80386

386 ISA Mainboard
User's Guide &
Technical Reference

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SOYO™

About This Guide

This User's Guide is for assisting system manufacturers and end users in setting up and installing the mainboard. Information in this guide has been carefully checked for reliability; however, no guarantee is given as to the correctness of the contents. The information in this document is subject to change without notice.

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Electrostatic Discharge Precautions

Make sure you ground yourself before handling the mainboard or other system components. Electrostatic discharge can easily damage the components. Note that you must take special precaution when handling the mainboard in dry or air-conditioned environments.

Abide by the precautions below to protect your equipment from electrostatic discharge:

- Do not remove the anti-static packaging until you are ready to install the mainboard and other system components.
- Ground yourself before removing 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.
- Frequently ground yourself while working, or use a grounding strap.
- Handle the mainboard by the edges and avoid touching its components.

Table of Contents

1 Introduction

The 386 mainboard is a high-performance system board that supports a 386 CPU in PQFP packing running at 33MHz or 40MHz. You can install 128K of external cache memory on the mainboard, as well as an optional 387 math coprocessor. The mainboard is fully compatible with industry standards, while incorporating many technical enhancements.

The 386 mainboard offers superior system performance, compatibility, flexibility, and reliability, and is the ideal choice for a wide variety of system applications.

Key Features

Features of the 386 mainboard include:

- 386DX CPU (PQFP packing) running at 33MHz or 40MHz
- Support for a 387 PGA math coprocessor
- Support for 128K of external cache memory
- On-board memory configurations up to 32Mbytes with combinations of 256K, 1M, and 4M SIMM modules
- Burst-line fill during Cache-Read-Miss
- Control of two non-cacheable regions
- Shadow RAM support for System BIOS, Video BIOS and adapter card BIOS
- Optional caching of shadowed video BIOS
- Hidden refresh support to enhance system performance
- Five 16-bit slots and one 8-bit slot
- 4-layer PCB

Unpacking the Mainboard

The mainboard package contains:

- The 386 Mainboard
- This User's Guide

Note: Do not unpack the mainboard until you are ready to install it.

Follow the precautions below while unpacking the mainboard.

1. Before handling the mainboard, ground yourself by grasping an unpainted portion of the system's metal chassis.
2. Remove the mainboard from its anti-static packaging and place it on a grounded surface, component side up.
3. Check the mainboard for damage. If any chip appears loose, press carefully to seat it firmly in its socket.

Do not apply power if the mainboard appears damaged. If there is damage to the board contact your dealer immediately.

Mainboard Layout

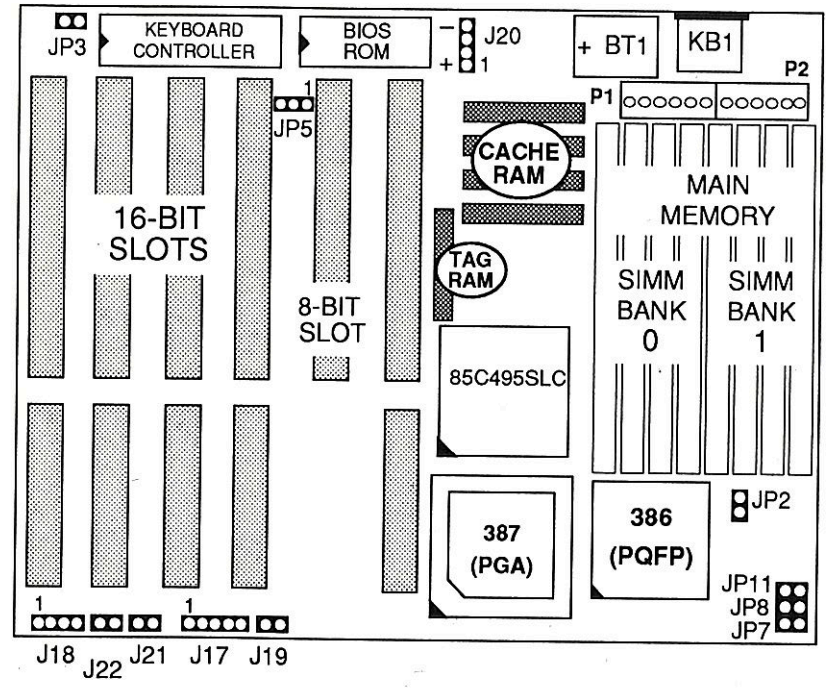


Figure 1–1. Mainboard Layout

2 Hardware Setup

This chapter explains how to configure the mainboard's hardware. After you install the mainboard, you can set jumpers install memory and a coprocessor on the mainboard and make case connections. Refer to this chapter whenever you upgrade or reconfigure your system.

CAUTION: *Turn off power to the mainboard, system chassis, and peripheral devices before performing any work on the mainboard or system.*

Setting Jumpers

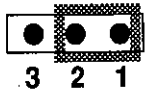
You can configure hardware options on the mainboard by setting jumper switches. Jumper switches are rows of small pins on the mainboard that are set by using a jumper cap. Refer to Figure 1-1 for jumper locations.

- *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.

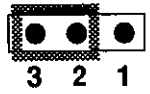
Note: *When you open a jumper, attach the plastic jumper cap to one of the pins so you won't lose it.*

For jumper settings, the symbol:  denotes a jumper cap.

For example, three-pin jumper settings are designated as below.



Pins 1 and 2 are Closed with a jumper cap.



Pins 2 and 3 are Closed with a jumper cap.

JP2: Factory Test Use Only

The setting of this jumper has no effect on mainboard operation. The default setting is Open.

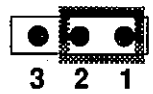
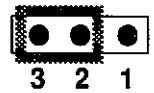
JP3: Display Type Settings

Set jumper JP3 to configure the mainboard for use with either a color or monochrome monitor.

Display Type	JP3
Monochrome (Default)	
Color/EGA/VGA	

JP5: CMOS Reset Jumper

Jumper JP5 lets you discharge CMOS memory in the event you forget your password or encounter a BIOS Setup problem. Before you install the mainboard make sure that JP5 is set to retain CMOS memory.

CMOS Setting	JP5
Retain CMOS Data	
Discharge CMOS	

CPU Type Configuration

Configure the 386 mainboard's CPU by inserting the specified CPU and Oscillator, and setting jumpers as described below. Set jumpers JP11, JP7, and JP8 in accordance with the CPU type and speed as in the diagram below.

JP7, JP8, JP11: CPU Type Settings

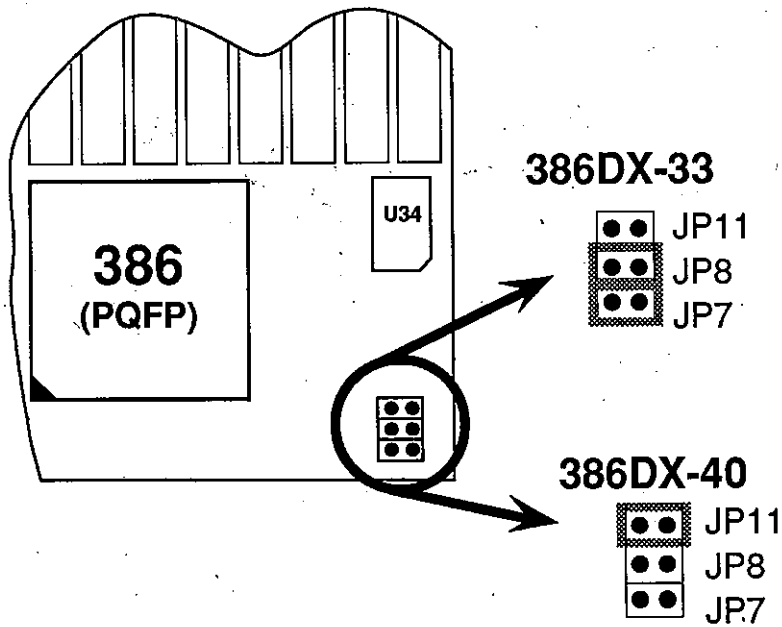


Figure 2-1. 386DX-33/40 Jumper Settings

CPU	Description
386DX-33	66.67 MHz oscillator inserted in U34 or use the clock generator
386DX-40	80 MHz oscillator inserted in U34 or use the clock generator

Memory Configuration

The 386 mainboard lets you increase the system's main memory via on-board SIMM (Single In-line Memory Modules) sockets. The mainboard supports two banks of 256K, 1M, and 4M SIMM modules. The mainboard requires SIMM of at least 80ns access time.

On-board memory is located in two banks: Bank 0 and Bank 1. See Figure 1-1. Four SIMM sockets are provided in each bank. You can install either a 256K, 1M, or a 4M SIMM in each socket. The section that follows explains how to install SIMM modules.

The mainboard supports the following configurations:

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

Table 2-1. On-board Memory Configurations

Installing SIMM

Install a SIMM in a memory socket as follows:

1. Review the section on Electrostatic Discharge Precautions.
2. Remove the SIMM from its anti-static wrapping.
3. Hold the SIMM so that the chips are toward you and the edge connector is pointed toward the mainboard.
4. Insert the module's connectors into the socket at a 60-degree angle and gently move the SIMM back and forth until it is firmly in place.
5. Slowly move the module to a vertical position until the locking tabs snap into the holes at each end of the module.

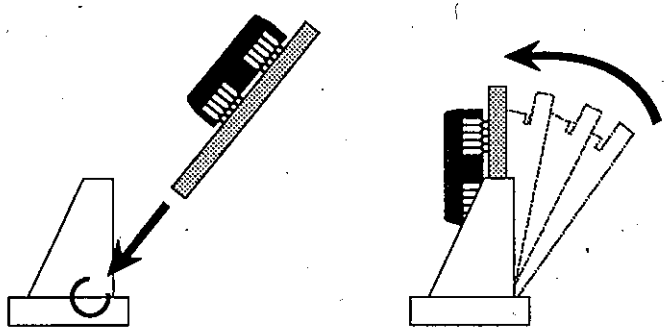


Figure 2-2. Installing a SIMM

6. Repeat steps 2~5 until the sockets of each bank are full.
7. Once you install memory, run the Setup program to let the system know how much memory you have installed.

Math Coprocessor Installation

The 386 mainboard supports a 387 math coprocessor. Refer to Figure 1-1 for the coprocessor socket location .

Install a 387 coprocessor as follows:

1. Review the section on Electrostatic Discharge Precautions and make sure that power to the mainboard is off.
2. Align the notched corner of the 387 chip to the notched corner of the PGA socket. The chip's notched corner also has a dot.

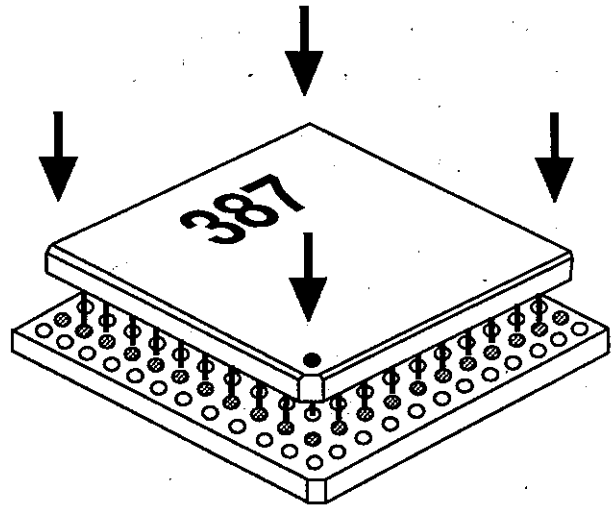


Figure 2-3. Installing a 387 Coprocessor

3. Match the pins of the 387 with the second row of socket holes. Make sure a row of empty socket holes appears around the chip. (The socket is a 3167 socket that accepts a 387 chip.)
4. Press the chip into the socket.

Connectors

Attach the 386 mainboard to case devices, or an external battery, via connectors on the mainboard. Refer to Figure 1-1 for connector locations and connector pin positions.

J17 - Keylock & Power LED Connector

J17 is a connector for a lock that may be installed on the system case for enabling or disabling the keyboard. This connector also attaches to the case's Power LED.

J18 - Speaker Connector

Attach the system speaker to connector J18.

J19 - Hardware Reset Control

Attach the Reset switch to J19. Closing the Reset switch restarts the system.

J20 - External Battery Connector

J20 is a 4-pin connector to which you can attach an external battery. Pin 1 of J20 is positive (+) and pin 4 is negative (–).

J21 - Turbo Switch Connector

J21 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.

J22 - Turbo LED Connector

J22 connects to a Turbo LED on the case control panel and works with the Turbo Switch. If the mainboard is in Turbo mode, the Turbo LED lights.

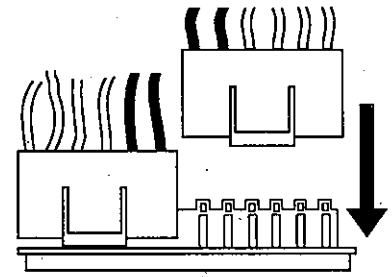
KB1- Keyboard Connector

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

P1, P2 - Power Supply Connectors

The mainboard requires a power supply with at least 200 watts and a "power good" signal. The power supply connector has two six-pin male header connectors, P1 and P2.

Plug the dual connectors from the power directly onto the board connector while making sure the black leads are in the center.



3 BIOS Setup

Once you have configured the mainboard, 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 mainboard.

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.

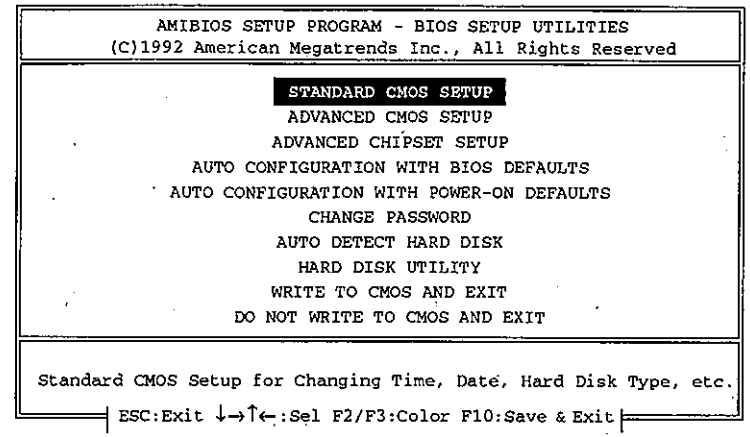
Entering BIOS Setup

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

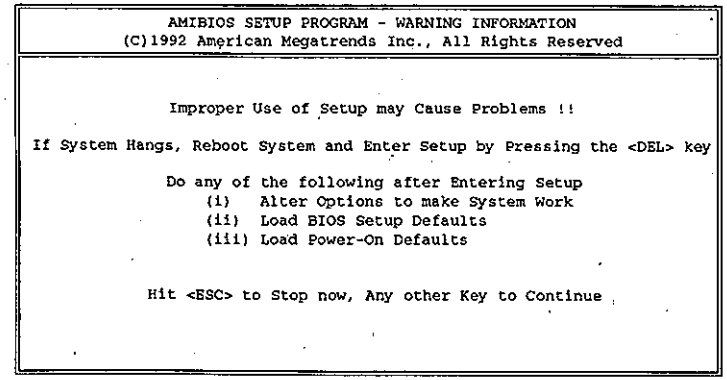
1. Turn on or reboot the system. After a series of diagnostic checks, the following message appears:

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

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



3. Choose an option and press <Enter>. Modify the system parameters to reflect the options installed in the system. (See the following sections.) A warning message appears each time one of the first three options is selected, before any changes are allowed to the 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.

Important *Make sure you set the parameters in the Advanced Chipset table to match your CPU speed. See Table 3-1 on page 20.*

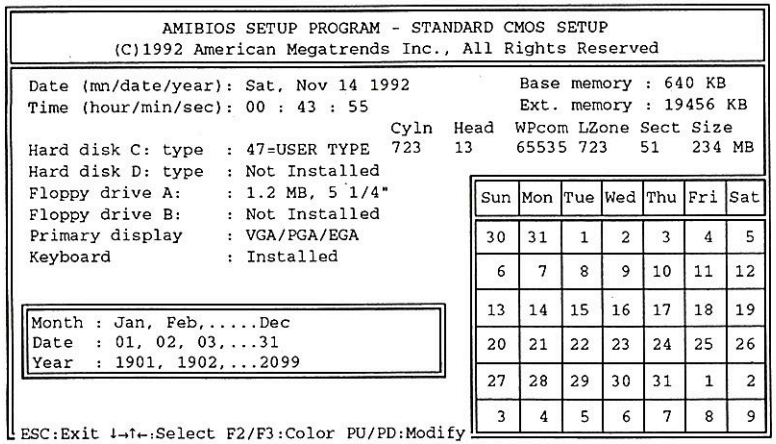
Main Menu Options

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.



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.

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." (default)

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

Primary display Choose Monochrome, (default)
Color 40x25,
VGA/EGA/PGA,
Color 80x25, or
Not installed

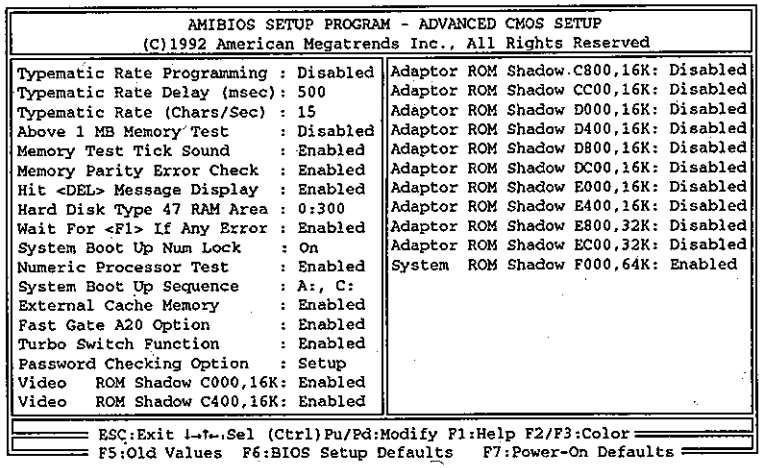
Keyboard Choose Installed (default) or Not installed.

3. After you have finished with the Standard CMOS Setup program, press the <ESC> key to return to the Main Menu.

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. **(The screen below shows the BIOS default settings.)**



2. Use the arrow keys to move between items and to select values. Modify the selected fields using the PgUp/PgDn keys. <F> keys are explained below:

<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 — 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 — 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 — Enable this option to turn on the "ticking" sound during the memory test. Disable to turn off this sound.

Memory Parity Error Check — Enables or disables BIOS memory parity error checking routines.

Hit <DEL> Message Display — Choose Enabled or Disabled. Disable this option to prevent "Hit <DEL> if you want to run SETUP" message from appearing when system boots-up.

Hard Disk Type 47 RAM 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 — Enable this option to display "Press <F1> to continue" when a POST non-fatal error occurs. Disable to eliminate the need for user response to a non-fatal error 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.

Numeric Processor Test — Choose Enabled or Disabled. This option enables the numeric processor test.

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.
External Cache Memory	This option lets you enable or disable the cache memory on the mainboard.
Fast Gate A20 Option	Choose Enabled or Disabled. Enable this option to allow RAM accesses above 1MB using the fast gate A20 line. This option makes accesses faster than normal, and is useful in networking operating systems.
Turbo Switch Function	Choose Enabled or Disabled. This option lets you enable the turbo switch function.
Password Checking Option	Choose Setup, or Always. Use this feature to prevent unauthorized system boot-up or unauthorized use of BIOS Setup. If no password is entered, both Always and Setup remain inactive. "Always" – Each time the system is booted the password prompt appears. "Setup"– Password prompt only appears if you attempt 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 32K segments can be shadowed from ROM to RAM. BIOS is shadowed in a 16K segment if it is enabled and it has BIOS present.
System ROM Shadow	If enabled and BIOS is present in this segment, then the system BIOS (64K) is shadowed.

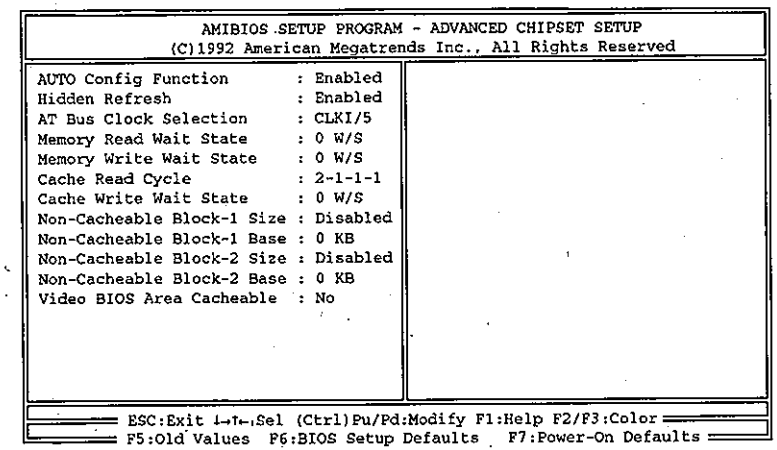
3. After you have finished with the Advanced CMOS Setup program, press the <ESC> key to return to the Main Menu.

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. **(The screen below shows the BIOS default settings for the 386DX-40 CPU.)**

*Note: Make sure you set the parameters in the **Advanced Chipset Setup** to match your CPU speed. See Table 3-1.*



2. Use the arrow keys to move between items and select values. Modify selected fields using the PgUp/PgDn keys. Use the <F> keys as explained in the section above.

A short description of the screen items follows:

AUTO Config Function — The default setting is Enabled. This option automatically configures the items that follow.

It is recommended that you enable this option. If this option is Enabled, then you must boot from Turbo mode.

Hidden Refresh — Choose Enabled or Disabled.

AT BUS Clock Selection — Set according to Table 3-1 below.

Memory Read Wait State — Set according to Table 3-1 below.

Memory Write Wait State — Set according to Table 3-1 below.

Cache Read Cycle — Set according to Table 3-1 below.

Cache Write Wait State — Set according to Table 3-1 below.

Non-Cacheable Block-1 & 2 Size — Select non-cache area length depending on your requirements.

Non-Cacheable Block-1 & 2 Base — Select non-cache area start address depending on your requirements.

Video BIOS Area Cacheable — Choose Yes or No. The default is No.

3. After you have finished with the Advance Chipset Setup, press the <ESC> key to return to the Main Menu.

Set the items in the Advanced Chipset Setup screen according to which CPU is installed on the mainboard. See the table below.

Table 3-1. Advanced Chipset Settings

CPU	Cache Write	Cache Burst	Memory Write	Memory Read	AT BUS Clock Selection
386DX-33	0 W/S	2111	0 W/S	0 W/S	CLK I/4
386DX-40	0 W/S	2111	0 W/S	0 W/S	CLK I/5

Auto Configuration with BIOS Defaults

This Main Menu item loads the default system values. If the CMOS is corrupted the defaults load automatically. Choose this item and this 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 with 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. Note that there is no default password stored in the ROM.

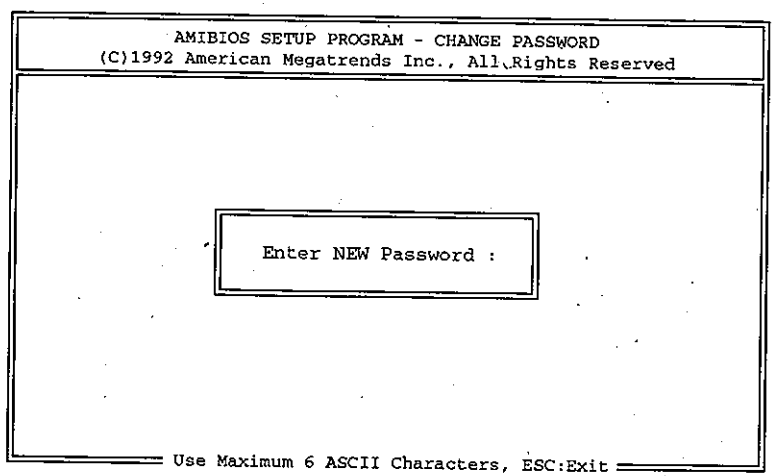
Change the password as follows:

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

   "Enter NEW Password:" (if there's no password) **or**

   "Enter CURRENT Password:" (if a password is already set)

2. The screen will not show the characters entered.



3. After you correctly enter the current password, the following message 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 prompt appears, type the new password and press <Enter>.

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 set jumper JP5 to clear the CMOS RAM. All setup information is lost and you must run the BIOS setup program again.**

Auto Detect Hard Disk

This Main Menu item automatically detects the hard disk type and configures the STANDARD SETUP accordingly.

Note: This function is only valid for **IDE** *hard disks.*