

PROMDISK<sup>®</sup>VI Disk Emulator User's Manual  
For MCSI PART NO. 717XX  
Solid State Disk Emulator Board  
For Industrial/Embedded System Applications

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## PREFACE

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This manual provides information about the MCSI PROMDISK VI Disk Emulator Board and related software utility programs. This information is intended for users who must implement IBM PC/AT compatible computer solutions to a wide variety of applications which cannot be satisfied using conventional desktop computers. This manual assumes that the reader has a good understanding of MS-DOS and the standard IBM PC/AT compatible architecture. For more information on the IBM PC compatible hardware and software architecture, refer to any of the many books available on the subject. A few suggestions are listed below:

- *Advanced MS-DOS Programming*, Microsoft Press
- *Programmers Guide to the IBM PC*, Microsoft Press
- *Undocumented DOS*, Addison Wesley

## INVENTORY CHECKLIST

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The complete PROMDISK VI Disk Emulator package consists of the following:

- PROMDISK VI Disk Emulator Board
- This Manual
- One 3 ½" Diskette containing:
  - PROMDISK VI Software Utilities
  - ROM-DOS Operating System and Software Utilities

If any of the above is missing or appears to be damaged, inform MCSI immediately. Note that for quantity shipments, only one copy of this manual and one diskette is included, unless otherwise requested.





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## SECTION 1 - INTRODUCTION

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With the advent of IBM PC compatible boards for creating dedicated systems, there exists a need to provide a method by which a DOS (MS-DOS, PC-DOS, ROM-DOS, QNX, Embedded DOS, etc.) application program can become part of a target system without requiring a disk. Many times a physical disk will not operate in the environment in which the target machine is to be placed. Also, the added cost of a disk controller, disk, and other associated equipment increase the cost of the target machine. Development time can be reduced by creating an environment in which programs can be developed and tested on standard PCs utilizing your DOS system utilities. What happens if a disk cannot be part of the target system? DOS will not operate because the operating environment is changed between the development system and the target system.

MCSI has a total solution for this problem -- the MCSI PROMDISK VI Disk Emulator Board! PROMDISK can emulate Read/Write fixed disk drives with capacities ranging from 8M to 64M-bytes. This means that a program developed utilizing DOS on any PC Compatible *will run without a disk* in a target application system!. In addition, you can also use PROMDISK with other physical drives in the system. Therefore, DOS can boot from a PROMDISK drive C and read the application code from a physical disk in the system, creating a flexible development environment.

### 1.1 FEATURES

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A complete list of features is listed below:

- IBM PC/XT/AT Compatible
- *All New Variable Block Flash* File System
- Includes ROMDOS Disk Operating System
- Capacity up to 64M-bytes
- Emulates Read/Write Fixed Disk Drives
- Use SMT *Nand* Flash Memory for Ultra High Reliability
- Occupies Only 16K of Memory Address Space
- Passive Backplane Architecture
- Ideally Suited for *DISKLESS* Applications
- Low Power CMOS Design
- Standard Half-Size "XT" Plug-in Board

## SECTION 2 - GENERAL DESCRIPTION

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The PROMDISK Disk Emulator is a unique memory board designed to emulate DOS compatible disk drives for use in IBM PC/XT/AT compatible computers as a replacement for a hard disk drive. It includes an on-board BIOS extension that occupies only 16K bytes of address space within the ROM Adapter address space, and is selectable from address segment C800H through D800H on 400H boundaries. Two I/O addresses are used for the Flash Memory data port and command register. The I/O address is jumper selectable for I/O address 230H, 300H, 310H, 320H, or 330H.

The on-board BIOS extension includes the Datalight CardTrick® VBF integrated Flash File System and boot utilities. The CardTrick Variable Block Flash (VBF) File System gives MS-DOS compatible operating systems the ability to treat PROMDISK VI as non-volatile Read/Write disk drive. This means that you can list directories, copy files, and read and write the Flash memory on PROMDISK VI through standard DOS interrupts and commands. PROMDISK VI provides the system designer with a much simpler and more versatile mechanism of reading and writing data. Instead of performing a bulk erase and copy as you would do with traditional EPROMs, this new system lets your high level application software read and write to the PROMDISK VI as if it were a standard disk drive. Files can be opened, read, written, and erased as you would do on a normal disk.

### 2.1 PROMDISK MEMORY

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The PROMDISK disk memory can support up to 16 NAND Flash SMT (surface mount technology) memory chips organized as 2Mx8 or 4Mx8. The SMT technology provides reliable operation in very harsh environments. The PROMDISK VI board is offered in sizes ranging from 8M-bytes to 64M-bytes. The standard sizes stocked at the factory are: 8M, 16M, 24M, 32M, and 64M-bytes. Other sizes are available as a Custom Order.

### 2.2 PROMDISK POWER REQUIREMENTS

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The PROMDISK board is implemented using CMOS technology for low power consumption and is powered from the +5VDC I/O expansion bus power supply. The power requirements for the PROMDISK VI board are shown in Table 2.2 below:

*Table 2.2*  
PROMDISK VI BOARD POWER REQUIREMENTS

Voltage	Tolerance	Operating	Writing	Standby
+5VDC	10%	80 ma.	80 ma.	60 ma.
+12VDC*	10%	0 ma.	60 ma.	0 ma.

**\* Used only for updating BIOS extension firmware, not used during normal operation.**

## SECTION 3 - PROMDISK HARDWARE SETUP

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### 3.1 SETTING THE ROM-SCAN ADDRESS

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The PROMDISK VI Disk Emulator board is controlled by an on-board control program which must be located in the ROM-SCAN address space of an IBM PC/XT/AT compatible computer. The control firmware is contained in 32K byte Flash EPROM located at U2. The absolute address is selected by configuration jumper E4. The address selections and jumper settings are shown in Table 3.1 below:

*Table 3.1*  
ROM-SCAN ADDRESS E4

ADDRESS	E4
D800H	1-2
D400H	3-4
D000H	5-6
CC00H	7-8
C800H	9-10

*Note: Shaded area indicates default setting*

Care must be taken when selecting the ROM-Scan address. You must be sure that no other device occupies the selected address space. Be aware that some systems have shadow memory and/or extended memory addressed at D000H through D800H. In light of this, be sure to disable these functions if they conflict with the PROMDISK address you have chosen, or select another starting address. Also when using EMM386.EXE or other memory drivers be sure to exclude the address block used by PROMDISK.

### 3.2 SETTING THE I/O ADDRESS

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The PROMDISK VI memory array uses two I/O addresses for commands and data transfers. The I/O address is selected by configuration jumper E3. The address selections and jumper settings are shown in Table 3.2 below:

*Table 3.2*  
I/O ADDRESS E3

ADDRESS	E3
330H	1-2
320H	3-4
310H	5-6
300H	7-8
230H	9-10

*Note: Shaded area indicates default setting*

Care must be taken when selecting the I/O address. You must be sure that no other device occupies the selected I/O address space. Be aware that some network and audio boards use I/O addresses similar to PROMDISK VI. In light of this, be sure to disable these functions if they conflict with the PROMDISK address you have chosen, or select another I/O address.

### 3.3 CONFIGURING THE DRIVES

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The on-board control ROM automatically installs the PROMDISK VI board as the last logical fixed disk drive in the system (E1 OFF). If there is no fixed disk drives setup in CMOS, PROMDISK loads as a bootable drive C.

Installing the Enable First jumper, E1, causes the PROMDISK VI board to always install itself as drive C, and automatically reassigns the physical drives without any changes to your present fixed disk CMOS settings.

*Table 3.3*  
ENABLE FIRST JUMPER E1

Description	E1
PROMDISK Installs as last fixed drive	OFF
PROMDISK Installs as first fixed drive	ON

*Note: Shaded area indicates default setting*

### 3.4 WRITE PROTECT FEATURE

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PROMDISK includes an on-board hardware write-protect feature. Setting the write-protect jumper E5 to the write-protect mode ensures that data on the PROMDISK can not be altered. The write-protect jumper settings are shown in Table 3.4 below:

*Table 3.4*  
WRITE-PROTECT JUMPER E5

Description	E5
Normal Operation	1-2
Write-Protect	2-3

*Note: Shaded area indicates default setting*

## SECTION 4 - USING PROMDISK

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The PROMDISK VI Disk Emulator Board operates as a Read/Write fixed disk drive. The paragraphs that follow describe how to use PROMDISK.

### 4.1 USING ROM-DOS AND OTHER DISK OPERATING SYSTEMS

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The PROMDISK VI board has been preconfigured at the factory with the latest version of the Datalight ROM-DOS disk operating system. In addition, a current copy of the operating system is supplied on a floppy diskette.

If the operating system is accidentally erased from the PROMDISK it may be restored using the SYS command. The DOS format utility should not be used to restore the operating system.

To change the operating system version or type you should simply use the equivalent DOS SYS command to transfer the operating system.

### 4.2 PROMDISK LOW LEVEL FORMAT

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The Flash memory contained on the PROMDISK VI board was initialized with the Datalight CardTrick low level format at the factory. During normal operation the Flash memory should never require reformatting unless there is a serious hardware or software malfunction. In the event it has been determined that the low level format is corrupted, proceed as follows:

1. At the DOS prompt, run the PROMDISK VI low level format utility PD6FMT.EXE located on the distribution diskette.
2. Install a bootable floppy diskette in drive A and boot the system.
3. At the DOS prompt type SYS C: to transfer a bootable copy of ROM-DOS to PROMDISK VI.
4. Remove the floppy diskette from drive A: and reboot the system from PROMDISK VI.

**CAUTION: Do Not use the DOS Format or Fdisk utilities on the PROMDISK VI board.**

## SECTION 5 - PROMDISK INSTALLATION

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This section describes the procedures for installing the PROMDISK Disk Emulator board into your system. The PROMDISK Disk Emulator board was preconfigured at the factory with the ROM-DOS Operating System prior to shipment. Be sure to check the configuration jumper setting closely before installing the board into your computer system.

### 5.1 SETTING UP YOUR SYSTEM FOR PROMDISK

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The first step is to configure your computer for the type and number of physical floppy and fixed disk drives installed. This is done by running the CMOS Setup program supplied with your computer. To install PROMDISK as a “bootable” drive C be sure that you have selected “NONE” or “NOT INSTALLED” for fixed disk drive 1.

### 5.2 INSTALLING PROMDISK IN YOUR SYSTEM

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To install PROMDISK in your target system, the following steps should be followed:

1. Remove power from your target system and unplug the AC power cord from the DC power supply.
2. Remove cover (if applicable) and locate an empty I/O card slot.
3. Install the PROMDISK board in any one of the unused I/O expansion slots in your computer.
4. Replace cover, if applicable.
5. Apply AC power to power supply.
6. Apply power and boot system.

After power is turned on to your target system, you will see the PROMDISK VI CardTrick sign-on message and then the system will boot to ROM-DOS.

## APPENDIX A - SPECIFICATIONS

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This appendix lists the specifications for the PROMDISK Disk Emulator board.

### PROMDISK DISK EMULATOR SPECIFICATIONS

Memory:	64M-bytes total (Maximum).
Disk Emulator:	Emulates fixed disk drive
BIOS:	On-board BIOS extension firmware with Datalight CardTrick VBF.
I/O Bus:	IBM PC/XT/AT Compatible 62-pin Edge Connector
DMA:	Not Used
Timers:	Not Used
Interrupts:	Not Used
I/O Ports:	Not Used
Size:	Half size XT board 5.15"L X 4.2"H
Power:	+5VDC @ 0.080A (+12VDC @ 0.060A used for programming BIOS extension ROM)

## APPENDIX B - SIZE SPECIFICATIONS

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This appendix lists the size specifications for the various PROMDISK VI Disk Emulator boards formatted with ROM-DOS 6.22 Disk Operating System.

Unformatted Size	Free Space (Bytes)
8MB	7,608,320
16MB	15,482,880
24MB	23,339,008
32MB	31,219,712
64MB	62,846,976

**Note: Free space is approximate and may vary slightly with different versions of ROM-DOS and/or CardTrick.**

# APPENDIX C - BOARD OUTLINE

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