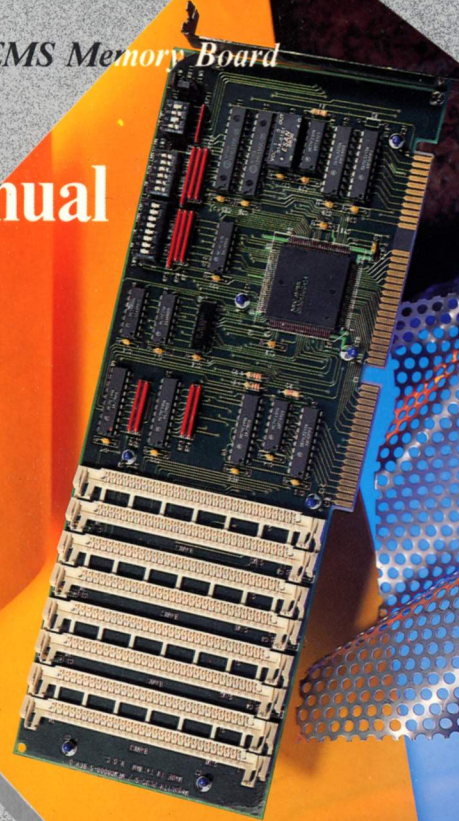


MegaLITH Plus

EMS (LIM 4.0) and EEMS Memory Board

User's Manual



8MB Memory Board using SIM Modules

DFI[®]

**MegaLITH PLUS
MEMORY EXPANSION
BOARD
USER'S MANUAL**

- D14110826 -

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FCC STATEMENT ON CLASS B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the receiver and equipment.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

NOTICE:

- (1) The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- (2) Shielded interface cables must be used in order to comply with the emission limits.

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INTRODUCTION

HARDWARE

The MegaLITH PLUS memory board is a high speed, cost-effective 8MB, 16-bit memory board for the 286 and 386 systems that accepts AT-expansion cards. Compatible systems include IBM PC/AT and Compaq Deskpro 386/25.

The MegaLITH PLUS offers flexible and easy memory configuration. It supports up to 32MB of EMS 4.0 and extended memory. The eight megabytes of memory per board can be configured to all EMS, all conventional/extended, or a combination of the two. The board can backfill 0K systems to 640K, in 128K steps while also providing EMS memory for programs that require it.

The MegaLITH PLUS's EMS memory is hardware EMS. EMS page registers are built into the hardware, so EMS functions are performed quickly.

Setting up the board is easy. Most switch settings are made using DIP switches that are almost self-explanatory. If you need to set up many boards, you will probably be able to set them up without even using the manual, once you've learned the switch functions.

The MegaLITH PLUS is compatible with operating systems such as Novell, OS/2 and XENIX. The MegaLITH PLUS's several linear memory modes are well suited for these types of operating systems.

The MegaLITH PLUS is fast enough to work in virtually all systems available today. Almost all 16, 20 and 25MHz 286 and 386 systems have bus speeds of only six to ten MHz. The MegaLITH PLUS board can run in systems with bus speeds of 12MHz.

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SOFTWARE

The MegaLITH PLUS comes with software device drivers to install EMS memory conforming to EMS version 4.0. In addition, RAM disk and print spooler software are provided that can use either conventional, extended or EMS memory.

The MegaLITH PLUS supports all EMS 4.0 capabilities including multi-tasking functions. In addition to storing data, the MegaLITH PLUS board with the EMS 4.0 software provides the following additional features:

- *Memory-resident programs like SideKick Plus can be loaded into EMS memory, saving crowded conventional memory for other applications.*
- *Programs can store most of their program codes in EMS memory, again conserving limited conventional memory.*
- *With its hardware backfill capability, the MegaLITH PLUS EMS driver can provide superior performance for software packages such as Microsoft Windows 3.0 and Quarterdeck DESQview Rev. 2.31.*

The MegaLITH PLUS EMS device driver software lets you choose from five EMS page frame base addresses. This feature lets you work around address conflicts when other boards are installed that access the same memory address.

FEATURES AND SPECIFICATIONS

HARDWARE

- *8192 (8MB) of conventional, extended and expanded memory*
- *Supports 32 register sets for multitasking capability*
- *Easy installation with clearly marked DIP switch settings*
- *Backfills OK systems to 640K, in 128K steps, of conventional memory. Memory can be used as either expanded memory, extended memory, or both.*
- *Works with DOS, NOVELL, OS/2, XENIX, DESQview, Microsoft Windows 3.0, Concurrent DOS XM and other operating systems*
- *Maximum expanded memory:*
 - *8M (one board)*
 - *32M (four boards)*
- *Maximum linear memory:*
 - *8M (one board)*
 - *16M (two boards)*
- *DRAM chip type:*
 - *256K x 8 or 256K x 9 (70 - 120 ns) SIMM*
 - *1M x 8 or 256K x 9 (70 - 120 ns) SIMM*

SOFTWARE

- Support for EMS 4.0 driver
 - MegaLITH.SYS
- Virtual Disk (Vdisk) programs provided
 - CMMDISK.SYS - conventional memory
 - EXMDISK.SYS - extended memory
 - EMSDISK.SYS - expanded memory
- Printer spooler program provided
 - PSPOOL.COM
 - PSPOOLA.COM
 - PSPLHELP.COM
- Installation program provided

TYPES OF MEMORY - AN OVERVIEW

This chapter describes the different kinds of memory and suggests the most appropriate way to set up your board.

NAMING CONVENTIONS

In this manual, memory between 0K and 640K is referred to as conventional memory. Memory above the 1024K address is referred to as extended memory. When conventional and extended memory are referenced as one unit, they are called linear memory. Memory conforming to the Lotus/Intel/Microsoft (LIM) Expanded Memory Specification is referred to as EMS memory. Enhanced Expanded Memory Specification (EEMS) is a superset of EMS memory.

CONVENTIONAL MEMORY

Conventional memory refers to DOS memory below 640K. Generally programs must fit into conventional memory to run, although some programs use extended or EMS memory to store data files.

The 640K conventional memory size was designed around the 8088 microprocessor. This microprocessor, used in the IBM PC and PC/XT, is capable of addressing only 1024K of memory. Operating systems such as MS-DOS and PC-DOS and other application programs were limited to the first 640K with the remaining 384K address space reserved for video RAM, ROM BIOS, and other system devices. Figure 2-1 gives an illustration of the 1MB memory map. Below it is a table of decimal and hexadecimal addresses for the 1MB memory map.

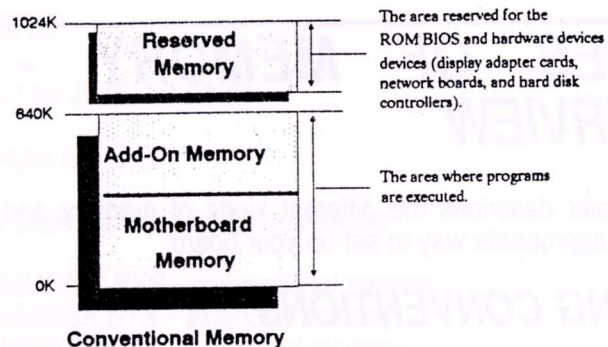


FIGURE 2-1. 1 MEGABYTE MEMORY MAP

DECIMAL	HEX	MEMORY USE
1024K	100000h	Reserved address space 640K - 1024K for video memory, ROM BIOS, and some system devices
960K	F0000h	
896K	E0000h	
832K	D0000h	
768K	C0000h	
704K	B0000h	Conventional memory address space 0K - 640K for DOS and application programs
640K	A0000h	
576K	90000h	
512K	80000h	
448K	70000h	
384K	60000h	
320K	50000h	
256K	40000h	
192K	30000h	
128K	20000h	
64K	10000h	
0K	00000h	

TABLE 2-1. ADDRESS FOR THE 1MB MEMORY MAP

Reserved memory in Figure 2-1 is divided into the following areas:

- ROM BIOS area - the part of DOS that is built into every PC and manages the hardware basics, such as reading the keyboard, driving the printer, and displaying information on the screen.
- Screen Buffer on Video Display RAM - the area that stores the information that appears on the video display monitor.
- Hardware-specific ROMs - the area for the enhanced graphics adapter (EGA) display and hard disk controller.

Refer to Figure 2-2 for an illustration on how reserved memory is normally configured.

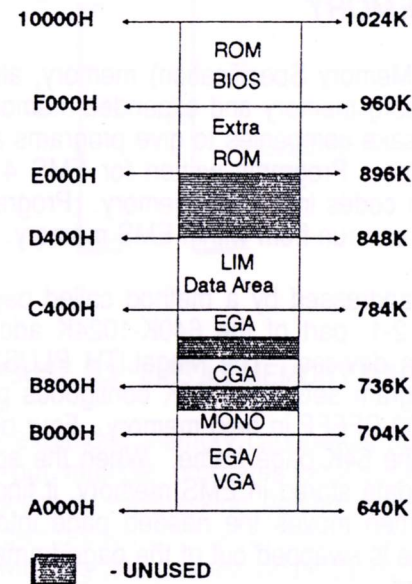


FIGURE 2-2. RESERVED MEMORY ON AN AT OR 386 SYSTEM

EXTENDED MEMORY

The 286 and 386 CPU can address more than 1MB of memory, but the DOS operating system still places a 640K cap on the size of conventional memory. Extended memory, also referred to as protected mode memory, is mapped to a 1024K (1.0M) or higher address.

Under the DOS operating system, extended memory is primarily used for RAM disks, print spoolers, and EMS 4.0. No DOS application is able to execute in extended memory, and few DOS applications are able to make any use of extended memory. Linear-memory operating systems, e.g., XENIX, Novell and OS/2, can use extended memory more effectively than DOS.

EXPANDED MEMORY

EMS (Expanded Memory Specification) memory, also known as LIM (Lotus/Intel/Microsoft) memory and expanded memory was developed by the LIM namesake companies to give programs additional room to load their data files. Programs written for EMS 4.0 can store both data and program codes into EMS memory. Program code stored in EMS 4.0 memory can run from within EMS memory.

EMS memory is addressed by a method called page swapping. As shown in Figure 2-1, part of the 640K-1024K address range is reserved for system devices. The MegaLITH PLUS's MegaLITH.SYS device driver program sets up a 64K contiguous page frame in the 768K-896K (C0000-DFFFF in hex) memory. Four of these pages can be mapped into the 64K page frame. When the application program needs to access data stored in EMS memory, it finds which page the data is located, then moves the needed page into the base frame. The previous page is swapped out of the page frame and moved back into the EMS board.

Since the size of the mapping area is not limited to 64K, any area between 16K to 1MB can be mapped. This mapping area can be set and changed by the program where several non-adjacent "mapping" areas are possible.

Figure 2-3 shows how a 16K page of expanded memory can be mapped into the conventional memory space of the PC. An EMS physical page can be positioned logically in any empty memory space between 256K and 1024K.

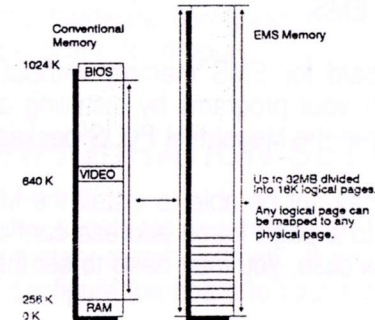


FIGURE 2-3. EMS 4.0 MEMORY MAP

In summary, these expanded memory capabilities make it possible to run not just one, but multiple programs concurrently in expanded memory. The process of multitasking (letting several programs run simultaneously by giving each a "slice" of time in turn) is now possible because context-switching (the process of allocating these time slices) can be done at processor speeds.

USING THE MegaLITH PLUS MEMORY

If your system has only 512K memory, you should use the MegaLITH PLUS to backfill the system to 640K. MegaLITH PLUS can offer a total of 8192K onboard memory. The remaining 8064K of memory can be configured as all EMS, all extended, or a combination of the two.

If you have software that requires extended memory, or you are running a linear-memory operating system like Novell, XENIX or OS/2, you should use the MegaLITH PLUS for linear memory.

If you have any EMS 4.0 or 3.2 programs, you should set up the MegaLITH PLUS for EMS.

You can set the board for EMS memory without leaving the EMS memory available for your programs by installing a RAM disk similar to those provided for in the MegaLITH PLUS package.

In rare cases, you may not be able to install the MegaLITH PLUS as an EMS board due to a page frame address conflict with another expansion card. In this case, you may need to set the MegaLITH PLUS for linear memory.

HARDWARE INSTALLATION

This chapter describes the installation of the MegaLITH PLUS memory expansion board to your system. It is divided into three main sections. Section 1 details the board configuration settings. Section 2 describes memory installation and section 3 illustrates the installation of the board into your system.

If you will be using the MegaLITH PLUS for linear memory, you need to know how much conventional and extended memory your system currently has. Run your system's configuration setup program to check your system's hardware configuration. You can also run the DOS CHKDSK program to display total conventional memory onboard.

BOARD CONFIGURATION SETTINGS

This section provides a detailed description on the MegaLITH PLUS board's layout and factory switch settings. It provides the basic information required to configure the board to your system.

Shown in Figure 3-1 is the MegaLITH PLUS board layout. The left-hand side of the board consists of the SIMM sockets. There are a total of 4 banks for the 256K x 8/256K x 9 or 1M x 8/1M x 9 (70 to 120 ns) SIM modules. On the upper right-hand side of the board are the three DIP switches. DIP SW1 contains the switches to enable/disable parity checking and onboard memory configuration settings. DIP SW2 and SW3 contain the switches for reserved linear memory settings and I/O port designation respectively.

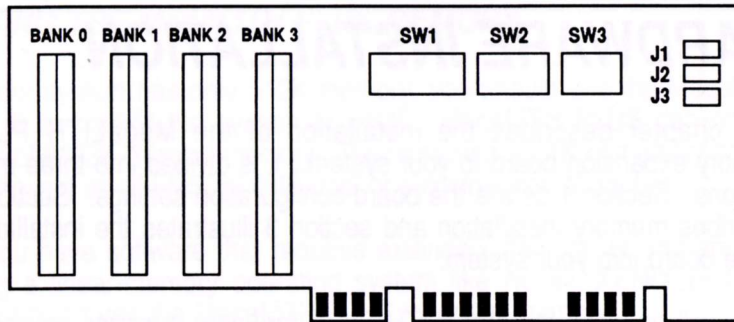


FIGURE 3-1. MEGALITH PLUS BOARD LAYOUT

JUMPER SETTINGS

Jumper J1 DRAM Type Selection



ON: 1M SIMM (Default)



OFF: 256K SIMM

Jumper J2 EMS Data Access



ON: 8-Bit

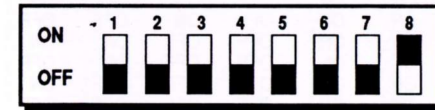


OFF:16-Bit (Default)

Note: If for some reasons your system refuses to work on a 16-bit EMS, please change the jumper setting to 8-bit mode.

Warning: Jumper J3 should always be OFF (default setting). Reconfiguring this jumper will cause problems to the board.

SW1 DEFAULT SETTING



DEFAULT SETTING
ALL EXPANDED MEMORY

FIGURE 3-2. SW1 DEFAULT SETTING

Figure 3-2 shows the default setting for SW1. SW1-8 is used to set the board for parity check enable/disable. Switches SW1-1 to SW1-7 are set according to the number of memory you have onboard. The default setting for the MegaLITH PLUS board is SW1-8 ON (parity enable). Listed below is a summary of switch settings for conventional/extended memory already installed onboard.

Note: Leave SW1-8 ON (parity enable) unless you have a special reason to disable parity checking.

Linear Memory on System (KB)	SW1						
	1	2	3	4	5	6	7
0	ON	ON	ON	ON	ON	ON	ON
128	ON	ON	ON	ON	ON	ON	OFF
256	ON	ON	ON	ON	ON	OFF	ON
384	ON	ON	ON	ON	ON	OFF	OFF
512	ON	ON	ON	ON	OFF	ON	ON
640	ON	ON	ON	ON	OFF	ON	OFF
768	ON	ON	ON	ON	OFF	OFF	ON
896	ON	ON	ON	ON	OFF	OFF	OFF
1024	ON	ON	ON	OFF	ON	ON	ON

Linear Memory on System (KB)	SW1						
	1	2	3	4	5	6	7
1152	ON	ON	ON	OFF	ON	ON	OFF
1280	ON	ON	ON	OFF	ON	OFF	ON
1408	ON	ON	ON	OFF	ON	OFF	OFF
1536	ON	ON	ON	OFF	OFF	ON	ON
1664	ON	ON	ON	OFF	OFF	ON	OFF
1792	ON	ON	ON	OFF	OFF	OFF	ON
1920	ON	ON	ON	OFF	OFF	OFF	OFF
2048	ON	ON	OFF	ON	ON	ON	ON
2176	ON	ON	OFF	ON	ON	ON	OFF
2304	ON	ON	OFF	ON	ON	OFF	ON
2432	ON	ON	OFF	ON	ON	OFF	OFF
2560	ON	ON	OFF	ON	OFF	ON	ON
2688	ON	ON	OFF	ON	OFF	ON	OFF
2816	ON	ON	OFF	ON	OFF	OFF	ON
2944	ON	ON	OFF	ON	OFF	OFF	OFF
3072	ON	ON	OFF	OFF	ON	ON	ON
3200	ON	ON	OFF	OFF	ON	ON	OFF
3328	ON	ON	OFF	OFF	ON	OFF	ON
3456	ON	ON	OFF	OFF	ON	OFF	OFF
3584	ON	ON	OFF	OFF	OFF	ON	ON
3712	ON	ON	OFF	OFF	OFF	ON	OFF
3840	ON	ON	OFF	OFF	OFF	OFF	ON
3968	ON	ON	OFF	OFF	OFF	OFF	OFF
4096	ON	OFF	ON	ON	ON	ON	ON
4224	ON	OFF	ON	ON	ON	ON	OFF
4352	ON	OFF	ON	ON	ON	OFF	ON
4480	ON	OFF	ON	ON	ON	OFF	OFF
4608	ON	OFF	ON	ON	OFF	ON	ON
4736	ON	OFF	ON	ON	OFF	ON	OFF
4864	ON	OFF	ON	ON	OFF	OFF	ON
4992	ON	OFF	ON	ON	OFF	OFF	OFF
5120	ON	OFF	ON	OFF	ON	ON	ON
5248	ON	OFF	ON	OFF	ON	ON	OFF
5376	ON	OFF	ON	OFF	ON	OFF	ON
5504	ON	OFF	ON	OFF	ON	OFF	OFF
5632	ON	OFF	ON	OFF	OFF	ON	ON
5760	ON	OFF	ON	OFF	OFF	ON	OFF
5888	ON	OFF	ON	OFF	OFF	OFF	ON
6016	ON	OFF	ON	OFF	OFF	OFF	OFF
6144	ON	OFF	OFF	ON	ON	ON	ON

Linear Memory on System (KB)	SW1						
	1	2	3	4	5	6	7
6272	ON	OFF	OFF	ON	ON	ON	OFF
6400	ON	OFF	OFF	ON	ON	OFF	ON
6528	ON	OFF	OFF	ON	ON	OFF	OFF
6656	ON	OFF	OFF	ON	OFF	ON	ON
6784	ON	OFF	OFF	ON	OFF	ON	OFF
6912	ON	OFF	OFF	ON	OFF	OFF	ON
7040	ON	OFF	OFF	ON	OFF	OFF	OFF
7168	ON	OFF	OFF	OFF	ON	ON	ON
7296	ON	OFF	OFF	OFF	ON	ON	OFF
7424	ON	OFF	OFF	OFF	ON	OFF	ON
7552	ON	OFF	OFF	OFF	ON	OFF	OFF
7680	ON	OFF	OFF	OFF	OFF	ON	ON
7808	ON	OFF	OFF	OFF	OFF	ON	OFF
7936	ON	OFF	OFF	OFF	OFF	OFF	ON
8064	ON	OFF	OFF	OFF	OFF	OFF	OFF
8192	OFF	ON	ON	ON	ON	ON	ON
8320	OFF	ON	ON	ON	ON	ON	OFF
8448	OFF	ON	ON	ON	ON	OFF	ON
8576	OFF	ON	ON	ON	ON	OFF	OFF
8704	OFF	ON	ON	ON	OFF	ON	ON
8832	OFF	ON	ON	ON	OFF	ON	OFF
8960	OFF	ON	ON	ON	OFF	OFF	ON
9088	OFF	ON	ON	ON	OFF	OFF	OFF
9216	OFF	ON	ON	OFF	ON	ON	ON
9344	OFF	ON	ON	OFF	ON	ON	OFF
9472	OFF	ON	ON	OFF	ON	OFF	ON
9600	OFF	ON	ON	OFF	ON	OFF	OFF
9728	OFF	ON	ON	OFF	OFF	ON	ON
9856	OFF	ON	ON	OFF	OFF	ON	OFF
9984	OFF	ON	ON	OFF	OFF	OFF	ON
10112	OFF	ON	ON	OFF	OFF	OFF	OFF
10240	OFF	ON	OFF	ON	ON	ON	ON
10368	OFF	ON	OFF	ON	ON	ON	OFF
10496	OFF	ON	OFF	ON	ON	OFF	ON
10624	OFF	ON	OFF	ON	ON	OFF	OFF
10752	OFF	ON	OFF	ON	OFF	ON	ON
10880	OFF	ON	OFF	ON	OFF	ON	OFF
11008	OFF	ON	OFF	ON	OFF	OFF	ON
11136	OFF	ON	OFF	ON	OFF	OFF	OFF
11264	OFF	ON	OFF	OFF	ON	ON	ON

**Linear
Memory on
System (KB)**

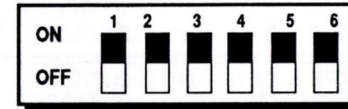
SW1

	1	2	3	4	5	6	7
11392	OFF	ON	OFF	OFF	ON	ON	OFF
11520	OFF	ON	OFF	OFF	ON	OFF	ON
11648	OFF	ON	OFF	OFF	ON	OFF	OFF
11776	OFF	ON	OFF	OFF	OFF	ON	ON
11904	OFF	ON	OFF	OFF	OFF	ON	OFF
12032	OFF	ON	OFF	OFF	OFF	OFF	ON
12160	OFF	ON	OFF	OFF	OFF	OFF	OFF
12288	OFF	OFF	ON	ON	ON	ON	ON
12416	OFF	OFF	ON	ON	ON	ON	OFF
12544	OFF	OFF	ON	ON	ON	OFF	ON
12672	OFF	OFF	ON	ON	ON	OFF	OFF
12800	OFF	OFF	ON	ON	OFF	ON	ON
12928	OFF	OFF	ON	ON	OFF	ON	OFF
13056	OFF	OFF	ON	ON	OFF	OFF	ON
13184	OFF	OFF	ON	ON	OFF	OFF	OFF
13312	OFF	OFF	ON	OFF	ON	ON	ON
13340	OFF	OFF	ON	OFF	ON	ON	OFF
13568	OFF	OFF	ON	OFF	ON	OFF	ON
13696	OFF	OFF	ON	OFF	ON	OFF	OFF
13824	OFF	OFF	ON	OFF	OFF	ON	ON
13952	OFF	OFF	ON	OFF	OFF	ON	OFF
14080	OFF	OFF	ON	OFF	OFF	OFF	ON
14208	OFF	OFF	OFF	ON	ON	ON	OFF
14366	OFF	OFF	OFF	ON	ON	ON	ON
14464	OFF	OFF	OFF	ON	ON	OFF	ON
14592	OFF	OFF	OFF	ON	ON	ON	OFF
14720	OFF	OFF	OFF	ON	ON	OFF	OFF
14848	OFF	OFF	OFF	ON	OFF	ON	ON
14976	OFF	OFF	OFF	ON	OFF	ON	OFF
15104	OFF	OFF	OFF	ON	OFF	OFF	ON
15232	OFF	OFF	OFF	ON	OFF	OFF	OFF
15360	OFF	OFF	OFF	OFF	ON	ON	ON
15488	OFF	OFF	OFF	OFF	ON	ON	OFF
15616	OFF	OFF	OFF	OFF	ON	OFF	ON
15744	OFF	OFF	OFF	OFF	ON	OFF	OFF
15872	OFF	OFF	OFF	OFF	OFF	ON	ON
16000	OFF	OFF	OFF	OFF	OFF	ON	OFF
16128	OFF	OFF	OFF	OFF	OFF	OFF	ON
* ALL EMS	OFF	OFF	OFF	OFF	OFF	OFF	OFF

* DEFAULT

TABLE 3-1. SUMMARY OF SW1 SETTING

SW2 DEFAULT SETTING



RESERVED FOR
LINEAR MEMORY TYPE

FIGURE 3-3. SW2 DEFAULT SETTING

Figure 3-3 shows the default setting for SW2. SW2 is reserved for linear memory. The default setting for SW2-1 to SW2-6 is ON. Refer to Table 3-2 for a summary of switch settings for SW2.

**MegaLITH PLUS
Reserved for
Conventional/
Extended Memory**

SW2

	1	2	3	4	5	6
* 128	ON	ON	ON	ON	ON	ON
256	ON	ON	ON	ON	ON	OFF
384	ON	ON	ON	ON	OFF	ON
512	ON	ON	ON	ON	OFF	OFF
640	ON	ON	ON	OFF	ON	ON
768	ON	ON	ON	OFF	ON	OFF
896	ON	ON	ON	OFF	OFF	ON
1024	ON	ON	ON	OFF	OFF	OFF
1152	ON	ON	OFF	ON	ON	ON
1280	ON	ON	OFF	ON	ON	OFF
1408	ON	ON	OFF	ON	OFF	ON
1536	ON	ON	OFF	ON	OFF	OFF
1664	ON	ON	OFF	OFF	ON	ON
1792	ON	ON	OFF	OFF	ON	OFF
1920	ON	ON	OFF	OFF	OFF	ON
2048	ON	ON	OFF	OFF	OFF	OFF

* DEFAULT

MegaLITH PLUS
Reserved for
Conventional/
Extended Memory

SW2

1 2 3 4 5 6

2176	ON	OFF	ON	ON	ON	ON
2304	ON	OFF	ON	ON	ON	OFF
2432	ON	OFF	ON	ON	OFF	ON
2560	ON	OFF	ON	ON	OFF	OFF
2688	ON	OFF	ON	OFF	ON	ON
2816	ON	OFF	ON	OFF	ON	OFF
2944	ON	OFF	ON	OFF	OFF	ON
3072	ON	OFF	ON	OFF	OFF	OFF
3200	ON	OFF	OFF	ON	ON	ON
3328	ON	OFF	OFF	ON	ON	OFF
3456	ON	OFF	OFF	ON	OFF	ON
3584	ON	OFF	OFF	ON	OFF	OFF
3712	ON	OFF	OFF	OFF	ON	ON
3840	ON	OFF	OFF	OFF	ON	OFF
3968	ON	OFF	OFF	OFF	OFF	ON
4096	ON	OFF	OFF	OFF	OFF	OFF
4224	OFF	ON	ON	ON	ON	ON
4352	OFF	ON	ON	ON	ON	OFF
4480	OFF	ON	ON	ON	OFF	ON
4608	OFF	ON	ON	ON	OFF	OFF
4736	OFF	ON	ON	OFF	ON	ON
4864	OFF	ON	ON	OFF	ON	OFF
4992	OFF	ON	ON	OFF	OFF	ON
5120	OFF	ON	ON	OFF	OFF	OFF
5248	OFF	ON	OFF	ON	ON	ON
5376	OFF	ON	OFF	ON	ON	OFF
5504	OFF	ON	OFF	ON	OFF	ON
5632	OFF	ON	OFF	ON	OFF	ON
5760	OFF	ON	OFF	OFF	ON	ON
5888	OFF	ON	OFF	OFF	ON	OFF
6016	OFF	ON	OFF	OFF	OFF	ON
6144	OFF	ON	OFF	OFF	OFF	OFF

MegaLITH PLUS
Reserved for
Conventional/
Extended Memory

SW2

1 2 3 4 5 6

6272	OFF	OFF	ON	ON	ON	ON
6400	OFF	OFF	ON	ON	ON	OFF
6528	OFF	OFF	ON	ON	OFF	ON
6656	OFF	OFF	ON	ON	OFF	OFF
6784	OFF	OFF	ON	OFF	ON	ON
6912	OFF	OFF	ON	OFF	ON	OFF
7040	OFF	OFF	ON	OFF	OFF	ON
7168	OFF	OFF	OFF	OFF	OFF	OFF
7296	OFF	OFF	OFF	ON	ON	ON
7424	OFF	OFF	OFF	ON	ON	OFF
7552	OFF	OFF	OFF	ON	OFF	ON
7680	OFF	OFF	OFF	ON	OFF	OFF
7808	OFF	OFF	OFF	OFF	ON	ON
7936	OFF	OFF	OFF	OFF	ON	OFF
8064	OFF	OFF	OFF	OFF	OFF	ON
8192	OFF	OFF	OFF	OFF	OFF	OFF

TABLE 3-2. SUMMARY OF SW2 SETTING

SW3 DEFAULT SETTING

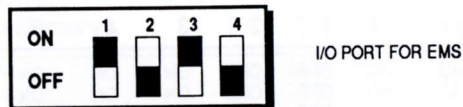


FIGURE 3-4. SW3 DEFAULT SETTING

Figure 3-4 shows the default settings for SW3. SW3 is used for I/O port address settings. The default setting for the MegaLITH PLUS is SW3-1 ON, SW3-2 OFF, SW3-3 ON and SW3-4 OFF. The default setting for I/O port address is 258H. Refer to Table 3-3 for a summary of I/O port address settings for SW3 of the MegaLITH PLUS.

I/O ADDRESS	SW3			
	1	2	3	4
0208H	ON	ON	ON	ON
0218H	ON	ON	ON	OFF
0228H	ON	ON	OFF	ON
0238H	ON	ON	OFF	OFF
0248H	ON	OFF	ON	ON
* 0258H	ON	OFF	ON	OFF
0268H	ON	OFF	OFF	ON
0278H	ON	OFF	OFF	OFF
0288H	OFF	ON	ON	ON
0298H	OFF	ON	ON	OFF
02A8H	OFF	ON	OFF	ON
02B8H	OFF	ON	OFF	OFF
02C8H	OFF	OFF	ON	ON
02D8H	OFF	OFF	ON	OFF
02E8H	OFF	OFF	OFF	ON
02F8H	OFF	OFF	OFF	OFF

* DEFAULT

TABLE 3-3. I/O PORT ADDRESS SETTINGS

MEMORY INSTALLATION

TYPES OF MODULES

To install the maximum 8192K (8MB) of memory on the MegaLITH PLUS memory expansion board, you will need 8 pieces of 1M x 9 SIM modules. The chips must all be rated at a maximum access time of 70 to 120 nanoseconds (ns).

The following SIM modules have been tested good with the MegaLITH PLUS board. Most other brands will work with this board, but a few untested brands may fail to do so.

BRAND	CHIP NUMBER
PANASONIC	MN41C4256-08
PANASONIC	MN41C1000SJ-08
OKI	M511000A-08
SIEMENS	HYB511000AJ-70
NEC	NEC421000-80
FUJITSU	F81C1000BJ-80
MITSUBISHI	M5M41000BJ-80

TABLE 3-4. TABLE OF TESTED CHIPS

HOW TO INSTALL THE MODULES

Computer components are easily damaged by static electricity. Be careful to handle the MegaLITH PLUS only by its edges. Do not touch any of the metal circuitry with your hands, specifically, the gold contacts. Do all of the preparation work on a static-free surface.

Position the legs of the modules above the SIMM bank. Seat the legs of the module into the bank. Make sure that each leg is seated in its respective socket before pressing the module securely into the bank. Check that none of the legs are bent under the module.

WHERE TO INSTALL THE MODULES

You will need two (2) to eight (8) SIM modules to populate onboard memory. The MegaLITH PLUS can be configured to 512K, 1M, 1.5M, 2M, 4M, 6M and 8M memory sizes.

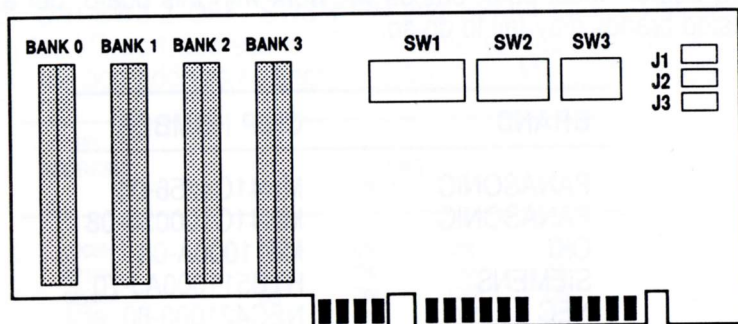


FIGURE 3-5. BANK LOCATIONS ON THE MEGALITH PLUS

Figure 3-5 shows the location of the banks. Make sure that the DIP switch SW1-8 is set ON to enable the memory parity check function. See the section on Board Configuration settings to set the DIP switch SW1-8.

The table below summarizes the bank locations and number of SIM modules needed for the corresponding memory sizes.

MEMORY SIZE	256KX8 OR 256KX9 SELECTION SIMM	BANK SELECTION	1MX8 OR 1MX9 SIMM	BANK SELECTION
512K	2 PCS.	BANK 0	--	--
1M	4 PCS.	BANK 0, 1	--	--
1.5M	6 PCS.	BANK 0, 1, 2	--	--
*2M	8 PCS.	BANK 0, 1, 2, 3	2 PCS.	BANK 0
4M	--	--	4 PCS.	BANK 0,1
6M	--	--	6 PCS.	BANK 0, 1, 2
8M	--	--	8 PCS.	BANK 0, 1, 2, 3

* Use only either 256K or 1M memory configuration and not both.

Note: Use DRAM chips with speed of 70 ns to 120 ns.

TABLE 3-5. BANK SELECTION AND CHIP REQUIREMENTS

BOARD INSTALLATION

BACKING UP THE MegaLITH PLUS

The MegaLITH PLUS software disk is a single-sided, eight sector non-system disk. It can be used with PC-DOS 3.0 or above. Before you begin, you must first backup the original MegaLITH PLUS utility disk. The following steps are used to back up the MegaLITH PLUS software programs.

1. Prepare a blank formatted disk for copying the files from the original disk.
2. Put a write-protect tab on the original diskette. This will prevent accidental erasures during the copy process.

3. Boot your PC/AT system.
4. Copy the MegaLITH PLUS programs to a blank formatted disk.

a. If you have only one floppy drive, type:

```
COPY A:*.* B: <Enter>
```

Note: *The system will prompt you to change the source (A:) and destination (B:) diskettes although you're using only one floppy disk drive.*

b. If you have two floppy drives, insert the MegaLITH PLUS software disk in drive B and type:

```
COPY B:*.*A: <Enter>
```

5. Store the original MegaLITH PLUS disk in a safe place.

INSTALLING THE MEGALITH PLUS

If you are installing the MegaLITH PLUS for the first time, install the MegaLITH PLUS memory expansion board into the bus slot of your system. Insert the backup utility disk into drive A and type INSTALL.EXE. Before you begin installation, access the READ.ME file using the TYPE command under DOS and read the information carefully. After reading the READ.ME file, type INSTALL at the DOS prompt to begin installation. The program will guide you through a series of questions and instruct you on the proper installation of the board.

Additional details on the MegaLITH PLUS utility program disk are found on the next chapter.

The steps for the proper installation of the board are listed below.

1. Unlock your system unit, turn off the power, and unplug the power cord.
2. Remove the cover mounting screws from the rear of the system unit. After removing the mounting screws slide the top of the case forward and lift the cover. Refer to Figure 3-6.

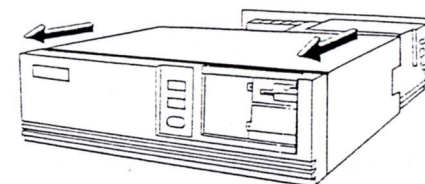


FIGURE 3-6. REMOVING THE SYSTEM COVER

3. Remove the blank cover plate from any empty 16-bit expansion slot. (Please refer to Figure 3-7). Save the screw.

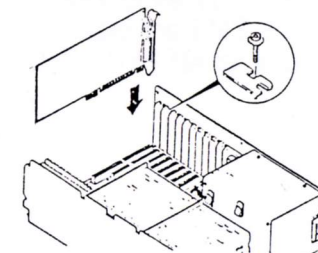


FIGURE 3-7. MEGALITH PLUS INSTALLATION

4. Firmly and carefully plug the prepared MegaLITH PLUS board into the selected slot. The gold contacts at the base of the card go into the connector on the motherboard.
5. Replace the adapter mounting screw.
6. Replace the system unit cover and reattach all cards.

SOFTWARE INSTALLATION

This section describes the use and operation of the MegaLITH PLUS software, including the EMS device drivers, RAM disk device drivers, and print spoolers.

DESCRIPTION

Your MegaLITH PLUS diskette includes the following programs:

1. INSTALL.EXE

This program facilitates the setting of the DIP switches on the MegaLITH PLUS memory expansion board. It also automatically creates or modifies the CONFIG.SYS and the AUTOEXEC.BAT to facilitate the installation of the MegaLITH PLUS's drivers and utilities. To use the program, follow the instructions prompted on the screen.

2. MegaLITH.SYS

MegaLITH.SYS is a device driver conforming to EMS version 4.0. You must tell DOS to install the EMS driver by including a command line in the CONFIG.SYS file for application programs using the expanded memory.

3. EMSDISK.SYS

EMSDISK.SYS is a device driver using EMS memory to simulate a virtual disk. In the CONFIG.SYS file, the command line to use EMSDISK.SYS must be placed after the command line which defines MegaLITH.SYS.

4. CMMDISK.SYS

CMMDISK.SYS is a device driver using conventional memory to set up a RAM disk.

5. EXMDISK.SYS

EXMDISK.SYS is a device driver using extended memory to set up a RAM disk.

6. PSPOOLA.COM

PSPOOLA.COM uses EMS memory for print spooling. It lets you do other computing tasks while the computer is printing.

7. PSPOOL.COM

PSPOOL.COM uses conventional memory for print spooling. It lets you do other computing tasks while the computer is printing.

8. PSPLHELP.COM

This program shows the PSPOOL and PSPOOLA command syntax. It also gives a listing of all spooler options and their meanings.

USING EXPANDED MEMORY

The Lotus/Intel/Microsoft Expanded Memory Specification defines the software interface of the Expanded Memory Manager (EMM) as a device driver that controls and manages the interface between DOS application programs and expanded memory. If you are using the MegaLITH PLUS for EMS memory, the MegaLITH.SYS expanded memory manager (EMM) must be installed.

Up to four MegaLITH PLUS cards with 32MB of expanded memory can be installed using the MegaLITH.SYS driver.

To install the EMM, use an ASCII text editor to either create or modify the CONFIG.SYS file. This file must be in the root directory of the boot disk. (The boot disk is usually hard disk C or the drive A system floppy.)

You can select the I/O port and base segment addresses of the MegaLITH PLUS expanded memory by properly specifying the parameters.

MEGALITH.SYS PARAMETER SPECIFICATION

The full command format for using MegaLITH.SYS is as follows:

```
DEVICE = MegaLITH.SYS [/B=xxxx] [/P=nnn{;mmm}] [/H=yy]
          [/S=zz] [/L] [/X=aaaa-bbbb] [/I=cccc-dddd] [/T=tttt]
```

/B= xxxx

xxxx is the EMS page frame base address in hexadecimal. In expanded memory management, a contiguous 64K page frame segment must be reserved. The following are valid page frame base addresses: C000, C400, C800, CC00 and D000. The default page frame base address is C000.

/P= nnn{;mmm}

nnn{;mmm} is the I/O port address in hexadecimal used in EMS mapping. The valid I/O ports range from 208H to 2F8H. If you do not specify the /P parameter, MegaLITH.SYS will, by default, check I/O ports 258H, 268H, 208H and 218H.

/H=yy

yy is the maximum handle numbers in hexadecimal. The default value is 40H (64 in decimal).

/S= zz

zz is the maximum number of contexts, in hexadecimal, to be reserved. The default value is 40H (64 in decimal).

/L

specifies that the backfill area (384K from 4000:0 to 9000:FFFF) is to be used exclusively as conventional memory. The EMS driver is unable to use this area as page frames or EMS pages.

/X = aaaa-bbbb

specifies that certain range of memory should be excluded from EMS mapping. aaaa is the starting segment address of the range and bbbb the ending. You only need to specify an exclusive region if the EMS driver can not automatically detect it. For example, if there is a network adapter on your system that occupies memory from D0000 to D3FFF, then /X=D000-D3FF is appropriate.

/I = cccc-dddd

specifies that certain range of memory should be included in EMS mapping. cccc is the starting segment address of the range and dddd the ending. This option is useful if you want the EMS driver to use unused video area. For example, if there is a Hercules graphics adapter on your system, the memory area between A0000 and AFFFF is not used at all, parameter /I = A000-AFFF would then tell the EMS driver to use the area for mapping.

/T = tttt

specifies an area of extended memory in kilobytes to be reserved and not be used by the EMS driver. /T parameter is a convenient way to use portions of extended memory as expanded memory without resetting the DIP switches. For example, you are using a MegaLITH PLUS board as all "linear" memory ranging from 100000H to 4FFFFFFH and for some reason you need 1M byte EMS memory available, then /T=3072 would tell the EMS driver to reserve 3072K bytes extended memory and use the remaining 1024K bytes as expanded memory.

Notes:

1. *To use /T parameter, place MegaLITH.SYS before any other drivers that make use of extended memory in CONFIG.SYS.*
2. *This option is effective only for the memory on MegaLITH PLUS boards. It doesn't work with extended memory on the motherboard.*
3. *This option serves on a temporary basis. If you experience any conflict with this option, please set the DIP switches to their exact values.*

EXAMPLES USING MegaLITH.SYS

Example 1

To install the MegaLITH PLUS with the I/O port address set at 2E8H and page frame at C000H, insert the following line in the CONFIG.SYS as follows:

```
DEVICE = MegaLITH.SYS /B = C000 /P = 2E8 <Enter>
```

Example 2

To install three MegaLITH PLUS cards with I/O ports set at 208H, 258H or 2E8H, with the page frame address set at C400H, insert the following line in the CONFIG.SYS file:

```
DEVICE = MegaLITH.SYS /P = 208; 258; 2E8 /B = C400  
<Enter>
```

Example 3

If you install two MegaLITH PLUS cards with their I/O ports set at 258H and 268H while using the default page frame address of C000H, insert the following line into your CONFIG.SYS.

```
DEVICE = MegaLITH.SYS <Enter>
```

Note: We suggest that you specify the needed I/O ports, otherwise, data corruption will occur if you have other cards on ports 208H-209H and 218H-219H. To avoid this situation, include the /P option as follows:

```
DEVICE = MegaLITH.SYS /P = 258; 268 <Enter>
```

EMS ERROR MESSAGES

A. ERROR: Failed to install Expanded Memory Manager!

This message indicates EMS memory was not installed. A large variety of reasons could account for this error. Check the following:

1. Are two MegaLITH PLUS cards or other cards using the same I/O port address?
2. Are all memory modules properly installed?
3. Try booting the system with the motherboard's expansion bus running at a slower speed.
4. Try changing the memory modules, especially if the brand and speed of the chips are not listed in the Table of Tested Chips on Table 3-4.
5. If EMS memory will not install, you can test if the memory modules are good by changing the MegaLITH PLUS to all-linear-memory mode. If the board works properly for linear memory, the memory modules are good.
6. A contiguous (unbroken) 64K block of memory space could not be found in the 128K-range C0000H-DFFFFH memory address segments. This failure is due to a hardware conflict with other expansion cards in the system.
7. Several expansion cards that need the C and/or D memory segments are competing for a limited amount of address space. The most common occurrence of conflicting cards are EGA and VGA cards that are used in combination with some local area network cards.

B. Problems running EMS application programs.

1. Applications report no available expanded memory.

You may have assigned all of the EMS memory for a RAM disk or disk cache.

2. Application report EMS memory is available, but still gives a "memory full" error.

Spreadsheet programs like Lotus 1-2-3 Rel. 2.01 cannot store cells containing integers, blank cells, and alphanumeric text in EMS memory. Only floating point numbers can be stored in EMS. If your worksheet contains many non-EMS-capable data and only a few EMS-capable data, conventional memory can become filled even when EMS memory is available.

If you convert integers into decimal numbers, worksheets can more effectively use EMS memory.

USING VIRTUAL DISKS

DEFINITION

A virtual disk uses RAM to simulate a physical disk. With no mechanical parts, this disk can access speed much faster than a physical disk. Thus, if users place frequently used data files and programs in virtual disks, performance can be greatly improved.

The following describes how EMSDISK/CMMDISK/EXMDISK.SYS is used to prepare a virtual disk for your system. Normally, you should do this only once after setting up your PC.

EMSDISK.SYS, CMMDISK.SYS and EXMDISK.SYS are device drivers for virtual disks using EMS and conventional memory and extended memory, respectively. The EMSDISK.SYS or CMMDISK.SYS command line must be inserted into the CONFIG.SYS file. This configuration file tells DOS to install the RAM disk when the system boots up.

HOW TO USE THE VIRTUAL DISK

To implement or install a virtual disk to your system, copy the MegaLITH.SYS, CMMDISK.SYS, EXMDISK.SYS and EMSDISK.SYS files from the MegaLITH PLUS disk to the root directory of your boot disk. The EMSDISK.SYS requires the MegaLITH.SYS to run but isn't necessary for the CMMDISK.SYS and EXMDISK.SYS. Run INSTALL.EXE and specify the amount of memory you will allocate for your virtual disk. The INSTALL.EXE program will automatically update your CONFIG.SYS file.

VIRTUAL DISK ERROR MESSAGES

1. EMS driver not installed!

Check if the MegaLITH.SYS file is copied to the root directory of your boot disk.

2. Insufficient Conventional Memory!

Check if conventional memory is sufficient or available.

3. Insufficient Extended Memory!

Check if extended memory is sufficient or available.

4. Invalid Parameter Found!

Check if the command syntax is correct and whether the correct frame address and/or I/O port address are included.

USING THE PRINT BUFFER

The PSPOOL/PSPOOLA programs are print spoolers which provide queued print-out data to a parallel or serial printer during concurrent processing of other programs. Files to be printed will be loaded to the PSPOOL queue; the PSPOOL program will handle the output to the printer at printer speed. PSPOOL uses extended memory as a print buffer while PSPOOLA utilizes EMS memory as print buffer.

PSPOOL/PSPOOLA have the following features:

- Provide queued output of print data to either a parallel or serial printer.
- Allow you to define the size of the spooler queue.
- Allow stop/restart, and line per page controls.

SPOOLER INSTALLATION

To install PSPOOLA, copy the PSPOOLA file into the root directory of your boot disk. Run INSTALL.EXE from the backup copy of the MegaLITH PLUS disk. Specify the amount of memory you want to allocate as buffer for the printer. The AUTOEXEC.BAT file will automatically be updated by the INSTALL program. Reboot the system to activate PSPOOLA spooler.

PSPOOL/PSPOOLA PARAMETER SPECIFICATIONS

The PSPOOL(A) commands included in the AUTOEXEC.BAT file are only a small subset of all the available parameters. Many additional installation parameters are available for greater flexibility in print buffer setting. Listed and described below are these parameter specifications. For an on-screen summary of this information put the MegaLITH PLUS backup disk in drive A and type:

A: PSPLHELP

The full syntax for PSPOOL or PSPOOLA is:

PSPOOL LPTn:

```
[=COMn:][U=xxx][M=xxx][L=xx][S][C][R][I]  
[ON = OPTION][OFF = OPTION]
```

or

PSPOOLA LPTn:

```
[=COMn:][U=xxx][M=xxx][L=xx][S][C][R][I]  
[ON = OPTION][OFF = OPTION][P]
```

LPTn

Selects one of the three possible parallel ports, where n = 1, 2 or 3.

=COMn:

Redirects parallel printer output to a serial port. LPTn now responds as LPTn+1. Note that you must initialize the Asynchronous Communication Adapter by using the DOS MODE command before you select this option.

/U=xxx

This option reserves a minimum of xxxK bytes of memory for user application programs. If this option is omitted, PSPPOOL will reserve a minimum default program of 64K. This option is not applicable to PSPPOOLA.

/M=xxx

This option reserves a minimum of xxxK bytes of memory for the PSPPOOL queue. If this option is omitted, the default queue size is 64K. If =xxx is omitted, all available memory will be allocated to the PSPPOOL queue.

/L=xx

Sets the number of lines per page. Default is 66.

/S

Stops output of print data. No data will be lost and data output can be restarted by using the /C or /R option.

/C

Continues output of print data.

/R

Continues output of print data at the beginning of the current page.

/I

Immediately purges all data from the queue.

/ON

Turns on serial port handshake line protocol options.

/OFF

Turns off serial printer port handshake line protocol options.

The handshake line protocol options are XON, DCD, DSR, CTS. Default settings for ON = CTS, DSR; OFF = XON, DCD.

/P

Discards previous setting of print spooler in your MegaLITH PLUS EMS memory.

EXAMPLES USING PSPPOOL

The following examples are provided to help clarify how the PSPPOOL commands are used.

Example 1

PSPPOOL LPT1:
Spools print output to LPT1.

Example 2

```
PSPOOL LPT1:/U = 192/M
```

Spools print output to LPT1, reserves a minimum of 192K for the application program. Uses as much remaining memory space as possible for the spooler queue.

Example 3

```
PSPOOL LPT1:= COM1:/ON = CTS
```

Redirects to serial printer 1, with CTS handshake line protocol control.

USING THE SPOOLER

To use the spooler, use the print-screen command (Shift-PtrSc), or print file XYZ.LST from drive A to LPT1: by entering the following command:

```
A: COPY A:XYZ.LST LPT1:
```

At this point, you can resume work on your computer while PSPOOL is printing out the specified data files.

PSPOOL/PSPOOLA ERROR MESSAGES

PSPOOL/PSPOOLA error messages are described below:

1. PRINTER NOT AVAILABLE

No such printer port in the system, or the printer is not on line.

2. INVALID PARAMETER SPECIFIED

This indicates that an invalid parameter has been specified.

3. CANNOT BE REDIRECTED

Redirect parameter error.

4. NO AVAILABLE MEMORY SPACE

This indicates that there is no available memory space for printer queue.

APPENDIX A

LINEAR MEMORY MODE

The MegaLITH PLUS software does not generate linear memory error messages. However, the most common linear memory problems are due to the following:

- A. The memory starting address is incorrectly set at SW1 and SW2. Usually, the system will lock up while booting, and the power-on memory count will be incorrect. Double-check the amount of memory in your system before installing the MegaLITH PLUS. Recalculate the starting address. Confirm the switch settings.
- B. The memory modules are incorrect, or the system speed is too fast.

APPENDIX B

MEGALITH PLUS MEMORY IMPLEMENTATION

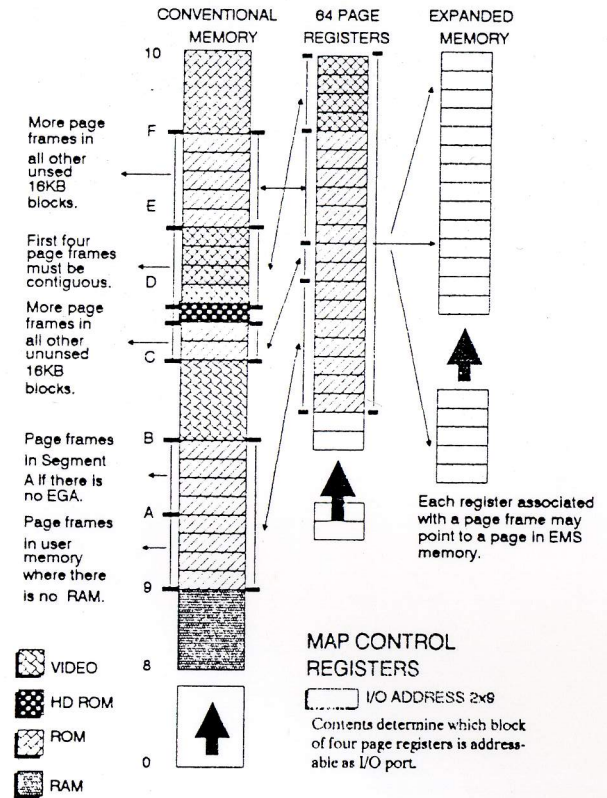
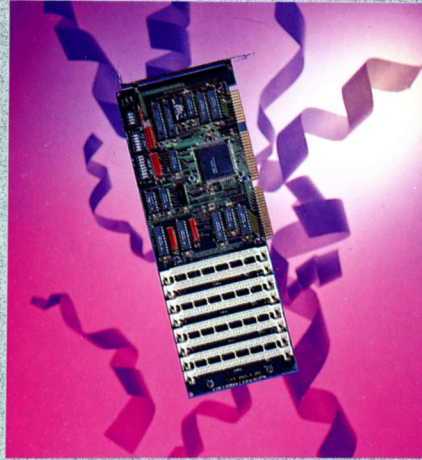


FIGURE B-1. MegaLITH PLUS MEMORY IMPLEMENTATION



MegaLITH Plus is a high speed, cost-efficient, 16-bit memory board that provides a total of 8MB of memory using SIM Modules. Memory can be all expanded, all conventional/extended or a combination of both types of memory. Works with DOS, Novell, OS/2, XENIX, DESQview, Concurrent DOS XM and other operating systems.

D141-1