

PROMDISK[®]V Disk Emulator User's Manual
For MCSI PART NO. 711XX
Solid State Disk Emulator Board
For Industrial/Embedded System Applications

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PREFACE

This manual provides information about the MCSI PROMDISK V 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

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

PROMDISK V Disk Emulator Board
This Manual
One 3 ½" Diskette containing:
 PROMDISK V 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

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 V Disk Emulator Board! PROMDISK can emulate Read/Write fixed disk drives with capacities ranging from 1M to 32M-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

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 32M-bytes
- Emulates Read/Write Fixed Disk Drives
- Use SMT Flash Memory for Ultra High Reliability
- Occupies Only 32K 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

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 occupies only 32K bytes of address space within the ROM Adapter address space, and is selectable from address segment C800H through E800H on 800H boundaries. PROMDISK V supports up to 32M-bytes of Intel Flash memory and includes an on-board BIOS extension ROM containing the Datalight CardTrick® FTL 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 V 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 V through standard DOS interrupts and commands. PROMDISK V 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 V 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

The PROMDISK disk memory can be support up to 32 Intel Flash Surface Mounted (SMT) memories. The SMT technology provides reliable operation in very harsh environments. The PROMDISK V board is factory configurable in 1M-byte increments. The standard sizes stocked at the factory are: 1M, 2M, 4M, 8M, 16M, and 32M-bytes. Other sizes are available as a Custom Order.

2.2 PROMDISK POWER REQUIREMENTS

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 board also uses the +12VDC supply from the I/O expansion bus when writing or erasing the Flash memories. The power requirements for the PROMDISK V board are shown in Table 2.2 below:

Table 2.2
PROMDISK V BOARD POWER REQUIREMENTS

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

SECTION 3 - PROMDISK HARDWARE SETUP

3.1 SETTING THE ROM-SCAN ADDRESS

The PROMDISK V 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 64K byte Flash EPROM located at U17. The absolute address is selected by configuration jumper E1. The address selections and jumper settings are shown in Table 3.1 below:

Table 3.1
ROM-SCAN ADDRESS E1

ADDRESS	E1
C800H	1-2
D000H	3-4
D800H	5-6
E000H	7-8
E800H	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 or E000H. 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 CONFIGURING THE DRIVES

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

A custom version of PROMDISK V is available that causes the PROMDISK V board to always install itself as drive C. This version of PROMDISK V automatically reassigns the physical drives without any changes to your present fixed disk CMOS settings. Consult the factory for pricing and ordering information.

SECTION 4 - USING PROMDISK

The PROMDISK V 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

The PROMDISK V 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

The Flash memory contained on the PROMDISK V 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 V low level format utility VBFORMAT.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 DOS to PROMDISK V.
4. Remove the floppy diskette from drive A: and reboot the system from PROMDISK V.

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

SECTION 5 - PROMDISK INSTALLATION

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

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

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 V CardTrick sign-on message and then the system will boot to ROM-DOS.

APPENDIX A - SPECIFICATIONS

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

PROMDISK DISK EMULATOR SPECIFICATIONS

Memory:	32M-bytes total (Maximum). Access Time: 150 nanoseconds 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

APPENDIX B - SIZE SPECIFICATIONS

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

Unformatted Size	Free Space (Bytes)
1MB	782,336
2MB	1,795,072
4MB	3,804,160
8MB	7,833,600
16MB	15,888,384
32MB	30,141,440

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