U S E R 'S M A N U A L

Document No. 011091 DT-423S4L Edition B

IMPORTANT SAFETY INSTRUCTIONS

1. Read all of these instructions.

2. Save these instruction for later use.

3. Follow all warnings and instructions marked on the product.

4. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners aerosol cleaners. Use a damp cloth for cleaning.

5. Do not use product near water.

6. Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product.

7. Slots and openings in the cabinet and the back or bottom are provided for ventilation; to ensure reliable operation of the product and to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in the built-in installation unless proper ventilation is provided.

8. This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.

9. This product is equipped with a 3-wire grounding type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the purpose of the grounding-type plug.

10. Do not allow any thing to rest on the power cord. Do not locate this product where persons will walk on the cord.

11. If an extension cord is used with this product, make sure that the total of the ampere ratings on the products plugged into the extension cord do not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.

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Table of Contents

CHAPTER 1 SYSTEM DESCRIPTION

1.1 Major Function Blocks 1-1
1.2 The Setup Program 1-2
1.2.1 When Should You Run Setup ? 1-3
1.2.2 How to Call up the Setup Program ? 1-4

CHAPTER 2 CPU INSTALLATION

2.1 CPU Type Selection 2-1
2.2 Changing Oscillator 2-2

CHAPTER 3 SYSTEM MEMORY

3.1 Introduction 3-1
3.1.1 Conventional Memory 3-1
3.1.2 Extended Memory 3-2
3.1.3 Expanded Memory 3-2
3.1.4 Summary of Extended and Expanded Memory 3-3
3.2 DT-423S System Memory 3-3
3.2.1 DT-423S Memory Access Methods 3-4
3.2.2 Installing The SIMM Modules 3-4
3.2.2 SIMM Sockets 3-5
3.3 Shadow RAM 3-5
3.4 The Cache Subsystem 3-6
3.4.1 Setting the Jumpers 3-7

CHAPTER 4 MATH COPROCESSOR

4.1 Coprocessor Used on the DT-423S 4-1
4.2 Installing the Coprocessor 4-2
4.2.1 80487SX Coprocessor Installation 4-2
4.2.2 Weitek 4167 Coprocessor Installation 4-2

CHAPTER 5 DISK DRIVE CONFIGURATION

5.1 Hard Disk Interfaces 5-1
5.1.1 ST506/412 5-1
5.1.2 ESDI (Enhanced Small Device Interface) 5-2
5.1.3 SCSI (Small Computer Systems Interface) 5-2

CHAPTER 6 VIDEO DISPLAYS CONFIGURATION

6.1 Display Adapters 6-1
6.1.1 Monochrome Display Adapter (MDA) 6-1
6.1.2 Hercules Graphics Card or Adapter 6-2
6.1.3 Color Graphics Adapter (CGA) 6-2
6.1.4 Enhanced Graphics Adapter (EGA) 6-2
6.1.5 Video Graphics Array (VGA) 6-3
6.1.6 8514A Adapters 6-4

CHAPTER 7 DETAIL OF THE BIOS SETUP

7.1 MR BIOS Setup Utility 7-1
7.1.1 Summary (Signon) Screen Descriptions 7-6
7.1.2 Clock Setup 7-12
7.1.3 Video Setup 7-14
7.1.4 Floppy Diskette Drives Setup 7-16
7.1.5 Fixed Disk Drives Setup 7-18
7.1.6 Drive Boot Sequence 7-20
7.1.7 Keyboard Setup 7-22
7.1.8 First-Aid Setup 7-23
7.1.9 Speed Setup 7-24
7.1.10 Cache Memory Setup 7-26
7.1.11 Shadow RAM Setup 7-27
7.1.12 Chipset Register Configuration 7-29
7.1.13 Password Security Setup 7-31
7.2 Running AMI BIOS 7-33
7.2.1 Auto Configuration with BIOS Defaults 7-38
7.2.2 Auto Configuration with Power-On Defaults 7-39

7.2.3 Write to CMOS and Exit 7-40
7.2.4 Do not Write to CMOS and Exit 7-41
7.2.5 Standard CMOS Setup 7-42
7.2.6 Advanced CMOS Setup 7-45
7.2.7 Change Password 7-49
7.2.8 Hard Disk Utility 7-55

APPENDIX A
CACHE/TAG SRAM SPECIFICATION A-1

APPENDIX B
SYSTEM BOARD JUMPERS SETTING B-1

APPENDIX C
SYSTEM BOARD CONNECTORS C-1

APPENDIX D
MR BIOS's BEEP CODES & ERROR MESSAGES D-1

APPENDIX E
AMI BIOS's BEEP CODES & ERROR MESSAGES E-1

APPENDIX F
SERVICE F-1

List of Figures

Figure 7-1. MR BIOS Signon Screen 7-6
Figure 7-2. Clock Setup Edit Menu 7-12
Figure 7-3. Video Setup Edit Menu 7-14
Figure 7-4. Floppy Drives Setup Edit Menu 7-16
Figure 7-5. Hard Disk Setup Edit Menu 7-18
Figure 7-6. Disk Boot Sequence Edit Menu 7-20
Figure 7-7. Keyboard Setup Edit Menu 7-22
Figure 7-8. First-Aid Setup Edit Menu 7-23

Figure 7-9. Speed Setup Edit Menu 7-24
Figure 7-10. Cache Memory Setup Edit Menu 7-26
Figure 7-11. Shadow RAM Setup Edit Menu 7-27
Figure 7-12. Chipset Setup Edit menu 7-29
Figure 7-13. Password Setup Utility Edit Menu 7-31
Figure 7-14. Initial Power-On Screen 7-34
Figure 7-15. AMI BIOS Setup Screen 7-36
Figure 7-16. Warning Message Screen 7-37
Figure 7-17. BIOS Default Auto Configuration Screen 7-38
Figure 7-18. Power-On Default Auto Configuration Screen 7-39
Figure 7-19. Write to CMOS Exit Screen 7-40
Figure 7-20. CMOS Exit Screen 7-41
Figure 7-21. Standard CMOS Setup Screen 7-42
Figure 7-22. Advanced CMOS Setup Screen 7-45
Figure 7-23. Password Opening Screen 7-50
Figure 7-24. New Password Screen 7-51
Figure 7-25. Password Confirmation Screen 7-52
Figure 7-26. Password Error Screen 7-53
Figure 7-27. Password Installation Confirmation Screen 7-54
Figure 7-28. Hard Disk Utility Setup Screen 7-56
Figure 7-29. Hard Disk Format Screen 7-58
Figure 7-30. Hard Disk Utility Options 7-59
Figure 7-31. Hard Disk Format Warning Screen 7-60
Figure 7-32. Interleave Utility Options 7-62
Figure 7-33. Interleave Bad Track Option Screen 7-63
Figure 7-34. Auto Interleave Warning Screen 7-64
Figure 7-35. Media Analysis Screen 7-65
Figure 7-36. Media Analysis Warning Screen 7-66

CHAPTER 1 SYSTEM DESCRIPTION

This mainboard is a high performance 32-bit 80486-based PC-AT compatible system, running from 20 MHz up to 50 MHz. To introduce this mainboard, we first list the major mainboard block function. Following this is a section on configuring the system.

1.1 Major Function Blocks

CPU

Socket for Intel 80486 33 MHz, 50 MHz, Intel 80486SX (P23) 20 MHz

Software switchable by keyboard stroke combination

Coprocessor

Socket available for an optional Weitek 4167 math coprocessor

Socket available for an optional 80487SX (P23N) math coprocessor

Cache Memory

64KB, 256KB, or 1MB cache memory in direct map mode

Burst mode cache fill 2-1-1-1

Memory

Up to 32 MB memory size in two 32-bit banks

9 different memory configuration from mixture of different type DRAMs

Shadow RAM for system/video BIOS

256K/384K reserved memory relocation

Page interleave /address interleave mode

Decoupled and staggered refresh

BIOS

AMI BIOS or MR BIOS supported

1.2 The Setup Program

Setup is the System Configuration program used to specify peripheral types and operating parameters for the system. It is located in ROM BIOS and can be called up by press a hot-key after the memory test is done and before the system is booted up. The following few paragraphs explain when to call up and how to use the setup program.

Related to Setup is a program called BIOS (Basic Input Output System). This special software is located in a read-only memory (ROM) chip on the mainboard. BIOS is software, but not like other software you're probably familiar with. It is a part of the system that cannot be modified, unless you're an engineer with the adequate knowledge and tools.

BIOS is the first to have control of the system after turning on system power. First, it reads information from a special non-volatile (or permanent) memory, and then instructs the CPU and other devices to operate according to this information. If the information in permanent memory is incorrect or insufficient , the system may not bootup until accurate information is supplied. You provide this information by means of the Setup program.

In this motherboard, we supply two kind of BIOS version, i.e. MR and AMI BIOS. The two BIOS give you different setup screen but same function of configuring your system. User can inform manufacturer or dealer to install one of the two BIOS into the mainboard.

1.2.1 When Should You Run Setup ?

1) To establish system operation parameters the very first time you turn on the computer. This may not be necessary if your dealer has already set up the system.

2) Whenever you change one or more hardware components of your system. If you add a hard disk or more memory, for example, you should run Setup to record the new system configuration. If you don't do so, the computer will prompt you to run setup the next time you reboot.

3) When the Setup program ask you to reset some field. When BIOS detects something wrong with the configuration information, it will not continue to boot. It will, instead, display a message requesting you to run Setup.

4) Loss of information in the battery-backup (or permanent) memory. You may never encounter this situation, but if you do, the information can be restored by running Setup. This may occurs after not using the system for a number of weeks.

1.2.2 How to Call up the Setup Program ?

We will explain detailly for AMI and MR BIOS to call up the Setup program. For AMI BIOS, you have three ways to call up the setup program.

Powering Up the System

After powered on, the system will execute the Power-on Self Test (POST) and display the following message on the left-top corner of the screen

ROM BIOS (C) 1990 American Megatrends, Inc.,
AMI FOR XXXXXX

XXXXX KB OK

This message indicates that the memory test is executing. After the POST is done, the system begin to boot the MS-DOS up and the screen will display the following message:

ROM BIOS (C) 1990 American Megatrends, Inc.,
AMI FOR XXXXXX

XXXXX KB OK

Hit <DEL>, if you want to run SETUP

It means you should press the < **DEL** > key if you need to run the Setup program provided in the BIOS. When you need to call up the Setup program

Resetting the System

By press <**Ctrl**>, <**Alt**>, and <**Del**> key combination during system power on and under DOS or other environment software that supports this feature, you can reset the system and boot it up again.

Before the system is booted up from the diskette or hard disk, you can also see the same prompting message as described in previous paragraph:

Responding to an Error Message

In the POST process, if the BIOS detects an incorrect configuration information in CMOS or find any physical system error, it will display an error message to remind you and prompt you to run the Setup. The message is similar to the following:

ROM BIOS (C) 1990 American Megatrends, Inc.,
AMI FOR XXXXXX

XXXXXX KB OK

WAIT .....

CMOS memory size mismatch

RUN SETUP UTILITY
Press <F1> to RESUME

For more detail information about the BIOS SETUP utility, please refer to chapter seven.

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CHAPTER 2 CPU INSTALLATION

The DT-423S mainboard supplies user the alternative of Intel 80486DX, 80486SX (P23), or 80487SX (P23N). *User can choose the different CPU installed in the same mainboard.* The socket of CPU is located in U16. When putting the CPU in this socket, user should **set the proper jumper** and **change the oscillator** depending on the type of CPU.

NOTE: Intel 80486DX is the highest performance of Intel 80*86 series CPU containing internal cache controller, floating point math controller.

Intel 80486SX (P23) provides a new low-cost solution to the powerful 80486DX, and does not have FPU (Floating Point Unit) inside.

Intel 80487SX (P23N) Math Coprocessor provides optional math upgrade capability for end-users who want to increase floating point performance. Someone tries to use 80487SX (P23N) as CPU and works well.

2.1 CPU Type Selection

Jumper Setting for 80486 DX (factory setting)	
JP3	close
JP4	1-2
JP5	1-2
Jumper setting for 80486 SX (P23)	
JP3	open
JP4	open
JP5	2-3
Jumper Setting for 80487 SX (P23N)	
JP3	close
JP4	2-3
JP5	1-2

2.2. Changing Oscillator

X1 is a socket for oscillator installation. When CPU type or CPU speed is changed, user need to change the oscillator to match the CPU speed. The following table shows the relation between CPU and Oscillator.

CPU Speed (MHz)	OSCILLATOR (MHz)
486DX-25	50
486DX-33	66
486DX-50	50 (use 1x clock) *
486SX-20	40
486SX-25	50

* For CPU frequency faster than 33MHz.

CHAPTER 3 SYSTEM MEMORY

This chapter introduces some basic concepts about the system memory and memory access methods. It also instructs you on how to install and configure memory.

3.1 Introduction

System memory generally refers to Random Access Memory (RAM) on the mainboard. For the DT-423S, it refers to the SIMM RAM memory installed on the Mainboard. It is a vital part of the computer system, functioning mainly to store code and data during system operation. The information in RAM is lost when the power is turned off.

Listed below are the different categories of memory discussed in this chapter:

1. Conventional Memory
2. Extended Memory
3. Expanded Memory

3.1.1 Conventional Memory

The memory range between 0 and 1024KB is called "Conventional Memory." This is the area of RAM that the computer uses to execute programs. Base memory usually refers to memory between 0 and 640 KB. Reserved memory is only for system use, for ROM BIOS and hardware device like display card, network card, and certain hard disk controller.

3.1.2 Extended Memory

Extended memory is memory above 1 MB on an AT-compatible computer. AT-compatible machines can access this memory only when operating in protected mode. Programs have to be specially written to take advantage of extended memory. More and more applications and operation systems (OS/2 and UNIX) are coming out that can run in protected mode, thus being able to use extended memory. For example, Windows 3.0 makes extensive use of extended memory.

3.1.3 Expanded Memory

Expanded Memory, also called EMS for Expanded Memory Specification, is an attempt on the part of the DOS computer industry to overcome the 640 KB memory limit imposed by DOS. It is available to all DOS program, but only those program that EMS support EMS actually use this additional memory. Programs that don't EMS support EMS derive no benefit from the presence of expanded memory on a system.

The reason for this is that expanded memory uses an access method that different from base memory. This access method is optimized by the current standard for expanded memory, EMS 4.0. In order for a DOS program to use EMS memory installed in a system, the program must be designed with EMS in view, i.e. it has to include EMS support. For those program that do EMS support EMS, the additional memory gives them a little more "elbow room", and in a sense, streches the DOS 640KB memory limit.

3.1.4 Summary of Extended and Expanded Memory

Although AT-compatible computers can directly address extended memory in protected mode, extended memory's presence in a DOS system frequently does little to improve the performance

3.2 DT-423S System Memory

The memory subsystem in this system board requires one to two banks of RAM modules. It supplies the memory size from 1 MB up to 32 MB and three types of DRAM are supported: 256KB, 1 MB and 4 MB SIMM module. The possible memory configuration is indicated in following table .

DRAM Module Type		Total Memory (MB)
BANK 0	BANK 1	
256K	0	1
256K	256K	2
256K	1M	5
1M	0	4
1M	256K	5
1M	1M	8
1M	4M	20
4M	0	16
4M	256K	17
4M	1M	20
4M	4M	32

The BIOS will configure and determine the size of memory already installed automatically. There is no need for user to set the jumper of memory configuration.

3.2.1 DT-423S Memory Access Methods

Page Mode

Page mode is related to the type of RAM chips. When using 4MB RAM chips , the page size is 2048 bytes; When using 1MB RAM chips, the page size is 1024 bytes; When using 256KB RAM chips, the page size is only 512 bytes. Therefore, the page hit rate is higher and the performance better when using 4MB RAM chips.

2-way/4-way address interleaving

Address interleaving improves performance by reducing sequentially accessed memory cycle time. The precharge of one bank of DRAM can occur while the other bank is being accessed.

2-way paged/2-way address interleaving

Paged interleaving improves performance by increasing the page hit rate. 2-way paged/2-way address interleaving is the combination of address interleaving and paged interleaving . For 2-way interleaving a minimum of 2 banks of same type DRAM must be occupied. 4-way and 2-way paged/ 2-way address interleaving requires all four banks with the same type of DRAMs.

The BIOS will look for DRAM configuration to set up the best DRAM timing and high performance access method. We suggest users install the same high capacity DRAM at the two banks for better DRAM access performance.

3.2.2 Installing The SIMM Modules

The DT-423S supports two 32-bit wide banks of SIMM modules. SIMM (Single In-Line Memory Modules) sticks for each bank must be installed in pairs, and the amount of memory on each stick of a pair must be the same. The SIMM size can be: 256 Kbytes by 9, 1 Mbytes by 9, or 4 Mbytes by 9.

3.2.2 SIMM Sockets

There are 8 sockets on DT-423S for installing SIMM modules. The unit number of each bank are shown as follows:

BANK 0 -- S1, S2, S3, S4
BANK 1 -- S5, S6, S7, S8

3.3 Shadow RAM

In order to enhance system performance, it is preferable to execute BIOS code through RAM rather than slower EPROMs. The DT-423S mainboard also provides the feature called SHADOW RAM which when enabled, allows the BIOS code to be executed from system RAM resident at the same physical address as the BIOS EPROM.

Shadow RAM feature can be enabled or disabled in BIOS SETUP program. The software should transfer code stored in the BIOS EPROMs to the system RAM, before enabling it.

Shadow RAM provides several areas of memory for shadowing system BIOS , Video BIOS and adapter BIOS.

3.4 The Cache Subsystem

In addition to Intel 80486DX internal cache, the DT-423S mainboard provides external Direct-mapped write-through cache control to enhance the system performance. By maintaining the most frequently accessed code and data in CACHE memory such that most memory requests can be satisfied from CACHE. If the data resides in the cache (cache hit), the data is returned to the CPU without wait states. If the data is not present in the cache (cache miss), then it is retrieved from the slower main memory with wait state.

The effectiveness of the cache is determined predominantly by the size and organization of the cache, the hit and miss access time, and the dynamic behavior of the program. An efficient organization will result in a high hit rate. Majority of the accesses are to cache and are completed without wait states. Very few accesses are to the main memory.

The cache memory on DT-423S is installed with 64KB, 256KB, 1MB SRAM chips on the cache socket U23-U30 and U20. The following table lists all the possible cache configuration.

Cache Memory Size	SRAM Type	Location
64KB	9 pcs. of 8KB x 8 SRAM	U20,U23-U30
256KB	9 pcs. of 32KB x 8 SRAM	U20,U23-U30
1MB	9 pcs. of 128KB x 8 SRAM	U20,U23-U30

In addition to add SRAM chips, you still need to adjust several jumpers to configure the cache memory size. Beware of the speed specification for different CPU speed and write wait state. Please refer to Appendix F for detail information.

3.4.1 Setting the Jumpers

Five jumpers should be set to configure the cache memory size - 64KB, 256 KB, 1MB - and make it recognized by the system. Their location is illustrated in the figure of Appendix B.

Cache Size / Jumper#	64KB	256KB	1MB
JP8	1-2	2-3	2-3
JP9	1-2	2-3	2-3
JP11	1-2	2-3	2-3
JP13	1-2	1-2	2-3
JP14	1-2	1-2	2-3

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CHAPTER 4 MATH COPROCESSOR

The contents of this chapter will provide detailed installation information about the math coprocessor used on the DT-423S, including the insertion and removement of the coprocessor.

4.1 Coprocessor Used on the DT-423S

A math coprocessor enhances the system's mathematical calculating speed. *If user put 80486DX into the CPU socket (U16), user should select Weitek 4167 as a math coprocessor.*

In addition to Intel internal Floating-Point unit, the DT-423S mainboard also provides a socket for Weitek 4167 Numeric Coprocessor for coprocessor upgrade. When adding this chip, the DT-423S does not need to set any jumper to indicate the external coprocessor installed or not. The BIOS (Basic Input Output System) on the system board will detect it automatically. So! If you want to use the Weitek 4167 then you just install it on the Weitek 4167 socket (U11).

If user put 80486SX (P23) on the CPU socket, user should select Intel 80487SX (P23N) as math coprocessor rather than Weitek 4167. It should be noticed that 80487SX (P23N) just can be put in 80487SX (P23N) socket (U17). It is very clear that 80487SX (P23N) has 168 pins while Weitek 4167 has 144 pins. It is prohibited that the two coprocessors are installed in the same board.

4.2 Installing the Coprocessor

The system board provides two PGA sockets for 80487SX and Weitek 4167 numeric coprocessor to speed up the floating-point-intensive applications.

When adding this chip ,please follow the following procedures:

4.2.1 80487SX Coprocessor Installation

The (U17) is a 168-pin PGA socket for 80487SX Coprocessor. Please follows the following instructions to install.

(1) The inner edge of 80487SX coprocessor socket has one cut off corner containing pin 1. The pin 1 position of the 80487SX is indicated by a dot on the surface of one corner (This corner of 80487SX is slightly cut off). The dot should be oriented so that it can match the cut off corner of the coprocessor socket.

(2) Insert the chip gently and firmly in the socket.

4.2.2 Weitek 4167 Coprocessor Installation

The (U11) is a 144-pin PGA socket for Weitek 4167 Coprocessor. Please follows the following instructions to install.

(1) The inner edge of the Weitek 4167 coprocessor socket has one cut off corner containing pin 1. The pin 1 position of the 4167 is indicated by a dot on the surface of one corner (This corner of Weitek 4167 is slightly cut off). The dot should be oriented so that it can match the cut off corner of the coprocessor socket.

(2) Insert the chip gently and firmly in the socket.

CHAPTER 5 DISK DRIVE CONFIGURATION

In this chapter, we discuss hard disk interfaces used in the PC field. We then describe how to configure the disk drives in the BIOS Setup program.

5.1 Hard Disk Interfaces

There are several types of hard disk interfaces in the PC field. Here is an overview on the features of these interfaces, so you can select the proper hard disk interface for your system.

The disk interface is a specification that defines the signals that pass between controller and hard disk. These signals include both digital data and control information that tell the hard disk where the data is or where it should go. Both the interface and the data coding system must match the design and capabilities of the hard disk you choose.

5.1.1 ST506/412

The ST506/412 interface was conceived when hard disks were still in their infancy and their electronics relatively unrefined. It actually predates the PC, and most hard disk manufacturers have products that use it. Most personal computers still use the ST506/412 interface for their hard disks. The data transfer rate is 5 MHz between the disk and controller using MFM modulation, and 7.5 MHz using RLL modulation.

5.1.2 ESDI (Enhanced Small Device Interface)

ESDI interface improves the functions of ST506 interface. Its transfer speed is about 5 to 15 MHz and supports higher capacity hard disks up to 600MB. The ESDI moves the data separator from the controller onto the drive. Instead of sending raw data (the MFM pulses from the disk to the controller), an ESDI drive and controller communicate in NRZ (not-return-to-zero) code. This helps ensure better data integrity.

5.1.3 SCSI (Small Computer Systems Interface)

While ESDI requires a separate controller, much like that of ST506, the SCSI interface locates all the traditional controller functions on the hard disk drive itself. It operates at a higher level, the system level, than the ST506 and ESDI. The SCSI system hardware arbitration uses eight dedicated signal lines to determine which device gets control of the bus. The standard allows seven devices plus the computer host to be connected to one SCSI circuit. It also allows different devices to be connected to the bus, for example, a tape drive, a hard disk, a laser printer and so on. Moreover, it can co -exit with other disk interface standards.

The bus transfers signals in parallel, 8 bits at a time. These parallel transfers endow SCSI with higher speed potentials. Most SCSI hard disk actually transfer data at 10 MHz or higher. 5.1.4 XT/AT-bus
The XT/AT-bus interface improves the ST506, moves all control circuits onto the hard disk drive itself, and upgrades data path width from one bit to 16 bits (AT-bus) or 8 bits (XT-bus). The parallel transfers give the AT-bus interface higher speed potential, operating at rates of 4 megabytes per second.

Another benefit of the XT/AT-bus interface is the intelligent control circuits on the hard disk. It can present different "logical" sector / cylinder/head combination structures to the system to accommodate BIOS. Many AT-bus hard disks have 26 sectors or even more, which is not supported by AT BIOS. You can, however, assign a type number in the SETUP to the hard disk as long as the capacity of the type matches the actual hard drive.

For example, suppose your hard disk has 904 cylinders, 8 heads, and 36 sectors with a capacity of 127 MB. You can assign it as Type 32 in the BIOS built-in Setup program. Though Type 32 is defined to have 1020 cylinders, 15 heads, and 17 sectors, the hard disk will make the BIOS believe it has the same definition because of the drive's intelligent control circuit.

These hard disks are usually low-level formatted by the manufacturer before shipment. Users only need to partition and format them. The cable used to connect the XT/AT -bus interface with the hard disk is a 40-pin interface cable. It can support up to two AT-bus drives or one XT-bus hard disk on the system.

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CHAPTER 6 VIDEO DISPLAYS CONFIGURATION

The purpose of this chapter is to provide information for setting the mainboard's video configuration. for the sake of those with little or no knowledge of display adapters and monitors, we start out with a description of these devices. This should make everything more understandable when coming to the video configuration setting.

6.1 Display Adapters

A display adapter is an interface card installed in the computer system and connected with a monitor.

The following is a general overview of the popular display adapters for IBM compatible personal computers.

6.1.1 Monochrome Display Adapter (MDA)

The MDA (Monochrome Display Adapter) is the first display adapter developed by IBM. It is less expansive but offers reasonably good resolution (720 by 350 pixels). Its major drawback is that it can only display single color text (no graphics) on no more than 25 lines of 80 characters each. For those interested, its output consist of standard TTL-level signals with vertical scanning frequency of 60 Hz and Horizontal scanning frequency of 18.43 KHz.

6.1.2 Hercules Graphics Card or Adapter

The Hercules Graphics Card took one step froward from MDA in that it adds graphics support to the text mode provided by MDA. Like MDA, it supports monochrome resolution of 80 characters by 25 lines for text. It adds to this graphics support at a resolution of 720 by 283 pixels. Its output level is also the same as the MDA's. It is one of the few adapters to become an industry standard not originating from IBM. It is probably the least expensive adapter on the market, and still very popular.

6.1.3 Color Graphics Adapter (CGA)

The CGA (Color Graphics Adapter) is the first bit-mapped display adapter. It can display both text and graphics in color. In a text mode, It uses 16-color palette with 80 columns by 25 lines or 40 columns by 25 lines. with 40 columns the text is twice as wide as with 80 columns. It has two graphics modes: 320 by 200 resolution with four colors or 640 by 200 with two colors (black and white). Its TTL output is 15.75 KHz for the horizontal frequency and 60 Hz for the vertical frequency.

6.1.4 Enhanced Graphics Adapter (EGA)

The Enhanced Graphics Adapter card can simultaneously display 16 out of 64 colors at a resolution of 640 by 350 pixels. The card increases on-screen resolution, brings graphics to monochrome screens, and adds new BIOS routines. It's output consist of TTL-level signals with vertical scanning frequency of 60 Hz and a horizontal scanning frequency of 21.8 KHz.

Because of its fairly high resolution, graphics are clearer and more distinct. The EGA card can therefore display more lines on one screen, though with smaller text.

One of its characteristics is that soft fonts are accepted. Therefore, the fonts available to be used are not only those supported with an EGA card but also those loaded from softwares. The multi-national fonts support in a text mode is indispensable.
EGA retains all basic CGA-standard functions. All CGA functions can be used on an EGA system through a BIOS call.

6.1.5 Video Graphics Array (VGA)

VGA was originally available only on the mainboards of Micro Channel machines. Within a year of VGA's debut, board manufacturers sucessfully created compatible cards to port the higher resolution to standard PC expansion buses.

At a resolution of 320 x 200 pixels, it supports up to 256 hues on the screen at one time from a palette of 262144 colors. At 640x480 resolution, it supports up to 4 colors from a palette of 16.

One major difference between VGA and other adapters id its analog output signals. The adapters list above have TTL (digital) signals.

VGA maintains hardware and software compatibility with its previous standards, including functions and resolution at the BIOS-level. The VGA system require a vertical frequency of 70 Hz and Horizontal frequency of 31.5 KHz.

6.1.6 8514A Adapters

The 8514A adapter is one of the newest video adapters to come out. It is an interlaced board which maintains VGA and analog output compatibility. It comes with 512KB of memory, allowing 16 colors to be displayed simultaneously with a maximum resolution of 1024 by 768. The interlaced display, however, is likely to produce flicker.

The 8514A adapter uses a vertical scanning frequency of 70 Hz (vertical) and horizontal scanning dual-frequency of 31 or 35 KHz. It was originally promoted by IBM in 1987 with the PS/2 line. At present, few programs support this adapter, and compatible monitors are costly.

CHAPTER 7 DETAIL OF THE BIOS SETUP

Chapter 1 covers in detail the Setup program and the way to call it up. Here we provide a detail guide for setting each item.

NOTE: Detailed descriptions for some items in the Setup program are covered in related chapters. Refer to those chapters if the information contained here is not enough.

This System Main Board provides MR or AMI BIOS (Basic Input Output System) for customer's need.

The SETUP UTILITY program is resident in the BIOS (U5). The BIOS stores system configuration information in the battery-backed up CMOS RAM (DS1287).

7.1 MR BIOS Setup Utility

The Setup Utility allows the user to view the system configuration, and to select variety of powerup/runtime options.

Entrance to Setup can occur in three ways:

A configuration change detected during POST forces entrances, or

ESC is pressed during cold-boot, or

CTRL+ALT+ESC is pressed to warm-boot into Setup.

The Setup screen is broadcast simultaneously to both CRTs regardless of CMOS settings, so it will never happen that the user will be without video when (re)configuration is necessary. The screen format consist of these four fields:

(1) **COPYRIGHT/OEM BANNER**. On the top two lines. The BIOS version number and OEM Porting description also appear in this field:

Directly below the copyright/OEM banner, a three segment graphics window is displayed which consumes the remaining 23 lines of the screen. A Menu resides on the top line, a dynamic keystroke Prompt is found on the bottom line, and the remaining region is referred to as the Edit Page:

(2) **MENU LINE**. A list of utility names appears on this line, from which a specific selection may be made. (Eg, Video, Floppy, etc.) A reverse-video cursor is present which can be moved leftward or rightward to highlight a desired entry. As the cursor is moved from entry to entry, the Edit-Page (see #3 below) is simultaneously updated to show the corresponding configuration utility. When ENTER is pressed, that utility will be invoked within the Edit-Page window.

The cursor leaves the Menu-Line, and reappears upon the first editable field within the utility. Because there are more utility names than can be fit onto the Menu Line, only a subset of the entire menu is displayed. The rightmost entry displays "More -->", and an attempt to move the cursor onto it causes a new portion of the menu to be revealed. This new section begins with "<-- More", allowing leftward cursor movement back to the original menu.

(3) **EDIT PAGE**. This "window: displays the utility whose title is illuminated on the Menu Line (#2 above). As already explained, the utility becomes activated by pressing ENTER (or PgDn), and the cursor appears on the editable field within this Edit-Page. To further distinguish that this utility is active, the Menu-line is erased with only this utility's title remaining. Until exited (back to the Menu), all fields within this Edit-Page are accessible for editing. The Menu-Line is redisplayed and the cursor leaves the Edit-Page, reappearing on the Menu-Line.

While the utility is activated, all keystrokes required to accomplish the edit are indicated on the PROMPT-LINE, discussed next.

(4) **PROMPT LINE**. The setup-Utility is designed to be usable without the aid of this manual. To this end, a list of acceptable keystrokes and effects is provided on this line, and that list is updated on a keystroke by keystroke basis. Even an unfamiliar user should be able to maneuver around and successfully configure the system, upon realization that this PROMPT LINE updates dynamically per keystrokes.

A. Prompt-Line Text

The purpose of this section is to further explain the meanings of the keystroke prompts. They are somewhat abbreviated due to screen limitations:

F10 TO RECORD AND EXIT

Press F10 to record the new configuration to CMOS, and terminate the Setup session. The system will proceed to boot-up.

HOME END (LEFT/RIGHT ARROWS) MOVES CURSOR

The menu-cursor can be moved respectively to the first entry, last entry, or next leftward/rightward entry.

(ENTER) TO SELECT

The Menu-cursor currently illuminates an entry, such as CLOCK, VIDEO, FLOPPY, etc., and the Edit-Window currently shows the configuration related to that Menu entry. Press ENTER to commence editing that Edit Page, upon the first editable field. Note: PgDn key can be used instead of ENTER in this context.

ESC FOR MENU

The cursor is currently in the Edit-Window. ESC or (PgUp) returns you to the Menu-Line. Note: the newly edited configuration is not yet recorded to CMOS. See F10 key description above.

(UP/DOWN/LEFT/RIGHT ARROWS) MOVES CURSOR

The cursor is currently illuminating a field within a Edit-Page. It may be removed to another field via these cursor keys.

(ENTER) TO EDIT

The cursor is currently illuminating a field within an Edit-Page. This particular field can be edited by keying-in numbers or letters. To invoke the editor, press ENTER. The field remains illuminated, and a small blinking underline (hardware cursor) will appear under the leftmost editable character in that field. In general, Left-Arrow, Right-Arrow, Space, BackSpace, and AlphaNumerics are accepted in edit mode. ESC will restore the field to its pre-edit state and the blinking underline will disappear. All "edit-mode" keystrokes are prompted.

+ - SCROLLS CHOICES
SPACEBAR + - TO CHANGE
SPACEBAR + - SCROLLS CHOICES

The cursor is currently illuminating a field within the Edit-Page which may be changed. SpaceBar and "+" make visible (select) other available options. The options are rolled through a list in the forward direction. BackSpace and "-" roll the options in reverse order.

B. Esoteric Prompts

A few special-case prompts also exits. Generally, they specify a range of numbers or a particular set of AlphaNumeric characters that will be accepted in the field. For example, the CLOCK Time-Of-Day sub-field accepts Alphabetic "a" and "p" to indicate am and pm.

The SECURITY utility requires pressing ENTER after selecting a new configuration. This additional step is not consistent with behavior of the other utilities, but is necessary so that a new password can be prompted when appropriate, and so the current password is not dismissed should the user simply scroll through available options.

Due to the severity of consequences, the LOW-LEVEL-FORMAT field column within the FIXED disk configuration utility cannot be accessed until CTRL-F is pressed. Pressing ESC while the cursor is in that column will move it safely to a non-Format column on the screen. While the format is in progress, ESC will immediately terminate (abort) the process.

7.1.1 Summary (Signon) Screen Descriptions

This page serves as both a summary utility and as the signon screen of the Setup-Utility. Most every characteristic of the computer can be viewed here, but editing the fields is not permitted from this page. Select the desired utility by moving the Menu cursor. Each of the fields are discussed as following pages.

```
MR BIOS (tm) Copyright (c) 1991, Microid Research Ver 1.20 Port SYML401

 Summary  Clock  Video  Floppy  Fixed  Boot-Seq  Keyboard  More -->

 CPU Type ............... 486-01        Floppy 0 ...........1.2M [51/4]
 CPU MHz ............. 25.0 (2x)        Floppy 1 ................. None
 Boot Speed ............... High        Floppy 2 ................. None
 Math Unit ............ Built-in        Floppy 3 ................. None
                                        Fixed 80 ........... 42.5M [17]
 RAM Cache ................. 64K        Fixed 81 ................. None
 Shadow RAM ............ Disable        Boot Sequence .......... A: 1st

 Memory-Base .............. 640K        Anti-Virus ............. Enable
 Memory-Extended ......... 1024K        Security ............... Disable
 Memory-System ............ 384K
 Memory-Total ............ 2048K        Keyboard .................PC/AT
                                        NumLock ................... Off
 COM1 ..... n/a | LPT1 ..... 3BC       Typematic ................. 30.0
 COM2 ..... n/a | LPT2 ..... n/a
 COM3 ..... n/a | LPT3 ..... n/a       Video-Primary ...... V/EGA-Color
 COM4 ..... n/a | LPT4 ..... n/a       Video-Secondary ........... n/a

   F10 to Record and Exit          Home End <- ↓ -> Moves Cursor
```

Figure 7-1. MR BIOS Signon Screen

*** Description of the Signon Screen ***

<< CPU Type >>

The type and "stepping" (reversion) number of the CPU is shown.

<< CPU MHz >>

Indicated the oscillator frequency driving the CPU and BIOS determines if a 2x or 1x Oscillator is in use.
Eg,
MHz .... 20.0 indicates a 20 MegaHertz Speed.

<< Coprocessor >>

Numeric-Coprocessor type found on the system.
Eg,
NPX .... n/a
NPX .... Enable
NPX .... Disable

<< RAM Cache >>

Indicates if a Cache SRAM is present.
Eg,
RAM Cache .... n/a
RAM Cache .... Enable
RAM Cache .... Disable

<< Shadow RAM >>

Indicates if any part of the 384K ROM is mapped to shadow RAM.
Eg,
Shadow RAM .... n/a
Shadow RAM .... Enable
Shadow RAM .... Disable

<< Memory-Base >>

Indicates the amount of base memory (below 1 Megabyte boundary).
Eg,
Memory-Base 640K

<< Memory-Extended >>

Indicates the amount of extended memory (above 1 MB boundary)
Eg,
Memory-Extended 1024K

<< Memory-System >>

Indicates the amount of special found to be in working order. Typically, this field will be unimplimented (0K), or will represent the 384K available for shadow RAM or relocation to the Extended Memory pool.
Eg,
Memory-System 128K

<< Memory-Total >>

This is simply a sum of the three preceding quantities.
Eg,
Memory-Total 2048K

<< COM1 >>

Indicates if RS-232 serial port present, and its I/O address.
Eg,
COM1 .... n/a
COM1 .... 3F8
COM1 .... 2F8

<< COM2, COM3, COM4 >>

See COM1 description above.

<< LPT1 >>

Indicates if a parallel (printer) port LPT1 is present, and its I/O address.
Eg,
LPT1 .... n/a
LPT1 .... 3BC
LPT1 378
LPT1 278

<< LPT2, LPT3, LPT4 >>

See LPT1 description above.

<< Floppy 0 >>

Indicates floppy drive A: type. The type can be 360KB, 1.2MB, 720KB, 1.4MB or 2.88MB.
Eg,

Floppy 0 : .... n/a	no controller card found
Floppy 0 : .... none	card present but no drive
Floppy 0 : 1.2M	5.25 inch hi-cap
Floppy 0 : 1.4M	3.5 inch hi-cap
Floppy 0 : 2.8M	3.5 inch hi-cap, double-side

<< Floppy 1 >>, << Floppy 2 >>, << Floppy 3 >>

See description of drive A: field, above.

A single **Step-Rate** field exists, *to globally select* **slow/fast** *operation for all configuration drives. The Fast option should always be selected unless some compatibility problem appears.*

<< Fixed 80 >>

Indicates fixed disk C: type and capacity, The drive type may be any value from 1 to 47, and dependent on the fixed disk present in the system. If this drive has more than 1024 cylinders, a special feature "Translation Mode" may be selected (via FIXED menu entry) to make use of the cylinders in excess of 1023.
Eg,

Fixed 80 .... n/a	fixed controller card not present
Fixed 80 .... none	drive type"0", no drive present
Fixed 80 2	drive type "2", no special feature
Fixed 80 47	drive type 47

<< Fixed 80 >>

See description of drive C: field, above.

<< Boot Sequence >>

Specifies the selected order in which the disk(s) will be booted.
Eg,

Boot-Sequence .... A: 1st	Try A: first, if failure, try C:
Boot-Sequence .... C: 1st	Try C: first, if failure, try A:
Boot-Sequence .... Prompt	Screen prompt for drive A: - D:

<< Anti-Virus >>

A **Anti-Virus** feature is provided as a user selectable option. It offers a measure of protection against malicious (or runaway) programs, by trapping writes to the main boot sector. It also traps attempts to low-level-format any region of the fixed disk.

<< Security >>

The state of the Password-Security is shown in this field.
Eg,
Security .... Enable
Security .... Disable

<< Keyboard >>

The keyboard type/protocol is shown in this field.
Eg,
Keyboard .... AT PC/AT type keyboard

<< Numlock >>

The programmable powerup Numlock state is shown in this field.
Note: This is only meaningful for AT-type keyboards.
Eg,
Numlock .... Off
Numlock .... On

<< Typematic >>

The programmable powerup "Typematic" repeat rate is shown here. Many values are possible, up to 30.0 characters per second.
Note: This is only meaningful for AT-type keyboards.
Eg,

Typematic .... Default	No rate programed, speed is approx 10 cps.
Typematic 30.0	30 cps rate is programed.

<< Video-Primary >>

Indicates the video adapter which will be in use when the system boots (DOS).
Eg,

Video-Primary	Monochrome	B/W card
Video-Primary	V/EGA-Color	Advanced Graphics, Color monitor
Video-Primary	None	Special Support, see Video Setup for details

<< Video-Secondary >>

Indicates if a second video card is present in the system. (Typically, two CRT systems are used in CAD applications).

7.1.2 Clock Setup

The battery backed Real-Time-Clock (RTC) time, date, and daylight savings feature are programmed through this utility.

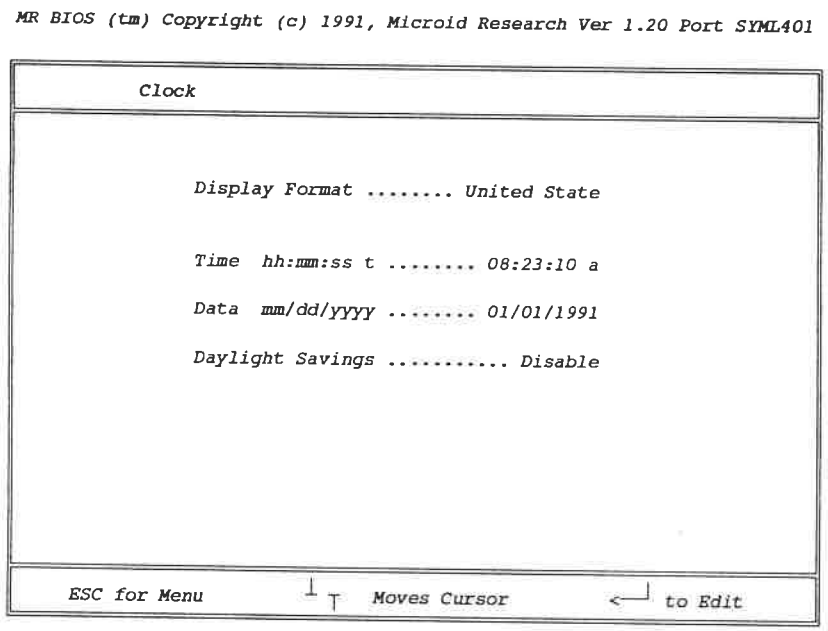


Figure 7-2. Clock Setup Edit Menu

*** Description of Clock Setup Utility ***

1) Display Format:

Allows the user to select either the United States Time/Date format, or International format. United States format displays time as 12 hr hh/mm/ss am/pm, and date is mm/dd/yyyy,. International format displays time as 24 hr hh/mm/ss, and date is dd/mm/yyyy.

2) Time:

The time field is shown in USA 12 hour format, followed by a time-of-day indicator "a" or "p" (am/pm). When changing the time setting, all values are checked.
Eg,
Time hh/mm/ss t .... 12:00:00 a (00:00:00 military)
Time hh/mm/ss t .... 09:10:11 p (21:10:09 military)

3) Date:

The date field is shown in USA mm/dd/yy format. When editing the date setting, all values are checked (include leap years).
Eg,
Date mm/dd/yy .... 01/21/1991 (January 21, 1991)

4) Daylight Savings:

The RTC has a built-in capability to automatically adjust the time on two daylight savings days of the year(*). If this is desired, set the field to "Enable". Otherwise, set the field to "Disable".
Eg,
Daylight Savings .... Enable
Daylight Savings .... Disable

7.1.3 Video Setup

The primary video adaptor is declared through this utility.

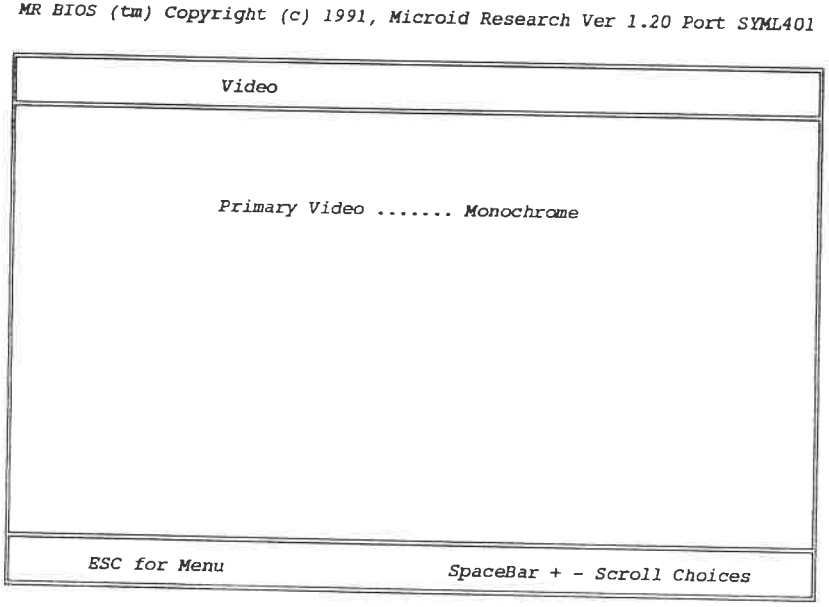


Figure 7-3. Video Setup Edit Menu

*** Description of the Video Setup Utility ***

1) Automatic Video log-on: No Jumper (**Mono/Color**) need be set on the mainboard.

2) Dual Video support: When two video cards are present in the system, one must be color, and the other B/W. MR BIOS ™ will identify these cards, and make both choices available for primary selection. If one of the cards is V/EGA, its operation in the capacity of monochrome or color will automatically be detected and reported. Although V/EGA cards generally require setting dipswitches, MR BIOS will override those settings according to primary adapter selected via this utility. Note well that "some" valid dipswitch state must still be set on the V/EGA card so that it may correctly initialize itself.

3) Fast CGA Support: Most CGA card don't suffer from bus-contention "snow". The user may select to have BIOS access the region buffer without video retrace synchronization. This result in flicker-less scrolling, and speed rivaling Monochrome cards.

4) Non-Video Support: The system may be configured to run without any video card present.

Configured Video-less system:

1. Enter the setup utility and select the video configuration utility (here).

2. Select the "none" option and exit this screen (ESC). Then press F10 which records the new configuration and boots the computer.

3. Turn the system off, and remove the video card. The computer is now ready to be run without video.

7.1.4 Floppy Diskette Drives Setup

This utility configures the floppy drive subsystem, drives 0, 1, 2, 3.

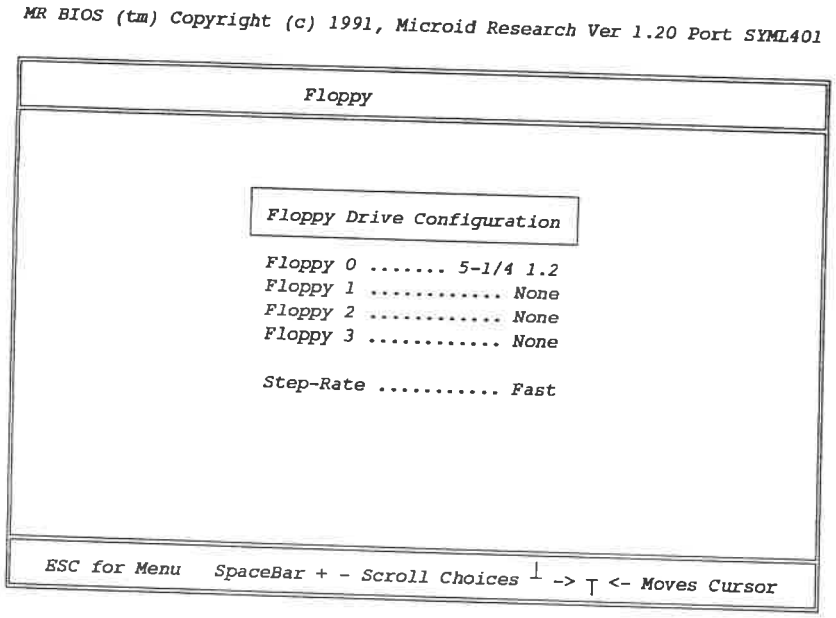


Figure 7-4. Floppy Drives Setup Edit Menu

*** Description of the Floppy Disk Drive Setup Utility ***

1) Four Floppy Diskette Drives supported: Up to four drives may simultaneously be configured. 5-¼ inch 360KB/1.2MB, 3-½ inch 720KB/1.44MB and 3-½ inch 2.88MB.

Note that four floppy can be configured. Due to the nature of the interface between BIOS and DOS, they must be designated in numerically increasing order. Eg, *If Floppy #3 exists, then floppies #2, 1, 0 must also exist.*

2) 2.88MB Floppy Diskette Drive supported: 2.88MB drives are now directly supported, in addition to the original 360K, 1.2M, 720K, and 1.44M drives.

NOTE: Due to differences in recording technology, the industry standard floppy controller cards (NEC 765 FDC) cannot be used with this new 2.88M drive. Instead, a card with upward-compatible i82077/ NCS 8477 FDC (and a few new signals on the 34-pin cable/header) is required.

3) Two Floppy Diskette Drive Controller Cards supported: Two floppy controller cards are directly supported at the industry standard Primary and Secondary I/O address 3F0 and 370.

4) None-floppy support: The system can be configured without floppies connection.

4) Step Rate: A single **Step-Rate** field exists, to globally select slow/ fast operation for all configured drives. The **Fast** option should always be selected unless some compatibility problem appears.

7.1.5 Fixed Disk Drives Setup

This utility configures the fixed disk subsystem, drives C: and D:.

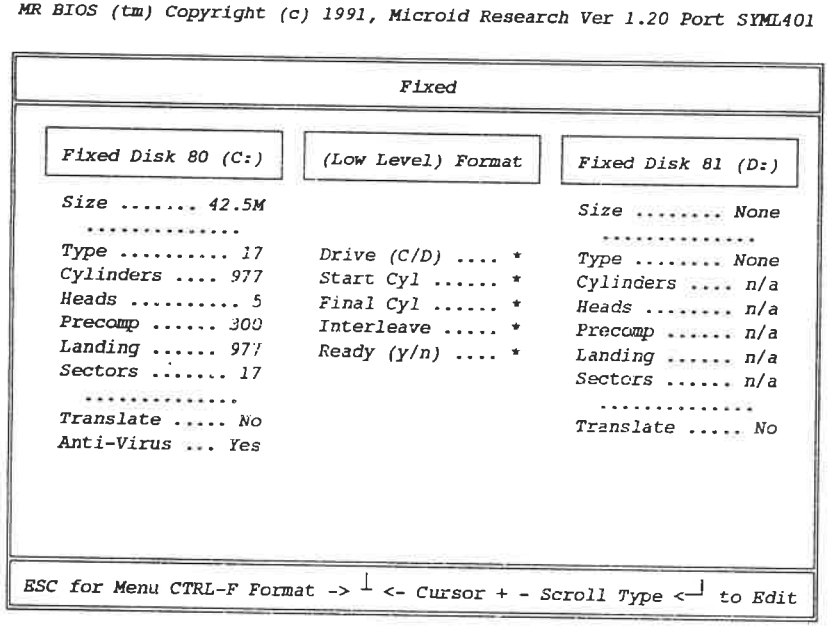


Figure 7-5. Hard Disk Setup Edit Menu

*** Description of the Fixed Disk Drive Setup Utility ***

1) User Programmable drive types 46 & 47: This utility provides tables for types 1-45, reserving types 46 and 47 as "user programmable" drive types. The parameters for each drive type can be viewed by scrolling the "Type" field through the entire sequence 1-47. If it happens that your particular drive parameter table is not among the 45 explicitly defined in this BIOS, then the option exists to program them "by hand" into either drive table 46 or 47.

2) Translation Mode: Larger capacity drives with higher track density are becoming increasingly available, but the standard BIOS interface limits support to 1024 tracks. MR BIOS provides such a Translation Mode to surpass this 1024 (1K) cylinder limitation.

3) Built-in Low-Level format: The large drive support is completed by a built-in Low-Level-Format utility. Be very careful when using this utility. As with all format programs, the data currently on the drive will be forever lost. Most typical uses of format utility will involve the entire disk., but it is not required here. A range of cylinders may be specified as target of the operation, and the sequence may be in increasing or decreasing order. Also, the "interleave" is selectable. In general, select an interleave of "3" (default) unless your drive card has 8K or more RAM on board, or specifically claims to be a "1:1" card. In that case, select an interleave of "1".

4) Anti-Virus is provided as a user selectable option. It offers a measure of protection against malicious (or runaway) programs, by trapping writes to the main boot sector. It also traps attempts to low-level-format any region of the fixed disk.

7.1.6 Drive Boot Sequence

The order in which the disks are searched for a "boot sector" is configurable via this utility.

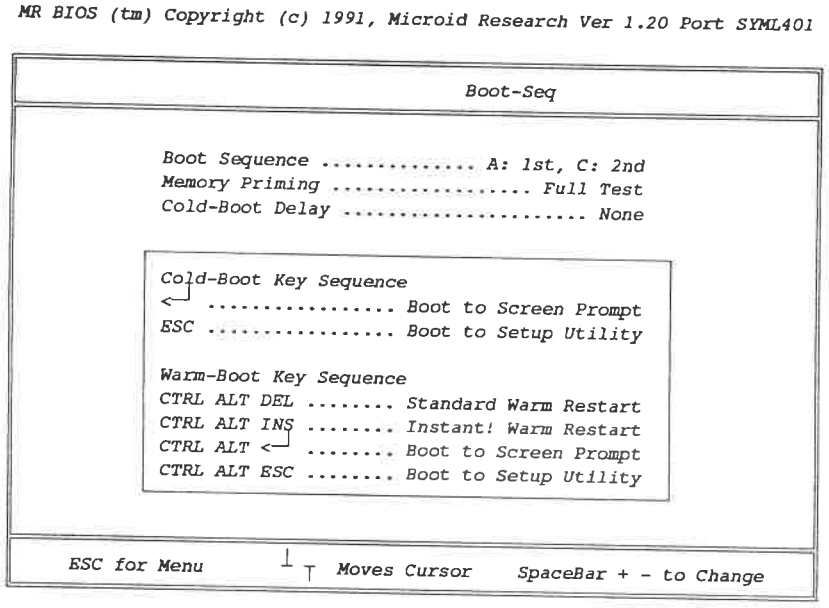


Figure 7-6. Disk Boot Sequence Edit Menu

*** Description of the Drive Boot-Sequence Setup Utility ***

Programmable boot sequence: The user can configure the system to boot from drive A:, drive C:, or to a screen prompt. The screen prompt asks the user to select drive A: or drive C:.

❒ **Hot-Key sequence CTRL-ALT-ENTER:** Warm-boot to the screen prompt, to override the default sequence set via the Setup Utility.

❒ **Hot-Key Sequence CTRL-ALT-INS:** Some adaptor ROMs are very slow to initialize during warm-boot, while others deliberately delay (up to 10 seconds) to display a corporate logo. This hot-key sequence warm boots the computer and replicates the effects of the adaptor ROM initialization without actually accessing the ROMs. The boot latency is thus reduced to the amount of time taken to access the disk.

7.1.7 Keyboard Setup

This utility is used to configure the boot-time Numlock state and the keyboard Typematic rate.

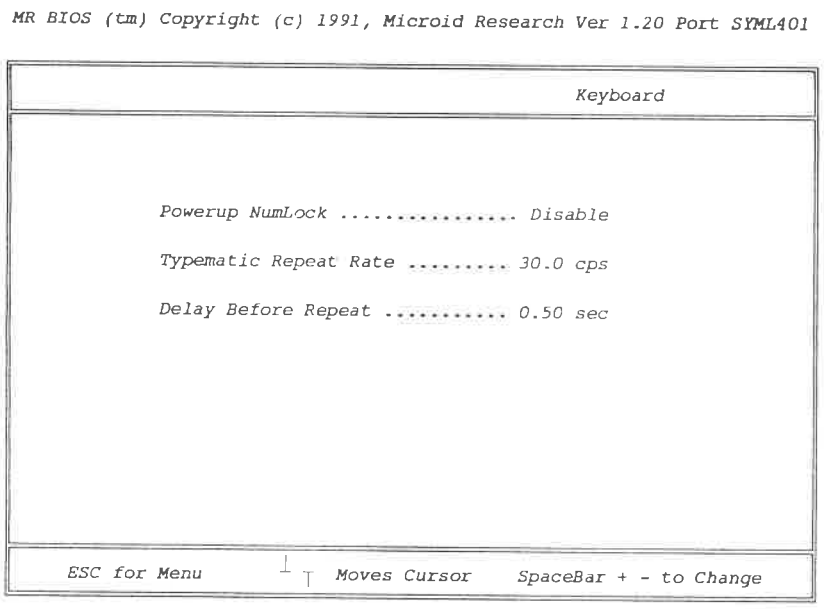


Figure 7-7. Keyboard Setup Edit Menu

*** Description of the keyboard Setup Utility ***

1) **Powerup Numlock:** Program the Numeric keypad to numeric operation or cursor functions.

2) **Typematic Repeat Rate:** program the typematic repeat rate for AT keyboard.

3) **Delay Before Repeat:** Configure the delay repeat rete.

7.1.8 First-Aid Setup

This utility is used to enhance/correct system operation.

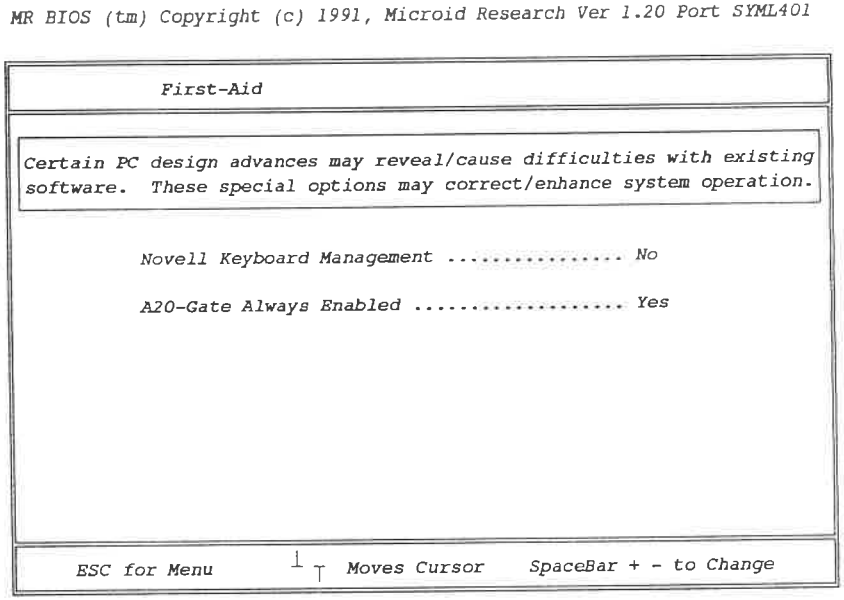


Figure 7-8. First-Aid Setup Edit Menu

*** Description of the First-Aid Setup Utility ***

1) Select the lowest numeric value allowing the keyboard to operate properly.

2) Select "YES" for fastest Extended-Memory/Protected-Mode access.

7.1.9 Speed Setup

This utility is used to configure system boots time speed at high or low.

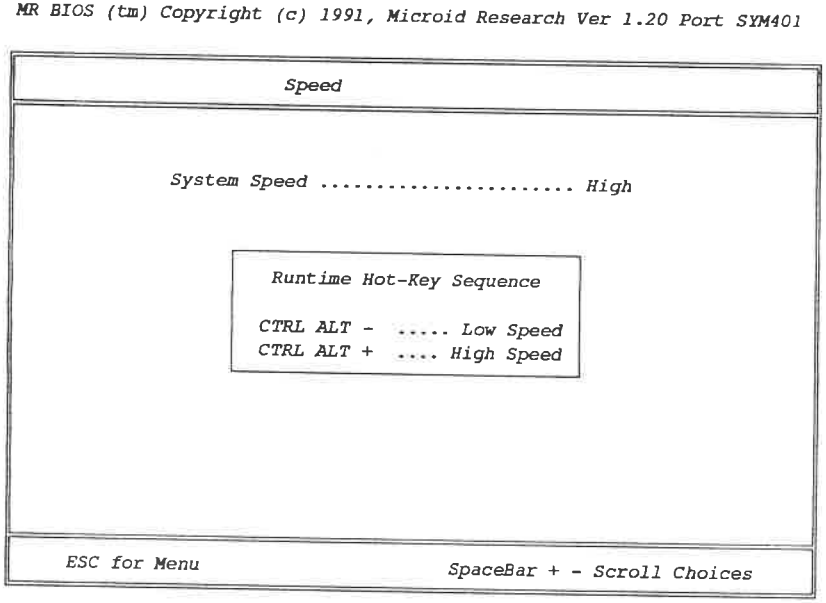


Figure 7-9. Speed Setup Edit Menu

*** Description of the Speed Setup Utility ***

This utility allows the boot-time speed of the system to be selected, either high-speed or low-speed.

It is unusual to configure the system to boot the computer into the slow-speed state, since the only effect is degraded performance. Two instances where it may be necessary are: An add-on card or other hardware device malfunctions when running at full speed, or, a software program that always used fails at full speed. In general, set the default system speed to "High".

A convenient method is available to change system speed "on the fly", without affecting the boot-time default speed. The hot-key sequences **CTRL ALT +** and **CTRL ALT -** set the speed to high and low, respectively. Running the computer with the cache disabled usually yields lower performance than an equivalent computer having no cache at all).

7.1.10 Cache Memory Setup

This utility configures the boot-time state of the RAM cache device(s), either enabled or disabled.

```
MR BIOS (tm) Copyright (c) 1991, Microid Research Ver 1.20 Port SYM401
```

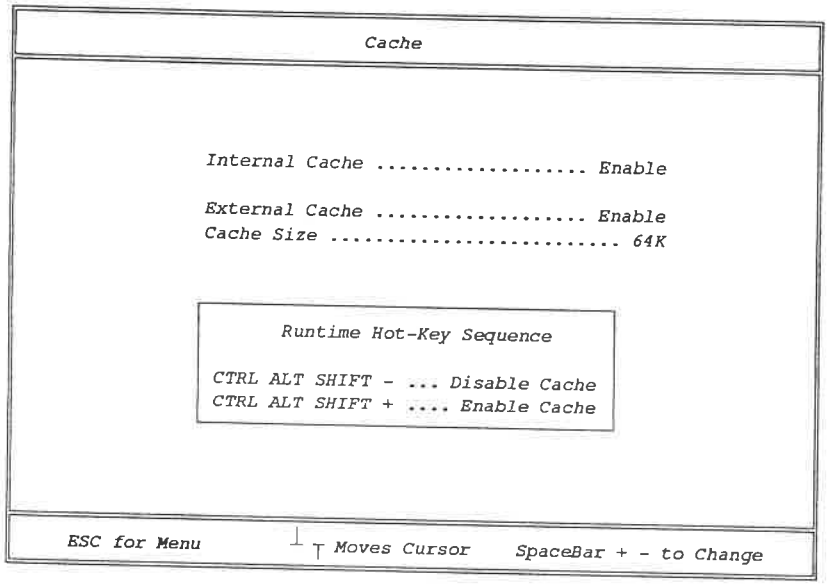


Figure 7-10. Cache Memory Setup Edit Menu

*** Description of the Cache Setup Utility ***

1. Internal Cache:
   Enable or Disable the internal cache memory.

2. External Cache:
   Enable or Disable the External cache memory.

3. Hot-Key for Cache Enable/disable:
   Press "**CTRL ALT SHIFT -**" disable Cache option.
   Press "**CTRL ALT SHIFT +**" enable Cache option.

7.1.11 Shadow RAM Setup

This utility performs two functions. Its main purpose is to allow the boot-time state of the shadow RAM to be configured. It also provides a means to view the ROMs found in the 640K - 1Mega region.

```
MR BIOS (tm) Copyright (c) 1991, Microid Research Ver 1.20 Port SYML401
```

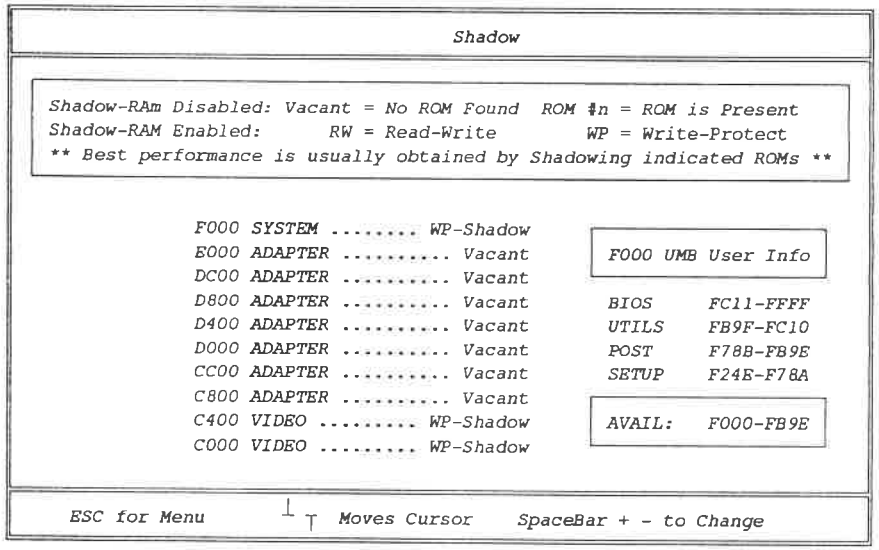


Figure 7-11. Shadow RAM Setup Edit Menu

*** Description of the Shadow RAM Setup Utility ***

The entire 384K ROM space is sub-divided into ten regions, depicted by the ten fields shown on the screen. The Video and Adapter ROM region is comprised of eight equal 16K segments, and the System and BIOS ROM region is divided into two 64K segments.

ROMs of varying capacities may be present in the computer, and a single one may (or often was) extend beyond a 16K boundary, Also, a single ROM might not be aligned on a 16K boundary, and consequently resides in two adjacent segments even though it smaller than 16K.

MR BIOS is now restructured to minimize Run-Time space requirements. Approximately the lower 48K of F000 EPROM may be overlaid by EMM386 or other O/S for use as upper Blocks (UMBs). A breakdown of the space usage appears in a table entitled F000 UMB user info. The table is nothing to select, it is for information only.

7.1.12 Chipset Register Configuration

This utility is used to configure system board Chipset Registers.

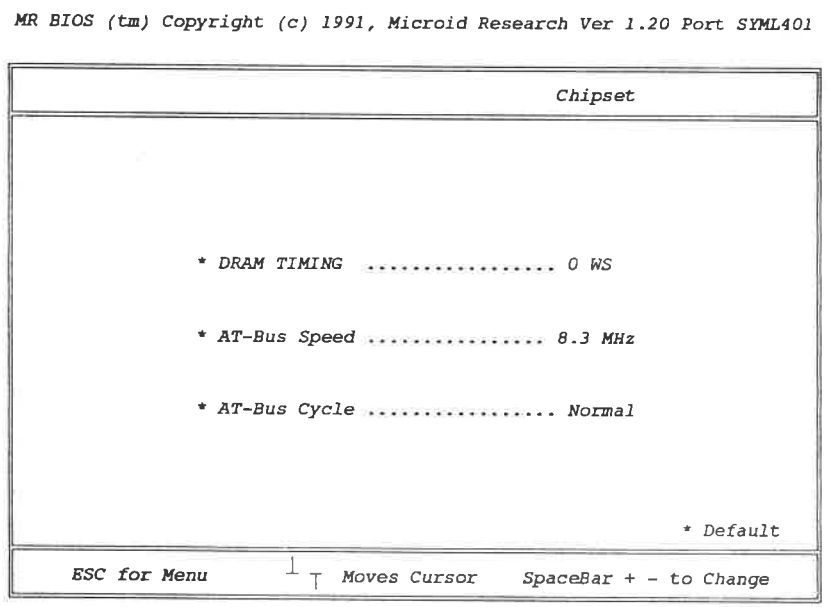


Figure 7-12. Chipset Setup Edit menu

*** Description of the Chipset Setup Utility ***

DRAM TIMING (MR BIOS)	0 WS	1 WS	2 WS
# CCLK2 cycles CAS# Pulse Width	2	4	6
# CCLK2 cycles RAS# Pulse Width	4	6	6
# CCLK2 cycles CAS# Precharge	1	2	2
# CCLK2 cycles RAS# Precharge	4	4	5
# CCLK2 cycles RAS# to CAS#	2	3	4
# CCLK2 cycles RAS# to Column Add.	1	1	2

AT-BUS Speed	ATCLK	CLK2/3	CLK2/4	CLK2/5
20 MHz	x	6.6 MHz	5 MHz	4 MHz
25 MHz	x	8.3 MHz	6.25 MHz	5 MHz
33 MHz	x	11 MHz	8.25 MHz	6.6 MHz

AT BUS Cycle	Normal	Extend
# Command delay for 16-bit External Memory	0	2
and # Command delay for other cycles	1	3
16-bit AT BUS cycle wait states	1	3
8-bit AT BUS cycle wait states	3	5
On Chipset I/O wait states	2	4
I/O Recovery Time	12	12
Extended ALE	Disable	Disable
Extended Ready#	Disable	Disable

7.1.13 Password Security Setup

This utility is used to enable or disable Password Security feature.

NOTE: The Mono/Color jumper on the system board is a master override for this Security feature.

"Mono" unconditionally disables the feature.

"Color" must be selected before this utility will permit enabling the password Entry mode.

To prevent unintended (or mischievous) enabling of the Password Entry feature in installations where it is unused, be certain to set the ***Video Monitor selection jumper*** to "Mono" prior to bolting down the lid on the computer.

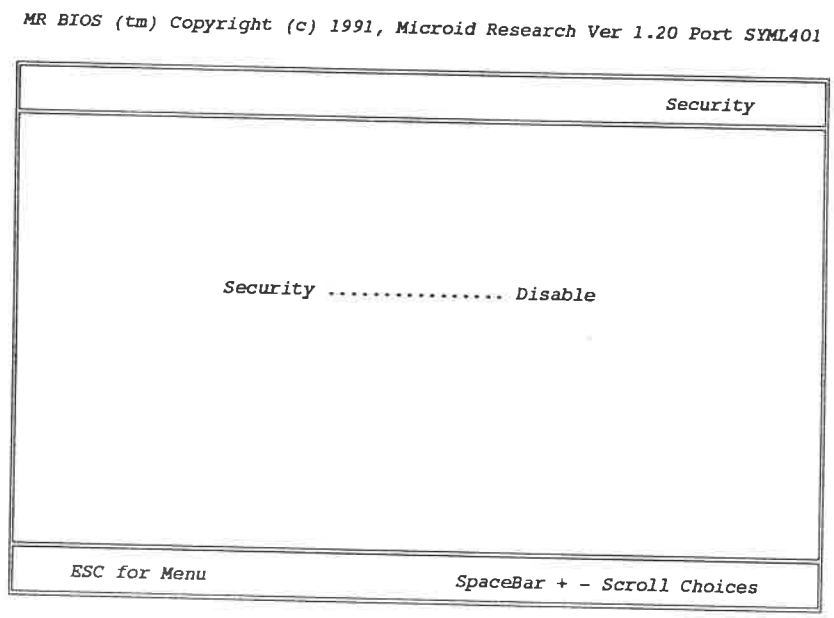


Figure 7-13. Password Setup Utility Edit Menu

*** Description of the Security Password Setup Utility ***

Powerup and Setup Password entry. The user can program the system prompt for a password during **"Powerup"** and during entry to the **"Setup"** Utility. When Security is enabled, the computer will deny powerup access until the correct password is pressed. An alarm will sound if three incorrect are presented. This feature can be disabled, or the password changed, via the Setup Utility.

MR BIOS provides three options Security Setup as follows:

1) Disable : No Password Setup.

2) Setup-Only : Request Password when entry to Setup Utility.

3. Powerup & Setup : Request Password when Powerup and entry to Setup Utility.

7.2 Running AMI BIOS

When the system is power on, the BIOS will enter the Power-On self Test (POST) routines. Three routines are divided into two phases:

System Test and Initialization (test and initialize system boards for normal operations) and
System Configuration Verification (compare defined configuration with hardware actually installed).

The AMI BIOS performs the various diagnostic checks at the time the system is power up; if an error is encountered, the error will be reported in one of two different ways. If the error occurs before the display device is initialized, a series of beeps will be transmitted. Beep codes are found in Appendix E.

If the error occurs after the display device is initialized, the screen will display the error message. BIOS error messages are found in Appendix E. In the case of a non-fatal error, a prompt to press the <**F1**> key may also appear on the screen.

Normally, the only routine visible on the screen will be the memory test. Figure 14 displays the screen which appears when the system is power on.

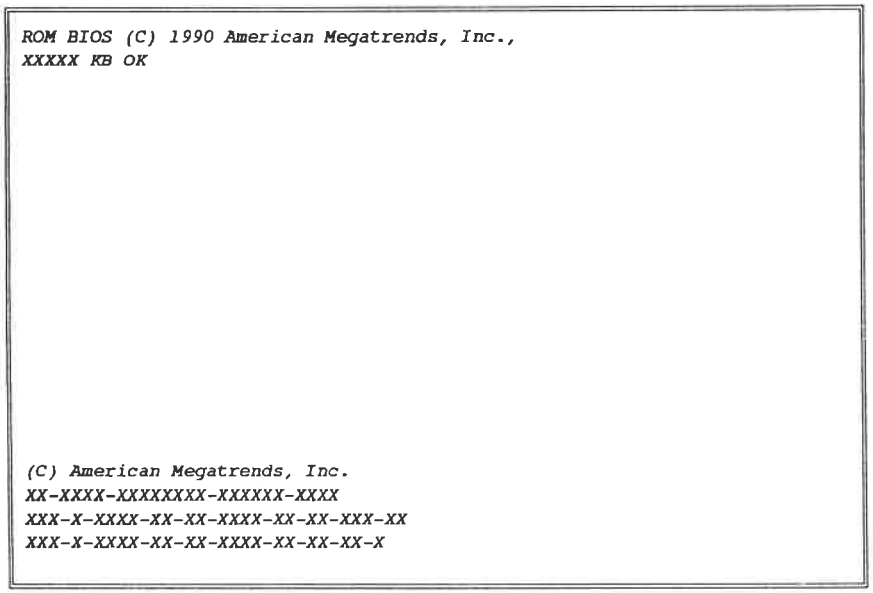


Figure 7-14. Initial Power-On Screen

At the left bottom corner of the screen, below the copyright message, a three (3) line reference string appears. This screen is used to determine the options installed in the AMI BIOS.

If a problem occurs with the system, copy numbers down before consulting your system dealer.

After the POST routines are completed, the following message appears:

"Hit <DEL> if you want to run SETUP"

To access the AMI BIOS SETUP program, press the **<DEL>** key. The Figure 7-15 will be displayed in this time.

A record of the computer's system parameters (such as amount of memory, disk drives, video displays and numeric coprocessor) is stored in the CMOS memory. When the computer is turned off, a back-up battery retains the system parameters in the CMOS memory.

Each time the system is powered-up, it is configured with these values, unless the CMOS has been corrupt or is faulty.

If, for some reason, the CMOS becomes corrupt, the system is configured with the default values stored in the ROM file. There are two (2) sets of BIOS values stored in ROM file: the BIOS Setup default values and Power-On default values.

The BIOS Setup default values are those which should provide optimum performance for the system. The are the best case default values.

The Power-On defaults, which are the worst case defaults, are the stable values for the system. They are to be used if the system is performing erratically because of hardware problems.

Listed below is an explanation of the keys displayed at the bottom of the screens accessed through the BIOS SETUP programs.

ESC: Exit to previous screen

ARROW KEYS: Use arrow keys to move cursor to desired selection.

PAGEUP/PAGEDOWN/CTRL-PAGEUP/CTRL-PAGEDOWN: Modify the default value of the options for the highlighted feature.

F1: Displays help screen for selected feature.

F2/F3: Changes background and foreground colors.

F5: Retrieves the values which were resident when current setup session was started. These values will be CMOS values if the CMOS was uncorrupted at the start of the session, or they will be the BIOS Setup default values.

F6: Loads all features in the Advanced CMOS Setup/Advanced Chip Set with the BIOS Setup default values.

F7: Loads all features in the Advanced CMOS Setup/Advanced Chip Set with the BIOS Setup default values.

F10: Saves all changes made to Setup and exits program.

The generic menu options of the BIOS SETUP program are shown in Figure 7-15.

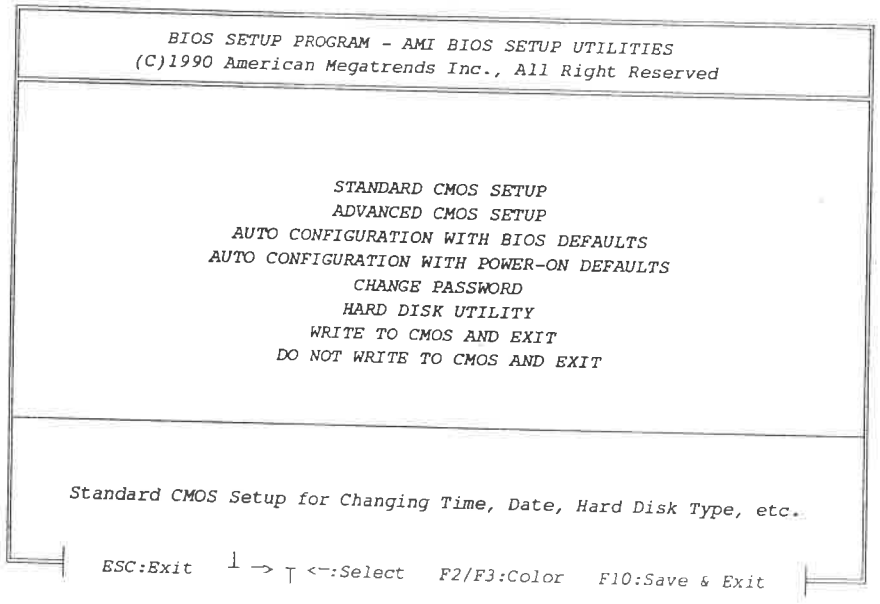


Figure 7-15. AMI BIOS Setup Screen

A **warning message**, shown in figure 7-16, is displayed each time one of the first three options (Standard CMOS Setup and Advanced CMOS Setup) is selected, before any changes are allowed to any of the setup parameters.

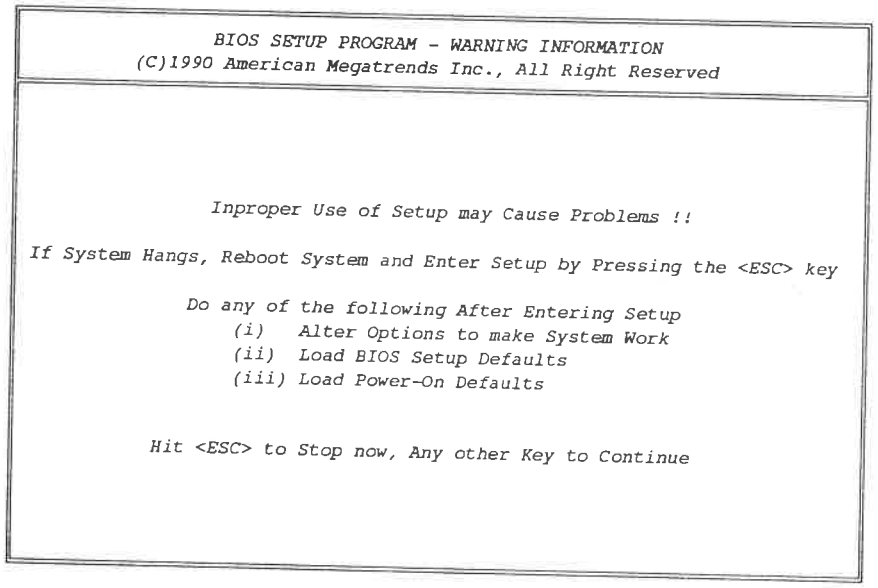


Figure 7-16. Warning Message Screen

7.2.1 Auto Configuration with BIOS Defaults

The Auto Configuration with BIOS feature uses the default system values before the user has changed any CMOS values. If the CMOS is corrupted, the BIOS defaults will automatically be loaded.

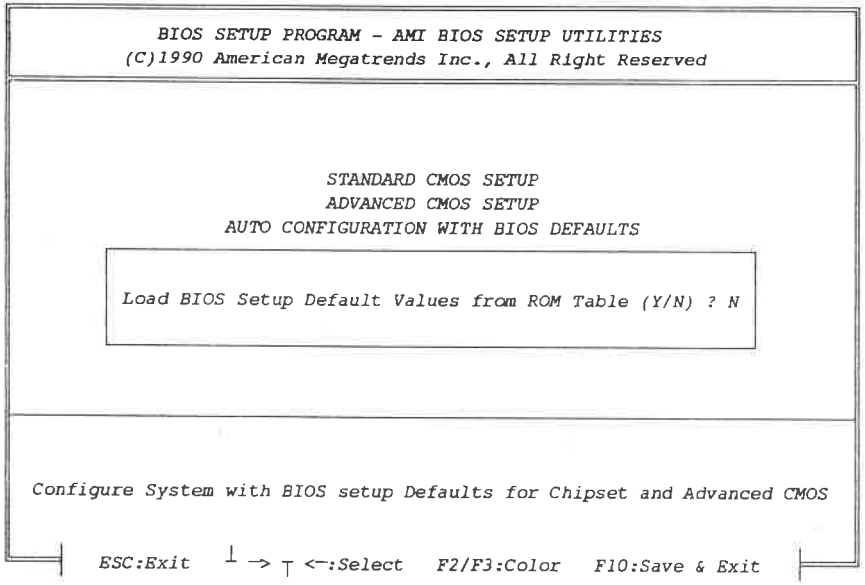


Figure 7-17. BIOS Default Auto Configuration Screen

If you want to use the BIOS defaults, change the prompt to <**Y**> and press <**ENTER**>. The following message will appear on the screen:

"Default Values loaded. Press any key to continue."

7.2.2 Auto Configuration with Power-On Defaults

This feature uses the default Power-On values. You may wish to use this option as a diagnostic aid if your system is behaving erratically.

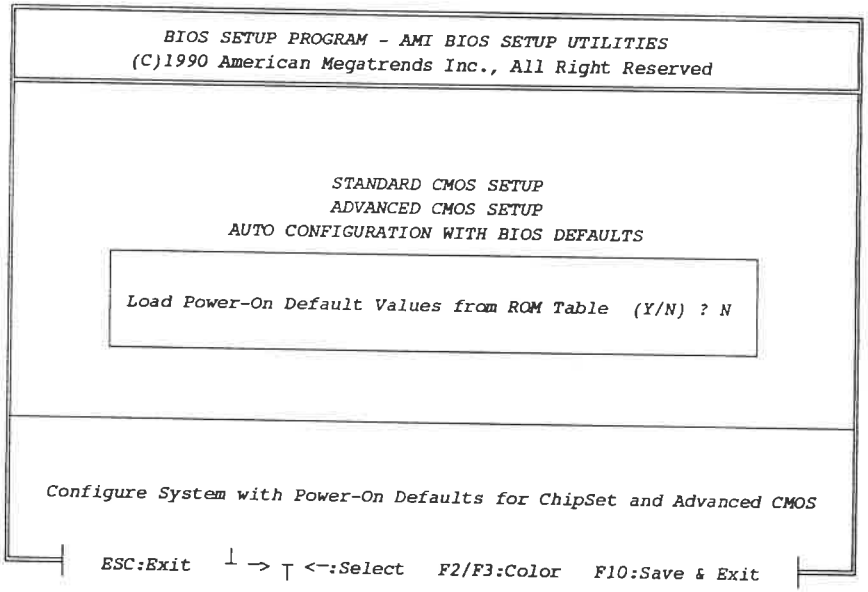


Figure 7-18. Power-On Default Auto Configuration Screen

7.2.3 Write to CMOS and Exit

The features selected and configured in the standard Setup, Advanced CMOS Setup and the New Password Setup will be stored in the CMOS when this option is taken. The CMOS checksum is calculated and written to the CMOS. Control is then passed back to BIOS.

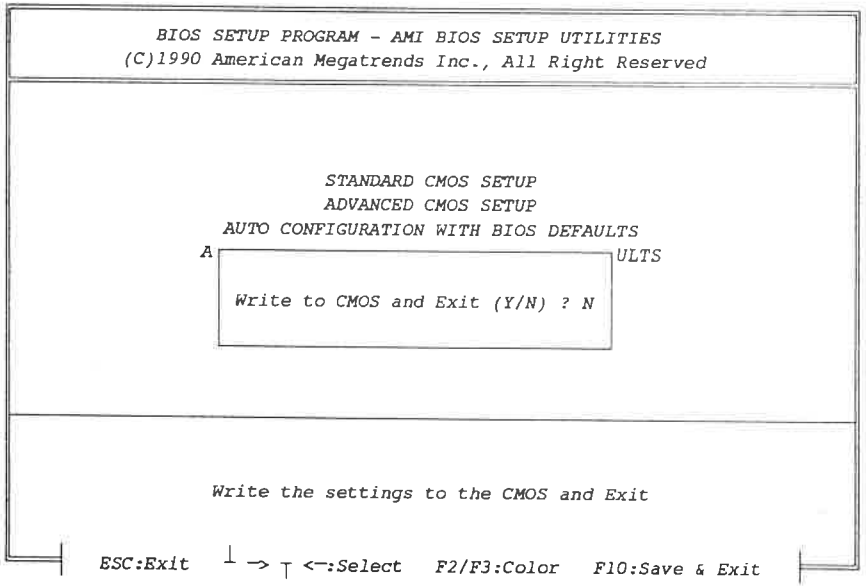


Figure 7-19. Write to CMOS Exit Screen

Pressing <**N**> (No) and <**ENTER**> will return you to the Main Menu.

Pressing <**Y**> (Yes) and <**ENTER**> will save the system parameters and continue with the booting process.

7.2.4 Do not Write to CMOS and Exit

This option passes control back to BIOS without writing any changes to the CMOS.

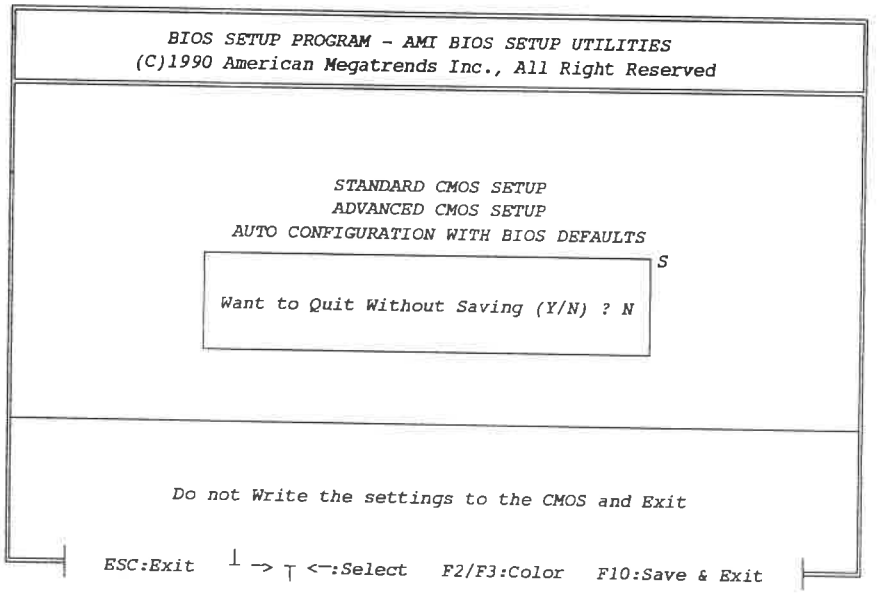


Figure 7-20. CMOS Exit Screen

Pressing <**N**> (No) and <**ENTER**> will return the user to the Main Menu.

Pressing <**Y**> (Yes) and <**ENTER**> will continue with the booting process without saving any parameters.

7.2.5 Standard CMOS Setup

Standard CMOS Setup is the first option on the main setup menu. Press <ENTER> at the highlighted selection to access this option. The screen in Figure 7-21 will appear.

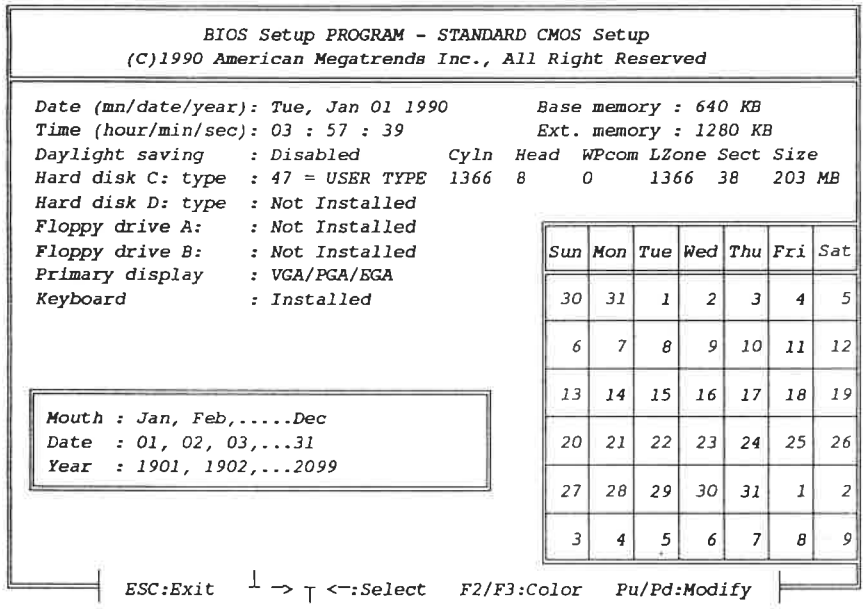


Figure 7-21. Standard CMOS Setup Screen

The Standard CMOS Setup utility is used to configure the following features:

Date: Month, Date, and Year. Ranges for each value are listed below in prompt box in the lower left corner of the CMOS Setup Screen (Figure 7-21).

Time: Hour, Minute, and Second. Uses 24 hour clock format, i.e., for PM numbers, add 12 to the hour. You would enter 4:30 P.M. as 16:30:00.

Daylight Savings: Disabled or Enabled.

Hard Disk C and Hard Disk D: Hard disk types from 1 to 46 are standard ones; type 47 is user definable. The user must enter the hard disk parameters for each drive.

NOTE: The USER definition entry allows you to perform a test on a disk drive not defined in ROM. The USER definition entry is valid only during the period that the test is performed.

The drive types are identified by the following characteristics:

Type	This is the number designation for a drive with certain identification parameters.
Cyl.	This is the number of cylinders found in the specified drive type.
Heads	This is the number of heads found in the specified drive type.
WPcom	WPcom is the read delay circuitry which takes into account the timing differences between the inner and outer edges of the surface of the disk platter. The number designates the starting cylinder of the signal.
L-zone	L-zone isthe landing zone of the heads. This number determines the cylinder location where the heads will normally park when the system is shut down.
Capacity	This is the formatted capacity of the drive based on the following formula: (# of heads) X (# of cylinders) X (17 secs/cyl.) X (512 bytes/sec)

"Not installed" is available for use as an option. This option could be used for diskless workstations and SCSI hard disks. Type 47 may be used for both hard disk C: and D:.

The parameters for type 47 under Hard Disk C: and Hard Disk D: may be different, which effectively allows 2 different user-definable hard disk types.

Floppy Drive A and Floppy Drive B: The options are 360 KB 5 ¼", 1.2 MB 5 ¼", 720KB 3 ½", 1.44 MB 3 ½", and Not Installed". **Not Installed** *could be used as an option for diskless workstations.*

Primary Display: Options are Monochrome, Color 40x25, VGA/PGA/ EGA, Color 80x25, and Not Installed. The "Not Installed" option could be used for network file server.

Keyboard: Options are Installed or Not Installed.

7.2.6 Advanced CMOS Setup

The Advanced CMOS Setup program is equipped with a series of help screens. Accessed by the <**F1**> key, which will display the options available for a particular configuration feature and special help for some of the options.

```
        BIOS SETUP PROGRAM - ADVANCED CMOS SETUP
    (C)1990 American Megatrends Inc., All Right Reserved

Typematic Rate Programming :Disabled | Video  ROM Shadow C000,16K :Enabled
Typematic Rate Delay (msec):250      | Video  ROM Shadow C400,16K :Enabled
Typematic Rate (Chars/Sec) :10.0     | Adaptor ROM Shadow C800,16K:Disabled
Above 1 MB Memory Test     :Disabled | Adaptor ROM Shadow CC00,16K:Disabled
Memory Test Tick sound     :Enabled  | Adaptor ROM Shadow D000,16K:Disabled
Hit <ESC> Message Display  :Enabled  | Adaptor ROM Shadow D400,16K:Disabled
Hard Disk Type 47 RAM Area :0:300    | Adaptor ROM Shadow D800,16K:Disabled
Wait for <F1> if Any Error :Enabled  | Adaptor ROM Shadow DC00,16K:Disabled
System Boot Up Num Lock    :On       | Adaptor ROM Shadow E000,64K:Disabled
Weitek Processor           :Absent   | System ROM Shadow F000,64K :Enabled
Floppy Drive Seek At Boot  :Enabled  | Timing Parameter Selection : 1
System Boot Up Sequence    :C:, A:   | DRAM Wait State Selection  : 1 W/S
External Cache Memory      :Enabled  | Bus Clock Selection        : CLK2/4
Internal Cache Memory      :Enabled  | 256K/384K Memory Relocation: 256K Rel
Optional Chipset Turbo Pin :Enabled  | Decoupled Refresh Option   : Enabled
Password Checking Option   :Disabled |

ESC:Exit  ↓ → ↑ ←:Sel  (Ctrl)Pu/Pd:Modify  F1:Help
F5:Old Values  F6:BIOS Setup Defaults  F7:Power-On Defaults
```

Figure 7-22. Advanced CMOS Setup Screen

Typematic Rate Programming: By enabling this option, the user can adjust the rate at which a keystroke is repeated. The options "Typematic Rate Delay" and "Typematic Rate" affect this rate. When a key is pressed and held down, the character appears on the screen and after a delay set by the Typematic Rate Delay, it keeps on repeating at a rate set by the Typematic Rate value.

Extended Memory Test: This feature, when enabled, will invoke the POST memory routines on the RAM above 1MB (if present on the system). If disabled, the BIOS will only check the first 1MB of RAM. Memory Test Tick sound: This option will enable (turn on) or disable (turn off) the "ticking" sound during the memory test.

Memory Parity Error Check: If the system board does not have parity RAM, the user may disable the memory parity checking routines in the BIOS.

Hit <DEL> Message Display: Disabling this option, will prevent the message:

"Hit <DEL> if you want to run SETUP"

from appearing on the screen when the system boots-up.

Hard Disk Type 47 Area: The AMI BIOS SETUP features two user-definable hard disk types. Normally, the data for these disk types are stored at 0:300 in lower system RAM. If a problem occurs with other software, this data can be located at the upper limit of the DOS shell (640KB). If the option is set to "DOS 1KB," The DOS Shell is shortened to 639 KB, and the top 1KB is used for the hard disk data storage.

Wait for <F1> If Any Error: Before the system boots-up, the BIOS will execute the POST routines, a series of system diagnostic routines. If any of these tests fail, but a non-fatal error has occurred and the system can still function, the BIOS will respond with an appropriate error message followed by the following statement:

"Press <F1> to continue."

If this option is disabled, any non-fatal error which occurs will not generate the above statement, but the BIOS will still display the appropriate error message. This will eliminate the need for any user response to a non-fatal error condition message.

System Boot Up NumLock: The user may turn off the "Numlock" option on his Enhanced Keyboard when the system is powered on. This will allow him to use the arrow keys on the numeric keypad instead of using the other set of arrow keys on the Enhanced Keyboard. The BIOS will default to turning the **"Numlock"** on.

Floppy Drive Seek At Boot: The default for this option is "Disabled" to allow a fast boot and to decrease the possibility of damage to the heads.

System Boot Up Sequence: The AMI BIOS will normally attempt to boot from floppy drive A: (if present), and if unsuccessful, it will attempt to boot from hard disk C: This sequence can be switched using this option. *If the option is set to "C:, A:", The system will attempt to boot from the hard drive C:, and then A:*. If the option is set to A:, C:, the sequence is reserved.

System Boot Up CPU Speed: The speed at which the system will boot up is determined with this option. Choices for this option are **"high"** or **"low"**.

Password Check Option: When enabled, the password feature can be used to prevent unauthorized system boot-up or unauthorized use of BIOS SETUP.

Fast Gate A20: This option uses the fast gate A20 line, supported in This main board, to access any memory above 1MB. Normally, all RAM access above 1 MB is handled through the keyboard controller chip. Using this option will make the access faster than the normal method. This option is very useful in networking operation systems.

Video or Adapter ROM Shadow: ROM shadow is a procedure in which BIOS code is copied from slower ROM to faster RAM. The BIOS is then executed from RAM. Each option, when it does appear, allows for segment of 16 KB to be shadowed from ROM to RAM. If one of these options is enabled, and there is BIOS present in that particular 16 KB segment, the BIOS will be shadowed.

System ROM Shadow: The same concept applies here as above, except that in this case, the system BIOS (64 KB in length) is shadowed automatically.

Timing Parameter Selection: This option selects the ROM wait state, DMA Timing and AT Bus cycle command control. Available option are Extended and Normal. The following are each option description:

ROM Control	Normal	Extend
ROM wait state	1 wait	2 wait
DMA Timing	**Normal**	**Extend**
DMA command delay DMA cycle wait state	0 1	1 2
AT BUS Cycle Command Control	**Normal**	**Extend**
# Command delay for 16-bit External Memory and # Command delay for other cycles 16-bit AT BUS cycle wait states 8-bit AT BUS cycle wait states On Chipset I/O wait states I/O Recovery Time (SYSCLK) Extended ALE Extended Ready#	0 1 1 3 2 12 Enable Disable	2 3 3 5 4 12 Enable Disable

DRAM Wait State Selection	0 W/S	1 W/S	2 W/S
CAS# pulse width RAS# precharge RAS# pulse width RAS# to column address RAS# to CAS# CAS# precharge	2 4 4 1 2 1	4 4 6 1 3 2	6 5 6 2 4 2

BUS Clock Selection	CLK2/2	CLK2/3	CLK2/4	CLK2/5
20 MHz CPU 25 MHz CPU 33 MHz CPU	10 MHz 12.5 MHz 16.5 MHz	6.6 MHz 8.33 MHz 11 MHz	5 MHz 6.25 MHz 8.25 MHz	4 MHz 5 MHz 6.6 MHz

Decouple Refresh Option: Selects Decouple Refresh option "Enabled" or "Disabled". There are two types of refresh cycle provided by this mainboard: *conventional refresh and decouple refresh.*

In the conventional refresh cycle, which is the type adapted by IBM PC/AT ®. The DRAMs on both the local DRAM bus and AT bus are refreshed at the same time while the CPU is held idle during the entire refresh period. The decouple refresh performs the local DRAM refresh separately from the AT bus.

256K/384K Memory Relocation: Non-shadowed memory in the range of A0000h to FFFFFh can be relocated to the top of memory. For 384K relocation, all memory between A0000h and FFFFFh are relocated and can be used only when shadow RAM is completely disabled. For 256K relocation, memory in the segments address B0000h to BFFFFh and between D0000h to EFFFFh are relocated.

7.2.7 Change Password

The BIOS SETUP program has a optional password feature. The password may be configured so that the user is required to enter a password every time the system boots, or whenever an attempt is made to enter the SETUP programs. The password function may also be disabled, which means that the prompt will not appear under any circumstances.

This section of the manual deals with changing the user password. The password check function is enabled or disabled in Advanced CMOS Setup . The password check function is enabled by choosing either **"Always"** or **"Setup"**.

The password which will be stored in the CMOS, cannot exceed 6 characters in length. A default password, to be used if the CMOS is corrupted, is stored in the ROM. The default password is ***<AMI>***.

To change the user password, select the Change Password option from the main Setup screen, by using the arrow keys to move the cursor to this selection and pressing <**ENTER**>. The Figure 7-23 will appear.

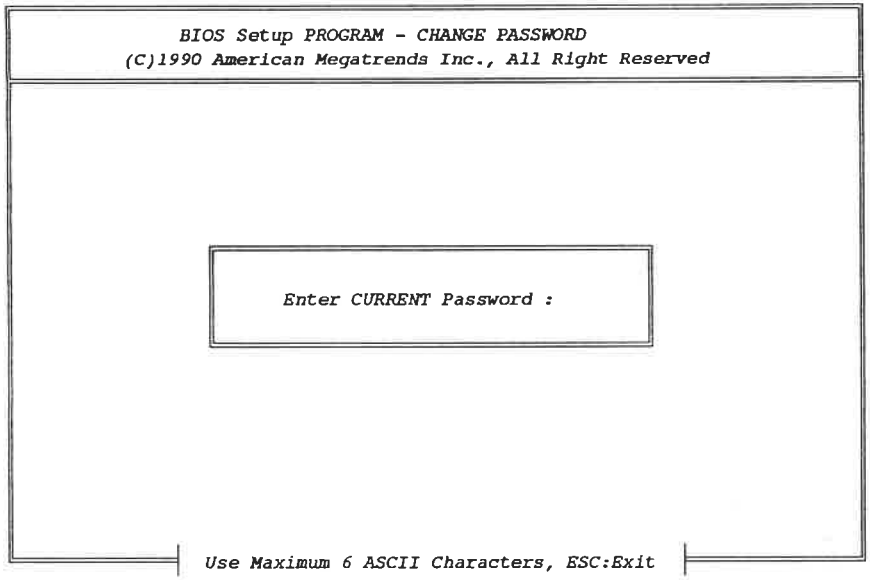


Figure 7-23. Password Opening Screen

The first time you select this option, enter the default password <**AMI**>, then press <**ENTER**> to complete your selection.

The screen will not display the characters entered. After the current password has been correctly entered, the screen in Figure 7-24 will appear, prompting you for the new password.

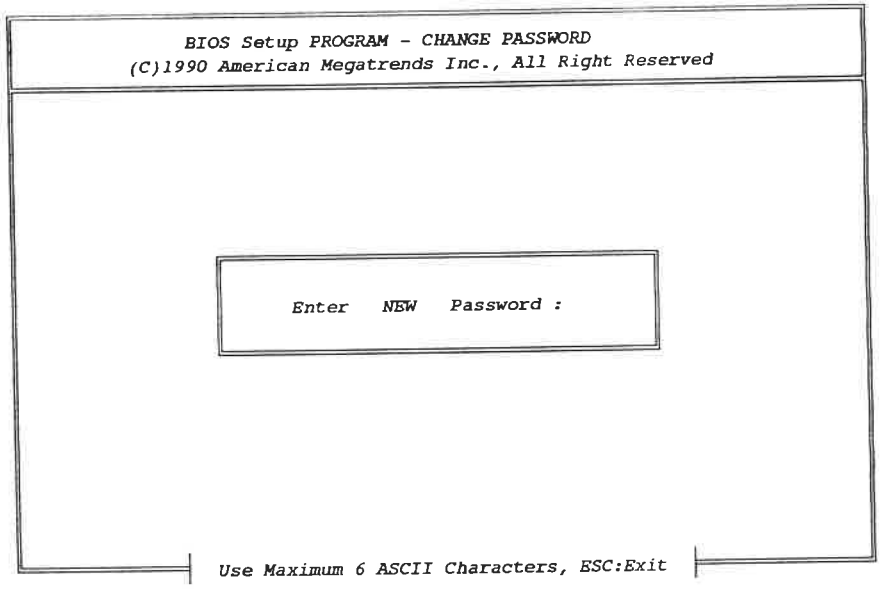


Figure 7-24. New Password Screen

After the new password is entered, the prompt in Figure 7-25 will appear. *Re-key* the new password and press <**ENTER**>.

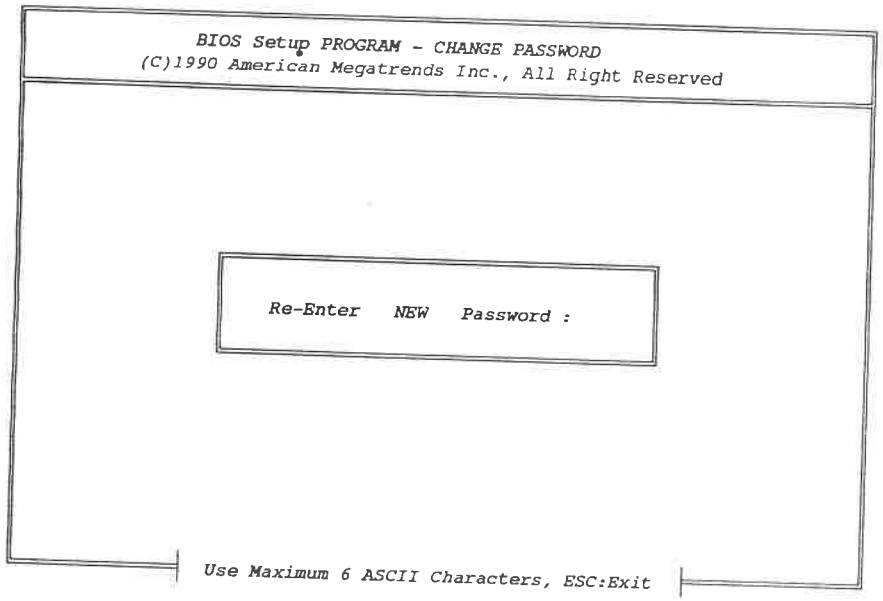


Figure 7-25. Password Confirmation Screen

If the password confirmation is miskeyed, the error screen in Figure 7-26 will appear. If the new password confirmation entered without error, the screen in Figure 7-27 will appear. Press <**ESC**> to return to the Main Setup menu.

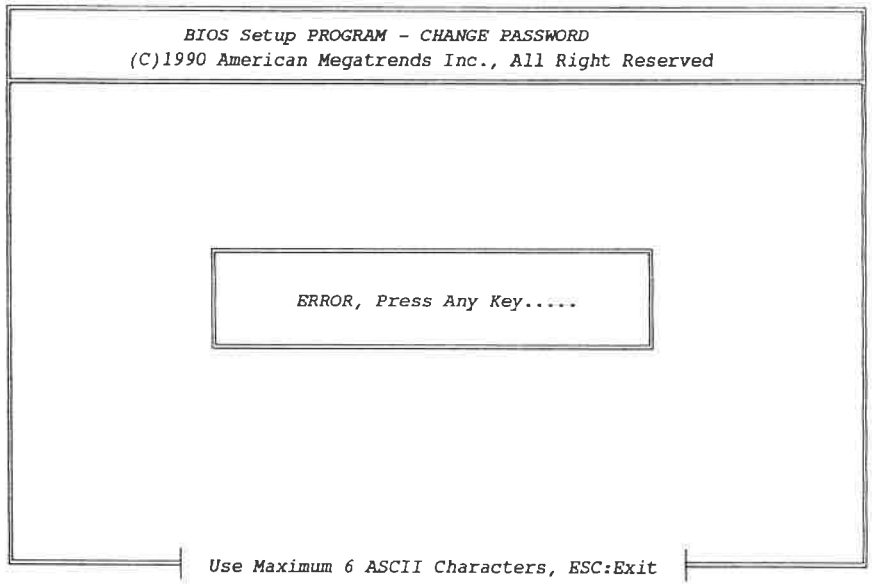


Figure 7-26. Password Error Screen

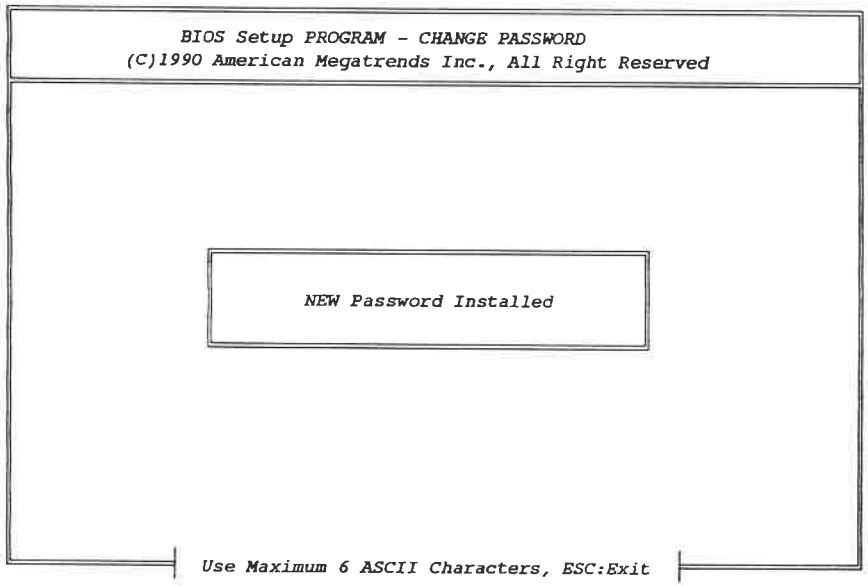


Figure 7-27. Password Installation Confirmation Screen

Once Setup is completed and the changed values have been stored in the CMOS, when the system next boots, the user will be prompted for the password if the password function is present and has been enabled.

If the "**Always**" option was chosen in Advanced CMOS Setup, the prompt will appear each time the system in powered on.

If the "**Setup**" option was chosen in Advanced CMOS Setup, the prompt will not appear when the system is powered on, but will appear each time an attempt is made to enter the Setup program.

If the "**Disabled**" option was chosen in Advanced CMOS Setup, the password prompt will never appear.

When the password prompt appears, the new password, which is now stored in the CMOS, should be entered and the <Enter> key pressed. If the CMOS is corrupted, e.g., the batteries fall out or are loosened, the default ROM password mentioned above should be used instead.

NOTE: When the password is changed, however, it is important that a record of the change be kept in safe place. In the event the password check has been enabled in Setup and the user forgets or loses the new password, the default password stored in the ROM cannot be used unless the CMOS is disabled. A relatively safe way to do this would be to disconnect the CMOS Batteries.

7.2.8 Hard Disk Utility

WARNING Performing the Hard Disk Format, Auto Interleave, and /or Media Analysis will destroy any data on the hard disk being tested. Back up the hard disk(s) before actually performing any of these routines.

NOTE: These routines are not valid for SCSI Disk Drive.
The Hard Disk Format option performs a "low level" format of the hard drive(s). The user should check with the system or hard drive manufacturer to determine if this option should be taken.

The Auto Interleave option determines the optimum interleave factor prior to the format of the hard disk drive(s).

The Media Analysis option performs an analysis of each track of hard drive to determine whether it is usable. If it is not usable, the track is marked as "bad" so that data cannot be stored there in the feature.

If you are installing a brand new hard disk (drive), the manufacturer of the hard drive usually provides a list of "bad track" with the hard drive.

In this case, assuming that you have a list of bad tracks and know the interleave and media analysis options. Simply follow the instructions in the instructions in the Hard Disk Format section below. If you have a bad track list but have not been provided with the optimum interleave factor, follow the instructions in the Auto Interleave section.

If you are installing a used hard disk or reperforming an existing hard disk, perform the Media Analysis and then follow the instruction in the Auto Interleave section.

Once the Hard Disk Diagnostics option is taken by pressing <Enter> at the Main Setup Menu, the screen in Figure 7-28 will appear.

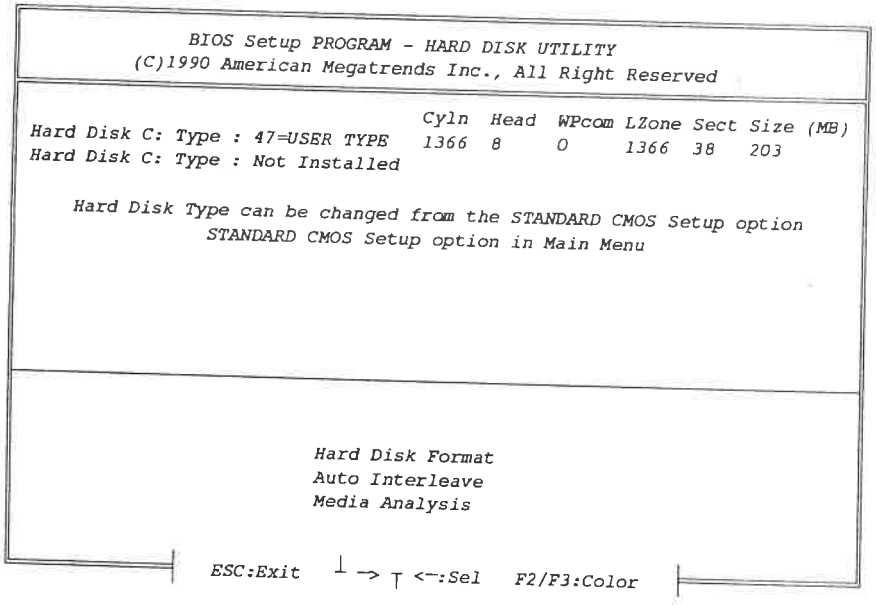


Figure 7-28. Hard Disk Utility Setup Screen

Use the Arrow Keys to select one of the three options and press <**ENTER**>.

A. Hard Disk Format Utility

WARNING Performing the Hard Disk Format, Auto Interleave, and/or Media Analysis will destroy any data on the hard disk being tested. Back up the hard disk(s) before actually performing any of these routines.

NOTE: This routines is not valid for a SCSI Disk Drive.

Use the Hard Disk Format option to integrate a new hard disk to the system, or to reformat a used hard disk which has developed some bad patches on a used drive, you may select the Media Analysis option.

When you press <**ENTER**> at the Hard Disk option, the screen in Figure 7-29 will appear.

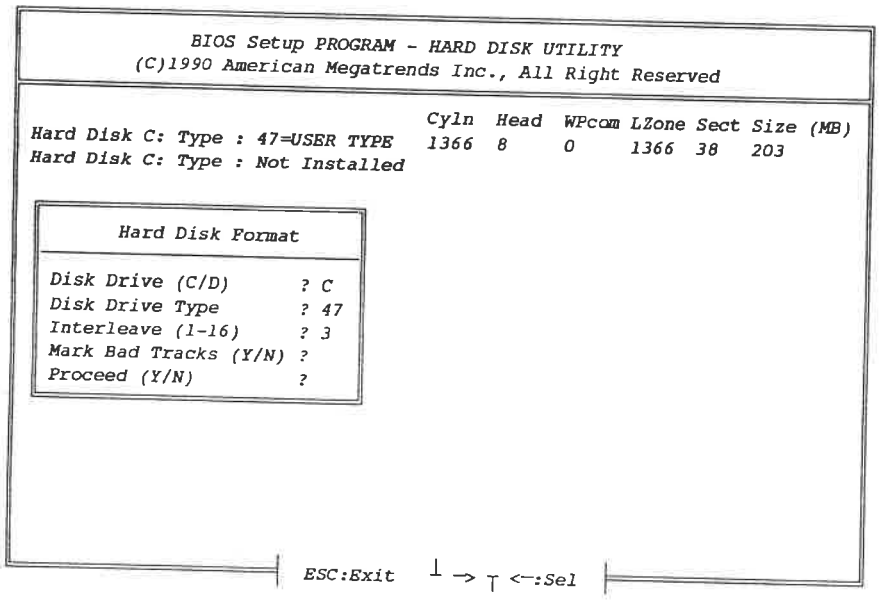


Figure 7-29. Hard Disk Format Screen

The box on the left of the screen contains a series of questions (prompts) which must be answered before performing the Hard Disk Format. The first two questions may already have been answered for you if the value was previously entered for one disk only at the Standard CMOS setup screen.

The value for Disk Drive is C for a C: Drive or D for a D: Drive. If two disk drives have been previously entered at the Standard CMOS Setup Screen, then the ID (C/D) will appear to the right of the question mark following the disk Drive field. Choose which drive you wish to format by selecting the appropriate letter and pressing <**ENTER**>. If only one drive was selected at the Standard CMOS Setup screen, the cursor will automatically be placed at the interleave prompt.

The Disk Drive Type is read from the CMOS. The Interleave factor can be selected manually, or can be determined with the Auto Interleave feature of the SETUP program.

The manufacturer of the hard drive usually provides a list of "bad tracks" with the hard drive. These tracks should be entered with this option, and they will be marked as "bad" in order to prevent data from being stored there in the feature.

The Figure 7-30 is displayed when the prompt to Mark Bad Tracks is changed to <**Y**> and the <**ENTER**> key is pressed and an option to add, delete, revise, or clear is selected from the Bad Track Edit Menu.

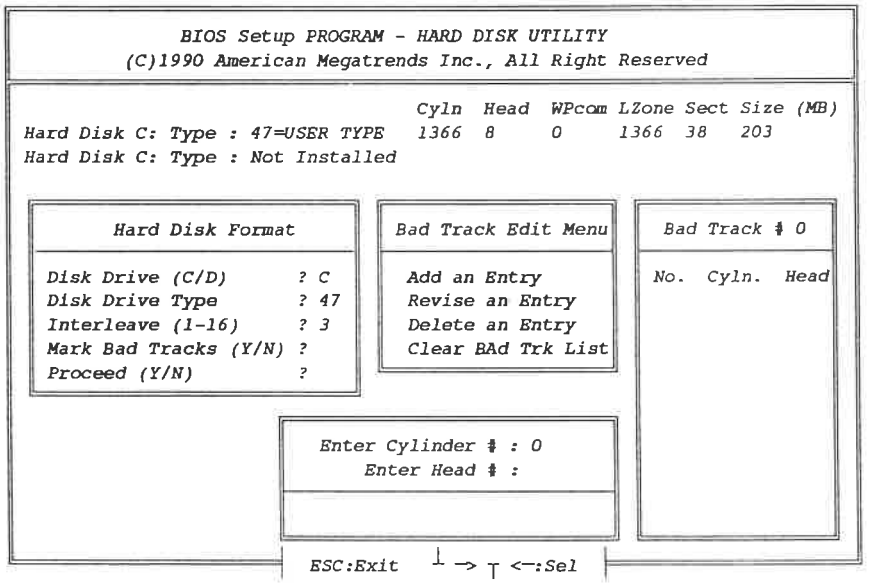


Figure 7-30. Hard Disk Utility Options

When the Proceed prompt is changed to <Y> and the <ENTER> key pressed, the warning screen in Figure 7-31 will be displayed.

The default for the Continue prompt is <N> to prevent accidental formatting of the hard drive and subsequent loss of data. Once this prompt is changed to <Y> and the <ENTER> key pressed, any data residing on the hard drive will be irrevocably lost.

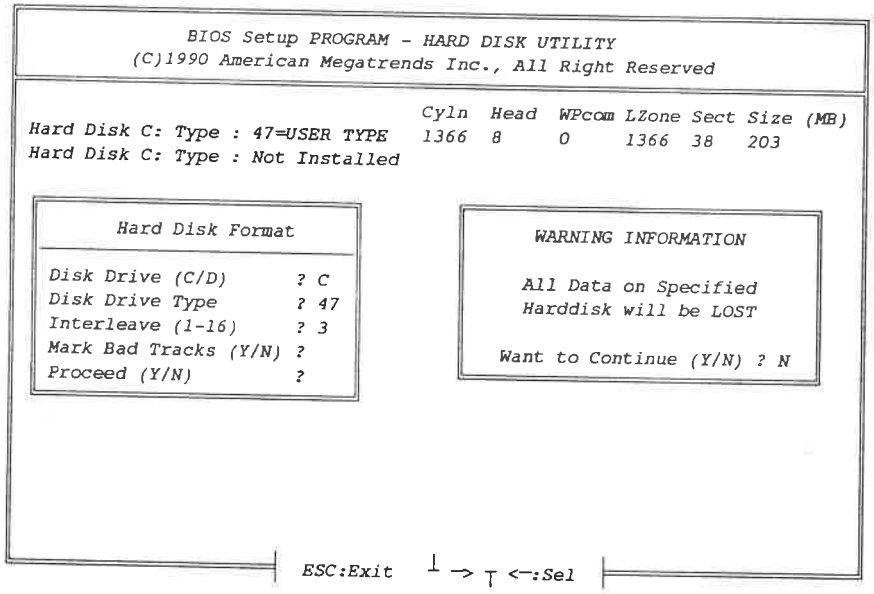


Figure 7-31. Hard Disk Format Warning Screen

B. Auto Interleave Utility

WARNING Performing the Hard Disk Format, Auto Interleave, and/or Media Analysis will destroy any data on the hard disk being tested. Back up the hard disk(s) before actually performing any of these routines.

NOTE: This routines is not valid for a SCSI Disk Drive.

The Auto Interleave utility calculates the optimum interleave value through trial and error by measuring the transfer rate for four interleave values. To determine the best interleave factor, the system will format a portion of the hard disk for each transfer rate calculated. The cylinders, heads and sectors formatted for each value will be displayed in the activity box on the screen.

To begin the Auto Interleave process, use your arrow keys to select this function on the main Hard Disk Utility Screen (Figure 7-28). Press <ENTER> to select this option. The screen in Figure 7-32 will appear.

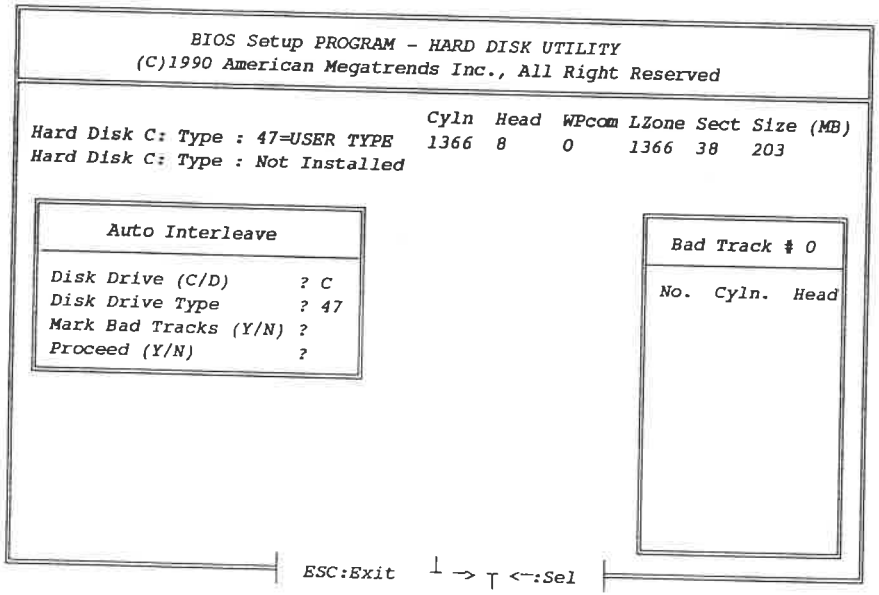


Figure 7-32. Interleave Utility Options

The cursor will be placed at the Mark Bad Tracks prompt. The default for this prompt is <**N**>. To *mark additional bad tracks*, change the prompt to <**Y**> and press <**ENTER**>. The screen in Figure 7-33 will appear.

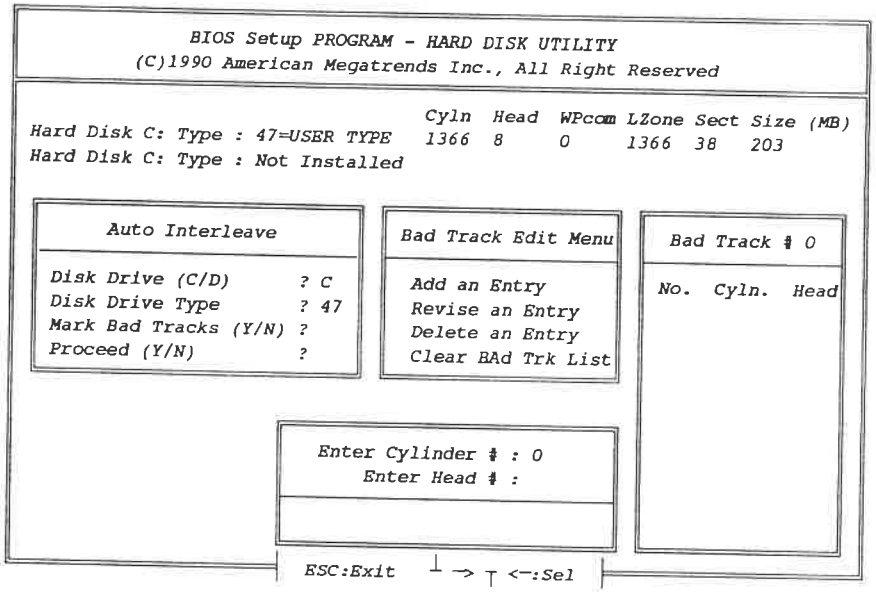


Figure 7-33. Interleave Bad Track Option Screen

After you have made the desired selection at the Bad Tracks Edit Menu, press <**ESC**>. The cursor will be moved to the Proceed prompt.

To proceed with the Auto Interleave process, change the prompt to <**Y**> and press <**ENTER**>. The warning screen in Figure 7-34 will appear.

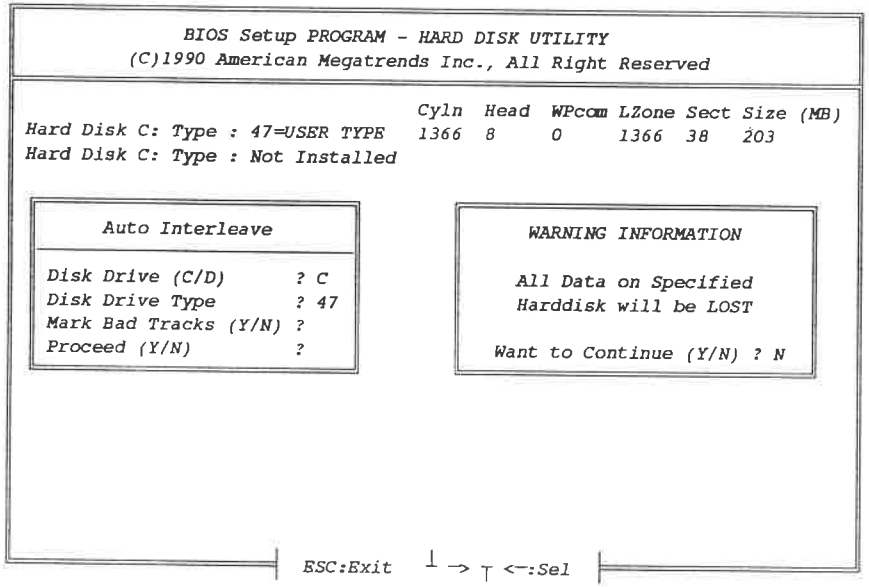


Figure 7-34. Auto Interleave Warning Screen

If you do not wish to proceed, press <**ENTER**> and you will return to the main Hard Disk Utility screen. To Proceed, change the warning prompt to <**Y**> and press <**ENTER**>.

C. Media Analysis

WARNING Performing the Hard Disk Format, Auto Interleave, and/or Media Analysis will destroy any data on the hard disk being tested. Back up the hard disk(s) before actually performing any of these routines.

NOTE: This routines is not valid for a SCSI Disk Drive.

The Media Analysis utility performs a series of tests to locate bad or damaged patches on the hard disk as a result of aging or poor handling. This utility locates all bad tracks on the hard disk and lists them in the Bad Track List Box. Since this test writes to all cylinders and heads on the hard disk to verify any bad tracks, the test may require several minutes to complete. For best results, run this test in its entirety.

To run the Media Analysis utility, use your arrow keys to select the option from the main Hard Disk Utility Menu and press <**ENTER**>. The Figure 7-35 will appear.

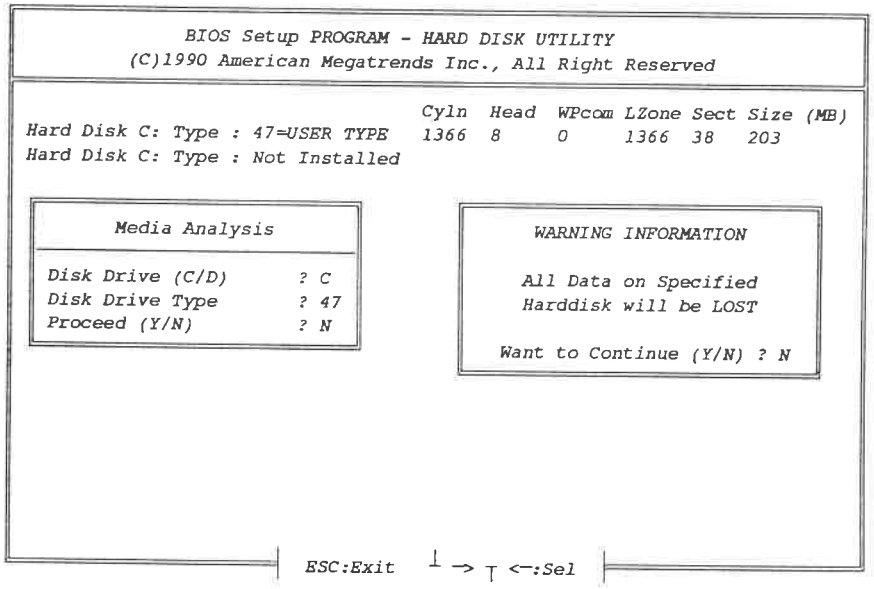


Figure 7-35. Media Analysis Screen

The cursor will appear at the Proceed prompt. When you press <ENTER>, the warning screen in Figure 7-36 will appear.

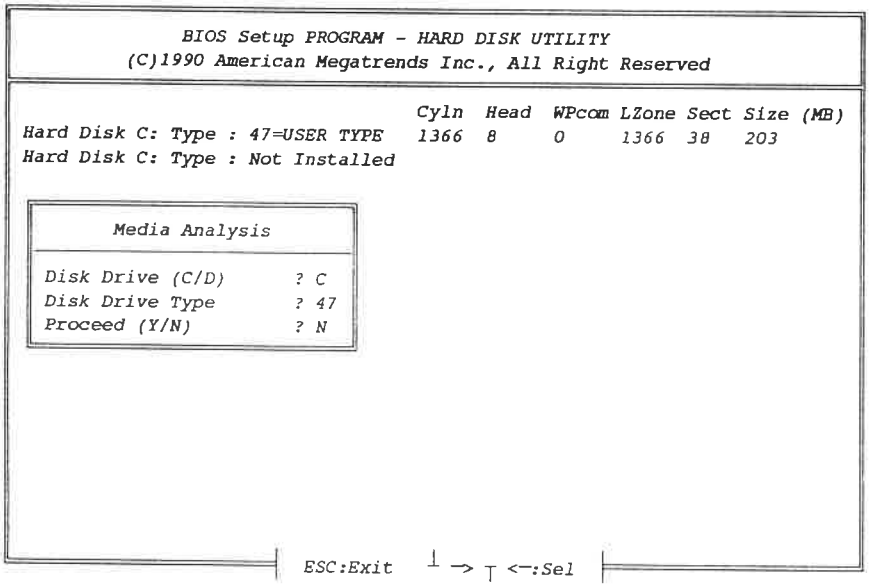


Figure 7-36. Media Analysis Warning Screen

If do not wish to proceed at this point, press the <ENTER> key and you will be returned to the main Hard Disk Utility screen. If you wish to proceed with the analysis, change the prompt to <Y> and press <ENTER>.

APPENDIX A

SRAM/DRAM SPECIFICATION

A. SRAM Timing

Since the DT-423S mainboard can run from 20 MHz to 50 MHz, the specification of cache/tag SRAM should match the system requirement. The following table is shown for different CPU speed, the read / write spec, the speed specification of the cache/tag SRAM.

CPU	Read	Write	Tag RAM (ns)	Cache RAM (ns)
80486SX-20	2-1-1-1	0 wait	40	45
80486DX-25	2-1-1-1	0 wait	40	45
80486DX-33	2-1-1-1	0 wait	25	25
80486DX-50	2-1-1-1	1 wait	15	15
80486DX-50	3-2-2-2	1 wait	25	25

For setting burst read cache fill 2-1-1-1 , JP16 should be open. For setting burst read cache fill 3-2-2-2, JP16 should be close. *For setting 0 wait write through buffer, JP12 should be close.* For setting 1 wait write through buffer, JP12 should be open.

For example, A 50 MHz CPU running 1 wait buffer write and 2-1-1-1 burst cache fill, user should set the jumper JP16 open, JP12 open and install TAG/CACHE high speed SRAM with 15 ns. The factory default jumper setting is JP16 open, JP12 close for 33 MHz CPU with 2-1-1-1 cache fill burst cycle and 0 wait write through buffer. When install SRAM, please ask manufacturer or dealer for the approved vendor of SRAM.

B. DRAM Timing

The DT-423S can run CPU speed from 20MHz to 50MHz, the specification of the DRAM (SIMM) should match the system requirement. The following table is shown for different CPU type and speed, the DRAM wait states and the specification of the DRAM.

DRAM Acess Time Specification:

CPU Speed	DRAM Acess Time
20 MHz	80 ns
25 MHz	80 ns
33 MHz	70 ns
50 MHz	60 ns

AMI/MR BIOS DRAM Timing:

BIOS / CPU	DRAM TIMING (SEE BIOS SETUP)	
	AMI BIOS	MR BIOS
80486DX-25	0 wait	0 wait
80486DX-33	1 wait	0 wait
80486DX-50	1 wait	1 wait
80486SX-20	0 wait	0 wait
80486SX-25	0 wait	0 wait

APPENDIX B

SYSTEM BOARD JUMPERS SETTING

The DT-423S mainboard has several jumpers for customizing the system's configuration. The only times you will need to change these setting are when you add or change peripherals or change the cache memory configuration.

B.1 Jumper Setting

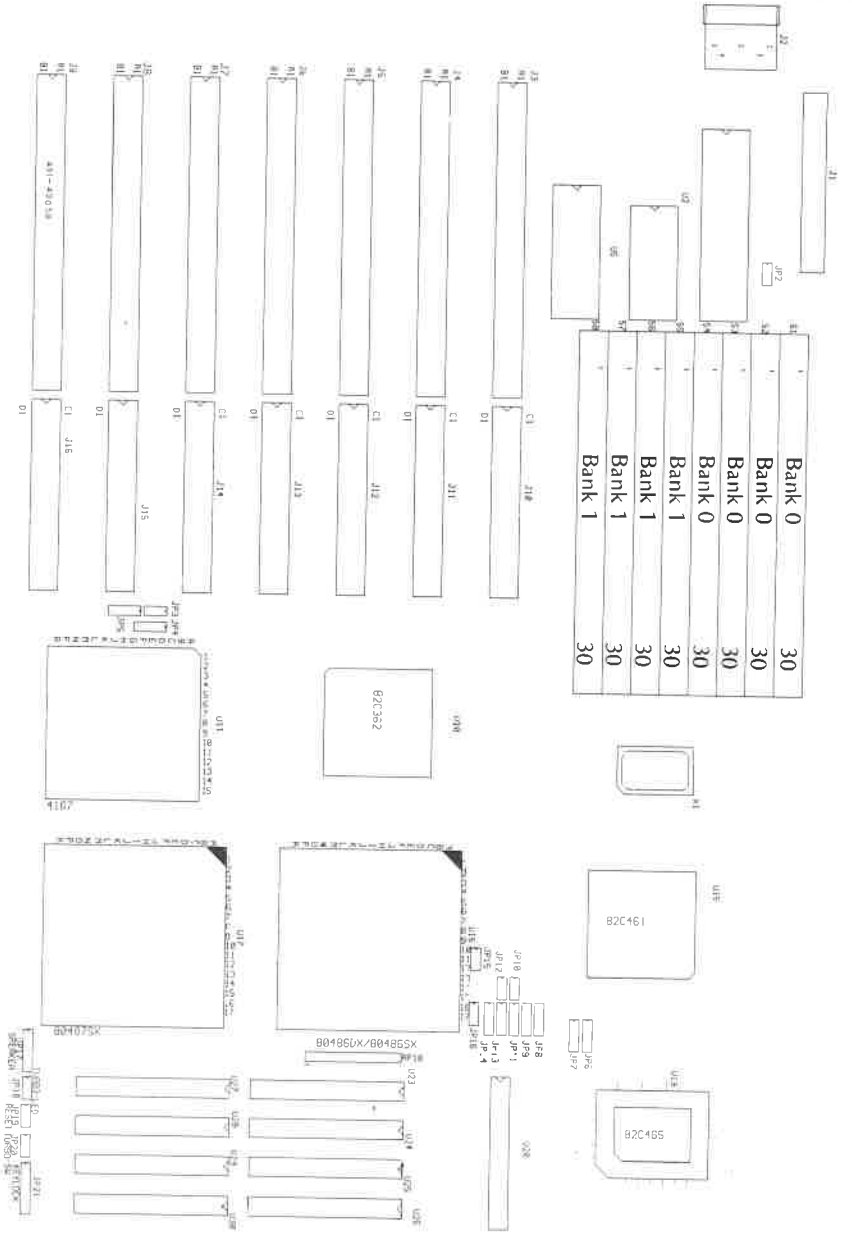
The jumper default setting is based on 486-33 MHz configuration. Default setting is denoted by * and is also factory setting.

Locatio	Description			Default
JP0	**Clear CMOS RAM**			
	open	Normal Operation		*
	close	Clear CMOS RAM		
JP2	**Security Passaword Enable or Disable Setting**			
	close	Enables Password security feature		
	open	Disables Password Security feature		*
JP3 JP4 JP5	**CPU Type Selection**			
	80486DX	80486SX (P23)	80487SX (P23N)	**80486DX**
	close 1-2 1-2	open open 2-3	close 2-3 1-2	
JP6	**System Ready# Selection**			
	pin 1-2 close	Ready#1: non-extended ready#		
	pin 2-3 close	Ready#2: extended ready#		*
See Apendix F for more detailed information about JP6				

Location	Description			Default
JP7	**1x/2x CPU Clock Frequency Selection**			
	pin 1-2 close	Selects 1x CPU clock		
	pin 2-3 close	Selects 2x CPU clock		*
	Cache Size Selection			
	64KB	256KB	!MB	64KB
JP8	1-2	2-3	2-3	
JP9	1-2	2-3	2-3	
JP11	1-2	2-3	2-3	
JP13	1-2	1-2	2-3	
JP14	1-2	1-2	2-3	
JP10	**1x or 2x System Frequency Selection**			
	close	Selects 1x cache clock		
	open	Selects 2x cache clock		*
JP12	**Post-Write Buffer Wait State Selection**			
	close	0 wait state		*
	open	1 wait state		
JP15	**Extended/Non-Extended Ready Selection**			
	close	When JP6 pin 2-3 close Ready #2: Extended Ready is selected		*
	open	When JP6 pin 1-2 close Ready #1: Non-extended Ready is selected		
JP16	**Burst Cache fill Cycle Selection**			
	open	2-1-1-1 burst cache fill		*
	close	3-2-2-2 burst cache fill		

NOTE: JP0 is NOT Available on REV-C2 or earlier version.

B.2 Location of Jumpers on the mainboard.



B.3 Default Jumper setting for different type CPU 486SX-25,33 486DX-33 486DX-50 DX2-50,66

	486SX-25,33	487SX (P23N)	486DX-33 DX2-50,66	486DX-50
JP3	open	close	close	close
JP4	open	2-3 close	1-2 close	1-2 close
JP5	2-3 close	1-2 close	1-2 close	1-2 close
JP6	2-3 close	2-3 close	2-3 close	1-2 close
JP7	2-3 close	2-3 close	2-3 close	1-2 close
JP10	open	open	open	close
JP12	close	close	close	close
JP15	close	close	close	open
JP16	open	open	open	close

APPENDIX C

SYSTEM BOARD CONNECTORS

The following illustration shows the location of all mainboard connectors and each connector's pin number.

NOTE: When connecting cables, make sure pin#1 of the cable aligns with the corresponding mainboard connector.

J1	**Power Connector**	
Pin #	Signal Name	
1 2 2 4 5 6	Power Good +5 Vdc +12 Vdc -12 Vdc Ground Ground	PS8
1 2 3 4 5 6	Ground Ground -5 Vdc +5 Vdc +5 Vdc +5 Vdc	PS9
J2	**Keyboard Connector**	
Pin #	Signal Name	
1 2 3 4 5	Keyboard clock Keyboard data Not used Ground +5 Vdc	

JP17	**Speaker Connector**
Pin #	Signal Name
1 2 3 4	Speaker N/C Ground Vcc
JP18	**Turbo LED Connector**
Connects to the Turbo indicator on the front panel	
Pin #	Signal Name
1 2	Turbo + (LED Anode) Ground - (LED Cathode)
JP19	**Hardware Reset Connector**
Pin #	Signal Name
1 2	Reset Ground
JP20	**Turbo Switch Bottom Connector**
Connecta to the Turbo switch bottom on the front panel, if any	
1 2	Turbo switch pin Ground
JP21	**Keylock Connector**
Pin #	Signal Name
1 2 3 4 5	Power LED (key pin) Ground Keylock Ground

APPENDIX D

MR BIOS's BEEP CODES & ERROR MESSAGES

This Appendix describes the Power-On-self-Test (**POST**) sequence, "**beep**" error codes, and "**CRT**" errorcode messages.

Each time the system is cold-booted via powerup or push-button reset, or warm-booted by pressing **CTRL ALT DEL**, the computer runs through a series of initializations and tests.

When system survives an unrecoverable error condition and halts, a code consisting of low and high tones is emitted from the speaker.

All *beep-codes begin with 2 reference tones*: 1st low, 2nd high. Not counting this pair of reference tones, the beep-codes are generated from an internal 3-bit, 4-bit, or 5-bit binary number. If you are familiar with binary encoding, *there is way to cross reference the tone pattern:* Low tones represent "0", High tones represent "1". Although the tones are not numerically equivalent to the checkpoint number are emitted from speaker at later points in POST.

A substantial number of Text messages have no Beep-Code associated with them. These messages are either warnings, or describe non-fatal error conditions. A "warning" messages is for informational purpose only - an absent keyboard or bad adaptor ROM will cause warnings to be displayed. "Error" messages always indicate situations which can be remedied by entering a configuration session in the Setup-utility. In most cases, Setup will auto-configure system to accommodate the new environment, and the user need only view the Summary screen and acknowledge the new configuration. Of course, the user may opt to change the default settings at that time.

<< Checkpoint 03/03H >>

Beep-Code 000 Low High - Low Low Low
ROM-BIOS Checksum Failure - System Halted

<< Checkpoint 04/04H >>

Beep-Code 001 Low High - High Low Low
DMA Page Register Failure - System Halted

<< Checkpoint 05/05H >>

Beep-Code 010 Low High - Low High Low
Keyboard Controller Selftest Failure - System Halted

<< Checkpoint 07/07H >>

Beep-Code 011 Low High - High High Low
Memory Refresh Circuitry Failure - System Halted

<< Checkpoint 08/08H >>

Beep Code 100 Low High - Low Low High
Master(16-bit) DMA Controller Failure - System Halted

Beep Code 101 Low High - High Low High
Slave(8-bit) DMA Controller Failure - System Halted

<< Checkpoint 10/0AH >>

Beep Code 0000 Low High - Low Low Low Low
Memory Bank 0 Pattern Test Failure - System Halted

Beep Code 0001 Low High - High Low Low Low
Memory Bank 0 Parity Circuitry Failure - System Halted

Beep Code 0010 Low High - Low High Low Low
Memory Bank 0 Parity Error - System Halted

Beep Code 0011 Low High - High High Low Low
Memory Bank 0 Data Bus Failure - System Halted

Beep Code 0100 Low High - Low Low High Low
Memory Bank 0 Address Bus Failure - System Halted

Beep Code 0101 Low High - High Low High Low
Memory Bank 0 Block Access Read Failure - System Halted

Beep Code 0110 Low High - Low High High Low
Memory Bank 0 Block Access Read/write Failure - System Halted

<< Checkpoint 11/0BH >>

Beep Code 0111 Low High - High High High Low Master
8259 (Port 21) Failure - System Halted

Beep Code 1000 Low High - Low Low Low High Slave
8259 (Port A1) Failure - System Halted

<< Checkpoint 12/0CH >>

Beep-Code 1001 Low High - High Low Low High
Master 8259 (Port 20) Interrupt Address Error - System Halted

Beep-Code 1010 Low High - Low High Low High
Slave 8259 (Port A0) Interrupt Address Error - System Halted

Beep-Code 1011 Low High - High High Low High
8259 (Port 20/A0) Interrupt Address Error - System Halted

Beep-Code 1100 Low High - Low Low High High
Master 8259 (Port 20) Stuck Interrupt Error - System Halted

Beep-Code 1101 Low High - High Low High High Slave
8259 (Port A0) Stuck Interrupt Error - System Halted

Beep-Code 1110 Low High - Low High High High
System Timer 8254 CH0/IRQ0 Interrupt Failure - System Halted

<< Checkpoint 13/0DH >>

Beep-Code 1111 Low High - High High High High
8254 Channel 0 (System Timer) Failure - System Halted

<< Checkpoint 14/0EH >>

Beep-Code 10000 Low High - Low Low Low Low High
8254 Channel 2 (Speaker) Failure - System Halted

Beep-Code 10001 Low High - High Low Low Low High
8254 OUT2 (Speaker Detect) Failure - System Halted

<< Checkpoint 15/0FH >>

Beep-Code 10010 Low High - Low High Low Low High
CMOS RAM Read/Write Test Failure - System Halted

Beep-Code 10011 Low High - High High Low Low High
RTC Periodic Interrupt/IRQ8 Failure - System Halted

<< Checkpoint 16/10H >>

Beep-Code 10100 Low High - Low Low High Low High
Video ROM Checksum Failure at Address XXXX
Monochrome Card Memory Error at Address XXXX
Color Graphics Memory Error at Address XXXX
Color Graphics Card Address Line Error at Address XXXX

<< Checkpoint 17/11H >>

(no beep code)
Real-Time-Clock (RTC) Battery is Discharged
Battery Backed Memory (CMOS) is Corrupt

<< Checkpoint 18/12H >>

Beep-Code 10101 Low High - High Low Low High
Keyboard Controller Failure - System Halted

<< Checkpoint 20/14H >>

<< Checkpoint 24/18H >>

<< Checkpoint 25/19H >>

Beep-Code 10110 Low High - Low High High Low High
Memory Parity Error - System Halted

Beep-Code 10111 Low High - High High High Low High
IO Channel Error - System Halted

(no beep code)
RAM Pattern Test Failed at Address XXXX
Parity Circuitry Failure in Bank XXXX
Data Bus Test Fail: Address XXXX
Address Line Test Failure at XXXX
Block Access Read Failure at Address XXXX
Block Access Read/Write Failure at Address XXXX
Banks Decode to Same Location: XXXX and YYYY

<< Checkpoint 18/12H >>

<< Checkpoint 21/15H >>

(no beep code)
Keyboard Error - Stuck Key
Keyboard Failure or Keyboard Not Present

<< Checkpoint 23/17H >>

Beep-Code 11000 Low High - Low Low Low High High
A20 Test Failure Due to 8042 Timeout -System Halted

Beep-Code 11001 Low High - High Low Low High High
A20 Stuck in Disabled State (A20=0) - System Halted

(no beep code)
A20 Gate Stuck in Asserted State (A20 Follows CPU)

<< Checkpoint 26/1AH >>

Beep-Code 11010 Low High - Low High Low High High
Real-Time-Clock (RTC) is not Updating - System Halted

(no beep code)
Real-Time-Clock (RTC) Setting are Invalid

<< Checkpoint 30/1EH >>

(no beep code)
Diskette CMOS Configuration is Invalid
Diskette Controller Failure
Diskette Drive A: Failure
Diskette Drive B: Failure

(no beep code)
Fixed Disk CMOS Configuration is Invalid
Fixed Disk Drive C: (80)Failure
Fixed Disk Drive D: (81)Failure
Please Wait For Fixed Disk to Spin UP

<< Checkpoint 32/20H >>

Fixed Disk Configuration Change
Diskette Configuration Change Serial
Port Configuration Change
Parallel Port Configuration Change
Video Configuration Change
Memory Configuration Change
Numeric Coprocessor Configuration Change

<< Checkpoint 33/21H >>

(no beep code)
System Key is Locked Position - Turn Key to Unlocked Position

<< Checkpoint 41/29H >>

(no beep code)
Adaptor ROM Checksum Failure at Address

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APPENDIX E

AMI BIOS's BEEP CODES & ERROR MESSAGES

A. BIOS Error Beep Codes

During the POST (**Power On Self Test**) routines, which are performed each time the system is power on, errors may occur.

Non-fatal errors are those which, in most cases, allow the system to continue the boot up process. The error messages normally appear on the screen.

Fatal errors are those which will not allow the system to continue the boot-up procedure. The numbers on the fatal error list below correspond to the number of beeps for the corresponding error. All errors listed, with the exception of #8, are fatal errors.

No. of Beeps	Error Message	Description
1	Refresh Failure	The memory refresh circuitry of the motherboard is faulty
2	Parity Error	A Parity error was detected in the base memory (the first block of 64KB) of the system
3	Base 64KB Memory Failure	A memory failure occured within the first 64KB of memory.
4	Timer Not operational	Timer#1 on the system board has failed to function properly
5	Processor Error	The CPU (Central Processing Unit) on the system board has generated an error

No. of Beeps	Error Message	Description
6	8042-Gate A20 Failure	The keyboard controller (8042) contains the Gate A20 switch which allows the CPU to operate in virtual mode. This error message means that the BIOS is not able to switch the CPU into protected mode
7	Processor Exception Interrupt Error	The CPU on the motherboard has generated an exception interrupt
8	Display Memory Read/Write Error	The system video adapter is either missing or its memory is faulty PLEASE NOTE: This is not a fatal error
9	ROM Checksum Error	The ROM cahecksum value does not match the value encoded in the BIOS
10	CMOS Shutdown Register Read/Write Error	The shutdown register for the CMOS memory has failed

B. BIOS Non-Fatal Error Messages

In a non-fatal error occurs during the POST routines performed each time the system is powered on, the error message will appear on the screen in the following format:

ERROR Message Line 1
ERROR Message Line 2
Press <F1> to RESUME

Note the error message and press the **<F1>** key to continue with the boot-up procedure.

NOTE: If the **"Wait for <F1> If Any Error"** option in the Advanced CMOS Setup portion of the BIOS SETUP PROGRAM has been set to "disabled," the <F1> prompt will not appear on the third line.

For most of the error messages, there is no ERROR Message Line 2. Generally, for those messages containing a line 2 ERROR Message, the text will be "RUN SETUP UTILITY." Pressing the <F1> key will invoke the BIOS SETUP PROGRAM.

A description of the error messages appears below:

CH-2 Timer Error - Most AT standard system boards include two timers. AN error with timer #1 is a fatal error, explained in A. If an error occurs with timer #2, this error messages appears.

INTR #1 Error - The interrupt channel #1 has failed the POST routine.

INTR #2 Error - The interrupt channel #2 has failed the POST routine.

CMOS Checksum Failure - After the CMOS values are saved, a checksum value is generated to provide for error checking. If the previous value is different from the value currently read, this error message appears. To correct this error, you should run the BIOS SETUP Program.

CMOS System Options Not Set - The values stored in the CMOS are either corrupt or nonexistent. Run the BIOS SETUP Program to correct this error.

Keyboard Is Locked... Unlock It - The keyboard lock on the system is engaged. The system must be unlocked to continue the boot-up procedure.

Keyboard Error - The BIOS has encountered a timing problem with the keyboard. Make sure you have an AMI Keyboard BIOS installed in your system. You may also set the "keyboard" option in the BIOS SETUP Program Standard CMOS Setup to "Not Installed," which will cause the BIOS skip the keyboard POST routines.

KB/Interface Error - The BIOS has found an error with the keyboard connector on the system board.

CMOS Memory Size Mismatch - If the BIOS finds the amount of memory on your system board to be different from the amount stored in CMOS, this error message is generated.

FDD Controller Failure - The BIOS is not able to communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered off.

HDD Controller Failure - The BIOS is not able to communicate with the hard disk drive controller. Check all appropriate connections after the system is powered down.

C: Drive Error - The BIOS is not receiving any response from hard disk drive C:. It may be necessary to run the Hard Disk Utility to correct this problem. Also, check the type of hard disk selected in the Standard CMOS Setup of the BIOS SETUP Program to see if the correct hard disk drive has been selected.

D: Drive Error - The same error as Drive C: has occurred with hard drive D:.

C: Drive Failure - The BIOS cannot get any response from the hard disk drive C:. It may be necessary to replace the hard disk.
D: Drive Failure - The same error as above has occurred with Hard Drive D:.

CMOS Time & Date Not Set - Run the Standard CMOS Setup of the BIOS SETUP Program to set the date and time of the CMOS.

Cache Memory Bad, Do Not Enable Cache! - The BIOS has found the cache memory of the motherboard to be defective. Consult your system dealer to repair this problem.

8042 Gate A20 Error - The Gate-A20 portion of the keyboard controller (8042) has failed to operate correctly. The 8042 chip should be replaced.

Address Line Short! - An error has occurred in the address decoding circuitry of the motherboard.

DMA #2 Error - An error has occurred with the second DMA channel on the motherboard.

DMA #1 Error - An error has occurred with the first DMA channel on the motherboard.

DMA Error - An error has occurred with the DMA controller on the motherboard.

Diskette Boot Failure - The diskette used to boot-up in floppy drive A: is corrupt, which means you can not use it to boot-up the system. Use another boot diskette and follow the instruction on the screen.

Invalid Boot Diskette - The BIOS can read the diskette in floppy drive A:, but it cannot boot-up the system with it. Use another boot diskette and follow the instruction on the screen.

On Board Parity Error - The BIOS has encountered a parity error with some memory installed on the system board. The message will appear as follows:

ON BOARD PARITY ERROR
ADDR (HEX) = (XXXX)

where XXXX is the address (in hexadecimal) at which the error has occurred. "On Board" means that it is part of the memory attached directly to the system board, as opposed to memory installed via an expansion card in an I/O (BUS) slot.

Off Board Parity Error - The BIOS has encountered a parity error with some memory installed an expansion card in an I/O (BUS) slot. The message will appear as follows:

OFF BOARD PARITY ERROR
ADDR (HEX) = (XXXX)

where XXXX is the address (in hexadecimal) at which the error has occurred. "Off Board" means that it is part of the memory installed via an expansion card in an I/O slot, as opposed to memory attached directly to the system board.

Parity Error ???? - The BIOS has encountered a parity error with some memory in the system, but it is not able to determine the address of the error.

APPENDIX F SERVICE

IN CASE OF DIFFICULTY

If you have problems after installation, check the following to determine the cause.

a. Ensure that all cables are properly connected, and that all plugs are firmly seated in their sockets.

b. Ensure that the display monitor is properly connected and that its power is turned on.

Power OFF the computer system and all other connected devices before checking the following:

c. Ensure that the SRAMs & DRAMs (SIMMs) are seated properly.

d. Ensure that the jumpers on the system board are set correctly.

e. Refer to the Questions & Answers on next page.

If checking these items does not locate the problem, there may be a malfunction of the mainboard, display monitor or the display card. Please fill-in the **Problem Report Form** on this section to assist your computer dealer for assistance in locating the problem.

Questions & Answers

Q1. What is the mentioned application to UNIX/OS2 operation ?
A1: The 256/384K memory relocation must be disabled.

Q2. What is the mentioned application to drive A: booting ?
A1: System BIOS must be shadowed to match the bus release timing between the CPU and DMA.

Q3. What is the mentioned application to VGA card of TRIDENT 8800 and TSENG LAB ET3000/4000 ?
A3: The Decouple Refresh must be disabled.

Q4. When should I use the 1x frequency ?
A4: The 1x frequency is used when CPU is over 33MHz. (2x clock mode is recommended for CPU frequency no faster than 33MHz, because of the performance is slightly better than if 1x mode is used)

Q5. What is the function to jumper JP6 ?
A5: Jumper JP6 is used for SYSTEM READY# selection
READY# 1, Non-Extended Ready# W/O synchronous, if JP6 1-2 CLOSE and the SPEED is LESS than 33MHz or 1x clock is used.
READY# 2, Extended Ready# W/synchronous, if JP6 2-3 CLOSE and the SPEED is EQUAL/OVER 33MHz, 2x clock is used.

Q7. What is the function to jumper JP10 ?
A7: Jumper JP10 is used for SYSTEM FREQUENCY selection
1x SYSTEM FREQUENCY, JP10 CLOSE , if the CPU speed is OVER 33MHz. 2x SYSTEM FREQUENCY, JP10 OPEN, if the CPU speed is LESS/EQUAL 33MHz.

PROBLEM REPORT FORM

INFORMATION ON SYSTEM BOARD:

DT-423S REV. _____ S/N. _____ Purchased Date : _____

CPU:

80486DX _____ MHz, 80486SX _____ MHz

CHIPSET INFORMATION:

SL82C461 Chip Code _____ Manufactured Date : _____

SL82C362 Chip Code _____ Manufactured Date : _____

SL82C465 Chip Code _____ Manufactured Date : _____

Oscillator:

66.667 MHz ____, 66.0 MHz ____, 50.0 MHz ____, 40.0 MHz ____, Others: ____

BIOS:

AMI ____, Issued Date: ____ /____ /_____, Messages _____

MR ____, Version _____ other _____

KEYBOARD CONTROLLER:

Manufacturer: _____ Keyboard BIOS Vender: _____ Version ____

DRAM INFORMATION:

BANK 0 Type _____ Manufacturer _____ Speed _____ ns

BANK 1 Type _____ Manufacturer _____ Speed _____ ns

SRAM INFORMATION:

Part No. _____ SRAM Speed _____ ns, Manufacturer _____

SRAM Size: 64K _____ , 256K _____ , 1M _____

JUMPER SETTING:

JP2: _____, JP3: _____, JP4: _____, JP5: _____

JP6: _____, JP7: _____, JP8: _____, JP9: _____

JP10: _____, JP11: _____, JP12: _____, JP13: _____

JP14: _____, JP15: _____, JP16: _____

INFORMATION OF VIDEO DISPLAY CARD:

VGA: Chipset Part No. _____, Manufacturer _____

EGA: Chipset Part No. _____, Manufacturer _____

MGA/P: Chipset Part No. _____, Manufacturer _____

Display Card Manufacturer: _____ Model No. _____

Display Card Jumper/switch settings: _____

Display Card DRAM: ___ 256KB, ___ 512KB, ___ 1024KB, Speed: _____ns

INFORMATION OF FLOPPY/HARD DISK CONTROLLER CARD:

ST-412/506 FHDC: Part No. _____ Manufacturer: _____

IDE (AT BUS): Part No. _____ Manufacturer. _____

SCSI: Part No. _____ Manufacturer. _____

ESDI: Part No. _____ Manufacturer. _____

INFORMATION OF OTHER ADD-ON CARDS:

Multi-Function Card: Part No. _____ Manufacturer _____

LAN Card: Part No. _____ Manufacturer _____

SOFTWARE INFORMATION:

Operation System (version):

MS-DOS _____ PC-DOS _____ OS/2 _____

XENIX _____ UNIX _____ Others _____

Application Software:

_____ Version _____

_____ Version _____

PROBLEM DESCRIPTION:

1. _____

2. _____

Does the same problem exist in other mainboard using the same Chipset ? __ Y __ N