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DECarray Service Guide

EK–SFXXS–SG–003

Digital Equipment Corporation

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The postpaid Reader's Comment Card included in this document requests the user's critical evaluation to assist in preparing future documentation.

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About This Guide

This guide provides information and procedures for servicing the SF7x series storage enclosures in DECarray cabinets.

Chapter 1, Introduction, contains a product description and specifications for the SF7x series storage enclosures and the DECarray cabinets.

Chapter 2, Theory of Operation, describes the normal operation of the SF7x series storage enclosures and the DECarray cabinets. This chapter includes service guidelines.

Chapter 3, Troubleshooting, contains information for isolating and troubleshooting faulty FRUs internal to the SF7x series storage enclosures and the DECarray cabinets.

Chapter 4, DECarray FRU Removal and Replacement, contains the step-by-step procedures for removing and replacing DECarray cabinet FRUs.

Chapter 5, SF3x Storage Enclosure FRU Replacement, contains the step-by-step procedures for removing and replacing FRUs internal to the SF3x series storage enclosures and the DECarray cabinets.

Chapter 6, SF7x Storage Enclosure FRU Replacement, contains the step-by-step procedures for removing and replacing FRUs internal to the SF7x series storage enclosures and the DECarray cabinets.

The appendices provide a list of recommended spare parts, and cabling information for the DECarray cabinets and SF-series storage enclosures.

1
Introduction

This chapter provides an overview of the DECarray, and the SF3x and SF7x series storage enclosures.

1.1 DECarray Overview

The DECarray is a storage rack cabinet designed to hold up to six SF-series storage enclosures and one or two magazine tape ISEs.

The DECarray is intended to be installed on one or both sides of a system. All operator control panels (OCPs) project through the front door of the storage array to allow easy access.

The Digital Storage System Interconnect (DSSI) cables from the host cabinet input/output (I/O) panel connect to the DSSI I/O panel at the bottom rear of the storage array. The DSSI I/O panel supports as many as 16 individual DSSI buses.

Viewing the DECarray from the front, note that the SF-series storage enclosures and magazine tape ISEs are arranged in the DECarray cabinet as follows (Figure 1–1):

- The DECarray has four levels, each with two storage enclosure positions. The levels are numbered from the bottom up. Viewing from the front, odd-numbered positions are on the left, and even-numbered positions are on the right.

Table 1–1 DECarray Storage Positions

Level	Left Position	Right Position
1	1	2
2	3	4
3	5	6
4	7	8

- Levels 1, 2, and 4 are reserved for SF-series storage enclosures only. Storage enclosure upgrades are installed into these levels in the following order: position 1, 2, 3, 4, 7, and 8.
- Level 3 is reserved for magazine tape ISEs. Magazine tape ISE upgrades are installed first in position 5 then in position 6.

NOTE

The position numbers are visible on the right and left chassis side rails when the front and rear doors of the storage array are open.

Specifications for the DECarray are shown in Table 1–2.

Figure 1–1 Front View of the DECarray

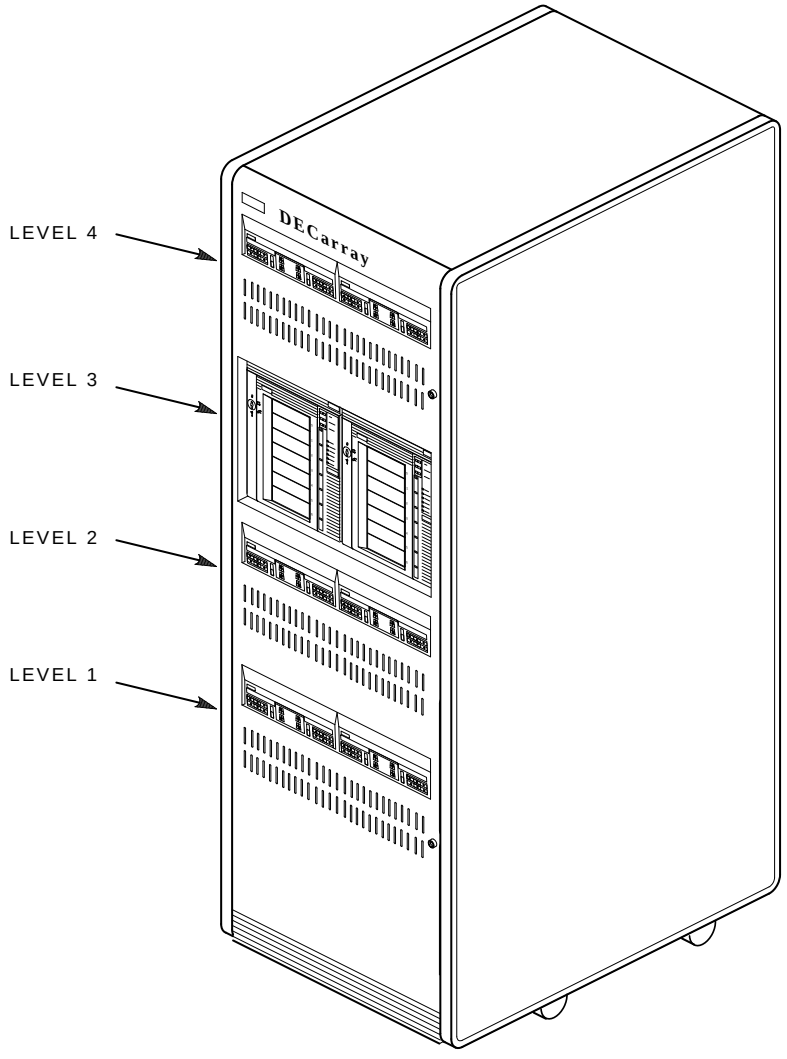

Table 1–2 DECarray Specifications

Characteristic	Specification
Dimensions (nominal)	152.4 cm (60.5 inches) H, 60.96 cm (24.0 inches) W, 76.2 cm (34.0 inches) D
Weight	
Minimum configuration Maximum configuration	228 kg (500 lb) 454 kg (1000 lb)
Agency compliance	FCC, UL, IEC, CSA, and VDE
Temperature	+10°C to +40°C (+50°F to +104°F). Reduce rating by 1.8°C for each 1000 meters altitude (1.0°F for each 1000 feet altitude)
Humidity	10% to 85% @ maximum wet bulb temperature of +32°C (+90°F) and minimum dew point of +2°C (+36°F)
Recommended Environmental Limits[1]	
Operating environment	
Temperature	18°C to 24°C (64.4°F to 75.2°F) with an average rate of change of 3°C/hour maximum and a step change of 3°C or less
Relative humidity	40% to 60% (noncondensing) with a step change of 10% or less (noncondensing)
Altitude	Up to 2400 meters (8000 feet)
Air quality (maximum particle count)	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger
Air volume (at inlet)	50 cubic feet per minute (0.026 cubic meters per second)
Nonoperating environment	
Temperature	-40°C to +66°C (-40°F to +151°F)
Relative humidity	10% to 80%, noncondensing
Altitude	4900 meters (16,000 feet)
Acoustic noise	6.8 bels

[1]These limits are for optimum equipment performance and reliability.

Table 1–2 (Continued) DECarray Specifications

Characteristic	Specification
Recommended Environmental Limits[1]	
Nominal airflow through enclosure	360 to 520 cubic feet/minute
Input power requirements, with SF35 (47 to 63 Hz normal operation)	7.2 A (per phase) @ 100 to 120 Vac (60 Hz), 3.7 A (per phase) @ 220 to 240 Vac (50 Hz)
Power requirements during disk ISE spinup, with SF35	11.5 A @ 100 to 120 Vac (60 Hz), 6.1 A @ 220 to 240 Vac (50 Hz)
Input power requirements, with SF72 (47 to 63 Hz normal operation)	6.00 A (per phase) @ 100 to 120 Vac (60 Hz), 3.00 A (per phase) @ 220 to 240 Vac (50 Hz)
Power requirements during disk ISE spinup, with SF72	21.0 A @ 100 to 120 Vac (60 Hz), 10.5 A @ 220 to 240 Vac (50 Hz)
Input power requirements, with SF73 (47 to 63 Hz normal operation)	6.6 A (per phase) @ 100 to 120 Vac (60 Hz), 3.8 A (per phase) @ 220 to 240 Vac (50 Hz)
Power requirements during disk ISE spinup, with SF73	12.8 A @ 100 to 120 Vac (60 Hz), 7.5 A @ 220 to 240 Vac (50 Hz)

[1]These limits are for optimum equipment performance and reliability.

1.2 Storage Enclosure Overview

The SF-series storage enclosures are available in two series; the SF3x enclosure, which contains up to twelve half-height, 3 1/2-inch ISEs, and the SF7x enclosure which contains up to four full-height, 5 1/4-inch ISEs.

Each disk ISE within an SF-series enclosure is independently controlled from the OCP on the front of the enclosure. A power supply in the enclosure provides the dc power and cooling for all disk ISEs installed in the enclosure.

The SF3x storage enclosure (Figure 1–2) holds up to twelve RF3x series ISEs. There are six slots in the front of the enclosure and six slots in the rear. Disk ISEs installed in these slots plug directly into a backplane, which is cabled to a connector tray on the top rear of the storage enclosure.

The SF3x enclosure can be configured in through-bus or split-bus mode. In through-bus mode, the six ISEs in the front of the SF3x enclosure are connected to a single DSSI bus, and the six ISEs on the rear of the SF3x enclosure are connected to a second DSSI bus. In split-bus mode, each end of the enclosure (front and rear) is further divided into left-side ISEs and right-side ISEs, each connected to a separate DSSI bus. Thus, in split-bus mode there are four DSSI buses, each with three drives connected to it.

The SF7x series storage enclosure (Figure 1–3) holds either two or four RF7x series ISEs. The ISEs in the SF7x storage enclosure can also be configured in split-bus or through-bus mode. In through-bus mode, all four disk ISEs are connected to a single DSSI bus. In split-bus mode, the left-side ISEs are connected to one DSSI bus, while the right-side ISEs are connected to a second DSSI bus.

Both SF-series storage enclosures have the following features:

- It can operate in through-bus or split-bus mode.
- Each disk ISE has its own set of switches and indicators on the OCP.
- The enclosure power supply provides operating power to all disk ISEs and other subassemblies in the enclosure.
- The drive dc power switches for the disk ISEs are on the front panel of the storage enclosure.

Specifications for the SF3x series storage enclosure are shown in Table 1–3. Specifications for the SF7x series storage enclosure are shown in Table 1–4.

Figure 1–2 SF3x Series Storage Enclosure

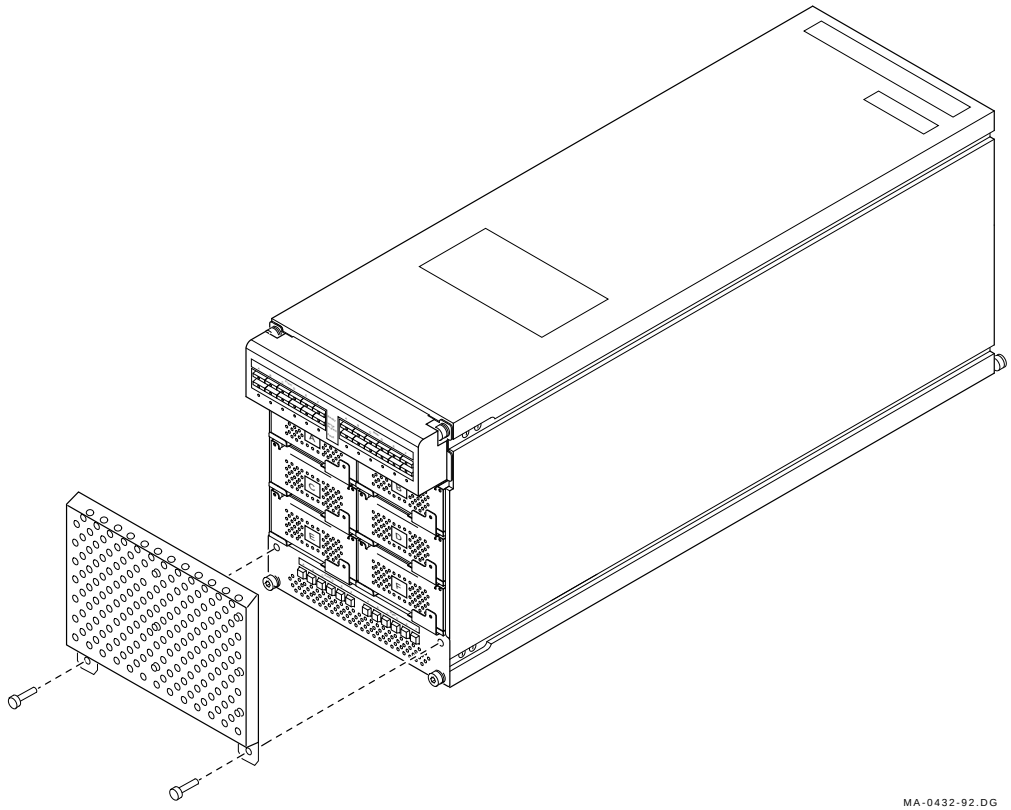

Figure 1–3 SF7x Series Storage Enclosure

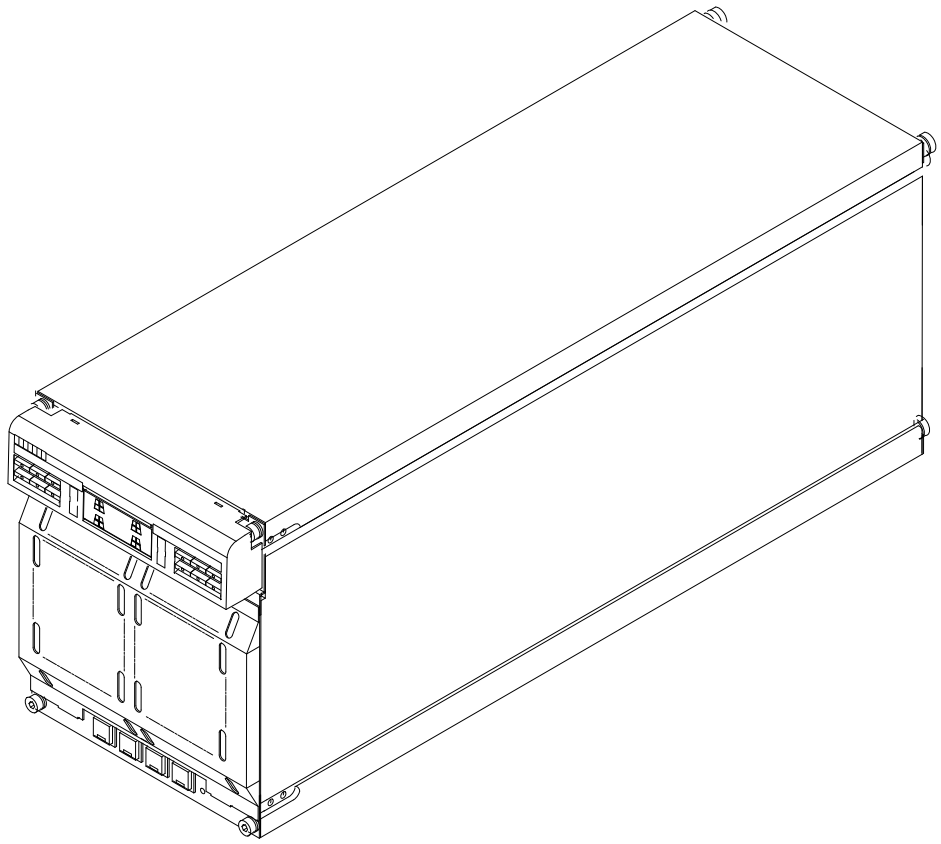

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Table 1–3 SF3x Storage Enclosure Specifications

Characteristic	SF35 Specification	SF36 Specification
Formatted storage capacity		
SF3x–BK[1]	1.7 GB	3.9 GB
SF3x–HK[2]	5.1 GB	9.6 GB
SF3x–JK[2]	10.2 GB	19.2 GB
Dimensions	H = 26.7 cm (10.5 inches) W = 22.2 cm (8.75 inches) D = 71.1 cm (28 inches)	Same as SF35
Weight		
SF3x–BK[1]	26 kg (58 lb)	Same as SF35
SF3x–HK[2]	33 kg (73 lb)	
SF3x–JK[3]	40 kg (88 lb)	
Agency compliance	FCC, UL, IEC, CSA, and VDE	Same as SF35
Temperature	+10°C to +40°C (+50°F to +104°F). Decrease the rating 1.8°C for each 1000 meters altitude (1.0°F for each 1000 feet altitude)	Same as SF35
Humidity	10% to 85% @ maximum wet bulb temperature of +32°C (+90°F) and minimum dew point of +2°C (+36°F)	Same as SF35
Recommended Environmental Limits[4]		
Operating Environment		
Temperature	18°C to 24°C (64.4°F to 75.2°F) with an average rate of change of 3°C/hour maximum and a step change of 3°C or less	Same as SF35

[1]The SF3x–BK contains two disk ISEs.

[2]The SF3x–HK contains six disk ISEs.

[3]The SF3x–JK contains twelve disk ISEs.

[4]These limits are for optimum equipment performance and reliability.

Table 1–3 (Continued) SF3x Storage Enclosure Specifications

Characteristic	SF35 Specification	SF36 Specification
Recommended Environmental Limits[4]		
Relative humidity	40% to 60% (noncondensing) with a step change of 10% or less (noncondensing)	Same as SF35
Altitude	Up to 2400 meters (8000 feet)	Same as SF35
Air quality (maximum particle count)	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger	Same as SF35
Air volume (at inlet)	50 cubic feet per minute (0.026 cubic meters per second)	Same as SF35
Nonoperating environment		
Temperature	-40°C to +66°C (-40°F to +151°F)	Same as SF35
Relative humidity	10% to 80%, noncondensing	Same as SF35
Altitude	4900 meters (16,000 feet)	Same as SF35
SF3x enclosure acoustic noise	6.2 bels	Same as SF35
Nominal airflow through enclosure	45 to 65 cubic feet/minute	Same as SF35
SF3x Input power requirements (47 to 63 Hz normal operation)	3.0 A @ 100 to 120 Vac (60 Hz), 1.5 A @ 220 to 240 Vac (50 Hz)	3.2 A @ 100 to 120 Vac (60 Hz), 1.9 A @ 220 to 240 Vac (50 Hz)
SF3x Power requirements during disk ISE spinup	4.5 A @ 100 to 120 Vac (60 Hz), 2.3 A @ 220 to 240 Vac (50 Hz)	Same as SF35

[4]These limits are for optimum equipment performance and reliability.

Table 1–4 SF7x Storage Enclosure Specifications

Characteristic	Specification
Number of disk ISE positions	4 (RF series disk ISEs)
Formatted storage capacity	
SF72–HK[1]	2 GB
SF72–JK[2]	4 GB
SF73–HK[1]	4 GB
SF73–JK[2]	8 GB
SF74–AE[4]	3.5 GB
SF74–JE[4]	14 GB
Dimensions	H = 26.7 cm (10.5 inches) W = 22.2 cm (8.75 inches) D = 71.1 cm (28 inches)
Weight	
SF72–HK[1]	35 kg (72 lb)
SF72–JK[2]	41 kg (91 lb)
SF73–HK[1]	35 kg (72 lb)
SF73–JK[2]	41 kg (90 lb)
SF74–AE[4]	35 kg (72 lb)
SF74–JE[4]	41 kg (90 lb)
Agency compliance	FCC, UL, IEC, CSA, and VDE
Temperature	+10°C to +40°C (+50°F to +104°F). Decrease rating 1.8°C for each 1000 meters altitude (1.0°F for each 1000 feet altitude)
Humidity	10% to 85% @ maximum wet bulb temperature of +32°C (+90°F) and minimum dew point of +2°C (+36°F)
Recommended Environmental Limits[3]	
Operating environment	

[1]The SF72–HK contains two RF72 disk ISEs. The SF73–HK contains two RF73 disk ISEs

[2]The SF72–JK contains four RF72 disk ISEs. The SF73–JK contains four RF73 disk ISEs.

[3]These limits are for optimum equipment performance and reliability.

[4]The SF74–AE contains one RF74 disk ISE. The SF74–JE contains four RF74 disk ISEs.

Table 1–4 (Continued) SF7x Storage Enclosure Specifications

Characteristic	Specification
Recommended Environmental Limits[3]	
Temperature	18°C to 24°C (64.4°F to 75.2°F) with an average rate of change of 3°C/hour maximum and a step change of 3°C or less
Relative humidity	40% to 60% (noncondensing) with a step change of 10% or less (noncondensing)
Altitude	Up to 2400 meters (8000 feet)
Air quality (maximum particle count)	Not to exceed 500,000 particles per cubic foot of air at a size of 0.5 micron or larger
Air volume (at inlet)	50 cubic feet per minute (0.026 cubic meters per second)
Nonoperating environment	
Temperature	-40°C to +66°C (-40°F to +151°F)
Relative humidity	10% to 80%, noncondensing
Altitude	4900 meters (16,000 feet)
SF72 enclosure acoustic noise	6.2 bels
SF73 enclosure acoustic noise	6.0 bels
SF74 enclosure acoustic noise	6.1 bels
Nominal airflow through enclosure	45 to 65 cubic feet/minute
SF72 Input power requirements (47 to 63 Hz normal operation)	2.70 A @ 100 to 120 Vac (60 Hz), 1.20 A @ 220 to 240 Vac (50 Hz)
SF72 Power requirements during disk ISE spinup	3.50 A @ 100 to 120 Vac (60 Hz), 3.25 A @ 220 to 240 Vac (50 Hz)
SF73 Input power requirements (47 to 63 Hz normal operation)	2.4 A @ 100 to 120 Vac (60 Hz), 1.3 A @ 220 to 240 Vac (50 Hz)
SF73 Power requirements during disk ISE spinup	4.7 A @ 100 to 120 Vac (60 Hz), 2.4 A @ 220 to 240 Vac (50 Hz)
SF74 Input power requirements (47 to 63 Hz normal operation)	2.8 A @ 100 to 120 Vac (60 Hz), 1.6 A @ 220 to 240 Vac (50 Hz)

[3]These limits are for optimum equipment performance and reliability.

Table 1–4 (Continued) SF7x Storage Enclosure Specifications

Characteristic	Specification
Recommended Environmental Limits[3]	
SF74 Power requirements during disk ISE spinup	4.8 A @ 100 to 120 Vac (60 Hz), 2.9 A @ 220 to 240 Vac (50 Hz)

[3]These limits are for optimum equipment performance and reliability.

1.3 Related Documentation

Table 1–5 lists reference documentation that supplements this guide.

Table 1–5 Related Documentation

Title	Order Number
KFMSA Module Installation and User Manual	EK–KFMSA–IM
KFQSA Module Installation and User Manual	EK–KFQSA–IM
RFxx Series Integrated Storage Element User Guide	EK–RF7xD–UG
TF857 Magazine Tape ISE Service Manual	EK–TF857–SM
DECarray Owner's Manual	EK–SF7xS–OM
System Expansion Installation Supplement	EK–431AB–IN

2
Theory of Operation

This chapter describes the normal operation of the storage enclosures and the DECarray.

General descriptions of normal operations are presented so the service person has a frame of reference to compare the customer complaint to a possible service problem.

This chapter also provides guidelines that you should follow when servicing the storage enclosures and the DECarray.

2.1 Overview

The magazine tape ISEs and disk storage enclosures in a DECarray can be connected to one or more host systems. Possible configurations can be broken down into three basic categories: single-system, stripe set, and DSSI VAXcluster configurations.

In the single-system and stripe set configurations, the ISEs on a DSSI bus connect to one system. In the DSSI VAXcluster configuration, the ISEs on a DSSI bus connect to two or more systems, and any system can access any ISE on that bus.

In a DECarray, using DSSI bus convention, the higher DSSI node IDs are reserved for DSSI adapters resident in the system. The lower DSSI node IDs are reserved for magazine tape ISEs. The remaining DSSI IDs are used for the disk ISEs in the storage enclosures.

When correctly configured and connected, data on the DSSI bus passes to all ISEs on the bus. The DSSI node ID passed on the bus enables the ISE with that DSSI node ID to communicate on the bus, either receiving data to be written to the ISE or reading data from the ISE.

2.2 SF3x Series Storage Enclosure

The SF3x storage enclosure exists with either two, six, or twelve half-height, 3-1/2 inch disk ISEs. The ISEs are arranged on two DSSI buses; one for up to six ISEs in the front of the enclosure and one for up to six ISEs in the rear of the enclosure. These can be further divided up into four DSSI buses by splitting each bus into left and right sides.

Each ISE slides into a slot in the enclosure, where it plugs directly into a backplane. There is one backplane for the front ISEs and one for the rear ISEs.

2.2.1 DSSI Node ID

Each slot in the backplane is assigned a letter designation, from A through F. Each slot has a corresponding factory-designated DSSI node ID (Table 2–1). These DSSI node IDs are the same for both front and rear slots in the SF3x storage enclosure.

Table 2–1 SF3x Factory-set DSSI Node IDs

Position	Backplane Location	DSSI Node ID
A	upper left slot	0
B	upper right slot	1
C	middle left slot	2
D	middle right slot	3
E	lower left slot	4
F	lower right slot	5

You can change the DSSI node ID for an ISE in any given slot position by using DIP switches provided on the SF3x enclosure's transition module. Figure 2–1 shows the location of the switches for each slot position. Table 2–2 shows what the switches must be set to for each slot position.

Table 2–2 DSSI Node ID Switch Settings for SF3x Storage Enclosure

Slot Position	Front Switch	Rear Switch	DSSI Node ID	Switch Positions[1] 1 2 3 4
A	S3	S10	0	X 1 0 0
			1	X 0 0 0
			2	X 1 1 0
			3	X 0 1 0
			4	X 1 0 1
			5	X 0 0 1
			6	X 1 1 1
			7	X 0 1 1
B	S1	S9	0	X 0 1 0
			1	X 1 1 0
			2	X 0 0 0
			3	X 1 0 0
			4	X 0 1 1
			5	X 1 1 1
			6	X 0 0 1
			7	X 1 0 1
C	S6	S7	0	X 1 1 0
			1	X 0 1 0
			2	X 1 0 0
			3	X 0 0 0
			4	X 1 1 1
			5	X 0 1 1
			6	X 1 0 1
			7	X 0 0 1
D	S4	S12	0	X 0 0 1
			1	X 1 0 1
			2	X 0 1 1
			3	X 1 1 1
			4	X 0 0 0
			5	X 1 0 0
			6	X 0 1 0
			7	X 1 1 0

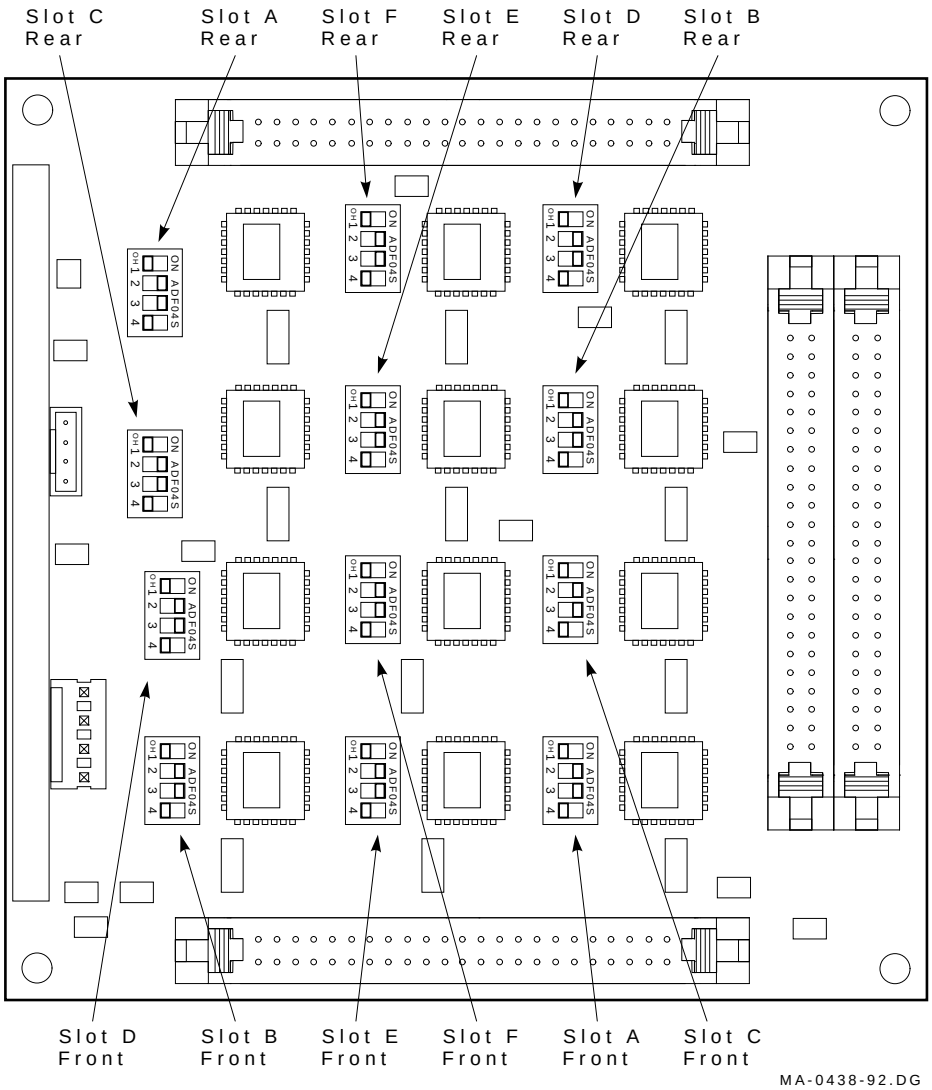
[1] 1 = On, 0 = Off, X = Doesn't matter

Table 2–2 (Continued) DSSI Node ID Switch Settings for SF3x Storage Enclosure

Slot Position	Front Switch	Rear Switch	DSSI Node ID	Switch Positions[1] 1 2 3 4
E	S2	S8	0	X 1 0 1
			1	X 0 0 1
			2	X 1 1 1
			3	X 0 1 1
			4	X 1 0 0
			5	X 0 0 0
			6	X 1 1 0
			7	X 0 1 0
F	S5	S11	0	X 0 1 1
			1	X 1 1 1
			2	X 0 0 1
			3	X 1 0 1
			4	X 0 1 0
			5	X 1 1 0
			6	X 0 0 0
			7	X 1 0 0

[1] 1 = On, 0 = Off, X = Doesn't matter

Figure 2–1 SF3x DSSI Node ID Switches



2.2.2 SF3x Operating Modes

SF3x series storage enclosures can operate in either through-bus or split-bus mode. These modes are described in the following sections.

2.2.2.1 Through-Bus Mode

In through-bus mode, all six disk ISEs in each half of the storage enclosure are connected to the same DSSI bus. The DSSI bus enters through the left DSSI connector on the top of the backplane, connects to the ISEs in slots A, C, and E on the left side of the enclosure, then goes through the ISEs in slots F, D, and B, and finally out the right DSSI connector.

At this point, the DSSI bus is either terminated, with a DSSI terminator, (PN 12–31281–01), connected to a magazine tape ISE, or connected to the DECarray I/O panel.

2.2.2.2 Split-Bus Mode

Each set of ISEs (front and rear) can be further separated by putting the ISEs on the left (slots A, C, and E) and the ISEs on the right (slots B, D, and F) on separate DSSI buses. This configuration leaves each enclosure with four distinct DSSI buses, each with three ISEs.

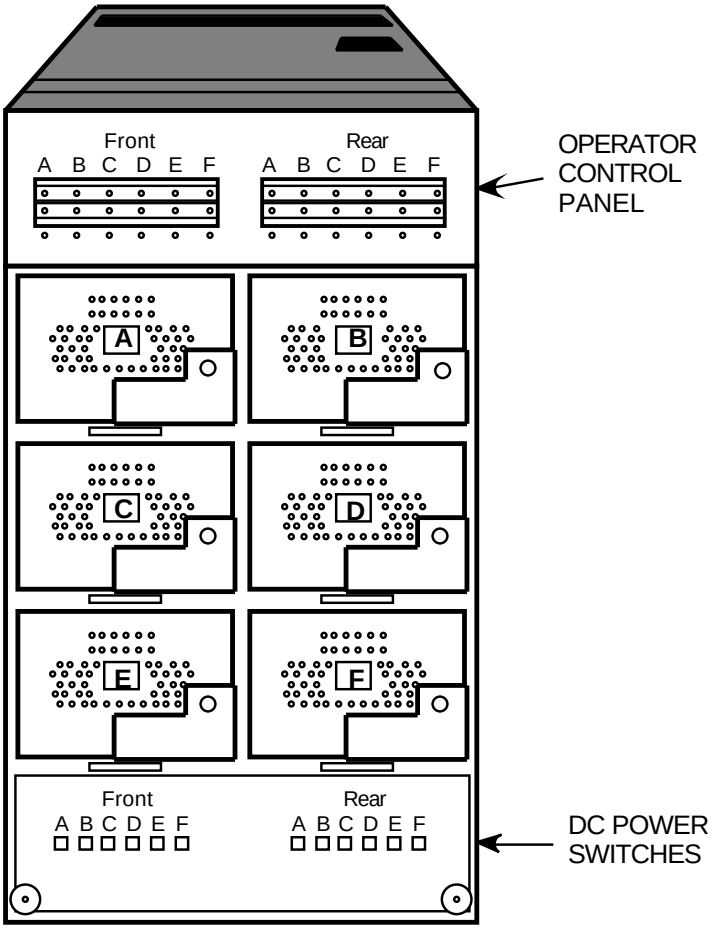
To configure an SF3x enclosure in split-bus mode it is necessary to remove the jumper cable from the DSSI backplane and put DSSI terminators (PN 12-28976-01) on the connectors where the jumper cable was attached.

2.2.3 Front Panel Controls, Labels, and Indicators

Figure 2–2 shows a front view of the storage enclosure. The OCP is on the top front of the enclosure. It can be accessed without opening the cabinet front door.

The dc power switches for each ISE are on the bottom front of the enclosure. These switches are not accessible when the front door of the cabinet is closed.

Figure 2–2 Front View of the SF3x Storage Enclosure (with cover removed)



2.2.3.1 Operator Control Panel (OCP)

The OCP (Figure 2–3) contains two identical sets of controls and indicators, one set for the front ISEs and one set for the rear. Each set consists of switches and LEDs for six ISEs, one for each slot in that side of the storage enclosure. Unless a disk ISE is installed and power is applied to a given slot, the corresponding controls and indicators are non-operational.

Figure 2–3 SF3x Operator Control Panel

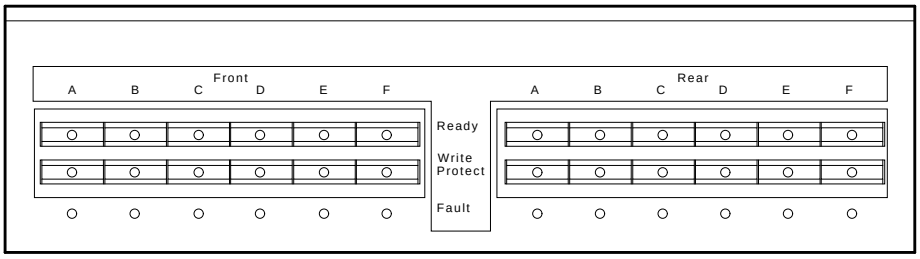


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Table 2–3 summarizes the function of the controls and indicators provided for each ISE in the storage enclosure.

Table 2–3 Operator Control Panel Functions

Control/Indicator	Function
Ready switch	The Ready switch is a push-to-set switch with a green indicator. When pressed in, the Ready switch causes the disk ISE to come on-line. After the Ready switch is pressed, it takes approximately 10 seconds for the disk ISE to come on-line. The green indicator remains lit while the disk ISE is on-line. However, this indicator may flicker or go out entirely when the disk ISE is performing heavy seeks.
Write Protect switch	The Write Protect switch is a push-to-set switch with an amber indicator. When the Write Protect switch is engaged, the data on that disk ISE cannot be overwritten, nor can any new data be written to that disk ISE.
MSCP switch/FAULT indicator	The MSCP/Fault switch is a recessed switch with a multi-color indicator. During normal operation this LED is unlit. If the MSCP switch is pressed and MSCP is disabled, this LED is lit green. If the system detects a fault in the ISE, this LED is lit red. If a fault is detected while MSCP is disabled, this LED is lit amber.

2.2.3.2 DC Power Switches

Power switches for each ISE are on the lower front side of the storage enclosure. The six switches on the left are for the front six ISEs and the six switches on the right are for the rear six ISEs. Each power switch is associated with a disk ISE position, as shown in Figure 2–2.

An indicator in each drive dc power switch lights to show that nominal power is being applied to the associated disk ISE.

Press the dc power switch to connect power to the associated disk ISE. This causes the disk ISE to spin up and run a self-test. After setting the drive dc power switch, you must press the Ready button on the OCP to bring the disk ISE on-line.

After pressing the ac power switch in the rear of the SF3x enclosure, power is applied to the rear six ISEs first. Then after a 15-second delay, power is applied to the front six ISEs.

2.2.4 Rear Panel Controls and Indicators

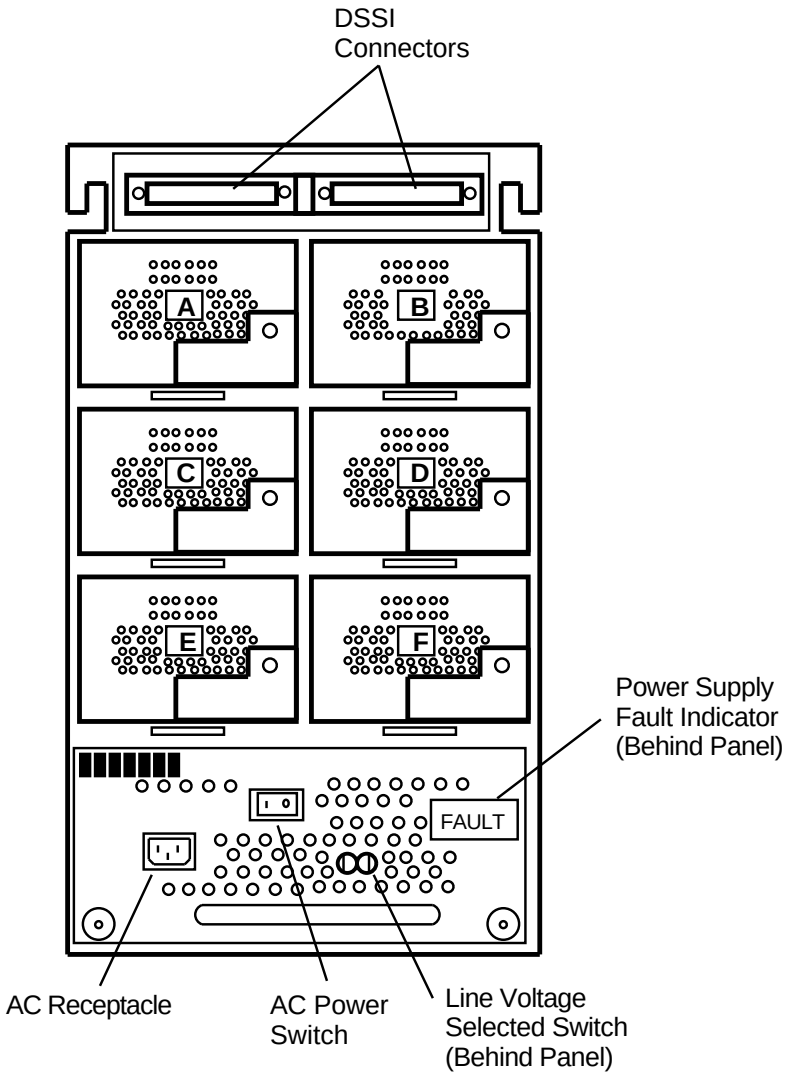
Figure 2–4 shows the rear panel of the storage enclosure. The DSSI connectors are on the top rear side of the enclosure. The ac power switch, line voltage selector switch, and power supply fault indicator are on the bottom rear of the enclosure, on the power supply chassis, as shown in Figure 2–4. These controls and indicators affect operation of the entire storage enclosure.

Table 2–4 summarizes the rear panel control/indicator functions. Details are provided in the paragraphs that follow.

Table 2–4 Summary of Rear Panel Control/Indicator Functions

Control/Indicator	Function
Power Supply Chassis	
AC power switch	Applies line voltage to dc power supply.
Line voltage selector switch	Selects between 120 Vac (60 Hz) and 240 Vac (50 Hz) line voltage.
Power supply fault indicator	Illuminates for fault or overtemperature in enclosure.

Figure 2–4 Rear Panel of the Storage Enclosure (with cover removed)



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WARNING

Hazardous voltages are present inside the equipment cabinet and the storage enclosure. Installation and service must be performed only by qualified Digital Services engineers.

The ac power switch for the storage enclosure is in the center of the rear panel. Setting the ac power switch to the (1) position applies power to the storage enclosure. Setting the switch to the (0) position removes power from the enclosure.

As you face the rear panel, the line voltage selector switch is located to the right of the ac power switch. It is visible through a hole in the rear panel. The Digital Services engineer sets this switch to the available line voltage during installation. The number *120* represents 120 Vac at 60 Hz, and the number *240* represents 240 Vac at 50 Hz.

CAUTION

The storage enclosure power supply is universal for both 120 Vac and 240 Vac. The supply is factory-set to 240 Vac and must be reset to 120 Vac for some installations. Selecting 120 Vac and using 240 Vac will damage the power supply.

The power supply fault indicator is behind the panel, in the lower right corner of the storage enclosure. When the fault indicator is lit, a red light is visible through the holes in the rear panel. The storage enclosure automatically shuts down when the dc power supply detects a fault or overtemperature condition.

2.3 SF7x Series Storage Enclosure

The SF7x storage enclosure connects its resident disk ISEs to the DSSI bus in parallel. If one of the four drive positions is empty, that position is ignored. If a position is occupied, the ISE can be on-line or off-line, MSCP enabled or disabled, powered up or down, or failed. In any case, the performance of the DSSI bus is not directly affected.

The storage enclosure provides termination power for the DSSI bus when operating in either split-bus mode or through-bus mode.

2.3.1 DSSI Node ID

Four switchpacks behind the OCP door are used for setting the DSSI node ID of the ISEs in the SF7x enclosure (Figure 2–5). The leftmost switch is the MSCP enable switch, and must be set in the down position in order for MSCP to be enabled. The other switches are used to set the DSSI node ID, where the rightmost switch is the least significant.

Typical switch settings are shown in Table 2–5 and Table 2–6.

Table 2–5 DSSI ID Switch Settings (DSSI VAXcluster)

Disk ISE	DSSI ID	Setting[1]
Positions 1, 2, 3, 4, 7 and 8		
Left Rear (LR)	1	001
Left Front (LF)	2	010
Right Front (RF)	3	011
Right Rear (RR)	4	100

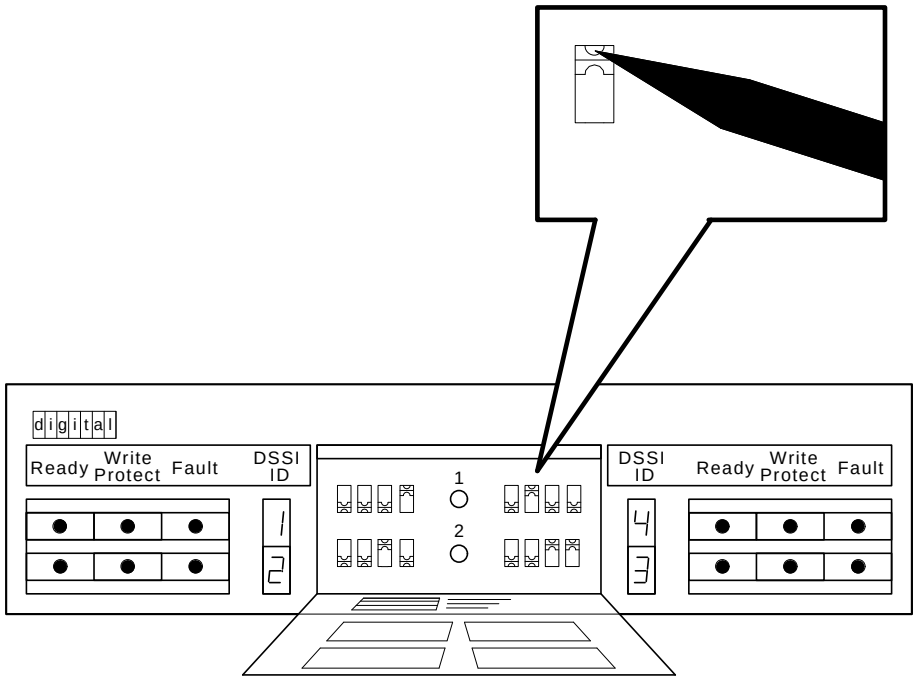
[1] "0" = down, "1" = up.

Table 2–6 DSSI ID Switch Settings (Single-System and Stripe Set)

Disk ISE	DSSI ID	Setting[1]
Positions 1, 2, 4, and 7		
Left Rear (LR)	1	001
Left Front (LF)	2	010
Right Front (RF)	3	011
Right Rear (RR)	4	100
Positions 3 and 8		
Left Rear (LR)	5	101
Left Front (LF)	6	110
Right Front (RF)	6	110
Right Rear (RR)	5	101
Stripe Set (All Positions)		
Left Rear (LR)	1	000
Left Front (LF)	2	001
Right Front (RF)	2	001
Right Rear (RR)	1	000

[1] "0" = down, "1" = up.

Figure 2–5 SF7x Operator Control Panel



2.3.2 SF7x Operating Modes

SF7x series storage enclosures can operate in either through-bus or split-bus mode. These modes are described in the following sections.

2.3.2.1 Through-Bus Mode

In through-bus mode, all four drive positions (if occupied or not) are connected to one DSSI bus. The drive positions are physically connected (facing the front of the enclosure):

- Left-rear position (DSSI ID = 1)
- To left-front position (DSSI ID = 2)
- To right-front position (DSSI ID = 3)
- To right-rear position (DSSI ID = 4)

2.3.2.2 Split-Bus Mode

In split-bus mode, the two ISEs on the right side of the enclosure are connected to one DSSI bus while the two ISEs on the left side of the enclosure are connected to another DSSI bus. The drive positions are physically connected (facing the front of the enclosure):

- Left-rear position (DSSI ID = 5 or 1, for single-system or stripe set)
- To left-front position (DSSI ID = 6 or 2, for single-system or stripe set)
- Right-front position (DSSI ID = 6 or 2, for single-system or stripe set)
- To right-rear position (DSSI ID = 5 or 1, for single-system or stripe set)

2.3.3 Front Panel Controls, Labels, and Indicators

The various controls and indicators on the storage enclosure allow you to place the resident ISEs in a variety of operating states. These controls and indicators connect to the ISE on the OCP 10-pin cable and the 5-pin power cable. There are four sets of identical controls and indicators, one set for each drive position in the storage enclosure. The following list is a summary of these controls and indicators:

- DC power is controlled by means of one of four switches on the lower front of the enclosure. Each switch has a status LED and an icon. This icon shows the location of the drive position in the storage enclosure.
- The Ready, Write Protect, and Fault buttons are on the OCP. Each of these buttons has a switch element and a status LED.
  - — The Ready button is used to place the ISE on- and off-line; its status LED is green. This LED is lit when the ISE is on-line.
  - — The Write Protect button is used to prevent data on the ISE from being written over or erased; its status LED is yellow. This LED is lit when the ISE is write-protected.
  - — The Fault button is used to display fault codes and to clear a ISE fault; its status LED is red. This LED is lit when the ISE has failed. When the Fault LED is lit, press the button to obtain the fault codes for the disk ISE.
- Behind the front door of the OCP are two green LEDs and four switchpacks.
  - — The top LED is TERM PWR (terminator power), which indicates that the correct termination power is being supplied to that enclosure.
  - — The bottom LED is SPLIT, which indicates that the enclosure is operating in split-bus mode.
  - — The switchpacks, again one for each of the four drive positions in the enclosure, are used to set the drive positions DSSI ID number and the left-most to MSCP enable or disable that ISE. The icon on the front of the door denotes the location of the drive position in the storage enclosure.

2.4 Service Guidelines

The following sections contain the guidelines for servicing the storage arrays and the storage enclosures.

The guidelines for servicing the DECarray are:

- Never disconnect a 42-inch, 70-inch, or 108-inch DSSI cable that is connected to a storage enclosure, magazine tape ISE, or the DECarray while power is on.
- Never change the DSSI node ID of a disk ISE in a storage enclosure while power is applied to the bus.
- Never change the DSSI ID number of an adapter module in a system.
- Use only valid DSSI bus configurations.
- Never have two DSSI devices on the same DSSI bus with the same DSSI node ID number.
- Always take the ISE that is to be serviced off-line and then power it down.
- Always adhere to the prescribed method for taking a system down.
- Always terminate a DSSI bus in a single-system configuration, either with a DSSI terminator or with a storage enclosure operating in split-bus mode.
- Always cable a magazine tape ISE to the DECarray I/O panel before cabling any storage enclosures that belong on the same DSSI bus.
- Note that 70-inch and 108-inch DSSI cables connected to the DECarray I/O panel are connected in order (left to right) when the DECarray has been correctly installed using the instructions in the installation guide. This may not be so if the instructions were not followed at the time of installation. In that case, use the color code to determine what ISEs are on what DSSI bus.

3
Troubleshooting

This chapter describes troubleshooting procedure for the DECarray and storage enclosures.

For this topic . . .	See Section . . .
Troubleshooting the subsystem to verify a fault	3.1
Troubleshooting and fault isolation to a subsystem component	3.1
General troubleshooting and fault isolation of the DECarray and storage enclosure	3.2
Specific troubleshooting and fault isolation of the DECarray	3.2.1
Specific troubleshooting and fault isolation of the storage enclosure	3.2.2
Optional fault isolation steps using the DSSI bus meter	3.2.3
Troubleshooting chart	3.3

3.1 Subsystem Fault Verification

Use this section to determine if the error, fault, or failure reported is in the DSSI storage subsystem.

The subsystem consists of the following:

- Adapter module(s), installed in the host system(s)
- DECarray(s)
- Magazine tape ISEs installed in the DECarray
- Disk ISEs in the storage enclosures installed in the DECarray
- Cables to connect the products above

If a KFMSA module, tape ISE, or disk ISE has reported an error or is not seen with the SHOW DEVICE command, see Table 3–1.

Table 3–1 Subsystem Troubleshooting Chart

If you find this symptom . . .	See the . . .
KFMSA not seen.	Adapter service manual
Tape ISE not seen.	Magazine tape service manual
Disk ISE not seen.	Following sections in this chapter.

3.2 Fault Isolation

The following sections contain general information on troubleshooting the DECarray and the storage enclosure, and they provide specific procedures for fault isolation.

Use Table 3–2 to check quickly that the DECarray and storage enclosures are correctly operating and configured for the user's desired application.

If you discover discrepancies, see the following sections or the *DECarray Installation Guide.*

Table 3–2 DECarray and Storage Enclosure Checklist

Items to check at the rear . . .	No, then . . .
DECarray is plugged in?	Plug in main power cord.
BUS/OFF/ON switch on power controller down?	Set switch down.
The power controller circuit breaker is on?	Set breaker to ON.
All ac power cords are plugged into the power controller correctly?	Seat correctly.
The power controller is the correct variant for the room power source?	Swap power controller.
AC power cords for installed devices are plugged in?	Seat correctly.
Magazine tape subsystems have correct voltage variant?	Swap tape subsystem.
Storage enclosure voltage selection switch is in correct position?	Set to correct position.
All ac power switches are on?	Set to on.
DECarray is correctly configured for the application?	See DECarray Installation Manual.
DSSI cables are correctly seated and labeled?	Seat all DSSI cables.
Storage enclosure power supply LED is lit?	See Section 3.3.

Table 3–2 (Continued) DECarray and Storage Enclosure Checklist

Items to check at the front. . .	No, then. . .
Any Fault LEDs lit?	Press the Fault button and read the fault code[1] Replace the failed ISE.
Is the fan spinning?	Check the power supply and cord.
Drive dc power switches are on?	Press switch in.
ISEs are on-line?	Press the Ready button in.
DSSI ID switches are set correctly?	See Table 2–2 or Section 2.3.1.
The 7-segment LEDs are lit?[1]	Seat the OCP, check the power supply.
ISE is write-protected?	Press the Write Protect switch.
TERM PWR LED is lit?[1]	Seat OCP, check power supply.
Correctly configured for bus mode (through-bus or spilt-bus)?	See Section 2.2.2 or Section 2.3.2.

[1]Applies to RF7x storage enclosures only.

3.2.1 Troubleshooting the DECarray

The following sections describe the procedure for isolating a fault or failure in the DECarray.

3.2.1.1 Introduction

The DECarray consists of a power controller to supply ac power for internally installed storage enclosures, a 16-port I/O panel to connect the DECarray to a system or systems, and the DECarray cabinet assembly.

The DECarray also consists of three DSSI cables; the 108-inch cable (PN BC21Q–09 or BC22Q–09), that connects the DECarray to the system(s), the 70-inch cable (PN BC21R–5L), that connects the storage enclosure to the DECarray I/O panel, and the 42-inch cable (PN BC21Q–3F) that connects the storage enclosure to another enclosure.

3.2.1.2 Configuration Verification

Use this section only after you have determined that the problem or fault is *not* in the adapter modules or tape magazine tape ISEs.

1. Check that the DECarray has been configured according to the *DECarray Installation Guide*:
2. Ensure that all ISEs in the storage enclosures have the correct DSSI switch settings, and that each ISE on each DSSI bus has a unique DSSI node ID for that bus.
3. Ensure that the KFMSA adapter(s) in the systems are set correctly.
4. If the DECarray contains magazine tape ISE(s) in single-system or DSSI VAXcluster configurations, ensure that it has a unique DSSI node ID. See the magazine tape documentation for instructions on how to check and change the node DSSI ID.

If the problems persist, record the symptoms and consult Section 3.3.

3.2.2 Troubleshooting the Storage Enclosure

Use this section only after you have determined that the problem or fault is *not* in the adapter modules or tape magazine tapes, or the DECarray (power controller and configuration).

3.2.2.1 Introduction

The storage enclosure consists of several major components:

- Disk ISEs
- Power supply
- Operator control panel (OCP)
- Cooling fan
- Transition-termination module (TTM) for SF7x series
- Transition module (TM) for SF3x series
- Interconnect cables for power, control signals, and DSSI bus signals

The troubleshooting procedure for the storage enclosure follows the above order as the FRUs go from the easiest to repair and replace (the disk ISE) to the more difficult (internal interconnecting cables).

3.2.2.2 Configuration Verification

Use the following steps to verify that the storage enclosure has been configured according to the *DECarray Installation Guide*.

1. Are the storage enclosures in the correct bus mode for single-system, stripe set or DSSI VAXcluster configurations?
2. Are the DSSI ID numbers set correctly?
3. Are there any Fault LEDs lit?

If the above steps reveal that the DECarray, magazine tape ISEs, and storage enclosures were not configured correctly, then reconfigure the DECarray. (Refer to the *DECarray Installation Guide*). Reboot the system or systems, and run the EVCXF configuration program (Refer to the *KFMSA Module Installation and Owner's Manual*).

Check for symptoms that indicate a problem.

If the problems persist, consult Table 3–3. Isolate the symptom, find the probable cause, and follow the corrective action and reference called for in Table 3–3.

3.2.3 Optional Fault Isolation Steps with the DSSI Bus Meter

The DSSI bus meter (DBM) is a small, easily portable device used to look at bus signals in real-time as well as verify DSSI ID numbers. The DBM can quickly locate faulty cables or duplicate DSSI ID numbers on a given DSSI bus.

This service tool is strongly recommended when any service is to be performed on the entire DSSI subsystem, especially the DECarray and the SF-series storage enclosures.

For more information on the DBM, see the following;

DSSI Troubleshooting with the DSSI Bus Meter (EY–F419E–SG)
DSSI Troubleshooting Self-Paced Instruction (EY–F419E–P0)
DSSI Bus Meter User's Guide (supplied with meter)

3.3 Troubleshooting Chart

Use this section to find a symptom, probable cause, corrective action, and references to the FRU procedure only after you have gone through all the checks and procedures in the previous sections.

Table 3–3 Storage Enclosure Troubleshooting Chart

Symptom(s)	Probable Cause(s)	Corrective Action(s)
No OCP indicators are lit.	1. Storage enclosure is not plugged in or not turned on.	1. Plug in the ac power cord or turn on the AC power.
	2. Drive dc power switch is off.	2. Turn on the drive dc power switch.
	3. OCP is not plugged in or seated firmly.	3. Press the OCP firmly in place.
	4. Bad OCP.	4. Configure and replace a new OCP.
	5. Bad transition module.	5. Configure and replace a new transition module.
	6. Bad power supply.	6. Replace power supply.
	7. Bad ac power cord.	7. Replace ac power cord.
	8. Ise not seen.	8. Reseat ISE into backplane.[1]

[1]This step only applies to SF3x storage enclosures.

Table 3–3 (Continued) Storage Enclosure Troubleshooting Chart

Symptom(s)	Probable Cause(s)	Corrective Action(s)
Single Fault LED lit on OCP.	1. Faulty disk ISE.	1. Press lit Fault button. Read fault code[2]. Replace failed FRU[4].
	2. Conflicting DSSI ID numbers.	2. Verify correct DSSI node ID settings for that all devices on that DSSI bus.
Multiple Fault indicators lit on OCP.	1. Conflicting DSSI ID numbers.	1. Verify correct DSSI node ID settings for that bus.
	2. Bad OCP.	2. Configure and install a new OCP.
	3. Bad DSSI cable(s).	3. Isolate with DSSI bus meter[3] and replace.
One or more indicators continue to cycle.	1. Conflicting DSSI ID numbers.	1. Verify correct DSSI node ID settings for that bus.
One ISE is not accessible.	1. DC power to ISE is not on.	1. Turn on dc power switch.
	2. Bad ISE drive module.	2. Replace ISE drive module[4].
	3. Bad DSSI cable(s).	3. Isolate with DSSI bus meter[3] and replace.
	4. Bad OCP cable.	4. Replace cable.
	5. Bad power harness.	5. Replace power harness.

[2]This step only applies to SF7x storage enclosures.

[3]The DSSI bus meter, or DBM, is used to look at bus signals in real-time as well as to verify DSSI ID numbers. The DBM can quickly locate faulty cables or duplicate DSSI ID numbers on a given DSSI bus. The DSSI bus meter part number is 29–28008–01.

[4]If the fault LED remains lit after replacing FRU, wait 5-8 minutes for calibration to complete.

Table 3–3 (Continued) Storage Enclosure Troubleshooting Chart

Symptom(s)	Probable Cause(s)	Corrective Action(s)
ISE is not seen or seen at unexpected DSSI ID value.	1. Incorrect DSSI node ID setting	1. Verify correct DSSI node ID settings for that bus.
	2. Cables are not plugged in the transition module or ISE.	2. Check that both ends of OCP cables are plugged in.
	3. Bad OCP ID switch.	3. Reconfigure and replace OCP.
	4. Bad OCP cable.	4. Replace appropriate OCP cable.
	5. Ise not seen.	5. Reseat ISE into backplane.[1]
Fan is not spinning and power supply LED is lit.	1. Bad power supply.	1. Replace power supply.
	2. Bad fan.	2. Replace fan.
	3. Bad transition module.	3. Configure a new transition module and replace.
Fan is not spinning and power supply LED is not lit.	1. Disconnected ac power cord.	1. Reconnect the ac power cord.
	2. Bad power supply.	2. Replace power supply.
	3. Bad power cord.	3. Replace cord.
	4. Bad transition module.	4. Configure a new transition module and replace.
	5. Bad power controller.	5. Replace power controller.

[1]This step only applies to SF3x storage enclosures.

Table 3–3 (Continued) Storage Enclosure Troubleshooting Chart

Symptom(s)	Probable Cause(s)	Corrective Action(s)
In a DSSI VAXcluster installation, one or more of the following symptoms are observed: -unexplained virtual circuit (VC) closures -unexplained VMS crashes -performance degradation	1. Excessive ground offset voltage between DSSI VAXcluster cabinets.	1. Measure ground offset voltage between cabinets. Correct faults in power distribution system. Install cabinet grounding wire between all cabinets sharing DSSI buses.
	2. Loose or missing DSSI terminators.	2. Tighten or replace DSSI terminators.
	3. Low terminator power voltage.	3. Replace fuses.
	4. Bus length too long.	4. Shorten bus.
	5. Non DEC devices on bus.	5. Replace with DEC devices.
	6. Terminated mid-bus adapters	6. Remove terminators from mid-bus adapters.

Table 3–4 Disk ISE Fault Codes (for SF7x only)

READY	WRITE PROTECT	FAULT	Disk ISE FRU
Off	Off	On	HDA
Off	On	Off	Drive module
Off	On	On	Drive module, then HDA

4
DECarray FRU Removal and Replacement

This chapter contains removal and replacement procedures for the DECarray field replaceable units (FRUs).

NOTE

You do not have to remove the storage array doors when servicing the array or any installed device.

4.1 Doors

Occasionally, you may need to replace a front or rear door. Refer to Figure 4–1 while performing the door removal procedure that follows.

WARNING

Hazardous voltages are inside storage array cabinets. Installation and service must be performed only by qualified service engineers. When performing any operation involving the source power, turn off the power switches of all components and the power controller. Disconnect the line cord from the power controller and from the source outlet. Perform the operation, then reconnect the cord.

1. Turn the two hex fasteners at the top of the door one-quarter turn counterclockwise to unlock.
2. Swing the door open.
3. Remove the screw securing the ESD ground wire to the cabinet at the door.
4. Lift up on the door hinges and remove the door.

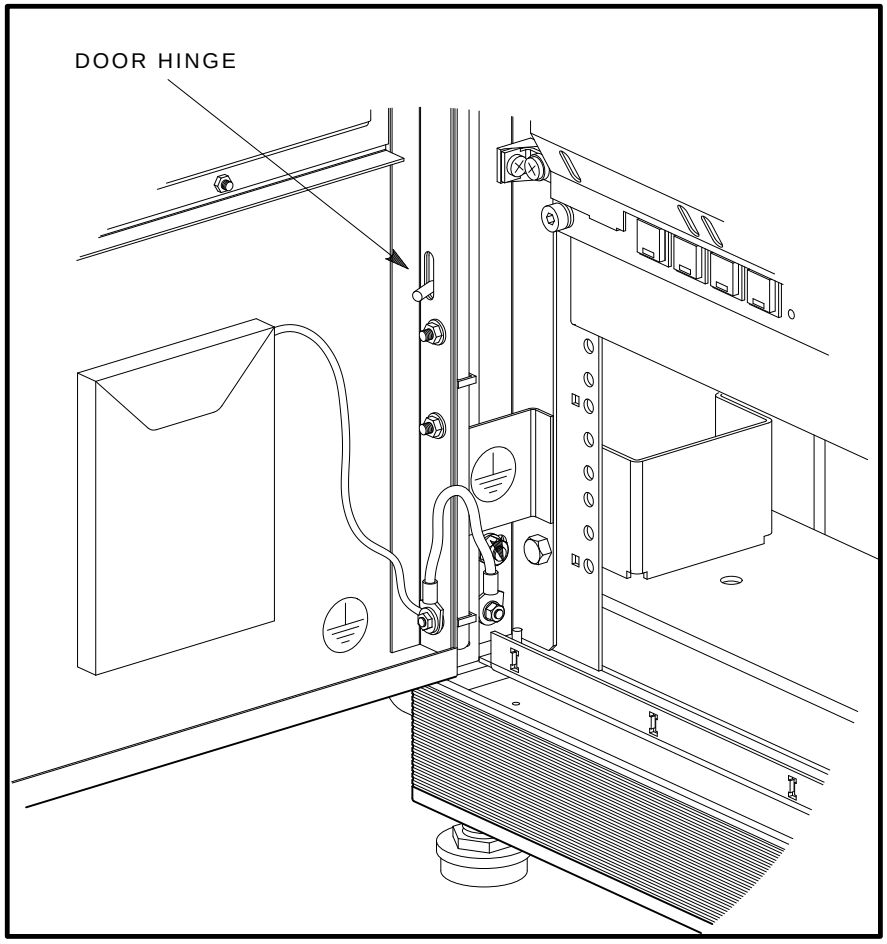
Install the new door.

1. Lift and place the door up on the door hinges.
2. Replace the screw securing the ESD ground wire to the cabinet at the door.
3. Swing the door closed.
4. Turn the two hex fasteners at the top of the door one-quarter turn clockwise to lock.

REMEMBER

If you have replaced the front door, remove the card(s) from behind the door logo and place them behind the door logo on the new front door.

Figure 4–1 Removing DECarray Door



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4.2 Power Controller

The only FRU in the cabinet is the power controller. If it is not functioning correctly, then part of the cabinet or the entire cabinet will not power up. This power controller is a single FRU; if it fails, replace it.

To replace a power controller, perform the following steps.

NOTE

Make sure that you have the same power controller variants when you replace the failed power controller. The 881–A is the 120 variant and the 881–B is the 240 variant.

1. At the system console, dismount *all* the ISEs.
2. Access the power controller and storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP of all storage enclosures in the DECarray. Wait for the Ready LEDs to go out.
   b. At the front of each storage enclosure, set the drive dc power switches to *off*. The LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

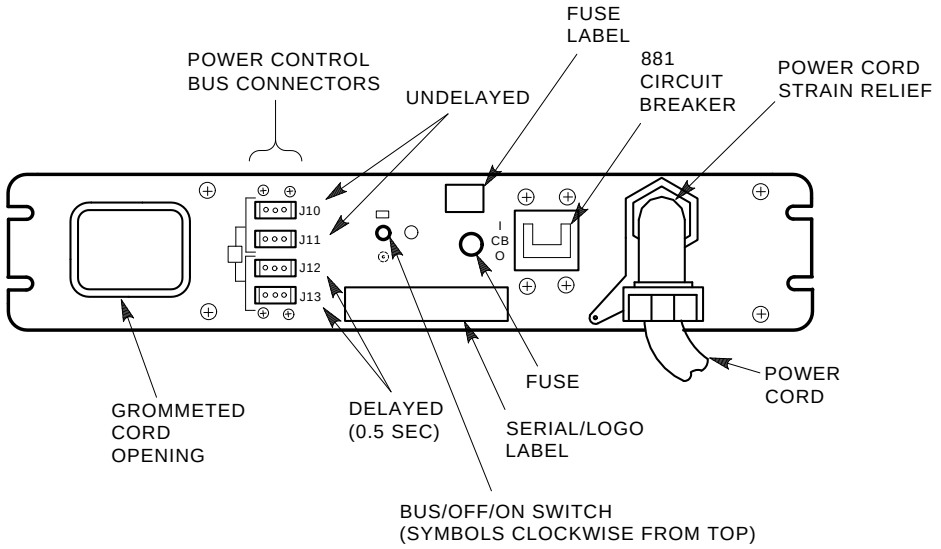
4. At the rear of the cabinet, turn off *all* storage enclosures by pressing the ac power switch on rear of the enclosure to off.

5. Turn off the breaker on the power controller (Figure 4–2).
6. Disconnect all enclosure ac power cords that are connected to the power controller.
7. Disconnect the controller power cord from the room power source.
8. Remove the ground strap (PN 12–13756–07) from the power controller.
9. Remove the four Phillips screws that secure the power controller to the cabinet (Figure 4–2).
10. Remove the power controller from the cabinet.

Install the new power controller.

1. At the rear of the storage array, place the power controller in the cabinet.
2. Secure the power controller to the cabinet (Figure 4–2) with the four Phillips screws.
3. Replace the ground strap (PN 12–13756–07) at the power controller.
4. Connect the controller power cord to the room power source.
5. Reconnect all enclosure ac power cords to the power controller.
6. Ensure that the BUS/OFF/ON switch is in the down position.
7. Turn off the breaker on the power controller (Figure 4–2).
8. Restore all enclosures to service, and run the checkout procedure.

Figure 4–2 Power Controller



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4.3 DSSI Interconnect Cables

These DSSI interconnect cables are external to the storage enclosure and are used as follows:

- The 42-inch (PN BC21Q–3F) connects the enclosures to each other and to magazine tape subsystems.
- The 70-inch (PN BC21R–5L) connects the enclosures to the storage array I/O panel.
- The 108-inch (PN BC21Q–09) connects the storage array to the system I/O panel.

Use the following steps to remove and replace an internal DSSI cable:

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the system(s).
2. Access the cables and the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in *all* storage enclosures off-line:

   CAUTION

   Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

   a. Press and release all Ready buttons on the OCP of all storage enclosures in the DECarray. Wait for the Ready LEDs to go out.

   b. At the front of the storage enclosure, set the drive dc power switches to *off*. The LEDs should go out to indicate that power has been removed from the disk ISE.

4. At the rear, turn off the enclosure with the ac power switch on the power supply.
5. Ensure that the ac power is removed from the host system(s).

6. Disconnect both ends of the cable.
7. Connect the new cable.
8. Fill out new labels and place them on both ends of the new cable. Remember to use the colored labels supplied in the *SF Family Label Booklet* and write the same information on the new label as the faulty cable. Use the following tables for suggested color codes.
9. Restore the enclosure to service, and run the checkout procedure.

Table 4–1 DSSI Label Color Codes (Single-System Configurations)

Label Color	I/O Port	SF7x Position	SF3x Position
Blue	1	5, 1, 3	2 Rear
Red	2	6, 2, 3	2 Front
Yellow	3	4, 8	4 Rear
Green	4	7, 8	4 Front
Blue & white	5		8 Rear
Red & white	6		8 Front
Yellow & white	7		
Green & white	8		
Blue, red	9		1 Rear
Yellow, green	10		1 Front
Blue, red & white	11		3 Rear
Yellow, green & white	12		3 Front
Blue, blue & white	13		7 Rear
Yellow, yellow & white	14		7 Rear
Blue & white, red & white	15		
Yellow & white, green & white	16		

Table 4–2 DSSI Label Color Codes (DSSI VAXcluster Configurations)

Label Color	I/O Ports for ...	SF7x Position	I/O Port for ...	SF3x Position
Blue	1,9	5, 1	1	2 Rear
Red	2,10	6, 2	2	2 Front
Yellow	3,11	4, 8	3	4 Rear
Green	4,12	7, 8	4	4 Front
Blue & white	5,13	7	5	8 Rear
Red & white	6,14	8	6	8 Front
Yellow & white			7	
Green & white			8	
Blue, red			9	1 Rear
Yellow, green			10	1 Front
Blue, red & white			11	3 Rear
Yellow, green & white			12	3 Front
Blue, blue & white			13	7 Rear
Yellow, yellow & white			14	7 Rear
Blue & white, red & white			15	
Yellow & white, green & white			16	

Table 4–3 DSSI Label Color Codes (Stripe Set Configurations)

Label Color(s)	Port	SF7x Position	SF3x Position
Blue	1	1 Right	2 Right Rear
Red	2	1 Left	2 Left Rear
Yellow	3	2 Right	2 Right Front
Green	4	2 Left	2 Left Front
Blue & white	5	3 Right	4 Right Rear
Red & white	6	3 Left	4 Left Rear
Yellow & white	7	4 Right	4 Right Front
Green & white	8	4 Left	4 Left Front
Blue, red	9	7 Right	1 Right Rear
Yellow, green	10	7 Left	1 Left Rear
Blue, red & white	11	8 Right	1 Right Front
Yellow, green & white	12	8 Left	1 Left Front
Blue, blue & white	13		3 Right Rear
Yellow, yellow & white	14		3 Left Rear
Blue & white, red & white	15		3 Right Front
Yellow & white, green & white	16		3 Left Front

5
SF3x Storage Enclosure FRU Replacement

This chapter describes the procedures for removing, replacing, and checking for correct operation after repairing the FRUs associated with the SF3x series storage enclosure.

See the service documentation for the other components of the DSSI subsystem such as the magazine tape subsystem (installed in the DECarray) and the DSSI adapters (installed in the system or systems).

NOTE

The disk ISEs in the storage enclosure are the *only* FRUs that you can remove and replace while the host system is running and the devices in the storage array are powered up and on-line. Remove and replace all other FRUs while the host system and *all* devices in the storage array are off-line and, in some cases, powered down.

The procedures covered in this chapter include:

- Warm swap of the disk ISEs, Section 5.1

NOTE

The following FRUs require the storage enclosure to be powered down.

- OCP, (Section 5.2)
- Power supply, (Section 5.3)
- AC power cord, (Section 5.7.1)

NOTE

The following FRUs require the storage enclosure be powered down and the storage enclosure inner assembly *must* be extended from the extrusion tube.

- Fan assembly, (Section 5.4)
- OCP to TM cable, (Section 5.7.2)

NOTE

The following FRU requires the storage enclosure and the system(s) to be powered down and the storage enclosure inner assembly *must* be extended from the extrusion tube.

- Transition module (TM), (Section 5.5)

NOTE

The following FRUs require the system(s) and the storage array to be powered down, and the storage enclosure inner assembly *must* be removed from the extrusion tube.

- Backplane, (Section 5.6)
- Power harness, (Section 5.7.3)
- DSSI signal cable, (Section 5.7.4)
- DC switch module, (Section 5.8)

Figure 5–1 SF3x Storage Enclosure Front View

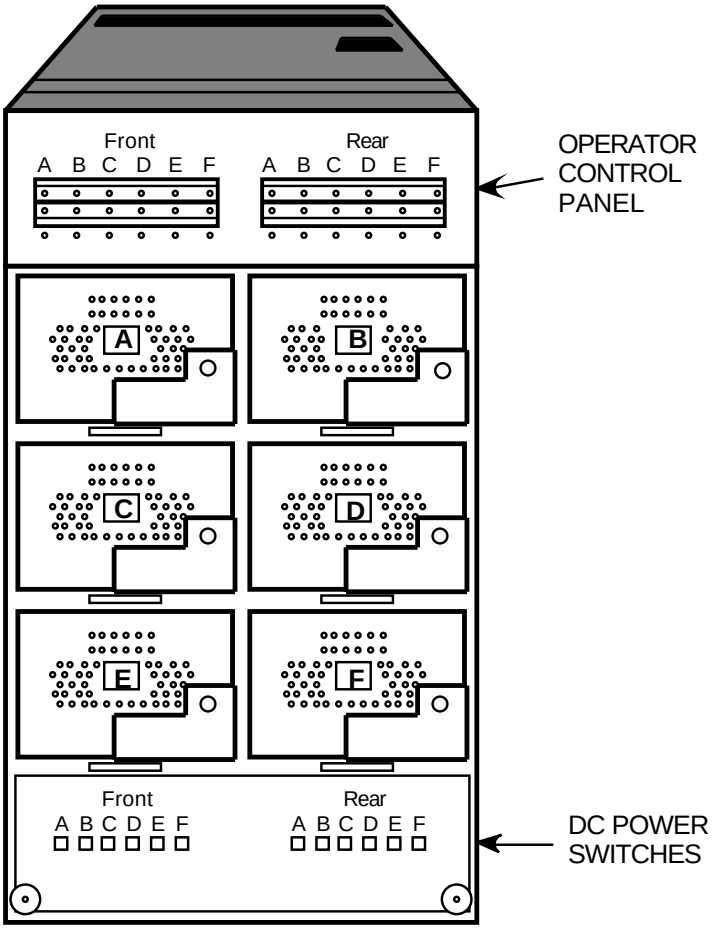
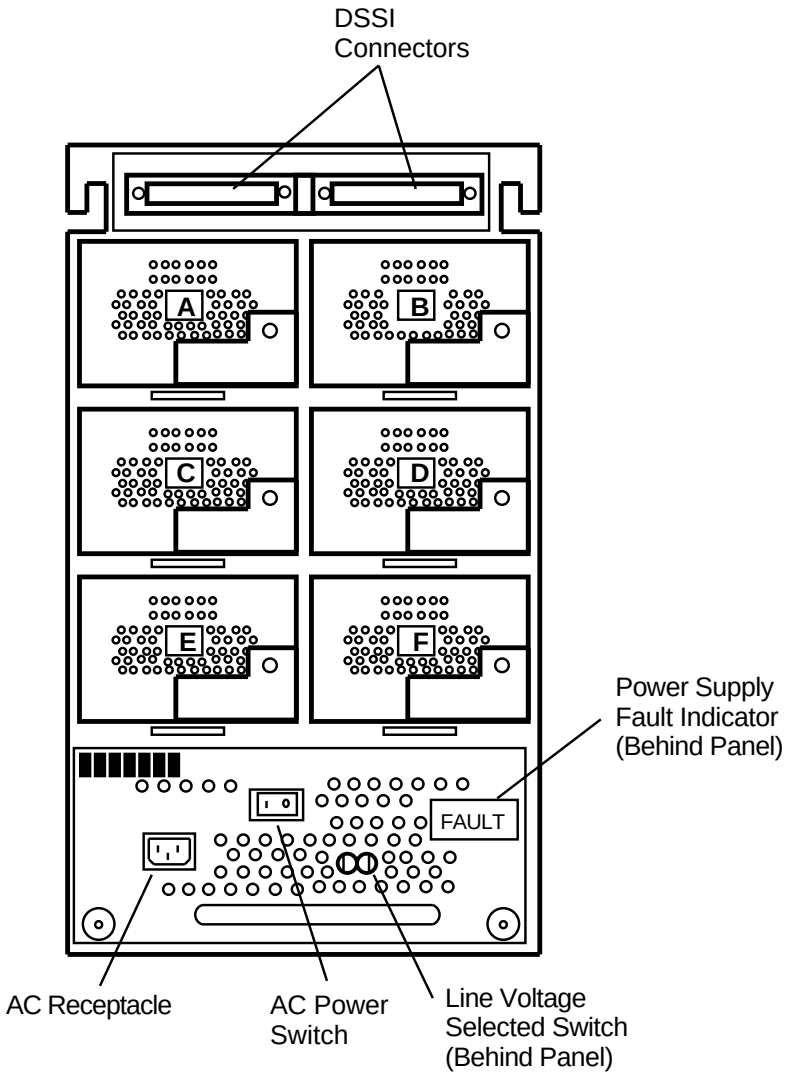


Figure 5–2 SF3x Storage Enclosure Rear View



5.1 Warm Swap of Disk ISE

CAUTION

Only qualified service personnel should perform the following procedures. Before beginning these procedures, make sure that the system manager has backed up all files on the disk ISE.

This section covers removing and replacing the disk ISE from the SF3x storage enclosure.

WARNING

Remember that you are performing the following procedures while the system or systems are up and running, and the rest of the disk ISEs in that storage enclosure are on-line.

The procedures that follow describe how to:

- Obtain current disk ISE parameters, (Section 5.1.1)
- Remove and replace the disk ISE from the storage enclosure, (Section 5.1.2)
- Restore the disk ISE to service and test the disk ISE (after repair), (Section 5.1.3)

CAUTION

Never disconnect any 42-inch DSSI interconnect cables (PN BC21Q–3F) between storage enclosures and magazine tapes.

Never disconnect any 70-inch DSSI interconnect cables (PN BC21Q–3F) between the array I/O panel and storage enclosures or magazine tapes.

Never disconnect any 108-inch DSSI interconnect cables (PN BC21Q–09) between the storage array and any system I/O panels.

Never remove a DSSI terminator while power is applied.

5.1.1 Obtaining Current Disk ISE Parameters

Use the following procedure when performing a disk ISE warm swap or when repairing a disk ISE:

1. Find the node name of the disk ISE by typing either the SHOW DEVICE (Example 5–1) or the SHOW CLUSTER (Example 5–2) DCL command at the system console.

   NOTE

   Record all of the node names listed for use later in this procedure.

   Note that the device name in the sample for SHOW DEV DIA contains the allocation class between the two dollar ($) symbols. In this example, the disk ISE has an allocation class of 1. If ALLCLASS (the parameter name for allocation class) were 0, the device name would appear as R2CYAA$DIA21. UNITNUM is the number following DIA, 21 in this example. It is the MSCP unit number.

   The node name appears in parentheses following the device name in the SHOW DEVICE output; the node name is listed directly in the table in the SHOW CLUSTER output.

   In the examples given in this procedure, the disk ISE in question has a node name of R2CYAA.

Example 5–1 SHOW DEVICE

```
$ SHOW DEVICE DIA

Device                  Device      Error    Volume      Free  Trans Mnt
 Name                   Status      Count     Label     Blocks Count Cnt
$1$DIA21:    (R2CYAA)   Online          5
$1$DIA22:    (R2RRBA)   Mounted         0    DISK22     744282     1   1
 ^    ^^      ^^^^^^
 |    ||        |
 |    ||        +------- NODENAME
 |    ||
 |    ++------- UNITNUM
 +------------ ALLCLASS
```

Example 5–2 SHOW CLUSTER

```
$ SHOW CLUSTER
View of Cluster from system ID 63973  node: CLOUDF
+--------------------+---------+
|      SYSTEMS       | MEMBERS |
+--------+-----------+---------+
|  NODE  | SOFTWARE  |  STATUS |
+--------+-----------+---------+
| CLOUDF | VMS V5.4  | MEMBER  |
| R2CYAA | RFX V200  |         |
| R2RRBA | RFX V200  |         |
+--------+-----------+---------+
```

NOTE

Record the node names (in this example, R2CYAA and R2RRBA) for use later in this procedure.

2. Establish a connection to the suspected disk ISE by using the SET HOST/DUP command. This step requires a privileged account. If you cannot establish a connection due to the nature of the disk ISE problem, then use the alternate method outlined in the next step to determine disk ISE parameters.

   Display and record the disk ISE parameters as shown in Example 5–3. In this case, the parameter values are:

NODENAME	R2CYAA
SYSTEMID	404194100302
ALLCLASS	1
FIVEDIME	1
UNITNUM	21
FORCEUNI	0

Example 5–3 SET HOST/DUP

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS R2CYAA

%HSCPAD-I-LOCPROGEXE, Local program executing - type ^\ to exit
Copyright (C) 1990 Digital Equipment Corporation


PARAMS> SHOW NODENAME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
NODENAME          R2CYAA             RF35         String   Ascii   B

PARAMS> SHOW SYSTEMID

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
SYSTEMID     0404194100302      0000000000000  Quadword      Hex   B

PARAMS> SHOW ALLCLASS

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
ALLCLASS                1                  0       Byte     Dec   B

PARAMS> SHOW FIVEDIME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FIVEDIME                1                  1    Boolean     0/1   B

PARAMS> SHOW UNITNUM

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
UNITNUM                21                  0       Word     Dec   U

PARAMS> SHOW FORCEUNI

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FORCEUNI                0                  1    Boolean     0/1   U

PARAMS> EXIT

$
```

3. If you cannot establish a connection to the disk ISE, you can use the DCL command ANALYZE/SYSTEM (Example 5–4) to obtain the parameter information. Refer to the example (❶) where the system ID is 404194100302.

NOTE

This command displays a page of data. Press Return to bring up the next screen of data, where you will find the system ID.

Example 5–4 ANALYZE/SYSTEM

```
$ ANALYZE/SYSTEM

VAX/VMS System analyzer

SDA> SHOW DEVICE $1$DIA21

I/O data structures
-------------------
$1$DIA21    RF35              UCB address:  802D65D0
Device status:   00021810 online,valid,unload,lcl_valid
Characteristics: 1C4D4108 dir,rct,fod,shr,avl,mnt,elg,idv,odv,rnd
                 000022A1 clu,mscp,srv,nnm,loc
Owner UIC [000010,000001] Operation count    1116 ORB address  802D6700
PID        00000000       Error count           0 DDB address  804DA680
Alloc. lock ID   00B000E5 Reference count       1 DDT address  80308BD8
Alloc. class            1 Online count          2 VCB address  802E2750
Class/Type          01/38 BOFF               0000 CRB address  8048C250
Def. buf. size        512 Byte count         0000 PDT address  802A5F80
DEVDEPEND        00000000 SVAPTE         00000000 CDDB address 802D6410
DEVDEPND2        00000000 DEVSTS             0004 I/O wait queue  empty
FLCK index             34 RWAITCNT           0000
DLCK address     00000000

Press RETURN for more.

SDA> Return

I/O data structures
-------------------
      --- Primary Class Driver Data Block (CDDB) 802D6410 ---
Status:              0040 alcls_set
Controller Flags:    80D4 cf_mlths,cf_this,cf_misc,cf_attn,cf_replc
Allocation class        1  CDRP Queue      empty   DDB address   804DA860
System ID 404194100302 ❶ Restart Queue empty   CRB address   8048C250
                         DAP Count           3   CDDB link     80344C30
Contrl. ID      94100302  Contr. timeout     60   PDT address   802A5F80
                01644041  Reinit Count        0   Original UCB  00000000
Response ID     00000000  Wait UCB Count      0   UCB chain     802D65D0
MSCP Cmd status FFFFFFFF
                   *** I/O request queue is empty ***

Press RETURN for more.

SDA> EXIT
$
```

5.1.2 Warm Swap and Repair Procedures

Before you start the removal and replacement procedures, you *must* obtain all necessary parameters from the device to be replaced, or operating system data structures. If you have not done this, refer back to Section 5.1.1.

Check that the parameters you obtained from the preceding steps are accurately recorded on the DSSI Configuration Sheet for this unit. Configuration sheets should be in the *Site Management Guide.* Make any necessary corrections to the recorded information.

To remove the disk ISE from the storage enclosure:

1. At the system console, dismount the faulty disk ISE through the VMS operating system. For example:

   ```
   >> DISMOUNT $1$DIA21
   ```

2. Take the disk ISE off-line by pressing Ready on the operator control panel (OCP) for the disk ISE being removed (Figure 5–1).

3. At the bottom front of the storage enclosure, set the drive dc power switch to *off* (Figure 5–1). The switch LED should go out to indicate that power has been removed from the disk ISEs. If the LED does not go out, suspect a faulty switch.

   CAUTION

   Do not attempt the following steps unless you have taken precautions against electrostatic discharge (ESD). Wear an ESD grounding strap. Do not place the disk ISE on anything other than a grounded antistatic work surface. Failure to observe these precautions can result in ESD damage to the disk ISEs.

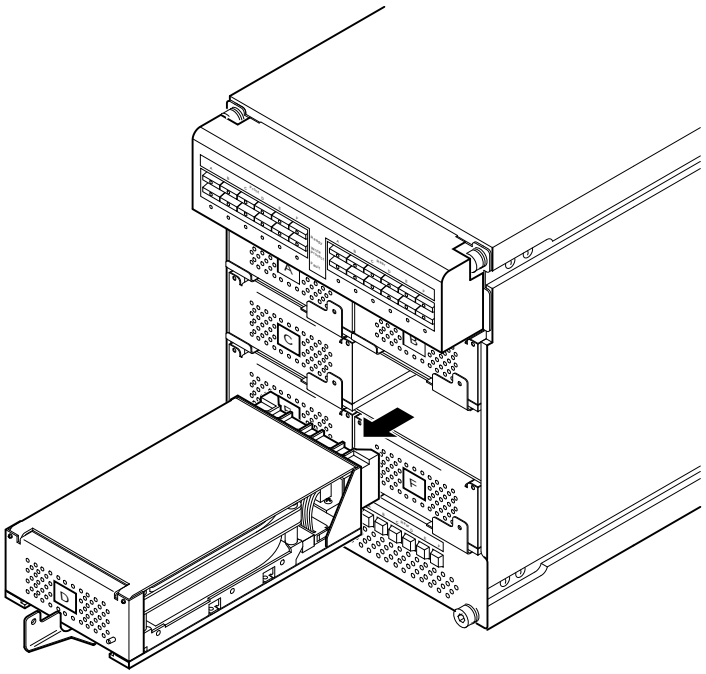
4. Remove cover by removing two screws

5. Remove the disk ISE from the SF3x enclosure.

   a. Remove the screw from the ISE carrier lever.

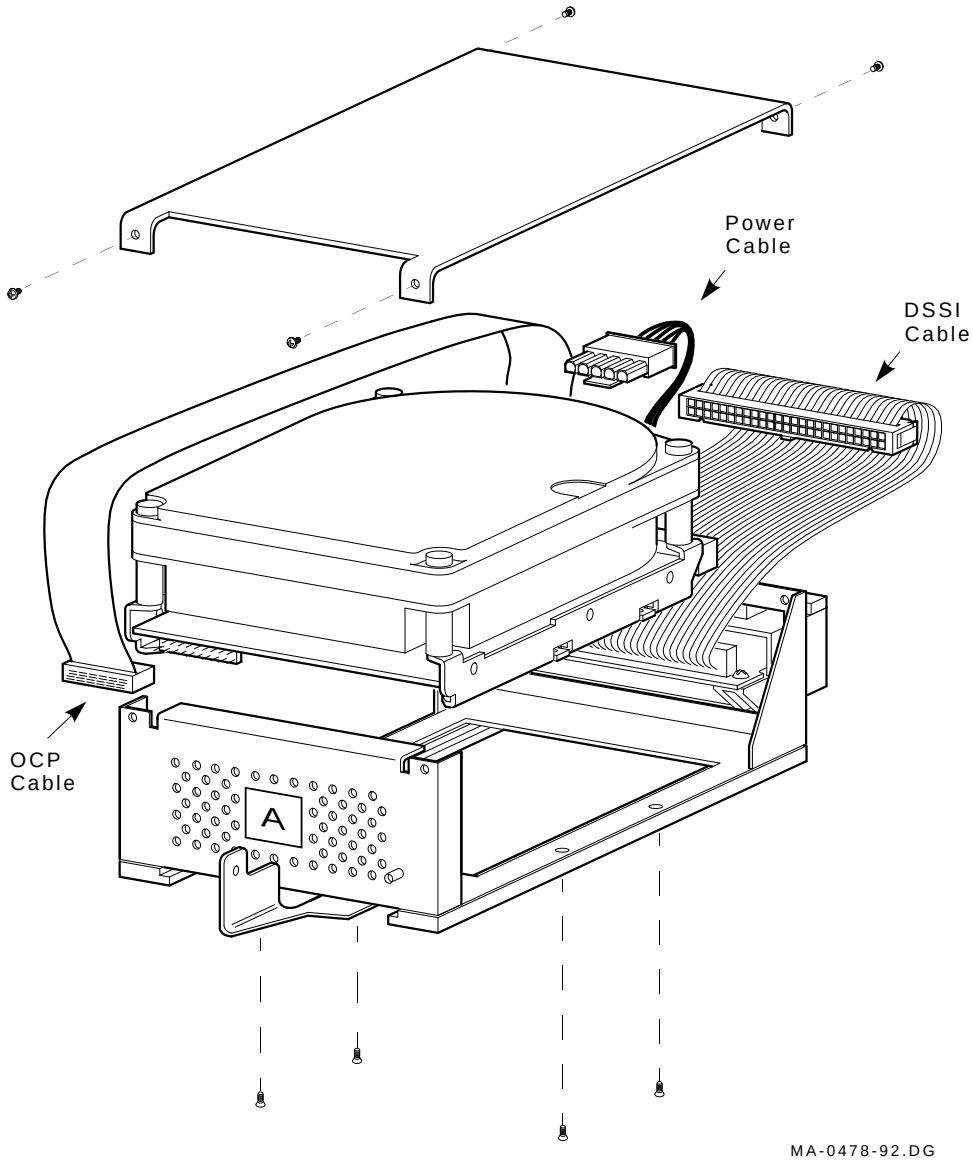
   b. Pull the lever forward and slide the carrier out of the slot.

Figure 5–3 Disk ISE Removal



MA-0477-92.DG

Figure 5–4 Disk ISE Replacement



6. Remove the four screws holding the top cover on the carrier and remove the cover.
7. Remove the faulty ISE from the carrier by removing the two screws on each side of the bottom of the carrier (see Figure 5–4).
8. Lift the ISE out of the carrier and disconnect the DSSI bus, OCP, and power connectors from the ISE.
9. Plug the DSSI bus, power, and OCP connectors into the replacement ISE.
10. Attach the ISE to the carrier.
11. Replace the top cover.
12. Install the disk ISE in the enclosure.
13. Install cover

NOTE

DO NOT APPLY POWER AT THIS TIME.

14. Record the disk ISE serial number in the site log.
15. Proceed to Section 5.1.3 to restore the disk ISE.

5.1.3 Restoring the Disk ISE

Follow the steps in this section to bring a disk ISE back into service on its DSSI bus.

CAUTION

Perform the following steps only after repairing or replacing a disk ISE.

1. Apply power to the disk ISE with the drive dc power switch.
2. Press the Ready button to bring the disk ISE back on-line. This step invokes the one-time HDA to drive module calibration that runs nominally 5 to 8 minutes.
3. Restore the customer data to the repaired disk ISE by using the usual BACKUP procedure.

NOTE

Following the replacement of a disk ISE, a one-time calibration is performed that takes nominally 5 to 8 minutes, during which time the disk ISE does not communicate with the host system. The calibration sequence is complete when the Fault LED on the OCP stops flashing and the Ready LED is on. Until this time, this disk ISE is unavailable.

4. Find the node name of the replacement disk ISE, R2QSAA in this example. Type the SHOW CLUSTER (Example 5–2) command at the system console. If necessary, compare the list of node names you recorded in Section 5.1.1 to find the new node name.

NOTE

The SHOW DEVICES command will *not* display the repaired disk ISE at this time.

5. Invoke PARAMS in the unit by issuing the SET HOST/DUP command:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS nodename
```

6. Using PARAMS commands, check all parameters and set them to the values previously recorded:
   a. Use the SHOW command to read each parameter.
   b. Use the SET command to change parameter values.
   c. Use the WRITE command once all values have been set to match the originals.

7. Set the MSCP switch on the OCP to the enable position before continuing.
8. Answer yes to the initialization question.
9. The program then terminates and leaves the disk ISE in the server-enabled state. Example 5–5 shows typical dialog for the disk ISE using the steps above.

Example 5–5 PARAMS Dialog Restoring Disk ISE Parameters

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS R2QSAA

%HSCPAD-I-LOCPROGEXE, Local program executing - type ^\ to exit
Copyright (C) 1990 Digital Equipment Corporation

PARAMS> SHOW NODENAME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
NODENAME         R2QSAA              RF35         String   Ascii   B

PARAMS> SET NODENAME R2CYAA


PARAMS> SHOW SYSTEMID

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
SYSTEMID      593200495860      0000000000000  Quadword      Hex   B

PARAMS> SET SYSTEMID 0404194100302

PARAMS> SHOW ALLCLASS

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
ALLCLASS                0                  0       Byte     Dec   B

PARAMS> SET ALLCLASS 1

PARAMS> SHOW FIVEDIME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FIVEDIME                1                  1    Boolean     0/1   B

PARAMS> SHOW UNITNUM

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
UNITNUM                 0                  0       Word     Dec   U

PARAMS> SET UNITNUM 21
```

Example 5–5 Cont'd on next page

Example 5–5 (Continued) PARAMS Dialog Restoring Disk ISE Parameters

```
PARAMS> SHOW FORCEUNI

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FORCEUNI                1                  1    Boolean     0/1   U

PARAMS> SET FORCEUNI 0


NOTE:  Verify the correct parameter settings before writing. Use the SHOW command.

PARAMS> WRITE


NOTE:  BEFORE RESPONDING TO THE FOLLOWING QUESTION, SET THE MSCP SWITCH
       TO THE OFF OR OUT POSITION.

Changes require controller initialization, ok? [Y/(N)] Y
Initializing...


NOTE:  It takes approximately 1 minute before the following message prints.

%HSCPAD-S-REMPGMEND, Remote program terminated - message number 3.
%HSCPAD-S-END, Control returned to node CLOUDF
$
```

WARNING

If you did not put the MSCP switch in the enable position before allowing the controller to initialize, you *must* do so before continuing to the next section.

Failure to put the MSCP switch in the enable position will result in the loss of VMS communication with this disk ISE at the next power-up.

5.1.4 Testing the Disk ISE

Once the disk ISE parameters are set, test the disk ISE by using the local program DRVTST. DRVTST is accessed in the same way as PARAMS, using the SET HOST/DUP command. In this case, instead of specifying PARAMS, you specify DRVTST:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DRVTST nodename
```

DRVTST is a comprehensive hardware test. Once invoked, it prompts you to specify whether the test should be a write/read test or a read-only test. After you specify the type of test, it runs for 5 minutes. After 5 minutes, DRVTST indicates either that the test passed, or that a failure occurred.

Once the disk ISE has passed DRVTST, the installation is complete.

Example 5–6 shows how to run DRVTST.

NOTE

You can abort the test at any time by pressing one of the following: Ctrl/C, Ctrl/Y, or Ctrl/Z. If you do abort the test, the informational message `Operation aborted by user` **is displayed.**

Example 5–6 Running DRVTST

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DRVTST R1EJAA ❶
Copyright © 1989 Digital Equipment Corporation
Write/read anywhere on the medium? [1=Yes/(0=No)] 1 ❷
User data will be corrupted. Proceed? [1=Yes/(0=No)] 1 ❸
5 minutes to complete. ❹
Test passed. ❺
```

❶ DRVTST is accessed through the VMS operating system on a disk ISE with a node name of R1EJAA.

❷ You must respond to this query for the program to continue. By answering yes (1), you select a write/read test, and DRVTST prompts you with another query.

In this case, type 1 Return, selecting a write/read test.

❸ This query gives you the chance to reconsider. If you answer no (0), your response to the first query is overridden, and a read-only test is executed. If you answer yes (1), DRVTST begins executing a write /read test of the disk ISE.

In this case, type 1 Return.

❹ The program displays this message during the test.

❺ This message indicates that DRVTST executed successfully.

If an error condition is found during the execution of DRVTST, an error message is displayed. Two types of errors are reported:

- Soft errors, which are corrected during the operation of the disk ISE
- Fatal errors, which prevent the disk ISE from functioning

Table 5–1 lists error messages and what they mean.

Table 5–1 DRVTST Error Messages

Message	Description
Soft read error on head xx track yyyy. Soft write error on head xx track yyyy. Soft compare error on head xx track yyyy.	These are soft error messages indicating that an operation succeeded, but that the error recovery firmware was invoked. These messages may indicate a forced-error flag or correctable ECC error, or that the read/write head was temporarily off-track. These soft errors are corrected during normal operation.
xxxx - Unit diagnostics failed.	This is a fatal error. The xxxx is the MSCP error code.
xxxx - Unit read/write test failed.	This is a fatal error. The xxxx is the MSCP error code.

5.1.5 Mounting the Disk ISE

Once testing completes successfully, mount the disk ISE and restore data with BACKUP.

The SHOW CLUSTER command will continue to show the original name of the replacement drive module. This will disappear only after the next reboot.

NOTE

A moderate increase in error counts is to be expected after this warm swap procedure has been correctly completed.

5.2 Replacing the Operator Control Panel

Use the following steps to remove and replace the OCP (PN 70–28887–01):

1. At the system console, dismount *all* the ISEs on that bus.
2. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

3. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.

CAUTION

Do not bend the alignment or connector pins when reinstalling the OCP. The panel should go into place without force.

4. Align the replacement OCP connector pins with the clip fasteners on the transition module and push straight in to lock the fasteners.
5. Push the OCP into the fasteners by applying equal pressure to both sides.
6. Restore the enclosure to service, and run the checkout procedure in Section 5.9.2.

5.3 Replacing the Power Supply

Use the following steps to remove and replace the enclosure power supply (PN H7969–AA).

1. At the system console, dismount *all* the ISEs on that bus.
2. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off*. The switch LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

3. At the rear of the storage enclosure, set the ac power switch on the power supply rear panel to *off*.
4. Disconnect the ac power cord from the enclosure rear bulkhead.
5. Loosen the two captive screws at the rear panel of the power supply.
6. Grasp the power supply by its handle and pull straight back until the power supply is free of the enclosure.
7. Inspect the power supply recess in the enclosure chassis to check that no wires are loose and no connector pins are broken.

8. Fit the tabs on the replacement power supply between the rails previously noted, and slide the power supply into the enclosure. Gently press the power supply to seat it in its connector.
9. Tighten the captive screws. Do not use force as you may strip the threads in the chassis.
10. At the rear of the power supply, locate the line voltage selector switch. The switch is accessible through a cutout in the rear panel of the power supply, just to the right of the line input connector.
11. Set the switch to the desired line voltage. The selected voltage is marked on the switch element. Setting the switch alternates between the two line voltage options (120 V or 240 V).

CAUTION

Do not apply power to the supply until you are sure the line voltage selector switch is set to the correct position. Severe damage to the power supply will result if the switch is set to the incorrect position.

12. Check that the ac power switch on the replacement power supply is set to *off*.
13. Reconnect the ac power cord to the ac receptacle at the rear of the enclosure.
14. Restore the enclosure to service, and run the checkout procedure in Section 5.9.2.

5.4 Replacing the Fan Assembly

Use the following steps to remove and replace the fan assembly (PN 70–24440–01):

1. At the system console, dismount *all* the ISEs on that bus.
2. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. Set the drive dc power switches to *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

3. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
4. At the rear of the enclosure, ensure that the DSSI interconnect cables can be extended up to 3 feet.

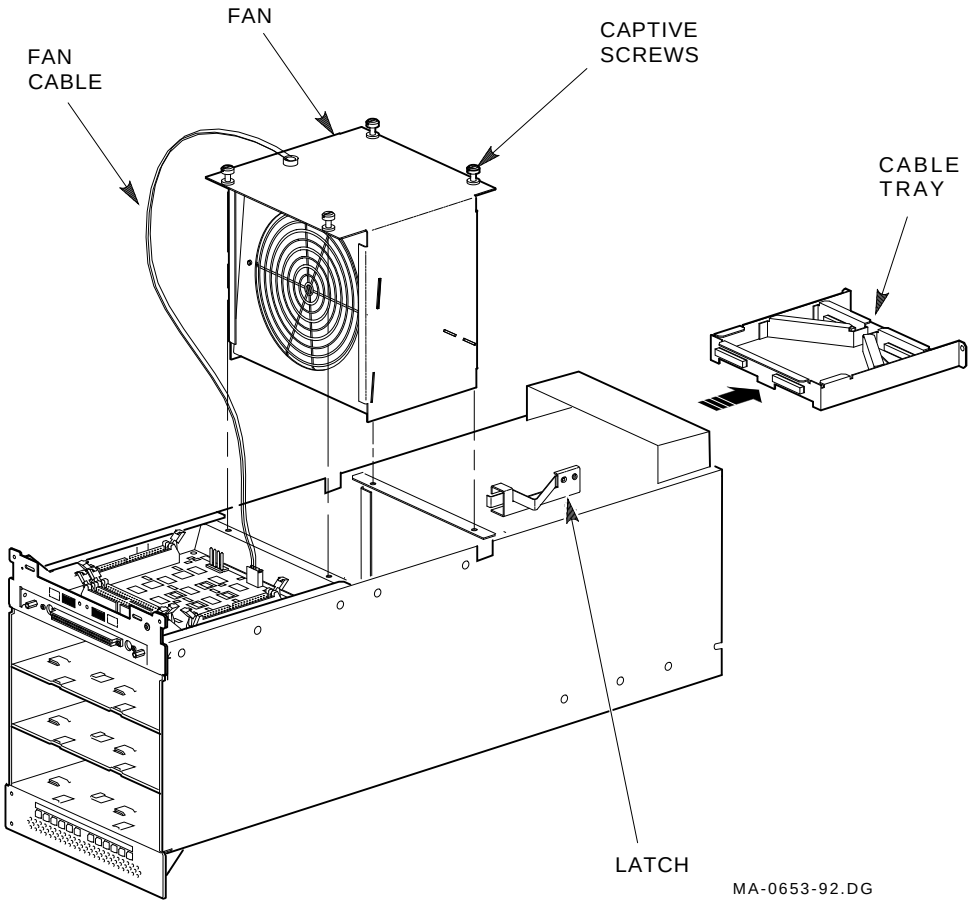
WARNING

Take care when accessing the internal components of the inner assembly. A stop mechanism in the chassis locks the inner assembly at a point that allows access to the fan assembly. This stop mechanism locks the chassis so that the inner assembly is over three-quarters of the way out of the chassis. If you release this stop, nothing prevents the inner assembly from being pulled completely free of the extrusion tube.

5. Remove the four screws in each corner of the storage enclosure.
6. From the rear, push the inner assembly out of the extrusion tube until it latches at a position just past the top of the fan assembly.
7. Disconnect fan connector J5 from the transition module (Figure 5–6). The fan cable is captive to the fan.
8. Loosen the four captive captive screws in each corner of the fan assembly (Figure 5–5).

9. Pull the fan assembly straight up to remove (Figure 5–5).

Figure 5–5 Removing and Replacing the Fan Assembly



10. Orient the replacement fan assembly with the fan motor facing the front of the enclosure and with the fan cable exiting on the left top of the assembly.
11. Slide the fan assembly in and gently tighten the captive screws, while avoiding any internal DSSI cables.
12. Reinstall the fan connector J5 at transition module.

CAUTION

Assure that no internal cables have been trapped or pinched by the fan assembly.

13. Slide the inner assembly back into the extrusion tube. Replace the front panel screws. Do not use excessive force as it may strip the threads in the extrusion tube.
14. Replace the OCP by aligning the OCP connector pins with the TM clip fasteners on the transition module. Push the OCP into the fasteners by applying equal pressure to both sides.
15. Move to the back of the enclosure and reposition the DSSI interconnect cables as needed at the rear bulkhead of the enclosure.
16. Turn on the enclosure with the ac power switch located at the rear of the power supply.
17. Restore the enclosure to service, and run the checkout procedure in Section 5.9.2.

5.5 Replacing the Transition Module

Use the following procedure to remove and replace the transition module (TM) (PN 54–21199–01):

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the host system(s).
2. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the lower front of the storage enclosure, set the drive dc power *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.
3. At the rear of the storage enclosure, turn off the enclosure with the ac power switch located at the rear of the power supply.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

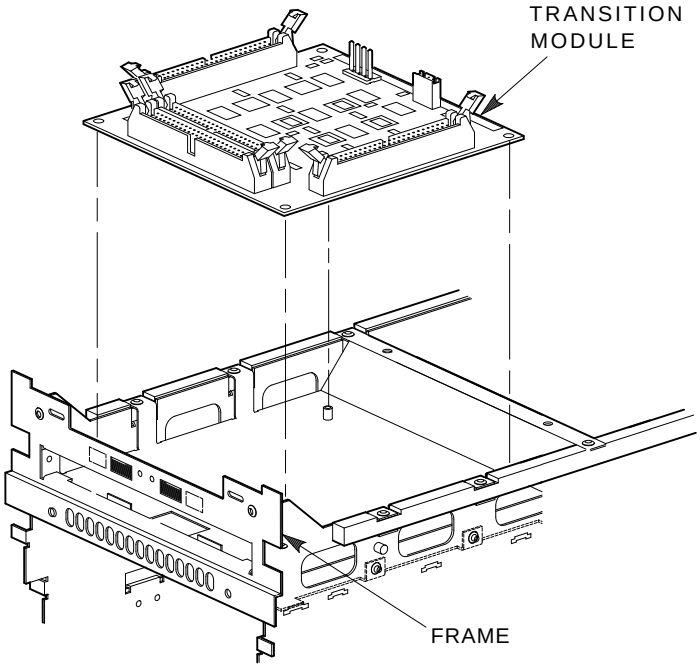
4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. Remove the four screws at each corner of the enclosure frame and, from the rear, push the inner assembly partially out of the enclosure.

WARNING

Take care when accessing the internal components of the inner assembly. A stop mechanism in the chassis locks the inner assembly at a point that allows access to the fan assembly. This stop mechanism locks the chassis so that the inner assembly is over three-quarters of the way out of the chassis. If you release this stop, nothing prevents the inner assembly from being pulled completely free of the extrusion tube.

6. Disconnect all the cables from the transition module.
7. Remove the philips-head screws from each corner of the transition module.
8. Remove the transition module.

Figure 5–6 Removing and Replacing the Transition Module



9. Install the new transition module and tighten the four screws.
10. Replace all cables on the appropriate transition module connectors.
11. If applicable, set any DSSI node ID switches that need setting. Table 2–2.
12. Slide the inner assembly back into the extrusion tube. Replace the front panel screws. Do not use excessive force as it may strip the threads in the extrusion tube.
13. Replace the OCP by aligning the OCP connector pins with the TM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
14. Restore the enclosure to service, and run the checkout procedure in (Section 5.9.2).

5.6 Replacing the Backplane

Use the following steps to remove and replace the DSSI backplane (PN 54-12109-01) from either the front or the rear of the storage enclosure.

1. Remove the fan assembly, using the procedure outlined in Section 5.4.
2. Remove the fan bracket by removing 4 screws, 2 on each side.
3. Remove the cables from the backplane.
4. Remove the five philips-head screws holding the backplane to the storage enclosure.

NOTE

On the middle philips-head screw the is a insulating space washer.

5. Install the replacement backplane, and tighten the five screws holding it to the enclosure (Do not over tighten).
6. Replace all cables that you removed from the faulty backplane.
7. Replace fan bracket.
8. Repalce fan assembly.

5.7 Cable Replacement Procedures

NOTE

Do *not* disconnect any DSSI interconnect cables while power is applied to the storage array (all installed ISEs) and the system(s).

The ac power cord, power harness, OCP cables, and DSSI cables are storage enclosure FRUs.

The OCP cables run down the side of the inner assembly from the transition module to the front and rear backplanes.

The DSSI interconnect cables run from the rear bulkhead, over the top of the inner assembly to the front and rear backplanes. You must replace all the cables for a port when replacing a single cable.

The removal and replacement procedures for these FRUs are as follows:

- AC power cord, (Section 5.7.1)
- OCP to TM cable, (Section 5.7.2)
- Power harness, (Section 5.7.3)
- Internal DSSI cables, (Section 5.7.4)

5.7.1 Replacing the AC Power Cord

Use the following procedure to remove and replace the storage enclosure ac power cord (PN 17–00442–18):

1. At the system console, dismount the disk ISEs in *all* storage enclosures.
2. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosures, set the drive dc power switches to *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

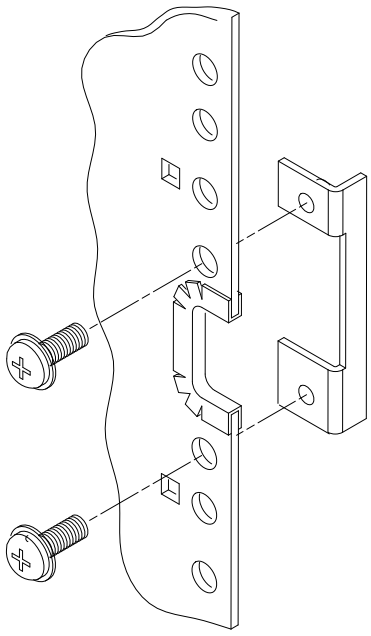
3. At the rear of the storage enclosure, turn off the enclosures with the ac power switch on the power supply.
4. Turn off the circuit breaker on the power controller.
5. Locate the ac power cord to be replaced. Loosen the lower screw of the ac retainer bracket. Remove the upper ac power cord retainer bracket screw and tilt the retainer 45 degrees. Then retighten the lower screw (Figure 5–7).
6. At the lower rear of cabinet, open DSSI I/O panel by loosening the two captive screws on the right.

CAUTION

Use care not to disturb or damage any power cords, and DSSI interconnect cables, that are already connected to the DSSI I/O panel.

7. Unplug the faulty ac power cord from the back of the storage enclosure and from the power controller.

Figure 5–7 AC Power Cord Retainer



SHR-X0137-90

8. Place the new ac power cord in the retainer space with the shrouded male plug end inside the cabinet side rail.
9. Leave approximately 2 feet of slack at the position location.
10. Loosen the lower screw and put the retainer bracket back to its original position. Then reinsert the upper screw and tighten both the top and bottom screws.
11. Connect the male end of the ac power cord to the outlet on the power controller where the original ac power cord was plugged in.
12. Restore the enclosure to service, and run the checkout procedure found in Section 5.9.

5.7.2 Replacing the OCP to TM Cable

Use the following procedure to remove and replace the OCP to TM cable (PN 17–03471–01):

1. At the system console, dismount *all* the ISEs on that bus.
2. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

3. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
4. Remove the four screws in each corner of the storage enclosure.
5. Pull the inner assembly out of the enclosure until it engages the latch.

WARNING

Do not extend the storage enclosure past the first mechanical stop.

6. Remove the cable (Figure 5–8) as follows:
   a. Disconnect the cable at J2 and J3 on the front of the TM.
   b. Remove the screws, washers, nuts, and lock washers from the cable connector at the OCP end.

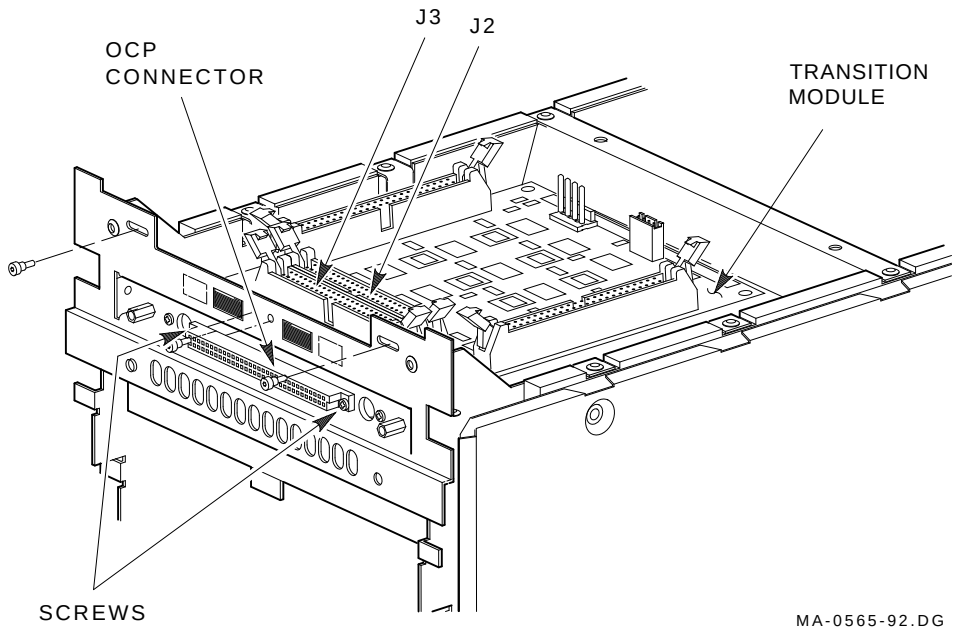
WARNING
Be careful not to drop any parts inside the assembly.

7. Remove the faulty cable and insert the replacement cable connector into the cutout in the enclosure chassis.
8. Replace the screws, nuts, and lock washers on the cable connector. Tighten both screws.

WARNING
Be careful not to drop any parts inside the assembly.

9. Connect the cable to J2 and J3 on the front of the transition module.
10. Slide the inner assembly back into the extrusion tube. Replace the front panel screws. Do not use excessive force as it may strip the threads in the extrusion tube.
11. Replace the OCP by aligning the OCP connector pins with the TM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
12. Restore the enclosure to service, and run the checkout procedure found in Section 5.9.2.

Figure 5–8 Removing and Replacing the OCP to TM Cable



5.7.3 Replacing the Power Harness

Use the following procedure to remove and replace the storage enclosure power harness (PN 17–03469–01):

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the system(s).
2. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

3. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
4. At the rear of the storage enclosure, turn off the enclosure with the ac power switch located at the rear of the power supply.
5. Turn off the circuit breaker on the power controller.
6. Disconnect the DSSI interconnect cables from the enclosure.
7. Disconnect the ac power cord at the rear of the enclosure.

WARNING—USE TWO PEOPLE.

Releasing the latch allows the inner assembly to be removed from the extrusion tube for this operation. Be prepared to take the weight of the inner assembly when it comes free of the extrusion tube. Have an ESD-protected workspace ready to put the inner assembly on after removing it.

8. Remove the four screws in the corners of the enclosure frame and pull the inner assembly out of the enclosure until it engages the latch.
9. Double-check the enclosure to verify that nothing can prevent the inner assembly from being pulled out farther. Reach into the chassis and release the latch. (It may be necessary to push the frame back in about a quarter inch before the latch will release.) See Figure 5–5. Pull the inner assembly free of the extrusion tube, reach into the

inner assembly, grasp the sheet metal in front of the fan, and pull. Set the inner assembly on an antistatic work surface.

10. Turn the storage enclosure upside down.
11. Remove the two phillips screws holding the cover over the dc power switch module and remove the cover.
12. Disconnect the power supply harness to the appropriate backplane. Looking from the front of the enclosure, the left side harness (J1) goes to the rear backplane and the right side harness (J5) goes to the front backplane.
13. Connect the replacement harness to the connector on the dc power switch module. Route it to the appropriate backplane, and connect it to connector J13 on the backplane. The red wire of J13 is pin one.
14. Install the protective cover over the drive dc power switch module and secure it with the two Phillips screws previously removed.

WARNING—USE TWO PEOPLE.
Use two people to place the inner assembly back into the extrusion tube mounted in the storage array.

15. Slide the inner assembly back into the extrusion tube. Replace the front panel screws. Do not use excessive force as it may strip the threads in the extrusion tube.
16. Tighten the four screws at each corner of the enclosure frame.
17. Replace the OCP by aligning the OCP connector pins with the TM clip fasteners on the transition module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
18. At the rear of the storage enclosure, reconnect the ac power cord to the ac receptacle on the power supply.
19. Replace the DSSI interconnect cables to the enclosure.
20. Restore the enclosure to service, and run the checkout procedure found in Section 5.9.

5.7.4 Replacing the Internal DSSI Cables

Use the following procedure to remove and replace the storage enclosure internal DSSI cable (PN 17–03472–01):

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the host system(s).
2. Access the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. At the rear of the storage enclosure, turn off the enclosure with the ac power switch on the power supply.
6. Remove ac power from the storage array by turning off the circuit breaker on the the power controller, and the system(s).
7. Disconnect the external DSSI interconnect cables from the cable tray.
8. Disconnect the ac power cord at the power supply.
9. Remove the four screws in the corners of the enclosure frame and push the inner assembly out of the enclosure until it engages the safety latch.

WARNING—USE TWO PEOPLE.
Releasing the latch allows the inner assembly to be removed from the extrusion tube for this operation. Be prepared to take the weight of the inner assembly when it comes free of the extrusion tube. Have an ESD-protected workspace ready to put the inner assembly on after removing it.

10. Double-check the enclosure to verify that nothing can prevent the inner assembly from being pulled out farther. Reach into the chassis and release the latch. (It may be necessary to push the frame back in about a quarter inch before the latch will release.) Push the inner assembly free of the extrusion tube, reach into the inner assembly, grasp the sheet metal in front of the fan, and pull. Set the inner assembly on an antistatic work surface.
11. Remove the fan assembly, using the procedures in Section 5.4.
12. Remove the fan mounting plate (PN 74-44306-01) by removing the four countersunk screws inside the assembly.
13. Disconnect the internal DSSI cable(s) that you are replacing from the front or rear backplanes.
14. Remove the screws holding the DSSI cable connector(s) in the cable tray.
15. If you are installing a single DSSI cable, remove the tape holding the bundled DSSI cables together.
16. Install the replacement cable(s) in the cable tray.
17. Attach the cable(s) to the connectors on the front and rear backplanes.

18. If necessary, tape the two DSSI cables for that side of the enclosure together.
19. Replace the fan assembly.

WARNING—USE TWO PEOPLE.
Use two people to place the inner assembly back into the extrusion tube mounted in the storage array.

20. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.
21. Replace the four screws at each corner of the enclosure frame.
22. Replace the OCP by aligning the OCP connector pins with the TM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
23. At the rear of the storage enclosure, reconnect the ac power cord to the ac receptacle on the power supply.
24. Replace the DSSI interconnect cables to the rear bulkhead of the enclosure.
25. Restore the enclosure to service, and run the checkout procedure found in Section 5.9.

5.8 Replacing the DC Switch Module

Use the following procedure for replacing the dc switch module (PN 54-21209-01).

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the system(s).
2. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP. Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off*. The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

3. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
4. At the rear of the storage enclosure, turn off the enclosure with the ac power switch at the rear of the power supply.
5. Turn off the circuit breaker on the power controller.
6. Disconnect the DSSI interconnect cables from the enclosure.
7. Disconnect the ac power cord at the rear of the enclosure.

WARNING—USE TWO PEOPLE.

Releasing the latch allows the inner assembly to be removed from the extrusion tube for this operation. Be prepared to take the weight of the inner assembly when it comes free of the extrusion tube. Have an ESD-protected workspace ready to put the inner assembly on after removing it.

8. Remove the four screws in the corners of the enclosure frame and pull the inner assembly out of the enclosure until it engages the latch.
9. Double-check the enclosure to verify that nothing can prevent the inner assembly from being pulled out farther. Reach into the chassis and release the latch. (It may be necessary to push the frame back in about a quarter inch before the latch will release.) See Figure 5–5. Pull the inner assembly free of the extrusion tube, reach into the

inner assembly, grasp the sheet metal in front of the fan, and pull. Set the inner assembly on an antistatic work surface.

10. Turn the storage enclosure upside down.
11. Remove the two phillips screws holding the cover over the dc power switch module and remove the cover.
12. Disconnect all cables from the module.
13. Remove the phillips head screws from the power supply connector housing.
14. Remove the five phillips head screws holding the module to the enclosure chassis, and slide out the module.
15. Remove the connector from the power supply connector housing.
16. Install the replacement module and replace the phillips head screws that hold it to the chassis and the power supply connector housing.
17. Replace the connectors on the new module.
18. Replace the cover and tighten the two phillips head screws that hold it to the enclosure chassis.

WARNING—USE TWO PEOPLE.
Use two people to place the inner assembly back into the extrusion tube mounted in the storage array.

19. Slide the inner assembly back into the extrusion tube. Replace the front panel screws. Do not use excessive force as it may strip the threads in the extrusion tube.
20. Tighten the four screws at each corner of the enclosure frame.
21. Replace the OCP by aligning the OCP connector pins with the TM clip fasteners on the transition module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
22. At the rear of the storage enclosure, reconnect the ac power cord to the ac receptacle on the power supply.
23. At the rear, replace the DSSI interconnect cables to the enclosure.
24. Restore the enclosure to service, and run the checkout procedure found in Section 5.9.

5.9 Postrepair Checkout and Power-Up

Perform the following procedure to power up and check normal operation of the storage enclosure and any FRUs that have been replaced or repaired.

CAUTION

Ensure that the inner assembly is back in the extrusion tube. Failure to do so will defeat the cooling airflow of the enclosure and may result in permanent damage to the disk ISEs or power supply.

5.9.1 From the Rear of the Storage Array

Perform these steps in the order presented.

1. Check that all ac power cords and DSSI interconnect cables at the rear of the storage enclosure are installed and secured correctly.
2. Check that the line voltage select switch on the power supply of the storage enclosure has been set to the correct voltage for the power controller. If not, set the switch as described in Section 5.3.
3. Ensure that the ac power cord is connected to the power controller.
4. At the front, check that the drive dc power switches on the front panel are *off* for the disk ISEs.
5. Turn the power controller on by setting the circuit breaker to the *on* position.
6. At the rear of the storage enclosure, turn the ac power switch to *on*.
7. Check the power supply operation by noting that the enclosure fan starts. If the fan does not start, see Chapter 3.
8. If no problems are encountered, proceed to Section 5.9.2.

5.9.2 From the Front of the Storage Array

Perform these steps in the order presented.

1. Ensure that the ac power switch at the rear of the enclosure is on.
2. Listen for the fan spinning. If the fan is *not* spinning, press the ac power switch to the off position and see Chapter 3.
3. At the front of the enclosure, turn on the drive dc power switch for each disk ISE.
4. Check power to the disk ISE by the green LED in the drive dc power switch lights. If the green LED does not light, see Chapter 3.

NOTE

The rear six drives start immediately, while the front six drives start after a 15 second delay.

NOTE

Setting a drive dc power switch to *on* starts the associated drive motor.

5. Press the Ready button on the OCP for each desired disk ISE. When the Ready LED comes on, the disk ISE has completed its internal diagnostics and is ready for operation. If the Fault LED comes on, see Section 5.1 for the procedure to repair or replace the disk ISE.

Perform the procedures in Section 5.1.3 if a disk ISE has been repaired or replaced.

REMEMBER

If the host system(s) has been powered down and ac power removed, apply ac power to the system(s) and power it back up.

6
SF7x Storage Enclosure FRU Replacement

This chapter describes the procedures for removing, replacing, and checking for correct operation after repairing the field replaceable units (FRUs) associated with the SF7x series storage enclosure.

See the service documentation for the other components of the DSSI subsystem such as the magazine tape subsystem (installed in the DECarray) and the DSSI adapters (installed in the system or systems).

NOTE

The disk ISEs in the storage enclosure are the *only* FRUs that you can remove and replace while the host system is running and the devices in the storage array are powered up and on-line. Remove and replace all other FRUs while the host system and *all* devices in the storage array are off-line and, in some cases, powered down.

The procedures covered in this chapter include:

- Warm swap of the disk ISEs, (Section 6.1)

NOTE

The following FRUs require the storage enclosure to be powered down.

- OCP, (Section 6.2)
- Power supply, (Section 6.3)
- AC power cord, (Section 6.7.1)

NOTE

The following FRUs require the storage enclosure be powered down and the storage enclosure inner assembly *must* be extended from the extrusion tube.

- Fan assembly, (Section 6.4)
- OCP to TTM cable, (Section 6.7.2)

NOTE

The following FRU requires the storage enclosure and the system(s) to be powered down and the storage enclosure inner assembly *must* be extended from the extrusion tube.

- Transition-termination module (TTM), (Section 6.5)

NOTE

The following FRUs require the system(s) and the storage array to be powered down, and the storage enclosure inner assembly *must* be removed from the extrusion tube.

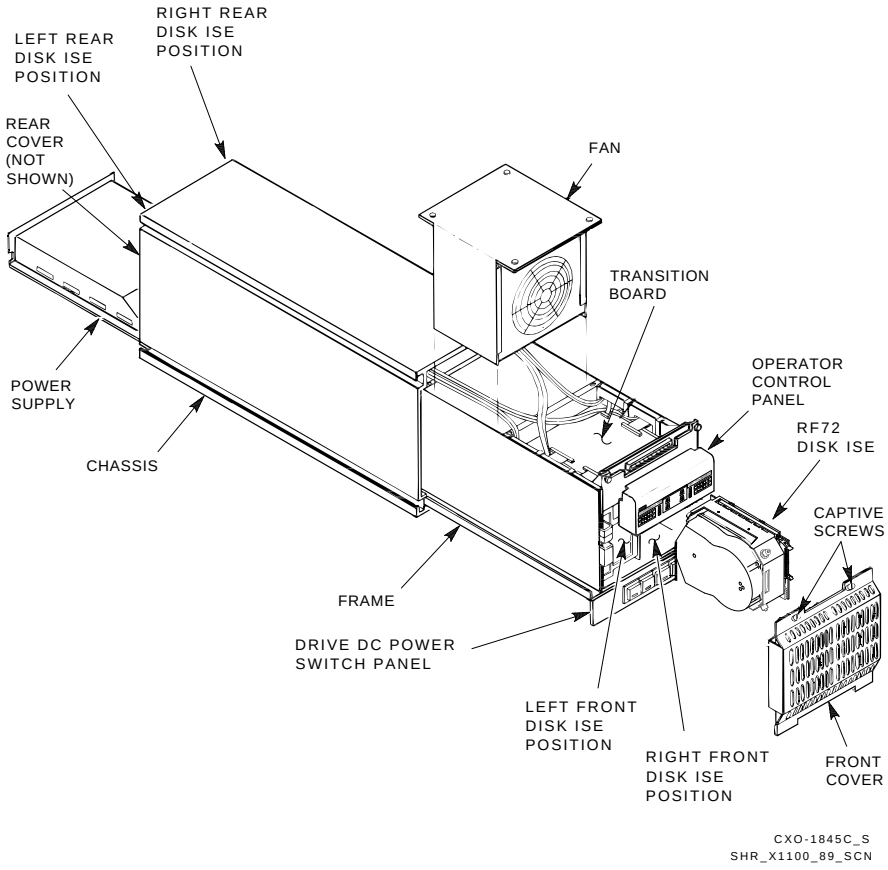
- Drive dc power switches, (Section 6.6)
- Power harness, (Section 6.7.3)
- OCP signal cable, (Section 6.7.4)
- DSSI signal cable, (Section 6.7.5)

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

See Figure 6–1 for the location and names of the major assemblies of the SF7x series storage enclosure.

Figure 6–1 Storage Enclosure Exploded View



6.1 Warm Swap of Disk ISE

CAUTION

Only qualified service personnel should perform the following procedures. Before proceding, make sure that the system manager has backed up all files on the disk ISE.

This section covers removing and replacing the disk ISE from the storage enclosure, and removing and replacing the disk ISE FRUs. The FRUs for the RF72 disk ISE are the HDA (PN 70–25972–01) and the drive module (PN 54–19010–01). The FRUs for the RF73 disk ISE are the HDA (PN 70–19119–01) and the drive module (PN 54–28814–01).

WARNING

Remember that you are performing the following procedures while the system or systems are up and running, and the rest of the disk ISEs in that storage enclosure are on-line.

The following procedures describe how to:

- Obtain current disk ISE parameters, (Section 6.1.1)
- Remove and replace the disk ISE from the storage enclosure and how to remove and replace a disk ISE FRU, (Section 6.1.2)
- Restore the disk ISE to service and test the disk ISE (after repair), (Section 6.1.3)

CAUTION

Never disconnect any 42-inch DSSI interconnect cables (PN BC21Q–3F) between storage enclosures and magazine tapes.

Never disconnect any 70-inch DSSI interconnect cables (PN BC21Q–3F) between the array I/O panel and storage enclosures or magazine tapes.

Never disconnect any 108-inch DSSI interconnect cables (PN BC21Q–09) between the storage array and any system I/O panels.

Never remove a DSSI terminator while power is applied.

6.1.1 Obtaining Current Disk ISE Parameters

Use the following procedure when performing a disk ISE warm swap or when repairing a disk ISE:

1. Find the node name of the disk ISE by typing either the SHOW DEVICE (Example 6–1) or the SHOW CLUSTER (Example 6–2) DCL command at the system console.

   NOTE

   Record all of the node names listed for use later in this procedure.

   Note that the device name in the sample for SHOW DEV DIA contains the allocation class between the two dollar ($) symbols. In this example, the disk ISE has an allocation class of 1. If ALLCLASS (the parameter name for allocation class) were 0, the device name would appear as R2CYAA$DIA21. UNITNUM is the number following DIA, 21 in this example. It is the MSCP unit number.

   The node name appears in parentheses following the device name in the SHOW DEVICE output; the node name is listed directly in the table in the SHOW CLUSTER output.

   In the examples given in this procedure, the disk ISE in question has a node name of R2CYAA.

Example 6–1 SHOW DEVICE

```
$ SHOW DEVICE DIA

Device                  Device      Error    Volume      Free  Trans Mnt
 Name                   Status      Count     Label     Blocks Count Cnt
$1$DIA21:    (R2CYAA)   Online          5
$1$DIA22:    (R2RRBA)   Mounted         0    DISK22     744282     1   1
 ^    ^^      ^^^^^^
 |    ||        |
 |    ||        +------- NODENAME
 |    ||
 |    ++------- UNITNUM
 +------------ ALLCLASS
```

Example 6–2 SHOW CLUSTER

```
$ SHOW CLUSTER
View of Cluster from system ID 63973  node: CLOUDF
+--------------------+---------+
|      SYSTEMS       | MEMBERS |
+--------+-----------+---------+
|  NODE  | SOFTWARE  |  STATUS |
+--------+-----------+---------+
| CLOUDF | VMS V5.4  | MEMBER  |
| R2CYAA | RFX V200  |         |
| R2RRBA | RFX V200  |         |
+--------+-----------+---------+
```

NOTE

Record the node names (in this example, R2CYAA and R2RRBA) for use later in this procedure.

2. Establish a connection to the suspected disk ISE by using the SET HOST/DUP command. This step requires a privileged account. If you cannot establish a connection due to the nature of the disk ISE problem, then use the alternate method outlined in the next step to determine disk ISE parameters.

   Display and record the disk ISE parameters as shown in Example 6–3. In this case, the parameter values are:

NODENAME	R2CYAA
SYSTEMID	404194100302
ALLCLASS	1
FIVEDIME	1
UNITNUM	21
FORCEUNI	0

Example 6–3 SET HOST/DUP

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS R2CYAA

%HSCPAD-I-LOCPROGEXE, Local program executing - type ^\ to exit
Copyright (C) 1990 Digital Equipment Corporation

PARAMS> SHOW NODENAME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
NODENAME          R2CYAA             RF72         String   Ascii   B

PARAMS> SHOW SYSTEMID

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
SYSTEMID     0404194100302      0000000000000  Quadword      Hex   B

PARAMS> SHOW ALLCLASS

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
ALLCLASS                1                  0       Byte     Dec   B

PARAMS> SHOW FIVEDIME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FIVEDIME                1                  1    Boolean     0/1   B

PARAMS> SHOW UNITNUM

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
UNITNUM                21                  0       Word     Dec   U

PARAMS> SHOW FORCEUNI

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FORCEUNI                0                  1    Boolean     0/1   U

PARAMS> EXIT

$
```

3. If you cannot establish a connection to the disk ISE, you can use the DCL command ANALYZE/SYSTEM (Example 6–4) to obtain the parameter information. Refer to the example (❶) where the system ID is 404194100302.

NOTE

This command displays a page of data. Press Return to bring up the next screen of data, where you will find the system ID.

Example 6–4 ANALYZE/SYSTEM

```
$ ANALYZE/SYSTEM

VAX/VMS System analyzer

SDA> SHOW DEVICE $1$DIA21

I/O data structures
-------------------
$1$DIA21    RF72              UCB address:  802D65D0
Device status:   00021810 online,valid,unload,lcl_valid
Characteristics: 1C4D4108 dir,rct,fod,shr,avl,mnt,elg,idv,odv,rnd
                 000022A1 clu,mscp,srv,nnm,loc
Owner UIC [000010,000001] Operation count    1116 ORB address  802D6700
PID        00000000       Error count           0 DDB address  804DA680
Alloc. lock ID   00B000E5 Reference count       1 DDT address  80308BD8
Alloc. class            1 Online count          2 VCB address  802E2750
Class/Type          01/38 BOFF               0000 CRB address  8048C250
Def. buf. size        512 Byte count         0000 PDT address  802A5F80
DEVDEPEND        00000000 SVAPTE         00000000 CDDB address 802D6410
DEVDEPND2        00000000 DEVSTS             0004 I/O wait queue  empty
FLCK index             34 RWAITCNT           0000
DLCK address     00000000

Press RETURN for more.

SDA> Return

I/O data structures
-------------------
      --- Primary Class Driver Data Block (CDDB) 802D6410 ---
Status:              0040 alcls_set
Controller Flags:    80D4 cf_mlths,cf_this,cf_misc,cf_attn,cf_replc
Allocation class        1  CDRP Queue      empty   DDB address   804DA860
System ID 404194100302 (1) Restart Queue   empty   CRB address   8048C250
                           DAP Count           3   CDDB link     80344C30
Contrl. ID      94100302  Contr. timeout     60   PDT address   802A5F80
                01644041  Reinit Count        0   Original UCB  00000000
Response ID     00000000  Wait UCB Count      0   UCB chain     802D65D0
MSCP Cmd status FFFFFFFF
                   *** I/O request queue is empty ***

Press RETURN for more.

SDA> EXIT
$
```

6.1.2 Warm Swap and Repair Procedures

Before you start the removal and replacement procedures, you *must* obtain all necessary parameters from the device to be replaced, or operating system data structures. If you have not done this, refer back to Section 6.1.1.

- Check that the parameters you obtained from the preceding steps are accurately recorded on the DSSI Configuration Sheet for this unit. Configuration sheets should be in the *Site Management Guide*. Make any necessary corrections to the recorded information.
- If the Fault LED on the front of an OCP is lit, press the Fault button and record the fault code. This code corresponds to the failed FRU of the disk ISE, as seen in Table 6–1.

Table 6–1 Disk ISE OCP Fault Codes

READY	WRITE PROTECT	FAULT	Disk ISE FRU
Off	Off	On	HDA
Off	On	Off	Drive module
Off	On	On	Drive module, then HDA

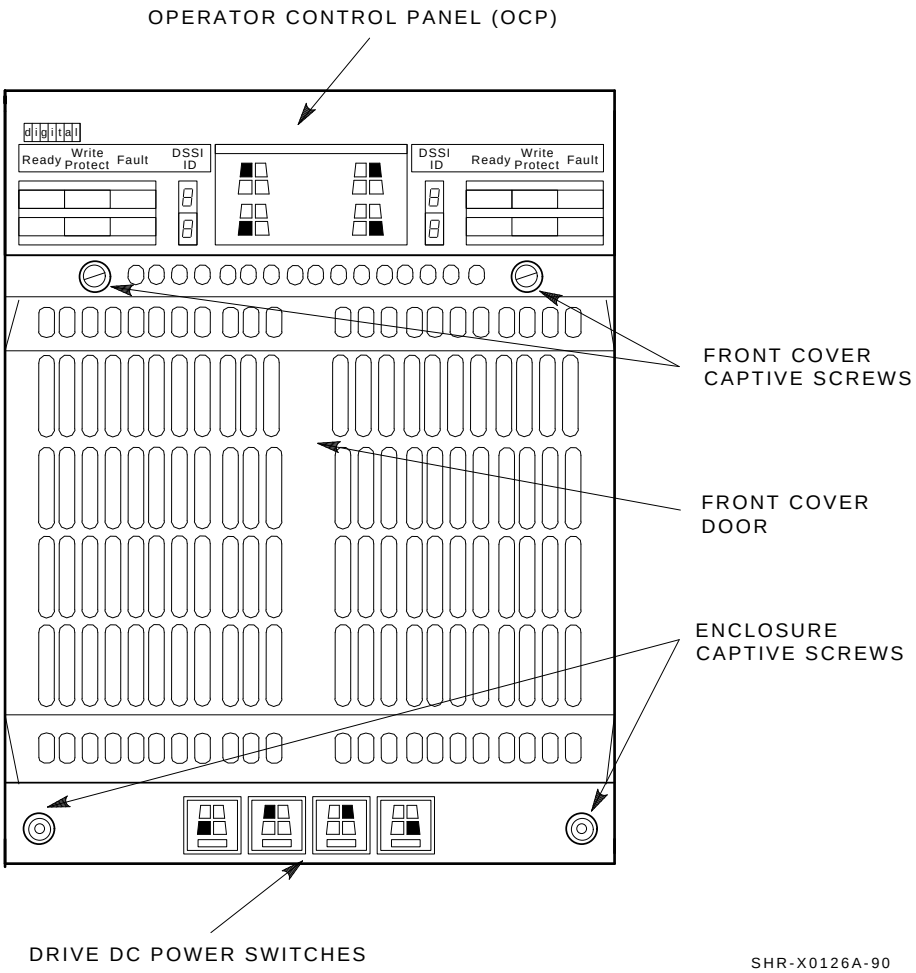
To remove the disk ISE from the storage enclosure:

1. At the system console, dismount the faulty disk ISE through the VMS operating system. For example:

   ```
   >> DISMOUNT $1$DIA21
   ```

2. Access the front of the storage enclosure by opening the cabinet doors.
3. Take the disk ISE off-line by pressing Ready on the operator control panel (OCP) for the disk ISE being removed (Figure 6–2).
4. At the bottom front of the storage enclosure, set the drive dc power switch to *off* (Figure 6–2). The switch LED should go out to indicate that power has been removed from the disk ISEs. If the LED does not go out, suspect a faulty switch.
5. Remove the front or rear cover over the drive position. Loosen the two captive screws in the upper corners of the cover. Lift the cover off and clear from the enclosure.

Figure 6–2 Storage Enclosure Front View



CAUTION

Do not attempt the following steps unless you have taken precautions against ESD. Wear an ESD grounding strap. Do not place the disk ISE on anything other than a grounded antistatic work surface. Failure to observe these precautions can result in ESD damage to the disk ISEs.

6. Disconnect the cables to the disk ISE in the following order *only* (Figure 6–3):

   DSSI cable
   OCP cable
   Power cable

WARNING

The disk ISE weighs approximately 10 pounds. Be prepared to handle this weight when the disk ISE comes free from the storage enclosure.

7. Loosen the screws on the top and bottom wedges—do not remove these screws—and push forward to loosen the disk ISE.

8. A retaining clip on the outside wall of the storage enclosure holds the disk ISE in place. The retaining clip locks with a tab on the skid plate (Figure 6–3). Release this clip and pull straight out on the disk ISE. After the disk ISE is released, pull it slightly forward. Stop and note how the edges of the skid plate slide between the guides in the upper and lower walls of the drive position.

9. Grasp the disk ISE firmly and remove the disk ISE from the storage enclosure. Take care not to damage the cables as you slide the disk ISE out.

10. The FRU to be replaced was determined by the fault code displayed on the OCP. Refer again to Table 6–1 or an error log.

11. At this time, you must remove the skid plate to replace either FRU. With a #1 Phillips screwdriver, remove the four screws that secure the skid plate to the HDA frame assembly (Figure 6–4).

Figure 6–3 Removing and Replacing a Disk ISE

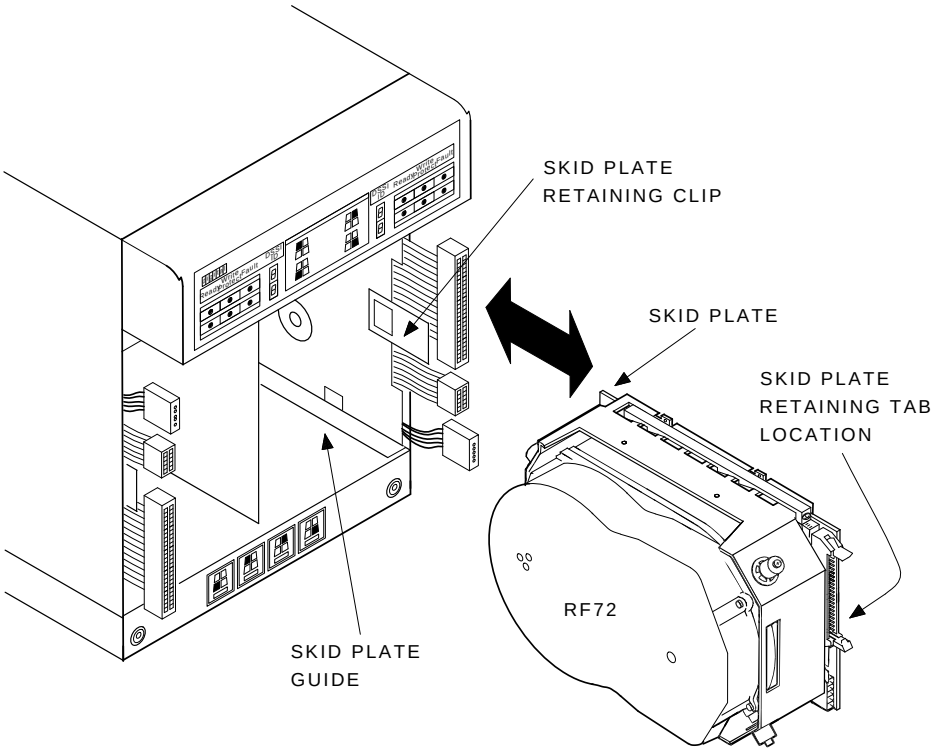
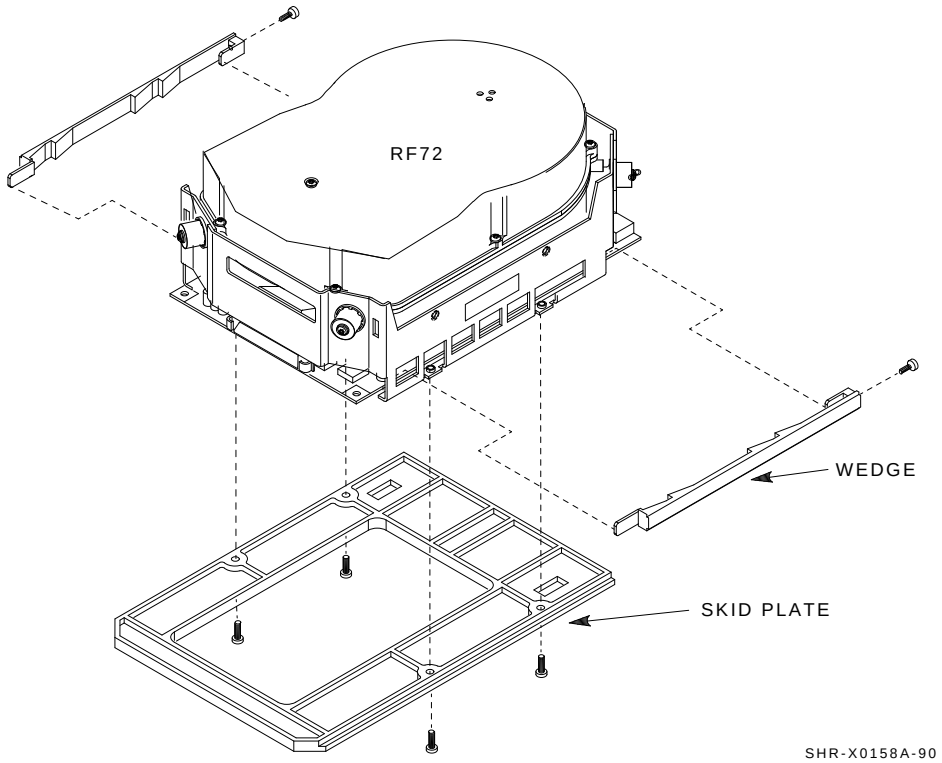


Figure 6–4 Disk ISE Skid Plate and Wedges



12. Use the following steps to remove and replace either disk ISE FRU.

CAUTION

- **Static electricity can damage the circuitry on the drive module. To avoid this problem, use an antistatic wrist strap and grounded work surface, such as that in the antistatic kit (PN 29–26246), when performing these steps.**
- **Handle the disk ISE with care. Excessive shock can damage the HDA.**
- **Do *not* lose the screws or use screws other than the ones that come with the device (PN 90–00039–07). Replacement screws must be the same type and size (6/32 × 1/4" flathead) or the HDA can be damaged.**

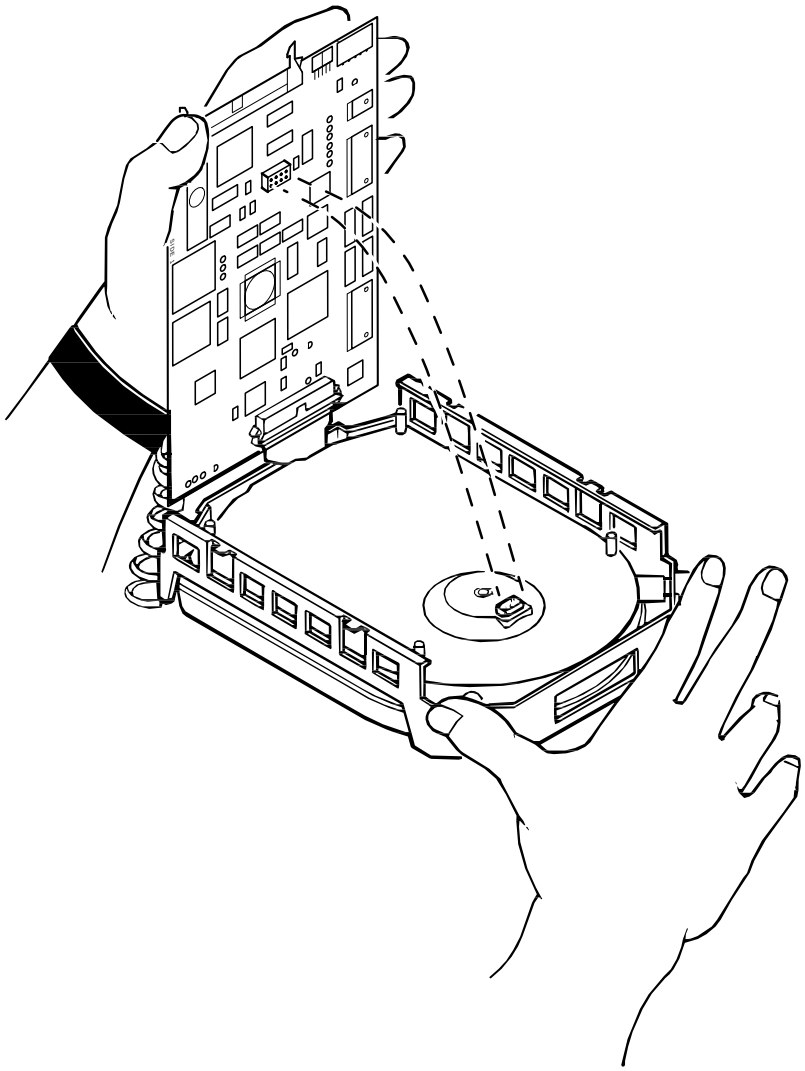
a. Remove the four screws (using a #1 Phillips screwdriver) securing the drive module to the HDA.

b. Carefully separate the drive module from the HDA, as shown in Figure 6–5. Be sure to lift the drive module from the end with the DSSI connector, separating the spindle motor from its socket on the drive module. Take care not to stress the flex circuit.

NOTE

Figures 6–5 and 6–6 show a generic RF series disk ISE.

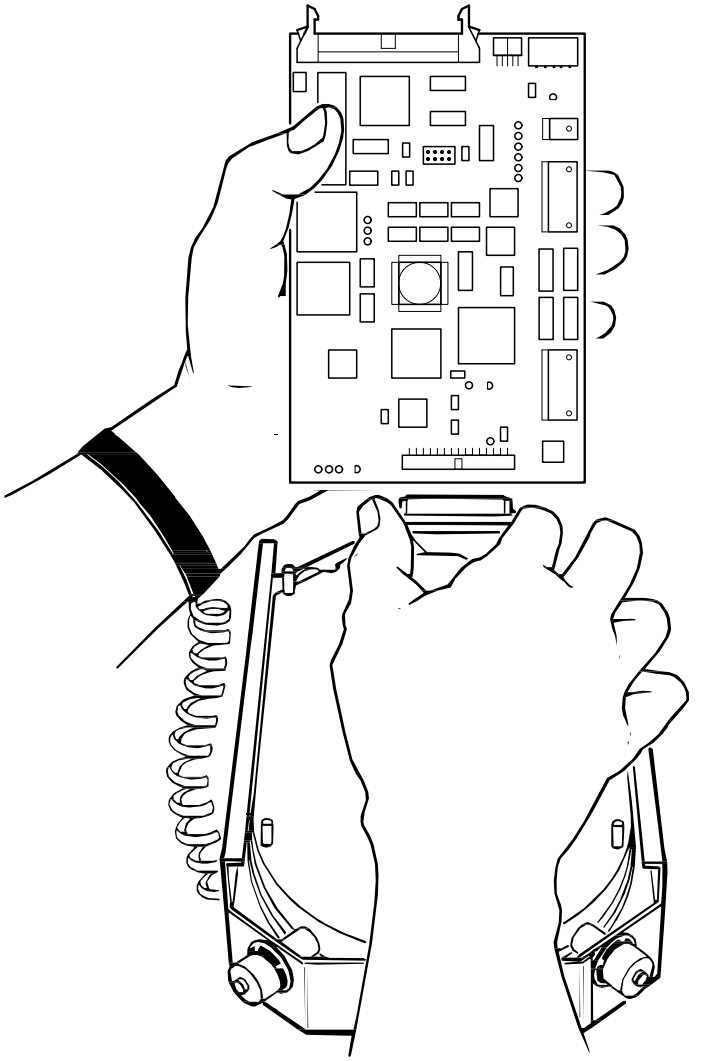
Figure 6–5 Separating the HDA from the Drive Module



MA-X0962-88

SHR-X0157-90

Figure 6–6 Disconnecting the Flex Circuit



MA-X0961-88

SHR-X0156-90

c. Carefully remove the connector attaching the flex circuit to the drive module, as shown in Figure 6–6.

d. If the HDA is to be replaced, remove the wedges from the HDA frame assembly at this time. Note their orientation.

e. Replace the faulty FRU and reconnect the flex circuit to the connector on the drive module.

f. Swing the drive module into position over the HDA and line up the four screw holes in the drive module over the corresponding holes in the HDA. Gently apply enough pressure to seat the pins from the spindle motor into the spindle socket on the drive module.

g. Replace the four screws that secure the drive module to the HDA. These screws *must* be tightened firmly, as the drive module is subjected to vibration when the device is running.

CAUTION

Make sure the screws are not touching the HDA.

13. If you removed the wedges, reinstall them at this time. Then replace the skid plate. Check that the tab on the replacement skid plate faces the connector end of the disk ISE.

14. Record the disk ISE serial number in the site log. You may also want to record the HDA serial number at this time. This number is in front of the HDA. The drive module set serial number is on the side of the module and is not readily accessible without disassembling the disk ISE.

15. Orient the disk ISE with the skid plate facing the outside wall of the enclosure frame. The disk ISE is installed with its rear connectors facing out of the storage enclosure.
16. While holding the wedges forward, slide the replacement disk ISE into the drive position. (Be sure to hold the cables clear of the disk ISE.) Take care to get the edges of the drive skid plate between the guides and the outer wall of the storage enclosure.
17. Push the disk ISE into the drive position by applying forward pressure to the wedge screws with your thumbs.
18. Check that the disk ISE is locked with the clip engaging the retaining tab on the drive skid plate.
19. Tighten, *do not overtighten*, the wedge screws at this time.
20. Reconnect the cables at the rear panel of the disk ISE, in the following order (note that all the connectors are keyed):

    Power cable
    OCP cable
    DSSI cable

21. Replace the front or rear cover on the storage enclosure.

NOTE

DO NOT APPLY POWER AT THIS TIME.

22. Go to Section 6.1.3 to restore the disk ISE.

6.1.3 Restoring the Disk ISE

Follow the steps in this section to bring a disk ISE back into service on its DSSI bus.

CAUTION

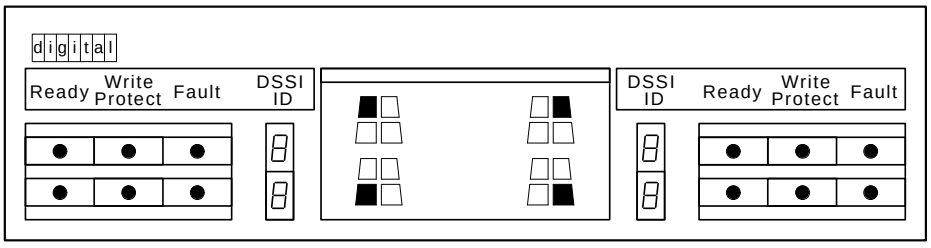
Perform the following steps only after repairing or replacing a disk ISE.

6.1.3.1 HDA Replaced

Use this section only if you replaced the HDA. Follow each step in the order presented and do not skip or miss any steps.

1. Apply power to the disk ISE with the drive dc power switch.
2. Press the Ready button (Figure 6–7) to bring the disk ISE back on-line. This step invokes the one-time HDA to drive module calibration that runs nominally 5 to 8 minutes.
3. Restore the customer data to the repaired disk ISE by using the usual BACKUP procedure. See the disk ISE service manual.

Figure 6–7 Storage Enclosure OCP

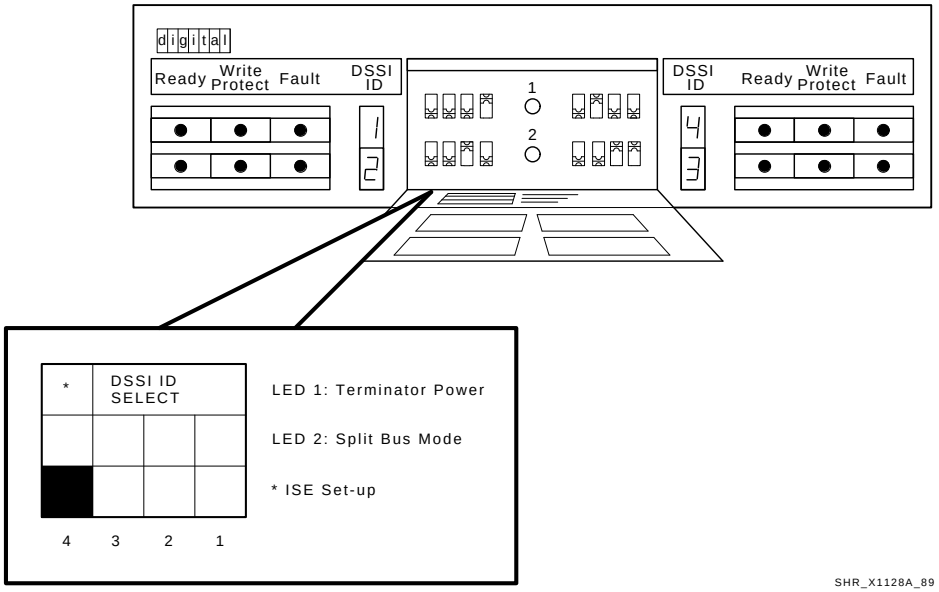


6.1.3.2 Drive Module Replaced

Use this section only if you replaced the drive module. Follow each step in the order presented and do not skip or miss any steps.

1. Set the MSCP switch to the disabled or up position (Figure 6–8).
2. Apply power to the disk ISE with the drive dc power switch.
3. Press the Ready button to bring the disk ISE back on-line.

Figure 6–8 OCP MSCP Switch



NOTE

Following the replacement of either an HDA or a drive module, a disk ISE performs a one-time calibration algorithm that takes nominally 5 to 8 minutes, during which time the disk ISE does not communicate with the host system. The calibration sequence is complete when the Fault LED on the OCP stops flashing and the Ready LED is on. Until this time, this disk ISE is unavailable.

6.1.3.3 Restoring the Disk ISE Parameters

Restore the parameters to the repaired disk ISE by following these steps in the order presented:

1. Find the node name of the replacement drive module (or disk ISE), R2QSAA in this example. Type the SHOW CLUSTER (Example 6–2) command at the system console. If necessary, compare the list of node names you recorded in Section 6.1.1 to find the new node name.

   NOTE

   The SHOW DEVICES command will *not* display the repaired disk ISE at this time.

2. Invoke PARAMS in the unit by issuing the SET HOST/DUP command:

   ```
   $ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS nodename
   ```

3. Using PARAMS commands, check all parameters and set them to the values previously recorded:

   a. Use the SHOW command to read each parameter.

   b. Use the SET command to change parameter values.

   c. Use the WRITE command once all values have been set to match the originals.

4. Set the MSCP switch on the OCP to the enable or down position before continuing.

5. Answer yes to the initialization question.

6. The program then terminates and leaves the disk ISE in the server-enabled state. Example 6–5 shows typical dialog for the disk ISE using the steps above.

Example 6–5 PARAMS Dialog Restoring Disk ISE Parameters

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=PARAMS R2QSAA

%HSCPAD-I-LOCPROGEXE, Local program executing - type ^\ to exit
Copyright (C) 1990 Digital Equipment Corporation

PARAMS> SHOW NODENAME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
NODENAME         R2QSAA              RF72         String   Ascii   B

PARAMS> SET NODENAME R2CYAA


PARAMS> SHOW SYSTEMID

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
SYSTEMID      593200495860      0000000000000  Quadword      Hex   B

PARAMS> SET SYSTEMID 0404194100302

PARAMS> SHOW ALLCLASS

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
ALLCLASS                0                  0       Byte     Dec   B

PARAMS> SET ALLCLASS 1

PARAMS> SHOW FIVEDIME

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FIVEDIME                1                  1    Boolean     0/1   B

PARAMS> SHOW UNITNUM

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
UNITNUM                 0                  0       Word     Dec   U

PARAMS> SET UNITNUM 21

PARAMS> SHOW FORCEUNI

Parameter     Current            Default         Type      Radix
--------- ----------------  -----------------  ---------   -----
FORCEUNI                1                  1    Boolean     0/1   U

PARAMS> SET FORCEUNI 0

NOTE:  Check the correct parameter settings before writing. Use the SHOW command.

PARAMS> WRITE
```

Example 6–5 Cont’d on next page

Example 6–5 (Continued) PARAMS Dialog Restoring Disk ISE Parameters

```
NOTE:  BEFORE RESPONDING TO THE FOLLOWING QUESTION, SET THE MSCP SWITCH
       TO THE OFF OR DOWN POSITION.

Changes require controller initialization, ok? [Y/(N)] Y
Initializing...


NOTE:  It takes approximately 1 minute before the following message prints.

%HSCPAD-S-REMPGMEND, Remote program terminated - message number 3.
%HSCPAD-S-END, Control returned to node CLOUDF
$
```

7. If you did not put the MSCP switch in the enable or down position before allowing the controller to initialize, you *must* do so now.

WARNING

Failure to put the MSCP switch in the enable or down position will result in the loss of VMS communication with this disk ISE at the next power-up.

6.1.3.4 Testing the Disk ISE

Once the disk ISE parameters are set, test the disk ISE by using the local program DRVTST. DRVTST is accessed in the same way as PARAMS, using the SET HOST/DUP command. In this case, instead of specifying PARAMS, you specify DRVTST:

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DRVTST nodename
```

CAUTION

- **If you have changed only a drive module in a disk ISE, answer the questions to force a read-only test. Do *not* run the write /read test as it will destroy the customer data on the HDA.**
- **If you have replaced an HDA, or an entire disk ISE, allow this test to perform write/read testing by responding accordingly to the questions. The write/read test will destroy the customer data on the HDA.**

DRVTST is a comprehensive hardware test. Once invoked, it prompts you to specify whether the test should be a write/read test or a read-only test. After you specify the type of test, it runs for 5 minutes. After 5 minutes, DRVTST indicates either that the test passed, or that a failure occurred.

Once the disk ISE has passed DRVTST, the installation is complete.

Example 6–6 shows how to run DRVTST.

NOTE

You may abort the test at any time by pressing one of the following: Ctrl/C, Ctrl/Y, or Ctrl/Z. If you do abort the test, the informational message `Operation aborted by user` **is displayed.**

Example 6–6 Running DRVTST

```
$ SET HOST/DUP/SERVER=MSCP$DUP/TASK=DRVTST R1EJAA ❶
Copyright © 1989 Digital Equipment Corporation
Write/read anywhere on the medium? [1=Yes/(0=No)] 1 ❷
User data will be corrupted. Proceed? [1=Yes/(0=No)] 1 ❸
5 minutes to complete. ❹
Test passed. ❺
```

❶ In Example 6–6, DRVTST is accessed through the VMS operating system on a disk ISE with a node name of R1EJAA.

❷ You must respond to this query for the program to continue. By answering yes (1), you select a write/read test, and DRVTST prompts you with another query.

In this case, type 1 Return, selecting a write/read test.

❸ This query gives you the chance to reconsider. If you answer no (0), your response to the first query is overridden, and a read-only test is executed. If you answer yes (1), DRVTST begins executing a write /read test of the disk ISE.

In this case, type 1 Return.

❹ The program displays this message during the test.

❺ This message indicates that DRVTST executed successfully.

If an error condition is found during the execution of DRVTST, an error message is displayed. Two types of errors are reported:

- Soft errors, which are corrected during the operation of the disk ISE
- Fatal errors, which prevent the disk ISE from functioning

Table 6–2 indicates the error messages you may see and what they mean.

Table 6–2 DRVTST Error Messages

Message	Description
Soft read error on head xx track yyyy. Soft write error on head xx track yyyy. Soft compare error on head xx track yyyy.	These are soft error messages indicating that an operation succeeded, but that the error recovery firmware was invoked. These messages may indicate a forced-error flag or correctable ECC error, or that the read/write head was temporarily off-track. These soft errors are corrected during normal operation.
xxxx - Unit diagnostics failed.	This is a fatal error. The xxxx is the MSCP error code.
xxxx - Unit read/write test failed.	This is a fatal error. The xxxx is the MSCP error code.

6.1.3.5 Mounting the Disk ISE

Once testing completes successfully, you can mount the disk ISE. Again, if you replaced the HDA, restore data with BACKUP.

The SHOW CLUSTER command will continue to show the original name of the replacement drive module. This "ghost" will not harm anything and will disappear only after the next reboot.

NOTE

A moderate increase in error counts is to be expected after this warm swap procedure has been correctly completed.

6.2 Replacing the OCP

Use the following steps to remove and replace the OCP (PN 70–26060–01):

1. At the system console, dismount *all* the ISEs on that bus.
2. Access the front of the enclosure by opening the cabinet door.
3. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. If applicable, remove the appropriate foreign language label set from the packet supplied with the replacement OCP and affix it to the appropriate locations.
6. Relabel the OCP as before. Refer to the *SF Family Label Booklet*.
7. Set the DSSI ID switches (behind the OCP door) the same as the original OCP.

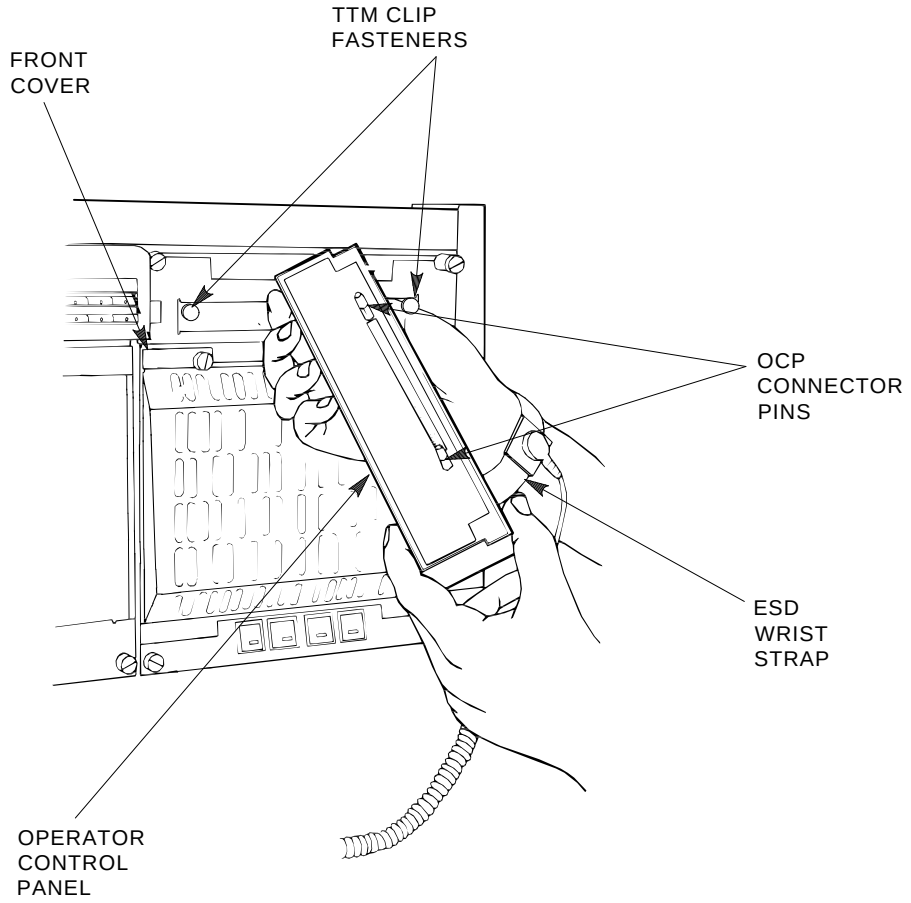
Install the new OCP (Figure 6–9).

CAUTION

Do not bend the alignment or connector pins when reinstalling the OCP. The panel should go into place without force.

1. Align the OCP connector pins with the clip fasteners on the transition-termination module and push straight in to lock the fasteners.
2. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
3. Restore the enclosure to service, and run the checkout procedure in Section 6.8.2.

Figure 6–9 Removing the OCP



6.3 Replacing the Power Supply

Use the following steps to remove and replace the enclosure power supply (PN H7869–AK for SF7x).

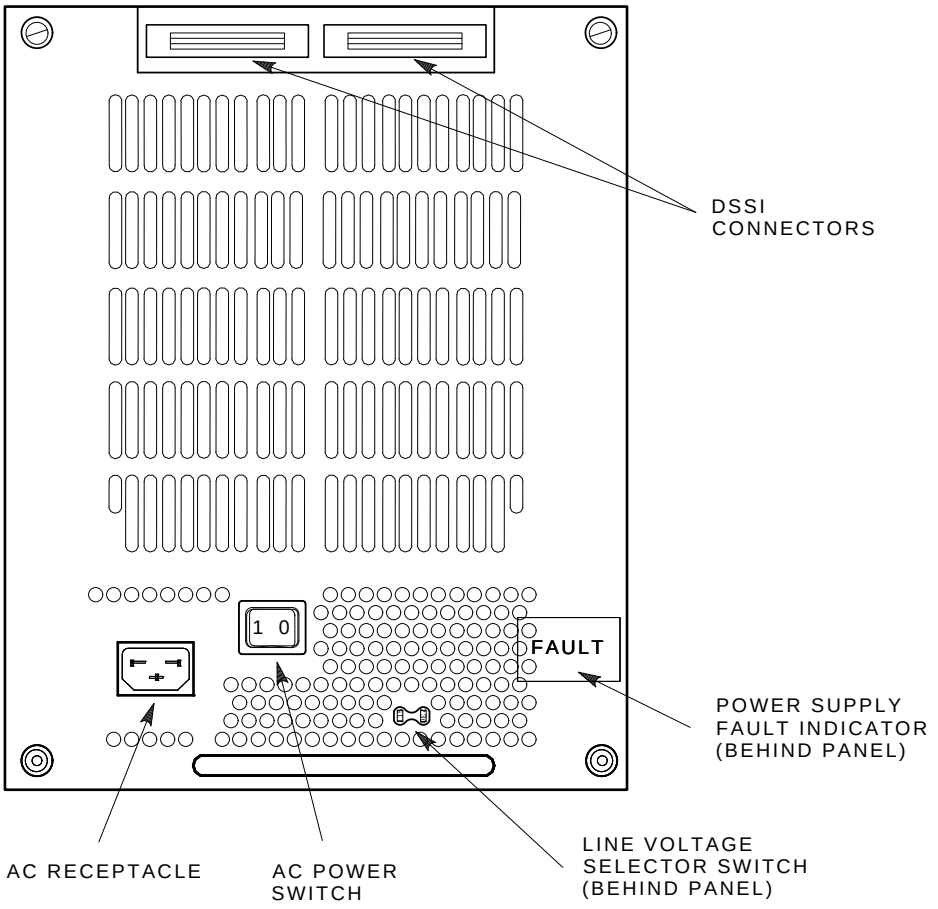
1. At the system console, dismount *all* the ISEs on that bus.
2. Access the enclosure by opening the cabinet doors.
3. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

4. At the rear of the storage enclosure, set the ac power switch on the power supply rear panel to *off*.
5. Disconnect the ac power cord from the enclosure rear bulkhead.
6. Loosen the two captive screws at the rear panel of the power supply (Figure 6–10).
7. Grasp the power supply by its handle and pull straight back until the power supply is free of the enclosure.
8. Inspect the power supply recess in the enclosure chassis to check that no wires are loose and no connector pins are broken.

Figure 6–10 Storage Enclosure Rear View



Install the new power supply.

1. Fit the tabs on the replacement power supply between the rails previously noted, and slide the power supply into the enclosure. Gently press the power supply to seat it in its connector.
2. Tighten the captive screws. Do not use force as you may strip the threads in the chassis.
3. At the rear of the power supply, locate the line voltage selector switch (Figure 6–10). The switch is accessible through a cutout in the rear panel of the power supply, just to the right of the line input connector.
4. Using a small screwdriver, set the switch to the desired line voltage. The selected voltage is marked on the switch element. Setting the switch alternates between the two line voltage options (120 V or 240 V).

CAUTION

Do not apply power to the supply until you are sure the line voltage selector switch is set to the correct position. Severe damage to the power supply will result if the switch is set to the incorrect position.

5. Check that the ac power switch on the replacement power supply is set to *off*.
6. Reconnect the ac power cord to the ac receptacle at the rear of the enclosure.
7. Restore the enclosure to service, and run the checkout procedure in Section 6.8.2.

6.4 Replacing the Fan Assembly

Use the following steps to remove and replace the fan assembly (PN 70–24440–01):

1. At the system console, dismount *all* the ISEs on that bus.
2. Access the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. At the rear of the enclosure, ensure that the DSSI interconnect cables can be extended up to 3 feet.

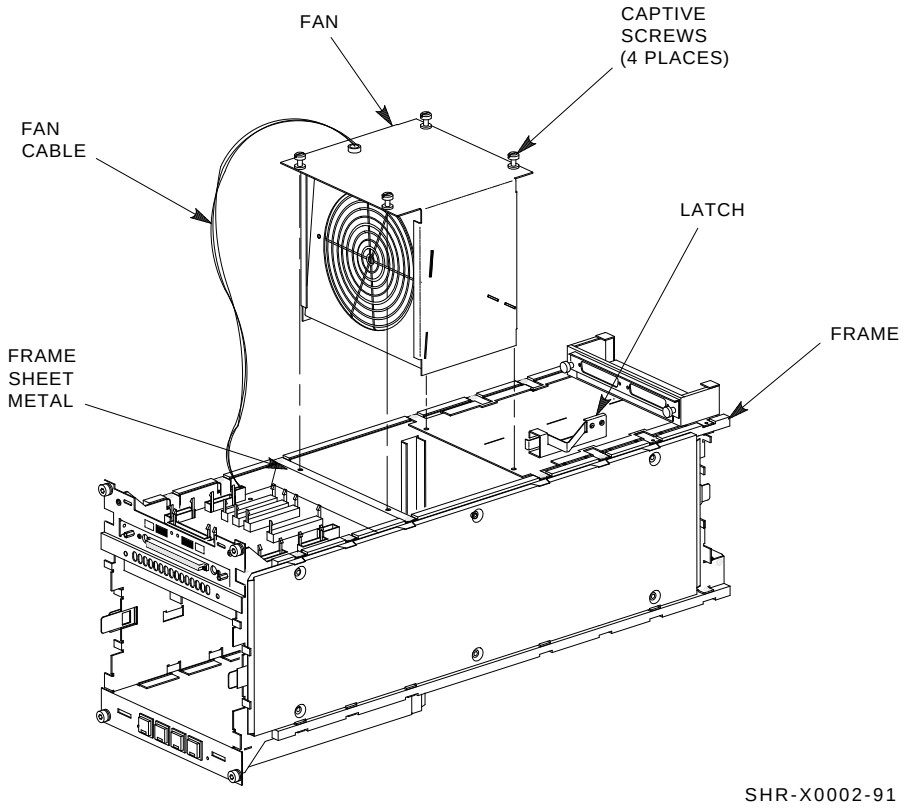
WARNING

Take care when accessing the internal components of the inner assembly. A stop mechanism in the chassis locks the inner assembly at a point that allows access to the fan assembly. This stop mechanism locks the chassis so that the inner assembly is over three-quarters of the way out of the chassis. If you release this stop, nothing prevents the inner assembly from being pulled completely free of the extrusion tube.

6. Loosen the four captive hex-head screws in each corner of the storage enclosure.
7. From the rear, push the inner assembly out of the extrusion tube until it latches at a position just past the top of the fan assembly.
8. Disconnect fan connector J6 from the transition-termination module (Figure 6–12). The fan cable is captive to the fan.

9. Loosen the four captive captive screws in each corner of the fan assembly (Figure 6–11).
10. Pull the fan assembly straight up to remove (Figure 6–11).

Figure 6–11 Removing and Replacing the Fan Assembly



Install the new fan assembly (Figure 6–11).

1. Orient the fan assembly with the fan motor facing the front of the enclosure and with the fan cable exiting on the left top of the assembly.
2. Slide the fan assembly in and gently tighten the captive screws, while avoiding any internal DSSI cables.
3. Reinstall the fan connector J6 at transition-termination module.

CAUTION

Assure that no internal cables have been trapped or pinched by the fan assembly.

4. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.
5. Replace the OCP by aligning the OCP connector pins with the TTM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
6. Move to the back of the enclosure and reposition the DSSI interconnect cables as needed at the rear bulkhead of the enclosure.
7. Turn on the enclosure with the ac power switch at the rear of the power supply.
8. Restore the enclosure to service, and run the checkout procedure in Section 6.8.2.

6.5 Replacing the Transition-Termination Module

Use the following procedure to remove and replace the transition-termination module (TTM) (PN 54–19081–01):

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the host system(s).
2. Access the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the lower front of the storage enclosure, set the drive dc power *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.
4. At the rear of the storage enclosure, turn off the enclosure with the ac power switch at the rear of the power supply.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

5. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
6. Loosen the four captive hex-head screws at each corner of the enclosure frame and, from the rear, push the inner assembly partially out of the enclosure.

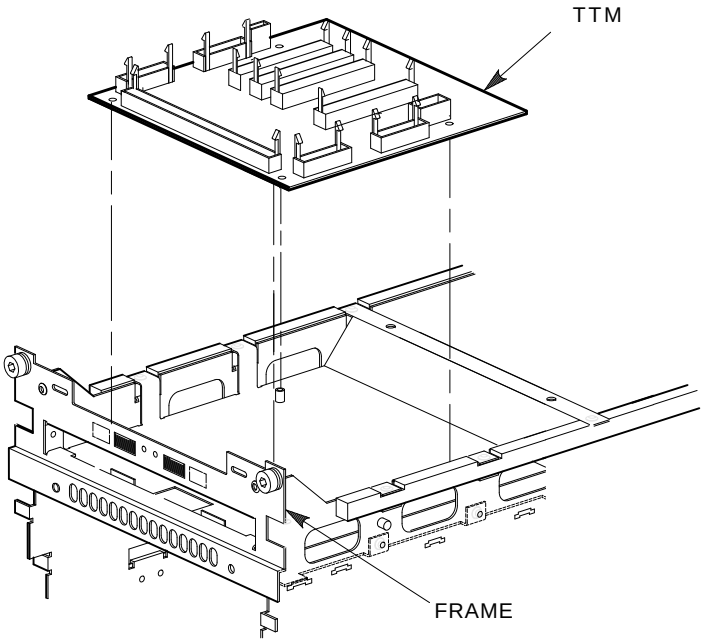
WARNING

Take care when accessing the internal components of the inner assembly. A stop mechanism in the chassis locks the inner assembly at a point that allows access to the fan assembly. This stop mechanism locks the chassis so that the inner assembly is over three-quarters of the way out of the chassis. If you release this stop, nothing prevents the inner assembly from being pulled completely free of the extrusion tube.

7. Disconnect all the cables from TTM.
8. Carefully unseat the TTM from the nylon posts. Use a flatblade screwdriver to release the locking tabs.

9. Now remove the TTM (Figure 6–12).

Figure 6–12 Removing and Replacing the Transition-Termination Module



SHR-X0001A-91

Install the new transition-termination module.

1. Align the new TTM with the nylon posts (Figure 6–12).
2. Set the small black jumper on the TTM to the same bus mode operation as the one replaced.
3. While facing the front of the storage enclosure, connect all the cables to the new TTM.
   a. Connect the power cable to J1, right-rear of the TTM.
   b. Connect the OCP cable to J11, front of the TTM.
   c. Connect the fan cable to J6, left-rear of the TTM.
   d. Connect the OCP cables as follows:

      Left-rear disk ISE, J8 (left-rear of the TTM)
      Left-front disk ISE, J10 (left-front of the TTM)
      Right-front disk ISE, J9 (right-front of the TTM)
      Right-rear disk ISE, J7 (right-rear of the TTM)

   e. Connect the left DSSI (50-pin) cable to J5 for through-bus mode or to J3 for split-bus mode.
   f. Connect the right DSSI (50-pin) cable to J4 for through-bus mode or to J2 for split-bus mode.
4. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.
5. Replace the OCP by aligning the OCP connector pins with the TTM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.

NOTE

Be sure to fold and position the excess cables to prevent pinching.

6. Move to the back of the enclosure and reposition the DSSI interconnect cables as needed at the rear bulkhead of the enclosure.
7. Restore the enclosure to service, and run the checkout procedure in Section 6.8.2.

6.6 Replacing the Drive DC Power Switch

Use the following procedure to remove and replace the drive dc power switch (PN 17–12717–13):

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the host system(s).
2. Access the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

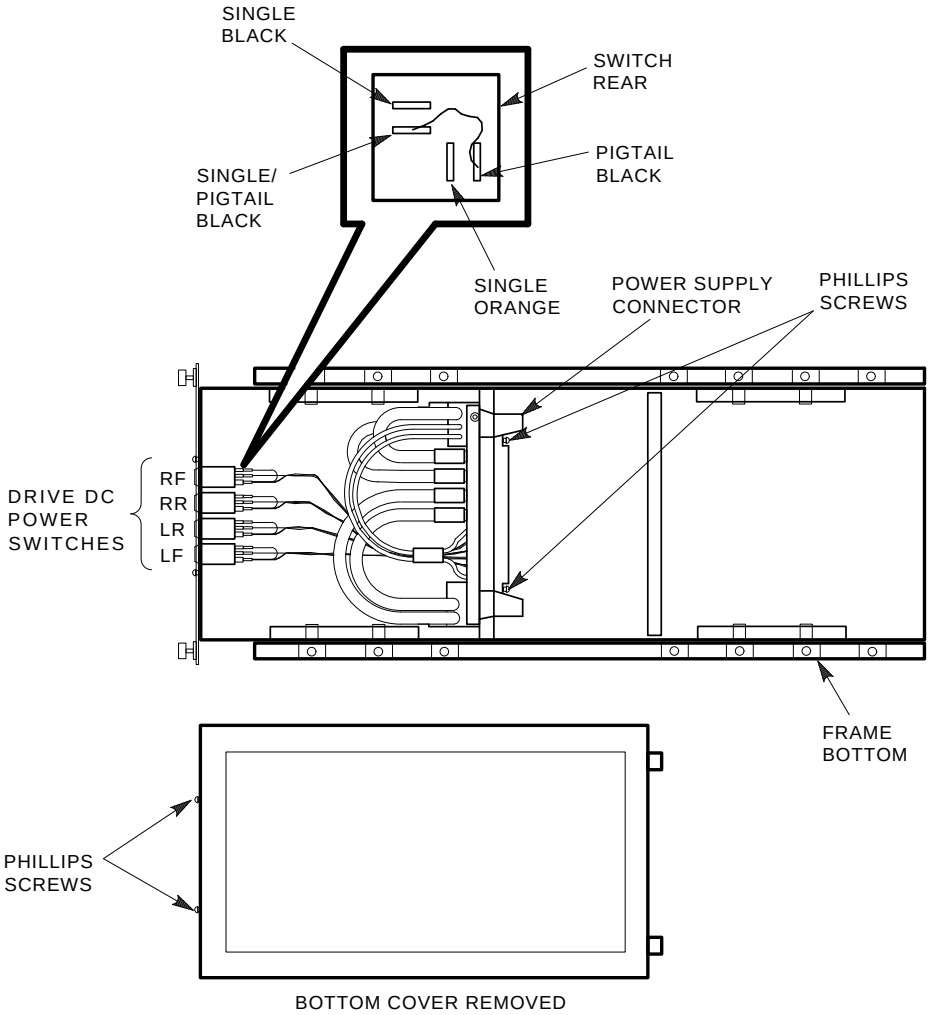
4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. Remove the storage enclosure front and rear covers by loosening the top captive screws and lifting the cover up and off.
6. At the rear of the storage enclosure, turn off the enclosure with the ac power switch at the rear of the power supply.
7. At the lower rear of the storage array, turn off the circuit breaker on the power controller.
8. Disconnect the DSSI interconnect cables from the rear bulkhead of the enclosure (Figure 6–10).
9. Disconnect the ac power cord at the rear of the enclosure.

10. Loosen the four captive screws in the corners of the enclosure frame and push the inner assembly out of the enclosure until it engages the latch.

WARNING—USE TWO PEOPLE.
Releasing the latch allows the inner assembly to be removed from the extrusion tube for this operation. Be prepared to take the weight of the inner assembly when it comes free of the extrusion tube. Have an ESD-protected workspace ready to put the inner assembly on after removing it.

11. Double-check the enclosure to verify that nothing can prevent the inner assembly from being pulled out farther. Reach into the chassis and release the latch. (It may be necessary to push the frame back in about a quarter inch before the latch will release.) See Figure 6–11. Push the inner assembly free of the extrusion tube, reach into the inner assembly, grasp the sheet metal in front of the fan, and pull. Set the inner assembly on an antistatic work surface.
12. Turn the assembly upside down (Figure 6–13).
13. Remove the two Phillips screws on either side of the drive dc power switches. This step allows you to remove the protective cover from the drive dc power switches. Remove this cover, exposing the wiring from the power harness to the drive dc power switches.
14. Remove the two Phillips screws holding the power supply connector to the frame (Figure 6–13).
15. Carefully remove all single-black, pigtail-black, and orange wires from each drive dc power switch terminal. Each front panel power switch wire is labeled according to its intended switch. Wires in each group are color-coded: single-black is the SW A wire to TTM, orange is the LED wire from the power supply to the associated switch indicator, and the two pigtail-black wires are returns. Route the replacement cable in the same manner as the original cable. These wires are labeled with their respective drive positions, corresponding to the drive dc power switches.
16. Remove the drive dc power switch from the enclosure frame.

Figure 6–13 Removing and Replacing the Drive DC Power Switches



Install the new drive dc power switch.

1. Install the new drive dc power switch into the enclosure frame.
2. Install all single-black, pigtail-black, and orange wires to all drive dc power switches, observing the correct drive position.
3. Route all drive position power cables to the correct drive position.

NOTE

The left-rear and right-rear cables are 31.5 inches long. The left-front and right-front cables are 15 inches long. Be sure to route the correct cable to the correct drive position.

4. Install the protective cover over the drive dc power switches and secure it with the two Phillips screws previously removed.

NOTE

Do not disturb the fingerstock on the storage enclosure frame.

WARNING—USE TWO PEOPLE.

The next step requires two people to lift the inner assembly back into the extrusion tube mounted in the storage array.

5. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.
6. Tighten the four captive screws at each corner of the enclosure frame.
7. Replace the front and rear covers on the storage enclosure and tighten the top two captive screws.
8. Replace the OCP by aligning the OCP connector pins with the TTM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
9. At the rear of the storage enclosure, reconnect the ac power cord to the ac receptacle on the power supply.
10. Replace the DSSI interconnect cables to the rear bulkhead of the enclosure.
11. Restore the enclosure to service, and run the checkout procedure in Section 6.8.

6.7 Cable Replacement Procedures

NOTE

Do *not* disconnect any DSSI interconnect cables while power is applied to the storage array (all installed ISEs) and the system(s).

The ac power cord, power harness, operator control panel (OCP) cables, and DSSI cables are storage enclosure FRUs. The wires to the drive dc power switches are replaced as part of the power harness.

The power harness cable runs from the power supply connector on the bottom of the inner assembly, through holes in the side of the inner assembly, and up to the top of the inner assembly. As the harness runs up the sides of the inner assembly, power wires for each disk ISE are broken out of the harness.

The OCP cables run down the side of the inner assembly from their associated disk ISE and up to the TTM.

The DSSI interconnect cables run from the rear bulkhead, over the top of the inner assembly, and down the sides to their respective disk ISEs. You must replace all the cables for a port when replacing a single cable.

The removal and replacement procedures for these FRUs are as follows:

- AC power cord, Section 6.7.1
- OCP to TTM cable, Section 6.7.2
- Power harness, Section 6.7.3
- Operator control panel cables, Section 6.7.4
- Internal DSSI cables, Section 6.7.5

6.7.1 Replacing the AC Power Cord

Use the following procedure to remove and replace the storage enclosure ac power cord (PN 17–00442–18):

1. At the system console, dismount the disk ISEs in *all* storage enclosures.
2. Access the front and rear of the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosures, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

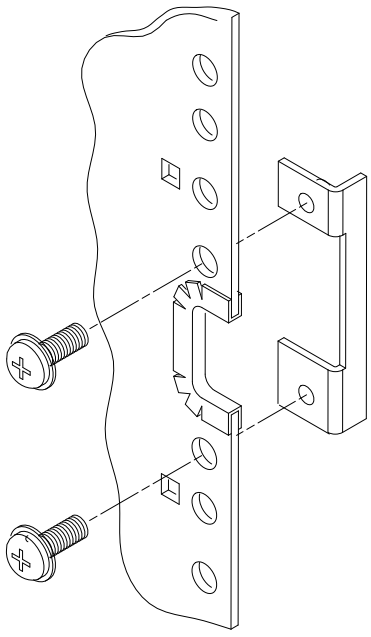
4. At the rear of the storage enclosure, turn off the enclosures with the ac power switch on the power supply.
5. Turn off the circuit breaker on the power controller.
6. Locate the ac power cord to be replaced. Loosen the lower screw of the ac retainer bracket. Remove the upper ac power cord retainer bracket screw and tilt the retainer 45 degrees. Then retighten the lower screw (Figure 6–14).
7. At the lower rear of cabinet, open DSSI I/O panel by loosening the two captive screws on the right.

CAUTION

Use care not to disturb or damage any power cords, and DSSI interconnect cables, that are already connected to the DSSI I/O panel.

8. Unplug the faulty ac power cord from the back of the storage enclosure or the magazine tape, and from the power controller.

Figure 6–14 AC Power Cord Retainer



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Install the new ac power cord.

1. Place the ac power cord in the retainer space with the shrouded male plug end inside the cabinet side rail.
2. Leave approximately 2 feet of slack at the position location.
3. Loosen the lower screw and put the retainer bracket back to its original position. Then reinsert the upper screw and tighten both the top and bottom screws.
4. Connect the male end of the ac power cord to the outlet on the power controller where the original ac power cord was plugged in.
5. Restore the enclosure to service, and run the checkout procedure in Section 6.8.

6.7.2 Replacing the OCP to TTM Cable

Use the following procedure to remove and replace the OCP to TTM cable (PN 17–02551–01):

1. At the system console, dismount *all* the ISEs on that bus.
2. Access the front of the storage enclosure by opening the cabinet door.
3. Take the disk ISEs in the storage enclosure off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. Loosen the four captive hex-head screws in each corner of the storage enclosure.
6. Push the inner assembly out of the enclosure until it engages the latch.

WARNING

Do not extend the storage enclosure past the first mechanical stop.

7. Remove the cable (Figure 6–15) as follows:
   a. Disconnect the cable at J11 on the front of the TTM.
   b. Use a #1 Phillips screwdriver to remove the screw, washer, nut, and lock washer on the right side of the cable at the OCP end.

WARNING
Be careful not to drop any parts inside the assembly.

   c. Loosen, *do not remove,* the screw on the left side.
   d. Slide the connector to the right and remove.

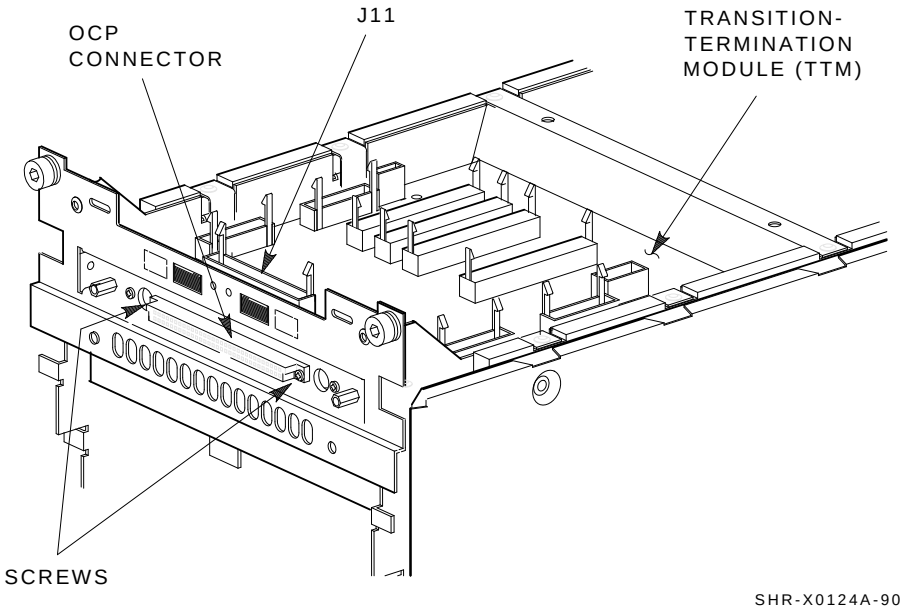
Install the new OCP to TTM cable.

1. Slide the new cable in and under the left screw; *do not tighten.*
2. Replace the screw, nut, and lock washer on the right side of the cable at the OCP end. Tighten both screws at this time.

WARNING
Be careful not to drop any parts inside the assembly.

3. Connect the cable to J11 on the front of the TTM.
4. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.
5. Replace the OCP by aligning the OCP connector pins with the TTM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
6. Restore the enclosure to service, and run the checkout procedure in Section 6.8.2.

Figure 6–15 Removing and Replacing the OCP to TTM Cable



6.7.3 Replacing the Power Harness

Use the following procedure to remove and replace the storage enclosure power harness (PN 17–02389–01):

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the system(s).
2. Access the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

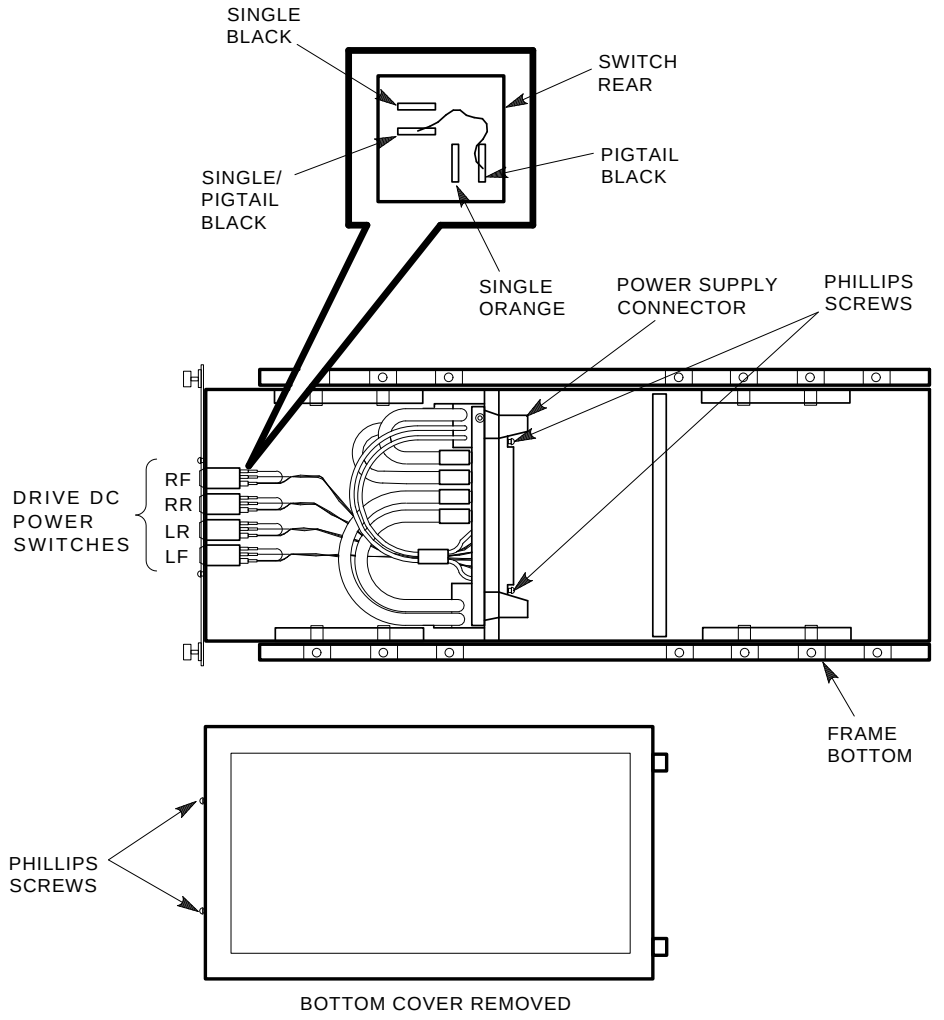
4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. Remove the front and rear storage enclosure covers by loosening the top captive screws and lifting up on the cover.
6. At the rear of the storage enclosure, turn off the enclosure with the ac power switch at the rear of the power supply.
7. Turn off the circuit breaker on the power controller.
8. Disconnect the DSSI interconnect cables from the rear bulkhead of the enclosure (Figure 6–10).
9. Disconnect the ac power cord at the rear of the enclosure.

WARNING—USE TWO PEOPLE.
Releasing the latch allows the inner assembly to be removed from the extrusion tube for this operation. Be prepared to take the weight of the inner assembly when it comes free of the extrusion tube. Have an ESD-protected workspace ready to put the inner assembly on after removing it.

10. Loosen the four captive screws in the corners of the enclosure frame and push the inner assembly out of the enclosure until it engages the latch.
11. Double-check the enclosure to verify that nothing can prevent the inner assembly from being pulled out farther. Reach into the chassis and release the latch. (It may be necessary to push the frame back in about a quarter inch before the latch will release.) See Figure 6–11. Push the inner assembly free of the extrusion tube, reach into the inner assembly, grasp the sheet metal in front of the fan, and pull. Set the inner assembly on an antistatic work surface.
12. Turn the inner assembly on its side and remove the acoustic panel. Flip the frame over and remove the other acoustic panel (Figure 6–17).
13. Turn the inner assembly upside down (Figure 6–16).
14. Remove the two Phillips screws on either side of the dc power switches. This step allows you to remove the protective cover from the drive dc power switches. Remove this cover, exposing the wiring from the power harness to the drive dc power switches (Figure 6–16).
15. Remove the two Phillips screws holding the power supply connector to the frame (Figure 6–16).
16. Tilt the power supply connector so that it can be removed from the bracket. (The connector cannot be removed unless it is tilted.)
17. Carefully remove all single-black, pigtail-black, and orange wires from each of the drive dc power switch terminals. Each front panel power switch wire is labeled according to its intended switch. Wires in each group are color-coded: single-black is the SW A wire to TTM, orange is the LED wire from the power supply to the associated switch indicator, and the two pigtail-black wires are returns. Route the replacement cable in the same manner as the original cable. These wires are labeled with their respective drive positions, corresponding to the drive dc power switches. See Figure 6–16 for wiring information on the drive dc power switches.

18. Trace and remove the power harness from all drive positions and the TTM.

Figure 6–16 Storage Enclosure Power Harness



Install the new power harness.

1. Install the power supply connector into the power supply bracket by tilting the connector until flush against the bracket. Secure the power supply connector with the two Phillips screws previously removed.
2. Install all single-black, pigtail-black, and orange wires to all drive dc power switches, observing the correct drive position.
3. Route all drive position power cables to the correct drive position.

NOTE

The left-rear and right-rear cables are 31.5 inches long. The left-front and right-front cables are 15 inches long. Be sure to route the correct cable to the correct drive position.

4. Route the TTM power cable to the TTM, connector J7 (right-front).

NOTE

Do not disturb the fingerstock on the storage enclosure frame.

5. Install the protective cover over the drive dc power switches and secure it with the two Phillips screws previously removed.
6. Install both acoustic panels, using six Phillips screws for each panel previously removed. Note that the end stamped “front” aligns with the front of the enclosure.

WARNING—USE TWO PEOPLE.
Use two people to place the inner assembly back into the extrusion tube mounted in the storage array.

7. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.
8. Tighten the four captive screws at each corner of the enclosure frame.
9. Replace the OCP by aligning the OCP connector pins with the TTM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
10. Replace the front and rear storage enclosure covers and tighten the top captive screws.
11. At the rear of the storage enclosure, reconnect the ac power cord to the ac receptacle on the power supply.
12. At the rear, replace the DSSI interconnect cables to the rear bulkhead of the enclosure.
13. Restore the enclosure to service, and run the checkout procedure in Section 6.8.

6.7.4 Replacing the OCP Cables

Use the following procedure to remove and replace the storage enclosure OCP cables for the front disk ISEs (PN 17–01936–03), or the OCP cables for the rear disk ISEs (PN 17–01936–04):

1. Perform an orderly shutdown of the system and *all* devices on that bus. Remove ac power to the system(s).
2. Access the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in *all* enclosures off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. Remove the front and rear storage enclosure covers by loosening the top captive screws and lifting up on the cover.
6. At the rear of the storage enclosure, turn off the enclosure with the ac power switch at the rear of the power supply.
7. Turn off the circuit breaker on the power controller.
8. Disconnect the DSSI interconnect cables from the rear bulkhead of the enclosure (Figure 6–10).
9. Disconnect the ac power cord at the rear of the enclosure.

WARNING—USE TWO PEOPLE.
Releasing the latch allows the inner assembly to be removed from the extrusion tube for this operation. Be prepared to take the weight of the inner assembly when it comes free of the extrusion tube. Have an ESD-protected workspace ready to put the inner assembly on after removing it.

10. Loosen the four captive screws in the corners of the enclosure frame and push the inner assembly out of the enclosure until it engages the latch.
11. Double-check the enclosure to verify that nothing can prevent the inner assembly from being pulled out farther. Reach into the chassis and release the latch. (It may be necessary to push the frame back in about a quarter inch before the latch will release.) See Figure 6–11. Push the inner assembly free of the extrusion tube, reach into the inner assembly, grasp the sheet metal in front of the fan, and pull. Set the inner assembly on an antistatic work surface.
12. Turn the inner assembly on the side exposing the OCP cable that needs replacing.
13. Remove the acoustic panels necessary to replace the defective OCP cable. Six Phillips screws hold each acoustic panel on the inner assembly. If you are replacing a single OCP cable, remove only the panel for the associated disk ISE (Figure 6–17).
14. Remove the OCP cable from the inner assembly and the disk ISE. Note how the cable is routed.

Install the new OCP cable.

1. While facing the front of the storage enclosure, connect all the OCP cables to the new TTM:

   Left-rear disk ISE, J8 (left-rear of the TTM)
   Left-front disk ISE, J10 (left-front of the TTM)
   Right-front disk ISE, J9 (right-front of the TTM)
   Right-rear disk ISE, J7 (right-rear of the TTM)

2. Reinstall the acoustic panels to the sides of the inner assembly. Note that the end stamped *front* aligns with the front of the enclosure.

WARNING—USE TWO PEOPLE.
Use two people to place the inner assembly back into the extrusion tube mounted in the DECarray.

3. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.

4. Replace the front and rear storage enclosure covers and tighten the top captive screws.

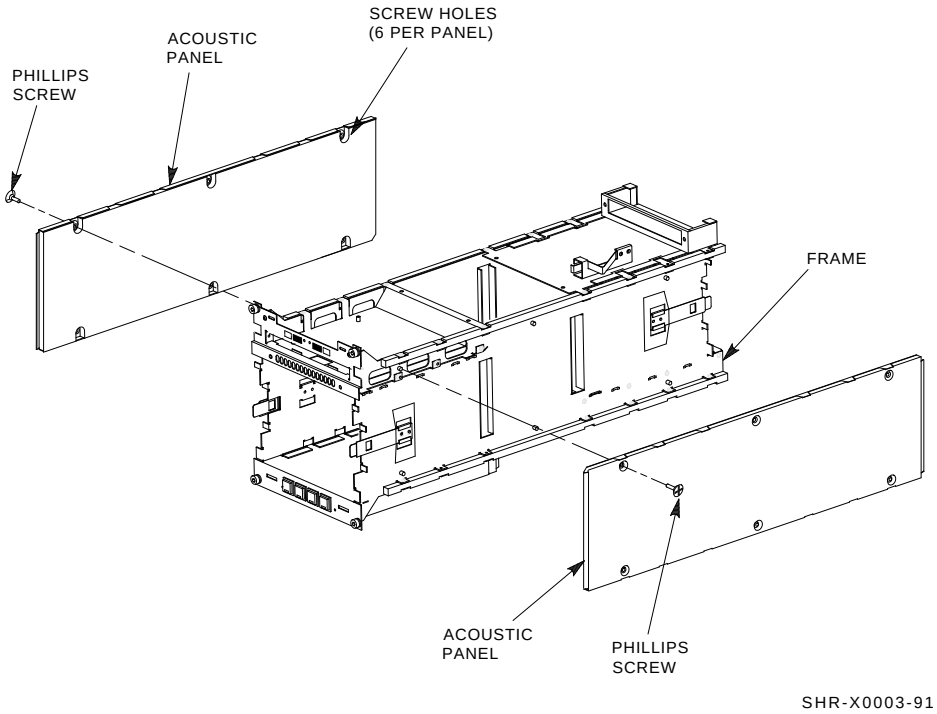
5. Replace the OCP by aligning the OCP connector pins with the TTM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.

6. At the rear of the storage enclosure, reconnect the ac power cord to the ac receptacle on the power supply.

7. Replace the DSSI interconnect cables to the rear bulkhead of the enclosure.

8. Restore the enclosure to service, and run the checkout procedure in Section 6.8.

Figure 6–17 Removing the Acoustic Panels



6.7.5 Replacing the Internal DSSI Cables

Use the following procedure to remove and replace the storage enclosure internal DSSI cable (PN 17–02994–01):

1. Perform an orderly shutdown of the host system and *all* devices on that bus. Remove ac power to the host system(s).
2. Access the storage enclosure by opening the cabinet doors.
3. Take the disk ISEs in *all* storage enclosures off-line:
   a. Press and release all Ready buttons on the OCP (Figure 6–2). Wait for the Ready LEDs to go out.
   b. At the front of the storage enclosure, set the drive dc power switches to *off* (Figure 6–2). The switch element LEDs should go out to indicate that power has been removed from the disk ISE. If any LED does not go out, suspect a faulty switch.

CAUTION

Wear an ESD grounding strap at all times while handling the storage enclosure or any of its FRUs.

4. Remove the OCP—grasp it firmly and pull it straight out. Do not pry; the panel comes free with a straight pull.
5. Remove the front and rear storage enclosure covers by loosening the top captive screws and lifting up on the cover.
6. At the rear of the storage enclosure, turn off the enclosure with the ac power switch on the power supply.
7. Remove ac power from the storage array by turning off the circuit breaker on the the power controller, and the system(s).
8. Disconnect the DSSI interconnect cables from the rear bulkhead of the storage enclosure (Figure 6–10).
9. Disconnect the ac power cord at the power supply.
10. Loosen the four captive screws in the corners of the enclosure frame and push the inner assembly out of the enclosure until it engages the safety latch.

WARNING—USE TWO PEOPLE.
Releasing the latch allows the inner assembly to be removed from the extrusion tube for this operation. Be prepared to take the weight of the inner assembly when it comes free of the extrusion tube. Have an ESD-protected workspace ready to put the inner assembly on after removing it.

11. Double-check the enclosure to verify that nothing can prevent the inner assembly from being pulled out farther. Reach into the chassis and release the latch. (It may be necessary to push the frame back in about a quarter inch before the latch will release.) See Figure 6–11. Push the inner assembly free of the extrusion tube, reach into the inner assembly, grasp the sheet metal in front of the fan, and pull. Set the inner assembly on an antistatic work surface.
12. Flip the inner assembly on either side and remove the appropriate acoustic panels, held on by six Phillips screws (Figure 6–17).
13. At the rear of the storage enclosure, remove the DSSI connector screws securing the internal DSSI cables to the inner assembly by using a #0 Phillips screwdriver.
14. Trace and remove the DSSI cable from both drive positions and the TTM.
15. Unplug the fan power cord at the TTM, and remove the fan assembly by loosening the four captive screws and lifting the assembly straight up.
16. Remove the cable from the inner assembly.

Install the new internal DSSI cable.

1. Place the replacement cable in the inner assembly.
2. Insert the DSSI port connector in the rear DSSI bulkhead of the inner assembly so it is oriented the same as the one next to it.

NOTE

Ensure that no cables are pinched by the acoustic panel.

NOTE

Remember that J5 (left cable) and J4 (right cable) on the TTM are for through-bus mode. J3 (left cable) and J2 (right cable) are for split-bus mode. Check the position of the small black jumper on the TTM to determine the bus mode.

3. Route the replacement DSSI cable to both disk ISEs and the TTM, as shown in Figure 6–18. Note the orientation of the keys on the DSSI connectors.

Figure 6–18 Enclosure Internal DSSI Cables

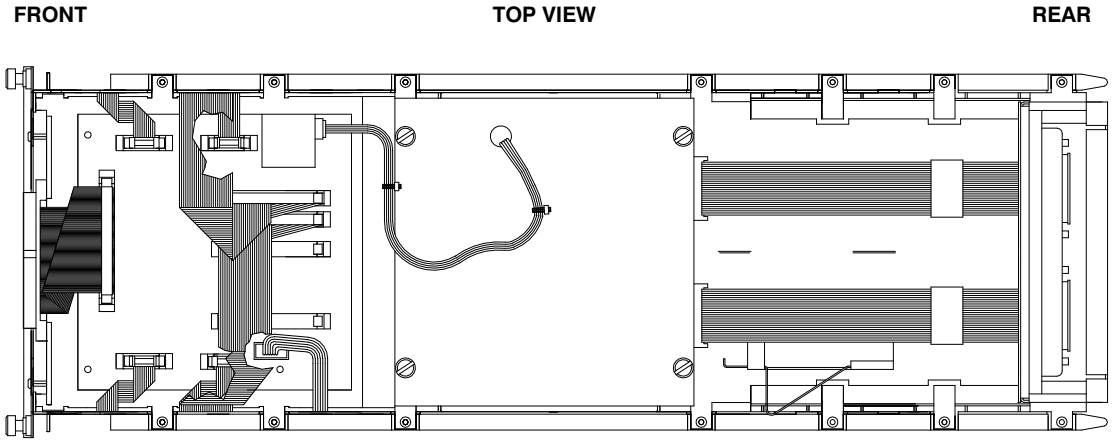


Figure 6–19 Enclosure Internal DSSI Cables (cont.)

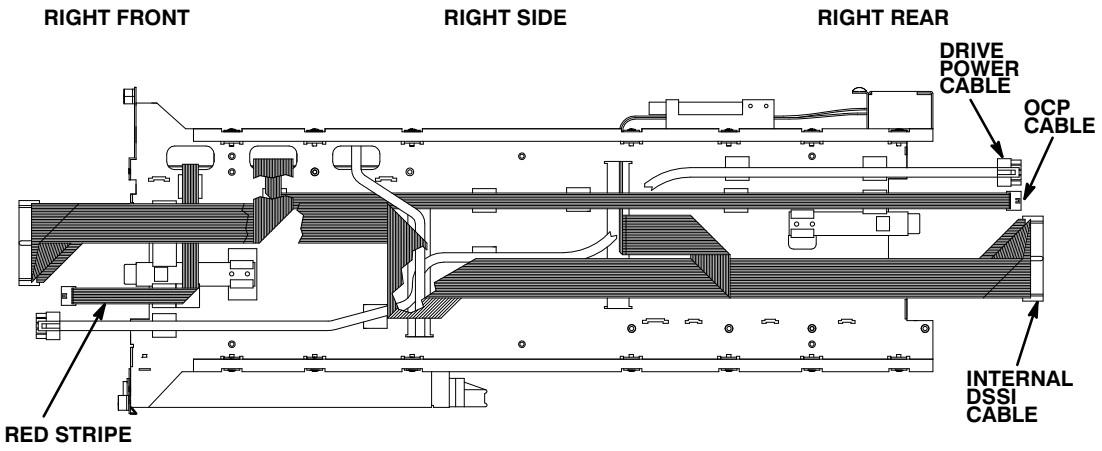
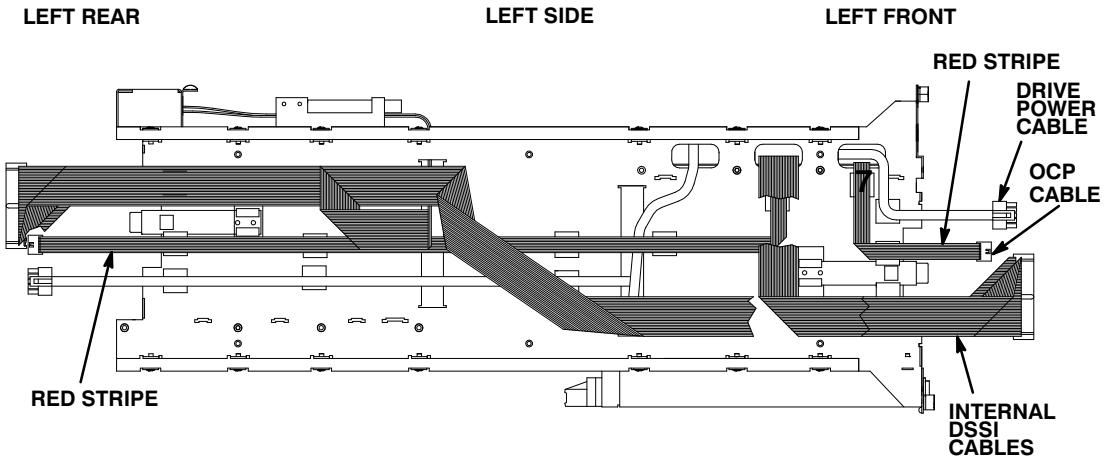


Figure 6–20 Enclosure Internal DSSI Cables (cont.)



4. Replace the fan assembly by sliding the assembly into the inner assembly and tightening the captive screws. Connect the power cable to the TTM.
5. Replace the acoustic panels. Note that the front of the panel is stamped *front*. Place this end at the front (OCP end) of the storage enclosure.

WARNING—USE TWO PEOPLE.
Use two people to place the inner assembly back into the extrusion tube mounted in the storage array.

6. Slide the inner assembly back into the extrusion tube. Secure the front panel captive screws. Do not use excessive force as it may strip the threads in the extrusion tube.
7. Tighten the four captive screws at each corner of the enclosure frame.
8. Replace the front and rear storage enclosure covers and tighten the captive screws.
9. Replace the OCP by aligning the OCP connector pins with the TTM clip fasteners on the transition-termination module. Push, do not force, the OCP into the fasteners by applying equal pressure to both sides.
10. At the rear of the storage enclosure, reconnect the ac power cord to the ac receptacle on the power supply.
11. Replace the DSSI interconnect cables to the rear bulkhead of the enclosure.
12. Restore the enclosure to service, and run the checkout procedure in Section 6.8.

6.8 Postrepair Checkout and Power-Up

Perform the following procedure to power up and check the normal operation of the storage enclosure and any FRUs that have been replaced or repaired.

CAUTION

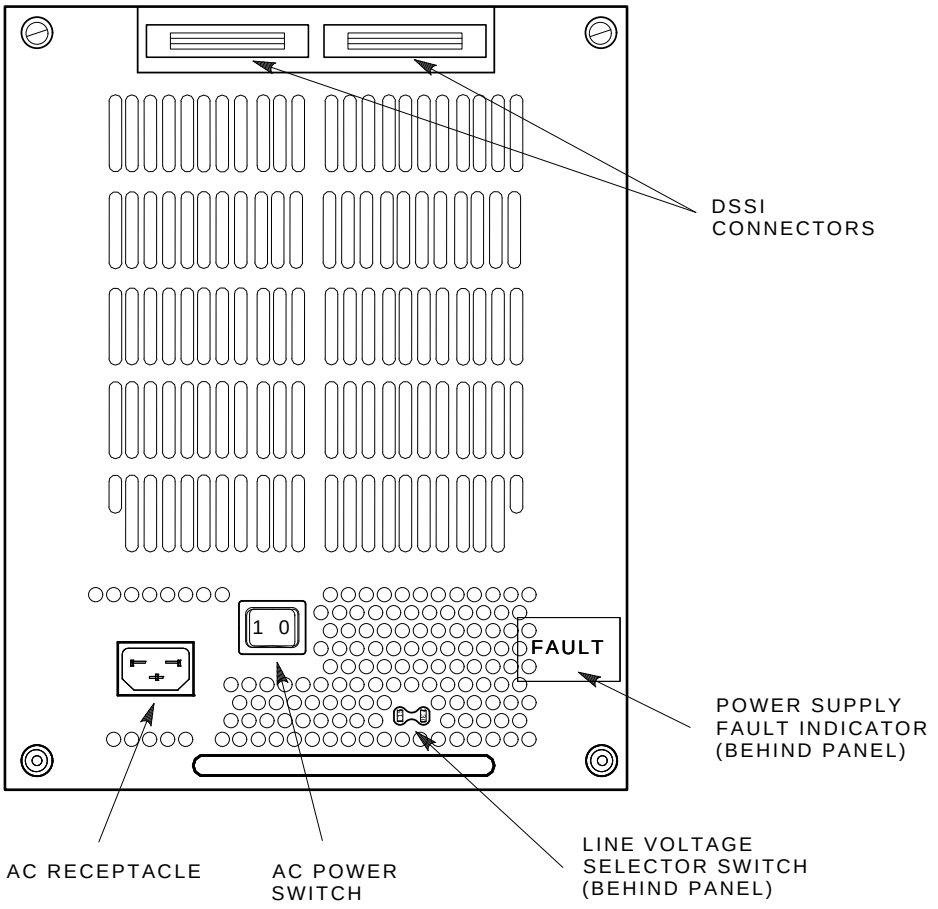
Ensure that the inner assembly is back in the extrusion tube and the front and rear covers are replaced before performing any of the following steps. Failure to do so will defeat the cooling airflow of the enclosure and may result in permanent damage to the disk ISEs or power supply.

6.8.1 From the Rear of the Storage Array

Perform these steps in the order presented (Figure 6–21):

1. Check that all ac power cords and DSSI interconnect cables at the rear of the storage enclosure are installed and secured correctly.
2. Check that the line voltage select switch on the power supply of the storage enclosure has been set to the correct voltage for the power controller. If not, set the switch as described in Section 6.3.
3. Ensure that the ac power cord is connected to the power controller.
4. At the front, check that the drive dc power switches on the front panel are *off* for the disk ISEs.
5. Turn the power controller on by setting the circuit breaker to the *on* position.
6. At the rear of the storage enclosure, turn the ac power switch to *on*.
7. Check power supply operation by noting that the enclosure fan starts. If the fan does not start, see Chapter 3.
8. If no problems are encountered, proceed to Section 6.8.2.

Figure 6–21 Storage Enclosure Rear View



6.8.2 From the Front of the Storage Array

Perform these steps in the order presented (Figure 6–22):

1. Ensure that the ac power switch at the rear of the enclosure is on.
2. Listen for the fan spinning. If the fan is *not* spinning, press the ac power switch to the off position and see Chapter 3.
3. At the front of the enclosure, turn on the drive dc power switch for each disk ISE (Figure 6–22).
4. Check that the green LED in the drive dc power switch lights, to confirm power to the disk ISE. If the green LED does not light, see Chapter 3.

NOTE

Setting a drive dc power switch to *on* starts the associated drive motor.

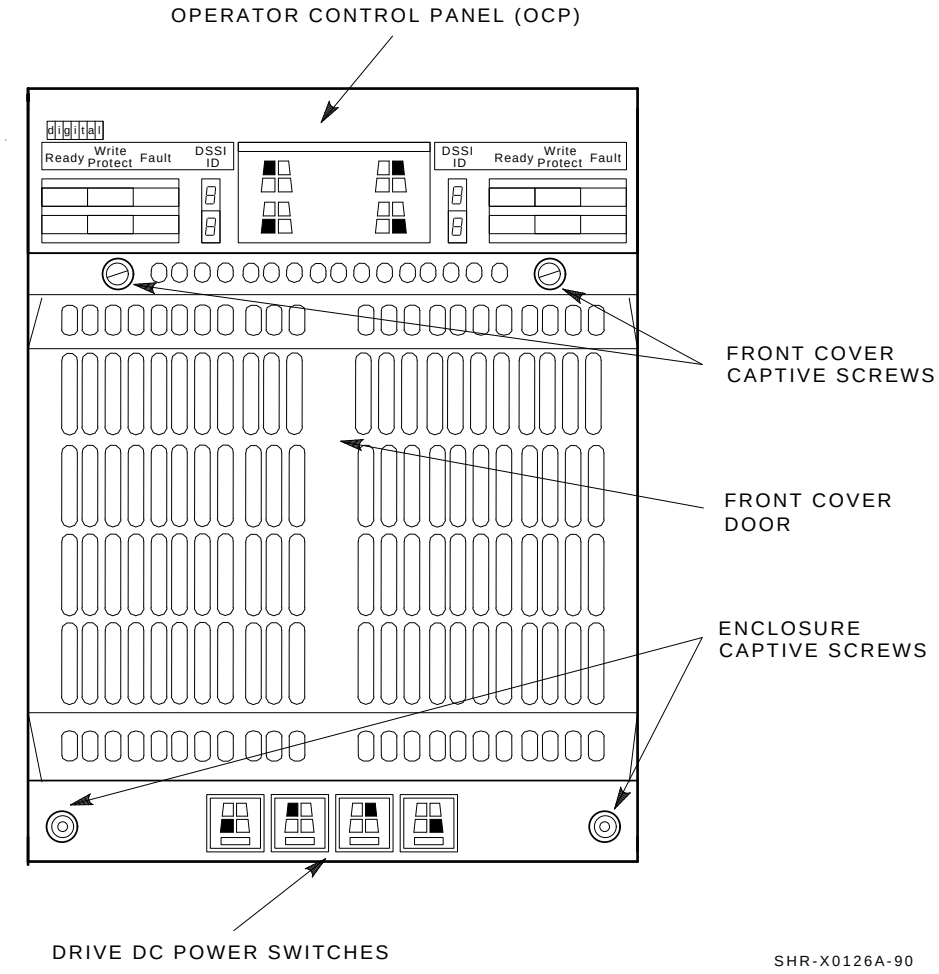
5. Press the Ready button on the OCP for each desired disk ISE. When the Ready LED comes on, the disk ISE has completed its internal diagnostics and is ready for operation. If the Fault LED comes on, press and release the Fault button for the fault code of the failing disk ISE. See Table 6–1 for the fault codes and Section 6.1 for the procedure to repair or replace the disk ISE.

Perform the procedures in Section 6.1.3 if a disk ISE has been repaired or replaced.

REMEMBER

If the host system(s) has been powered down and ac power removed, apply ac power to the system(s) and power it back up.

Figure 6–22 Storage Enclosure Front View



A
Recommended Spare Parts

This appendix contains the lists of recommended spare parts for the DECarray (Table A–1) and the SF7x storage enclosure (Table A–3).

Table A–1 DECarray Recommended Spare Parts

Part Number	Description
70–26050–01	Front door
70–26051–01	Rear door
30–24374–01	881 power controller (120 V)
30–24374–02	881 power controller (240 V)
12–31281–01	DSSI terminator (PCR type)
BC21Q–09	108 inch DSSI cable
BC22Q–09	108 inch DSSI cable
BC21R–5L	70 inch DSSI cable
BC21Q–3F	42 inch DSSI cable
17–00442–03	8 foot power cord (TF8xx)
17–00442–18	9 foot power cord (SF7x)
CK–SF200–LM	DECarray to 6000/9000 systems cable kit
CK–SF200–LP	DECarray to 3xxx/4000 systems cable kit
36–32882–01	SF Family Label Booklet

Table A–2 SF3x Recommended Spare Parts

Part Number	Description
RF35–EA	RF35 ISE
RF36–EA	RF36 ISE
70–24440–01	Fan assembly
70–28887–01	OCP assembly
70–28891–01	Connector guide assembly
H7969–AA	Power supply
54–21199–01	Transition module
54–12103–01	SF35 backplane
54–21209–01	DC power switch module
17–00442–18	9 foot ac power cord
17–03471–01	OCP to TM cable
17–03469–01	Backplane power cable
17–03470–01	Transition module power cable
17–03472–01	Internal DSSI signal cable
17–03473–01	Regulator signal cable
17–03474–01	Transition module OCP cable
17–03475–01	DSSI backplane jumper cable

Table A–3 SF7x Recommended Spare Parts

Part Number	Description
54–19010–01	RF72 drive module
70–25972–01	RF72 HDA
54–19119–01	RF73 drive module
70–28814–01	RF73 HDA
54–21891–02	RF74 drive module
RF74-EA	(HDA fails replace drive assembly)

SF7x Storage Enclosure	
70–23901–01	Chassis
70–24440–01	Fan assembly
70–23913–01	Frame assembly
70–26060–01	OCP assembly
H7969–AK	Power supply
54–19081–01	Transition-termination module
12–12717–13	Pushbutton switch with green LED
12–14027–12	Pushbutton switch cap, right rear
12–14027–13	Pushbutton switch cap, right front
12–14027–14	Pushbutton switch cap, left front
12–14027–15	Pushbutton switch cap, left rear
17–00442–18	9 foot power cord (SF7x)
17–02389–01	Power harness
17–02511–01	OCP to TTM cable
17–01936–03	RFP cable, front ISEs
17–01936–04	RFP cable, rear ISEs
17–02994–01	DSSI cable assembly

B
DECarray Cabling Information

This appendix consists of tables containing cabling information for the DECarray variations.

B.1 Single-System Configurations for DECarray with SF7x Enclosures

This section contains cabling information for DECarray variations containing SF7x enclosures in the single-system configuration.

Note the following:

- DSSI bus termination is supplied by the TTM module inside the SF7x storage enclosures in position 3 and 8.
- The SF7x storage enclosures in positions 3 and 8 must be operating in split-bus mode.
- If a DSSI bus is not connected to a SF7x storage enclosure in position 3 or 8, then DSSI bus termination is accomplished by using a DSSI terminator (PN 12–31281–01).
- Split-bus mode is supported only in the single-system configuration.

Table B–1 Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
BA/BD	1	Terminator		DECarray I/O port P1	BC21R-5L
CA/CD (with tape ISEs)	1	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Terminator		DECarray I/O port P2	BC21R-5L
FA/FD (without tape ISE)	1	Terminator		DECarray I/O port P1	BC21R-5L
	2	Terminator		DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
FA/FD (with one tape ISE)	1	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	2	Terminator		DECarray I/O port P2	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
FA/FD (with two tape ISEs)	1	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	2	Terminator		Bottom connector of TF8x in position 6	BC21Q-3F
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Right connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (without tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
HA/HD (with one tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (with two tape ISEs)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	Bottom connector of TF8x in position 6	BC21Q-3F
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Right connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (plus SF7x, without tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Terminator		DECarray I/O port P3	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (plus SF7x, with one tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Terminator		DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (plus SF7x, with two tape ISEs)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	Bottom connector of TF8x in position 6	BC21Q-3F
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Terminator		DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Right connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (plus two SF7x, without tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Terminator		DECarray I/O port P3	BC21R-5L
	7	Terminator		DECarray I/O port P4	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (plus two SF7x, with one tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Terminator		DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	7	Terminator		DECarray I/O port P4	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (plus SF7x, with two tape ISEs)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	Bottom connector of TF8x in position 6	BC21Q-3F
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Terminator		DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Right connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	7	Terminator		DECarray I/O port P4	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JA/JD (without tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Left connector of SF7x in position 8	BC21Q-3F	DECarray I/O port P3	BC21R-5L
	7	Right connector of SF7x in position 8	BC21Q-3F	DECarray I/O port P4	BC21R-5L
	8	Left connector of SF7x ISE in position 4	BC21Q-3F	Left connector of SF7x in position 7	BC21Q-3F

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JA/JD (with one tape ISE)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Left connector of SF7x enclosure in position 3	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	3	Left connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Left connector of SF7x in position 8	BC21Q-3F	DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	7	Right connector of SF7x in position 8	BC21Q-3F	DECarray I/O port P4	BC21R-5L
	8	Left connector of SF7x ISE in position 4	BC21Q-3F	Left connector of SF7x in position 7	BC21Q-3F

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JA/JD (with two tape ISEs)	1	Right connector of SF7x in position 3	BC21Q-3F	Bottom connector of TF8x in position 5	BC21R-5L
	2	Bottom connector of TF8x in position 6	BC21Q-3F	Left connector of SF7x enclosure in position 3	BC21Q-3F
	3	Right connector of SF7x in position 2	BC21Q-3F	Left connector of SF7x in position 1	BC21Q-3F
	4	Left connector of SF7x in position 8	BC21Q-3F	DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Left connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	7	Right connector of SF7x in position 8	BC21Q-3F	DECarray I/O port P4	BC21R-5L
	8	Left connector of SF7x ISE in position 4	BC21Q-3F	Left connector of SF7x in position 7	BC21Q-3F

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–1 (Continued) Cabling SF7x in DECarray Single-System Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
TA/TD (one tape ISE)	5	Terminator		DECarray I/O port P1	BC21R-5L
TA/TD (two tape ISEs)	5	Terminator		DECarray I/O port P1	BC21R-5L
	6	Terminator		DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

B.2 DSSI VAXcluster Configurations

This section contains cabling information for DECarray variations in the DSSI VAXcluster configuration.

Note the following:

- DSSI bus termination is supplied by the KFMSA modules installed in each host system.
- All KFMSA modules installed in each host system must be set to the same DSSI ID.
- All SF7x storage enclosures operate in through-bus mode.

Table B–2 Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
BE/BH	1	DECarray I/O port P9	BC21R-5L	DECarray I/O port P1	BC21R-5L
CE/CH (with one tape ISE)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
CE/CH (with two tape ISEs)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
FE/FH (without tape ISE)	1	DECarray I/O port P9	BC21R-5L	DECarray I/O port P1	BC21R-5L
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
FE/FH (with one tape ISE)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
FE/FH (with two tape ISEs)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	DECarray I/O port P10	BC21R-5L	Bottom connector of TF8x in position 6	BC21Q-3F
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Right connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HE/HH (without tape ISE)	1	DECarray I/O port P9	BC21R-5L	DECarray I/O port P1	BC21R-5L
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
HE/HH (with one tape ISE)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HH/HH (with two tape ISEs)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	Bottom connector of TF8x in position 6	BC21Q-3F	DECarray I/O port P10	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Left connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HE/HH (plus SF7x, without tape ISE)	1	DECarray I/O port P9	BC21R-5L	DECarray I/O port P1	BC21R-5L
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
HE/HH (plus SF7x, with one tape ISE)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HE/HH (plus SF7x, with two tape ISEs)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	Bottom connector of TF8x in position 6	BC21Q-3F	DECarray I/O port P10	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Left connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HE/HH (plus two SF7x, without tape ISE)	1	DECarray I/O port P9	BC21R-5L	DECarray I/O port P1	BC21R-5L
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	7	DECarray I/O port P13	BC21R-5L	DECarray I/O port P5	BC21R-5L
HE/HH (plus two SF7x, with one tape ISE)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	7	DECarray I/O port P13	BC21R-5L	DECarray I/O port P5	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HE/HH (plus two SF7x, with two tape ISEs)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	Bottom connector of TF8x in position 6	BC21Q-3F	DECarray I/O port P10	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Left connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	7	DECarray I/O port P13	BC21R-5L	DECarray I/O port P5	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JE/JH (without tape ISE)	1	DECarray I/O port P9	BC21R-5L	DECarray I/O port P1	BC21R-5L
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	7	DECarray I/O port P13	BC21R-5L	DECarray I/O port P5	BC21R-5L
	8	DECarray I/O port P14	BC21R-5L	DECarray I/O port P6	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JE/JH (with one tape ISE)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	DECarray I/O port P10	BC21R-5L	DECarray I/O port P2	BC21R-5L
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	7	DECarray I/O port P13	BC21R-5L	DECarray I/O port P5	BC21R-5L
	8	DECarray I/O port P14	BC21R-5L	DECarray I/O port P6	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–2 (Continued) Cabling SF7x in DECarray DSSI VAXcluster Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JE/JH (with two tape ISEs)	1	DECarray I/O port P9	BC21R-5L	Bottom connector of TF8x in position 5	BC21Q-3F
	2	DECarray I/O port P10	BC21R-5L	Bottom connector of TF8x in position 6	BC21Q-3F
	3	DECarray I/O port P11	BC21R-5L	DECarray I/O port P3	BC21R-5L
	4	DECarray I/O port P12	BC21R-5L	DECarray I/O port P4	BC21R-5L
	5	Right connector of SF7x in position 1	BC21Q-3F	DECarray I/O port P1	BC21R-5L
	6	Right connector of SF7x in position 2	BC21Q-3F	DECarray I/O port P2	BC21R-5L
	7	DECarray I/O port P13	BC21R-5L	DECarray I/O port P5	BC21R-5L
	8	DECarray I/O port P14	BC21R-5L	DECarray I/O port P6	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

B.3 Stripe Set Configurations with SF7x Enclosures

This section contains cabling information for DECarray stripe set configurations using SF7x enclosures.

Note the following:

- The SF7x storage enclosures must be operating in split-bus mode.
- DSSI bus termination is supplied by the TTM module inside the SF7x storage enclosures.
- If a DSSI bus is not connected to a SF7x storage enclosure, then DSSI bus termination is accomplished by using a DSSI terminator (PN 12–31281–01).
- Stripe sets are supported only in a single-system configuration.

Table B–3 Cabling SF7x in DECarray Stripe Set Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
All variants	1	DECarray I/O port P2	BC21R-5L	DECarray I/O port P1	BC21R-5L
	2	DECarray I/O port P4	BC21R-5L	DECarray I/O port P3	BC21R-5L
	3	DECarray I/O port P6	BC21R-5L	DECarray I/O port P5	BC21R-5L
	4	DECarray I/O port P8	BC21R-5L	DECarray I/O port P7	BC21R-5L
	5	Terminator		DECarray I/O port P16	BC21R-5L
	6	Terminator		DECarray I/O port P15	BC21R-5L
	7	DECarray I/O port P10	BC21R-5L	DECarray I/O port P9	BC21R-5L
	8	DECarray I/O port P12	BC21R-5L	DECarray I/O port P11	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

B.4 DECarray Configurations with SF3x Enclosures in Through-Bus Mode

This section contains cabling information for DECarray variations containing SF3x enclosures in through-bus mode.

Through-bus configurations are cabled the same way for both single-system and DSSI VAXcluster configurations.

Table B–4 Cabling SF3x in DECarray Through-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
BA/BD	1 rear	Terminator		DECarray I/O port P9	BC21R-5L
BA/BD (with tape ISEs)	1 rear	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	5	Right connector of SF3x in position 1 (rear)	BC21Q-3F	DECarray I/O port P9	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–4 (Continued) Cabling SF3x in DECarray Through-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
CA/CD (without tape ISE)	1 rear	Terminator		DECarray I/O port P9	BC21R-5L
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
CA/CD (with tape ISE)	1 rear	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
	5	Right connector of SF3x in position 1 (rear)	BC21Q-3F	DECarray I/O port P9	BC21R-5L
FA/FD (without tape ISE)	1 rear	Terminator		DECarray I/O port P9	BC21R-5L
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
	2 rear	DECarray I/O port P1	BC21R-5L	Terminator	
	2 front	DECarray I/O port P2	BC21R-5L	Terminator	

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–4 (Continued) Cabling SF3x in DECarray Through-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
FA/FD (with tape ISE)	1 rear	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
	2 rear	DECarray I/O port P1	BC21R-5L	Terminator	
	2 front	DECarray I/O port P2	BC21R-5L	Terminator	
	5	Right connector of SF3x in position 1 (rear)	BC21Q-3F	DECarray I/O port P9	BC21R-5L
HA/HD (without tape ISE)	1 rear	Terminator		DECarray I/O port P9	BC21R-5L
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
	2 rear	DECarray I/O port P1	BC21R-5L	Terminator	
	2 front	DECarray I/O port P2	BC21R-5L	Terminator	
	3 rear	Terminator		DECarray I/O port P11	BC21R-5L
	3 front	Terminator		DECarray I/O port P12	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–4 (Continued) Cabling SF3x in DECarray Through-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
HA/HD (with tape ISE)	1 rear	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
	2 rear	DECarray I/O port P1	BC21R-5L	Terminator	
	2 front	DECarray I/O port P2	BC21R-5L	Terminator	
	3 rear	Terminator		DECarray I/O port P11	BC21R-5L
	3 front	Terminator		DECarray I/O port P12	BC21R-5L
	5	Right connector of SF3x in position 1 (rear)	BC21Q-3F	DECarray I/O port P9	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–4 (Continued) Cabling SF3x in DECarray Through-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JA/JD (without tape ISE)	1 rear	Terminator		DECarray I/O port P9	BC21R-5L
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
	2 rear	DECarray I/O port P1	BC21R-5L	Terminator	
	2 front	DECarray I/O port P2	BC21R-5L	Terminator	
	3 rear	Terminator		DECarray I/O port P11	BC21R-5L
	3 front	Terminator		DECarray I/O port P12	BC21R-5L
	4 rear	DECarray I/O port P3	BC21R-5L	Terminator	
	4 front	DECarray I/O port P4	BC21R-5L	Terminator	
	7 rear	Terminator		DECarray I/O port P13	BC21R-5L
	7 front	Terminator		DECarray I/O port P14	BC21R-5L
	8 rear	DECarray I/O port P5	BC21R-5L	Terminator	
	8 front	DECarray I/O port P6	BC21R-5L	Terminator	

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–4 (Continued) Cabling SF3x in DECarray Through-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JA/JD (with one tape ISE)	1 rear	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	1 front	Terminator		DECarray I/O port P10	BC21R-5L
	2 rear	DECarray I/O port P1	BC21R-5L	Terminator	
	2 front	DECarray I/O port P2	BC21R-5L	Terminator	
	3 rear	Terminator		DECarray I/O port P11	BC21R-5L
	3 front	Terminator		DECarray I/O port P12	BC21R-5L
	5	Right connector of SF3x in position 1 (rear)	BC21Q-3F	DECarray I/O port P9	BC21R-5L
	7 rear	Terminator		DECarray I/O port P13	BC21R-5L
	7 front	Terminator		DECarray I/O port P14	BC21R-5L
	8 rear	DECarray I/O port P5	BC21R-5L	Terminator	
	8 front	DECarray I/O port P6	BC21R-5L	Terminator	

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Table B–4 (Continued) Cabling SF3x in DECarray Through-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
JA/JD (with two tape ISEs)	1 rear	Terminator		Bottom connector of TF8x in position 5	BC21Q-3F
	1 front	Terminator		Bottom connector of TF8x in position 6	BC21Q-3F
	2 rear	DECarray I/O port P1	BC21R-5L	Terminator	
	2 front	DECarray I/O port P2	BC21R-5L	Terminator	
	3 rear	Terminator		DECarray I/O port P11	BC21R-5L
	3 front	Terminator		DECarray I/O port P12	BC21R-5L
	5	Rt. conn. of SF3x in position 1 (rear)	BC21Q-3F	DECarray I/O port P9	BC21R-5L
	6	Rt. conn. of SF3x in position 1 (front)	BC21Q-3F	DECarray I/O port P10	BC21R-5L
	7 rear	Terminator		DECarray I/O port P13	BC21R-5L
	7 front	Terminator		DECarray I/O port P14	BC21R-5L
	8 rear	DECarray I/O port P5	BC21R-5L	Terminator	
	8 front	DECarray I/O port P6	BC21R-5L	Terminator	

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

B.5 DECarray Configurations with SF3x Enclosures in Split-Bus Mode

This section contains cabling information for DECarray variations containing SF3x enclosures in split-bus mode.

DSSI bus termination is accomplished by attaching a terminator (PN 12-28976-01) to the backplane connectors P9 & P10.

Table B–5 Cabling SF3x in DECarray Split-Bus Configurations

DECarray Variant	Position Number	Left DSSI Connector to:[1]	Using Cable:	Right DSSI Connector to:[2]	Using Cable:
All variants	1 rear	DECarray I/O port P9	BC21R-5L	DECarray I/O port P10	BC21R-5L
	1 front	DECarray I/O port P11	BC21R-5L	DECarray I/O port P12	BC21R-5L
	2 rear	DECarray I/O port P1	BC21R-5L	DECarray I/O port P2	BC21R-5L
	2 front	DECarray I/O port P3	BC21R-5L	DECarray I/O port P4	BC21R-5L
	3 rear	DECarray I/O port P13	BC21R-5L	DECarray I/O port P14	BC21R-5L
	3 front	DECarray I/O port P15	BC21R-5L	DECarray I/O port P16	BC21R-5L
	4 rear	DECarray I/O port P5	BC21R-5L	DECarray I/O port P6	BC21R-5L
	4 front	DECarray I/O port P7	BC21R-5L	DECarray I/O port P8	BC21R-5L

[1]Bottom DSSI connector when referring to tape ISE in position 5 or 6

[2]Top DSSI connector when referring to tape ISE in position 5 or 6

Glossary

ADAPTER A module that connects one or more device controllers to the system bus and hides many of the system bus requirements from the controller. The KFQSA module is an Q–bus to DSSI bus adapter. The KFMSA module is an XMI to DSSI bus adapter.

ALLOCATION CLASS A numerical value assigned to the ISE to indicate which system(s) on a cluster it will be served by.

BLOCK The smallest data unit addressable on a disk. Also called a sector. In DSSI ISEs, a block contains 512 bytes of customer data, EDC, ECC, flags, and the block's address header.

DECarray A storage array that houses up to six storage enclosures and up to two magazine tape ISEs (such as the TF857).

DEVICE NAME A unique name given to each device by the VMS operating system. The device name generally includes either the allocation class and MSCP unit number assigned to the device (if the allocation class is not zero), or the node name and MSCP unit number (if the allocation class is zero).

DRVTST A local program resident on the ISE. It is a comprehensive hardware test used to verify ISE operation.

DSSI Digital Storage System Interconnect. A DSA-based storage interconnect used by the KFMSA adapter and the RF- and TF-series integrated storage elements to transfer data and to communicate with each other.

DSSI VAXcluster Storage configuration where DSSI ISEs are shared between two DSSI adapters and systems.

DUP Diagnostic and utility protocol. A SYSAP-level protocol by which a computer directs a storage device controller to run internal diagnostics or utility functions. DUP is implemented as a class driver on the system side, and a corresponding class server on the storage controller side.

EEPROM Electrically erasable programmable read only memory. Used by the KFMSA adapter to store configuration, manufacturing, and error information in a nonvolatile location.

EMBEDDED ADAPTER A adapter that connects one or more device controllers to the system (such as a VAX 4000) bus and hides many of the system bus requirements from the controller. Refer to the system documentation for further information.

ISE Integrated storage element. All DSSI storage devices are ISEs.

KFMSA XMI bus to DSSI bus adapter.

KFQSA Q–bus to DSSI bus adapter.

MAGAZINE TAPE ISE A DSSI tape ISE with tape loader, such as a TF857.

MSCP Mass Storage Control Protocol. An application layer protocol used by the system to perform disk I/O operations and I/O control functions.

NODE NAME A 6-character (maximum) value that is assigned to each DSSI ISE. The node name of each ISE must be unique across the system topology.

OCP Operator control panel. An enclosure interface that allows remote control of DSSI node ID selection and ISE operating status.

PARAMS A local program resident on the ISE. PARAMS is used to view and modify current device parameter settings on an ISE.

Q-BUS The system bus for the MicroVAX II, MicroVAX/VAXserver 3xxx, and VAX 4000 series systems.

RF35 A 3-1/2", half-height, 0.8-gigabyte formatted capacity DSSI disk ISE.

RF72 A 5-1/4", full-height, 1-gigabyte formatted capacity DSSI disk ISE.

RF73 A 5-1/4". full-height, 2-gigabyte formatted capacity DSSI disk ISE.

RLL Run length limited. The format used in the DSSI ISE to record data.

SF3x A DSSI storage enclosure that houses up to six half-height RF series disk ISEs.

SF7x A DSSI storage enclosure that houses up to four full-height RF series disk ISEs.

SINGLE-SYSTEM Storage configuration where DSSI ISEs are connected to only one DSSI adapter and system.

SPLIT-BUS A mode of operation where the ISEs in the one side of a storage enclosure are connected to a different DSSI bus than those on the other side.

STRIPE SET A set of disk drives operating in concert as a single virtual disk so as to provide increased I/O performance. In a DSSI bus application, all SF7x storage enclosures are in split-bus mode and each half of each enclosure is connected to it's own dedicated DSSI adapter port.

THROUGH-BUS A mode of operation where all the ISEs in an storage enclosure are connected to the same DSSI bus. In this mode, the DSSI bus is terminated using an external terminator.

TMSCP Tape Mass Storage Control Protocol. Application layer protocol that is used by the system to perform tape I/O operations and I/O control functions.

TTM Transition termination module. A PC board that provides connection between the storage enclosure OCP and RF series disk ISE, and also provides DSSI bus termination when in split-bus mode.

UNIT NUMBER Also called the MSCP/TMSCP unit number. Default value is the ISE's DSSI node ID. A unique value can be selected using PARAMS.

VAX DIAGNOSTIC SUPERVISOR A diagnostic environment that allows access to DSSI tests and programs in VAX 6000 and 9000 series systems.

VIRTUAL CIRCUIT A logical point-to-point link between nodes.

XMI Extended Memory Interconnect. The system bus for the VAX 6000 and 9000 series systems.

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