R23RF-C Rackmount Disk System

Installation/Owner's Manual

Order Number EK-R23RF-IN-003

Digital Equipment Corporation

3nd Edition, December, 1991

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ABOUT THIS MANUAL

The *R23RF-C Rackmount Disk System Installation / Owner's Manual* provides the information needed to install, operate, and maintain the R23RF-C Rackmount Disk System.

FOR THE CUSTOMER

Refer to Chapter 2 of this manual to install the Removable Storage Elements (RSEs). If you have any difficulty performing the installation, call Digital Field Service for assistance.

MANUAL ORGANIZATION

The manual is organized into four chapters and two appendices. The contents of each chapter and appendix are briefly described below:

- CHAPTER 1, INTRODUCTION - Describes R23RF-C Rackmount Disk System installation, provides physical characteristics of the R23RF-C, and gives power requirements.
- CHAPTER 2, RSE UNPACKING INSTRUCTIONS - Provides unpacking instructions for the RSEs.
- CHAPTER 3, OPERATION - Describes how to operate the R23RF-C.
- CHAPTER 4, MAINTENANCE - Provides maintenance procedures for the R23RF-C.
- APPENDIX A, OPTION KITS - Lists the R23RF-C Option Kits available.
- APPENDIX B, CUSTOMER SERVICES INSTALLATION - Explains how to unpack, install, and test an R23RF-C Rackmount Disk System. This information is for Digital Customer Services personnel.

RELATED DOCUMENTATION

Title	Order No.
R23RF Removable Storage Element / System Installation and User's Guide	EK-A0375-IN
KFQ Storage Adapter Installation and User's Manual	EK-KFQSA-IN

Customers may order documents from:

Digital Equipment Corporation
444 Whitney Street (NR03/W3)
Northboro, Ma 01532
Attn: Publishing & Circulation Services
Order Processing

CONVENTIONS

Where notes, cautions, and warnings are used in this document, they highlight specific types of information as follows:

NOTE	A note calls the reader's attention to any item of information that may be of special importance
CAUTION	A caution contains information essential to avoiding damage to the system.
WARNING	A warning contains information essential to the safety of personnel.

FCC USER STATEMENT

NOTICE:

This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

1
INTRODUCTION

The R23RF-C Rackmount Disk System provides mounting capability for two Removable Storage Elements (RSEs). This chapter provides a brief description, characteristics, and power requirements of the R23RF-C Rackmount Disk System.

Figure 1-1 illustrates the front view of the R23RF-C with RSEs removed.

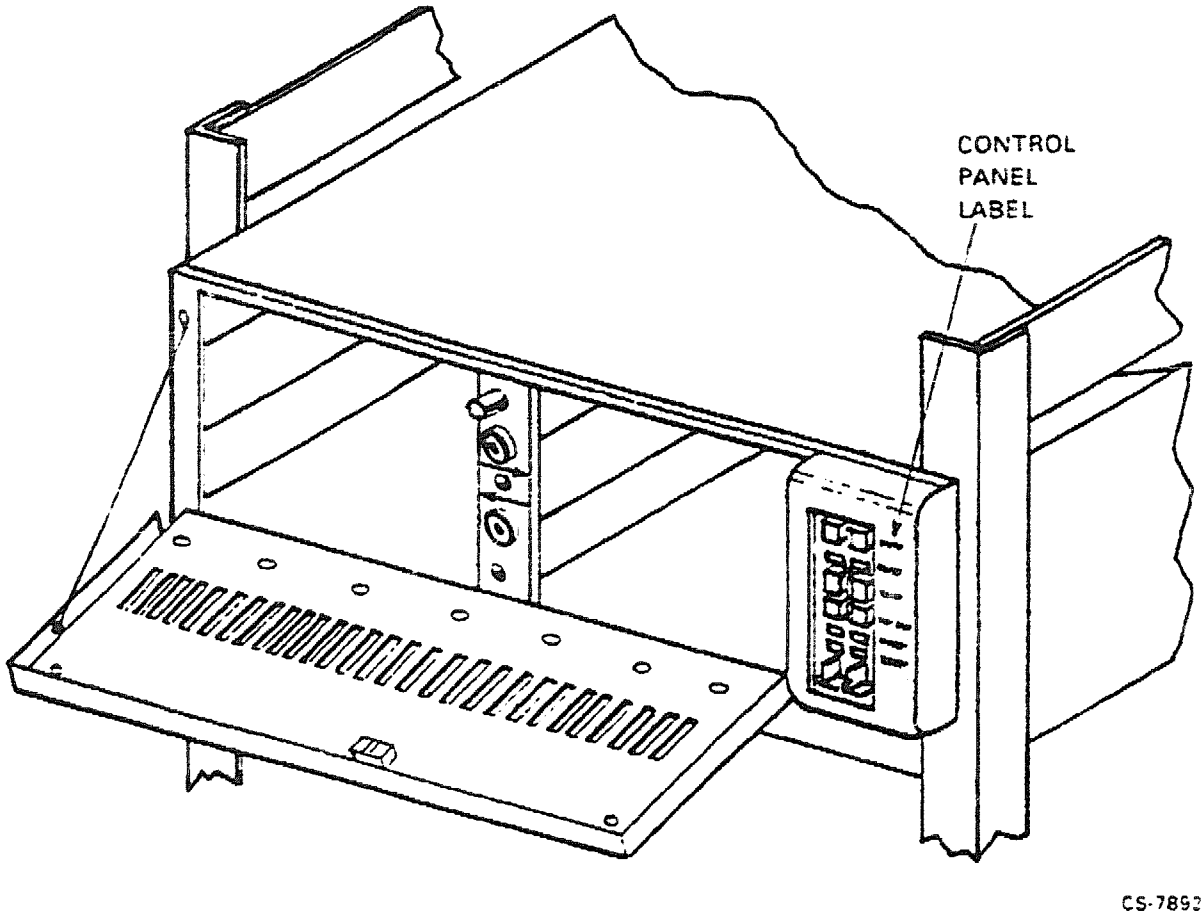

Figure 1–1 Front View of R23RF-C Rackmount Disk with RSEs Removed

1.1 DESCRIPTION

The R23RF-C Rackmount Disk System is a 13.3 cm (5.25 inch) tall, 48.25 cm (19-inch) rack mountable device. Two Removable Storage Elements (RSEs) can be inserted into the R23RF-C Rackmount Disk System.

1.2 CHARACTERISTICS

Table 1-1 lists the characteristics, environmental specifications, electrical requirements, and space requirements of the R23RF-C Rackmount Disk System.

Table 1–1 R23RF-C Characteristics, Specifications, and Requirements

Rack Height	13.3 cm (5.25 in)
Rack Width	48.3 cm (19 in)
Rack Depth	60.96 cm (24 in)
Rack Weight including 2 RF31 RSEs	19.5 kg (43 lbs)
Rack Weight including 2 RF72 RSEs	22.91 kg (50.5 lbs)
Rack Weight including 2 RF73 RSEs	22.91 kg (50.5 lbs)
Environmental Specifications	
Temperature	
Operating	10 to 40°C (50 to 104°F)
Non-Operating	-40 to 66°C (-40 to 151°F)
Relative Humidity	
Operating	10 to 90% (non-condensing) Maximum wet bulb temperature 28°C (82°F) Minimum dew point 2°C (36°F)
Non-Operating	8 to 90% (non-condensing)
Altitude	
Operating	2,438 m (8,000 ft)
Non-Operating	4,876 m (16,000 ft)

Table 1–1 (Cont.) R23RF-C Characteristics, Specifications, and Requirements

Noise	5.0 Bels	
Agency Compliance	Underwriter's Laboratory (UL STD. 478) Canadian Standards Association (C22.2-154) FCC Part 15J Class A IEC (STD. 380/19)	
Electrical Requirements		
Voltage	110–120 Vac	220–240 Vac
Power (average)	86 W	88 W
Current	1.3 A	0.7 A
Frequency	60 Hz	50 Hz
Space Requirements		
Rack Space	13.3 cm x 48.3 cm x 60.96 cm (5.25 in x 19 in x 24 in)	
Maintenance Space	58.42 cm x 266.7 cm (23 in x 105 in)	

2
RSE UNPACKING INSTRUCTIONS

Whenever an R23RF-C Rackmount Disk System is delivered to the user's premises, its unpacking, installation, testing, and demonstration must only be carried out by Digital Customer Services or other trained service engineers. These processes are described in Appendix B. Once the rackmount disk system is installed, the RSEs can be unpacked and installed.

When extra RSEs are ordered, users can unpack and install the RSEs themselves since, once unpacked, RSEs are ready for use.

Refer to the *R23RF Removable Storage Element / System Installation and User's Guide* (EK-A0375-IN) for further information on unpacking RSEs.

3
OPERATION

3.1 INTRODUCTION

This chapter describes the R23RF-C Rackmount Disk System operating procedures and functions that are different from those given in Chapter 3 (Using the R23RF Removable Storage Element System) of the *R23RF Removable Storage Element / System Installation and User's Guide* (EK-A0375-IN). Refer to the *R23RF Installation and User's Guide* for all other operation procedures.

3.2 OPERATOR CONTROL PANEL

The Operator Control Panel (refer to Figure 3-1) contains all the switches and indicators required to use the R23RF-C. The functions of the switches and indicators are as follows:

- On the bottom of the operator control panel are the DSSI node select plugs. There is one plug for each RSE slot. The plug on the left corresponds to the left drive slot and the plug on the right corresponds to the right drive slot. The plugs are selected when the rackmount disk system is installed. The plugs set the DSSI node ID (0 through 7; do not use the DSSI adapter node number, which is usually 6 or 7) of the RSE residing in that slot.
- On the top of the operator control panel are two columns of switches and indicators, one column for each drive slot. The left column of switches and indicators corresponds to the left drive slot and the right column of switches and indicators to the right drive slot. When power is applied to the RSEs, the RSEs spin up automatically and light the top four indicators for each drive. After a few seconds, when the RSEs are up to speed, the FAULT and WRITE PROTECT indicators go out, leaving the POWER and READY indicators lit.

The switches and indicators are used as follows:

- The POWER switch is an operator-controlled push-button with an integral amber indicator. When this push-button is pressed, the RSE interlock (an electromechanical drive lock) is engaged and power is applied to the related RSE. The amber indicator lights to signify that the RSE is powered up. When the POWER switch is pressed again, power is removed from the RSE. The indicator flashes for about 15 seconds while the RSE is spinning down. When powering down is complete, the indicator goes out and the interlock disengages. Once the interlock is disengaged, the RSE can be removed from its drive slot by turning the key in the related drive key lock (see Section 3.3).
- The red FAULT indicator lights if a drive error is detected by the internal diagnostics of the RSE. Note that the FAULT indicator lights briefly during power-up diagnostics and this does not indicate a fault. However, if the indicator remains lit, power down, remove the RSE, and call Digital Customer Services. You may still use other RSEs in the R23RF-C.

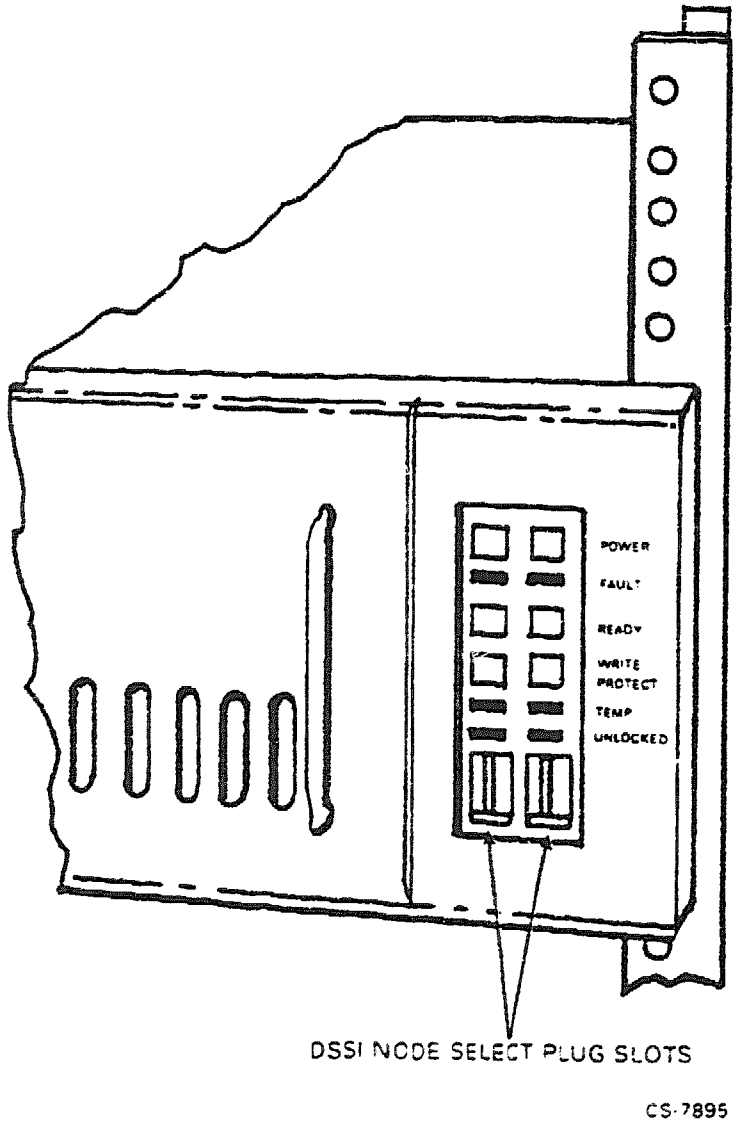

Figure 3–1 Operator Control Panel

- The READY switch is an operator-controlled, alternate-action push-button with an integral green indicator. When this indicator is lit, the RSE is ready to be accessed by the operating system.

  When this button is pressed, the indicator goes out and the RSE goes off-line, inhibiting further access by the software. Press this button again to put the RSE back on line. The indicator lights, showing that the RSE is again ready. During seek operations, this indicator flickers.

  NOTE
  The READY indicator lights briefly during power-up diagnostics.

- The WRITE PROTECT switch is an operator-controlled, alternate-action push-button with an integral amber indicator. When this push-button is pressed, the indicator lights to show that the RSE is write protected, so that the operating system can only *read* data from the RSE.

  When this button is pressed again, the indicator goes out and both reading and writing of the RSE are enabled.

- The red TEMP. indicator lights if the temperature inside the RSE has risen above its maximum safe operating limit. If the TEMP. indicator lights, remove the RSE from the drive slot and contact Digital Customer Services. *Do not* use the RSE or place another RSE in the drive slot until the problem has been corrected and the TEMP. indicator is no longer lit.

  If an over-temperature condition is detected, the RSE automatically powers down at the end of the data transfer. This indicator remains lit until the RSE cools to an acceptable temperature, when it goes out. However, the RSE does *not* power up again automatically: you must again press the POWER button.

- When the green UNLOCKED indicator is lit, the drive interlock is disengaged and the RSE may be removed from the drive slot. When the indicator is not lit, the drive interlock is engaged and the RSE may not be removed from its slot. Note that this electromechanical locking is in addition to the drive key locks.

3.3 DRIVE KEY LOCKS

In addition to the electromechanical drive lock, key locks provide extra security for the RSE since, without a key, the RSE cannot be removed from the drive slot. (However, it is not necessary to have a key to insert the RSE.)

Refer to Figure 3-2 to indicate appropriate key lock for the associated RSE slot.

For your own reference, list identification number of key here.

Figure 3–2 Inserting an RSE

3.4 POWERING UP THE RACKMOUNT DISK SYSTEM

Connect the ac power cable for the rackmount disk system to a convenient source of ac power. Typically, this ac power source is a remotely controlled switched outlet from the cabinet's power distribution controller. The R23RF-C does not have an ac power switch.

The rackmount disk system can now be powered up with other ac controlled devices.

After powering up the rackmount disk system, for each RSE in place, the top four drive indicators and switches will light to show that the disk is spinning up and performing its power-up diagnostics.

After a few seconds, when the RSE is ready for use, the FAULT and WRITE PROTECT indicators go out, leaving the POWER and READY indicators lit.

4
MAINTENANCE

This chapter describes maintenance procedures that may help you to get an inoperative RSE working again, or decide that Digital Customer Services should be called. Repairs to the R23RF-C should only be attempted by trained service engineers.

4.1 SYMPTOM: NO POWER TO THE RACKMOUNT DISK SYSTEM

Before calling Digital Customer Services, check that:

- The ac power cord is connected.
- The fuse in the ac power plug has not blown (if applicable).
- The fuse in the inlet filter has not blown.

WARNING
For continued protection, replace only with the same type and rating of fuse.

A
OPTION KITS

The following options are available for the R23RF-C Rackmount Disk System and for individual RSEs. Note that, if the host computer system does not have a DSSI adapter, an option that includes a DSSI adapter must be ordered.

Table A–1 R23RF-C Options

Options	Description
R23RF-C2	One 110-120V/220-240V R23RF-C Rackmount Chassis with no removable storage elements
	R23RF-C Chassis Support Kit (Part No. 70-27372-01)
	One DSSI Cable, BC21M-09 (Part No. 17-02152-03)
	One DSSI Terminator (Part No. 12-29258-01)
	Eight DSSI Node ID Plugs (Part No. 12-28766-19)
	One *R23RF Removable Storage Element / Systems Installation and User's Guide* (EK-A0375-IN)
	One *R23RF-C Rackmount Disk System Installation / Owner's Manual* (EK-R23RF-IN)
	Power Cord 5-15P, BN19P-1K (Part No. 17-00606-02)
	Power Cord, 6-15P, 250V (Part No. 17-00083-01)
R23RF-C4	One 110-120V/220-240V R23RF-C Rackmount Chassis with no removable storage elements
	R23RF-C Chassis Support Kit (Part No. 70-27372-01)
	One DSSI Cable, BC21N-01 (Part No. 17-02982-01)
	Eight DSSI Node ID Plugs (Part No. 12-28766-19)
	One *R23RF Removable Storage Element / Systems Installation and User's Guide* (EK-A0375-IN)

Table A–1 (Cont.) R23RF-C Options

Options	Description
	One *R23RF-C Rackmount Disk System Installation / Owner's Manual* (EK-R23RF-IN)
	Power Cord 5-15P, BN19P-1K (Part No. 17-00606-02)
	Power Cord, 6-15P, 250V (Part No. 17-00083-01)
RF73R-KA	R23RF-C2 + RF73 removable storage element
RF73-RA	RF73, 2 GB removable storage element
2R-RF72R-01	R23RF-C2 + RF72 removable storage element
2R-RF72R-05	R23RF-C4 + RF72 removable storage element
RF72-RA	RF72, 1 GB removable storage element
2R-RF31R-01	R23RF-C2 + RF31 removable storage element
2R-RF31R-05	R23RF-C4 + RF31 removable storage element
RF31-RA	RF31, 381 MB removable storage element

Table A–2 R23RF-C Cable Options

DSSI cable, 1 meter (Part No. BC21M-03)
DSSI cable, 2 meter (Part No. BC21M-06)
DSSI cable, 3 meter (Part No. BC21M-09)
DSSI cable, 0.5 meter (Part No. BC21N-01)

Table A–3 R23RF-C RSE Options

Options	Description
RF31-RA	RF31 Removable Storage Element, 381 MB
RF72-RA	RF72 Removable Storage Element, 1 GB
RF73-RA	RF73 Removable Storage Element, 2 GB
RFXX-CK	RSE carry case

Table A–4 R23RF-C AC Power Cords

Options	Description	
BN19P-1K	120 Vac	U.S.A./Japan
BN24R-2E	220 Vac	Australia/New Zealand
BN19W-2E	220 Vac	Central Europe
BN26B-2E	240 Vac	U.K./Ireland
BN19E-2E	220 Vac	Switzerland
BN19K-2E	220 Vac	Denmark
BN19Z-2E	220 Vac	Italy
BN22Z-2E	240 Vac	India/South Africa
BN22P-2E	220 Vac	Israel

B

CUSTOMER SERVICES INSTALLATION

B.1 INTRODUCTION

This appendix describes how to unpack, install, and test an R23RF-C Rackmount Disk System. These procedures should only be carried out by a Digital Customer Services representative or other trained service engineers. (RSEs may be unpacked by users.)

The rackmount disk system weighs approximately 13.83 kg (30.5 lbs). It should be transported on a trolley and unpacked at its operating location.

B.2 DELIVERY

The R23RF-C is delivered as:

- One large container, containing the rackmount disk system and mounting hardware.
- Two smaller containers, containing the RSEs (if applicable). There will be more containers if extra RSEs were ordered.
- Documentation, cabling, and DSSI adapters as appropriate to the option ordered.

B.3 UNPACKING

To unpack the R23RF-C Rackmount Removable Storage Element System:

- Check the shipping list for compliance with the customer order.
- Check that the correct number of shipping containers are present.
- Check the shipping containers for damage such as dents, holes, and crushed corners.
- Keep the area free from dust and abrasive materials.
- Move the containers to the site at which the R23RF-C will be installed.
- Open and unpack the shipping containers. Check the contents against the shipping list to verify that there are no missing parts. Retain shipping containers and packing materials for possible future use.
- Visually inspect the R23RF-C and the RSEs for damage. Check the shock detectors on the RSE, the Low Insertion Force (LIF) socket on each RSE, and the R23RF-C LIF pins (inside each slot, at the back). If the shock detector shows red, contact the Digital representative.

CAUTION

The Removable Storage Element contains precision equipment. Mishandling may cause damage and lead to the Warranty/Contract being invalidated.

Keep the R23RF-C and RSEs away from magnets and equipment that generate magnetic fields such as motors, transformers, and terminals.

Set aside a secure, clean area near the rack mounted system to store the RSEs.

All electronic equipment can be damaged by the static electricity present in most working environments. To prevent damage to the internal electronics of the RSE, DO NOT TOUCH the socket at the rear of the RSE. Also, do not allow small objects to fall into the socket, as this may damage the pins on the R23RF-C or the RSE socket.

If any item is missing or damaged, do not continue with the installation. Report any damage or shortages to the shipper and notify the Digital representative.

B.4 INSTALLING A DSSI ADAPTER

Perform the following procedure to install a DSSI adapter. If you are going to install an R23RF on a host without a DSSI adapter, first install and configure the DSSI adapter delivered with the R23RF together with its associated I/O panel. Refer to the *KFQ Storage Adapter Installation and User's Manual* (EK-KFQSA-IN).

Ensure that all available DSSI drive select plugs can be used (program the DSSI adapter for all seven drives). Refer to the *KFQ Storage Adapter Installation and User's Manual* (EK-KFQSA-IN).

B.5 RACKMOUNTING THE DISK SYSTEM

The R23RF-C requires a 13.3 cm (5.25 in) vertical space for mounting. Refer to Figures B-1 and B-2 for locating the position of the retainer nuts and bracket included with the R23RF-C chassis support kit (P/N 70-27372-01).

After the left- and right-side brackets are secured in place, the chassis assembly can be inserted from the front of the cabinet and pushed in until the back of the bezel meets the cabinet rails.

The R23RF-C chassis retaining bracket (P/N 74-40259-01) can be inserted into the key provided on the left rear of the R23RF-C chassis assembly, and then secured to the right chassis support bracket (P/N 74-28372-01), not shown.

NOTE
It is the responsibility of the end user to test the system for FCC compliance when the R23RF-C is installed in the end-user cabinetry.

CAUTION
Do not cover air flow louvers or place next to high heat sources.

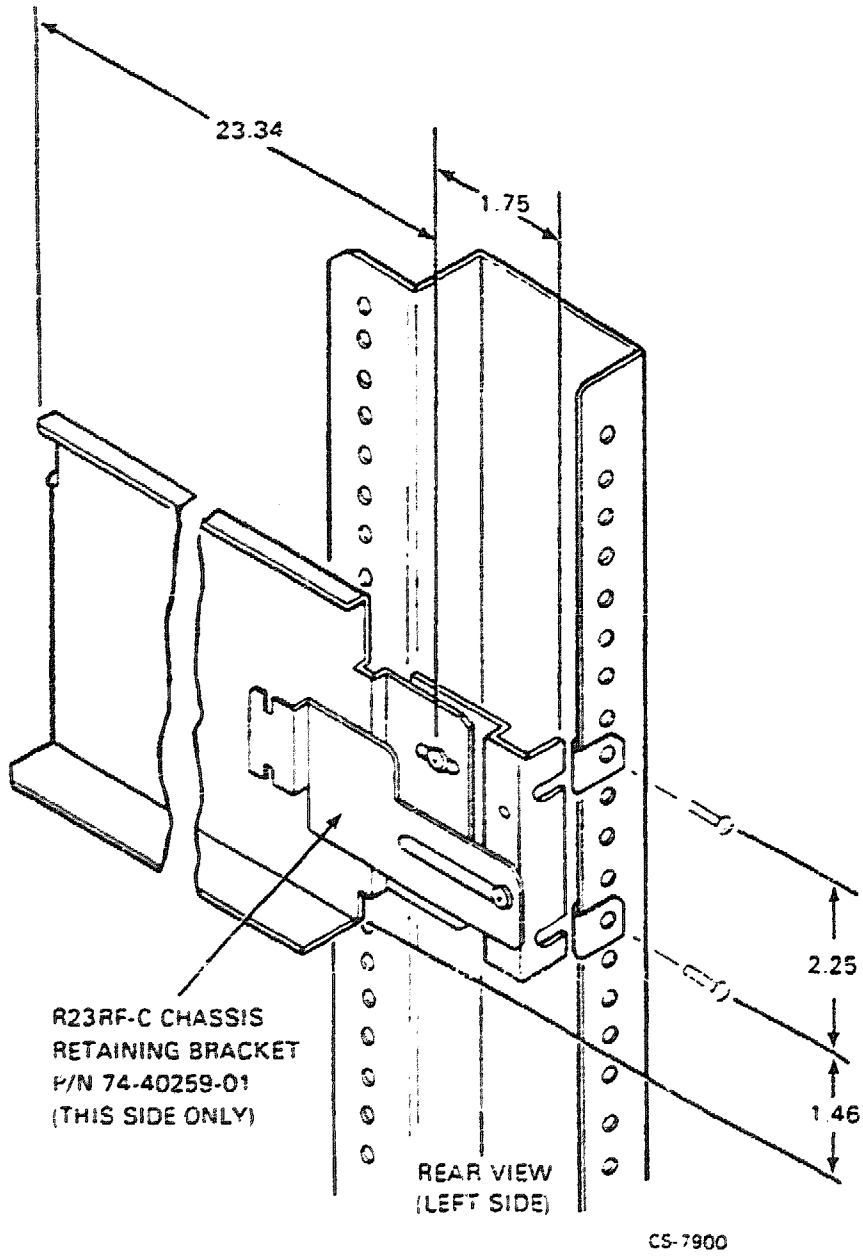

Figure B–1 Rackmount Disk System Dimensions

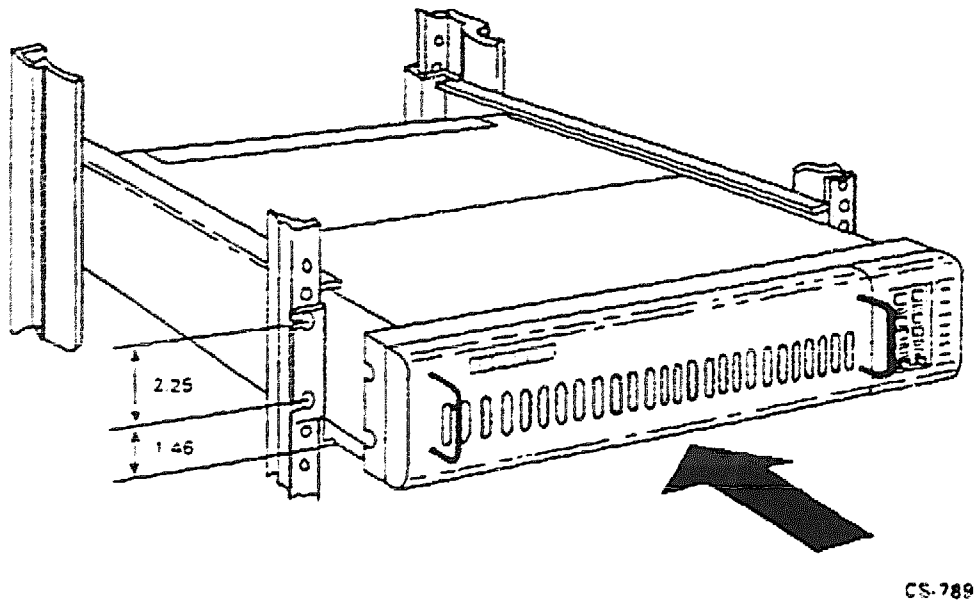

Figure B–2 Inserting the Disk System in the Rackmount

B.6 CABLING THE RACKMOUNT DISK SYSTEM

B.6.1 Single Rackmount Configurations

Refer to Figures B-3 and B-4. Proceed as follows:

- Open the rear door of the cabinet where the rackmount disk system is installed.
- Connect the DSSI bus cable from the host's DSSI I/O panel to the DSSI bus input connector on the R23RF-C Rackmount Disk System.
- Tighten all connector fastening screws.
- Connect the ac power cable to the ac power inlet socket on the rear of the R23RF-C Rackmount Disk System.
- For single R23RF configurations, fit a DSSI bus terminator to the DSSI bus output connector.
- Route the cables so that they will not interfere with any other device mounted in the cabinet.
- Close the rear door of the rackmount disk system.

CAUTION
For single R23RF configuration, a terminator (P/N 12-29258-01) must be fitted to the DSSI bus output connector to ensure data integrity. See Figure B-4.

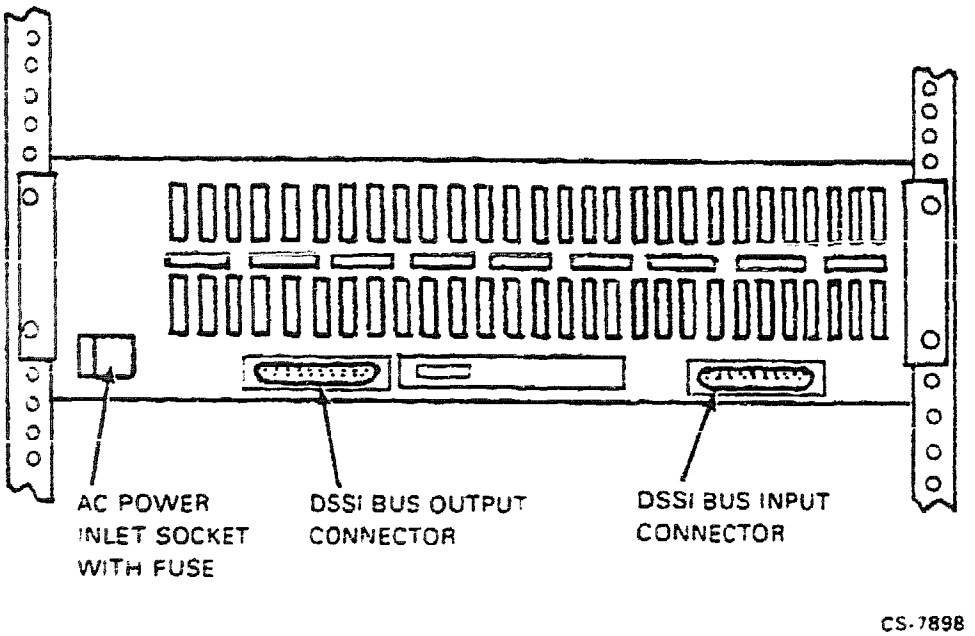

Figure B–3 Rear View of R23RF-C Rackmount Disk System

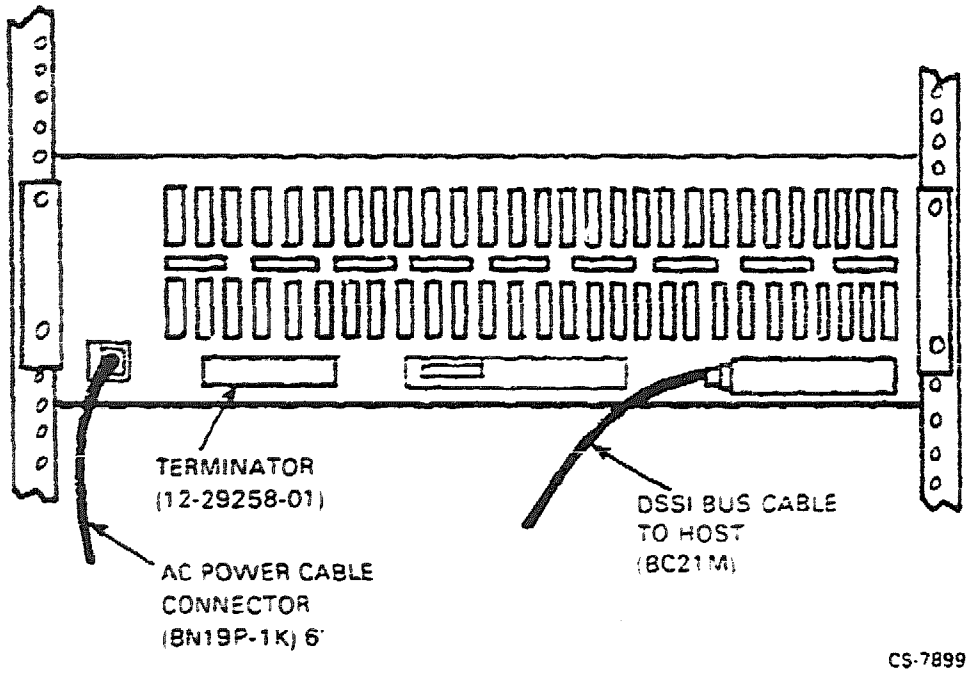

Figure B–4 Cabling the Rackmount Disk System

B.6.2 Multiple Rackmount Configurations

Connect the first R23RF-C Rackmount Disk System to the adapter I/O port with a BC21M-09 DSSI cable. Connect the second R23RF-C Rackmount Disk System to the first with a BC21N-01 DSSI cable. Install a DSSI terminator in the remaining DSSI connection on the last R23RF-C. See Figure B-5.

CAUTION

A terminator (P/N 12-29258-01) must be fitted to the DSSI bus output connector of the last R23RF in the line to ensure data integrity. See Figure B-5.

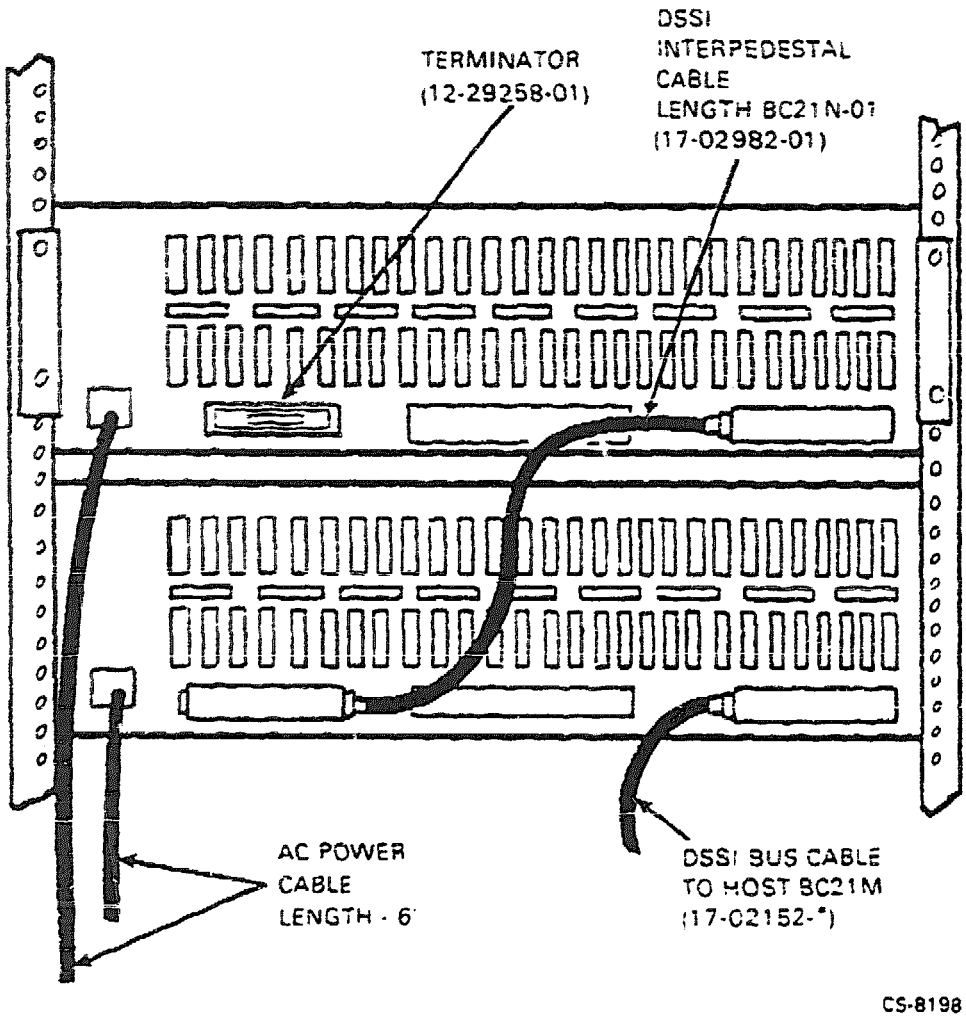

Figure B–5 Interrack Cabling

B.7 INSTALLING THE DSSI NODE ID PLUGS

Once the DSSI adapter has been configured and cabled, install two of the eight supplied DSSI node ID select plugs (P/N 12-28766-19) in the DSSI drive select switches on the Operator Control Panel (refer to Chapter 3, Figure 3-1). These plugs, which are numbered 0 to 7, define the DSSI Node ID for each slot.

Do not install two plugs with the same number on the same OCP. If several R23RF-Cs are connected together, install plugs numbers that are unique throughout the system. *Do not* use node ID plugs that conflict with the DSSI adapter node ID (usually 6 or 7).

B.8 TESTING THE R23RF-C

Having set the DSSI Drive IDs, insert the RSEs into the R23RF-C Rackmount Disk System (see Chapter 3 for details).

Power up the R23RF-C Rackmount Disk System. Both RSEs spin up automatically and the top four indicators for each RSE light while they run their internal diagnostics. After a few seconds, when the RSEs are up to speed, the FAULT and WRITE PROTECT indicators go out, leaving the POWER and READY indicators lit.

The system is now ready for testing using MDM Diagnostics (refer to the *MDM User Guide* for details).

The R23RF-C is now ready for use.

Give the user a demonstration of how to use it.

Glossary

DSA
Digital Storage Architecture.

DSSI
Digital Storage Systems Interconnect.

DUP
Diagnostic Utilities Protocol.

ID
Abbreviation for Identification. The DSSI node ID allows ISEs, RSEs, and adapters to address one another on the DSSI.

KA640
The KA640 is the CPU module as used on the Micro/VAX 3300/3400. It includes an embedded DSSI adapter.

KFQSA
The KFQSA is an adapter that provides an interconnect between the Q–bus and the Digital Storage System Interconnect (DSSI).

LED
Light Emitting Diode, an illuminated indicator.

LIF
Low Insertion Force, a type of electrical connector.

MDM
Micro/VAX Diagnostic Monitor, for testing Digital modules and options.

MSCP
Mass Storage Communications Protocol.

OCP
Operator Control Panel, contains all controls for operating the R23RF.

RF Integrated Storage Elements (ISE).
The RF family of disks belong to a new generation of storage solutions which contain their own controllers and Mass Storage Communications Protocol (MSCP) Servers. Hence, the name Integrated Storage Element.

RF31
The RF31 is a 381 Megabyte, half-height, 5 ¼" ISE.

RF72
The RF72 is a 1 Gigabyte, full-height, 5 ¼" ISE.

RF73
The RF73 is a 2 Gigabyte, full-height, 5 ¼" ISE.

RSE
Removable Storage Element.

Terminator
An electrical device, which improves the integrity of signals on a bus.