AC 486

USER'S MANUAL

AC 486

Mainboard

User's Manual

INTRODUCTION

This manual has been designed to be useful for several purposes. If the AC 486 is already set up in functioning system, it will be helpful to review the manual to become familiar with the features of the board and where things are. This will be helpful in the unlikely event there is a problem with the system.

For those who want to alter the board's configuration or upgrade it, the manual will serves as a guide to both procedure and specifications. While the necessary information is included in the manual, we recommend that unless you feel confident of your ability to do the work, it would be best to have your dealer or a local service shop do it. Before making alterations to the system, check to see that doing so will not violate the system warranty. If it does, have the work done by an authorized dealer.

The "chip set" consists of an advanced single-chip ACC 2168 chip set , that incorporates most of the logic required for a low-cost, highly integrated IBM PC AT-compatible computer.

IMPORTANT: The chip set requires correct configuration information; otherwise a malfunction may result.

CAUTION: Static electricity can cause serious damage to integrated circuit chips. To avoid building up a static electric charge on your body, touch a grounded object before touching the chips and at frequent intervals as you handle the chips. If chips are handed from one person to another, the two should touch hands first, then pass the chips.

Information presented in this publication has been carefully checked for reliability; however, no responsibility is assumed for inaccuracies. The information contained in this document is subject to change without notice.

Contact your dealer for warranty details.

Trademarks

AMI Modular BIOS is a trademark of American Megatrends Inc.

IBM, PC, AT, and PS/2 are registered trademarks of

International Business Machines Corporation.

Intel is a registered trademark; 80486DX, 80486SX, 80487SX are trademarks of Intel Corp.

■ CONTENTS

■ CONTENTS

CHAPTER 5

BUILT-IN BIOS SETUP PROGRAM

APPENDIX A

HARD DISK TYPES

APPENDIX B

SETTING THE SYSTEM SPEED

Chapter 1

Introduction

This manual is edited for both model PQFP and PGA of AC 486 except the description is individually mentioned of PQFP or PGA. This chapter will cover the general specifications and features of the AC 486, as well as their major components, including the CPU, brief specifications of the ACC 2168 chipset, etc.

Note: The 2168 chipset is designed to 486 (PQFP) + 486 (PGA) & 486 (PGA) + 487 (PGA) mainboards. We referred to the former as "PQFP model", and the latter as "PGA model".

1.1 General Specifications and Features

The AC 486 mainboards are based on the powerful 80486SX,80487SX and 80486DX microprocessor respectively, and incorporate advanced computer technology to meet the requirements of the next generation of operating systems and applications. Yet they retain full compatibility with the original IBM XT and AT and use existing PC software and hardware.

- Microprocessor: 80486SX for the 16/20/25/33 MHz, 80486DX for the 33 MHz, 80487SX, 80487DX2.

- Coprocessor:

  ¤ **(For PQFP)**
  CPU PQFP supports 80486SX.
  PGA socket supports 80486SX,80487SX, 80486DX, 80486DX2.

  ¤ **(For PGA)**
  Support primary CPU with 80486SX/80486DX/80486DX2.
  CPU upgrade socket supports 80487SX/80486DX/80486DX2.

- Single ROM BIOS support; default 64-KB AMI BIOS with built-in SETUP program.

- Complementary metal oxide semiconductor (CMOS) RAM to maintain system configuration.

- Support shadow RAM options for fast execution of the system BIOS and video BIOS.

- Support 64 MB DMA address space.

- Support page mode DRAM timing

- Fast reset and fast Gate A20 (port 92) for OS/2.

- Expansion slots:

  ¤ **(For PQFP)**
  Six 16-bit slots for AT-compatible ann-on cards.
  One 8-bit slot for XT-compatible add-on cards.

  ¤ **(For PGA)**
  Six 16-bit slots for AT-compatible add-on cards.

- 4-layer PCB with surface-mount technology.

1.2 Major Components

The AC 486 mainboards are composed of many integrated circuits, chips, jumpers and connectors. (Please refer to Figure 3.1)

The major components, basic features and functions are outlined as below:

■ CPU (Central Processing Unit)

The central processing unit is the brain of a computer system that interprets and executes instructions, such as performing calculations, routing information, and temporarily storing data. In personal computers, the CPU is a highly integrated chip called the microprocessor.

■ ACC Micro 2168 Single Chip

The ACC Micro 2168 single chip AT is designed for system designers to build a high performance 486DX/ 486SX/ 386DX AT systems.

The 2168 single chip AT supports a local CPU bus, a system memory bus, and compatible AT bus. The AT bus clock can be synchronous or asynchronous to the CPU clock to support compatible AT bus timing. The built-in peripheral controller and on chip direct mapped cache controller add flexibility for designers to design high performance systems for different requirements.

■ BIOS

In addition to reducing space and cost, it allows the user to enable the BIOS shadow feature for access to the fast, DRAM, instead of the slow, EPROM chip.

■ Jumpers

On the AC 486 there are several jumpers which should be properly set according to the system configuration.

Detailed information regarding all jumpers can be obtained from Chapter 3.

■ Connectors

Several connectors are used to connect the power supply, keyboard and LED indicators. Refer to Chapter 3 for more information.

■ Slots

¤ **(For PQFP)**
One 8-bit and seven 16-bit I/O slots are provided for inserting add-on cards, including cards for monitors, disk drivers, etc.

¤ **(For PGA)**
Six 16-bit I/O slots are provided for inserting add-on cards, including cards for monitors, disk drives, etc.

Chapter 2

Memory Configuration

The AC 486 DRAM configurations are discussed, followed by DRAM module installation and removal. Users are recommended to read through this chapter before installing or removing memory.

2.1 System Memory

The AC 486 provides tremendous flexibility to support a number of different on-board DRAM configurations. The on-board DRAM is installed with SIMM (Single-In-Line Memory Module). There are two banks of DRAM module slots seated on the AC 486, to support up to 32 MB of on-board memory.

The location and layout of all the SIMM banks is illustrated below and shown in Figure 3.1:
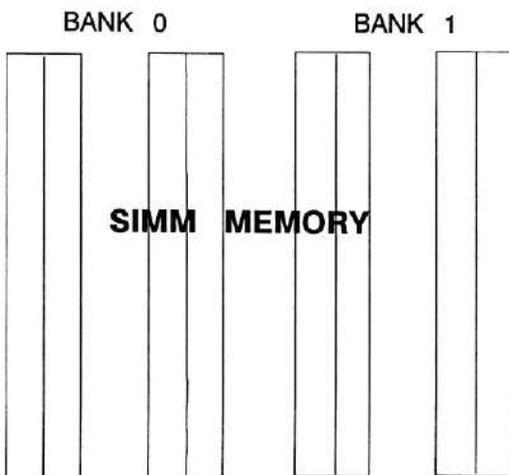
The two banks are composed of four standard 30-pin SIMM sockets. These sockets take 256-KB, 1-MB or 4-MB SIMM.

Note that all of the four SIMMs within a bank must be of the same type; you can not mix 256-KB, 1-MB and 4-MB modules in the same bank.

The total size of on-board memory depends on the combinations of different types of DRAM modules installed on the memory banks. The table below list all the possible DRAM module combinations and the total memory amount for each option.

Option	Bank 0	Bank 1	Memory Amount
1	256 KB	None	1 MB
2	256 KB	256 KB	2 MB
3	1 MB	None	4 MB
4	256 KB	1 MB	5 MB
5	1 MB	1 MB	8 MB
6	4 MB	None	16 MB
7	1 MB	4 MB	20 MB
8	4 MB	4 MB	32 MB

2.1.1   DRAM Module Insertion

The SIMMs must be seated on the sockets as firmly as possible, and because of the fragility of the slot, you must be careful when inserting or removing the module.

1. Align the module so the pin-1 marking and corner notch of the module correspond to the SIMM socket pin 1 marking at the rear of the board. The module can fit in the socket one way only. Do not force it!

2. Push the module against the clip arms with your thumbs until a "click" sound is heard; the little plastic tabs appear in the latching holes on the RAM module board, and the clip arms fully grab the module board.

2.1.2 DRAM Module Removal

If possible, use a SIMM extraction tool; otherwise use the following method:

1. Carefully use your thumbs to bend outward the plastic tab ends on both sides of the slot.

2. The RAM module board is automatically ejected off the clip arms.

3. Take it out of the socket.

4. Repeat step 1 through 3 to release the other RAM modules.

Chapter 3

Jumper Settings and Connectors

This chapter will assist you with setting-up the AC 486 before you install it in a system case. If your AC 486 has already been installed and you do not wish to change the configuration settings, you can skip over this section.

3.1 Jumper Settings

The AC 486 has several jumper switches that must be set to define a system configuration. These switches are three-pin components on the mainboard. They are turned off and on by placing or removing a cover cap over the pins. This is called a short or closed jumper. All jumpers must be set to one of the possible two settings.

Figure 3.1/3.2 shows the location of the jumpers and connectors.
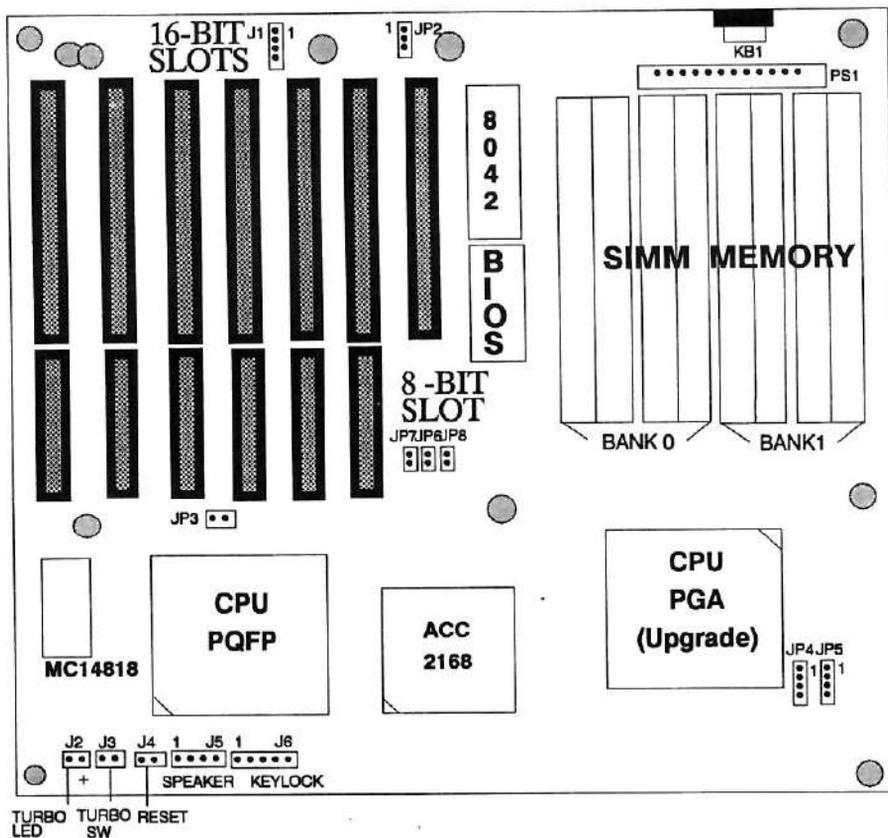
Figure 3.1 AC 486 (PQFP) Board Layout
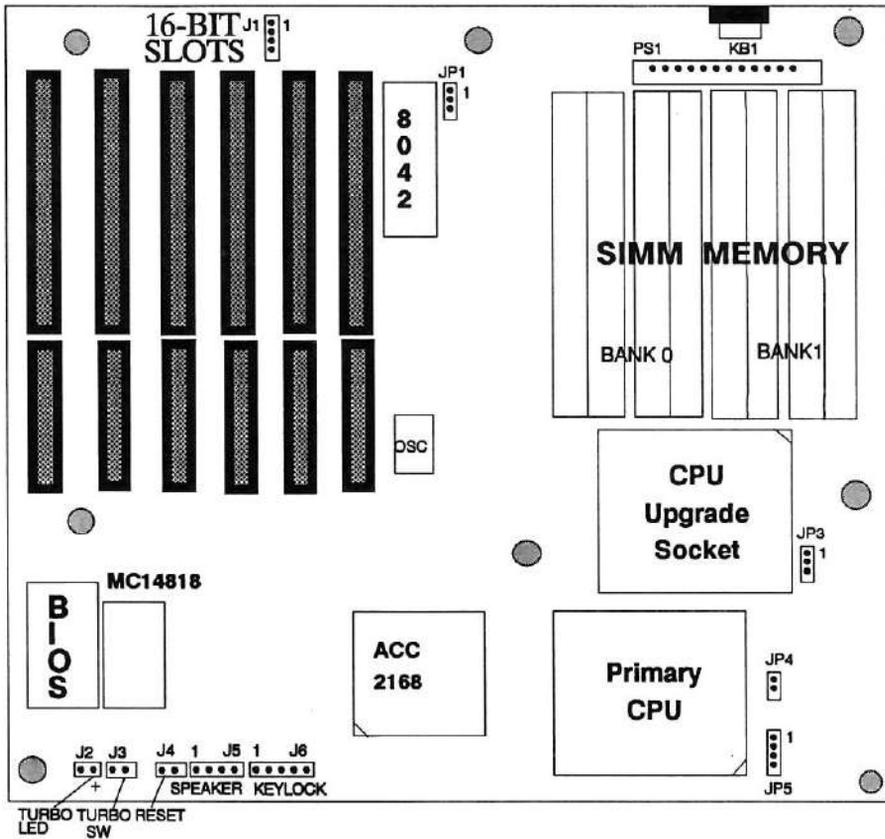
Figure 3.2 AC 486 (PGA) Board Layout

The table below summarizes the function and settings of each jumper on the AC 486.

The jumper settings of AC 486 (PQFP) is described as follows:

Function		Jumper Settings
Type of display adapter	Monochrome	**JP2** pin 1,2 closed
	Color	**JP2** pin 2,3 closed
Type of CPU Selection	80487SX	**JP4** pin 1,2 & 3,4 closed **JP5** pin 1,2 closed
	80486DX/486DX2	**JP4** pin 1,2 & 3,4 closed **JP5** pin 3,4 closed
	80486SX	**JP4** pin 2,3 closed **JP5** pin 2,3 closed
Upgrade CPU Setting *	Disable PQFP	**JP3** closed
CPU Clock	16 MHz	**JP6** closed **JP7** closed **JP8** closed
	20 MHz	**JP6** opened **JP7** closed **JP8** closed
	25 MHz	**JP6** closed **JP7** opened **JP8** closed
	28 MHz	**JP6** opened **JP7** opened **JP8** closed
	33 MHz	**JP6** closed **JP7** closed **JP8** opened

Note: "*" means while using the PGA CPU, JP3 must be closed to disable the PQFP CPU.

The jumper settings of AC 486 (PGA) is described as follows:

Function		Jumper Settings
Type of display adapter	Monochrome	**JP1** pin 1,2 closed
	Color	**JP1** pin 2,3 closed
Type of Primary CPU Selection	80486DX/DX2	**JP4** opened **JP5** pin 1,2 & 3,4 closed
	80486SX	**JP4** opened **JP5** pin 2,3 closed
Type of upgrade CUP Selection *	486DX/DX2	**JP3** pin 2,3 closed **JP4** closed
	487SX	**JP3** pin 1,2 closed **JP4** closed

Note: "*" means while using the upgrade CPU, JP4 must be closed to disabled the primary CPU.

3.2   Connectors

There are several connectors located on the AC 486. They are used to connect with some peripheral devices to enhance the performance of the system operation.

Refer to Figure 3.1 /3.2 for the positions of all the connectors on the mainboard. Their functions are listed below:

Connector	Function
J1	External Battery Connector
J2	Turbo LED Connector
J3	Turbo Switch Connector
J4	Hardware Reset Connector
J5	Speaker Connector
J6	KeyLock Connector
KB1	Keyboard connector
PS1	Power Supply connector

Chapter 4

System Installation

If the AC 486 is not yet installed in a computer system, then the following basic information will be of use. Because of the wide variety of cases, it is not possible to provide exact instructions for every case. This section covers the factors common to installing the board in most situations. A board illustration is shown in Figure 3.1.

Before removing the board from its anti-static bag read the caution notice in the Introduction.

4.1   Mounting Holes, Fasteners

The AC 486 have 10 mounting holes drilled on the printed circuit board of AC486. These will line up with some or all the mounting points on the case. In some cases the long inside edge of the board fits under metal flanges in the case frame rather than being screwed to the case.

Cases can come with a variety of mounting fasteners, both metal and plastic. In general, metal fasteners are attached to the case and the board is attached to this by metal screws and/or plastic snaps. The plastic fasteners usually snap into the board and then lock into slotted holes in the case bracket. Metal fasteners can ground the board to the case.

4.2   Peripheral Connections

IMPORTANT: Turn off power before changing any connections!

These connectors look the same as jumpers and have various numbers of pins. Whichever indicators or devices are presented on the case will have wire leads extending from them with plastic female connectors attached. The connectors should be plugged onto the appropriate connecting pins on the board.

Keyboard (KB1)

The AC 486 has a standard 5-pin DIN keyboard jack at the rear of the board, for an AT type keyboard.

Power Supply (PS1)

The AC 486 requires a power supply of at least 180 watts in order to be used in a fully configured system that includes a hard disk drive and more than a minimum of expansion cards installed. Power supplies commonly supplied for AT-type system boards generally have a power good signal.

The power supply connectors on the AC 486 use a standard 12-pin header, PS1, located near the right rear of each board. Dual connectors from the power supply plug directly onto these. Each has multiple wires extending from it. The black wires on each connector should be placed so that they are to the inside, near each other.

Battery (J1)

External

4.3 Case Connections

The AC 486 have connectors for utilities that are commonly mounted on the front panel of most system cases. These include

- Turbo indicator LED
- Turbo switch
- Reset button
- Speaker
- Keyboard lock

Turbo LED Connector (J2)

If the front panel has an LED to indicate the turbo mode, connect it to J2.

Turbo Switch Connector (J3)

If the front panel has an Turbo Switch Button to set the CPU speed, connect it to J3.

Reset Button (J4)

The AC 486 have a connector for a reset button (J4). If this has been connected to the front panel of the system case, the button can be used to restart the system without turning the power off. Pushing the button will cause the system to restart from the memory test. It is then necessary to reboot the operating system software before continuing.

Speaker (J5)

Connect the speaker to J5.

The Keyboard Lock (J6)

The AC 486 have a connector (J6) for a keyboard lock. If this has been connected to the front panel of the case, a key provided with the case can be used to disable the keyboard electrically. This does not actually lock the keyboard. The keyboard cannot be turned back on from this switch without the correct key. This device provides security from casual tampering with the system. It will not stop a determined intruder if the case can be opened and the function disconnected inside.

Chapter 5

Built-in BIOS Setup Program

This chapter provides detailed instructions on how to configure your system using the Built-in BIOS Setup Program and gives some technical information about your computer. If you are not very familiar with microcomputers, please carefully read this chapter before proceeding. If you do not want to change the system's configuration, you can skip this chapter.

Before you start to add optional devices to your system, you should first learn how to setup your system and adjust its jumpers (Refer to Chapter 3 for detailed information). Running the Setup Program of the AC 486 takes place after all jumper setting adjustments have been completed. You should at then record what the configuration is, and keep it for reference.

5.1   Setup Summary

1. Install any extra memory SIMMs.
2. Set jumper JP2 (PQFP) or JP1 (PGA) for color or monochrome monitor.
3. Make all connections to board.
4. Install control cards, monitor, and any peripheral devices and drivers.
5. Turn-on system.
6.   At setup prompt, press the **Del** key.
7. Type the password if you set the password checking option to "Setup" or "Always" in the Advanced CMOS Setup program.
8. Choose Standard CMOS or Advanced CMOS.
9. Follow screen prompts.

5.2 BIOS Setup

Every AT-compatible computer has battery supported CMOS memory otherwise called "non-volatile" RAM. It stores information about your computer and peripheral device configuration. Unlike ordinary RAM, it retains the information even after you turn off your computer.

A computer needs to know certain things about itself so it can operate correctly when powered on. A special type of software called BIOS (Basic Input Output System) is contained in read-only memory (ROM) chips on the mainboard. The BIOS reads information from the CMOS memory everytime you power on the computer. It then instructs the CPU and other devices to operate according to this information. If the information it retrieves is incorrect or insufficient, the system may not be able to operate properly until accurate information is supplied. You do this by means of the SETUP program built in the system BIOS.

5.2.1 When Should You Run Setup ?

1. Although someone may have set up the system for you, you may want to adjust the system to fit your needs.

2. Whenever you change some components in your system. For example, if you add a hard disk or more memory, you must run Setup to record the new system configuration. If you don't do so after adding memory, the computer will prompt you to run Setup.

3. The last and most unlikely possibility is the loss of information in the CMOS memory. You may never encounter this situation, but if you do, you can restore the information by running Setup.

5.2.2 How to Recall the Setup Program ?

You can run the built-in SETUP program in several ways:

1. When powering-on the system

    When you turn on the system power, or press the reset button on the system case while the system is running (not every system has this button), the BIOS will first test the functionality of the system components and display a start-up message similar to the following:

```
XXXX KB OK
Hit <Del> key,If you want to run Setup
```

The numeral digits will continue to count at the top left of the screen. This is the BIOS testing the mainboard memory chips. Before the above message disappears, you can press the **< Del >** key to run the Setup program.

2. To reset the system

By pressing **< Ctrl > < Alt > < Del >** key combination when the system is up and running (assuming you are running under DOS or other environments that support this feature), the system will immediately reset itself and boot up. Before booting up from a diskette or hard disk, you can also see the below start-up message :

```
Hit <Del> key,if you want to run Setup
```

3. When the BIOS prompts you

In the self-test process, if the BIOS detects inconsistent or incorrect configuration information, or some physical system error, it will display an error message on the screen, and prompt you to take action; for example:

```
Run SETUP UTILITY
Press <F1> to RESUME
```

Press the **<F1>** key, and continue.

4. To Enter password

If you set the password checking option to the "Setup" or "Always" field in the Advanced CMOS Setup program, after pressing the **"Del"** key to run the Setup program, it will display the Enter password message on the screen. Refer to section 5.6, Using the Change Password Setup.

5.2.3 Running the SETUP Program

When you call up the Setup program, the screen displays a "main menu" similar to the following:

```
        BIOS SETUP PROGRAM - AMI BIOS SETUP UTILITIES
    (C) 1991 American Megatrends Inc., All Rights Reserved


                   STANDARD CMOS SETUP
                   ADVANCED CMOS  SETUP
            AUTO CONFIGURATION WITH BIOS DEFAULTS
                   CHANGE PASSWORD
                WRITE TO CMOS AND EXIT
              DO NOT WRITE TO CMOS AND EXIT



Standard CMOS Setup for Changing Time, Date, HardDiskType, etc.

        ESC:EXIT  ↓→↑←:Sel F2/F3:Color F10:Save&Exit
```

Figure 5.1 BIOS Setup Main Menu Options

On-screen instructions at the bottom of the screen explain how to use the program.

The following is a brief description of the six options of the Setup main menu:

■ STANDARD CMOS SETUP

Display the standard CMOS Setup screen to check or modify general configuration information. The standard CMOS setup for the date, time, floppy type, hard disk type, video type, etc.

■ **ADVANCED CMOS SETUP**

The ADVANCED CMOS SETUP option is used to set the various system options for the user, including the above 1 MB memory test, Scratch RAM area for BIOS, Co-processor detection, Video ROM Shadow and System ROM Shadow.

■ **AUTO CONFIGURATION WITH BIOS DEFAULTS**

This option allows for automatic configuration of all the options in the Advanced CMOS Setup/Advanced Chipset Setup with the BIOS defaults.

■ **CHANGE PASSWORD**

The password is required for entering the Setup program or boot your system. The user can change current (user) password stored in the CMOS by accessing this option. When you want to use this option, you must be enabled the password option in ADVANCED CMOS SETUP.

■ **WRITE TO CMOS AND EXIT**

Choose this option to save the changes you have made in the "Standard Setup" and " Advanced Setup" option, then exit to reboot the system.

■ **DO NOT WRITE TO CMOS AND EXIT**

Choose this option to abandon all previous settings and then exit to reboot the system.

To choose an item from the setup main menu, move the cursor to appropriate line using the Up< ↑ > and Down< ↓ > arrow keys and press < Enter >. The screen will display a warning message as below:

```
┌─────────────────────────────────────────────────────────────────┐
│         BIOS SETUP PROGRAM-WARNING INFORMATION                    │
│         (C) 1991 American Megatrends. Inc.,All Rights Reserved    │
├─────────────────────────────────────────────────────────────────┤
│                                                                   │
│             Improper Use of Setup may Cause Problems !!           │
│                                                                   │
│   If System Hangs, Reboot System and  Enter Setup by Pressing the < Del > key │
│                                                                   │
│             Do any of the following After Entering Setup          │
│                (i) Alter options to make System Work              │
│                (ii) Load BIOS Setup Defaults                      │
│                (iii) Load Power-On Defaults                       │
│                                                                   │
│         Hit <ESC> to Stop now, Any other Key to continue          │
│                                                                   │
└─────────────────────────────────────────────────────────────────┘
```
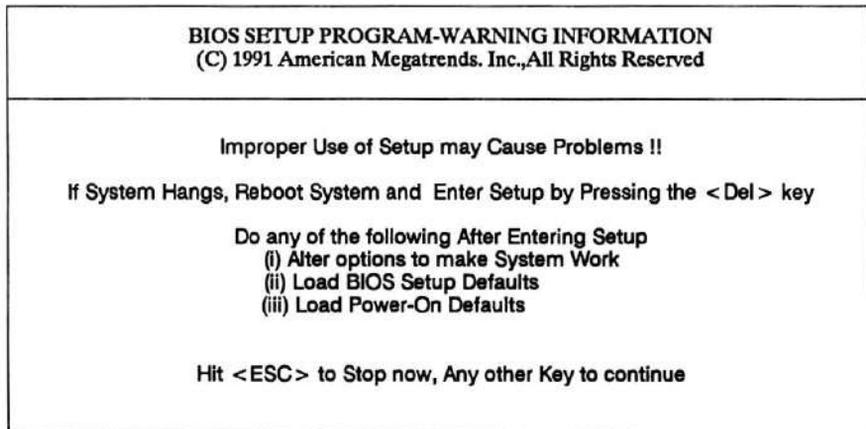
Figure 5.2   BIOS Setup Warning Message

5.3   Running the Standard CMOS Setup

To check or modify the general system configuration, choose "STANDARD CMOS SETUP" from the Setup main menu and press < Enter >. The screen will display the following:

```
BIOS SETUP PROGRAM - Standard CMOS SETUP
(C)1991 American Megatrends Inc., All Rights Reserved

Date (mn/date/year)  : Tue, Jan 01 1991         Base memory size    : 640 KB
Time (hour/min/sec)  : 04 : 07 : 29             Ext. memory size    : 3072 KB
                                      Cyln Head Wpcom LZone Sec Size
Hard disk C: type    : 47 = USER TYPE  642   8    0     0    17   43 MB
Hard disk D: type    : Not Installed
Floppy drive A:      : 1.2 MB, 5 1/4"
Floppyy drive B:     : Not Installed       Sun  Mon  Tue  Wed  Thu  Fri  Sat
Primary display      : Monochrome
Keyboard             : Installed            30   31   1    2    3    4    5

                                            6    7    8    9    10   11   12

                                            13   14   15   16   17   18   19
Month : Jan, Feb, .............Dec
Date  : 01, 02,03.....................31    20   21   22   23   24   25   26
Year  : 1901, 1902,................2099
                                            27   28   29   30   31   1    2

ESC:Exit ↓ → ↑ ←:Select F2/F3:Color PU/PD:Modify   3    4    5    6    7    8    9
```

Figure 5.3 The Standard CMOS Setup Program Screen

On-screen instructions in the lower left corner of the screen explain how to use the program. After making all selections, press <ESC> key and then return to the main menu program to choose another Setup program.

■   Date

In the Date fields, you manually set the electronic calendar on the mainboard only if the values are incorrect.

■ Time

Time fields include hour, minutes, seconds, but you can only set the value of hour and minute. Check and adjust these fields as you would a clock or wrist watch.

■ Floppy Drive A and B

In this field you may specify the capacity and format of the floppy drives installed in your system:

- 360KB, 5 1/4"
- 1.2 MB, 5 1/4"
- 720KB, 3 1/2"
- 1.44MB, 3 1/2"
- Not Installed

■ Hard Disk C: and Hard Disk D:

In these fields, you specify the physical and electronic properties of the "Standard" hard disk drives installed in your system. Relevant specifications include the number of cylinders and heads, write pre-compensation time, read/write head landing zone, number of sectors per track.

The BIOS provides 46 predefined types of popular hard disk drives. You select the appropriate type by scrolling forward/backward using the <PgUp> and <PgDn> keys. The relevant specifications of the selected drive will be immediately displayed on the corresponding field positions.

If for some reason your particular drive is not one of the 46 predefined types, simply scroll down to select type 47, then use the left < ← > and right < → > arrow keys to move to the Cyln(Cylinders), Head, WPcom(Write Pre-Compensation), LZone(Landing Zone), and Sec(Sectors) fields and directly key in the appropriate values. The Setup program will calculate the capacity of the drive based on the input cylinder, head and sector numbers and display the result on the capacity field for your reference.

Refer to Appendix A for the table of hard disk types.

■ Primary Display

In the display field, you specify the display adapter installed in your system.

■ **Keyboard**

This setting is used to select "Installed" or "Not Installed" for the keyboard during the Power On Self Test. Normally, it should be set as "Installed".

■ **Base·Memory and Extended Memory Size**

A small section in the upper right corner of the screen displays important status information on your system, including base and extended memory amount. They are updated automatically by the Setup program according to status detected by the BIOS self-test; no manual change is allowed.

5.4 Running the Advanced CMOS Setup

When you choose the "RUN Advanced CMOS Setup" option in the Setup main menu, the screen displays the following menu:

```
                    BIOS SETUP PROGRAM - ADVANCED CMOS SETUP
                (C)1991 American Megatrends Inc., All Rights Reserved

    Above 1 MB Memory Test          :Disabled
    Hard Disk Type 47 RAM Area      :Dos 1KB
    System Boot Up Num Lock         :On
    Internal Cache Memory           :Enabled
    Password Checking Option        :Setup
    Video ROM Shadow C000,32K       :Enabled
    Auto-Configuration              :Enabled
    AT Bus Clock Source             :AUTOSYNC
    Internal MUX Clock Source       :AUTOSYNC
    CAS Width in Read Cycle         :2T
    Shadow RAM Cacheable            :Disabled
    Remap Memory                    :Enabled
    ADS Delay                       :Disabled
    Slow Memory Refresh Divider     :CLKIN/4



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

Figure 5.4 The Advanced CMOS Setup Program Screen

■ Above 1 MB Memory Test

You can disable this option to bypass the memory test if a lot of memory is installed in the system, or you can enable this option to test all the memory.

■ Hard Disk Type 47 RAM Area

The purpose of this field is to specify the address of the memory area used by the system BIOS for storing extended information, such as to save the user definable drive type 47.
The available options are as follows:

- 0:300
  To reserve the stack area at address 30h:0.
- DOS 1KB
  To reserve the top 640 KB in the DOS base memory and reduce the size of base memory by 1 KB.

■ System Boot Up Num Lock

This option can set the "Num Lock" key to "On" or "Off" after system boot up.

■ Internal Cache Memory

The Internal Cache Memory is available on the mainbords. In nomal use, you should enable it for performance.

■ Password Checking Option

The purpose of this field is to determine whether the password is asked for in every boot (set to "Always") or asked for entering into the Setup program (set to "Setup") .

■ Video ROM Shadow C000, 32K

Choose these two options for better video display performance. It enables the shadow RAM operation for the video BIOS on display cards such as VGA or EGA. The Video card should be checked to see whether it has 32 K of ROM. If there is no ROM in the display card, there is no need to shadow the Video BIOS. If it has 32K of ROM, the Video BIOS should be shadowed at C000, 32K.

■ Auto-Configuration

If enabled, the following parameters will be automatically configured with default values depending on the CPU Clock speed:

- CAS Width in Read Cycle
- ADS Delay
- Slow Memory Refresh Divider

If disabled, user selected values for above parameters will be used. The available options are listed below:

- Disabled
- Enabled

■ AT Bus Clock Source

The bus clock is an output clock for the I/O channel. This field is used to specify the I/O BUS clock source used by the system. Selecting AUTOSYNC will cause the BIOS to automatically set the AT BUS Clock source based on the CPU clock speed.

The AT Bus Clock options are as follows:

- AUTOSYNC
- 16 MHz
- SCLK/5
- SCLK/4
- SCLK/3
- SCLK/2.5
- SCLK/2   (is Recommended for 33 MHz)
- SCLK/1.5 (is Recommended for 25 MHz)
- SCLK/1   (is Recommended for 20 & 16 MHz)
- 14.3 MHz

■ Internal MUX Clock Source

This option controls the frequency of polling external IRQ, DRQ & IOchck# signal. Selecting AUTOSYNC will cause the BIOS to automatically set the Internal MUX Clock source based on the CPU clock speed. There are some options as follows:

• AUTOSYNC	• SCLK/3
• 16 MHz	• SCLK/2
• SCLK/5	• SCLK/1
• SCLK/4	• 14.3 MHz

The recommended selection is SCLK/1.

■ CAS Width in Read Cycle

The option determines the number of wait states to be kept when the CPU reads data into the local DRAM. The available options are as follows:

- 2T
- 3T

■ Shadow RAM Cacheable

If you have the shadowing of the system and video BIOS, you can enable this option for memory cacheable function.

■ Remap Memory

This option enables or disables the system to map the unused 320KB/ 128KB reserved memory to address space immediately above normal extended memory. If video shadow is enabled, the reserved memory will be 128KB. If video shadow is disabled, the reserved memory will be 320KB. You should normally enable this field.

For example, if 2 MB of memory installed, there will be 1 MB of normal extended memory resides at address from 1024KB to 2048KB. By relocation, the 320KB or 128KB extra memory can mapped to address extactly above 2048 KB.

■ ADS Delay

The default value is "disabled". If this option is set to be "enabled", there will have an effect on performance.

■ Slow Memory Refresh Divider

In normal AT, the DRAM is refreshed every $15\mu s$, but it will slow down the speed of CPU. You can choose the slow refresh divisor (Read/Write) as follows:

- CLKIN/1 = $15\mu s$ Refresh (Standard)
- CLKIN/2 = $30\mu s$ Refresh
- CLKIN/4 = $60\mu s$ Refresh
- CLKIN/8 = $120\mu s$ Refresh

In order to enhance the system performace, the $60\mu s$ is the recommended value.

5.5 Using the Change Password Setup

To change the password, choose the "CHANGE PASSWORD" option form the Setup main menu and press < Enter > .

1. If the CMOS is bad or this option has never been used, please go to step 3. The screen will display the following messages:

```
Enter ROM Password:
```

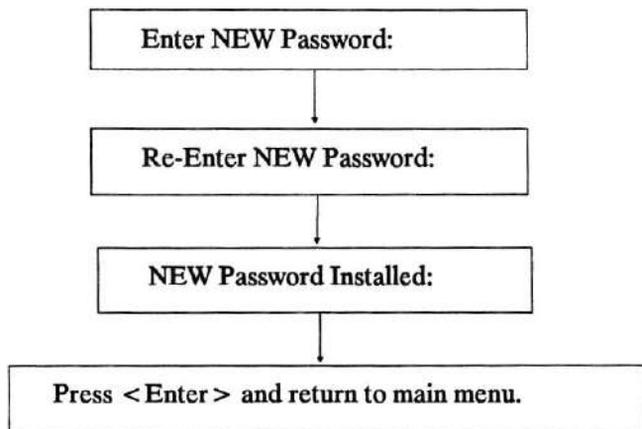Press the < Enter > key and continue to change the password.

2. If the CMOS is good or this option has been used to change the default password, the user is asked for the password stored in the CMOS. The screen will display the following message:

```
Enter Current Password:
```

Enter the correct password and continue to change the password.

3. After pressing the < Enter > key (ROM password) or current password (user-defined password), you can change the password stored in the CMOS. The password can be at most 6 characters long. If you want to disable password, then press < Enter > key only. It means "No password".
    To change the password, please follow the steps below:

```
┌─────────────────────────────┐
│    Enter NEW Password:       │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│    Re-Enter NEW Password:    │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│    NEW Password Installed:   │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────────────────┐
│  Press < Enter > and return to main menu.│
└─────────────────────────────────────────┘
```

5.6 BIOS Errors and Messages

After entering setup choices, the system will reboot. The setup summary and system information will appear on screen, along with messages. These may include ERROR messages concerning the system or setup.

AMI BIOS performs various diagnostic tests at the time the system is turned-on. Whenever an error is encountered during these tests, there will be either a few short beeps or an error displayed on the screen. If the error occurs before the display device is initialized the system reports the error with several short beeps.

If the error is FATAL, the system halts after reporting the FATAL error. If the error is NON-FATAL the process continues after reporting the error.

5.6.1 Fatal Errors Through Beeps

These errors are conveyed through a number of beeps.

Beep Count	Meaning
1	DRAM refresh failure
2	Base 64 KB RAM failure
4	System timer failure
5	Processor failure
6	Keyboard controller-GATE A20 error
7	Virtual Mode Exception Error
9	ROM-BIOS CheckSum Failure

5.6.2 Non- Fatal Errors Through Beeps

These errors are conveyed as one long beep followed by several short beeps.

Beep Count	Meaning
3	Conventional and Extended memory test failure
8	Display test and vertical and horizontal retrace test failure

5.6.3 Fatal Errors Shown in Display

When these errors are displayed, the screen is cleared, and the error message display is followed by a line saying **SYSTEM HALTED**.

1. **CMOS INOPERATIONAL:** indicates failure of CMOS shutdown register test.
2. **8042 GATE-A20 ERROR:** error in getting into protected mode.
3. **INVALID SWITCH MEMORY FAILURE**
4. **DMA ERROR:** DMA controller page register test failed.
5. **DMA #1 ERROR:** DMA Unit 1 register test failed.
6. **DMA #2 ERROR:** DMA Unit 2 register test failed.

5.6.4 Non- Fatal Errors In Display

There are two types of errors in this category:

1. Ones that require you to press the **F1** key and give you the option of running SETUP.
2. Ones that require you to press the **F1** key and don't give you the SETUP option.

5.6.5 Errors With Setup Option

1. **CMOS battery state low** indicates failure of CMOS battery or failure in the set and checksum tests.
2. **CMOS system options not set** indicates failure of CMOS battery or failure in set and checksum tests.
3. **CMOS checksum failure** indicates CMOS battery low or a failure in set and checksum tests.
4. **CMOS display type mismatch** indicates failure of display verification.
5. **CMOS memory size mismatch** indicates a System Configuration and setup failure.
6. **CMOS time & date not set** indicates System Configuration verification error and setup error (in timer).

5.6.6 Errors Without Setup Option

1. **CH-2 timer error** indicates channel 2,1,0 timer test failure.

2. **keyboard error** indicates keyboard test failure.

3. **KB/Interface error** indicates keyboard test failure.

4. **Display switch setting not proper** indicates display type verification error.

5. **Keyboard is locked....Unlock it.**

6. **FDD controller error** indicates System Configuration verification error in diskette setup.

7. **HDD controller failure** indicates System Configuration verification error in hard disk setup.

8. **C:Drive error** indicates hard disk setup error.

9. **D:Drive error** indicates hard disk setup error.

10. **D:Drive failure** indicates hard disk failure.

Appendix A

Hard Disk Types

Type	Cylinders	Heads	Write-Precomp	Landing Zone	Sectors	Capacity (Mbytes)
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	31
4	940	8	512	940	17	62
5	940	6	512	940	17	47
6	615	4	65535	615	17	20
7	462	8	256	511	17	31
8	733	5	65535	733	17	30
9	900	15	65535	901	17	112
10	820	3	65535	820	17	20
11	855	5	65535	855	17	35
12	855	7	65535	855	17	50
13	306	8	128	319	17	20
14	733	7	65535	733	17	43
15	000	0	000	000	17	00
16	612	4	0000	663	17	20
17	977	5	300	977	17	41
18	977	7	65535	977	17	57
19	1024	7	512	1023	17	60
20	733	5	300	732	17	30

Table A.1   AMI BIOS Hard Disk Types

Table A.1 AMI BIOS Hard Disk Types Continued

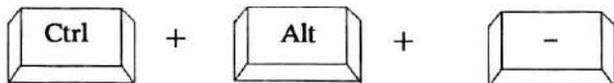|						
21	733	7	300	732	17	43
22	733	5	300	733	17	30
23	306	4	0000	336	17	10
24	325	7	0000	925	17	54
25	925	9	65535	925	17	69
26	754	7	754	754	17	44
27	754	11	65535	754	17	69
28	699	7	256	699	17	41
29	823	10	65535	823	17	68
30	918	7	918	918	17	53
31	1024	11	65535	1024	17	94
32	1024	15	65535	1024	17	128
33	1024	5	1024	1024	17	43
34	612	2	128	612	17	10
35	1024	9	65535	1024	17	77
36	1024	8	512	1024	17	68
37	615	8	128	615	17	41
38	987	3	987	987	17	25
39	987	7	987	987	17	57
40	820	6	820	820	17	41
41	977	5	977	977	17	41
42	981	5	981	981	17	41
43	830	7	512	830	17	48
44	830	10	65535	830	17	69
45	917	15	65535	918	17	114
46	1224	15	65535	1223	17	152

Appendix B

Setting the System Speed

The AC 486 offers two methods to select the system processing speed. You can change the speed during operation while you are working with your application program.

■ **High Speed**

```
┌─────────┐        ┌─────────┐        ┌─────────┐
│  Ctrl   │   +    │   Alt   │   +    │    +    │
└─────────┘        └─────────┘        └─────────┘
```

■ **Low Speed**

```
┌─────────┐        ┌─────────┐        ┌─────────┐
│  Ctrl   │   +    │   Alt   │   +    │    –    │
└─────────┘        └─────────┘        └─────────┘
```
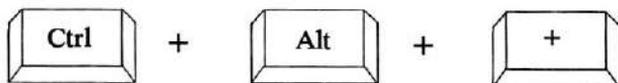
NOTE: Above keys must be pressed simultaneously