MODEL SQ739

DISK AND TAPE CONTROLLER

INSTALLATION AND OPERATION MANUAL

REVISION B

21-October-91

Update manual for firmware changes
## Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-June-91</td>
<td>Initial Release</td>
</tr>
<tr>
<td>21-October-91</td>
<td>Update manual for firmware changes</td>
</tr>
</tbody>
</table>

# Table Of Contents

1 - Introduction .............................................................................................................. 4
2 - Specifications ............................................................................................................ 5
   Controller Specification ......................................................................................... 5
   Controller Characteristics ............................................................................... 6
3 - Host Adapter Installation ..................................................................................... 9
   Host Adapter Configuration ............................................................................. 10
   Jumper Configuration ...................................................................................... 11
   Switch Configuration ...................................................................................... 11
4 - Operation ................................................................................................................... 12
   Serial Port Initiation ......................................................................................... 12
   Virtual Terminal Initiation ............................................................................... 13
      Virtual Terminal - LSI/11 Based Systems ....................................................... 13
      Virtual Terminal - MicroVAX II and MicroVAX III ....................................... 14
   IP and SA Addresses .................................................................................... 15
      MSCP Emulation ....................................................................................... 15
      TMSCP Emulation .................................................................................... 15
5 - Dilog On-Board Diagnostics ............................................................................... 16
   Diagnostic Main Menu .................................................................................... 16
   Controller Utility Menu .................................................................................. 16
      Option #1 ........................................................................................................ 16
      Option #2 ........................................................................................................ 17
      Option #3 ........................................................................................................ 18
      Option #4 ........................................................................................................ 18
   Controller Configuration Menu .................................................................... 19
      Unit Mapping Menu .................................................................................... 20
6 - Host Based Diagnostics ......................................................................................... 23
   Startup - LSI/11 Systems ................................................................................. 23
   Disk Emulation Diagnostics ............................................................................ 23
      Front End Test - ZRCFB3 ............................................................................ 23
      Disk Exerciser - ZRCDA1 ........................................................................... 25
   Tape Emulation Diagnostics ............................................................................ 29
      Front End Test for TK50 - ZTKAC0 ............................................................... 29
      TK50 Data Reliability Test - ZTKBB0 ............................................................ 30
   MicroVAX II System Diagnostics ..................................................................... 32
      MDM Diagnostic for Tape ........................................................................... 32
      MDM Diagnostics for Disk .......................................................................... 32
7 - Errors and Troubleshooting .................................................................................. 33
8 - Error Logs ................................................................................................................ 34
   Host Memory Access Error Log ................................................................... 34
   Disk Transfer Error Log ............................................................................... 35
   Disk SDI Error Log ......................................................................................... 36
   Tape Transfer Error Log .............................................................................. 37
      Exabyte EXB-8200 Error Log Definition .................................................... 38
9 - Standard Error Codes ............................................................................................ 40
   Self Test Error Codes ....................................................................................... 40
   Fatal SA Error Codes .................................................................................... 40
   VMS Error Codes ........................................................................................... 42
      MSCP ........................................................................................................... 42
      TMSCP ........................................................................................................ 43
1 - Introduction

The SQ739 is a high performance dual-wide Qbus Host Adapter which supports the SCSI interface. The host adapter is compatible with the DEC Mass Storage Control Protocol (MSCP) for disk and tape devices (TMSCP). The host adapter supports the DEC Qbus systems including the 11/23, 11/73, MicroVAX II, MicroVAX III and MicroPDP11 computers. It also supports the DU and MU driver of the associated DEC operating systems including; RT-11, RSX11M, RSX11M+, RSTS/E, DSM(Mumps), Ultrix, Unix, MicroVMS, and VMS.

The SQ739 can support up to seven (7) SCSI disk or tape nodes with a maximum support of eight (8) mapped logical units. The SCSI implementation supports bus arbitration, disconnect/reconnect, synchronous and asynchronous data transfer with a maximum transfer rate of 4.0MB/sec. The SQ739 features a full 22 bit QBUS DMA addressing capability and supports non-block mode in addition to block mode DMA transfers with a maximum burst rate of 3.3MB/sec.

The host adapter has on-board diagnostic/configuration capability that includes utilities to configure the user defined parameters of the SQ739, format and test SCSI devices, and a mapping menu for selection of logical units. All user defined parameters are stored in non-volatile Electrically Erasable/Programmable ROM (EEPROM) and are retrieved upon power-up of the module. The host adapter also includes boot support of popular devices including DU, MU, MS, MT, DM, DR, DL. Also included is a special FT boot which configures the console device into a virtual terminal for support of the on-board diagnostics.

Figure 1 - SQ739 Simplified Diagram
2 - Specifications

Controller Specification

Mechanical: Dual-Wide Module 5.22 x 8.88 inches
Bus Interface: DEC Qbus
Addressing: 18 or 22-bit addressing support
IP/SA Address: DU 172150, 160334, 160340, or user-defined
               MU 174500, 160404, 160410, or user-defined
Interrupt Vector: Software Programmable 0 - 774
Interrupt Priority: Jumper selectable BR4 to BR7
Qbus DMA Burst: 2 to 16 words user-defined, up to 3.3MB/sec
Qbus DMA Mode: Block Mode or Non-Block Mode
Command Queue: DU 16 entry command queue with elevator seek algorithm
               MU 8 entry command queue
Data Buffer: 2KB Fifo
Bootstrap Capability: Disk DK, DL, DM, DR, DB, DU
                   Tape MT, MS, MU
                   Utility FT
Diagnostic Capability: Full power-up self-test diagnostics including MicroProcessor, RAMFIFO, Qbus Interface and SCSI Interface. On-Board Configuration/Diagnostic menu supports, format and test of SCSI devices.
Emulation: DEC MSCP and TMSCP.
Software Support: Compatible with DU and MU drivers utilized in RT-11, RSX11M, RSX11M+, RSTS/E, DSM11, Unix, Ultrix, MicroVMS, and VMS operating systems. Also compatible with XXDP+ diagnostics ZRCF?? Front End Tests 1 - 8, ZRCD?? Disk Exerciser, ZTKA?? TK50 Front End Tests 1 - 8, and ZTKB?? Tests 1 - 6 TK50 Data Reliability Test.
LED Indicators: Terminator Power and Self-Test/Activity
Cable Requirements: Maximum cable length of 6.0 meters with no more than 0.1 meters STUB to connecting devices. Characteristic impedance of 100 ohms +/-10%.
I/O Connectors: Standard 50 pin flat ribbon connector for SCSI I/O, 10 pin connector for the on-board configuration/diagnostic (RS-232).
SCSI Device Support: Maximum of 7 SCSI NODES using 8 devices with any mix of disk or tape devices.

Multi-Initiator Support: Supports Multi-Initiator configurations including TERM PWR support and removable termination.

SCSI Transfer Rate: 3.5 MB/sec Asynchronous, 4.0 MB/sec Synchronous

Operating Temperature: 40 to 104 degrees Fahrenheit (5 to 50 degrees Celsius)

Relative Humidity: 10 to 90% Non-condensing

Power Requirements: + 5 Volts at 1.5 Amps
+ 12 Volts at .1 Amps

Controller Characteristics

Mechanical

The SQ739 is fully contained on a single DUAL height module 5.22 inches (13.2cm) wide by 8.88 (22.56) high. The controller utilizes a single dual slot in a Q-BUS backplane minimizing slot utilization.

Base Address

The SQ739 supports the full addressing range of 160000 - 177774 with a combination of switch settings and a user defined selection. The SQ739 has 2 switches with 4 combinations for each emulation. The first three (3) switch combinations selects a pre-defined base address while the last combination selects the user defined address stored in EEPROM.

<table>
<thead>
<tr>
<th></th>
<th>MSCP Emulation IP/SA Address</th>
<th>TMSCP Emulation IP/SA Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>172150, 160334, 160340, user-defined</td>
<td>174500, 160404, 160410, user-defined</td>
</tr>
</tbody>
</table>

Controller Emulation

The controller emulates the DEC DU and MU devices. The disk emulation responds with RA80, RA81, RA82 RA90, and RA70 drive types depending upon the capacity of the unit selected. The tape emulation responds with TK50 drive type only.

interrupt Vector

The host interrupt vector is host programmable and supports the full range of 0 - 774.

DMA Address Range

The SQ739 supports a full 22-bit address for up to 4M Bytes of addressable memory.

Qbus DMA Burst Rate

The SQ739 supports a burst rate of up to 3.3MB/sec with a maximum allowable burst of 16 words. The burst rate is user defined and is stored in EEPROM.
Obus DMA Dwell Rate

The S0739 supports DMA dwell times of 200ns to 3.2us. The DMA dwell rate is user defined and stored in EEPROM.

QBUS Interrupt Priority Level

The interrupt priority level is jumper selectable on the module and supports BR4 to BR7.

SCSI Bus Transfer Rate

The S0739 supports both asynchronous and synchronous data transfers on the SCSI bus with a maximum transfer rate of 4.0MB/sec. The synchronous transfer rate has been preset on the controller to maximize data throughput for the Obus.

SCSI Drive Support

The S0739 supports up to seven (7) nodes on the SCSI bus with up to eight (8) units. The controller supports up to four (4) logical units (LUN) on a single SCSI node and is user defined in EEPROM. The S0739 supports any combination of disk and tape drives on the SCSI bus.

SCSI Multiple Initiator

The S0739 supports multiple initiator applications. The host adapter SCSI node ID is user defined and stored in EEPROM.

SCSI I/O Interface

The S0739 supports the SCSI single-ended interface and utilizes the driver/receiver capability of the NCR 53C90A SCSI Interface Chip. The SCSI bus must be terminated at each end of the cable with 220 ohms to +5 volts and 330 ohms to ground. The S0739 supports the TERM PWR line (PIN 26) which is required for some applications where termination cannot be accomplished on the devices or host adapters. The termination can be removed on the S0739 when the module is not a terminating node on the SCSI bus.

SCSI Specification Support


SCSI Single-Ended Cable Requirements

The host adapter supports the single-ended SCSI bus specification of up to 6.0 meters in length with no more than a 0.1 meter stub to any connected device. The ideal impedance match for single-ended SCSI is 132 ohms which, in general, is not available today. Therefore, it is recommended that a cable with a characteristic impedance of 100 ohm +/- 10% twisted-pair be utilized. To minimize impedance mismatch, cables of different impedances must not be mixed on the same SCSI bus. A minimum conductor size of 28 AWG should be used to minimize noise effects.

Suggested non-shielded flat cable: Spectra 455-248-50 Twist-n-Flat
SCSI Single-Ended Pin Assignments

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin</th>
<th>Description</th>
<th>Signal</th>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB0</td>
<td>2</td>
<td>Data Bus Bit 0</td>
<td>Ground</td>
<td>28</td>
<td>I/O Ground</td>
</tr>
<tr>
<td>DB1</td>
<td>4</td>
<td>Data Bus Bit 1</td>
<td>Ground</td>
<td>30</td>
<td>I/O Ground</td>
</tr>
<tr>
<td>DB2</td>
<td>6</td>
<td>Data Bus Bit 2</td>
<td>ATN</td>
<td>32</td>
<td>Attention</td>
</tr>
<tr>
<td>DB3</td>
<td>8</td>
<td>Data Bus Bit 3</td>
<td>Ground</td>
<td>34</td>
<td>I/O Ground</td>
</tr>
<tr>
<td>DB4</td>
<td>10</td>
<td>Data Bus Bit 4</td>
<td>BSY</td>
<td>36</td>
<td>Busy</td>
</tr>
<tr>
<td>DB5</td>
<td>12</td>
<td>Data Bus Bit 5</td>
<td>ACK</td>
<td>38</td>
<td>Acknowledge</td>
</tr>
<tr>
<td>DB6</td>
<td>14</td>
<td>Data Bus Bit 6</td>
<td>RST</td>
<td>40</td>
<td>Reset</td>
</tr>
<tr>
<td>DB7</td>
<td>16</td>
<td>Data Bus Bit 7</td>
<td>MSG</td>
<td>42</td>
<td>Message</td>
</tr>
<tr>
<td>DBP</td>
<td>18</td>
<td>Data Bus Parity</td>
<td>SEL</td>
<td>44</td>
<td>Select</td>
</tr>
<tr>
<td>Ground</td>
<td>20</td>
<td>I/O Ground</td>
<td>C/D</td>
<td>46</td>
<td>Command/Data</td>
</tr>
<tr>
<td>Ground</td>
<td>22</td>
<td>I/O Ground</td>
<td>REQ</td>
<td>48</td>
<td>Request</td>
</tr>
<tr>
<td>Ground</td>
<td>24</td>
<td>I/O Ground</td>
<td>I/O</td>
<td>50</td>
<td>Input/Output</td>
</tr>
<tr>
<td>TPWR</td>
<td>26</td>
<td>Termination Power</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All odd pins except pin 25 are connected to I/O ground.

I/O Connector

The SQ739 incorporates a single 50-pin flat ribbon connector located at the top of the module for connection to the SCSI peripherals. The mating connector is 3M 3452-5000 or equivalent.

Power Requirements

The SQ739 requires +5 volts +/- 5% at 1.5 amps and +12 volts +/-10% at .100 amps.

Environmental Requirements

Acceptable operating environment for the module is 50 to 104 degrees Fahrenheit with humidity 10 to 90 % non-condensing.

Shipping Weight

The SQ739 is shipped in anti-static packaging with a INSTALLATION AND OPERATION MANUAL. Shipping weight is 5 pounds.
3 - Host Adapter Installation

Refer to Page 11 to install the jumpers and configure the switches for the desired options. Once completed, continue with the following installation procedure.

Ensure that all power has been removed from the system, disks and tapes before installing the host adapter. Damage may result if the host adapter is installed while power is applied.

Select the backplane slot into which the S0739 is to be installed. There are several backplane assemblies available from DEC and other manufacturers.

Some Qbus based systems utilize a serpentine backplane which has all the slots wired for Qbus in a serpentine fashion starting in the upper left slot and proceeding left to right, down, right to left, down and so on.

Some backplanes also incorporate a C/D bus or MEMORY bus in the C/D connector of the backplane. The host adapter can only be installed in the A/B Qbus Slot for proper operation. If the host adapter is installed in a Q/CD slot, no grant card is required in the CD connector.

Refer to the system manuals for clarification of the type of backplane incorporated in the system.

If the serial port on the adapter is to be connected, connect the serial cable to J2 on the host adapter.

Install the peripheral cable into J1 on the host adapter ensuring that pin 1 of the connector matches.

CAUTION - Damage may result to the peripheral and/or the host if the SCSI cable is installed backwards.

Ensure that the S0739 is oriented with the components facing ROW 1 of the backplane and gently press both sides until the module connectors are firmly seated in the backplane.

CAUTION - Damage may result to the peripheral and/or the host if the controller is installed backwards.

Connect SCSI cable to the SCSI peripheral ensuring proper orientation of PIN1. Also, ensure that the SCSI bus has been properly terminated at both ends of the cable. Failure to properly terminate the bus can result in system failure or intermittent operation.

Refer to the peripheral manual for proper operating procedure before attempting to apply power to the peripheral and computer system.

Apply power to the system and peripherals. The ACTIVITY led will illuminate if SELF TEST has completed successfully. The S0739 will continue with self test until the host adapter is initialized by the operating system at which time the led will blink with I/O ACTIVITY.

If a SELF TEST ERROR occurs the activity led will blink an error code (refer to Page 39). The error code will also be output to the RS232 port J2 and will be displayed if a terminal has been connected.
Figure 2 - SQ739 Host Adapter Configuration
### Jumper Configuration

#### Jumper JP1-3

<table>
<thead>
<tr>
<th>BR Level</th>
<th>JP1</th>
<th>JP2</th>
<th>JP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BR4 *</td>
<td>IN</td>
<td>IN</td>
<td>IN</td>
</tr>
<tr>
<td>BR5</td>
<td>OUT</td>
<td>IN</td>
<td>IN</td>
</tr>
<tr>
<td>BR6</td>
<td>IN</td>
<td>OUT</td>
<td>IN</td>
</tr>
<tr>
<td>BR7</td>
<td>IN</td>
<td>IN</td>
<td>OUT</td>
</tr>
</tbody>
</table>

#### Jumper JP4

<table>
<thead>
<tr>
<th>Shield Ground</th>
<th>JP4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected to LOGIC Ground</td>
<td>IN</td>
</tr>
<tr>
<td>Disconnected from LOGIC Ground *</td>
<td>OUT</td>
</tr>
</tbody>
</table>

### Switch Configuration

#### IP/SA Base Address

<table>
<thead>
<tr>
<th>MSCP Base Address</th>
<th>SW1-1</th>
<th>SW1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>172150*</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>160334</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>160340</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>User Defined in EEPROM</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TMSCP Base Address</th>
<th>SW1-3</th>
<th>SW1-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>174500*</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>160404</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>160410</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>User Defined in EEPROM</td>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>

#### Bootstrap Address/Select

<table>
<thead>
<tr>
<th>Bootstrap Address</th>
<th>SW1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled *</td>
<td>OFF</td>
</tr>
<tr>
<td>Enabled</td>
<td>ON</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bootstrap Select</th>
<th>SW1-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>173000*</td>
<td>OFF</td>
</tr>
<tr>
<td>175000</td>
<td>ON</td>
</tr>
</tbody>
</table>

#### AutoBoot Select

<table>
<thead>
<tr>
<th>Autoboot Select</th>
<th>SW1-7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disabled *</td>
<td>OFF</td>
</tr>
<tr>
<td>Enabled</td>
<td>ON</td>
</tr>
</tbody>
</table>

#### SW1-8 Not Used

Note - * denotes default settings
4 - Operation

This section of the manual describes the operation of the system, including establishing communication with the host computer, the host adapter and connected peripherals, bootstrapping devices and configuring the host adapter.

Refer to Section 6 for a description of supported diagnostics.

Refer to Section 8 for error codes and description of error log formats.

The On-Board diagnostics can be started via the RS-232 serial port J2 or via the virtual terminal. This section describes the method for using either method.

Serial Port Initiation

Install a serial cable to J2 and connect to a terminal ensuring that the baud rate has been set to 9600 baud, 8 data bits, 1 stop bit and no parity. The serial communication will begin immediately upon power-up or a Qbus INIT. Please note that the system must be in console mode when activating the serial port. Also, upon resumption of normal operation, the serial cable must be removed for proper operation of the host adapter.

![Serial Port Connector Diagram](image1)

![Cable Pinout Diagram](image2)
Virtual Terminal Initiation

The virtual terminal is used to communicate between the console of the host computer and the onboard diagnostics via the computer console terminal. The virtual terminal is initiated differently depending upon the type of system. For LSI-11 based systems the virtual terminal can be started via the boot prompt "••". The procedure for starting the virtual terminal on a MicroVAX system involves depositing keyword values in the SA register.

Virtual Terminal - LSI/11 Based Systems

The virtual terminal utilizes the system console as the terminal for serial communications. The system console must be placed on ODT (Online Debugging Technique) mode. The boot procedure is initiated at the console by entering 775000G or 773000G, depending on which boot address has been selected (see section 3 for details on enabling and selecting the boot address). At this point, the host adapter will respond to the boot attempt by transferring the bootstrap program on-board, to host memory. The system console will respond with a "••" as the boot prompt if the DMA transfer was successful (see section 7 for more information if the prompt does not appear). Once the "••" prompt has been output to the console, enter 'FT' which is the designation for the virtual terminal connection. Immediately, the on-board diagnostic will print the banner and prompt for (C)RT or (P)PRINTER.

Example:

```
775000G  ; start boot procedure
*       ; prompt is received
FT<cr>  ; start virtual terminal
```

<table>
<thead>
<tr>
<th>Dilog On-Board Diagnostic</th>
<th>Model</th>
<th>SQ739</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic Main Menu</td>
<td>Revision</td>
<td>B</td>
</tr>
<tr>
<td>MSCP IP/SA Address</td>
<td>172150</td>
<td></td>
</tr>
<tr>
<td>TMSCP IP/SA Address</td>
<td>Disabled</td>
<td></td>
</tr>
<tr>
<td>Boot Address</td>
<td>175000</td>
<td></td>
</tr>
<tr>
<td>Autoboot</td>
<td>Disabled</td>
<td></td>
</tr>
</tbody>
</table>

(P)rinter or (C)RT ?:

An alternate method of starting the virtual terminal involves the deposit of 77777 octal in the host adapters SA register. This can be utilized if the bootstrap has not been enabled. Once the keyword (77777) has been entered, the host adapter will DMA the bootstrap program into host memory. The user must then start the bootstrap program by entering 2000G on the console terminal. The console will then respond with the "••" prompt as in the preceding example.

Example:

```
77772150/000000 0<cr>
77772152/005400 77777<cr>
2000G
* FT <cr>
```

The console will respond with the banner as in the preceding example.
Virtual Terminal - MicroVAX II and MicroVAX III

The host adapter does not contain a bootstrap program for the MicroVAX systems. Therefore the user can only initiate the virtual terminal by the deposit of the keyword in the configured SA register. The on board bootstrap MUST be disabled for proper operation of the MicroVAX system.

Upon the power-up of the system, the MicroVAX will enter into self-test diagnostics. Upon successful completion of the diagnostics, the user must enable the I/O map before the on-board diagnostic program can be initiated. The I/O map can alternatively be enabled by booting a non-existent device. Once the I/O map has been enabled, the user must deposit 3FFF into the configured SA register. Once input, the host adapter will DMA the VAX virtual terminal driver to host memory. The user then initiates the virtual terminal by starting execution at location 200. Alternatively, the user can start the program at 218 for GPX (Graphics Workstation) support. If the on-board diagnostic banner does not appear, refer to section 7 for troubleshooting hints.

Example: with IP/SA address of 20001940

```
>>> D/P/L 20088004 80000001 <cr> ; setup I/O map
>>> D/P/W 20001F40 20 <cr> ; enable mapping
>>> D/P/W 20001940 0 <cr> ; write IP to reset host adapter
>>> D/P/W 20001942 3FFF <cr> ; write keyword to initiate DMA
>>> S 200 <cr> ; start virtual terminal driver

or

>>> S 218 <cr> ; start terminal driver for GPX
```

If the virtual terminal is successful, then the following screen will be displayed:

```
-----------------------------------------------
Dilog On-Board Diagnostic                      Model         SQ739
Diagnostic Main Menu                          Revision      B
MSCP IP/SA Address                           172150       Boot Address 175000
TMSCP IP/SA Address                          Disabled      Autoboot Disabled
-----------------------------------------------

(P)rinter or (C)RT ? :
```

Alternatively, the virtual terminal may be initiated by attempting to boot a nonexistent disk drive. This will automatically setup the I/O maps and reset the host adapter. Once the console returns with the 'NO SUCH DEVICE' error message, the user can initiate the virtual terminal by depositing the keyword in the SA register and starting the virtual terminal driver described above.
Example:

```
>>> B DUDO <cr> ; boot nonexistent drive
NO SUCH DEVICE
>>> D/P/W 20001942 3FF <cr> ; deposit keyword
>>> S 200 <cr> ; start program
```

### IP and SA Addresses

#### MSCP Emulation

<table>
<thead>
<tr>
<th>IP REGISTER OCTAL ADDRESS</th>
<th>SA REGISTER OCTAL ADDRESS</th>
<th>IP REGISTER MICROVAX</th>
<th>SA REGISTER MICROVAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>172150</td>
<td>172152</td>
<td>20001468</td>
<td>2000146A</td>
</tr>
<tr>
<td>160334</td>
<td>160336</td>
<td>200000DC</td>
<td>200000DE</td>
</tr>
<tr>
<td>160340</td>
<td>160342</td>
<td>200000E0</td>
<td>200000E2</td>
</tr>
<tr>
<td>160344</td>
<td>160346</td>
<td>200000E4</td>
<td>200000E6</td>
</tr>
<tr>
<td>160354</td>
<td>160356</td>
<td>200000EC</td>
<td>200000EE</td>
</tr>
<tr>
<td>160360</td>
<td>160362</td>
<td>200000F0</td>
<td>200000F2</td>
</tr>
<tr>
<td>160364</td>
<td>160376</td>
<td>200000FC</td>
<td>200000FE</td>
</tr>
</tbody>
</table>

#### TMSCP Emulation

<table>
<thead>
<tr>
<th>IP REGISTER OCTAL ADDRESS</th>
<th>SA REGISTER OCTAL ADDRESS</th>
<th>IP REGISTER MICROVAX</th>
<th>SA REGISTER MICROVAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>174500</td>
<td>174502</td>
<td>20001940</td>
<td>20001942</td>
</tr>
<tr>
<td>160404</td>
<td>160406</td>
<td>20000104</td>
<td>20000106</td>
</tr>
<tr>
<td>160410</td>
<td>160412</td>
<td>20000108</td>
<td>2000010A</td>
</tr>
<tr>
<td>160414</td>
<td>160416</td>
<td>2000010C</td>
<td>2000010E</td>
</tr>
<tr>
<td>160444</td>
<td>160446</td>
<td>20000124</td>
<td>20000126</td>
</tr>
<tr>
<td>160450</td>
<td>160452</td>
<td>20000128</td>
<td>2000012A</td>
</tr>
<tr>
<td>160454</td>
<td>160456</td>
<td>2000012C</td>
<td>2000012E</td>
</tr>
</tbody>
</table>

Page 15
5 - Dilog On-Board Diagnostics

Once the On-Board Diagnostic Menu has been booted, the user must initially input the type of terminal the diagnosis is utilizing. If the (C)rt is entered, the banner will appear at the top of each page and the screen is formatted for appearance. A (P)rinter selection will disable the screen formatting to minimize paper usage. There is no default for the terminal type, the user must input a variable to continue.

Upon terminal selection, the main menu will appear and the user must select an item from the menu. If the user inputs a <CR> at any selection prompt, the diagnostic will return to the previous menu. A <CR> input at other prompt times will either return to the previous menu or the default value is used. If at any time the user inputs a CTRL C (^C), the diagnostic will return to the Diagnostic Main menu.

Diagnostic Main Menu

The diagnostic main menu displays the current menus supported by the on-board diagnostics. The user must enter a selection at the prompt to access the lower level menus. A <CR> entered at the main menu prompt will cause a return to the initial (P)rinter or (C)RT prompt.

```
Diagnostic Main Menu
--------------------
1 - Controller Utility Menu
2 - Controller Configuration Menu
3 - Unit Mapping Menu

Enter Selection (CR to Exit) :
```

Controller Utility Menu

The Controller Utility Menu contains the SCSI I/O utilities currently supported by the diagnostic. The user must select the utility or enter a <CR> to exit and return to the main menu.

```
Controller Utility Menu
------------------------
1 - SCSI Direct Command
2 - Write/Read SCSI Unit
3 - Format SCSI Unit
4 - SCSI Bus Scan

Enter a Selection (CR to Exit) :
```

Option #1

The SCSI Direct Command allows the user the ability to issue a single SCSI command. This is sometimes useful in troubleshooting or during system configuration to check on the status of the connections to all of the peripherals. The menu item will prompt the user for the NODE ID and the LUN. Once entered, a default 6 byte SCSI command is displayed and the user is prompted for any changes. Changes to the SCSI CDB (Command Data Block) are entered as HEX bytes ONLY. If the user inputs an INVALID character, the program will display an error message and prompt again. Once all bytes have been modified, the user will be prompted to enter any data that is to be written,
then Execute SCSI Command. A (Y)es answer will execute the SCSI command, a (N) will return the user to the NODE ID prompt.

Example:

```
SCSI Direct Command

SCSI Node [00] : 0<CR>
SCSI LUN [00] : 0<CR>

Bytes in CDB (hex) 06
SCSI CDB Byte 00-00,00,00,00,00,00

Any Changes (Y/N) ? N<CR>
Any Data to Write (Y/N) ? N<CR>
Execute SCSI Command (Y/N) ? Y<CR>

Completed with no Errors
More Commands (Y/N) ? N<CR>

*** <CR> to Continue ***
```

Option #2

The WRITE/READ SCSI UNIT menu item allows the user to test a SCSI unit. The utility supports both disk and tape units and determines unit type before testing. The utility will first prompt the user for NODE ID and the LUN of the required unit. Once the NODE ID and LUN have been input, the utility will select the unit and determine unit type (disk or tape) and select the proper test for the unit. The tape exerciser will write/read a 63K byte record to the unit. The disk exerciser will write/read a pattern across the disk surface sequentially. Either test is aborted by entering a CTRL C (~C) which returns to the Diagnostic Main menu.

Example:

```
Write/Read SCSI Unit

SCSI Node [00] : 0<CR>
SCSI LUN [00] : 0<CR>

Testing Unit: SEAGATE ST125N

Length of Test (Continuous/Long(1-5 minutes)/Quick) ? Q<CR>
Read Only Test (Y/N) ? N<CR>
Write/Read Test

WARNING - Data will be overwritten<beep>

Proceed (Y/N) ? Y<CR>

SEAGATE ST125N

Write Test Started
Press <Control-C> to abort
Write Test Completed
Read Test Started
Press <Control-C> to abort
Read Test Completed

**** CR to Continue ****
```
Option #3

The SCSI Format Unit menu item allows the user to select and format a specified SCSI unit. The user will enter the NODE ID and the LUN of the unit. Once the NODE ID and LUN have been entered, the utility will scan the device and display the type of device selected. The user will be prompted with a warning message. The utility will format the selected unit and display any errors that are encountered.

Example:

Format SCSI Unit
-----------------
SCSI Node [00] : 0<CR>
SCSI LUN [00] : 0<CR>

Testing Unit: SEAGATE ST125N

WARNING - Data will be overwritten<beep>

Proceed (Y/N) ? Y<CR>

Format Started

Completed with no Errors

**** CR to Continue ****

Option #4

The SCSI Bus Scan menu item allows the user to scan the attached SCSI bus for all devices and display the manufacturer and model of each device found. The utility scans each node starting with 0 and cycles through each logical unit (0 thru 3) on each node. The utility will display each node/LUN combination that is present on the SCSI bus. The utility does not prompt the user for any input.

Example:

SCSI Bus Scan
-------------
Node LUN Type Current Device
----------------------------
0 0 Disk SEAGATE ST125N
1 0 Not Found
2 0 Not Found
3 0 Not Found
4 0 Not Found
5 0 Not Found
6 0 Not Found
7 0 Host DILOG SQ739

**** CR to Continue ****
The Controller Configuration Menu contains the utility to change the configuration of the host adapter pertaining mainly to the QBUS interface. The utility allows the enabling/disabling of emulations, user defined address, burst and dwell rate, etc. The user will be prompted for any changes to the current setup. The user can respond with Y, N or D. The D input will cause the default values to be used. If a Y or D was input, the user will be prompted to save the changes. A Y(es) answer will write the values to the EEPROM for storage. A N(no) will return to the utility menu. Once the data has been saved to EEPROM, the diagnostic will return to the utility menu.

The Emulation (E/D) prompt is used to enable/disable the specific emulation. If disabled, the selected QBUS address will not respond to the host processor and all SCSI nodes mapped to the emulation will not be utilized. The User Defined IP/SA Address is used to select the address that will be used when the switches are selected for user defined (i.e. SW1-3 and SW1-4 ON). This allows any address to be specified in the range 160000 - 177774 while maintaining a quick method of setup for the first three(3) common address's.

The DMA Burst Size prompts the user for the number of words transferred during one DMA operation. The user can input from 2 to 16. It is recommended that the burst rate be limited to 8 with older controllers which may not have adequate buffering.

The DMA Dwell Count is used to set the time to wait between dma bursts. This time period allows other DMA devices on the QBUS to transfer data to host memory. The allowable values are from 1 to 16 which allows for a dwell of between 200ns and 3.2us. It is recommended that a larger dwell count be utilized if the QBUS contains many PIO or interrupt driven controllers.

The Fast File Search prompt is used to enable the fast file search capability of 8MM Helical Scan Devices. With this feature enabled, the tape unit will space in high speed search mode between tape marks allowing for a x10 increase in throughput. NOTE - a correctly reported TMSCP tape position is not possible. As most stand-alone backup programs require correct tape position to be returned to the host, it is recommended that the feature be disabled. The microcode does include an automatic enable during operating system startup that will override the EEPROM variable. This allows the operating system to take full advantage of the increase in throughput while still maintaining compatibility with the stand-alone backup utilities.

Auto Configuration on the SCSI Bus into MSCP/TMSCP Units on Boot allows self-configuring of the SCSI bus devices. Note: All devices must be powered on and able to respond to a SCSI bus inquiry command at boot time. Any devices not found at that time cannot be added without rebooting the system.

(The default values for the controller configuration are outlined in the example below)
Example:

Controller Configuration Menu
--------------------------------

MSCP Emulation (E/D) [ Enabled] :
User Defined MSCP IP/SA Address [ 172150] : set in switch
TMSCP Emulation (E/D) [ Enabled] :
User Defined TMSCP IP/SA Address [ 174500] : set in switch
Dma Burst Size [16] :
Dma Dwell Count (x200ns) [01] :
Fast File Search (E/D) [Disabled] :
Auto Configure SCSI Bus into MSCP/TMSCP Units on Boot (E/D) [Disabled] :

Any Changes (Y/N/Default) ? D<CR>

Save Changes (Y/N) ? Y<CR>

Unit Mapping Menu

The Unit Mapping Menu is used to map the SCSI devices to MSCP and/or TMSCP unit numbers. The SQ739 supports mapping of any SCSI node to any (T)MSCP unit number in the range 0 to 252. The user can specify a SCSI NODE ID and LUN to be mapped along with the device type and the (T)MSCP unit number. This information is stored in EEPROM and used on power-up to configure the host adapter. The utility supports a default setup mode (D) at the Changes prompt which will map SCSI NODE 0 to MSCP unit 0 and set the host adapter NODE ID to 7. If the user enters a <CR> at the select item prompt, all entries have been completed and the diagnostic will then prompt to save the changes. The user must respond with a (Y)es or (N)o to continue. If a device is ready at the specified SCSI node, information about the drive will be displayed. Otherwise, "Not Found" will be displayed.

Note: If the Auto-configure option has been enabled, the current unit mapping is not displayed. Instead, the devices on the SCSI bus are polled and displayed as they will be mapped if the system is booted. If the Auto-Configure option is disabled, the current unit mapping will be used again.

Example:

Unit Mapping Menu
-------------------

<table>
<thead>
<tr>
<th>Item</th>
<th>Node</th>
<th>LUN</th>
<th>(T)MSCP</th>
<th>Type</th>
<th>Device Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>DU000</td>
<td>Disk</td>
<td>SEAGATE ST125N</td>
</tr>
<tr>
<td>2</td>
<td>(Item not Mapped)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>(Item not Mapped)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>(Item not Mapped)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>(Item not Mapped)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(Item not Mapped)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>(Item not Mapped)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>(Item not Mapped)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>Host</td>
<td>DILOG</td>
<td>SQ739</td>
<td></td>
</tr>
</tbody>
</table>

Any Changes (Y/N/Default/Remove/Scan) ? Y<CR>
Select Item : 1<CR>
Disk or Tape : D<CR>
SCSI Node [01] : 1<CR>
SCSI LUN [00] : 0<CR>
MSCP Unit Number [001] : 151<CR>

Select Item (CR to end) : <CR>

Unit Mapping Menu

<table>
<thead>
<tr>
<th>Item</th>
<th>Node</th>
<th>LUN</th>
<th>(T)MSCP</th>
<th>Type</th>
<th>Device Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>DU000</td>
<td>Disk</td>
<td>SEAGATE ST125N</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>DU151</td>
<td>Disk</td>
<td>Not Found</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
<td>Host</td>
<td>DILOG SQ739</td>
</tr>
</tbody>
</table>

Save Changes (Y/N) ? Y<CR>

Unit Mapping Menu

<table>
<thead>
<tr>
<th>Item</th>
<th>Node</th>
<th>LUN</th>
<th>(T)MSCP</th>
<th>Type</th>
<th>Device Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>DU000</td>
<td>Disk</td>
<td>SEAGATE ST125N</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>DU151</td>
<td>Disk</td>
<td>Not Found</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
<td>Host</td>
<td>DILOG SQ739</td>
</tr>
</tbody>
</table>

Any Changes (Y/N/Default/Remove/Scan) ? R<CR>

Select Item to Delete (CR to end) : 2<CR>
Select Item to Delete (CR to end) : <CR>

Unit Mapping Menu

<table>
<thead>
<tr>
<th>Item</th>
<th>Node</th>
<th>LUN</th>
<th>(T)MSCP</th>
<th>Type</th>
<th>Device Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>DU000</td>
<td>Disk</td>
<td>SEAGATE ST125N</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>DU151</td>
<td>Disk</td>
<td>Not Found</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>(Item not Mapped)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td></td>
<td></td>
<td>Host</td>
<td>DILOG SQ739</td>
</tr>
</tbody>
</table>

Save Changes (Y/N) ? Y<CR>
The proper selection of a SCSI NODE ID on a peripheral device is important to the overall performance of the system. Be advised that the SCSI bus has an arbitration priority scheme that gives the highest priority device to NODE 7 and the lowest to NODE 0. It is therefore recommended that the amount of activity on a SCSI device should be the determining factor when selecting the SCSI node ID. If the system is configured for 4 disk devices and a single tape device, place the SCSI tape device at a lower priority than the SCSI disk devices. The disks should also be configured dependent upon the I/O activity of the device. For example, the system disk should always be the highest priority SCSI peripheral to guarantee a minimum throughput under heavy I/O activity. With the flexibility of the SCSI Mapping Menu on the SQ739, maximum I/O throughput can be maintained for any given configuration.

Unit Mapping Menu

<table>
<thead>
<tr>
<th>Item</th>
<th>Node</th>
<th>LUN</th>
<th>MSCP</th>
<th>Type</th>
<th>Device Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>DU000</td>
<td>Disk</td>
<td>SEAGATE ST125N</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>0</td>
<td>MU000</td>
<td>Tape</td>
<td>EXABYTE EXB-8200</td>
</tr>
</tbody>
</table>

Auto Configure Option Enabled

**** CR to Continue ****
6 - Host Based Diagnostics

The S0739 supports a variety of DEC diagnostics to functionally test the host adapter. This section describes the procedure for the setup and execution of the supported diagnostics.

Startup - LSI/11 Systems

Install the host adapter as described in the Section 3. Apply power to the system and verify that both LED's on the S0739 are ON (refer to section 7 for troubleshooting if either LED's fail to light). Install the XXDP+ diagnostic medium into the drive and boot the system. When booting has completed successfully, the XXDP+ sign-on message will appear.

XXDP-SM Small Monitor Version 2
Boot from XXX (where XXX is the boot device)
28kw Memory
Qbus System

Restart Addr: 152010
This is XXDP-SM Type "H" or "H/L" for Help

Disk Emulation Diagnostics

The MSCP emulation of the S0739 supports two (2) DEC RC25 diagnostics including the ZRCF?? Front End Test and the ZRCD?? Disk Exerciser. The host adapter also supports a limited number of MDM diagnostics for the DEC KDA50-Q controller.

Front End Test - ZRCFB3

The host adapter supports tests 1 thru 8 of the ZRCFB3 diagnostic. These tests will initialize the host adapter and extensively test the interrupt and DMA capability. Once the XXDP+ prompt has appeared ".", start the diagnostic by entering:

.R ZRCFB3<cr>

The system will echo the filename and load the file from the boot medium.

.R ZRCFB3
ZRCFB3.BIN

Once the diagnostic has been loaded, the diagnostic startup message will appear at the console device.

DRSSM-F0
CZRCF_A_0
RC25 Front End/Host Diagnostic
Unit is AZTEC RC25 Platter
RSTRT ADR 145676

DR>
The diagnostic is started by entering the following command line:

```
DR>STA/FLA:PNT:HOE/TES:1-8 <CR>
```

The above command line instructs the diagnostic supervisor to run only tests 1 through 8, printing the total number of passes and halting in the case of an error. The supervisor will then prompt for hardware or software changes.

```
Change HW (L) ?
```

The diagnostic must be informed of the new hardware parameters of the system under test. Enter the following:

```
Change HW (L) ? Y <CR>
```

Enter the number of host adapters which are to be tested.

```
# Units (D) ? 1 <CR>
```

The diagnostic will then prompt the user to enter the following for the number of units that have been selected:

```
Unit 0
IP Address (o) 172150 ? <CR> ; or configured IP address
Vector (o) 154 ? <CR>
BR Level (o) 5 ? 4 <CR> ; or selected BR level
Platter Address(es) (D) ? 0 <CR> ; always enter 0
```

The platter address is the unit number of the disk under test. Since the host adapter does not support the tests which require a disk, this question is irrelevant but must be answered before the diagnostic will start. Once the hardware questions have been answered, the supervisor will prompt for any software changes:

```
Change SW (L) ?
```

The software question will always be answered NO because the host adapter DOES NOT support the test which require a disk drive.

```
Change SW (L) ? N <CR>
```

The diagnostic will print each test as it runs and will inform the user of any errors encountered. The test can be stopped at any time by typing a CTLR C. For Example,
When the diagnostic has completed all the tests, the end of pass message will be printed and the diagnostic will restart until a CTRL C is executed. The diagnostic supervisor can be exited by typing EXIT at the DR> prompt.

```
DZRCF EOP  1
  0   Total Errors
```

```
^C
DR>EXIT<CR>
```

**Disk Exerciser - ZRCDA1**

The host adapter is compatible with the DEC RC25 multi-drive exerciser ZRCD??. The diagnostic will initialize the host adapter and exercise the disk drives by issuing random LBN's with random byte counts. This diagnostic also supports up to four (4) host adapters and four (4) units on each host adapter.

Start the diagnostic when at the XXDP+ prompt "." by issuing the following command line:

```
.R ZRCDA1<CR>
```

The system will echo the filename during the loading process.

```
.R ZRCDA1<CR>
ZRCDA1.BIN
```

Once the diagnostic has been loaded, the startup message will appear at the console device:

```
DRSSM-F0
CZRCD_A_0
RC25 Disk Exerciser
Unit is Single RC25 Platter
RSTRT ADR 145676
```

```
DR>
```

The ZRCDA1 diagnostic requires a patch to load the proper unit size from the host adapter.

<table>
<thead>
<tr>
<th>Patch</th>
<th>Address</th>
<th>Value</th>
<th>Change To</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>26070</td>
<td>16237</td>
<td>12737</td>
</tr>
<tr>
<td></td>
<td>26072</td>
<td>50</td>
<td>143326</td>
</tr>
<tr>
<td>2</td>
<td>30644</td>
<td>1003</td>
<td>1367</td>
</tr>
<tr>
<td>3</td>
<td>30704</td>
<td>1003</td>
<td>1367</td>
</tr>
<tr>
<td>4</td>
<td>37552</td>
<td>1416</td>
<td>240</td>
</tr>
</tbody>
</table>

Start the test after the diagnostic supervisor prompt DR> appears at the console device.

```
DR>STA/FLA:HOE<CR>
```

The above command line instructs the diagnostic supervisor to begin execution of the diagnostic. The supervisor will then prompt for hardware or software changes.

```
Change HW (L)?
```
The diagnostic must be informed of the new hardware parameters of the system under test. Enter the following:

```
Change HW (L) ? Y <CR>
```

Enter the number of host adapters which are to be tested.

```
# Units (D) ? 1 <CR>
```

The diagnostic will then prompt the user to enter the following for the number of units that have been selected:

```
Unit 0
IP Address (o) 172150 ? <CR> ; or configured IP address
Vector (o) 154 ? <CR>
BR Level (o) 5 ? 4 <CR> ; or selected BR level
Platter Address (Unit Plug) (D) 0 ? <CR>
Allow Writes To Customer Data Area on this Platter (L) ? Y <CR> ; enable writes
```

** WARNING - CUSTOMER AREA MAY BE OVERWRITTEN ! ... CONFIRM (L) ? Y <CR>

The platter address is the unit number of the disk drive under test. The customer data area is the host data area of the disk drive and is used to test the controller. Backup any data on the disk drive, if necessary, before continuing with the diagnostic.

After the hardware questions are answered, the supervisor will prompt the user for any software changes:

```
CHANGE SW (L) ?
```

The user can take the default software values because the drives are larger than an RC25. If the tests are being run on a smaller unit, some of the software values may have to be changed to prevent errors from occurring.

If the selected unit is fully formatted, use the default values by typing NO to the software query:

```
CHANGE SW (L) ? N <CR>
```

To change the software default values, answer YES to the software query:

```
CHANGE SW (L) ? Y <CR>
```

The user will then be prompted by the supervisor to input the following information:

```
ERROR LIMIT (0 FOR NO LIMIT) (D) 32? <CR>
```
Enter the error limit that must be reached before a unit is deselected by the diagnostic. The default value of 32 is used.

TRANSFER LIMIT IN MEGABYTES (0 FOR NO LIMIT) (D) 2? <CR>

Enter the number of bytes to be transferred between the controller and the diagnostic. Effectively, this selects the time required to reach an END OF PASS.

SUPPRESS PRINTING ERROR LOG MESSAGES (L) ? <CR>

The default value should be used unless multiple errors occur and more information is required to resolve the problem.

RUN DM EXERCISER INSTEAD OF MULTI-DRIVE SUBTEST (L) N? <CR>

The default must always be taken because the controller does not support Diagnostic Mode (DM) of operation.

RANDOM SEEK MODE (L) Y ? <CR>

The best possible test is to seek randomly across the entire disk surface. Therefore, the default value should be used.

STARTING TRACK (L) Y ? <CR>

The starting track number is to be entered. Because the controller does not emulate the RC25, the questions regarding starting and ending track numbers do no apply. If the unit under test is fully formatted and is more than 40 megabytes, the diagnostic will not overflow the cylinder address.

ENDING TRACK (D) 1641? <CR>

Enter the ending track number. If the unit is larger than an RC25 unit (40 megabytes), the default can be used.

READ-COMPARES PERFORMED AT THE CONTROLLER (L) Y? <CR>

A "Yes" typed here will cause the controller to compare the data read with host memory.

THE REMAINING QUESTIONS APPLY ONLY TO UNPROTECTED PLATTERS.

The user can use the default values for the remaining questions.

WRITE ONLY (L) N? <CR>

The disk drive under test is never a write only disk; therefore, always take the default.

WRITE-COMPARES PREFORMED AT THE CONTROLLER (L) N? <CR>
The controller will perform write checks if the default is taken.

CHECK ALL WRITES AT HOST BY READING (L) Y? <CR>

The diagnostic will NOT issue read commands to check the data just written if the default is taken. Otherwise, the diagnostic software will perform the write check function.

USER DEFINED DATA PATTERN (L) N? <CR>

The data pattern used in the diagnostic is worst case. To ensure prompt testing, always use the default value.

SELECT PREDEFINED DATA PATTERN (0 FOR SEQUENTIAL SELECTION) (D) 0: <CR>

Always use the default value.

The test will begin after the hardware and software questions are answered.

INIT SUBTEST START

ABOUT TO VERIFY VECTOR 154(0) FOR DEVICE 172150(0) ... COMPLETED

The diagnostic will run until the transfer limit is reached. After the limit has been reached, the diagnostic will print status information about the unit under test and display the END OF PASS:

CZRCDEOP 1
0 TOTAL ERRORS
Tape Emulation Diagnostics

The TMS CP emulation of the SQ739 supports two (2) DEC TK50 diagnostics including the ZTKA?? Front End Test and the ZTKB?? Reliability Test. The host adapter also supports a limited number of MDM diagnostics for the DEC TK50 controller.

Front End Test for TK50 - ZTKAC0

Start the diagnostic when at the XXDP + prompt ":." by issuing the following command line:

.R ZTKAC0<CR>

The system will echo the filename during the loading process.

.R ZTKAC0<CR>
ZTKAC0.BIN

Once the diagnostic has been loaded, the startup message will appear at the console device:

DRSSM-F0
CZTKA_C_0
TK50 Front End Test
Unit is TK50Q
RSTRT ADR 145676
DR>

The ZTKAC0 diagnostic requires a patch to load the proper unit size from the host adapter.

<table>
<thead>
<tr>
<th>Address</th>
<th>Value</th>
<th>Change To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patch 1</td>
<td>44154</td>
<td>16537</td>
</tr>
<tr>
<td></td>
<td>44156</td>
<td>2260</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12737</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Start the test after the diagnostic supervisor prompt DR> appears at the console device.

DR>STA/FLA:PNT:HOE/TES:1-8<CR>

The above command line instructs the diagnostic supervisor to begin execution of the diagnostic running tests 1 to 8 only, printing the total number of passes and halting in the case of an error. The supervisor will then prompt for hardware or software changes.

Change HW (L) ?

The diagnostic must be informed of the new hardware parameters of the system under test. Enter the following:

Change HW (L) ? Y<CR>

# UNITS (D) ? 1<CR>

UNIT 0
TKIP ADDRESS (O) 174500 ? <CR> ; or configured IP address.
TK VECTOR (O) 260 ? <CR>
The diagnostic will then prompt for any software switch register changes to be entered. The diagnostic does not require any changes, enter NO.

The diagnostic will print each test as it runs. Tests 1 to 8 perform the functions described below.

TEST 1 - REGISTER EXISTENCE TEST
TEST 2 - DIAGNOSTIC WRAP TEST
TEST 3 - STEP 1-3 INITIALIZATION TEST
TEST 4 - VECTOR AND INTERRUPT TEST
TEST 5 - BR LEVEL TEST
TEST 6 - PURGE AND POLL TEST
TEST 7 - LARGE RING TEST
TEST 8 - EXTENDED ADDRESS TEST

To stop the execution of the diagnostic, type a CTRL-C (^C). To exit the diagnostic supervisor, enter EXIT at the DR prompt.

To stop the execution of the diagnostic, type a CTRL-C (^C). To exit the diagnostic supervisor, enter EXIT at the DR prompt.

TK50 Data Reliability Test - ZTKBB0

The SQ739 supports the TK50 Data Reliability diagnostic test 1 to 6 only. These tests will check the data reliability of the subsystem by performing several read, write and repositioning functions. Start the diagnostic when at the XXDP + prompt "." by issuing the following command line:

.R ZTKBB0<CR>

The system will echo the filename during the loading process.

.R ZTBBC0<CR>
ZTKBB0.BIN

Once the diagnostic has been loaded, the startup message will appear at the console device:

CZTKBB0 TK50 Data Reliability Test
Unit is TK50
RSTRT ADR 145676

DR>

The diagnostic is started by entering the command line:

DR>START/FLAG:PNT/TEST:1-6<CR>

This command instructs the diagnostic supervisor to start the diagnostic and run test 1 through 6 only, printing the total number of passes and halting in the case of an error. The supervisor will
then prompt for hardware and software changes. The user must enter the number of units under test.

```
CHANGE HW (L) ? Y<CR>

# UNITS (D) ? 1<CR>

UNIT 0
TKIP ADDRESS (O) 174500 ?<CR>
TK VECTOR (O) 260 ? <CR>
T/MSCP UNIT NUMBER (O) 0 ?<CR>

CHANGE SW (L) ? Y<CR>

ENABLE TIME OF DAY CLOCK (L) N ? <CR>
CHANGE CONTROLLER PARAMETERS (L) N ?<CR>
CHANGE PRINTING PARAMETERS (L) N ? <CR>
CHANGE TEST PARAMETERS (L) N ? Y<CR>

DATA PATTERN (O) 0 ? <CR>
RUN TEST 3 ONLY (L) Y ? N<CR>
ENABLE DATA COMPARES IN TEST 5 (L) N ?<CR>
ENABLE PRINT READ BUFFER IN TEST 5 (L) N ?<CR>
CHANGE COMMAND SEQUENCE (L) N ?<CR>
```

The diagnostic will print each test header as it is run. Tests 1 through 6 perform the functions described below.

```
TEST 1 - BASIC FUNCTION TEST
TEST 2 - QUICK VERIFY READ/WRITE TEST
TEST 3 - COMPLEX READ/WRITE TEST
TEST 4 - WRITE INTERCHANGE TEST
TEST 5 - READ UNKNOWN TAPE
TEST 6 - START/STOP WRITE/READ TEST
```

To stop execution of the diagnostic, type a CTRL-C (^C) at the console.
To exit the Data Reliability test type EXIT at the DR prompt as shown below.

```
DR>EXIT<CR>
```
MicroVAX II System Diagnostics

MDM Diagnostic for Tape

The SQ739 host adapter does support and is compatible with the following MicroVAX II MDM diagnostics listed below.

- Service Functional (1-11) - Run tests 1-8 only
- Verify Functional (1) - Run tests 1-8 only

For additional information regarding MDM diagnostics, refer to the MicroVAX Diagnostic Monitor Users Guide, order number AA-FM7SB-DN.

MDM Diagnostics for Disk

NONE SUPPORTED
7 - Errors and Troubleshooting

The SCSI cable that connects the host adapter to the drives must be terminated at both ends. Since the host adapter is already terminated, this must be one end of the cable. If several drives are attached to the cable, the drive at the end of the cable must be the only drive with termination.

If you are experiencing problems, option 1 of the configuration menu allows a single SCSI command to be given directly to the drive. This is documented in Section 5.

For example, a SCSI Test Unit Ready command is as follows:

6 bytes - 0,0,0,0,0,0

Enter and execute this command. If it cannot be executed, the system may return SCSI Request Sense command information. Consult the drive manual to decode this information. NOTE: After a SCSI bus reset, the SCSI Test Unit Ready command will usually return an error indicating that the bus was reset. Execute the SCSI command again to clear this error.

The SCSI Request Sense command information returned from a SCSI command that failed is error status returned from the drive. This allows drive vendors to give general SCSI status and vendor unique information. General SCSI status is summarized in the four bits of word three of the returned information. This is called the SENSE KEY and is as follows:

0 - NO SENSE. No specific information to return
1 - RECOVERED ERROR. Last command completed successfully but with some drive recovery action.
2 - NOT READY. Drive not ready.
3 - MEDIUM ERROR. Media error.
4 - HARDWARE ERROR. Drive has detected a hardware fault.
5 - ILLEGAL REQUEST. The SCSI command is incorrect for the drive.
6 - UNIT ATTENTION. SCSI bus was reset or drive media was changed.
7 - DATA PROTECT. Drive is write protected.

Consult the drive manual for additional Request Sense information to further isolate the problem.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller address not found</td>
<td>- Is emulation enabled in Diagnostic Main Menu?</td>
</tr>
<tr>
<td></td>
<td>- Is correct IP/SA address set in switch or Diagnostic Main Menu?</td>
</tr>
<tr>
<td></td>
<td>- Is self-test light on?</td>
</tr>
<tr>
<td>SCSI device not found</td>
<td>- Is SCSI cable connected?</td>
</tr>
<tr>
<td></td>
<td>- Is SCSI cable connection inverted?</td>
</tr>
<tr>
<td></td>
<td>- Is device at a unique node address?</td>
</tr>
<tr>
<td></td>
<td>- Is the termination power LED on?</td>
</tr>
<tr>
<td></td>
<td>- Is device mapped into (T)MSCP unit in Diagnostic Main Menu?</td>
</tr>
<tr>
<td></td>
<td>- Is device found using SCSI bus Scan in Diagnostic Main Menu?</td>
</tr>
<tr>
<td>Data errors</td>
<td>- Is SCSI cable terminated at both ends?</td>
</tr>
<tr>
<td></td>
<td>- Is SCSI cable length greater than 18 feet?</td>
</tr>
<tr>
<td></td>
<td>- Is SCSI drive power source adequate?</td>
</tr>
</tbody>
</table>
8 - Error Logs

The error logs that are generated by the host adapter conform to the MSCP and TMSCP specification. The host/device dependent area contains information saved by the host adapter about the specific error. This information can then be used to aid the user in troubleshooting the problem. The format of the error log is consistent throughout the section. The error log outline contains the contents of the error log while the boxes at the far left are the BYTE OFFSET of the longword.

Host Memory Access Error Log

```
| 31 | 0 |
|-----------------------------|
| Host Memory Access Error Log | 0 |
|                             | 24 |
```

Controller Dependent Information

<table>
<thead>
<tr>
<th>Host DMA Address</th>
<th>Q Status</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffer Low</td>
<td>Byte Count</td>
<td>Modifiers</td>
</tr>
<tr>
<td>Undefined</td>
<td>Burst</td>
<td>Dwell</td>
</tr>
</tbody>
</table>
Disk Transfer Error Log

<table>
<thead>
<tr>
<th>COB Size</th>
<th>CDB Size</th>
<th>Ucode Rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte 3</td>
<td>Byte 2</td>
<td>Byte 1</td>
</tr>
<tr>
<td>Byte 0</td>
<td>Byte 4</td>
<td>Byte 3</td>
</tr>
<tr>
<td>Byte 8</td>
<td>Byte 7</td>
<td>Byte 6</td>
</tr>
<tr>
<td>Byte 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SCSI Inquiry Byte 16 to 19

Logical Block Number

Controller Dependent Information
Request Sense Command Information

<table>
<thead>
<tr>
<th>Sense Key</th>
<th>Byte 14</th>
<th>Byte 13</th>
<th>Byte 12</th>
<th>Byte 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>Byte 18</td>
<td>Byte 17</td>
<td>Byte 16</td>
<td>Byte 15</td>
</tr>
<tr>
<td>48</td>
<td>Byte 22</td>
<td>Byte 21</td>
<td>Byte 20</td>
<td>Byte 19</td>
</tr>
<tr>
<td>52</td>
<td>Not Used</td>
<td>Internal Error</td>
<td>Byte 24</td>
<td>Byte 23</td>
</tr>
</tbody>
</table>

Internal Error
- 01H SCSI Check Condition
- 02H SCSI Parity Error
- 03H QBUS NXM Error
- 04H Reassign Bad Block Executed
- 06H Odd Byte Count Error
- 07H Odd Address Error
- 08H Invalid Logical Block Number (LBN)
- 09H SCSI Target did not respond
- 0AH SBIC Fatal Error
- 0BH SCSI Bus Reset Detected
- 0DH SCSI Parity Error (Recoverable)
- 13H Operation Timeout
- 15H SCSI Device Busy Timeout
- 16H Self Test Error
- 19H Fatal Port Error
- 1AH Fatal Controller Error
Disk SDI Error Log

<table>
<thead>
<tr>
<th>CDB Byte 3</th>
<th>CDB Byte 2</th>
<th>CDB Byte 1</th>
<th>CDB Byte 0</th>
<th>Unit Number</th>
<th>CDB Byte 4</th>
<th>CDB Byte 3</th>
<th>CDB Byte 8</th>
<th>CDB Byte 7</th>
<th>CDB Byte 6</th>
<th>CDB Byte 5</th>
<th>SCSI Inquiry Bytes 16 to 19</th>
<th>Logical Block Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undefined</td>
<td>CDB Size</td>
<td>Assy Rev</td>
<td>20</td>
<td></td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDB Byte 3</td>
<td>CDB Byte 2</td>
<td>CDB Byte 1</td>
<td>CDB Byte 0</td>
<td>Unit Number</td>
<td>CDB Byte 4</td>
<td>CDB Byte 3</td>
<td>CDB Byte 8</td>
<td>CDB Byte 7</td>
<td>CDB Byte 6</td>
<td>CDB Byte 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Controller Dependent Information
Request Sense Command Information

<table>
<thead>
<tr>
<th>Byte 14</th>
<th>Byte 13</th>
<th>Byte 12</th>
<th>Sense Key</th>
<th>44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte 18</td>
<td>Byte 17</td>
<td>Byte 16</td>
<td>Byte 15</td>
<td>48</td>
</tr>
<tr>
<td>Byte 22</td>
<td>Byte 21</td>
<td>Byte 20</td>
<td>Byte 19</td>
<td>52</td>
</tr>
<tr>
<td>Not Used</td>
<td>Internal Error</td>
<td>Byte 24</td>
<td>Byte 23</td>
<td>56</td>
</tr>
</tbody>
</table>

Internal Error
- 01H SCSI Check Condition
- 02H SCSI Parity Error
- 03H QBUS NXM Error
- 04H Reassign Bad Block Executed
- 06H Odd Byte Count Error
- 07H Odd Address Error
- 08H Invalid Logical Block Number (LBN)
- 09H SCSI Target did not respond
- 0AH SBIC Fatal Error
- 0BH SCSI Bus Reset Detected
- 0DH SCSI Parity Error (Recoverable)
- 13H Operation Timeout
- 15H SCSI Device Busy Timeout
- 16H Self Test Error
- 19H Fatal Port Error
- 1AH Fatal Controller Error
### Tape Transfer Error Log

<table>
<thead>
<tr>
<th>31</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMSCP Tape Transfer Error Log</td>
<td>0</td>
</tr>
<tr>
<td>Current Tape Position</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>40</td>
</tr>
</tbody>
</table>

#### CONTROLLER DEPENDENT INFORMATION
Request Sense Command Information

<table>
<thead>
<tr>
<th>31</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDB Byte 2</td>
<td>CDB Byte 1</td>
</tr>
<tr>
<td>Sense Key</td>
<td>CDB Byte 5</td>
</tr>
<tr>
<td>Byte 20</td>
<td>Byte 19</td>
</tr>
<tr>
<td>Byte 16</td>
<td>Internal Error</td>
</tr>
</tbody>
</table>

Internal Error = 01H SCSI Check Condition
= 02H SCSI Parity Error
= 03H QBUS NXM Error
= 05H Transfer Request > 64KB
= 09H SCSI Target did not respond
= 0AH SBIC Fatal Error
= 0BH SCSI Bus Reset Detected
= 0EH SCSI Reservation Conflict
= 10H Serious Exception Found
= 13H Operation Timeout
= 16H Self Test Error
= 17H TMSCP Unit Available
= 18H TMSCP No Volume
= 19H Fatal Port Error
= 1AH Fatal Controller Error
Exabyte EXB-8200 Error Log Definition

<table>
<thead>
<tr>
<th>Offset</th>
<th>Byte Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Current Tape Position</td>
</tr>
<tr>
<td>44</td>
<td>SCSI Command Size</td>
</tr>
</tbody>
</table>

- **Bit 7-0 06 Six (6) Byte Command**
- **10 Ten (10) Byte Command**
- **12 Twelve (12) Byte Command**

| 45     | SCSI Command Opcode                   |

- **Bit 7-0 00 Test Unit Ready**
- **03 Request Sense**
- **08 Read**
- **10 Write Filemark**
- **12 Inquiry**
- **19 Erase**
- **1B Load/Unload**

| 46     | SCSI CDB Byte 1                       |
| 47     | SCSI CDB Byte 2                       |
| 48     | SCSI CDB Byte 3                       |
| 49     | SCSI CDB Byte 4                       |
| 50     | SCSI CDB Byte 5                       |

| 51     | Sense Key                              |

- **Bit 7  File Mark**
- **Bit 6  End Of Media**
- **Bit 5  Incorrect Length Indicator**
- **Bit 4  Not Used**
- **Bit 3-0 0 No sense**
- **2 Not Ready**
- **4 Hardware Error**
- **6 Unit Attention**
- **8 Blank Check**
- **A Copy Aborted**
- **C Not Used**
- **E Not Used**
- **1 Not Used**
- **3 Medium Error**
- **5 Illegal request**
- **7 Data protect**
- **9 Exabyte**
- **B Aborted Command**
- **D Volume Overflow**
- **F Reserved**

| 52     | Sense Code (Additional)               |

- **Bit 7-0 02 Not Ready**

| 53     | Sense Qualifier (additional)          |

- **Bit 7-0 00 Volume not Mounted**
- **01 Busy Rewinding or Loading**
SCSI Status
Bit 7  Power Fail
Bit 6  SCSI Bus Parity Error
Bit 5  Formatted Buffer Parity Error
Bit 4  Media Error
Bit 3  Error Counter Overflow
Bit 2  Tape Motion Error
Bit 1  Tape Not Present
Bit 0  Beginning of Tape

SCSI Status
Bit 7  Transfer Abort Error
Bit 6  Tape Mark Detect Error
Bit 5  Write Protect
Bit 4  Write Filemark Error
Bit 3  Underrun Error
Bit 2  Write Error 1
Bit 1  Servo System Error
Bit 0  Formatter Error

SCSI Status
Bit 7-2  Reserved
Bit 1  Write Splice Error
Bit 0  Write Splice Error
9 - Standard Error Codes

Self Test Error Codes

If an error occurs during self-test, an error code will be flashed on the activity LED (D2) and sent to the terminal port if enabled. A long flash represents a "1" while a short flash indicates a "0". The flashes are decoded starting with the most significant bit (MSB). The error code can be identified by the following error code table.

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>EEPROM Checksum Error</td>
</tr>
<tr>
<td>1</td>
<td>Ram Error</td>
</tr>
<tr>
<td>2</td>
<td>Disk QBIC Error</td>
</tr>
<tr>
<td>3</td>
<td>Tape QBIC Error</td>
</tr>
<tr>
<td>4</td>
<td>SBIC Error</td>
</tr>
<tr>
<td>5</td>
<td>Fifo Error</td>
</tr>
<tr>
<td>6</td>
<td>Serial Port Error</td>
</tr>
<tr>
<td>7</td>
<td>QBUS Interrupt Error</td>
</tr>
<tr>
<td>8</td>
<td>QBUS DMA Error</td>
</tr>
<tr>
<td>9</td>
<td>SCSI Term Power Error</td>
</tr>
</tbody>
</table>

Fatal SA Error Codes

The SA error codes will be posted in the SA register upon detection of a fatal error which prevents the proper operation of the host adapter. Bit 15 set in the SA register indicates a fatal error while the low byte indicates the type of failure.

<table>
<thead>
<tr>
<th>Hex</th>
<th>Octal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8001</td>
<td>100001</td>
<td>Envelope/Packet Read Error</td>
</tr>
<tr>
<td>8002</td>
<td>100002</td>
<td>Envelope/Packet Write Error</td>
</tr>
<tr>
<td>8006</td>
<td>100006</td>
<td>Ring Read Error</td>
</tr>
<tr>
<td>8007</td>
<td>100007</td>
<td>Ring Write Error</td>
</tr>
<tr>
<td>8009</td>
<td>100011</td>
<td>Host Access Timeout</td>
</tr>
<tr>
<td>800A</td>
<td>100012</td>
<td>Credit Limit Exceeded</td>
</tr>
<tr>
<td>8013</td>
<td>100023</td>
<td>Step 1 Init Error</td>
</tr>
<tr>
<td>801C</td>
<td>100034</td>
<td>Step 3 NXM Error</td>
</tr>
<tr>
<td>801x</td>
<td>1001xx</td>
<td>Fatal Firmware Error (see below)</td>
</tr>
<tr>
<td>Hex</td>
<td>Octal</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>8041</td>
<td>100101</td>
<td>Out of range opcode in io_pre</td>
</tr>
<tr>
<td>8042</td>
<td>100102</td>
<td>Out of range opcode in io_busy</td>
</tr>
<tr>
<td>8043</td>
<td>100103</td>
<td>Out of range opcode in Q-bus interrupt</td>
</tr>
<tr>
<td>8044</td>
<td>100104</td>
<td>Out of range SCSI phase</td>
</tr>
<tr>
<td>8045</td>
<td>100105</td>
<td>Out of range opcode in SCSI reselect</td>
</tr>
<tr>
<td>8046</td>
<td>100106</td>
<td>QBIC interrupt w/hsi full set</td>
</tr>
<tr>
<td>8047</td>
<td>100107</td>
<td>QBIC interrupt w/hsi holding set</td>
</tr>
<tr>
<td>8048</td>
<td>100110</td>
<td>SCSI interrupt w/no status</td>
</tr>
<tr>
<td>8049</td>
<td>100111</td>
<td>QBIC interrupt twice on command</td>
</tr>
<tr>
<td>804A</td>
<td>100112</td>
<td>QBIC interrupt w/wrong ack</td>
</tr>
<tr>
<td>804B</td>
<td>100113</td>
<td>QBIC interrupt w/no status</td>
</tr>
<tr>
<td>804C</td>
<td>100114</td>
<td>SCSI interrupt interrupt w/wrong ack</td>
</tr>
<tr>
<td>804D</td>
<td>100115</td>
<td>SCSI reselect interrupt w/wrong ack</td>
</tr>
<tr>
<td>804E</td>
<td>100116</td>
<td>SCSI reselect interrupt w/wrong current command</td>
</tr>
<tr>
<td>804F</td>
<td>100117</td>
<td>SCSI chip illegal command</td>
</tr>
<tr>
<td>8050</td>
<td>100120</td>
<td>SCSI gross error</td>
</tr>
<tr>
<td>8051</td>
<td>100121</td>
<td>SCSI unexpected phase</td>
</tr>
<tr>
<td>8052</td>
<td>100122</td>
<td>execute routine is off</td>
</tr>
<tr>
<td>8053</td>
<td>100123</td>
<td>Q-bus timeout</td>
</tr>
<tr>
<td>8054</td>
<td>100124</td>
<td>SCSI timeout</td>
</tr>
<tr>
<td>8055</td>
<td>100125</td>
<td>SCSI unknown reselect</td>
</tr>
<tr>
<td>8056</td>
<td>100126</td>
<td>SCSI flush queue failed</td>
</tr>
<tr>
<td>8057</td>
<td>100127</td>
<td>SCSI bus reset will not work</td>
</tr>
<tr>
<td>8058</td>
<td>100130</td>
<td>other QBIC has error</td>
</tr>
<tr>
<td>8059</td>
<td>100131</td>
<td>write_ip during diagnostics</td>
</tr>
<tr>
<td>805A</td>
<td>100132</td>
<td>auto configure failure w/no nodes for host</td>
</tr>
</tbody>
</table>
MSCP error log sample. Only accurate system descriptions have been included along with special meanings in bold italics for the SQ739.

**ENTRY**

ERROR SEQUENCE 14.

DATE/TIME 18-OCT-1991 09:53:07.60

SYSTEM UPTIME: 0 DAYS 00:05:35

SCS NODE:

ERL$LOGMESSAGE ENTRY KA630

I/O SUB-SYSTEM, UNIT _DUA3:

MESSAGE TYPE 0001  
MSLGS$CMD_REP AD1A0002
MSLGS$UNIT 0003  
UNIT #3.
MSLGS$SEQ_NUM 0000  
SEQUENCE #0.
MSLGS$FORMAT 03  
SDI ERROR
MSLGS$FLAGS 01  
SEQUENCE NUMBER RESET
MSLGS$EVENT 0023  
UNIT OFFLINE
MSLGSQ_CNT_ID 33375153  
NO MEDIA LOADED/DISABLED VIA SWITCH
               01D2039  
SQ739 reversed in ascii code
               MASS STORAGE CONTROLLER
               KDA50-Q
MSLGS$CNT_SVR F0  
SCSI CDB bytes 3/2/1/0
MSLGS$CNT_HVR 1F  
SCSI CDB bytes 4/5
MSLGS$MULT_UNIT 0000  
SCSI CDB byte 6
MSLGS$UNIT_ID 00000028  
SCSI CDB byte 7
               02010000  
SCSI inquiry bytes 16 to 19
               RA80  
LOGICAL BLOCK #0.
               GOOD LOGICAL SECTOR.
MSLGS$HDR_CODE 00000000  
Sense key
MSLGS$REQUEST 02  
Sense byte 12
MSLGS$MODE 0A  
Sense byte 13
MSLGS$ERROR 00  
Sense byte 14
MSLGS$CONTROLLER 00  
Sense byte 15
MSLGS$RETRY 00

DEVICE DEPENDENT INFORMATION

LONGWORD 1. 3C000000  
Sense bytes 20/19/18/17
LONGWORD 2. 07001000  
Sense bytes 24/23/22/21
LONGWORD 3. 008D0122  
NA/NA/internal error/Sense byte 25

This error log indicates a MSCP error of 23 which is no media. The SCSI command was a read (CDB 28,00,00,00,00,00,00,00,00). The SCSI read command had an internal error of 01 which is a SCSI check condition. The sense bytes from the SCSI request sense that was automatically done after the read had a sense key of 2, which is a NOT READY condition.
TMSCP

TMSCP error log sample. Only accurate system descriptions have been included along with special meanings in bold italics for the SQ739.

ERROR SEQUENCE 22.
SYSTEM UPTIME: 0 DAYS 00:14:42
SCS NODE:

ERL$LOGMESSAGE ENTRY KA630
I/O SUB-SYSTEM, UNIT _MUA0:, CURRENT LABEL ""

MESSAGE TYPE 0002 TAPE MSCP MESSAGE
MSLGSW_CMD_REF AB5F0005
MSLGSW_UNIT 0000 UNIT #0.
MSLGSW_SEQ_NUM 0000 SEQUENCE #0.
MSLGSW_FORMAT 05 APE TRANSFER LOG
MSLGSW_FLAGS 01 SEQUENCE NUMBER RESET
UNRECOVERABLE ERROR
MSLGSW_EVENT 0023 UNIT OFFLINE
NO MEDIA LOADED/DISABLED VIA SWITCH
MSLGSW_Q_CNT_ID 33375153 SQ739 reversed in ascii code
3092039 TAPE CLASS DEVICE
MSLGSW_CNT_SVR 05
MSLGSW_CNT_HVR 04
MSLGSW_MUSTUNT 0001
MSLGSW_UNIT_ID 33377173 SQ739 reversed in ascii code
3092039 TAPE CLASS DEVICE

TK50 DEVICE/CONTROLLER DEPENDENT INFORMATION

TRK NUMBER 00
PHYSICAL BLK# 0000
LOGICAL BLK# 5A
TAPE POSITION 020000 sense key/CDB byte 5/NA
DRIVE STATE 0004 sense byte 13/sense byte 12
RD/WRT STATE 3C02 sense byte 19/sense byte 20
OPERATION FLGS 2100 opcode/sense byte 21
CNTRLR STATUS 01 internal error
DRIVE ERR CODE 00 sense byte 16

This error log indicates a TMSCP error of 23 which is no media. The SCSI command was a read (CDB 08,00,00,00,5A,00). The SCSI read command had an internal error of 01 which is a SCSI check condition. The sense bytes from the SCSI request sense that was automatically done after the read had a sense key of 2, which is a NOT READY condition. The TMSCP opcode is 21 which is a read.