
**RQZX1 SCSI Controller Upgrade
and Installation Guide**

RQZX1 SCSI Controller Upgrade and Installation Guide

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Preface

This manual provides the information and procedures necessary to install the RQZX1 small computer system interface (SCSI) adapter and SCSI cabling in a Q-bus MicroPDP-11 based system. It also provides instructions for configuring a system using the console commands.

Intended Audience

This document is intended for Digital service personnel or for qualified self-maintenance customers.

Factory-Installed Option: When purchased as a factory-installed option, the RQZX1 SCSI adapter module comes installed and preconfigured in the system. No additional installation instructions are required.

Customers who have purchased the factory-installed option will find the following sections of this guide useful:

Chapter 1, Description	Overview of the controller functions, specifications, associated software and hardware, and installation options
Chapter 5, RQZX1 Configuration	Instructions for verifying the configuration
Chapter 6, Diagnostics	Instructions for using the diagnostic tests that are available
Chapter 7, Command Implementation	Information about the registers that control the SCSI port and the way SCSI commands are implemented

In the event another upgrade is performed, or additional equipment is added to the system, other parts of the guide may be required.

Structure of This Manual

- Chapter 1, Description, describes the RQZX1 adapter module and provides an overview of related equipment.
- Chapter 2, Planning the System Installation, contains the information you need to plan the physical and electrical configuration of your system.
- Chapter 3, Prepare for Installation, describes the tasks that need to be accomplished prior to installation of the RQZX1 adapter module.
- Chapter 4, Installing the RQZX1 Option, describes the installation of the RQZX1 adapter kit in the BA23 enclosure, in either a pedestal-mounted or H9642 series cabinet-mounted MicroPDP-11 system.
- Chapter 5, RQZX1 Configuration, describes how to use the the Resident Firmware Menu of the RQZX1 controller to configure the system.
- Chapter 6, Diagnostics, describes the diagnostic tests that are provided with the RQZX1 adapter and instructions on how to run them.
- Chapter 7, Command Implementation, contains information about the registers that control the SCSI port and the way SCSI commands are implemented.
- Appendix A contains the list of field-replaceable units (FRUs).

Conventions

The following conventions are used in this book.

Conventions	Meaning
code example	Indicates a system message or prompt
bold code example	Indicates user input at a system prompt. (Commands are printed uppercase.)
<code>Ctrl/Z</code>	A sequence such as <code>Ctrl/Z</code> indicates that you must hold down the key labeled Ctrl while you press the key Z.
Note	Notes provide general information about the current topic.
Caution	Cautions provide information to prevent damage to equipment or software.
Warning	Warnings provide information to prevent personal injury.

Related Documents

Document	Order Number
MicroPDP-11 BA23 Installation	EK-050AC-IN
MicroPDP-11 BA23 Operation	EK-051AC-OW
MicroPDP-11 System Troubleshooting	EK-220AA-TS
MicroPDP-11 BA23 Technical Information	EK-053AC-IS
Micro Systems Site Preparation Guide	EK-067AB-PG
MicroPDP-11 Customer Hardware Information Kit Addendum	EK-406AA-AD
MicroPDP-11 H9642 Installation	EK-187AA-MG
MicroPDP-11 H9642 Operation	EK-061AB-OW
MicroPDP-11 H9642 Troubleshooting	EK-062AB-SG
MicroPDP-11 H9642 Technical Information	EK-063AB-IS

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Instructions to Customers

If you are planning to install the RQZX1 option yourself . . .

Make sure you are qualified to perform the installation. If you have any doubts, call your local Digital service representative to schedule an installation.

To install the module and cable, carefully follow the procedures outlined in this manual. If you have any difficulty performing the installation, call your Digital service representative for assistance.

If you are having the option installed by Digital . . .

It is your responsibility to perform a software backup before your Digital service representative arrives at the site. This step ensures that data is not lost during installation.

This chapter begins with a description of the functions performed by the RQZX1 SCSI controller. It then describes some of the features of the module and how they work. Following a discussion of the hardware and software with which it works, the chapter concludes with physical descriptions of the devices, the Digital enclosure, and the different ways in which they can be purchased.

1.1 RQZX1 SCSI Controller Functions

The RQZX1 controller provides an interface between a Q-bus based system and various small computer systems interface (SCSI) devices and compatible floppy disk (diskette) drives. MicroPDP-11 based systems can use the RQZX1 to communicate with SCSI-based mass storage devices.

The Q-bus side of the RQZX1 supports MSCP (mass storage control protocol) and TMSCP (tape mass storage control protocol). The other side of the RQZX1 acts as a SCSI initiator, controlling as many as seven SCSI devices in a variety of configurations. (Due to the limited space available, the RQZX1 mounted in a BA23 enclosure can support a total of only four devices. These can be all SCSI devices or a mixture of SCSI devices and as many as two RX33 devices.)

Resident Firmware

The RQZX1 incorporates a set of diagnostic and configuration utilities. These utilities allow the user to communicate directly with the RQZX1 by means of a firmware-resident terminal driver. Through them it is possible to:

- Configure the RQZX1
- Format SCSI hard drives
- Test media and drive hardware
- Format RX33 diskettes
- Perform extensive reliability tests

The RQZX1 includes a self-test routine to check all internal components. The self-test runs when the system is turned on, and it can also be run as needed by the user.

1.2 Product Features

Microprocessor

The RQZX1 controller is organized around a 16-bit high-performance NMOS Intel 80186 microprocessor. The primary function of the microprocessor is to decode MSCP and TMSCP commands from the host to control SCSI storage devices and the RX33 floppy drive. At command completion, the microprocessor is responsible for generating status and transmitting it back to the host. The microprocessor also sets up the registers of the Q-bus, SCSI, and diskette interfaces for data transfers.

The RQZX1 module uses a 128-kilobyte EPROM, which contains the firmware. It also features 64 kilobytes of SRAM and a 512-word FIFO buffer, which are used for data buffering and working storage. Configuration parameters are stored in an 8-kilobyte EEPROM.

RQZX1 Buses

The RQZX1 uses a 16-bit internal data bus with 18-bit addressing capability and is capable of addressing 22 bits of the extended LSI-11™ bus.

Q-bus Interface and Control The Q-bus interface and control are implemented using a programmable logic device (PLD). The PLD is used for programmed I/O, host interrupts, and DMA transfers. The microprocessor responds to all programmed I/O and carries out the I/O functions required for the addressed Q-bus specific register.

Block-Mode DMA This automatic DMA capability is used to transfer large blocks of data directly between host memory and the FIFO buffer. The default burst length is 16 words. During the DMA data transfers, the RQZX1 monitors the Q-bus for other pending DMA requests and suspends its own DMA to permit other DMA activities to occur. This assures that host CPU functions, including interrupt servicing, are not locked out for excessive periods of time during high-speed SCSI data transfers.

SCSI Bus Interface and Control The SCSI bus is controlled by the CMOS LSI chip NCR 53C94. This chip is able to transfer data on the SCSI bus in asynchronous and synchronous mode at a rate up to 5 megabytes per second (MB/s). This transfer rate can be achieved only between SCSI devices. The transfer rate between the SCSI bus and the Q-bus is limited by the Q-bus timing restrictions.

IP/SA Register Sets

There are two independent IP/SA register sets. Each one can emulate either an MSCP or a TMSCP server, providing an interface between the Digital mass storage protocols and the SCSI bus. The RQZX1 queues up to 15 commands per IP/SA register set in any combination of MSCP or TMSCP protocols.

The host's operating system limits the number of Q-bus logical unit numbers (LUNs) to 4 MSCP or 1 TMSCP per IP/SA register set.

Command Sets The RQZX1 supports both the SCSI-1 common command set and also all mandatory SCSI-2 commands. To accommodate drives from other manufacturers, SCSI drives are controlled only by the mandatory SCSI-1 commands, when possible. Since full disconnect and reconnect ability is supported on the SCSI drives, several operations can be performed simultaneously. The ability to store and sort commands makes the RQZX1 very efficient in heavily loaded multiuser systems.

1.3 Associated Software and Hardware

This section lists the operating systems which support the RQZX1 and the Digital drives which have been qualified on the RQZX1.

1.3.1 Operating Systems Which Support the RQZX1

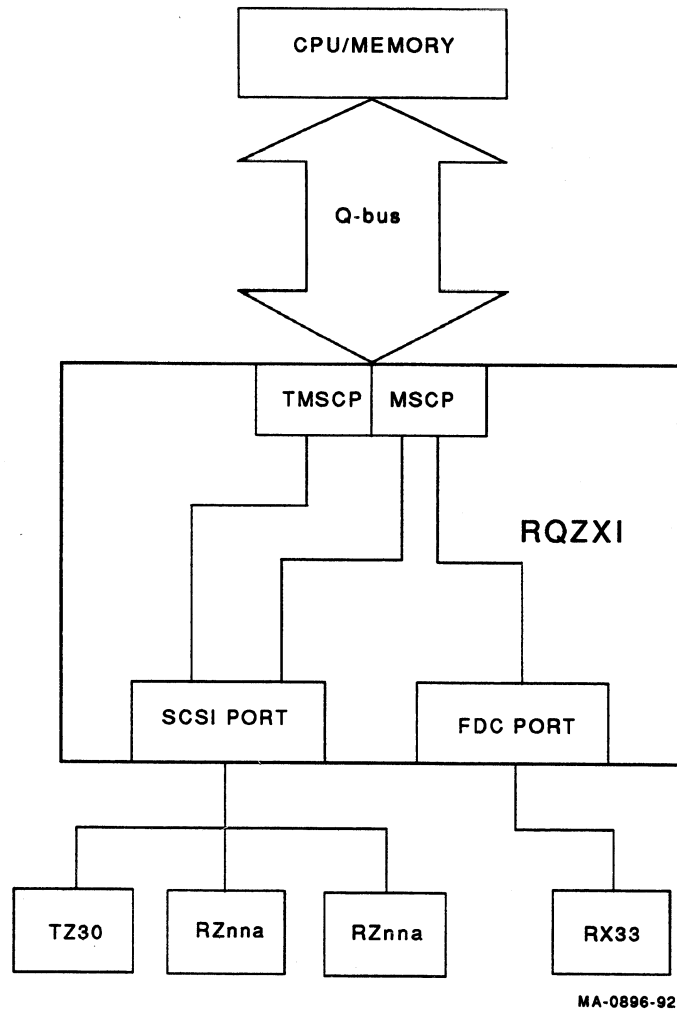
The RQZX1 adapter module is supported by the following operating systems and associated diagnostic utilities:

Operating System	Version
RSTS/E™	Version 10.1
RSX-11M™	Version 4.7
RSX-11M-PLUS™	Version 4.4
RSX-11S™	Version 4.7
MicroRSX™	Version 4.4
RT-11™	Version 5.6
XXDP	Version 2.5

1.3.2 Supported Digital Drives

Figure 1-1 illustrates the relationship between the CPU and memory, the RQZX1 controller, and four storage devices that are connected through the controller.

Figure 1-1 Typical System with RQZX1 Controller



The Digital drives currently supported by the RQZX1 controller are the RZ23L, RZ24, and RZ24L disk drives, the TZ30 tape drive, and the RX33 diskette drive.

1.4 MicroPDP-11 Systems in a BA23 Enclosure

The RQZX1 is a quad-height LSI-11 mass storage adapter designed for a BA23 enclosure.

BA23 Enclosure Overview

The BA23 enclosure contains an 8-slot Q22-bus backplane and accommodates as many as two 13.3-cm (5.25-in) full-height mass storage devices or four half-height storage devices 4.13-cm (1.625-in). The BA23 enclosure also contains a control panel.

The BA23 enclosure may be rack-mounted or housed either in a pedestal cabinet or inside the H9644-JA cabinet.

The H9644-JA cabinet contains space for two rack-mounted BA23 enclosures and has additional space for larger mass storage devices.

1.5 Option Kits

The RQZX1 adapter module is usually ordered as part of an option kit. Each option kit includes an RQZX1 adapter module, one terminator, and documentation. Table 1-1 lists the option kits, and Table 1-2 lists the components of the upgrade kit.

Factory Installation or Field Upgrade

The RQZX1 option kit is ordered either as part of a factory installation or for a field upgrade. Other options may be included in either order. For example, a typical order might include the BA23 enclosure with a CPU module, memory module, SCSI controller (the RQZX1 option kit), RZ24 disk drive, and TZ30 tape drive.

Factory Installation All modules which belong in the BA23 enclosure are installed and configured before delivery to the customer. The customer simply turns on the power to the system, verifies the configuration, and loads the software to run.

Field Installation Either a Digital installer or the customer unpacks the products, installs them, and configures them. The customer can then begin using them.

If the field installation includes all the components of a system, then the installation instructions that come with the system are used to perform those parts of the installation.

Description 1.5 Option Kits

Table 1-1 Standard RQZX1 Option Kits

Option Kit	Description
RQZX1-AA	RQZX1 adapter module - factory installed kit
RQZX1-UA	RQZX1 adapter module - upgrade kit

Table 1-2 Components of the RQZX1 Upgrade Kit

Description	Digital Part Number	Order Number
RQZX1 adapter module SCSI to Q-bus controller	M5977-AA	M5977-AA
SCSI 50-pin cable assembly includes bulkhead connector plate	17-03036-01	
SCSI terminator	12-30552-01	H8574-A
DC power cables (2)	17-01389-01	—
RX33-Ax ribbon cable	17-01526-03	—
Flat cable clamp	12-23272-04	—
RQZX1 Installation Guide	EK-MPDP1-IN	EK-MPDP1-IN

2 Planning the System Installation

It is important to plan the system installation carefully before putting new modules into the system. This process involves checking the power and bus load requirements and ensuring that you have everything you need to make the configuration work.

2.1 Steps for Planning a System

The steps to follow in planning a system are listed below.

1. Identify all devices already installed in the system.
2. Identify all devices you plan to install in the system.
3. Calculate the power and bus loads for each device in the system.
4. Make sure the totals are within the limits specified for the enclosure and that they meet the the configuration guidelines (Section 2.3).

A configuration worksheet is included in the next section to organize and simplify this process.

2.2 Configuration Worksheet

A configuration worksheet lets you track the parameters that limit system configuration, such as space, power requirements, and bus loads. A configuration worksheet should be filled out before you begin the installation.

Figure 2-1 shows a configuration worksheet for the BA23 enclosure. The column labeled "I/O Inserts" includes notes for a pedestal-mounted system, but you can use the worksheet to plan any installation.

Figure 2-1 BA23 Configuration Worksheet

SLOT	MODULE	Current (Amps)		Power (Watts)	I/O Inserts	
		+5 V	+12 V		B	A
1	AB CD					
2	AB CD					
3	AB CD					
4	AB CD					
5	AB CD					
6	AB CD					
7	AB CD					
8	AB CD					
MASS STORAGE:						
1						
2						
3						
4						
Total these columns:						
Must not exceed:		36.0	7.0	230 W	4 *	2 *
with adapter template:					2 *	5 *

*If more than two type A connectors are required in a pedestal, an adapter template (PN 74-27740-01) may be used.

MA-0356-92.DG

If your system requires more than two A connectors, you can use an adapter template (part number 74-27740-01) in the I/O distribution panel for the pedestal, in the B cutouts labeled C and D.

Table 2-1 lists the maximum number of I/O inserts allowed in a pedestal-mounted system.

Table 2-1 I/O Inserts Allowed

Type	Dimensions	Number
without adapter template		
A	1 inch by 4 inches	2
B	2 inches by 4 inches	4
with adapter template		
A	1 inch by 4 inches	5
B	2 inches by 4 inches	2

Table 2-2 lists power and bus load data for many of the modules and storage devices on other modules currently supported by Digital. For additional information, refer to the documentation supplied with that module.

Table 2-2 Power and Bus Load Data

Option	Module	Current in Amps		Power Bus Loads		
		+5 V	+12 V	Watts	AC	DC
AAV11-D ¹	A1009	1.8	0.0	9.0	1.0	1.0
ADV11-D ¹	A1008	3.2	0.0	16.0	1.0	1.0
DEQNA™	M7504	3.5	0.5	23.5	2.8	0.5
DHV11	M3104	4.5	0.55	29.1	2.9	0.5
DLVJ1	M8043	1.0	0.25	8.0	1.0	1.0
DMV11-M	M8053	3.4	0.4	21.8	2.0	1.0
DMV11-N	M8064	3.4	0.4	21.8	2.0	1.0
DPV11	M8020	1.2	0.3	9.6	1.0	1.0
DRV11	M7941	0.9	0.0	4.5	2.8	1.0
DRV11-J	M8049	1.8	0.0	9.0	2.0	1.0
DZQ11	M3106	1.0	0.36	9.32	1.5	1.0
DZV11	M7957	1.2	0.39	10.7	3.9	1.0
IEQ11	M8634	3.0	0.0	15.0	2.0	1.0

¹Usually connected through a universal data input panel (UDIP) using a 13.3-cm (5.25-in) mass storage slot.

(continued on next page)

Planning the System Installation
2.2 Configuration Worksheet

Table 2-2 (Cont.) Power and Bus Load Data

Option	Module	Current in Amps		Power Bus Loads		
		+5 V	+12 V	Watts	AC	DC
KDA50-Q	M7164	6.93	0.0	34.65	3.0	0.5
KDA50-Q	M7165	6.57	0.03	33.21	0.0	0.0
KLESI™	M7740	3.0	0.0	15.0	2.3	1.0
KMV11	M7500	2.6	0.2	15.4	3.0	1.0
KWV11-C ¹	M4002	2.2	0.013	11.2	1.0	1.0
LPV11	M8027	0.8	0.0	4.0	1.4	1.0
MRV11-D	M7942	2.8	0.0	14.0	1.8	1.0
RC25™		1.0	2.5	35.0	-	-
RD51		1.0	1.6	24.2	-	-
RD52		1.0	2.5	35.0	-	-
RD53		0.9	2.5	34.5	-	-
RD54		1.3	1.34	23.7	-	-
RQDX2™	M8639-YB	6.4	0.1	33.2	2.0	1.0
RQDX3	M7555	2.48	0.06	13.2	1.0	1.0
RQDXE	M7513	0.8	0.0	4.0	1.0	0.0
RQZX1-AA	M5977	4.5	N/A	22.5	2.0	1.0
RD31	-	1.0	2.0	-	-	-
RD32	-	1.0	2.0	-	-	-
RX33		0.5	0.3	5.6	-	-
RX50™		0.85	1.8	25.9	-	-
RZ23L	-	0.280	0.200	3.80	-	-
RZ24	-	0.300	0.325	5.50	-	-
RZ24L	-	0.3	0.3	4.9	-	-
TK50		1.35	2.4	33.55	-	-
TQK50™	M7546	2.9	0.0	14.5	2.0	1.0
TSV05	M7196	6.5	0.0	32.5	3.0	1.0

¹Usually connected through a universal data input panel (UDIP) using a 13.3-cm (5.25-in) mass storage slot.

(continued on next page)

Planning the System Installation
2.2 Configuration Worksheet

Table 2-2 (Cont.) Power and Bus Load Data

Option	Module	Current in Amps		Power Bus Loads		
		+5 V	+12 V	Watts	AC	DC
TZ30	-	1.8	2.0	33.0	-	-

2.3 Guidelines for RQZX1 System Configuration

The following guidelines should help you plan an acceptable configuration using the RQZX1 controller.

- For optimal performance, install the RQZX1 SCSI adapter after any TMSCP controllers and before any MSCP controllers.
- The RQZX1 host adapter is connected to the SCSI devices using a 50-wire flat ribbon cable with 50-pin headers. The RQZX1 provides termination for one end of the cable. A SCSI terminator is attached to the IEEE connector to terminate the other end of the SCSI bus. The RQZX1 provides power to the SCSI terminator.

Note

The SCSI I/O connector on the rear bulkhead is for ease of termination only. External SCSI devices are not currently supported by Digital.

Digital recommends a maximum cable length of 4 meters (13 feet) for best performance results. The BA23 enclosure's internal SCSI bus length is 2.9 meters (87 inches, or 7 feet, 3 inches).

- Use supported devices. Supported devices are listed in Section 1.3.2. Due to the limited space available, the RQZX1 mounted in a BA23 enclosure can support a total of only four devices. These can be all SCSI devices or a combination of SCSI devices and as many as two RX33 devices.
- Connect devices within the standard limits of the SCSI bus and the operating system used. For example, Digital operating systems allow a maximum of four MSCP devices or one TMSCP per switchpack.

Prepare for Installation

3.1 Introduction

This chapter describes the tasks which must be completed before you can install the RQZX1 SCSI adapter upgrade.

Preparing for the installation consists of unpacking the products, confirming that everything is in order, planning the installation layout, and setting the switches on the modules and any drives in accordance with your plan.

Pre-Installation Checklist

Before proceeding, make sure you can check off all items in the following list.

- Are you qualified to perform this installation or upgrade?*

To avoid damage to equipment or files, only qualified service personnel should attempt to install the RQZX1 adapter module.

- Is the system itself working properly?*

Before beginning an upgrade, the system should be tested to make sure it is functioning as it should.

- Has the system manager backed up all files?*

This is a precaution in case files are lost during installation.

- Has the system manager performed a shutdown of the operating system?*

The operating system should be shut down properly before the power is turned off.

Make sure all items on the checklist are complete before beginning an installation or upgrade.

3.2 Unpacking and Inspecting

Caution

Static electricity can damage integrated circuits. The RQZX1 adapter module is packaged inside an antistatic wrapping with a silica gel packet to prevent moisture damage. Do not unpack the module until antistatic precautions have been taken. Save the wrapping and the gel packet to protect any modules that are being stored or transported.

Antistatic Precautions: Always wear a grounded wrist strap and use a grounded work surface, such as the one found in the antistatic kit (part number 29-26246-00), when installing modules.

Before opening the container, check for external damage such as dents, holes, or crushed corners. Open and unpack the shipping container.

Visually inspect the RQZX1 adapter module for damage. Check the components and connectors for broken, bent, or missing pins. If there is any damage, discontinue the installation.

Verify the contents of the RQZX1 option kit with the packing list and Table 1-2.

Report any damages or shortages to the shipper and notify your Digital service representative.

3.3 Planning the Layout

Plan the physical configuration to match the configuration work sheet that you created in Chapter 2.

If you are including any of the supported Digital drives, use the drawings that come with those devices in your planning. The drawings show how best to mount the devices in different combinations.

The following table shows the physical dimensions and weight of these drives.

Table 3-1 Drive Dimensions and Weight

Drive	Height	Width	Depth	Weight
RX33 diskette drive	1.69 in 4.29 cm	5.75 in 14.60 cm	8.00 in 20.32 cm	2.43 lb 1.10 kg
RZ23L disk drive	1.00 in 2.54 cm	4.00 in 10.16 cm	5.75 in 14.60 cm	1.20 lb 0.54 kg
RZ24 disk drive	1.625 in 4.13 cm	4.00 in 10.16 cm	5.75 in 14.60 cm	1.70 lb 0.77 kg
RZ24L disk drive	1.00 in 2.54 cm	4.00 in 10.16 cm	5.75 in 14.60 cm	1.05 lb 0.47 kg
TZ30 tape drive	1.625 in 4.13 cm	5.72 in 14.53 cm	8.49 in 21.56 cm	3.75 lb 1.70 kg

3.4 RQZX1 Switches

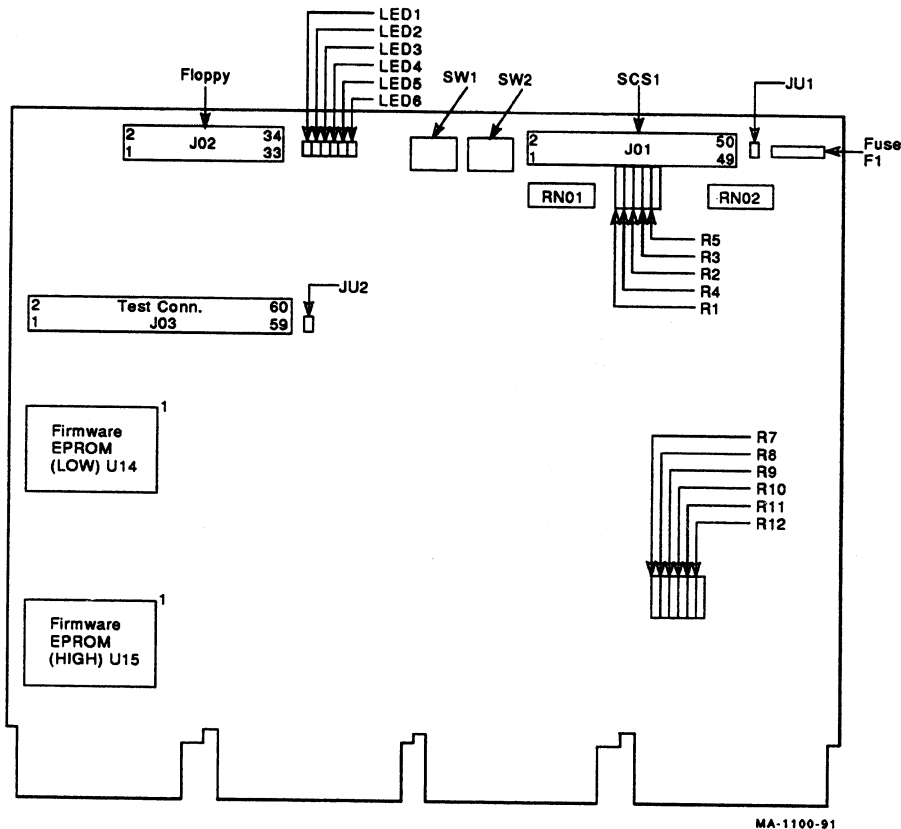
Most of the switches on the RQZX1 controller are set at the factory. This section helps you locate the switches and describes how to set any that you might need to set.

3.4.1 Description of RQZX1 Switches

Figure 3-1 shows the layout of the RQZX1 adapter, the location of the various sets of switches, the LEDs, and other parts of the module.

Prepare for Installation 3.4 RQZX1 Switches

Figure 3-1 RQZX1 Module Layout (M5977)



Prepare for Installation 3.4 RQZX1 Switches

Notice especially the following items:

Item	Description/Function
LEDs 1 - 6	Allow you to isolate faults discovered in the self-test diagnostic. (Refer to Chapter 6.)
SW1 and SW2	Switchpacks 1 and 2: 2 sets of 5 dual in-line package (DIP) switches, which allow you to select MSCP or TMSCP protocol (DIP switch 1) and set the CSR addresses.
J01 and J02	Connectors: J01 is a 50-pin connector; J02 is a 34-pin connector
JU1 and JU2	Jumpers

The following table provides details about the jumpers.

Jumper	Type	Signal Name	Factory Setting	Description
JU01	push-on	TMRPW	IN	To provide SCSI terminator power to a remote termination circuit
R01	solder		OUT	Connects J1 pin 23 to ground
R02	solder		OUT	Connects J1 pin 25 to ground
R03	solder		OUT	Connects J1 pin 27 to ground
R04	solder		OUT	Connects J1 pin 24 to ground
R05	solder		OUT	Connects J1 pin 28 to ground
JU02	push-on	CPSRES	OUT	Manual reset
R07 to R12	solder	HL0 to HL5		Hardware revision level Bit 0 to Bit 5 (MSB). These jumpers are installed at the factory and reflect the current hardware revision level.

3.4.2 Setting the RQZX1 Switches

Every device on the SCSI bus, including the RQZX1 SCSI adapter, must have a unique identification address. The available addresses range from 0 to 7. The SCSI ID 7 has the highest priority on the bus; SCSI ID 0 has the lowest priority. During configuration, you assign a SCSI address for the host adapter and for each of the SCSI drives to be supported.

The Q-bus address and emulation type for each port must be set up before the RQZX1 module is installed. Since the module includes two ports (0 and 1), you must set the emulation and address for each port. The RQZX1 is shipped with the following configuration:

Prepare for Installation

3.4 RQZX1 Switches

Port 0 disk address 17772150

Port 1 tape address 17774500

If these addresses need to be changed, then the following tasks must be completed before the RQZX1 option can be installed:

- Select MSCP or TMSCP protocol (the same protocol or different protocols may be selected for each switchpack)
- Set Q-bus address

If you change a switch position, the RQZX1 must be reset so that the initialization sequence reads the new address.

3.4.2.1 Selecting MSCP or TMSCP Protocol

CAUTION

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

Use switch 1 of the five-position DIP switchpacks (labeled SW1 and SW2 in Figure 3-1) on the RQZX1 adapter to assign MSCP and TMSCP protocol to the ports.

- Set switch 1 as follows:

OFF to designate MSCP protocol

ON to designate TMSCP protocol

3.4.2.2 Setting Q-bus Addresses

Use the five-position DIP switchpacks on the RQZX1 to set CSR addresses on both MSCP and TMSCP protocols. These addresses enable you to boot the system and access the EPROM.

- Set switches 2, 3, 4, and 5 according to the following tables (Table 3-2 and Table 3-3) to reflect a CSR address from either MSCP or TMSCP protocol

Table 3-2 shows the CSR addresses (in octal) when Switch 1 is set to the Off (MSCP) position.

Prepare for Installation

3.4 RQZX1 Switches

Table 3-2 MSCP Address Selection

1	2	3	4	5	Bus Address
OFF	OFF	OFF	OFF	OFF	17772150
OFF	OFF	OFF	OFF	ON	17760334
OFF	OFF	OFF	ON	OFF	17760340
OFF	OFF	OFF	ON	ON	17760344
OFF	OFF	ON	OFF	OFF	17760350
OFF	OFF	ON	OFF	ON	17760354
OFF	OFF	ON	ON	OFF	17760360
OFF	OFF	ON	ON	ON	17760364
OFF	ON	OFF	OFF	OFF	17760370
OFF	ON	OFF	OFF	ON	17760374
OFF	ON	OFF	ON	OFF	17760400
OFF	ON	OFF	ON	ON	17760404
OFF	ON	ON	OFF	OFF	17760770
OFF	ON	ON	OFF	ON	17760774
OFF	ON	ON	ON	OFF	not used
OFF	ON	ON	ON	ON	CSR disabled
ON	ON	ON	ON	ON	self-test ¹

¹Continuous self-test runs only if all switches on both switchpacks are set to the ON position.

Table 3-3 shows the CSR addresses (in octal) when Switch 1 is set to the On (TMSCP) position.

Prepare for Installation

3.4 RQZX1 Switches

Table 3-3 TMSCP Address Selection

TMSCP Address Switches (Switch 1 ON)					
1	2	3	4	5	Bus Address
ON	OFF	OFF	OFF	OFF	17774500
ON	OFF	OFF	OFF	ON	17760404
ON	OFF	OFF	ON	OFF	17760410
ON	OFF	OFF	ON	ON	17760414
ON	OFF	ON	OFF	OFF	17760420
ON	OFF	ON	OFF	ON	17760424
ON	OFF	ON	ON	OFF	17760430
ON	OFF	ON	ON	ON	17760434
ON	ON	OFF	OFF	OFF	17760440
ON	ON	OFF	OFF	ON	17760444
ON	ON	OFF	ON	OFF	17760450
ON	ON	OFF	ON	ON	17760454
ON	ON	ON	OFF	OFF	17760770
ON	ON	ON	OFF	ON	17760774
ON	ON	ON	ON	OFF	not used
OFF	ON	ON	ON	ON	CSR disabled
ON	ON	ON	ON	ON	self-test ¹

¹Continuous self-test runs only if all switches on both switchpacks are set to the ON position.

3.5 Connecting Multiple Drives

Multiple drives are connected to the RQZX1 by a daisy-chain cabling configuration. SCSI drives may be daisy chained in any order. Each drive must then be assigned a unique node ID number.

3.5.1 Setting ID Numbers

Each of the supported drives is included in the following sections, with a figure showing the location of the jumpers or switches you use to set the ID number, and a table showing the settings for each possible ID number. Each drive has either four numbered DIP switches or three jumpers labeled E1, E2, and E3.

Prepare for Installation

3.5 Connecting Multiple Drives

You set the ID number on each drive according to the system plan you developed earlier (Chapter 2).

CAUTION

Use a ballpoint pen or pointed object to set the switches. Never use a pencil to set the switches. The graphite used in pencils can damage the switches.

1. Make sure the power to all drives is Off.
2. Determine the ID number to be assigned to each drive.
The SCSI node ID number can be any number from 0 to 7, with higher numbers having higher priority. The default ID for the RQZX1 is 7.
3. Set the jumpers or switches to the correct ID number.
(The various drive jumpers and switches are marked differently. See the corresponding reference tables for the specific drive.)
4. After installation, test the bus interconnects using the procedures described in Chapter 6.

Prepare for Installation
3.5 Connecting Multiple Drives

3.5.2 RZ23L Disk Drive

Determine the SCSI address and set the jumpers on the RZ23L drive according to Table 3-4. Figure 3-2 shows the location of the jumpers.

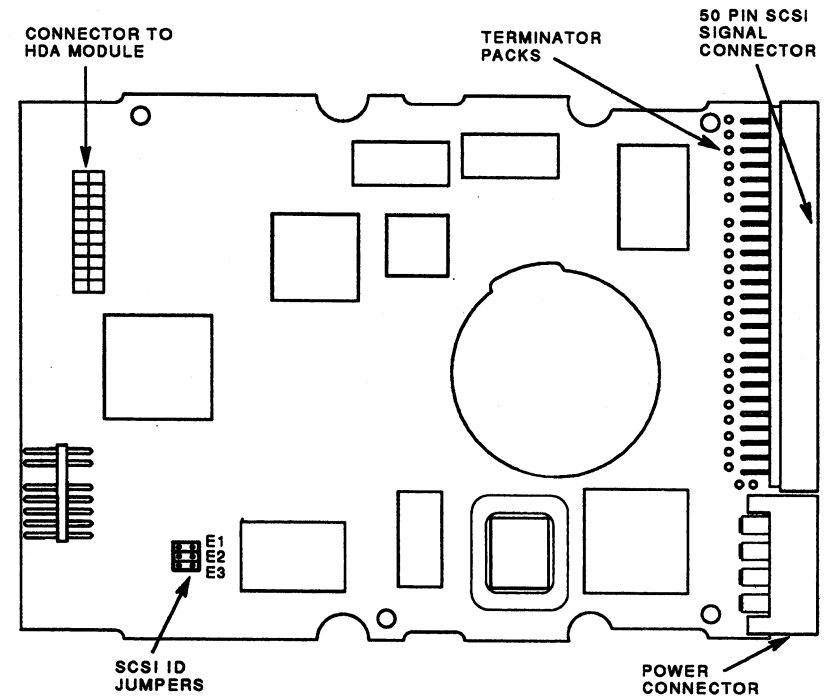
Table 3-4 RZ23L SCSI ID Jumper Settings

SCSI ID	E1	E2	E3
0	Out	Out	Out
1	In	Out	Out
2	Out	In	Out
3	In	In	Out
4	Out	Out	In
5	In	Out	In
6	Out	In	In
7 ¹	In	In	In

¹Reserved address ID for the RQZX1 controller.

Prepare for Installation
3.5 Connecting Multiple Drives

Figure 3-2 RZ23L Drive Module Layout



GSF-AX0115-02-DG
 SHR-X0166-90

Prepare for Installation
3.5 Connecting Multiple Drives

3.5.3 RZ24 Disk Drive

Determine the SCSI address and set the jumpers on the RZ24 drive according to Table 3-5. Figure 3-3 shows the location of the jumpers.

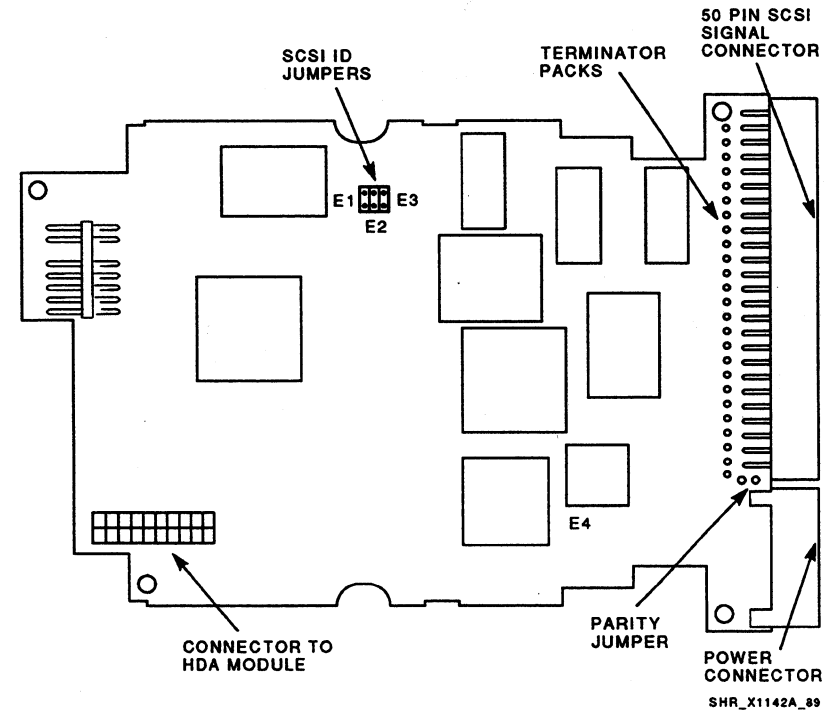
Table 3-5 RZ24 SCSI ID Jumper Settings

SCSI ID	E1	E2	E3
0	Out	Out	Out
1	In	Out	Out
2	Out	In	Out
3	In	In	Out
4	Out	Out	In
5	In	Out	In
6	Out	In	In
7 ¹	In	In	In

¹Reserved address ID for the RQZX1 controller.

Prepare for Installation
3.5 Connecting Multiple Drives

Figure 3-3 RZ24 Drive Module Layout



Prepare for Installation
3.5 Connecting Multiple Drives

3.5.4 RZ24L Disk Drive

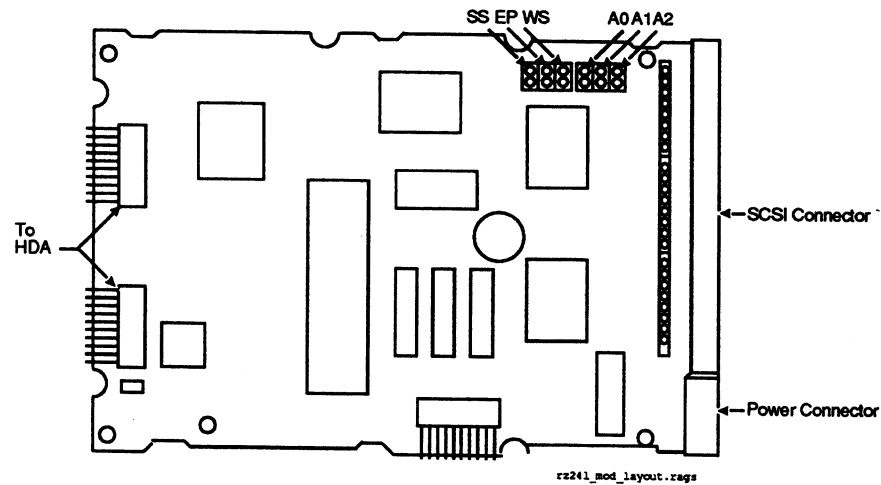
Determine the SCSI address and set the jumpers on the RZ24L drive according to Table 3-6. Figure 3-4 shows the location of the jumpers.

Table 3-6 RZ24L SCSI ID Jumper Settings

SCSI ID	A0	A1	A2
0	Out	Out	Out
1	In	Out	Out
2	Out	In	Out
3	In	In	Out
4	Out	Out	In
5	In	Out	In
6	Out	In	In
7 ¹	In	In	In

¹Reserved address ID for the RQZX1 controller.

Figure 3-4 RZ24L Drive Module Layout



Prepare for Installation
3.5 Connecting Multiple Drives

3.5.5 TZ30 Tape Drive

Determine the SCSI address and set the SCSI ID switches on the TZ30 tape drive according to Table 3-7. Figure 3-5 shows the location of the SCSI ID switches.

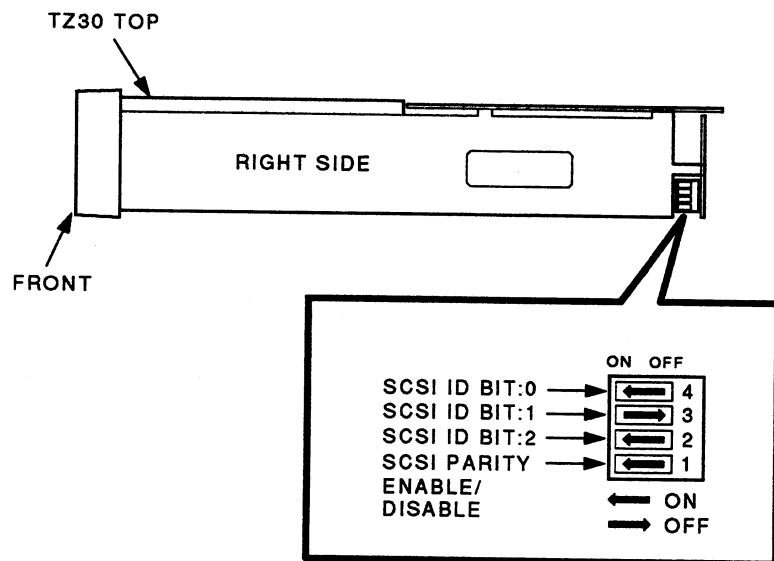
Table 3-7 TZ30 SCSI ID Switch Settings

SCSI ID	4	3	2	1
0	Off	Off	Off	On
1	On	Off	Off	On
2	Off	On	Off	On
3	On	On	Off	On
4	Off	Off	On	On
5	On	Off	On	On
6	Off	On	On	On
7 ¹	On	On	On	On

¹Reserved address ID for the RQZX1 controller.

Prepare for Installation
3.5 Connecting Multiple Drives

Figure 3-5 TZ30 SCSI ID Switch Locations



EXAMPLE OF SCSI ID SET TO 5 WITH PARITY ON.

MA-X1084-88

Prepare for Installation
3.5 Connecting Multiple Drives

3.5.6 RX33 Floppy Drive

The jumpers that are used to select the unit ID numbers are jumpers D0, D1, D2, and D3, corresponding to Drive 0, 1, 2, and 3. If your system has one RX33 drive, then the jumper D0 should be set to ON. If your system has two RX33 drives, then the the first drive's D0 jumper should be set to ON, and the second drive's D1 jumper to ON. The factory setting is D0 ON.

RX33 Drives	Jumpers			
	D0	D1	D2	D3
RX33 Drive 0	ON	OFF	OFF	OFF
RX33 Drive 1	OFF	ON	OFF	OFF
	OFF	OFF	OFF	OFF
	OFF	OFF	OFF	OFF

Installing the RQZX1 Option

4.1 Introduction

The RQZX1 module is delivered as either a factory-installed option or as part of a SCSI Upgrade Kit. This chapter explains how to install the RQZX1 SCSI controller in a BA23 enclosure in order to upgrade a field unit to a SCSI-based I/O bus. The information in this chapter is not needed for factory-installed units, except as a future reference for installing additional options.

This chapter explains how to install the RQZX1 module in a BA23 enclosure, both in the pedestal standalone system and the H9642-J cabinet. It also details the system modifications needed to install SCSI drives.

Modularized Instructions:

The following instructions are modularized, so that if you do not need to perform one of the steps, you can easily skip it. For example, if you are installing an adapter into a cabinet-mounted system, you can skip the instructions for removing the BA23 enclosure from a pedestal. On the other hand, if you are installing an adapter in a pedestal-mounted system, you can skip the instructions for removing the enclosure from a cabinet.

4.2 Perform the Installation

Overview of Installation Steps

Note

Before beginning the RQZX1 SCSI adapter module upgrade, test the system to verify that it is working properly.

Installing the RQZX1 Option 4.2 Perform the Installation

The steps involved in installation are:

1. Power OFF
2. Remove BA23 enclosure
3. Remove backplane (includes cables and options)
4. Install new cabling
5. Reinstall backplane
6. Install RQZX1 module, other modules, and drives
7. Reinstall BA23 enclosure
8. Power ON

Configuration of the module (the address and termination scheme) is described in Chapter 5.

4.2.1 Power OFF

Caution

Before starting the procedure, make sure that the system manager has backed up all files.

Have the system manager perform a system shutdown of the operating system before turning off the power.

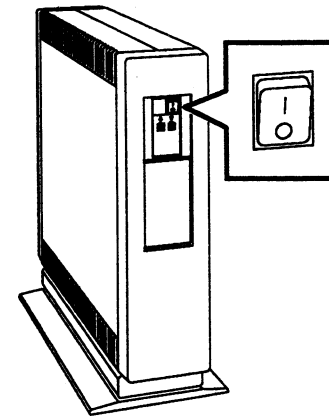
Autobooting Caution

If you plan to autoboot the system from a device that is attached to the RQZX1, then the selftest feature of the the CPU must be enabled. Otherwise, the system will fail to start up.

To turn the power off, place the power switch in the Off position and disconnect the power from its source. The power switch for the standalone pedestal system is shown in the Off (0) position in Figure 4-1.

Installing the RQZX1 Option 4.2 Perform the Installation

Figure 4-1 BA23 Power Switch



MLO-005265
MA-1144-91

4.2.2 Remove BA23 Enclosure

Caution

To avoid damage to the equipment or files, only qualified service personnel should attempt to perform these procedures.

Follow the procedure for either the pedestal-mounted enclosure or the cabinet-mounted enclosure.

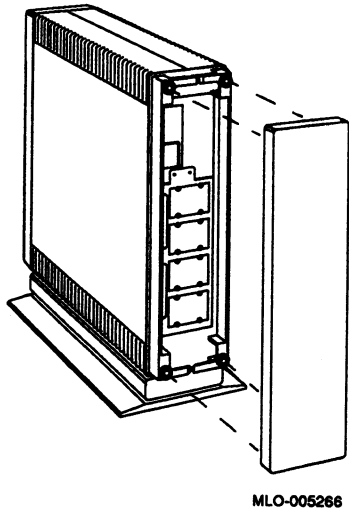
4.2.2.1 Pedestal-Mounted

To remove the BA23 enclosure from the pedestal, perform the following tasks:

1. Remove rear cover by pulling gently and expose the I/O panel as shown in Figure 4-2. The cover does not contain mounting screws and can be removed easily.

Installing the RQZX1 Option 4.2 Perform the Installation

Figure 4-2 Removing the Rear Cover



2. Disconnect and label all cables leading to the I/O panel.

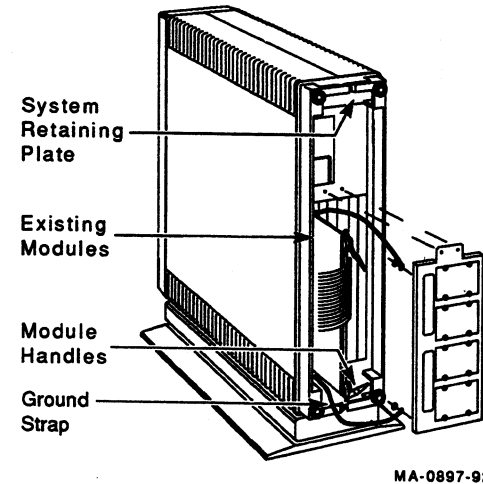
Label cables

Failure to label all cables correctly with their corresponding I/O ports will cause confusion when reinstalling the cables after the installation.

3. Loosen the two captive screws that hold the I/O panel (bulkhead assembly) in place, as shown in Figure 4-3, and swing the assembly open.

Installing the RQZX1 Option 4.2 Perform the Installation

Figure 4-3 Bulkhead and Removal of Ground Strap



Note that the ground strap shown in the illustration may not be present, as it was not included on all versions.

4. Disconnect and label all cables leading from the I/O panel to their respective modules.
5. Remove the system retaining plate, which is attached by two or four Phillips screws in the upper rear portion of the pedestal.
6. Carefully slide the BA23 enclosure from its pedestal and place it on a work surface with the top access panels facing up.

4.2.2.2 Cabinet-Mounted

To remove the BA23 enclosure from the H9642-JA cabinet, perform the following steps:

1. Disengage the main breaker on the bottom of the cabinet.
2. Remove the rear door from the cabinet, exposing the I/O panel.
3. Disconnect and label all cables leading to the I/O panel.

Installing the RQZX1 Option

4.2 Perform the Installation

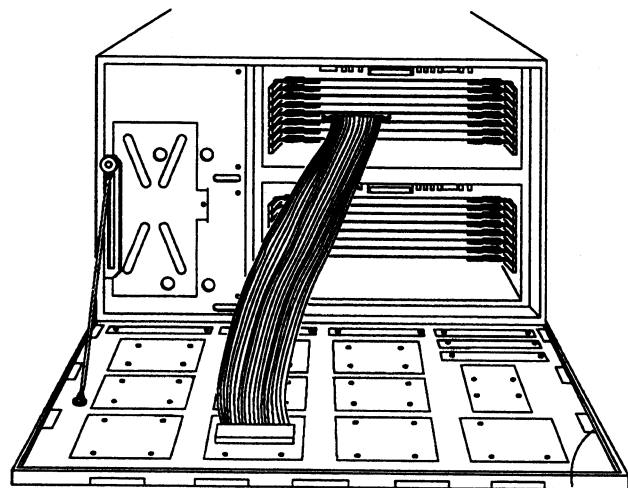
Label cables

Failure to label all cables correctly with their corresponding I/O ports will cause confusion when reinstalling the cables after the installation.

4. Loosen the two captive screws on the I/O panel and carefully lower it. Behind the I/O panel are spaces for two BA23 enclosures.

Figure 4-4 shows a cabinet with the I/O panel suspended on its cable restraint. Two BA23 enclosures are visible.

Figure 4-4 Typical Dual Box System



Bulkhead Connector

I/O Panel Cutout

LJ-02251-T10

5. Disconnect and label all cables coming out of the enclosure in which the RQZX1 module is to be installed.
6. Remove the front cover (or bezel). Remove the locking screw, if present.
7. Carefully slide the BA23 enclosure out from the cabinet and place it on a work surface with the top panels facing up.

Installing the RQZX1 Option

4.2 Perform the Installation

4.2.3 Remove Backplane (Includes Cables and Options)

Before any installation or upgrade can be performed, you must gain access to the backplane. Removal of all field replaceable units (FRUs) allows access to the backplane inside the BA23 enclosure.

Perform the following tasks to remove all internal FRUs:

1. Remove the cover over the module card cage (top rear) of the BA23 enclosure. Depending on the version of the cover, you may have to remove as few as four or as many as eight Phillips screws. Place cover and screws aside.

Keep track of loose screws.

As you remove screws, place them on the inside of the cover and attach them with a strip of tape.

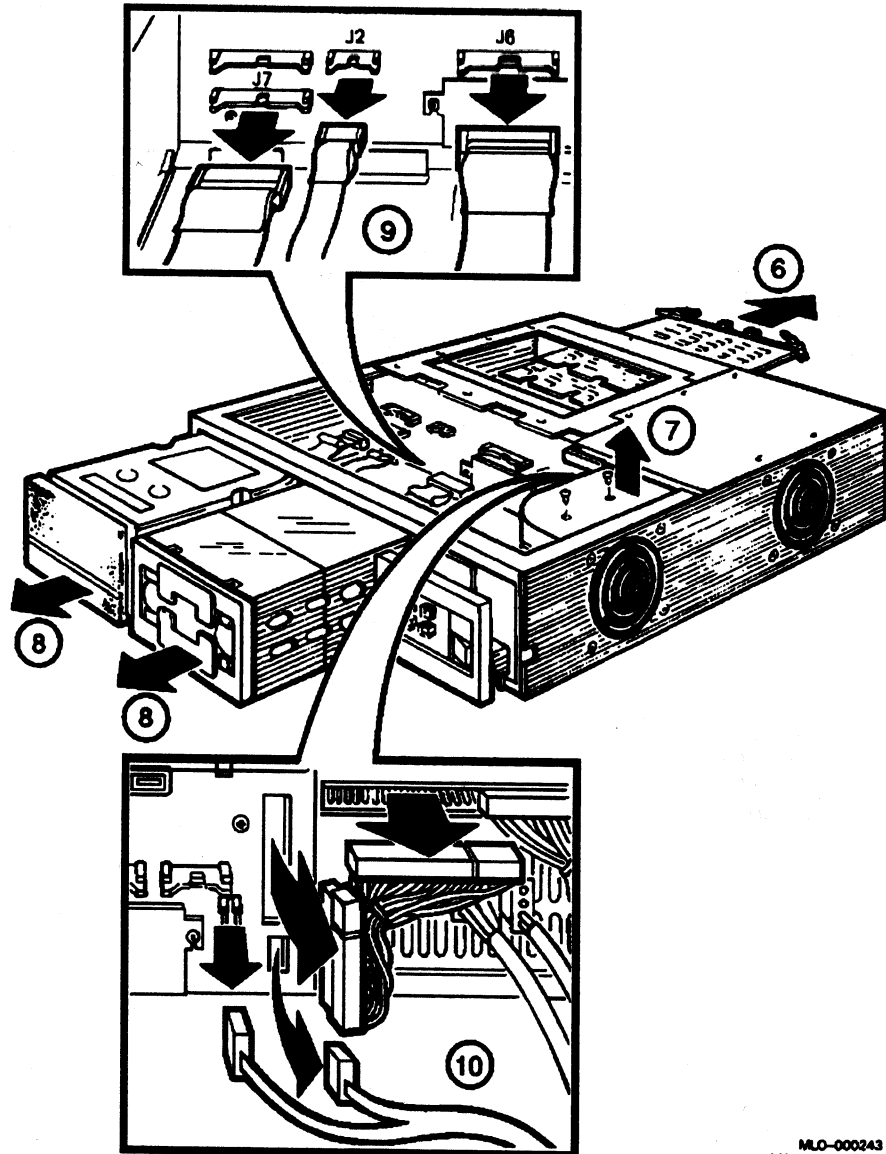
2. Remove the cover over the storage area.

Figure 4-5 shows the BA23 enclosure with these two covers removed. The circled section numbers in the illustration identify the devices, modules, and cables that will be removed in order to gain access to the backplane.

- Section 9 of the drawing shows the cables which must be disconnected in order to remove the devices (shown in section 8) from the storage area.
- Section 7 shows the metal fan baffle, which (if present) is removed in order to disconnect the cables shown in section 10.
- Section 6 shows a module being removed from the module area of the enclosure.

Installing the RQZX1 Option
4.2 Perform the Installation

Figure 4-5 Accessing the Backplane



MLD-000243
MA-1388-81.DDF

Installing the RQZX1 Option
4.2 Perform the Installation

Caution

Before any removal of modules or storage devices, make sure that all electrostatic discharge (ESD) procedures are observed. Wearing an ESD approved ground strap is mandatory, along with the placement of all modules and storage devices in appropriate ESD containers or bags, or on an ESD mat. This in accordance with DEC Standard #67 (A-DS-EL00067-00-0) "Handling ESD Devices".

3. Remove all modules from the enclosure.
4. Remove all storage devices, making sure that all cables are labeled.
5. Disconnect the power harness from the backplane.

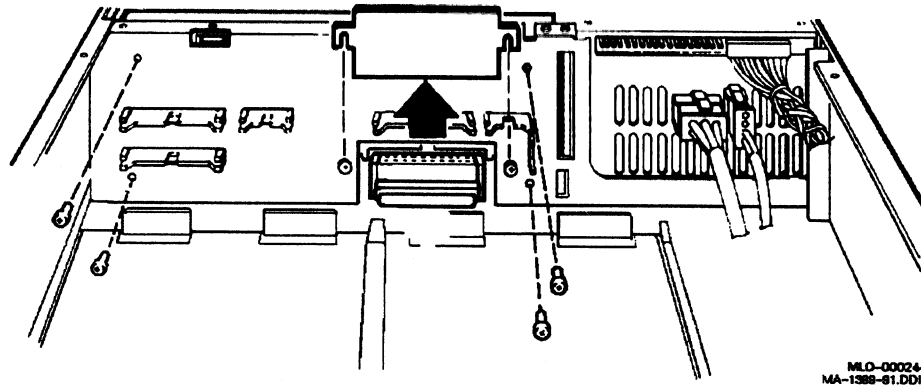
The power harness is located inside the storage device cavity. It appears in section 10 of Figure 4-5 as the two long rectangular plugs positioned at right angles.

The power harness is attached connector J1 on the backplane. The connector J1 is labeled and is located in the right-hand corner (facing the front of the unit).

6. Disconnect and label the two OCP (operator control panel) cables.
These are the keyed flat ribbon cables at the end of a single cable that is split, as shown in Figure 4-5, at the very bottom of the section 10 of the drawing. This cable, which comes from the front control panel, is attached by these plugs to connectors J2 and J4, located in the right-hand corner of the backplane (facing the front of the unit).
7. Loosen the two Phillips screws which hold the cable access cover and remove it.
These screws are shown in Figure 4-6. The arrow shows the cable access cover being removed, and dotted lines lead from the ends of the cover down to the screws themselves. The screws do not need to be removed to perform this step.

Installing the RQZX1 Option 4.2 Perform the Installation

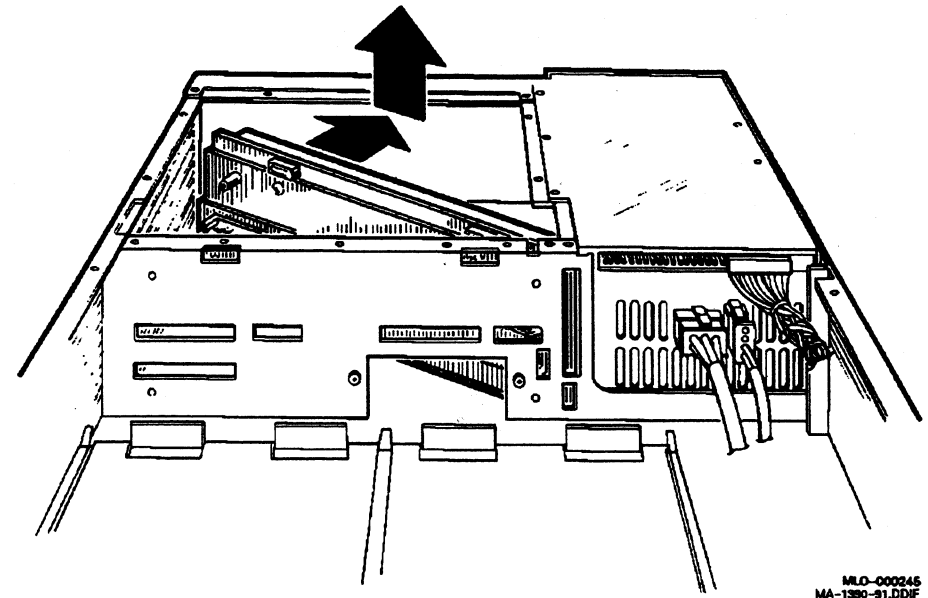
Figure 4-6 Cable Access and Removal of Screws



8. If an RQDX3 I/O cable is installed, disconnect it from its connector in the backplane.
9. Remove the four Phillips screws that secure the backplane to the metal partition as shown in Figure 4-6.
10. Remove the backplane as shown by the arrows in Figure 4-7.

Installing the RQZX1 Option 4.2 Perform the Installation

Figure 4-7 Removing the Backplane



4.2.4 Install New Cabling

_____ At this point in the procedure . . . _____

All cables, covers, cutouts, modules, storage devices, and the backplane itself should have been removed.

_____ Note _____

If you are installing the RQZX1 module into the H9642 cabinet, you may find it easier to skip step 1 at this time, and connect the SCSI cable to the I/O panel at the time you reinstall the BA23 enclosure.

Installing the RQZX1 Option

4.2 Perform the Installation

Follow these steps to install the new cabling.

1. Connect the SCSI cable to the I/O panel.
 - a. Remove the 1-inch by 4-inch I/O panel cutout closest to the power supply by removing two Phillips screws. Discard the blank plate.
 - b. Route the SCSI cable from the outside through the cutout. The IEEE connector should be on the outside of the I/O panel and the red stripe should face away from the power supply.
 - c. Attach the IEEE connector at the end of the SCSI cable to the I/O panel cutout, using the screws from the blank plate.
 - d. Install the SCSI terminator (part number 12-30552-01) into the IEEE connector, using the spring latches.
2. Feed the other end of the SCSI cable through the cable access opening until all of the other connectors are through the partition.

Make sure that the red line on the ribbon cable is located on the side of the cable access opening away from the power supply.
3. Forming a loop with the cable, feed the end of the cable back through the cable access opening.

Make sure that the four drive connectors remain on the drive side of the partition and that they are facing outward toward the front.

Make sure also that the red line on the ribbon cable remains on the side of the access opening away from the power supply as the cable passes back into the module area.
4. Route the cable for the RX33 through the cable access opening, leaving the end with two connectors in the drive area. The red stripe should face away from the power supply when the cable passes through the cable access opening.
5. Reinstall the RQDX3 cable to the backplane, if required.

4.2.5 Reinstall Backplane

In this section, you reinstall the backplane and associated cables into the BA23 enclosure, reversing the removal steps.

1. Reinstall the backplane itself (Figure 4-7), and reinstall the four Phillips screws that secure the backplane to the metal partition (Figure 4-6).

Installing the RQZX1 Option

4.2 Perform the Installation

— To ensure proper alignment of the backplane and modules . . . —

Before you secure the backplane, install a quad height module into the first or second slot of the backplane. Then secure the backplane and remove the module.

2. Install the flat cable clamp (part number 12-23272-04) in the cable access opening, as a strain relief.
3. Reinstall the cable access cover and tighten the two Phillips screws which hold it (Figure 4-6).
4. Reconnect the two OCP cables into connectors J2 and J4. (Both connectors are keyed.) Refer to section 10 of Figure 4-5.

Secure the OCP cables under the plastic cable restraints.
5. Reconnect the power harness to connector J1 on the backplane.
6. Mount any new drives using the mounting hardware and drawings supplied with the devices.
7. Install the two dc power extensions (part number 17-01389-01) to the ends of the two power cables on the power harness. These extensions allow you to supply power to as many as four drives.
8. Reinstall the power harness.
9. Reinstall the fan baffle assembly, if needed.

4.2.6 Install the RQZX1 Module, Other Modules, and Drives

Note

Prior to the installation of any modules and drives, it is essential that the CSR addresses have been set on the devices (Chapter 2 and Chapter 3).

This section provides instructions for installing the RQZX1 module and reassembling the system.

To install all modules (including the RQZX1) and drives, follow these steps:

1. Slide each module into the appropriate card slot as shown in your configuration plan.

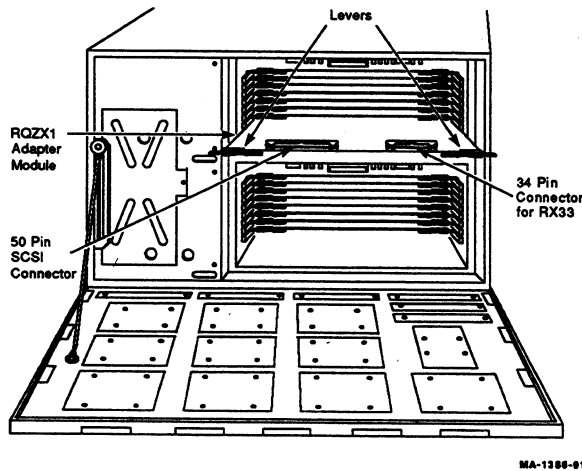
Slide the RQZX1 adapter module into the appropriate card slot.

Installing the RQZX1 Option

4.2 Perform the Installation

Push in the levers to lock the module into place. (Figure 4-8 shows the RQZX1 module being installed in a cabinet.)

Figure 4-8 Sliding the RQZX1 Module Into the Enclosure



If there are vacant slots between the last module and the RQZX1 adapter module, a bus grant continuity card (M9047) must be installed in the empty slots to ensure bus continuity. No vacant backplane slots should exist between modules.

2. Install SCSI devices and other drives according to your system plan, connecting all SCSI devices to the appropriate connectors on the SCSI cable. Attach power cables to each of the devices.

Note

The drawings that are supplied with these devices show how best to mount them in different combinations.

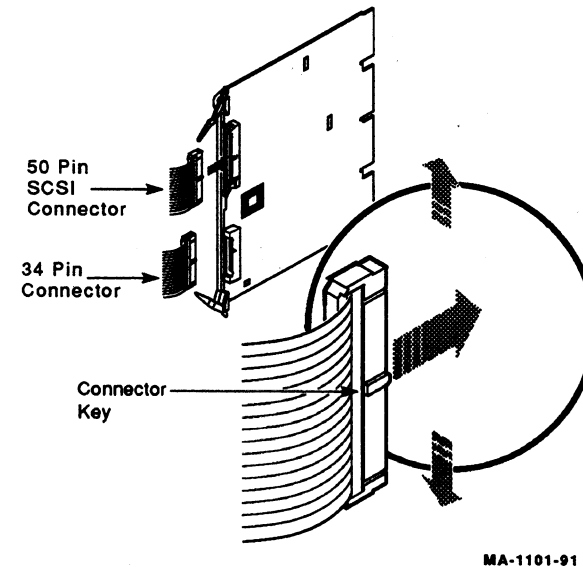
3. Connect the SCSI cable (part number 17-03036-01) to the RQZX1 module as shown in Figure 4-9, using the connector key to position it in the 50-pin slot.

Installing the RQZX1 Option

4.2 Perform the Installation

4. If your system includes the RX33 floppy drive, connect the 34-pin cable (part number 17-01526-03) to the RX33 and directly to the RQZX1, using the 34-pin slot, as shown in Figure 4-8 and Figure 4-9.

Figure 4-9 Cable Connection to RQZX1 Module



5. Reinstall the cables for the RD-type drives to the bulkhead if required.
6. Reinstall the covers over the storage area and the module card cage, using the screws you removed earlier.

4.2.7 Reinstall BA23 Enclosure

Follow the procedure for either the pedestal-mounted enclosure or the cabinet-mounted enclosure.

Installing the RQZX1 Option

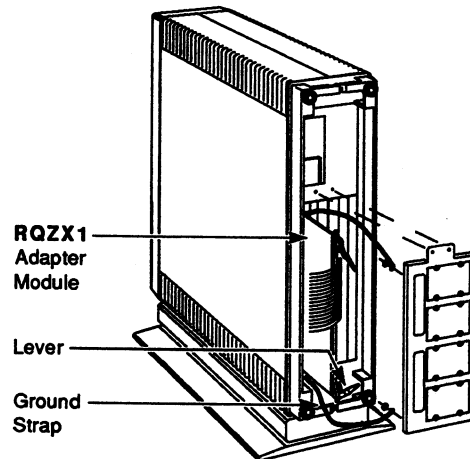
4.2 Perform the Installation

4.2.7.1 Pedestal-Mounted

To reinstall the BA23 enclosure into the pedestal, follow these steps:

1. Carefully slide the enclosure into the pedestal.
2. Reinstall the system retaining plate, using the two or four Phillips screws you removed earlier, in the upper portion of the pedestal.

Figure 4-10 Reinstalling the BA23 Enclosure in the Pedestal



3. Reconnect all cables from the modules and drives to the I/O panel. Attach the grounding strap to the I/O panel if one was present on the system.
4. Mount the I/O panel to the frame, using the two captive screws in the panel.
5. Attach all required cables to the I/O panel.
6. Reinstall the cover.

Installing the RQZX1 Option

4.2 Perform the Installation

4.2.7.2 Cabinet-Mounted

To reinstall the BA23 enclosure into the H9642 cabinet, follow these steps:

1. Carefully slide the enclosure into the cabinet.
2. Replace the front cover (or bezel). Tighten the locking screw, if present.

_____ If you have not yet connected the SCSI cable . . . _____

1. Connect the SCSI cable to the I/O panel.
 - a. Remove a 1-inch by 4-inch cutout from the I/O panel.
 - b. Remove the two screws holding the bulkhead connector plate to the IEEE connector.
 - c. Feed the IEEE connector through the cutout.
 - d. Reattach the bulkhead connector plate to the IEEE connector.
 - e. Attach the IEEE connector to the I/O panel, using the screws from the cutout.
 - f. Install the SCSI terminator (part number 12-30552-01) into the IEEE connector, using the spring latches.

3. Attach all other cables that run between the I/O panel and the enclosure.
4. Raise the I/O panel and use the 2 captive screws to secure it to the cabinet.
5. Attach all required cables to the I/O panel.
6. Reinstall the rear door on the cabinet.
7. Engage the main breaker on the bottom of the cabinet.

4.2.8 Power ON

Turn on the power.

Installation of the RQZX1 SCSI controller is complete.

The SCSI controller performs an extensive self-test, and provides utilities for testing other parts of the system. Refer to Chapter 5 for instructions on booting the system and configuring it, and to Chapter 6 for instructions on using the testing functions.

RQZX1 Configuration

5.1 Introduction

This chapter first describes several procedures for booting the RQZX1 resident firmware menu (RFM) and then describes the procedures for configuring the RQZX1 and other devices in the system. Sample screens are presented, with lists of default settings. Some general guidelines for configuration are listed, as well as procedures to follow if errors are discovered.

5.2 Boot RQZX1 Resident Firmware Menu

The RFM allows you to communicate with the RQZX1 host adapter through the CPU console port to perform functions such as changing drive configurations, changing host adapter parameters, showing configuration data, and executing diagnostic programs. The EEPROM (electrically erasable programmable read-only memory) on the RQZX1, which contains the configuration menu that you program, must be updated with the SCSI drive bus configuration in a new installation and after every change thereafter to the SCSI drive bus configuration.

The RFM monitor is designed to be run from the host CPU console with the normal operating system on the host not running. The console link is performed by a communication program which the monitor downloads into the host memory.

The RQZX1 resident firmware menu (RFM) can be invoked in two ways: by entering an ODT toggle routine or by using the boot device DU253 or MU253 procedure. The ODT toggle routine is the recommended choice.

5.2.1 Using the ODT Toggle Routine

To start the monitor on a LSI-11 system, first halt the processor. (The ODT (on-line debugging tool) is accessed either by pressing the Halt button on the front panel of the system or by pressing the Break key.)

RQZX1 Configuration

5.2 Boot RQZX1 Resident Firmware Menu

Then, enter the following commands in response to the ODT prompt:

```
>177xxxxx/177777 1 <LF>          * CSR address
>177xxxxx+2/05000 123 <CR>      * Downloads communication program
>0G                               * Starts monitor
```

The offset `xxxxx` is dependent on the Q-bus address of the RQZX1. The Q-bus address of the RQZX1 may vary. See Table 3-2 and Table 3-3 for the appropriate values, whether MSCP or TMSCP.

The procedure for booting the RFM using the ODT toggle routine is illustrated in the following example.

Example

1. At the system prompt, type the base address, followed by a slash (/):

```
@17772150/
```

The system responds, as follows:

```
@17772150/177777
```

2. Deposit the number 1 in the base address, as shown below:

```
@17772150/177777 1 [F13 (Line Feed)]
```

The system then responds:

```
17772152/005000
```

3. Deposit the numbers 1, 2, and 3 in the base address plus 2, as shown:

```
17772152/005000 123 [Return]
```

4. To access the RFM Main Menu, start the program at memory address zero, as shown:

```
@0G
```

The Main Menu is then displayed.

5.2.2 Using the Procedure to Boot Device DU253 or MU253

Note

Remember, the ODT toggle routine is the recommended method to invoke the RFM monitor.

Select boot device DU253 or MU253 from the host's boot utility.

5.2.3 Terminate Use of the RFM

To terminate use of the RFM monitor, use one of the following procedures:

- Halt the CPU and re-boot using ODT (173000G).
- Reinitialize the system by turning the power off and on.

5.3 Using the RFM

The RQZX1 monitor, when accessed through the console terminal, displays the Main Menu:

Example 5-1 RQZX1 Monitor Main Menu

```
RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev G
```

```
***** Main Menu *****
*
*
*
*      0) Autoconfigure
*      1) Show Configuration
*      2) Check Configuration
*      3) Change Configuration
*      4) Load previous Configuration from EEPROM
*      5) Save Configuration to EEPROM
*      6) Format
*      7) Diagnostics
*
*
*
*
*****
```

Type a command to proceed :

5.3.0.1 RFM Keyboard Conventions

The Main Menu and all submenus prompt you for the required input. To select an item from a menu list, you type the number next to the item and then press **Return**. When you enter a valid selection, the monitor either performs the selected operation or displays the next menu. If you enter an invalid entry, then the monitor rejects the entry and prompts you again.

The RFM uses the following keyboard conventions:

Keystrokes	As displayed on the screen ...	Function
Return	<CR>	Terminates operator inputs
<X>		Clears the last input
Ctrl/C	<CTRL>C	Aborts the current test
Ctrl/Z	<CTRL>Z	Returns to the previous menu

To be compatible with hard-copy terminals, the monitor uses no ASCII control characters other than Return, Line Feed, and the bell for output.

5.3.0.2 Main Menu Options

From the Main Menu, options 1, 3, 6, and 7 provide submenus. All of the options available from the Main Menu are listed in Table 5-1.

Table 5-1 RFM Main Menu Options

Option	Description
0 Autoconfigure	Automatically sets the RQZX1 SCSI ID, enables host adapter parity checking, sets DMA parameters, assigns Q-bus LUNs, and checks whether configuration data complies with data gained from SCSI devices in the system.
1 Show Configuration	Allows you to see how the system is currently configured, with tables of data about the SCSI drives, floppy drives, and Q-bus configuration.
2 Check Configuration	Allows you to verify the configuration data, with the RQZX1 controller actually determining pertinent information about each attached device. (Error messages allow you to check all configuration changes before saving a configuration to EEPROM.)
3 Change Configuration	Allows you to change the SCSI drive configuration, update the floppy drive configuration, change the host adapter configuration, and change the Q-bus assignments.
4 Load previous Configuration from EEPROM	Loads the last saved configuration back into the EPROM.
5 Save Configuration to EEPROM	Saves the current configuration data to the EEPROM.
6 Format	Allows you to format floppy disks or SCSI hard disks.
7 Diagnostics	Allows you to use the diagnostic testing utilities (see Chapter 6).

About the Sample Procedures

The descriptions that follow include sample screens, showing prompts and sample user responses as they appear on the screen. Keep in mind that your system may differ from the system used for the samples, and that your responses may also be different.

The system configuration in the example used in this chapter consists of two disk drives, one tape drive, and one floppy drive.

5.3.1 Autoconfigure

For a new installation, to configure the devices automatically, you first select Autoconfigure (0) from the Main Menu.

When you select the Autoconfigure option, the monitor loads from EEPROM any values not obtainable by Autoconfigure, such as host adapter SCSI ID or DMA burst length, and displays the information. You can then either accept the default values as loaded by Autoconfigure, or change them.

The following example shows a typical Autoconfigure screen:

Example 5-2 Autoconfigure Screen

```
RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5   19-Mar-1992
(C) Digital Equipment Corporation 1992   Hardwrev  G

***** Autoconfigure *****
*
*
*           Autoconfigure loaded parameters :
*
*           Host Adapter SCSI ID <0..7>   : 7
*           SCSI Parity Checking           : Enabled
*           DMA Burst Length <1..64>       : 01
*           DMA Block Length <1..64>       : 08
*           DMA Burst Delay <1..16>        : 01 x 1.6us
*
*
*           Old configuration data will be lost !
*           Insure Drives are powered up !
*           Autoconfigure could take up to 60 seconds
*
*           Type <CTRL> Z to get back to Main Menu
*
*****
Type <CR> to proceed :                               Working...
```


Table 5-3 Q-bus Configuration Information

Heading	Description
LUN	Displays the type of device and the assigned Q-bus logical unit numbers (LUNs)
CSR	Shows the CSR register used
Mode	Identifies MSCP or TMSCP protocol (or mode type)
Drive-Nr	Displays the SCSI ID numbers of the disks and tapes
LBN-Begin LBN-End	Displays LBNs (logical block numbers)
Device	Displays the kind of device (disk, tape, or floppy)

5.3.1.1 Configuration Guidelines

The logical unit numbers (LUNs) in the whole system must be contiguous and must fall within the following configuration guidelines:

Description	MSCP (direct access device)	TMSCP (sequential access drive)
Maximum number of LUNs per CSR address	4	1
Starting LUN, if the base address is used	DU0	MU0

Assigning more than the maximum number of logical unit numbers to a CSR address is prohibited by the RQZX1 module itself. Disregarding other rules causes warning messages.

5.3.1.2 Errors During Configuration

The RQZX1 checks the configuration by arbitrating for the SCSI bus and selecting all SCSI IDs. If a device does not respond, or if any additional device does respond, an error message is displayed, as in the following examples:

```
****SCSI DEVICE ID=n NOT ANSWERING !
RESTART OR HIT RETURN TO CONTINUE !
```

```
****SCSI DEVICE ID=N present, but not configured !
restart or hit return to continue !
```

You have two options:

- Check the SCSI device and restart the system by pressing the restart key on the front of the system panel.

- Press the Return key and enter the configuration submenu directly. In this case, the RQZX1 module will first update its internal drive control tables. If the module is not generally disabled, it sends an SDTR message, an inquiry command, and a read capacity command to all selectable drives. In this way, the RQZX1 module gets the following information:
 - Name of faulty drive
 - Type of drive
 - Transfer mode and capacity of all drives

All drives busy or not ready to accept data transfer instructions will get an extra start unit (load unit) command. Processor devices or foreign reserved devices need not be configured. (You may get error messages, however.)

The RQZX1 then checks whether its actual configuration complies with all data gained from the SCSI devices.

Several errors or warnings may occur, starting invalid configurations. If an error occurs, then the configuration submenu is entered directly.

If no error occurs, the screen is deleted and the Main Menu is displayed.

After autoconfiguration is complete, press Return again to display the Main Menu.

Note

You must save configuration changes before exiting the RQZX1 RFM, or the changes will be lost. To save the new configuration, select Save Configuration to EEPROM (5) from the Main Menu.

5.3.3 Check Configuration

When you select Check Configuration (2) from the Main Menu, the Check Configuration screen is displayed.

Example 5-7 Check Configuration Screen

```

RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev  G
***** Check Configuration *****
*
*
*           Check Configuration will do the following:
*
*           Check SCSI Drive Configuration
*           Check Floppy Drive Configuration
*           Check Q-Bus Assignments
*
*
*           Insure Drives are powered up !
*           Check could take up to 15 seconds
*
*
*           Type <CTRL> Z to get back to previous Menu
*
*****

```

Type <CR> to proceed :

This screen shows the three steps involved in checking the configuration. A caution is included to make sure the power to the drives is turned on.

Press **Return** to begin the process.

The first screen displayed is the Check SCSI Drive Configuration screen.

Example 5-8 Check SCSI Drive Configuration Screen

```

RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev  G

```

```

***** Check SCSI Drive Configuration *****
*
*
*   SCSI-ID  Disconnect  Sync  Vendor  Product  Revision Stat.
*   -----
*   0         Disabled   No   DEC    RZ23L (C) DEC 2528  OK
*   1         Disabled   No   DEC    RZ24  (C) DEC 0606  OK
*   2
*   3
*   4
*   5         Enabled    No   DEC    TZ30          02.15  OK
*   6
*   7         Enabled    Yes  DEC    RQZX1         G      OK
*
*
*           Configuration OK
*
*           Type <CTRL> Z to get back to previous Menu
*
*****

```

Type <CR> to proceed :

5.3.3 Check Configuration

When you select Check Configuration (2) from the Main Menu, the Check Configuration screen is displayed.

Example 5-7 Check Configuration Screen

```
RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev  G
```

```
***** Check Configuration *****
*
*
*           Check Configuration will do the following:
*
*           Check SCSI Drive Configuration
*           Check Floppy Drive Configuration
*           Check Q-Bus Assignments
*
*
*           Insure Drives are powered up !
*           Check could take up to 15 seconds
*
*
*           Type <CTRL> Z to get back to previous Menu
*
*****
```

Type <CR> to proceed :

This screen shows the three steps involved in checking the configuration. A caution is included to make sure the power to the drives is turned on.

Press Return to begin the process.

The first screen displayed is the Check SCSI Drive Configuration screen.

Example 5-8 Check SCSI Drive Configuration Screen

```
RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev  G
```

```
***** Check SCSI Drive Configuration *****
*
*
*   SCSI-ID  Disconnect  Sync  Vendor  Product  Revision Stat.
*   -----
*   0         Disabled  No   DEC    RZ23L (C) DEC 2528  OK
*   1         Disabled  No   DEC    RZ24  (C) DEC 0606  OK
*   2
*   3
*   4
*   5         Enabled   No   DEC    TZ30          02.15  OK
*   6
*   7         Enabled   Yes  DEC    RQZX1          G      OK
*
*
*           Configuration OK
*
*           Type <CTRL> Z to get back to previous Menu
*
*****
```

Type <CR> to proceed :

**RQZX1 Configuration
5.3 Using the RFM**

The second screen displayed is the Check Floppy Drive Configuration screen.

Example 5-9 Check Floppy Drive Configuration Screen

```
RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev  G

***** Check Floppy Drive Configuration *****
*
*
* Drive Number  Drive Status                Status *
*-----*
*      0      Drive installed                OK *
*      1      No Drive installed            OK *
*      2      No Drive installed            OK *
*      3      No Drive installed            OK *
*
*                               Configuration OK
*
*
*                               Type <CTRL> Z to get back to previous Menu
*
*****
```

Type <CR> to proceed :

The third screen displayed is the Check Q-bus Assignments screen.

**RQZX1 Configuration
5.3 Using the RFM**

Example 5-10 Check Q-bus Assignments Screen

```
RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev  G

***** Check Q-Bus Assignments *****
*
*
* LUN  CSR  Mode  Drive-Nr  LBN-Begin  LBN-End  Device Status *
*-----*
* DU  0  0   MSCP  SCSI-ID 0  000000000  0000237584  Disk  OK *
* DU  1  0   MSCP  SCSI-ID 1  000000000  0000356174  Disk  OK *
* DU  2  0   MSCP  FLOPPY 0                Floppy OK *
* MU  0  1   TMSCP  SCSI-ID 5                Tape  OK *
*
*                               Assignments OK
*
*
*
*                               Type <CTRL>Z or <CR> to get back to previous Menu
*
*****
```

This screen shows one drive installed, and the status of all four drive numbers as OK.

In the case of an error (for example, if the power is not turned on to a drive), the status of the affected drive is indicated as BAD. (See Example 5-11.)

RQZX1 Configuration
5.3 Using the RFM

Example 5-11 Check Floppy Drive Configuration Screen with Error

```

RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev  G
***** Check Floppy Drive Configuration *****
*
*
* Drive Number  Drive Status                Status *
* -----
*      0      Drive installed              OK      *
*      1      Drive installed              BAD     *
*
*
*                               Error, No drive found !
*
*
*                               Type <CTRL> Z to get back to previous Menu
*
*****

```

Type <CR> to proceed :

The prompt indicates that you press **Return** to check the next drive. (When no errors are found, the checking continues without intervention.) Example 5-12 shows the screen when checking is completed.

RQZX1 Configuration
5.3 Using the RFM

Example 5-12 Check Floppy Drive Configuration with Error, Completed

```

RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev  G
***** Check Floppy Drive Configuration *****
*
*
* Drive Number  Drive Status                Status*
* -----
*      0      Drive installed              OK      *
*      1      Drive installed              BAD     *
*      2      No Drive installed          OK      *
*      3      No Drive installed          OK      *
*
*
*                               Type <CTRL> Z to get back to previous Menu
*
*****

```

Type <CR> to proceed :

Press **Return**, and the Main Menu is displayed again.

5.3.4 Change Configuration

If you want to change any of the configuration data, you select Change Configuration (3) from the Main Menu. The Change Configuration screen is then displayed.

Example 5-13 Change Configuration Screen

```
RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev  G

***** Change Configuration *****
*
*
*
*
*
*
*      0) Change SCSI-Drive Configuration
*      1) Update Floppy-Drive Configuration
*      2) Change Host Adapter Configuration
*      3) Change Q-Bus Assignments
*
*
*
*
*
*
*      Type <CTRL> Z to get back to Main Menu
*
*****
```

Type a command to proceed :

You can choose any of the menu items listed.

Note

You must save configuration changes before exiting the RQZX1 RFM, or the changes will be lost. To save the new configuration, select Save Configuration to EEPROM (5) from the Main Menu.

5.3.4.1 Change SCSI Drive Configuration

To reconfigure a SCSI drive, select the Change SCSI Drive Configuration option (0) from the Change Configuration screen.

Example 5-14 Change SCSI Drive Configuration Screen

```
RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev  G

***** Change SCSI-Drive Configuration *****
*
*
*   SCSI-ID  Disconnect  Sync  Vendor  Product          Revision *
*   -----
*   0        Enabled    Yes   DEC    RZ23L (C) DEC    2528 *
*   1        Disabled   No    DEC    RZ24  (C) DEC    0606 *
*   2
*   3
*   4
*   5        Enabled    No    DEC    TZ30              02.15 *
*   6
*   7        Enabled    Yes   DEC    RQZX1              G      *
*
*
*              Insure all SCSI Drives are powered up !
*
*              Type <CTRL> Z to get back to previous Menu
*
*****
Enter SCSI ID <0..7>                                [0]      NEW =
Enable SCSI disconnect                               0 = NO  1 = YES [1]      NEW = 0
Enable synchronous SCSI transfer mode                0 = NO  1 = YES [1]      NEW = 0
```

The prompts guide you through the three steps of the procedure.

1. You are prompted for the SCSI ID of the device you want to change. The valid range is from 0 to 7. In this example, entering 0, 1, or 5 would modify the corresponding drive. Entering 7 would cause the following message to appear: Host Adapter SCSI-ID. The default entry is 0, and the example shows that choice.
2. Next, you are prompted for the SCSI disconnect parameter. When enabled, this parameter allows drives that are performing time-consuming tasks to release the SCSI bus temporarily, reconnecting when the task is complete. The default is 1, for YES, enabled. In the example, the SCSI disconnect is disabled.

- Finally, you are prompted to enable or disable synchronous SCSI transfer mode. Before enabling this option, make sure that the SCSI device you are connecting supports synchronous transfers. This field is automatically set during Autoconfigure, either to YES, if the device supports synchronous mode, or to NO, if the device is asynchronous only.

5.3.4.2 Update Floppy Drive Configuration

To update the floppy drive configuration, select the Update Floppy Drive Configuration option (1) from the Change Configuration screen.

Example 5-15 Update Floppy Drive Configuration Screen

```
RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev  G

***** Update Floppy Drive Configuration *****
*
* Drive Number  Drive Status
* -----
*      0      Drive installed
*      1      Drive installed
*      2      No Drive installed
*      3      No Drive installed
*
*
*          Insure Drives are powered up !
*
*          Type <CTRL> Z to get back to previous Menu
*
*****
Update Floppy Drive Nr. <0..3>          [0]      NEW = 1
Working...
```

In the example, two drives have been installed. You are prompted for the number of the drive you want to re-configure. The default choice in the example is Drive 0, but the example shows Drive 1 selected.

5.3.4.3 Change Host Adapter Configuration

To change the host adapter configuration, select the Change Host Adapter Configuration option (2) from the Change Configuration screen.

Example 5-16 Change Hostadapter Configuration Screen

```
RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev  G

***** Change Host Adapter Configuration *****
*
*
* Host Adapter SCSI ID <0..7>      : 7
* SCSI Parity Checking              : Enabled
* DMA Burst Length <1..64>         : 01
* DMA Block Length <1..64>         : 08
* DMA Burst Delay <1..16>          : 01 x 1.6us
*
*
*          Type <CTRL> Z to get back to previous Menu
*
*****
Host Adapter SCSI ID <0..7>          [7]      NEW =
Enable SCSI parity checking          0 = NO  1 = YES [0]      NEW =
DMA Burst Length <1..64>             [01]     NEW =
DMA Block Length <1..64>             [08]     NEW =
DMA Burst Delay <1..16>              [01]     NEW =
```

The burst delay in microseconds is the time the RQZX1 waits between two DMA bursts to raise the BDMR again. A value of 0 has the effect that the Q-bus will be busy near 100%. A minimum value of 4 is recommended on Q-bus systems where the memory is accessed through the Q-bus. In this case, the number of bursts that may occur before a delay is inserted, which should be 1.

Note

PDP-11 operating systems support only as many as four Logical Unit Number (LUN) assignments per MSCP port and only one LUN assignment per TMSCP port. Users who modify the driver to support

more assignments need to use the Change Configuration option to add more LUNs per CSR.

5.3.4.4 Change Q-bus Assignments

To change the Q-bus assignments, select the Change Q-bus Assignments option (3) from the Change Configuration screen.

Example 5-17 Change Q-bus Assignments Screen

RQZX1 SCSI-Host Adapter Monitor Softwrev 1.5 19-Mar-1992
(C) Digital Equipment Corporation 1992 Hardwrev G

```
***** Change Q-Bus Assignments *****
*
*
* LUN  CSR  Mode  Drive-Nr  LBN-Begin  LBN-End  Device-Type
* -----
* DU  0  0  MSCP   SCSI-ID 0  000000000  0000237584  Disk
* DU  1  0  MSCP   SCSI-ID 1  000000000  0000356174  Disk
* DU  2  0  MSCP   FLOPPY  0
* MU  0  1  TMSCP  SCSI-ID 5
*                               Tape
*
*
*                               Type <CTRL> Z to get back to Main Menu
*
*****
```

```
Enter LUN <0..252>                                   [000]   NEW =<CR>
Enter CSR <0..1>                                     [0]     NEW =<CR>
                      Same LUN and CSR already assigned
Delete old assignment ?                             0 = NO 1 = YES [0]   NEW = 1
```

You are prompted to select the drive for which you want to change the Q-bus assignment on the Select Drive for Assignment screen. In Example 5-18, three drives are available.

Example 5-18 Select Drive for Assignment Screen

```
***** Select Drive for Assignment *****
*
*                               SCSI Drives
*
*   SCSI-ID  Disconnect  Sync  Vendor  Product  Revision
* -----
* A      0    Disabled  No    DEC    RZ23L  (C) DEC  2528
* B      1    Disabled  No    DEC    RZ24   (C) DEC  0606
*
*                               Floppy Drives
*
*   Drive Number  Drive Status
* -----
* C      0           Drive installed
*
*                               Type <CTRL> Z to get back to previous Menu
*
*****
Enter Drive Letter :
```


5.3.7 Format

To format floppy disks or SCSI hard disks, select the Format option (6) from the Main Menu.

Example 5-23 Format Drive Screen

```
RQZX1 SCSI-Host Adapter Monitor      Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992  Hardwrev G
```

```
***** Format Drive *****
*
*
*
*
*          0) Format Floppy Disks (RX33 media)
*          1) Format SCSI Hard Disks
*
*
*
*
*
*
*          Type <CTRL> Z to get back to Main Menu
*
*****
```

Type a command to proceed :

You can choose to format either RX33 media or SCSI hard disks. If you select the first option, then the Select Drive screen is displayed with a list of the floppy drives.

Example 5-24 Select Drive Screen with Floppy Drives Listed

```
***** Select Drive *****
*
*          Floppy Drives
*
*          Drive Number  Drive Status
*          -----
*  A          0          Drive installed
*  B          1          Drive installed
*
*
*
*          Format destroys drive data !!
*
*          Insure diskette inserted in selected drive !
*
*
*          Type <CTRL> Z to get back to previous Menu
*
*****
Enter drive letter :A
ARE YOU SURE ?          0 = NO  1 = YES  [0]      NEW = 1
*
*          Type <CTRL> C to abort
*
***** Format completed
Verify media ?          0 = NO  1 = YES  [0]      NEW = 1
*
*          Type <CTRL> C to abort
*
***** Verify successful
Type <CR> to get back to previous Menu:
```

As shown in the example, you are prompted first for the drive letter. As soon as you confirm your selection by entering 1 for YES, the formatting begins.

Watching the progress on the screen ...

You can watch the progress on the screen. If the duration of the requested function is known to the RQZX1, a line of periods (. . .) represents this time. (The number of periods is always the same, whatever the length of time.) Asterisks are displayed, one by one, on the line below the periods to show the progress as it occurs. If the exact time is not known to the RQZX1, then the asterisks appear alone. The purpose is simply to let the user know that progress is being made.

After the formatting is completed, you are prompted to verify the media. In the example, the user has chosen to verify the media, and the verification has been successfully completed.

Press **Return** to display the Format Drive screen (Example 5-23). At the Format Drive screen, select Format SCSI Hard Disks (1). The Select Drive screen is then displayed, with a list of the SCSI drives already configured on your system.

Example 5-25 Select Drive Screen, with SCSI Drives

```
***** Select Drive *****
*
*                         SCSI Drives                       *
*
*      SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
* -----
* A      0      Disabled  No   DEC      RZ23L (C) DEC  2528 *
* B      1      Disabled  No   DEC      RZ24  (C) DEC  0606 *
*
*
*                               Format destroys drive data !!
*
*                               !! SCSI command cannot be aborted !!
*
*
*                               Type <CTRL> Z to get back to Main Menu
*
*****
Enter drive letter :A
ARE YOU SURE ?                 0 = NO  1 = YES  [0]    NEW = 1
***** Format completed

Verify media ?                 0 = NO  1 = YES  [0]    NEW = 1
                                Type <CTRL> C to abort

***** Verify successful

Type <CR> to get back to previous Menu:
```

The process for formatting SCSI drives is similar to the process for formatting floppy disks, except that the duration of the process is not known to the RQZX1.

Note

VERIFY can take as long as 2 to 3 hours, depending on the drive type, because the process will read/write/verify every LBN.

5.3.8 Diagnostics

See Chapter 6 for procedures for using the RFM diagnostics.

The RQZX1 controller incorporates various diagnostic utilities. Faults can be isolated to the RQZX1, associated drives, or the cabling subsystem.

- **Self-test**

At power-up the RQZX1 executes an extensive series of self-tests to ensure that the RQZX1 itself is functioning properly.

- **Resident firmware diagnostics**

Additional diagnostics are available from the RQZX1 firmware menu. These diagnostics further test the functionality of the RQZX1, and also test the functionality of associated cables and of all drives on the RQZX1 drive buses.

- **XXDP system-level diagnostics**

XXDP diagnostics are available to test the RQZX1 subsystem in a system environment and at a device level.

6.1 Power-Up Self Test

When the system is turned on, the RQZX1 executes an extensive self-diagnostic to ensure that the host adapter is functioning properly. (This self-diagnostic can also be accessed by the corresponding monitor menu option.) The progress of this test is indicated by six LEDs. The LEDs (LED1 to LED6) allow you to isolate faults discovered in the self-test diagnostic.

(Figure 3-1 shows the layout of the RQZX1 controller, with the location of the various sets of switches, the LEDs, and other parts of the product.)

As soon as the RQZX1 completes the self-diagnostic without errors, all six LEDs turn off. If the RQZX1 fails any of the tests, an error code placed in the SA registers causes the LEDs to display the number of the test that failed.

Diagnostics

6.1 Power-Up Self Test

Table 6-1 shows the relationship between the LEDs on the RQZX1 module and the error codes in the SA registers, for fault isolation.

Table 6-1 Self-Test Error Code

LED						Falling Test	SA Register
6	5	4	3	2	1		Error Codes (octal)
1	1	1	1	1	1	Microprocessor	0014
1	1	1	1	1	0	RAM	0022
1	1	1	1	0	1	EPROM Checksum	0005
1	1	1	1	0	0	EEPROM Checksum	0004
1	1	1	0	1	1	Receive FIFO	1666
1	1	1	0	1	0	Transmit FIFO	1667
1	1	1	0	0	1	SCSI Controller	1670
1	1	1	0	0	0	Floppy Disk Controller	1671
1	1	0	1	0	0	SCSI Configuration	1672
1	1	0	0	1	1	DMA to Host Memory	0007
1	1	0	0	1	0	DMA from Host Memory	0006

6.2 Using RFM Diagnostics

This section explains how to use the diagnostic subsystem menu of the RQZX1 Resident Firmware Menu (RFM).

The RQZX1 RFM diagnostic menus are easy to understand and use. You are prompted for responses and notified at the end of a pass or when errors occur.

There are four types of tests available through the RFM:

- **Host adapter hardware tests (Section 6.3)**

These tests evaluate the RQZX1 and the DMA path to the PDP-11 memory.

- **Disk drive tests (Section 6.4)**

These tests provide diagnostic testing of the SCSI hard drives. The menu can also instruct the SCSI hard drives to invoke resident self-tests.

- **Tape drive tests (Section 6.5)**

These tests check the SCSI tape drives associated with the TMSCP CSR of the RQZX1 controller.

- **Floppy drive tests (Section 6.6)**

Diagnostics

6.2 Using RFM Diagnostics

These tests check the floppy drives connected through the RQZX1.

6.2.1 Booting the RQZX1 Firmware Diagnostic Menu

There are two steps involved in gaining access to the RQZX1 Diagnostic menu: booting the RQZX1 Main Menu and selecting the diagnostics option from that menu.

1. **Boot the RQZX1 Main Menu**

Note

Complete instructions for booting the system can be found in Chapter 5.

2. **From the RQZX1 Main Menu, select Option 7, Diagnostics.**

The Diagnostics menu is displayed (Example 6-1).

Example 6-1 Diagnostics Menu

```
RQZX1 SCSI-Host Adapter Monitor           Softwrev 1.5   19-Mar-1992
(C) Digital Equipment Corporation 1992     Hardwrev G

***** Diagnostics *****
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                                                                           *
*                               0) Host Adapter Hardware Tests          *
*                               1) Disk Drive Tests                       *
*                               2) Tape Drive Tests                       *
*                               3) Floppy Drive Tests                     *
*                                                                           *
*                                                                           *
*                                                                           *
*                               Type <CTRL> Z to get back to Main Menu   *
*                                                                           *
*****
```

Type a command to proceed :

You can select any of the following diagnostic submenus:

- (0) Host Adapter Hardware Tests
- (1) Disk Drive Tests

Diagnostics

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- (2) Tape Drive Tests
- (3) Floppy Drive Tests

Or, you can press **Ctrl/Z** to return to the Main Menu.

6.2.2 Using the RFM Menus

All of the diagnostic menus have the same general format. You are prompted for the test you want to execute, as in the following example:

Type a command to proceed :

You type the menu number and then press **Return**.

You are then prompted for additional instructions, depending on the test you chose.

- **Select Drive**

Some tests require that you specify a drive to be tested. In these cases, a list is displayed of the drives available for the test you have chosen, and you are prompted for the drive to test.

- **How Many Loops?**

All tests prompt you for the number of loops. The loop counter is then decremented until it reaches zero.

In the following example of the screen message provided during the CPU Test, the number 2 has been selected.

```
How many loops ? < 0..65535 , 0 = Endless>           [00001] NEW = 2
```

The test runs until the loop counter gets to zero, at which point it stops.

```
0) CPU Test           Status Good   Errors :    0   Loop :    1
0) CPU Test           Status Good   Errors :    0   Loop :    0
```

If 0 is entered for a value, continuous running is selected, as shown in the following example:

```
How many loops ? < 0..65535 , 0 = Endless>           [00001] NEW = 0
```

The test continues, as shown below, until you type **Ctrl/C**.

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6.2 Using RFM Diagnostics

```
0) CPU Test           Status Good   Errors :    0   Loop : Endless
0) CPU Test           Status Good   Errors :    0   Loop : Endless
0) CPU Test           Status Good   Errors :    0   Loop : Endless
0) CPU Test           Status Good   Errors :    0   Loop : Endless
0) CPU Test           Status Good   Errors :    0   Loop : Endless
0) CPU Test           Status Good   Errors :    0   Loop : Endless
0) CPU Test           Status Good   Errors :    0   Loop : Endless
0) CPU Test           Status Good   Errors :    0   Loop : Endless
```

- **Destroy Data?**

Any test that will destroy user data prompts you with a message like the following:

```
Destroys User Data !!
```

Reminders may be included, to make sure the test will run properly. You may also see a prompt to confirm that you want to run the test, like the following:

```
ARE YOU SURE ?                0 = NO  1 = YES  [0]      NEW =
```

If you do not wish to destroy data, answer 0 for no (the default). The test will abort.

Other User Input

At any screen, to return to the previous menu, you can press **Ctrl/Z**. After a test is completed, you can also press **Return** to return to the previous menu.

Watching the progress on the screen ...

You can watch the progress on the screen. If the duration of the requested function is known to the RQZX1, a line of periods (. . .) represents this time. (The number of dots is always the same, whatever the length of time.) Asterisks are displayed, one by one, on the line below the periods to show the progress as it occurs. If the exact time is not known to the RQZX1, then the asterisks appear alone. The purpose is simply to let the user know that progress is being made.

About the Sample Procedures

The descriptions that follow include sample screens, showing prompts and sample user responses as they appear on the screen. Keep in mind that your system may differ from the system used for the samples, and that your responses may also be different.

6.3 Host Adapter Hardware Tests

The Host Adapter Hardware Tests menu is accessed by selecting 0 from the Diagnostics menu.

The following example shows not only the Host Adapter Hardware Tests menu, but also the selection of the CPU Test, a request for 10 loops of the test, and the results of the test, as displayed on the screen.

Example 6-2 Host Adapter Hardware Tests

```
RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5   19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev G

***** Host Adapter Hardware Tests *****
*
*
*
*          0) CPU Test                      *
*          1) Eprom Checksum Test           *
*          2) EEprom Checksum Test          *
*          3) Memory Test                   *
*          4) FIFO Test                     *
*          5) SCSI Test                     *
*          6) FDC Test                      *
*          7) Internal DMA Test             *
*          8) External DMA Test            *
*          9) Test 0 - 8                    *
*
*
*          Type <CTRL> Z to get back to previous Menu
*
*****

Type a command to proceed : 0
How many loops ? < 0..65535 , 0 = Endless>      [00001] NEW = 10
          Type <CTRL> C to abort test

0) CPU Test          Accumulated Errors :    0   Loop :    9
0) CPU Test          Accumulated Errors :    0   Loop :    8
0) CPU Test          Accumulated Errors :    0   Loop :    7
0) CPU Test          Accumulated Errors :    0   Loop :    6
0) CPU Test          Accumulated Errors :    0   Loop :    5
0) CPU Test          Accumulated Errors :    0   Loop :    4
0) CPU Test          Accumulated Errors :    0   Loop :    3
0) CPU Test          Accumulated Errors :    0   Loop :    2
0) CPU Test          Accumulated Errors :    0   Loop :    1
0) CPU Test          Accumulated Errors :    0   Loop :    0
```

Type <CR> to get back to previous Menu :

The tests that can be selected from the Host Adapter Hardware Tests menu are listed in Table 6-2.

Table 6-2 Host Adapter Hardware Tests

Test	Description
0 CPU Test	Tests the microprocessor on the RQZX1
1 EPROM Checksum Test	Reads the EPROM and develops a checksum, which is then compared to a known value
2 EEPROM Checksum Test	Reads the EEPROM and develops a checksum, which is then compared to a known value
3 Memory Test	Tests the RQZX1 RAM for data integrity and address uniqueness
4 FIFO Test	Tests the FIFO fully
5 SCSI Test	Tests the SCSI controller chip
6 FDC Test	Tests the floppy controller chip
7 Internal DMA Test	Tests the data paths on the RQDX1 for data integrity
8 External DMA Test	Moves data from the RQZX1 to the memory on the PDP-11. Data is written, read, and verified.
9 Tests 0 - 8	Executes all nine tests, 0 - 8

6.4 Disk Drive Tests

The Disk Drive Tests menu is accessed by selecting option 1 from the Diagnostics menu.

Example 6-3 Disk Drive Tests Menu

```

RQZX1 SCSI-Host Adapter Monitor           Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992     Hardwrev G

***** Disk Drive Tests *****
*
*
*
*
*                               0) Drive Hardware Selftest
*                               1) Drive Media Selftest
*                               2) Read only Test
*                               3) Write only Test
*                               4) Read/Write/Verify Test
*
*
*
*
*
*                               Type <CTRL> Z to get back to previous Menu
*
*****

Type a command to proceed :
```


The tests that can be selected from this menu are listed in Table 6-3.

Table 6-3 Disk Drive Tests

Test	Description
0 Drive Hardware Selftest	<p>The RQZX1 sends a diagnostic command to all drives selected for test. All SCSI hard drives selected for test then execute drive-resident self-tests. Results are reported back to the RQZX1.</p> <p>The test depends on implementation of the SCSI command <i>send diagnostics</i>. If the selected drive does not support this command, then the following message is displayed:</p> <p>**** SCSI IDn Deselected SELF DIAGNOSTICS NOT AVAILABLE</p> <p>This test does not destroy data.</p>
1 Drive Media Selftest	<p>The RQZX1 sends a diagnostic command to all drives selected for test. All SCSI tape drives selected for test then execute drive-resident self-tests. Results are reported back to the RQZX1.</p> <p>The test depends on implementation of the SCSI command <i>send diagnostics</i>. If the selected drive does not support this command, then the following message is displayed:</p> <p>**** SCSI IDn Deselected SELF DIAGNOSTICS NOT AVAILABLE</p> <p><i>This test destroys data.</i></p>
2 Read Only Test	Performs a read of all selected SCSI drives. All errors are reported to RQZX1.
3 Write Only Test	Performs a write of all selected SCSI drives. All errors are reported to RQZX1.
4 Read/Write/Verify Test	<p>Reads a logical block number (LBN) and saves data.</p> <p>Writes data to the selected LBN.</p> <p>Verifies data on the selected LBN.</p> <p>Restores the original data.</p> <p>This test does not destroy data.</p>

6.4.1 Drive Hardware Selftest

To select the Drive Hardware Selftest, select option 0 from the Disk Drive Tests menu.

The Select Drive screen is displayed, with a prompt to enter the drive letter. In Example 6-4, Drive A has already been selected, and one loop has been chosen. The results of the test are also displayed.

Example 6-4 Drive Hardware Selftest: Select Drive Screen

```

***** Select Drive *****
*
*                                SCSI Drives                               *
*                                -----                               *
*       SCSI-ID  Disconnect  Sync   Vendor   Product   Revision  *
*-----*-----*-----*-----*-----*-----*-----*-----*
*   A       0      Disabled   No     DEC     R223L   (C) DEC 2528  *
*   B       1      Disabled   No     DEC     R224    (C) DEC 0606  *
*
*
*                                User data will NOT be destroyed !
*                                !! SCSI command cannot be aborted !!
*
*
*                                Type <CTRL> Z to get back to previous Menu
*
*****
Enter drive letter :A
How many loops ? < 0..65535 , 0 = Endless>           [00001]  NEW = 1
0) Drive Hardware Selftest
***** Accumulated Errors :      0   Loop :      0
Type <CR> to get back to previous Menu :

```


**Diagnostics
6.4 Disk Drive Tests**

6.4.4 Write Only Test

To select the Write Only Test, select option 3 from the Disk Drive Tests menu. The Select Drive screen is displayed.

Example 6-7 Write Only Test: Select Drive Screen

```
***** Select Drive *****
*
*                SCSI Drives                *
*                *
*  SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
* -----
```

SCSI-ID	Disconnect	Sync	Vendor	Product	Revision
A 0	Disabled	No	DEC	RZ23L (C)	DEC 2528
B 1	Disabled	No	DEC	RZ24 (C)	DEC 0606

```

*
*
*                !! Destroys User Data !!
*
*
*                Type <CTRL> Z to get back to previous Menu
*
*****
Enter drive letter :A
ARE YOU SURE ?                0 = NO 1 = YES [0]     NEW = 1
How many loops ? < 0..65535 , 0 = Endless> [00001] NEW=<CR>

Type <CTRL> C to abort test

3) Write only Test
*****
***** Accumulated Errors :      0  Loop :      0

Type <CR> to get back to previous Menu :
```

**Diagnostics
6.4 Disk Drive Tests**

6.4.5 Read/Write/Verify Test

To select the Read/Write/Verify Test, select option 4 from the Disk Drive Tests menu. The Select Drive screen is displayed.

Example 6-8 Read/Write/Verify Test: Select Drive Screen

```
***** Select Drive *****
*
*                SCSI Drives                *
*                *
*  SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
* -----
```

SCSI-ID	Disconnect	Sync	Vendor	Product	Revision
A 0	Disabled	No	DEC	RZ23L (C)	DEC 2528
B 1	Disabled	No	DEC	RZ24 (C)	DEC 0606

```

*
*
*                User data will NOT be destroyed !
*
*
*                Type <CTRL> Z to get back to previous Menu
*
*****
Enter drive letter :A
How many loops ? < 0..65535 , 0 = Endless> [00001] NEW=<CR>

Type <CTRL> C to abort test

4) Read/Write/Verify Test
*****
***** Accumulated Errors :      0  Loop :      0

Type <CR> to get back to previous Menu :
```

6.5 Tape Drive Tests

The Tape Drive Tests menu is accessed by selecting option 2 from the Diagnostics menu.

Example 6-9 Tape Drive Tests Screen

```

RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5   19-Mar-1992
(C) Digital Equipment Corporation 1992   Hardwrev G

***** Tape Drive Tests *****
*
*
*
*
*      0) Drive Hardware Selftest
*      1) Drive Media Selftest
*      2) Rewind/BOT Test
*      3) Write only Test
*      4) Read only Test
*      5) Positioning Test
*      6) Write/Read/Verify Test
*
*
*
*
*      Type <CTRL> Z to get back to previous Menu
*
*****
Type a command to proceed :
```

The tests that can be selected from this menu are listed in Table 6-4.

Table 6-4 Tape Drive Tests

Test	Description
0 Drive Hardware Selftest	<p>The RQZX1 sends a diagnostic command to all drives selected for test. All SCSI tape drives selected for test then execute drive-resident selftests. Results are reported back to RQZX1.</p> <p>The test depends on implementation of the SCSI command <i>send diagnostics</i>. If the selected drive does not support this command, then the following message is displayed:</p> <p>**** SCSI IDn Deselected SELF DIAGNOSTICS NOT AVAILABLE</p> <p>The test does not destroy data.</p>
1 Drive Media Selftest	<p>The RQZX1 sends a diagnostic command to all drives selected for test. All SCSI tape drives selected for test then execute drive-resident selftests. Results are reported back to RQZX1.</p> <p>The test depends on implementation of the SCSI command <i>send diagnostics</i>. If the selected drive does not support this command, then the following message is displayed:</p> <p>**** SCSI IDn Deselected SELF DIAGNOSTICS NOT AVAILABLE</p> <p><i>This test destroys data.</i></p>
2 Rewind/BOT Test	Tests the rewind logic of the tape drive.
3 Write Only Test	Tests the ability of the drive to execute Write commands.
4 Read Only Test	Checks all associated Read logic in the drive.
	<i>Before this test is run, Test 3 (Write Only Test) should be run, or the tape cartridge should be previously written with data.</i>
5 Positioning Test	Tests the positioning logic in the drive by means of Space commands.
6 Write/Read/Verify Test	Full test of write and read data commands. Data is compared.

6.5.1 Drive Hardware Selftest

To select the Drive Hardware Selftest, select option 0 from the Tape Drive Tests menu. The Select Drive screen is then displayed, and you are prompted to enter the letter of the drive you want to test.

Example 6-10 Drive Hardware Selftest: Select Drive Screen

```

***** Select Drive *****
*
*                SCSI Drives                *
*
*  SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
*  -----  -
*  A      5    Disabled  No    DEC    TZ30    02.15 *
*
*
*                No tape cartridge required.
*                !! SCSI command cannot be aborted !!
*
*                Type <CTRL> Z to get back to previous Menu
*
*****
Enter drive letter :A
How many loops ? < 0..65535 , 0 = Endless>          [00001] NEW=<CR>
0) Drive Hardware Selftest
***** Accumulated Errors :      0 Loop :      0
Type <CR> to get back to previous Menu :

```

6.5.2 Drive Media Selftest

To select the Drive Media Selftest, select option 1 from the Tape Drive Tests menu. The Select Drive screen is displayed.

Example 6-11 Drive Media Selftest; Select Drive Screen

```

***** Select Drive *****
*
*                SCSI Drives                *
*
*  SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
*  -----  -
*  A      5    Disabled  No    DEC    TZ30    02.15 *
*
*
*                !! Destroys User Data !!
*                Insure media inserted and NOT write protected !
*                !! SCSI command cannot be aborted !!
*
*                Type <CTRL> Z to get back to previous Menu
*
*****
Enter drive letter :A
ARE YOU SURE ?                      0 = NO 1 = YES [0]    NEW = 1
How many loops ? < 0..65535 , 0 = Endless>      [00001] NEW=<CR>

1) Drive Media Selftest
***** Accumulated Errors :      0 Loop :      0

Type <CR> to get back to previous Menu :

```

6.5.3 Rewind/BOT Test

To select the Rewind/BOT Test, select option 2 from the Tape Drive Tests menu. The Select Drive screen is displayed.

Example 6-12 Rewind/BOT Test: Select Drive Screen

```
***** Select Drive *****
*
*                               SCSI Drives
*
*
*
*   SCSI-ID  Disconnect  Sync  Vendor  Product  Revision
* -----
* A         5      Disabled  No    DEC     TZ30     02.15
*
*
*                               Insure media inserted !
*                               User data will NOT be destroyed !
*                               Insure tape is SPUN-UP and READY !
*
*
*                               Type <CTRL> Z to get back to previous Menu
*
*****
```

```
Enter drive letter :A
How many loops ? < 0..65535 , 0 = Endless>      [00001] NEW=<CR>

Type <CTRL> C to abort test
```

2) Rewind/BOT Test

```
*****
***** Accumulated Errors :      0  Loop :      0
```

Type <CR> to get back to previous Menu :

6.5.4 Write Only Test

To select the Write Only Test, select option 3 from the Tape Drive Tests menu. The Select Drive screen is displayed.

Example 6-13 Write Only Test: Select Drive Screen

```
***** Select Drive *****
*
*                               SCSI Drives
*
*
*
*   SCSI-ID  Disconnect  Sync  Vendor  Product  Revision
* -----
* A         5      Disabled  No    DEC     TZ30     02.15
*
*
*                               !! Destroys User Data !!
*                               Insure media inserted NOT write protected !
*                               Insure tape is spun-up and READY !
*
*
*                               Type <CTRL> Z to get back to previous Menu
*
*****
```

```
Enter drive letter :A
ARE YOU SURE ?                               0 = NO  1 = YES  [0]      NEW = 1
How many loops ? < 0..65535 , 0 = Endless>    [00001] NEW=<CR>

Type <CTRL> C to abort test
```

3) Write only Test

```
***** Accumulated Errors :      0  Loop :      0
```

Type <CR> to get back to previous Menu :

6.5.5 Read Only Test

To select the Read Only Test, select option 4 from the Tape Drive Tests menu. The Select Drive screen is displayed.

Example 6-14 Read Only Test: Select Drive Screen

```

***** Select Drive *****
*
*                               *
*                               *
*                               *
*          SCSI Drives         *
*                               *
*   SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
* -----|-----|-----|-----|-----|-----|-----|
*   A         5         Disabled No    DEC     TZ30     02.15 *
*                               *
*                               *
*                               *
*                               *
*                               *
*                               *
*                               *
*      User data will NOT be destroyed ! *
*                               *
*      Insure media inserted !          *
*                               *
*      Insure tape is spun-up and READY ! *
*                               *
*                               *
*                               *
*                               *
*                               *
*      Type <CTRL> Z to get back to previous Menu *
*                               *
*****
Enter drive letter :A
How many loops ? < 0..65535 , 0 = Endless>      [00001] NEW=<CR>
                                          Type <CTRL> C to abort test

4) Read only Test

***** Accumulated Errors :      0   Loop :      0

Type <CR> to get back to previous Menu :
```

6.5.6 Positioning Test

To select the Positioning Test, select option 5 from the Tape Drive Tests menu. The Select Drive screen is displayed.

Example 6-15 Positioning Test: Select Drive Screen

```

***** Select Drive *****
*
*                               *
*                               *
*                               *
*          SCSI Drives         *
*                               *
*   SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
* -----|-----|-----|-----|-----|-----|
*   A         5         Disabled No    DEC     TZ30     02.15 *
*                               *
*                               *
*                               *
*                               *
*                               *
*                               *
*                               *
*      User data will NOT be destroyed ! *
*                               *
*      Insure media inserted !          *
*                               *
*      Insure tape is spun-up and READY ! *
*                               *
*                               *
*                               *
*                               *
*      Type <CTRL> Z to get back to previous Menu *
*                               *
*****
Enter drive letter :A
How many loops ? < 0..65535 , 0 = Endless>      [00001] NEW=<CR>
                                          Type <CTRL> C to abort test

5) Positioning Test

***** Accumulated Errors :      0   Loop :      0

Type <CR> to get back to previous Menu :
```

Diagnostics
6.5 Tape Drive Tests

6.5.7 Write/Read/Verify Test

To select the Write/Read/Verify Test, select option 6 from the Tape Drive Tests menu. The Select Drive screen is displayed.

Example 6-16 Write/Read/Verify Test: Select Drive Screen

```

***** Select Drive *****
*
*                          SCSI Drives                          *
*
*  SCSI-ID  Disconnect  Sync  Vendor  Product  Revision *
*-----*
*  A       5     Disabled  No     DEC      T230      02.15 *
*
*
*                          !! Destroys User Data !!                          *
*
*                Insure media inserted NOT write protected.                *
*
*                Insure tape is spun-up and READY !                          *
*
*                Type <CTRL> Z to get back to previous Menu                    *
*
*****
Enter drive letter :A

ARE YOU SURE ?                0 = NO  1 = YES  [0]   NEW = 1
How many loops ? < 0..65535 , 0 = Endless>    [00001] NEW=<CR>

                Type <CTRL> C to abort test

6) Read/Write/Verify Test

***** Accumulated Errors :      0   Loop :      0

Type <CR> to get back to previous Menu :
```

Diagnostics
6.6 Floppy Drive Tests

6.6 Floppy Drive Tests

The Floppy Drive Tests menu is accessed by selecting option 3 from the Diagnostics menu.

Example 6-17 Floppy Drive Tests Screen

```

RQZX1 SCSI-Host Adapter Monitor          Softwrev 1.5  19-Mar-1992
(C) Digital Equipment Corporation 1992    Hardwrev G

***** Floppy Drive Tests *****
*
*
*
*                                0) Read only Test                          *
*                                1) Write only Test                          *
*                                2) Write/Read/Verify Test                    *
*                                3) Positioning Test                          *
*
*
*                                Type <CTRL> Z to get back to previous Menu    *
*
*****
Type a command to proceed :
```

The tests that can be selected from this menu are listed in Table 6-5.

Table 6-5 Floppy Drive Tests

Test	Description
0	Read Only Test
1	Write Only Test
2	Write/Read/Verify Test
3	Positioning Test

Diagnostics 6.6 Floppy Drive Tests

6.6.1 Read Only Test

To select the Read Only Test, select option 0 from the Floppy Drive Tests menu.
The Select Drive screen is displayed.

Example 6-18 Read Only Test: Select Drive Screen

```
***** Select Drive *****  
*  
* Floppy Drives *  
*  
* Drive Number Drive Status *  
*-----*  
* A 0 Drive installed *  
* B 1 Drive installed *  
* *  
* *  
* *  
* User data will NOT be destroyed ! *  
* Insure media inserted ! *  
* *  
* Type <CTRL> Z to get back to previous Menu *  
* *  
*****  
Enter drive letter :A  
How many loops ? < 0..65535 , 0 = Endless> [00001] NEW=<CR>  
  
Type <CTRL> C to abort test  
  
0) Read only Test  
.....  
***** Accumulated Errors : 0 Loop : 0  
  
Type <CR> to get back to previous Menu :
```

Diagnostics 6.6 Floppy Drive Tests

6.6.2 Write Only Test

To select the Write Only Test, select option 1 from the Floppy Drive Tests menu.
The Select Drive screen is displayed.

Example 6-19 Write Only Test: Select Drive Screen

```
***** Select Drive *****  
*  
* Floppy Drives *  
*  
* Drive Number Drive Status *  
*-----*  
* A 0 Drive installed *  
* B 1 Drive installed *  
* *  
* *  
* *  
* !! Destroys User Data !! *  
* *  
* Insure media inserted NOT write protected ! *  
* *  
* Type <CTRL> Z to get back to previous Menu *  
* *  
*****  
Enter drive letter :A  
ARE YOU SURE ? 0 = NO 1 = YES [0] NEW = 1  
How many loops ? < 0..65535 , 0 = Endless> [00001] NEW=<CR>  
  
Type <CTRL> C to abort test  
  
1) Write only Test  
.....  
***** Accumulated Errors : 0 Loop : 0  
  
Type <CR> to get back to previous Menu :
```

6.6.3 Write/Read/Verify Test

To select the Write/Read/Verify Test, select option 2 from the Floppy Drive Tests menu. The Select Drive screen is displayed.

Example 6-20 Write/Read/Verify Test: Select Drive Screen

```
***** Select Drive *****
*
* Floppy Drives
*
* Drive Number Drive Status
* -----
* A 0 Drive installed
* B 1 Drive installed
*
* !! Destroys User Data !!
*
* Insure media inserted NOT write protected !
*
*
* Type <CTRL> Z to get back to previous Menu
*
*****
```

Enter drive letter :A
 ARE YOU SURE ? 0 = NO 1 = YES [0] NEW = 1
 How many loops ? < 0..65535 , 0 = Endless> [00001] NEW=<CR>

Type <CTRL> C to abort test

2) Read/Write/Verify Test

```
.....
***** Accumulated Errors :    0    Loop :    0
```

Type <CR> to get back to previous Menu :

6.6.4 Positioning Test

To select the Positioning Test, select option 3 from the Floppy Drive Tests menu. The Select Drive screen is displayed.

Example 6-21 Positioning Test: Select Drive Screen

```
***** Select Drive *****
*
* Floppy Drives
*
* Drive Number Drive Status
* -----
* A 0 Drive installed
* B 1 Drive installed
*
* User data will NOT be destroyed !
*
* Insure media inserted !
*
*
* Type <CTRL> Z to get back to previous Menu
*
*****
```

Enter drive letter :A
 How many loops ? < 0..65535 , 0 = Endless> [00001] NEW=<CR>

Type <CTRL> C to abort test

3) Positioning Test

```
.....
***** Accumulated Errors :    0    Loop :    0
```

Type <CR> to get back to previous Menu :

6.7 XXDP System-Level Diagnostics

System interaction testing between the CPU, memory, and other devices on the Q-bus is accomplished with Decx/11.

To test different types of devices, you configure the Decx/11 module differently:

To test this type of device . . .	Configure the Decx/11 module . . .
Hard disks and RX33 drives	RQA _x
TZ30 tape drives	TKA _x

The parameters that are required to test these devices are described in the following sections.

6.7.1 RQAI Parameters

The following table shows the location of each of the parameters involved in testing hard disks and RX33 drives.

APC	Parameter	Function
14	DVC - Device Count	Identifies the devices you want to test
16	SR1 - Switch Register 1	Determines the type of testing you want done
22	SR3 - Switch Register 3	Keeps the testing from writing over data in specific devices, data that you might want to keep

When the module is first started, the module defaults to do only reads from unit 0. To perform the full test of write, read, and check, set bit 1 in SR1, and set the bit corresponding to each of the units you want to test in SR3. During initialization a message will print on the console reporting on the write rights of each unit, allowing you to prevent a test that will destroy data that you want to preserve.

6.7.1.1 Device Count

The device count parameter determines which units are to be tested (exercised).

The units to be exercised are determined by DVID1 (location 14) in the module.

The following table shows Device Count.

DVC = Device Count

DC DC DC DC DC DC DC DC DC DC DC DC DC DC DC DC
15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00

The following table shows the DVC settings that correspond to different device counts:

To test these drives . . .	DVC Settings	Device Count
Drive 1 and Drive 3	DVC = 12	(DC01 + DC03)
Drive 0 only	DVC = 1	(DC00)
Drive 0 and Drive 1	DVC = 3	(DC00 + DC01)
Drive 2 only	DVC = 4	(DC02)

6.7.1.2 Switch Register 1 (SR1)

The recommended setting for testing is SR1 = 2012.

Switch Register 1 has the following characteristics (all bits default to 0):

Bit	Setting	Function
Bit 0	set 1	Print out packets as they are sent and received (for module diagnostic purposes)
	reset 0	Suppress printing of packets
Bit 1	set 1	Perform full test of write, read, and data check on all devices whose write bits are set in SW3 (except the load unit)
	reset 0	Only read from the desired units using the MSCP READ function
Bit 3	set 1	Do not print error summary at end of pass
	reset 0	Print error summary at end of pass
Bit 10	set 1	Select random block addressing
	reset 0	Select sequential block addressing
Bit 11	set 1	Bypass data compare
	reset 0	Do data compare

6.7.1.3 Switch Register 3 (SR3)

Caution

Data is destroyed on drives selected by the write mask.

SR3 is used as a bit mask for performing writes. Units represented by the AND of DVID1 (Device Count) and SR3 undergo the full test of write, read, and check. Units whose bits are set only in DVID1 will only be read from (by means of the MSCP READ operation).

Diagnostics

6.7 XXDP System-Level Diagnostics

All bits are ignored in either of the following situations:

- If the corresponding bit is not set in DVID1
- If bit 1 is clear in SR1

SR3 = Write Mask

```
-----
|WM|WM|WM|WM|WM|WM|WM|WM|WM|WM|WM|WM|WM|WM|WM|WM|
|15|14|13|12|11|10|09|08|07|06|05|04|03|02|01|00|
-----
```

Example:

To write on these drives ...	SR3 Settings
Drive 1 and Drive 3	SR3 = 12 (WM01 + WM03)
Drive 0 only	SR3 = 1 (WM00)
Drive 0 and Drive 1	SR3 = 3 (WM00+WM01)
Drive 2 only	SR3 = 4 (WM02)

6.7.2 TKAx Parameters

TKAx testing exercises a single TK50 or TZ30 cartridge subsystem. The drive is exercised by a write, rewind, and read forward, and the write/read sequence is verified by an an in-core compare.

Switch Register 2 is a required parameter unless the logical unit number (LUN) is zero.

6.7.2.1 Switch Register 1 (SR1)

SR1 may be set as follows:

Bit	Value	Description
#3	0	No error summary at end of pass
	1	Error summary at end of pass

6.7.2.2 Switch Register 2 (SR2)

The lower byte of SR2 can be set to the target device's TMSCP Unit Number. The value entered here *must* match the LUN assigned to the tape drive. The default value for the lower byte is zero.

Diagnostics

6.7 XXDP System-Level Diagnostics

6.7.2.3 Switch Register 3 (SR3)

SR3 is used to determine the number of records which will be read/written during an iteration. Setting this value results in a change in the expected execution time. If the register value is zero, the default record count of 813 will be used. To change the record count, set the register to the desired value.

6.7.3 Sample Diagnostic Test

Example 6-22 provides an example of the information displayed on the screen during XXDP system-level diagnostic testing. User input is indicated in **boldface** type and **[Return]**.

Example 6-22 Sample Decx/11 Build

```
BOOTING UP XXDP-XM
XXDP-XM EXTENDED MONITOR - XXDP V2.5
REVISION: F0
BOOTED FROM DL0
124KW OF MEMORY
NON-UNIBUS SYSTEM

RESTART ADDRESS: 152000
TYPE "H" FOR HELP !

.
.
.
.R DXCL
DXCL .BIN

DXCL - XXDP V2 DEC/X11 CNF/LNK REVISION I
RESTART: 006606

DO YOU WANT HELP?(Y <CR> OR JUST <CR>) [Return]
*CNF/NP [Return]
MONITOR: E [Return]
*MDL KWA? [Return]
*MDL CPA? [Return]
*MDL CPB? [Return]
*MDL FPB? [Return]
*MDL RQA? [Return]
```

(continued on next page)

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6.7 XXDP System-Level Diagnostics

Example 6-22 (Cont.) Sample Decx/11 Build

```
*SR1 2012 [Return]
*SR3 6 [Return]
*DVC 3 [Return]
*MDL TKA? [Return]

*TYPEPC [Return]
E
KWA? DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
CPA? DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
CPB? DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
FPB? DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
RQA? DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000007
      SR1-002012 SR2-000000 SR3-000006 SR4-000000
TKA? DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000

*LINK SAMPLE.BIN=XMONF0.LIB [Return]
SYS SIZE: 160000 [Return]
MAKE OUTPUT READY. WRITE ENABLE
TYPE <CR> WHEN READY. [Return]
PASS 1
TRANSFER ADDRESS: 002366
LOW LIMIT: 000000
HIGH LIMIT: 132016
PASS 2
```

(continued on next page)

Diagnostics
6.7 XXDP System-Level Diagnostics

Example 6-22 (Cont.) Sample Decx/11 Build

```
LINK DONE
*SAVC SAMPLE.CNF [Return]
DONE
*TYPEPC [Return]
E
KWAH DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
CPAG DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
CPBK DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
FPBF DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000
RQAI DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000007
      SR1-002012 SR2-000000 SR3-000006 SR4-000000
TKAC DVA-000000 VCT-000000 BR1-000000 BR2-000000 DVC-000000
      SR1-000000 SR2-000000 SR3-000000 SR4-000000

*EXIT [Return]
.R SAMPLE [Return]
SAMPLE.BIN
DEC/X-11 EXERCISER MONITOR "LIB. - F" - V02.5
"MD-ZZ-CXMON-E" 15-OCT-84
MONITOR: E
SYSTEM SIZE: 01920 K
WRITE BUFFER ROTATION ON
KT ON
TRAPPING ENABLED
CACHE ON
UNIBUS MAP ON
TO TEST LD MEDIA CLR LOC 40
CMD>
CMD>
CMD>
CMD>MAP [Return]
CMD>
KWAH AT VA: 066370 STAT: 140000
FPBF AT VA: 073772 STAT: 140000
RQAI AT VA: 102140 STAT: 150000
TKAC AT VA: 116400 STAT: 150000
CPAG AT VA: 070232 STAT: 040020
CPBK AT VA: 072114 STAT: 040020
CMD>
```

Command Implementation

This chapter describes the registers that carry commands between the devices and the RQZX1 controller. It then describes the command sets in MSCP and TMSCP protocol that are supported by the controller.

7.1 Register Descriptions

The two register sets in the RQZX1 controller are used for control of the SCSI port, which provides the link between the SCSI devices and the controller. Each register set can be set for either MSCP or TMSCP protocol. Each register set consists of two 16-bit registers. These register names, addresses, and functions are:

Register	CSR address	Functions
IP	7nnnn0/4	initialization and "polling"
SA	7nnnn2/6	status, address, and "purge"

The behavior of byte-aligned transfers to the I/O page registers is undefined. The register pair begins on a longword boundary within the I/O page.

These registers are always read or written as words.

7.1.1 IP Registers

When the IP registers are read or written with any value (initialization and polling), an interrupt signal is generated to the microprocessor.

The IP register has the following functions:

Command Implementation

7.1 Register Descriptions

Table 7-1 IP Register Functions

In this case . . .	The IP Register . . .
When written with any value,	Causes a hard initialization of the port and the controller.
When read by the host,	
If a connection exists between the host and the controller,	The controller examines the current location of the command queue in the communications area for commands. Note that the word "polling" is sometimes used to describe the controller's access of the command queue.
If no connection exists between the host and the controller,	The device controller ignores the IP register read.

7.1.2 SA Registers

Each SA register consist of two independent 16-bit registers, one for each direction. When read or written by the host during initialization or normal operation, the SA register communicates data, status, and error information to the microprocessor bus.

The SA register has the following functions:

Table 7-2 SA Register Functions

In this case . . .	The SA Register . . .
When read by the host,	
During initialization	Contains data and error information relating to the initialization process.
During normal operations	Contains status information, such as controller-detected fatal errors. The host examines the controller's SA registers regularly to verify normal controller operation. A fatal self-detected controller error is reported in the SA register.
When written by the host,	
During initialization (except when written with zeros by the host during step 3)	Communicates host-specific parameters to the controller.
During normal operation and when written with zeros during step 3 of initialization	Signals that the host has successfully completed a bus adapter purge in response to a request from the controller.

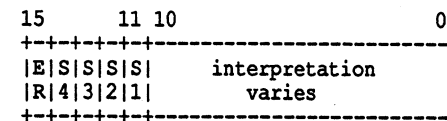
Command Implementation

7.1 Register Descriptions

7.1.2.1 Initialization Details

During initialization, the detailed format and meaning of the SA register depends on the initialization step and whether the SA is being read or written.

The layout of the SA register is shown below:



When it is being read, certain bits of the SA register format are constant and apply to all steps. The data portion of the SA register (bits 10-0) is qualified either by the ER bit (bit 15) or by one of the step bits (bits 14-11). If the ER bit is clear and a step bit is not set, then the contents of the SA register are undefined.

Bits S1-S4 are set separately by the controller to indicate which step it is ready to perform. If the host detects more than one S-bit set at any time, it reinitializes the controller. If this happens a second time, the host assumes that the controller has failed.

If ER = 1, then either a controller-based diagnostic test has failed or there has been a fatal error. Bits 10 - 0 display an error code which may be either port-generic or controller dependent.

If ER = 1 and a step bit is set, then a fatal error was detected during initialization. If ER = 1 and all step bits are clear, then a fatal error was detected during normal operation.

7.2 SCSI Command Implementation

A single command may transfer one or more logical blocks of data. If the target is able to disconnect, and if there will be a latency before data is ready to transfer, then the target will disconnect from the SCSI bus to allow activity by other SCSI devices. Upon command completion, whether successful or unsuccessful, the target will return a status byte to the initiator. Since most error and exception conditions cannot be adequately described with a single status byte, one status code, CHECK CONDITION, indicates that additional information is available. The initiator may issue a REQUEST SENSE command to retrieve this additional information.

7.2.1 Command Descriptor Block

The initiator issues a command to the drive by sending a command descriptor block (CDB) during the COMMAND phase. The CDB (either six or ten bytes in length) contains the information required for the execution of the command. If the command required additional parameters, these are transferred during the DATA-OUT phase.

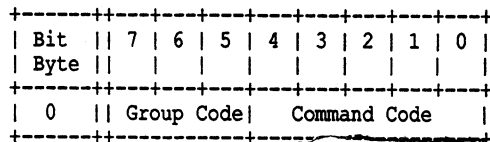
The first byte of the any SCSI command must contain an operation code. Three bits (bits 7 through 5) of the second byte of each SCSI command specify the logical unit number. Command parameters, if required, follow the logical unit number.

An invalid parameter in the CDB will cause the drive to terminate the command with CHECK CONDITION status, and the appropriate sense key set.

7.2.1.1 Operation Code

The operation code of the CDB consists of two fields: a group code field (bits 7 - 5) and a command code field (bits 4 - 0).

Figure 7-1 Operation Code



The group code field, consisting of three bits, is used to specify one of eight groups of command codes. The command code field, consisting of five bits, is used to specify one of 32 possible command codes. Thus, a total of 256 operation codes are available. Table 7-3 shows the available group codes.

Table 7-3 Available Group Codes

Group Number	Description
0	6-byte command
1	10-byte command
2	reserved
3	reserved
4	reserved
5	12-byte command (not used)
6	reserved
7	reserved

Typical command descriptor blocks for 6-byte commands and 10-byte commands are shown in Figure 7-2 and Figure 7-3.

Figure 7-2 Typical CDB for 6-Byte Commands

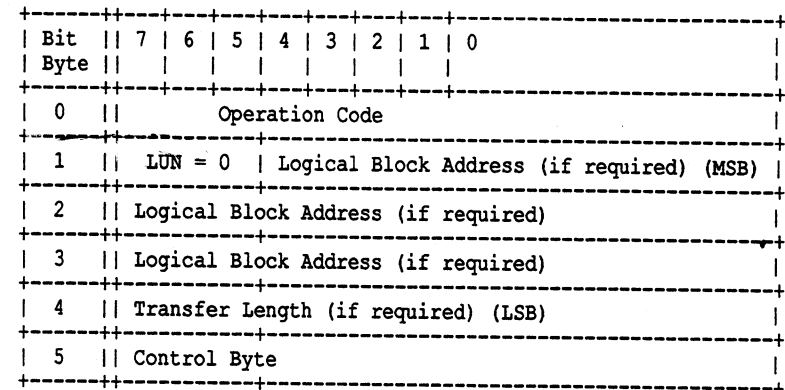


Figure 7-3 Typical CDB for 10-Byte Commands

Bit	7	6	5	4	3	2	1	0
Byte								
0	Operation Code							
1	LUN = 0	Reserved				Rel Adr = 0		
2	Logical Block Address (if required) (MSB)							
3	Logical Block Address (if required)							
4	Logical Block Address (if required)							
5	Logical Block Address (if required) (LSB)							
6	Reserved							
7	Transfer Length (if required) (MSB)							
8	Transfer Length (if required) (LSB)							
9	Reserved							

The terms used in the figures are explained in Table 7-4.

Table 7-4 Explanation of CDB Terms

Term	Description
LUN (logical unit number)	Is always zero, since the supported devices have only one logical unit. (It is therefore always ignored.)

(continued on next page)

Table 7-4 (Cont.) Explanation of CDB Terms

Term	Description						
LBA (logical block address)	Specifies the starting block from which a data transfer will take place. Logical block addresses begin with block zero and are contiguous up to the last logical block on the drive. Different groups of command descriptor blocks contain different sizes of logical block addresses: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>CDB Group (number of bytes)</th> <th>Size of LBA</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>21-bit</td> </tr> <tr> <td>1</td> <td>32-bit</td> </tr> </tbody> </table>	CDB Group (number of bytes)	Size of LBA	0	21-bit	1	32-bit
CDB Group (number of bytes)	Size of LBA						
0	21-bit						
1	32-bit						
Relative address bit	Not supported. This field is ignored.						
Reserved	Bits, bytes, fields, and code values set aside for future standardization. A reserved bit, byte, or field is set to zero. If the RQZX1 receives a reserved bit, byte, or field that is not zero, or receives a reserved code value, then it treats the field as zero.						
Transfer length	Specifies the amount of data to be transferred, usually the number of logical blocks. For some commands, the transfer length specifies the number of bytes to be transferred, as defined in the command description. For these commands, the transfer length field may be identified by a different name. (For further information, refer to individual command descriptions.)						
Control byte	Consists of four fields: vendor unique, reserved, flag, and link. If linked commands are supported (for example, RQZX1 and TZ30), then the link bit indicates a command queue, and the target performs another command phase. The flag bit is not used by the RQZX1, and is set to zero.						

7.2.2 Supported MSCP and TMSCP Commands

The command sets described in the following sections are implemented by the RQZX1. IF ANY host on the Q-bus uses optional commands or commands specific to an implementation, then the host receives the message "invalid command," as recommended in the MSCP/TMSCP specification V 2.0.2.

Multiaccess drives are not supported. On the Q-bus side, only one class driver can be logically connected to the RQZX1.

Command Implementation 7.2 SCSI Command Implementation

Bad block management is detected and initiated by the RQZX1.

Table 7-5 MSCP Command Set

Command	Function
ABORT	Guarantees that the referenced MSCP command will complete within the controller timeout period of 250 seconds
ACCESS	Reads data from the specified unit
AVAILABLE	If the specified unit is on-line, returns it to the unit-available state. (If the specified unit is currently in the unit-available state, then the command has no effect.)
COMPARE HOST DATA	Reads data from the disk and compares it with the data in the host buffer
ERASE	Writes data to the specified logical blocks on the unit. (No data is accessed from the host.)
FORMAT	Reformats the entire hard disk drive
GET COMMAND STATUS	Reports on the status of a specified command by returning a number that reflects the command's progress
GET UNIT STATUS	Reports on the status of a specified unit
ON LINE	Places the specified unit on line, if possible
READ	Reads data starting from the specified logical block on the disk into host memory
SET CONTROLLER CHARACTERISTICS	Sets all controller characteristics that can be set from the host
SET UNIT CHARACTERISTICS	Sets all unit characteristics that can be set from the host
WRITE	Writes data from the host memory, starting at the specified logical block on the disk

Command Implementation 7.2 SCSI Command Implementation

Table 7-6 TMSCP Command Set

Command	Function
ABORT	Guarantees that the referenced TMSCP command will complete within the controller timeout period
ACCESS	Reads data from the specified unit
AVAILABLE	If the specified unit is on-line, returns it to the unit-available state. (If the specified unit is currently in the unit-available state, then the command has no effect.)
COMPARE HOST DATA	Reads data from the disk and compares it with the data in the host buffer
ERASE	Writes zeroes to the specified logical blocks on the unit. (No data is accessed from the host.)
FLUSH	Ensures that all previously issued and cached "write" type commands have fully completed
GET COMMAND STATUS	Reports on the status of a specified command by returning a number that reflects the command's progress
GET UNIT STATUS	Reports on the status of a specified unit
ON LINE	Places the specified unit on line, if possible
READ	Reads data into host memory, starting from the specified logical block on the disk
REPOSITION	Position a tape on assigned record
SET CONTROLLER CHARACTERISTICS	Sets all controller characteristics that can be set from the host
SET UNIT CHARACTERISTICS	Sets all unit characteristics that can be set from the host
WRITE FILE MARK	Writes one file mark on the tape

7.2.3 Command Translation from MSCP/TMSCP to SCSI

This section provides a quick look at the SCSI commands that are sent from the RQZX1.

The two tables contain all supported MSCP and TMSCP commands and their SCSI counterparts. Any commands not listed here are unknown to the RQZX1 and are ignored.

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7.2 SCSI Command Implementation**

Table 7-7 MSCP Commands and Corresponding SCSI Commands

MSCP Command	SCSI Commands
ABORT	none
ACCESS	READ(6), READ(10)
AVAILABLE	START/STOP UNIT
COMPARE HOST DATA	READ(6), READ(10)
ERASE	WRITE(6), WRITE(10)
FORMAT	FORMAT ,WRITE(6), WRITE(10)
GET COMMAND STATUS	none
GET UNIT STATUS	MODE SENSE
ONLINE	START/STOP UNIT, READ(6), READ(10), READ CAPACITY
READ	READ(6), READ(10), REASSIGN BLOCKS
SET CONTROLLER CHARACTERISTICS	none
SET UNIT CHARACTERISTICS	READ CAPACITY
WRITE	WRITE(6), WRITE(10), REASSIGN BLOCKS

**Command Implementation
7.2 SCSI Command Implementation**

Table 7-8 TMSCP Commands and Corresponding SCSI Commands

TMSCP Command	SCSI Commands
ABORT	none
ACCESS	READ(6)
AVAILABLE	LOAD/UNLOAD, REWIND
COMPARE HOST DATA	READ(6)
ERASE	ERASE, REWIND
FLUSH	SPACE
GET COMMAND STATUS	none
GET UNIT STATUS	MODE SENSE, TEST UNIT READY
ONLINE	LOAD/UNLOAD,TEST UNIT READY, REWIND, MODE SELECT
READ	READ(6)
REPOSITION	REWIND, SPACE
SET CONTROLLER CHARACTERISTICS	none
SET UNIT CHARACTERISTICS	MODE SELECT
WRITE	WRITE(6), MODE SELECT
WRITE TAPEMARK	WRITE FILEMARKS

7.2.4 Supported SCSI Commands

ANSI standards describe how the initiator and the target react if one of them does not support a specific instruction. (All drives do not obey these standards.) The RQZX1 avoids using optional commands as part of the firmware.

Linked commands are not supported. The LINK and FLAG bits are therefore set to zero in all commands.

Table 7-9 shows the SCSI commands and the corresponding codes used by the RQZX1 in the initiator role to handle hard disk drives.

Command Implementation
7.2 SCSI Command Implementation

Table 7-9 SCSI Commands and RQZX1 Codes

SCSI Command	Code
FORMAT UNIT	04(H)
INQUIRY	12(H)
READ	08(H)
READ CAPACITY	25(H)
READ DEFECT DATA (used by RQZX1 monitor only)	37(H)
READ EXTENDED	28(H)
REASSIGN BLOCKS	07(H)
REQUEST SENSE	03(H)
SEND DIAGNOSTIC (used by RQZX1 monitor only)	1D(H)
START/STOP UNIT	1B(H)
TEST UNIT READY	00(H)
WRITE EXTENDED	2A(H)
WRITE	0A(H)

In order to handle SCSI hard drives with smaller command sets, the following commands from the common SCSI command set are not used by the RQZX1:

Command Implementation
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Table 7-10 Unused SCSI Commands and Codes

SCSI Command	Code
MODE SELECT	15(H)
MODE SENSE	1A(H)
READ BUFFER	3C(H)
READ LONG	3E(H)
RELEASE	17(H)
RESEVE	16(H)
REZERO UNIT	01(H)
SEEK	0B(H)
SEEK EXTENDED	2B(H)
VERIFY	2F(H)
WRITE AND VERIFY	2E(H)
WRITE BUFFER	3B(H)
WRITE LONG	3F(H)

Field Replaceable Units (FRUs)

Table A-1 Field Replaceable Units

Part Number	Description	Quantity
RZ23L-E	129 Mbyte Disk Drive	1
RZ23L-GF	129 Mbyte Disk Drive with brackets and mounting hardware	1
RZ24-E	209 Mbyte Disk Drive	1
RZ24-GF	209 Mbyte Disk Drive with brackets and mounting hardware	1
RZ24L-E	245 Mbyte Disk Drive	1
RZ24L-GF	245 Mbyte Disk Drive with brackets and mounting hardware	1
TZ30-AA	95 Mbyte Cartridge Tape Drive	1
TZ30-GF	95 Mbyte Cartridge Tape Drive with brackets and mounting hardware	1
M5977-AA	SCSI to Q-bus Controller	1
RX33-A	1.2 Mbyte 96 TPI Floppy Drive	1
17-03036-01	SCSI Cable Assembly	1
17-01526-03	RX33 Cable Assembly	1
17-01389-01	Power Extension Cable Assembly	2
H8574-A	SCSI Terminator	1