# CDU700

# INTELLIGENT

# UNIBUS SCSI HOST ADAPTER

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## FCC WARNING

This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the technical manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operating in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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# CHAPTER 1 INTRODUCTION

## CDU-700 UNIBUS SCSI TMSCP TAPE CONTROLLER

The CDU-700 is an intelligent hex-wide Unibus SCSI host adapter which is fully compatible with the DEC Mass Storage Control Protocol (MSCP) and the DEC Tape Mass Storage Control Protocol (TMSCP).

The CDU-700 can be used with the PDP-11/84, PDP-11/70, PDP-11/44, PDP 11/34, PDP 11/24, VAX 11/730, VAX 11/750, VAX 11/780, and other DEC computers with a UNIBUS. It supports RSX, RSTS, VMS, UNIX, ULTRIX, DSM-11, and other operating systems which use the DU/MU drivers.

The CDU-700 supports 16K bytes data buffer, command queuing, standard SCSI bus arbitration, disconnect and reconnect, and all required SCSI commands. Up to seven SCSI target devices (magnetic disk and tape) can be connected to CDU-700 with SCSI bus data transfer rate up to 2M bytes per second.

The CDU-700 has an on-board utility for users to configure and format drives, scan bad blocks and replace them automatically. The logical unit number offset is stored in an on-board non-volatile RAM (NOVRAM).

The CDU-700 comes standard with an installation manual, and one year warranty.

# CHAPTER 2 CDU-700 SPECIFICATIONS

## 2.1 UNIBUS CONTROLLER SPECIFICATIONS:

| | | |
|---|---|---|
| Emulation | DISK: | MSCP (DU driver) |
| | TAPE: | TMSCP (MU driver, same as TK50 and TU81) |
| CSR Address: | | |
| CDU-700/M (Disk only) | | 772150, 760334, 760354, 760374, |
| IC P70011B (U54) | | 760340, 760344, 760350, 760360 |
| CDU-700/T (Tape only) | | 774500, 760404, 760444, 760504, |
| IC P70012B (U54) | | 760544, 760410, 760450, 760454 |
| IC P70012C (U54) | | Support 30 CSR, please see Appendix D |
| CDU-700/TM | | 772150, 760334, 760354 (Disk) |
| (Disk and Tape) | | 774500, 760404, 760444 (Tape) |
| IC P70013A (U54) | | |
| Interrupt Vector: | | Software Programmable |
| Command Queuing: | | 16 commands |
| Data Buffer Capacity: | | 16K bytes data buffer |
| Bootstrap: | | Auto bootstrap or utility bootstrap |
| Formatting: | | On-board format and bad block replacement |
| Software Supported: | | All standard DEC operating system that uses the DU/MU driver |
| Peripheral Interface: | | Small Computer System Interface (SCSI) |
| Devices Supported: | | Up to 7 SCSI devices<br>CDU-700/T 7 Tape Dives<br>CDU-700/M 7 Disk Drives<br>CDU-700/TM 4 Disk and 3 Tape Drives |
| System Performance: | | Support disconnect/reconnect |
| SCSI Transfer Rate: | | 2MB/sec (maximun). |
| SCSI Bus Parity: | | Odd parity |
| SCSI Driver/receiver: | | Single ended |
| SCSI Cable Length: | | Up to 20 ft (6 meter) |
| Operating Temperature: | | 5 C to 50 C |
| Relative Humidity: | | 10% to 90%, Non-condensing |
| Power Requirement: | | +5V DC, 2.8A |

# CHAPTER 3 INSTALLATION

## 3.1 CDU-700 Jumper Settings

### 3.1.1 CSR Address Selection

The CDU-700 has jumpers to select different CSR addresses. Select the desired address by installing the jumper plugs. The standard address for the CDU-700/M is 772150. The standard address for the CDU-700/T is 774500.

A new IC P70012C has been installed at location U54 of the CDU-700/T to support 30 tape CSR addresses. Only 8 CSR jumper settings are shown in the following table. Please refer to Appendix D for the other 22 CSR jumper settings.

| CSR Address | | W6 | W10 | W7 | W8 | W9 |
|---|---|---|---|---|---|---|
| Standard: | 17774500 | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 2-3 IN |
| Second: | 17760404 | 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 2-3 IN |
| Third: | 17760444 | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 2-3 IN |
| Forth: | 17760504 | 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 2-3 IN |
| Fifth: | 17760544 | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 1-2 IN |
| Sixth: | 17760410 | 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 1-2 IN |
| Seventh: | 17760450 | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 1-2 IN |
| Eighth: | 17760454 | 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 1-2 IN |

The old IC P70012B at location U54 of the CDU-700/T only supports 8 CSR addresses. The CSR jumper settings are the same as those shown in the above table.

The CSR jumper setting for the CDU-700/M (Disk only) with IC P70011B at U54:

| CSR Address | | W7 | W8 | W9 |
|---|---|---|---|---|
| Standard: | 17772150 | 1-2 IN | 1-2 IN | 2-3 IN |
| Second: | 17760334 | 2-3 IN | 1-2 IN | 2-3 IN |
| Third: | 17760354 | 1-2 IN | 2-3 IN | 2-3 IN |
| Forth: | 17760374 | 2-3 IN | 2-3 IN | 2-3 IN |
| Fifth: | 17760340 | 1-2 IN | 1-2 IN | 1-2 IN |
| Sixth: | 17760344 | 2-3 IN | 1-2 IN | 1-2 IN |
| Seventh: | 17760350 | 1-2 IN | 2-3 IN | 1-2 IN |
| Eighth: | 17760360 | 2-3 IN | 2-3 IN | 1-2 IN |

The CSR jumper setting for the CDU-700/TM (Disk and Tape) with IC P70013A at U54:

| Tape CSR Address | | W7 | W8 |
|---|---|---|---|
| Standard: | 17774500 | 1-2 IN | 1-2 IN |
| Second: | 17760404 | 2-3 IN | 1-2 IN |
| Third: | 17760444 | 1-2 IN | 2-3 IN |
| Disable Tape | | 2-3 IN | 2-3 IN |

| Disk CSR Address | | W9 | W10 |
|---|---|---|---|
| Standard: | 17772150 | 1-2 IN | 1-2 IN |
| Second: | 17760334 | 2-3 IN | 1-2 IN |
| Third: | 17760354 | 1-2 IN | 2-3 IN |
| Disable Disk | | 2-3 IN | 2-3 IN |

If users require other CSR addresses than listed, please cousult CMD Technology.

### 3.1.2 SCSI Host Adapter (Initiator) ID Selection

Each device (Initiator or Target) on the SCSI bus requires an unique SCSI Identification address (0-7). SCSI ID 7 has the highest priority on the bus. SCSI ID 0 has the lowest priority on the bus. The SCSI Host Adapter of CDU-700 is factory configured to SCSI ID 7. To alter the Host Adapter SCSI ID, users need to change jumper setting of SW1-3, SW1-4 and SW1-5.

| SW1-5 | SW1-4 | SW1-3 | Initiator ID | |
|---|---|---|---|---|
| ON | ON | ON | 7 | Highest priority |
| ON | ON | OFF | 6 | |
| ON | OFF | ON | 5 | |
| ON | OFF | OFF | 4 | |
| OFF | ON | ON | 3 | |
| OFF | ON | OFF | 2 | |
| OFF | OFF | ON | 1 | |
| OFF | OFF | OFF | 0 | lowest priority |

Note: Do not have more than one device on the SCSI bus with the same SCSI ID. The CDU-700 should always have a higher priority than the drives on the SCSI bus.

### 3.1.3 SCSI Target ID Selection

Each SCSI device on (Initator or Target) on the SCSI bus requires an unique SCSI ID. Since the CDU-700 SCSI host adapter requires the highest priority, it is configured to SCSI ID 7. The SCSI ID of the target devices should be set from SCSI ID 0 to 6.

The CDU-700/T supports 7 tape drives. The SCSI ID of the tape drives should be configured as such:

| CDU-700/T Tape Drive | SCSI ID | VMS device name |
|---|---|---|
| First Tape | 0 | MUA0 |
| Second Tape | 1 | MUA1 |
| Third Tape | 2 | MUA2 |
| Forth Tape | 3 | MUA3 |
| Fifth Tape | 4 | MUA4 |
| Sixth Tape | 5 | MUA5 |
| Seventh Tape | 6 | MUA6 |

The CDU-700/M supports 7 disk drives. The SCSI ID of the disk drives should be configured as such:

| CDU-700/M | Disk Drive | SCSI ID | VMS device name |
|---|---|---|---|
| | First Disk | 0 | DUA0 |
| | Second Disk | 1 | DUA1 |
| | Third Disk | 2 | DUA2 |
| | Forth Disk | 3 | DUA3 |
| | Fifth Disk | 4 | DUA4 |
| | Sixth Disk | 5 | DUA5 |
| | Seventh Disk | 6 | DUA6 |
| | | 7 | PUA0 (CDU-700/M) |

The CDU-700/TM supports 4 disk drives and 3 tape drives. The SCSI ID of the disk and tape drives should be configured as such:

| CDU-700/TM | | SCSI ID | VMS device name |
|---|---|---|---|
| Disk: | First Disk | 0 | DUA0 |
| | Second Disk | 1 | DUA1 |
| | Third Disk | 2 | DUA2 |
| | Forth Disk | 3 | DUA3 |
| Tape: | First Tape | 4 | MUA0 |
| | Second Tape | 5 | MUA1 |
| | Third Tape | 6 | MUA2 |
| | | 7 | PUA0/PTA0 (CDU-700/TM) |

When connecting more than one device to the CDU-700, be sure that the SCSI Bus is terminated correctly. (see section of SCSI Bus termination.)

### 3.1.4 SCSI Terminator Power Option

The CDU-700 supplies terminator power to the TERMPWR pin (pin 26) of SCSI connector (J3) through a diode and jumper block W4 for external SCSI drives. In order to prevent accidental grounding or misconnection of terminator power, no jumper shunt is installed in W4 location. To use this option, users should add a jumper shunt in W4 location. Please make sure that the pin 1 mark of SCSI cable matches with the pin 1 mark of SCSI device's connector before turning on the system power.

| | | |
|---|---|---|
| W4 | OUT | SCSI terminator power disabled |
| W4 | IN | SCSI terminator power enabled |

### 3.1.5 Tape Mode Select

The CDU-700/T will support ANSI variable mode tape format and fixed block mode format. The advantage of ANSI mode is media interchangeable. Tapes written by the CDU-700/T in ANSI variable mode tape format can be read by the SCSI host adapter of other computer systems that follow the ANSI format.

| SW1-1 | SW1-2 | TAPE FORMAT SELECT |
|---|---|---|
| OFF | OFF | Fixed Block Mode |
| ON | OFF | ANSI Variable Mode but can read tapes written in Fixed Block Mode |
| ON | ON | ANSI Variable Mode |

| Configuration Chart: | SW1-1 | SW1-2 |
|---|---|---|
| EXABYTE Drive | ON | ON |
| GigaTrend DAT | ON | ON |
| Fujitsu 1/2 inch | ON | ON |
| Wangtek 1/4 inch | OFF | OFF |
| Archive 1/4 inch | OFF | OFF |
| Tandberg 1/4 inch | OFF | OFF |
| Caliper 1/4 inch | OFF | OFF |

Note: 1/4 inch tape streaming tape drives which does not support variable mode will be written in fix block mode even if the switch is is set to ANSI variable mode.

### 3.1.6 Tape Fast Search Option

When set to the Tape Fast Search mode, the controller will enable high speed forward and reverse filemark search. VMS may use this mode if the user does not attempt a standalone boot or run other programs that require the controller to keep track of the number of data records between filemarks. In VMS standalone boot application, this option need to be disabled. For the ISM-11 operating system, this switch need to be set to on position.

| | | |
|---|---|---|
| SW1-6 | OFF | Disable Tape Fast Search |
| | ON | Enable Tape Fast Search |

### 3.1.7 LED Indicators

The CDU-700 has two LED's in the front of the board. The two LEDs are labeled LED1 and LED2.

| LED | COLOR | INDICATIONS |
|---|---|---|
| LED1 | Red | Error condition occured. |
| LED2 | Green | Power up OK and activity indicator. On power up, this LED is turned on when the CDU-700/T suceeds in the self-diagnostic testing. The LED blinks to show controller activity. |

### 3.1.8 Auto-Boot Enable Selection

For PDP-11 disk users only, the CDU-700 may be set to provide an auto-bootstrap at 771000 or 773000 on power up or whenever the "Boot" switch is pressed. The auto-bootstrap may be enabled by installing a jumper shunt in jumper block W5 pin 2 and pin 3.

| | | |
|---|---|---|
| W5 | 2-3 IN | Auto-Boot enabled |
| | 1-2 IN | Auto-Boot disabled |
| W6 | 2-3 IN | Bootstrap address = 771000 |
| | 1-2 IN | Bootstrap address = 773000 |

If enabled, the bootstrap ROM at 771000 (or 773000) on the CDU-700 will load the boot block to memory. The boot program then bootstraps the operating system. Please make sure that there is no existing boot ROM at that address selected by W6. The controller will only auto-boot DU0: at CSR 772150. To boot other devices use Utility boot. (see section on Utility Boot)

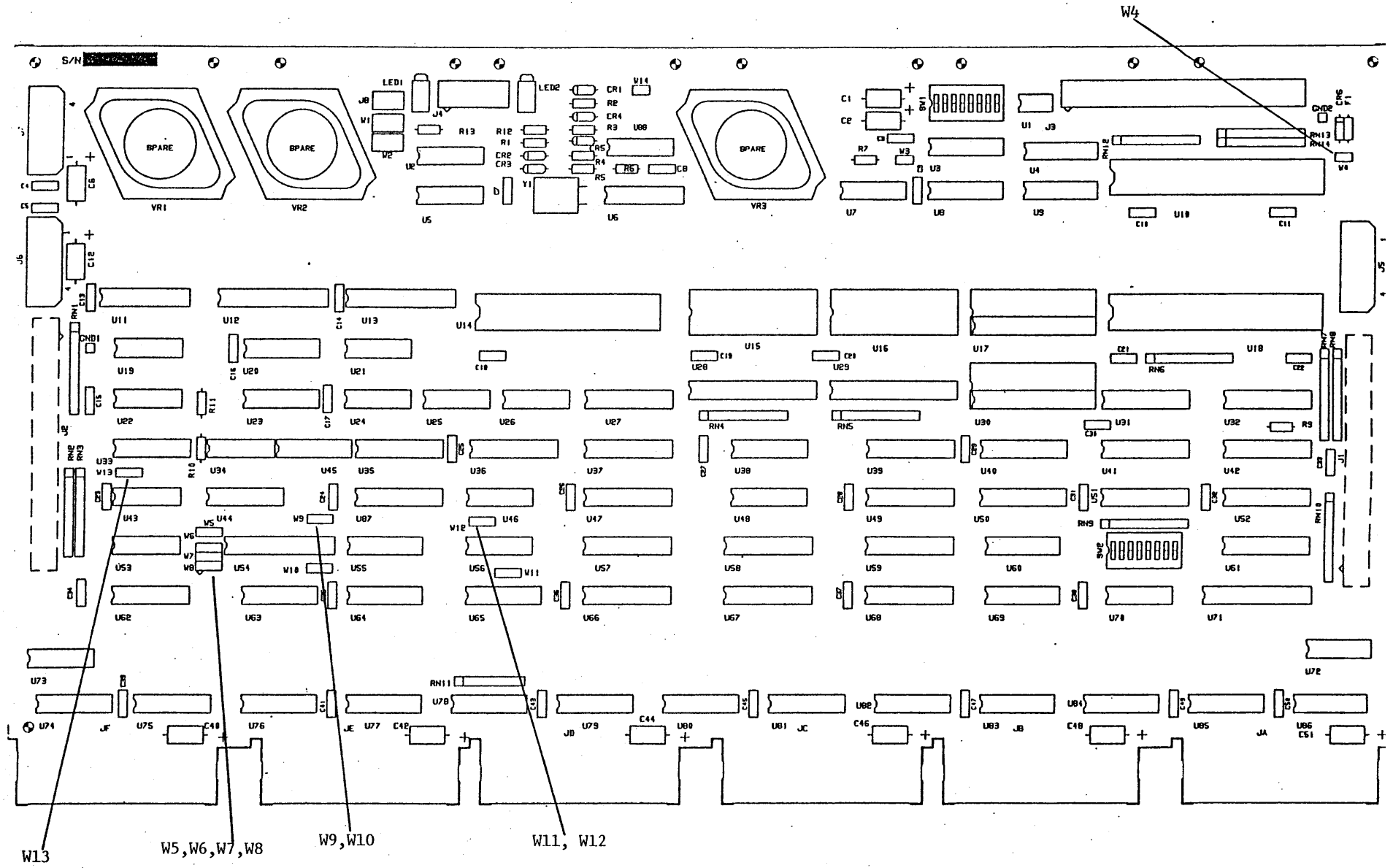



Figure 1. jumper Block location diagram



| CMD TECHNOLOGY INCORPORATED | | |
|---|---|---|
| CDU-700 | | |
| DWG NO. PCX-700-00 | SIZE C | REV C00 |

SILKSCREEN

**Table 1 Jumper Setting on the CDU-700**

| SW1-1 | SW1-2 | TAPE RECORDING MODE SELECT |
|---|---|---|
| OFF | OFF | Fixed Block Mode |
| ON | OFF | ANSI variable mode (Can read tapes written in Fixed Block Mode) |
| ON | ON | ANSI variable mode |

| | | |
|---|---|---|
| SW1-6 | OFF | Normal operation (F) |
| | ON | Enable Tape Fast Search |
| SW1-7 | OFF | Reserved (F) |
| SW1-8 | OFF | Reserved (F) |

| SW1-5 | SW1-4 | SW1-3 | Initiator ID |
|---|---|---|---|
| ON | ON | ON | 7 CDU-700 (F) |
| ON | ON | OFF | 6 |
| ON | OFF | ON | 5 |
| ON | OFF | OFF | 4 |
| OFF | ON | ON | 3 |
| OFF | ON | OFF | 2 |
| OFF | OFF | ON | 1 |
| OFF | OFF | OFF | 0 |

| | | |
|---|---|---|
| SW2 | OFF | All Reserved (F) |
| W3 | (Set at Factory) | |
| W4 | OUT | SCSI terminator power disabled (F) |
| W4 | IN | SCSI terminator power enabled |

FOR CDU-700/T

| | | |
|---|---|---|
| W5 | 1-2 IN | Reserved (F) |

FOR CDU-700/M, CDU700/TM

| | | |
|---|---|---|
| W5 | 2-3 IN | Auto-Boot Enabled |
| | 1-2 IN | Auto-Boot Disabled (F) |
| W6 | 2-3 IN | Bootstrap address = 771000 (F) |
| | 1-2 IN | Bootstrap address = 773000 |

---

CDU-700/T Tape Only with IC P70012C at U54:
Please refer to Appendix D for the other 22 CSR jumper settings.

| W6 | W10 | W7 | W8 | W9 | CSR Address of PDP-11 | |
|---|---|---|---|---|---|---|
| 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 2-3 IN | Standard CSR: | 17774500 (F) |
| 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 2-3 IN | Second CSR: | 17760404 |
| 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 2-3 IN | Third CSR: | 17760444 |
| 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 2-3 IN | Forth CSR: | 17760504 |
| 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 1-2 IN | Fifth CSR: | 17760544 |
| 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 1-2 IN | Sixth CSR: | 17760410 |
| 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 1-2 IN | Seventh CSR: | 17760450 |
| 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 1-2 IN | Eighth CSR: | 17760454 |

The old IC P70012B at location U54 of the CDU-700/T only supports 8 CSR addresses. The jumper settings are the same as those shown above.

---

CDU-700/M Disk only with IC P70011B at U54:

| W7 | W8 | W9 | CSR Address | |
|---|---|---|---|---|
| 1-2 IN | 1-2 IN | 2-3 IN | Standard CSR: | 17772150 (F) |
| 2-3 IN | 1-2 IN | 2-3 IN | Second CSR: | 17760334 |
| 1-2 IN | 2-3 IN | 2-3 IN | Third CSR: | 17760354 |
| 2-3 IN | 2-3 IN | 2-3 IN | Forth CSR: | 17760374 |
| 1-2 IN | 1-2 IN | 1-2 IN | Fifth CSR: | 17760340 |
| 2-3 IN | 1-2 IN | 1-2 IN | Sixth CSR: | 17760344 |
| 1-2 IN | 2-3 IN | 1-2 IN | Seventh CSR: | 17760350 |
| 2-3 IN | 2-3 IN | 1-2 IN | Eighth CSR: | 17760360 |

| W10 | 1-2 IN | Reserved |
|---|---|---|

---

CDU-700/TM Tape and Disk with IC P70013A at U54:

| W7 | W8 | | |
|---|---|---|---|
| | | CSR Address | |
| 1-2 IN | 1-2 IN | Tape Standard CSR: | 17774500 (F) |
| 2-3 IN | 1-2 IN | Tape Second CSR: | 17760404 |
| 1-2 IN | 2-3 IN | Tape Third CSR: | 17760444 |
| 2-3 IN | 2-3 IN | Disable Tape | |

| W9 | W10 | | |
|---|---|---|---|
| | | CSR Address | |
| 1-2 IN | 1-2 IN | Disk Standard CSR: | 17772150 (F) |
| 2-3 IN | 1-2 IN | Disk Second CSR: | 17760334 |
| 1-2 IN | 2-3 IN | Disk Third CSR: | 17760354 |
| 2-3 IN | 2-3 IN | Disable Disk | |

---

| W11 | W12 | |
|---|---|---|
| 2-3 IN | 2-3 IN | 1 word per DMA burst (F Tape) |
| 2-3 IN | 1-2 IN | 2 words per DMA burst |
| 1-2 IN | 1-2 IN | 4 words per DMA burst (F Disk) |

| | | |
|---|---|---|
| W13 | 1-2 IN | 4 uS dwell time between DMA (F Disk) |
| | 2-3 IN | 2 uS dwell time between DMA (F Tape) |

Note: (F) means factory setting.
Note: J4 connector is used for in house diagnostic only.

## 3.2 CDU-700 Mounting Slot Selection

The CDU-700 can be installed in any priority on the standard PDP-11 Unibus SPC backplane. The CDU-700 is a DMA device and requires the Nonprocessor Grant (NPG) jumper on the SPC card slot in which the controller is being installed be removed. It is recommended that the CDU-700 be placed in front of other devices on the Unibus except when there is an Ethernet controller which should go first.

### 3.2.1 NPG Non-Processor Grant Signal

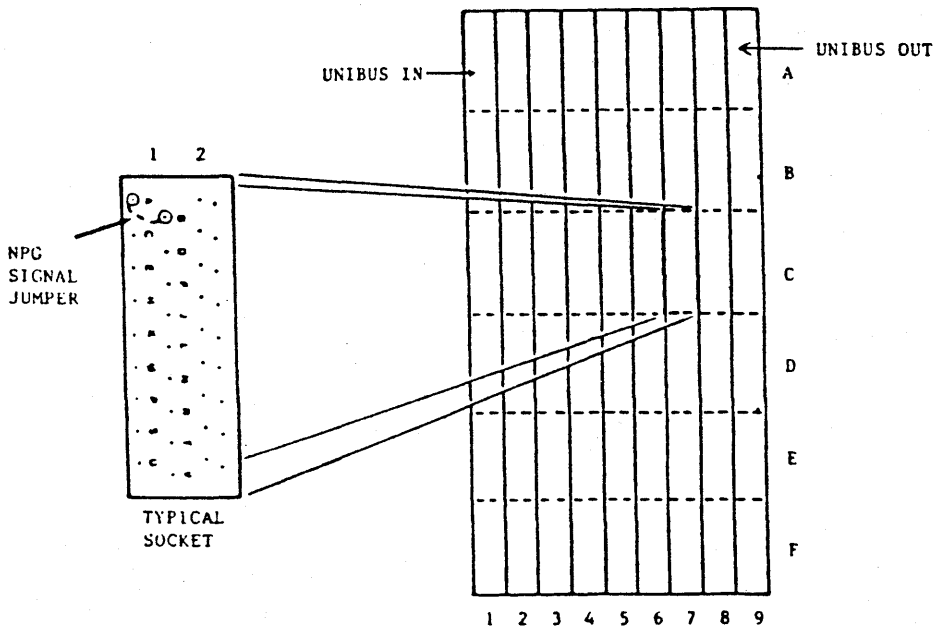
The NPG signal jumper is located at pins CA1 to CB1 on the Unibus backplane. Figure 2 is a DD11-DK nine-slot backplane seen from the rear.

To locate the NPG jumper do the following:

From the rear of the backplane locate the card slot in which the board is to be installed. Note: Each card slot is 4 pins wide.

Locate the C socket and then locate the pins CA1 and CB1. Remove the jumper wire between the two pins.

Figure 2. WIRE WRAP SIDE OF BACKPLANE



### 3.3 DMA Burst Length and Dwell Time

The Busrt Length determines how many words the CDU-700 transfers by DMA during each NPR. The Dwell time is the time the CDU-700 waits before it requests for another NPR.

| W11 | W12 | |
|---|---|---|
| 2-3 IN | 2-3 IN | 1 word per NPR |
| 2-3 IN | 1-2 IN | 2 words per NPR |
| 1-2 IN | 1-2 IN | 4 words per NPR |

| W13 | | |
|---|---|---|
| | 1-2 IN | 4 micro second dwell time |
| | 2-3 IN | 2 micro second dwell time |

Factory Settings:
CDU-700/T 1 word per NPR, 2 micro second dwell time
CDU-700/M, CDU-700/TM 4 words per NPR, 4 micro second dwell time

IMPORTANT: If the CDU-700 is installed in a VAX BI Unibus (VAX 8350, 8750, etc) the setting must be 1 word per NPR and 2 micro second dwell time. Data compare errors will occur on the VAX BI Unibus if the throughput is set to more than the BI Unibus adapter can handle. On the PDP-11 and Non-BI VAX (VAX-730, 750, 780, and others) Unibus the user may set the controller to 4 words per NPR and 4 micro second Dwell time.

## 3.4 SCSI Bus Cabling and Termination

The CDU-700 provides a 50-pin connector (J3), to interface with external SCSI devices.

When the CDU-700 and the external SCSI drives are installed in the same cabinet which meets EMI/RFI shielding requirements, a 50-conductor flat cable or 25-signal twisted-pair cable can be used for connecting the CDU-700 (J3) and the external SCSI drives When the CDU-700 and the external SCSI drives are installed in seperated cabinets, the shielded SCSI cable should be used to meet FCC requirements.

Note that a minimum conductor size of 28 AWG shall be employed to minimize noise effects and ensure proper distribution of optional terminator power. The maximum cable length is 6.0 meters or 20 feet in single ended mode.

The SCSI bus signals should be terminated with 220 ohms to +5 volts and 330 ohms to ground at each end of the cable. The CDU-700 provides on-board removable terminators (RN7,RN8,RN10), which are next to the connector J1. Therefore, the CDU-700 can be installed in any position of the SCSI cable. If the CDU-700 is installed at either end of SCSI cable, the on-board SCSI bus terminators should remain on the board. Otherwise, the on-board SCSI bus terminators should be removed.

# CHAPTER 4 ON-BOARD UTILITY

## 4.1 Disk Utility for the CDU-700/M, CDU-700/TM

The CMD Technology Utility Program provides a convenient means of formatting and configuring the drive and configuring the logical unit number offset. The utility program can be started by means of an ODT command. For Example:

**PDP-11/24 SYSTEMS**

1. Hit the Boot Switch.
2. Halt the processor.

```
3.  17772152/004400 123456 <CR>     ;DEPOSIT 123456 TO
                                    ; CSR BASE ADDRESS + 2

4.  17772152/001000 100 <CR>        ;DEPOSIT 100 TO
                                    ; CSR BASE ADDRESS + 2

5.  5000G                           ;5000 and a G
                                    ;The Utility program
                                    ;will begin executing.
```

Note that the address shown in step 3 is equal to the CSR address selected by jumper W7 and W8 plus 2.

**PDP-11/34 SYSTEMS**

```
1.  Enter ODT mode
2.  From the terminal type          ; DEPOSIT 123456 TO
    L 772152    <CR>                ; CSR BASE ADDRESS + 2
    D 123456    <CR>

3.  L 772152    <CR>                ; DEPOSIT 100 TO
    D 100       <CR>                ; CSR BASE ADDRESS + 2

4.  L 5000      <CR>                ; 5000 and a S
    S           <CR>                ; The Utility program
                                    ; will begin executing.
```

**For the CDU-700/M, the utility will display:**

```
CMD TECHNOLOGY UTILITY PROGRAM
COPYRIGHT 1987, CMD TECHNOLOGY, INC.

     SELECT CSR ADDRESS
     1 = 772150                          ;The user will then
     2 = 760334                          ;select the number which
     3 = 760354                          ;matches with the CSR
     4 = 760374                          ;address selected by
     5 = 760340                          ;jumpers W7, W8, W9
     6 = 760344
     7 = 760350
     8 = 760360

     WHICH CSR #
```

**For the CDU-700/TM, the utility will display:**

```
CMD TECHNOLOGY UTILITY PROGRAM
COPYRIGHT 1987, CMD TECHNOLOGY, INC.

     SELECT CSR ADDRESS
     1 = 772150                          ;The user will then
     2 = 760334                          ;select the number which
     3 = 760354                          ;matches with the CSR
     4 = 774500 (TAPE)                   ;address selected by
     5 = 760404 (TAPE)                   ;jumpers W7,W8,W9,W10
     6 = 760444 (TAPE)

     WHICH CSR #
```

### 4.1.1 Configure LUN Offset

LUN Offset: For LSI-11 systems, each MSCP drive requires a different Logical Unit Number. If there are no other MSCP controllers in the system, then the LUN offset number is 0 (Drive 0 will be LUN 0, and Drive 1 will be LUN 1). If there exists another MSCP controller with 4 LUN units (0 to 3), then the LUN offset should be 4. In this case Drive 0 will be LUN 4 and Drive 1 will be LUN 5. Normally, when the CDU-700 is used in VMS operating system, the LUN Offset should remain as factory setting (LUN=0).

The operator now has 6 options to choose from. To specify or to check the configuration of a drive, the operator types in a 2. If at any time the operator types in a ctrl C, the command is aborted and the utility program returns to the main menu. If the operator types in <CR> with no value, then the parameters will remain unchange.

In order to store any changes permanently, the user must give the correct password. The password is CMD.

```
MAIN MENU

     1 = BOOT DRIVE
     2 = CONFIGURE LUN OFFSET
     3 = FORMAT DRIVE
     4 = QUALIFY DRIVE
     5 = MANUAL REPLACE BAD SECTORS
     6 = READ, WRITE AND VERIFY TEST

SELECT OPTION :  2

PRESENT LUN OFFSET = 0, ENTER NEW VALUE:
SAVE NEW CONFIGURATION (Y or N)?   Y
ENTER PASSWORD: CMD

COMPLETE.
```

### 4.1.2 Format Drive

Formatting a drive will rewrite all the sectors on the drive. In this option, the CDU-700 issues Format Unit Command to the selected SCSI disk drive and requests it to map out the defects on the Manufacture Defect List (MDL). It is recommended to use qualify drive option after formatting the drive. In order to format or qualify the drive, the correct password is needed. The password is CMD.

```
     1 = BOOT DRIVE
     2 = CONFIGURE LUN OFFSET
     3 = FORMAT  DRIVE
     4 = QUALIFY DRIVE
     5 = MANUAL REPLACE BAD SECTORS
     6 = READ, WRITE AND VERIFY TEST

SELECT OPTION :  3

ENTER DRIVE NUMBER <0 TO 6> :  0

*** WILL DESTROY DATA ON DRIVE 0, ARE YOU SURE?  Y

ENTER PASSWORD: CMD

WAIT.....

COMPLETE.
```

### 4.1.3 Qualify Drive

The qualify program will write different patterns into the drive and then verify the pattern. If there is any bad sector, the sector will be automatically replaced.

To ensure a defect free drive, the qualify program should be run at least 10 passes.

```
     1 = BOOT DRIVE
     2 = CONFIGURE LUN OFFSET
     3 = FORMAT DRIVE
     4 = QUALIFY DRIVE
     5 = MANUAL REPLACE BAD SECTORS
     6 = READ, WRITE AND VERIFY TEST

SELECT OPTION :  4

ENTER PASSWORD:  CMD

QUALIFY DRIVE # <0 TO 6>:  0
*** WILL DESTROY DATA ON THIS DRIVE, ARE YOU SURE?

QUALIFY LOOP 1

TO ABORT, ENTER ^C ( CONTROL C).
```

### 4.1.4 Manual Replace Bad Sectors

This program allows user to replace bad sectors found in the future.

```
     1 = BOOT DRIVE
     2 = CONFIGURE LUN OFFSET
     3 = FORMAT DRIVE
     4 = QUALIFY DRIVE
     5 = MANUAL REPLACE BAD SECTORS
     6 = READ, WRITE AND VERIFY TEST

SELECT OPTION :  5

ENTER PASSWORD:  CMD

ENTER DRIVE NUMBER <0 TO 6>:  0

REPLACE LOGICAL BLOCK NUMBER ?  XXXXXX

REPLACE LOGICAL BLOCK XXXXXX. ARE YOU SURE ?  Y

--REPLACED--
```

### 4.1.5 Read, Write and Verify Test

This option allows user to test the integrity of the controller board, drive cable and disk drive. The program will generate random data patterns for testing.

```
     1 = BOOT DRIVE
     2 = CONFIGURE LUN OFFSET
     3 = FORMAT DRIVE
     4 = QUALIFY DRIVE
     5 = MANUAL REPLACE BAD SECTORS
     6 = READ, WRITE AND VERIFY TEST

SELECT OPTION :  6

RANDOM READ WRITE TEST
DO YOU WANT READ ONLY ? <Y OR N>

ENTER PASSWORD:  CMD

DRIVE NUMBER <0 TO 6>:  0
*** WILL DESTROY DATA ON THIS DRIVE, ARE YOU SURE?

TEST FROM BLOCK # <0-XXXXX> ?

TO BLOCK # <XXXXX-YYYYY> ?

TESTING STARTED. TYPE CTRL-C TO ABORT.
```

### 4.1.6 Utility Bootstrap

To bootstrap the operating system on drive 0 to 6, just select option 1 from MAIN MENU.

```
     1 = BOOT DRIVE
     2 = CONFIGURE LUN OFFSET
     3 = FORMAT DRIVE
     4 = QUALIFY DRIVE
     5 = MANUAL REPLACE BAD SECTORS
     6 = READ, WRITE AND VERIFY TEST

SELECT OPTION :  1

BOOT DRIVE NUMBER <0 TO 6>   0

BOOT DU0. ARE YOU SURE ?   Y

WAIT ...
```

## 4.2 Tape Utility for the CDU-700/T, CDU-700/TM

The utility program can be started by means of an ODT command.

For Example:

**PDP-11/24 SYSTEMS**

1. Hit the Boot Switch.
2. Halt the processor.

```
3.  17774502/004700 123456 <CR>     ;DEPOSIT 123456 TO
                                    ; CSR BASE ADDRESS + 2

4.  17774502/001000 100 <CR>        ;DEPOSIT 100 TO
                                    ; CSR BASE ADDRESS + 2

5.  5000G                           ;5000 and a G
                                    ;The Utility program
                                    ;will begin executing.
```

Note that the address shown in step 3 is equal to the CSR address selected by jumper W7, W8, and W9 plus 2.

**PDP-11/34 SYSTEMS**

```
1.  Enter ODT mode
2.  From the terminal type          ; DEPOSIT 123456 TO
    L 774502    <CR>                ; CSR BASE ADDRESS + 2
    D 123456    <CR>

3.  L 774502    <CR>                ; DEPOSIT 100 TO
    D 100       <CR>                ; CSR BASE ADDRESS + 2

4.  L 5000      <CR>                ; 5000 and a S
    S           <CR>                ; The Utility program
                                    ; will begin executing.
```

**For the CDU-700/T, the utility will display:**

```
CMD TECHNOLOGY UTILITY PROGRAM
COPYRIGHT 1987, CMD TECHNOLOGY, INC.

     SELECT CSR ADDRESS
     1 = 774500                          ;The user will then
     2 = 760404                          ;select the number which
     3 = 760444                          ;matches with the CSR
     4 = 760504                          ;address selected by
     5 = 760544                          ;jumpers W7 W8
     6 = 760410
     7 = 760450
     8 = 760454

     WHICH CSR #
```

**For the CDU-700/TM, the utility will display:**

```
CMD TECHNOLOGY UTILITY PROGRAM
COPYRIGHT 1987, CMD TECHNOLOGY, INC.

     SELECT CSR ADDRESS
     1 = 772150                          ;The user will then
     2 = 760334                          ;select the number which
     3 = 760354                          ;matches with the CSR
     4 = 774500 (TAPE)                   ;address selected by
     5 = 760404 (TAPE)                   ;jumpers W7,W8,W9,W10
     6 = 760444 (TAPE)

     WHICH CSR #
```

### 4.2.1 Configure Tape LUN Offset

LUN Offset: For PDP-11 only, TMSCP requires that each TMSCP drive has a different Logical Unit Number. If there are no other TMSCP controllers in your system, then the LUN offset number is 0 (Drive 0 will be LUN 0, and Drive 1 will be LUN 1). If there exists another TMSCP controller with 4 LUN units (0 to 3), then the LUN offset should be 4. In this case Tape Drive 0 will be LUN 4 and Tape Drive 1 will be LUN 5.

The operator now has 1 option to choose from. To configure the LUN offset, the operator types in a 1. If at any time the operator types in a ctrl C, the command is aborted and the utility program returns to the main menu. If the operator types in <CR> with no value, then the parameters will remain unchange.

In order to store any changes permanently, the user must give the correct password. The password is CMD.

```
MAIN MENU

     1 = CONFIGURE LUN OFFSET

SELECT OPTION :  1

PRESENT LUN OFFSET = 0, ENTER NEW VALUE:
SAVE NEW CONFIGURATION (Y or N)?   Y
ENTER PASSWORD: CMD

COMPLETE.
```

## 4.3 ODT Utility

When the CDU-700/M is used in VAX-11/730, 750 , 780 systems, the ODT utility is required to format or qualify a disk drive.

The addresses of IP and SA registers of CDU-700/M for VAX-11/730 and VAX-11/750 are listed in the following table.

| OCTAL ADDRESS | HEX ADDRESS |
|---|---|
| 772150 | FFF468 |
| 772152 | FFF46A |
| 760334 | FFE0DC |
| 760336 | FFE0DE |
| 760354 | FFE0EC |
| 760356 | FFE0EE |
| 760374 | FFE0FC |
| 760376 | FFE0FE |
| 760340 | FFE0E0 |
| 760342 | FFE0E2 |
| 760344 | FFE0E4 |
| 760346 | FFE0E6 |
| 760350 | FFE0E8 |
| 760352 | FFE0EA |
| 760360 | FFE0F0 |
| 760362 | FFE0F2 |

The addresses of IP and SA registers of CDU-700/M for VAX-11/780 are listed in the following table.

| OCTAL ADDRESS | HEX ADDRESS FOR UBA 1 | HEX ADDRESS FOR UBA 2 | HEX ADDRESS FOR UBA 3 | HEX ADDRESS FOR UBA 4 |
|---|---|---|---|---|
| 772150 | 2013F468 | 2017F468 | 201BF468 | 201FF468 |
| 772152 | 2013F46A | 2017F46A | 201BF46A | 201FF46A |
| 760334 | 2013E0DC | 2017E0DC | 201BE0DC | 201FE0DC |
| 760336 | 2013E0DE | 2017E0DE | 201BE0DE | 201FE0DE |
| 760354 | 2013E0EC | 2017E0EC | 201BE0EC | 201FE0EC |
| 760356 | 2013E0EE | 2017E0EE | 201BE0EE | 201FE0EE |
| 760374 | 2013E0FC | 2017E0FC | 201BE0FC | 201FE0FC |
| 760376 | 2013E0FE | 2017E0FE | 201BE0FE | 201FE0FE |
| 760340 | 2013E0E0 | 2017E0E0 | 201BE0E0 | 201FE0E0 |
| 760342 | 2013E0E2 | 2017E0E2 | 201BE0E2 | 201FE0E2 |
| 760340 | 2013E0E4 | 2017E0E4 | 201BE0E4 | 201FE0E4 |
| 760342 | 2013E0E6 | 2017E0E6 | 201BE0E6 | 201FE0E6 |
| 760350 | 2013E0E8 | 2017E0E8 | 201BE0E8 | 201FE0E8 |
| 760352 | 2013E0EA | 2017E0EA | 201BE0EA | 201FE0EA |
| 760350 | 2013E0F0 | 2017E0F0 | 201BE0F0 | 201FE0F0 |
| 760352 | 2013E0F2 | 2017E0F2 | 201BE0F2 | 201FE0F2 |

On a VAX-11/730 or VAX-11/750, please follow the example to specify LUN offset, verify LUN offset, format a drive, or qualify a drive. In this example, first CSR address is assumed.

### 4.3.1 Specify LUN Offset

```
>>> D/W/P   FFF468   0                ;WRITE IP ANY VALUE
>>> D/W/P   FFF46A   A72E             ;WRITE SA, ADDRESS=CSR+2
>>> D * 22                           ;WRITE SA WITH COMMAND
>>> D * 0                            ;WRITE LUN OFFSET VALUE
```

### 4.3.2 Verify LUN Offset

```
>>> D/W/P   FFF468   0                ;WRITE IP ANY VALUE
>>> D/W/P   FFF46A   A72E             ;WRITE SA, ADDRESS=CSR+2
>>> D * 23                           ;WRITE SA WITH COMMAND
>>> E *                              ;DISPLAY LUN OFFSET VALUE
```

### 4.3.3 Format a Drive

```
>>> D/W/P    FFF468    0          ;WRITE IP ANY VALUE
>>> D/W/P    FFF46A    A72E       ;WRITE SA, ADDRESS=CSR+2
>>> D * 20                       ;WRITE SA WITH COMMAND
>>> D * 0                        ;SELECT DRIVE 0
>>> D * 0                        ;DRIVE SERIAL NUMBER
>>> E *                          ;VALUE=20000, FORMATTING
                                 ;VALUE=0,FORMAT COMPLETE
```

### 4.3.4 Qualify a Drive

```
>>> D/W/P    FFF468    0          ;WRITE IP ANY VALUE
>>> D/W/P    FFF46A    A72E       ;WRITE SA, ADDRESS=CSR+2
>>> D * 21                       ;WRITE SA WITH COMMAND
>>> D * 0                        ;SELECT DRIVE 0
>>> E *                          ;SHOW CURRENT QUALIFY
                                 ;LOOP COUNT
```

On a VAX-11/780, please follow the example to specify LUN offset, verify LUN offset, format a drive, or qualify a drive. In this example, first CSR address of UBA 1 is assumed.

### 4.3.5 Specify LUN Offset

```
>>> D/W/P    2013F468    0         ;WRITE IP ANY VALUE
>>> D/W/P    2013F46A    A72E      ;WRITE SA, ADDRESS=CSR+2
>>> D * 22                        ;WRITE SA WITH COMMAND
>>> D * 0                         ;WRITE LUN OFFSET VALUE
```

### 4.3.6 Verify LUN Offset

```
>>> D/W/P    2013F468    0         ;WRITE IP ANY VALUE
>>> D/W/P    2013F46A    A72E      ;WRITE SA, ADDRESS=CSR+2
>>> D * 23                        ;WRITE SA WITH COMMAND
>>> E *                           ;DISPLAY LUN OFFSET VALUE
```

### 4.3.7 Format a Drive

```
>>> D/W/P    2013F468    0              ;WRITE IP ANY VALUE
>>> D/W/P    2013F46A    A72E           ;WRITE SA, ADDRESS=CSR+2
>>> D * 20                             ;WRITE SA WITH COMMAND
>>> D * 0                              ;SELECT DRIVE 0
>>> D * 0                              ;DRIVE SERIAL NUMBER
>>> E *                                ;VALUE=20000, FORMATTING
                                       ;VALUE=0,FORMAT COMPLETE
```

### 4.3.8 Qualify a Drive

```
>>> D/W/P    2013F468    0              ;WRITE IP ANY VALUE
>>> D/W/P    2013F46A    A72E           ;WRITE SA, ADDRESS=CSR+2
>>> D * 21                             ;WRITE SA WITH COMMAND
>>> D * 0                              ;SELECT DRIVE 0
>>> E *                                ;SHOW CURRENT QUALIFY
                                       ;LOOP COUNT
```

# CHAPTER 5 SCSI INFORMATION

## 5.1 SCSI DEFINITIONS:

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: An 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 attatched to an 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 refering 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 attatched to the SCSI bus.

Target: An SCSI device that performs an operation requested by an initiator.

## 5.2 SCSI Commands

SCSI commands used by CDU-700 for MSCP emulation are listed in the following table.

| Code | Command Name |
|---|---|
| 00h | Test Unit Ready |
| 01h | Rezero Unit |
| 03h | Request Sense |
| 04h | Format Unit (1) |
| 07h | Reassign Block |
| 08h | Read |
| 0Ah | Write |
| 0Bh | Seek |
| 12h | Inquiry |
| 15h | Mode Select |
| 1Ah | Mode Sense |
| 25h | Read Capacity |
| 28h | Extended Read (2) |
| 2Ah | Extended Write(2) |
| 2Bh | Extended Seek (2) |
| 3Eh | Read Long (3) |
| 3Fh | Write Long(3) |

(1) The Format Unit command is used by the on-board utility only.
(2) These commands are used only when the disk drive capacity is greater than 1 Giga bytes.
(3) These commands are used if the drives support them.

SCSI commands used by CDU-700 for TMSCP emulation are listed as follows:

| Code | Command Name |
|---|---|
| 00h | Test Unit Ready |
| 01h | Rewind |
| 03h | Request Sense |
| 08h | Read |
| 0Ah | Write |
| 10h | Write Filemark |
| 11h | Space |
| 12h | Inquiry |
| 15h | Mode Select |
| 19h | Erase |
| 1Ah | Mode Sense |
| 1Bh | Load/Unload |

## 5.3 SCSI Status

The SCSI status codes used by CDU-700 are listed as follows:

| Code | Status Name |
|---|---|
| 00h | Good |
| 02h | Check Condition |
| 08h | Busy |

## 5.4 SCSI Messages

The SCSI Messages used by CDU-700 are listed as follows:

| Code | Message Name |
|---|---|
| 00h | Command Complete |
| 01h | Extended Message |
| 02h | Save Data Pointer |
| 03h | Restore Pointer |
| 04h | Disconnect |
| 05h | Initiator Detected Error |
| 07h | Message Reject |
| 08h | No Operation |
| 09h | Message Parity Error |
| 80-FFh | Identify |

## 5.5 SCSI Single-Ended Signals

Pin assignment of the CDU-700 SCSI Cable Connector (J1,J2,J3):

| Signal | Pin Number |
|---|---|
| -DB(0) | 2 |
| -DB(1) | 4 |
| -DB(2) | 6 |
| -DB(3) | 8 |
| -DB(4) | 10 |
| -DB(5) | 12 |
| -DB(6) | 14 |
| -DB(7) | 16 |
| -DB(P) | 18 |
| GROUND | 20 |
| GROUND | 22 |
| GROUND | 24 |
| TERMPWR | 26 |
| GROUND | 28 |
| GROUND | 30 |
| -ATN | 32 |
| GROUND | 34 |
| -BSY | 36 |
| -ACK | 38 |
| -RST | 40 |
| -MSG | 42 |
| -SEL | 44 |
| -C/D | 46 |
| -REQ | 48 |
| -I/O | 50 |

NOTE: All odd pins except pin 25 are connected to ground. Pin 25 is left open. The minus sign next to the signal indicates active low.

## Warranty

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).

HOST ADAPTER WARRANTY - CMD warrants Host Adapter products of its manufacture to be free from defect in material and workmanship for a period of one year from the date of shipment. During this period, if the customer experiences difficulties with a CMD Host Adapter and is unable to resolve the problem via phone with CMD Technical Support, a Return Material Authorization (RMA) will be issued. Following receipt of an RMA, the Purchaser is responsible for returning the product to CMD, freight prepaid. CMD, upon verification of warranty, will repair or replace at its option the Host Adapter in question, and will then return the product to the Purchaser, freight prepaid.

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.

THE EXPRESSED WARRANTIES SET FORTH IN THIS AGREEMENT ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND ALL SUCH OTHER WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY CMD. THESE STANDARD EXPRESS WARRANTIES ARE IN LIEU OF ALL OBLIGATIONS OR LIABILITIES ON THE PART OF CMD FOR DAMAGES, INCLUDING BUT NOT LIMITED TO SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THE PRODUCT.

## Return and 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 90 days |
| Cable | less than 60 days |
| Drive | not applicable |

RETURN FOR REPAIR

CMD Host Adapter

In-Warranty (Less then 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 respon-

sible 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 needs to talk to CMD Technical Support personnel to authorize returns of CMD Host Adapter for not functional upon arrival boards and swap requests. CMD Sales personnel must be consulted for the authorization of returning goods for credit and/or evaluation return.

## Appendix B Operating Systems Supported by CDU-700

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 following DEC operating systems.

| Operating System | Version |
|---|---|
| VMS | 4.0 and 5.0 |
| Ultrix | 1.2 |
| UNIX/Berkeley | 4.2 |
| RSX-11M | 4.1 |
| RSX-11M-PLUS | 3.0 |
| RSTS/E | 9.0 |
| RT-11 | 5.2 |
| DSM-11 | 3.3 |
| ISM-11 | 3.4 |
| TSX | x.x |
| VAXELN | x.x |

## Appendix C SCSI Devices Supported by CDU-700

**Disk drives supported by CDU-700/M,CDU-700/TM SCSI host adapter:**

10/18/1989 *** indicates new qualified device.

**Magnetic disk drives:**

| | |
|---|---|
| CDC | WREN-III, WREN-IV, WREN V, WREN VI<br>SWIFT (3 1/2"), Sabre (8") *** |
| CITOH | YD-3042, YD-3082 |
| CONNER PERIPHERALS | CP-340, CP-3100 |
| FUJITSU | M2246SA, M2249SA Series |
| HITACHI | DK515C Series |
| HP | 97548S/D series *** |
| IBM | 320MB, 3 1/2" *** |
| MAXTOR | XT-3000 ,XT-4000S, XT-8000S Series |
| MICROPOLIS | 1370 Series |
| PRIAM | Model 717, 728, 738 |
| QUANTUM | ProDrive 40S/80S |
| RODIME | 3085S, 5215S, 5180S |
| SIEMENS | Model 2200, 2300 |
| SYQUEST | SQ555 *** |
| TOSHIBA | MK156FB series |
| EMULEX | MD21, MD23 (SCSI TO ESDI CONTROLLER) |

**Erasable Optical disk drives:**

| | | |
|---|---|---|
| SONY | SMO-D501 | Magneto Optical disk |
| RICOH | RO-5030E | Magneto Optical disk |

**CD ROM drives:**

| | |
|---|---|
| LMS | CM210, CM212 *** |
| TOSHIBA | XM3200 series *** |

**WORM drives:**

1. with Ten X Technology Optical Convertion Unit

| | | |
|---|---|---|
| MAXTOR | RXT-800S, REV.J K | |
| LMSI | LD510, LD1200 | |
| MITSUBISHI | MW-5U1 | |
| PIONEER | DD-55001 | etc. |

2. with LASERDRIVE interface

| | | |
|---|---|---|
| LASERDRIVE | Model 800 series *** | |

**Tape drives supported by CDU-700/T,CDU-700/TM SCSI host adapter:**

10/18/1989 *** indicates new qualified device.

| | | |
|---|---|---|
| EXABYTE | EXB-8200 | 8mm helical scan |
| GIGATREND | 1200 Series DAT, 4mm helical scan | |
| SONY | SDT-1000 DAT, 4 mm helical scan | |
| HP | 35450A DAT, 4 mm helical scan *** | |
| ARCHIVE | 1/4 " | streaming |
| ASPEN | 1/2 " | System 480, 3480 compatible |
| CALIPER | 1/4 " | C150SAE streaming, series |
| CIPHER | 1/4 " | ST150S-I streaming, series |
| FUJITSU | 1/2 " | M2452E, 1/2" Cartridge |
| KENNEDY | 1/4 "<br>1/2 " | streaming<br>9 track, model 9612 |
| LMS | 1/2" | Independence, 3480 compatible *** |
| TANDBERG | 1/4 " | TDC3600 series |
| TEAC | 1/4 " | streaming |
| WANGTEK | 1/4 " | streaming |

## Appendix D 30 CSR Addresses Supported by IC P70012C

1. 8 CSR addresses supported by old IC P70012B at location U54

| Address | PDP-11 | W6 | W10 | W9 | W8 | W7 |
|---|---|---|---|---|---|---|
| Standard: | 17774500 | 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 1-2 IN |
| Second: | 17760404 | 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 2-3 IN |
| Third: | 17760444 | 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 1-2 IN |
| Fourth: | 17760504 | 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 2-3 IN |
| Fifth: | 17760544 | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 1-2 IN |
| Sixth: | 17760410 | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 2-3 IN |
| Seventh: | 17760450 | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 1-2 IN |
| Eighth: | 17760454 | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 2-3 IN |

2. 30 CSR addresses supported by new IC P70012C at location U54

| Address | PDP-11 | W6 | W10 | W9 | W8 | W7 |
|---|---|---|---|---|---|---|
| 1 | 17774500 | 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 1-2 IN |
| 2 | 17760404 | 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN | 2-3 IN |
| 3 | 17760444 | 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 1-2 IN |
| 4 | 17760504 | 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN | 2-3 IN |
| 5 | 17760544 | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 1-2 IN |
| 6 | 17760410 | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN | 2-3 IN |
| 7 | 17760450 | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 1-2 IN |
| 8 | 17760454 | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN | 2-3 IN |
| 9 | 17760414 | 2-3 IN | 2-3 IN | 2-3 IN | 1-2 IN | 1-2 IN |
| 10 | 17760420 | 2-3 IN | 2-3 IN | 2-3 IN | 1-2 IN | 2-3 IN |
| 11 | 17760460 | 2-3 IN | 2-3 IN | 2-3 IN | 2-3 IN | 1-2 IN |
| 12 | 17760510 | 2-3 IN | 2-3 IN | 2-3 IN | 2-3 IN | 2-3 IN |
| 13 | 17760514 | 2-3 IN | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN |
| 14 | 17760520 | 2-3 IN | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN |
| 15 | 17760550 | 2-3 IN | 2-3 IN | 1-2 IN | 2-3 IN | 1-2 IN |
| 16 | 17760554 | 2-3 IN | 2-3 IN | 1-2 IN | 2-3 IN | 2-3 IN |
| 17 | 17760560 | 1-2 IN | 1-2 IN | 2-3 IN | 1-2 IN | 1-2 IN |
| 18 | 17760604 | 1-2 IN | 1-2 IN | 2-3 IN | 1-2 IN | 2-3 IN |
| 19 | 17760610 | 1-2 IN | 1-2 IN | 2-3 IN | 2-3 IN | 1-2 IN |
| 20 | 17760614 | 1-2 IN | 1-2 IN | 2-3 IN | 2-3 IN | 2-3 IN |
| 21 | 17760620 | 1-2 IN | 1-2 IN | 1-2 IN | 1-2 IN | 1-2 IN |
| 22 | 17760644 | 1-2 IN | 1-2 IN | 1-2 IN | 1-2 IN | 2-3 IN |
| 23 | 17760650 | 1-2 IN | 1-2 IN | 1-2 IN | 2-3 IN | 1-2 IN |
| 24 | 17760654 | 1-2 IN | 1-2 IN | 1-2 IN | 2-3 IN | 2-3 IN |
| 25 | 17760660 | 1-2 IN | 2-3 IN | 2-3 IN | 1-2 IN | 1-2 IN |
| 26 | 17760704 | 1-2 IN | 2-3 IN | 2-3 IN | 1-2 IN | 2-3 IN |
| 27 | 17760710 | 1-2 IN | 2-3 IN | 2-3 IN | 2-3 IN | 1-2 IN |
| 28 | 17760714 | 1-2 IN | 2-3 IN | 2-3 IN | 2-3 IN | 2-3 IN |
| 29 | 17760744 | 1-2 IN | 2-3 IN | 1-2 IN | 1-2 IN | 1-2 IN |
| 30 | 17760750 | 1-2 IN | 2-3 IN | 1-2 IN | 1-2 IN | 2-3 IN |