SC 386 sx

USER'S MANUAL

SC 386sx

Mainboard

User's Manual

INTRODUCTION

This manual has been designed to be useful for several purposes. If the SC 386sx is already set up in functioning system, it will be helpful to review the manual to become familiar with the features of the board and where things are. This will be helpful in the unlikely event there is a problem with the system.

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

The "chip set" consists of a VLSI device, the C&T 82C836 , that incorporates most of the logic required for a low-cost, highly integrated IBM PC AT-compatible computer.

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

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

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

Contact your dealer for warranty details.

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Chapter 1

Introduction to the SC 386sx

This chapter will cover the general specifications and features of the SC 386sx, as well as their major components, including the CPU, brief specifications of C&T 82C836 Chip, etc.

1.1 General Specifications and Features

The SC 386sx mainboards are based on the powerful 80386sx microprocessor and incorporate advanced computer technology to meet the requirements of the next generation of operating systems and applications. Yet they retain full compatibility with the original IBM XT and AT and use existing PC software and hardware.

- Intel 32-bit 80386sx microprocessor control logic & clocks to support CPU speeds of up to 16 or 20 MHz with zero (or one) wait states.

- Direct support for the Intel 80387sx to boost performance of mathematics-intensive applications.

- Flexible DRAM memory configuration to accommodate 512KB, 1MB, 1.5MB, 2MB, 3MB, 4MB, 5MB, 6MB, 8MB, 9MB, 10MB and 16MB memory size by using a combination of 256KB, 1MB and 4MB SIMMs.

- 32KB or 64KB ROM BIOS support; default 64KB AMI BIOS with built-in SETUP program.

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

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

- Support four EMS page registers (LIM EMS 4.0 & 3.2 compatible).

- "Multi-RAS Active" mode for zero wait state bank switching.

- Advanced page and interleave memory accessing technic, offering maximum memory performance and minimum wait state.

- Fast A20 Gate to boost performance of software utilizing 80386 protected mode, such as OS/2, UNIX,...etc.

- Compact packaging in a single 160-pin plastic flat package.

- Eight expansion slots:
  Six 16-bit slots for AT compatible add-on cards.
  Two 8-bit slots for XT compatible add-on cards.

- 4-layer PCB with surface mounting technology.

1.2 Major Components

The SC 386sx mainboards are composed of many integrated circuits, chips, jumpers and connectors. (Please refer to Figure 3.1)

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

■ CPU (Central Processing Unit)

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

The microprocessor used on the SC 386sx is Intel's 80386sx running at 16 or 20 MHz .

■ 82C836 CHIPSet

The 82C836 Single-Chip 386sx AT, also known as SCATsx, is a VLSI device that incorporate most of the mainboard logic required to build a low cost, highly integrated, IBM PC/AT compatible computer using the 80386sx. The 82C836 acts as the heart of a highly integrated system that significantly reduces motherboard size, component count, and the need for many I/O channel slots.

■ Math Coprocessor Socket

There is a spare socket is provided for installing an optional Intel 80387sx math coprocessor to enhance the capability of the system.

For optimal performance, the rated speed of 80387sx should be the same as the CPU. That is to say, the 80387sx should be rated at 20 MHz.

■ BIOS

The SC 386sx are intentionally designed to use a single EPROM chip for the system instead of the conventional 2-chip design. In addition to reducing space and cost, it allows the user to enable the BIOS shadow feature for access to the fast, DRAM, instead of the slow, EPROM chip.

■ DRAM Memory Block

The eight SIMM memory sockets are designed for flexible and convenient memory expansion.

The eight 30-Pin standard sockets are for 256KB, 1MB and 4MB SIMMs. They support from 512KB up to 16MB of total memory, which is large enough for most application requirements.

■ Jumpers

On the SC 386sx there are several jumper which should be properly set according to the system configuration.

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

■ Connectors

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

■ Slots

Two 8-bit and Six 16-bit I/O slots are provided for inserting add-on cards, including cards for monitors, disk drives, etc.

Chapter 2

Memory Configuration

The SC 386sx DRAM configurations are discussed, followed by DRAM module installation and removal. Users are recommended to read through this chapter before installing or removing memory.

2.1 System Memory of the SC 386sx

System memory usually refers to the memory block composed of Dynamic Random Access Memory (DRAM) chips on the mainboard. This type of memory is used in computer systems for temporary storage of information during system operation. After turning the system power off, the information in DRAM will be lost.

The SC 386sx provides tremendous flexibility to support a lot of different on-board DRAM configurations. The on-board DRAM is installed with SIMM (Single-In-Line Memory Module). There are four banks of DRAM module slots seated on the SC 386sx to support up to 16 MB of on-board memory.

The location and layout of all the SIMM banks is illustrated below and shown in Figure 3.1:

BANK 0   BANK 1   BANK 2   BANK 3

SIMM MEMORY
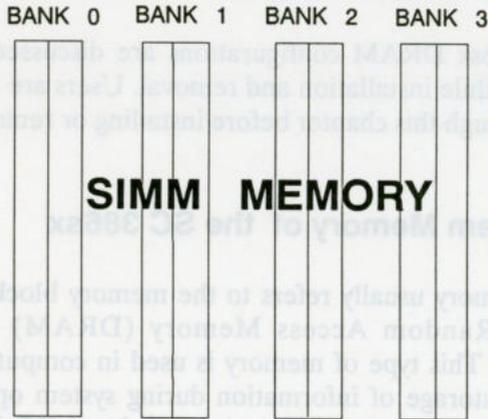
The four banks are composed of two standard 30 pin SIMM sockets. These sockets take 256 KB, 1 MB or 4 MB SIMM.

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

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

Option	Bank 0	Bank 1	Bank 2	Bank 3	Memory Amount
1	256 K	0	0	0	512 K
2	256 K	256 K	0	0	1 M
3	256K	256K	0	0	1 M (384 K Extended)
4	256 K	256 K	256 K	0	1.5 M
5	256 K	256 K	256 K	256 K	2 M
6	256 K	256 K	1 M	0	3 M
7	256 K	256 K	1 M	1 M	5 M
8	1M	0	0	0	2 M
9	1 M	1 M	0	0	4 M
10	1 M	1 M	1 M	0	6 M
11	1 M	1 M	1 M	1 M	8 M
12	256 K	256 K	4 M	0	9 M
13	1 M	4 M	0	0	10 M
14	4 M	4 M	0	0	16 M

Some principles about DRAM installation:

1. The installation of the modules must start from bank 0 and then bank 1 and so on.

2. The jumper needs to be adjusted after DRAM installation or removal. Also you should run the BIOS's built-in SETUP program to update the memory configuration information. Refer to Chapter 5 for detailed instructions.

3. Since the system utilizes the so called "page mode" of DRAM chip, it's recommended to use large size module to get somewhat better overall performance; 1 MB module is preferred to 256 KB modules because of the large page size.

4. Since the system also utilize so called "interleave" memory accessing, it's preferred to use same type of memory modules for each bank pair or all the 4 banks. For example, use 1 MB of RAM module for both bank 0 and 1, instead of using 256 KB modules on bank 0 and 1 MB modules on bank 1. For your reference options that enable interleave mode are listed in the above table.

2.1.1 DRAM Module Insertion

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

1. Place the mainboard on a desktop with the RAM module-socket side close to you and leave enough working area.

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

3. Holding the module at about a 70-degree angle to the socket, insert the module's gold edge connectors into the socket.

4. Insert the RAM module board into the RAM socket and then carefully press it down until its gold fingers meets the socket bottom.

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

2.1.2 DRAM Module Removal

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

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

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

3. Take it out of the socket.

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

After the system memory size is changed, the next time you power on the machine, the BIOS will note the inconsistency between the recorded memory size in the CMOS and the actual memory amount detected during the self-test. It will then prompt you to run the SETUP program to correct the error. Refer to Chapter 5 for details.

Chapter 3

Jumper Settings and Connectors

This chapter will assist you with setting-up the SC 386sx before you install it in a system case. If your SC 386sx has already been installed and you do not wish to change the configuration settings, you can skip over this section.

3.1 Jumper Switches

The SC 386sx has several jumper switches that must be set to define a system configuration. These switches are three-pin components on the mainboard. They are turned off and on by placing or removing a cover cap over the pins. This is called a short or closed jumper. All jumpers must be set to one of the possible two settings.

Note: Pin assignment of all the jumpers are arranged so the way that the upper most pin is pin 1.

Figure 3.1 shows the location of the jumpers and connectors.
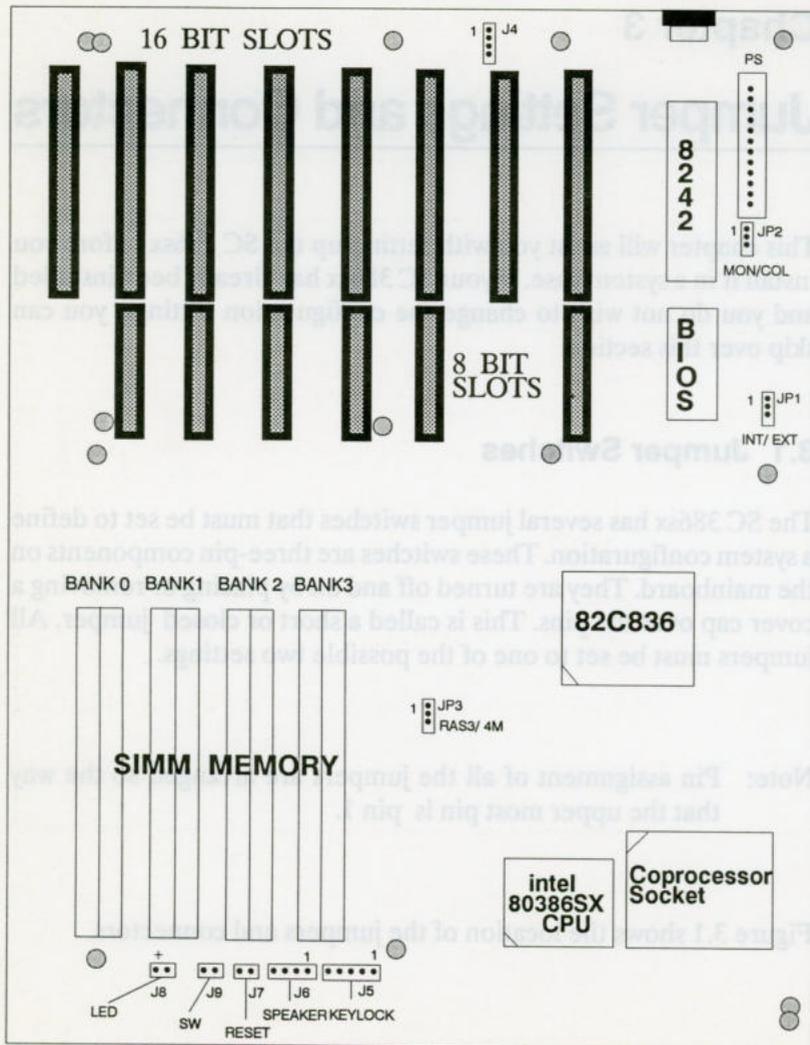
Figure 3.1 Board Layout

The table below summarizes the function and settings of each jumper on the SC 386sx.

Jumper	Function
JP1	**Power Good Setting** Pin 1,2 closed: On-board power good Pin 2,3 closed: Power supply power good
JP2	**Type of display adapter installed in the system** Pin 1,2 closed: Monochrome Pin 2,3 closed: Color
JP3	**DRAM Type Setting** Pin 1,2 closed: Use 256 K/ 1 M DRAM Module Pin 2,3 closed: Only use 4 M DRAM Module

3.2 Connectors

There are several connectors located on the SC386sx. They are used to connect with some peripheral devices to enhance the performance of the system operation.

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

Connector	Function
J4	External Battery Connector
J5	Keylock Connector
J6	Speaker Connector
J7	Hardware Reset Connector
J8	Turbo LED Connector
J9	Turbo Switch Connector
KB	Keyboard connector
PS	Connects the Power Supply

The following lists the pin assignments for each connectors.

■ External Battery Connector (J4)

Pin No.	Assignment	Pin No.	Assignment
1	+3.6Vdc	3	GND
2	Not used	4	GND

■ Keylock and Power LED Connector (J5)

Pin No.	Assignment	Pin No.	Assignment
1	+5Vdc	4	Keylock
2	NC	5	GND
3	GND		

■ Speaker Connector (J6)

Pin No.	Assignment	Pin No.	Assignment
1	Data IN	3	GND
2	Not used	4	+5V

■ Hardware Reset Connector (J7)

Pin No.	Assignment	Pin No.	Assignment
1	RESET	2	GND

■ Turbo LED Connector (J8)

Pin No.	Assignment	Pin No.	Assignment
1	+5V	2	Turbo

■ Turbo Switch Connector (J9)

Pin No.	Assignment	Pin No.	Assignment
1	TURBO	2	GND

■ Keyboard Connector (KB)

Pin No.	Assignment	Pin No.	Assignment
1	Keyboard CLK	4	GND
2	Keyboard DATA	5	Vcc
3	Not used		

■ **Power Connector (PS)**

Pin No.	Assignment	Pin No.	Assignment
1	Power Good	7	GND
2	+5V	8	GND
3	+12V	9	-5V
4	-12V	10	+5V
5	GND	11	+5V
6	GND	12	+5V

Chapter 4

System Installation

If the SC 386sx is not yet installed in a computer system, then the following basic information will be of use. Because of the wide variety of cases, it is not possible to provide exact instructions for every case. This section covers the factors common to installing the board in most situations. A board illustration is shown in Figure 3.1.

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

4.1 Mounting Holes, Fasteners

The SC 386sx has 14 mounting holes drilled in the printed circuit board. These will line up with some or all the mounting points on the case. In some cases the long inside edge of the board fits under metal flanges in the case frame rather than being screwed to the case.

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

4.2 Peripheral Connections

IMPORTANT: Turn off power before changing any connections!

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

Keyboard (KB)

The SC 386sx has a standard 5-pin DIN keyboard jack at the rear of the board, for an AT type keyboard.

Power Supply (PS)

The SC 386sx requires a power supply of at least 180 watts in order to be used in a fully configured system that includes a hard disk drive and more than a minimum of expansion cards installed. Power supplies commonly supplied for AT-type system boards generally have a power good signal.

The power supply connector on the SC 386sx is a standard 12-pin header, PS, located near the right rear of the board. Dual connectors from the power supply plug directly onto this. Each has multiple wires extending from it. The black wires on each connector should be placed so that they are to the inside, near each other.

Battery (J4)

External

4.3 Case Connections

The SC 386sx has connectors for utilities that are commonly mounted on the front panel of most system cases. These include

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

Reset Button (J7)

The SC 386sx has a connector for a reset button (J7). If this has been connected to the front panel of the system case, the button can be used to restart the system without turning the power off. Pushing the button will cause the system to restart from the memory test. It is then necessary to reboot the operating system software before continuing.

The Keyboard Lock (J5)

The SC 386sx has a connector (J5) for a keyboard lock. If this has been connected to the front panel of the case, a key provided with the case can be used to disable the keyboard electrically. This does not actually lock the keyboard. The keyboard cannot be turned back on from this switch without the correct key. This device provides security from casual tampering with the system. It will not stop a determined intruder if the case can be opened and the function disconnected inside.

Speaker (J6)

Connect the speaker to J6, pins 1 and 4. Polarity is not important.

Turbo LED Connector (J8)

If the front panel has an LED to indicate the turbo mode, connect it to J8.

Chapter 5

Built-in BIOS Setup Program

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

Before you start to add optional devices to your system, you should first learn how to setup your system and adjust its jumpers (Refer to Chapter 3 for detailed information). Running the Setup Program of the SC 386sx takes place after all Jumper setting adjustments have been completed. You should at that time record what the configuration is and keep it for reference.

5.1 Setup Summary

1. Install any extra memory SIMMs.

2. Set jumper JP2 for color or monochrome monitor.

3. Make all connections to board:

   - Power supply
   - Speaker
   - Battery
   - Keyboard lock & LED, if used
   - Keyboard
   - Reset switch, if used

4. Install control cards, monitor, and any peripheral devices and drivers.

5. Turn-on system.

6. At setup prompt, press the **Del** key.

7. Type the password if you set the password checking option to "Setup" or "Always" in the Advanced CMOS Setup program.

8. Choose Standard CMOS, Advanced CMOS or Advanced CHIPSet Setup.

9. Follow screen prompts.

5.2 BIOS Setup

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

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

5.2.1 When Should You Run Setup?

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

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

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

5.2.2 How to Recall the Setup Program

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

1. When powering-on the system

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

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

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

2. To reset the system

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

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

3. When the BIOS prompts you

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

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

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

4. To Enter password

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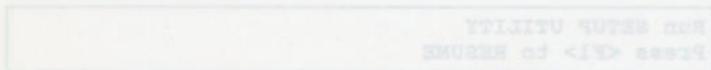
5.2.3 Running the SETUP Program

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

```
┌─────────────────────────────────────────────────────────────────┐
│        BIOS SETUP PROGRAM - AMI BIOS SETUP UTILITIES            │
│   (C) 1990 American Megatrends Inc., All Rights Reserved        │
├─────────────────────────────────────────────────────────────────┤
│                                                                 │
│                    STANDARD CMOS SETUP                          │
│                    ADVANCED CMOS  SETUP                         │
│                    ADVANCED   CHIPSET SETUP                     │
│              AUTO CONFIGURATION WITH BIOS DEFAULTS              │
│                       CHANGE PASSWORD                           │
│                   WRITE TO CMOS AND EXIT                        │
│                 DO NOT WRITE TO CMOS AND EXIT                   │
│                                                                 │
│                                                                 │
│                                                                 │
├─────────────────────────────────────────────────────────────────┤
│StandardCMOSSetupforChangingTime,Date,HardDiskType,etc.          │
│        ESC:EXIT ↓→↑←:Sel F2/F3:Color F10:Save&Exit              │
└─────────────────────────────────────────────────────────────────┘
```
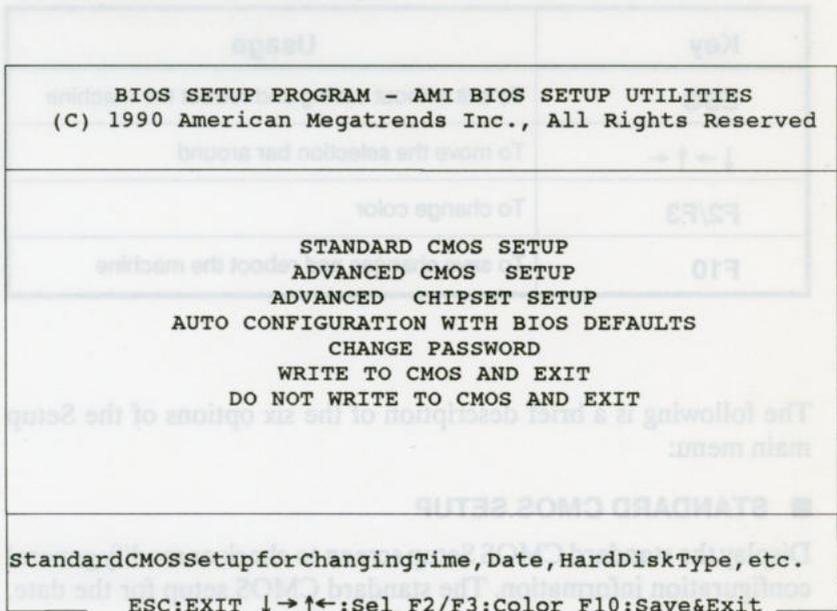
Figure 5.1 BIOS Setup Main Menu Options

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

■ USING THE SETUP MAIN MENU

The following table describes available keys in the SETUP main menu:

Key	Usage
ESC	To exit without saving and reboot the machine
↓ → ↑ ←	To move the selection bar around
F2/F3	To change color
F10	To save changes and reboot the machine

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

■ STANDARD CMOS SETUP

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

■ ADVANCED CMOS SETUP

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

■ ADVANCED CHIPSET SETUP

This Setup option is for the user who wishes to program the chip set registers. The chip set registers control most of the system options in the computer.

■ AUTO CONFIGURATION WITH BIOS DEFAULTS

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

■ CHANGE PASSWORD

The password is required for entering the Setup program or boot your system. The user can change the ROM default or current (user) password stored in the CMOS by accessing this option. The ROM default password is the < Enter > key.
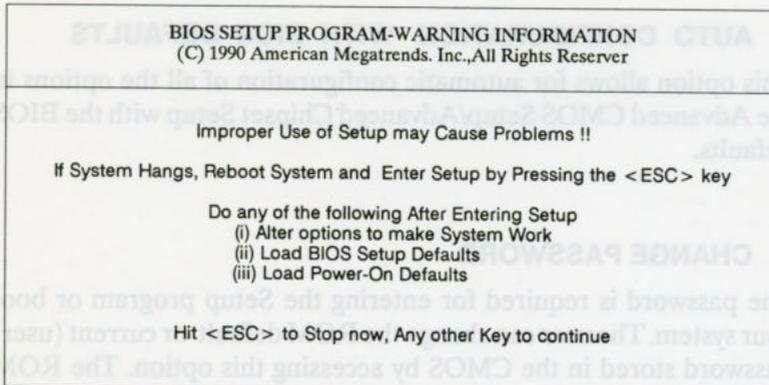
■ WRITE TO CMOS AND EXIT

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

■ DO NOT WRITE TO CMOS AND EXIT

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

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

```
BIOS SETUP PROGRAM-WARNING INFORMATION
(C) 1990 American Megatrends. Inc.,All Rights Reserver


        Improper Use of Setup may Cause Problems !!

If System Hangs, Reboot System and  Enter Setup by Pressing the  < ESC > key

        Do any of the following After Entering Setup
          (i) Alter options to make System Work
          (ii) Load BIOS Setup Defaults
          (iii) Load Power-On Defaults

     Hit < ESC > to Stop now, Any other Key to continue
```

Figure 5.2   BIOS Setup Warning Message

5.3 Running the Standard CMOS Setup

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

```
        CMOS Setup (C) Copyright 1985-1990,American Megatrends Inc.,

  Date (mn/date/year)  : Tue, Jan 01 1991        Base memory size   : 640 KB
  Time (hour/min/sec)  : 04 : 07 : 29            Ext. memory size   : 0 KB
  Daylight saving      : Disabled        Cyln Head Wpcom LZone Sec  Size
  Hard disk C: type    : 47 = USER TYPE  642  8    0     0    17   43 MB
  Hard disk D: type    : Not Installed
  Floppy drive A:      : 1.2 MB, 5 1/4"
  Flopyy drive B:      : 1.44 MB, 3 1/2"    Sun  Mon  Tue  Wed  Thu  Fri  Sat
  Primary display      : Monochrome
  Keyboard             : Installed          30   31   1    2    3    4    5

                                            6    7    8    9    10   11   12

                                            13   14   15   16   17   18   19

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

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

Figure 5.3   The Standard CMOS Setup Program Screen

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

■ Using the Standard CMOS Setup Program

Key	Usage
↓ → ↑ ←	To move the selection bar around
PgUp/PgDn	To modify the values of the option by scrolling through the predefined values in most fields
F2/F3	To change Color
Enter	To move the selection bar around
ESC	To exit to previous screen

■ Date

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

■ Time

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

■ Daylight saving

In this field you can enable or disable the daylight saving function.

■ **Floppy Drive A and B**

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

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

■ **Hard Disk C: and Hard Disk D:**

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

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

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

the input cylinder, head and sector numbers and display the result on the capacity field for your refence.

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

■ Primary Display

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

■ Keyboard

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

5.4   Running the Advanced CMOS Setup

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

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

Above 1 MB Memory Test          :Disabled
Hard Disk Type 47 RAM Area      :0:300
System Boot Up Num Lock         :On
Numeric Processor               :Enabled
Fast Gate A20 Option            :Enabled
Password Checking Option        :Disabled
Video  ROM  Shadow C000,32K     :Enabled
System  ROM  Shadow F000,64K    :Enabled




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

Figure 5.4 The Advanced CMOS Setup Program Screen

■ **Using the Advanced CMOS Setup Program**

Key	Usage
↓ → ↑ ←	To move the selection bar around
PgUp/PgDn	To modify the values of the option by scrolling through the predefined values in most fields
Ctrl + PgUp/PgDn	To quickly Modify the values of the option by scrolling through the predefined values in the "Non-Cacheable Base&Size" field:
F1	To got help for each of the options
F2/F3	To change Color
F5	To get the old values. These values are the values which with the user started the current session. If the CMOS was good, then the old values are the CMOS values; otherwise they are the BIOS Setup default values.
F6	This will load all the options in the Advanced CMOS Setup/ Advanced Chipset Setup with the BIOS Setup default.
F7	This will load all the options in the Advanced CMOS Setup / Advanced Chipset Setup with the Power-On default.
ESC	To exit to previous screen

■ Above 1 MB Memory Test

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

■ Hard Disk Type 47 RAM Area

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

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

The default is option "0:300".

■ System Boot Up Num Lock

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

■ Numeric Processor

The SC 386sx can use the Intel 80387sx math coprocessor. If a math coprocessor is installed , the "Numeric Processor" field should be set to "Enabled". If a math coprocessor is not installed, this field should be set to "Disabled".

■ Fast Gate A20 Option

The "Gate A20" is a special controllable switch existing in AT class machine, to boost performance of software utilizing 80286 protected mode, such as OS/2, UNIX,etc. Program intends to utilize extended memory must issue special command to enable this gate and make extended memory accessable.

If this option is enabled, the A20 address is enabled after power on.

■ Password Checking Option

The purpose of this field is to determine whether the password is asked for in every boot (set to "Always"),when entering into the Setup program (set to "Setup") or never (set to "Disabled").

■ **Video ROM Shadow**

Choose these two options for better video display performance. It enables the shadow RAM operation for the video BIOS on display cards such as VGA or EGA. The Video card should be checked to see whether it has 16 K or 32 K of ROM. If it has no ROM in the display card, there is no need to shadow the Video BIOS. If it has 16K of ROM, the Video BIOS should be shadowed at C000,16K. If it has 32K of ROM, the Video BIOS should be shadowed at both C000,16K and C400,16K.

■ **System ROM Shadow F000,64K**

This option enables the shadowing of the system BIOS(addressed between F0000 - FFFFFh, 64KB). You are recommended to enable this option for proper BIOS performance.

5.5 Running the Advanced CHIPSet Setup

To program the registers of the CHIPSet, choose the "Advanced CHIPSet Setup" option from the Setup main menu and press < Enter >. The screen will display the following menu:

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


 Bus Clock Select              : PROCLK/5
 Additional RAM Wait State     : Disabled
 RAS Timeout Feature           : Disabled
 Extended Boundary             : None
 Global EMS Memory             : Disabled
 EMS I/O Port Access           : Disabled
 EMS Page Registers            : EMS 0









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

Figure 5.5 The Advanced CHIPSet Setup

■ Using the Advanced CHIPSet Setup

For operating in the Advanced CHIPSet Setup, you can refer to page 5-16. It uses the same procedure as the Advanced CMOS Setup.

■ Bus Clock Select

The bus clock is an output clock for the I/O channel. This field is used to specify the I/O BUS clock source used by the system. The user does not need to change this setting.

The Bus Clock options are as follows:

- PROCLK/4 (Recommended for 16 MHz)
- PROCLK/5 (Recommended for 20 MHz)
- PROCLK/6

■ Additional RAM Wait State

" Wait State" refers to the number of extra clock cycles the CPU must wait for acessed devices to accomplish a data transferring cycle. According to the type of DRAM you could choice this option. When using the DRAM is low speed, you should "Enable" this option for increase Wait State.

In normal use, you should disable this option. Don't need to make any changes to the additional RAM Wait State.

■ RAS Timeout Feature

A RAS timeout feature is provided to support DRAMs that require a 10 microsecond maximum RAS-active time. If the timeout is enabled, RAS is not allowed to remain low continuously for more than about 9.5 microseconds. If the timeout is disabled, periodic refresh cycles limit the maximum possible RAS active time to about 15 microseconds.

The default is option "Disabled."

■ Extended Memory Boundary

The Extended Memory Boundary is the address of the end of extended memory, and the beginning of expanded memory. For example, if 2 MB of memory is installed and the Extended Memory Boundary is set at 1 MB, there will be 640 KB of base RAM, 384 KB of shadow RAM, 1 MB of EMS, and no extended memory available.

The available options are as follows:

- None
- 1 MB
- 1.25 MB
- 1.5 MB
- 2 MB
- 3 MB
- 4 MB
- 5 MB
  ....
- 15 MB

■ Global EMS Memory

This field is used to indicate the presence or use of EMS memory. If this option is "Disabled", then the following EMS options are ignored.

■ EMS I/O Port Access

This field is used to indicate the access of EMS I/O port. If using EMS memory, you should enabled this options.

■ EMS Page Registers

The EMS page register are accessed using three I/O ports located at either I/O addresses 208H-20AH or 218H-21AH.

The available options are as follows:

- EMS 0 (EMS Page Registers are 0208H, 0209H & 020AH)
- EMS 1 (EMS Page Registers are 0218H,0219H & 021AH)

The default is option "EMS 0".

5.6 Using the Change Password Setup

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

1. If the CMOS is bad or this option has never been used, there is default password which is stored in the ROM. The screen will display the following messages:

    ```
    Enter ROM Password:
    ```

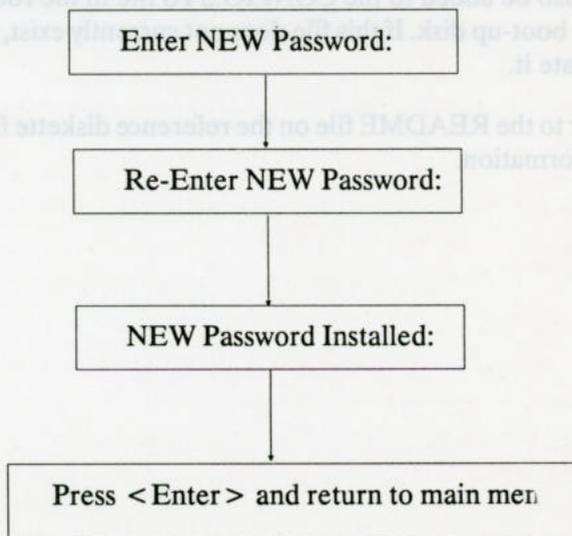   Press the < Enter > key and continue to change the password.

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

    ```
    Enter Current Password:
    ```

    Enter the correct password and continue to change the password.

3. After press the <Enter> key (ROM password) or current password (user-defined password), you can change the password stored in the CMOS. The password can be at most 6 characters long.

To change the password, please follow the below of steps:

```
┌─────────────────────────────┐
│    Enter NEW Password:       │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│    Re-Enter NEW Password:    │
└─────────────────────────────┘
              │
┌─────────────────────────────┐
│    NEW Password Installed:   │
└─────────────────────────────┘
              │
┌──────────────────────────────────────┐
│ Press <Enter> and return to main men  │
└──────────────────────────────────────┘
```
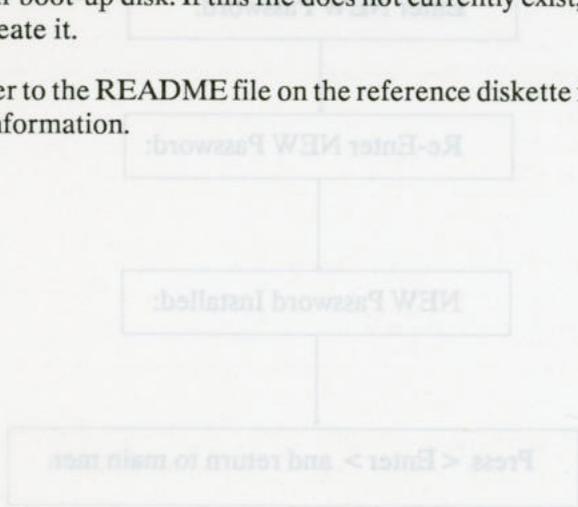
5.7 EMS Driver Installation

If you are going to use the EMS feature of the SC 386sx, the EMS driver file must be installed on your operating system disk. Copy the EMS driver file to the root directory of your boot-up disk. The EMS driver file comes with a document file that gives more information about the dirver and its use.

You must also be added to the CONFIG.SYS file in the root directory of your boot-up disk. If this file does not currently exist, you will need to create it.

Please refer to the README file on the reference diskette for more detailed information.

■ EMS Driver Installation:

If you do not know how to amend a CONFIG.SYS file or your boot-up disk does not have one and you do not know how to create it, refer to the instructions below:

To copy the device driver to your system, do the following:

- If your system has two diskette drives and no hard disk drive, put the SC 386sx EMS driver diskette in drive B and change directory to 286B.

```
CD \286B
```

Put the system disk in drive A and type:

```
COPY B:SCATEMM.SYS A:
```

- If your system has a hard disk drive, put the SC 386sx EMS driver diskette in drive A, change directory to 286B and type:

```
COPY A:SCATEMM.SYS C:
```

You can also copy the SCATEMM document file in the same way by change directory to 286B.

To add the required line to the CONFIG.SYS file, type:

```
EDLIN CONFIG.SYS
*1
1.DEVICE=SCATEMM.SYS
<Ctrl C>
*E
```

This will correctly modify the CONFIG.SYS file or will create one with this line included, where necessary.

Your DOS User's Guide and User's Reference Manual also contain information on this subject. Look in the appendices under "How to Configure Your System" and "Installable Device Drivers" for a more comprehensive explanation.

5.8 BIOS Errors and Messages

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

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

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

5.8.1 Fatal Errors Through Beeps

These errors are conveyed through a number of beeps.

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

5.8.2 Non- Fatal Errors Through Beeps

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

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

5.8.3 Fatal Errors Shown in Display

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

1. **CMOS INOPERATIONAL**: indicates failure of CMOS shutdown register test

2. **8042 GATE-A20 ERROR**: error in getting into protected mode

3. **INVALID SWITCH MEMORY FAILURE**

4. **DMA ERROR**: DMA controller page register test failed

5. **DMA #1 ERROR**: DMA Unit 1 register test failed.

6. **DMA #2 ERROR**: DMA Unit 2 register test failed.

5.8.4 Non- Fatal Errors In Display

There are two types of errors in this category:

1. Ones that require you to press the **F1** key and give you the option of running SETUP.

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

5.8.5 Errors With Setup Option

1. **CMOS battery state low** indicates failure of CMOS battery or failure in the set and checksum tests

2. **CMOS system options not set** indicates failure of CMOS battery or failure in set and checksum tests

3. **CMOS checksum failure** indicates CMOS battery low or a failure in set and checksum tests.

4. **CMOS display type mismatch** indicates failure of display verification.

5. **CMOS memory size mismatch** indicates a System Configuration and setup failure.

6. **CMOS time & date not set** indicates System Configuration verification error and setup error (in timer).

5.8.6 Errors Without Setup Option

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

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

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

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

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

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

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

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

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

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

Chapter 6

Care & Maintenance

As with most computer equipment, dust, high humidity, corrosive gases, and extreme temperatures can cause problems. Since dust is difficult to avoid, inspect the board occasionally. If there is noticeable dust, remove it with a vacuum cleaner designed for this type of equipment. Be sure the unit is disconnected, and be careful that delicate parts are not disturbed. A brush-tipped adaptor is generally safe and effective. Also observe static precautions. If there has been exposure to corrosive gases or smoke (tobacco smoke included), all connections should be checked. This includes all IC sockets. Re-seating connectors usually helps in such cases. Do this with the power OFF. If the system has a cooling fan (nearly all do), make sure the fan is working and the ventilation openings are not blocked.

Appendix A

Hard Disk Types

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

Table A.1 AMI BIOS Hard Disk Types

Table A.1 AMI BIOS Hard Disk Types Continued

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

■ Setting by "Turbo Switch"

The turbo switch connector is located on "J9", it can connect the turbo switch button by change the CPU's speed. To press down this button , the system can working in low speed; and to press up this button, the system will working in high speed.

Note: At boot time, the system speed is always in high speed. When the system is working in high speed, the CPU speed indicator (J8) is light up.

Appendix G

Glossary

Adapter card — A printed circuit board that gives the computer added capability, such as more memory or control of a new device. A card plugs into an expansion slot on the system board.

Benchmark — A program used to test and evaluate the performance characteristics of different systems.

BIOS — Basic Input/Output System. Programs that are permanently stored in the system board's ROM chips providing functions such as the Power-On Self Test. See also ROM.

Bus — A set of address or data lines used to transfer information between different components within a computer (such as memory, the microprocessor, and slots).

Cache — Provides fast local storage for frequently accessed codes and data that always keeps main memory current.

Chip — An electronic device that combines thousands of transistors on a small sliver of silicon. See integrated circuit.

Clock — A circuit that sends a consistent, periodic signal that is used to step logic information through a computer circuit.

CMOS RAM — Complementary Metal Oxide Semiconductor. A logic circuit family that uses very little power.

Configuration — The way in which a computer and peripheral equipment (such as printers and display monitors) are interconnected and programmed to operate as a system.

CPU (Central Processing Unit) — An integrated circuit chip that performs the actual computing functions of the computer. Other chips perform support functions like storing data and controlling peripherals. See also microprocessor.

Conventional memory — The standard main memory delivered with an IBM PC/AT or AT-compatible personal computer and used by DOS. This is usually considered to be the memory from zero to 640 Kbytes. DOS can address up to 1024 Kbytes of memory, although portions of the memory between 640 Kbytes and 1024 Kbytes are reserved for special functions.

Coprocessor — A microprocessor device that performs specialized computations (such as floating-point arithmetic) much more efficiently than the microprocessor alone.

DIP (Dual In-line Package) — A widely used container for an integrated circuit. DIPs have pins in two parallel rows. The pins are spaced 0.10 inch apart.

DMA (Direct Memory Addressing or Access) — A method for transferring data directly to and from system memory, bypassing the microprocessor.

DRAM — Dynamic Random Access Memory; requires a periodic refresh cycle. Loss of power causes loss of data in this memory.

Expanded memory — Special additional memory — up to 16 Mbytes — beyond the normal 640 Kbytes limit of main memory. This special additional memory is made available to DOS through a window selected from an unused reserved portion of DOS memory between 768 Kbytes and 960 Kbytes. Expanded memory may be used by software programs that adhere to the Lotus/Intel/Microsoft Expanded Memory Specification (LIM EMS).

Expanded Memory Specification (EMS) — The functional definition of a bank-switched memory expansion subsystem made up of hardware expansion modules and a user-installable resident driver program specific for those modules. See "expanded memory".

Expansion slot — A connector on the mainboard for holding an adapter card.

Extended memory — Memory beyond the 1 Mbyte addressing limit of DOS that can only be utilized by operating systems (such as XENIX) or programs (such as VDISK) that are able to address it directly.

Gigabyte — 1,073,741,824 (2^{30}) bytes; abbreviated Gbyte.

Hertz (Hz) — A unit of frequency equal to one cycle per second.

I/O — An abbreviation for "input/output," a generic term that refers to the devices and processes involved in the computer's reading and writing data.

Integrated circuit — An electronic device that combines thousands of transistors on a small chip of silicon or other semiconductor. Such devices are the building blocks of computers.

Interface — The connection between the computer and its human operator, or between the computer and a peripheral device.

Interleaving — A technique for improving the performance of system memory. Successive memory locations are assigned to different banks, cycling through the available banks.

ISA — Industry Standard Architecture

Jumper — On a printed circuit board, a patch cable or wire used to establish a circuit.

LAN — Local Area Network

Mainboard — The large printed-circuit board in a computer on which most electronic devices are mounted; the primary board in a computer. All other interfaces receive control signals or information from the mainboard. Also commonly referred to as a "motherboard".

Megahertz (MHz) — A frequency of 1 million cycles per second.

Memory — Devices used to hold information and programs while they are being accessed by the microprocessor. See also RAM and ROM.

Microprocessor — An integrated circuit that contains the circuits the computer needs to calculate and to communicate with the other parts of the system. See also CPU.

Multitasking — The ability of an operating system to run several programs or tasks simultaneously.

Page — Sections of memory consisting of sets of consecutive bytes. Pages begin on 4-Kbyte boundaries.

Page mode — Special function in DRAM that saves up to about 30% in cycle time by not re-loading RAS bits.

Parity bit — An additional non-informational bit appended to a group of bits to make the number of ones in the group of bits either an odd or even number; an elementary mechanism for error checking.

Pin — Any of the leads on a device, such as an IC, that plug into a socket and connect it to a system.

Power-On Self Test (POST) — Check-out procedures that the BIOS runs automatically when the system is turned on. These procedures verify that all computer hardware is functioning properly. If the test detects problems, the computer displays error codes before (or instead of) starting the operating system. The error codes can help a service person determine what is wrong with a computer.

RAM — An acronym for "random-access memory". The type of computer memory that can be used to store information while a program is running. RAM consists of a number of small integrated circuits that are plugged into the mainboard or an external memory card.

ROM — An acronym for "read-only memory". The type of computer memory that is used to store permanently the information vital to computer operation, including some parts of the operating system ROM is permanent and the contents will not be lost when the computer is turned off.

Setup — The arrangement of connections between an assembly of individual computing units, and the adjustments needed for the computer to operate.

Shadow RAM — A method of copying BIOS routines from slower ROM chips to much faster RAM, increasing system performance.

SIMM — Single In-line Memory Module: Taller than DIP (Dual In-line Package) but takes less board space.

SRAM — Static Random Access Memory. Does not require periodic refreshing that dynamic memory requires.

System — An assembly of components united by some form of regulated interaction to form an organized whole.

Wait state — A delay in the computer's information processing cycle caused by a difference in speed between a faster processor and slower memory, which holds data. A 0 wait state means the processor does not have to "wait" for memory, and can access data as fast as needed.

Word — The set of bits comprising the largest unit that the computer can handle in a single operation.

COMPATIBILITY CLAIM FORM

SALES: _____
REQUEST DATE:___ /__/___
TARGET DATE: ___ /__/___
REVISED DATE: __ /__ / ___

CUSTOMER INFORMATION:

COMPANY NAME:	TEL NO.:
CONTACT PERSON:	FAX NO.:
ADDRESS	

REQUEST INFORMATION:

PRODUCT	MODEL: S/N: SHIPPING DATE: __/__/___	DATE CODE: BIOS REV.: PCB REV.:
PERIPHERAL /SYSTEM CONFIGUR- ATION	ON-BOARD MEMORY: ___MB RAM-CARD TYPE: __, __MB FDC/HDC: __, __ FDD/A: __MB B:___MB VIDEO CARD: _____	CPU CLOCK SPEED: ___MHz HD: _____TYPE: _____ K/B CONTROLLER TYPE: ____ CO-PRO. (Y/N): __SPD: __MHz APP. S/W: _____ VER.: ____
	APPLICATION S/W SETUP CONDITION:	

ROBLEM STATUS:

PROBLEM OCCURS	TIME IF FAILURE
____ONLY ONCE ____ INTERMITTENTLY ____CONTINUOUSLY	____ INSTALLATION ____ DURING OPERATION ____ OTHERS

PROBLEM DESCRIPTION/ERROR MESSAGE:

SOLUTION/RESPONSE