Sun StorEdge™ A7000 VME SCSI Controller Diagnostics Reference Manual

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Preface

Sun StorEdge A7000 VME SCSI Controller Diagnostics Reference Manual is specific to the Extended Diagnostic provided for testing various VME SCSI Controller and SCSI Target Emulation (STE) boards. This manual contains the following information:

■ Special requirements for program execution
■ Program initialization procedures
■ Test descriptions
■ Descriptions of messages produced by this program

How This Book Is Organized

Chapter 1 "Diagnostic Overview" describes the Extended Diagnostic used for testing the VME SCSI Controller and SCSI Target Emulation (STE) boards. It identifies the model numbers supported by this diagnostic and testing considerations.

Chapter 2 "Program Initialization" describes the initialization options provided when running this diagnostic in interactive mode.

Chapter 3 "Program Tests" describes the individual diagnostic tests.

Chapter 4 "Program Messages" describes the messages produced by the diagnostic during program execution.

Typographic Conventions

TABLE P-1   Typographic Conventions

Typeface or Symbol	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output.	Use the `setconfig` command to change the testing configuration. `Single Device (0 1 0)`
`AaBbCc123`	What you type, when contrasted with on-screen computer output.	`Select the channel? =0 ;[cr,?,^,(0-3)]?`**3**
AaBbCc123	Book titles, new words or terms, words to be emphasized. Variable expressions; replaced with a real name or value.	Read Chapter 2 in the *Sun StorEdge A7000 ROM Monitor Reference Manual*. `slot` *n*`:Loading extended image scsidiag`
|	In system output displays, a vertical line indicates that a choice will be made between the values.	In the following example, either `HW` or `SW` will be displayed: `Channel 0 SCSI Bus Id: 6 (HW`|`SW)`
[ ]	In system output examples, brackets indicate optional values. If several values are placed inside brackets, any or none of them can be displayed. Brackets are also used in system prompts to enclose the response choices.	In the following example, displaying the slot number is optional: `[Slot` *n*`:]`

Related Documentation

TABLE P-2   Related Documentation

Type	Title
User interface	*Sun StorEdge A7000 ROM Monitor Reference Manual*
Diagnostic reference	*Sun StorEdge A7000 Diagnostics Reference Manual*
Hardware reference	*VME Dual Channel Small Computer System Interface (SCSI) Controller Supplement*
Hardware Reference	*VME Dual Channel SCSI-2 Controller Supplement*
Hardware Reference	*VME Quad Channel SCSI-2 Controller Supplement*

Note – The *VME Dual Channel Small Computer System Interface (SCSI) Controller Supplement*, the *VME Dual Channel SCSI-2 Controller Supplement*, and the *VME Quad Channel SCSI-2 Controller Supplement* are supplements to the vendor documentation.

Before executing diagnostics, refer to the vendor documentation or the appropriate hardware supplement manual to verify that the board jumpers and switch settings are correct.

Sun Documentation on the Web

The docs.sun.com^{sm} web site enables you to access Sun technical documentation on the Web. You can browse the docs.sun.com archive or search for a specific book title or subject at:

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Diagnostic Overview

Introduction

The VME SCSI Controller Diagnostic is an extended diagnostic used to verify the functionality of VME SCSI Controller and SCSI Target Emulation (STE) boards.

This program performs the following functions:

- Reads and displays board information including board Control/Status Register (CSR) address, firmware revision, SCSI bus ID numbers, and the absence or presence of a SCSI daughter card.
- Verifies the ability of the controller to execute a `Restart` command.
- Executes vendor-supplied PROM-resident diagnostics.
- Displays board initialization parameters, if requested.
- Verifies the ability of the controller to generate and respond to VME interrupts.
- Verifies the ability of the controller to reset the SCSI bus by executing the SCSI `Reset` command.
- Verifies the ability of the controller to reinitialize a SCSI device by executing the SCSI `Reinitialize` command.
- Checks the current SCSI device configuration.
- Verifies the ability of the controller to perform data transfers in D16 Single, D32 Single, D32 Block, and D64 Block transfer modes.

This is a disk based diagnostic normally executed during the power up testing sequence. If configured, the program is automatically called from the ROM Monitor after the Built-in Self Tests (BISTs) are executed. You can also run this diagnostic using individual ROM Monitor commands. Refer to the *Sun StorEdge A7000 Diagnostics Reference Manual* for extended diagnostic commands and execution procedures.

Testing Considerations

- You can use Control-C to terminate an operation in interactive mode. Any environment variable changes made under control of this diagnostic are preserved when the Control-C sequence is initiated.

- Use the Escape key to abort an Extended Diagnostic and return control to the Interactive Mode Options Menu. Any environment variable changes made under the control of this diagnostic are preserved when the Escape sequence is initiated.

The VME Quad Channel SCSI-2 Controller contains two 4220 boards. Consider the following when testing this controller:

- Each VME Quad Channel SCSI-2 Controller uses two CSR addresses. To test all the devices on all the channels on this board, run the diagnostic with the first CSR address (0xfff48800, for example) to test the first two channels. Then, assign the second CSR address (0xfff49000, for example) and run the diagnostic a second time to test the other two channels.

- When testing a single device on the VME Quad Channel SCSI-2 Controller, ensure the selected CSR address is for the channel controlling the device you want to test.

- When configuring this diagnostic to run on a VME Quad Channel SCSI-2 Controller during automatic testing, two CSR addresses must be assigned using the `setconfig` command. Use `setconfig scsr 1` and `setconfig scsr 2` to assign the CSR addresses.

Program Initialization

Initialization Options

When running in interactive mode, the VME SCSI Controller Diagnostic provides initialization options for:

- Enabling and disabling milestone messages
- Displaying the Debug Menu
- Changing the channel SCSI IDs
- Selecting the device testing configuration
- Enabling and disabling the disk self-test
- Enabling and disabling SCSI Bus initialization
- Selecting the test mode
- Selecting the bus width
- Displaying the Transfer Test Menu

To initialize the diagnostic, select the `Initialize Diag.` option from the Interactive Mode Options Menu. The interactive mode options are described in the *Sun StorEdge A7000 Diagnostics Reference Manual.*

Once you select `Initialize Diag.`, the program displays an Initialization Menu in the following format. The values displayed under `Current State` are the default values for this diagnostic.

```
INITIALIZATION MENU Valid Options     Current State
--------------------------------      ------------
a - Milestone Messages.               disabled
b - Debug Menu.

c - Channel 0 ID.                     Use Hardware Jumpers
d - Channel 1 ID.                     Use Hardware Jumpers
e - Channel 2 ID.                     Use Hardware Jumpers
f - Channel 3 ID.                     Use Hardware Jumpers

g - Device Test Configuration.        All Devices
h - Channel.                          0
i - Target.                           1
j - Lun.                              0

k - Test Printer.                     disabled
l - Disk Self_Test.                   disabled
m - SCSIbus Initialization.           enabled
n - Test Mode.                        Initiator Mode
o - Bus Width.                        Narrow
p - Transfer Test Menu.
q - Quit this submenu.

Enter your selection:
```

Enter the letter corresponding to the desired option and press the Return key. Some of the options toggle between enabled and disabled when they are selected. Other options prompt for additional information.

Note – Use q to exit the Initialization Menu and return to the Interactive Mode Options Menu.

Option k is not valid for the Sun StorEdge A7000 Intelligent Storage Server System and should never be enabled.

Standard Prompt Responses

The following are standard responses to prompts displayed when various initialization options are selected:

Response	Description
`cr`	Press the Return key to select the default response or value displayed in the prompt.
`?`	Displays help information.
`^`	Returns to the Initialization Menu.

Enabling and Disabling Milestone Messages

Use the `a` option to enable or disable expanded milestone messages displayed during diagnostic execution. When selected, this option toggles between the `enabled` and `disabled` states. The default state is `disabled`.

Displaying the Debug Menu

Use the b option to display the Debug Menu. When you select this option, the program displays the Debug Menu in the following format:

```
Debug Submenu
Valid Options                            Current State
----------------------------------    -------------------------
a - Dump MCSB.
b - Dump MCE.
c - Dump Command Queue.
d - Dump CRB.
e - Dump CSB.

f - Controller Reset at diag exit     (enabled)
i - Debug Messages                    (disabled)

q - Quit this submenu.

Enter your selection:
```

Use option i to enable or disable displaying debug messages during diagnostic execution. When selected, this option toggles between the enabled and disabled states. The default state is disabled.

Note – The other options on the Debug Menu are described in Chapter 4 under *Debug Displays.*

Use q to exit the Debug Menu and return to the Initialization Menu.

Changing the Channel ID Values

Use options `c` through `f` to change the Channel SCSI ID values. These options default to using the hardware jumpered addresses as the Channel SCSI ID values. When you select one of these options, the program displays a prompt in the following format:

```
Channel n SCSI ID? = HW ;[cr,?,^,HW,(0-15)]?
```

Variable	Description
n	Specifies the channel number.

Enter one of the following or a standard response:

- Enter `HW` to select the hardware jumpered address as the Channel SCSI ID. This is the default selection.
- Enter a number from `0` through `15` to select a software programmed value as the Channel SCSI ID. If you select a software value, the `Current State` field displays:

```
n (Software Programmed)
```

Variable	Description
n	Specifies the software ID value you selected.

Note – Run Test 1 to display the hardware jumpered addresses in use by the diagnostic.

You can assign Channel SCSI ID values 8 through 15 only when you use option `o` to select the `Wide` bus width.

Selecting the Device Test Configuration

Option `g` toggles between seven testing configurations:

Testing Configuration	Description
`All Devices`	Test all configured devices.
`Only Channel 0 Devices`	Test all configured devices on Channel 0 only.
`Only Channel 1 Devices`	Test all configured devices on Channel 1 only.
`Only Channel 2 Devices`	Test all configured devices on Channel 2 only.
`Only Channel 3 Devices`	Test all configured devices on Channel 3 only.
`Tests Luns off Channel x Target y`	Test all logical units off the specified channel (*x*) and target (*y*). The channel and target are selected with options `h` and `i` as described in the following section. The default is to test all logical units off Channel 0 and Target 1.
`Single Device (x y z)`	Test the single device specified. You select the channel (*x*), target (*y*), and logical unit (*z*) with options `h`, `i`, and `j` as described in the following section. The default device is 0 1 0.

Changing the Channel, Target, and Lun Selections

The `h`, `i`, and `j` options are used to change the channel, target, and logical unit selections. Use these options when you use option `g` to specify testing all logical units off a channel and target other than the default, or to specify testing a single device other than the default.

When you select option `h`, the program displays the following prompt:

```
Select the channel? = 0 ;[cr,?,^,(0-3)]?
```

Enter the number of the channel connected to the device you want to test or one of the standard responses.

When you select option `i`, the program displays the following prompt:

```
Select the target? = 1 ;[cr,?,^,(0-15)]?
```

Enter the number of the device you want to test or one of the standard responses. Valid device numbers range from 0 through 15.

When you select option `j`, the program displays the following prompt:

```
Select the logical unit? = 0 ;[cr,?,^,(0-31)]?
```

Enter the desired logical unit number or one of the standard responses. Valid logical units numbers range from 0 through 31. If the testing configuration is not `Tests Luns`, only logical unit number 0 is tested.

Note – You can assign logical unit numbers 8 through 31 only when you use option `n` to select `Target Mode` and option `g` to select `Tests Luns`.

Note – If an invalid selection is entered at an initialization prompt, the program displays an `Invalid Response` message and redisplays the prompt.

To run tests in interactive mode, use the `a`, `e`, or `t` option from the Interactive Mode Options Menu to select the desired tests. Then, use the `r` option to start test execution. The interactive mode options are described in the *Sun StorEdge A7000 Diagnostics Reference Manual.*

Each VME Quad Channel SCSI-2 Controller contains two 4220 boards and uses two CSR addresses. To test all the devices on all the channels on this controller, run the diagnostic with the first CSR address (0xfff48800, for example) to test the first two channels. Then, assign the second CSR address (0xfff49000, for example) and run the diagnostic a second time to test the other two channels.

When testing a single device on the VME Quad Channel SCSI-2 Controller, ensure that the CSR address selected is for the channel controlling the device you want to test.

Running the Disk Self_Test

Use the `l` option to enable or disable running a self-test on the selected disk drives. This option toggles between `enabled` and `disabled` when selected. The default for disk self-testing is `disabled`.

Enabling and Disabling SCSI Bus Initialization

Use the `m` option to enable or disable running tests that initialize the SCSI Bus. This option toggles between `enabled` and `disabled` when selected. When the option is disabled, Tests 4, 6, and 7 are bypassed automatically. Test 8 does not execute the `Restart Controller`, `Reinitialize Device`, and `Start-Stop` commands when SCSI Bus initialization is disabled. The default is `enabled`.

Selecting the Test Mode

Use the n option to select the test mode. This option toggles between `Initiator Mode` and `Target Mode` when selected. The default is `Initiator Mode`.

Selecting the Bus Width

Use the o option to select the bus width. This option toggles between `Narrow` and `Wide` when selected. The default is `Narrow`.

Displaying the Transfer Test Menu

Use the p option to display the Transfer Test Menu. This menu allows you to modify the values used by the diagnostic when running the VME Transfers test (Test 10).

When you select the p option, the diagnostic displays the Transfer Test Menu in the following format:

```
Transfer Test Submenu
Valid Options                        Current State
--------------------------------  ----------------------------
a - Transfer Type                 All Transfer Types
b - Transfer Length               Variable
c - Transfer Size                 2048 bytes
d - Data Pattern                  All Data Patterns
e - Number of Passes              1024 passes

q - Quit this submenu.

Enter your selection:
```

Note – The options on the Transfer Test Menu are described in Chapter 3 under the Test 10 description.

Use q to exit the Transfer Test Menu and return to the Initialization Menu.

Program Tests

Test Summary

The VME SCSI Controller Diagnostic contains the following tests:

Test	Test Name
1	Board Information
2	Extensive On_board Diagnostics
3	Dump Initialization Parameters
4	Restart Controller
5	VME Interrupts
6	SCSI Bus Reset
7	Reinitialize Device
8	SCSI Configuration
9	Printer
10	VME Transfers

Note – Tests 2 and 5 are the only tests run during the automatic testing sequence.

Test 9 is not supported on the Sun StorEdge A7000 Intelligent Storage Server System and is bypassed automatically.

Test 1   Board Information

This test reads and displays the following board information:

- CSR Address
- Board ID number and supported bus width
- Firmware revision level
- Firmware release date
- Channel SCSI Bus ID values (hardware jumpered or software selected)
- Front end channel type
- Absence or presence of a SCSI daughter card
- Absence or presence of a Raid Accelerator daughter card
- Serial number of the 4440 Integrated SCSI Controller, if applicable
- Software jumper assignments

Test 2   Extensive On_board Diagnostics

This test executes the vendor-supplied on-board diagnostics. The program runs each test in sequence and verifies that the test completes successfully by analyzing the command completion status.

The following tests are executed:

- ROM
- Scratchpad RAM
- Buffer RAM
- Event RAM
- SCSI Channel n

Variable	Description
n	Specifies the channel number. Channel numbers are 0 through 3, depending on the number of channels.

Note – The on-board diagnostics are described in the vendor documentation.

Test 3   Dump Initialization Parameters

This test issues a `Dump Initialization Block` command and verifies that the command executes successfully. If expanded milestone messages are enabled, the program displays the following initialization block information:

- Maximum number of command queue entries
- DMA burst count
- Normal completion vector
- Error completion vector
- Channel SCSI bus ID numbers
- Command Response Block offset
- Selection timeout value
- Work Queue 0 timeout value
- VME Transfer timeout value
- Controller setup
- Error flag condition

Note – The initialization block values were previously assigned by the diagnostic for testing purposes.

Test 4   Restart Controller

This test verifies the ability of the controller to correctly execute a `Restart Controller` command. The `Restart Controller` command provides a method for resetting the controller and bypassing the power up diagnostics.

After receiving the `Restart Controller` command, the board resets the SCSI ports and flushes all pending internal commands, except `Restart Controller`.

The test performs the following operations:

- Resets the Command Queue Pointer to the base of the command queue.
- Verifies that the Controller Initialization Block (CIB) parameters remain unchanged from their expected values.
- Issues the `Restart Controller` command.
- Verifies that the command completes successfully.
- Verifies that the CIB remains intact.
- Verifies that the board is in Queue Mode if Queue Mode was set previously.

If option `m` on the Initialization Menu is disabled, this test is bypassed and the diagnostic displays the following:

```
Test skipped.
To enable test, select option 'm' in the Initialization Menu.
```

Test 5   VME Interrupts

This test verifies the ability of the controller to generate and respond to VME interrupts. The test enables the interrupt, issues the `Dump Initialization Parameters` command, and verifies that an interrupt is received to indicate command completion. This process is repeated for each of the seven VME interrupt levels.

Test 6   SCSI Bus Reset

This test verifies the ability of the controller to reset the SCSI bus by executing the
`SCSI Reset` command. The test issues the `SCSI Reset` command to the configured
channels and verifies the command completion status.

If option `m` on the Initialization Menu is disabled, this test is bypassed and the
diagnostic displays the following:

```
Test skipped.
To enable test, select option 'm' in the Initialization Menu.
```

The test displays the following for each unconfigured channel. The configuration
selected for testing is determined by option `g` on the Initialization Menu.

```
Channel x is not being reset.
Change option 'g' in the Initialization Menu to reset this channel.
```

Variable	Description
x	Specifies the channel number.

Test 7   Reinitialize Device

This test verifies the ability of the controller to reinitialize a SCSI device by executing
the `SCSI Reinitialize` command. The test issues the
`SCSI Reinitialize` command and verifies the command completion status.

If option `m` on the Initialization Menu is disabled, this test is bypassed and the
diagnostic displays the following:

```
Test skipped.
To enable test, select option 'm' in the Initialization Menu.
```

Test 8   SCSI Configuration

This test checks the current SCSI device configuration. The test is performed for all devices selected during program initialization. The default is to test all devices with logical unit number 0. Refer to Chapter 2 for information about selecting one or all devices.

The test issues a `Restart Controller` command to place the controller and SCSI bus in a known state before determining the device configuration.

If the `Restart Controller` command encounters any type of error, no further testing is performed.

If the `Restart Controller` command executes successfully, the test then performs the following operations for each device selected during program initialization:

■ Issues a `Reinitialize Device` command to the device under test to clear the device connections.

■ Sends a `Test Unit` command to the device under test. If no response is received, no further testing is performed on this device address. If a SCSI Bus Check condition is detected, a `Request Sense` command is issued.

■ Issues an `Inquire` command to the device under test. If the command fails, no further testing is performed on this device. If a SCSI Bus Check condition is detected, a `Request Sense` command is issued.

If the `Inquire` command executes successfully and the device under test is a disk drive, the program then issues the following commands:

■ `Start-Stop`. If the command fails, the program reports an error and repeats the testing sequence for the next device.

■ `Write Buffer`. If the command fails, the program reports an error.

■ `Read Buffer`. If the command fails, the program reports an error.

■ `Send Diagnostic`. Starts the execution of the device on-board self-tests, which usually include read and write operations on tracks not accessible to the user. If the command fails, an error is reported. If a SCSI Bus Check condition occurs, a `Request Sense` command is issued.

■ `Receive Diagnostic`. Obtains the results of the tests executed by the `Send Diagnostic` command. If the command fails, an error is reported. If a SCSI Bus Check condition occurs, a `Request Sense` command is issued.

After each device is tested successfully, the program displays a message indicating the type of device configured. If no devices respond, the program indicates that no devices are configured. Refer to Chapter 4 for descriptions of the Configuration messages.

Note – Enable debug messages during program initialization to observe the SCSI command execution sequence.

The `Send Diagnostic` and `Receive Diagnostic` commands are not executed if option l (`Disk Self-Test.`) on the Initialization Menu is disabled. This option defaults to disabled.

The `Restart Controller`, `Reinitialize Device`, and `Start-Stop` commands are not executed if option m (`SCSIbus Initialization.`) on the Initialization Menu is disabled. This option defaults to enabled.

Refer to Chapter 2 for program initialization information.

Test 10   VME Transfers

This test verifies that the SCSI controller can perform D16 Single, D32 Single, D32 Block, and D64 Block transfers. The test contains the following subtests:

Subtest	Subtest Name
a	Single 32 Bit Transfers
b	Single 16 Bit Transfers
c	32 Bit Block Transfers
d	64 Bit Block Transfers

Use option p on the Initialization Menu to display the Transfer Test Menu. This menu allows you to modify the following values used by the diagnostic during this test.

- Transfer type
- Transfer length
- Transfer size
- Data pattern
- Number of passes

When you select the p option, the diagnostic displays the Transfer Test Menu in the following format:

```
Transfer Test Submenu
Valid Options                        Current State
---------------------------------    ----------------------------
a - Transfer Type                    All Transfer Types
b - Transfer Length                  Variable
c - Transfer Size                    2048 bytes
d - Data Pattern                     All Data Patterns
e - Number of Passes                 1024 passes

q - Quit this submenu.

Enter your selection:
```

Changing the Transfer Type

Use the a option to change the transfer type used during this test. This option toggles between the following selections:

■ All Transfer Types
■ 32 Bit Single Transfers
■ 16 Bit Single Transfers
■ 32 Bit Block Transfers
■ D64 Block Transfers

The default value is All Transfer Types.

Note – Block transfers are performed only if an EDRAM board is configured in the system. If an EDRAM board is configured in the system, all transfers use the EDRAM memory.

Changing the Transfer Length

Use the b option to change the transfer length. This option toggles between Variable and Fixed. The default value is Variable. If you modify the transfer length to Variable and do not set the number of passes to take advantage of the maximum transfer size, the test displays a warning message in the following format:

```
WARNING: Current Maximum Transfer Size of this test is x bytes.
Increase the Number of Passes to y in order to get the max transfer
size.
```

Variable	Description
x	Specifies the maximum transfer size for the selected transfer type.
y	Specifies the number of passes required to take advantage of the maximum transfer size.

Changing the Transfer Size

Use the c option to change the transfer size. The default value is 2048 bytes which is the largest buffer that you can use with the Read/Write Buffer command. Once this option is selected, the program displays the following prompt:

```
Enter the number of bytes = 2048 ;[CR,q,?,#]?
```

Enter a decimal value from 1 through 2048 or one of the standard responses.

Changing the Data Pattern

Use the d option to change the data pattern. This option toggles between the following selections:

- All Data Patterns
- Incrementing
- A5 Pattern
- 5A Pattern
- C3 Pattern
- 3C Pattern
- All Zeros Pattern
- All Ones Pattern

- 78 Pattern
- 87 Pattern

The default is All Data Patterns.

Changing the Number of Passes

Use the e option to change the number of passes the test will execute. The default pass count is 1024. Once this option is selected, the program displays the following prompt:

```
Enter the number of passes = 1024 ;[CR,q,?,#]?
```

Enter a decimal value from 1 through 1024 or one of the standard responses.

Note – If no EDRAM board is configured in the system, subtests c and d are bypassed and CPU memory is used to run subtests a and b.

The Initialization Menu is described in Chapter 2.

Program Messages

The following types of messages are associated with the VME SCSI Controller Diagnostic:

- Monitor
- Start
- Milestone
- Configuration
- Debug
- Debug Displays
- Pass and Error Count
- Error

Monitor Messages

If this diagnostic is configured during automatic testing, the ROM Monitor displays the following program information on the operator's console before calling the diagnostic:

```
Slot n: Loading extended image scsidiag
```

Variable	Description
n	Specifies the slot number of the VME SCSI Controller board.

Note – The ROM Monitor cannot identify the slot associated with an extended diagnostic running in interactive mode.

Start Messages

Once called by the ROM Monitor or loaded interactively, the VME SCSI Controller Diagnostic displays its start message on the operator's console in the following format:

```
Extended SCSI/Printer Diagnostic
Diagnostic Revision: y.y
[Slot: s,] Board CSR Addr: 0xaaaaaaaa – 0xbbbbbbbb
[Copyright year Sun Microsystems, Inc.]
```

Variable	Description
y.y	Specifies the current revision of the diagnostic.
s	Specifies the slot number of the controller board. The slot number is displayed only when the diagnostic is running in automatic mode.
aaaaaaaa	Specifies the default starting address of the memory address range assigned to this board.
bbbbbbbb	Specifies the default ending address of the memory address range assigned to this board.
year	Specifies the year the program was copyrighted. The copyright message is displayed only when the diagnostic is running in interactive mode.

Note – During automatic testing, if the controller under test is a VME Quad Channel SCSI-2 Controller, the Board CSR address line in the start message is displayed twice; once for each CSR address assigned to the controller.

If the diagnostic is running in interactive mode, it then displays the Interactive Mode Options Menu. The interactive mode options are described in the *Sun StorEdge A7000 Diagnostics Reference Manual*.

If you changed the board CSR address during program initialization, the program displays the selected value in the following format:

```
Board CSR Addr: 0xaaaaaaaa – 0xbbbbbbbb
```

Variable	Description
aaaaaaaa	Specifies the selected starting address of the memory address range assigned to this board.
bbbbbbbb	Specifies the selected ending address of the memory address range assigned to this board.

Milestone Messages

Milestone messages are displayed only when the diagnostic is running in interactive mode. As each test starts, the diagnostic displays a test milestone in the following format:

```
Running Test tt: testname
```

Variable	Description
tt	Specifies the test number.
testname	Specifies the name of the test.

The program may also display the following types of milestone messages during program execution:

- Initialization milestones
- Test Specific milestones

Initialization Milestones

If you enabled milestone messages from the Initialization Menu, the program displays a series of messages prior to executing the tests. After displaying the Start message, the program verifies that the selected controller is available and resets successfully. The following messages are displayed during these operations:

```
Wait 5 seconds after controller reset.
SCSI controller passed power_up diagnostics
SCSI controller available
```

The program then begins controller initialization and displays the following
message:

```
Initializing Controller.................................
```

Test Specific Milestones

In addition to the milestone message displayed for each test, the program displays
additional test specific messages during test execution. These messages are
displayed only when the diagnostic is running in interactive mode.

Test 1 Milestones

During Test 1, the program displays the board information in the following format:

```
Board CSR Address: 0xcsr
Board ID = id (bus)
[Factory Installed Serial Number: serno]

[TARGET EMULATION SUPPORTED.]

Firmware Revision Level: rev Firmware Release Date: mm/dd/year

Daughter Card x Status: status

Channel 0 SCSI Bus ID:yy(HW|SW)  [Channel 1 SCSI Bus ID:yy(HW|SW)]
[Channel 2 SCSI Bus ID:yy(HW|SW)] [Channel 3 SCSI Bus ID:yy(HW|SW)]

[Channel n is a type]

Jumper Settings (0xbbbb):
  Bit    a: description
    .
    .
    .
```

Variable	Description
csr	Specifies the starting address of the memory address range assigned to this board.
id	Specifies the board ID: `4220` or `4440`.
bus	Specifies the bus width: `Narrow` or `Wide`.
serno	Specifies the controller serial number.
rev	Specifies the firmware revision level.
mm/dd/year	Specifies the firmware release date in month/day/year format.
x	Specifies the daughter card number: `0` or `1`.

status	Specifies one of the following messages determined by the configuration:
	
	`SCSI card installed.`
	
	`Raid Accelerator card installed.`
	
	`Not present.`

yy	Specifies the SCSI Bus ID number.
n	Specifies the channel number.
type	Specifies the front end channel type.
bbbb	Specifies the hexadecimal value of the software jumper settings. This value is determined by the controller type and the jumper settings.
a	Specifies the software jumper bit number. The number of bits displayed is determined by the controller type.
description	Specifies a description of the software jumper bit function.

Test 2 Milestones

Test 2 milestone messages are identical to the *Initialization Milestones*.

Test 3 Milestones

During Test 3, the program displays the initialization parameters in the following format if you enabled milestone messages from the Initialization Menu:

```
Max number of Command Queue Entries:10
DMA Burst Count: 0x0 (Keep the VMEbus until done)
Normal Completion Vector: 0x45aError Completion Vector:0x45e
Channel 0 SCSI Bus ID (HW|SW):x  [Channel 1 SCSI Bus ID (HW|SW):x]
[Channel 2 SCSI Bus ID (HW|SW):x] [Channel 3 SCSI Bus ID (HW|SW):x]
Command Response Block Offset: 0x73c
Selection Timeout: 250 msecs
Work Queue 0 Timeout: 0x64 (25600 msecs)
VME Transfer Timeout Value: val
SCSI controller is setup for onboard IOPBs.
No SCSI Error flags set.
```

Variable	Description
x	Specifies the SCSI Bus ID number.
val	Specifies either the VME Transfer Timeout value or `Unsupported`.

Note – The values provided in the sample messages are assigned by the diagnostic for testing purposes only. The values used during normal system operation vary with the system configuration.

Test 4 Milestones

During Test 4, if you enabled milestone messages, the program displays the following message before executing the Restart Controller command:

```
Check CIB values before executing Restart Command
```

After executing the Restart Controller command, the program displays:

```
Check CIB values after executing Restart Command
```

Test 8 Milestones

If you enabled Target Mode during program initialization and a loopback cable is installed, the program displays the following milestone message during Test 8:

```
Verifying Cable Data Integrity
```

Note – The loopback cable is for manufacturing use only.

Test 8 configuration-related milestone messages are described in the *Configuration Messages* section.

Test 10 Milestones

Test 10 displays the following milestone messages during test execution:

■ Before starting the subtests, the test displays:

```
Controller Addresses:
  Input Buffer Base Address  = 0x40000000
  Output Buffer Base Address = 0x50000000
Cpu Addresses (Master Page 2):
  Input Buffer Base Address  = 0xc0000000
  Output Buffer Base Address = 0xd0000000
```

Note – The addresses in the display are for example only and will vary with the configuration.

■ As each subtest starts, the test displays a subtest milestone message in the following format if you enabled milestone messages:

```
Subtest n.  subtest name
```

Variable	Description
n	Specifies the subtest letter.

subtest name	Specifies the subtest name:
	`Single 32 Bit Transfers`
	`Single 16 Bit Transfers`
	`32 Bit Block Transfers`
	`64 Bit Block Transfers`

Configuration Messages

Configuration messages are displayed by Test **8** during interactive mode testing only. The program displays the following message for each configured device detected during the test:

```
ch dev lun configured as device [(vendor  product) (Serial# nnnnn)]
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.
lun	Specifies the logical unit number for the device.
device	Specifies the name of the SCSI device. For example, `disk drive` specifies a SCSI disk device or controller channel.
vendor	Specifies the vendor ID number.
product	Specifies the product ID number.
nnnnn	Specifies the device serial number (for disk drives only).

If you enabled Target Mode during program initialization and a loopback cable is installed, the following information is displayed in the configuration message for each device:

```
ch dev lun configured as disk drive (SUN MICROSYSTEMS) (Serial# 55555555)
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.
lun	Specifies the logical unit number for the device.

If all devices with logical unit 0 are selected for testing and none of the devices are configured or they do not respond, the program displays:

```
No SCSI devices configured
```

If an individual device is not configured or does not respond, the program displays:

```
ch dev lun not configured
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.
lun	Specifies the logical unit number for the device.

If logical unit testing is selected and no logical units are supported off a given channel and target, the following message is displayed:

```
No logical units configured off channel ch target dev
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.

If the program is initialized to test all SCSI devices, the channel SCSI IDs are identified with the following message:

```
ch dev lun configured as Channel n controller id
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.
lun	Specifies the logical unit number for the device.
n	Specifies the channel number.

If the program is initialized to test all SCSI devices and Initiator Mode is enabled, the ATTO firmware revision is reported with the following type of message after all the configured devices are identified:

```
ch dev lun configured as CPU device (ATTO SCSIExpander) (Revision#rev)
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.
lun	Specifies the logical unit number for the device.
rev	Specifies the revision of the ATTO firmware.

Debug Messages

Debug messages provide detailed test information during program execution. You enable the display of debug messages during program initialization. Refer to Chapter 2 for program initialization information.

Note – Refer to the ANSI SCSI Specification, the controller vendor documentation, and the disk drive vendor documentation to interpret the debug information.

This section describes the following types of debug messages:

- Initialization
- Controller command
- SCSI command
- SCSI Bus status
- Test Specific

Initialization Debug Messages

If you enabled Target Mode and the Wide bus size during program initialization, the following debug messages display before testing starts:

```
Running on a Viper with the 2GB Modification.
D: master page = 0xpg mem_base = 0xbaseaddr
```

Variable	Description
pg	Specifies the master page value.
baseaddr	Specifies the starting memory address.

The program displays the following message after the `Initialize Controller` command executes successfully:

```
Using Extended SCSI Addressing.
```

If Target mode or Wide bus size is enabled, the extended SCSI addressing is in the IOPB field.

Controller Command Debug Messages

As the program issues commands to the controller, it displays a series of debug messages to identify the progress of command execution. When a command is issued, the program displays a message in the following format:

```
Sending cmd
```

If the command is configured to interrupt when done, the program then displays:

```
Waiting for command to complete
int rcvd = x   timer_rcvd = y
```

If the command executes successfully, the program displays:

```
cmd Completed Successfully
```

Variable	Description
cmd	Specifies one of the following controller commands: INITIALIZE CONTROLLER RUN EXTENSIVE DIAGNOSTICS DUMP INITIALIZATION PARAMETERS RESTART CONTROLLER SCSI RESET (**Channel** *n*) INITIALIZE WORK QUEUE REINITIALIZE DEVICE for *ch dev lun*
n	Specifies the channel number.
ch	Specifies the channel address.
dev	Specifies the device ID number.
lun	Specifies the logical unit number for the device.
x	Specifies whether an interrupt occurred to signal command completion (1=interrupt received, 0=no interrupt received).
y	Specifies whether a timeout condition occurred (1=timeout occurred, 0=no timeout occurred).

If an error or exception condition occurs during the execution of a command and debug messages are enabled, the program displays the contents of the Command Response Block in place of the command completion message. The Command Response Block display is shown in FIGURE 4-1. Only SCSI commands display the crb.iopb_SCSI[] values.

Additional messages associated with individual commands are described in the following sections.

```
crb_CRSW = 0x6
crb_CTAG = 0x802
crb_ISIZE = 0x0
crb_WQNO = 0x0
crb.iopb_CMD = 0x20
crb.iopb_OPT = 0x1
crb.iopb_STAT = 0x30
crb.iopb_NVEC = 0x1a
crb.iopb_EVEC = 0x1e
crb.iopb_ILEVEL = 0x4
crb.iopb_ATYPE = 0x10d
crb.iopb_BADDR = 0x3f61abcc
crb.iopb_SIZE = 0x400000
crb.iopb_UNIT = 0x0080
crb.iopb_SCSI[0] = 0x0
crb.iopb_SCSI[1] = 0x0
crb.iopb_SCSI[2] = 0x0
crb.iopb_SCSI[3] = 0x0
crb.iopb_SCSI[4] = 0x0
crb.iopb_SCSI[5] = 0x0
crb.iopb_SCSI[6] = 0x0
crb.iopb_SCSI[7] = 0x0
crb.iopb_SCSI[8] = 0x0
crb.iopb_SCSI[9] = 0x0
```

FIGURE 4-1   Command Response Block Contents

Note – The values displayed in FIGURE 4-1 are for example only. The actual values are determined by the configuration.

The crb.iopb_SCSI[] values are displayed only by SCSI commands.

Run Extensive Diagnostics Command

If the Run Extensive Diagnostics command executes successfully, the program reinitializes the controller and displays the *Initialization Milestone Messages.*

Restart Controller Command

While waiting for the Restart Controller command to complete, the program displays:

```
Timed Delay to wait for SCSI bus to recover from RESTART
```

Initialize Work Queue Command

When the Initialize Work Queue command is issued, the program displays:

```
Initializing Work Queue n
```

Variable	Description
n	Specifies the work queue number. Valid numbers are 1 through 255.

SCSI Command Debug Messages

The following debug messages display during the execution of SCSI commands:

- When the program issues a SCSI command, it displays a message in the following format:

```
Sending SCSI command cmd (code) on ch dev lun
```

- If the command is configured to interrupt when done, the program displays:

```
Waiting for command to complete
int rcvd = x   timer_rcvd = y
```

- If the command executes successfully, the program displays:

```
cmd Command Completed Successfully
```

Variable	Description
cmd	Specifies one of the following SCSI commands: TEST UNIT REQUEST SENSE INQUIRE START-STOP WRITE BUFFER READ BUFFER SEND DIAGNOSTIC RECEIVE DIAGNOSTIC
code	Specifies the SCSI command code.
ch	Specifies the channel under test.
dev	Specifies the device under test.
lun	Specifies the logical unit number.
x	Specifies whether an interrupt occurred to signal command completion (1=interrupt received, 0=no interrupt received).
y	Specifies whether a timeout condition occurred (1=timeout occurred, 0=no timeout occurred).

If an error or exception condition occurs during the execution of a SCSI command, the program displays the contents of the Command Response Block in place of the command completion message. The Command Response Block display is shown in FIGURE 4-1.

Additional messages associated with individual commands are described in the following sections.

`Test Unit` Command

If no response is received from the device when a `Test Unit` command is issued, the program displays:

```
ch dev lun not configured
```

If a logical unit under test is not supported, the program displays:

```
Channel ch Target dev doesn't support Logical Unit lun
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.
lun	Specifies the logical unit number for the device.

`Inquire` Command

After issuing the `Inquire` command, the program displays the following debug message:

```
Inquire Buffer Data is at 0xbbbbbbbb
```

Variable	Description
bbbbbbbb	Specifies the starting address of the inquire data buffer. To read the inquire buffer data, run one pass of the diagnostic, exit the Interactive Mode Options Menu, and use the ROM Monitor `readmem` command to read 0x100 locations starting at this address. Inquire data is described in the ANSI SCSI Specification.

The program also displays the following debug message:

```
ch dev lun is a SCSI-n device
```

Variable	Description
ch	Specifies the channel under test.
dev	Specifies the device under test.
lun	Specifies the logical unit number.
n	Specifies the SCSI device type (1 or 2).

Request Sense Command

After issuing the `Request Sense` command, the program displays:

```
Sense Buffer Data is at 0xaaaaaaaa
```

Variable	Description
aaaaaaaa	Specifies the starting address of the sense data buffer. To read the sense buffer data, run one pass of the diagnostic, exit the Interactive Mode Options Menu, and use the ROM Monitor `readmem` command to read 0x20 locations starting at this address. Sense data is described in the ANSI SCSI Specification.

If valid sense data is returned, the program displays the following sense information:

```
Sense Byte 0 = 0xaa
Sense Byte 2 = 0xbb   Sense Key = 0xkey
Additional Sense Code = 0xcode
Additional Sense Code Qualifier = 0xqual
Sense Key = 0xkey: description
```

Variable	Description
aa	Specifies the value of Sense Byte 0.
bb	Specifies the value of Sense Byte 2.
key	Specifies the Sense Key value.
code	Specifies the additional Sense code value.
qual	Specifies the additional Sense code qualifier value.
description	Specifies a message describing the Sense Key value.

Receive Diagnostic Command

After issuing the Receive Diagnostic command, the program displays:

```
Receive Diagnostic Data is at 0xaaaaaaaa
```

Variable	Description
aaaaaaaa	Specifies the location of the Receive Diagnostic data.

If an error is detected, the program also displays:

```
Receive Diagnostic Data:
Additional Length = length
FRU Code = 0xfru
Error Code = 0xerror
```

Variable	Description
length	Specifies the hexadecimal and decimal number of bytes allocated for returned diagnostic data.
fru	Specifies the value of the field replaceable unit (FRU) code.
error	Specifies the value of the error code.

Note – If either the FRU or error code is non zero, both are displayed regardless of the state of debug messages.

SCSI Bus Status Message

If SCSI Bus status other than GOOD is received after the execution of a SCSI command, the program displays the following message:

```
SCSI Bus Status: stat
```

Variable	Description
stat	Specifies a message describing the SCSI bus status. For example: Check Condition has occurred. Condition Met. Target is Busy. Intermediate status returned. Intermediate Condition Met.

Test Specific Debug Messages

The following sections describe debug messages that are specific to individual tests.

Test 8 Debug Messages

When run in Target Mode, the controller automatically responds to the Test Unit, Request Sense, and Inquiry commands. In Target Mode, the SCSI Start-Stop command causes a Target Mode interrupt. The host responds to the interrupt with a Continue Target command. Test 8 displays a series of debug messages during the execution of the SCSI Start-Stop command when these options are enabled.

■ The test first displays the following SCSI command debug messages:

```
Sending SCSI command START-STOP (0x1b) on ch dev lun
Waiting for command to complete
int rcvd = x  timer_rcvd = y
```

Variable	Description
ch	Specifies the channel address.
dev	Specifies the device ID number.

Variable	Description
lun	Specifies the logical unit number for the device.
x	Specifies whether an interrupt occurred to signal command completion (1=interrupt received, 0=no interrupt received).
y	Specifies whether a timeout condition occurred (1=timeout occurred, 0=no timeout occurred).

- The test then displays the following Target Mode debug messages:

```
Target Mode Interrupt
Target Mode CRSW = 0x8001
Status = stat
device reg = aaaa
TM CRB received on Bus b
SCSI ID of Initiator id
LUN 0
CDB Length: 0x6
Queue Tag: tag
SCSI CDB[0]=0x1b
SCSI CDB[1]=0x0
SCSI CDB[2]=0x0
SCSI CDB[3]=0x0
SCSI CDB[4]=0x1
SCSI CDB[5]=0x0
Extended Tag: 0x1
```

Note – The values in the message display are for example only. The actual values are determined by the configuration.

Variable	Description
stat	Specifies the controller status.
aaaa	Specifies the unit address.
b	Specifies the SCSI bus number. Valid bus numbers are 0 to 3.
id	Specifies the SCSI ID of the device. Valid numbers are 0 to 15.
tag	Specifies the queue tag value. Valid values are: 0 = none 1 = simple 2 = ordered 3 = end of queue

■ When the test receives a Target Mode Interrupt Vector (0x99), it issues a
  Continue Target command and displays:

```
Sending CONTINUE TARGET Command
Waiting for Continue Target command to complete
int rcvd = x timer_rcvd = y
```

Variable	Description
x	Specifies whether an interrupt occurred to signal command completion (1=interrupt received, 0=no interrupt received).
y	Specifies whether a timeout condition occurred (1=timeout occurred, 0=no timeout occurred).

■ While the test waits for the original command to complete, it displays:

```
Finish Waiting for original cmd to complete
int rcvd = x timer_rcvd = y
```

■ The following message indicates command completion:

```
START-STOP Command Completed Successfully
```

Test 10 Debug Messages

The following debug messages are specific to Test 10 (VME Transfers Test):

■ When the test determines the presence of EDRAM memory, it displays:

```
D: get_buf: Expansion Memory Available.
diagmem.mem_base = 0xbase
diagmem.mem_size = 0xsize
```

Variable	Description
base	Specifies the base address of expansion memory.
size	Specifies the size of expansion memory.

■ As each subtest starts, the program displays a debug message in the following format:

```
xfertype VME Transfer Type (0xmod)
```

Variable	Description

xfertype	Specifies the transfer type used during this subtest:
	`Single 32 Bit`
	`Single 16 Bit`
	`32 Bit Block`
	`D64 Block`

mod	Specifies the VME address modifier used during this subtest.

■ When a subtest issues a command, it displays debug messages in the following format:

```
Sending cmd Command, xfertype VME Transfer Type, Pass: p
Buffer Address: 0xaddr
Transfer Size: 0xsize
```

Variable	Description
cmd	Specifies the command: `WRITE BUFFER FIFO` or `READ BUFFER FIFO`.

xfertype	Specifies the transfer type used during this subtest:
	`Single 32 Bit`
	`Single 16 Bit`
	`32 Bit Block`
	`D64 Block`

p	Specifies the pass number.
addr	Specifies the data buffer address.
size	Specifies the transfer size.

■ The subtest displays the following debug messages while waiting for command completion:

```
Waiting for command to complete
int rcvd = x  timer_rcvd = y
```

Variable	Description
x	Specifies whether an interrupt occurred to signal command completion (1=interrupt received, 0=no interrupt received).
y	Specifies whether a timeout condition occurred (1=timeout occurred, 0=no timeout occurred).

■ The following message indicates command completion:

```
cmd Command Completed Successfully
```

Variable	Description
cmd	Specifies the command: WRITE BUFFER FIFO or READ BUFFER FIFO.

Debug Displays

The Debug Menu provides options you can use to display the contents of the following program areas:

■ Master Control/Status Block (MCSB)
■ Master Command Entry (MCE)
■ Command Queue
■ Control Response Block (CRB)
■ Configuration Status Block (CS)

Use option b on the Initialization Menu to display the Debug Menu.

Note – The values shown in the sample displays in this section are for example. The actual values displayed are determined by the configuration.

Dumping the Master Control/Status Block (MCSB)

Use option a on the Debug Menu to display the contents of the Master Control/ Status Block (MCSB). A sample display follows.

TABLE 4-1   Master Control/Status Block Display Example

```
Master Control/Status Block (MCSB)
MSR       = 0x2 (Board OK)
MCR       = 0x0
IQAR      = 0x0
QHP       = 0x1c
TWQR      = 0x0
```

Dumping the Master Command Entry (MCE)

Use option b on the Debug Menu to display the contents of the Master Command Entry (MCE). A sample display follows.

TABLE 4-2   Master Command Entry Display Example

```
Master Command Entry
QECR             = 0x0 (WQ 0 Available)
IOPB_ADDR        = 0x94
COMMAND_TAG_H    = 0x0
COMMAND_TAG_L    = 0x1eff
IOPB_LEN         = 0x0
WORK_QUEUE_N     = 0x0
```

Dumping the Command Queue

Use option c on the Debug Menu to display the contents of the command queue. A
sample display follows.

TABLE 4-3   Command Queue Display Example

```
Command Queue Entry
0:QECR            = 0x0
0:IOPB_ADDR       = 0x0
0:COMMAND_TAG_H   = 0x0
0:COMMAND_TAG_L   = 0x0
0:IOPB_LEN        = 0x0
0:WORK_QUEUE_N    = 0x0

1:QECR            = 0x0
1:IOPB_ADDR       = 0x0
1:COMMAND_TAG_H   = 0x0
1:COMMAND_TAG_L   = 0x0
1:IOPB_LEN        = 0x0
1:WORK_QUEUE_N    = 0x0

2:QECR            = 0x0
2:IOPB_ADDR       = 0x0
2:COMMAND_TAG_H   = 0x0
2:COMMAND_TAG_L   = 0x0
2:IOPB_LEN        = 0x0
2:WORK_QUEUE_N    = 0x0

3:QECR            = 0x0
3:IOPB_ADDR       = 0x0
3:COMMAND_TAG_H   = 0x0
3:COMMAND_TAG_L   = 0x0
3:IOPB_LEN        = 0x0
3:WORK_QUEUE_N    = 0x20

4:QECR            = 0x0
4:IOPB_ADDR       = 0x0
4:COMMAND_TAG_H   = 0x0
4:COMMAND_TAG_L   = 0x0
4:IOPB_LEN        = 0x0
4:WORK_QUEUE_N    = 0x0

5:QECR            = 0x0
5:IOPB_ADDR       = 0x0
5:COMMAND_TAG_H   = 0x0
5:COMMAND_TAG_L   = 0x0
5:IOPB_LEN        = 0x0
5:WORK_QUEUE_N    = 0x0
```

TABLE 4-3 Command Queue Display Example *(Continued)*

```
6:QECR             = 0x0
6:IOPB_ADDR        = 0x0
6:COMMAND_TAG_H    = 0x0
6:COMMAND_TAG_L    = 0x0
6:IOPB_LEN         = 0x0
6:WORK_QUEUE_N     = 0x0

7:QECR             = 0x0
7:IOPB_ADDR        = 0x0
7:COMMAND_TAG_H    = 0xa
7:COMMAND_TAG_L    = 0x0
7:IOPB_LEN         = 0x0
7:WORK_QUEUE_N     = 0x64

8:QECR             = 0x0
8:IOPB_ADDR        = 0x0
8:COMMAND_TAG_H    = 0x0
8:COMMAND_TAG_L    = 0x0
8:IOPB_LEN         = 0x0
8:WORK_QUEUE_N     = 0x0

9:QECR             = 0x0
9:IOPB_ADDR        = 0x6969
9:COMMAND_TAG_H    = 0x6969
9:COMMAND_TAG_L    = 0x6900
9:IOPB_LEN         = 0x0
9:WORK_QUEUE_N     = 0x0
```

Dumping the Control Response Block (CRB)

Use option d on the Debug Menu to display the contents of the Control Response Block (CRB). A sample display follows.

TABLE 4-4   Control Response Block Display Example

```
Control Response Block
CRSW              = 0x2
CMD_TAG_HI        = 0x0
CMD_TAG_LO        = 0x1eff
IOPB_LEN          = 0x0
WQN               = 0x0
IOPB_0            = 0x53 (command)
IOPB_1            = 0x1 (Interrupt Mode)
IOPB_2            = 0x0 (returned status)
IOPB_3            = 0x0
IOPB_4            = 0xa0e
IOPB_5            = 0x4
IOPB_6            = 0x0
IOPB_7            = 0xc0d
IOPB_8            = 0x4000
IOPB_9            = 0x0
IOPB_10           = 0x0
IOPB_11           = 0x800
IOPB_12           = 0x0
IOPB_13           = 0x0
IOPB_14           = 0x0
IOPB_15           = 0x0
PKT_0             = 0x0
PKT_1             = 0x0
PKT_2             = 0x0
PKT_3             = 0x0
PKT_4             = 0x0
PKT_5             = 0x0
PKT_6             = 0x0
PKT_7             = 0x0
PKT_8             = 0x0
PKT_9             = 0x0
PKT_10            = 0x0
PKT_11            = 0x0
```

Dumping the Configuration Status Block (CSB)

Use option e on the Debug Menu to display the contents of the Configuration Status Block (CSB). A sample display follows.

TABLE 4-5   Configuration Status Block Display Example

```
Configuration Status Block
Board ID                       = 0x4440
Extended Board ID              = 0x4
Product Code Byte 0            = 0x30
Product Code Byte 1            = 0x37
Product Code Byte 2            = 0x37
Raid Memory Info               = 0x0
Firmware Type                  = 0xf
Variation                      = 0x34
Raid ID Info                   = 0x0
Reserved Byte                  = 0x0
Firmware Rev Byte 0            = 0x44
Firmware Rev Byte 1            = 0x30
Firmware Rev Byte 2            = 0x36
Reserved Word                  = 0x0
Firmware Date Byte 0           = 0x30
Firmware Date Byte 1           = 0x32
Firmware Date Byte 2           = 0x30
Firmware Date Byte 3           = 0x34
Firmware Date Byte 4           = 0x31
Firmware Date Byte 5           = 0x39
Firmware Date Byte 6           = 0x39
Firmware Date Byte 7           = 0x37
Cpu Ram Size                   = 0x1fc
Buffer Size                    = 0x400
Available Work Queues          = 0x100
Channel 0 FE Channel Type      = 0x3
Channel 1 FE Channel Type      = 0x3
Channel 0 ID                   = 0x0
Channel 1 ID                   = 0x1
Last Channel 0 ID              = 0x3
Last Channel 1 ID              = 0x3
Channel 0 Phase                = 0x0
Channel 1 Phase                = 0x0
Extended DCID                  = 0x1
```

TABLE 4-5 Configuration Status Block Display Example *(Continued)*

```
Daughter Card ID              = 0xf
Software Jumper               = 0x5201
Channel 0 Sync Neg            = 0x19
Channel 1 Sync Neg            = 0x19
Frozen Work Queue Reg         = 0x0
Channel 2 FE Channel Type     = 0x3
Channel 3 FE Channel Type     = 0x3
Channel 2 ID                  = 0x2
Channel 3 ID                  = 0x3
Last Channel 2 ID             = 0x3
Last Channel 3 ID             = 0x2
Channel 2 Phase               = 0x0
Channel 3 Phase               = 0x0
Channel 2 Sync Neg            = 0x19
Channel 3 Sync Neg            = 0x19
Primary OEM Serial number     = 0x012300020003
Secondary OEM Serial number   = 0x000100020003
Primary MFG Serial number     = 0x000100020003
Secondary MFG Serial number   = 0x000100020003
```

Pass and Error Count Messages

If the diagnostic is running during the automatic testing sequence, it displays `PASS` when the program executes successfully or `FAIL` if the program fails.

If the diagnostic is running in interactive mode, the following message displays after each pass completes:

```
Pass Count: pppppppp
```

If an error occurs, the program displays the number of errors at the end of each pass in the following format:

```
Pass Count: pppppppp, Error Count: eeeeeeee
```

Variable	Description
pppppppp	Specifies the number of program passes completed.
eeeeeeee	Specifies the number of errors encountered since the program started execution.

Error Messages

If an error is detected during interactive mode testing, the diagnostic displays an error header and message in the following format:

```
Extended SCSI/Printer Diagnostic Failed       Time:hh:mm:ss
Board CSR Addr: 0xaaaaaaaa - 0xbbbbbbbb  [Int Priority Level: x]
Error: Slot s: CPU n: SCSI: Test t:  test name
        error message
```

Variable	Description
hh:mm:ss	Specifies the system elapsed time when the error occurred.
aaaaaaaa	Specifies the starting address of the memory address range assigned to this board.
bbbbbbbb	Specifies the ending address of the memory address range assigned to this board.
x	Specifies the interrupt priority level. The priority level displays only if interrupts are enabled.
s	Specifies the slot number of the VME SCSI Controller board. When the diagnostic is running in interactive mode, the board slot number is always reported as 0.
n	Specifies the number of the CPU running the diagnostic.
t	Specifies the number of the failing test. If an error occurs during the initialization sequence, the test number is reported as 0.
test name	Specifies the name of the failing test.
error message	Specifies one of the following types of error messages: Initialization Timeout Exception Condition Command Execution Interrupt Configuration On-board Diagnostic

Initialization Error Messages

If the controller is inoperable, the program displays:

```
SCSI controller has failed to operate
```

If the controller is unable to execute commands, the program displays:

```
SCSI controller not available for commands.
```

If the onboard power up diagnostics fail to execute correctly, the program displays:

```
SCSI controller detected failure during power_up diagnostics
```

If the Control/Status Register (CSR) address is not a multiple of 0x800 during the program initialization sequence for automatic testing, the program displays:

```
Invalid board CSR address
```

If you enabled the Wide bus size and the channel does not support wide transfers, the program displays:

```
User selected Wide Transfers.
Channel n does not support wide transfers.
```

Variable	Description
n	Specifies the number of the channel under test.

If you enabled the Wide bus size and the controller does not support wide transfers, the program displays:

```
User selected Wide Transfers.
This controller does not support wide transfers.
```

If you selected a SCSI ID greater than 7 and the controller does not support wide transfers, the program displays:

```
User selected Channel n SCSI Id greater than 7.
This controller does not support Channel SCSI Ids greater than 7.
```

Variable	Description
n	Specifies the number of the channel under test.

If you enabled Target Mode and the controller does not support Target Mode, the program displays:

```
User selected Target Mode.
This controller does not support Target Mode.
```

If you selected a Channel SCSI ID greater than 7 but did not enable the Wide bus size, the program displays:

```
User selected Channel n SCSI Id greater than 7.
The diagnostic must be initialized to run WIDE.
See option (o) in the Initialization Menu.
```

Variable	Description
n	Specifies the number of the channel under test.

Timeout Error Messages

If a command completes with a timeout, the program displays an error message in the following format:

```
Timeout occurred during execution of the
cmd command
```

Variable	Description
cmd	Specifies the command under execution when the timeout occurred.

If a timeout occurs during the execution of the SCSI Configuration test (Test 8), the program displays an error message in the following format:

```
cmd Command Timed Out [for ch dev lun]
```

Variable	Description
cmd	Specifies the command under execution when the timeout occurred.
ch	Specifies the channel under test.
dev	Specifies the device under test.
lun	Specifies the logical unit number.

Note – The channel, device, and logical unit number do not display for the Restart and Reinitialize Device commands.

Exception Condition Error Messages

If a command completes with an exception condition, the program displays an error message in the following format:

```
The cmd Command completed with an exception.
```

Variable	Description
cmd	Specifies the command executing when the exception occurred.

Command Execution Error Messages

If the program is unable to issue any commands, it displays:

```
Unable to successfully issue cmd command
```

Variable	Description
cmd	specifies the command the program was unable to issue.

If the program is unable to place the controller in Queue Mode, it displays:

```
Unsuccessful changeover to Queue Mode.
```

If a command completes with a defined vendor error code, the program displays:

```
Error Code: 0xa
message
```

Variable	Description
a	Specifies the vendor-defined error code associated with this failure.
message	Specifies the vendor error message associated with this error code.

If a command completes with an error and a zero error code, the program displays:

```
cmd command completed with error but
returned an error code of zero, which is undefined.
```

Variable	Description
cmd	Specifies the failing command.

If an undefined SCSI error flag value is detected after executing the `Display Initialization Parameters` command, the program displays:

```
Undefined SCSI Error Flag setting
```

Interrupt Error Messages

If an interrupt is expected but not received, Test 5 displays:

```
VME interrupt was not received.
```

If an interrupt is received but the status indicates an error occurred, the program displays:

```
Bad Interrupt Status
Expected Status = 0xee  Actual Status = 0xaa
```

Variable	Description
ee	Specifies the expected interrupt status value.
aa	Specifies the actual interrupt status value posted.

Configuration Error Messages

If the SCSI Bus ID number in the Configuration Status Block does not match the value used for initialization, Test 1 displays:

```
Channel n SCSI Bus ID in Configuration Status Block does not match
initialized value.
```

Variable	Description
n	Specifies the channel number.

If the SCSI daughter card ID number is undefined, the program displays:

```
Daughter Card Status: Undefined Daughter Card ID.
```

If the parameters obtained from executing the `Dump Initialization Parameters` command do not match the initialized values, the program displays:

```
Initialization Parameters do not compare with expected values.
Address = 0xbbbbbbbb      Expected = 0xee
Address = 0xdddddddd      Actual = 0xaa
```

Variable	Description
bbbbbbbb	Specifies the expected parameter address.
ee	Specifies the expected parameter value.
dddddddd	Specifies the actual parameter address.
aa	Specifies the actual parameter value.

If Test 1 determines that the 4440 Integrated SCSI Controller serial number is not valid, the test displays:

```
Serial Number byte n has invalid data = 0xnum
```

Variable	Description
n	Specifies the number of the byte in error (0 through 5).
num	Specifies the invalid serial number value. A valid serial number ranges from 0x30 through 0x39.

If option g was used to select an invalid channel for the controller under test, Test 6 displays:

```
Channel n is an invalid selection for this type of SCSI Controller.
```

Variable	Description
n	Specifies the selected channel number.

If option g was used to select an invalid channel for the controller under test, Test 8 displays:

```
Channel n is an invalid channel for testing with this SCSI
Controller.
```

Variable	Description
n	Specifies the selected channel number.

If a loopback cable is installed and the SCSI Bus ID values are programmed incorrectly, Test **8** displays:

```
NOTE: Check port termination and cable connections.
      Also check for conflicting scsi ids.
      The Initialization Menu provides options for
      reprogramming the channel ids.
```

On-board Diagnostic Error Messages

If an error is detected during the execution of the on-board diagnostics, the program displays:

```
testname Test....FAILED
```

Variable	Description
testname	Specifies the name of the failing on-board diagnostic test.