CMD Technical Support

CQD220/223 Qbus Controller Installation Guide

The QBUS CONTROLLER is an intelligent high performance Q-Bus single-ended (sync/async) SCSI Host Adapter. The QBUS CONTROLLER is fully compatible with the DEC Mass Storage Control Protocol (MSCP) and Tape Mass Storage Control protocol (TMSCP).

The QBUS CONTROLLER can be used with the LSI-11/23, PDP-11/23+, Micro-PDP-11/53, 11/73, 11/83, 11/93, MicroVAX II, and MicroVAX III, VAX 4000 and DECsystem 5400 systems. It supports RT-11, TSX, DSM-11, ISM-11, RSX, RSTS, VMS, UNIX, ULTRIX, and other operating systems which use DU/TU drivers.

Models:

CQD-220/M	Disk Only	(P22016A or P22016B in U40)
CQD-220/T	Tape Only	(P22017A in U40)
CQD-220/TM	Disk and Tape	(P22015A in U40)
CQD-220/TMP	Disk and Tape	(P22015A in U40) Special Passthrough version
CQD-220/TMJ	Disk and Tape	(P22015A in U40) Jukebox Option
CQD-220/TMS	Disk and Tape	(P22015A in U40) Shadow Option

CQD-223 has the MicroVAX-3 metal mounting bracket, otherwise is the same board.

Board Size	Dual Wide Q-bus
Emulation	MSCP (DU driver) / TMSCP (TU driver)
Bus Interface	Standard MicroVAX or LSI-11 Q-bus
Addressing	18- or 22-bit Addressing
Interrupt Priority	Level 4 or 5
Interrupt Vector	Software programmable
Transfer Mode	Normal or block mode DMA
Command Queuing	Commands with optimized seek
Data Buffer Capacity	Virtual data buffer (infinite size)
Bootstrap	Auto bootstrap or utility bootstrap
Defect Management	Dynamic defect management
Software Supported	All standard DEC operating systems
Multiple-Hosting	Support multiple-hosting for disks, optical drives and tapes.

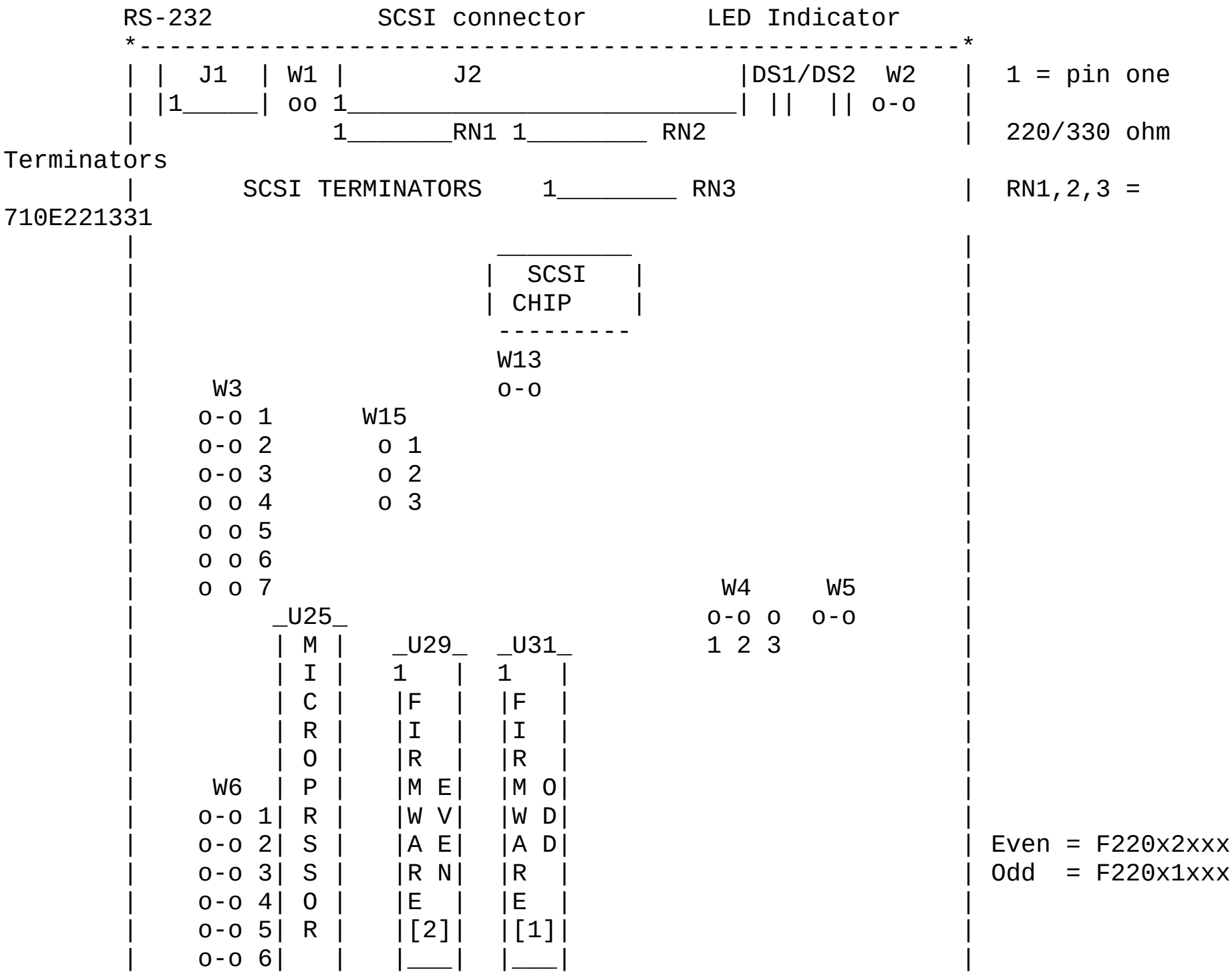
Formatting	On board format and bad block replacement (ISO standard for optical erasable disk format)
Partitioning	2 or 4 equally divided partitions for disk drives
Shadowing	Any two disk drives of equal size on the bus can form a shadow set (for /TMS version only)
Optional Software	Tape Monitor Utility (TMU) SCSIformat ON-LINE (FMT) SCSI Library Manager (SLM for /TMJ only)
LED Indicators	Self test, error conditions
Peripheral Interface	Single Ended SCSI
SCSI Transfer Rate:	4.8-MB/sec in Sync 3.0-MB/sec in Async
SCSI Bus Parity	Odd parity
Devices Supported	7 SCSI devices disk or tape
System Performance	disconnect/reconnect, multiple-host
SCSI Cable Length	Single ended, up to 20-feet (6-meters)
Operating Temperature	5 to 50 degrees C
Relative Humidity	10% to 90% , Non-condensing
Power	5V DC 2.0 A

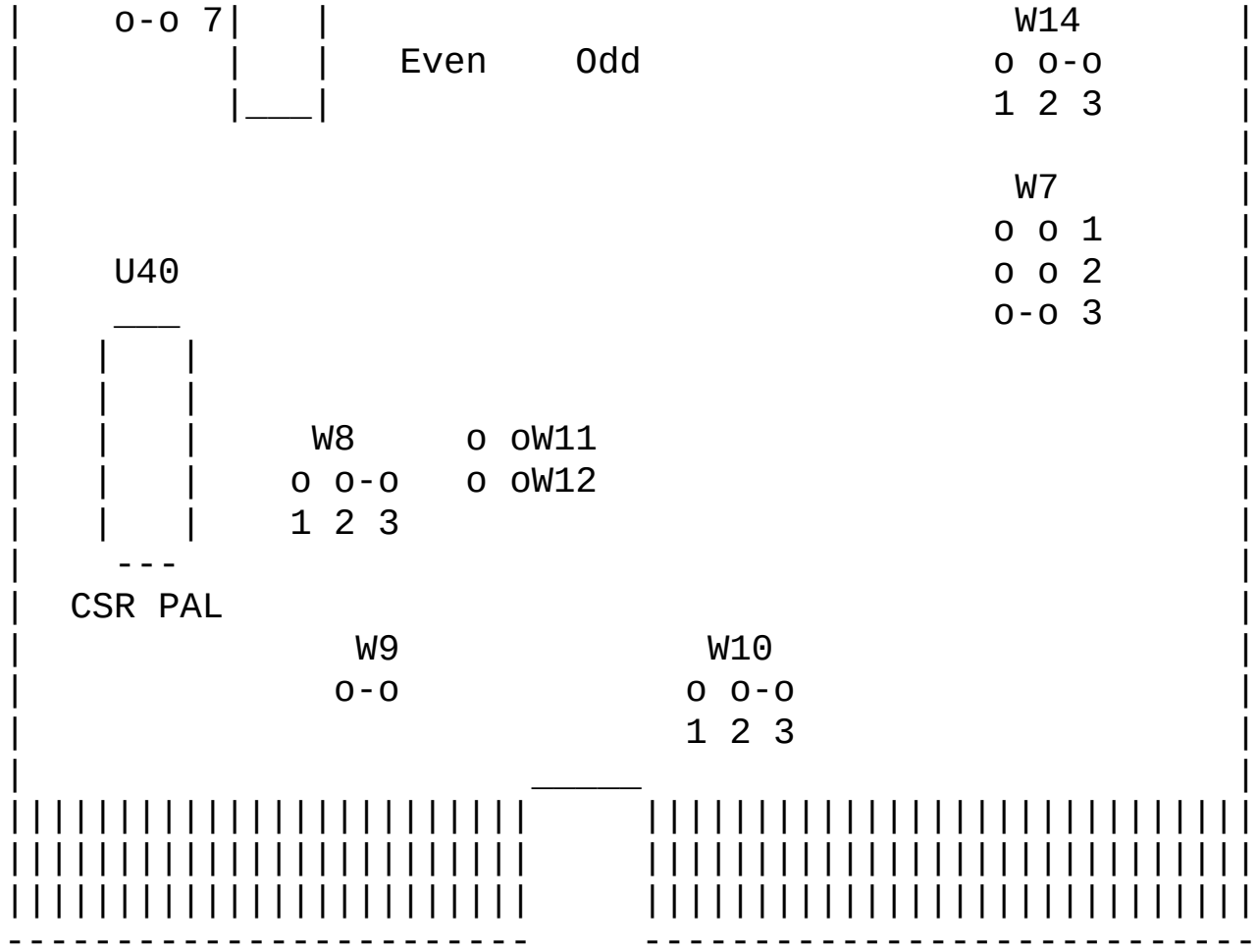
Selecting CSR Address

Before you install the QBUS SCSI host adapter under the VMS,Ultrix or Unix operating system you must select the appropiate Control and Status Register (CSR) address. If /T(tape only), then the appropiate tape csr is required. If /M(disk only), then the appropiate disk csr must be selected. If the dual function /TM controller is enabled so that both disk and tape are supported, two CSR addresses are required, one for disk and the other for tape. If /TM is being used as a tape only or disk only, then select the single appropiate CSR. Click here for help in CSR Address selection.

- RS232 Cable Connection
- Hardware Shadow Option
- On-Line Format Or Tape Monitor Utility
- Dualhosting For Scsi Clustering
- Quick Switch Settings
- On-Board Test Utility

CQD220/223 Board Layout





CQD-220/CQD-223 Jumper Assignments

Host Adapter SCSI ID Selections: (should normally be set to ID=7)

W3-1	W3-2	W3-3	Initiator ID
IN	IN	IN	Host adapter ID = 7, highest priority (F)
IN	IN	OUT	Host adapter ID = 6

W1	OUT	Reserved (F)
W2	IN	SCSI terminator power enabled. This should be in. (F)

```
W3-4     IN=Enable tape fast search,   OUT=Normal operation (F)
W3-5    OUT=Tape Monitor Utility and Disk SCSIformat ON-LINE disabled (F)
W3-5     IN=Tape Monitor Utility enabled (/T, /TM)     (MUx255 shows up)
             Disk SCSIformat ON-LINE enabled (/M, /TM)  (DUx254 shows up)
W3-6    OUT=Tape sync. mode enabled (F)  ;This should normally be out
W3-7    OUT=Disk sync. mode enabled (F)  ;THis should normally be out
W4 1-2   IN=Block mode DMA enabled (F)
W5       IN=Adaptive DMA enabled (F)
W6-1     IN=Auto-Bootstrap address = 773000 (F)    ;LSI-11 autoboot.
W6-1    OUT=Auto-Bootstrap address = 771000        ;
W7-1      OUT          1.2 us DMA dwell time       ;W7-1,2,3 only one jumper
W7-2      OUT          2.4 us DMA dwell time       ;in at a time
W7-3      IN           4.8 us DMA dwell time (F)   ;always set to this
W8 1-2    IN           Auto-Bootstrap enabled      ; LSI-11 autoboot
W8 2-3    IN           Auto-Bootstrap disabled (F) ; (all VAX set to this)
W9        IN           22-Bit addressing (F)*      ; (all VAX set to this)
W10 2-3   IN           Interrupt level 4 (F)       ; (all VAX set to this)
W11, W12  OUT          Reserved (F)
W13       IN           Reserved, Rev. C (F)
W14 1-2   IN           27256 Eprom hardware Rev. C
W14 2-3   IN           27C512 Eprom hardware Rev. C (F)
Note: (F) means factory setting.
```

CSR Address Selections

The next two tables list the CSR address selections for the CQD-220/TM (Rev. B and higher) with the IC P22015A in U40.

CQD-220/TM CSR jumper settings for disk (Rev. B & higher)

Address	LSI-11	MicroVAX	W6-2	W6-3	W6-4
Standard	17772150	20001468	IN	IN	IN
Second	17760334	200000DC	IN	IN	OUT
Third	17760354	200000EC	IN	OUT	IN
Fourth	17760374	200000FC	IN	OUT	OUT

Fifth	17760340	200000E0	OUT	IN	IN
Sixth	17760344	200000E4	OUT	IN	OUT
Seventh	17760350	200000E8	OUT	OUT	IN
Disable disk			OUT	OUT	OUT

CQD-220/TM CSR jumper settings for tape (Rev. B & higher)

Address	LSI-11	MicroVAX	W6-5	W6-6	W6-7
Standard	17774500	20001940	IN	IN	IN
Second	17760404	20000104	IN	IN	OUT
Third	17760444	20000124	IN	OUT	IN
Fourth	17760504	20000144	IN	OUT	OUT
Fifth	17760544	20000164	OUT	IN	IN
Sixth	17760410	20000108	OUT	IN	OUT
Seventh	17760450	20000128	OUT	OUT	IN
Disable Tape			OUT	OUT	OUT

CQD-220/M with IC P22016A or P22016B in U40 CSR Address Selections (Rev. B & higher)

Addr	LSI-11	Micro VAX	W6-2	W6-3	W6-4	W6-5	W6-6
1	17772150	20001468	IN	IN	IN	OUT	OUT
2	17760334	200000DC	IN	IN	OUT	OUT	OUT
3	17760354	200000EC	IN	OUT	IN	OUT	OUT
4	17760374	200000FC	IN	OUT	OUT	OUT	OUT
5	17760340	200000E0	OUT	IN	IN	OUT	OUT
6	17760344	200000E4	OUT	IN	OUT	OUT	OUT
7	17760350	200000E8	OUT	OUT	IN	OUT	OUT
8	17760360	200000F0	OUT	OUT	OUT	OUT	OUT
9	17760364	200000F4	IN	IN	IN	IN	OUT
10	17760370	200000F8	IN	IN	OUT	IN	OUT
11	17760400	20000100	IN	OUT	IN	IN	OUT
12	17760404	20000104	IN	OUT	OUT	IN	OUT
13	17760410	20000108	OUT	IN	IN	IN	OUT
14	17760414	2000010C	OUT	IN	OUT	IN	OUT

15	17760420	20000110	OUT	OUT	IN	IN	OUT
16	17760424	20000114	OUT	OUT	OUT	IN	OUT
17	17760430	20000118	IN	OUT	IN	OUT	IN
18	17760434	2000011C	IN	OUT	OUT	OUT	IN
19	17760440	20000120	IN	OUT	IN	OUT	IN
20	17760444	20000124	IN	OUT	OUT	OUT	IN
21	17760450	20000128	OUT	IN	IN	OUT	IN
22	17760454	2000012C	OUT	IN	OUT	OUT	IN
23	17760460	20000130	OUT	OUT	IN	OUT	IN
24	17760464	20000134	OUT	OUT	OUT	OUT	IN
25	17760470	20000138	IN	IN	IN	IN	IN
26	17760474	2000013C	IN	IN	OUT	IN	IN
27	17760500	20000140	IN	OUT	IN	IN	IN
28	17760504	20000144	IN	OUT	OUT	IN	IN
29	17760510	20000148	OUT	IN	IN	IN	IN

For these CSR address selections, W6-7 can be IN or OUT; it does not matter.

CQD-220/T with the IC P22017A in U40.
CQD-220/T CSR Address Selections (Rev. B & higher)

Addr	LSI-11	MicroVAX	W6-3	W6-4	W6-5	W6-6	W6-7
1	17774500	20001940	OUT	OUT	IN	IN	IN
2	17760404	20000104	OUT	OUT	IN	IN	OUT
3	17760444	20000124	OUT	OUT	IN	OUT	IN
4	17760504	20000144	OUT	OUT	IN	OUT	OUT
5	17760544	20000164	OUT	OUT	OUT	IN	IN
6	17760410	20000108	OUT	OUT	OUT	IN	OUT
7	17760450	20000128	OUT	OUT	OUT	OUT	IN
8	17760454	2000012C	OUT	OUT	OUT	OUT	OUT
9	17760414	2000010C	OUT	IN	IN	IN	IN
10	17760420	20000110	OUT	IN	IN	IN	OUT
11	17760460	20000130	OUT	IN	IN	OUT	IN
12	17760510	20000148	OUT	IN	IN	OUT	OUT
13	17760514	2000014C	OUT	IN	OUT	IN	IN
14	17760520	20000150	OUT	IN	OUT	IN	OUT

15	17760550	20000168	OUT	IN	OUT	OUT	IN
16	17760554	2000016C	OUT	IN	OUT	OUT	OUT
17	17760560	20000170	IN	OUT	IN	IN	IN
18	17760604	20000184	IN	OUT	IN	IN	OUT
19	17760610	20000188	IN	OUT	IN	OUT	IN
20	17760614	2000018C	IN	OUT	IN	OUT	OUT
21	17760620	20000190	IN	OUT	OUT	IN	IN
22	17760644	200001A4	IN	OUT	OUT	IN	OUT
23	17760650	200001A8	IN	OUT	OUT	OUT	IN
24	17760654	200001AC	IN	OUT	OUT	OUT	OUT
25	17760660	200001B0	IN	IN	IN	IN	IN
26	17760704	200001C4	IN	IN	IN	IN	OUT
27	17760710	200001C8	IN	IN	IN	OUT	IN
28	17760714	200001CC	IN	IN	IN	OUT	OUT
29	17760744	200001E4	IN	IN	OUT	IN	IN
30	17760750	200001E8	IN	IN	OUT	IN	OUT
31	17760754	200001EC	IN	IN	OUT	OUT	IN

For these CSR address selections, W6-2 can be IN or OUT; it does not matter.

On-Board Utility

The Utility can be accessed through the system console or the RS-232 Port on the CQD-220 or CQD-223. The CQD-220 uses a 10-pin RS-232 cable. The CQD-223 uses the same RS-232 MMJ cable used on the MicroVAX-3.

To access the On-Board Utility through the RS-232 port, plug in the cable and power-on or Restart the computer. The On-Board Utility will display on the screen. Be sure to set the terminal to 9600 baud, 8 bit data, and no parity.

The above information can be changed without notice.
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CMD Technical Support

RS-232 Cable

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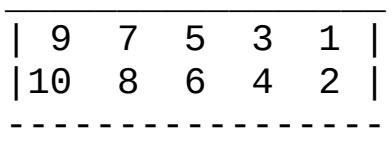
FTP Site: FTP.CMD.COM
BBS: (714) 454-0795

The RS-232 cable is used on CMD's SCSI host adapters to access the On-Board Utility. This cable is the same type as the DEC DLV-11J RS-232 cable. Some of the LSI-11 and MicroVax CPU console port use the similiar cable. If you have a DEC cable, you may have to remove the Key-Pin in order to plug into the CMD SCSI host adapter.

Pin Assignments of the RS-232

Physical pin number assignments and functions of the RS-232 port for accessing the On-Board Utility. Connector J1 pin assignments are listed in the following table when you are facing the 10 pin connector from the controller's top edge.

NOTE
For CMD's On-Board RS-232 Utility, only pin 3, 8 and grounds are used.



Pin Assignments for Utility Interface

Pin 1 No connect
Pin 2 Ground
Pin 3 TXD, transmit data for RS-232 application
Pin 4 Ground
Pin 5 No connect

```
Pin 6     No connect
Pin 7     No connect
Pin 8     RXD, receive data for RS-232 application
Pin 9     Ground
Pin 10    No connect
```

NOTE
Only the Utility is operational when the RS-232 port connector is in place. Be sure to remove the cable when using normal operation.

- On-Line Format or Tape Monitor Utility
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CMD Technical Support

Setup Procedures for Hardware Shadowing

The Super Shadow QBUS CONTROLLER/TMS is a hardware variation of the QBUS CONTROLLER. Installation and setup of CMD shadowing host adapters are simplified with the CMD On-Board Utilities. This easy to use menu-driven utility allows you to quickly configure virtually any combination of disk shadow sets. See Chapter 4 for "Hardware Shadowing Configuration" and the CMD "Super Shadow Management Guide." The hardware disk shadowing on DEC computers enables simultaneous writing of data to two shadow set members. This provides an exact real-time duplicate data set that can be later retrieved by the user if data on primary disk becomes inaccessible. The access performance benefits are derived from the ability to read data from a particular disk in the shadow set that responds faster. By adapting specific host adapter resident firmware algorithms, QBUS CONTROLLER/TMS provides incredible performance benefits with disk access time reduced 100% or more during reads. This hardware-based shadowing technique also results in far less VMS overhead and much higher data availability than software solutions. You can now configure complete SCSI drive failure tolerant subsystems built around Super Shadow host adapters. When used in conjunction with other CMD exclusive features like Multi-Host capability, subsystem data availability can be increased substantially.

Hardware Shadowing Configuration

This section explains how to configure drives into shadow sets. A maximum of three shadow sets can be formed with each controller. For the purpose of this explanation, four disk drives will be divided into two shadow sets with three remaining tape drives as shown below:

```
DU0 SCSI ID 0
Primary

DS0 SCSI ID 1
Shadow drive of DU0

DU1 SCSI ID 2
Primary

DS1 SCSI ID 3
```

```
Shadow drive of DU1

MU0
SCSI ID 4


MU1
SCSI ID 5


MU2
SCSI ID 6
```

Configuration Instructions

Follow the instructions below for configuring shadow sets.

1. Select 5 from the SCSI Host Adapter Utility.
2. Select D from the "Additional Utilities" to display current configuration.
3. Answer Y to the question: CHANGE CONFIGURATION ? (Y/N).
4. Select Z to reset configuration back to default. Answer Y to reconfigure the adapter. This step is IMPERATIVE!

   NOTE
   If you ever reconfigure the board, you must reset the configuration to default using selection Z and then reconfigure.
5. Select C to reconfigure the device.

```
Number of Disks (including shadow units)? (0-7)  4
Number of Shadow sets? (0-2)  2
  DU0 to be Reconfigured? (Y/N)  Y
  DU0 SCSI ID? (0-7)  0
  DU0 LUN? (0-3)  0
Shadow units exist? (Y/N)  Y
  DS0 SCSI ID? (0-7)  1
  DS0 LUN? (0-3)  0
  DU1 to be Reconfigured? (Y/N)  Y
```

```
  DU1 SCSI ID? (0-7)  2
  DU1 LUN? (0-3)  0
Shadow units exist? (Y/N)  Y
  DS1 SCSI ID? (0-7)  3
  DS1 LUN? (0-3)  0

Number of Tapes? (0-3)  3
  MU0 to be Reconfigured? (Y/N)  Y
  MU0 SCSI ID? (0-7)  4
  MU0 LUN? (0-3)  0
  MU1 to be Reconfigured? (Y/N)  Y
  MU1 SCSI ID? (0-7)  5
  MU1 LUN? (0-3)  0
  MU2 to be Reconfigured? (Y/N)  Y
  MU1 SCSI ID? (0-7)  6
  MU1 LUN? (0-3)  0
```

6. After you have completed configuration, the system will display the device configuration screen.

```
DEV0  DU0, SCSI ID 0, LUN 0
      Disconnect ON, Sync Mode ON, Prevent Medium Removal ON, Write W/Verify OFF

DEV1  DU1, SCSI ID 2, LUN 0
      Disconnect ON, Sync Mode ON, Prevent Medium Removal ON, Write W/Verify OFF

DEV2  DS0, SCSI ID 1, LUN 0
      Disconnect ON, Sync Mode ON, Prevent Medium Removal ON, Write W/Verify OFF

DEV3  DS1, SCSI ID 3, LUN 0
      Disconnect ON, Sync Mode ON, Prevent Medium Removal ON, Write W/Verify OFF

DEV4  MU0, SCSI ID 4, LUN 0
      Disconnect ON, Sync Mode ON, Buffer Mode ON

DEV5  MU1, SCSI ID 5, LUN 0
      Disconnect ON, Sync Mode ON, Buffer Mode ON

DEV6  MU2, SCSI ID 6, LUN 0
```

```
        Disconnect ON, Sync Mode ON, Buffer Mode ON

DEV7  SCSI ID 7, HOST ADAPTER
      SCSI Reset ON, Density Mode ON , Default Tape OFF
```

7. Then answer N to the question: CHANGE CONFIGURATION ? (Y/N) and exit out of the On-Board Utility.

Detecting Shadowing Errors Using VMS

The following instructions will help you detect shadowing errors and shadowing drive failure.

1. At the system prompt, enter show dev du.
2. Check the error count for shadowed disk drives.
3. If errors are detected, follow the instructions given in Appendix C, “Troubleshooting,” to view “Controller Dependent Information.” Look for information describing which drive has failed such as given below:

   ```
   /ID x/ /LUNx/
   ```

   Where: x is the variable used to represent the ID, LUN disk drive.
4. Back up the remaining good shadow set member.
5. Shut down the system.
6. Replace the drive.
7. Enter the On-Board Utility and follow these instructions:
   1. Select option D. The current configuration will display.
   2. Answer Y to the question: DO YOU WANT TO CLEAR SHADOW FAILED STATUS ? <<Y/N>>
   3. Answer N to the question: CHANGE CONFIGURATION <<Y/N>>
   4. Exit On-Board Utility.
8. Boot the system.
9. Initialize the specified shadow set in VMS.
10. Restore the backup copy to the specified shadow set.
11. Put the specified drives back on-line by mounting them to VMS.

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The Tape Monitor Utility (TMU) is an application software that works exclusively with CMD SCSI host adapters as an optional feature for VAX/VMS systems. This Tape Monitor Utility displays the tape drive vendor identification, drive firmware revision, the remaining tape capacity, percentage/number of rewrites during writes or percentage/number of ECC retrys during reads (see manufacturer's documentation for returns whether percentages or numbers), and current tape operations such as read, write, write file mark, space, rewind, etc. You can install multiple QBUS CONTROLLER's and tape drives in one site and observe all tape activity from any VAX terminal locally or across the network without any additional add-in hardware. You can also open a file to log all the information during unattended backup. To install the Tape Monitor Utility, follow the instructions given in the accompanying CMD Tape Monitor Utility User's Manual part number MAN-000TMU-000 and install jumper shunt as given in Chapter 3, subsection “Tape Monitor Utility and SCSIformat.”

Note
Please check the installation guide for the jumper or switch setting for your particular controller.

The SCSIformat ON-LINE (FMT) is an application software that works exclusively with CMD SCSI host adapters as an optional feature for VAX/VMS systems. This SCSIformat ON-LINE allows you to format the disk drives without interfering with the other devices on the SCSI bus. To install SCSIformat ON-LINE follow the instructions given in the accompanying SCSIformat ON-LINE User's Manual and install jumper shunt as given in Chapter 3, subsection “Tape Monitor Utility and SCSIformat ON-LINE.”

Note
Please check the installation guide for the jumper or switch setting for your particular controller.

CMD Technical Support

Multi-Hosting using the CMD SCSI Controllers

Multi-Hosting Setup

CMD's multi-host solution can support disk. It gives you the ability to completely share an array of disks between multiple VAX systems running VAX cluster software. Multi-hosting configuration instructions are given in Chapter 4. Refer to Appendix A for supported disk and tape devices.

Multi-Hosting Configuration

The following is a list of software requirements for multi-hosting; refer to Appendix A for supported multi-hosting devices: VMS version 5.3 or above VAX cluster software must be running on both systems with at least one of the DEC's interconnects operational Tape drives can only be mounted to one system at a time. Allocation classes must be the same for all systems when installing disk drives (value must not equal 0). Using VMS and the QBUS CONTROLLER, you can multi-host by following the instructions below:

Configure the first QBUS controller to SCSI ID 7 for the first computer; configure the second QBUS controller to SCSI ID 6 for the second computer. If you need to alter the Host Adapter SCSI ID change the jumper settings as shown in Table 4-4.

Table 4.2: Host Adapter ID Selections Host Adapter ID = 7

W10-3	**W10-4**	**W10-5**	**Initiator ID**
IN	IN	IN	Host adapter ID = 7 highest priority
W10-3	W10-4	W10-5	Initiator ID
IN	IN	OUT	Host adapter ID = 6
W10-3	W10-4	W10-5	Initiator ID
IN	OUT	IN	Host adapter ID = 5

From the Additional Utilities Menu in the On-Board Utility, follow these instructions:

- Select option D to display current configuration.
- Answer Y to the statement: CHANGE CONFIGURATION ? (Y/N).
- Select Z to reset configuration back to default.
- Answer Y to reconfigure the adapter.

NOTE
If you ever reconfigure the board, you must reset the configuration to default using selection Z.

- Select R to toggle SCSI reset. Then set the SCSI reset to OFF. Do this for all SCSI host adapters to be multi-hosted.
- Answer Y to reconfigure the adapter.
- Select C to reconfigure the device. Then configure the QBUS CONTROLLER for exact number of disks and tapes. This will inhibit scanning of other host adapters.
- If other MSCP disks are in the cluster, follow the rules in the subsection "Changing LUN Offset" in "On-Board Utility" so that each device has a unique unit number.
- Exit out of the On-Board Utility.

NOTE
In a multi-hosting system the physical disk device name must be identical on both systems.

Terminate both physical ends of the SCSI bus. (See "SCSI Bus Termination" in Chapter 3.) If the QBUS CONTROLLER is at either end of the SCSI bus, remove on-board terminators, RN9, RN10, RN11, and use a pass-through terminator as close to the board as possible. If the QBUS CONTROLLER is in the middle of the SCSI bus, RN9, RN10 and RN11 terminators must be removed, do not use pass through terminators.

Differential SCSI is set if the QBUS CONTROLLER is at either end of the SCSI bus, remove on-board terminators, RN1, RN2, RN3, RN4, RN5, RN6, RN7, RN8 and use a pass-through terminator as close to the board as possible. If the QBUS CONTROLLER is in the middle of the SCSI bus, RN1, RN2, RN3, RN4, RN5, RN6, RN7, and RN8 terminators must be removed, do not use pass through terminators.

When running cluster_config.com on a system with only Ethernet as a computer interconnect, answer Yes for the question, "WILL THIS BE A SATELLITE NODE?"

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CMD Technical Support

Jumper Settings for CQD220/223 Qbus to SCSI Controller

If you encounter any problems or have any questions regarding the information contained here, contact CMD's Technical Support Department directly at the following address and phone number.

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Irvine, CA 92718
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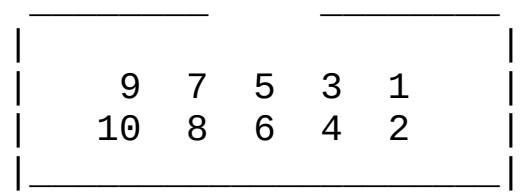
BBS: (714) 454-0795

Pin Assignments

Physical pin number assignments and functions of the RS-232 port for accessing the On-Board Utility. Connector J1 pin assignments are listed in the following table when you are facing the 10 pin connector from the controller's top edge.

NOTE
For CMD's On-Board RS-232 Utility, only pin 3, 8 and grounds are used.



Pin Assignments for Utility Interface

Pin 1	No connect
Pin 2	Ground
Pin 3	TXD, transmit data for RS-232 application
Pin 4	Ground
Pin 5	No connect
Pin 6	No connect
Pin 7	No connect

```
Pin 8     RXD, receive data for RS-232 application
Pin 9     Ground
Pin 10    No connect
```

NOTE
You cannot use thE CQD-220 when the RS-232 port connector is in place. Be sure to remove the connector in J1 before using the board. For write protection, contact CMD.

Host Adapter ID Selections

```
W3-1  W3-2  W3-3  Initiator ID
IN    IN    IN    Host adapter ID = 7, highest priority (F)
IN    IN    OUT   Host adapter ID = 6
IN    OUT   IN    Host adapter ID = 5
IN    OUT   OUT   Host adapter ID = 4
OUT   IN    IN    Host adapter ID = 3
OUT   IN    OUT   Host adapter ID = 2
OUT   OUT   IN    Host adapter ID = 1
OUT   OUT   OUT   Host adapter ID = 0, lowest priority
Note: (F) means factory setting.
```

CQD-220 Pin Assignments

```
W1        OUT          Reserved (F)
W2        IN           SCSI terminator power enabled (F)
W2        OUT          SCSI terminator power disabled
W3-4      IN           Enable tape fast search option
W3-4      OUT          Normal operation (F)
W3-5      IN           Tape Monitor Utility enabled
                       (/T, /TM) Disk SCSIformat ON-LINE
                       enabled (/M, /TM)
W3-5      OUT          Tape Monitor Utility disabled (F)
                       Disk SCSIformat ON-LINE disabled (F)
W3-6      IN           Tape sync. mode disabled
W3-6      OUT          Tape sync. mode enabled (F)
W3-7      IN           Disk sync. mode disabled
```

W3-7	OUT	Disk sync. mode enabled (F)
W4 1-2	IN	Block mode DMA enabled (F)
W4 2-3	IN	Block mode DMA disabled
W5	IN	Adaptive DMA enabled (F)
W5	OUT	Adaptive DMA disabled
W6-1	IN	Auto-Bootstrap address = 773000 (F)
W6-1	OUT	Auto-Bootstrap address = 771000
W7-1	OUT	1.2 us DMA dwell time
W7-2	OUT	2.4 us DMA dwell time
W7-3	IN	4.8 us DMA dwell time (F)
W8 1-2	IN	Auto-Bootstrap enabled
W8 2-3	IN	Auto-Bootstrap disabled (F)
W9	IN	22-Bit addressing (F)**
W9	OUT	18-Bit addressing
W10 1-2	IN	Interrupt level 5
W10 2-3	IN	Interrupt level 4 (F)
W11, W12	OUT	Reserved (F)
W13	IN	Reserved, Rev. C (F)
W14 1-2	IN	27256 Eprom hardware Rev. C
W14 2-3	IN	27C512 Eprom hardware Rev. C (F)

Note: (F) means factory setting.
** Hardware Revision C only supports 22-bit addressing.

CSR Address Selections

CQD-220/TM CSR Address Selections (Rev. B & higher)P22015A in U40

Address	LSI-11	MicroVAX	W6-2	W6-3	W6-4
Standard	17772150	20001468	IN	IN	IN
Second	17760334	200000DC	IN	IN	OUT
Third	17760354	200000EC	IN	OUT	IN
Fourth	17760374	200000FC	IN	OUT	OUT
Fifth	17760340	200000E0	OUT	IN	IN
Sixth	17760344	200000E4	OUT	IN	OUT
Seventh	17760350	200000E8	OUT	OUT	IN

Disable disk			OUT	OUT	OUT

CQD-220/TM CSR jumper settings for tape (Rev. B & higher)

Address	LSI-11	MicroVAX	W6-5	W6-6	W6-7
Standard	17774500	20001940	IN	IN	IN
Second	17760404	20000104	IN	IN	OUT
Third	17760444	20000124	IN	OUT	IN
Fourth	17760504	20000144	IN	OUT	OUT
Fifth	17760544	20000164	OUT	IN	IN
Sixth	17760410	20000108	OUT	IN	OUT
Seventh	17760450	20000128	OUT	OUT	IN
Disable disk			OUT	OUT	OUT

CQD-220/M CSR Address Selections (Rev. B & higher) P22016A or P22016B in U40

Addr	LSI-11	Micro VAX	W6-2	W6-3	W6-4	W6-5	W6-6
1	17772150	20001468	IN	IN	IN	OUT	OUT
2	17760334	200000DC	IN	IN	OUT	OUT	OUT
3	17760354	200000EC	IN	OUT	IN	OUT	OUT
4	17760374	200000FC	IN	OUT	OUT	OUT	OUT
5	17760340	200000E0	OUT	IN	IN	OUT	OUT
6	17760344	200000E4	OUT	IN	OUT	OUT	OUT
7	17760350	200000E8	OUT	OUT	IN	OUT	OUT
8	17760360	200000F0	OUT	OUT	OUT	OUT	OUT
9	17760364	200000F4	IN	IN	IN	IN	OUT
10	17760370	200000F8	IN	IN	OUT	IN	OUT
11	17760400	20000100	IN	OUT	IN	IN	OUT
12	17760404	20000104	IN	OUT	OUT	IN	OUT
13	17760410	20000108	OUT	IN	IN	IN	OUT
14	17760414	2000010C	OUT	IN	OUT	IN	OUT
15	17760420	20000110	OUT	OUT	IN	IN	OUT
16	17760424	20000114	OUT	OUT	OUT	IN	OUT
17	17760430	20000118	IN	OUT	IN	OUT	IN

18	17760434	2000011C	IN	OUT	OUT	OUT	IN
19	17760440	20000120	IN	OUT	IN	OUT	IN
20	17760444	20000124	IN	OUT	OUT	OUT	IN
21	17760450	20000128	OUT	IN	IN	OUT	IN
22	17760454	2000012C	OUT	IN	OUT	OUT	IN
23	17760460	20000130	OUT	OUT	IN	OUT	IN
24	17760464	20000134	OUT	OUT	OUT	OUT	IN
25	17760470	20000138	IN	IN	IN	IN	IN
26	17760474	2000013C	IN	IN	OUT	IN	IN
27	17760500	20000140	IN	OUT	IN	IN	IN
28	17760504	20000144	IN	OUT	OUT	IN	IN
29	17760510	20000148	OUT	IN	IN	IN	IN

CQD-220/T CSR Address Selections (Rev. B & higher) with the IC P20017A in U40

Addr	LSI-11	MicroVAX	W6-3	W6-4	W6-5	W6-6	W6-7
1	17774500	20001940	OUT	OUT	IN	IN	IN
2	17760404	20000104	OUT	OUT	IN	IN	OUT
3	17760444	20000124	OUT	OUT	IN	OUT	IN
4	17760504	20000144	OUT	OUT	IN	OUT	OUT
5	17760544	20000164	OUT	OUT	OUT	IN	IN
6	17760410	20000108	OUT	OUT	OUT	IN	OUT
7	17760450	20000128	OUT	OUT	OUT	OUT	IN
8	17760454	2000012C	OUT	OUT	OUT	OUT	OUT
9	17760414	2000010C	OUT	IN	IN	IN	IN
10	17760420	20000110	OUT	IN	IN	IN	OUT
11	17760460	20000130	OUT	IN	IN	OUT	IN
12	17760510	20000148	OUT	IN	IN	OUT	OUT
13	17760514	2000014C	OUT	IN	OUT	IN	IN
14	17760520	20000150	OUT	IN	OUT	IN	OUT
15	17760550	20000168	OUT	IN	OUT	OUT	IN
16	17760554	2000016C	OUT	IN	OUT	OUT	OUT
17	17760560	20000170	IN	OUT	IN	IN	IN
18	17760604	20000184	IN	OUT	IN	IN	OUT

19	17760610	20000188	IN	OUT	IN	OUT	IN
20	17760614	2000018C	IN	OUT	IN	OUT	OUT
21	17760620	20000190	IN	OUT	OUT	IN	IN
22	17760644	200001A4	IN	OUT	OUT	IN	OUT
23	17760650	200001A8	IN	OUT	OUT	OUT	IN
24	17760654	200001AC	IN	OUT	OUT	OUT	OUT
25	17760660	200001B0	IN	IN	IN	IN	IN
26	17760704	200001C4	IN	IN	IN	IN	OUT
27	17760710	200001C8	IN	IN	IN	OUT	IN
28	17760714	200001CC	IN	IN	IN	OUT	OUT
29	17760744	200001E4	IN	IN	OUT	IN	IN
30	17760750	200001E8	IN	IN	OUT	IN	OUT
31	17760754	200001EC	IN	IN	OUT	OUT	IN

The above information can be changed without notice.
Rev. Date: A = 04-15-96

Goto top of this page.

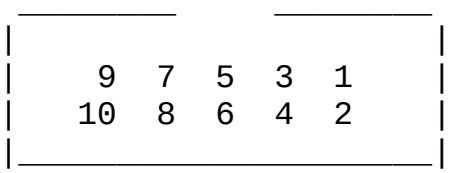
Technical Support

On-Board Utility for Q-Bus Controllers

RS-232 Port Pinout

Physical pin number assignments and functions of the RS-232 port for accessing the On-Board Utility. Connector J1 pin assignments are listed in the following table when you are facing the 10 pin connector from the controller's top edge.

NOTE: For CMD's On-Board RS-232 Utility, only pins 3, 8 and grounds are used.



Connector J6 for the CQD-440 and J5 for the CQD-443 pin assignments are listed in the following table shown when you are facing the connector from the controller's top edge.

Pin Assignments for RS-232 Utility Interface

J6 (CQD-XX0)	J5 (CQD-XX3)	Pin Assignments
Pin 1	Pin 1	No connect
Pin 2		Ground
Pin 3	Pin 5	TXD, transmit data for RS-232 application.
Pin 4	Pin 3	Ground
Pin 5	Pin 4	No connect
Pin 6		No connect

Pin 7		No connect
Pin 8	Pin 2	RXD, receive data for RS-232 application.
Pin 9		Ground
Pin 10	Pin 6	No connect

NOTE
You cannot use the Controller when the RS-232 port connector is in place. Be sure to remove the connector in J1 before using the board.

On-Board Utility

The CQD SCSI host adapter comes with a general purpose On- Board Utility for all systems. The On-Board Utility can test the system slot, SCSI cable, and SCSI devices connected to the controller.

Accessing the Utility can be done through LSI or VAX system or the RS-232 Port. Be sure to complete utility functions, explained at the end of this chapter. Accessing the Utility Through the LSI or VAX System The On-Board Utility Program can be accessed by means of an ODT command for LSI and VAX systems. One example is shown with the SCSI host adapter set to the first disk CSR address.

Because the formats and features of the On-Board Utilities for LSI-11 systems and MicroVAX systems are similar (except different start up procedures), the MicroVAX utility will be described. Instructions for using the Disk Utility with LSI-11 Systems are listed below:

1. Halt the processor.

2. Hit the Boot Switch.

3. Enter the CSR address plus 2 (in Octal), a slash, and 123456. For example, for CSR address 17772150 enter `17772152/005400 123456`.

4. Enter CSR address plus 2 (in Octal), a slash, and 100 to load the utility to the system memory. For example, for CSR address 17772150 enter `17772152/001000 100`.

5 Enter `5000G`. The Utility program will begin executing.

Example
For steps 3 to 5 with CSR 17772150, enter the following:

```
772152/005400 123456 [ENTER]
772152/ 100 [ENTER]
5000G [ENTER]
```

Instructions for using this utility with VAX Systems are listed below:

1 Halt the CPU.

2 At the prompt `>>>>>>` enter `U` to unlock the CPU.

3 At the prompt `>>>>>>` enter `I` to initialize the CPU.

4 At the prompt `>>>>>>` enter D/P/W 20001F40 20 to enable Q-bus memory access.

5 At the prompt `>>>>>>` enter D/L 20088008 80000002 to set up Q-bus map.

6 At the prompt `>>>>>>` enter `D/W YYYYYYYY A72E` to deposit to the base CSR address plus 2 (in Hex). CSR addresses can be found in Chapter 3 or Appendix C of the manual. Where `YYYYYYYY` is the CSR address plus 2 (in Hex).

Disk CSR Addresses Plus 2 Configurations

CSR Reference	CSR Addresses	CSR Addresses Plus 2: YYYYYYYY
772150	20001468	2000146A
760334	200000DC	200000DE
760354	200000EC	200000EE
760374	200000FC	200000FE
760340	200000E0	200000E2
760344	200000E4	200000E6
760350	200000E8	200000EA

760360	200000F0	200000F2

Tape CSR Addresses Plus 2 Configurations

CSR Reference	CSR Addresses	CSR Addresses Plus 2: YYYYYYYY
774500	20001940	20001942
760404	20000104	20000106
760444	20000124	20000126
760504	20000144	20000146
760544	20000164	20000166
760410	20000108	2000010A
760450	20000128	2000012A
760454	2000012C	2000012E

7 At the prompt >>>>>> enter `D * 100` to load the utility to system memory. This command deposits 100 to current address.

8 At the prompt >>>>>> enter `S 400` to start the utility.

Example
For steps 2 and 8, enter:

```
U [ENTER]
I [ENTER]
D/P/W 20001F40 20 [ENTER]
D/L 20088008 80000002 [ENTER]
D/W YYYYYYYY A72E [ENTER] (YYYYYYYY = CSR +2)
D * 100   [ENTER]
S   400
```

9 Enter the corresponding CSR address for the controller.

DISK	TAPE
1=772150	A=774500
2=760334	B=760404
3=760354	C=760444
4=760374	D=760504
5=760340	E=760544
6=760344	F=760410
7=760350	G=760450
8=760360	H=760450

NOTE
LSI systems will display the Main Menu as follows:

```
MAIN MENU                CSR=772150
        1 = Boot Drive
        2 = ADDITIONAL SCSI COMMANDS
SELECT OPTION:
        If the message appears CONTROLLER NOT PRESENT,make sure CSR
        address is correct.
```

10 From the Main Menu only select option 1 or 2. 1 will halt the system and 7 will bring you to the SCSI Host Adapter Utility.

Accessing the Utility Through the RS-232 Port

To access the utility from the RS-232 port, follow the instructions below.

1. Connect a terminal to the CQD-240's RS-232 port (10 pin connector) or to the CQD-243's RS-232 port (DEC compatible RJ-11/Modified Module 423 Jack connector).

2. Set the terminal baud rate to 9600 (8-bit data, 1-stop bit, no parity) jump scroll.

3. Halt the system's CPU, reset the system, and hit carriage return on the terminal. The SCSI Host Adapter Utility will display as shown.

```
SCSI HOST ADAPTER UTILITY (REV. YYYxZZ)

X = UTILITY EXIT
D = DIAGNOSTICS TEST

[DISK]                                  [TAPE]
1 = LOGICAL UNIT NUMBER OFFSET          6 = LOGICAL UNIT NUMBER OFFSET
2 = FORMAT DRIVE                        7 = ADDITIONAL UTILITIES
3 = QUALIFY DRIVE
4 = MANUALLY REPLACE BAD BLOCKS
5 = ADDITIONAL UTILITIES

SELECT OPTION:


Once the SCSI Host Adapter Utility shows up, you can key in the
number to select the desired option. Press [CTRL] + C at any time
to return to the main menu.
```

4. Refer the next subsections for configurations. When completed, unplug the terminal, reset the system, and boot. DO NOT use the On-Board Utility while the system is running.

   NOTE The following sections will illustrate the On-Board Utility from the RS-232 Port. There may be some variation in the Main Menu and the SCSI Host Adapter Utility Menu. If you are accessing from the Main Menu, simply chose the correct number for each option.

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