

EXHIBIT 3

USER MANUAL

Advanced Pentium Motherboard

User's Manual

IN5598 (FR500)

USER'S MANUAL

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EASY INSTALLATION

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Radio and Television Interference Statement

The equipment described in this manual generates and uses radio frequency energy. If it is not installed and used properly, that is in strict accordance with the manufacturer's instruction, it may cause interference to radio and television reception.

This equipment has been tested and complies with the limits for a Class B Digital Device in accordance with the specifications in Part 15 of the FCC Rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or TV reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- * Reorient the receiving antenna.
- * Relocate the computer with respect to the receiver.
- * Move the computer away from the receiver.
- * Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/TV technician for additional suggestions. The user may find the following booklet, prepared by the Federal Communications Commission, helpful: *How to Identify and Resolve Radio and TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

WARNING

This equipment has been certified to comply with the limits for a Class B Digital Device under Part 15 of the FCC Rules. Only peripherals (modems, printers, etc.) certified to comply with the Class B limits may be attached to this computer. Operation with non-certified peripherals is likely to result in interference to radio and TV reception. Any changes or modifications to this equipment not expressly approved by the manufacturer could void the user's authority to operate this equipment.

REMARKS

To meet FCC requirements, shielded interface cables and power cords are required to connect the device to a personal computer, peripheral, or other Class B Certified device.

EASY INSTALLATION



The following "Easy Installation" steps are intended for users familiar with the assembly of a computer system. For those individuals requiring more specific information please refer to the more detailed descriptions located within the latter chapters of this manual.

Note: You must keep your power cable unplugged until the following installation steps are completed.

Getting Start:

Touch a grounded metal surface to release static electricity stored in your body before unpacking your motherboard. For details please refer to **Precaution** section in **Chapter 3**.

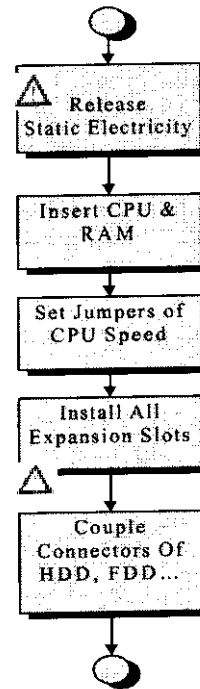
Install the CPU by correctly aligning the CPU with the Socket7 as noted in the motherboard diagram. Once aligned, press down on the CPU gently but firmly and lock it into place. Install EDO DRAM into the 72 pin SIMMs. See **Sec. 3.2 & Sec. 3.3**.

Set CPU speed jumper in accordance to **Sec.3.2**.

After completing the above steps, install any expansion Cards into the appropriate PCI or ISA slots and screw them tight to the chassis. See **Sec. 3.4**.

Plug in all cables included in the package EXCEPT for the power cord. See **Sec. 3.5**.

Re-check all the above steps making sure each has been completed accurately. You are now ready to plug in the power cord and turn on the power to enter the BIOS setup, **Chapter 4**.



EASY INSTALLATION

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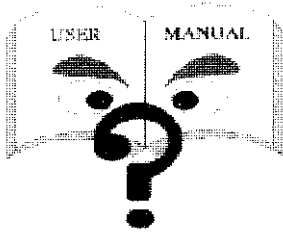
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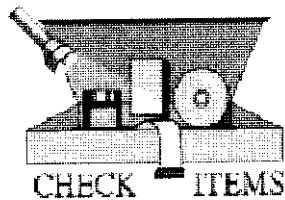
1. INTRODUCTION



presented on the “EASY INSTALLATION” page. Each step will refer to another section within this manual where you can find more detailed information if needed.

How to use this Manual

This manual provides information necessary for Original Equipment Manufactures, (OEMs), and home users to build a PC-AT compatible system using the Pentium PCI/ISA motherboard. Follow the installation procedure



Check your device items

The standard package will contain the following items marked with a “✓”. If you find any these items missing or damaged. Please contact your retailer immediately.

- ✓ The IN5598 motherboard
- ✓ 1 IDE ribbon cable
- ✓ 1 floppy ribbon cable
- ✓ 1 CD-ROM Diskette with Video and Audio Driver
- ✓ 1 User Manual
- 1 COM2 cable (*Optional*)

2. FEATURES

Photo of the Motherboard

2. FEATURES

Features of the Motherboard



The IN5598 motherboard integrates the Pentium® microprocessor, memory, I/O and is designed to fit into a standard LPX form factor chassis. Page 12 illustrates the Layout for the IN5598 motherboard. Below lists the key features provided by this motherboard:

Processor/Cache

Processor

Intel/AMD 75 ~ 233 MHz
Cyrix 6X86 & 6X86L, PR120+ ~ 166+
Cyrix 6X86MX, PR133 ~ PR266
Cyrix MII 266~300

Cache

0/512KB, Write Back Direct Mapped organization, Pipeline Burst
Cache soldered on the motherboard.

System Memory

Memory Size

8 MB minimum to 256 MB maximum.

Memory Sites

4 SIMM Sockets, Burst Mode Read-Write support.

DRAM Type

Supports EDO DRAM type can be 1M, 2M, 4M, 8M, 16M bit deep by n bit wide DRAM's, and both symmetrical and asymmetrical type DRAM are supported. Supports both single and double sided.

Access Time

70ns or faster for FPM/EDO or 60ns or faster for SDRAM

Chipset

SiS5598 Pentium PCI/ISA Chipset.

Integrated Graphics

Graphics Controller

SiS5598 integrated VGA Controller.

Video Memory

UMA supports 0.5M ~ 4M EDO DRAM.

Integrated I/O

I/O Controller

Winbond W83877IF

Serial Ports

Two Asynch serial ports, two 9 Pin connectors using High Speed 16550 compatible ports with 16-byte FIFOs

Parallel Port

One 25 pin supporting EPP, ECP and Centronics

Hard Disk Controller

PCI Bus Mastering IDE. Native and Compatible Mode Support. IDE Transfer with Scatter Gather. Multiword DMA Transfers Mode 0,1,2. Enhanced IDE PIO Modes 3 & 4. Separate IDE Bus FIFOs for PCI burst transfers. Supports Ultra DMA/33 Bus Master Programming Interface for ATA windows 95 Compliant Controller. Plug and Play Compatible.

Hard Disk Connector

2 PCI IDE Connectors for 4 Drives Support

Floppy Controller

1.2, 1.44 and 2.88 MB support

2. FEATURES

Keyboard Port	PS/2 (Integrated in the SiS5598)
Mouse Port	PS/2 (Integrated in the SiS5598)
Real Time Clock	Integrated in the SiS5598
Serial Bus	USB (Universal Serial Bus), Microsoft and Intel spec. compliant, integrated in the SiS5598.

Integrated Sound

Sound Chip	ESS1869 3D Audio Chip
CODEC	Built-in, 16-bit Stereo
FM Synthesis	Yamaha OPL3 compatibility (Included with ESS1869)

System BIOS

BIOS Type	AWARD Software Inc., 2MB Flash BIOS
Hard Disk Driver	IDE, Auto-configuring
Plug&Play Support	Steerable DMA Channels and Interrupts. ISA Plug&Play
Special Features	Windows 95 ready. Multi-Boot. PCI add-in card auto-configuration.

Power Management

Green Features	APM1.2. Meets EPA Mod 2.0 (SMI, Stop Clock, HDD and Upgrade Monitor Shutdown)
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Jumpers and Front Panel Connectors

Connectors	PC Speaker, HD LED, Power/Sleep I.E.D, Reset Switch, Sleep Switch, Power Switch.
Jumpers	CPU Speed, CPU Multiplier, Clear CMOS, External VGA Selection, CPU voltage, PCI clock, Cache Linear Mode.

Headers and Back Panel Connectors

Headers	Floppy, IDE 1&2, CD-IN, Feature connector, Serial 2, WOL, CPU FAN.
Connectors	VGA Port, Serial 1, Keyboard & Mouse, Parallel port, USB 1&2, Line In, Line Out, Mic In, MIDI

Mechanical

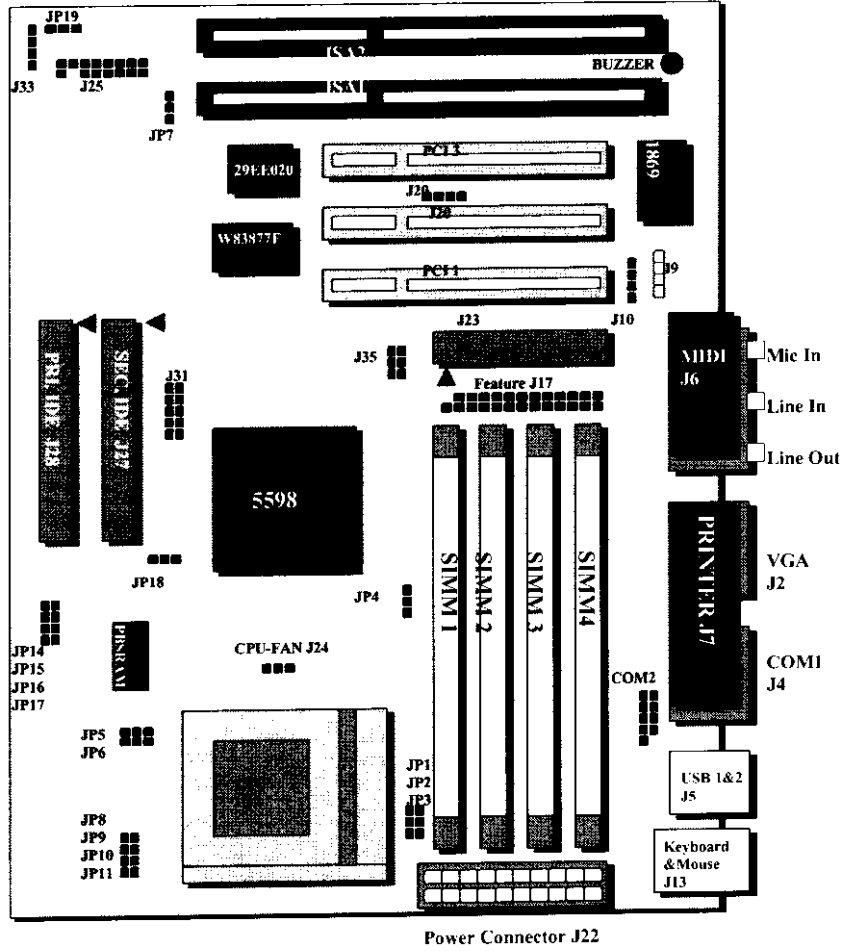
Board Style	Micro ATX form factor
Board Size/Type	9.6" x 8.1", four layer board

Expansion Slots

Description	Three PCI slots and Two ISA slots, one share.
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3. INSTALLATION

Motherboard Layout & Main Parts



3. INSTALLATION

Significant Parts List

Front Panel Connectors

Power/Sleep LED	Page 26
Speaker	Page 27
Power Switch	Page 26
Reset	Page 26
Sleep	Page 26
HDD LED	Page 27

Back Panel Connectors

PS/2-style keyboard and mouse connectors	Page 28
USB connectors	Page 28
Two serial port (One by cable, optional)	Page 28
One parallel port	Page 28
One VGA port	Page 28
One Line-in connector	Page 28
One Line-out connector	Page 28
One MIC-in Connector	Page 28
One MIDI connector	Page 28

Expansion Slots/Sockets

Socket7 CPU Slot	Page 16
SIMM Sockets	Page 21
PCI/ISA slots	Page 23

Power/IDE/FDD Connectors

IDE connectors	Page 24
Power connector	Page 25
FDD connector	Page 25

Additional Connectors

CPU Fan	Page 29
WOL Connector	Page 29
CD-IN	Page 29
Feature Connector	Page 29

3. INSTALLATION

Precautions

Static Electricity Damage:



Static electricity can easily damage your motherboard. Observing a few basic precautions will help safeguard against damage that could result in expensive repairs. Please read the following before beginning installation.

1. Keep the motherboard and other system components in their anti-static packaging until you are ready to install them.
2. Touch a grounded surface before you remove any system component from its protective anti-static packaging. Unpacking and installation should be done on a grounded, anti-static mat. The operator should be wearing an anti-static wristband, grounded at the same points as the anti-static mat.
3. After removing the motherboard from its original packaging, only place it on a grounded, anti-static surface, component side up. Immediately inspect the board for damage. Due to shifting during shipping, it is suggested that the installer press down on the entire socket ICs to ensure they are properly seated. Do this only with the board placed on a firm flat surface.
4. During configuration and installation touch a grounded surface frequently to discharge any static electrical charge that may have built up in your body. The best precaution, as stated above, is to wear a grounded wrist strap. When handling the motherboard or an adapter card, avoid touching its components. Handle the motherboard and adapter cards either by the edges or by the adapter card case-mounting bracket.

Misplaced Jumper Damage:



There are critical headers used for connectors or power sources. These are clearly marked separately from the jumpers listed in "Motherboard Layout". Incorrectly setting jumpers and connectors may lead to damage to your motherboard. Please pay special attention not to connect these headers in the wrong directions.

3. INSTALLATION

3.1 Slots and Connectors

The IN5598 motherboard requires jumper setting for CPU type, voltage and speed. Please refer to "Jumper Setting List" in sec.3.2.2.



In following pages, the triangle ▲ symbol indicates pin 1 of connectors.

Slots/Connectors List

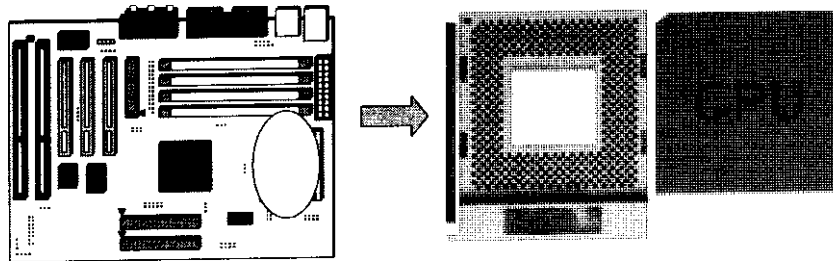
- J2: VGA
- J3: PS/2 keyboard & mouse
- J4: COM1
- J5: USB
- J6: Audio/Game port
- J7: Printer
- J9: CD-In
- J11: COM2
- J13: PCI3
- J14: PCI2
- J15: PCI1
- J16: SIMM4
- J17: Feature Connector
- J18: SIMM3
- J19: SIMM2
- J20: WOL
- J21: SIMM1
- J22: ATX Power Connector
- J23: Floppy Connector
- J24: CPU FAN
- J25: Front Panel Connector
- J27: Secondary IDE
- J28: Primary IDE
- J29: ISA2
- J30: ISA1

3. INSTALLATION

3.2 CPU (Central Processing Unit)

The Pentium P54C/P55C, Cyrix 6X86L/MX/MII, IDT-C6, AMD-K5/K6 processors have various voltage choices depending on the CPU suppliers. Also this motherboard can be upgraded with Pentium processors that run at higher speeds. When upgrading the processor, use the BIOS configuration mode to change the processor speed.

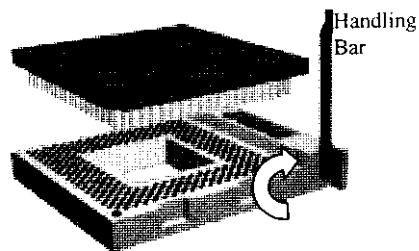
To complete CPU installation, please install CPU to socket firmly and arrange jumper settings carefully, presented in sec. 3.2.1 and 3.2.2.



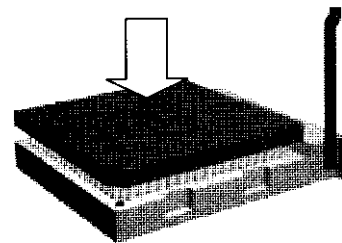
3.2.1 Install CPU

The following steps detail how to install your CPU and configure the types, voltage and speed according to the "Processor Jumper Setting List".

- Step 1: Pull the handling bar of the socket upward to the other end to loosen the socket's openings.
- Step 2: Place the CPU on the middle of the socket, orienting its beveled corner to line up with the socket's beveled corner. Make sure the pins of the CPU fit evenly to the socket openings.



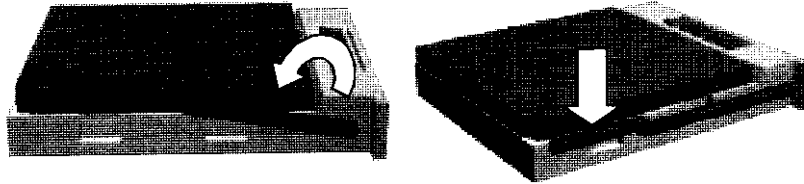
Step 1: Pull handling bar



Step 2: Place CPU

3. INSTALLATION

Step 3: Replace the handling bar to its original position to fasten the CPU into place.

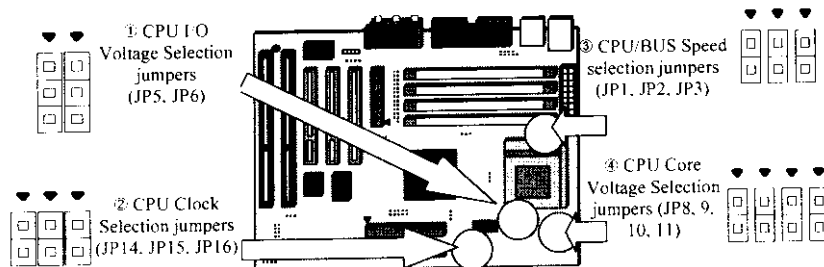


Step 3: Fasten the CPU to socket.

WARNING: It is strongly recommended that a heatsink and CPU cooling fan be used to prevent the CPU from overheating. Applying a thermal of jelly between the CPU and the heatsink/fan will further cool the CPU.

3.2.2 Arrange Jumper Setting

Due to different CPU require a varied configuration of Clock, CPU/BUS speed, I/O voltage and Core voltage. Please refer to the following Jumper setting list exactly to setup your jumper.



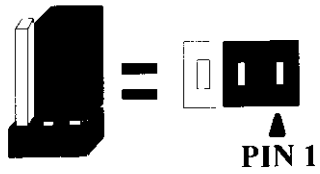
3. INSTALLATION

Setting CPU I/O Voltage

Setting CPU Clock

CPU TYPE (I/O Voltage)	JP5	JP6
P54C, K5, 6X86		
P55C, K6, 6X86L, M2,MII		

CPU Clock (MHz)	JP14	JP15	JP16
50			
60			
66			
75			



3. INSTALLATION

Setting CPU/BUS Speed

Intel CPU/BUS	JP1 (BF0)	JP2 (BF2)	JP3 (BF1)
X1.5 / X3.5			
X2.0			
X2.5			
X3.0			
X4.0			

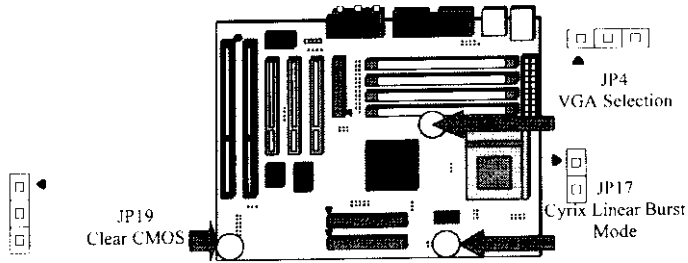
Setting CPU Core Voltage

Vcore	JP8	JP9	JP10	JP11
1.8V				
2.2V				
2.8V				
2.9V				

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3.2V				
3.38V				
3.52V				

3.2.3 Other Jumper Settings



Cyrix Linear Burst Mode (JP17)

The IN5598 has a jumper JP17, which allows you to running L2 cache at linear burst mode for Cyrix CPU only. Make sure this jumper is close for Cyrix CPU, open for other kind of processors.

VGA Selection (JP4)



IN5598 also has a 3-pin jumper allows you to enable or disable onboard VGA function.

Clear CMOS (JP19)



If an unknown password is set in the BIOS, it can be cleared by inserting a cap over JP19.

3. INSTALLATION



Cyrix Linear Burst Mode

Description	JP17
Interleaved Burst	
Linear Burst	

VGA Selection

Description	JP4
External VGA	
Onboard VGA	

Clear CMOS

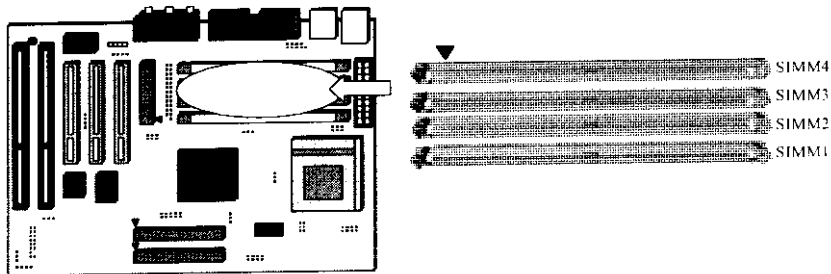
Description	JP19
Default	
Clear CMOS	

3. INSTALLATION

3.3 System Memory (DRAM) J21, 19, 18, 16

3.3.1 SIMM (Single Inline Memory Module)

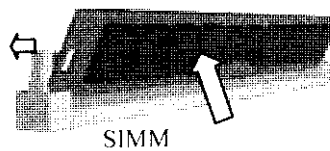
The IN5598 features four (4) 72-pin SIMM sockets. The system memory size can be configured in a variety of ways by using different combinations of the four (4) 72-pin DRAM SIMM.



3.3.2 Installation Procedure

Step 1: Pin 1 of the SIMM must match pin 1 of the SIMM socket.

Step 2: Insert SIMM module into SIMM socket at a 45 degree angle. Push it ahead to 90 degree angle until it locks firmly into the SIMM socket.



WARNING: Be careful not to mis-fit the SIMM Module into SIMM sockets in the wrong direction. This module can only be inserted into SIMM socket one way. Please note the "▲" symbol for pin 1 location. To release the memory module, push both latches down and carefully rock the module backward and forwards while slowly lifting it upward.

3. INSTALLATION

3.3.3 Memory Module Combinations

SIMM Combinations:

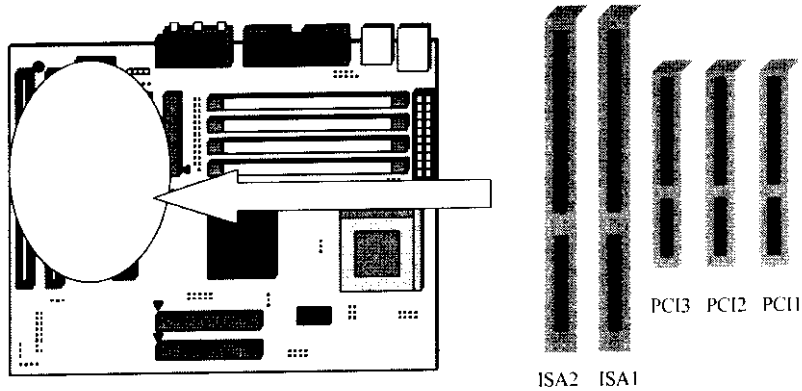
Total Memory (SIMM 1-4)	Bank A (SIMM 1&2)	Bank B (SIMM 3&4)
8MB	4MBx2	None
16MB	8MBx2	None
32MB	16MBx2	None
64MB	32MBx2	None
16MB	4MBx2	4MBx2
24MB	4MBx2	8MBx2
40MB	4MBx2	16MBx2
72MB	4MBx2	32MBx2
24MB	8MBx2	4MBx2
32MB	8MBx2	8MBx2
48MB	8MBx2	16MBx2
80MB	8MBx2	32MBx2
40MB	16MBx2	4MBx2
48MB	16MBx2	8MBx2
64MB	16MBx2	16MBx2
96MB	16MBx2	32MBx2
72MB	32MBx2	4MBx2
80MB	32MBx2	8MBx2
96MB	32MBx2	16MBx2
128MB	32MBx2	32MBx2
128MB	64MBx2	None
256MB	64MBx2	64MBx2

Note:

1. The memory module must be 60ns (nanoseconds) or faster using either EDO types.
2. Configuration must be one pair in sequence inserted at a time, (i.e. SIMM 1 and SIMM 2, or all four sockets at once).
3. Each pair of modules must be the same size and speed and may be single sided or doubled-side. Module sizes: Single-side SIMMs: 4MB, 8MB, 16MB; Double-side SIMMs: 8MB, 32MB, 64MB.
4. If using only one pair of memory modules, insert them into SIMM 1&2.

3. INSTALLATION

3.4 Expansion Slots



The IN5598 motherboard contains 5 expansion slots onboard: (2) 16-bit ISA Bus and (3) 32-bit PCI expansion slots.

One PCI and one ISA are shared to accommodate either ISA or PCI expansion cards, but not both at the same time. All three PCI expansion slots accept PCI Bus master cards and are fully supported by the PCI 2.1 specification.

For installation instructions and precautions for expansion cards, refer to Expansion Card's documentation.

Note: Some expansion cards require an IRQ to work and may cause a conflict. There are total of 16 IRQs with some reserved for expansion cards. In case of a conflict please contact system manufacturer for technical support.

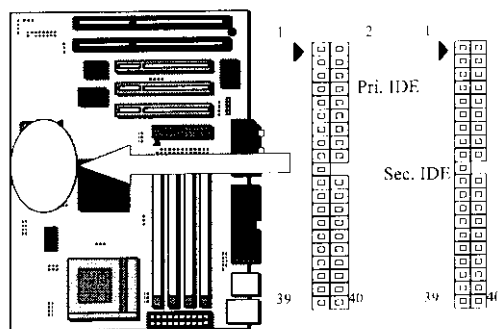
3. INSTALLATION

3.5 Connectors

The IN5598 motherboard contains IDE, floppy, power input, front panel, back panel and additional connectors.

3.5.1 Primary IDE Connector (J28, 39-pin block)

The Primary IDE connector supports two primary channel IDE devices via a ribbon cable. When two IDE devices are installed using the primary IDE connector, make sure that the second IDE device is set to slave mode as indicated in the device's manual.



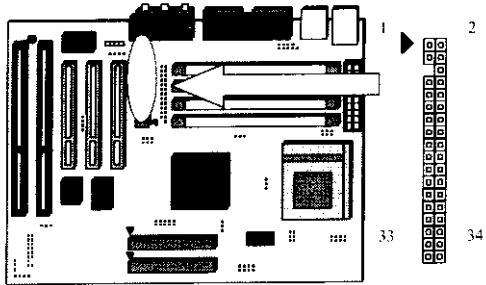
3.5.2 Secondary IDE Connector (J27, 39-pin block)

This connector supports two secondary channel IDE devices as well as the 120MB Floppy drives via a ribbon cable. When two IDE devices are installed using the secondary IDE connector, make sure that the second IDE device is adjusted to slave mode as instructed in the device's manual.

WARNING: *When you connect a ribbon cable to these ports, you must orient the cable connector so that the PIN 1 edge of the cable is at the PIN 1 edge of the onboard connector.*

3. INSTALLATION

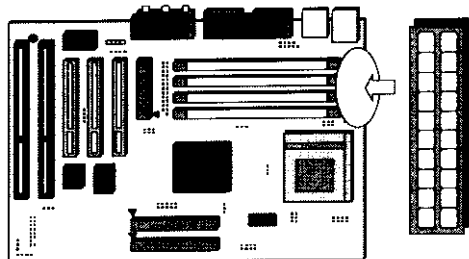
3.5.3 Floppy Drive Connector (J23, 33-pin block)



The FDC sub-system is capable of controlling three types of floppy drives: 1.2, 1.44 and 2.88MB or compatible tape drives. The connection to the floppy drive is via a header (J23). The floppy disk interface includes 48mA drivers and inputs on the drive interface.

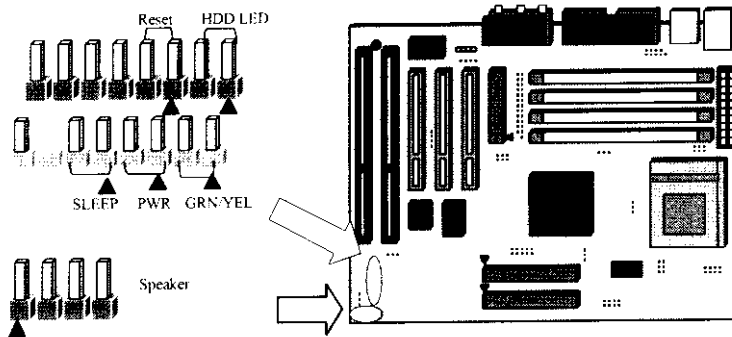
WARNING: When you connect a ribbon cable to this port, you must orient the cable connector so that the PIN 1 edge of the cable is at the PIN 1 end of the onboard port as well.

3.5.4 Power Input Connector (J22, 20-pin block)



The Power Input connector supports a standard ATX power supply. When connecting, make sure the lock key matches the hook attached on a power supply cable. The power cord should be unplugged when you connect it.

3.5.5 Front Panel connectors (J25)



3. INSTALLATION

Front Panel includes headers for the following eight I/O connectors:

Power/Sleep LED, Speaker, Power Switch, Reset, Sleep and HDD LED. Also included is an independent 4-pin header for Speaker connection.

Power/Sleep LED (2-pin)

Can be connected to a 2 colors or 1 color LED that will light green when the computer is powered, and may light yellow when sleep.

Power Switch (2-pin)

Supports the ATX case-mounted Power Switch.

Reset Switch Connector (2-pin)

Supports the front panel case-mounted reset button. It is advised that the reset switch be used for rebooting the system in order to extend the life of the system's power supply.

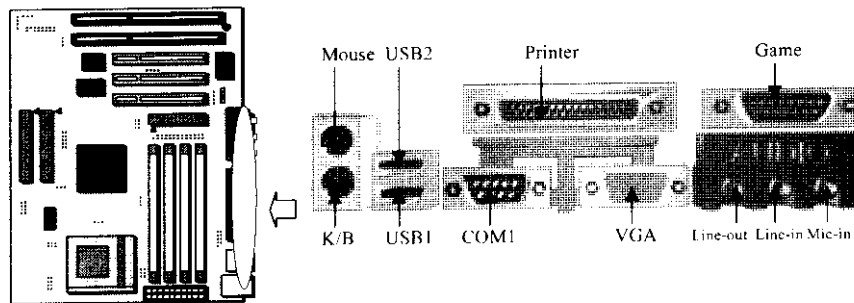
HDD LED Connector (2-pin)

The IN5598 supports one (1) straight 2-pin header for connecting to front Panel Hard Disk activity LED indicator.

Speaker Connector (4-pin)

Used to drive a chassis-mounted speaker if desired.

3.5.6 Back Panel Connectors



3. INSTALLATION

PS/2 Keyboard and Mouse Ports

The IN5598 motherboard offers (1) PS/2 Keyboard and (1) PS/2 Mouse port.

Universal Serial Bus (USB) Ports

The IN5598 motherboard has (2) USB connectors. USB devices provide a more convenient operating environment and improve data transferring capacity. True Plug & Play, this new bus technology will support over 127 different peripherals through a Hub.

Parallel Port (Printer)

The IN5598 includes a parallel port which is EPP/ECP compatible. The parallel port is capable of being disabled or remapped to either the secondary LPT address or the primary LPT address through BIOS if another parallel port is installed.

Serial Port (COM1, COM2 optional)

The IN5598 motherboard has (2) serial ports. The electrical characteristics are compliant with the EIA-232-D Serial Communications Specifications. The serial ports may be remapped over other installable serial ports or disabled through the BIOS.

The COM2 header is connected to a bracket assembly with all the necessary connectors by a ribbon cable. The case must reserve space for the COM2 if you want to use the COM2 function.

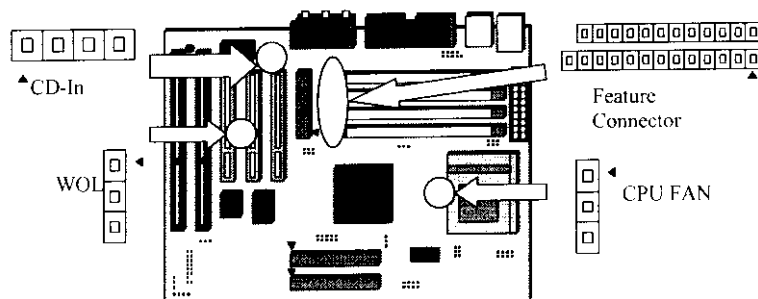
VGA Port

The IN5598 supplies a VGA function on board with an integrated chip.

Audio/Game Port

The IN5598 also has an Audio/Game function, including Line-in, Line-out, Mic, and a game port for joystick use.

3.5.7 Additional Connectors



3. INSTALLATION

WOL (Wake On LAN)

The WOL header is used for remote wakeup of the computer through a network. WOL requires a PCI add-in network interface card (NIC) with remote wakeup capabilities. The remote wakeup header on the NIC must be connected to the onboard Wake on LAN header. For Wake on LAN, the 5-V standby line for the ATX power supply must be capable of delivering $5V \pm 5\%$ at 720mA.

CPU Fan

Your Pentium Cartridge may have an attached heatsink and Fan which would utilize this connector for the CPU Fan.

CD-IN Connector (Audio)

A 1x4 connector is built into the IN5598 motherboard for audio input from CD-ROM drives.

Feature Connector

The VESA feature connector is available for synchronizing graphics output with an external NTSC or PAL signal, and will allow a shared frame buffer interface to maximize Multimedia performance. The feature connector will use pass-through signals from a video add-in card to utilize the system's VGA circuitry.

The IN5598 motherboard also supports other VESA standards such as the "VESA DPMS protocol" to switch a DPMS compliant monitor into power savings mode and the "VESA Bi-directional Monitor Data", (DDC-2), that allows the transfer of monitor identification and resolution supported data for ease of use.

3. INSTALLATION

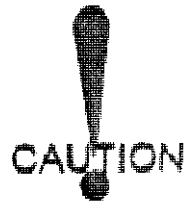
3.6 Ready To Turn On Power

- **Review**



1. Is the CPU installed correctly and locked firmly into socket? (Sec. 3.2)
2. Are all DRAM modules installed properly? (Sec. 3.3)
3. Are all expansion cards inserted, (Modem.... etc.)? (Sec. 3.4)
4. Are all connectors described in Section 3.5 properly connected to their variable devices? (Sec. 3.5)

- **Yes, I have checked and assured the above steps!**



Now get ready to turn on your device by following these steps.

1. Mount your motherboard to the chassis frame and close the chassis cover.
2. Switch off all power.
3. Connect the power supply cord to inlet of the system case.
4. Connect the power supply cord into an outlet of power supply.
5. Connect monitor signal cable to system VGA port, and the monitor power cord to power outlet.
6. Turn on monitor and system power.

Once Powered On

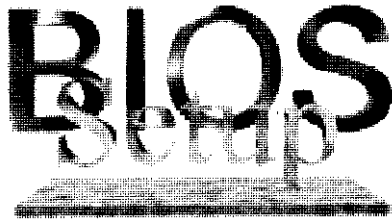
The power LED on the front panel of the system case will light. For ATX power supplies, the system LED will light when the ATX power switch is pressed.

The system will then perform "power-on" tests for each item, one at a time. Additional messages will appear on screen at this time. If the screen blinks or the tests stops more than 30 seconds, the system may have failed the "power-on" test. If this happens, recheck the above steps or call your retailer for assistance.

If all of the "power-on" tests pass, you are ready to enter BIOS setup. Do this now by holding down the <Delete> button on the keyboard. Follow the instructions in the next chapter, **BIOS SETUP**.



4. BIOS SETUP



The IN5598 motherboard uses AWARD BIOS, which is stored in a Flash EEPROM and can be upgraded by a floppy disk-based program. The BIOS has a built-in Setup Program which allows users to modify the basic system configuration settings. The settings are then stored in a dedicated battery-backed memory, called CMOS RAM that retains the information when the

power is turned off. The BIOS provides critical low-level support for the system's central processing, memory and I/O subsystems. The AWARD BIOS has been customized by adding important, nonstandard, features such as virus and password protection, power management, and detailed fine-tuning of the chipset which controls the system. The remainder of this manual is intended to guide you through the process of configuring your system using the BIOS Setup.

4.1 How to enter BIOS Setup

The AWARD BIOS is immediately activated when you first turn on the computer. The BIOS reads system configuration information in CMOS RAM and begins the process of checking the system and configuring it through the "power-on self test", (POST). When these preliminaries are completed, the BIOS searches for an operation system on the data storage devices (hard drive, floppy drive, etc.). The BIOS launches the operating system and hands over control of system operation to it.

To begin Setup, press the <Delete> key during boot-up before or while a message similar to this appears briefly at the bottom of the screen during POST, (Power On Self Test):

Press DEL if you want to enter SETUP

If the above message disappears before you have responded and you still wish to enter Setup, reboot the system to try again by pressing the "RESET" button on the system case. You can also restart by simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys.

Press F1 to continue, DEL to enter SETUP

4. BIOS SETUP

4.1.1 Setup Keys

The following table of key strokes are used to navigate during setup:

<↑> , <↓>	Move to previous or next item
<←> , <→>	Move to the item in the left or right hand
<Esc>	Main Menu -- Quit and not save changes into CMOS Other Pages -- Exit current page and return to Main Menu
<PgUp> / <+>	Increase the numeric value or make changes
<PgDn> / <->	Decrease the numeric value or make changes
<F1>	General help, only for Status Page Setup Menu and Option Page Setup Menu
<F2>	Change color from total 16 colors. F2 to select Shift-F2 color forward, Shift-F2 to select color backward
<F3>	Calendar, only for Status Page Setup Menu
<F5>	Restore the previous CMOS value from CMOS, only for Option Page Setup Menu
<F7>	Load the Setup default
<F10>	Save all the CMOS changes, only for Main Menu

4.1.2 Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press Esc or the F1 key again.

4.1.3 In Case of Problems

If after making and saving system changes with Setup, you discover that your computer is no longer able to boot-up, the Award BIOS supports an override to the CMOS settings that resets your system to its default configuration.

The best advice is to alter only settings that you thoroughly understand. In particular, do not change settings in the Chipset screen without a good reason. Your system manufacturer has carefully chosen the Chipset defaults for the best performance and reliability. Even a seemingly small change to the Chipset setup may cause the system to become unstable.

4. BIOS SETUP

4.2 Main Setup Menu

When you enter the Award BIOS CMOS Setup Utility, a Main Menu (Figure 1) appears on the screen. The Main Menu allows you to select from several Setup functions and two exit choices. Use the arrow keys to select among the items and press Enter to accept and enter the sub-menu.

A brief description of each highlighted selection appears at the bottom of the screen.

ROM PCI/ISA BIOS (2A51IG5D) CMOS SETUP UTILITY AWARD SOFTWARE, INC.	
STANDARD CMOS SETUP BIOS FEATURES SETUP CHIPSET FEATURES SETUP POWER MANAGEMENT SETUP PNP/PCI CONFIGURATION INTEGRATED PERIPHERALS LOAD SETUP/DEFAULTS	USER PASSWORD IDE HDD AUTO DETECTION SAVE & EXIT SETUP EXIT WITHOUT SAVING
Esc : Quit F10 : Save & Exit Setup	↑→←↓ : Select Item (Shift) F2 : Change Color
Time, Date, Hard Disk Type	

Figure 1: Main Menu

4. BIOS SETUP

Following is a brief summary of each Setup category.

Standard CMOS	Options in the original PC AT-compatible BIOS.
BIOS Features	Award enhanced BIOS options.
Chipset Features	Options specific to your system chipset.
Power Management	System Power Management options.
PnP/PCI Configuration	Plug and Play standard and PCI Local Bus configuration options.
Integrated Peripherals	I/O subsystems that depend on the integrated peripherals controller in your system.
User Password Setting	Change, set, or disable a password.
IDE HDD Auto Detection	Automatically detect and configure IDE hard disk parameters.
Load Setup Defaults	Setup defaults are factory settings for optimal-performance system operations.
Save & Exit Setup	Save settings in nonvolatile CMOS RAM and exit Setup.
Exit Without Save	Abandon all changes and exit Setup.

4. BIOS SETUP

4.3 Standard CMOS Setup Menu

In the Standard CMOS Menu (Figure2) you can set the system clock and calendar, record disk drive parameters and the video subsystem type, and select the type of errors that stop the BIOS POST.

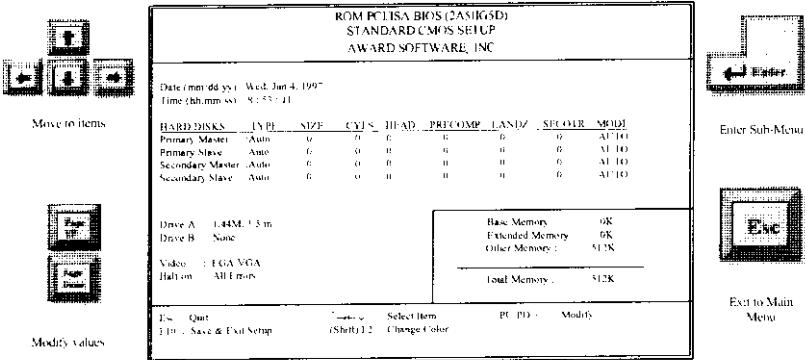


Figure 2: Standard CMOS setup

Date

The BIOS determines the day of the week from the other date information. This field is for information only. Press the left or right arrow key to move to the desired field (date, month, year). Press the PgUp or PgDn key to increment the setting, or type the desired value into the field.

Time

The time format is based on the 24-hour military-time clock. For example, 1 p.m. is 13:00:00. Press the left or right arrow key to move to the desired field. Press the PgUp or PgDn key to increment the setting, or type the desired value into the field.

Hard Disks

The BIOS supports up to 4 IDE drives. This section does not show information about other IDE devices, such as a CD-ROM drive, or other hard drive types, such as SCSI drives.

NOTE: We recommend that you select type AUTO for all Hard disks.

4. BIOS SETUP

The BIOS can automatically detect the specifications and optimal operating mode of almost all IDE hard drives. When you select type AUTO for a hard drive, the BIOS detects its specifications during POST, each time the system boots.

If you do not want to select drive type AUTO, other methods of selecting the drive type are available:

- 1) Match the specifications of your installed IDE hard drive(s) with the preprogrammed values for drive types 1 through 45.
- 2) Select USER and enter values into each drive parameter field.
- 3) Use the IDE HDD AUTO DETECTION function in Setup.

The following is a brief explanation of drive specifications:

- **Type:** The BIOS contains a table of pre-defined drive types. Each defined drive type has a specified number of cylinders, number of heads, write precompensation factor, landing zone, and number of sectors. Drives whose specifications do not accommodate any pre-defined type are classified as type USER.
- **Size:** Disk drive capacity (approximate). Note that this size is usually slightly greater than the size of a formatted disk given by a disk-checking program.
- **Cyls:** Number of cylinders
- **Head:** Number of heads
- **Precomp:** Write precompensation cylinder
- **Landz:** Landing zone
- **Sector:** Number of sectors
- **Mode:** Auto, Normal, large, or LBA
- **Auto:** The BIOS automatically determines the optimal mode.
- **Normal:** Maximum number of cylinders, heads, and sectors supported are 1024, 16, and 63.
- **Large:** For drives that do not support LBA and have more than 1024 cylinders.
- **LBA (Logical Block Addressing):** During drive accesses, the IDE controller transforms the data address described by sector, head, and cylinder number into a physical block address, significantly improving data transfer rates. For drives with greater than 1024 cylinders.

4. BIOS SETUP

Drive A/B type

Select the correct specifications for the diskette drive(s) installed in the computer.

None	No diskette drive installed
360K, 5.25 in	5-1/4 inch PC-type standard drive; 360 kilobyte capacity
1.2M, 5.25 in	5-1/4 inch AT-type high-density drive; 1.2 megabyte capacity
720K, 3.5 in	3-1/2 inch double-sided drive; 720 kilobyte capacity
1.44M, 3.5 in	3-1/2 inch double-sided drive; 1.44 megabyte capacity
2.88M, 3.5 in	3-1/2 inch double-sided drive; 2.88 megabyte capacity

Video

Select the type of primary video subsystem in your computer. The BIOS usually detects the correct video type automatically. The BIOS supports a secondary video subsystem, but it is not selected during Setup.

EGA/VGA	Enhanced Graphics Adapter/Video Graphics Array. For EGA, VGA, SEGA, SVGA or PGA monitor adapters.
CGA 40	Color Graphics Adapter, power up in 40 column mode.
CGA 80	Color Graphics Adapter, power up in 80 column mode.
MONO	Monochrome adapter, includes high resolution monochrome adapters.

Halt on

During the "power-on self-test", (POST), the computer halts if the BIOS detects any hardware errors. You can instruct the BIOS to ignore certain errors during POST and continue the boot-up process. These are the selections:

No errors	POST does not stop for any errors.
All errors	If the BIOS detects any non-fatal error, POST stops and prompts you to take corrective action.
All, But keyboard	POST does not stop for a keyboard error, but stops for all other errors.
All, But Diskette	POST does not stop for diskette drive errors, but stops for all other errors.
All, But Disk/Key	POST does not stop for a keyboard or disk error, but stops for all other errors.

4. BIOS SETUP

Memory

Values in the Memory field are for your information only and cannot be changed. The fields show the total installed "Random Access Memory", (RAM), and amounts allocated to base memory, extended memory, and other (high) memory. RAM is counted in kilobytes (KB: approximately one thousand bytes) and megabytes (MB: approximately one million bytes).

RAM is the computer's working memory, where the computer stores programs and data currently being used, so they are accessible to the CPU. Modern personal computers may contain up to 64 MB, 128 MB, or more.

Base Memory

Base memory is typically 640 KB. It is also referred to as "conventional memory".

The DOS operating system and conventional applications utilize this type of memory.

Extended Memory

Extended Memory is above the 1 MB boundary. Early IBM personal computers could not use memory above 1 MB, but current PCs and their software can use extended memory.

Other Memory

Between 640 KB and 1 MB: often called High memory. DOS may load "Terminate-and-Stay-Resident", (TSR), programs such as device drivers, in this area, to free as much conventional memory as possible for applications. Lines in your CONFIG.SYS file beginning with "LOADHIGH" will load programs into high memory.

Total Memory

System total memory is the sum of base memory, extended memory, and other memory.

4. BIOS SETUP

4.4 BIOS Features Setup Menu

This screen (Figure 3) contains industry-standard options additional to the core PC AT BIOS. This section describes all fields offered by Award Software in this screen. Some fields may vary from those in your Setup program. Your system board designer may omit or modify some fields.

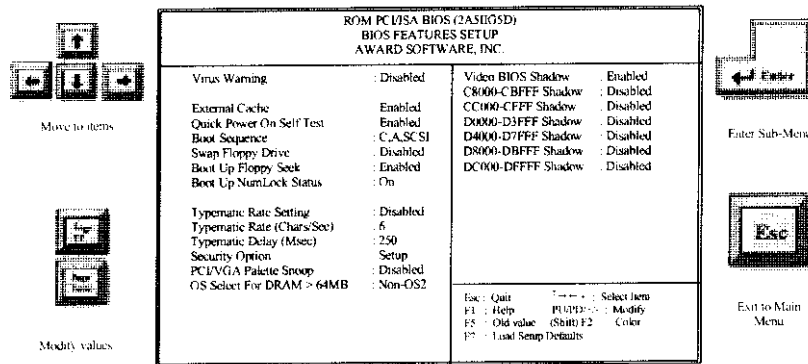


Figure 3: BIOS Features Setup Menu

Virus Warning

When enabled, you will receive a warning message if a program (specifically, a virus) attempts to write to the boot sector or the partition table of the hard disk drive. You should then run an anti-virus program. Keep in mind that this feature protects only the boot sector, not the entire hard drive.

NOTE: Many disk diagnostic programs that access the boot sector table can trigger the virus warning message. If you plan to run such a program, we recommend that you first disable the virus warning.

External Cache

Cache memory is additional memory that is much faster than conventional DRAM (system memory). When the CPU requests data, the system transfers the requested data from the main DRAM into cache memory, for even faster access by the CPU. The External Cache field may not appear if your system does not have external cache memory.

Quick Power On Self Test

This enables your system to do a "Quick Self Test" after Power on.

4. BIOS SETUP

Boot Sequence

The original IBM PCs loaded the DOS operating system from drive A (floppy disk). Because of this, IBM PC-compatible systems are designed to search for an operating system first on this drive, and then on drive C (hard disk). However, the BIOS now offers 10 different boot sequence options of three drives each. In addition to the traditional drives A and C, options include IDE hard drives D, E, and F, as well as an SCSI hard drive and a CD-ROM drive.

Swap Floppy Drive

This field is effective only in systems with two floppy drives. Selecting "*Enabled*" assigns physical drive B to logical drive A, and physical drive A to logical drive B.

Boot Up Floppy Seek

When "*Enabled*", the BIOS tests (seeks) floppy drives to determine whether they have 40 or 80 tracks. Only 360-KB floppy drives have 40 tracks; drives with 720 KB, 1.2 MB, and 1.44 MB capacity all have 80 tracks. Because very few modern PCs have 40-track floppy drives, we recommend that you set this field to "*Disabled*" to save time.

Boot Up NumLock Status

Toggle between "*On*" or "*Off*" to control the state of the NumLock key when the system boots. When toggled "*On*", the numeric keypad generates numbers instead of controlling cursor operations.

Typematic Rate Setting

When "*Disabled*", the following two items, "Typematic Rate" and "Typematic Delay", are irrelevant. Keystrokes repeat at a rate determined by the keyboard controller in your system. When "*Enabled*", you can select a Typematic Rate and Typematic Delay.

Typematic Rate (Chars/Sec)

When the "Typematic Rate" setting is "*Enabled*", you can select a Typematic Rate, (the rate at which characters repeat when you hold down a key) of 6, 8, 10, 12, 15, 20, 24 or 30 characters per second.

Typematic Delay (Msec)

When the "Typematic Rate" setting is "*Enabled*", you can select a Typematic Delay, (the delay before key strokes begin to repeat) of 250, 500, 750 or 1000 milliseconds.

Security Option

If you have set a password, select whether the password is required each time the System boots, or only when you enter Setup.

PCI/VGA Palette Snoop

Some display cards that are not standard VGA, such as graphics accelerators or MPEG cards, may not show the correct colors. This setting can correct the problem once it is set it to "*Enabled*". For default setting, leave at "*Disabled*".

4. BIOS SETUP

OS select for DRAM > 64MB

Select "OS2" only if you are running OS/2 operating system with greater than 64 MB of RAM on your system.

Shadow

This is software that resides in a Read-Only Memory, (ROM), chip on a device is called "firmware". The Award BIOS permits " *shadowing*" of firmware such as the system BIOS, video BIOS, and similar operating instructions that come with some expansion peripherals, such as, for example, a SCSI adaptor.

Shadowing copies firmware from ROM into system RAM, where the CPU can read it through the 16-bit or 32-bit DRAM bus. Firmware not shadowed must be read by the system through the 8-bit X-bus. Shadowing improves the performance of the system BIOS and similar ROM firmware for expansion peripherals, but it also reduces the amount of high memory (640 KB to 1 MB) available for loading device drivers, etc.

"*Enable*" shadowing into each section of memory separately. Many system designers hard-wire shadowing of the system BIOS and eliminate a System BIOS Shadow option.

Video BIOS shadows into memory area C0000-C7FFF. The remaining areas shown on the BIOS Features Setup screen may be occupied by other expansion card firmware. If an expansion peripheral in your system contains ROM-based firmware, you need to know the address range the ROM occupies to shadow it into the correct area of RAM.

4. BIOS SETUP

4.5 Chipset Features Setup Menu

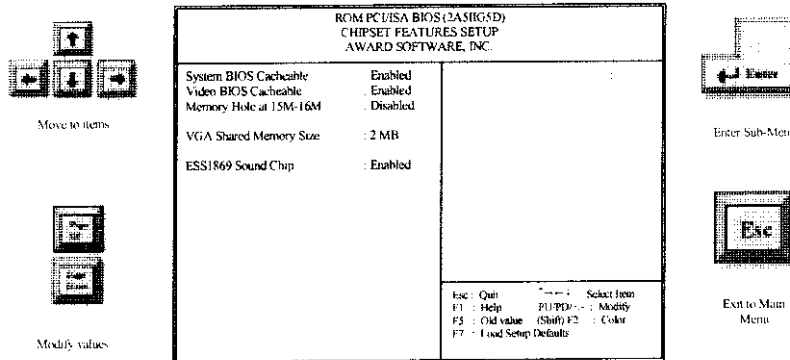


Figure 4: Chipset Features Setup Menu

System BIOS Cacheable

Selecting “*Enabled*” allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

Video BIOS Cacheable

Selecting “*Enabled*” allows caching of the video BIOS ROM at C0000h to C7FFFh, resulting in better video performance. However, if any program writes to this memory area, a system error may result.

Memory Hole At 15M-16M

You can reserve this area of system memory for ISA adapter ROM. When this area is reserved, it cannot be cached. The user information of peripherals that need to use this area of system memory usually discusses their memory requirements.

VGA Shared Memory Size

You can share the system memory in this item for VGA use.

ESS1869 Sound Chip

To enable the onboard Sound function or not.

4. BIOS SETUP

4.6 Power Management Setup Menu

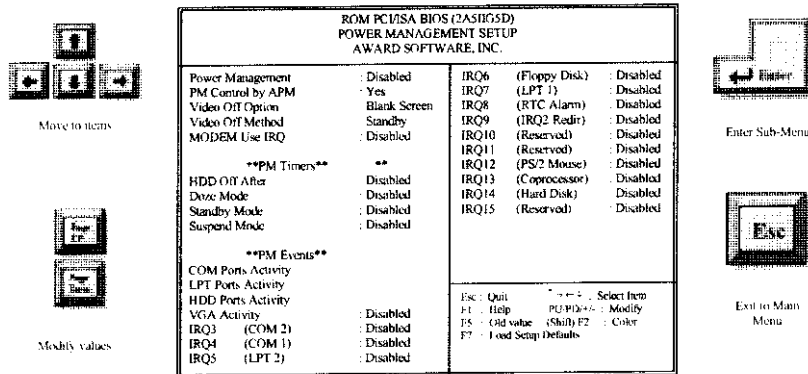


Figure 5: Power Management Setup Menu

Power Management

This option allows you to select the type (or degree) of power saving for Doze, Standby, and Suspend modes. See the section *PM Timers* for a brief description of each mode. The following table describes each Power Management mode:

Disable	Global Power Management will be disabled
Max Saving	Maximum power savings. Only Available for SL CPUs. Inactivity period is 1 minute in each mode.
User Define	Set each mode individually. Select time-out periods in the PM Timers section, following.
Min Saving	Minimum power savings. Inactivity period is 1 hour in each mode (except the hard drive).

PM Control by APM

If "Advanced Power Management", (APM), is installed on your system, selecting "Yes" provides you with greater power savings.

4. BIOS SETUP

Video Off Option

Determines the method of how video display enters power saving mode.

Video Off Method

Determines the manner in which the monitor is blanked.

V/H SYNC+Blank	System turns off vertical and horizontal synchronization ports and writes blanks to the video buffer.
DPMS Support	Select this option if your monitor supports the Display Power Management Signaling (DPMS) standard of the Video Electronics Standards Association (VESA). Use the software supplied for your video subsystem to select video power management values.
Blank Screen	System only writes blanks to the video buffer.

Modem Use IRQ

Enter the Interrupt that is used by the modem, if installed. Select "N/A" if no modem is installed

COM Ports Activity

When set to "Enabled", any event occurring at a COM (serial) port will awaken a system which has been powered down MODEM use.

LPT Ports Activity

When set to "Enabled", any event occurring at a LPT (printer) port will awaken a system which has been powered down.

HDD Ports Activity

When set to "Enabled", any event occurring at a hard or floppy drive port will awaken a system which has been powered down .

VGA Activity

When set to "Enabled", any event occurring at VGA will awaken a system which has been powered down.

4. BIOS SETUP

4.7 PCI Configuration Setup Menu

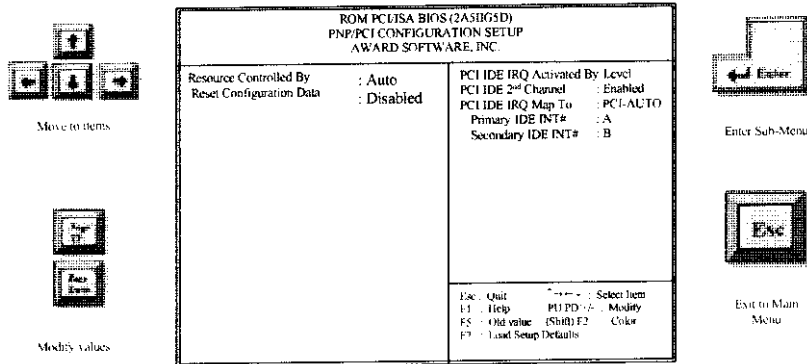


Figure 6: PNP/PCI Configuration Setup Menu

Resources Controlled by

The Award Plug and Play BIOS can automatically configure all the boot and Plug and Play-compatible devices. By selecting "Auto", the Interrupt Request, (IRQ), and DMA are automatically assigned by the BIOS and those fields disappear from the menu.

Reset Configuration Data

Normally, this field is left "Disabled". Selecting "Enabled" will reset the Extended System Configuration Data, (ESCD), when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the operating system cannot boot.

PCI IRQ Activated By

Leave the IRQ trigger set at "Level" unless the PCI device assigned to the interrupt specifies Edge-triggered interrupts.

PCI IDE 2nd Channel

The IDE standard supports 2 channels (interfaces) with 2 devices on each. "Enabled" the second channel if your system has two PCI IDE connectors in use, either on the system board or on expansion boards. "Disable" the second channel if a second IDE connector is not present or not in use.

PCI IDE IRQ Map To

This field lets you select PCI IDE IRQ mapping or PC AT (ISA) interrupts. If your system does not have one or two PCI IDE connectors on the system board, select values

4. BIOS SETUP

according to the type of IDE interface(s) installed in your system (PCI or ISA). Standard ISA interrupts for IDE channels are IRQ14 for primary and IRQ15 for secondary.

Primary/Secondary IDE INT#

Each PCI peripheral connection is capable of activating up to 4 interrupts: INT# A, INT# B, INT# C and INT# D. By default, a PCI connection is assigned INT# A. Assigning INT# B has no meaning unless the peripheral device requires two interrupt services rather than just one. Because the PCI IDE interface in the chipset has 2 channels, it requires 2 interrupt services. The primary and secondary IDE INT# fields default to values appropriate for 2 PCI IDE channels, with the primary PCI IDE channel having a lower interrupt than the secondary.

4. BIOS SETUP

4.8 Integrated Peripherals Menu

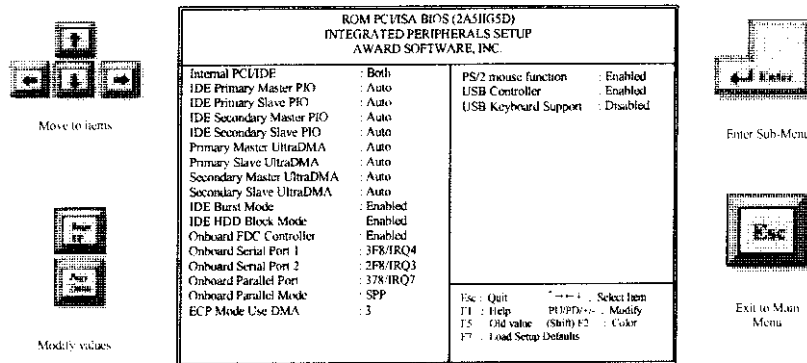


Figure 7: Integrated Peripherals setup Menu

Internal PCI/IDE

The SiS 5598 chipset contains a PCI IDE interface that supports 2 IDE channels: Primary (IRQ14) and Secondary (IRQ15). Each channel supports 2 IDE devices, so the system is capable of supporting a total of 4 IDE devices. Select Primary, Secondary, or Both to activate chipset IDE interface(s) installed on your system board.

IDE Primary/Secondary Master/Slave PIO

The 4 IDE PIO (Programmed Input/Output) fields allow you to set a PIO mode (0-4) for each of the 4 IDE devices that the onboard IDE interface supports. Modes 0 through 4 provide successively increased performance. In "Auto" mode, the system automatically determines the best mode for each device.

IDE Primary/Secondary Master/Slave UDMA

Ultra DMA/33 implementation is possible only if your IDE hard drive supports it and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive and your system software both support Ultra DMA/33, select "Auto" to enable BIOS support.

IDE Burst Mode

Selecting "Enabled" reduces latency between each drive read/write cycle, but may cause instability in IDE subsystems that cannot support such fast performance. If you are experiencing disk drive errors, try setting this value to "Disabled". This field does not appear when the Internal PCI/IDE field, above, is "Disabled".

4. BIOS SETUP

IDE HDD Block Mode

Block mode is also called block transfer, multiple commands, or multiple sector read/write. If your IDE hard drive supports block mode, (most new drives do), select *Enabled* for automatic detection of the optimal number of block read/writes per sector the drive can support.

Onboard FDC Controller

Select *Enabled* if your system has a Floppy Disk Controller, (FDC) installed on the system board and you wish to use it. If you install an add-in FDC or the system has no floppy drive, select *Disabled* in this field.

Onboard Serial Port 1/2

Select an address and corresponding interrupt for the first and second serial ports.

Onboard Parallel Port

Select a logical LPT port name and matching address for the physical parallel (printer) port.

Onboard Parallel Mode

Select an operating mode for the onboard parallel (printer) port. Select *Normal* unless your hardware and software require one of the other modes offered in this field.

SPP	Standard parallel port mode (Default)
EPP	Bi-directional mode
ECP	Fast, buffered
ECP+EPP	Bi-directional and buffered

ECP Mode Use DMA

Select a DMA channel for the port.

PS/2 Mouse Function

Select *Enabled* if your system contains a PS/2 port and you have a PS/2 mouse in use.

USB Controller

Allows you to enable USB Bus or not.

USB Keyboard Support

Select *Enabled* if your system contains a Universal Serial Bus, (USB), controller and

4. BIOS SETUP

you have a USB keyboard.

4.9 Load Setup Defaults

The chipset defaults are settings that provide for maximum system performance. While Award has designed the custom BIOS to maximize performance, the manufacturer has the right to change these defaults to meet their needs.

4.10 User Password

When you select this function, a message appears at the center of the screen:

ENTER PASSWORD:

Type a password up to eight characters and press "Enter". Typing a password clears any previously entered password from CMOS memory. Once you have pressed the "Enter" key, the following message appears:

CONFIRM PASSWORD:

Re-enter the same password and press "Enter". To abort the process at any time, press Esc.

For the "Security Option" item in the **BIOS Features Setup** screen, select "System" or "Setup":

System Enter a password each time the system boots and whenever you enter Setup.

Setup Enter a password whenever you enter Setup.

NOTE: *To clear the password, simply press "Enter" when asked to enter a password. The password function is then disabled.*

4.11 IDE HDD Auto Detection

BIOS setup will display all possible modes that are supported by the HDD including NORMAL, LBA & LARGE. If HDD does not support LBA modes, no 'LBA' option will be shown. If number of cylinders is less than or equal to 1024, no 'LARGE' option will be shown. Users can select a mode which is appropriate for them.

4.12 Save & Exit Setup

This feature allows the changes to be made to the CMOS setup to be saved. The system will resume booting after a successful save.

4. BIOS SETUP

4.13 Exit Without Saving

Abandon all CMOS value changes and exit setup without saving.