Installation Manual for the

DCQ-2300

Alphatronix Qbus Host Adapter Replacement

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Chapter 1: Installation

This chapter lists the steps involved in installing the DCQ-2300 hardware. The DCQ-2300-A module is shown in Figure 1-1.

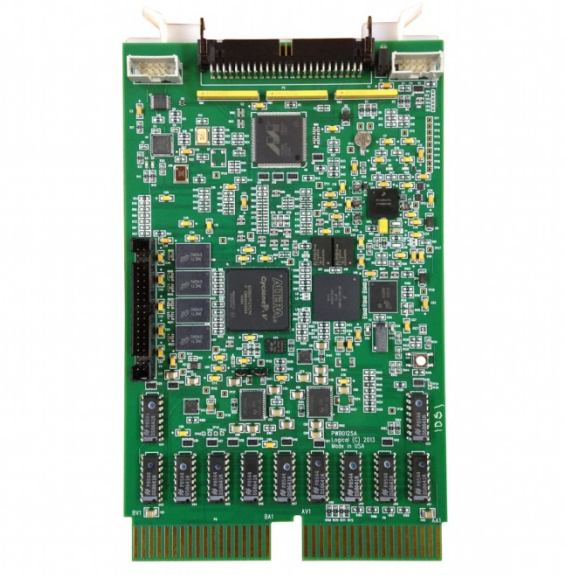


Figure 1-1: DCQ-2300 Controller

The DCQ-2300 controller is factory configured and ready to install. The Qbus address and vector are set to fixed values:

Device Address	772150_8
Interrupt Vector	154_8
Priority Level	4

Install DCQ-2300 Controller

Install the controller using Lockheed Martin procedures and policies for board installation or replacement for the Block 1 CASS systems.

CAUTION

The DCQ-2300 contains very small surface mount components on the back side of the board, so it is especially important that the board be inserted carefully.

Power up the System and Verify Installation

Apply power to the system, wait for the display of the >>> boot prompt:

Note: User input is shown in bold print, [CR] indicates pressing the return key.

```
Tests completed.
>>>
```

To verify that the system recognizes the DCQ-2300, type:

```
>>>show qbus [CR]
```

The system displays the devices on the Qbus. Verify that the RQDX3 is displayed. For example:

```
Scan of Qbus I/O Space
-20001468 (772150) = 0000 (154) RQDX3/KDA50/RRD50/RQC25/KFQSA-DISK
-2000146A (772152) = 09C0
-20001F40 (777500) = 0020 (004) IPCR

Scan of Qbus Memory Space
>>>
```

To confirm that the DCQ-2300 is connected to the hard drives and optical drive, type:

```
>>>show dev [CR]
```

The system displays the connected devices.

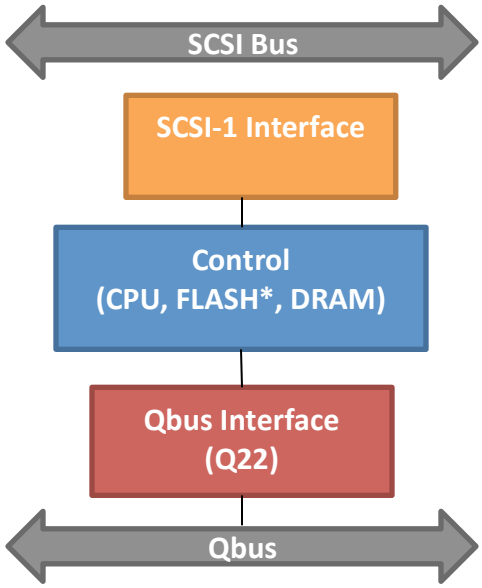
```
UQSSP Disk Controller 0 (772150)
-DUA0 (RZ58)
-DUA1 (RZ58)
-DUA2 (RZ58)
>>>
```

Chapter 2: General Description

Product Description

The DCQ-2300 is a drop-in replacement for the Alphatronix Inspire optical storage host adapter. Like the Alphatronix host adapter, the DCQ-2300 provides an interface to SCSI hard drives, and in addition, the DCQ-2300 provides an interface to a CD or DVD Optical Drive.

The DCQ-2300 accepts MSCP commands and converts them to standard CD and DVD commands for reading and writing data to CD and DVD media.



*FLASH is used for program storage only.

Figure 2-1: DCQ-2300 Block Diagram

Key Features

- Drop-in replacement for the Alphatronix Inspire host adapter.
- Supports new, modern optical drives.
- Supports locking of optical drive tray.
- CASS system-bootable from a hard drive or optical drive.

Compatibility

- VMS version 5.5-2 operating system software with the F11CD ECO kit and the DEC DUDRIVER.

- CASS Block 1.
- DEC MSCP commands.
- CD-R, DVD-R and DVD+R media.

Specifications

Physical Dimensions

DCQ-2300-A Controller	Dual-width Qbus card measuring 5.3 in by 8.4 in (13.3 cm by 21.3 cm)
SCSI Interface	SCSI-1 5 MHz,

Electrical

DCQ-2300-A	2.0 amps @ 5.0 volts DC ±12 volts DC not used
Bus Loading	1 DC load, 2 AC loads

Qbus

Device Address	772150_8
Interrupt Vector	154_8
Priority Level	4

LEDs

A pair of LEDs on the board indicate power and DMA activity.

Red LED	Lights on power-up and remains illuminated until the FPGA has successfully loaded.
Green LED	Blinks to indicate SCSI and Qbus DMA activity.

Environmental

Operating Conditions:	
Temperature	10° to 32° C (50° to 90° F)
Relative Humidity	20% to 95% non-condensing
Storage Conditions:	
Temperature	-40° to 66° C (-40° to 151° F)
Relative Humidity	10% to 90% non-condensing

I/O Ports

SCSI User Port	
Termination	Active, non-selectable
Quantity	1
Connector	50-pin IDC
Hard Drives	Up to three hard drives
Optical Drives	One optical drive
Development Ports	
Ethernet, Serial, JTAG	

CD / DVD

Optical Media	
Type	CD-R, DVD±R
CD Capacity	700MB, unformatted
DVD Capacity	4.7GB, unformatted
Data Format	
Format	Mode 1
File System	Custom

Optical Drives

The DCQ-2300 supports the following optical drives with bridges.

Drive Manufacturer	Drive Model	Bridge Model
Pioneer	DVR-S20MBK	AEC-7732LM Firmware 1.08L
LG	GH24NS95	AEC-7732LM Firmware 1.08L

The DCQ-2300 can support other CD and DVD drives and/or bridges with the following specifications, after qualification.

Interface	SCSI-1 and SCSI-2 compatible
Supported Media	CD-R, DVD±R
Tray Lock	Must support tray locking

Hard Drives

The DCQ-2300 supports the following solid state SCSI hard drives:

Drive Manufacturer	Drive Model
Acard	ARS-2000LMD
Acard	ARS-2160LMDSE (SCSI narrow adapter)

The DCQ-2300 can support other SCSI hard drives and/or bridges after qualification.

Chapter 3: Operation

The DCQ-2300 functions as a hard drive controller as well as an optical media controller. This chapter describes how the DCQ-2300 is used to access hard drives and to read and write optical media.

Hard Drive Operation

When accessing a hard drive, the functions and operation of the DCQ-2300's hard drive interface are the same as for any hard drive running under VMS. Any hard drive recognized by VMS is available to read and write using the DCQ-2300 controller.

CD/DVD Operation

Definitions

Optical Drive SCSI-compatible optical drive that reads/writes CD and DVD media (discs).

RAM Drive The volatile memory on the DCQ-2300 controller that contains a disc image to be written to the Optical Drive. RAM drive memory is erased when power is removed.

DCL Operator Commands Supported

INITIALIZE Use to name and format a disc for VMS. VMS writes an empty directory and special system files to the RAM Drive.

CD_MOUNT Makes the optical media ready for use and verifies that the disc has the expected volume name.

DISMOUNT Burns data from the RAM Drive onto the optical media and performs VMS dismount operations. The burning may take a few minutes. Can take one of the following qualifiers:

UNLOAD causes the disc to be ejected following a burn cycle. Default.

NOUNLOAD Requires the operator to manually eject the disc.

File Operations

Read Reads data from the Optical Drive.

Write Writes data to the RAM Drive.

Reading an Image

Action	User Action	DCQ-2300 Response
Mount Media	To read a disc image, insert a non-blank finalized CD or DVD media into the Optical Drive and issue the DCL CD_MOUNT command	The DCQ-2300 checks that the Optical Drive is ready for use and contains non-blank media. It locks the drive tray, supplies the volume name and other file system data to VMS, and sets the volume as write-locked.
Dismount Media	When the read is complete, issue a DISMOUNT command: DISMOUNT or DISMOUNT/NOUNLOAD	The DCQ-2300 unlocks the drive tray and ejects the disc unless the /NOUNLOAD switch is set.

If errors occur while mounting or reading an image, refer to the section later in the chapter on Optical Drive Error Messages.

Writing a New Image

Action	User Action	DCQ-2300 Response
Initialize Media	To write to a new disc, insert a blank CD or DVD media into the Optical Drive and issue the INITIALIZE command.	The DCQ-2300 checks that the Optical Drive is ready for use and contains blank media. The RAM Drive is initialized.
Write to RAM Drive	Issue a CD_MOUNT command when the initialize is complete.	The DCQ-2300 supplies the volume name and other file system data to VMS and locks the drive tray. The system writes data to the RAM drive.
Write to Media	Issue a DISMOUNT command to burn all of the data from the RAM Drive onto the optical media.	When the burn is complete, media is finalized, the DCQ-2300 unlocks the Optical Drive tray and ejects the media unless the /NOUNLOAD qualifier is set.

If errors occur while initializing, mounting or writing to a disc, refer to the section below on Optical Drive Error Messages.

Optical Drive Error Messages

Error messages that may occur when reading or writing to optical media are listed below along with their meanings and suggested user actions.

Errors	Potential Causes	User Actions
INITIALIZE Command		
MEDOFL	Optical media not present	Verify optical media is properly inserted in the Optical Drive.
WRTLCK	Unknown disk media type	Verify the optical media is blank and free of scratches. Replace optical media is needed.
CD_MOUNT Command		
INCSEGTRA	Unknown disk media type	Verify the proper media type is being used (ISO9660 or Files11).
OPRQST	Optical media not present	Verify optical media is properly inserted in the Optical Drive, or that media is free of scratches.
File Read Operations		
READERR	Reading a block from the Optical Drive resulted in an error	Verify optical media is free of scratches.
File Write Operations		
WRITEERR	Unable to write to RAM Drive	Verify drive not write-locked Contact Logical.

Chapter 4: Maintenance

Firmware Update Instruction

To be determined.

The console keyboard commands and VAX I/O addresses used below to read and write the SA register will be included within the instructions to be provided..

1. Place the VAX at the Boot prompt ">>>" either after power on or by using the Halt switch.
2. Place an Update CD disc into the DVD optical drive.
3. Write a value of ffff (hex) to the disk controller SA register to start a Firmware update process or
4. Write a value of aaaa (hex) to the disk controller SA register to start a FPGA PROM update process.
5. Read the disk controller SA register and it should contain one of the following values.

Disk Controller SA Register Values	
Value	**Indication**
bbbb (hex)	Process is busy with the update process.
dddd (hex)	Process is done and completed successfully.
eexx (hex)	Process detected an error and the error code is xx (hex).

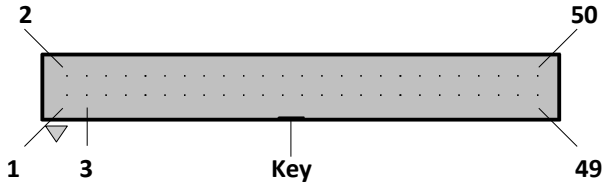
6. Error code values are to be defined, but will include the following.

Error Codes	
Value	**Indication**
	Not an update CD for Firmware
	Not an update CD for FPGA PROM
	Cannot mount or read the CD
	No CD in the DVD drive
	Update file checksum error
	Update verify error

When at the Boot prompt after a power-on or console initiated INIT, reading the disk controller SA register will display a hex number representing the controller firmware version.

Appendix A: SCSI User Connector

This appendix lists the pin assignments for the SCSI interface connector located at P2 on the board. The connector is a 50-pin male header, 3M part number N2550-5002-RB.



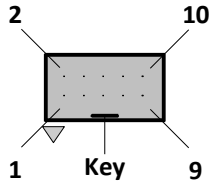
Pin	Signal	Pin	Signal
1	GND	26	A_TERMPWR
2	A_SD0-L	27	
3	GND	28	
4	A_SD1-L	29	GND
5	GND	30	GND
6	A_SD2-L	31	GND
7	GND	32	A_ATN-L
8	A_SD-3-L	33	GND
9	GND	34	GND
10	A_SD4-L	35	GND
11	GND	36	A_BSY-L
12	A_SD5-L	37	GND
13	GND	38	A_ACK-L
14	A_SD6-L	39	GND
15	GND	40	A_RST-L
16	A_SD7-L	41	GND
17	GND	42	A_MSG-L
18	A_SDP0-L	43	GND
19	GND	44	A_SEL-L
20	GND	45	GND
21	GND	46	A_CD-L
22	GND	47	GND
23		48	A-REG-L
24		49	GND
25		50	A_IO-L

Appendix B: Factory Support Connectors

This appendix lists the pin assignments for the connectors used for factory support of the DCQ-2300.

Debug Connector

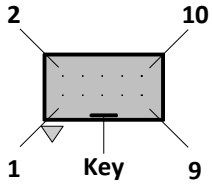
This section lists the pin assignments for the 10-pin debug connector, located at Px on the board. Pins 1,3,5,7, and 9 are used for Ethernet connection and pins 2, 4, 6, and 8 are used for serial connection. The connector is a 10-pin male header, 3M part number 2510-6002-UB. Note that pin 10 is removed.



Pin	Signal	Pin	Signal
1	TXP1	2	Not used
3	TXM1	4	DCQ TX
5	GND	6	GND
7	RXP1	8	DCQ RX
9	RXM1	10	Key

JTAG Connector

This section lists the pin assignments for the 10-pin JTAG connector located at Px on the board. The connector is a 10-pin male header, 3M part number 2510-6002-UB.



Pin	Signal	Pin	Signal
1	TCK	2	GND
3	TDO	4	GND
5	TMS	6	GND
7	TRST B	8	GND
9	TDI	10	GND

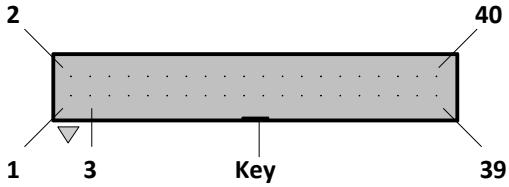
Qbus Connectors

This section lists the pin assignments for the Qbus backplane connectors.

Qbus A		Qbus B	
Pin	**Signal**	**Pin**	**Signal**
AA1	BIRQ5-L	BA1	BDCOK-H
AB1	BIRQ6-L	BB1	BPOK-H
AC1	BDAL16-L	BC1	BDAL18-L
AD1	BDAL17-L	BD1	BDAL19-L
AE1		BE1	BDAL20-L
AF1		BF1	BDAL21-L
AH1		BH1	
AJ1	GND	BJ1	GND
AK1		BK1	
AL1		BL1	
AM1	GND	BM1	GND
AN1	BDMR-L	BN1	BSACK-L
AP1	BHALT-L	BP1	BIRQ7-L
AR1	BREF-L	BR1	BEVNT-L
AS1		BS1	
AT1	GND	BT1	GND
AU1		BU1	
AV1		BV1	+5
AA2	+5	BA2	+5
AB2		BB2	
AC2	GND	BC2	GND
AD2		BD2	
AE2	BDOUT-L	BE2	BDAL02-L
AF2	BRPLY-L	BF2	BDAL03-L
AH2	BDIN-L	BH2	BDAL04-L
AJ2	BSYNC-L	BJ2	BDAL05-L
AK2	BWTBT-L	BK2	BDAL06-L
AL2	BIRQ4-L	BL2	BDAL07-L
AM2		BM2	BDAL08-L
AN2	BIAKO-L	BN2	BDAL09-L
AP2	BBS7-L	BP2	BDAL10-L
AR2		BR2	BDAL11-L
AS2	BDMGO-L	BS2	BDAL12-L
AT2	BINIT-L	BT2	BDAL13-L
AU2	BDAL00-L	BU2	BDAL14-L
AV2	BDAL01-L	BV2	BDAL15-L

Maintenance Connector

This section lists the pin assignments for the maintenance connector located at P4on the board. The connector is a 40-pin male header, 3M part number N2540-6002RB.



Pin	Signal	Pin	Signal
1	RSYNC-B	2	RWTBT-H
3	RBS7-H	4	RDIN-H
5	RDOUT-H	6	RRPLY-H
7	RREF-H	8	XDMR-H
9	RSACK-H	10	RDMGI-H
11	XSACK-H	12	RIAKI-H
13	TPS13	14	TPS14
15	TPS15	16	TPS16
17	TPS17	18	TPS18
19	TPS19	20	TPS20
21	TPS21	22	TPS22
23	TPS23	24	SCSI INT-L
25	SCSI DREQ	26	SCSI DBRD-L
27	SCSI-DBWR-L	28	SCSI DACK-L
29	SCSI PAUSE	30	SCSI CS-L
31	SCSI RD-L	32	SCSI WR-L
33	SCSI A0	34	SCSI A1
35	SCSI A2	36	SCSI A3
37	GND	38	GND
39	GND	40	GND

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Cottage Grove, Oregon 97424 USA
http://www.logical-co.com

Telephone: +1 541-942-3610
Fax: +1 541-942-3640
E-mail: sales@logical-co.com