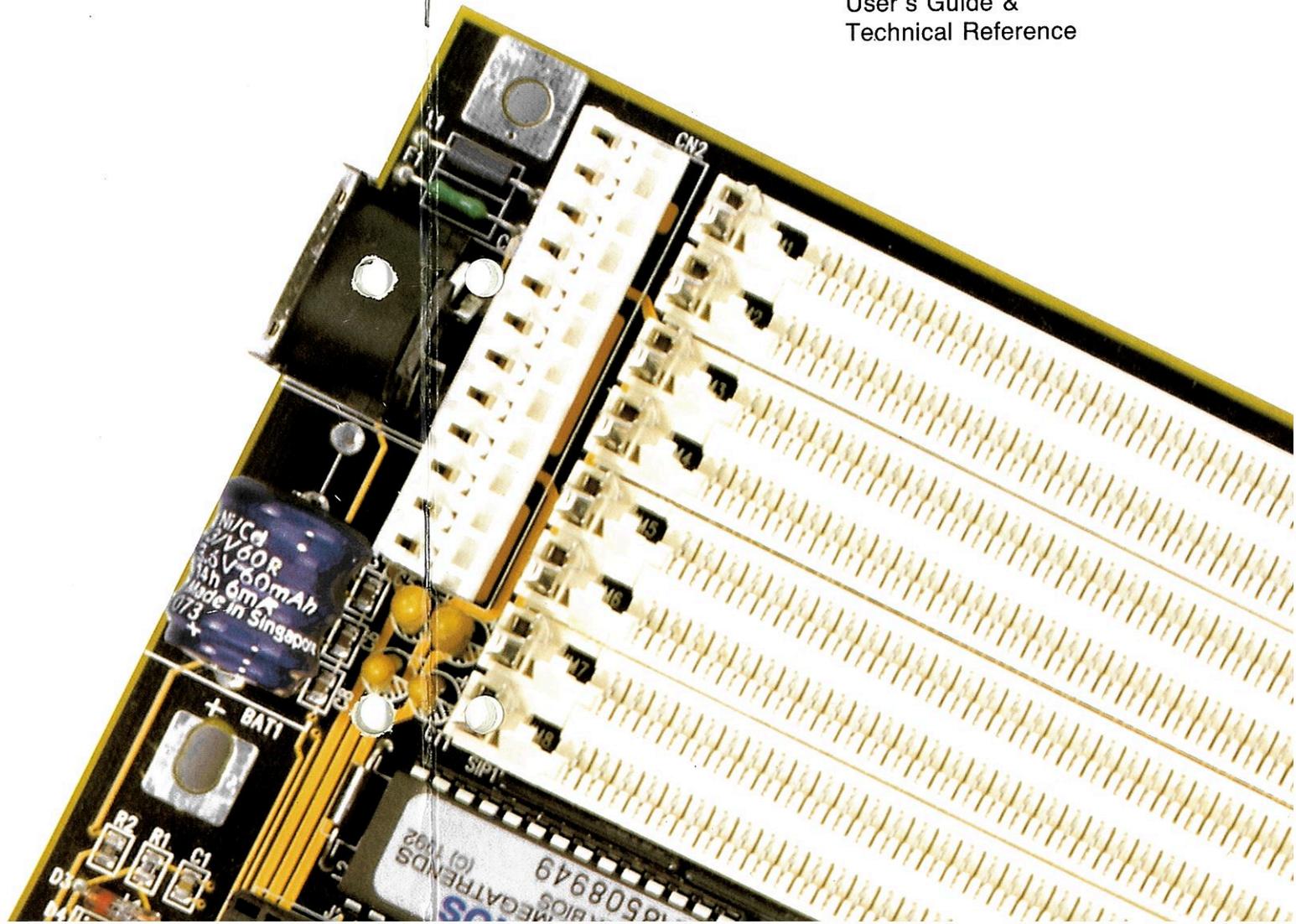


80386

386 ISA Mainboard
User's Guide &
Technical Reference





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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1 Introduction

The 386 mainboard is a high-performance system board that supports a 386 CPU 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, 486DLC CPU (PQFP or PGA 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 128Mbytes with combinations of 256K, 1M, 4M, and 16M SIMM modules
- Control of two non-cacheable regions
- Shadow RAM support for System BIOS, Video BIOS and adapter card BIOS
- Optional caching of shadowed video BIOS
- Built-in RTC
- Slow refresh support to enhance system performance
- Five 16-bit slots and one 8-bit slot
- 128K / 256K remap
- 4-layer PCB (22 x 20cm)

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.

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.

Take these precautions 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. To ground yourself grasp 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.

Mainboard Layout

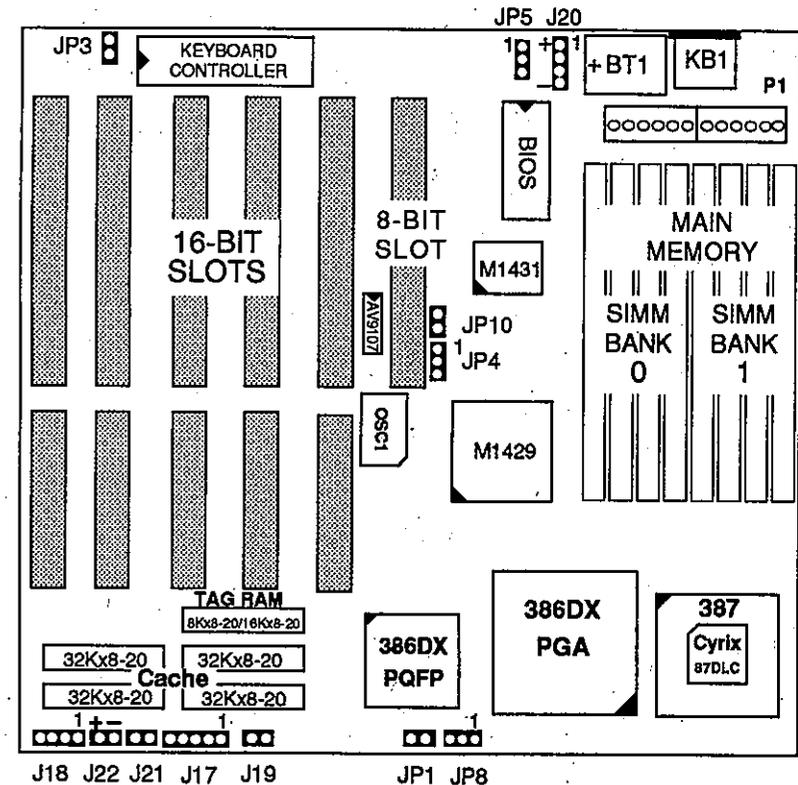


Figure 1-1. Mainboard Layout

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.

JP3: Display Type Settings

JP3 configures the mainboard for use with a color or monochrome monitor.

Display Type	JP3
Monochrome (Default)	 1 2
Color/EGA/VGA	 1 2

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 (Default)	 1 2 3
Discharge CMOS	 1 2 3

CPU Type Configuration

Configure the 386 mainboard's CPU by inserting the specified CPU and setting jumpers as described in the diagrams that follow.

AMD, Intel 386DX-40/33 CPU Settings

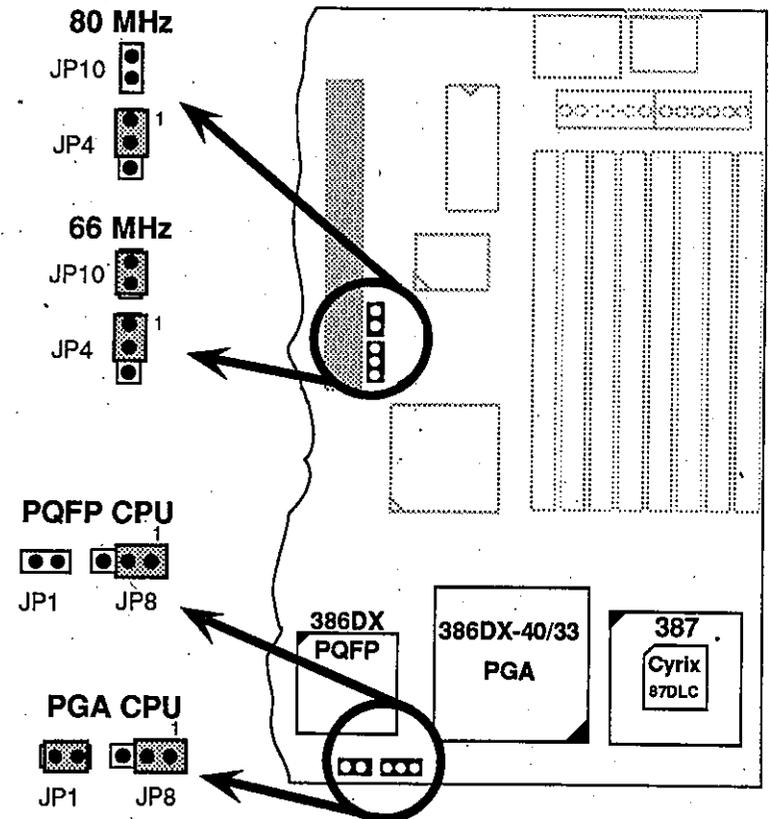


Figure 2-1. AMD, Intel 386DX-40/33 Jumper Settings

Cyrix, TI 486DLC-40/33 CPU Settings

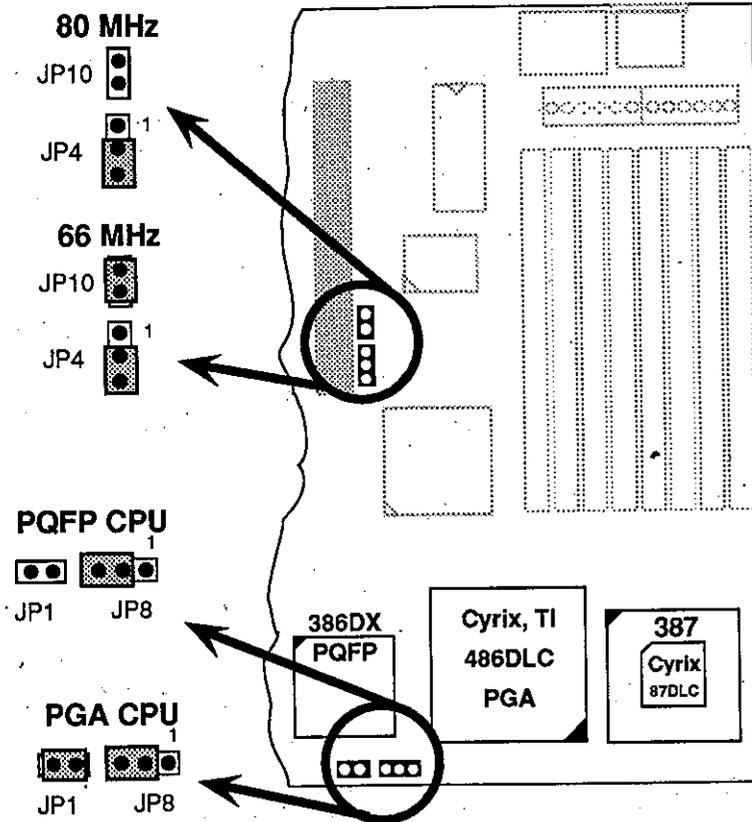


Figure 2-2. Cyrix, TI 486DLC-40/33 Jumper Settings

Cache Configuration

The 386 mainboard has a write-back caching scheme. You can configure the mainboard's external 128KB cache by installing cache chips in the sockets noted below. Refer to Figure 1-1 for cache socket locations.

Cache Size and RAM Locations

This table describes the chip type and socket locations for cache configuration.

Cache Size	Cache RAM	Tag RAM	Cacheable Range
128KB	32K x 8 - 20/ U19, U20, U22, U23	8K x 8 - 20 or 16K x 8 - 20/U16	16 MB

Note: Tag and Data RAM use 20ns for 40/33 MHz.

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. J17 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 open for normal operation and closed for turbo 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.

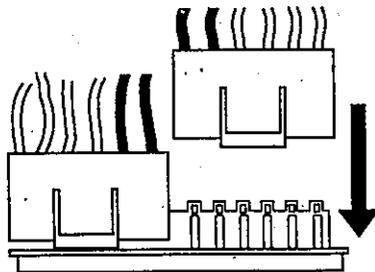
KB1- Keyboard Connector

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

P1 - Power Supply Connectors

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

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

**Memory Configuration**

The 386 ISA 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, 4M and 16M SIMM. 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, 4M or a 16M SIMM in each socket with any configuration.

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	—
17 MB	256K	4M
20 MB	1M	4M
32 MB	4M	4M
64 MB	16M	—
68 MB	1M	16M
80 MB	4M	16M
128 MB	16M	16M

Table 2-1. On-board Memory Configurations

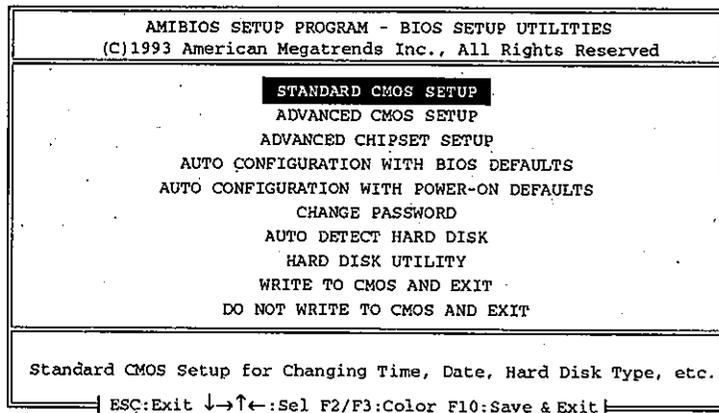
3 BIOS Setup

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

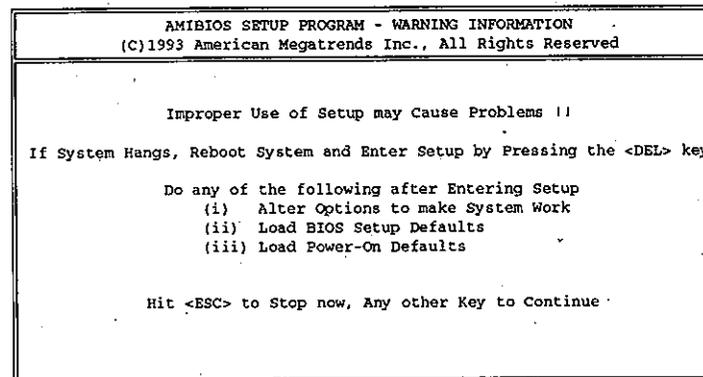
1. Turn on or reboot the system. After a series of diagnostic checks, the following message appears:

"Hit if you want to run SETUP"

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



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 CMOS Setup to match your CPU speed. See Table 3-1 on page 19.

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.

AMIBIOS SETUP PROGRAM - STANDARD CMOS SETUP	
(C)1993 American Megatrends Inc., All Rights Reserved	
Date (mn/date/year): Sat, Aug 28 1993	Base memory : 640 KB
Time (hour/min/sec): 00 : 43 : 55	Ext. memory : 19456 KB
	Cyln Head WPcom LZone Sect Size
Hard disk C: type : 47=USER TYPE 723 13 65535 723 51 234 MB	
Hard disk D: type : Not Installed	
Floppy drive A: : 1.2 MB, 5 1/4"	
Floppy drive B: : Not Installed	
Primary display : VGA/PGA/EGA	
Keyboard : Installed	

Sun	Mon	Tue	Wed	Thu	Fri	Sat
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	31	1	2
3	4	5	6	7	8	9

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

ESC:Exit F1: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.

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.)

AMIBIOS SETUP PROGRAM - ADVANCED CMOS SETUP (C)1993 American Megatrends Inc., All Rights Reserved			
Typematic Rate Programming	: Disabled	Adaptor ROM Shadow C800,32K	: Disabled
Typematic Rate Delay (msec)	: 500	Adaptor ROM Shadow D000,32K	: Disabled
Typematic Rate (Chars/Sec)	: 30	Adaptor ROM Shadow D800,32K	: Disabled
Above 1 MB Memory Test	: Disabled	Adaptor ROM Shadow E000,32K	: Disabled
Memory Test Tick Sound	: Enabled	Adaptor ROM Shadow E800,32K	: Disabled
Memory Parity Error Check	: Enabled		
Hit Message Display	: Enabled		
Hard Disk Type 47 RAM Area	: 0:300		
Wait For <F1> If Any Error	: Enabled		
System Boot Up Num Lock	: On		
Numeric Processor Test	: Enabled		
System Boot Up Sequence	: A:, C:		
System Boot Up CPU Speed	: High		
External Cache Memory	: Enabled		
Internal Cache Memory	: Disabled		
Past Gate A20 Option	: Enabled		
Password Checking Option	: Setup		
Video ROM Shadow C000,32K	: Enabled		

ESC:Exit F1-F5: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. <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** 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 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** 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 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 lets you enable 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.
- System Boot Up CPU Speed** Choose High or Low. This option determines the speed at which the system boots up.
- External Cache Memory** Choose Enabled or Disabled. This option lets you enable or disable the external on-board cache memory.
- Internal Cache Memory** Choose Enabled or Disabled. Use this option to enable or disable the 486DLC CPU's internal cache.
- Fast Gate A20 Option** Choose Enabled or Disabled. Enable this option to allow RAM accesses above 1MB using the fast gate A20 line.
- Password Checking Option** Choose Setup, or Always. Use this feature to prevent unauthorized system boot-up or unauthorized use of BIOS Setup.
- "Always" – Each time the system is booted the password prompt appears.
- "Setup" – If a password is set, the password prompt only appears if you attempt to enter the Setup program. If a password is not set, this choice disables the Password Checking Option.
- Video or Adaptor ROM Shadow** ROM shadow copies BIOS code from slower ROM to faster RAM. BIOS can then execute from RAM. These 128K segments can be shadowed from ROM to RAM. BIOS is shadowed in a 128K segment if it is enabled and it has BIOS present.

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 setting at 40MHz.)

Note: Make sure you set the parameters in the Advanced Chipset Setup to match your CPU speed. See Table 3-1 page 19.

AMIBIOS SETUP PROGRAM - ADVANCED CHIPSET SETUP (C)1993 American Megatrends Inc., All Rights Reserved	
AUTO Config Function	: Enabled
AT Bus Clock Select	: CLK2/10
DRAM Read Wait State	: Fast
DRAM Write Wait State	: Fast
SRAM Read Wait State	: 0 W/S
SRAM Write Wait State	: 0 W/S
Cycle Check Point	: Fast
Slow Refresh	: 60µs
Shadow Cacheable	: Disabled
Polling Clock Select	: CLK2/3
DMA Clock Select	: ATCLK/2
ISA Write Cycle Insert WS	: Enabled

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 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.
- AT BUS Clock Select** Set according to Table 3-1 on page 19.
- DRAM Read Wait State** Set according to Table 3-1 on page 19.
- DRAM Write Wait State** Set according to Table 3-1 on page 19.
- SRAM Read Wait State** Set according to Table 3-1 on page 19.
- SRAM Write Wait State** Set according to Table 3-1 on page 19.
- Slow Refresh *** Choose 60 μ s (default) or 15/30/120 μ s.
- Shadow Cacheable** Choose Enabled or Disabled(default).
- Polling Clock Select** Select I/O polling clock, set according to Table 3-1 on page 19.
- DMA Clock Select** Choose 8MHz (ATCLK) or 4MHz (ATCLK/2, default)
- ISA Write Cycle Insert WS** Choose Enabled (default) or Disabled.

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

- * Some DRAM does not support Slow Refresh. Contact your SIMM module dealer for information on setting this item, or use the default setting. You can also use 15 μ s, but performance is lower.

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	
	386DX-33 486DLC-33	386DX-40 486DLC-40
DRAM Read WS	Fast	Fast *
DRAM Write WS	Fast	Fast *
SRAM Read WS	0 W/S	0 W/S *
SRAM Write WS	0 W/S	0 W/S *
Cycle Check Point	Fast	Fast *
AT Bus Clock	CLK2/8	CLK2/10 *
Polling Clock Sel	CLK2/3	CLK2/3 *

* default setting

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.

AMIBIOS SETUP PROGRAM - CHANGE PASSWORD (C)1992 American Megatrends Inc., All Rights Reserved
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> Enter NEW Password : </div>
Use Maximum 6 ASCII Characters, ESC:Exit

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.