

Model SKZ-2221

SCSI Disk Subsystem

Technical Manual

SCZ-2F

1 - Floppy

2 - 330MB DISKS

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Preface

This manual contains information regarding installation, testing, and operation of the ZETACO SKZ-2221 SCSI Disk Subsystem. The technical contents have been written with the following assumptions in mind:

- 1) *You have a working knowledge of Data General (DG) Minicomputers, operating systems, and diagnostic and utility software;*
- 2) *You have access to full hardware and software documentation for your particular system;*
- 3) *You are familiar with standard installation, power, grounding, and peripheral cabling procedures.*

The information in this manual is organized into the following chapters:

Chapter 1 - Product Overview

Describes the SKZ-2221 Subsystem features, capabilities, specifications, power and interface requirements.

Chapter 2 - Installation Procedures

Describes and illustrates the procedures required to install an SKZ-2221 Subsystem.

Chapter 3 - Trouble-shooting

Contains information useful in analyzing subsystem problems and how to get help.

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Product Overview

1.0 Introduction

The SKZ-2221 Subsystem is a high capacity, digital data storage and retrieval system, designed for interface with Data General minicomputers.

The Subsystem is composed of ZETACO's DG-emulating disk controller (Model SCZ-2F), one or two 330-megabyte magnetic disk drives, an optional 3.5" extra high density floppy drive, and a rack-mountable enclosure for the drives and their power supplies. Both drive types use the Small Computer Systems Interface (SCSI). All components are connected by a shielded daisy-chain cabling system that is compatible with DG's shielding requirements, or its non-FCC compliant chassis.

The Controller pairs ZETACO's emulation of the DG Zebra Disk Subsystem with the SCSI peripheral interface on a single 15" x 15", 10-layer printed circuit board. Data transfers take place over the data channel (DCH) on DG's Nova and 16-bit Eclipse Series computers.

Note that your SKZ-2221 Subsystem has been integrated at the factory as a complete unit. Its components have been designed and tested together, and none should be substituted with any other type or brand of component, however similar; if substitutions are made ZETACO cannot guarantee the proper functioning of the Subsystem.

1.2 Features

- The SKZ-2221 subsystem interfaces to DG's data channel bus on 16-bit Eclipse and Nova Series processors running RDOS or ERDOS.

- The controller supports simultaneous control of up to two - 330 MB SCSI Wren Runner drives (Seagate's 94181-385H), and a single 3½ inch, 4 MB unformatted floppy drive (TEAC's FD-235JS-401).
- The controller's device code and throttle rate are easily selected via switches on the board edge.
- By flipping a switch on the front of the drive enclosure, you can select the floppy as SCSI ID0, or the hard drive as SCSI ID0, thus designating the boot device.

1.3 Specifications - Functional

General

Drives per Controller: 2 SCSI hard drives (330 MB)
1 SCSI floppy drives (4 MB)

Transfer Rate: Maximum SCSI burst rate of
1.5 MB/sec.

Indicator Lights: Red - Selftest
Green - Host Busy
Yellow - SCSI Busy

Device Code, Throttle,
DZ0 Device Selection Switch-selectable

Computer Interface

DG Emulation Zebra Disk Subsystem

Bus Load 1 unit load (any I/O slot)

Data Channel Interface Selectable throttle rate of 1 to 128
16-bit words/access.

Drive Interface

Small Computer Systems Interface (SCSI):

- supports parity generation and checking
- complies with "Common Command Set"
- Byte-wide parallel data bus

1.3.1 Mechanical**Controller Dimensions**

Width 15 inches (38.1 cm)
 Length 15 inches (38.1 cm)
 Height 0.5 inches (1.3 cm)

Controller Shipping Weight

10 pounds (4.5 kg) - includes controller, paddleboard, cables, Software Support Floppy and Tape, documentation, and SCSI Bus terminator.

Power Requirements

+5 (+/- 5%) Volts DC @ 3.5 Amps typical

Environmental**Operating Environment**

Temperature 0 to +55 degrees C
 Relative Humidity . . +10% to +90% (non-condensing)

Non-operating Environment

Temperature -45 to +115 degrees C
 Relative Humidity . . +10% to +90% (non-condensing)

Exceeds all Eclipse and Nova temperature and humidity specifications.

Disk Drive Enclosure

Drives per enclosure . Up to three drives total.
 Up to two 330 MB disks; up to one
 4 MB floppy disk.

Mechanical Height . . 5.25" (133mm)

Width 19.00" (483mm)

Depth 25.00" (635mm)

Weight 66 lbs. (30 kg) max.
 (maximum weight with 2 hard drives,
 and 1 floppy drive.)

Power Input

Standard 90 to 135 Vac
 47 to 63 Hz

(20 Amp maximum peak current at power-up.)

Power Output Per Drive

+5 Vdc @ 3.0 Amps

+12 Vdc @ 3.5 Amps continuous

+12 Vdc @ 4.5 Amps max at power-up

50 watts maximum continuous

2.0% maximum on +5V

3.0% maximum on +12V

Environmental

Operating Environment

Temperature +10 to +38 degrees C

Relative Humidity .. +10% to +80% (non-condensing)

Altitude -1000 to +10000 feet

Non-operating Environment

Temperature -34 to +60 degrees C

Relative Humidity .. 5% to +95% (non-condensing)

Altitude -1000 to +40000 feet

Installation

2.0 Before You Begin

This section contains the procedures necessary for proper installation of the SKZ-2221 Subsystem. We recommend that you read through it once in its entirety before you begin.

The following sections are in order of execution. In Sections 2.2 through 2.4 you will select a slot and device code for the Controller, establish slot priority, and install the controller. Section 2.5 covers rack-mounting of the enclosure and cable connections. Section 2.6 details the power-up sequence.

In Sections 2.7 through 2.11 you will use programs on the Software Support Floppy or Tape to complete the installation. Finally, you will run ZSDKINIT on the subsystem and bring it into full system operation.

You will need the following tools to install the SKZ-2221 Subsystem:

1. A Phillips screwdriver
2. A set of nut drivers
3. A small straight-blade screwdriver
4. A large straight-blade screwdriver

You may also find a flashlight and needlenose pliers helpful for installing jumpers and the paddleboard in the computer backplane.

2.1 Unpacking & Inspection

The SKZ-2221 Subsystem consists of the following parts:

QTY DESCRIPTION

1	SCZ-2F Disk Controller
1	Disk Drive Enclosure with drives
1	External SCSI Cable 9'
1	Software Support Diskette (optional)
1	Software Support Tape (9-track, 1600 bpi)
1	SKZ-2221 Subsystem Manual
1	SCSI Bus Terminator

In this procedure, we assume that you are installing an SKZ-2221 Subsystem that consists of one drive enclosure containing one hard drive and one floppy drive. If your system does not contain a floppy drive then all the references toward using the Software Support Diskette must be directed to the information concerning the Software Support Tape.

Upon receipt of the SKZ-2221 Subsystem from the carrier, inspect the shipping cartons immediately for any evidence of damage or mishandling in transit.

If the shipping cartons are water stained or damaged, contact the carrier and shipper immediately, specify the nature and extent of the damage and request that the carrier's agent be present when the cartons are opened.

ZETACO'S warranty does not cover shipping damage.

For repair or replacement of any ZETACO product damaged in shipment, call ZETACO to obtain return authorization instructions. See Section 3.7.

System Hardware Requirements

- a) Eclipse or Nova CPU.
- b) Magnetic Tape Subsystem (for first-time operating system build)
- c) Console on Device 10/11

The Software Support Package

The programs on the Software Support Package have been written by ZETACO specifically for the SKZ-2221 Subsystem. You will use these programs for Media Formatting, Diagnostic, Reliability, and RDOS Initialization. DG's CORRESPONDING PROGRAMS MAY NOT WORK ON THIS CONTROLLER.

The software support package comes in two flavors - A 1600 bpi 9-track tape and a 3.5 inch ED diskette. If the system you ordered does not contain a floppy drive then you need only take note of the information referring to the tape. Both packages contain the same ZETACO programs.

Tape

The Software Support Tape is structured so that the programs on Files 2 through 5 can be loaded and executed directly from the tape. Each is a stand-alone program; this means that they do not need, and cannot have, an operating system running when they are executed.

Files 0 and 1 contain the software that enables you to boot from the tape and select the particular program you want to load into the system. The boot procedure is detailed in Section 2.7.

Diskette

This diskette contains a skeletal RDOS operating system onto which was loaded Zetaco's software support programs. These programs can be executed by booting the diskette. Each of these programs are stand-alone; they cannot have an operating system running when they are executed.

Detailed information on using this Diskette is provided in Section 2.7.

2.2 Select a Slot for the Controller

The Controller may be installed in any I/O or I/O-MEM slot. Consult the hardware manuals for your particular computer to identify the appropriate slots.

Priority Selection

The Controller must receive two priority signals from the DG minicomputer backplane: DCH Priority In (Pin A94), and Interrupt Priority In (Pin A96). If there are vacant slots between the Controller and the processor, or between the Controller and another controller already installed in the chassis, jumper wires must be installed to obtain priority continuity. To "jumper across" unused slots, connect DCH Priority Out (Pin A93) to DCH Priority In (Pin A94) and Interrupt Priority Out (Pin A95) to Interrupt Priority (Pin A96). See Figure 2.2.

2.3 Prepare the Controller

Configuration Switches

The controller has been shipped preconfigured for your SKZ-2221 Subsystem. Check the following table to make sure the switches on the Controllers front edge are properly set before installing your SKZ-2F.

Table 2.1

Configuration Switch Settings

Default Switch Settings for the SCZ-2221 system (any drive combination) Drive System:

Switch Position:

(down = D, up = U)

	1	2	3	4	5	6	7	8	
SW1	D	D	D	D	U	U	D	D	(Recognize multiple targets) (throttle = 16)
SW2	D	D	D	D	D	D	D	D	(Bank of switches not used.)
SW3	D	D	U	D	U	D	D	D	(Device code = 27 ₈)

Configuration Options

The recommended configuration per the application (i.e., ordered subsystem) is selected prior to shipping. Please refer to Appendix A if it is necessary to deviate from the recommended configuration. All optional switch settings are defined in Appendix A.

2.4 Install the Controller

First, be sure the computer is turned OFF. Pull the lock tabs on the two front corners of the controller out as far as they will go. Next, carefully guide the controller into the slot you selected in Section 2.2. When the board engages the backplane connectors, gently press the lock tabs in to provide insertion leverage. Use equal pressure on both lock tabs until the board seats firmly into the backplane connectors.

Figure 2.1

SCZ-2F Board Layout

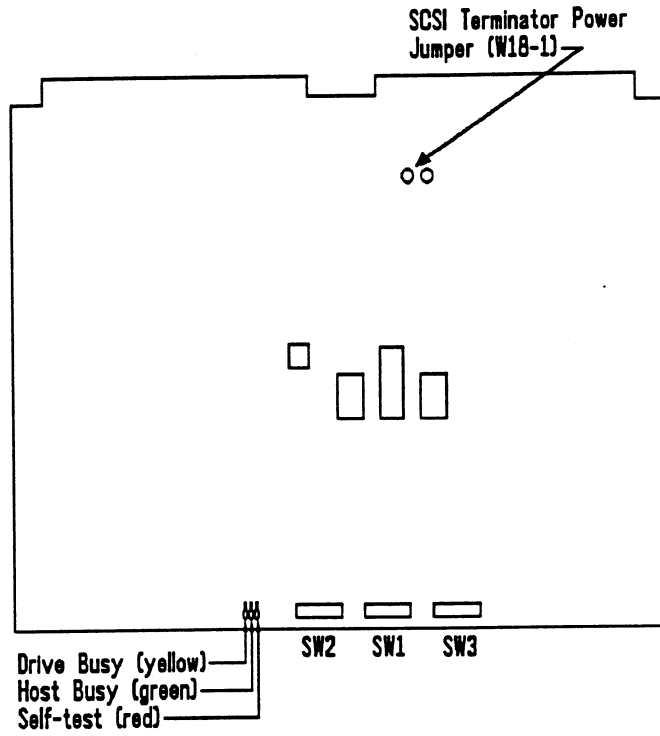


Figure 2.2 *Backplane Priority Jumpers & Cable Placement*

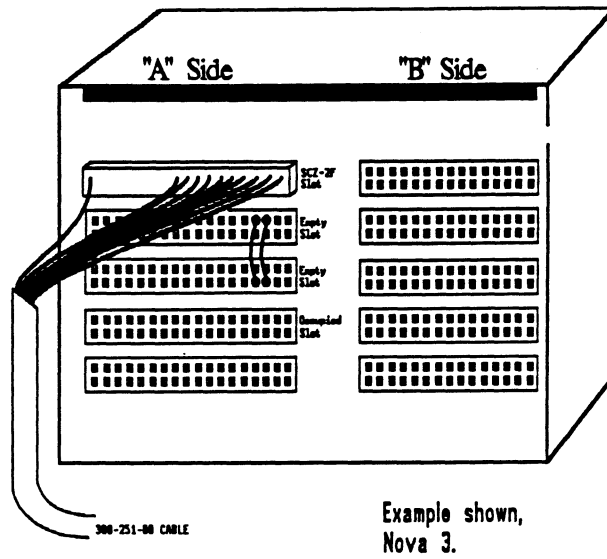
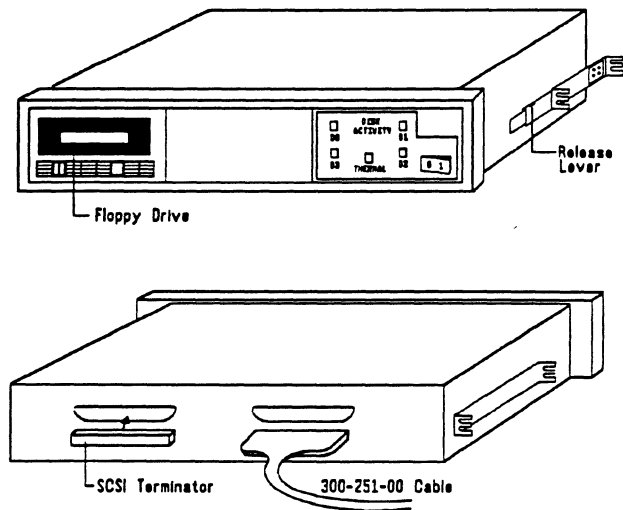


Figure 2.3 *Disk Enclosure Slide Assembly & Terminator*



Device Code Selection

The recommended device code for the SKZ-2221 Subsystem Controller is 27₈. However, any usable device code can be selected, as long as there is not already a controller in the system with that code.

A set of switches on the edge of the board allows you to easily set the device code. Refer to Appendix A if an alternate device code is desired.

If, at a later date, you wish to change the device code for the Controller, you need not remove the board from the computer chassis. Simply set the switches accordingly and press RESET on the computer. The new device code will then be operative.

2.5 Disk Drive Enclosure Installation

The hard and floppy drives of the SKZ-2221 subsystem are mounted in a rack-mountable enclosure. Installing the enclosure consists of mounting the slide assemblies onto the vertical rails of the equipment rack, then inserting the enclosure into the slides.

Determine the Slide & Bracket Orientation

There are two slide assemblies; one for the left side of the enclosure and one for the right. They are different and must be installed on the correct sides. When positioned correctly in the rack, the front slide release lever will be on the top side of each slide. See Figure 2.3. One end of each slide has four mounting holes in it. This end of the slide goes towards the rear of the equipment rack. An L-bracket mounts to the rear of each slide and provides a means of adjusting the slides to fit different rack types.

Determine Vertical Positioning

The front of each slide has two slots through which screws secure the slide to the front rail. When choosing the vertical position for mounting the slides, the following clearance should be maintained:

1. Allow approximately 1" distance from the lower mounting slot on the front of the rail to the top of the peripheral or rack cover directly below it.
2. Allow approximately 5 1/4" clearance for the enclosure height within the equipment rack.

L-Brackets

First, fasten two 10-32 clip nuts onto each rail with the nut on the rear side. Next, secure each L-bracket to its rail with two 10-32 philips screws.

Slide Assemblies

Fasten two 10-32 clip nuts onto each front vertical rail with the nut on the rear side. Secure each slide to the rail with two 10-32 philips screws.

To secure the L-brackets to their slides, use two 10-32 slotted screws and two 10-32 hex nuts.

Install Enclosure onto Slides

First extend each slide out fully by pulling the inner member of each slide out until the rear slide release locks the slide in the extended position. Next, lift the enclosure and guide the slide members attached to the enclosure into the extended slides; this may require two people. Once guided into the slides, the enclosure will lock when it encounters the front slide release. Unlock the release by pressing down on the release lever. To complete the enclosure installation, push the enclosure fully into the equipment rack.

Attach SCSI Data Cable

The cabling scheme for the SKZ-2221 Subsystem consists of a single cable: A 50 conductor cable with a 100 position block at one end and a 50 pin "Champ" connector at the other end. The 100 position block is to be installed across the pins of the computer backplane on the "A" side of the slot holding the SCZ-2F controller. The other end of the cable, with the Champ connector, can be connected to either mating Champ connector on the rear of the Disk Drive Enclosure. On the remaining Champ connector of the Drive Enclosure install the SCSI bus terminator (124-070-00) included with your Subsystem. See Figure 2.3

The computer backplane, viewed from the rear, has the "A" side pins on the left. (On computers with vertically mounted circuit boards, the "A" side pins are on the top.)

Locate the two rows of pins on the "A" side of the backplane for the slot containing the Controller. Ensure that no pins are bent. Position the "A" connector block of the 300-251-01A cable so that it covers all the pins on of the A side backplane (pins 1 through 100) and is oriented correctly. Press the connector securely over the pins, making sure all pins insert and do not bend, until the connector block is flush with the backplane. See Figure 2.2.

CAUTION

Component damage may occur if the connector block is misaligned. Make sure the connector block is not shifted right or left. Also, ensure that the block is positioned over the correct two rows of pins and NOT between slots. It may be necessary to count pairs of rows to determine correct positioning.

2.6 Power-Up the Subsystem

Begin the power up sequence by first switching power on to the disk drive enclosure. The "disk activity" LEDs on the front of the drive enclosure will be lit continuously for the hard drives in the system. Because the SCSI bus receives its termination power through the SCSI data cable, these LEDs will remain on and the drives will not spin up until the computer is turned on.

Computer Power-Up

After you turn on the drive enclosure, you can power-up the computer. When you press the computers power switch, you will notice that the red LED on the SCZ-2F controller will be active momentarily, and then go out. This indicates a successful self-test. The yellow LED on the controller will be ON until the disk(s) become active. Also, the busy LED on the controller and disk activity LEDs on the enclosure will be OFF until the disk(s) are activated.

Anytime power is applied to the disk enclosure, the THERMAL indicator LED should be green, indicating that the cooling fans are operating properly. If a malfunction occurs with any fan in the enclosure, this LED will turn red.

If any of these LED events don't occur as stated above see Section 3.1 for further advice.

2.7 Begin System Test

Your next step will be to boot either the software support tape or diskette and initiate the process of preparing your disk for an operating system.

Boot the Software Support Diskette

The software support diskette contains programs useful for testing the reliability of the subsystem and for preparing the disks of the subsystem for operating system installation

The bootstrap procedure for the software support diskette is:

1. Insert the diskette into the floppy drive.
2. Set the Switch on the enclosure to "boot floppy." This will select the diskette as DZ0 making it the boot device.
3. Perform a computer power-up cycle again or an IORESET.
4. Execute a "program load". The controller at this time is set for device 27, and must remain at this device code whenever booting this diskette.
5. When *filename?* appears, your choices will be:
 - SCZ2R . A reliability program used for ensuring that your system is sound.
 - SCZ2D . A diagnostic program used primarily by Zetaco personnel for troubleshooting.
 - SCZ2F . The formatter program used to format your systems hard drives and diskettes.
 - ZSDKINIT The disk initializer program used to prepare your hard drives and diskettes for holding operating system structure.

Before executing any of these programs, please review Section 3.3 for the details concerning these programs.

Boot the Software Support Tape

The Bootstrap Procedure for the Software Support Tape is:

1. Mount the Software Support Tape on a tape drive and put it on-line. Be sure that the BPI setting matches that specified on the tape label.
2. Execute a "Program Load." The Program Load procedure is different for different computers. Consult the Operator's Manual for your computer to determine the correct one.

3. The software support package menu will be displayed:

FILE #	PROGRAM
2	SCZ-2 DIAGNOSTIC
3	SCZ-2 FORMATTER
4	SCZ-2 RELIABILITY
5	SCZ-2 ZSDKINIT
6	".SV & .LS" Files in RDOS DUMP Format

File Number?

Enter the number of the program you wish to execute. At this point in the installation procedure, you enter the file number, but first refer to Section 3.3 for program execution details.

2.8 Run Reliability

It is recommended that the Disk Reliability program be run for at least one pass, beginning at 500R, to ensure you have a reliable subsystem before beginning a system build. For assistance, you can refer to Section 3.3 and follow the sample dialog. If an occasional data error or address error should occur, reformat the disk using SCZ2F. If the problem was bad media, this will correct the problem. Once this is done, run Reliability again to make sure the problem is resolved.

2.9 Initialize the Disk

The disk is now ready to be initialized for RDOS or ERDOS. Use Zetaco's initializer (ZSDKINIT) to perform this procedure. Each drive, be it a hard drive or a floppy diskette, must be initialized for operating system use. (Of course prior to this, the drive or diskette must be formatted.)

The sample dialogue found at the end of Section 3.3 will guide you through this procedure.

2.10 Store the Software Support Programs on System Disk

Once you have built your operating system on the hard drive, you can load the software support programs from the diskette using a sequence of basic RDOS commands:

1. In DZ0 (the hard drive), create the directory to hold these programs. Note - The switch on the enclosure must be set to "boot disk" in order to select the hard drive as DZ0.
2. With the software support diskette in the floppy drive do an "INIT DZ2" to allow the system to recognize the floppy.

3. Move into the DZ2 structure via "DIR DZ2".
4. Transfer the support programs to your desired directory using the following commands:

```
MOVE/V YOUR DIRECTORY SCZ2-.SV  
MOVE/V YOUR DIRECTORY ZSDKINIT.SV
```

If you have a tape drive, you may opt for loading these programs from the Software Support Tape onto your System drive. File 6 on the Software Support Package Tape is the RDOS dump format of all the contained programs that can be loaded on the system disk.

EXAMPLE: RDOS - Load MT0: 6

The files can now be booted from disk. Enter the appropriate filename in response to "FILENAME?".

2.11 Floppy Drive Notes

The RDOS operating system sees the Floppy drive as a small Zebra emulation disk drive. Because of this, the user must keep some things in mind:

1. Backing up or moving files from the system disk to the floppy disk always first requires that the diskette be formatted, and then initialized with ZSDKINIT followed by INIT/F. If the diskette already contains RDOS structure, then all that is required is that INIT DZ0 or INIT DZ2 (depending on the position of the enclosure "boot" switch) be performed. The DISK command reveals that a diskette after INIT/F has 2,832,384 bytes of free storage space.
2. When moving files to a diskette the user must ensure that the diskette has ample room for the transfer. If the diskette runs out of space the system will respond with "FILE SPACE EXHAUSTED". If a DUMP command was being executed, the command will then be aborted and no information will have been transferred. If a MOVE command was being executed, each file will have been moved with the exception of the one that was being moved when the error occurred.
3. The floppy drive (under Zebra emulation) is not a standard option as a dump device in case of a system crash.

4. If a "LOSS OF READY" error for any drive ever occurs, a system reset (IORESET) or powerup sequence must be performed in order for the drive to be recognized once again by the system.
5. If RDOS is ever built and executed from a diskette, this diskette should remain read/write; setting the write protect switch to READ ONLY may result in system errors.
6. The proper power on sequence is: Apply power to the drive enclosure first and then power up the computer.
7. To make a bootable copy of RDOS on a diskette perform the following:
 - Start with your RDOS on the hard drive with the enclosure "boot" switch set to "boot disk".
 - Run format, ZSDKINIT and INIT/F on the diskette (DZ2).
 - Do MOVE/V DZ2 from the hard drive root directory to put the RDOS files on the diskette.
 - Now boot device 27 and respond to *filename?* with
BOOT DZ2: SYSTEMNAME
 - Install the Bootstrap on DZ2 (diskette).
 - The diskette can now be booted by setting the enclosure "boot" switch to "boot floppy" and booting device 27.

Trouble-shooting

3.0 Introduction

The SKZ-2221 Subsystem is supported by ZETACO in the following ways:

- Field proven disk drives with 100,000 hours MTBF
- Microprocessor-based self-test of over 70% of the controller each time it is powered up, with an LED status report.
- Reliability and Diagnostic program on an ED diskette and/or a 1600 bpi tape for use during installation and trouble-shooting.
- Zetaco Authorized Distributors provide support for their customers.
- Customer Support Hotline, manned from 8:00 a.m. to 5:00 p.m. (Central Time) to answer your questions. (612-890-5135)
- 48-hour turn around on most factory repairs or replacement.
- Up to a two year warranty on workmanship and materials.

3.1 Power/Spin-up Problems

Problem:

The Disk Enclosure indicator lights show no activity when attempting a boot.

Solution:

1. Ensure the AC power cord is firmly seated in the power receptacle on the module.
2. Check the fuse. If replacement is necessary, use ONLY a 6 Amp Slo-Blo for 120 VAC.
3. Ensure the AC wall receptacle is "live."
4. Check that the red LED on the SCZ-2F is out.
5. Check that the data cable and terminator are attached properly.
6. Listen closely to the hard device to make sure it's spun up - which it should be once the computer is powered on.
7. Call the ZETACO Hotline, or your maintenance organization.

Problem:

The THERMAL LED on the front panel turns red.

Solution:

1. Turn the enclosure off and repeat the power-up sequence.
2. Call the ZETACO Hotline, or your maintenance organization.

3.2 Self-test

Self-test checks out 70% of all the internal functions of the controller board once for every time power is applied to the board. The test takes approximately 2 seconds to execute.

If self-test passed, the red LED will go out. If a failure was detected, the LED will blink a number of times which corresponds to the subtest that failed. Depressing the front panel IORESET switch will cause the LED to stay lit (no blinking) and self-test will loop on the error.

Table 3.1**Self-test Errors**

BLINK TEST CODE		POSSIBLE FAILURE
1	EPROM CHECKSUM	The data in the EPROM did not compare with expected check word. The data is the processor firmware.
2	SCRATCHPAD	Data read from RAM did not MEMORY compare with data written.
3	RAM TEST	Test patterns have determined that the buffer ram cannot support error free data handling.

3.3 Software Support Package

In addition to the diagnostic functions provided by the SCZ-2F Controller via on-board Self-test, ZETACO provides Reliability and Diagnostic software. The Software Support Package consists of these programs loaded on a 4 MB diskette or a 1600 bpi tape included with your subsystem.

Each of the programs on the Software Support Package has been written by ZETACO specifically for the SCZ-2F Controller. You should use this tape or diskette for loading Media Formatting, Disk Diagnostic and Reliability, and RDOS initializing. DATA GENERAL'S CORRESPONDING PROGRAMS MAY NOT WORK ON THIS CONTROLLER.

At several points during the installation procedure, you will find sample dialogue for the programs. In these samples, the lines that the computer prints will be entirely in **courier typeface**. The sample user responses will be on the next line below, indented. The CARRIAGE RETURN response will be designated by "<cr>". Comments and suggestions that do not appear in an actual session, and are here provided for clarification, will be in the normal typeface of this manual.

The Bootstrap Procedure for the Software Support Diskette and Tape are presented in Section 2.7.

*Using the
Software Support
Package Tape or
Diskette*

Each of the ZETACO programs on the software support package is a stand-alone program. This means that they do not need, and cannot have, an operating system running when they are executed. Even after the programs have been transferred to your disk, retain the Software Support Diskette and/or Tape in case of disk subsystem problems.

The following sequence of events is recommended by ZETACO upon receiving your SKZ-2221 subsystem. Each step is described in greater detail in the subsequent sections of this chapter.

1. Boot the Software Support Diskette or Tape. This requires that the controller switches be configured according to the information in Section 2.3.
2. Select SCZ2F - Format the Media.
3. Select SCZ2D - Disk Diagnostics.
4. Select SCZ2R - Disk Reliability.

NOTE: It is not essential that you run Diagnostics or Reliability, however, they will locate disk subsystem problems. It is better that this be checked out now rather than after you have loaded your data.

5. If the controller is to run in an RDOS system, now select ZSDKINT to initialize the disk.
6. You can load the programs from the diskette or tape any time after you have built your disk.

Disk Formatter

The Disk Formatter Program, is a program designed to format a drive. Formatting a disk is required to prepare the media with the necessary overhead information to accept user data.

The following is a sample dialogue:

```
Zetaco...SCZ-2 Disk Controller Formatter  
Rev. XX
```

```
Starting Addresses:
```

```
500-Formatter/Check Program  
502-Error Log Recovery  
503-Command String Interpreter
```

```
Enter Device Code [27]:
```

Set SWPAK as per "HELP" or hit <cr> to continue.

Start Time? - MON, DAY, YR HR, MIN

UNIT	TYPE	HDS	CYLS	SEC/TRK
0	0	2	90	32
2	1	20	1008	32

This is a list of all the ready units connected to the SCSI cable, and the parameters assigned to them. This information will look like this if an enclosure containing 1 hard drive and 1 floppy drive is cabled to the SCZ-2F controller and both drives are ready. Unit 0 is the boot device - in this case it's the floppy; Unit 2 is the hard drive that is the drive you will want to prepare for loading on the operating system.

Enter Unit Numbers (0,1,2,3) to run: 2

Enter the unit numbers of the drive(s) you wish to have formatted. The drive(s) will be formatted one at a time consecutively.

Unit: 2

Enter type of disk: 1

Enter the TYPE that is associated with the UNIT as listed above (same line that shows the parameters). Specify UNIT: and ENTER TYPE OF DISK: will repeat for each unit number that was declared in the ENTER UNIT NUMBERS TO RUN: statement.

FORMATTING UNIT 2,

The display will freeze right here until the entire drive has been formatted. Notice (if board edge is visible) that the green LED is on and the yellow is off. The amount of time it takes to format the hard drive (330 MB) is approximately 45 minutes.

FORMATTING DONE ON ALL UNITS, NOW DOING
SEEK EXERCISER.

The Seek Exerciser performs random seeks and reads of the header information of sectors on the tracks being seeked. This

portion of the test is not critical and may be aborted after a few minutes by entering a 'Control O' on the keyboard.

Disk Diagnostic

This Diagnostic program is provided to find failures that are related to the basic operations of the disk controller. The disk diagnostic program is designed to test the basic hardware functions of the controller board and the SCSI subsystem and to indentify or help isolate any possible hardware problems.

Boot the software diskette or tape and request SCZ2D.

The following is a sample dialogue:

```
...SCZ-2 DISK CONTROLLER DIAGNOSTIC
REV. XX

STARTING ADDRESSES:

200-DIAGNOSTIC (INITIALIZE)
201-DIRECT ODT ENTRY
202-RANDOM SEEK EXERCISERS
    SEEK EXER 1 IS A SINGLE DRIVE
    EXERCISER SEEK EXER
    2 IS A TWO DRIVE EXERCISER WITH SEEK
    OVERLAP
500-DIAGNOSTIC (RESTART)

DO YOU WANT HELP (Y/N) ? N
```

You may want to select Y if this is the first time you have entered the diagnostic program. The information available in the HELP section may be useful.

```
ENTER DEVICE CODE [27]: 27
```

Please enter the selected device code. Review the switch settings if necessary.

```
ENTER UNIT NUMBER (0,1,2,3) TO RUN: 2
```

```
SET SWPAK AS "HELP" OR ENTER RETURN (CR)
TO CONTINUE.
```

```
TESTING UNIT 2
```

Will list the tests being run.

•
•
•

UNIT	HDS	CYLS	SEC/TRK
0	2	90	32
2	20	1008	32

These are the units and characteristics found. Do you want to loop on reading them? Enter 1, otherwise enter Return <cr>.

Normally enter Return unless instructed otherwise, due to a problem with reading the selected characteristics from the controller.

•
•
•

Listing tests again.

```
See Diagnostic text at the end of the
manual for further details.
TEST(S) COMPLETE.
SEEK EXERCISER TESTS.
PASS
```

Diagnostic Error Description

When the diagnostic detects an error, it prints out the test number that failed along with what is wrong. Use the programs software SWPACK register to help determine whether or not the error is intermittent. This is done by hitting "3" on your keyboard, which prints out an error percentage.

If you answer "yes" to the question "'Do you want help?", you can get to the information that describes the meaning of the bits in the SWPACK register. Depressing the M key allows you to observe the contents of the register.

Disk Reliability

The Disk Reliability program is a maintenance program designed to exercise and test the disk subsystem. The program

will test from one to three drives. Boot the Disk Reliability Program from the Software Support Package Diskette or Tape by requesting SCZ2R.

Refer to "HELP" for invoking the command string interpreter.

The following is a sample dialogue:

ZETACO...SCZ-2 DISK RELIABILITY REV. XX

STARTING ADDRESSES:

500-RELIABILITY TEST
501-RELIABILITY TEST WITH OPTIONS
502-DISK ADDRESS TEST
503-COMMAND STRING INTERPRETER
504-ERROR COUNT/LOG RECOVERY
505-RUN ALL TESTS
506-SEEK EXERCISER
507-RANDOM SEEK EXERCISER
510-ENTER MULTIPLE DEVICE CODES

ENTER DEVICE CODE [27]: 27

STARTING ADDRESS = 505

SET SWPAK AS PER "HELP" OR HIT (CR) TO CONTINUE.

At this point enter a "CONTROL O."
"@ " will be displayed. Enter "500R" and continue

ARE MAPS TO BE EXERCISED (YES/NO)? YES

START TIME? - MON, DAY, YR HR, MIN

UNIT	TYPE	HDS	CYLS	SEC/TRK
0	0	2	90	32
2	1	20	1008	32

ENTER UNIT NUMBERS (0,1,2,3) TO RUN: 2

UNIT: 2

ENTER TYPE OF DISK: 1

TESTING UNIT 2

Pressing "W" on the keyboard will scroll up a list of data exchange and error information on the screen.

If you wish, you can also run Reliability on the floppy drive. To do this you must first boot the software support diskette and then remove it and replace it with a formatted ED diskette. When ENTER UNIT NUMBERS appears enter 0,2 to run both the floppy and hard drive.

*Reliability Error
Description*

Reliability errors are displayed when they are detected. The controller status will be displayed with the particular problem spelled out below the status.

Loss of Ready

This error indicates the disk unit was not ready when a command was issued. If this error occurs, Check that the disk unit is still powered up and the cabling is intact on the disk unit. Once this is done you must Reset the computer or perform a power-on sequence of the entire system.

*Data Errors and
Address Errors*

These may indicate bad media locations on the disks. If these should occur, reformat the disk. If they still occur after this, call Zetaco for assistance.

*ZSDKINIT -
RDOS Disk
Initializer*

(ZETACO's version of DKINIT, referred to as ZSDKINIT, is supplied on the Software Support Package under the name ZSDKINIT.SV)

Initializing a SKZ-2221 Model disk (or diskette):

Before you load any RDOS system onto a disk in this subsystem, you **must initialize the disk by running ZSDKINIT**. This is a stand-alone program that performs all the functions of Data General's DKINIT. Please refer to the Data General manual on loading an RDOS system for full details on the functionality of disk initialization.

Remember that only ZSDKINIT will work correctly for Model SCZ-2F controllers. If you are building your system from an RDOS release tape, do NOT run File #4 on the Data General tape after running ZSDKINIT. Data General's DKINIT cannot be run in expanded emulation on a SCZ-2F.

STEP 1 - LOADING

Loading from the Software Support Package:

Perform the steps described for booting the diskette or tape in Section 2.7.

Program displays:

FILENAME?

You respond:

ZSDKINIT

STEP 2 - DISK TYPE

Program displays:

DISK INITIALIZER - REV. NN.NN/with
ZETACO Disk Support - REV. 1

DISK DRIVE MODEL NUMBER?

You respond:

SCSI

NOTE:SCSI will instruct the initializer to read the drive characteristics that were selected by the configuration switches.

If the disk type is not valid,

Program displays:

ILLEGAL DISK TYPE

Step 2 will be repeated until your response is acceptable.

STEP 3 - DISK UNIT

Program displays:

DISK UNIT?

You respond:

DZx, where x indicates drive number: 0,
1, 2, 3

At this point you wish to initialize the hard drive at SCSI ID 0. With the switch on the drive enclosure set to "boot floppy", this hard drive is seen as DZ2. Therefore, enter DZ2.

A) If the disk unit is not valid,

Program displays:

ILLEGAL DISK UNIT DECLARATION

Step 3 will be repeated until your response is acceptable.

B) If the disk unit is valid,

Program displays:

# HEADS	# SEC/TRK	# CYLINDERS	
MGB/BLK			
20	32	1008	330*

* Megabytes if disk is >4000 blks;
blocks if disk is <4000 blocks.

These are the assigned parameters for the hard drive 94181-385H.

STEP 4 - COMMANDS AND SUBSEQUENT OUTPUT

The commands which can be selected are identical to those of DKINIT. From this point on, ZSDKINIT will perform exactly as DKINIT.

3.4 System Errors

If a system error occurs, refer to the User Manuals provided with the system to help determine what is wrong. For example, if a panic code is given, look up the code by referring to the Data General User's Manual. This information could help determine how to solve the problem.

Test Program to use if the System is Built but Problems have Arisen

This Section explains a test that can be done on a disk that has a system or system data on it without destroying that system or data. This provides an avenue for conditions requiring diagnostic testing, but where time does not permit the luxury of being able to rebuild a system.

This test requires that the Reliability program (SCZ2R) on the Software Support Package Diskette be loaded into system memory.

Answer the question "enter device code" with the correct information. Next, depress "Control O". An @ should be on the console.

To run the random seek test, enter a 501R after the prompt (@).

Now answer the questions the program asks, as in the normal reliability testing, with the exception of one question. When the question "SET SWPAK PER "HELP" OR HIT (CR) TO CONTINUE." is asked, enter an "8" one time. This puts the program in a Read Only mode and writes will not be done. Enter an "M" to verify that switch 8 is now on; if it is not, writes will be done, crashing the disk. The 501 Reliability will behave in the following manner:

A. Random Reliability Test (SA 501) with Options

The operator is given options on data patterns (from the command string data) and may choose a constant cylinder, head, sector or # of sectors. Any letter response to cyl, head, etc. gets random function for that variable. A carriage return only gets the random function for all variables.

The operator is also asked to respond to jitter option (YES/NO). If YES, a random delay (0-40,50MS) is inserted into the background loop to create a more asynchronous disk I/O loop.

3.5 Customer Support Hotline

ZETACO, Inc. provides a Customer Support Hotline (800-537-5292) to answer technical questions and to assist with installation and trouble-shooting problems.

The Hotline is manned by a technical team from 8:00 a.m. to 5:00 p.m. (Central Time) Monday through Friday.

Please review the General Installation Checklist on page 3-15 before calling the Hotline.

3.6 Warranty Information

ZETACO controllers are warranted free from manufacturing and material defects when used in a normal and proper manner for a period of up to two years from date of shipment. All drives and power supplies in ZETACO subsystems are warranted for 6 months from date of shipment. Except for the express warranties, stated above, ZETACO disclaims all warranties, including all implied warranties of merchantability and fitness. The stated express warranties are in lieu of all

obligations of liabilities on the part of ZETACO for damages, including but not limited to, special, indirect or consequential damages arising out of or in connection with the use or performance of ZETACO's products.

3.7 Product Return Authorization

When a controller malfunction has been confirmed using the tests outlined in Sections 3.1 to 3.4 above, the controller can be returned to ZETACO for warranty repair if the product has been damaged or for time-and-material repair if it is out of warranty. A Return Material Authorization (RMA) number is required before shipment and should be referenced on all packaging and correspondence.

To ensure prompt response, the information outlined in the Material Return Information form on the following page should be gathered before calling the ZETACO Hotline for the RMA number.

Please include a completed copy of the Material Return Information form with the product. Each product to be returned requires a separate RMA number and Material Return Information form.

To safeguard the controller during shipment, please use packaging that is adequate to protect it from physical and electrostatic damage. Mark the box "Delicate Instrument" and indicate the RMA number(s) on the shipping label.

GENERAL INSTALLATION CHECKLIST

CPU _____ Operating System and Rev. _____

Is board replacing a previously installed subsystem? _____

Device Code of New Product: _____ Any similar subsystem in the CPU? YES NO

If yes, then its Device Code: _____ Configuration Facts _____

Problem Description _____

Problem happens when (during Dump, Reliability, etc.)? _____

Intermittent or consistent problem? _____

Does self-test pass? _____

Priority of Board in CPU (Slot) _____

BMC Priorities of other BMC Devices (BMC Products Only) _____

Reviewed Interrupt and Priority Jumpers on Vacant Slots? _____

Tried Different Slot? _____

Cleaned gold-fingered contact points of board and reset board? _____

Did Zetaco-supplied software support diskette or tape "boot" correctly? _____

Is peripheral set to correct unit number, and is terminator in? _____

For peripheral disk drives, what is Sector Switch setting? _____

Double checked Pin 1 of cable to Pin 1 of controller, backplane and peripheral? _____

Result of Zetaco Reliability or Diagnostics: _____

MATERIAL RETURN INFORMATION

All possible effort to test a suspected malfunctioning controller should be made before returning the controller to Zetaco for repair. This will: 1) Determine if the board is actually defective. 2) Increase the speed and accuracy of a product's repair, which is often dependent upon a complete understanding of the user's checkout test results, problem characteristics, and the user system configuration. Test results for the SCZ-2F Controller should be obtained by performing the tests below. (Include error program counter numbers and accumulator contents if applicable). Use back of sheet if more space is needed.

FUNCTION	TEST	RESULT
Power-up	Self-test	_____
Controller	Diagnostics	_____
Subsystem	Reliability	_____

Other tests performed (system operation, errors, etc.):

Please allow our service department to do the best job possible by answering the following questions thoroughly and returning this information with the malfunctioning board.

1. Does the problem appear to be intermittent or heat sensitive? (If yes, explain).
2. Under which operating system are you running? Include revision number.
3. Describe the system configuration (i.e., peripherals, I/O controllers, model of computer).

To be filled out by CUSTOMER:

Model #: _____

Serial #: _____

RMA #: _____ (Call Zetaco to obtain an RMA number.)

Returned by:

Your name: _____

Firm: _____

Address: _____

Phone: _____

Appendices

Appendix A

Controller Configuration Options

SCZ-2F configuration is accomplished by three easy access DIP switches (piano key style). All three switches have eight positions. The switch positions are usually identified on the switch itself. If not, the positions are then counted left to right starting with position 1 and ending with position 8.

Switch Position			Throttle Count
6	7	8	# of Words/Req
down	down	down	1
down	down	up	2
down	up	down	4
down	up	up	8
up	down	down	16*
up	down	up	32
up	up	down	64
up	up	up	128

* Standard Setting. NOTE: UP=open DOWN=closed

DIP SWITCH 1 (Silk Screen Identified as SW1)

POSITION	OPTION	DEFINITION
1	not used	Switch should be DOWN.
2	DEFER	If switch is in DOWN position, actual SEEK will not take place until READ/WRITE command. Deferred SEEK is recommended. (DOWN position).
3	not used	Switch should be DOWN.
4	not used	Switch should be DOWN.
5	POLL MODE	Recognize multiple targets if UP, or recognize single target and multiple logical unit numbers if DOWN. <u>UP is required in all cases.</u>
6-8	THROTTLE	The three throttle setting switches for controlling the number of data channel words per request.

Throttle Burst Rate is defined as the (DCH) number of word transfers that take place over the Data Channel during a single bus access by the disk controller. Throttle adjustment is dependent upon the type of system configuration in which the controller is installed. Too low a throttle setting could result in slow disk performance and too high a setting could cause a data late on another DCH device. The controller may be set to burst rates of 1, 2, 4, 8, 16, 32, 64, and 128 words per access. A burst rate of 16 is recommended for most applications.

DIP SWITCH 2 (Silk Screen Identified as SW2)

POSITION	NAME	DEFINITION
1	INTLV	Sector interleave option. UP for interleave by 2. DOWN for no interleave. DOWN for most applications. (Available for Wrens only)
2	not used	Switches should be DOWN.
3-8	not used	Switches should be DOWN.

DIP SWITCH 3 (Silk Screen Identified as SW 3)

POSITION	NAME	DEFINITION
1	FMT NEW	Format new drive if DOWN; uses manufacturers defect list only. Verifies and uses grown list if UP. UP only if an older drive and soft or hard media errors are suspected when formatting a drive. (Available for Wrens only.)
2	RETRY	Report SCSI media related retries to the system if the switch is UP. This switch should be normally DOWN. It is only used during the reliability program if you wish to expose any media related soft errors.
3-8	DEV SEL	Device select code switches. Primary device code = 27 (octal), secondary device code = 67 ₈ .

CODE	3	4	5	6	7	8
27	up	down	up	down	down	down
67	down	down	up	down	down	down

For other selections, switch 3 is the most significant and 8 is the least. UP Switch = 0, DOWN Switch = 1.

If, at a later date, you wish to change the device code for the SKZ, you need not remove the board from the computer chassis. Simply set the switches accordingly and press RESET on the computer. The new device code will then be operative.

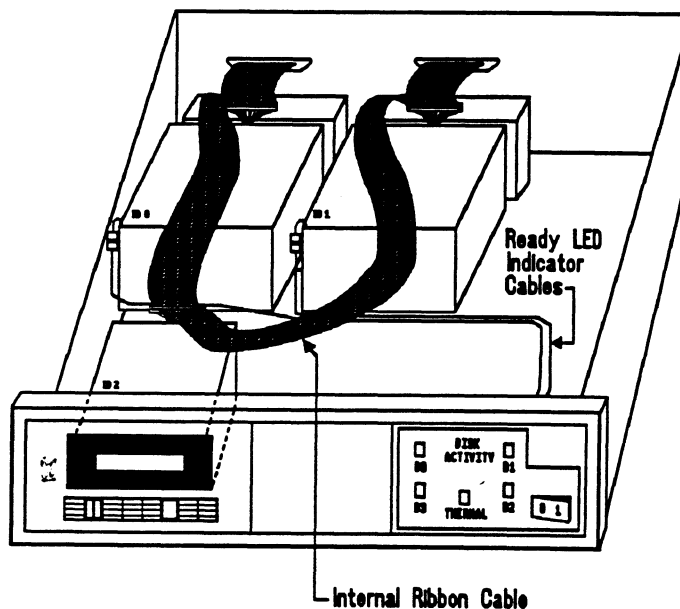
Appendix B

B.0 Adding Drives to Your SKZ-2221 Disk Subsystem

ZETACO has available two disk add-on kits for the SKZ-2221 Disk Subsystem. These are the SKZ-2301, which includes a 330 MB Wren hard drive and the SKZ-2309 consisting of a 3½-inch-extra-high-density (4 MB unformatted) floppy drive. Each kit includes the proper cabling and mounting hardware. See Figure B.1 for installation location.

Figure B.1

Upgrade Kit Installation



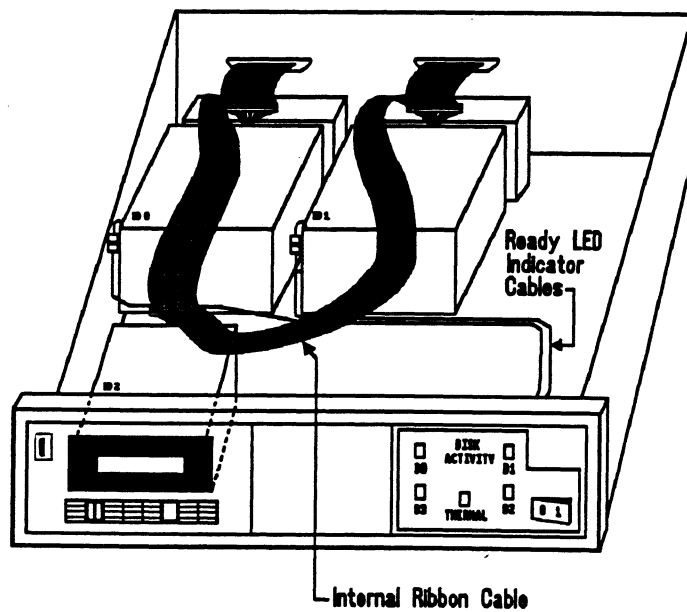
Appendix B

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Figure B.1

Upgrade Kit Installation



Install the disk drive kits as follows:

Step 1 Install the disk drive using the hardware provided.

- Remove an unused drive mounting plate from the drive enclosure and mount the new drive to the plate using the four screws provided.
- Slide the drive/plate combination into the base plate mounted in the enclosure and push it back until it snaps into place.

Step 2 Connect the Ready LED cable (applies only to Wren drive).

- Couple the connector located at the front of the drive to the mating connector in the vicinity of the drive that runs to the enclosure front panel.

Step 3 Connect the 4-inch interface cable.

- For a hard drive: Insert one end of the 4-inch cable into the mating connector at the rear of the drive.

NOTE - The connector on the 4-inch cable must be inserted with pin 1 up. (indicated by the small triangle)

- For a floppy drive: Insert one end of the 4-inch cable onto the mating header located at the rear of the floppy drive.

NOTE - Align the connector such that pin 1 (indicated by the small triangle), is adjacent to the six pin header.

- For both types of drives: Insert the opposite end of the 4-inch cable into the ribbon cable, making sure pins 1 of each connector lineup.

Step 4 Connect the DC power cable to the disk drive.

- The DC power connector is keyed and can only be inserted one way.

Step 5

- If the addon drive is a floppy, couple the mating connectors to connect the floppy SCSI ID header to the enclosure "boot floppy/boot disk" switch.



Please give us your comments.

Please use this form to send us your comments regarding this technical manual. Your input is greatly appreciated! Problems will be promptly addressed and action taken as necessary. If you wish a written reply, please furnish your name and mailing address. Thank you.

Date _____

Name _____ Title _____

Firm _____

Address _____

City/State/Zip _____

TECHNICAL MANUAL TITLE _____

DOCUMENT NUMBER _____ REVISION _____

ERRORS IN MANUAL:

SUGGESTIONS FOR IMPROVING EITHER THE MANUAL OR THE PRODUCT:
