

486AF

Motherboard

User's Manual

V1.0

486AF
Motherboard
User's Manual

Easy to read. Easy to use.

Printed in Taiwan V1.0

Notice

This User's Manual and all accompanying documentation are copyrighted and all rights are reserved. No part of this document may be photocopied, reproduced, or translated to any electronic or machine readable form, except for copies retained by the purchaser for backup purposes, without prior written consent.

The information contained in this document is subject to change without notice.

Trademarks

IBM, XT, and AT are trademarks of International Business Machines Corporation.

Intel is a trademark of Intel Corporation.

AMI is a trademark of American Megatrends Incorporated.

All Rights Reserved 1992

January, 1992

Table of Contents

How to Use This Guide	vi
Power Supply Requirements.....	vii
Static Electricity Precautions.....	viii
Chapter 1: Introduction	1 - 1
Features.....	1 - 2
Cache Overview.....	1 - 3
Unpacking.....	1 - 4
Chapter 2: Motherboard Description	2 - 1
Motherboard Components	2 - 1
Motherboard Layout	2 - 2
Chapter 3: Hardware Configuration.....	3 - 1
Power Precautions.....	3 - 1
Jumpers, Connectors, and Memory Bank	
Locations	3 - 2
Setting Jumpers.....	3 - 3
Symbols:.....	3 - 3
JP2: Monitor Type Selection.....	3 - 4
Setting the Monitor Type Jumper.....	3 - 4
JP3: Initial AT Bus Clock Selection.....	3 - 5
Setting the Initial AT Bus Clock	
Jumper	3 - 5

JP6~JP8: CPU Selection.....	3 - 6
Setting the CPU Selection Jumpers.....	3 - 6
JP9: Clock Speed Selection.....	3 - 7
Setting the Clock Speed Jumpers.....	3 - 7
JP10~JP13: Cache Size Selection.....	3 - 8
128KB Cache Installation.....	3 - 8
Setting the Cache Jumpers.....	3 - 9
Memory Configuration.....	3 - 10
Installing SIMM.....	3 - 11
Numeric Coprocessor Installation.....	3 - 12
Connectors.....	3 - 13
J1 - Keyboard Connector.....	3 - 13
J2 & J3 - Power Supply Connector.....	3 - 14
J4 - External Battery Connector.....	3 - 14
J5~J9 Case Device Connectors.....	3 - 15
J5- Reset Switch Connector.....	3 - 16
J6 - Speaker Connector.....	3 - 16
J7 - Turbo Switch Connector.....	3 - 17
J8 - Turbo LED Connector.....	3 - 17
J9 - Keylock & Power LED Connector.....	3 - 18
JP1- Secondary Keyboard Connector.....	3 - 18
Chapter 4: BIOS Setup.....	4 - 1
AMI BIOS Setup.....	4 - 2
Main Menu Options.....	4 - 4
STANDARD CMOS SETUP.....	4 - 4
ADVANCED CMOS SETUP.....	4 - 6

ADVANCED CHIPSET SETUP.....	4 - 11
AUTO CONFIGURATION W/ BIOS DEFAULTS.....	4 - 17
AUTO CONFIGURATION W/ POWER-ON DEFAULTS.....	4 - 17
CHANGE PASSWORD.....	4 - 18
HARD DISK UTILITY.....	4 - 20
Hard Disk Format.....	4 - 21
Auto Interleave.....	4 - 22
Media Analysis.....	4 - 24

How to Use This Guide

This guide provides information that will help you configure and install the 486AF motherboard easily and efficiently.

- Chapter 1, **Introduction**, acquaints you with the special features of the 486AF motherboard.
- Chapter 2, **Motherboard Description**, describes key components and their locations on the motherboard.
- Chapter 3, **Hardware Configuration**, shows you how to configure memory and set the motherboard's jumpers. Instructions for installing memory and a math coprocessor are also given.
- Chapter 4, **BIOS Setup**, explains how to run the motherboard's BIOS setup program.

Benchmark Test Performance:

Model	Landmark	Power Metric	Clock Speed
51 V4.0	V1.14	MIPS V1.5	50 MHz
81.1 MHz	over 300 MIPS	20.1 MIPS	33 MHz
84.0 MHz	151.3 MHz	14.05 MIPS	20 MHz
87.7 MHz	90.8 MHz	8.818 MIPS	

Power Supply Requirements

Your system requires a clean, steady power supply for reliable performance. For the high frequency CPU on the 486AF motherboard, the quality of the power supply is even more important. Most power supplies on the market meet the standards required by the motherboard's CPU. However, to be certain of the best performance, make sure your power supply provides a minimum of 200W and +5V voltage range of 4.95 volts minimum to 5.25 volts maximum.

If your area has noisy power transmission, use a line noise filter between the power source and your computer.

Static Electricity Precautions

Before you handle the motherboard or any other system component, you must discharge static electricity by grounding yourself. Observing the precautions below will protect your equipment from static discharge:

- Keep the motherboard and other system components in their anti-static packaging until you are ready to install them.
- Ground yourself before you remove any system component from its protective anti-static packaging. You can ground yourself by grasping the expansion slot covers or other unpainted portions of the computer chassis.
- Ground yourself frequently while working so that you discharge any static electric charge that may build up in your body. Another option is to use a grounding strap.
- Avoid touching the components on the motherboard. Handle the motherboard and other system components by the edges.

Chapter 1: Introduction

The 486AF motherboard is a highly integrated, 80486 system board that features an advanced Intel i486DX-33/50MHz or i486SX-20/25 microprocessor running at 33/50 MHz or 20/25 MHz clock speed. This board is ideal for building systems that meet the power requirements of current and future software applications, GUIs, and operating systems.

The board's i486 microprocessor includes an enhanced on-chip 80387 coprocessor. When you use the i486SX-20/25 CPU you can also install an optional Intel i487SX coprocessor to further improve system performance.

The motherboard features 64KB, 128KB, or 256KB of external cache memory with direct-map and write-back caching algorithms. The CPU accesses cache memory very quickly, significantly improving the speed of your programs.

The 486AF is compatible with MS-DOS, OS/2, Xenix 386, Unix, MS Windows 3.0, Novell Netware, and all the thousands of IBM personal computer applications.

Benchmark Test performance:

Clock Speed	Power Meter MIPS V1.5	Landmark V1.14	Norton SI V4.0
50 MHz	22.1 MIPS	over 200 MHz	82.1 MHz
33 MHz	14.65 MIPS	151.3 MHz	54.6 MHz
20 MHz	8.818 MIPS	90.8 MHz	32.7 MHz

Features

The advanced features of the 486AF motherboard include:

- Intel i486DX-33/i486DX-50 CPU running at 33MHz/50MHz or an Intel i486SX-20/25 CPU running at 20/25MHz
- CPU runs in both turbo and normal modes
- Enhanced 80387 built into the i486DX, and socket support for an Intel i487SX coprocessor
- Six 16-bit ISA slots and two 8-bit slots
- Memory configurations up to 32Mbytes with combinations of 256K, 1M, and 4M fast page mode DRAM modules.
- Shadow RAM function supports all BIOS areas
- Built-in 8K cache with 4-way set associate algorithm
- External 64K, 128K, or 256K with direct-map and write-back caching algorithm*
- Baby AT size, 218mm x 330mm (8.6-inches x 13-inches)

* *The motherboard supports 128K bytes of external cache only if the 82C495 chip is installed. (Refer to page 3-8.)*

Cache Overview

The cache features of the 486AF motherboard include a built-in 8K cache with 4-way set associate algorithm, as well as an external 64K, 128K or 256K cache with direct-mapped and write-back caching algorithms. You can easily configure the cache for the 64K, 128K, or 256K external cache options.

The cache capabilities of the 486AF motherboard significantly improve the performance of your software applications. Cache works by copying your most recent data and placing it in an area of high speed memory called SRAM. Cache SRAM is positioned between main memory DRAM and the CPU. Data is transferred from DRAM to SRAM and then from SRAM to the CPU. The CPU can access data in and out of the SRAM at a very high speed, allowing your applications to run much faster.

Two chips on the 486AF motherboard serves as Tag RAM for the system's cache. Tag RAM acts as a directory of addresses for the data stored in Cache RAM. The CPU first checks Tag RAM to see if the requested data is stored in cache. If the data addresses are not present, then the CPU must go to main memory to search.

The 486AF motherboard is configured to support 8 SRAM chips of either 8K or 32K capacity. This gives you the option of either a 64K (8K x 8), 128K (32K x 8) or 256K (32K x 8) cache size. Refer to the cache configuration section in Chapter 3.

Unpacking

The 486AF Motherboard comes packed in a sturdy cardboard shipping carton. The carton contains:

- The 486AF Motherboard
- This User's Guide

Note: Do not remove the motherboard from its original packing until you are ready to install it.

The motherboard is easily damaged by static electricity. You should observe the following precautions while unpacking and installing the motherboard.

1. Before you handle the motherboard, ground yourself by grasping an unpainted area of the system's metal chassis. Doing so discharges any static charge you may have accumulated in your body.
2. Remove the motherboard from its anti-static wrapping and place it on a grounded surface, component side up.
3. Check the motherboard for damage. If any integrated circuit appears loose, press carefully to seat it firmly in its socket.

Do not apply power if the motherboard appears damaged. If there is damage to the board, or items are missing from the carton, contact your dealer immediately.

Chapter 2: Motherboard Description

This chapter gives a brief description of key components on the motherboard.

Motherboard Components

Refer to Figure 2-1 on the following page to locate the components described below.

1 System Microprocessor

The Intel i486DX-33/i486DX-50, (or i486SX-20/25) microprocessor on the motherboard is a high-performance 32-bit microprocessor that runs at 33MHz/50MHz (or 20MHz/25MHz). The CPU runs at 33MHz/50MHz (or 20MHz/25MHz) under both turbo and normal modes. An enhanced 80387 co-processor is built-into the i486DX CPU.

2 Math Coprocessor Socket

This socket lets you add an optional Intel i487SX math coprocessor if the i486SX CPU is used. Adding a numeric coprocessor to the motherboard increases the speed of calculation intensive applications such as spreadsheets, databases, and graphics programs.

Motherboard Layout

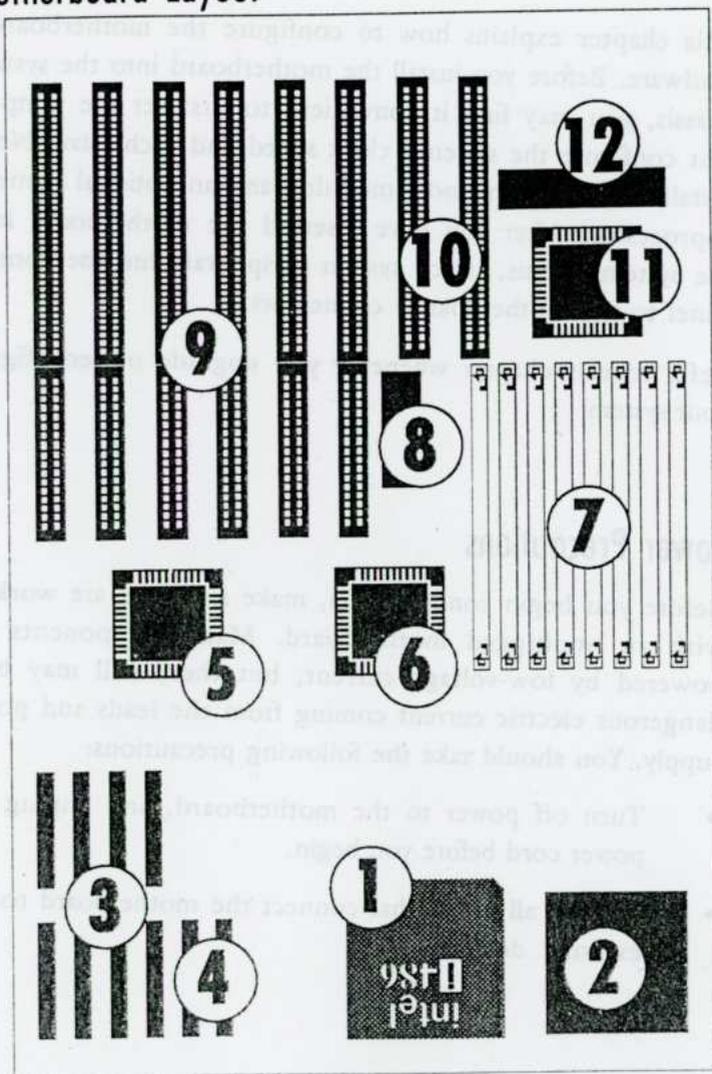


Figure 2-1. Components of the 486AF Motherboard

3 Cache SRAM

The on-board cache memory consists of eight SRAM (Static Random Access Memory) chips that hold cached code and data.

4 Cache TAG RAM

The on-board tag cache memory consists of two chips which register the addresses of code and data contained in Cache SRAM.

5 & 6 Opti 495 /392 (or 493/392) Chip Set

The Opti Chip Set implements core logic, and includes:

(5) Opti 82C495 (or 82C493) System Controller (SYSC)

The SYSC chip implements cache/DRAM controller functions, system logic, and AT-bus related logics.

(6) Opti 82C392 Data Buffer Controller (DBC)

The DBC chip acts as a data buffer unit among various data busses on the motherboard.

7 Main Memory

8 SIMM (Single In-line Memory Module) sockets are provided for 256K, 1MB, and 4MB SIMM modules. Possible memory sizes are: 1MB, 2MB, 4MB, 5MB, 8MB, 16MB, 20MB, and 32MB.

8 System BIOS

The AMI BIOS is included on this ROM chip. The BIOS lets you control the motherboard's microprocessor speed, shadow RAM and cache functions from the keyboard.

9 16-bit Expansion Slots

Six standard 16-bit expansion slots are provided on the motherboard.

10 8-bit Expansion Slots

The motherboard also offers two 8-bit expansion slots.

11 82C206 Integrated Peripherals Controller (IPC)

The 82C206 IPC is a universal standard chip that supports all peripheral functions required on an AT-compatible machine.

12 Keyboard Controller

The 8042 is a single chip keyboard interface controller.

Chapter 3: Hardware Configuration

This chapter explains how to configure the motherboard's hardware. Before you install the motherboard into the system chassis, you may find it convenient to first set the jumpers that configure the system's clock speed and cache size. Next, install the board's memory modules, and an optional numeric coprocessor. After you have inserted the motherboard into the system chassis, attach system peripherals and the control panel to the motherboard's connectors.

Refer to this chapter whenever you upgrade or reconfigure your system.

Power Precautions

Before you begin configuration, make sure you are working with an unplugged motherboard. Many components are powered by low-voltage current, but there still may be a dangerous electric current coming from the leads and power supply. You should take the following precautions:

- Turn off power to the motherboard, and unplug the power cord before you begin.
- Unplug all cables that connect the motherboard to any external devices.

Jumpers, Connectors, and Memory Bank Locations

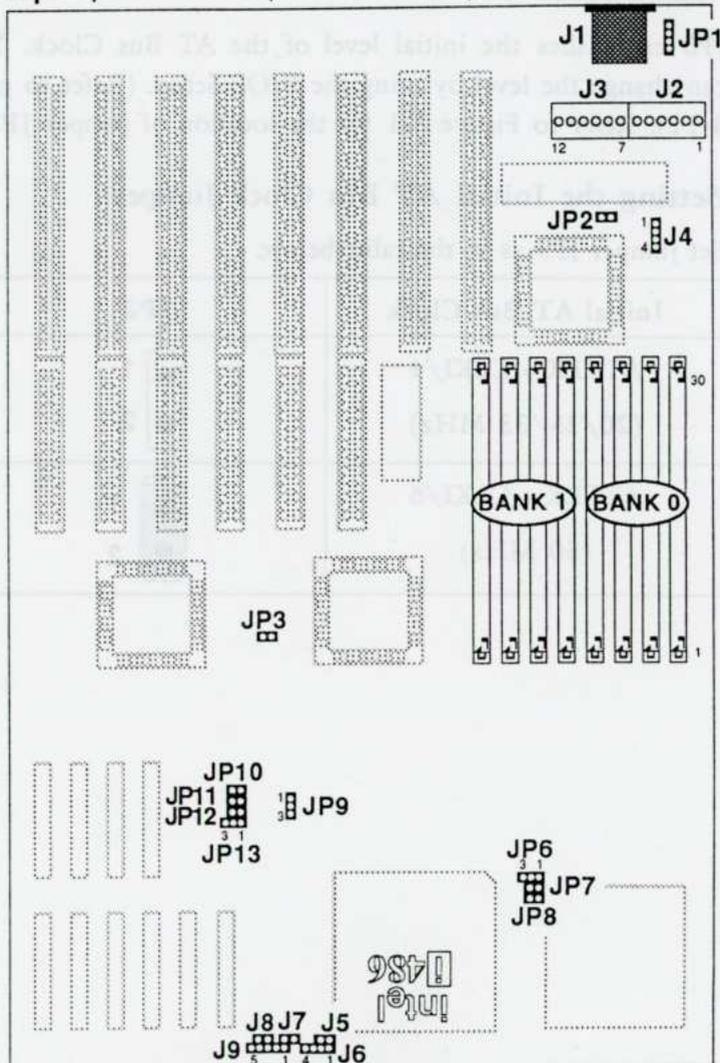


Figure 3-1. Jumpers, Connectors, and Memory Banks

Setting Jumpers

You configure some hardware options on the motherboard by setting jumper switches. Jumper switches are rows of small pins on the motherboard that are set by using a jumper cap.

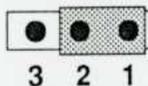
Set a jumper switch as follows:

- *Close* a jumper switch by inserting the plastic jumper cap over two pins of the jumper.
- *Open* a jumper switch by removing the jumper cap.

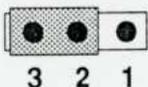
Note: When you open a jumper, attach the plastic jumper cap to one of the pins so you won't lose it.

Symbols:

For setting three-pin jumpers, the symbols below are used:

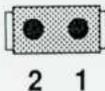


Pins 1 and 2 are Closed with a jumper cap.



Pins 2 and 3 are Closed with a jumper cap.

For setting 2-pin jumpers, the following symbols are used:



The jumper is Closed when the jumper cap is placed over the two pins of the jumper.



The jumper is Open when the jumper cap is removed from the jumper.

JP2: Monitor Type Selection

Set jumper JP2 to configure the motherboard for use with either a color or monochrome monitor. Refer to Figure 3-1 for the location of jumper JP1.

Setting the Monitor Type Jumper

Set jumper JP2 as in the table below.

Monitor Type	JP2
Monochrome	 1 2
Color	 1 2

JP3: Initial AT Bus Clock Selection

JP3 establishes the initial level of the AT Bus Clock. You can change the level by using the BIOS Setup. (Refer to page 4-11). Refer to Figure 3-1 for the location of jumper JP3.

Setting the Initial AT Bus Clock Jumper

Set jumper JP3 as in the table below.

Initial AT Bus Clock	JP3
ATCLK = CLKI/4 (20/25/33 MHz)	 1 2
ATCLK = CLKI/6 (50 MHz)	 1 2

JP6~JP8: CPU Selection

The 486AF motherboard is capable of supporting two different types of CPU: the i486DX, and the i486SX. Jumpers JP6~JP8 configure the motherboard to recognize the CPU you have installed. Refer to Figure 3-1 for the locations of jumpers JP8~JP10.

Setting the CPU Selection Jumpers

Set jumpers JP6 ~ JP8 as in the table below.

CPU Installed	JP6	JP7	JP8
i486DX			
i486SX			

JP9: Clock Speed Selection

The clock speed of the motherboard is selected by setting jumper JP9. This jumper lets you choose whether the motherboard runs at a clock speed that uses a single or double frequency oscillator. Refer to Figure 3-1 for the location of jumper JP9.

Setting the Clock Speed Jumpers

Set jumper JP9 as in the table below.

CPU-Clock speed	JP9
20 MHz (double frequency oscillator)	 1 2 3
25/33/50 MHz (single frequency oscillator)	 1 2 3

JP10~JP13: Cache Size Selection

Select cache size by setting JP10 through JP13. These jumpers let the motherboard recognize a cache configuration of 64KB, 128KB, or 256KB. Refer to Figure 3-1 for the location of jumpers JP10~JP13.

The 486AF motherboard is available with 64KB, 128KB, or 256KB cache memory on-board. See Figure 2-1 for the locations of cache and tag memory. For cache data memory, the motherboard supports eight 8K x 8-bit SRAM chips (64KB cache size), four 32K x 8-bit SRAM chips (128KB cache size), or eight 32K x 8-bit SRAM chips (256KB cache size). Tag memory uses one 8K x 8-bit SRAM chip for 64KB or 128KB cache size; or, two 8K x 8-bit SRAM chips or one 32K x 8-bit SRAM chip for 256KB cache size. Note that when only one tag memory chip is used, you must insert it in the tag memory socket adjacent to the CPU.

SRAM chips must have access times of 20ns for tag memory, and 20ns for data memory.

128KB Cache Installation

To support the 128KB cache function:

1. Insert 4 pieces of 32Kx8-20 Data SRAM in sockets U38~U41.
2. Insert 1 piece of 8Kx8-20 Tag SRAM in socket U36.

Note: You can only use 128KB cache size if the motherboard is using the 82C495 chipset as the System Controller.

Setting the Cache Jumpers

Set the cache jumpers as in the table below.

Cache Size		JP10	JP11	JP12	JP13
64K cache SRAM installed		 1 2	 1 2	 1 2	 1 2 3
128K cache SRAM installed		 1 2	 1 2	 1 2	 1 2 3
256K cache SRAM installed	2x8Kx8 Tag	 1 2	 1 2	 1 2	 1 2 3
	32Kx8 Tag	 1 2	 1 2	 1 2	 1 2 3

Memory Configuration

The 486AF motherboard lets you increase the system's main memory via on-board SIMM (Single In-line Memory Modules) sockets. The motherboard supports two banks of 256K, 1M and 4M fast-page-mode DRAM modules. The motherboard requires DRAM with at least 80ns RAS* access time.

On-board memory is located in two banks: Bank 0 and Bank 1. See Figure 3-1. Four SIMM sockets are provided in each bank. You can install either a 256K, a 1M or a 4M SIMM in each socket. The sockets in each bank must be completely filled and all SIMM modules in a bank must be of the same capacity.

The 486AF motherboard supports the following configurations:

Bank 0	Bank 1	Memory Size
256K	—	1 MB
256K	256K	2 MB
1M	—	4 MB
256K	1M	5 MB
1M	1M	8 MB
4M	—	16 MB
1M	4M	20 MB
4M	1M	20 MB
4M	4M	32 MB

Table 3-1. On-board Memory Configurations

Installing SIMM

Before installing SIMM, review this manual's section on Static Electricity Precautions. Install SIMM as follows:

1. Remove the SIMM from its anti-static packaging.
2. Hold the SIMM so that the chips are toward you and the edge connector is pointed toward the motherboard.
3. Gently insert the module's connectors into the socket at a 60-degree angle and wiggle it slightly so that it is firmly in place.
4. Move the module slowly to a vertical position until the locking tabs snap into place.

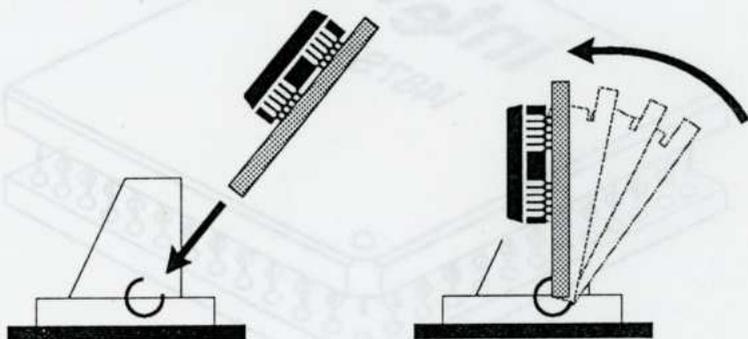


Figure 3-2. Installing a SIMM

5. Repeat steps 2 ~ 5 until the bank's sockets are full.
6. Once you install memory, run the Setup program to let the system know how much memory you have installed. If you have installed any 4M SIMM you must set **Hidden Refresh** in the **ADVANCED CHIPSET SETUP** to "Disabled."

Numeric Coprocessor Installation

The 486AF motherboard supports the Intel i487SX numeric coprocessor. Refer to Figure 2-1 for the location of the coprocessor socket. Install the coprocessor as follows:

1. Review the section on Static Electricity Precautions and make sure that power to the motherboard is off.
2. Align the notched corner of the i487SX chip to the notched corner of the socket. The chip's notched corner also has a dot.

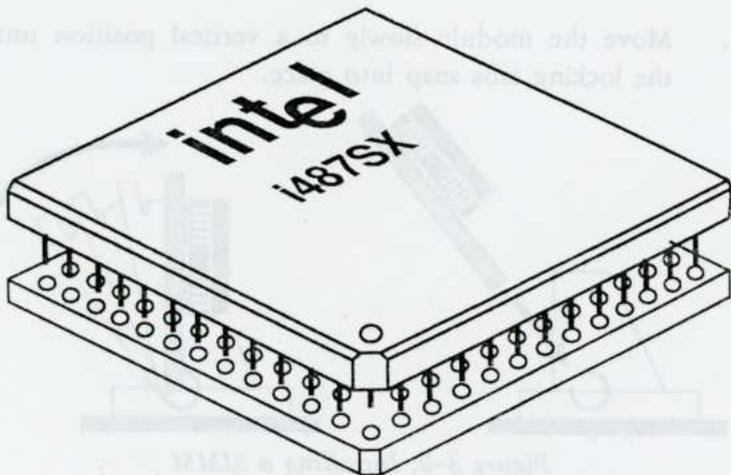


Figure 3-3. Installing the Intel i487SX Coprocessor

3. Match the pins of the i487SX to the corresponding socket holes.
4. Press the chip into the socket and then run the Setup program. In **ADVANCED CMOS SETUP**, set **Numeric Processor Test** to "Enabled." See page 4-6.

Connectors

Attach the 486AF motherboard to system components via connectors on the motherboard. There are connectors for the keyboard, power supply, speaker, and various control panel switches and indicators. Refer to Figure 3-1 for connector locations and connector pin positions.

J1 - Keyboard Connector

A five-pin female DIN keyboard connector is located at the rear of the board (J1). Plug the keyboard jack into this connector.

Pin	Description
1	Keyboard Clock
2	Keyboard Data
3	Spare
4	Ground
5	+5V DC



J2 & J3 - Power Supply Connector

The power supply connector has two six-pin male header connectors (J2 & J3). Plug the dual connectors from the power directly onto the board connector.

J2		J3	
Pin	Description	Pin	Description
1	Power Good	7	Ground
2	+5V DC	8	Ground
3	+12V DC	9	-5V DC
4	-12V DC	10	+5V DC
5	Ground	11	+5V DC
6	Ground	12	+5V DC

J4 - External Battery Connector

You can connect an external battery to J4 in place of the on-board battery.

Pin	Description
1	Battery (+)
2	Not Used
3	Ground
4	Ground

J5~J9 Case Device Connectors

The connectors J5~J9 attach various case-mounted devices to the motherboard as in the diagram below. Refer to the following pages for connector pin descriptions.

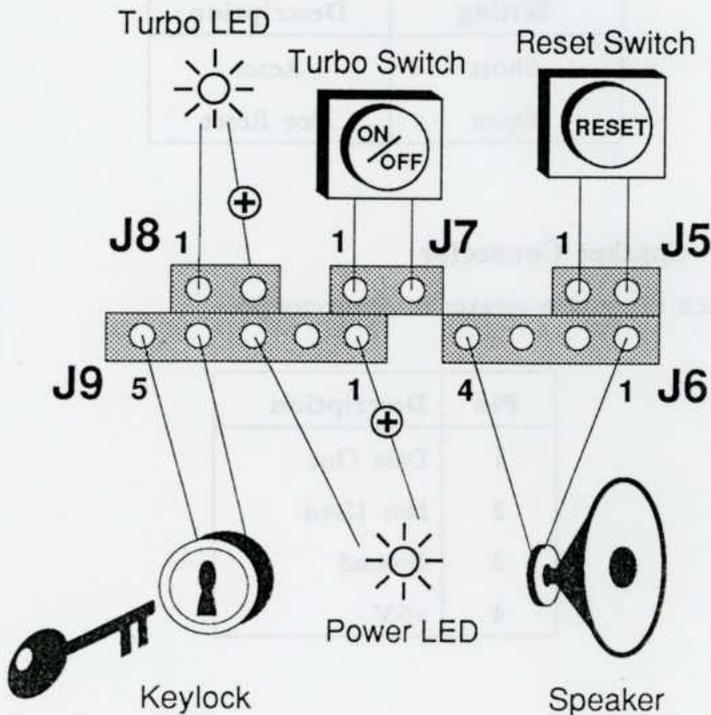


Figure 3-5. Jumpers J5~J9 - Case Device Connectors

J5- Reset Switch Connector

Attach the Reset switch to this connector. The Reset switch restarts the system.

Setting	Description
Short	Reset
Open	Not Reset

J6 - Speaker Connector

Attach the system speaker to connector J6.

Pin	Description
1	Data Out
2	Not Used
3	Ground
4	+5V

J7 - Turbo Switch Connector

J7 is connected to a Turbo switch on the front of the system case. The connector is shorted for turbo operation and open for normal operation.

Setting	Description
On	Turbo
Off	Normal

Note: In Normal mode the i486 CPU's internal cache is disabled. This slows the performance of the i486 to emulate a slower CPU.

J8 - Turbo LED Connector

J8 is connected to a Turbo LED on the system case control panel. If the motherboard is in Turbo mode, the LED lights, in Normal mode the LED is off.

Pin	Description
1	-Cathode
2	+Anode

Note: The Turbo LED does not function well if Internal Cache or External Cache are disabled in the BIOS Setup program.

J9 - Keylock & Power LED Connector

J9 is a keylock connector that enables and disables the keyboard and Power-LED on the case.

Pin	Description
1	LED power
2	Not Used
3	Ground
4	Keylock
5	Ground

JP1- Secondary Keyboard Connector

JP1 is reserved for a secondary keyboard connector.

Chapter 4: BIOS Setup

Once you have configured the motherboard, and have assembled the components, you can turn on the completed system. At this point, run the software setup to make sure your system information is correct.

Software setup is accomplished via Basic Input-Output System (BIOS) programming. You setup the BIOS program to tell the operating system what devices are connected to the motherboard.

BIOS setup is also called CMOS setup. You need to run the BIOS setup if hardware is not identical with information contained in the CMOS RAM, or if the CMOS RAM has lost power.

AMI BIOS Setup

The BIOS setup program provided with the motherboard is the AMI BIOS from American Megatrends Inc. Enter the AMI Setup program's Main Menu as follows:

1. Turn on or reboot the system. After a series of diagnostic checks, the following message appears:

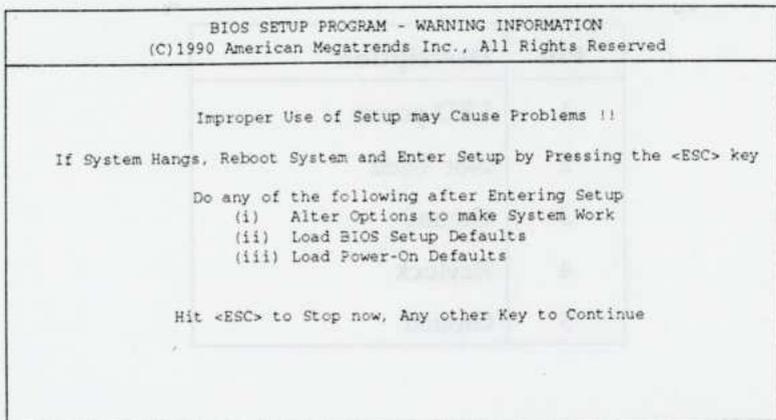
“Hit if you want to run SETUP”

2. Press the key to enter the AMI BIOS setup program and the following screen appears:

BIOS SETUP PROGRAM - AMI BIOS SETUP UTILITIES (C)1990 American Megatrends Inc., All Rights Reserved
STANDARD CMOS SETUP ADVANCED CMOS SETUP ADVANCED CHIPSET SETUP AUTO CONFIGURATION WITH BIOS DEFAULTS AUTO CONFIGURATION WITH POWER-ON DEFAULTS CHANGE PASSWORD HARD DISK UTILITY WRITE TO CMOS AND EXIT DO NOT WRITE TO CMOS AND EXIT
Standard CMOS Setup for Changing Time, Date, Hard Disk Type, etc.
ESC:Exit ↓↑←:Sel F2/F3:Color F10:Save

3. Choose an option and press <Enter>. Modify the system parameters to reflect the options installed in the system. (See the following sections for more information.)

A warning message appears each time one of the first three options, (Standard CMOS Setup, Advanced CMOS Setup, and Advanced Chipset Setup) is selected, before any changes are allowed to any of the setup parameters.



4. Press <ESC> at anytime to return to the Main Menu.
5. In the Main Menu, choose "WRITE TO CMOS AND EXIT" to save your changes and reboot the system. Choosing "DO NOT WRITE TO CMOS AND EXIT" ignores your changes and exits the program.

Main Menu Options

The Main Menu options of the AMI BIOS are described below.

STANDARD CMOS SETUP

Run the Standard CMOS Setup as follows.

1. Choose "STANDARD CMOS SETUP" from the Main Menu and a screen with a list of items appears.

BIOS SETUP PROGRAM - STANDARD CMOS SETUP								
(C)1990 American Megatrends Inc., All Rights Reserved								
Date (mn/date/year):	Wed, Jun 12 1991	Base memory :	640 KB					
Time (hour/min/sec):	16 : 42 : 40	Ext. memory :	3072 KB					
Daylight saving :	Disabled	Cyln	Head	WPcom	LZone	Sect	Size	
Hard disk C: type :	Not Installed							
Hard disk D: type :	Not Installed							
Floppy drive A: :	Not Installed							
Floppy drive B: :	Not Installed							
Primary display :	VGA/PGA/EGA							
Keyboard :	Installed							
Month :	Jan, Feb,.....Dec							
Date :	01, 02, 03,....31							
Year :	1901, 1902,....2099							
		Sun	Mon	Tue	Wed	Thu	Fri	Sat
		26	27	28	29	30	31	1
		2	3	4	5	6	7	8
		9	10	11	12	13	14	15
		16	17	18	19	20	21	22
		23	24	25	26	27	28	29
		30	1	2	3	4	5	6

ESC:Exit Select F2/F3:Color PU/PD:Modify

2. Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUp/PgDn keys. Some fields let you enter numeric values directly.

Date (mn/date/year) Type the current date

Time (hour:min:sec) Type the current time

Daylight saving	Choose Enabled or Disabled
Hard disk C & D	Choose from the standard hard disk types 1 to 46. Type 47 is user definable. If a hard disk is not installed choose "Not installed."

Floppy drive A & B	Choose	360KB / 5 1/4"
		1.2MB / 5 1/4"
		720KB / 3 1/2"
		1.4M / 3 1/2" or
		Not installed

Primary display	Choose	Monochrome, Color 40x25, VGA or EGA, Color 80x25, or Not installed
-----------------	--------	--

Keyboard Choose Installed or Not installed

3. After you have finished with the Standard CMOS Setup program, press the <ESC> key. The following appears:
"Write to CMOS and Exit (Y/N)?"
4. Typing "N" and <Enter> returns you to the Main Menu. Typing "Y" and <Enter> saves the system parameters and the system reboots.

ADVANCED CMOS SETUP

Run the Advanced CMOS Setup as follows.

1. Choose "ADVANCED CMOS SETUP" from the Main Menu and a screen with a list of items appears.

BIOS SETUP PROGRAM - ADVANCED CMOS SETUP	
(C)1990 American Megatrends Inc., All Rights Reserved	
Typematic Rate Programming : Disabled	Adaptor ROM Shadow C800,16K: Disabled
Typematic Rate Delay (msec) : 500	Adaptor ROM Shadow CC00,16K: Disabled
Typematic Rate (Chars/Sec) : 15	Adaptor ROM Shadow D000,16K: Disabled
Above 1MB Memory Test : Enabled	Adaptor ROM Shadow D400,16K: Disabled
Memory Test Tick Sound : Enabled	Adaptor ROM Shadow D800,16K: Disabled
Memory Parity Error Check : Enabled	Adaptor ROM Shadow DC00,16K: Disabled
Hit Message Display : Enabled	Adaptor ROM Shadow E000,16K: Disabled
Hard Disk Type 47 RAM Area : 0:300	Adaptor ROM Shadow E400,16K: Disabled
Wait For <F1> If Any Error : Enabled	Adaptor ROM Shadow E800,16K: Disabled
System Boot Up Num Lock : On	Adaptor ROM Shadow EC00,16K: Disabled
Floppy Drive Seek At Boot : Disabled	System ROM Shadow F000,64K: Enabled
System Boot Up Sequence : A:, C:	
System Boot Up CPU Speed : High	
External Cache Memory : Enabled	
Internal Cache Memory : Enabled	
Password Checking Option : Disabled	
Video ROM Shadow C000,16K: Disabled	
Video ROM Shadow C400,16K: Disabled	

ESC:Exit Sel (Ctrl)Pu/Pd:Modify F1:Help F2/F3:Color
F5:Old Values F6:BIOS Setup Defaults F7:Power-On Defaults

2. Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUp/PgDn keys. An explanation of the <F> keys follows:

<F1>: "Help" gives options available for each item.

<F2/F3>: Change color.

- <F5>: Get the old values. These values are the values with which the user started the current session. If the CMOS was good, then the old values are either the CMOS values or the BIOS Setup default values.
- <F6>: Load all options in the Advanced CMOS Setup / Advanced Chipset Setup with the BIOS Setup default values.
- <F7>: Load all options in the Advanced CMOS Setup / Advanced Chipset Setup with the Power-On default values.

A short description of the screen items follows:

- Typematic Rate Programming** Choose Enabled or Disabled. Enable this option to adjust the keystroke repeat rate. Adjust the rate via Typematic Rate Delay and Typematic Rate.
- Typematic Rate Delay** Choose the delay between holding down a key and when the character begins repeating.
- Typematic Rate** Choose the rate a character keeps repeating.
- Above 1 MB Memory Test** Choose Enabled or Disabled. Enable this option to invoke the POST memory routines on the RAM above 1MB. Disable and BIOS only checks the first 1MB of RAM.

Memory Test Tick Sound	Choose Enabled or Disabled. Enable this option to turn on the "ticking" sound during the memory test. Disable to turn off this sound.
Memory Parity Error Check	Choose Enabled or Disabled. Disables BIOS memory parity error checking routines.
Hit Message Display	Choose Enabled or Disabled. Disable this option to prevent "Hit if you want to run SETUP" message from appearing when system boots-up.
Hard Disk Type 47 Data Area	The choice "0:300" is recommended for most cases. However, if the system is involved with Novell Netware, choose "DOS 1KB" to avoid conflicts with DOS. (Novell uses 0:300 for operation system programming.)
Wait for F1 if any Error	Choose Enabled or Disabled. Enable this option to display "Press <F1> to continue" when a POST non-fatal error occurs. Disable to eliminate the need for any user response to a non-fatal error condition message.
System Boot Up Num Lock	Choose On or Off. On puts numeric keypad in Num Lock mode at boot-up. Off puts numeric keypad in arrow key mode at boot-up.

Floppy Drive Seek at Boot	Choose Enabled or Disabled. Default is "Disabled" to provide a fast boot and reduce the possibility of damage to the heads.
System Boot Up Sequence	The AMI BIOS first attempts to boot from drive A: and then, if unsuccessful, from hard disk C:. You can reverse this sequence with this option.
System Boot Up CPU Speed	Choose High or Low. This function has been superseded by jumper J7 which selects turbo or normal speed.
External Cache Memory	Choose Enabled or Disabled. Specifies if external cache is present or absent.
Internal Cache Memory	Choose Enabled or Disabled. Enables the internal cache of the CPU.
Password Checking Option	Choose Disabled, Setup, or Always. Use this feature to prevent unauthorized system boot-up or unauthorized use of BIOS Setup. "Disabled"- (Default) Password prompt does not appear when re-booting the system. "Always"- Each time the system is booted the password prompt appears. "Setup"- Password prompt appears if you try to enter the Setup program.

Video or Adaptor ROM Shadow	ROM shadow copies BIOS code from slower ROM to faster RAM. BIOS can then execute from RAM. These 16K segments can be shadowed from ROM to RAM. BIOS is shadowed in a 16K segment if it is enabled and has BIOS present.
System ROM Shadow	If enabled and BIOS is present in this segment, then the system BIOS (64K) is shadowed.

3. After you have finished with the Advance CMOS Setup program, press the <ESC> key. The following appears:
“Write to CMOS and Exit (Y/N)?”
4. Typing “N” and <Enter> returns you to the Main Menu. Typing “Y” and <Enter> saves the system parameters and the system reboots.

ADVANCED CHIPSET SETUP

The Advanced Chipset Setup option is used to change the values of the chipset registers. These registers control most of the system options in the computer.

Run the Advanced Chipset Setup as follows.

1. Choose "ADVANCED CHIPSET SETUP" from the Main Menu and a screen with a list of items appears.

BIOS SETUP PROGRAM - ADVANCED CHIPSET SETUP (C)1990 American Megatrends Inc., All Rights Reserved		
Hidden Refresh	: Enabled	Video BIOS Area Cacheable : No
Slow Refresh	: Disabled	
Single ALE Enable	: No	
Keyboard Reset Control	: Enabled	
Master Mode Byte Swap	: Disabled	
AT Cycle Wait State	: Disabled	
AT BUS Clock Selection	: CLKI/4	
Fast Decode Enable	: Disabled	
Memory Read Wait State	: 0 W/S	
Memory Write Wait State	: 0 W/S	
Cache Read Wait State	: 0 W/S	
Cache Write Wait State	: 0 W/S	
Cache Memory Buffer Output	: Disabled	
Non-Cacheable Block-1 Size	: Disabled	
Non-Cacheable Block-1 Base	: 0 KB	
Non-Cacheable Block-2 Size	: Disabled	
Non-Cacheable Block-2 Base	: 0 KB	
Cacheable RAM Address Range	: 64 MB	
ESC:Exit Sel (Ctrl)Pu/Pd:Modify F1:Help F2/F3:Color F5:Old Values F6:BIOS Setup Defaults F7:Power-On Defaults		

2. Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUp/PgDn keys. An explanation of the <F> keys follows:

- <F1> "Help" gives options available for each item.
- <F2/F3>: Change color
- <F5> : Get the old values. These values are the values with which the user started the current session. If the CMOS was good, then the old values are either the CMOS values or the BIOS Setup default values.
- <F6>: Load all options in the Advanced CMOS Setup / Advanced Chipset Setup with the BIOS Setup default values.
- <F7>: Load all options in the Advanced CMOS Setup / Advanced Chipset Setup with the Power-On default values.

A short description of the screen items follows:

Hidden Refresh Choose Enabled or Disabled. Enabled is recommended to improve system performance. However, **if you install any 4M SIMM modules, then you must choose Disabled.**

Slow Refresh Choose Enabled or Disabled. Disabled is recommended. Choose Enabled only if DRAM modules can endure 64 μ sec. refresh cycle.

-
- Single ALE Enable** Choose Yes or No. The recommended choice is "Yes", which is compatible with the IBM AT-bus specification. "No" generates multiple ALE signals during bus conversion cycles. Choose "No" if suggested by a peripheral card's instructions.
- Keyboard Reset Control** Choose Enabled or Disabled. Enable this option to execute HALT instruction before SYSC generates CPU reset from the keyboard reset. SYSC is the system control chip 82C495 (or 82C493). "Enabled" is the recommended setting.
- Master Mode Byte Swap** Choose Enabled or Disabled. Enable this option for the motherboard to "byte-swap" for the master card when the card is accessing a slave with a different data bus width. Ask your card supplier on whether to enable this feature.
- AT Cycle Wait State** Choose Enabled or Disabled. Enabled inserts one wait state to add more I/O recovery time when using slower peripherals. This option may sacrifice some I/O throughput.
- AT BUS Clock Selection** Set CLKI/3 for i486SX-25MHz.
Set CLKI/4 for i486DX-33MHz.
Set CLK2I/5 for i486SX-20MHz.
Set CLKI/6 for i486DX-50MHz.

- Fast Code Enable** Choose Enabled or Disabled. Choose Disabled for 33 MHz or 50 MHz operation, Enabled for 20/25 MHz operation. Enabled decreases the DRAM wait state by 1.
- Memory Read Wait State** Choose a wait state. "0 W/S" is the optimum choice for operation with the i486SX-20/25 MHz and i486DX-33MHz CPUs. An extra wait state, "1 W/S", is recommended for operation with the i486DX-50MHz CPU.
- Memory Write Wait State** Choose a wait state. "0 W/S" is the optimum choice for operation with the i486SX-20/25 MHz and i486DX-33MHz CPUs. An extra wait state, "1 W/S", is recommended for operation with the i486DX-50MHz CPU.
- Cache Read Wait State** Choose a wait state. "0 W/S" is the optimum choice for operation with the i486SX-20/25 MHz and i486DX-33MHz CPUs. An extra wait state, "1 W/S", is recommended for operation with the i486DX-50MHz CPU, and/or if 128KB cache SRAM is installed.

-
- Cache Write Wait State** Choose a wait state. "0 W/S" is the optimum choice for operation with the i486SX-20/25 MHz and i486DX-33 MHz CPUs. An extra wait state, "1 W/S", is recommended for operation with the i486DX-50 MHz CPU, and/or if 128KB cache SRAM is installed.
- Cache Memory Buffer Output** Choose Enabled or Disabled. Enable this option for the i486DX-50 MHz CPU to achieve 3-1-1-1 burst cycle, and/or if 128KB cache SRAM is installed. For the i486SX-20/25 MHz and i486DX-33 MHz CPUs, this option must be Disabled.
- Non-Cacheable Block-1 Size** Choose the block size.
- Non-Cacheable Block-1 Base** Choose Enabled or Disabled. This sets the start address for the first non-cacheable block.
- Non-Cacheable Block-2 Size** Choose the block size.
- Non-Cacheable Block-2 Base** Choose Enabled or Disabled. This sets the start address for the first non-cacheable block.

Cacheable RAM Address Range Choose a RAM address range. If 64K cache is installed, only 16MB can be cacheable. If 128K or 256K cache is installed, the cacheable range can be as large as the DRAM installed.

Video BIOS Area Cacheable Choose Yes or No. This feature puts the most often used video BIOS in cache to improve the efficiency of the video subsystem. If cache RAM is not installed, you must choose No.

3. After you have finished with the Advance Chipset Setup, press the <ESC> key. The following appears:
"Write to CMOS and Exit (Y/N):?"
4. Type "N" and <Enter> to return to Main Menu. Type "Y" and <Enter> to save the parameters and reboot the system.

AUTO CONFIGURATION W/ BIOS DEFAULTS

This Main Menu item loads the default system values. If the CMOS is corrupted the defaults are loaded automatically. Choose this item and the following message appears:

“Load BIOS Setup Default Values from ROM Table (Y/N)? N”

To use the BIOS defaults, change the prompt to “Y” and press <Enter>. The following message appears:

“Default values loaded. Press any key to continue.”

AUTO CONFIGURATION W/ POWER-ON DEFAULTS

This Main Menu item uses the default Power-On values. Use this option as a diagnostic aid if your system behaves erratically. Choose this item and the following message appears:

“Load Power-On Default Values (Y/N)? N”

To use the Power-On defaults, change the prompt to “Y” and press <Enter>. The following message appears:

“Default values loaded. Press any key to continue.”

CHANGE PASSWORD

This Main Menu item lets you configure the system so that a password is required every time the system boots or an attempt is made to enter the Setup program.

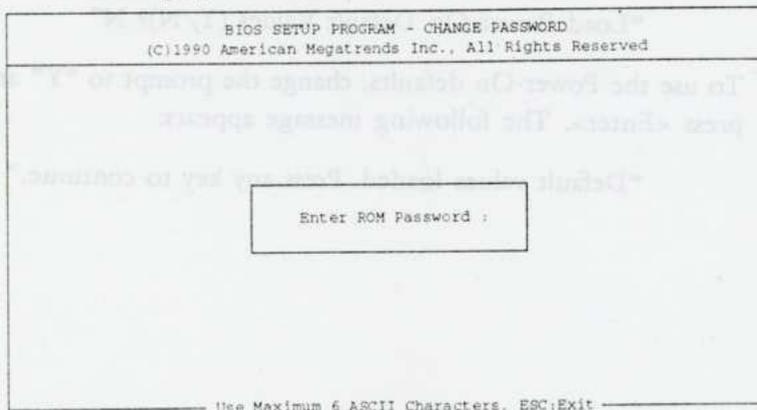
The password cannot be longer than 6 characters. A default password is stored in the ROM in case the CMOS is corrupted. The default password is <AMI>.

Change the password as follows:

1. Choose "Change Password" in the Main Menu and press <Enter>. The following message appears:

"Enter ROM Password:"

2. The first time you run this option, enter the default password <AMI> and press <Enter>. The screen does not display the characters entered.



3. After you correctly enter the current password, the following appears prompting you for the new password:

"Enter NEW Password:"

4. Enter the new password and the following appears:
 “Re-Enter NEW Password:”
5. Re-enter the new Password. If the password is miskeyed, the following error message appears:
 “ERROR, Press Any Key...”
 If the password is keyed in correctly the following confirmation message appears:
 “NEW Password Installed”
6. Press <ESC> to exit to the Main Menu.

When you next boot the system, after saving the changed values to CMOS, you will be prompted for the password.

If you are not prompted for the password, check that the “Password Checking Option” in the Advanced CMOS Setup is configured for “Always” or “Setup.” See the section above on “Advanced CMOS Setup.”

When the password prompt appears, key in the new password and press <Enter>. If loose or disconnected batteries corrupt the CMOS, use the default password, <AMI> instead.

Important: Keep a safe record of the new password. If you forget or lose the password, the only way to access the system is to disconnect the CMOS batteries and then use the default password <AMI>.

HARD DISK UTILITY

This Main Menu item gives you three options for analyzing and formatting a hard disk. The three options are:

- **Hard Disk Format** – performs a “low level” format of the hard disk. Check with the hard drive manufacturer to see if this option is required.
- **Auto Interleave** – determines optimum interleave factor before formatting the hard disk.
- **Media Analysis** - analyzes each track of the hard drive. Marks unusable tracks as “bad” to prevent future data storage on those tracks.

Error messages specific to the Hard Disk Utility options may appear during initialization or operation.

WARNING! *Performing any one of these options destroys all data on the hard disk. You must back-up the hard disk before performing any of these tests.*

- Notes:*
1. *System documentation for brand new hard disks usually provides a list of “bad tracks” as well as the optimum interleave factor.*
 2. *These options are not valid for a SCSI Disk Drive.*

Hard Disk Format

Use this option to format a new hard disk or to reformat a used hard disk that has developed problems due to aging or mishandling.

Run this option as follows:

1. In the Main Menu select "Hard Disk Utility" and press <Enter>.
2. A screen with three options appears, select "Hard Disk Format" and press <Enter>.
3. A screen containing a series of questions appears. You must answer the questions before you can perform the format. Consult your hard disk system documentation when answering questions such as marking bad tracks.

BIOS SETUP PROGRAM - HARD DISK UTILITY						
(C) 1990 American Megatrends Inc., All Rights Reserved						
	Cyln	Head	WPcom	LZone	Sec	Size (MB)
Hard Disk C: Type : 47 = USER TYPE	1314	7	1314	1314	17	76
Hard Disk D: Type : Not Installed						

Hard Disk Format		Bad Track Edit Menu		Bad Track	
Disk Drive (C/D)	? C	Add an Entry		No.	Cyln. Head
Disk Drive Type	? 47	Revise an Entry			
Interleave (1-16)	? 3	Delete an Entry			
Mark Bad Tracks (Y/N)	? Y	Clear Bad Trk List			
Proceed (Y/N)	?				

Enter Cylinder :
Enter Head :

| ESC:Exit ↓→↑←:Sel |

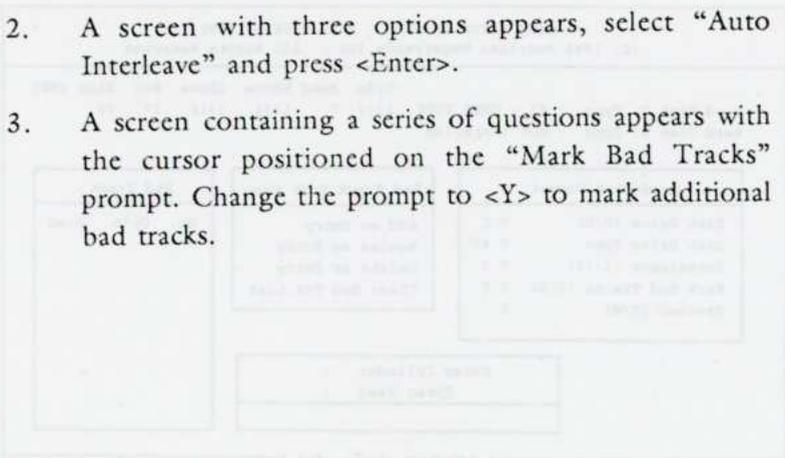
4. After answering the questions, change the Proceed prompt to <Y> and press <Enter>.
5. A WARNING screen with a Continue prompt appears. Once you have changed this prompt to <Y> and pressed <Enter>, all data on the hard disk drive will be irretrievably lost.

Auto Interleave

Use this option to calculate the optimum interleave factor.

Run this option as follows:

1. In the Main Menu select "Hard Disk Utility" and press <Enter>.
2. A screen with three options appears, select "Auto Interleave" and press <Enter>.
3. A screen containing a series of questions appears with the cursor positioned on the "Mark Bad Tracks" prompt. Change the prompt to <Y> to mark additional bad tracks.



BIOS SETUP PROGRAM - HARD DISK UTILITY						
(C) 1990 American Megatrends Inc. All Rights Reserved						
	Cyln	Head	WPoom	LZone	Sec	Size (MB)
Hard Disk C: Type	: 47	= USER TYPE	1314	7	1314	17 76
Hard Disk D: Type	: Not Installed					

Auto Interleave		Bad Track Edit Menu		Bad Track	
Disk Drive (C/D)	? C	Add an Entry		No.	Cyln. Head
Disk Drive Type	? 47	Revise an Entry			
Mark Bad Tracks (Y/N)	? Y	Delete an Entry			
Proceed (Y/N)	?	Clear Bad Trk List			

Enter Cylinder	:
Enter Head	:

| ESC:Exit ↓↑←→:Sel |

- After making the appropriate selections in the Bad Tracks Edit Menu, press <ESC>. The cursor moves to the Proceed prompt.
- Change the Proceed prompt to <Y> and press <Enter>.
- A WARNING screen with a Continue prompt appears. Once you have changed this prompt to <Y> and pressed <Enter>, all data on the hard disk drive will be irretrievably lost.

Media Analysis

Use this option to locate all bad tracks on the hard disk and list them in the Bad Track List Box. This option may take several minutes. Run this option as follows:

1. In the Main Menu select "Hard Disk Utility." Press <Enter>.
2. Three options appear. Select "Media Analysis" then <Enter>.
3. Answer the questions on the screen that appears, and then change the Proceed prompt to <Y> and press <Enter>.
4. A WARNING screen with a Continue prompt appears. Once you have changed this prompt to <Y> and pressed <Enter>, all data on the hard disk drive will be irretrievably lost.

BIOS SETUP PROGRAM - HARD DISK UTILITY									
(C) 1990 American Megatrends Inc., All Rights Reserved									
	Cyln Head WPCom LZone Sec Size (MB)								
Hard Disk C: Type : 47 = USER TYPE	1314 7 1314 1314 17 76								
Hard Disk D: Type : Not Installed									
<table border="1" style="margin: 10px auto;"> <thead> <tr> <th colspan="2">Media Analysis</th> </tr> </thead> <tbody> <tr> <td>Disk Drive (C/D)</td> <td>? C</td> </tr> <tr> <td>Disk Drive Type</td> <td>? 47</td> </tr> <tr> <td>Proceed (Y/N)</td> <td>? Y</td> </tr> </tbody> </table>		Media Analysis		Disk Drive (C/D)	? C	Disk Drive Type	? 47	Proceed (Y/N)	? Y
Media Analysis									
Disk Drive (C/D)	? C								
Disk Drive Type	? 47								
Proceed (Y/N)	? Y								
<table border="1" style="margin: 10px auto;"> <tbody> <tr> <td colspan="2" style="text-align: center;">WARNING INFORMATION</td> </tr> <tr> <td colspan="2" style="text-align: center;">All Data on Specified Harddisk will be LOST</td> </tr> <tr> <td colspan="2" style="text-align: center;">Want to Continue (Y/N) ? N</td> </tr> </tbody> </table>		WARNING INFORMATION		All Data on Specified Harddisk will be LOST		Want to Continue (Y/N) ? N			
WARNING INFORMATION									
All Data on Specified Harddisk will be LOST									
Want to Continue (Y/N) ? N									
ESC:Exit ← → :Sel									

