Model SCZ-1

Disk Controller

Technical Manual

Document No: 600-0558-00
Revision: A
Date: April 1993

NOTICE

ZETACO, Inc. has prepared this Technical Manual for use by ZETACO personnel and its customers to assist in the installation, operation and maintenance of the Model SCZ-1 Disk Controller. The information contained herein is the property of ZETACO, Inc. and shall not be reproduced in whole nor in part without prior written approval of ZETACO, Inc.

ZETACO, Inc. makes every effort to produce quality products and documentation. However, the reader must be cautioned that changes may be made to the product not reflected in the supplied documentation. If you find errors or omissions, please notify ZETACO, Inc. ZETACO, Inc. shall not be responsible for any damages (including consequential) caused by reliance on this material as presented. If installation problems arise after you thoroughly review the manual, please contact the ZETACO Product Support Hotline at (612) 890-5138.

Copyright 1993, Zetaco, Inc. All rights reserved.
Zetaco is a division of Carlisle Systems Group Incorporated.

SCZ-1 and SCZ-HTD are trade names of Zetaco, Inc.

PREFACE

This manual contains information regarding installation, testing, and operation of the ZETACO Model SCZ-1 Disk Controller.

The technical contents have been written based on the assumptions that the reader 1) has a working knowledge of one of the applicable Data General mini-computers with associated AOS, or AOS/VS operating system; 2) is familiar with standard installation, power, grounding, and peripheral cabling procedures; and 3) has access to technical information describing the disk drive(s) to be installed with this controller. The information in this manual is organized into four major sections:

Chapter 1 - Product Overview
Describes the Model SCZ-1 Disk Controller features, capabilities, specifications, power and interface requirements.

Chapter 2 - Installation Procedures
Describes and illustrates procedures required to install the SCZ-1.

Chapter 3 - Trouble-shooting
Contains information useful in analyzing subsystem problems, and how to get help.

Chapter 4 - Usage Guidelines
Describes how various features and configuration are used and how they impact the performance of the controller.

Appendix A
Describes SCZ-HTD specific procedures required to install an SCZ-1 board with the HTD option.

TABLE OF CONTENTS

Chapter 1 - Product Overview

1.0 General Description 1-1
1.1 Specifications 1-1
Functional 1-1
Computer Interface 1-3
BMC Bus Cables 1-3
Disk Drive Interface 1-3
Mechanical 1-3
Power Requirements 1-3
Environmental 1-4

Chapter 2 - Installation
2.0 Unpacking and Inspection 2-1

2.1 Before You Begin 2-1
System Hardware Requirements 2-2
The Software Support Tape 2-2

2.2 Prepare the Computer Chassis 2-3
Slot Selection 2-3
Priority Selection 2-3

2.3 Prepare the Controller 2-3
BMC Bus Termination 2-3
Device Code Selection 2-4
EEPROM Write Disable 2-5

2.4 Install the Controller and Paddleboards 2-5
Paddleboard Installation 2-5
Internal Cabling for FCC-Compliant Chassis 2-6
External Cabling for FCC-Compliant Chassis 2-6
Non-Bulkhead Cabling 2-7
BMC Bus Cabling 2-7

Subsystem Grounding 2-8

2.5 Turn the System On 2-9

2.6 Boot the Software Tape 2-9

2.7 Configure the SCZ-1 2-10

2.8 Unit Number and Miscellaneous Preparation 2-11

2.9 Initialize the Disk 2-11

2.10 Run Reliability to Verify the Installation 2-15

2.11 Automatic Soft Error Logging 2-17

2.12 "GEN" in the New Device 2-17

2.13 Run DFMTR on the Subsystem 2-18

2.14 Store the Software Support Program on Your System Disk 2-18

2.15 AOS, AOS/VS On-Line Utilities 2-18

Chapter 3 - Trouble-shooting

3.0 Self-test 3-1
Errors During System Operation 3-2

3.1 Software Support Package 3-4

3.2 System Errors 3-6
Test Programs to Use if the System is Built but Problems Have Arisen 3-6

3.3 Reliability - Error Description 3-7

3.4 Formatter - Error Description 3-8

3.5 Customer Support Hotline 3-9

3.6 Warranty Information 3-10

3.7 Product Return Authorization 3-11

Chapter 4 - Controller Usage Guidelines

4.0 Controller Features Programmed by the Configurator 4-1
Configurator Aid (HELP) 4-1
Throttle Burst Rate 4-1
Disk Drives Supported 4-2
BMC Bus Priority 4-2
Break Count Interval 4-2
Controller SCSI II 4-3

Appendix A - SCZ-HTD Controller

A.0 Boot the Software Tape A-1

A.1 Configure the SCSI Disk Controller A-2

A.2 Unit Number and Miscellaneous Preparation A-3

A.3 Usage of Formatter, Initializer, and Reliability A-3

A.4 Analyze the Disk A-4

A.5 Run Reliability to Verify the Installation A-7

A.6 Initialize the Disk A-9

A.7 Run Reliability to Verify the Installation A-12

LIST OF ILLUSTRATIONS

Figure 2.1	Device Code Switches	2-4
Figure 2.2	Backplane Priority Jumpers	2-6
Figure 2.3	SCZ-1 Cabling Diagram	2-7
Figure 2.4	Subsystem Cabling	2-8

LIST OF TABLES

Table 3.1	HOST Module Error Codes	3-3
Table 3.2	SCSI Module Error Codes	3-4
Table 3.3	Operational Error Codes	3-4

1

Product Overview

1.0 General Description

The SCZ-1 Disk Controller is ZETACO's state-of-the-art bridge between DG's Eclipse and Eclipse/MV minicomputers, and high performance SCSI-Interfaced disk drives. It fully emulates DG's Argus Disk Subsystem Controller in AOS, and AOS/VS environments.

The SCZ-1 allows integration of SCSI Magnetic Disk Drives into systems where large storage capacity, small footprint, and high reliability are demanded.

The SCZ-1 has been implemented on a single 15" x 15" 10-layer printed circuit board, with a paddleboard to route signals to and from the disk drives. The SCZ-1 is compatible with FCC hardened chassis requirements, and interfaces DG's high speed bus, the Burst Multiplexor Channel (BMC).

1.1 Specifications

Functional

Drives per Controller:	Up to 7 SCSI targets.
Recording Format:	Media format is drive vendor unique.
Data Transfer Rate:	Up to 1.5 MB per second (Async.)

Maximum Capacity:	The theoretical maximum capacity supported by a single SCZ-1 is 67 gigabytes.
Device Code:	Switch selectable.
Interrupt Priority Mask Bit:	Bit 7
Bus Load:	1 unit load (any I/O slot).
Data Channel Interface:	Not supported.
Burst Multiplexor Channel Interface:	Less than 1 STTL load 64ma drive at 0.7v Supports selectability of any of the 8 priority requests Selectable burst rates of 1 to 256, 16 bit words/access. Selectable break count from 1 to 255 sync clock periods Maximum allowable BMC latency is 30ms (to achieve maximum performance, system overhead including BMC latency should not exceed one disk sector time). Support BMC transfer rates equal to the fastest available BMC computers.
Sector Data Field:	256 - 16 bit words per sector
Data Buffering:	Two 256-word BMC buffers in a ping-pong configuration
Memory Address:	21 bits
Indicator Lights:	RED (Right) Self-Test (HOST) RED (Left) Self-Test (SCSI) GREEN (Right) Controller Busy (HOST) GREEN (Left) SCSI Busy

Computer Interface

The SCZ-1 is designed to operate only with the BMC, in any I/O slot of an MV or Eclipse computer.

BMC Bus Cables

Two 40-conductor flat ribbon cables, with a single socket on one end and multiple sockets (for multiple controllers), are required for BMC operation.

Disk Drive Interface

Functional: SCSI Interface single-ended Asynchronous

Cabling: CHASSIS WITH BULKHEAD

INTERNAL: Optional 50-conductor flat ribbon cable with D connector on one end that mounts in the computer EMI/RFI backpanel. The other end plugs into the A paddleboard. See Figure 2.4.

NON-BULKHEAD CHASSIS

EXTERNAL: Contact ZETACO with your cabling requirements.

NOTE: The maximum cumulative length allowable for external cables is 18 feet, for single-ended interface.

Mechanical

Dimensions: 15" x 15" x 1/2"

Shipping Weight: 10 pounds - includes controller, paddleboards, cables (if ordered), software tape and documentation.

Paddleboard: "A" paddleboard: Passive backplane paddleboard with one 50-pin cable connector. ("A" backplane)

Power Requirements

+5 (+/- 5%) Volts DC @ 6.5 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/MV temperature and humidity specifications.

2

INSTALLATION

2.0 Unpacking and Inspection

Upon receipt of the Model SCZ-1 from the carrier, inspect the shipping carton immediately for any evidence of damage or mishandling in transit.

If the shipping carton is 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 carton is opened.

ZETACO's warranty does not cover shipping damage. For repair or replacement of any ZETACO product damaged in shipment, call ZETACO, Inc. to obtain return authorization instructions.

2.1 Before You Begin

This section contains the procedures necessary for proper installation of the SCZ-1 Disk Controller. We recommend that you read through it once in its entirety before you start the actual installation process.

The following subsections, beginning with 2.3, are in order of execution. Subsections 2.3 through 2.8 involve preparation and installation of the hardware components. Subsections 2.9 through 2.12 describe the programs used to complete the installation. These programs are on the Software Support Tape, the 1/2" magnetic tape reel shipped with the SCZ-1.

System Hardware Requirements

- Eclipse or MV Family CPU with minimum 32K words memory.
- Magnetic Tape Subsystem
- SCZ-1 Controller Board(s)
- Disk Drive(s)
- Console at Device 10/11
- Printer at Device 17, in order to log errors and print a copy of your configuration facts (optional).

You should have complete hardware documentation for your computer and disk drive available for reference during the installation.

The Software Support Tape

Each of the programs on the Software Support Tape has been written by ZETACO specifically for the SCZ-1 controller. Use this tape for configuring the controller, Media Formatting, Disk Diagnostic and Reliability, and installation of controller microcode onto the disk. DG's CORRESPONDING PROGRAMS MAY NOT WORK ON THIS CONTROLLER. Also note that the SCZ-1 does NOT support MVSYSTEMX.

The Software Support Tape is structured so that the programs on Files 2 through 4 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 loaded into the system. The boot procedure is detailed in Section 2.8.

At several points in the installation procedure you will find sample dialogues for the programs. In these samples, the lines that the computer prints will be entirely in upper case letters. The CARRIAGE RETURN/ response will be designated by '<cr>'. Comments and suggestions, which do not appear in an actual session and are provided here for clarification, will be proceeded and followed by the characters '**'.

2.2 Prepare The Computer Chassis

Before installing the SCZ-1, the computer chassis must be prepared. To do so, choose an available I/O slot and establish the correct priority.

Slot Selection

The SCZ-1 may be installed in any "I/O" slot. Consult the hardware manual for your particular computer to identify the appropriate available 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 SCZ-1 and the processor, or between the SCZ-1 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 In (Pin A96). See Figure 2.2.

2.3 Prepare The Controller

To prepare the controller for installation you will need to establish proper BMC bus termination and select the Device Code.

BMC Bus Termination

If there is more than one BMC device daisy-chained on the BMC bus, then the BMC controller at the end of the bus must have the bus terminators installed. If the SCZ-1 is to be installed as the last (or only) BMC controller, then make sure the bus terminator is installed in the middle cable header on the front edge of the SCZ-1.

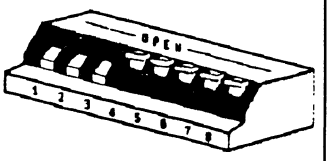
NOTE: The SCZ-1 is shipped from the factory with the terminator installed unless otherwise specified.

Device Code Selection

The standard Primary device code for the SCZ-1 is 24 octal; the Secondary is 64 octal. However, any DG device code can be selected, as long as there is not already a controller in the system with that device code.

There is a set of Device Code switches on the edge of the board that allow you to easily set the device code. Switches 3 through 8 specify device code. Switches 1 and 2 are reserved and should be placed in the "DOWN" position. Refer to Figure 2.1 for proper selection.

If, at a later date, you wish to change the device code for the SCZ-1, 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.



Note

Switch Down = Binary 1
Switch Up = Binary 0
Switch 3 = Most Significant Bit
Device Code = 40_8 is Shown
Switch 2 = E^2PROM Write Disable (DOWN)

Device Code	S1 Over-ride	S2 E^2PROM WRITE DISABLE	S3 DS0	S4 DS1	S5 DS2	S6 DS3	S7 DS4	S8 DS5
0X			UP	UP	UP			
1X			UP	UP	DOWN			
2X			UP	DOWN	UP			
3X			UP	DOWN	DOWN			
4X			DOWN	UP	UP			
5X			DOWN	UP	DOWN			
6X			DOWN	DOWN	UP			
7X			DOWN	DOWN	DOWN			
X0						UP	UP	UP
X1						UP	UP	DOWN
X2						UP	DOWN	UP
X3						UP	DOWN	DOWN
X4						DOWN	UP	UP
X5						DOWN	UP	DOWN
X6						DOWN	DOWN	UP
X7						DOWN	DOWN	DOWN

Figure 2.1
Device Code Switches

EEPROM Write Disable

Switch position 2 (see Figure 2.1) is used to disable wirting of the EEPROMS. This switch, when in the down (closed) position, disables writing while the up (open) position allows writing. To configure the controller, this switch must be in the up position. It is recommended that the switch be closed at all other times to prevent accidental writing to the EEPROMS.

2.4 Install The Controller And Paddleboards

First, pull the lock tabs on the two front corners of the board out as far as they will go. Next, carefully guide the Controller board into the I/O 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.

Paddleboard Installation

The computer backplane, viewed from the rear, has the "A" side pins on the left. On computers with vertically mounted controller boards, think of the component side of the boards as up, then the "A" side pins are on the left.

Locate the two rows of pins on the "A" side of the backplane for the slot containing the SCZ-1 Controller. Ensure that no pins are bent. Position the "A" paddleboard over the "A" backplane pins (29-100), with the header connectors facing up. Press the connector securely over the pins, making sure all pins insert and do not bend, until the guide block is flush with the backplane.

CAUTION: Component damage may occur if paddleboard is mis-aligned. Make sure the block is not shifted right or left by checking for non-inserted pins on both ends. Double check 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.

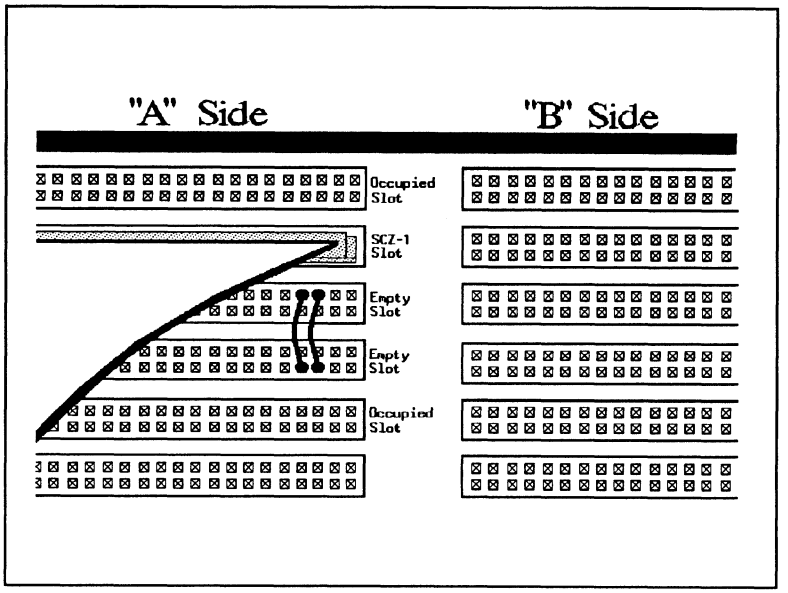


Figure 2.2
Backplane Priority Jumpers

Internal Cabling For FCC-Compliant Chassis

The internal cable is a flat 50-conductor cable terminated on one end with a socket connector and on the other with a "D" connector. As shown in Figure 2.3, the socket connector end plugs into the "A" paddleboard. The other end o this cable (D connector) mounts on the computer backpanel.

To mount the "D" connectors to the backpanel, first remove the covers from the desired mounting holes, and the hex bolts, washers, and nuts from the connectors. Then, insert the connector into the hole in the backpanel from the inside, insert the hex bolts from the outside, and secure the connector to the backpanel.

External Cabling For FCC-Compliant Chassis

Contact ZETACO with your external bulkhead-to-disk drive cabling requirements.

Non-Bulkhead Cabling

Contact ZETACO with your non-bulkhead paddleboard-to-disk drive requirements.

BMC Bus Cabling

The two BMC bus cables provided have a single 40-pin connector on one end and a group of connectors on the other end.

This cable daisy-chains from the computer's BMC interface to the multiple BMC peripheral controllers. The controller at the end of the chain must have it's BMC terminators installed, the others must have them removed. Refer to Section 2.3 for BMC terminator installation. Install the BMC bus cables as shown in Figure 2.3 by plugging the single-plug end of the cables into the DG BMC board, and the multiple-plug end of the cables into the SCZ-1 and other BMC peripheral controllers.

The standard Zetaco BMC bus cables have 4 connectors to access BMC devices; cables with 6 and 8 connectors are also available.

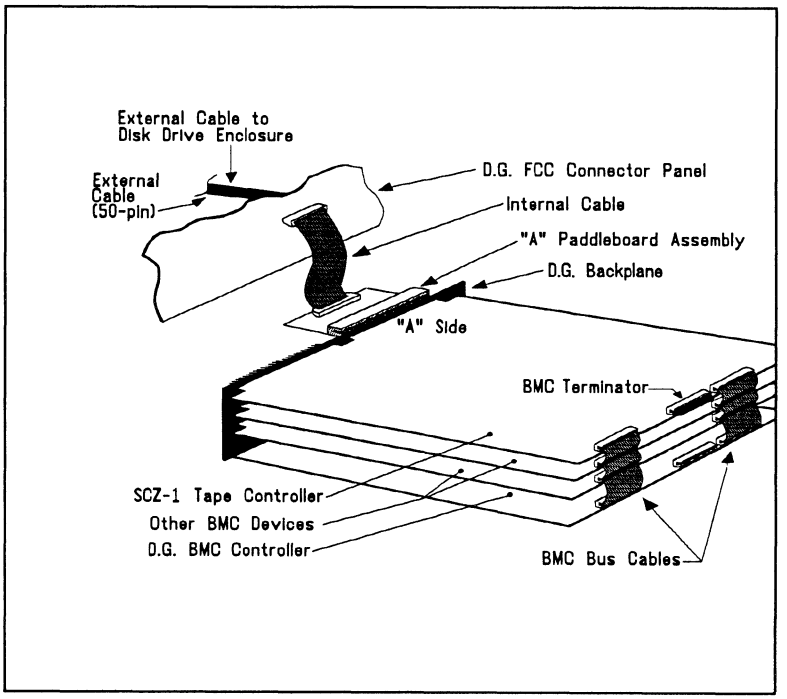


Figure 2.3
SCZ-1 Cabling Diagram

Subsystem Grounding

Because the AC power system safety ground does not necessarily satisfy all system grounding requirements, additional connections are required to earth ground, referred to as system ground. The Controller and its attached drive(s) must be connected to a single point ground system. Ground connections are made via ground braids (5/8" minimum flat braid) that pass from enclosure to enclosure, enclosure to computer chassis and computer chassis to earth ground. Refer to Figure 2.4.

WARNING: To ensure proper ground return to earth, each component in the system must be connected using a daisy-chain ground system. The AC and DC grounds within each drive may need to be joined (consult your drive manual). The drives must then be joined by a daisy-chain grounding braid and connected to the grounding post at the rear of the computer cabinet.

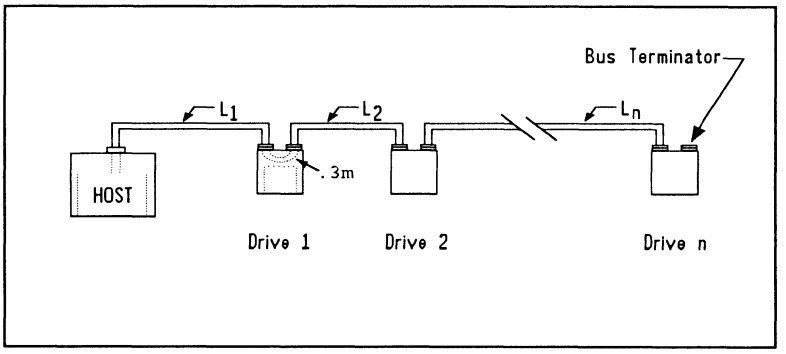


Figure 2.4
Subsystem Cabling

2.5 Turn The System On

To find out the basic status of the controller upon power-up, observe the four LEDs at the front edge of the board. Their meanings from right to left are as follows:

RED	SCSI SLFTS - Indicates SCSI microprocessor is executing Self-test.
GREEN	SCSI BUSY - Indicates the SCSI microprocessor is busy executing a disk command.
YELLOW	Not Used.
RED	HOST SLFTST - Indicates Host Processor is executing Self-test Diagnostics.
GREEN	HOST BUSY - This LED indicates the Host is executing one of the READ/WRITE commands.

Self-test takes one second to complete. At that point the red LED should turn OFF and remain off. If it does not, or if it blinks, this indicates a Self-test failure. See Section 3.0 for assistance.

The green LED should be OFF, since no READ/WRITE activity will have been initiated immediately after power-up.

If you have an SCZ-HTD, proceed to Appendix A.

2.6 Boot The Software Tape

If you are using an MV class machine, you must load the MV's microcode before booting the software support tape.

The bootstrap procedure for the software support tape is as follows:

1. Mount the software support tape on the drive and put it "On-Line". Be sure that the BPI setting matches that specified on the tape label.

2. Program Load. Boot the tape in your normal fashion.

3. The software support package menu will be displayed:

```
FILE #      PROGRAM

2           SCZ-1 CONFIGURATOR
3           SCZ-1 INITIALIZER
4           SCZ-1 RELIABILITY
5           ".SV & .LS" Files in AOS DUMP
            Format

File Number?
```

You should enter the number of the program you wish to execute.
At this point of the installation procedure, enter:

2 <cr>

to load the Configurator Program.

2.7 Configure The SCZ-1

After the Configurator Program has loaded, the following message will appear on your computer screen:

```
CFSCZ1-CONFIGURATOR FOR SCZ-1 CONTROLLER
          PRODUCT OF ZETACO
```

The purpose of the configurator program is to allow you to tailor the SCZ-1 Controller to your particular environment. The SCZ-1 Controller includes an electrically erasable PROM (EEPROM) that contains certain facts. This program lets you list the current facts, modify those that you want changed, and record the new facts onto the EEPROM.

The help command on the main menu provides information both on what to do and how to do it. If this is the first time you have run this program, you might want to start by selecting Help.

You can get an explanation of any question the program asks by responding to that question with an "H".

```
WHAT IS THE PRESENT SETTING OF THE DEVICE CODE
(IN OCTAL)?
```

```
24

ENTER COMMAND (? TO SEE CHOICES):
```

**We have responded to the question about the device code of the controller with the primary device code. The program returned with a prompt for a Configurator command. This indicates that the system has successfully communicated with the controller at that device code, and the controller is ready to be configured.

If the system had not returned with any prompt, that would have indicated that the system was unable to contact the controller at that device code. In such cases, turn the computer off and double-check all of the proceeding installation steps. If, after doing so, you still have problems, contact ZETACO's Customer Support Hotline. See Section 3.6.**

In addition to configuring disk drive parameters, the Configurator tailors BMC parameters and the Controller SCSI Address to your specific needs. See Section 4.0 for Configurator Usage Guidelines.

2.8 Unit Number and Miscellaneous Preparation

Set the drive(s) to the desired unit number(s). This is usually done via jumpers in the drive. For two or more drives, unit numbers assigned are usually consecutive, with unit "0" being the primary unit.

2.9 Initialize The Disk

The Initializer Program (File #3) consists of five modules:

1. ANALYZE DISK
2. RELOCATE BLOCKS
3. MICROCODE INSTALL ONLY
4. FORMAT ONLY
5. ZDKINIT ONLY

In the opening menu there are selections to enter and start the devices. You will need to select the [E]nter device selection and then you will be given the menu listing the above choices.

We recommend at this point that you run the Initialize module. This will format the disk, write out the microcode, and write out an empty bad block map for the microcode to use. Run Reliability (see Section 2.10, below) to verify that the media has been formatted and the subsystem is operational.

The following sample dialogue will guide you through this procedure.

To analyze the disk, boot the software support tape and load file #3. The sample dialogue below will guide you through the Analyze module of the Initializer Program.

```
        SCZ1 DISK INITIALIZER
        REV. X.XX
        COPYRIGHT 19XX, ZETACO, INC.

        COMMAND LIST

[E]NTER A DEVICE        [D]ELETE A DEVICE
[S]TART A DEVICE        [H]ALT A DEVICE
[R]ESTART THE PROGRAM   [L]IST ERROR TOTALS
[C]OMMAND LIST          [P]RINTER CONTROL
[B]SOFTWARE DEBUGGER    [F]LAGS
[M]ODE OF DISPLAY       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  E
```

We wish to enter the device that we want to format, so we type E.

```
ENTER THE DEVICE CODE [24]:   <cr>
```

24 is the primary device code. If you have your controller set up for the secondary device code of 64, you would enter that number here.

```
START INITIALIZATION OF CONTROLLER
CONTROLLER MICROCODE REV: X.XX
END INITIALIZATION OF CONTROLLER
```

This is just telling you that the program is loading microcode onto the SCZ-1, and what the revision number is.

```
UNIT 0. IS READY; SELECT (YES, [NO]):  YES
```

The Initializer Program has looked at the SCZ-1 and found that Unit 0 is ready. It then asks you if you want to use Unit 0. If you do then you would type YES. If not, then type <cr> and the Initializer Program would go on to the next ready unit.

```
COMMAND CHOICES

[A]NALYZE DISK (ANALYZE,ZDKINIT,INST UCODE,INIT
               SOFT LOG
[R]ELOCATE BLOCKS
[M]ICROCODE INSTALL ONLY
[F]ORMAT ONLY
[Z]DKINIT ONLY (For RDOS, when supported.)

ENTER YOUR SELECTION [A]:  A
```

At this time we wish to Analyze the disk so we can run the Reliability Program and verify that the subsystem is operational.

```
FORMAT ([YES], NO)  YES
```

You should select to Format.

```
RETAIN ANY PREVIOUSLY RELOCATED SECTORS?  IF YOU DO
NOT RETAIN THE PREVIOUSLY RELOCATED SECTORS, IT IS
RECOMMENDED THAT A FULL FIVE PATTERN ANALYSIS BE DONE
IN ORDER TO RELOCATE ALL THE BAD SECTORS THAT WERE
PREVIOUSLY BEING HANDLED ([YES], NO):  YES
```

You'll usually want to retain previous lists on formatting.

```
THE DATA PATTERNS LISTED BELOW ARE USED IN THE ORDER
LISTED.

AAAA  2525  5555  1F1F  FFFF
0000  F6F6  5252  F1F1  6F6F

ENTER THE NUMBER OF PATTERNS TO RUN [5]:  <cr>
```

Use the default.

```
UNIT 0. IS SELECTED
UNIT 1. IS NOT READY
UNIT 2. IS NOT READY
UNIT 3. IS NOT READY

**** NOTE **** YOU MUST ENTER [S]TART IN ORDER TO HAVE
THE SELECTED OPERATIONS ACTUALLY TAKE PLACE.
```

```
                    SCZ1 DISK INITIALIZER
                         REV. X.XX

                  COPYRIGHT 19XX, ZETACO, INC.

      COMMAND LIST

      [E]NTER A DEVICE        [D]ELETE A DEVICE
      [S]TART A DEVICE        [H]ALT A DEVICE
      [R]ESTART THE PROGRAM   [L]IST ERROR TOTALS
      [C]OMMAND LIST          [P]RINTER CONTROL
      [B]SOFTWARE DEBUGGER    [F]LAGS
      [M]ODE OF DISPLAY       [Q]UIT


ENTER A COMMAND SELECTION (C=CMD LIST):  S

START ALL ENTERED DEVICES ([YES], NO):     <cr>
```

This will start the program analyzing. Now you may enter other commands such as [L]IST.

```
                    SCZ1 DISK INITIALIZER
                         REV. X.XX

                  COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

      [E]NTER A DEVICE        [D]ELETE A DEVICE
      [S]TART A DEVICE        [H]ALT A DEVICE
      [R]ESTART THE PROGRAM   [L]IST ERROR TOTALS
      [C]OMMAND LIST          [P]RINTER CONTROL
      [B]SOFTWARE DEBUGGER    [F]LAGS
      [M]ODE OF DISPLAY       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  L
```

As the initializing moves along, you may want to see if it is still active. Use of the L command will show you the current state of each of the devices being initialized.

```
RUN TIME 0. HRS.  20. MINS.  3. SECS.
DEVICE CODE 24  UNIT NUMBER 0.  STATE: **ACTIVE**
MODES: - FORMAT - ANALYZE - INSTL UCODE - INSTL MAP
```

This tells us that we are formatting and analyzing.

```
RUN TIME 0. HRS.  40. MINS.  3. SECS.
DEVICE CODE 24 UNIT NUMBER 0. DEVICE STATE: **ACTIVE**
MODES: - FORMAT - ANALYZE - INSTL UCODE - INSTL MAP
THIS UNIT IS COMPLETE WITH ITS ASSIGNED TASKS.
```

When this message is printed, the program has finished with the unit, and you may now enter the [Q]UIT key.

2.10 Run Reliability To Verify The Installation

At this point, run Reliability for several minutes, just to verify that the subsystem is operating after the initial format. To do so, boot the software support tape and load file #4.

The Reliability Program consists of two basic modules. The first is the Random RELI. In this module, the disk transfer addresses and size are selected at random. The data type will be selected by the user, but if ALL PATTERNS is selected, the pattern will be selected at random as well. In random RELI sixteen device control blocks will be active and distributed randomly between the devices that are currently active.

```
SCZ1 RELIABILITY UTILITY

ENABLE MAPPING (YES, [NO]):  <cr>

EXECUTION MODE:
[R]ANDOM RELIABILITY     [S]EQUENTIAL RELIABILITY

ENTER YOUR CHOICE [R]:  <cr>
```

This question refers to the order in which the disk will be accessed for all of the devices tested in the Reliability. We will choose the default, "R".

```
SCZ1 RELIABILITY UTILITY
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[B]SOFTWARE DEBUGGER      [F]LAGS
[M]ODE OF DISPLAY         [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST): E

ENTER THE DEVICE CODE [24]:  <cr>
```

24 is the primary device code. If you have your controller set up for the secondary device code of 64, you would enter that number here.

```
      START INITIALIZATION OF CONTROLLER
      CONTROLLER MICROCODE REV:  X.XX
      END INITIALIZATION OF CONTROLLER
```

This is just telling you that the Reliability Program is loading the microcode onto the SCZ-1 from the disk. The revision number is also displayed.

```
      UNIT 0. IS READY; SELECT (YES,[NO]):  <cr>
```

The Reliability Program has looked at the SCZ-1 and found that UNIT 0 is ready. It then asks you if you want to use UNIT 0. If you do then you would type "YES". If you do not, then type <cr> and the Program will go on to the next ready unit.

```
      THE DISK SIZE IS XXX. MB
      WRITE ONLY (YES, [NO]):  <cr>
      READ ONLY (YES, [NO]):  <cr>
      VERIFY DATA ([YES], NO):  <cr>
      SELECT DATA TYPE:

0 - LOGICAL BLOCK ADDRESS     1 - FLOATING ZERO
2 - FLOATING ONE              3 - ALTERNATE ZEROS
4 - ALTERNATE ONES (125252)   5 - ALL ZEROS
6 - ALL ONES                  7 - RANDOM
8 - ROTATING (125252)         9 - DO ALL PATTERNS

SELECT DATA TYPE [0.]:  <cr>


UNIT 0. IS SELECTED
UNIT 1. IS NOT READY
UNIT 2. IS NOT READY
UNIT 3. IS NOT READY

      SCZ1 RELIABILITY UTILITY
      REV. X.XX

      COPYRIGHT 19XX, ZETACO, INC.

      COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[Q]UIT

ENTER A COMMAND CHOICE (C=CMD LIST):  S
START ALL ENTERED DEVICES ([YES],NO):  <cr>
```

At this point you are finished Entering your device and have commanded the program to start running. The green LEDs on the front of the controller board should now be ON (they are actually flashing very rapidly), signifying that the controller is active. You may at any time initiate another command from the list simply by typing its letter.

```
      L

RUN TIME 0. HRS. 20. MIN. 3. SECS.
DEVICE CODE 24 UNIT NUMBER 0. MAPPING NOT ENABLED
DEVICE STATE:
MODES:  RANDOM, R/W, DATA CHECK-ADDRESS
# SECTORS WRITTEN   451.   # OF SECTORS READ  451.
TOTAL ERRORS :   0.

ENTER A COMMAND SELECTION (C=CMD LIST):
```

We selected List to get a printout of the system's activity. In this case, there are no errors logged. If you select List again, you should see that the number of sectors written and read has increased; this confirms that the subsystem is operational. Data compare errors will require further trouble-shooting. For trouble-shooting help, see Section 3.0. We recommend that you run this for at least five minutes.

2.11 Automatic Soft Error Logging

The SCZ-1 will log certain soft errors, and can log up to 80 erroring blocks per unit.

These logged blocks can, at a convenient time for the user, be relocated on the disk drive. To do this, the user must run the SCZ-1 Initializer and choose the "R" option for Relocating Blocks. The Initializer will then READ the blocks that were logged and relocate them on the disk drive.

2.12 "GEN" In The New Device

Before going on-line, you must introduce the new device into your operating system configuration. To do this, start up your operating system and run the AOSGEN program (or VSGEN for AOS/VS). Specify the device name as "DPJx", where x is the number of the device. At the device code of 24, this number can be 0 (for Unit 0 at that device code) through 3 (for Unit 3 at that device code).

If you need assistance running the GEN programs, consult your system management documentation.

2.13 Run DFMTR On The Subsystem

When you run DFMTR, the program will ask you whether you want to do a Surface Analysis. You must answer NO to this question.

2.14 Store The Software Support Programs On Your System Disk

The Software Support tape contains a file that, in turn, contains the Configurator, Initializer, and Reliability programs in .SV file format. This is the standard system DUMP format for AOS and AOS/VS.

Once your basic system has been built, you can load this file onto your disk for quick access.

To load files from File 5, use the standard CLI command for loading from tape.

```
AOS:
SUPERUSER ON
DIR:
LOAD/R/V @MTAO:5
REW 2MTAO
SUPERUSER OFF

AOS/VS:
SUPERUSER ON
DIR:
LOAD/R/V @MTCO:5
REW @MTCO
SUPERUSER OFF
```

NOTE: Although you now have your utility programs saved on disk, it is important to retain the Software Support tape. This contains your only copy of the controller microcode.

2.15 AOS, AOS/VS On-Line Utilities

After following the procedure in Section 2.14, two directories will be loaded onto your disk. These are called AOS and AOS/VS. Delete the one that does not pertain to your system. DIR into the one you have kept. Inside you will find the PR

files. SCZORI.PR is an install program for the SCZOR.PR Program.

This program will allow examination of the soft error log from your disks. In order to use them, you must first run the installation program. This program will create a file called SCZORL.TX, which will contain all of the legal disk names for use in the display program (SCZOR.PR). Type X SCZORI.

Enter all the DPJ devide names that are SCZ1 devices.

NOTE: They must contain microcode from 400-472-00 A or later.

Enter a <cr> when you are finished. Now type X SCZOR. Enter the DPJ name that you want to examine. The program will only allow the names that were entered in with the install program (SCZORI.PR).

This program can be run at any time on any SCZ-1 disk that is running microcode REV. 3.00 or later.

NOTE: It is important not to enter any DG Argus device in the install program. Running the display program can crash the system if run on an Argus device.

3

Trouble-shooting

The SCZ-1 is supported by ZETACO in the following ways:

- Microprocessor-based Self-test of over 90% of the board each time it is powered up, with an LED status report.

- Reliability Program on 9-track tape for use during installation and trouble-shooting.

Zetaco provides support through authorized distributers with:

- Quick turnaround for factory repair/replacement.

- warranties on workmanship and materials.

3.0 Self-Test

Self-test checks out 90% of all the internal functions of the Controller once every time power is applied. Self-Test is actually composed of 2 independent modules, each of which is associated with an LED on the front of the board. The LEDs are grouped (three on the left, two on the right) according to which "side" of the board they are reporting on.

SCSI Module	Red LED (Left)
HOST Module	Red LED (Right)

The entire test takes approximately 2 seconds to execute. Once Self-Test has passed, all LEDs will go out.

If a failure is detected in either the SCSI or HOST module, one or both red LEDs will flash a repeating numerical series; the

number of flashes in the series corresponds to the specific subtest that failed. Tables 3.1 and 3.2 identify the subtests for the SCSI and HOST modules.

Both red LEDs remain steadily lit.

1. **Turn off the computer**, remove the Controller, and re-install it. Be sure it is firmly seated in the backplane connectors.

2. **Turn off the computer**, remove the Controller, and install it in a different slot. To do so, you will need to rearrange your priority jumpers. See Section 2.2.

3. Call your maintenance organization.

Either or both red LEDs flash an error code.

1. **Turn off your computer**, clean the gold fingers on the edge connector, and re-install the controller.

2. Record the error code and call the Zetaco Hotline, or your maintenance organization.

Errors During System Operation

When an error is displayed during system operation, write down the message that appears on the screen. If either red LED is flashing an error code, make note of it and look at Table 3.1, 3.2, or 3.3 to determine which self-test is failing. Then contact your Maintenance Organization.

Table 3.1 **HOST Module Error Codes**

CODE	TEST
1	RAM Test
2	Hi-speed buffer 1
3	Hi-speed buffer 2
4	Done
5	Burst counter
6	Break counter
7	BMC CB test
8	Sector transfer simulation
9	EEPROM checksum
10	Dual port RAM
11	Reserved
12	Reserved
13	Reserved
14	Error condition

Table 3.2 **SCSI Module Error Codes**

CODE	TEST
1	Reserved
2	Dynamic RAM Test
3	BMC Data buffer
4	Dual port RAM
5	5380 SCSI IC
6	Dynamic RAM parity
7	Not used
8	Not used

Table 3.3 **Operational Error Codes**

CODE	ERROR
9	BMC data buffer parity error
10	Dynamic RAM parity
11	Illegal interrupt from HOST side

3.1 Software Support Package

In addition to the diagnostic functions provided by the SCZ-1 Controller via on-board Self-test, ZETACO provides Reliability and Utility software. The Software Support Package on a magnetic tape included with the controller contains these programs.

Each of the programs on the Software Support Tape has been written by ZETACO specifically for the SCZ-1 Controller. You should use this tape for loading controller Microcode, Media Formatting, Disk Diagnostic and Reliability, and Configuration of the Controller. DG's CORRESPONDING PROGRAMS MAY NOT WORK ON THIS CONTROLLER. Also note that the SCZ-1 does not support MVSYSTEMX.

The Software Support Package tape is structured so that the programs on Files 2 through 4 on the SCZ-1 and 2 through 6 on the SCZ-HTD 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 loaded into the system. The boot procedure is detailed in Section 2.6.

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 upper case letters. 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 proceeded and followed by the characters "**".

If you are using an MV class machine, you must load the MV's microcode before booting the software support tape.

The Bootstrap Procedure for the software support tape is:

1. Mount the Software Support tape on the drive and put in on-line. Be sure that the BPI setting matches that specified on the tape label.

2. Boot the tape in your normal fashion.

3. The Software Support Package menu will be displayed:

3a.
```
FILE #              PROGRAM

2                   SCZ-1 Configurator
3                   SCZ-1 Formatter
4                   SCZ-1 Reliability
5                   ".SV & .LS" Files in AOS
                    DUMP Format

File Number?
```

3b.
```
FILE #              PROGRAM

2                   SCZHTD Configurator
3                   SCZHTD Diagnostic
3                   SCZHTD Formatter
5                   SCZHTD Initializer
4                   SCZHTD Reliability
5                   ".SV & .LS" Files in
                    RDOS DUMP format
```

```
6                ".SV & .LS" Files in AOS
                 DUMP Format

File Number?
```

Enter the file number of the program you wish to execute.

3.2 System Errors

If a system error occurs, refer to the DG User's Manual 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 DG User's Manual. This information should help determine how to solve the problem. Next, try to execute a similar function and see if the same results are obtained. If a BURST or a COPY is not working, try a DUMP. This could add vital information about the problem.

Test Programs 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 for rebuilding the system.

This test requires that the Reliability program on the Software Support Package tape be loaded into system memory.

Go through the enter procedure as you would normally, except when it asks you "READ ONLY (YES,[NO]):" answer YES. Then when it asks you "VERIFY DATA ([YES],NO):" answer NO. Now start RELI with the S Command.

This will test the controller's ability to seek, read data from the disk and transfer data on the BMC without destroying the data on the disk.

3.3 Reliability - Error Description

If Self-test was successful but there are still problems with the subsystem, run the Reliability program. Reliability will display PIO errors, CB errors and Data Compare errors.

PIO errors will be of the format:

```
                Timeout type errors
          RUN TIME 0. HRS. 20. MINS. 3. SECS.
 DEVICE CODE:  24  UNIT NUMBER:  0. STATE: **ACTIVE**
        MODES:  RANDOM, R/W, DATA CHECK - ADDR
                REG A   REG B    REG C
          OPERATION        0    3400      201
          STATUS           0       0        0
            TIMEOUT WAITING FOR INTERRUPT.
```

Timeout errors are generally fatal and will likely cause other unrelated errors to occur.

```
PIO status type errors
RUN TIME 0. HRS. 20. MINS. 3. SECS.
DEVICE CODE 24  UNIT NUMBER 0.          STATE:
**ACTIVE**
MODES:  RANDOM, R/W, DATA CHECK - ADDR
                                 REG A   REG B   REG C
                    OPERATION        0    3400     201
                    STATUS           0    3400  144201
```

CB errors will have the following format:

```
RUN TIME 0. HRS. 20. MINS. 3. SECS.
DEVICE CODE 24  UNIT NUMBER 0.  MAPPING NOT ENABLED
STATE: **ACTIVE**
MODES:  RANDOM, R/W, DATA CHECK - ADDR
LOGICAL BLOCK    124532     SECTOR COUNT    4
MEMORY ADDRESS    64321     COMMAND     WRITE
PAGE TABLE ADDRESS    0     RETURNED XFER COUNT  0
PHYSICAL BLOCK: 125452 = CYLINDER: 123 HEAD: 3 SECTOR:
34
ASYNC STATUS    :      3
      CB EXECUTION ERROR : HARD ERRORS
CB STATUS       : 100001
      ANY CB HARD EXECUTION ERROR
      CB DONE BIT
CB ERROR        :      1
      HEADER NONCOMPARE
CB UNIT STATUS :  24000
      READY
      PORT RESERVED BIT 1
DISK ERROR      :   5000
```

The physical block shown above can be entered into the initializer as a bad block address. The logical block is the starting logical block address. If the returned transfer count is added to the logical block, you will have the logical block in error, but this block is not the ACTUAL block on the disk due to controller features. The physical block is in fact the actual block in error on the disk

Data Compare errors will have the following format:

```
      ***** DATA COMPARE ERROR *****

DEVICE CODE 24  UNIT NUMBER 0.  MAPPING NOT ENABLED
STATE:  **ACTIVE**
MODES:  RANDOM, R/W, DATA CHECK - ADDR
LOGICAL BLOCK   :  12345   SECTOR COUNT     :      3
PAGE TABLE ADDRESS :  0   LOGICAL XFER ADDRESS:  56271
PHYSICAL XFER ADDRESS:  56271
EXPECTED    RECEIVED    OFFSET
165346       165347        1
165346       165347        3
165346       165347        5
TOTAL ERROR COUNT:   384.
```

For further description of the error status, refer to Data General Programmer's Reference Series: Models 6236/6237 and 6239/6240 Disk Subsystems.

3.4 Formatter - Error Description

If Reliability fails, you can try reformatting the disk drive. This will destroy any data on the disk, but it may get the subsystem working again. You could then rebuild your system on the disk. The Initializer error display is as follows.

PIO errors will have the following format:

(Same as the Reliability in Section 3.4)

CB errors will have the following format:

```
      RUN TIME 0. HRS. 20. MINS. 3. SECS.
DEVICE CODE 24  UNIT NUMBER 0. MAPPING NOT ENABLED
STATE: **ACTIVE**
MODES: - ANALYZE - INSTL UCODE - INSTL MAP - ZDKINIT
(FOR RDOS)
PHYSICAL BLOCK  124532 SECTOR COUNT  1240
MEMORY ADDRESS  64321  COMMAND  WRITE ONE/WORD
PAGE TABLE ADDRESS  0  RETURNED XFER COUNT  22
PHYSICAL BLOCK:  124554 = CYLINDER: 123 HEAD: 3
SECTOR: 34
ACTIVE DATA   AAAA        ACTIVE OFFSET  STROBE LATE;
SERVO-
ASYNC STATUS : 3
      CB EXECUTION ERROR : HARD ERROR
CB STATUS    : 100001
      ANY CB HARD EXECUTION ERROR
      CB DONE BIT
CB ERROR :  1
      HEADER NONCOMPARE
CB UNIT STATUS : 24000
      READY
      PORT RESERVED BIT 1
```

```
DISK ERROR   : 17000
```

The physical block shown at the top is the starting physical block and the erroring physical block is shown below with the cylinder, head, and sector.

For further description of the error status refer to Data General Programmer's Reference Series: Models 6236/6237 and 6239/6240 Disk Subsystems.

3.5 Help is Available for Problem Situations

You Can Use the Customer Support Hotline

Zetaco provides a Customer Support Hotline to answer technical questions and to assist with installation and help trouble-shoot problems. The Hotline technical team is available from 8:00 a.m. to 5:00 p.m. (CST), Monday through Friday.

Within the U.S. dial 1-800-537-5292

Outside the U.S. dial 1-612-890-5138

How to Get a Return Material Authorization (RMA)

A Return Material Authorization number is required before shipping anything back to Zetaco. It should be referenced on the package and in any correspondence about the return. To get an RMA number:

1. Fill out a copy of the Material Return Information form shown on the next page and be prepared to give some of this information on the phone if asked. A copy of the filled out form should also be sent with any return package.

2. Call the Customer Support Hotline to request an RMA number from them.

Each product being returned needs a separate RMA number and Material Return Information form. It should be shipped to Zetaco, 11400 Rupp Drive, Burnsville, MN, 55337, freight prepaid.

Upon Zetaco's verification of defect, defective parts shall be repaired or replaced, and returned surface freight prepaid to the customer.

To safeguard the product during shipment, please use packaging that is adequate to protect it from damage. It would be a good idea to keep the original packaging for this purpose. Mark the box: *Delicate Instrument.* Indicate the RMA number(s) on the shipping label.

Information About Warranty

The SCZ-1 is warranted free from manufacturing and material defects, when used in a normal and proper manner, for a period of two years 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 arising out of or in connection with the use or performance of Zetaco's products.

If a part is no longer under warranty, or if the problem is not warranted (as set forth above), then repair will be billable to the customer.

Material Return Information

The speed and accuracy of a product's repair is often dependent upon a complete understanding of the user's check-out test results, problem characteristics, and the user system configuration. Use the form below to record the results of your trouble-shooting procedures. If more space is needed, use additional paper.

TEST	**RESULT**
Power-up self-test	_____
	_____

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? (AOS/VS, AOS/VS-II) Include revision number.*

3. *Describe the system configuration (i.e., peripherals, controllers, model of computer, etc.):*

4. *Has the unit been returned before?*
   Same problem?

To be filled out by CUSTOMER:

MODEL NUMBER: _____

SERIAL NUMBER: _____

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

Returned by:

Your Name: _____ **Firm:** _____

Address: _____ **Phone:** _____

4

Controller Usage Guidelines

Controller Features Programmed By The Configurator

Configurator Aid (Help)

The SCZ-1 Configurator Program includes two "HELP" commands: one for OPERATIONAL questions and one that suggests WHAT you might want to do. You can get an explanation for any item by responding with an "H" to the question. Please use these functions whenever you are uncertain as to what to do.

Throttle Burst Rate

This is defined as the number of word transfers that take place over the BMC 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 BMC device. The controller may be set to burst rates of 1, 2, 4, 8, 16, 32, 64, 128 and 256 words per access. A burst rate of 32 is recommended for most applications.

To maximize overall performance, the Burst Rate should be set to the largest value that doesn't cause interference on other controllers, such as "data lates".

Disk Drives Supported

The SCZ-1 is designed to support drives that meet the SCSI Interface Specification and utilize the SCSI Common Command Set. ZETACO has verified several drives with the SCZ-1 and will continue to test additional drives for verification of compatibility with the SCZ-1. If you don't find the drive you want to interface in the Configurator Program, call us to discuss your requirements.

The SCZ-1 may be configured to assign drives of varying capacities and transfer rates to any of the 4 logical units. Any combination of up to 7 physical drives may be configured to any one of the 4 logical units.

BMC Bus Priority

The SCZ-1 has the capability of functioning with up to seven other BMC peripheral controllers. However, some DG computers, such as the MV/4000 and S/280 only support up to four BMC devices. In this case you must select priorities 0 through 3, 3 being the highest priority. The lower the priority number the lower the priority level. If there is more than one BMC device, make sure you select a priority level that is different than the other BMC devices.

Break Count Interval

The Break Count Interval is defined as the period of time that the SCZ-1 is off the BMC bus. This period is a multiple of the BMC Sync Clock period, which in turn varies from computer to computer. A Break Count interval setting of 1 is equal to one Sync Clock period. The maximum setting is 255. A setting of 4 is recommended.

If there are other BMC devices present, it may be desirable to increase this count to allow more time for the other devices to access the bus. If the Break Count is set too large, slow disk performance may result. A larger Break Count also allows the CPU more memory time.

Controller SCSI ID

The SCSI Bus supports up to 8 devices (targets or initiators) and each must have a unique SCSI ID code. The possible values are 0-7, device 0 having the lowest priority on the bus and device 7 the highest. Since it is desirable for the controller to have higher priority than the drives, the Configurator allows the choice of ID 6 or 7 for the controller. If 2 controllers are to be on the same bus, make sure they are configured for different ID codes.

A

SCZ-HTD

A.0 Boot The Software Tape

If you are using an MV class machine, you must load the MV's microcode before booting the software support tape.

The Bootstrap Procedure for the software support tape is:

1. Mount the Software Support tape on the drive and put it on-line. Be sure that the BPI setting matches that specified on the tape label.

2. Boot the tape in your normal fashion.

   It is unnecessary to set the switch register on the S/140.

3. The Software Support Package menu will be displayed:

```
FILE #              PROGRAM

2                   SCZHTD CONFIGURATOR
3                   SCZHTD DIAGNOSTIC
4                   SCZHTD FORMATTER
5                   SCZHTD INITIALIZER
6                   SCZHTD RELIABILITY
7                   ".SV & .LS" Files in RDOS DUMP
                    Format
8                   ".SV & .LS" Files in AOS DUMP
                    Format

FILE NUMBER?
```

You should enter the number of the program you wish to execute. At this point of the installation procedure, enter:

```
2      <cr>
```

to load the Configurator Program.

A.1 Configure the SCSI Disk Controller

After the Configurator Program has loaded, the following message will appear on your computer screen:

```
CFSCZHTD CONFIGURATOR FOR SCZHTD CONTROLLER
PRODUCT OF ZETACO, INC.
```

The purpose of the configurator program is to allow you to tailor the SCZHTD Disk Controller to your particular environment. The SCSI Disk Controller includes an electrically erasable prom (EEPROM) that contains certain facts. This program lets you list the current facts, modify those that you want changed, and record the new facts onto the EEPROM.

The help command on the main menu provides information both on what to do and how to do it. If this is the first time you have run this program, you might want to start by selecting help.

You can get an explanation of any question the program asks by responding to that question with an "H".

```
WHAT IS THE PRESENT SETTING OF THE DEVICE CODE (IN
OCTAL)?   24

ENTER COMMAND  (? TO SEE CHOICES):
```

We have responded to the question about the device code of the controller with the primary device code. The program returned with a prompt for a Configurator command. This indicates that the system was unable to contact the controller at that device code. In such cases, turn the computer off and double-check all of the preceding installation steps. If, after doing so, you still have problems, contact Zetaco's customer Support Hotline. See Section 3.7.

You may now continue on through the Configurator, using the Help command whenever you need help.

A.2 Unit Number and Miscellaneous Preparation

Set the drive(s) to the desired unit number(s). This is usually done via jumpers in the drive. For two or more drives, unit numbers assigned are usually consecutive, with unit "0" being the primary unit.

A.3 Usage of Formatter, Initializer, and Reliability

There are two general procedures with which these programs are used; the first installation of the product and the occasional preventive maintenance.

The first installation should follow the steps listed below.

1. Configure the Controller
2. Run FORMATTER Utility (use default path [A])
3. Run RELIABILITY (use physical mode)
4. Run INITIALIZER (use default path [Z])
5. Optionally run RELIABILITY (use logical mode)
   If this step is selected, you must run step 4 again before building RDOS.

Follow the following steps for preventive maintenance.

1. Run INITIALIZER; use [A] path and select READ ONLY if you do not want to destroy your data.

NOTE: It is always recommended that you have a current back-up in case some fatal error should occur.

2. Run RELIABILITY in logical mode. Be sure to select READ ONLY and NO DATA VERIFICATION if you do not want to destroy your data.

The following sections will describe each of the programs as used during the first installation process.

A.4 Analyze The Disk

The formatter Program (File #4) consists of three modules:

1. ANALYZE DISK
2. RELOCATE BLOCKS
3. FORMAT ONLY

In the opening menu there are selections to enter and start the devices. You will need to select the [E]nter device selection and then you will be given the menu listing the above choices.

We recommend at this point that you run the Analyze module. This will format the disk and analyze the surface in order to relocate any bad blocks.

The following sample dialogue will guide you through this procedure.

To format the disk, boot the software support tape and load File #4. The sample dialogue below will guide you through the Analyze module of the Formatter Program.

```
SCZHTD DISK FORMATTER
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART A DEVICE        [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[X]EQ AND ERROR LOG       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  E
```

We wish to enter the device that we want to format, so we type "E".

```
ENTER THE DEVICE CODE [24]:
<CR>
```

24 is the primary device code. If you have your controller set up for the secondary device code of 64, you would enter that number here.

```
START INITIALIZATION OF CONTROLLER
CONTROLLER MICROCODE REV:  X.XX
END INITIALIZATION OF CONTROLLER
```

This is just telling you that the program is loading microcode onto the SCSI Disk Controller, and what the revision number is.

```
SCSI DEV. 0.  IS READY; SELECT (YES,[NO]):
```

The Formatter Program has looked at the SCSI Disk Controller and found that SCSI DEV.), Unit 0 is ready. It then asks you if you want to use this unit. If you do then you would type YES. If not, then type <cr> and the Formatter Program would go on to the next ready unit.

```
COMMAND CHOICES

[A]NALYZE DISK
[R]ELOCATE BLOCKS
[F]ORMAT ONLY

ENTER YOUR SELECTION [A]:  A
```

At this time we want to Analyze the disk so we can run the Reliability Program and verify that the subsystem is operational.

```
FORMAT ([YES] NO)!  YES
```

You should select to Format.

```
RETAIN ANY PREVIOUSLY RELOCATED SECTORS?  IF YOU DO
NOT RETAIN THE PREVIOUSLY RELOCATED SECTORS, IT IS
RECOMMENDED THAT A FULL FIVE PATTERN ANALYSIS BE DONE
IN ORDER TO RELOCATE ALL THE BAD SECTORS THAT WERE
PREVIOUSLY BEING HANDLED  ([YES] NO):  YES
```

You'll usually want to retain previous lists on formatting.

```
THE DATA PATTERNS LISTED BELOW ARE USED IN THE ORDER
LISTED.

AAAA  2525  5555  1F1F  FFFF
0000  FGFG  5252  F1F1  GFGF

ENTER THE NUMBER OF PATTERNS TO RUN [5]:
<cr>
```

Use the default.

```
SCSI DEV. 0. UNIT 0. IS SELECTED
```

NOTE You must enter [S]TART in order to have the selected operations actually take place.

```
SCZHTD DISK FORMATTER
REV. X.XX
```

```
COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[X]EQ AND ERROR LOG       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  S

START ALL ENTERED DEVICES ([YES], NO):  <CR>
```

This will start the program Analyzing. Now you may enter other commands such as [L]IST.

```
SCZHTD DISK FORMATTER
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[X]EQ AND ERROR LOG       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  L
```

As the Analyzing moves along, you may want to see if it is still active. Use of the L command will show you the current state of each of the devices being Analyzed.

```
RUN TIME  0.  HRS.  20.  MINS.  3.  SECS.
DEVICE CODE  24  SCSI DEV. NUMBER  0.  UNIT NUMBER  0.
STATE:  **ACTIVE**
MODES:  FORMAT - ANALYZE
FORMATTING IN PROGRESS  # OF BLOCKS ANALYZED:  0
# OF HARD ERRORS REPORTED:  0.
# OF SOFT ERRORS REPORTED:  0.
```

This tells us that we are Formatting and Analyzing.

```
RUN TIME  0.  HRS.  40.  MINS.  3.  SECS.
DEVICE CODE  24  SCSI DEV. NUMBER  0.  UNIT NUMBER  0.
DEVICE STATE:  *ACTIVE**
MODES:  - FORMAT - ANALYZE
THIS UNIT IS COMPLETE WITH ITS ASSIGNED TASKS.
```

When this message is printed, the program has finished with the unit, and you may now enter the [Q]UIT key.

At this point, before going on to Section A.5, you should press

the "E" key and enter the device code of the controller. This will initialize the controller microcode. DO NOT answer "yes" to any of the select questions. Now go on to Section 2.13.

A.5 Run Reliability To Verify The Installation

At this point, run Reliability for several minutes, just to verify that the subsystem is operating after the initial format. To do so, boot the software support tape and load File #6.

The Reliability Program consists of two basic modules. The first is the Random RELI. In this module, the disk transfer addresses and size are selected at random. The data type will be selected by the user, but if ALL PATTERNS is selected, the pattern will be selected at random as well. In random RELI sixteen device control blocks will be active and distributed randomly between the devices that are currently active.

The second module is the Sequential RELI. In this module, the disk is first written sequentially and then is read sequentially. After the READ is finished, the device halts and is finished. If ALL PATTERNS is selected, each of these patterns is completed in the order that they are listed. In both of these modules, device control blocks will be stacked on the controller for multiple units. Multiple controllers will also be active simultaneously. The sample dialogue below will guide you in getting the program started.

```
RELIABILITY PROGRAM


PHYSICAL MODE:  RUNS THE ACTUAL DISK DRIVES THAT ARE
CONNECTED AND REQUIRES MICROCODE TO BE ON THE
CONTROLLER.  LOGICAL CODE:  RUNS THE LOGICAL DISK AS
THE SYSTEM WOULD SEE IT AND WILL LOAD MICROCODE FROM
THE DISK DRIVE.  DO YOU WISH TO RUN IN PHYSICAL MODE
(YES, [NO]):  YES
```

At this time we will run a physical disk.

```
ENABLE MAPPING  (YES, [NO]):  <cr>

EXECUTION MODE:

[R]ANDOM RELIABILITY     [S]EQUENTIAL RELIABILITY

ENTER YOUR CHOICE [R]:  <cr>
```

This question refers to the order in which the disk will be accessed for all of the devices tested in the Reliability. We will choose the default, "R".

```
SCZHTD RELIABILITY UTILITY
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[X]EQ AND ERROR LOG       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  E

ENTER THE DEVICE CODE [24]:  <cr>
```

24 is the primary device code. If you have your controller set up for the secondary device code of 64, you would enter that number here.

```
START INITIALIZATION OF CONTROLLER
CONTROLLER MICROCODE REV:  X.XX
END INITIALIZATION OF CONTROLLER
```

This is just telling you that the Reliability Program is loading the microcode onto the SCSI Disk Controller from the disk. The revision number is also displayed.

```
UNIT 0.  IS READY; SELECT (YES, [NO])  <cr>
```

The Reliability Program has looked at the Controller and found that UNIT 0 is ready. It then asks you if you want to use this unit. If you do then you could type "YES". If you do not, then type <cr> and the Program will go on to the next ready unit.

```
THE DISK SIZE IS XXX. MB

WRITE ONLY (YES, [NO]):  <cr>
READ ONLY (YES, [NO]):  <cr>
VERIFY DATA (YES, [NO]):  <cr>

SELECT DATA TYPE:

0 - LOGICAL BLOCK ADDRESS     1 - FLOATING ZERO
2 - FLOATING ONE              3 - ALTERNATE ZEROS
(52525)
4 - ALTERNATE ONES (125252)   5 - ALL ZEROS
6 - ALL ONES                  7 - RANDOM
8 - ROTATING (125252)         9 - DO ALL PATTERNS
```

```
SELECT DATA TYPE[0.]:  <cr>

UNIT 0. IS SELECTED
UNIT 1. IS NOT READY
UNIT 2. IS NOT READY
UNIT 3. IS NOT READY


SCZHTD RELIABILITY UTILITY
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
2[X]EQ AND ERROR LOG      [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  S

START ALL ENTERED DEVICES ([YES], NO):  <cr>
```

At this point you are finished Entering your device and have commanded the program to start running. The green LEDs on the front of the controller board should now be ON (they are actually flashing very rapidly), signifying that the controller is active. You may at any time initiate another command from the list simply by typing its letter.

```
RUN TIME  0.  HRS.  20.  MIN.  3.  SECS.
DEVICE CODE  24  UNIT NUMBER 0.  MAPPING NOT
ENABLED DEVICE STATE:
MODES:  RANDOM, R/W, DATA CHECK-ADDRESS
# SECTORS WRITTEN 451.  # OF SECTORS READ 451.
TOTAL ERRORS:  0.

ENTER A COMMAND SELECTION (C=CMD LIST):
```

**We selected List to ge a printout of the system's activity. In this case, there are no errors logged. If you select List again, you should see that the number of sectors written and read has increased; this confirms that the subsystem is operational. Data compare errors will require further trouble-shooting. For trouble-shooting help, see Section 3.0. We recommend that you run this for at least five minutes.

A.6 Initialize The Disk

The Initializer Program (File #5)consists of four modules:

1. ZDKINIT (Also does: INSTL MCODE, INIT SOFT LOG)

2. ANALYZE DISK
3. RELOCATE BLOCKS
4. MICROCODE INSTALL ONLY

In the opening menu there are selections to enter and start the devices. You will need to select the [E]nter device selection and then you will be given the menu listing the above choices.

We recommend at this point that you run the ZDKINIT module. This will write out RDOS ZDKINIT data, write out the microcode, and write out an empty soft error log for the microcode to use. You must run this path even if you are not going to use RDOS.

The following sample dialogue will guide you through this procedure.

To ZDKINIT the disk, boot the software support tape and load File #5. The sample dialogue below will guide you through the ZDKINIT module of the Initializer program.

```
SCZHTD DISK INITIALIZER
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[X]EQ AND ERROR LOG       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  E
```

We want to enter the device that we want to ZDKINIT, so we type E.

```
ENTER THE DEVICE CODE [24]:  <cr>
```

24 is the primary device code. If you have your controller set up for the secondary device code of 64, you would enter that number here.

```
START INITIALIZATION OF CONTROLLER
CONTROLLER MICROCODE REV:  X.XX
END INITIALIZATION OF CONTROLLER
```

This is just telling you that the program is loading microcode onto the SCSI Disk Controller and what the revision number is.

```
UNIT 0.  IS READY; SELECT (YES, [NO]):  YES
```

The initializer Program has looked at the SCSI Disk Controller and found that Unit 0 is ready. It then asks you if you want to use Unit 0. It then asks you if you want to use Unit 0. If you do then you would type YES. If not, then type <cr> and the Initializer Program would go on to the next ready unit.

```
COMMAND CHOICES

[Z]DKINIT (ZDKINIT, INSTALL MICROCODE, INIT SOFT LOG)
[A]NALYZE DISK
[R]ELOCATE BLOCKS
[M]ICROCODE INSTALL ONLY

ENTER YOUR SELECTION [Z]:  Z
```

At this time we want to ZDKINIT the disk.

```
UNIT O. IS SELECTED
UNIT 1. IS NOT READY
UNIT 2. IS NOT READY
UNIT 3. IS NOT READY
```

NOTE: You must enter [S]TART in order to have the selected operations actually take place.

```
SCZHTD DISK INITIALIZER
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.

COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[X]EQ AND ERROR LOG       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):  S

START ALL ENTERED DEVICES ([YES], NO):  <cr>
```

This will start the program Initializing. Now you may enter other commands such as [L]IST.

```
SCZHTD DISK INITIALIZER
REV. X.XX

COPYRIGHT 19XX, ZETACO, INC.
```

```
COMMAND LIST

[E]NTER A DEVICE          [D]ELETE A DEVICE
[S]TART A DEVICE          [H]ALT A DEVICE
[R]ESTART THE PROGRAM     [L]IST ERROR TOTALS
[C]OMMAND LIST            [P]RINTER CONTROL
[F]LAGS                   [M]ODE OF DISPLAY
[X]EQ AND ERROR LOG       [Q]UIT

ENTER A COMMAND SELECTION (C=CMD LIST):

RUN TIME  0.  HRS.  40.  MINS.  3.  SECS.
DEVICE CODE 24  UNIT NUMBER 0.  DEVICE STATE:
**ACTIVE**
MODES: - ZDKINIT
THIS UNIT IS COMPLETE WITH ITS ASSIGNED TASKS.
```

When the message is printed, the program has finished with the unit, and you may now enter the [Q]UIT key.

A.7 Run Reliability To Verify The Installation

At this point you may optionally run Reliability for several minutes, just to verify that the system is operating after the initial format. To do so, boot the software tape and load file #6.

NOTE: If you opt to do so, you will have to complete Section A.6 again if RDOS is to be run. If you want to run this, just follow Section A.5 and select logical mode when asked.

Refer to:

Chapter 1 for the Product Overview.

Chapter 2, Sections 2.0 to 2.5 for Hardware Installation.

Chapter 3 for Trouble-shooting.

Chapter 4 for Usage Guidelines.