SUPER P9 - 16/20/25MHz
386SX MAIN BOARD

User's Manual

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How to Use This Manual

This manual covers all necessary information to operate your system board. It will assist you in the installation and configuration of the system. By carefully following the steps described in this manual the user should be able to handle the system without additional help.

The table of contents gives detailed information about the arrangement of this manual.

The information contained in this manual is subject to change without notice. King Phoenix Co., Ltd. shall not be liable for errors contained herein.

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Chapter I

Introduction

The 386SX mainboard is high-performance, half-size mainboard provides you with all the basic elements, which to build an advanc computer. The 386SX mainboard is based on an 80386SX microprocessor, the 82C336 system controller and 82C206 peripheral controller. 386SX mainboard is fully IBM PC/AT compatible.

Advanced options including BIOS and Video shadowing are provided to speed up the accessing of BIOS and Video. Extra 256KB memory remapping is supported.

The 386SX implements a high performance 2- or 4-way page interleaved memory controller supporting 1-4 banks of memory and up to 8M bytes of on-board system memory.

The 386SX supports DOS Conventional memory and Extended (running in protected mode) memory functions. It is fully compatible with XT, 286 AT and 386 software. It also supports MS-DOS, PC-DOS, MS-OS/2, Xenix, Unix, Novell Networking and all IBM PC/AT compatible application programs.

I-1 Features

■On board uses Surface Mounting Techno logy and SMD components

■Used 80386SX microprocessor running at 16-25MHz

■Socket support for an 80387SX math coprocessor

■Supports up to 8Mbytes memory using 100ns DRAM for 16MHz operation or 80ns DRAM for 16-25MHz operation

■2/4 Interleave Mode and Fast Page-Flip operation

■Provides Parity Logic and can be hardware disabled

■Mixed 256K * 1 type and 1M * 1 type DRAM

■128K Shadow RAM for System BIOS and Video BIOS

■Extra 256K remapping in any memory configuration

■256K-640K can be disabled for EEMS applications

■Fast CPU Reset & Fast Gate A20 Logic

■16 interrupt levels

■Six 16bit I/O slots and one 8bit I/O slot

■Half at size: 22cm * 22cm

Chapter II

Quick Start

Before the system is ready to operate, you have to first configure your mainboard with jumpers and connectors to allow for various functions. This chapter provides a quick reference for jumper settings and the functions of connectors. It allows you to set up your board quickly. Read *Chapter III Installation Guide* if you want to know more about how to set up your board.

II-1 Installation Procedure for the System

■ Open the package and inspect the board.

■ Fix the mainboard to your case.

■ Connect the power supply connector to the system board.

■ Plug in the keyboard, speaker, turbo switch, turbo LED, power LED, and keylock switch to their connectors.

■ Attach FDD and HDD, and install their cables to the controller.

■ Firmly plug in the FDD/HDD controller to a slot.

■ Install the display card. Select display mode (J7 Open for mono and J7 Close for color)

■ Connect the monitor cable to the display card.

■ Switch on the monitor and the power supply.

■ Execute the Setup program by pressing the <Del> key after Power On Self Test.

■ Enter Standard CMOS Setup to set up time, date, hard disk type, and display type.

■ Enter the "Auto Configuration with BIOS Defaults" screen and load BIOS Default Values. We recommend that you use the default settings. However, you may enter the Advanced CMOS Setup and Advanced Chipset Setup to make modifications. If you have any trouble after modifications, reload the default settings again.

■ Write to CMOS and exit.

III-2 The Layout for the 386SX

The 386SX is a half-sized board. *Figure 1* is the physical layout for 386SX mainboard.

Figure 1. Mainboard Layout of the 386SX
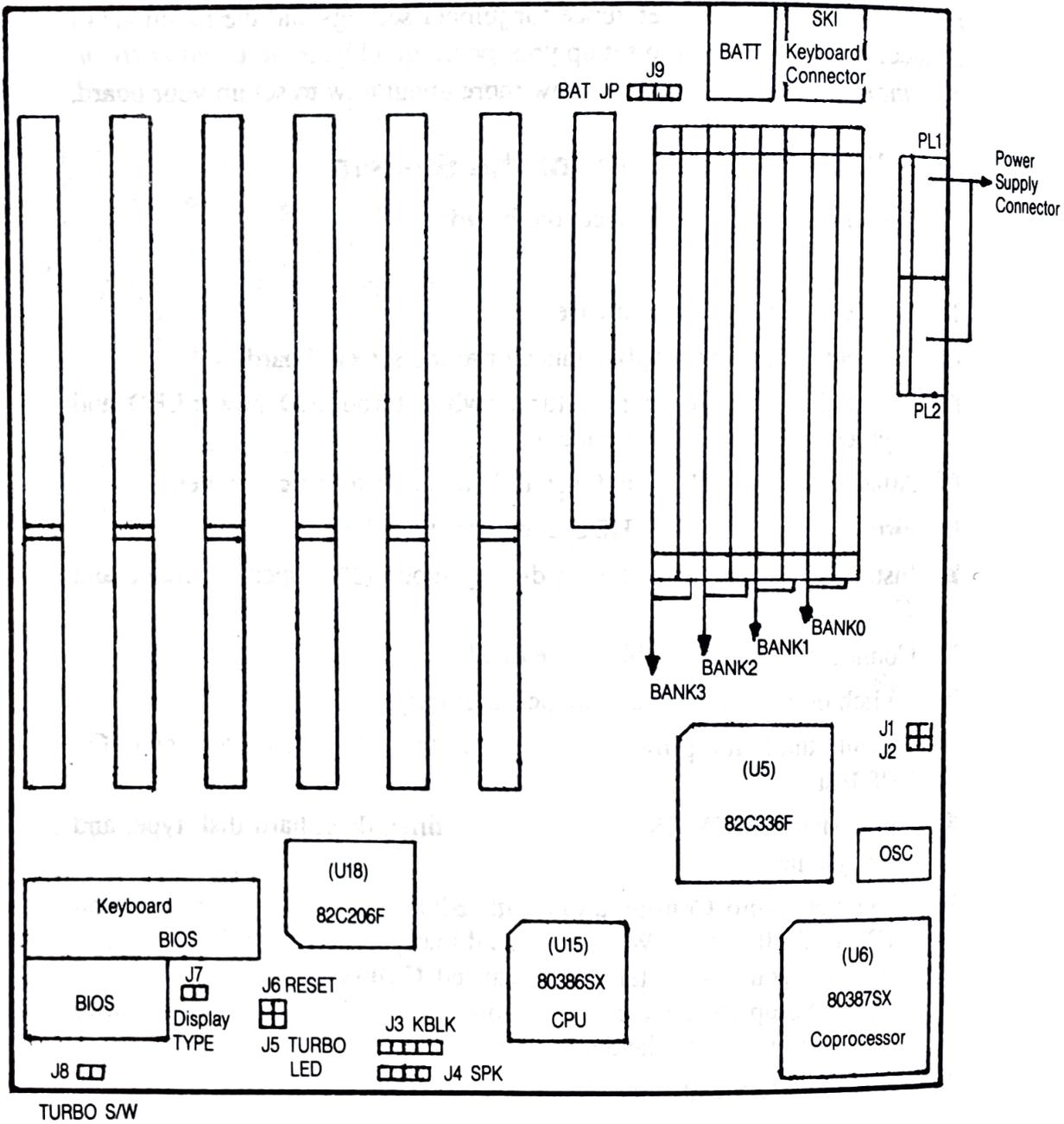
II-3 Functions of Connectors

Connector	Function & Description
J4	Speaker connector
J3	Keylock and power LED connector
J6	Hardware Reset connector
J5	Turbo LED connector
J8	Turbo switch
J9	External battery connector
SK1	Keyboard connector
PL1, PL2	Power supply connector

II-4 Quick Reference for Jumper Settings

Jumper	Function & Description
J7	Display mode setting * Close — Color Open — Mono

Note: * *means the factory default settings.*

Turbo Switch (J8)	Mode
Open	Software control through keyboard <Ctrl> + < Alt> + <+>: High Speed <Ctrl> + <Alt> + <->: Low Speed After power on,high speed is applied.
Close	Always low speed is applied.

You should enter the BIOS setup program to configure your system if you install or remove any component or peripherals. Press the <Del> key after Power On Self Test to enter the BIOS setup program.

J1, J2—DRAM Parity Selectors

Parity Check Function	J1	J2
Enable	Open	Open
Disable	Close	Close

Chapter III

Installation Guide

This chapter explains how to configure your particular system for the 386SX mainboard. Incorrect setup or use of the system may result in damage to the computer system or peripherals. Carefully read through this manual before you install the mainboard and peripherals into your system. The step-by-step instructions below will guide you through the installation process.

III-1 Check List

Upon receipt of your mainboard kit, inspect the package for evidence of damage during transportation. Open the package and inspect the board for visible damage such as scratches, loose components or broken components.

Besides this manual, you should have received the 386SX mainboard. If any of these items are missing or damaged, please contact your supplier. Make sure you keep all the packaging materials that accompany your 386SX mainboard kit, in case you need to return the product for any reason.

III-2 Peripherals Required for Installing a System

- 386SX system board with DRAMs and BIOS.
- AT compatible chasis.
- AT or XT compatible power supply with power good signal.
- AT compatible keyboard.
- Display card.
- Monitor.
- FDD (and HDD) controller.
- Floppy (and hard) disk drive.
- Any other XT/AT compatible equipment.

III-3 Installation Procedure for the System

- Open the package and inspect the board.
- Fix the mainboard to your case.
- Connect the power supply connector to the system board.
- Plug in the keyboard, speaker, turbo switch, turbo LED, power LED, and keylock switch to their connectors.
- Attach FDD and HDD, and install their cables to the controller.
- Firmly plug in the FDD/HDD controller to a slot.
- Install the display card. Select display mode (mono/color).
- Connect the monitor cable to the display card.
- Switch on the monitor and the power supply.
- Execute the Setup program by pressing the <Del> key after Power On Self Test.
- Enter Standard CMOS Setup to set up time, date, hard disk type, and display type.
- Load BIOS Default Values. We recommend that you use the default settings. However, you may enter the Advanced CMOS Setup and Advanced Chipset Setup to make modifications. If you have any trouble after modifications, reload the default settings again.
- Write to CMOS and exit.

The following sections detail the functions of connectors and jumpers. Read through this part carefully and set up your system board before you assemble your system.

III-4 Guide for Attaching Connectors

Keyboard Connector

This connector may be located at the back of your system unit. Any AT-compatible keyboard with a 5-pin DIN connector may be used.

Power Supply Connector (PL1, PL2)

There is a 12-pin male connector linking the mainboard to the power supply. When you attach the power cables, be sure the four black wires from the power supply are located at the middle of the power supply connector.

Speaker Connector (J4)

This connector is usually connected to the speaker in the chassis by wires.

Keylock and Power LED Connector (J3)

This connector has two functions:

-   The Power On LED indicator (pins 1 and 3)
-   The keyboard inhibited (pins 4 and 5) which is usually connected to the keyswitch on your control panel by wires. Refer to the table below for the keyboard inhibit function.

Keylock Setting	Function
Pins 4 and 5 Close	Keyboard inhibited
Pins 4 and 5 Open	Keyboard functioning

Hardware RESET Connector (J6)

This connector is usually connected to a button switch on the front panel by wires, the user just pushes the button to reset. There are two ways to reset the system: the hardware reset (by pressing the reset button, thereby closing jumper J6), and the software reset (by pressing <Ctrl>, <Alt>, and <Del> simultaneously on the keyboard).

Turbo LED (J5)

This connector is connected to a Turbo LED on the front panel by wires so that this LED will illuminate in turbo mode. Turbo Mode means faster system speed and Normal Mode is the slower system speed.

Turbo Switch (J8)

Jumper J8 is a hardware toggle-switch used for switching the Turbo and normal mode. It may be set Close with a jumper cap or left open or be connected to a push-button type toggle switch on the front panel by wires. For more about the turbo switch, refer to *III-6 Setting Up System Speed.*

External Battery Connector (J9)

Occasionally, users wish to add an additional replaceable external battery to back up the CMOS RAM. This connector is for the external battery.

III-5 Guide for Jumper Settings

Jumper

A jumper is a kind of switch which uses a plastic cap with a metal interior to connect (close) two pins. If a jumper needs to be left open, you should save the cap for future use by covering only one pin of the jumper. This has no effect on the function of the board while it keeps the cap handy. The illustration below shows the side view of a three pin jumper in which pins 1 and 2 are Close.

Figure 2.   Side View of a Jumper

Jumper Cap —

—Jumper

Pin 1

10
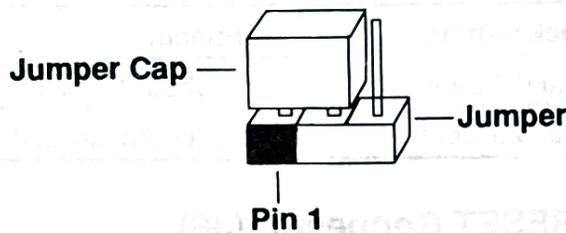
Display Mode Setting (J7)

Jumper (J7) is used to determine the type of display adapter attached. The table below gives the settings for J7 .

Jumper	Setting	Mode	Adapter Attached
J7	Open	Mono	Monochrome, Hercules
J7	*Close	Color	CGA, EGA, VGA, EVGA

Note: * *means the factory default setting.*

III-6 Setting Up System Speed

Jumper J8 is a hardware toggle-switch used for switching the Turbo and Normal mode. See the table below.

Turbo Switch (J8)	Mode
Open	Software control through keyboard <Ctrl> + < Alt> + <+>: High Speed <Ctrl> + <Alt> + <->: Low Speed After power on,high speed is applied.
Close	Always low speed is applied.

For compatibility with older software, you will probably wish to have an alternate slower speed. You options are.

Mode	System Speed	System Speed	System Speed
Turbo	25MHz	20MHz	16MHz
Normal	7.16MHz or 12.5MHz	7.16MHz or 10MHz(CLKIN/4)	7.16MHz or 8MHz (CLKIN/4)

Note: *You may set up the Normal speed (Low operating speed) in the BIOS Setup as either 7.16MHz or CLKIN/4.*

III-7 Installing the Coprocessor

The   386SX   was designed to support a coprocessor, which is an extension to the CPU architecture. Adding a coprocessor dramatically increases the processing speed of a computer for applications which intensely utilize mathematical operations.

The coprocessor should be inserted into socket U6 . It is advised to carefully note the correct alignment when inserting coprocessors. The flat corner of the socket and the coprocessor must be aligned. Wrong installation will damage your system or the coprocessor itself. See the figure below:

Figure 3.   Installing a Coprocessor

Coprocessor

Coprocessor
Socket

Notch
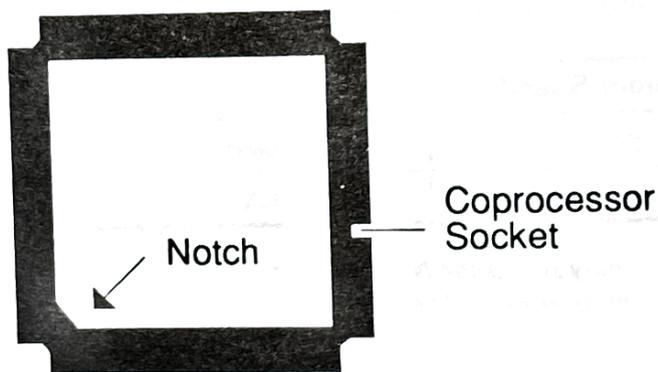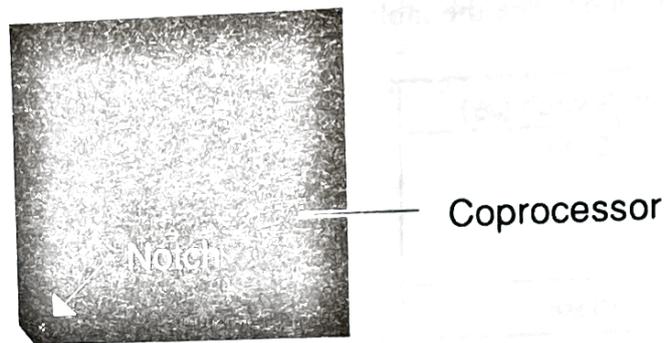
Chapter IV

Setting Up System Memory

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corner
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IV-1 Possible On-board Memory Configurations

The **386SX** was designed to have four SIMM Banks on-board, support-
ing 256K and 1M SIMMs. Each SIMM Bank needs two packs of SIMM
module. You should install at least 2 packs of SIMM modules to fill one
bank at a time. Memory modules should be installed in ascending order
from bank 0 to bank 3. The 256K SIMM should be installed first and then
1M SIMM to allow for mixed configurations. Up to 8M bytes of memory
may be installed on-board. Refer to *Figure 1* for the location of RAM banks.
The table below shows the possible on-board memory configurations.

Table 1.   Possible On-board Memory Configurations

Bank 0 (Type)	Bank 1 (Type)	Bank 2 (Type)	Bank 3 (Type)	Total On-board Memory
256K	x	x	x	512K
256K	256K	x	x	1M
256K	256K	256K	x	1.5M
256K	256K	256K	256K	2M
1M	x	x	x	2M
1M	1M	x	x	4M
1M	1M	1M	x	6M
1M	1M	1M	1M	8M
256K	256K	1M	x	3M
256K	256K	1M	1M	5M

Note: *We recommend that you use 80ns DRAM.*

IV-2 Auto Memory Partition and Memory Mode Setting

The **386SX** was designed to have full auto-setting for memory partition
and memory mode. When the system is turned on, the BIOS will automat-
ically sense the RAM installed on the mainboard. This eliminates the need
for the user to manually set any mainboard jumpers or switches.

IV-3 Installing SIMM Modules

Follow the steps below to install the SIMM module:

■ Switch off the power.

■ At a 70° to 80° angle, insert the SIMM module's edge connector ("golden fingers") into the SIMM socket. The component side (side with the memory chips) should face the stud and lip of the retainer. Because one end of the SIMM board is notched, the module can only be inserted in this way.

■ Gently but firmly push the SIMM module against the retainer until the retainer studs on both ends slip into the module board holes. At the same time the locking tabs should slip around the side of the module letting the module snap into an upright position.

■ Enter the BIOS Setup program by pressing the <Del> key after Power On Self Test and update the memory size in the Standard CMOS Setup screen.

Figure 4.   Installing a SIMM Module

Notch

RAM Module

RAM Module Socket
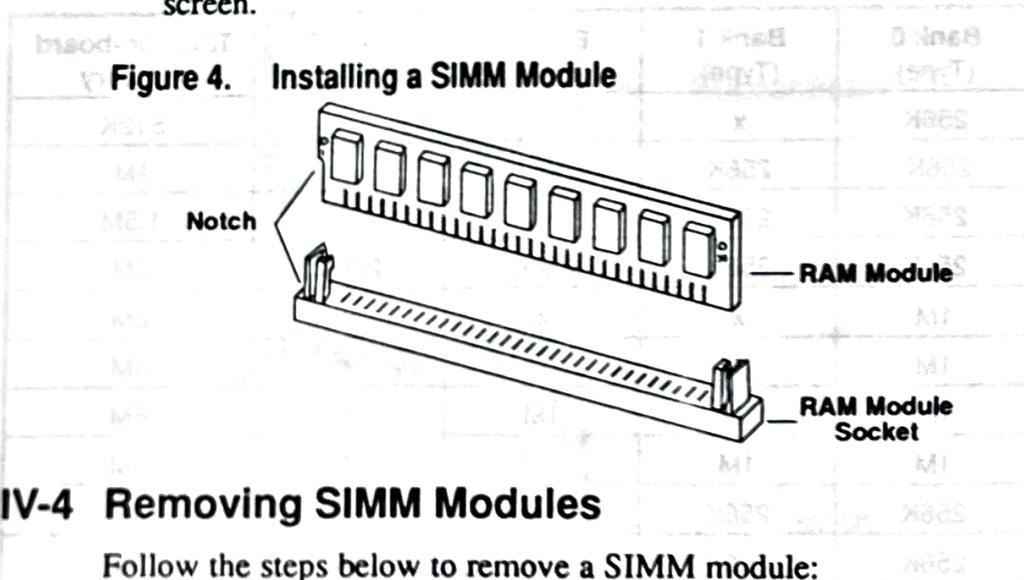
IV-4 Removing SIMM Modules

Follow the steps below to remove a SIMM module:

■ Switch off the power.

■ Use both thumbs to carefully spread the locking tabs that hold the module in the upright position. The locking tabs must be pulled far enough away from the module so that the module can slip around the edge of the tabs.

■ Pull the module away from the tabs. After the retainer studs slip out of the holes, the module will be at a 70° to 80° angle and can easily be lifted out of the socket.

■ Enter the BIOS Setup program by pressing the <Del> key after Power On Self Test and update the memory size in the Standard CMOS Setup screen.

Chapter V
CMOS RAM Setup

The system board contains user modifiable system configuration information in a CMOS RAM. This power conserving RAM is battery backed up so that it retains the configuration setup information even when the computer's power is switched off. Thus, when power is switched on, configuration information is immediately available to the BIOS and the operating system. The Setup program allows the user to change the configuration information stored in the CMOS RAM to match the configuration of the system.

If the CMOS is operating correctly, the system is configured with the values stored in the CMOS. If the CMOS is corrupted or is faulty, the system is configured with the Power On Default Values stored in the ROM file.

There are two sets of values stored in the ROM file — the BIOS Setup Default Values and the Power-On Default Values. The BIOS Setup Default Values are settings which allow the system to reach its optimum performance level. With these settings users may push their system to work at its peak level.

If a board is unable to operate at its optimum level, then another set of default values are provided called the Power-On Default Values. These values are the safest settings for the system. These settings disable many of the power enhancing options of this system. With these settings the board is not being pushed to perform at its peak level, therefore the board is in a more "stable" environment. These settings are very useful to use if the system is performing erratically because of hardware problems.

V-1   Entering Setup by Pressing the <Del> Key

You may press the <Del> key to enter the BIOS Setup Utilities after Power
On Self Test.

If any errors found by the BIOS are Non Fatal Errors, then it may display:

```
Press <F1> to RESUME
```

Pressing the <F1> key will let the BIOS proceed by booting from a bootable
device.

If any errors found by the BIOS are Fatal Errors, then it will display:

```
RUN Setup UTILITY
Press <F1> to RESUME
```

Pressing the <F1> key will let the BIOS enter the Setup Utilities in this case.

V-2 Hot Keys Used in CMOS Setup

The following keys are used for CMOS Setup Utilities:

<Del>	Enter the Setup program.
<Esc>	Exit to the previous menu.
<↑>, <↓>, <←> and <→>	Move cursor to the desired option.
<Enter>	Confirm the selection.
<PgUp> and <PgDn>	Modify the default values. Scroll allowable settings. (<Ctrl> <Page Up> and <Ctrl> <Page Down> function the same if there are less than 10 available options).
<F1>	Display help screen for selected feature.
<F2> and <F3>	Change background and foreground color.
<F5>	Retrieve old values which were resident when current setup session was started.
<F6>	Load BIOS Setup Defaults.
<F7>	Load Power-On Defaults.
<F10>	Save all changes and exit.

V-3 Setup Procedures

The general setup procedures are listed below:

■ Entering into the Setup routine by pressing the <Del> key during power on.

■ Modify the target options.

■ Save the changes and exit from Setup.

■ Reboot the system.

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V-4 AMI BIOS Setup Utilities

If the <Del> or <F1> key is pressed after POST, you will see a screen which shows the AMI BIOS Setup Utilities:

Figure 5. AMI BIOS Setup Utilities

```
┌─────────────────────────────────────────────────────────────────┐
│                                                                   │
│        BIOS SETUP PROGRAM - AMI BIOS SETUP UTILITIES              │
│                                                                   │
│     (c)1990 American Megatrends Inc., All rights Reserved.        │
│                                                                   │
├─────────────────────────────────────────────────────────────────┤
│                                                                   │
│                   ┌───────────────────────┐                       │
│                   │  STANDARD CMOS SETUP   │                       │
│                   └───────────────────────┘                       │
│                      ADVANCED CMOS SETUP                           │
│               AUTO CONFIGURATION WITH BIOS DEFAULTS               │
│             AUTO CONFIGURATION WITH POWER-ON DEFAULTS             │
│                        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 & Exit             │
└─────────────────────────────────────────────────────────────────┘
```

The different options in the BIOS Setup program are shown in the figure above. Select "STANDARD CMOS SETUP" if you want to change the setting for time, date, hard disk type, display, etc.

V-5 Warning Messages

The user is given a warning message before he is allowed to change any of the Setup parameters of the first two options (Standard CMOS Setup and Advanced CMOS Setup).

V-6 Auto Configuration with BIOS Defaults

The BIOS Setup default values are the system default values which are supposed to provide the optimum performance for the system. If you wish to load the BIOS defaults before you change any values, do the following:

■ Enter the BIOS Setup Utilities by pressing the <Del> key immediately after you turn on your system or reset.

■ The main menu will show the options. Press the <↑> and <↓> key to move the highlight bar to the "AUTO CONFIGURATION WITH BIOS DEFAULTS" option and press < Enter>. You will see a screen as shown below.

Figure 6.   Auto Configuration with BIOS Defaults

```
┌─────────────────────────────────────────────────────────────────┐
│                                                                   │
│      (C)1990 American Megatrends Inc., All Rights Reserved        │
│                                                                   │
│        BIOS  SETUP PROGRAM - AMI BIOS SETUP UTILITIES             │
│                                                                   │
├─────────────────────────────────────────────────────────────────┤
│                                                                   │
│                                                                   │
│                    STANDARD CMOS SETUP                            │
│                    ADVANCED CMOS SETUP                            │
│              AUTO CONFIGURATION WITH BIOS DEFAULTS                │
│   ╔═══════════════════════════════════════════════════════════╗  │
│   ║ Load BIOS Setup Default Values from ROM Table (Y/N) ? N    ║  │
│   ╚═══════════════════════════════════════════════════════════╝  │
│                                                                   │
├─────────────────────────────────────────────────────────────────┤
│                                                                   │
│  Configure System with BIOS Setup Default Values for Chipset and Advanced CMOS │
│                                                                   │
│            ┘↘↑↖   : Select F2/F3: Color F10: Save & Exit          │
└─────────────────────────────────────────────────────────────────┘
```
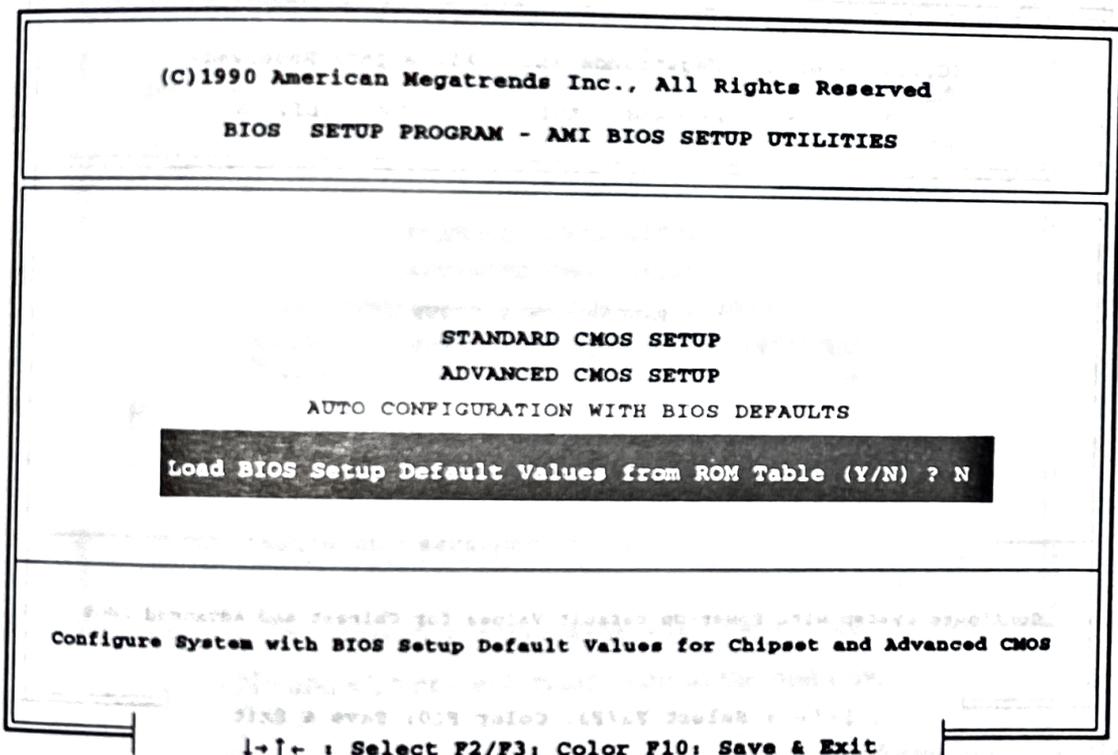
If you wish to use the BIOS defaults, change the prompt to <Y> and press <Enter>. The following message will appear on the screen:

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

V-7 Auto Configuration with Power-On Defaults

You may wish to use the Auto Configuration with Power-On Defaults as a diagnostic aid if your system is behaving erratically. If you wish to load the Power-On Defaults, do the following:

■ Enter the BIOS Setup Utilities by pressing the <Del> key immediately after you turn on your system or reset.

■ The main menu will show the options. Press the <↑> and <↓> key to move the highlight bar to the "AUTO CONFIGURATION WITH POWER-ON DEFAULTS" option and press < Enter>. You will see a screen as shown below:

Figure 7. Auto Configuration with Power-On Defaults

```
         (C)1990 American Megatrends Inc., All Rights Reserved

            BIOS  SETUP PROGRAM - AMI BIOS SETUP UTILITIES




                      STANDARD CMOS SETUP

                      ADVANCED CMOS SETUP

                 AUTO CONFIGURATION WITH BIOS DEFAULTS

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




    Configure System with Power-On Default Values for Chipset and Advanced CMOS


               ↓→↑← : Select F2/F3: Color F10: Save & Exit
```

If you wish to use the Power-On Defaults, change the prompt to <Y> and press <Enter>.

The following message will appear on the screen:

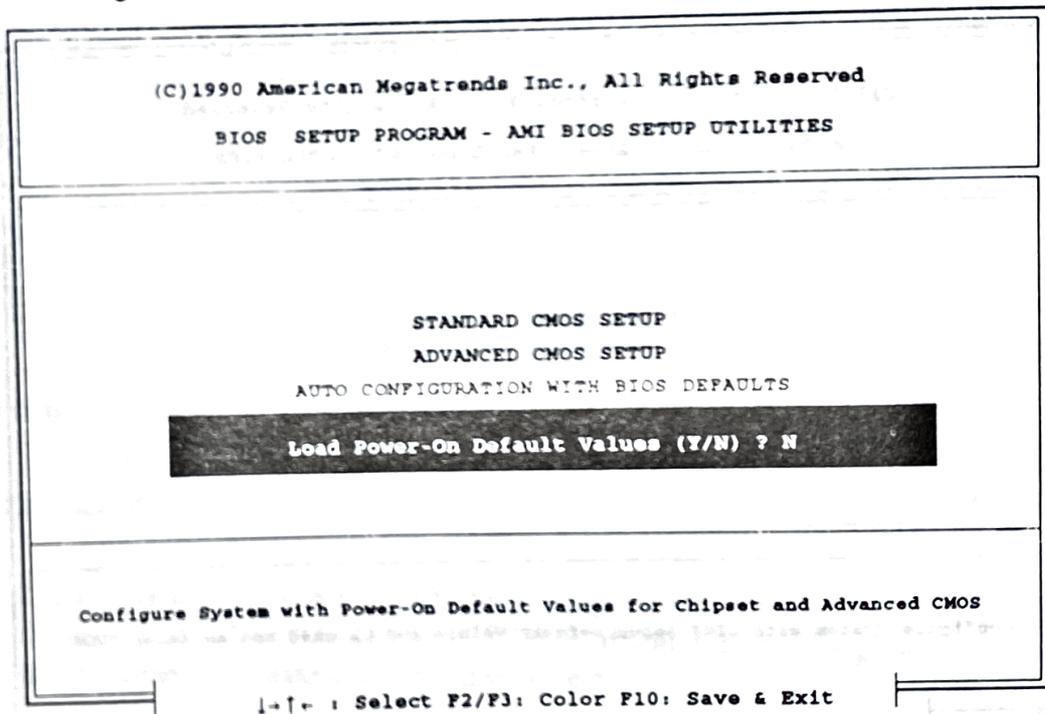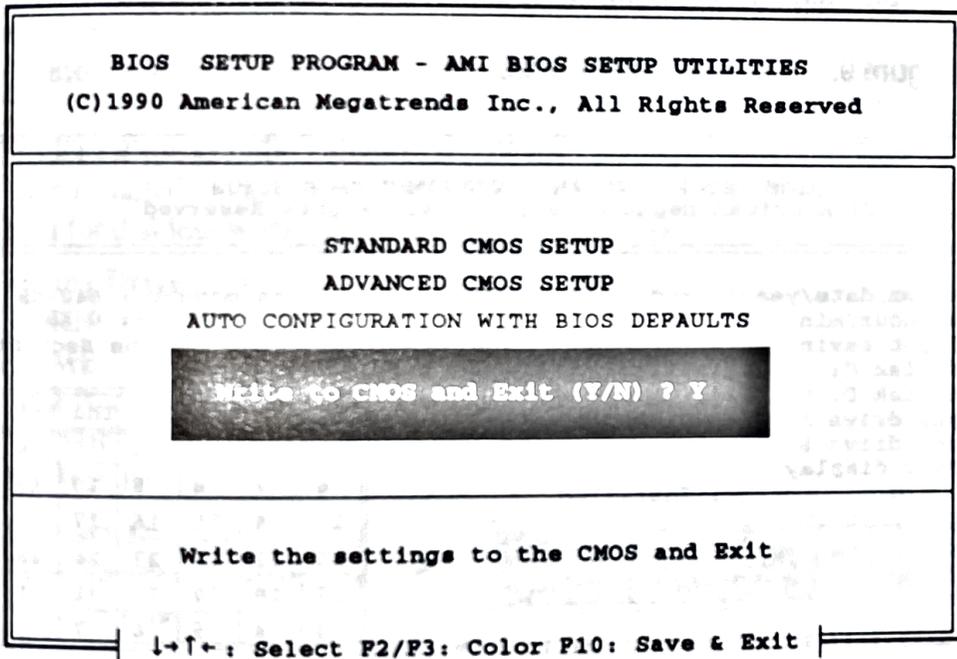"Default values loaded. Press any key to continue."

V-8 Write to CMOS and Exit

After you have changed any values in Setup, you must enter the "WRITE TO CMOS AND EXIT" option to save the new settings. Until users save the changes to the CMOS, the BIOS will continue to use the old settings (even though the new settings appear in the Setup screen window displays).

You should do the following to save the new settings to the CMOS:

■ Return to the main menu by pressing <Esc>.

■ Press the <↑> and <↓> key to move the highlight bar to the "WRITE TO CMOS AND EXIT" option and press < Enter>.

■ You will see a screen as shown below:

Figure 8.   Write to CMOS and Exit

```
┌─────────────────────────────────────────────────────────┐
│                                                         │
│      BIOS   SETUP PROGRAM - AMI BIOS SETUP UTILITIES    │
│     (C)1990 American Megatrends Inc., All Rights Reserved │
│                                                         │
├─────────────────────────────────────────────────────────┤
│                                                         │
│                                                         │
│                  STANDARD CMOS SETUP                    │
│                  ADVANCED CMOS SETUP                    │
│          AUTO CONFIGURATION WITH BIOS DEFAULTS          │
│                                                         │
│         Write to CMOS and Exit (Y/N) ? Y                │
│                                                         │
│                                                         │
├─────────────────────────────────────────────────────────┤
│                                                         │
│          Write the settings to the CMOS and Exit        │
│                                                         │
└──────────┤ ↓→↑← : Select F2/F3: Color F10: Save & Exit ├──────────┘
```

Pressing <N> and <Enter> will return you to the main menu.

Pressing <Y> and <Enter> will save the new settings and continue with the booting process.

V-9 Do Not Write to CMOS and Exit

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

V-10 Standard CMOS Setup

If you want to change time, date, hard disk type or display, run Standard CMOS Setup. Follow the steps below to run the Standard CMOS Setup.

■ Press the <Del> key immediately after you turn on your computer (or reset) to enter the BIOS Setup Utilities.

■ The main menu will show the options. The "STANDARD CMOS SETUP" option is highlighted. Press < Enter> and you will see a warning screen. Pressing any key except <Esc> will allow you to enter the Standard CMOS Setup as shown below:

Figure 9. Standard CMOS Setup

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


Date (mm/date/year): Wed,  Jul  10,1991    Base memory : 640 KB
Time (hour/min/sec): 04 : 11 : 26          Ext. memory : 0 KB
Daylight saving    : Disabled      Cyln Head WPcom LZone Sect Size
Hard disk C: type  : 17            977  5    300   977   17   41MB
Hard disk D: type  : Not Installed
Floppy drive A:    : 1.2MB,51/4"     ┌───┬───┬───┬───┬───┬───┬───┐
Floppy drive B:    : Not Installed   │Sun│Mon│Tue│Wed│Thu│Fri│Sat│
Primary display    : VGA/PGA/EGA     ├───┼───┼───┼───┼───┼───┼───┤
Keyboard           : Installed       │30 │31 │ 1 │ 2 │ 3 │ 4 │ 5 │
                                     ├───┼───┼───┼───┼───┼───┼───┤
 ┌─────────────────────────────┐     │ 6 │ 7 │ 8 │ 9 │10 │11 │12 │
 │Month :Jan, Feb,.......Dec    │     ├───┼───┼───┼───┼───┼───┼───┤
 │Date  : 01, 02, 03,.....31    │     │13 │14 │15 │16 │17 │18 │19 │
 │Year  : 1991, 1992,...2099    │     ├───┼───┼───┼───┼───┼───┼───┤
 └─────────────────────────────┘     │20 │21 │22 │23 │24 │25 │26 │
                                     ├───┼───┼───┼───┼───┼───┼───┤
                                     │27 │28 │29 │30 │31 │ 1 │ 2 │
                                     ├───┼───┼───┼───┼───┼───┼───┤
 ESC:Exit ↓→↑←:Select F2/F3:Color PU/PD:Modify │ 3 │ 4 │ 5 │ 6 │ 7 │ 8 │ 9 │
                                     └───┴───┴───┴───┴───┴───┴───┘
```

After you have entered the Standard CMOS Setup, you can modify each of the entries.

The AMI Setup program provides an easy to operate screen menu guiding the user without any special operating knowledge. For example, to modify the "Hard disk C" entry you may press the <↑> and <↓> keys to move the highlight bar cursor to the "Hard disk C" entry. Pressing the <PageUp> and <Page Down> keys will let you select from the hard disk type options.

You can setup the following in the Standard CMOS Setup menu:

■ **Date:** Month, Date and Year.

■ **Time:** Hour, Minute and Second. Use 24 hour clock format.

■ **Daylight Saving:** Disabled or Enabled

■ **Hard Disk C and D:**

Forty-six drive types have been defined by AMI BIOS. If for some reason your particular drive is not one of the 46 pre-defined types, simply scroll down (using the <Page Up> or <Page Down> key) to type 47 and enter the following drive specifications:
Cylinders, Heads, WPcom, LZone, Sectors
Type 47 may be used for both hard disk C and D. Please consult your vendor for the specific values that will give you optimum performance. "Not Installed" is available for use as an option. This option could be used for diskless workstations and SCSI hard disks.

■ **Floppy Drive A and B:**
360KB   5 1/4"
1.2 MB   5 1/4"
720KB   3 1/2"
1.44MB   3 1/2"
Not Installed

■ **Primary Display:**
The primary display options are:
Monochrome
Color 40 x 25
Color 80 x 25
EGA/PGA/ VGA
Not installed

■ **Keyboard:** Installed or Not Installed

After you have modified the configurations in the Standard CMOS Setup, press <Esc> to exit to the AMI BIOS Setup Utilities — the main menu which provides the "WRITE TO CMOS AND EXIT" option. Select this option and save all the changes to the CMOS.

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V-11 Advanced CMOS Setup

The Advanced CMOS Setup is an advanced setup software design which gives flexibility and allows your system to run in different ways. Less experienced users may 1) seek the advice of a technician or dealer before modifying the values of the Advanced CMOS Setup or 2) load the BIOS default settings first and make modification from that point. The figure below shows the BIOS default settings:

Figure 10. Advanced CMOS Setup

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

Typematic Rate Programming : Disabled  Video   ROM Shadow C000, 16K: Disabled
Typematic Rate Delay (msec): 500       Video   ROM Shadow C400, 16K: Disabled
Typematic Rate (Chars/Sec) : 15        Adapter ROM Shadow C800, 16K: Disabled
Above 1MB Memory Test      : Disabled  Adapter ROM Shadow CC00, 16K: Disabled
Memory Test Tick Sound     : Enabled
Memory Parity Error Check  : Enabled
Hit <DEL> Massage Display  : Enabled
Hard Disk Type 47 Data Area: 0:300
Wait for <F1> If Any Error : Enabled
System Boot Up Num Lock    : On
Numeric Processor Test     : Disabled
Floppy Drive Seek At Boot  : Disabled
System Boot Up Sequence    : C:, A:
System Boot Up CPU Speed   : Low
Main Shadow Option         : Disabled
SCLK                       : 7.16 Mhz
Low Operating Speed        : 7.16 Mhz

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

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

The figure on this page shows the BIOS Default settings. You may start from that point and make experimental modifications. You may press the <F5> key to return to the old settings or press the <F6> key to load the BIOS default settings when modifying your settings. If you have trouble running your system after modification, load the BIOS default settings.

Users must enter the "WRITE TO CMOS AND EXIT" to save the new settings or the BIOS will continue to use the old values.

You can setup the following in the Advanced CMOS Setup menu:

■ **Typematic Rate Programming:** Enabled or Disabled.
By enabling this option, the user can adjust the rate at which a keystroke is repeated. The options "Typematic Rate Delay" and "Typematic Rate" affect this rate. When a key is pressed and held down, the character appears on the screen and after a delay set by the "Typematic Rate Delay," it keeps on repeating at a rate set by the "Typematic Rate" value. The suggested setting for the "Typematic Rate" and "Typematic Rate Delay" are 500 and 15 as shown on the previous page.

■ **Typematic Rate Delay (msec):** See above.

■ **Typematic Rate (Chars/Sec):** See above.

■ **Above 1MB Memory Test:** Enabled or Disabled
If this feature is disabled, the BIOS will only check the first 1MB of RAM during Power On Self Test.

■ **Memory Test Tick Sound:** Enabled or Disabled
This option will enable or disable the "ticking" sound during the memory test.

■ **Memory Parity Error Check:** Enabled or Disabled
Since your system board supports this function, the user may enable the memory parity error checking routines in the BIOS.

■ **Hit <Del> Message Display:** Enabled or Disabled
Disabling this option will prevent the message "Hit <Del> if you want to run Setup" from appearing on the screen when the system boots-up.

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

■ **Wait for <F1> If Any Error:** Enabled or Disabled
If this option is disabled, any non-fatal error which occurs will not generate the "Press <F1> to continue" statement. The BIOS will still display the appropriate error message. This eliminates the need for any user response to a non-fatal error condition message.

■ **System Boot Up Num Lock:** On or Off
The user may turn "OFF" the Num Lock option on the user's enhanced keyboard when the system is powered on. This will allow the user to use the arrow keys on the numeric keypad. The default setting is "ON".

- **Numeric Coprocessor Test:** Enabled or Disabled
  This option allows the user to mark the 387 numeric coprocessor as enabled or disabled.

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

- **System Boot Up Sequence:** A:, C: or C:, A:
  You may set the boot up sequence as A:, C: (normal) or as C: , A:.

- **System Boot Up CPU Speed:** High or Low
  This determines the CPU speed when the system boot up.

- **Main Shadow Option:** Disabled or Enabled
  ROM shadow is a procedure in which BIOS code is copied from slower ROM to faster RAM. The BIOS is then excuted from the RAM. The option will allow you to shadow your system BIOS.

- **SCLK:** 7.16MHz or CLKIN/4
  This controls the speed of the SCLK.

- **Low Operating Speed:** 7.16Mhz or CLKIN/4
  Your 16/20 MHz system generates 16/20MHz signals, used for Turbo speed. For compatibiliy with older software, you will probably wish to have an alternate slower speed. The options for the slower operating speed are 7.16MHz and CLKIN/4.

- **Video ROM Shadow, Adapter ROM Shadow:** Enabled or Disabled
  ROM shadow is a procedure in which BIOS code is copied from slower ROM to faster RAM. The BIOS is then executed from the RAM. These option areas are chipset specific and are dependant on the system hardware. We recommend that you use the BIOS Default settings. Each option, when enabled, allows for a segment of 16KB to be shadowed from ROM to RAM.
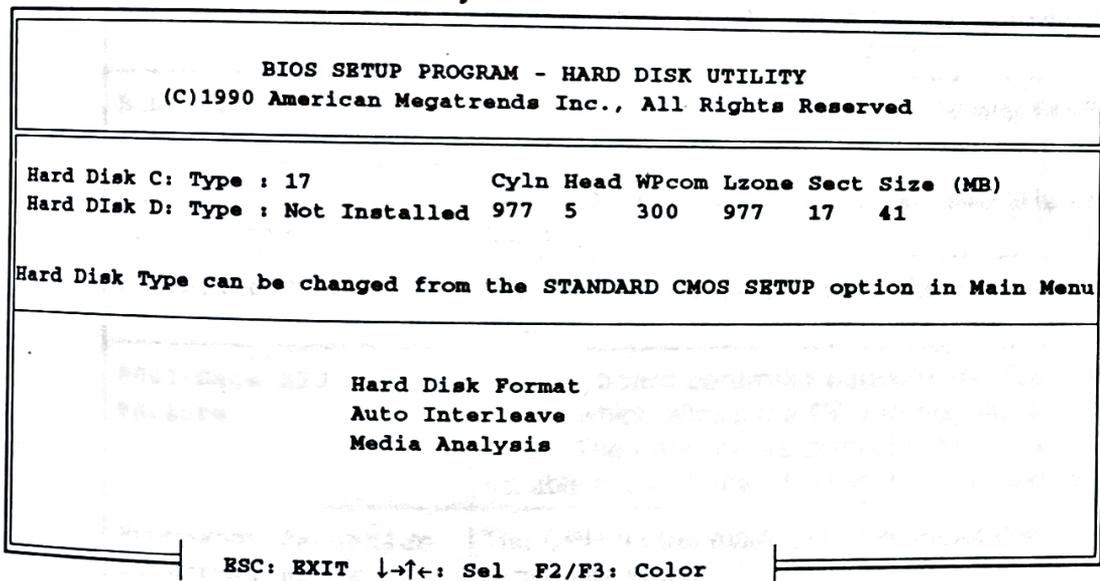
V-12 Hard Disk Utilities

The AMI BIOS also supports Hard Disk Utilities. The various sub-options are:

- **Hard Disk Format:** The Hard Disk Format utility is used for performing a "low level" format of the hard disk. The disk drive information is taken from the Standard CMOS Setup. If the user wants to change the disk drive types, he must go to the Standard CMOS Setup and change it. The user is asked for the disk drive (C/D) if two disks have been installed.

- **Auto Interleave:** This is for automatically detecting the best interleave factor and formatting the hard disk. The user can enter the bad track list.

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

Pressing the <Del> key after power on will allow you to enter the Setup Utilities. Highlight the Hard Disk Utility and press < Enter>. You will see a screen as shown below.

Figure 11.   Hard Disk Utility

```
┌─────────────────────────────────────────────────────────────────────┐
│            BIOS SETUP PROGRAM - HARD DISK UTILITY                     │
│        (C)1990 American Megatrends Inc., All Rights Reserved          │
├─────────────────────────────────────────────────────────────────────┤
│ Hard Disk C: Type : 17            Cyln Head WPcom Lzone Sect Size (MB)│
│ Hard DIsk D: Type : Not Installed 977  5    300   977   17   41       │
│                                                                       │
│ Hard Disk Type can be changed from the STANDARD CMOS SETUP option in Main Menu│
│                                                                       │
│                    Hard Disk Format                                   │
│                    Auto Interleave                                    │
│                    Media Analysis                                     │
│                                                                       │
│      ESC: EXIT  ↓→↑←: Sel  F2/F3: Color                               │
└─────────────────────────────────────────────────────────────────────┘
```

Note: *These routines are not valid for a SCSI Disk Drive.*

Warning

Performing the Hard Disk Format, Auto Interleave, and/or Media Analysis will destroy any data on the hard disk being tested. Backup your files before performing any of these utilities.

Chapter VI

BIOS Error Messages

The **386SX** system BIOS (AMI BIOS) supports a Power On Self Test diagnostic routine. It performs various diagnostic tests when the system is powered on. If the error is FATAL, the system beeps when reporting the FATAL error and then halts. If the error is NON-FATAL, the process continues after reporting the NON-FATAL error.

VI-1 Fatal Error Messages Through Beeps

The fatal error messages are usually communicated through a series of audible beeps. The table below lists the fatal error messages:

Table 2. Fatal Error Messages

Error Massage	Meaning
Refresh Failure	The memory refresh circuitry of the mainboard is faulty.
Parity Error	A parity error was detected in the base memory (the first block of 64KB) of the system.
Base 64KB Memory Failure	A memory failure occurred within the first 64KB of memory.
Timer Not Operational	Timer # 1 on the system board has failed to function properly.
Processor Error	The CPU on the system board has generated an error.
8042-Gate A20 Failure	The keyboard controller contains the Gate A20 switch which allows the CPU to operate in virtual mode. The error message means that the BIOS is not able to switch the CPU into the protected mode.
Processor Exception Interrupt Error	The CPU on the mainboard has generated an exception interrupt.
Display Memory Read/Write Error	The system video adapter is either missing or its memory is faulty. Note that this is a fatal error.

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Error Massage	Meaning
ROM Checksum Error	The ROM checksum value does not match the value encoded in the BIOS.
CMOS Shutdown Register Read/Write Error	The shutdown register for the CMOS memory has failed.

VI-2 Non-Fatal Errors

The following table shows the non-fatal error messages. If you find these messages on your screen, press <F1> key to continue or press the <Esc> key to run the Setup.

Table 3. Non-Fatal Error Messages

Error Message	Meaning
CH-2 Timer Error	Most AT standard system boards include two timers. An error with timer #1 is a fatal error. If an error occurs with timer #2, this error message appears.
INTR #1 Error	The interrupt channel #1 has failed the POST routine.
INTR #2 Error	The interrupt #2 has failed the POST routine.
CMOS Battery State Low	There is a battery in your system which is used for storing the CMOS values. This battery appears to be low in power and needs to be replaced.
CMOS Checksum Failure	After the CMOS values are saved, a checksum value is generated to provide for error checking. If the previous value is different from the value currently read, this error message appears. To correct this error, you should run the BIOS Setup program.
CMOS System Options not Set	The value stored in the CMOS are either corrupted or nonexistent. Run the BIOS Setup program to correct this error.
Display Switch Not Proper	Some systems require that a video switch on the motherboard be set to either color or monochrome, depending upon the type of video you are using. To correct this situation, set the switch properly. (Remember to shut down the system first.)
CMOS Display Type Mismatch	The type of video stored in the CMOS does not match the type detected by the BIOS. Run the BIOS Setup program to correct this error.
Keyboard is Locked ...Unlocked It	The keyboard lock on the system is engaged. The system must be unlocked to continue the boot up procedure.

Error Message	Meaning
Keyboard Error	The BIOS has encountered a timing problem with the keyboard. You may also set the keyboard option in the BIOS Setup standard CMOS Setup to "Not Installed," which will cause the BIOS to skip the keyboard POST routines.
KB/Interface Error	The BIOS has found an error with the keyboard connector on the system board.
CMOS Memory Size Mismatch	If the BIOS finds the amount of memory on your system board to be different from the amount stored in CMOS, this error message is generated. Run the BIOS Setup program to correct this error.
FDD Controller Failure	The BIOS is not able to communicate with the floppy disk drive controller. Check all appropriate connections after the system is powered off.
HDD Controller Failure	The BIOS is not able to communicate with the hard disk drive controller. Check all appropriate connections after the system is powered off.
C: Drive Error	The BIOS is not receiving response from hard disk drive C. It may be necessary to run the Hard Disk Utility to correct this problem. Also check the type of hard disk selected in the Standard CMOS Setup to see if the correct hard disk drive has been selected.
D: Drive Error	The same error has occurred with hard disk D. Follow the procedures above to correct this problem.
C: Drive Failure	The BIOS cannot get **any** response from the hard disk drive C. It may be necessary to replace the hard disk.
D: Drive Failure	The BIOS cannot get **any** response from the hard disk drive D. It may be necessary to replace the hard disk.
CMOS Time & Date Not Set	Run the Standard CMOS Setup to set the date and time of the CMOS.
Cache Memory Bad. Do Not Enable Cache!	The BIOS has found the cache memory of the motherboard to be defective.
8042 Gate-A20 Error	The gate-A20 portion of the keyboard controller has failed to operate correctly. The chip should be replaced.
Address Line Short	An error has occurred in the address decoding circuitry of the mainboard.
DMA #2 Error	An error has occurred with the second DMA channel on the motherboard.
DMA #1 Error	An error has occurred with the first DMA channel on the motherboard.
DMA Error	An error has occurred with the DMA controller on the motherboard.

Error Message	Meaning
No ROM BASIC	The error occurs when a proper bootable sector cannot be found on either the floppy diskette drive A or hard disk C. The BIOS will try at this point to run ROM BASIC, and the error message will be generated when the BIOS does not find it.
Diskette Boot Failure	The diskette used to boot-up in floppy drive A is corrupt, which means you can not use it to boot up the system. Use another boot diskette and follow the instructions on the screen.
Invalid Boot Diskette	The BIOS can read the diskette in floppy drive A, but it cannot boot-up the system with it. Use another boot diskette and follow the instructions on the screen.
On Board Parity Error	The BIOS has encountered a parity error with some memory installed on the system board. The message will appear as follows: ON BOARD PARITY ERROR ADDR (HEX) = (XXXX) Where XXXX is the address (in hexadecimal) at which the error occurred. "On Board" means that it is part of the memory attached directly to the system board, as opposed to memory installed via an expansion card in an I/O (BUS) slot.
Off Board Parity Error	The BIOS has encountered a parity error with some memory installed in an I/O (BUS) slot. The message will appear as follows: OFF BOARD PARITY ERROR ADDR (HEX) = (XXXX) Where XXXX is the address (in hexadecimal) at which the error occurred. "Off Board" means that it is part of the memory installed via an expansion card in an I/O (BUS) slot, as opposed to memory attached directly to the system board.
Parity Error ????	The BIOS has encountered a parity error with some memory in the system, but it is not able to determine the address of the error. Memory diagnostic software, such as AMIDIAG, can be used to find and correct memory problems.

VI-3 Hard Disk Utility Error Messages

The following messages may appear during execution of the "Hard Disk Utility" section of the AMI BIOS Setup program.

The first group of errors listed below may appear during the initialization process.

Table 4.   Hard Disk Utility Error Messages

Message	Meaning
No Hard Disk Installed	The program could not find a hard disk drive installed on the system. The message appears if there is no hard disk on the system and you have chosen to run the Hard Disk Utility.
Fatal Error Bad Hard Disk	The program is not getting a response from the hard disk, or the hard disk is not repairable. Check all cable and power connection to the hard disk.
Hard Disk Controller Failure	The program is getting an error response from the reset command sent to the hard disk controller. Check to see that the controller is seated properly in the BUS slot.
C: (D:) Hard Disk Failure	The hard disk drive C or D is not responding to commands sent to it by the program. Check power and cable connections to the hard disk.

The errors listed below may appear during operations.

Table 5.   Hard Disk Error Messages

Message	Meaning
Undefined Error- Command Aborted	An error condition has occurred which the program cannot identify.
Address Mark Not Found	The address mark (initial address) on the hard disk could not be found by the program.
Requested Sector Not Found	The sector currently requested on the hard disk could not be found.
Reset Failed	The program issued a reset command to the hard disk, but this command did not properly reset the hard disk.

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Message	Meaning
Drive Parameter Activity Failed	The program has sent a reset command to the controller, followed by the drive parameter. Using the parameters sent to it, the controller is not getting a response from the hard disk drive. Check to see if the drive type selected in the Standard CMOS Setup is correct for the disk drive being used.
Bad Sector Flag Detected	The program has tried to perform an operation on a sector which has been flagged, i.e., marked, as "bad".
Bad ECC on Disk Read	When the program attempts to write to the disk, it also calculates an ECC (Error Correction Code) value for the data being written. This ECC value is written to the drive and then read back. If the value read back is different from the one calculated, then this error will occur.
ECC Corrected Data Error	The ECC value (explained above) read from the disk is not the same value which was written to the disk; therefore, the program assumes that the data is not correct. It then attempts to correct the data, but the ECC value is not corrected. In this situation, this message appears.
Controller Has Failed	The program has issued a diagnostic command to the controller, which has failed; therefore, the controller has failed as well.
Seek Operation Failed	The program has issued a seek command to the controller, and this operation has failed. A seek operation is the act of finding a particular sector on the hard disk.
Attachment Failed to Respond	No response has been received from the hard disk. This message appears if an operation has already begun and the hard disk does not respond, when it had responded earlier.
Drive Not Ready	The program is trying to perform an operation on the hard disk drive, and it has waited beyond a preset specified time limit. This situation is known as a "timeout."
Write Fault on Selected Drive	A "write fault" has occurred during the write operation on the hard disk drive.

Q & A for Servicing the 386SX

Q: *Why does my system not work?*

A: It is important to note that problems on a new system should be treated differently than problems on a system that has been working for a period of time and now suddenly has trouble.

In particular, if a previously working system suddenly fails, the first thing to check is the most recent hardware or software upgrade to system. Installing new programs or system equipment can sometimes result in subtle changes to the way a system operates and affect system operation. Always try backing out of the upgrade, that is, reinstalling the new hardware or software to see if the problem goes away. If this is the case, review the installation steps taken and contact the supplier of the new equipment or software for help in installing their products.

A newly setup system may have the following problems, please check and restore:

- Power cord is not plugged. Check if the power-on LED lights up.
- Monitor cable is not attached.
- Keylock is engaged; release it now.
- Connectors are not firmly installed, or installed in the wrong position. Remember do not connect the Turbo-Switch wire to the reset connector!
- Add-on card is not installed firmly.
- You may have wrongly set the jumpers. Refer to Chapter II.
- Besides signal cables, the FDD and HDD should also be attached with power line from the power supply.
- Floppy diskette or hard disk not formatted, or formatted without bootable system.
- Wrong configuration setup for CMOS RAM.
- Peripherals are not compatible.

Q: *My system has no display, or the "Display Type Mismatch" message is on the screen. What Should I do?*

A: First, try to turn the brightness and contrast controls to proper ranges, and make sure the video signal cable is securely connected. If the system still can't display, check the switch settings on the mainboard and video adapter card (Refer to your adapter's manual for setting the Display Mode), and verify the jumper setting on the mainboard. The following table details the settings:

Mode	Adapter You May Install
Mono	Monochrome Card or Hercules Card
Color	CGA, EGA, VGA or EVGA

Q: *How can I know whether the system is running in Turbo or Normal Mode?*

A: The motherboard has an optional Turbo LED indicator. The LED illuminates when running in Turbo Mode (or full system speed).

Q: *Why does an add-on card from my old computer not work properly in this system?*

A: Check the switch and jumper settings on both the add-on card and the mainboard. There may be an address or interrupt conflict. You may have a compatibility problem, as some add-on cards were designed to run at slower processor clock speeds.

Q: *Why doesn't my Keyboard respond?*

A: Check if the Keylock Switch of the front panel is turned to the unlock position. You may have an XT/AT compatible keyboard, set the switch to the AT-position. Some keyboards will enable the NumLock function when the system is booted, press the key to disable NumLock function if necessary. Please verify for the LED on the keyboard, the LED will lights up and turns off during Power On Self Test. If it does not light up, check if the Keyboard Connector is connected firmly, or contact your vendor for replacement.

Q: *Why does my FDD or HDD not work?*

A: You may have attached a new floppy or hard disk drive to your system. Please verify that the CMOS RAM Configuration matched with the types of your FDD/HDD. Please check if you have a scratched diskette, change to a new workable diskette. Check if your HDD is formatted. Reset the system and verify that the LED on the FDD lights up briefly during Power On Self Test, and check the connection cables.

Chapter VIII
Connector Specifications

VIII-1 Pin Assignments for the   386SX   Connectors

Table 6.   Pin Assignments for the   386SX   Connectors

Connector	Function	Pin#	Assignment
J4	Speaker connector	1	Signal
		2	Not used
		3	Not used
		4	+5V (Vcc)
J3	Keyboard Lock and power on LED indicator connector	1	Power On LED
		2	Not used
		3	GND
		4	Keyboard Inhibit
		5	GND
J6	Hardware reset connector	1	Signal
		2	GND
J5	Turbo LED indicator connector	1	Signal
		2	GND
J8	Turbo switch	1	Signal
		2	GND
J9	External battery connector	1	+6V
		2	Key
		3	GND
		4	GND
SK1	Keyboard connector	1	Keyboard clock
		2	Keyboard data
		3	Spare
		4	Ground
		5	+5V DC

Connector	Function	Pin#	Assignment
PL1, PL2	Power supply connector	1	Power good
		2	+5V DC
		3	+12V DC
		4	-12V DC
		5	Ground
		6	Ground
		7	Ground
		8	Ground
		9	-5V DC
		10	+5V DC
		11	+5V DC
		12	+5V DC