2MM/GS

(80286 MAINBOARD)

INSTALLATION GUIDE

2MM/GS

(80286 MAINBOARD)

INSTALLATION GUIDE

3. Setup/Diagnostics

4. AMI BIOS POST Messages

1. Introduction

General Description

The 2MM/GS mainboard, built around the Intel 80286 microprocessor, is a cost effective system board, designed to provide the primary elements for building advanced personal computers.

Designed to utilize two state of the art highly integrated CMOS VLSI chips, the board dimensions have been reduced to half the size of an ordinary AT system board.

Offering 100% PC AT compatibility, its flexible architecture, capable of high speed memory page interleaving and multi-tasking / multi-user capabilities, allows it to be used in a wide variety of advanced computing environments.

Specifications

CPU : 80286-16

CPU Speed : 16MHz

Coprocessor : 80287-8/10/12 (Optional)

RAM : Flexible combinations of from 512KB to 5MB 4 way page/interleaved LIM 4.0 compatible memory on board

: Memory Design supports 44256 DRAM chips as well as 256KB and 1MB DRAM SIMM Modules.

Memory

ROM

The ROM BIOS is located in one 64KB 27512D chip. It resides at the upper 64KB address space in the 1st megabyte (from F0000 - FFFFF). It is also mapped to the uppermost 64KB of extended memory space when the processor switches to protected mode. In protected mode, the BIOS can be accessed at either location.

The ROM BIOS chips access memory 8 bits at a time. Since this is slower than 16 bit DRAM access, system throughput can be significantly increased by 'shadowing' (copying), the BIOS to the much faster DRAM. This is accomplished by 'enabling Shadow RAM' via the BIOS Setup Program (see Chapter 3, "Setup", for details).

Note: *Microsoft GW-BASIC and the GW-BASIC interpreter should be used with this board, since ROM does not contain code for IBM BASIC, or the BASIC interpreter.*

RAM

The mainboard supports up to 5MB of on board system memory. Memory is divided into four banks. Banks 0 and 1 support 256Kbit x 9 DIP DRAM memory chips. Banks 2 and 3 support 256Kbit x 9 and 1Mbit x 9 SIMM DRAM modules. In each case, eight bits are used to handle memory access, while one bit is used for parity checking. 80ns DRAM chips and/or modules must be used.

Different memory configurations can be arrived at depending on the number of banks filled, and whether 256K or 1M SIMM modules are used in banks 2 and 3.

Memory Mapping

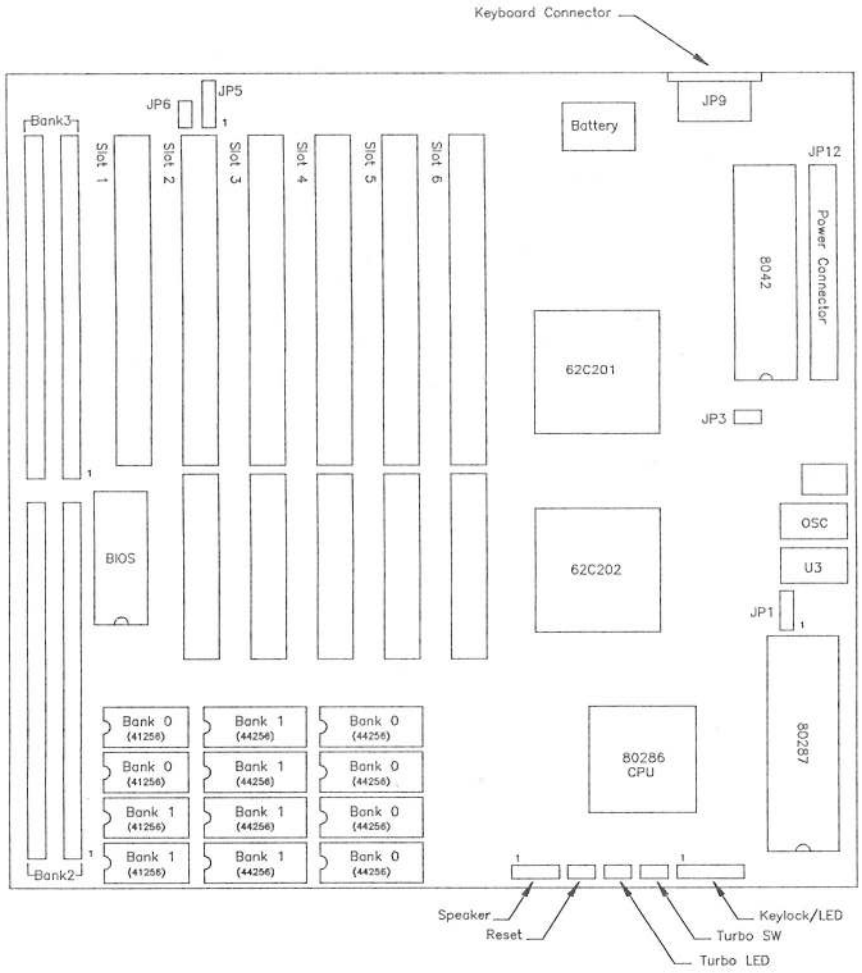
The PC/AT architecture utilizes a 24 bit, byte oriented, memory addressing scheme. The memory address allocation of this 16MB space is summarized as follows:

From – To	Description
000000 – 09FFFF	640KB of system memory on the system board
0A0000 – 0BFFFF	128KB of video RAM space reserved for the graphics display buffer.
0C0000 – 0DFFFF	128KB of I/O expansion ROM space reserved for I/O adapter ROM.
0E0000 – 0EFFFF	64KB reserved on the system board. This address space is aliased at FE0000 thru FEFFFF.
0F0000 – 0FFFFF	64KB of BIOS ROM on the system board. This address space is aliased at FF0000 thru FFFFFF.
100000 – FDFFFF	Extended memory up to the maximum (14MB plus 896KB) on the system board. The address space not used for system board memory is available for I/O channel expansion memory.
FE0000 – FEFFFF	64KB reserved on the system board.
FF0000 – FFFFFF	64KB of BIOS ROM on the system board.

This Page Intentionally Left Blank

2. Installation

Fig. 2-1 Mainboard Diagram



JP3 Display Type Select

JP3 provides an interface to select the type of monitor being used. Set JP3 according to the table below:

Pins	Function
Open*	Mono
Short	CGA

Note: *If an EGA or VGA display card is installed, it doesn't matter what this jumper is set to.*

JP5 External Battery Connector

The 2MM/GS mainboard has an internal 3.6V battery which provides back up power to the Real Time Clock when the power is off. JP5 provides an interface to connect an external battery. If an external battery is connected, set JP6 accordingly.

Pin assignments are as follows:

Pin	Function
1	+6V or +4.5V
2	Not Used
3	Ground
4	Ground

Note: *When the battery is changed, the data saved in the Real Time Clock RAM may be lost. If this occurs, use the CMOS Setup Program (see Chapter 3) to reset the system configuration.*

JP6: Internal/External Battery Select

JP6 provides an interface to select the CMOS back up battery source. If an external battery is used, connect it to pins 1 and 4 of JP5. Set JP6 according to the table below:

Pin	Function
Short*	Internal
Open	External

JP9: Keyboard Connector

JP9 provides an interface for connecting a keyboard. Pin assignments are as follows:

Pin	Function
1	Keyclk (clock)
2	Keydat (data)
3	N.C.
4	Ground
5	+5V

JP12: Power Connector

JP12 provides an interface for the power supply. Pin assignments are as follows:

P8		P9	
Pin	Function	Pin	Function
1	Power Good	7	Ground
2	+5V	8	Ground
3	+12V	9	-5V
4	-12V	10	+5V
5	Ground	11	+5V
6	Ground	12	+5V

Speaker: Speaker Connector

Pin assignments are as follows:

Pin	Function
1	Speaker Signal
2	VCC
3	Speaker Signal
4	VCC

Reset: RESET Switch Connector

This interface connects to the RESET switch on the front panel. When the Reset switch is pressed, it has the same effect as turning the power off and on.

TurboLED: Turbo LED Connector

This interface connects to the Turbo LED on the front panel. The Turbo LED lights to indicate that the system is in Turbo mode.

TurboSW: Turbo Switch Connector

This interface connects to the Turbo Switch on the front panel. This is a push button switch. The 'in' position selects fast (turbo) speed; the 'out' position selects slow (normal) speed.

Power LED/Keylock Connector

The Power LED/Keylock Connector has two functions. One is to indicate power On/Off; the other provides the interface for connecting an electrical interlock (key activated switch) to lock up the keyboard.

The 'Power On' indicator LED is lit while the power is on.

If the keyboard inhibit pin is grounded by the keylock, input from the keyboard is suppressed.

Pin	Function
1	Power On LED
2	Polarizing Key (pin removed)
3	Ground
4	Keyboard Inhibit
5	Ground

Turbo Mode

Turbo Mode makes use of a dual clock, allowing the system to operate at two speeds. In slow, **normal mode**, the clock speed is 8MHz. In fast, **turbo mode**, the clock speed is 16MHz.

System speed (Turbo or Normal Mode) is both hardware and software selectable. Hardware selection is accomplished by a 'Turbo Switch' found on the front panel of the system unit housing. Software selection is accomplished via the keyboard. The key combinations are as follows:

<Ctrl><Alt><->	**Switches to Normal Mode**
<Ctrl><Alt><+>	**Switches to Turbo Mode**

Note: *Keyboard selection of system speed can only be accomplished when the Turbo Switch is set for 'normal mode'. If the Turbo Switch is set for 'turbo mode', the key combinations have no effect.*

Memory Configuration

The 2MM/GS mainboard supports up to 5MB of LIM EMS V 4.0 compatible memory, all on board. There are four RAM memory banks; two banks for DIP DRAM chips (labeled Bank0 and Bank1), and two banks for SIMM memory modules (labeled Bank2 and Bank3). Refer back to Fig. 2-1 for the location of the memory banks.

Each DIP bank is comprised of four sockets for 44256Kbit DIP DRAM chips and two sockets for 41256 DIP DRAM chips. The 44256Kbit chips are used to handle memory access; the 41256Kbit chips are for parity check.

Each SIMM bank consists of two slots. The SIMM banks support both 256Kbit X 9 and 1Mbit X 9 DRAM modules. In each case, eight bits are used to handle memory access, while one bit is used for parity checking.

When adding memory, an entire bank must be filled. In the case of the SIMM banks, this means both slots; only filling one slot is not allowed. The banks must also be filled in order (Bank0 must be filled before installing memory in Bank1, Bank1 must be filled before installing memory in Bank2, etc.). 80ns DRAM must be used.

Depending on the chip size and the number of banks filled, the following memory configurations can be arrived at:

#	Bank Configuration				Total
	Bank0	Bank1	Bank2	Bank3	Memory
1	256K	X	X	X	512KB
2	256K	256K	X	X	1MB
3	256K	256K	256K	256K	2MB
4	256K	256K	1M	X	3MB
5	256K	256K	1M	1M	5MB

Note: *To configure expanded memory, see Chapter 3, "Setup."*

DRAM Installation

Installing DRAM Chips

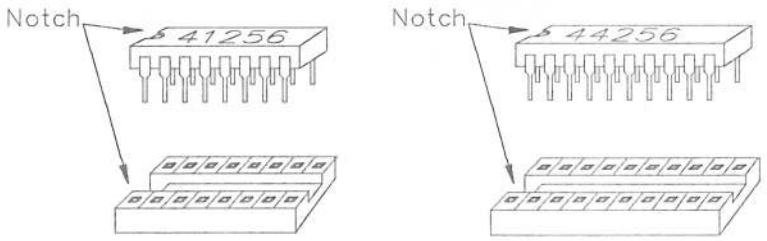
To install a DRAM chip do the following:

1. Hold the chip up so that its alignment notch lines up with the notch on the socket.

Note: *The 41256 chip is shorter than the 44256 – make sure you have the chips aligned with the correct sockets.*

2. Line the pins on the chip up with the socket holes, then lower the chip until the pins engage the holes.
3. Use firm, gentle, pressure to press the chip into the socket until it is fully seated. See Figure 2-2.

Fig. 2-2 DIP RAM Installation

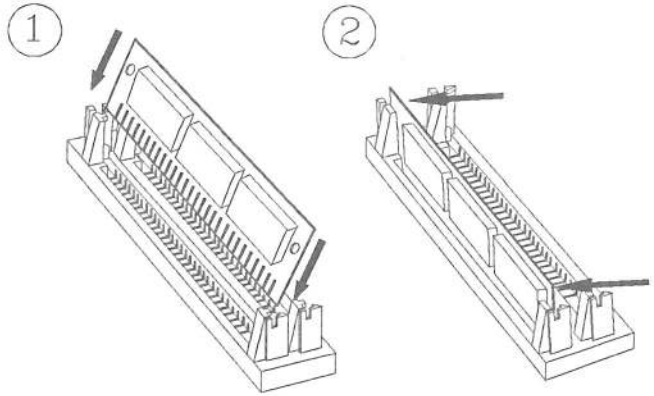


SIMM Module Insertion

To install a SIMM module, do the following:

1. Starting with the first empty slot closest to the center of the board, hold the memory module at an angle with the component side facing in toward the board. Line the 'golden fingers' on the module up with the sockets on the banks, and the alignment holes on the module with the alignment pins on the bank.
2. Use firm, gentle pressure to rotate the top of the module toward the alignment pins until it snaps into place. See Fig. 2-3.

Fig. 2-3 SIMM Module Installation



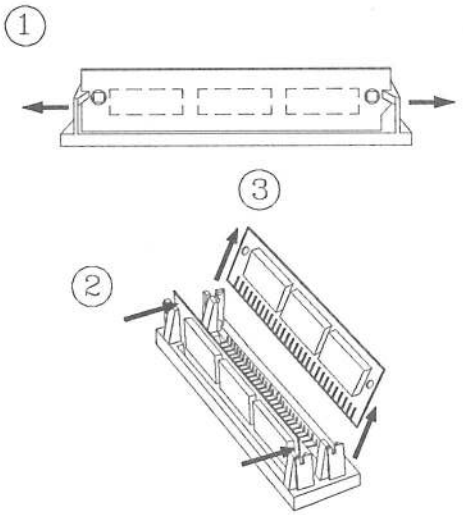
3. Repeat the procedure for any additional modules.

SIMM Module Removal

To remove a SIMM module, do the following:

1. Use your thumbs to pull the retaining tabs away from the sides of the module.
2. At the same time, use your fingers to push the module away from the alignment pins until it snaps free.
3. Remove the module from the socket. See Fig. 2-4.

Fig. 2-4 SIMM Module Removal

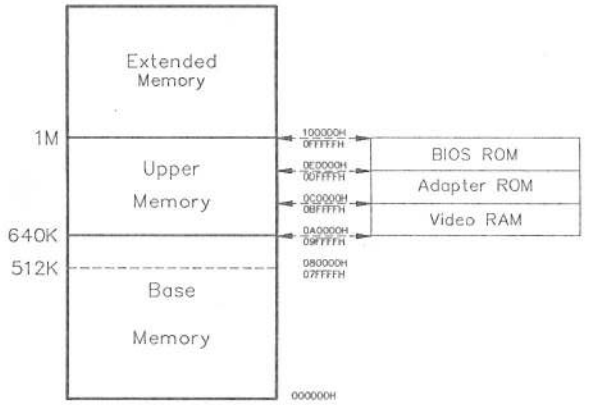


Shadow RAM

System memory (RAM) is composed of three areas; base memory, upper memory, and extended memory. Base memory refers to the memory range from 0KB up to 640KB. Upper memory consists of the memory range that falls between the base and 1MB. Extended memory is all the memory above 1MB.

For application program purposes, MS-DOS (the Disk Operating System), only makes use of base memory. It reserves specific locations in the upper memory address range for system BIOS, Video BIOS and expansion card ROM use. See Fig. 2-5.

Fig. 2-5 RAM Allocation



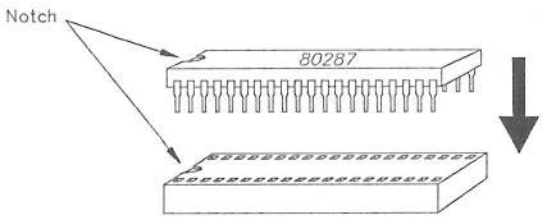
The 2MM/GS mainboard uses part of the 384KB of upper memory that lies between 640KB and 1MB for Shadow RAM. "Shadowing" refers to copying the Main System BIOS and/or Video BIOS from slow ROM into fast RAM. Since ROM chips are addressed only 8 bits at a time, copying their routines to 16 bit RAM, results in a very significant increase in total system speed (throughput). Use the BIOS Setup Program to enable Shadow RAM. See Chapter 3 for details.

Coprocessor Installation

An EMC (Extended Mathematic Coprocessor) socket is provided for the installation of an optional Intel 80287 8/10/12 floating point coprocessor. To install a coprocessor do the following:

1. Hold the coprocessor so that its alignment notch lines up with the notch on the socket.
2. Line up the pins on the chip with the socket holes, then lower the chip until the pins engage the holes.
3. Use firm, gentle, pressure to press the coprocessor into the socket until it is fully seated. See Figure 2-6.

Fig. 2-6 Coprocessor Installation



4. Set JP1 to reflect the type of coprocessor installed. See p. 2-3 for details.

3. Setup/Diagnostics

Start Up

Each time the system is powered on, a message stating the BIOS version is displayed and the system automatically goes through a self test of its memory, configuration and hardware devices to be sure everything is working properly (The ROM-BIOS Power On Self Test', or POST).

If the system encounters an error, it displays a message to tell you what the problem is and prompts you to press the DEL key to run the SETUP/DIAGNOSTICS Program.

The SETUP/DIAGNOSTICS Program allows you to redefine the System's configuration settings to the BIOS, and thus eliminate the source of the error.

The first test checks the system memory. The amount of memory that has been successfully tested is counted off on the screen.

To speed up the process of getting started, the memory test can be bypassed by pressing the Esc key when the message "Press <ESC> to bypass MEMORY test" is displayed.

Immediately after the memory test, the following message is displayed:

"Press <DEL> if you want to run SETUP or DIAGS"

- To access the SETUP/DIAGNOSTICS Program, press <DEL>.
- If you don't want to run the SETUP/DIAGNOSTICS Program, don't press anything. The system automatically moves on to the boot up procedure.
- If you do press <DEL>, the screen display changes as follows:

```
EXIT FOR BOOT
RUN CMOS SETUP
RUN DIAGNOSTIC
```

'EXIT FOR BOOT' is highlighted. If you change your mind and don't want to run the SETUP/DIAGNOSTICS Program, press <ENTER> to exit and move on to the boot up procedure.

To access the SETUP Program, use the Up and Down Arrow Keys (↑ ↓) to move the highlight bar to 'RUN CMOS SETUP', then press <ENTER>.

To access the DIAGNOSTICS Program, use the Up and Down Arrow Keys (↑ ↓) to move the highlight bar to 'RUN DIAGNOSTIC', then press <ENTER>.

The CMOS SETUP Program

The CMOS SETUP program allows you to set the following system parameters:

- Date
- Time
- Floppy Disk Type For Drive A
- Floppy Disk Type For Drive B
- Hard Disk Type For Drive C
- Hard Disk Type For Drive D
- Primary Display Type
- Keyboard
- BIOS Shadow Option
- Scratch RAM Option
- Coprocessor Wait States
- Fast/Normal Page Mode
- EMS Enable/Disable

When you access the SETUP Program, you are shown the SETUP Menu. A screen, much like the one on p. 3-4, is displayed.

Note: *The screen display is for example purposes. The information on your screen may differ according to how your system has been configured.*

```
CMOS SETUP (C) Copyright 1985-1990, American Megatrends Inc.,

Date (mn/date/year): Tue, Apr 02 1991      Base memory size  : 640 KB
Time (hour/min/sec): 10 : 33 : 27          Ext. memory size  : 384 KB
Floppy drive A:    : 1.2  MB, 5¼"          Numeric processor : Not Installed
Floppy drive B:    : Not Installed

                                  Cyln  Head  WPcom  LZone  Sect   Size
Hard disk C: type  : 2            615   4     300    615    17     20 MB
Hard disk D: type  : Not Installed
Primary display    : VGA or EGA
Keyboard           : Installed
BIOS shadow option : Main Shadow
Scratch RAM option : 1
Co-processor wait  : Disabled
Fast Page mode     : Disabled
EMS function       : Disabled

Month : Jan, Feb,.....Dec
Date  : 01, 02, 03,...31
Year  : 1901, 1902,...2099

ESC = Exit, ↓ → ↑ = Select, PgUp/PgDn = Modify
```

Sun	Mon	Tue	Wed	Thu	Fri	Sat
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	1	2	3	4
5	6	7	8	9	10	11

General Information

The screen is divided into several different areas. The important areas for making changes are:

- The large work area in the center left of the screen where the configuration settings are displayed and where you will make your changes.
- The smaller highlighted 'option' area just below it, where information about the various choices available for each entry are displayed. The information in this area changes depending on the entry you are currently at in the work area.
- The very bottom of the screen where information about the keys used to make changes is given.

Making Changes

1. Use the Arrow Keys (← ↑ ↓ →) to move the highlight bar to the entry you wish to change.
2. Once you have selected an entry with the highlight bar, look at the option area to see what your choices for this entry are.
3. Press the <PgUp> or <PgDn> key until the choice that you want is displayed in the work area highlight bar.
4. When the displayed information is correct, use the Arrow Keys (← ↑ ↓ →) to move on to the next entry to change.
5. When you have made all the changes you want, press <Esc>.
6. After you press <Esc>, a prompt is displayed in the option area asking if you want to have the new settings written into the CMOS and exit the SETUP Program.
7. If you change your mind, or feel the information is still not correct, press <N> then <ENTER>. You will return to the SETUP Menu and can go through the choices again to make the necessary changes.
8. If the information is correct, press <Y> then <ENTER>. The system will boot using the new information for its configuration settings.

Notes Concerning The Configuration Fields

Date:

The day of the week changes automatically when you change the numerical date.

Time:
Time is configured according to a 24 hr. clock:
1:30 AM = 01:30:00
1:30 PM = 13:30:00

Floppy Drive A:

To configure a system that doesn't have a floppy controller, choose the 'Not Installed' option. That way the BIOS will not check the floppy controller and not report any error.

Floppy Drive B:

See the explanation for Floppy Drive A.

Hard Disk C:

Every hard disk has a type number that identifies its characteristics (Cylinders, Heads, etc.). Each drive type's characteristics are automatically displayed in a table to the right of each drive type number. This information changes as the drive type number changes.

If you know your drive's characteristics but do not know its drive type number, you can select the drive type by using the PgUp or PgDn key to scroll through the table until the characteristics for your drive are displayed.

If you have a drive that is not defined in the drive type table (types 1 to 46), choose 47 'User Defined', as your drive type number. Then key in the table information yourself (Cyl, WPcom, LZone, Sec, Size). If you have a user defined hard disk, and encounter a situation in which the operating system is unable to find it, set the 'Scratch RAM Option', (see below), to '2'.

Hard Disk D:

See the explanation for Hard Disk C.

Primary Display:

To configure a system that does not have a display connected (e.g., non-dedicated file servers), choose the 'Not Installed' option. That way the BIOS will not report a 'Video Error' and will not ask you to press <F1> during system boot.

Keyboard:

To configure a system that does not have a keyboard connected (e.g., non-dedicated file servers), choose the 'Not Installed' option. That way the BIOS will not report a 'Keyboard Error' and will not ask you to press <F1> during system boot.

BIOS Shadow Option

Choices are 'Main Shadow', 'Video Shadow' and 'Disabled'. Main Shadow copies the Main System BIOS from slow ROM to fast RAM. Video Shadow copies the Video BIOS from slow ROM to fast RAM. Disabled disables shadowing of both. In general, 'Main Shadow' is the preferred choice. See page 3-9 for an explanation of RAM Shadowing.

Scratch RAM Option

The default setting for this item is 1. Unless there is a particular reason to change this setting (if you have a User Defined hard disk and encounter a situation in which the operating system is unable to find it, for example), leave the setting at 1.

Coprocessor Wait

Choices are 'Enabled' or 'Disabled'. Unless you experience timing conflicts, 'Disabled' is the preferred choice.

Fast Page Mode

Choices are 'Fast Page Mode' and 'Normal Page Mode'. Unless you experience timing conflicts, 'Fast Page Mode' is the preferred choice.

EMS Function

Choices are 'Enabled' or 'Disabled'. You must have at least 1MB of RAM, and the GS03EMM.SYS EMS driver must be installed in order to utilize this function. See page 3-10 for information on installing the GS03EMM.SYS EMS driver.

Finishing Up

After you have gone through all the fields and made your choices, go back to step 5 on p. 3-5 to finish up.

RAM Shadowing and RAM Relocation

Memory configurations can be from 1 to 5MB on board. Memory is composed of three areas; base memory, upper memory and extended memory. Upper memory is the area of memory that exists between the base and 1MB. For application programs, DOS only makes use of the base memory area, ignoring anything that lies above the base. Since the highest that base memory can be is 640KB, the 384KB of upper memory on the 2MM/GS mainboard is ignored by DOS. This "ignored" range does not have to be wasted, however:

- 64KB can be used to 'Shadow' either the Main System BIOS or the Video BIOS via the AMI BIOS Setup program. See p. 3-7, for details.
- If EMS is 'Enabled', and the GS03EMM.SYS EMS driver is installed, any or all 384KB can be 'relocated' above 1MB where it can be used for expanded memory purposes. If you do this, you can shadow both the Main System BIOS and Video BIOS. See p. 3-10, for details.

Note: *Shadowing refers to copying the slow ROM routines into fast RAM. Since RAM speed is at least twice as fast as I/O speed, this results in a significant increase in total system speed (throughput). Unless there is a conflict with one of your application programs it makes sense to 'enable' it.*

If EMS is 'Enabled', and the GS03EMM.SYS EMS driver is installed, shadowing can only be enabled via the GS03EMM.SYS EMS driver.

The EMS Driver

A device driver, GS03EMM.SYS, provided on the Utility Diskette, can be used to translate upper and extended memory to expanded memory.

Installation

To install the EMS device driver do the following:

1. Add the following statement to your CONFIG.SYS file:

   DEVICE = [d:][path]GS03EMM.SYS [options]

   Where:

   d: : is the drive GS03EMM.SYS is located on*

   path : is the directory path to where GS03EMM.SYS is located*

   options : represents optional configuration parameters, explained below.

   * *Not necessary if GS03EMM.SYS is in the root directory of the boot drive*

2. Specify that EMS is 'Enabled' in the BIOS Setup program. See p. 3-8 for details.

Configuration Options

If no options are specified, GS03EMM.SYS will convert all available extended memory from segment C000 – DFFF to EMS memory, and load itself into expanded memory segment F400–F7FF. If it finds a BIOS routine in any of the segments, that segment will be disabled for EMS use. To modify the default values, any of the following four configuration options may be added as a switch at the end of the command line:

/E:# EMS page mode

Where # specifies the maximum number of pages

#	Page Frame Address	Max Pages
0	C000-DFFF	8
1	C000-EFFF	12
2	4000-7FFF	32

/R:# Shadow RAM Area Set

This option allows you to specify areas of memory that GS03EMM.SYS will use to shadow the main system and/or video BIOS.

#	Address
0	C000
1	C400
2	C800
3	CC00
4	F000 – F7FF
5	F800 – FFFF

/U:# User Memory Reserved Area

This option allows you to specify areas of memory that GS03EMM.SYS cannot use for expanded memory.

#	Address
0	C000
1	C400
2	C800
3	CC00
4	D000
5	D400
6	D800
7	DC00

/X:# Driver HMA set

This option selects the memory address where the EMS driver is loaded.

#	Location
0*	F400 – F7FF
1	Base Memory
2*	EC00-EFFF

** Choices 0 and 2 are in the upper memory range. Loading GS03EMM.SYS to either of these locations saves 16K of base memory.*

Examples

Example 1:

DEVICE = GS03EMM.SYS

This is the default setting. All available memory above 640K is used as expanded memory, there is no shadow RAM, and GS03EMM.SYS is loaded at F400–F7FF.

Example 2:

DEVICE = GS03EMM.SYS /R:0 /R:5

This configuration specifies that memory area C000 – C3FF will be used for Video BIOS shadow RAM, memory area F800 – FFFF will be used for Main System BIOS shadow RAM, and that GS03EMM.SYS is loaded at F400–F7FF.

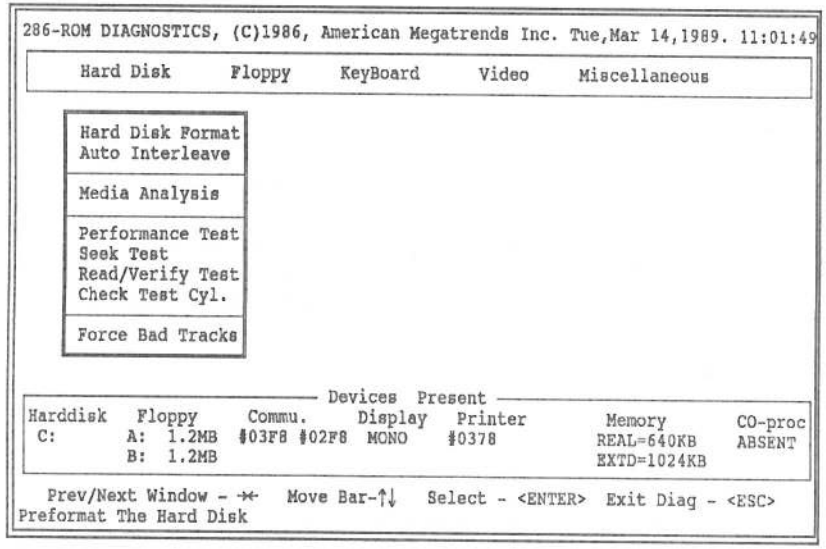
Example 3:

DEVICE = GS03EMM.SYS /U:0 /U:5 /X:1

This configuration specifies two memory areas (C000 and D400), that GS03EMM.SYS cannot use, and loads GS03EMM.SYS in base memory.

The DIAGNOSTICS Program

When you access the DIAGNOSTICS Program you are shown the following Main Menu:



Starting from the top of the screen and working down, the following categories are observed:

The DIAGNOSTICS Main Menu

The Top Line:

Information about the BIOS version; the date; and the time are displayed.

Main Menu Line:

Just below the top information line is the Main Menu line. It is from these Main Menu choices that you select the diagnostics operations to perform.

Use the Left and Right Arrow Keys (→←) to move the highlight bar to select the item you want.

The Submenus:

As each Main Menu choice is highlighted, submenu choices for specific operations pop up in the center of the screen.

Use the Up and Down Arrow Keys (↑ ↓) to move the submenu highlight bar to select the operation you wish to perform, then press <ENTER> to begin.

The Device Display Box:

Just below the submenu area is a box that indicates which devices the CMOS recognizes as being present.

The Highlighted Prompt Bar:

This line gives you information about the functions of the Cursor Movement keys, the ENTER key, and the ESC key.

- Pressing <ENTER> accepts a submenu choice and begins the indicated procedure.
- Pressing <ESC> aborts an operation, and returns you to the previous menu.

The Bottom Line:

Gives you a brief explanation as to what procedures the highlighted menu choices will perform.

The Submenu Functions

To activate any of the submenu choices, move the highlight bar to it and press <ENTER>.

The Hard Disk Submenu

Hard Disk Format:

This option formats a hard disk drive. If only one hard disk drive is installed, it is assumed to be drive C.

When you access this function, you will see a screen asking you to provide the following information:

- Disk Drive (C /D):
  - The default value is Drive C
- Disk Drive Type
  - The default value for the drive type is the value set during the CMOS SETUP.
  - If the disk drive type does not fall within the 46 standard disk types, use the USER option to define the drive parameters.
- Interleave Factor:
  - Choose an optimum interleave factor.
- Mark Bad Tracks:
  - The default for this specification is <N>.
  - If the HDD manufacturer has noted that certain sectors are bad, enter <Y>. You are then taken to a screen which allows you to specify where the bad tracks are.
  - After specifying the bad tracks, select 'Save And Exit'.
  - You can abort and exit at any time before 'Save And Exit' by pressing <ESC>.

- Start Cylinder Number:
  - The default value is 0.
  - To override the default, enter the Start Cylinder Number of your choice.
- End Cylinder Number:
  - The default value is the value of the maximum cylinder number.
  - To override the default, enter the End Cylinder Number of your choice.
- Start Head Number:
  - The default value is 0.
  - To override the default, enter the Start Head Number of your choice.
- End Head Number:
  - The default value is the value of the maximum number.
  - To override the default, enter the End Head Number of your choice.
- Proceed (Y/N):
  - The default is <N>.
  - If there are incorrect entries, press <N> to go through the choices again. If all the entries are correct, press <Y>.
  - If your answer to "Proceed" is <Y>, a NOTE message is displayed to give you a chance to change your mind.
  - Continue with the format procedure only if you are absolutely sure about the information you have entered up to this point.

› Activity Screen:
  - Once you press <Y>, the Hard Disk is formatted according to the parameters you specified.
  - During formatting, the screen displays the operations in progress, and the Cylinder & No. that is being formatted.

Pressing <ESC> at any time will abort any of the format operations described above.

Auto Interleave Option:

This very powerful feature enables you to get peak performance from the Hard Disk.

The optimum Interleave value is automatically calculated, and the Hard Disk is formatted using this value.

Before proceeding with this operation, a NOTE message is displayed to give you a chance to change your mind.

Continue with the procedure only if you are absolutely sure about the information you have entered up to this point.

Media Analysis Option:

Performs the following operations on the Hard Disk:

› Preformats the Hard Disk with specified parameters (e.g. Format Option).
› Analyzes the surface of the Hard Disk for any errors.
› Marks Bad Sectors.

Before proceeding with this operation, a 'NOTE' message is displayed to give you a chance to change your mind.

Continue with the procedure only if you are absolutely sure about the information you have entered up to this point.

Performance Test:

Tests disk performance.

The Data Transfer Rate & the Track to Track Seek time are determined. The Data Transfer Rate is measured in Kilobytes/Second, and the Track to Track seek time is measured in milliseconds.

The higher the value for the Data Transfer Rate, the better the disk performance. The lower the value of Track to Track Seek Time, the better the disk performance.

Seek Test:

Tests the Hard Disk seek capability over a specified Cylinder and range. First a sequential seek is performed and then a random seek is performed.

Read/Verify Test:

Tests sequential and random read operations, and verify operations over a specified Cylinder and range.

Force Bad Tracks:

Defines a set of tracks as being "bad."

Before proceeding with this operation, a NOTE message is displayed to give you a chance to change your mind.

Continue with the procedure only if you are absolutely sure about the information you have entered up to this point.

The Floppy Submenu

Floppy Format:

Tests the controller's ability to format a diskette. It is not necessary to specify the diskette type while formatting.

Drive Speed Test:

Determines the drive's speed of rotation. The following are the allowable speeds for the various drives:

1.2MB drive	:360 rpm with a 1.2MB diskette.
	300 rpm with a 360KB diskette.
360KB drive	:300 rpm
1.44MB drive	:360 rpm with a 1.44MB diskette.
	300 rpm with a 720KB diskette
720KB drive	:300 rpm

A tolerance of ±1% on all speeds is allowed.

Random Read/Write Test:

Performs a random read/write operation on the diskette to check the drive's random seek capability. Be sure to use a diskette that has been formatted when performing this test.

Sequential Read/Write Test:

Performs a sequential read/write operation to check the drive's sequential seek, and read/write capability.

Disk Change Line Test:

This test is valid only for drives having the disk change line feature, namely:

- 1.2MB 5.25" drive
- 720KB or 1.4MB 3.5" drive

This test checks whether the status of the disk change line changes when a diskette is inserted/removed from a drive.

The Keyboard Submenu

Scan/ASCII Code Test:

Confirms that the keyboard keys agree with the information transmitted to the computer—what you type is what you get.

When this function is accessed, a blank keyboard layout is displayed on the screen. (This layout may differ somewhat from your keyboard).

As each key on your keyboard is pressed, the blank that represents it on the screen changes to display it, and its Scan & ASCII Codes are also displayed.

If you wish to abort the test, press <CTRL><BREAK>.

The Video Submenu

Run All Tests:

Runs all the tests listed in this submenu.

Adapter Test:

Tests the Display Memory.

Attribute Test:

Tests the attributes of the Display memory.

80 x 25 Display Test:

Tests the 80 x 25 character set of the display adapter.

Miscellaneous Diagnostics

Printer Adapter Test:

This test causes the printer to print out a sample of its characters to determine if what appears on the screen corresponds to what is printed out.

Serial Communication Port Test:

This test requires that a special RS-232 connector be plugged into the serial port. The following configurations are checked:

- Baud Rate
- 7 Bit / 8 Bit
- Odd / Even Parity

The results of the tests are displayed on the screen.

4. AMI BIOS POST Messages

POST Messages

The Power-On Self Test (POST) runs each time the system is turned on. The POST checks memory, the CPU, the display monitor, the keyboard, the disk drives, and other installed options

If it finds an error condition, it displays a message on the screen to inform you of the problem. The following table lists the screen messages, indicates the possible cause of the problem, and suggests steps you can take to remedy the situation.

POST Boot Messages

Message	Possible Cause	Solution
Diskette configuration error.	The specified disk configuration is not supported.	Change the disk to one that is supported.
Diskette drive reset failed.	The diskette adapter has failed.	Check the diskette adapter.
Diskette drive 0 seek failure.	Drive A has failed or is missing.	Check drive A.
Diskette drive 1 seek failure.	Drive B has failed or is missing.	Check drive B
Diskette read failure; strike F1 to reboot.	The diskette is either not formatted or is defective.	Replace the diskette with a bootable diskette and try to reboot.

Message	Possible Cause	Solution
No boot sector on hard disk; strike F1 to reboot.	Drive C is not formatted or is not bootable.	Format drive C if it is not already formatted.
		If drive C is already formatted, install the DOS System to make it bootable.
Not a boot diskette, replace and strike F1 to reboot.	The diskette in drive A is not formatted as a bootable diskette.	Replace the diskette with a bootable diskette and reboot.
No timer tick interrupt.	The timer chip has failed.	Check the timer chip on the system board.
xxxx optional ROM bad. Checksum = *xxxx*.	The peripheral card contains a defective ROM.	Replace the peripheral card.
Shutdown failure.	The keyboard controller associated logic has failed.	Check the keyboard controller.
Time-of-day clock stopped.	The CMOS time-of-day clock chip has failed.	Run the SETUP utility.
Time-of-day not set; please run SETUP program.	Clock not set.	Run the SETUP utility.
Timer or interrupt controller bad.	Either the timer chip or the interrupt controller is defective.	Check the timer chip or the interrupt controller on the system board.
Unexpected interrupt in protected mode.	The non-maskable interrupt (NMI) port can't be disabled.	Check the system board, particularly the logic associated with the Nonmaskable Interrupt.

POST Information Messages

Message	Meaning
xxxx Base Memory.	The amount of base memory successfully tested.
xxxx Expanded Memory.	The amount of expanded memory successfully tested.
xxxx Extended Memory.	The amount of extended memory successfully tested.
xxxx Extra Memory.	The amount of extra memory successfully tested.
xxxx Standard Memory.	The amount of standard memory successfully tested.
Decreasing available memory.	This message immediately follows any memory error message, and informs you that the memory chips are failing.
Memory tests terminated by keystroke.	This message indicates that you have pressed the Spacebar while the memory tests were running. This stops the memory tests.
Strike the F1 key to continue.	This message indicates that an error was found during POST. Pressing the F1 key allows the system to attempt to boot.

Type	Cylinders	Heads	Write Precomp	Landing Zone	Sectors	Capacity (MB)
25	925	9	65535	925	17	69
26	754	7	754	754	17	44
27	754	11	65535	754	17	69
28	699	7	256	699	17	41
29	823	10	65535	823	17	68
30	918	7	918	918	17	53
31	1024	11	65535	1024	17	94
32	1024	15	65535	1024	17	128
33	1024	5	1024	1024	17	43
34	612	2	128	612	17	10
35	1024	9	65535	1024	17	77
36	1024	8	512	1024	17	68
37	615	8	128	615	17	41
38	987	3	987	987	17	25
39	987	7	987	987	17	57
40	820	6	820	820	17	41
41	977	5	977	977	17	41
42	981	5	981	981	17	41
43	830	7	512	830	17	48
44	830	10	65535	830	17	69
45	917	15	65535	918	17	114
46	1224	15	65535	1223	17	152
47	0	0	0	0	17	0

AMI BIOS Screen Error Messages

Error Condition	Error Type
Gate A20 Error	Fatal
Interrupt Controller #1 Failure	Fatal
Keyboard Error	Nonfatal
Keyboard/Interface error	Nonfatal
CMOS battery state low	Nonfatal
CMOS system options not set	Nonfatal
CMOS checksum failure	Nonfatal
CMOS memory size mismatch	Nonfatal
CMOS system time and date not set	Nonfatal
CMOS display configuration mismatch	Nonfatal
Display switch setting not proper	Nonfatal
Keyboard is locked -- unlock it	Nonfatal
Floppy disk controller failure	Nonfatal
Hard disk unit 0 error	Nonfatal
Hard disk unit 1 error	Nonfatal
Hard disk unit 1 is not defined in CMOS	Nonfatal

Check Point	Meaning
1E	Global equipment byte set for video OK
1F	Mode set call for mono/color OK
20	Video test OK
21	Video display OK
22	Power on message display OK
30	Virtual mode memory test about to begin
31	Virtual mode memory test started
32	Processor in virtual mode
33	Memory address line test in progress
34	Memory address line test in progress
35	Memory below 1 MB calculated
36	Memory size computation OK
37	Memory test in progress
38	Memory initialization below 1MB done
39	Memory initialization above 1MB done
3A	Display memory size
3B	Memory test below 1MB about to start
3C	Memory test below 1MB OK
3D	Memory test above 1MB OK
3E	About to go to real mode (Shutdown)
3F	Shutdown successful; real mode entered

Check Point	Meaning
40	About to disable Gate A20 address line
41	Gate A20 address line successfully disabled
42	About to start DMA controller test
4E	Address line test OK
4F	Processor in real mode after shutdown
50	DMA page register test OK
51	DMA unit 1 base register test about to begin
52	DMA unit 1 channel OK, CH-2 about to begin
53	DMA channel 2 base register test OK
54	About to test F/F latch for unit 1
55	F/F latch test for both units OK
56	DMA units 1 and 2 programs OK
57	8259 initialization over
58	Mask register check OK
59	Master 8259 mask register OK
5A	About to check timer and keyboard interrupt level
5B	Timer interrupt OK
5C	About to test keyboard interrupt
5D	Error Timer/Keyboard interrupt not in proper level
5E	8259 interrupt controller test error
5F	8259 interrupt controller test OK
70	Start keyboard test

Version 1.0
P/No.88-021140