CBI-1010
VAXBI SCSI Host Adapter
User’s Manual
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Class A Computing Device:
This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

BASIC WARRANTY - In the absence of any optional warranty or continuing provisions by formal agreement, CMD warrants its products in accordance with the schedules listed below. Purchaser hereafter mentioned refers at all times to the customer who purchased CMD product(s).

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CABLE WARRANTY - All CMD provided cables are warranted for ninety (90) days from the time of shipment. Questionable cables should be returned to CMD, freight prepaid, where they will be repaired or replaced by CMD at its option and returned to the Purchaser, freight prepaid.

GENERAL TERMS - The above warranties shall not apply to expendable components such as fuses, bulbs, and the like, nor to connectors, adapters, and other items not a part of the basic product. CMD shall have no obligation to make repairs or to cause replacement required through normal wear and tear or necessitated in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the product, or use of the product in such a manner for which it was not designed, or by causes external to the product, such as, but not limited to, power failure or air conditioning. CMD's sole obligation hereunder shall be to repair or replace any defective product, and, unless stated, pay return transportation costs within the United States of America for such replacement. Purchaser shall provide labor for removal of the defective product, shipping charges for return to CMD and installation of its replacement. On-site services are not a part of this warranty. Above warranties are subject to change without notice.

RETURNED MATERIAL - Warranty claims must be received by CMD within the applicable warranty period. A replaced product, or part thereof, shall become the property of CMD and shall be returned to CMD at Purchaser's expense. All returned material must be accompanied by a Return Materials Authorization (RMA) number assigned by CMD. For RMA numbers call CMD at (714) 454-0800.

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Repair Policy

WARRANTY PERIOD
The following warranty period is from the date of shipment:
CMD Host Adapter: one year
Cable: 90 days
Drive: manufacturer’s warranty

RETURN FOR CREDIT
The allowable period of return for credit from the date of shipment is as follows:
CMD Host Adapter: less than 30 days
Cable: less than 30 days
Drive: not applicable

RETURN FOR REPAIR
CMD Host Adapter
In-Warranty (Less than 1 year)
- CMD offers a 15 working day turnaround repair service at the cost of parts only. Defective boards will be repaired and returned to the customer within 15 working days from the date of return to CMD.
- CMD also offers two in-warranty 24 hour expediting services:
  24 Hour Turnaround Loaner Service:
  Under this policy, CMD will ship a loaner in 24 hours during regular working days to the customer for a charge of $100.00 per loaner. Upon receiving the loaner, customer must return the defective board to CMD within seven (7) days for repair. CMD will repair the defective board and return the board to the customer. Customer must then return the loaner in seven (7) days after the receipt of the repaired board. Approval for loaner service is based on credit verification.
  24 Hour Turnaround Swap Service:
  In the case that the defective board is within the first six (6) months of the warranty, CMD, at its own option, offers a 24 hour turnaround swap service. CMD will ship the same model of the board to customer within 24 hours during working days in exchange for the defective board. CMD will swap with a new board if board is not functional upon arrival. For all other cases, swap will occur with either a new or refurbished board for a charge of $200.00. CMD does not offer swap services for boards that are purchased more than six months from the date of shipment. Customer is responsible for returning the defective board to CMD within seven (7) days after receipt of the swapped board.
- The remaining warranty period shall apply to the repaired or swapped board.
Out-of-Warranty (more than 1 year)
- CMD offers a 15 working day turnaround repair service at a rate of $300.00 plus parts and freight for all out-of-warranty host adapter boards. Defective boards will be repaired and returned to customer within 15 working days starting with date of return to CMD.
- CMD also offers an Out-of-Warranty 24 Hour Turnaround Loaner Service:
  Under this policy, CMD will ship the same model loaner in the 24 hour time frame of working days to customer for an additional charge of $100.00 plus freight per loaner. The loaner is for use by the customer during the period that the defective board is being repaired. Customer is responsible for returning the defective board to CMD within seven days after the receipt of loaner and returning the loaner in seven (7) days once the defective board is repaired and received. The approval of the loaner service is at CMD’s option and based upon customer credit verification.
- CMD will extend warranty for a period of six (6) months on any out of warranty repaired board.

Cable
- In-Warranty (90 days) - free swap.
- Out-of-Warranty (90 days) - not applicable.
Drive
In-Warranty (per manufacturer) - manufacturer charge only.
Out-of-Warranty (per manufacturer) - manufacturer charge plus $100 CMD handling.

RETURN FOR UPGRADE/ UPDATE
CMD Host Adapter
In-Warranty (less than 1 year)
• CMD offers a 15 working day turnaround different function upgrade service for boards that can be upgraded to a higher function; and a free 15 working day turnaround ECO Field Upgrade for all its boards. CMD will upgrade the hardware of its board to a higher function for a charge of the difference of list prices of the original and upgraded functions. CMD will also update its board to its latest firmware release at no charge to the customer. Boards will be upgraded/updated and returned to the customer within 15 working days from the date of return to CMD.
• CMD also offers 24 hour turnaround loaner service as stated in “RETURN FOR REPAIR.”
• The remaining warranty period shall apply to the updated board. For upgraded boards, CMD will extend warranty for a period of six months.

Out-of-Warranty (More than 1 year)
• CMD offers a 15 working day turnaround different function upgrade service for boards that can be upgraded to a higher function at a charge of the difference of list prices of two functions. CMD also offers a free 15 working day turnaround ECO Field Upgrade for all its boards. Boards will be upgraded/updated and returned to customer within 15 working days from the date of return to CMD.
• CMD also offers 24 hours turnaround Loaner Service as stated in “RETURN FOR REPAIR.”
• There will be no warranty extension for same function firmware update. For different function Hardware upgrade, CMD will extend warranty for a period of six (6) months.

Drive—same as in RETURN FOR REPAIR.

SHIPPING CHARGES
The following shipping charges apply to all REPAIR, SWAP, LOANER, and UPGRADE UNITS.
In-Warranty
• Domestic - freight from CMD to customer is to be paid by CMD; freight from customer to CMD is to be paid by customer.
• International - all fees are to be paid by customer (including custom duty and broker fees).
Out-of-Warranty
• Domestic - all fees are to be paid by customer.
• International - all fees are to be paid by customer (including custom duty and broker fees).

GENERAL CONDITIONS
All goods returned to CMD including returns for credit, swap returns, loaner returns, and evaluation returns shall remain in good condition. Any damage or alteration done by the customer will result in a rejection or additional charge to the customer.

Customer must consult CMD Technical Support for authorization of CMD not functional upon arrival boards and swap requests. CMD Sales personnel must be consulted for authorization of returned goods for credit and/or evaluation.
Revision 1.3 of the CBI-1010 manual contains the following changes from the previous version:

- Instructions for switching between the CBI-1010/M and CBI-1010/MB have been added to Chapter 3.
- An error in the ULTRIX Configuration section has been corrected. The error was in steps 3 and 4 of the CBI-1010/TM instructions.
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This User's Guide explains the basics of your CBI-1010™. It includes information on setting up and configuring the system and the CBI-1010 for use.

**How to Use this Manual**

This guide has five chapters and three appendices. Each chapter explains a different aspect of preparing your CBI-1010 for use. You may refer to the appendices for further configuration and troubleshooting information. The following descriptions summarize each section.

**Chapter 1: Introduction** explains the purpose of this guide and details the conventions used.

**Chapter 2: Features and Specifications** describes the CBI-1010 and details its features and specifications.

**Chapter 3: Installation** describes hardware configuration and installation procedures for the CBI-1010.

**Chapter 4: Setup** describes the On-Board Utility, set up of special features and software configuration.

**Chapter 5: SCSI Library** lists a glossary on SCSI terms and gives SCSI status and command codes for the CBI-1010.

**Appendix A: Supported Devices and Host Computers** lists the SCSI devices and Host computers compatible with the CBI-1010.
Appendix B: Troubleshooting gives some troubleshooting guidelines for the CBI-1010 under VMS®.

Appendix C: Jumper Settings list the jumper setting selections available on the CBI-1010.

**Conventions**

The following conventions are used in the CBI-1010 User’s Guide.

**Keycaps**—Characters in square brackets represent keys on your keyboard. For example, “Press [ENTER]” means press the [ENTER] key. When two or more keys are joined by a plus sign (+), press those keys at the same time.

**Commands**—Italics text represents a command that can be used on a system, eg., `show dev du`.

**Entering Text or Commands on Screen**—Text or commands that must be entered on screen will be in italics and bold as `show dev du`; be sure to enter the text or command and press [ENTER].
This section briefly describes the CBI-1010 VAXBI SCSI Host Adapter and details its specifications.

**CBI-1010 Features**

The CBI-1010 is an intelligent high performance VAXBI SCSI host adapter that is fully compatible with the DEC Mass Storage Control Protocol (MSCP) and Tape Mass Storage Control Protocol (TMSCP). Each CBI-1010 is fully licensed by Digital and is built around DEC's own BIIC interface chip.

The CBI-1010 can be used with the 5800, 6000, 8000, and 9000 series VAXBI systems. It supports VMS, ULTRIX, and selected UNIX operating systems which use DUS/U drivers.

The CBI-1010 supports either a single-ended or differential SCSI channel. A single-ended SCSI channel can be used for connecting up to 9.9 feet of cable (when the transfer rate is 10 MBytes/second) while a differential SCSI channel can be used to connect up to 80 feet of cable.

The CBI-1010 features Octaword DMA master transfers, virtual data buffer, command queuing, dynamic defect management, standard SCSI bus arbitration, disconnect and reconnect capabilities, and multiple host capability. Up to seven SCSI devices (either single-ended or differential) can be connected to the CBI-1010 SCSI port with SCSI bus data transfer rate up to 10-MB/sec in synchronous (sync) mode and 7-MB/sec in asynchronous (async) mode.
The CBI-1010 supports a variety of Sync/Async SCSI devices including magnetic disk, tape, and optical disk drives. Table 2-1 lists the devices supported by the different CBI-1010 models.

### Table 2-1 CBI-1010 Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI-1010/M</td>
<td>supports disk drives only</td>
</tr>
<tr>
<td>CBI-1010/T</td>
<td>supports tape drives only</td>
</tr>
<tr>
<td>CBI-1010/TM</td>
<td>supports disk and tape drives simultaneously</td>
</tr>
<tr>
<td>CBI-1010/MB</td>
<td>supports disk drives only</td>
</tr>
</tbody>
</table>

The CBI-1010 has an On-Board Utility for you to format and configure the SCSI drives, scan bad blocks and replace them automatically, and test SCSI disk and tape drives.

The CBI-1010 has an on-board non-volatile RAM (NOVRAM) to store the drive Logical Unit Number Offset and other important information to handle configuration of devices.

The CBI-1010 features six LEDs—three green, one red, and two yellow. These LEDs are visible from the front or top of the chassis when the system is running and are labeled as shown in Figure 2-1.

![Front LED Assignment](image-url)

**Figure 2-1: Front LED Assignment**

2-2 **Features and Specifications**
Table 2-2 describes the conditions of CBI-1010 when LED’s are lit.

**Table 2-2  LED Indicators**

<table>
<thead>
<tr>
<th>LED</th>
<th>Color</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1-Right</td>
<td>red</td>
<td>Error condition occurred.</td>
</tr>
<tr>
<td>DS1-Left</td>
<td>green</td>
<td>Power-up OK and activity indicator. Upon power up, this LED lights when the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CQD-220 succeeds in the self-diagnostic testing. During normal operation, this</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED will blink to show controller activity.</td>
</tr>
<tr>
<td>DS2-Left</td>
<td>green</td>
<td>SCSI controller chip Single-ended mode enabled when lit. Differential mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>enabled with not lit.</td>
</tr>
<tr>
<td>DS2-Right</td>
<td>green</td>
<td>Terminator power pin is supplied with power. Refer to Figure 3-1.</td>
</tr>
<tr>
<td>D998/</td>
<td>yellow</td>
<td>Self-test passed.</td>
</tr>
<tr>
<td>D999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Special Features**

The CBI-1010 supports special features that pertain to the different CBI-1010 models as listed Table 2-3.

**Table 2-3  Special Feature Support List**

<table>
<thead>
<tr>
<th>Model</th>
<th>Multi-Hosting</th>
<th>TMU</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI-1010/TM</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CBI-1010/T</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CBI-1010/M</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>CBI-1010/MB</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

**Multi-Hosting**

CBI-1010 gives you the ability to completely share an array of disks and tapes between multiple VAX systems running VAX cluster software. CMD’s multi-host solution can support disk, tape, and optical devices including jukeboxes. Multi-hosting instructions are given in Chapter 4, under “Additional Utilities.” Refer to Appendix A for supported disk and tape devices. Refer to Chapter 4 for configuration instructions.
Tape Monitor Utility

The Tape Monitor Utility™ (TMU) is an application software developed by CMD Technology and works exclusively with CMD SCSI host adapters as an optional feature for VAX/VMS systems.

This Tape Monitor Utility™ runs under VMS and displays the tape drive vendor identification, drive firmware revision, the remaining tape capacity, percentage of rewrites during writes or percentage of ECC retries during reads, and current tape operations such as read, write, write file mark, space, rewind, etc. You can install multiple CBI-1010s 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 also can open a file to log all the information during unattended backup.

To install the Tape Monitor Utility, use On-Board Utility (Chapter 4, subsection "Additional Utilities") to enable TMU since the factory setting for TMU OFF. Then follow the instructions given in the accompanying CMD Tape Monitor Utility User’s Manual part number MAN-000TMU-001.

Sync/Async Mode

The CBI-1010 comes standard in synchronous mode. Most SCSI devices support synchronous mode. However, you can change the CBI-1010 to asynchronous mode using the On-Board Utility in Chapter 4.

In Sync mode, CBI-1010 will automatically negotiate with each SCSI device connected to find out whether the Sync mode is supported by the device.

In Async mode, CBI-1010 will communicate with the SCSI device asynchronously even if the SCSI device supports Sync mode. Most of the Sync SCSI devices also support Async mode.
# CBI-1010 Specifications

Table 2-4 on the following page lists the Controller Specifications for the CBI-1010.

## Table 2-4 Controller Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emulation</td>
<td>MSCP *(DU driver) / TMSCP *(TU driver)</td>
</tr>
<tr>
<td>Bus Interface</td>
<td>VAXBI</td>
</tr>
<tr>
<td>Adapter Size</td>
<td>Single VAXBI slot</td>
</tr>
<tr>
<td>Interrupt Vector</td>
<td>Software programmable</td>
</tr>
<tr>
<td>Transfer Mode</td>
<td>Octaword DMA master</td>
</tr>
<tr>
<td>Command Queuing</td>
<td>32 Commands with optimized seek</td>
</tr>
<tr>
<td>Data Buffer Capacity</td>
<td>Virtual data buffer</td>
</tr>
<tr>
<td>Defect Management:</td>
<td>Dynamic defect management</td>
</tr>
<tr>
<td>Software Supported</td>
<td>VMS, ULTRIX and selected UNIX versions</td>
</tr>
<tr>
<td>Multiple-Hosting</td>
<td>Support multiple-hosting for disks, optical drives and tapes.</td>
</tr>
<tr>
<td>Formatting</td>
<td>On board format and bad block replacement (ISO standard for optical erasable disk format)</td>
</tr>
<tr>
<td>Optional Software</td>
<td>Tape monitor utility <em>(TMU)</em></td>
</tr>
<tr>
<td>LED Indicators</td>
<td>Self test, error conditions, single-ended SCSI enable, single-ended terminator power, differential SCSI enable, differential terminator power</td>
</tr>
<tr>
<td>Peripheral Interface</td>
<td>Small Computer System Interface <em>(SCSI)</em></td>
</tr>
<tr>
<td>SCSI Transfer Rate</td>
<td>10.0-MB/sec in Synchronous mode</td>
</tr>
<tr>
<td></td>
<td>7.0-MB/sec in Asynchronous mode</td>
</tr>
<tr>
<td>SCSI Bus Parity</td>
<td>Odd parity</td>
</tr>
<tr>
<td>Devices Supported</td>
<td>Up to 7 SCSI devices</td>
</tr>
<tr>
<td>System Performance</td>
<td>Support disconnect/reconnect capability and multiple host configuration</td>
</tr>
<tr>
<td>SCSI Driver/Receiver</td>
<td>Single-ended or differential</td>
</tr>
<tr>
<td>SCSI Cable Length</td>
<td>Single-ended, up to 9.9 ft (3 meters) recommended at 10 MBytes/second transfer rate</td>
</tr>
<tr>
<td></td>
<td>Differential, up to 80 ft (25 meters)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>5°C to 50°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>10% to 90%, Non-condensing</td>
</tr>
<tr>
<td>Power Requirement</td>
<td>+5V DC 6.0A, +12V DC 14mA, -12V DC 6mA</td>
</tr>
</tbody>
</table>
Cabling

The CBI-1010 will operate in single-ended or differential mode; however, CMD Technology strongly recommends the use of differential mode when the data transfer rate exceeds five megabytes per second. If you have no choice but to use single-ended mode at a high transfer rate, the SCSI-3 proposal recommends that the total internal and external cable length should be no longer than three (3) meters or 9.9 feet when the transfer rate is 10 MBytes/second. Furthermore, the single-ended cable should meet or exceed the following specifications.

Table 2-5  Cable Specifications

<table>
<thead>
<tr>
<th>Characteristic Impedance</th>
<th>No less than 90 ohms and no greater than 140 ohms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Attenuation</td>
<td>.095 dB maximum per meter at 5 MHz</td>
</tr>
<tr>
<td>Pair-to-pair Propagation</td>
<td>.15 nanoseconds maximum per meter</td>
</tr>
<tr>
<td>Delay Delta</td>
<td></td>
</tr>
<tr>
<td>DC Resistance</td>
<td>.23 ohms maximum per meter at 20 degrees C</td>
</tr>
</tbody>
</table>

Termination

The single-ended daughter card adapter for the CBI-1010 employs active termination. Some SCSI devices still use passive termination, which is inadequate at high transfer rates. If your system is running in single-ended mode at transfer rates in excess of five megabytes per second and the CBI-1010 is at one end of the SCSI bus, you must use active termination or some other type of high-performance termination at the other end of the bus.
This chapter details hardware configuration and installation for the CBI-1010. The CBI-1010 must be configured first, installed in the system second, and SCSI devices installed last. This chapter is organized in the order the CBI-1010 must be installed; after completing hardware installation, refer to “Setup” in Chapter 4. Features not selectable here can be selected through the On-Board Utility in Chapter 4.

Hardware Configuration

This section details setting up various features for the CBI-1010 before installing it inside a system. Be sure to follow the instructions listed in each subsection for proper configuration. Table 3-1 illustrates the default settings for each CBI-1010 model.

<table>
<thead>
<tr>
<th>Model</th>
<th>W1(1-3)</th>
<th>W1(2-4)</th>
<th>W5(1-2)</th>
<th>U9</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI-1010/TM</td>
<td>OUT</td>
<td>OUT</td>
<td>OUT</td>
<td>PAL P1K08</td>
</tr>
<tr>
<td>CBI-1010/T</td>
<td>OUT</td>
<td>OUT</td>
<td>OUT</td>
<td>PAL P1K28</td>
</tr>
<tr>
<td>CBI-1010/M</td>
<td>OUT</td>
<td>OUT</td>
<td>OUT</td>
<td>PAL P1K29</td>
</tr>
<tr>
<td>CBI-1010/MB</td>
<td>OUT</td>
<td>OUT</td>
<td>IN</td>
<td>PAL P1K58A</td>
</tr>
</tbody>
</table>

Note that (F) means factory setting.

Figure 3-1 illustrates the components on the CBI-1010.
Disk and Tape Emulation Selection for the CBI-1010/TM

The CBI-1010/TM is a multiple function controller. When you configure the CBI-1010/TM as a single function controller (configured through RS-232 Utility as 0 disk or 0 tape) the unused function must be disabled. You can disable one of the functions shown below, see Table 3-2 for different configurations.

- To disable tape function, install a shunt on pins 1 and 3 of jumper W1. See Figure 3-2 for location of W1 and pin positions.

- To disable disk function, install a shunt on pins 2 and 4 of jumper W1. See Figure 3-2 for location of W1 and pin positions.
### Table 3-2  W1 Jumper Settings

<table>
<thead>
<tr>
<th>Pins 1 &amp; 3</th>
<th>Pins 2 &amp; 4</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT</td>
<td>OUT</td>
<td>CBI-1010/TM with PAL P1K08 in location U9 (F)</td>
</tr>
<tr>
<td>IN</td>
<td>OUT</td>
<td>CBI-1010/TM configured for disk only with PAL P1K08 in location U9</td>
</tr>
<tr>
<td>OUT</td>
<td>IN</td>
<td>CBI-1010/TM configured for tape only with PAL P1K08 in location U9</td>
</tr>
</tbody>
</table>

Note that (F) means factory setting.

### Switching Between CBI-1010/M and CBI-1010/MB

Both the CBI-1010/M and CBI-1010/MB support disk drives only, but the CBI-1010/M offers KLESI emulation, while the CBI-1010/MB offers KDB50 emulation, which is necessary for bootability on VAX 6000 systems. Switching between the CBI-1010/M and CBI-1010/MB models is a simple matter of changing the PAL at location U9 and either removing or installing the jumper at W5. All CBI-1010/M adapters come with PAL P1K29 installed at U9 and PAL P1K58A as an accessory. Likewise, all CBI-1010/MB adapters come with PAL P1K58A installed at U9 and PAL P1K29 as an accessory.

Be sure to turn off power to the adapter before you switch the PAL at U9. Use a screwdriver to pry the PAL loose and then remove it with your fingers. In-
sert the alternative PAL and press down until it is fully seated. Make sure that the alignment of the notch at one end of the PAL is identical to the surrounding chips. This will assure a proper pin-one match. Before restoring power, change the jumper at W5 to the appropriate setting for the model you desire. Table 3-3 shows the EPROM and jumper settings for each model.

### Table 3-3  CBI-1010/M and CBI-1010/MB Settings

<table>
<thead>
<tr>
<th>Model</th>
<th>Emulation</th>
<th>W5</th>
<th>U9</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBI-1010/M</td>
<td>KLESI</td>
<td>OUT</td>
<td>PAL P1K29 installed</td>
</tr>
<tr>
<td>CBI-1010/MB</td>
<td>KDB50</td>
<td>IN</td>
<td>PAL P1K58A installed</td>
</tr>
</tbody>
</table>

### System Node ID

Care must be taken when installing a CBI-1010 to avoid having the operating system change the physical device names of the currently installed devices. During autoconfigure, each device found is given a unique device name. The device names are expressed as:

\[ ddcu \]

where
\[ dd \] = type of device (i.e. MU, DU, PT, PU)
\[ c \] = Controller designator (A, B, C ...)
\[ u \] = Unit number

The device name is determined by the physical address of the controllers port registers (IP/SA). Since these addresses are fixed within the CBI-1010, there are no concerns with configuring the device type. Refer to Chapter 4, Table 4-1 for unit numbers.

The controller designator is derived by the operating system as it scans I/O space. The first MSCP disk controller found is given the letter 'A', the second MSCP disk controller 'B' and so on. This will generate devices DUAx/PUAx, DUBx/PUBx, incrementing the controller letter until all disk controllers are found. The same is true for each TMSCP tape controller, yielding devices MUAx/PTAx, MUBx/PTBx and so on.

The scan will start at node 0 and will work its way up to the last node ID within the system. On native BI systems (i.e. 8200/8250/8350), the node ID of the BI is the system node ID. In these systems, the system ID's range from 0 to 15.
On systems where the BI is the system I/O bus (i.e. 58xx, 85xx, 8700, 8800 and all 6000's), the system node ID does not match the BI node ID. For example, a VAX 6000 machine has 240 system node ID's. The XMI bus has 15 nodes each logically capable of containing a bus adapter with 16 node ID of its own. Physically this arrangement is not permissible, however, this is how VMS looks at the system.

Table 3-4 shows a map of system node ID's for a VAX 6000 type machine.

<table>
<thead>
<tr>
<th>XMI node</th>
<th>System nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 - 15</td>
</tr>
<tr>
<td>2</td>
<td>16 - 31</td>
</tr>
<tr>
<td>3</td>
<td>32 - 47</td>
</tr>
<tr>
<td>4</td>
<td>48 - 63</td>
</tr>
<tr>
<td>5</td>
<td>64 - 79</td>
</tr>
<tr>
<td>6</td>
<td>80 - 95</td>
</tr>
<tr>
<td>7</td>
<td>96 - 111</td>
</tr>
<tr>
<td>8</td>
<td>112 - 127</td>
</tr>
<tr>
<td>9</td>
<td>128 - 143</td>
</tr>
<tr>
<td>10</td>
<td>144 - 159</td>
</tr>
<tr>
<td>11</td>
<td>160 - 175</td>
</tr>
<tr>
<td>12</td>
<td>176 - 191</td>
</tr>
<tr>
<td>13</td>
<td>192 - 207</td>
</tr>
<tr>
<td>14</td>
<td>208 - 223</td>
</tr>
<tr>
<td>15</td>
<td>224 - 239</td>
</tr>
</tbody>
</table>

It is desirable to install the CBI-1010 at a system node ID that will not change the physical device names of the currently installed devices. This is accomplished by installing the CBI-1010 at a higher system node ID than any other currently installed device of the same type.

The CBI-1010/T is device type PT/MU and should be installed at a higher system node ID than other TMSCP tape controllers. The CBI-1010/M and CBI-1010/MB is a device type PU/DU and should be installed at a higher system node ID than other MSCP disk controllers. The CBI-1010/TM is a device type of PU/DU and PT/MU and should be installed at a higher system node ID than other MSCP disk and TMSCP tape controllers.
If you do not adhere to these guidelines, currently installed devices that have a higher system node ID than the CBI-1010 will have their controller designator changed (incremented by the number of CBI-1010's installed).

As an example, if the current system has a KDB-50 disk controller installed at XMI node 15, BI node 4, (system node ID 228) and a CBI-1010/M, CBI-1010/TM or CBI-1010/MB installed at XMI node 14, BI node 4, (system node ID 212), the controller designator for the KDB-50 will be incremented from ‘A’ to ‘B’ and the CBI-1010 will have the controller designator of ‘A’.

**Differential Mode**

The CBI-1010 supports either single-ended or differential SCSI modes. The CBI-1010 SCSI port is factory configured to your specifications. If for any reason you need to convert the CBI-1010 from single-ended SCSI mode to differential, follow these instructions.

**NOTE** Use only the components supplied by CMD.

1. Remove the single-ended SCSI daughter card (CBI-1011) from the lower left corner of the CBI-1010 board.

2. Install the differential SCSI daughter card (CBI-1012) at the same location of the CBI-1010 board. Make sure to align J1 of the daughter card with J1 of the CBI-1010 board. See figure 3-3.
Figure 3-3: Differential Card (CBI-1012) Installation

Figure 3-4 illustrates the components of the CBI-1012 differential daughter card. The terminator resistors are located at U22 and U23.

Figure 3-4: CBI-1012 Components
**Single-Ended Mode**

The CBI-1010 is factory configured to user specifications. However, if you need to convert the CBI-1010 from differential to single-ended, follow these instructions.

1. Remove the differential SCSI daughter card (CBI-1012) from the lower left corner of the CBI-1010 board.

2. Install the single-ended SCSI daughter card (CBI-1011) at the same location of the CBI-1010 board. Make sure to align J1 of the daughter card with J1 of the CBI-1010 board. See figure 3-5.

![Figure 3-5: Single-Ended Card (CBI-1011) Installation](image)

Figure 3-6 illustrates the components of the CBI-1011 single-ended daughter card. The terminator resistors are located at RN1 and RN2.
Installing the CBI-1010

Installing the CBI-1010 involves installing the board, cables, terminating the SCSI bus, identifying and testing SCSI devices with the On-Board Utility. This section explains these topics prior to listing installation procedures; carefully read the explanations first.

SCSI Cabling

The VAXBI systems provide two 30-pin connectors in the backplane for every one of the VAXBI Zero Insertion Force (ZIF) connectors JC, JD, and JE. The 30-pin connector on the component side of the CBI-1010 is defined as connector CON1. The 30-pin connector on the solder side of the CBI-1010 is defined as connector CON2 (see Figure 3-4 for details). Table 3-5 lists the connectors and cables for the CBI-1010.

<table>
<thead>
<tr>
<th>Connector</th>
<th>Connector – CON1</th>
<th>Connector – CON2</th>
</tr>
</thead>
</table>

The CBI-1010 comes with one three-foot SCSI I/O cable (including RS-232 utility interface) and system back panel adapter kit. The I/O cable is a 60-conductor cable. One end has two 30-pin connectors and the other end has 50-pin SCSI connector and a 10-pin connector.
NOTE  CMD strongly recommends the use of differential mode in systems employing transfer rates in excess of five megabytes per second. If you have no alternative but to use single-ended mode, the SCSI-3 proposal recommends that the total length of the SCSI cable be no longer than three meters (about 9.9 feet) at 10 megabytes per second. See page 2-6 for more details.

SCSI Terminator Power

Typically the initiator (SCSI host adapter) supplies terminator power, +5-volts, to the SCSI bus. Because the CBI-1010 is considered an initiator to the SCSI devices, the terminator power option of the CBI-1010 needs to be enabled.

The CBI-1010 supplies terminator power to the TERMPWR pins of single-ended/differential SCSI connector (JE) through a polyswitch and jumper block, W8. (Check Tables 5-5 and 5-6 for pin assignments.)

SCSI ID for Host Adapter (Initiator)

Each device on the SCSI bus requires a unique SCSI Identification address (0 to 7). SCSI ID 7 has the highest priority on the bus and SCSI ID 0 has the lowest priority.

The CBI-1010 plays the role of initiator and is factory configured to SCSI ID 7. To alter the Host Adapter SCSI ID, change NOVRAM settings through the On-Board RS-232 Utility given in Chapter 4.

CBI-1010 Installation Procedures

1  Make sure the system is powered OFF. Make sure the CBI-1010 is configured as given in the section, "Hardware Configuration."

WARNING  Make sure you are wearing anti-static wrist straps.

2  Choose a correct slot for installing the CBI-1010 by reading the section "System Node ID."

3  Install the CBI-1010 in the correct slot with the ZIF connectors set into the system’s backplane; push the ZIF handle down to clamp the CBI-1010 into place.
4a Differential Configuration: Install the back panel into the back of the system with the ribbon cable inside the system. If necessary, move the external connector to the “SCSI Differential” slot on the back panel by unscrewing the connector from the “SCSI Single Ended” slot and the plate from the “SCSI Differential” slot. Swap the plate and the connector and screw them both back into place. (See Figure 3-7.)

![Figure 3-7: Back Panel Cabling (Differential)](image)

4b Single Ended Configuration: Install the back panel into the back of the system with the ribbon cable inside the system. If necessary, move the external connector to the “SCSI Single Ended” slot on the back panel by unscrewing the connector from the “SCSI Differential” slot and the plate from the “SCSI Single Ended” slot. Swap the plate and the connector and screw them both back into place. (See Figure 3-8.)
5 Locate the 60-pin ribbon cable and connect cable labeled JE CON1 to JE CON1 of the backplane. (See Figure 3-9 for connectors on the system backplane.)

**WARNING** Pin 1 of the cable *must* match CON1 pin 1 of the backplane.
6 Connect JE CON2 of the ribbon cable to JE CON2 of the backplane.

7 Connect the 10-pin RS-232 cable to the back panel at J1 (see Figure 3-7 for differential configurations and Figure 3-8 for single ended configurations.)
Installing SCSI Devices

This section details installing devices from the connectors of the back panel adapter kit to the SCSI devices. Read carefully the subsections, “Cable Specifications” and “SCSI ID for Target Devices” before installing the devices.

Cable Specifications

Single-ended and differential cable specifications vary; see the appropriate paragraph below for cable specifications before attempting to install devices. See page 2-6 for a discussion of cabling issues in systems running at high transfer rates.

Single-ended:
- When the CBI-1010 and the SCSI devices are installed in the same cabinet that meets EMI/RFI shielding requirements, a 25-conductor twisted pair cable must be used for connecting the CBI-1010 (JE) and the SCSI devices.
- When the CBI-1010 and the SCSI devices are installed in separate cabinets, a shielded twisted pair cable must be used to meet FCC requirements.
- A minimum conductor size of 28-AWG must be used to minimize noise effects and ensure proper distribution of optional terminator power.
- The maximum cable length is 3.0 meters or 9.9 feet in single-ended mode at 10 megabytes per second.

Differential:
- When the CBI-1010 and the SCSI devices are installed in the same cabinet that meets EMI/RFI shielding requirements, a 25-conductor twisted pair cable must be used for connecting the CBI-1010 (JE) and the SCSI devices.
- When the CBI-1010 and the SCSI devices are installed in separate cabinets, a shielded twisted pair cable must be used to connect the SCSI devices from the back panel adapter kit meeting FCC requirements. Otherwise, crosstalk between adjacent signals causing spurious pulses on differential signals will occur even at slow data transfer rates and short cable distances. Each pair should be connected to the same signal, one wire to the positive signal, and the other wire to the negative.
- Cables should consist of conductors of 26-AWG or 28-AWG.
- The maximum cable length is 25 meters or 80 feet in differential mode.

SCSI ID for Target Devices

Each SCSI device (initiator or target) on the SCSI bus requires a unique SCSI ID number. Since the CBI-1010 has been set to SCSI ID 7 (initiator), target
devices must be set from SCSI ID 0 to 6. Normally, the assignment of SCSI Target ID starts with SCSI ID 0 on single function boards.

The factory setting of the CBI-1010/TM is four disk devices (SCSI ID=0 to 3) and three tape devices (SCSI ID=4 to 6). If you have more than four disks drives or three tapes drives you must use the On-Board Utility to change the configuration; if you do not, you do not need to change the configuration.

**SCSI Device Installation Procedures**

To install SCSI devices follow the procedures below:

1. Connect SCSI cables as listed below for the specified mode:

   *For single-ended mode:* Connect a SCSI cable from the back panel at the label “Single-Ended” to the SCSI devices (see “Cable Specifications”). The total of the internal and external cable lengths must not exceed 9.9 feet at 10 MBytes/second. See Figure 3-10.

   *For differential mode:* Connect a SCSI cable from the back panel at the label “Singled-Ended” to the SCSI devices (see “Cable Specifications”). The total of the internal and external cable lengths must not exceed 80 feet. See Figure 3-10.

   ![CBI-1010 in Host Computer](image)

   **Figure 3-10: SCSI cabling**

2. Terminate the physical ends of the SCSI bus by terminating the last SCSI device with on-board termination (see manufacturer’s documentation) or by using an external terminator. Be sure devices in the middle of the SCSI bus are not terminated (see Figure 3-10).
The CBI-1010 is factory configured with on-board termination.

3 Set the devices SCSI ID numbers to the specifications set forth in “SCSI ID for Target Devices” (see manufacturer’s documentation for setting devices SCSI ID).

NOTE For multi-hosting refer to section, “Multi-Hosting Configuration.”
This chapter will assist you in setting up the CBI-1010 and your system for use.

On-Board Utility

The CBI-1010 SCSI host adapter comes with the general purpose RS-232 utility for all DEC VAXBI systems. The On-Board utility can test the VAXBI slot, SCSI cable, and SCSI devices connected to the CBI-1010. Be sure to complete utility functions, explained at the end of this chapter.

Accessing the Utility

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

1. Connect a terminal to the CBI-1010’s RS-232 port (DB-25 connector or DEC compatible RJ-11/Modified Module 423 Jack connector of the back panel adapter kit).

2. Set the terminal baud rate to 9600 (8-bit data, 1-stop bit, no parity).
3 Halt the system’s CPU, reset the system, and hit carriage return on the terminal. The main menu will display as shown in Figure 4-1 on the following page.

<table>
<thead>
<tr>
<th>SCSI HOST ADAPTER UTILITY (REV. YYYxZZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X = EXIT</td>
</tr>
<tr>
<td>[DISK]</td>
</tr>
<tr>
<td>1 = LOGICAL UNIT NUMBER OFFSET</td>
</tr>
<tr>
<td>2 = FORMAT DRIVE</td>
</tr>
<tr>
<td>3 = QUALIFY DRIVE</td>
</tr>
<tr>
<td>4 = MANUALLY REPLACE BAD BLOCKS</td>
</tr>
<tr>
<td>5 = ADDITIONAL UTILITIES</td>
</tr>
<tr>
<td>[TAPE]</td>
</tr>
<tr>
<td>6 = LOGICAL UNIT NUMBER OFFSET</td>
</tr>
<tr>
<td>7 = ADDITIONAL UTILITIES</td>
</tr>
<tr>
<td>SELECT OPTION ?</td>
</tr>
</tbody>
</table>

Once the main utility menu 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 to 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.

**Changing LUN Offset**

When a system has a HSC or in a VAX cluster it will be necessary to change the LUN (Logical Unit Number) offset. Each MSCP drive requires a different Unit Number so that the unit numbers are not duplicated. If there are no other MSCP controllers in the system, the LUN offset can be 0.

If there exists another MSCP controller with four drives (0 to 3), then the LUN offset should be four or above. In the case that LUN offset is equal to 10, SCSI ID 0 will be DUB10 and SCSI ID 1 will be DUB11. The drives will show up as such DUA0, DUA1, DUA2, DUA3, DUB10, DUB11 (see section, “SCSI ID for Target Drives” in Chapter 3 for explanation).

1 Select option 1 from the main menu for disk drives; 6 for tape drives.

2 Enter the new value for LUN offset at the statement: PRESENT LUN OFFSET = 0, ENTER NEW VALUE:
3 At the statement: SAVE NEW CONFIGURATION (Y or N)? enter Y.

4 The monitor will display COMPLETE when finished executing.

**Formatting the Drive**

This section details formatting a drive. The CBI-1010 issues Format Unit Command to the selected SCSI disk drive and requests it to map out the defects on the Manufacture Defect List (MDL). Remember formatting a drive will rewrite all the sectors of that drive.

CMD recommends that you format all new drives. To format a drive, follow the steps below:

1 Select option 2 from the main menu.

2 Enter the device number from 0 to 6 in the statement: ENTER DEVICE NUMBER 0 TO 6:

3 At the statement: *** WILL DESTROY DATA ON DEVICE X, ARE YOU SURE? enter Y if you want to continue.

4 The monitor displays WAIT while the drive is executing the format process.

5 The monitor will display COMPLETE when finished executing.

**Qualifying the Drive**

After formatting the device, CMD recommends you qualify devices by running this procedure at least once without errors detected. The qualify program writes different patterns to the drive and then verifies the data. If there are any bad sectors, the sectors will automatically be replaced and the statement XX XXXXXX BAD BLOCK REPLACED will appear. Follow the instructions below for qualifying a drive.

1 Select option 3 from the main menu.

2 Enter the device number at the statement: QUALIFY DEVICE NUMBER <0 TO 6>:

3 At the statement: *** WILL DESTROY DATA ON THIS DEVICE, ARE YOU SURE? enter Y if you want to continue.
4 The monitor will display QUALIFY STARTED <SEQUENTIAL WRITE AND READ>! <HIT <BREAK> TO ABORT>.

5 The monitor will display TESTING LOOP COUNT AND BLOCK NUMBER:

6 Press [BREAK] to exit back to the main menu after you are satisfied with the qualifying process.

Manually Replacing Bad Sectors

This option allows you to replace bad sectors manually. The controller supports dynamic defect management which replaces defective sectors on-line so there is no need to manually replace bad sectors. However, if you wish to replace bad sectors manually follow these instructions; remember that any data in the sector will be lost:

1 Select option 4 from the main menu.

2 Enter the device number at the statement: DEVICE NUMBER ? DEV <0 TO 6>:

3 Enter the logical block number in HEX at the statement: ENTER THE BAD BLOCK NUMBER <HEX>:

4 The monitor will display —BAD BLOCK REPLACED— when finished executing.

Additional Utilities

To access additional utilities for disk drives, select option 5 from the main menu. To access additional utilities for tape drives, select option 7 from the main menu. The additional utilities menu will display as shown in Figure 4-2.

| D = DISPLAY SCSI DEVICE AND SET UP CONFIGURATION |
| S = SEND SCSI COMMAND TO THE DEVICE |
| T = TEST SCSI DEVICE |
| R = FORMAT RCT BLOCK |

SELECT OPTION ?

Figure 4-2: Utility Sub-menu
Displaying SCSI Device and Setting Up Configuration

Selection 'D' can be used to change the controller default configurations such as those listed below:

- reset to default
- number of disk and tape devices supported
- SCSI ID of the CBI-1010
- SCSI reset enable/disable
- SCSI disconnect enable/disable
- sync/async mode selection
- tape buffer mode enable/disable
- prevent medium removal enable/disable
- disk write with verify enable/disable
- Tape Monitor Utility (TMU) enable/disable
- Tape Fast Search enable/disable
- SCSI transfer rate selection
- remote density mode enable/disable
- default tape enable/disable
- reconfigure device
- autoboot start from floppy enable/disable
- write protect from controller jumper setting
- truncate disk size for volume shadowing
- eject removable disk cartridge after dismount

This utility can also scan/display the SCSI devices attached to the CBI-1010. The CBI-1010/TM will be shown as an example in the following display.
To display SCSI devices and set up configuration follow the procedures below.

1. Select option D at the sub-menu (Figure 4-2), the following current configuration is displayed as shown in Figure 4-3.

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

DEV1  DU1, SCSI ID 1, LUN 0
    Disconnect ON, Sync Mode ON, Prevent Medium Removal ON, Write W/Verify OFF

DEV2  DU2, SCSI ID 2, LUN 0
    Disconnect ON, Sync Mode ON, Prevent Medium Removal ON, Write W/Verify OFF

DEV3  DU3, 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, Prevent Medium Removal ON, Buffer Mode ON

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

DEV6  MU2, SCSI ID 6, LUN 0
    Disconnect ON, Sync Mode ON, Prevent Medium Removal ON, Buffer Mode ON

DEV7  SCSI ID 7, HOST ADAPTER SCSI Reset ON, Tmu OFF, Fast Search OFF, sync rate=4-mb, Density Mode ON, Default Tape OFF Boot Floppy OFF, Jumper Write Protect OFF, Eject Disk ON, Truncate Size OFF, Rsv/Rls Option ON, Sel Timeout=250 msec
```

Figure 4-3: Current configuration, default

NOTE: If Truncate Size is toggled, "Truncate Mode ON" will display under each disk device options and at the bottom when configuration is displayed.

2. To change the configuration, enter Y at the statement: CHANGE CONFIGURATION? (Y/N). The menu shown in Figure 4-4 will display.

NOTE: See subsection, "Unit Numbering" before trying to reconfigure devices.
The following list is an explanation of the selections in Figure 4-4.

**R = Toggle SCSI reset**—Choosing this option will toggle the controller’s ability to issue SCSI resets. This should be turned off when multi-hosting is desired.

**D = Toggle Disconnect**—This option allows you to enable or disable disconnect for each device. If disconnect is enabled, the controller will indicate its ability to disconnect during the SCSI identify message.

**S = Toggle Sync/Async**—This option allows you to configure each device for synchronous or asynchronous operations. If synchronous is selected, the controller will attempt a synchronous message exchange with the device. If the device accepts the message exchange, they will transfer data synchronously, otherwise they will transfer asynchronously.

**C = Reconfigure Device**—This option allows you to reconfigure each device.

**Q = Toggle TMU**—This option allows you to configure the controller for tape monitoring. It is used in conjunction with licensed software that will display tape statistics. If enabled, a pseudo unit of 255 will appear during a VMS show dev command.
CBI-tOtO

G = Toggle FMT—This options enables DU254 to show up for SCSI format ON-LINE. This feature must be enabled when using SCSI format ON-LINE.

U = Toggle Default Tape—This option allows you to force the presence of a tape unit to the operating system even if one does not exist. This is needed for some operating systems when the controller is connected to devices with a long self test procedure after power-up. If it is disabled, only units connected to the controller are seen by the operating system.

A = Autoboot Start From Floppy Drive—This option allows you to set the system to boot directly from the first floppy drive; if no floppy drive is present, the system will begin to boot from the first device.

N = Write Protect from Controller Jumper Setting—This option may be used when jumper setting for front panel is IN to allow you to select write protection to disk 0 and disk 1. Default is OFF.

V = Truncate Disk Size for Volume Shadowing—This option allows the size of the disk to be truncated to multiples of 126 blocks to allow VMS volume shadowing copy process to reach higher performance. The message "** WARNING ** Truncate Size ON/OFF will be toggled, Are you sure?" will display before truncate switch can be toggled. If this feature is used on a disk that contains valid data, the data must be removed and later restored after turning this feature ON.

E = Eject Disk after Dismount—This option allows you to specify whether the removable disk cartridges will eject from the drive after dismount.

L = Reserve/Release Disk Option—This option is to let the MSCP ON-LINE exclusive use modifier to be operable.

T = Reset all Devices Mode to Default—These modes are—disconnect, synchronous, Prevent Medium Removal, Write with Verify, and Buffer modes, etc.

Z = Reset Controller to Default Configuration—This option allows the user to set the controller to its factory default configuration. This will set the controller to support four disk drives, three tape drives; disconnect, SCSI reset, synchronous communication, buffer mode, prevent medium removal and density selection enabled; and fast file search, write with
verify, write protect disabled, reserve/release disabled, and default tape disabled. ALWAYS use this feature before reconfiguring the board.

**M = Toggle Density Mode**—This option allows you to configure the controller for remote density selection. If enabled, remote density selection may take place. If enabled, the controller reports itself as a 'TU81'. If disabled, it reports itself as a 'TK50'.

**B = Toggle Buffer/Truncate Mode (Tape/Disk)**—For tape devices, this option allows the controller to configure each individual tape device for write caching. If enabled, the tape device will send command complete message and good status to the controller once the data has been transferred to the tape device's internal buffers. If disabled, such message and status will be sent when the data is actually written to the tape. For disk devices, you may toggle truncate disk size, see "V = Truncate Disk Size for Volume Shadowing" for explanation.

**W = Toggle Write WNerify**—This option will allow the SCSI command Write with Verify to be issued for MSCP write with verify modifier. When set to OFF (which is the default), the normal write command will be issued.

**P = Prevent Medium Removal**—This option is for removable disk drives only. When set to ON, a "Prevent Medium Removal" will be issued to a drive when it is mounted by VMS. This will disable the eject media push-button in front of the drive. An "Allow Medium Removal" will be issued when the drive is dismounted by VMS and the push-button will be enabled. This feature can be disabled and the media can be ejected at anytime.

**F = Toggle Fast File Search**—This option allows you to configure the controller for normal or fast file searching. The difference between normal and fast file search is the type of SCSI commands used to find file marks. A normal file search will issue iterative 'Space Record' commands until a file mark is encountered, while the fast mode will issue a single 'Space filemark' command. VMS may use Fast File Search mode if you do not attempt a stand-alone boot or run other programs that require the controller to keep track of the number of objects. In VMS stand-alone boot applications, this option needs to be disabled. When fast file mark is enable, the controller's ability to keep correct position information for the host is not possible.
3  To reconfigure the device select option C and the screen will prompt you with the following question as shown in Figure 4-5.

WARNING  Use homogeneous high quality twisted pair cables within SCSI specifications for 5-MB/sec transfer rate.

Enter Synchronous transfer rate (MB/sec)
Enter (4-10)

Figure 4-5: Synchronous transfer rate change

4  Enter synchronous rate from 4 to 10 MB/sec. The screen will prompt you to answer the next series of questions as shown in Figure 4-6.

Enter Initiator ID 7
Number of Disks? (0-7)  4
  DU0 to be Reconfigured? (Y/N)  N
  DU1 to be Reconfigured? (Y/N)  N
  DU2 to be Reconfigured? (Y/N)  N
  DU3 to be Reconfigured? (Y/N)  N

Number of Tapes? (0-3)  3
  MU0 to be Reconfigured? (Y/N)  N
  MU1 to be Reconfigured? (Y/N)  N
  MU2 to be Reconfigured? (Y/N)  N

Figure 4-6: SCSI host adapter ID change

5  Enter Initiator SCSI ID 7 or the required Host Adapter SCSI ID (default is 7). Enter the number of disk and/or tapes. Default configuration is four disks, and three tapes; it is not necessary to configure if running fewer than four disks and three tapes.

NOTE  If zero is selected for the number of disk or tapes, place a shunt over the appropriate pins on jumper W1. See Table 3-2 on page 3-3.

Answer Y or N to reconfigure each of the disks or tapes. If you answer Y, the screen will prompt you with these questions:
NOTE This LUN is SCSI LUN; it is normally 0. This is used only for devices that support multiple LUN’s.

6 When you have completed these instructions the display will show your current configuration and prompt you again with the question CHANGE CONFIGURATION? (Y/N). Enter N; this will cause the CBI-1010 to scan the SCSI bus.

The utility will display your current configuration with manufacturer’s name, model number, and firmware revisions for each device.

Sending SCSI Commands To The Device

Selection ‘S’ can be used to send SCSI commands to the selected disk/tape drives directly.

This option is used to send a 6-, 10-, or 12-byte command to a SCSI device. Follow these procedures to send SCSI commands to the device:

1 Enter S from the “Additional Utilities” Menu. (Be sure you have correctly selected either 5 from the Main Menu for disk drives, or 7 for tape drives.)

2 At the question DEVICE NUMBER? DEV <0-6> enter the device number.

3 Enter the command sequence at the statement:

```
READY TO TEST DEVICE X
   EDIT CDB <HEX> ***<ESC> TO TERMINATE EDITING***
   BYTE 0000= 00
```

If a 6- or 10-byte command is used, press [ESC] to terminate command editing. If a 12-byte command is used, command editing is terminated automatically.
At the statement WRITE DATA TO THE DEVICE? <Y OR N> enter N to immediately send the command if SCSI command does not require a data out phase.

Or enter Y to send data to the device after the command phase if SCSI command requires a data out phase. Enter the data and enter [ESC] to terminate editing. The statement SAVE EDITED DATA IN BUFFER? <Y OR N> will appear. Enter Y to save data in the buffer; or enter N to erase edited data after the command is sent.

**Testing SCSI Device**

Selection 'T' can be used to read only, write and read selected disk drive, and/or write and read selected tape drive continuously. This is a diagnostic tool to help with installation and testing. Follow the procedures below to test the SCSI device.

1. Enter T from the "Additional Utilities" menu. (Be sure you have correctly selected either 5 from the main menu for disk drives, or 7 for tape drives.)

2. At the question DEVICE NUMBER? DEV <0-6> enter the device number.

3. When testing for disk devices, at the statement READY TO TEST THE DEVICE DO YOU WANT TO READ ONLY? <Y OR N> enter Y to read only or N to read and write. If you selected N, the question ARE YOU SURE? will display. Enter Y to read and write to the device.

**WARNING**  
*N* will destroy all data on the device.

When testing for tape devices, the statement ARE YOU SURE? will display. Enter Y to test the device.

4. The test will continue until you abort. Allow the test to continue for a few minutes for new devices and ten minutes for suspected bad devices. Press [BREAK] or [CTRL] + C to abort and exit back to the main menu.
**Formatting RCT Block**

Selection ‘R’ can be used to format the RCT blocks of the disk drive selected. This command writes zeros in the last logical block of the device. If you try to skip the formatting process and directly use the drive, you must use this option to eliminate “unrecoverable bad RCT block.” However, CMD recommends you format the drive. To format the RCT block follow these instructions:

1. Select R from the “Additional Utilities” menu. (Be sure you have correctly selected either 5 from the main menu for disk drives, or 7 for tape drives.)

2. Select the device number at the statement: DEVICE NUMBER DEV <0-6>.

3. FORMAT COMPLETE will display when RCT block has been formatted.

**Completing Utility Functions**

The following procedures should be done when using the On-Board Utility.

1. Use the On-Board Utility to verify the VAXBI slot seating, SCSI cable, and SCSI devices connected to the CBI-1010 after installing the CBI-1010 in the VAXBI slot.

2. After verifying the SCSI connections, disconnect RS-232 cable from the back panel, and reset the system; make sure that the system scans this VAXBI node (where the CBI-1010 is installed) successfully. The following indicators will display when the system completes the scan:

   - A negative sign (-) of the VAXBI node ID displayed in the system terminal indicates that the scanning of that VAXBI slot is unsuccessful. When this condition occurs, reseat the CBI-1010 in the VAXBI slot or use a different VAXBI slot and repeat the installation procedures.
   - A period (.) signifies nothing is found in that slot. Follow the procedures given for the negative sign if an adapter is in that slot.
   - A positive sign (+) or the node ID number signifies the system found the CBI-1010 and the node passed the self test.

**NOTE**  
If the terminal is connected, this may cause the On-Board Utility to be invoked during system operation and will take control of the Host Adapter from VMS.
Unit Numbering

This section explains configuring unit numbers. Unit numbers may be changed by using the “Configure LUN Offset” from the main menu. If you used the ‘D’ option from the “Additional Utilities” menu, the terminal will display the MU and/or DU numbers as shown in Table 4-1, factory default settings for unit numbers.

Table 4-1 Default for Unit Numbers

<table>
<thead>
<tr>
<th>CBI-1010/T</th>
<th>SCSI ID</th>
<th>On-Board Utility</th>
<th>OS Unit Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>MU0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>MU1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>MU2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>MU3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>MU4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>MU5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>MU6</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CBI-1010/M or CBI-1010/MB</th>
<th>SCSI ID</th>
<th>On-Board Utility</th>
<th>OS Unit Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DU0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>DU1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>DU2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>DU3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>DU4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>DU5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>DU6</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CBI-1010/TM</th>
<th>SCSI ID</th>
<th>On-Board Utility</th>
<th>OS Unit Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>DU0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>DU1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>DU2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>DU3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>MU0</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>MU1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>MU2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

An example below is given for each type of controller to show how the unit numbers can be determined. Refer to Figure 4-3 if necessary.
CBI-1010/T—Tape drives must be configured starting from SCSI ID 0 to properly use the information from Table 4-1. MU0 will be unit number 0; this is with LUN offset set to 0. Setting the LUN offset to 10 will change the MU number to 10 (i.e., MU10), making the unit number 10.

CBI-1010/M and CBI-1010/MB—Disk drives must be configured starting from SCSI ID 0 to properly use the information from Table 4-1. DU0 will be unit number 0. This is with LUN offset set to 0. Setting the LUN offset to 10 will change the DU number to 10 (i.e., DU10), making the unit number 10.

CBI-1010/TM—Default is four disk drives and three tape as shown in Table 4-1. If you have more than four disk drives or three tape drives, follow these guidelines—disk drives must start at SCSI ID 0 and tape drives must start after the last disk drive’s SCSI ID number and reconfigure the CBI-1010/TM (see subsection, “Displaying SCSI Devices and Setting Up Configuration”).

Note the example below:

<table>
<thead>
<tr>
<th>SCSI ID 0 disk</th>
<th>SCSI ID 1 disk</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCSI ID 2 disk</td>
<td>SCSI ID 3 disk</td>
</tr>
<tr>
<td>SCSI ID 4 disk</td>
<td>SCSI ID 5 tape</td>
</tr>
<tr>
<td>SCSI ID 6 tape</td>
<td>SCSI ID 7 is initiaor (CBI-1010/TM)</td>
</tr>
</tbody>
</table>

The MU and DU numbers are the unit numbers mapped back to the operating system. If the CBI-1010/TM is configured following these guidelines, you can apply this formula to determine the unit number mapped back to the operating system:

\[
\begin{align*}
\text{SCSI ID of the disk drive} + \text{the LUN offset for disk} &= \text{unit number for disk} \\
\text{SCSI ID of tape drive} - \text{number of disk drives} + \text{LUN offset for tapes} &= \text{unit number for tape}
\end{align*}
\]
Multi-Hosting Configuration

The following is a list of software requirements for multi-hosting:

- 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).

Refer to Appendix A for supported multi-hosting devices and follow the instructions below for multi-hosting:

1. From the Additional Utilities Menu in the On-Board Utility, follow these instructions:
   a. Select option D to display current configuration.
   b. Answer Y to the statement: CHANGE CONFIGURATION? (Y/N) The menu shown in Figure 4-4 will display.
   c. Select R to toggle SCSI reset.
   d. Set the host adapter SCSI reset to OFF. Do this for all SCSI host adapters to be multi-hosted.
   e. Answer Y to reconfigure the adapter.
   f. Select C to reconfigure the device.
   g. Configure the CBI-1010 to SCSI ID 7 for the first computer, and SCSI ID 6 for the second computer.
   h. Configure the CBI-1010 for exact number of disks and tapes. This will inhibit scanning of other host adapters (see Figure 4-6).
   i. 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.

NOTE: In a multi-hosting system the physical disk device name must be identical on both systems.
2 Terminate both physical ends of the SCSI bus.

If the CBI-1010 is at either end of the SCSI bus, do not change the configuration. The CBI-1010 is factory configured with on-board termination.

If the CBI-1010 is in the middle of the SCSI bus, terminators must be removed from the default setting as listed below:

*For single-ended mode:* remove RN1 and RN2 from daughter card (CBI-1011). See Figure 3-6 on page 3-8.

*For differential mode:* remove U22 and U23 from daughter card (CBI-1012). See Figure 3-4 on page 3-7.

In the event that one system becomes inoperable with only two nodes in the VAX cluster, a quorum disk must be used to count as a vote; this keeps the other system running. Refer to VMS VAXcluster manual order number AA-LA27A-TE to set up a quorum disk and a VAX cluster.

**NOTE** 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?"

**VMS Configuration**

VAX systems using VMS software will automatically configure new devices added. **NO** other configuration is required if guidelines are followed from Chapter 3, “System Node ID.”
ULTRIX Configuration

VAX and DEC systems using ULTRIX software must be manually configured to access the CBI-1010 boards. First, examine current configuration file to determine which controllers and devices are already connected to the system. Then refer to the respective sections for configuration procedures for the CBI-1010/T, CBI-1010/M, CBI-1010/MB, CBI-1010/TM.

CBI-1010/T

Edit the configuration file by performing the following instructions for the CBI-1010/T. Note, the CBI-1010/T must be configured with a higher klesib number, higher uq number, and higher tms number than any other klesib controller in the configuration file.

1. Make sure the following two lines are in the configuration file:

   adapter xmi0 at nexus? (this line only for VAX 6000's and 5810's)
   adapter vaxbi& at nexus?

   Where
   ? = the system will fill in this variable (simply enter this ?).
   & = the XMI node ID of the XMI to BI adapter for 6000's and 5810's (on 8200's use 0, zero, for the variable).

2. Connect the controller to the node on the BI bus by entering the following line:

   controller klesib? at vaxbi& node XX

   Where
   ? = the variable number that represents the CBI-1010/T.
   & = same number used in step 1.
   XX = the node ID of the VAXBI slot that contains the CBI-1010/T.

3. Tell ULTRIX what the name of the controller will be:

   controller uq# at klesib? vector uqintr

   Where
   ? = the same number used in step 2.
   # = the variable used to represent the controller.
4 Name the tape drives and list drive unit by entering the following line:

```
taxe tms0 at uq# driveα.
taxe tms1 at uq# driveα.
```

Where

# = the same number used to represent the controller in step 3.
α = the MU number in the On-Board Utility displays this configuration.

**CBI-1010/M**

Edit the configuration file by performing the following instructions for the CBI-1010/M. Note the CBI-1010/M must be installed with a higher node ID number, higher klesib number, higher ra number, and higher uq number than any other kdb and klesib controller in the configuration file.

1 Make sure the following two lines are in the configuration file:

```
adapter xmi0 at nexus? (this line only for VAX 6000's and 5810's)
adapter vaxbi& at nexus?
```

Where

? = the system will fill in this variable (simply enter this ?).
& = the XMI node ID of the XMI to BI adapter for 6000's and 5810's (on 8200's use 0, for the variable).

2 Connect the controller to the node on the BI bus by entering the following line:

```
controller klesibφ at vaxbi& node XX
```

Where

φ = the variable number that represents the CBI-1010/M.
& = the same number used in step 1.
XX = the node ID of the VAXBI slot that contains the CBI-1010/M.

3 Tell ULTRIX what the name of the controller will be:

```
controller uq# at klesibφ vector uqintr
```

Where

φ = the same number used in step 2.
# = the variable used to represent the controller.
4 Name the tape drives and list drive unit by entering the following line:

\[ \text{disk ra0 at uq\# drive\#} \]
\[ \text{disk ra1 at uq\# drive\#} \]

Where
\# = the same number used to represent the controller in step 3.
\# = the DU number in the On-Board Utility displays this configuration.

CBI-1010/MB

Edit the configuration file by performing the following instructions for the CBI-1010/MB. Note the CBI-1010/MB must be installed with a higher node ID number, higher kdb number, and higher ra number than any other kdb controller in the configuration file.

1 Make sure the following two lines are in the configuration file:

\[ \text{adapter xmi0 at nexus? (this line only for VAX 6000's and 5810's)} \]
\[ \text{adapter vaxbi& at nexus?} \]

Where
? = the system will fill in this variable (simply enter this ?).
& = the XMI node ID of the XMI to BI adapter for 6000's and 5810's (on 8200's use 0 for the variable).

2 Connect the controller to the node on the BI bus by entering the following line:

\[ \text{controller kdb}\phi at vaxbi& node XX} \]

Where
\phi = the variable number that represents the CBI-1010/MB.
& = the same number used in step 1.
XX = the node ID of the VAXBI slot that contains the CBI-1010/MB.

3 Tell ULTRIX what the name of the controller will be:

\[ \text{controller uq\# at kdb}\phi vector uqintr} \]

Where
\phi = the same number used in step 2.
# = the variable used to represent the controller.
4 Name the tape drives and list drive unit by entering the following line:

\[
\text{disk ra0 at uq# drive}\beta \\
\text{disk ra1 at uq# drive}\beta
\]

Where

# = the same number used to represent the controller in step 3.
β = the DU number in the On-Board Utility displays this configuration.

CBI-1010/TM

Edit the configuration file by performing the following instructions for the CBI-1010/TM. Note the CBI-1010/TM must be configured with a higher klesiu number, higher uq number, and higher tms numbers than any other klesiu controller; and a higher uda number, higher uq number, and higher ra number than any other uba controller in the configuration file.

1 Make sure the following two lines are in the configuration file:

\[
\text{adapter xmi0 at nexus? (this line only for VAX 6000's and 5810's)} \\
\text{adapter vaixbi& at nexus?}
\]

Where

? = the system will fill in this variable (simply enter this ? ).
& = the XMI node ID of the XMI to BI adapter for 6000's and 5810's (on 8200's use 0, zero, for the variable).

2 Connect the controller to the node on the BI bus by entering the following line:

\[
\text{controller uba\vartheta at vaxbi& node XX}
\]

Where

\vartheta = the variable number that represents the CBI-1010/TM.
& = the same number used in step 1.
XX = the node ID of the VAXBI slot that contains the CBI-1010/TM.
3 Connect disk and tape controller by entering the following lines in the configuration file:

```
controller klesiu# at uba\$
controller uda$ at uba$
```

Where
- $ = the same number used in step 2.
- # = a number that makes the CBI-1010/T unique from other klesiu controllers.
- $ = a number that makes the CBI-1010/T unique from other uda controllers.

4 Tell ULTRIX what the name of the controller for the different functions will be:

```
controller uqV at klesiu# csr 0174500 vector uqintr
controller uqΔ at uda$ csr 0172150 vector uqintr
```

Where
- V = variable used to represent the controller.
- Δ = variable used to represent the controller (unique from V above).
- # = the same number used in step 3 representing the controller.
- $ = the same number used in step 3 representing the controller.

5 Name the tape drives and list drive unit by entering the following line:

```
tape tms0 at uqV driveα
tape tms1 at uqV driveα
disk ra0 at uqΔ driveβ
disk ra1 at uqΔ driveβ
```

Where
- V = the same number used to represent the controller in step 4.
- Δ = variable used to represent the controller (unique from V above).
- α = the MU number in the On-Board Utility displays this configuration.
- β = the DU number in the On-Board Utility displays this configuration.
This chapter consists of a SCSI glossary, SCSI commands used by the CBI-1010 for MSCP emulation, SCSI status codes, SCSI messages, SCSI single-ended and differential signals.

**SCSI Glossary**

The following is a glossary of frequently used SCSI terms.

**Connect**—The function that occurs when an initiator selects a target to start an operation.

**Disconnect**—The function that occurs when a target release control of the SCSI bus, allowing it to go to the BUS FREE phase.

**Initiator**—A SCSI device (usually a host system) that requests an operation to be performed by another SCSI device.

**LUN**—Logic Unit Number.

**Peripheral device**—A peripheral that can be attached to a SCSI device (e.g., magnetic disk, magnetic tape, or optical disk).

**Reconnect**—The function that occurs when a target selects an initiator to continue an operation after a disconnect.

**SCSI address**—The octal representation of the unique address (0-7) assigned to an SCSI device. This address would normally be assigned and set in the SCSI device during system installation.
SCSI ID—The bit-significant representation of the SCSI address referring to one of the signal lines DB (7-0).

SCSI device—A host computer adapter or a peripheral controller or an intelligent peripheral that can be attached to the SCSI bus.

Target—A SCSI device that performs an operation requested by an initiator.

**SCSI Commands**

SCSI commands used by CBI-1010 for MSCP emulation are listed in Table 5-1. The Format Unit command is used by the On-Board Utility only. These commands are used if the drives support them.

<table>
<thead>
<tr>
<th>Code</th>
<th>Command Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h</td>
<td>Test Unit Ready</td>
</tr>
<tr>
<td>01h</td>
<td>Rezero Unit</td>
</tr>
<tr>
<td>03h</td>
<td>Request Sense</td>
</tr>
<tr>
<td>04h</td>
<td>Format Unit (1)</td>
</tr>
<tr>
<td>07h</td>
<td>Reassign Block</td>
</tr>
<tr>
<td>08h</td>
<td>Read</td>
</tr>
<tr>
<td>0Ah</td>
<td>Write</td>
</tr>
<tr>
<td>08h</td>
<td>Seek</td>
</tr>
<tr>
<td>12h</td>
<td>Inquiry</td>
</tr>
<tr>
<td>15h</td>
<td>Mode Select</td>
</tr>
<tr>
<td>16h</td>
<td>Reserve Unit</td>
</tr>
<tr>
<td>17h</td>
<td>Release Unit</td>
</tr>
<tr>
<td>1Ah</td>
<td>Mode Sense</td>
</tr>
<tr>
<td>1Bh</td>
<td>Start/Stop Unit</td>
</tr>
<tr>
<td>1Eh</td>
<td>Prevent/Allow Medium Removal</td>
</tr>
<tr>
<td>25h</td>
<td>Read Capacity</td>
</tr>
<tr>
<td>28h</td>
<td>Extended Read</td>
</tr>
<tr>
<td>2Ah</td>
<td>Extended Write</td>
</tr>
<tr>
<td>2Bh</td>
<td>Extended Seek</td>
</tr>
<tr>
<td>3Eh</td>
<td>Read Long (2)</td>
</tr>
<tr>
<td>3Fh</td>
<td>Write Long(2)</td>
</tr>
</tbody>
</table>
SCSI commands used by CBI-1010 for TMSCP emulation are listed in Table 5-2.

<table>
<thead>
<tr>
<th>Code</th>
<th>Command Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h</td>
<td>Test Unit Ready</td>
</tr>
<tr>
<td>01h</td>
<td>Rewind</td>
</tr>
<tr>
<td>03h</td>
<td>Request Sense</td>
</tr>
<tr>
<td>08h</td>
<td>Read</td>
</tr>
<tr>
<td>0Ah</td>
<td>Write</td>
</tr>
<tr>
<td>10h</td>
<td>Write Filemarks</td>
</tr>
<tr>
<td>11h</td>
<td>Space</td>
</tr>
<tr>
<td>12h</td>
<td>Inquiry</td>
</tr>
<tr>
<td>15h</td>
<td>Mode Select</td>
</tr>
<tr>
<td>16h</td>
<td>Reserve Unit</td>
</tr>
<tr>
<td>17h</td>
<td>Release Unit</td>
</tr>
<tr>
<td>19h</td>
<td>Erase</td>
</tr>
<tr>
<td>1Ah</td>
<td>Mode Sense</td>
</tr>
<tr>
<td>1Bh</td>
<td>Load/Unload</td>
</tr>
<tr>
<td>1Eh</td>
<td>Prevent/Allow Medium Removal</td>
</tr>
</tbody>
</table>

**SCSI Status**

The SCSI status codes used by CBI-1010 are listed in Table 5-3.

<table>
<thead>
<tr>
<th>Code</th>
<th>Status Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h</td>
<td>Good</td>
</tr>
<tr>
<td>02h</td>
<td>Check Condition</td>
</tr>
<tr>
<td>08h</td>
<td>Busy</td>
</tr>
<tr>
<td>10h</td>
<td>Intermediate/Good</td>
</tr>
<tr>
<td>18h</td>
<td>Reservation Conflict</td>
</tr>
</tbody>
</table>
SCSI Messages

The SCSI Messages used by CBI-1010 are listed in Table 5-4.

Table 5-4  SCSI Messages

<table>
<thead>
<tr>
<th>Code</th>
<th>Message Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>00h</td>
<td>Command Complete</td>
</tr>
<tr>
<td>01h</td>
<td>Extended Message</td>
</tr>
<tr>
<td>02h</td>
<td>Save Data Pointer</td>
</tr>
<tr>
<td>03h</td>
<td>Restore Pointer</td>
</tr>
<tr>
<td>04h</td>
<td>Disconnect</td>
</tr>
<tr>
<td>05h</td>
<td>Initiator Detected Error</td>
</tr>
<tr>
<td>06h</td>
<td>Abort</td>
</tr>
<tr>
<td>07h</td>
<td>Message Reject</td>
</tr>
<tr>
<td>08h</td>
<td>No Operation</td>
</tr>
<tr>
<td>09h</td>
<td>Message Parity Error</td>
</tr>
<tr>
<td>80-FFh</td>
<td>Identify</td>
</tr>
</tbody>
</table>

SCSI Single-Ended Signals

Figure 5-1 illustrates the pin locations of the CBI-1010 shielded SCSI device connector.

![Single-Ended SCSI device connector](image)

Figure 5-1: Single-Ended SCSI device connector

Table 5-5 shows the CBI-1010 shielded single-ended SCSI connector pin assignments.

**NOTE**  Pin 1 to pin 25 (except pin 13) are connected to ground. Pin 13 is left open. The minus sign next to the signal indicates active low.
<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>-DB(0)</td>
<td>26</td>
</tr>
<tr>
<td>-DB(1)</td>
<td>27</td>
</tr>
<tr>
<td>-DB(2)</td>
<td>28</td>
</tr>
<tr>
<td>-DB(3)</td>
<td>29</td>
</tr>
<tr>
<td>-DB(4)</td>
<td>30</td>
</tr>
<tr>
<td>-DB(5)</td>
<td>31</td>
</tr>
<tr>
<td>-DB(6)</td>
<td>32</td>
</tr>
<tr>
<td>-DB(7)</td>
<td>33</td>
</tr>
<tr>
<td>-DB(P)</td>
<td>34</td>
</tr>
<tr>
<td>GROUND</td>
<td>35</td>
</tr>
<tr>
<td>GROUND</td>
<td>36</td>
</tr>
<tr>
<td>GROUND</td>
<td>37</td>
</tr>
<tr>
<td>TERMPWR</td>
<td>38</td>
</tr>
<tr>
<td>GROUND</td>
<td>39</td>
</tr>
<tr>
<td>GROUND</td>
<td>40</td>
</tr>
<tr>
<td>-ATN</td>
<td>41</td>
</tr>
<tr>
<td>GROUND</td>
<td>42</td>
</tr>
<tr>
<td>-BSY</td>
<td>43</td>
</tr>
<tr>
<td>-ACK</td>
<td>44</td>
</tr>
<tr>
<td>-RST</td>
<td>45</td>
</tr>
<tr>
<td>-MSG</td>
<td>46</td>
</tr>
<tr>
<td>-SEL</td>
<td>47</td>
</tr>
<tr>
<td>-C/D</td>
<td>48</td>
</tr>
<tr>
<td>-REQ</td>
<td>49</td>
</tr>
<tr>
<td>-I/O</td>
<td>50</td>
</tr>
</tbody>
</table>
SCSI Differential Signals

Figure 5-2 illustrates pin locations for the differential SCSI device connector.

![Differential SCSI device connector](image)

Table 5-6 illustrates the CBI-1010 shielded differential SCSI connector pin assignments.
<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin Number</th>
<th>Signal</th>
<th>Pin Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUND</td>
<td>1</td>
<td>GROUND</td>
<td>26</td>
</tr>
<tr>
<td>+DB(0)</td>
<td>2</td>
<td>-DB(0)</td>
<td>27</td>
</tr>
<tr>
<td>+DB(1)</td>
<td>3</td>
<td>-DB(1)</td>
<td>28</td>
</tr>
<tr>
<td>+DB(2)</td>
<td>4</td>
<td>-DB(2)</td>
<td>29</td>
</tr>
<tr>
<td>+DB(3)</td>
<td>5</td>
<td>-DB(3)</td>
<td>30</td>
</tr>
<tr>
<td>+DB(4)</td>
<td>6</td>
<td>-DB(4)</td>
<td>31</td>
</tr>
<tr>
<td>+DB(5)</td>
<td>7</td>
<td>-DB(5)</td>
<td>32</td>
</tr>
<tr>
<td>+DB(6)</td>
<td>8</td>
<td>-DB(6)</td>
<td>33</td>
</tr>
<tr>
<td>+DB(7)</td>
<td>9</td>
<td>-DB(7)</td>
<td>34</td>
</tr>
<tr>
<td>+DB(P)</td>
<td>10</td>
<td>-DB(P)</td>
<td>35</td>
</tr>
<tr>
<td>DIFFSENS</td>
<td>11</td>
<td>GROUND</td>
<td>36</td>
</tr>
<tr>
<td>GROUND</td>
<td>12</td>
<td>GROUND</td>
<td>37</td>
</tr>
<tr>
<td>TERMPWR</td>
<td>13</td>
<td>TERMPWR</td>
<td>38</td>
</tr>
<tr>
<td>GROUND</td>
<td>14</td>
<td>GROUND</td>
<td>39</td>
</tr>
<tr>
<td>+ATN</td>
<td>15</td>
<td>-ATN</td>
<td>40</td>
</tr>
<tr>
<td>GROUND</td>
<td>16</td>
<td>GROUND</td>
<td>41</td>
</tr>
<tr>
<td>+BSY</td>
<td>17</td>
<td>-BSY</td>
<td>42</td>
</tr>
<tr>
<td>+ACK</td>
<td>18</td>
<td>-ACK</td>
<td>43</td>
</tr>
<tr>
<td>+RST</td>
<td>19</td>
<td>-RST</td>
<td>44</td>
</tr>
<tr>
<td>+MSG</td>
<td>20</td>
<td>-MSG</td>
<td>45</td>
</tr>
<tr>
<td>+SEL</td>
<td>21</td>
<td>-SEL</td>
<td>46</td>
</tr>
<tr>
<td>+C/D</td>
<td>22</td>
<td>-C/D</td>
<td>47</td>
</tr>
<tr>
<td>+REQ</td>
<td>23</td>
<td>-REQ</td>
<td>48</td>
</tr>
<tr>
<td>+I/O</td>
<td>24</td>
<td>-I/O</td>
<td>49</td>
</tr>
<tr>
<td>GROUND</td>
<td>25</td>
<td>GROUND</td>
<td>50</td>
</tr>
</tbody>
</table>
Appendix A

Supported Devices and Operating Systems

SCSI Devices

The following subsections list devices that are supported by the CBI-1010. Contact CMD Technical Support for correct firmware revision for the drives listed.

NOTE Devices marked by *italics* represent new qualified devices; devices marked **bold** support multi-hosting; devices marked by **bold italics** represent both new qualified devices supporting multi-hosting.

Magnetic disk drives supported by CBI-1010/TM, CBI-1010/M, and CBI-1010/MB

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEAGATE</td>
<td>WREN VI, SWIFT (3-1/2-inch), SABRE 8-inch, WREN VII, ELITE I &amp; II (5400 RPM), WREN VIII</td>
</tr>
<tr>
<td>CONNER</td>
<td>CP-3100, CP3200</td>
</tr>
<tr>
<td>CITOH</td>
<td>YD-3042, YD3082</td>
</tr>
<tr>
<td>DEC</td>
<td>RZ23, RZ24, RZ56, RZ57</td>
</tr>
<tr>
<td>FUJITSU</td>
<td>M2246SA Series, M2249SA, M2263SA, M2266SA</td>
</tr>
<tr>
<td>HITACHI</td>
<td>DK515C Series, DK516C</td>
</tr>
<tr>
<td>HP</td>
<td>97548S/D series, C2233, C2234, C2235, C3010, C3009, C3007</td>
</tr>
<tr>
<td>IBM</td>
<td>320-MB, 3-1/2-inch</td>
</tr>
<tr>
<td>MAXTOR</td>
<td>XT-4000S Series, XT-8000S Series</td>
</tr>
<tr>
<td>MICROPOLIS</td>
<td>1588-15, 1598</td>
</tr>
<tr>
<td>QUANTUM</td>
<td>ProDrive 40S/80S</td>
</tr>
<tr>
<td>TEAC</td>
<td>FD235HS (3-1/2-inch FLOPPY, DEC RX23 compatible)</td>
</tr>
</tbody>
</table>

More disk drives will be qualified soon.
Erasable Optical disk drives supported by CBI-1010/TM, CBI-1010/M, and CBI-1010/MB

MAXTOR Tahiti 1, Tahiti 2
SONY SMO-D501, SMO-D502
RICOH RO-5030E, RO-5030E2

Erasable Optical disk cartridge manufacturers

SONY, RICOH, MAXOPTICS, PDO, 3M.

CD ROM disk drives supported by CBI-1010/TM, CBI-1010/M, and CBI-1010/MB

DEC RRD40, RRD42
LMS CM210, CM212
TOSHIBA XM3200 series

WORM drives supported by CBI-1010/TM, CBI-1010/M, and CBI-1010/MB

1 With Ten X Technology Optical Conversion Unit
   All WORM drives supported by the optical conversion unit.

2 With LASERDRIVE interface
   LASERDRIVE Model 800 series

Tape drives supported by CBI-1010/TM, CBI-1010/T

1 8-mm helical scan tape drives
   EXABYTE EXB-8200, EXB-8500

2 4-mm DAT drives (Digital Audio Tape)
   Archive Python 4520 DAT
   GIGATREND 1200 series DAT
   HP 35450A DAT, 35470A, 35480A
   SONY SDT-1000 DAT
   WangDat 1300 DAT, 2600 DAT, 3200 DAT
   Wangtek 6130 series DAT

3 VHS helical scan tape drives
   Digitata
   Metrum
4 IBM-3480 compatible 18-track cartridge tape drives
   ASPEN System 480
   CIPHER T480
   FUJITSU M2480 series, 2680
   LMS Independence
   DEC TKZ60
   STORAGE TECH 4280 series (model Summit)

5 9 track reel to reel tape drives
   CIPHER F880-II, M990, M995
   HP Model 88780B
   KENNEDY Model 9612
   STORAGE TECH Model 2925, 9914
   QUALSTAR Model 340
   TELEX Model 9294
   DEC TSZ07
   M4 data Model 9914

6 TK50 compatible tape drives
   DEC TZ30

Jukeboxes supported by CBI-1010/TMJ

1 Disk Jukebox
   Hewlett-Packard C1710A
   IDE 6500, 7000

2 Tape Jukebox
   EXABYTE EXB120

Operating Systems

All DEC-compatible products designed by CMD Technology, Inc. implement
MSCP (Mass Storage Control Protocol) / TMSCP (Tape Mass Storage Control
Protocol). CMD supports its implementation of MSCP/TMSCP beginning
with the indicated version of the DEC operating systems listed in Table A-1.

Table A-1  Operating Systems Supported by CBI-1010

<table>
<thead>
<tr>
<th>Operating System</th>
<th>Supported Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMS®</td>
<td>4.0 to 5.5</td>
</tr>
<tr>
<td>ULTRIX™</td>
<td>1.2 to 4.2</td>
</tr>
<tr>
<td>Unix/Berkeley™</td>
<td>4.2 to 4.3</td>
</tr>
<tr>
<td>AT&amp;T UNIX®</td>
<td>System V</td>
</tr>
</tbody>
</table>
Appendix B
Troubleshooting

VMS Analyze/Error Utility

The CBI-1010 logs controller dependent information in ERRLOG.SYS file. User can use the VMS ANALYZE/ERROR utility to open the file ERRLOG.SYS and display the error messages for troubleshooting. By including option switches such as /SINCE=DATE and /INCLUDE=MUB0, user may define the time reference and device. To enter the ANALYZE/ERROR utility, log onto the system and enter the following command:

```
analerr/since=[time]/include=[device]
```

Some examples are shown by the following:
To view all errors that VMS has logged, enter:

```
analerr
```

To view the errors only on tape devices, enter:

```
analerr/inc=tapes
```

To view the errors that have occurred only on one tape unit (MUB0), enter;

```
analerr/inc=mubo
analerr/inc=(ptb,mubo)
```

To view the MUB0 errors that occurred on April 20, 1990 since 14:22 (02:22 PM), enter:

```
analerr/since=20-Apr-1989:14:22/inc=mubo
```
One example of the error log message is shown in below:

BEGINNING OF INTERVENING ENTRIES
*************************************************************************ENTRY 1163*************************************************************************

ERROR SEQUENCE 8.
DATE/TIME 0 DAYS: 090991 15:15:15
SYSTEM UPDATE TIME 00:08:56
SCS NODE: XMIVAX
ERL$LOGMESSAGE ENTRY LOGGED ON SID 0A000005 SYS TYPE 0241020
VAX/VMS V5.4

SCS NODE: XMIVAX

I/O SUB-SYSTEM, UNIT _MUA0:
MESSAGE TYPE 0002: TAPE MSCP MESSAGE

MSLG$L_CMD_REF 99730004
MSLG$W_SEQ_NUM 0001: SEQUENCE #1.

MSLG$B_FORMAT 00: CONTROLLER ERROR
MSLG$B_FLAGS 00: DATA ERROR
MSLG$W_EVENT 00E8: UNRECOVERABLE ECC ERROR

MSLG$Q_CNT_ID 00340000
03090000

UNIQUE IDENTIFIER, 000000340000
TAPE CLASS DEVICE
TK50P

MSLG$B_CNT_SVR 01: CONTROLLER SOFTWARE VERSION #1.
MSLG$B_CNT_HVR 01: CONTROLLER HARDWARE VERSION #1.
Controller Dependent Information: Listed below is the controller dependent information for the CBI-1010.

;COMMENTS:
;SCSI COMMAND, 6 BYTES
;COMMAND BYTE 3 TO 0
/..../
;(LEFT TO RIGHT, BYTE 3,2,1,0)
LONGWORD 1. 00000008
/..../
BYTE 7 TO 6 DONT CARE
;COMMAND BYTE 5 TO 4
/P.../
;EXTENDED SENSE, 26 BYTES
LONGWORD 2. 00000050
/P...
;COMMAND BYTE 5 TO 4
LONGWORD 3. 00030070
/P...
;SENSE DATA BYTE 3 TO 0
LONGWORD 4. 12000000
/P...
;SENSE DATA BYTE 7 TO 4
LONGWORD 5. 00000000
/P...
;SENSE DATA BYTE 11 TO 8
LONGWORD 6. 00000000
/P...
;SENSE DATA BYTE 15 TO 12
LONGWORD 7. 10000000
/P...
;SENSE DATA BYTE 19 TO 16
LONGWORD 8. 04000000
/P...
;SENSE DATA BYTE 23 TO 20
LONGWORD 9. 0000E202
/P...
;SENSE DATA BYTE 26 TO 24
LONGWORD 10 00000000
/(RESERVED)
/P...

Refer to the SCSI tape drive manual for a description of the error reported by the tape drive or call CMD for more detailed information.

Cables

If the system does not recognize the CBI-1010 or devices connected, check the cable connections. Make sure pin 1 on the cable is aligned with pin 1 on the SCSI device or CBI-1010. Make sure pins are NOT bent.

LED Indicators

When the Red LED is lit, turn system "OFF" and reboot. If the Red LED is still lit, call CMD technical support at (800) 426-3832 or (714) 454-0800.
CMD Technical Support

Having a CMD board entitles you to responsive technical support. Before you call CMD Technical Support, please gather the information listed below that pertains to you. Make a note of any on-screen messages when the problem occurs and have your manual close by.

CMD

- CMD product model number and serial number.
- Firmware Revision of CMD board as shown on Eproms.
- Listing of jumper settings on the board.
- Distributer company and contact.

SCSI

- SCSI devices model numbers and firmware Rev.
- Settings of SCSI ID numbers of all devices.

Computer

- Computer model.
- Operating System version.
- Complete listing of other controllers in computer backplane.
- Specify multi-hosting or clustering.

Problem

- Describe exact nature of problem.
- Specify detailed error messages.
- Specify any recent modification to the system.
- Is this a new install?
- Does the problem occur consistently?
- Does the problem occur when you do not use the board?
- Does the problem occur with another system (if available)?

You may contact CMD Technical Support from 8:30 AM to 5:30 PM, Pacific Standard Time, Monday through Friday, excluding major holidays, at:

(714) 454-0800 or
(800) 426-3832 or
(714) 455-1656 FAX
Appendix C
Miscellaneous

Jumper Settings

Table C-1 lists the jumper settings for the CBI-1010.

<table>
<thead>
<tr>
<th>Jumper Settings for the CBI-1010</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2</td>
</tr>
<tr>
<td>W3</td>
</tr>
<tr>
<td>W3</td>
</tr>
<tr>
<td>W4</td>
</tr>
<tr>
<td>W4</td>
</tr>
<tr>
<td>W5</td>
</tr>
<tr>
<td>W5</td>
</tr>
<tr>
<td>W6</td>
</tr>
<tr>
<td>W6</td>
</tr>
<tr>
<td>W8</td>
</tr>
<tr>
<td>W8</td>
</tr>
<tr>
<td>W9</td>
</tr>
</tbody>
</table>

Note that (F) means factory setting.
Table C-2 lists the W1 jumper settings for the CBI-1010.

<table>
<thead>
<tr>
<th>Pins 1 &amp; 3</th>
<th>Pins 2 &amp; 4</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT</td>
<td>OUT</td>
<td>CBI-1010/TM with PAL P1K08 in location U9 (F)</td>
</tr>
<tr>
<td>OUT</td>
<td>OUT</td>
<td>CBI-1010/T with PAL P1K28 in location U9 (F)</td>
</tr>
<tr>
<td>OUT</td>
<td>OUT</td>
<td>CBI-1010/M with PAL P1K29 in location U9 (F)</td>
</tr>
<tr>
<td>OUT</td>
<td>OUT</td>
<td>CBI-1010/MB with PAL P1K58A in location U9 (F)</td>
</tr>
</tbody>
</table>

Note that (F) means factory setting.

Figure C-1 illustrates the jumper locations for the CBI-1010.
Figure C-1: CBI-1010 Jumper locations
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CBI-1010 Quick Reference Guide

Installing the CBI-1010

1 Turn off the system. If you need to change the configuration for the CBI-1010 see section, “Hardware Configuration,” Chapter 3 of the CBI-1010 User’s Manual.

Make sure you are wearing anti-static wrist straps.

2 Choose a correct slot for installing the CBI-1010 by reading the section “System Node ID.”

3 Install the CBI-1010 in the correct slot with the ZIF connectors set into the system’s backplane; push the ZIF handle down to clamp the CBI-1010 into place.

4a Differential: Install the back panel into the back of the system with the ribbon cable inside the system. If necessary, move external connector to “SCSI Differential” slot on back panel. (See Figure 2.)

4b Single Ended: Install the back panel into the back of the system with the ribbon cable inside the system. If necessary, move external connector to “SCSI Single Ended” slot on back panel. (See Figure 3.)

5 Locate the 60-pin ribbon cable and connect cable labeled JE CON1 to JE CON1 of the back panel (see Figure 1).

Pin 1 of the cable must match CON1 pin 1 of the backplane.

6 Connect JE CON2 of the ribbon cable to JE CON2 of the back panel.

7 Connect the 10-pin RS-232 cable to the back panel at J1 (see Figures 2 and 3).

Installing SCSI Devices

Be sure you have successfully installed the CBI-1010 into your system. Then follow these instructions to install SCSI devices:

1 Connect SCSI cables as listed below for the specified mode (see examples in Figures 2 and 3):

   For single-ended mode: Connect a SCSI cable from the back panel at the label “Single-Ended” to the SCSI devices (see “Cable Specifications”). The sum total of the internal and external cable lengths must not exceed 3 meters (9.9 ft.) at 10 MBytes/sec.

   For differential mode: Connect a SCSI cable from the back panel at the label “Single-Ended” to the SCSI devices (see “Cable Specifications”). The sum total of the internal and external cable lengths must not exceed 80-feet.

2 Terminate the physical ends of the SCSI bus by terminating the last SCSI device.
with on-board termination (see manufacturer's documentation) or by using an external terminator.

Be sure devices in the middle of the SCSI bus are not terminated (see Figure 4).

The CBI-1010 is factory configured with on-board termination.

Set the devices' SCSI ID numbers to the specifications set forth in “SCSI ID for Target Devices” (see manufacturer's documentation for setting devices SCSI ID).

**On-Board Utility**

The On-Board Utility can be used to change the system configuration for use with the CBI-1010 and other special features. To access the RS-232 utility, follow the instructions below.

1. Connect a terminal to the CBI-1010's RS-232 port (DB-25 connector or DEC compatible RJ-11/Modified Module 423 Jack connector of the back panel adapter kit).

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

3. Halt the system's CPU, reset the system, and hit carriage return on the terminal.

4. Once the main utility menu 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.

Refer to 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. Refer to CBI-1010 User's Manual, Chapter 4 for further details.
If you wish to contact CMD Technology for any reason concerning CMD Warranty Service, please call at (714) 454-0800 or send a letter to:

CMD Technology, Inc.
Customer Service Department
1 Vanderbilt
Irvine, CA 92718

Product ____________________________________

Model Number ____________________________

Serial Number _________________________ Rev. __________

Purchase Date ____________________________

Purchased From (Dealer) ____________________________

Please retain proof of purchase/sales receipt to verify CMD Warranty.
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Identification (please provide company information if the system was purchased for your workplace.)

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