/ISUS® SP98-N
Pentium® NLX Motherboard

USER'S MANUAL

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FCC & DOC COMPLIANCE

Federal Communications Commission Statement

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

> **WARNING!** The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

I. INTRODUCTION

How this Manual is Organized

This manual is divided into the following sections:

I.	**Introduction:**	Manual information and checklist
II.	**Features:**	Information and specifications concerning this product
III.	**Installation:**	Instructions on setting up the motherboard
IV.	**BIOS Software:**	Instructions on setting up the BIOS software
V.	**Support Software:**	Information on the included support software
VI.	**ASUS SCSI Cards:**	Installation of ASUS SCSI cards (optional)

Item Checklist

Please check that your package is complete. If you discover damaged or missing items, please contact your retailer.

- ☑ (1) ASUS motherboard
- ☑ (1) IDE ribbon cable
- ☑ (1) Floppy ribbon cable for one 3.5inch floppy drive
- ☑ (1) Support drivers and utilities
- ☑ (1) Motherboard User's Manual
- ☑ (1) System housing User's Manual

- ☐ (1) NLX Form-factor system housing, riser card, and power supply (optional)
- ☐ DIMM memory module (optional)
- ☐ 3.5inch Floppy Drive (optional)
- ☐ Slim CD-ROM and cable (optional)
- ☐ ASUS PCI-SC200 Fast-SCSI or PCI-SC860 Ultra-Fast SCSI card (optional)

II. FEATURES

Features of the ASUS SP98-N Motherboard

The ASUS SP98-N motherboard is carefully designed for the demanding PC user who wants many features in a small package, namely:

- **Mini NLX:** Features ASUS' custom-designed mini-NLX form factor.
- **SiS Chipset:** Features the SiS 5598 chipset with built-in video controller and support for video-shared memory from 1MB to 4MB.
- **Onboard Audio:** Yamaha 16-bit audio onboard.
- **Slim CD-ROM:** Supports a notebook-sized slim CD-ROM drive.
- **Wake on LAN:** Supports wake on LAN activity with built-in network support.
- **Intel Network Interface:** Equipped with the Intel 82558 Ethernet LAN Controller (fully integrated 10BASE-T/100BASE-TX) with LED indicators for monitoring network conditions.
- **Versatile Processor Support:** Intel Pentium® 75–233MHz (P55C-MMX™, P54C/P54CS), IBM®/Cyrix® 6x86-PR166+ (Rev 2.7 or later), IBM®/Cyrix® 6x86MX™ (PR166 & faster), AMD-K5™ (PR75–PR133), AMD-K6™ (PR166 & faster).
- **Versatile Memory Support:** Equipped with two DIMM sockets to support 8-128MB 168-pin 3.3Volt SDRAM memory modules up to 256MB.
- **Super Multi-I/O:** Provides an onboard I/O processor for two high-speed UART-compatible serial ports and one parallel port with EPP and ECP capabilities.
- **Level 2 Cache:** Comes with onboard 512K Pipelined Burst SRAM.
- **Desktop Management Interface (DMI):** Supports DMI through BIOS, which allows hardware to communicate within a standard protocol creating a higher level of compatibility. (Requires DMI-enabled components.) (See section V)
- **PCI Bus Master IDE Controller:** Onboard Ultra DMA/33 Bus Master IDE controller with two connectors (one for CD-ROM only). Supports two IDE devices up to 8.4GB using one channel. Supports Bus Master UltraDMA/33 IDE, PIO Modes 3 & 4, and Bus Master IDE DMA Mode 2. Includes integrated keyboard controller. Supports two of either 5.25-inch (360KB, 1.2KB) or 3.5-inch disk drives (720KB, 1.44MB, 2.88MB). Supports Japanese "Floppy 3 mode" (3.5-inch disk drive: 1.2MB) and LS-120 floppy disk drives (3.5-inch disk drive: 120 MB, 1.44MB, 720K). BIOS supports IDE CD-ROM or SCSI device bootup.
- **Symbios SCSI BIOS:** Supports optional ASUS SCSI controller cards through onboard firmware.
- **Performance:** Provides 528MB/s data transfer rate using SDRAM, 33MB/s IDE transfer rate using Bus Master UltraDMA/33 IDE, concurrent PCI allows multiple PCI transfers.
- **Compliancy:** ACPI ready for advanced power management features and PC97 compliancy for greater support.
- **Easy Installation:** Incorporates BIOS that supports autodetection of hard disk drives, PS/2 mouse, and Plug and Play devices to make setup of hard disk drives, expansion cards, and other devices virtually automatic.
- **Riser Card:** Provides NLX power, primary IDE, floppy drive, LAN wake up connector, 2 PCI slots, 1 ISA slot, 2 USB ports, and IrDA.

II. FEATURES

Parts of the ASUS SP98-N Motherboard

T: Parallel Conn.
B: Serial Conn.

COM 1
COM 2
RJ45 Port
LAN Activity Indicator
VGA Connector
Joystick/MIDI Connector

T: PS/2 Mouse
B: PS/2 Keyboard

Multi-I/O

Intel CPU Compatible ZIF Socket 7

Intel 82558 Ethernet LAN Controller

512KB Pipelined Burst L2 Cache

2 DIMM Sockets

SiS 5598 Chipset

Programmable Flash ROM

Riser Card Front

2 PCI Slots

1 ISA Slot

NLX Slot

Floppy Drive Connector

Riser Card Back

IrDA Port

2 USB Ports

Primary IDE Connector

NLX Power Connector

III. INSTALLATION

ASUS SP98-N Motherboard Layout

Parallel Port

COM 1   COM 2

PS/2   RJ-45   VGA   Joystick/MIDI

MOUSE (TOP PORT)
KEYBOARD (BOTTOM)

VGA Setting 1

Internal Speaker Connector   Jack Connector

Switching Voltage Regulators

VID0 VID1 VID2
CPU Voltage

Multi I/O Chip

Audio Chipset

BF2 BF1 BF0
Freq. Ratio

CPU_FAN

CPU ZIF Socket 7

Feature Connector

LM75
CPU Thermal Sensor
(Hardware Monitor)

Intel 82558
Ethernet LAN
Controller

DIMM Socket 2 (64-bit, 168-pin module)
DIMM Socket 1 (64-bit, 168-pin module)

+5V TAG RAM

512KB Pipelined
Burst L2 Cache

SiS
5598
Chipset

VGA Setting
VGA Interrupt

CDROM Connector

CMOS Power
CR2032
3 Volt Cell

RTCLR

CR2

3:2 1:0 Row

BUS Freq.
FS1
FS1
FS2
PCI Freq. Sel. FS3

LM78

Hardware Monitoring

Flash EEPROM
(Programmable BIOS)

PCI Slot 2

PCI Slot 1

LAN LED Wake on LAN

ISA Slot 1

Floppy Drive Conn.

NLX Ext.   Riser Slot   Riser Slot   Riser Slot   Panel Conn.   MIC Con.

Riser Card Front

Infrared   Primary IDE

USB1&2   NLX Power

Riser Card Back

III. INSTALLATION

Jumpers

1) RTCLR   p. 13   Real Time Clock RAM (Normal Setting/Clear CMOS)

2) BF0, BF1, BF2   p. 14   CPU:BUS Frequency Ratio

3) FS0, FS1, FS2, FS3   p. 14   CPU External Clock (BUS) and PCI Frequency Selection

4) VID0, VID1, VID2, VID3 p. 16   CPU Voltage Regulator Output Selection

5) VGA_SEL, VGA_SEL1   p. 17   VGA Selection

6) INT_SEL   p. 17   VGA Interrupt Selection

Expansion Slots

1) DIMM Sockets   p. 18   168-Pin DIMM Memory Expansion Sockets

2) CPU ZIF Socket 7   p. 20   Central Processing Unit (CPU) Socket

3) SLOT 1   p. 21   16-bit ISA Bus Expansion Slots

4) PCI 1, PCI 2   p. 21   32-bit PCI Bus Expansion Slots

Connectors

1) PS2KBMS   p. 23   PS/2 Keyboard Connector (6-pin Female)

2) PS2KBMS   p. 23   PS/2 Mouse Connector (6-pin Female)

3) GAME_PORT   p. 23   Joystick or MIDI Connector (15-pin Female)

4) PRINTER   p. 24   Parallel Port Connector (25-pin Female)

5) COM1, COM2   p. 24   Serial Port COM1 and COM2 (Two 9-pin Male)

6) VGA   p. 24   VGA Compatible Connector (15-pin Female)

7) RJ-45   p. 24   RJ-45 Connector (8-pin Female)

8) LAN_LED   p. 24   LAN Condition LED (3-diode Indicator)

9) USB   p. 25   Universal Serial BUS Ports 1 & 2 (Two 4-pin Female)

10) IR   p. 25   IrDA/Fast IR-Compliant Infrared Module

11) POWER   p. 25   NLX Power Supply Connector (20-pin Block)

12) IDE1   p. 26   Primary IDE Connector (40-pin Block)

13) FLOPPY   p. 26   3.5-inch Floppy Drive Connector (34-pin Block)

14) LAN_LED   p. 26   LAN Activity Connectors (2-pin & 3-pin)

15) PAN_CON   p. 27   Front Panel Display LEDs and Switches (16-1 pin)

16) MIC_CON   p. 27   Front Panel Microphone Jack Connector (2 pin)

17) CPU_FAN   p. 29   CPU Fan Power (3-pin Block)

18) JACK_CONN   p. 29   Back Panel Audio Connectors (10-1 pin Block)

19) INT_SPKR   p. 29   Internal Speaker Connector (4 pins)

20) CDROM   p. 30   CD-ROM Drive Connector (50-1 pins)

21) FEATURE   p. 30   Video Feature Connector (26 pins)

III. INSTALLATION

Installation Steps

Before using your computer, you must complete the following steps:

1. **Set Jumpers on the Motherboard**
2. **Install System Memory**
3. **Install the Central Processing Unit (CPU)**
4. **Install Expansion Cards**
5. **Connect Ribbon Cables, Cabinet Wires, and Power Supply**
6. **Setup the BIOS Software**

1. Jumpers

Several hardware settings are made through the use of jumper caps to connect jumper pins (JP) on the motherboard. See "Motherboard Layout" for locations of jumpers. The jumper settings will be described numerically, such as [----], [1-2], [2-3] for no connection, connect pins 1&2, and connect pins 2&3 respectively. A "1" is written besides pin 1 on jumpers with three pins. The jumpers will also be shown graphically such as ▪▪▫ to connect pins 1&2 and ▫▪▪ to connect pins 2&3. Jumpers with two pins will be shown as ▪▪ for Short (On) and ▫▫ for Open (Off). For manufacturing simplicity, the jumpers may be sharing pins from other groups. Use the diagrams in this manual instead of following the pin layout on the board. Settings with two jumper numbers require that both jumpers be moved together. To connect the pins, simply place a plastic jumper cap over the two pins as diagrammed.

WARNING! Computer motherboards, baseboards and components, such as SCSI cards, contain very delicate Integrated Circuit (IC) chips. To protect them against damage from static electricity, you should follow some precautions whenever you work on your computer.

1. Unplug your computer when working on the inside.
2. Use a grounded wrist strap before handling computer components. If you do not have one, touch both of your hands to a safely grounded object or to a metal object, such as the power supply case.
3. Hold components by the edges and try not to touch the IC chips, leads or connectors, or other components.
4. Place components on a grounded antistatic pad or on the bag that came with the component whenever the components are separated from the system.

III. INSTALLATION

Jumper Settings

1. **Real Time Clock (RTC) RAM (RTCLR)**
   The CMOS RAM is powered by an onboard button cell battery. To clear the RTC data: (1) Turn off your computer and remove the AC power , (2) Move this jumper to "Clear CMOS" (3) Move the jumper back to "Normal Setting," (4) Turn on your computer, (5) Hold down <Delete> during bootup and enter BIOS setup to re-enter user preferences.

   Battery Test Jumper (RTCLR)
   You can test the battery's current by removing the RTCLR jumper and touching the "Normal Setting" pins with the test probes from a battery tester.

   WARNING! You must unplug the power cord to your power supply to ensure that there is no power to your motherboard. The CMOS RAM containing BIOS setup information *may* be cleared by this action. You *should* enter BIOS to "Load Setup Defaults" and re-enter any user information after removing and reapplying the RTCLR jumper.

RTC RAM	RTCLR
Normal Setting	[1-2] (Default)
Clear CMOS	[2-3] (momentarily)
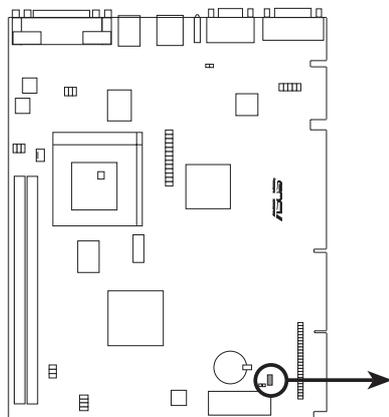
WARNING! Move the jumper to the "Clear CMOS" setting only when clearing RTC data. Otherwise, BIOS setup information *may* be cleared.

RTCLR
3
2   Battery test
1
Normal Setting (Default)

RTCLR
3
2
1
Clear CMOS

SP98-N Real Time Clock (RTC) RAM
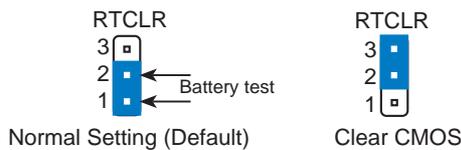
2. CPU to BUS Frequency Ratio (BF0, BF1, BF2)

These jumpers set the frequency ratio between the *Internal* frequency of the CPU and the *External* frequency (called the *BUS Clock*) within the CPU. These must be set together with the above jumpers *CPU External (BUS) Frequency Selection.*

3. CPU External Clock (BUS) (FS0, FS1, FS2) and PCI Frequency Selection (FS3)

These jumpers tell the clock generator what frequency to send to the CPU. These allow the selection of the CPU's *External* frequency (or *BUS Clock*). The BUS Clock multiplied by the BUS Ratio equals the CPU's *Internal* frequency (the advertised CPU speed).

Match the **Ratio** column of the table on the opposite page with these CPU types.

CPU A →	1.5x(3/2)	2.0x(2/1)	2.5x(5/2)	3.0x(3/1)	----	----
CPU B →	3.5x(7/2)	2.0x(2/1)	2.5x(5/2)	3.0x(3/1)	----	----
CPU C →	3.0x(3/1)	2.0x(2/1)	1.0x(1/1)	----	----	----
CPU D →	3.0x(3/1)	2.0x(2/1)	2.0x(2/1)	----	----	----
CPU E →	3.5x(7/2)	2.0x(2/1)	2.5x(5/2)	3.0x(3/1)	4.0x(4/1)	4.5x(9/2)
CPU F →	----	2.0x(2/1)	2.0x(2/1)	----	1.5x(3/2)	1.5x(3/2)

CPU:BUS Frequency Ratio

Host →	50MHz	55MHz	60MHz	66.8MHz	75.9MHz	83.3MHz
Sync PCI →	25MHz	27.5MHz	30MHz	33.4MHz	37.5MHz	41.7MHz
Async PCI →	32MHz	32MHz	32MHz	32MHz	32MHz	32MHz

CPU External Clock (BUS) Frequency Selection

FS3 — Synchronous PCI   FS3 — Asynchronous PCI

PCI Frequency Selection

SP98-N CPU Jumpers

WARNING! Do not overclock your processor. Overclocking can cause undue stress on the CPU and motherboard. It may result in a slower speed or other unpredictable outcomes. The table on the following page shows the approved CPUs and their settings.

III. INSTALLATION

Set the jumpers according to the internal speed of your processor as follows:

CPU Model	Freq.	Ratio	BUS F.	(BUS Freq.) FS0	FS1	FS2	FS3	(Freq. Ratio) BF2	BF1	BF0
Intel Pentium P54C	166MHz	A-2.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[2-3]	[2-3]	[1-2]
Intel Pentium P54C	150MHz	A-2.5x	60MHz	[1-2-]	[2-3]	[2-3]	[1-2]	[2-3]	[2-3]	[1-2]
Intel Pentium P54C	133MHz	A-2.0x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]
Intel Pentium P54C	120MHz	A-2.0x	60MHz	[1-2]	[2-3]	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]
Intel Pentium P54C	100MHz	A-1.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
Intel Pentium P54C	90MHz	A-1.5x	60MHz	[1-2]	[2-3]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
Intel Pentium P54C	75MHz	A-1.5x	50MHz	[2-3]	[2-3]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
AMD-K5-PR133	100MHz	A-1.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
AMD-K5-PR120	90MHz	A-1.5x	60MHz	[1-2]	[2-3]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
AMD-K5-PR100	100MHz	A-1.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
AMD-K5-PR90	90MHz	A-1.5x	60MHz	[1-2]	[2-3]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
AMD-K5-PR75	75MHz	A-1.5x	50MHz	[2-3]	[2-3]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
Intel Pentium P55C	233MHz	B-3.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
Intel Pentium P55C	200MHz	B-3.0x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[2-3]	[1-2]
Intel Pentium P55C	166MHz	B-2.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[2-3]	[2-3]	[1-2]
IBM/Cyrix 6x86MX-PR233	200MHz	B-3.0x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[2-3]	[1-2]
IBM/Cyrix 6x86MX-PR200	166MHz	B-2.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[2-3]	[2-3]	[1-2]
IBM/Cyrix 6x86MX-PR166	150MHz	B-2.5x	60MHz	[1-2]	[2-3]	[2-3]	[1-2]	[2-3]	[2-3]	[1-2]
IBM/Cyrix 6x86-PR166+*	133MHz	C-2.0x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]
IBM/Cyrix 6x86L-PR166+*	133MHz	D-2.0x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]
AMD-K6-PR233	233MHz	E-3.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[1-2]	[1-2]
AMD-K6-PR200	200MHz	E-3.0x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[1-2]	[2-3]	[1-2]
AMD-K6-PR166	166MHz	E-2.5x	66MHz	[2-3]	[1-2]	[2-3]	[1-2]	[2-3]	[2-3]	[1-2]
IBM/Cyrix 6x86L-PR200+	150MHz	F-2.0x	75MHz	[1-2]	[2-3]	[1-2]	[2-3]	[2-3]	[1-2]	[1-2]

*Compatible Cyrix CPU Identification

The only IBM/Cyrix 6x86(L)-PR166+ (M1) CPU that is supported on this motherboard is revision 2.7 or later. Look the underside of the CPU for the serial number. The number should read G8DC6620A or later.
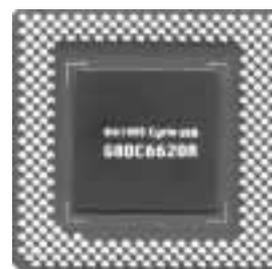
4. Voltage Regulator Output Selection (VID0, VID1, VID2, VID3)

These jumpers set the voltage supplied to the CPU.

Pentium MMX (P55C) (150MHz-233MHz) Intel Pentium (P54C) (75MHz-200MHz) AMD-K6 (PR166 and faster) AMD-K5 (PR75-PR133) IBM/Cyrix 6x86(MX) (PR166 and faster) IBM/Cyrix 6x86(M1) (PR166 and faster)
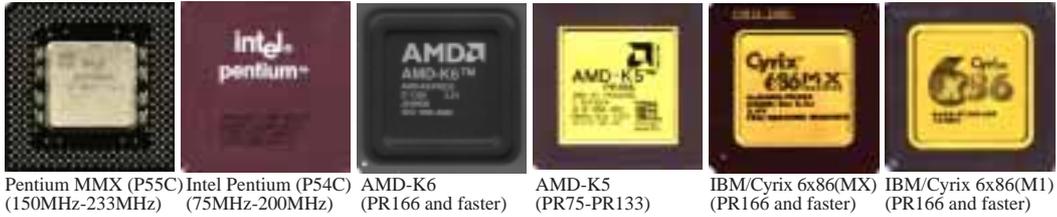
WARNING! Because CPU designs change rapidly, the table below is only intended as a simple guideline and thus may not be true for your CPU. Always refer to the CPU documentation for your CPU's voltage and then set the appropriate VID jumpers according to the illustration below.

Manufacturer	CPU Type	Single Plane	Dual Plane	VID0	VID1	VID2	VID3
Intel	P54C/P54CS	3.5V(VRE)	----	[1-2]	[1-2]	[1-2]	[1-2]
AMD	K5	3.5V(VRE)	----	[1-2]	[1-2]	[1-2]	[1-2]
IBM/Cyrix	6x86	3.5V(VRE)	----	[1-2]	[1-2]	[1-2]	[1-2]
Intel	P54C/P54CS	3.4V(STD)	----	[2-3]	[1-2]	[1-2]	[1-2]
AMD	K5	3.4V(STD)	----	[2-3]	[1-2]	[1-2]	[1-2]
AMD (.35micron)	K6-PR233	----	3.2V(Dual)	[2-3]	[2-3]	[1-2]	[1-2]
AMD (.35micron)	K6-166,200	----	2.9V(Dual)	[1-2]	[2-3]	[2-3]	[1-2]
IBM/Cyrix	6x86MX	----	2.9V(Dual)	[1-2]	[2-3]	[2-3]	[1-2]
Intel	P55C-MMX	----	2.8V(Dual)	[2-3]	[2-3]	[2-3]	[1-2]
AMD (.25micron)	K6-233,266,300	----	2.1V(Dual)	[1-2]	[2-3]	[2-3]	[2-3]
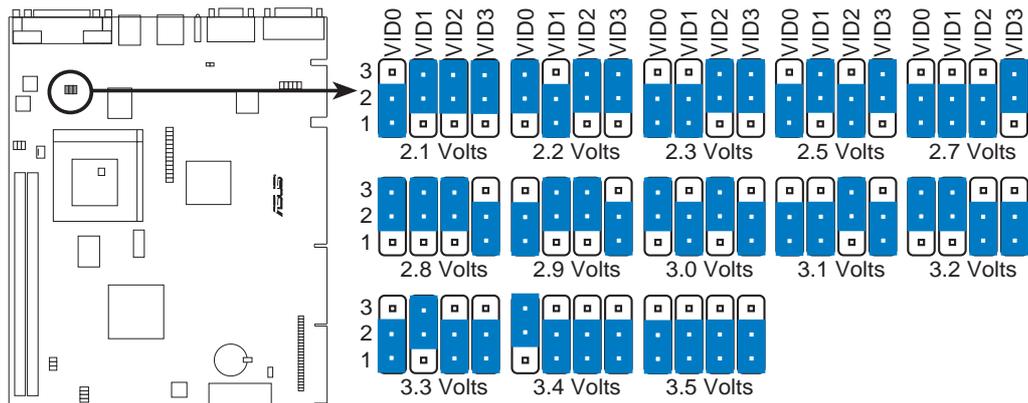
SP98-N Voltage Regulator Output Selection

III. INSTALLATION

Using your own VGA card on the PCI expansion slot

The motherboard's BIOS will autodetect whether a VGA card is installed on the PCI expansion slot and disable or enable the onboard VGA but most operating systems bypasses the BIOS and installs the onboard VGA through Plug and Play. The following VGA Selection jumpers are not required under standard configurations but if you experience any conflicts, follow the jumper settings below.

5.   VGA Selection (VGA_SEL, VGA_SEL1)

These jumpers allow you to turn the onboard VGA on or off. BIOS has automatic Enable/Disable onboard VGA. You need to disable the onboard VGA only if you have conflicts within your operating system.

VGA_SEL1

VGA_SEL1

VGA_SEL
INT_SEL

VGA_SEL
INT_SEL

Enable VGA
(Default)

Disable VGA

SP98-N Onboard VGA
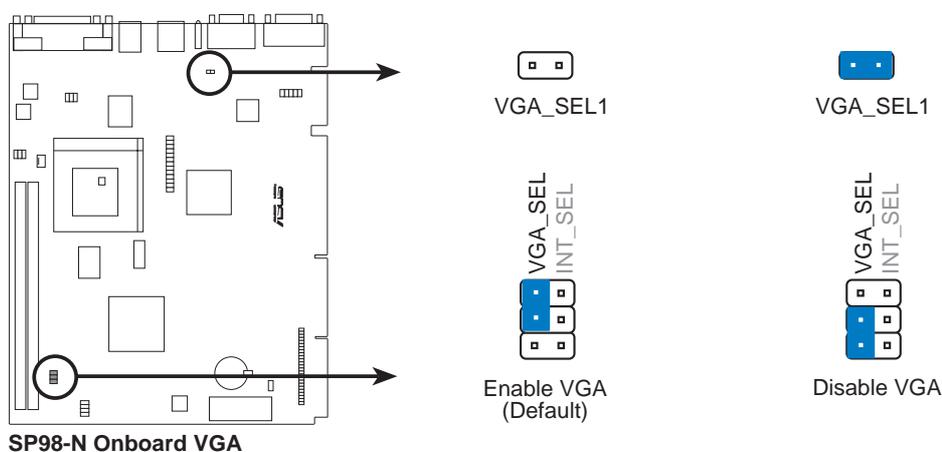
6.   VGA Interrupt Selection (INT_SEL)

These jumpers allow you to set the VGA interrupt method. The default disables the chipset's internal interrupt routing. Some video capture cards may require that the interrupt be assigned by the onboard chipset.

VGA_SEL
INT_SEL

VGA_SEL
INT_SEL

Interrupt Disabled
(Default)

Interrupt by Chipset
(Video Capture Cards)

SP98-N Onboard VGA Interrupt
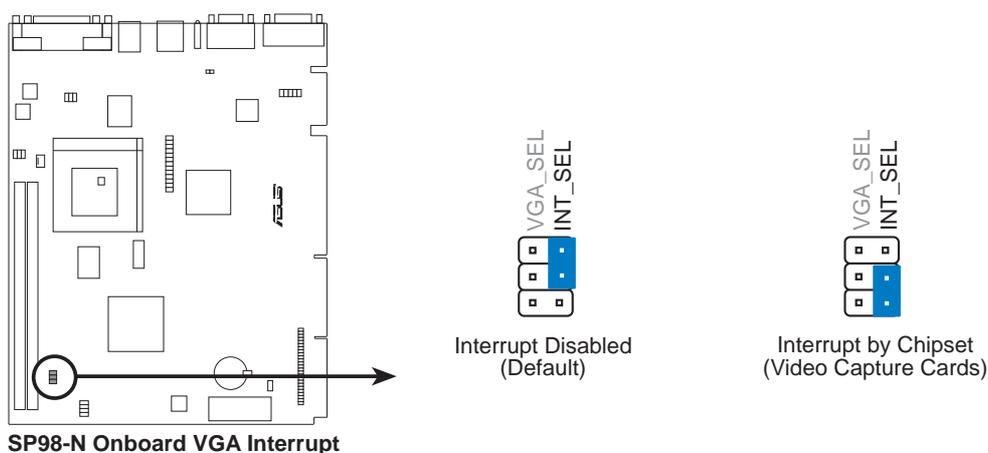
III. INSTALLATION
Jumpers

2. System Memory (DIMM)

Only Dual Inline Memory Modules (DIMMs) can be used with this motherboard. Two sockets are available for **3.3Volt** (power level) Unbuffered Synchronous DRAMs (SDRAM) or EDO DRAM of either 8, 16, 32, 64, or 128MB to form a memory size between 8MB to 512MB. One side (with memory chips) of the DIMM module takes up one Row on the motherboard.

IMPORTANT: Memory speed setup is required through "Auto Configuration" in BIOS Chipset Features Setup.

Install memory in any combination as follows:

DIMM Location	168-pin DIMM Memory Modules		Total Memory
Socket 1 (Rows 0&1)	SDRAM/EDO 8, 16, 32, 64, 128MB	x1	
Socket 2 (Rows 2&3)	SDRAM/EDO 8, 16, 32, 64, 128MB	x1	
	Total System Memory (Max 256MB)	=	

ASUS DIMM Module Examples:
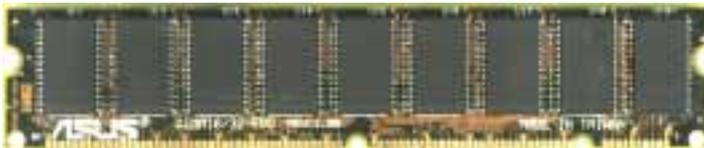
Parity EDO DIMM (9 chips)
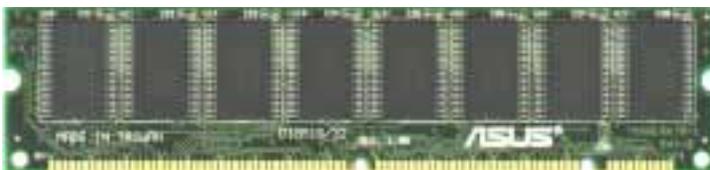
Non-Parity SDRAM DIMM (8 chips)

General DIMM Notes: (not true for all memory modules)
• Four possible memory chips are supported: EDO or SDRAM with and without parity.
• SDRAM chips are generally thinner with higher pin density than EDO chips.
• BIOS shows EDO or SDRAM memory on bootup screen.
• 8 chip/side modules do not support parity, only 9 chip/side modules support parity.
• Single sided modules are usually 16 or 64 MB, double sided are usually 8, 32, or 128MB.

III. INSTALLATION

DIMM Memory Installation Procedures:

Insert the module(s) as shown. Because the number of pins are different on either side of the breaks, the module will only fit in the orientation as shown. DRAM SIMM modules have the same pin contact on both sides. SDRAM DIMM modules have different pint contact on each side and therefore have a higher pin density.

88 Pins

60 Pins

20 Pins

Lock
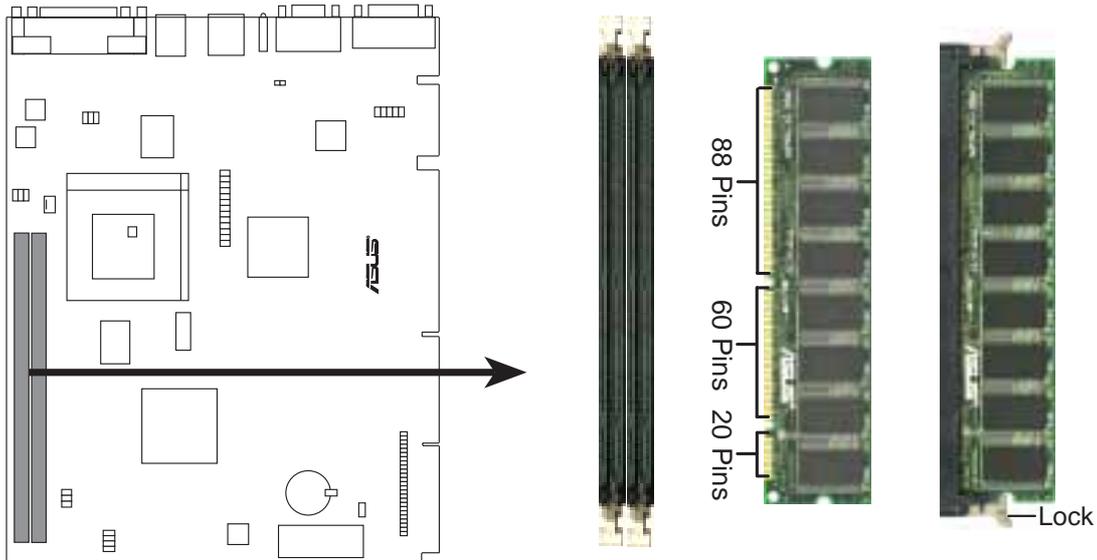
SP98-N 168-Pin DIMM Memory Sockets

The Dual Inline Memory Module (DIMM) memory modules must be 3.3Volt Un-buffered Synchronous DRAM (SDRAM) or Extended Data Output (EDO) . You can identify the type of DIMM module by the illustration below:

168-Pin DIMM Notch Key Definitions (3.3V)

DRAM Key Position   Voltage Key Position

RFU   **Unbuffered**   5.0V   Reserved
Buffered   **3.3V**
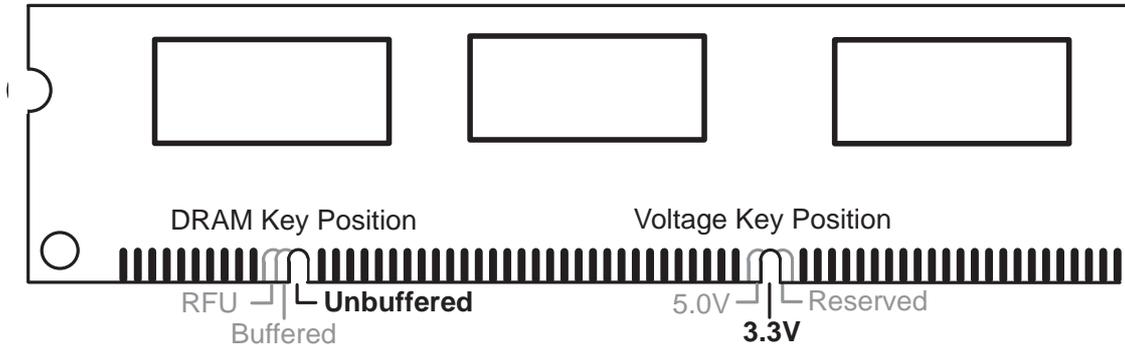
The notch on the DIMM module will shift between left, center, or right to identify the type and also to prevent the wrong type to be inserted into the DIMM slot on the motherboard. You must ask your retailer for the specifications before purchasing. Four clock signals are supported on this motherboard.

III. INSTALLATION

3. Central Processing Unit (CPU)

The motherboard provides a 321-pin ZIF Socket 7 that is backwards compatible with ZIF Socket 5 processors. The CPU that came with the motherboard should have a fan attached to it to prevent overheating. If this is not the case then purchase a fan before you turn on your system.

> **WARNING!** Without a fan circulating air on the CPU, the CPU can overheat and cause damage to both the CPU and the motherboard.

To install a CPU, first turn off your system and remove its cover. Locate the ZIF socket and open it by first pulling the lever sideways away from the socket then upwards to a 90-degree right angle. Insert the CPU with the correct orientation as shown. Use the notched corner of the CPU with the white dot as your guide. The white dot should point towards the end the of the lever. Notice that there is a blank area where one hole is missing from that corner of the square array of pin holes and a "1" printed on the motherboard next to that corner. Because the CPU has a corner pin for three of the four corners, the CPU will only fit in the one orientation as shown. The picture is for reference only; you should have a CPU fan that will cover the face of the CPU. With the added weight of the CPU fan, no force is required to insert the CPU. Once completely inserted, hold down on the fan and close the socket's lever.

IMPORTANT: You must set jumpers for "CPU to BUS Frequency Ratio" and jumpers for "BUS Frequency Selection" depending on the CPU that you install.
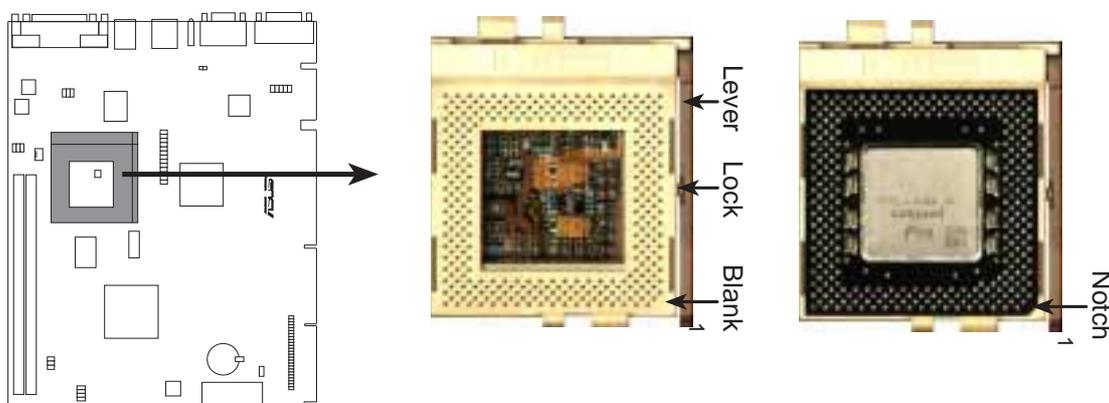
SP98-N ZIF Socket 7 with Pentium MMX Processor

4. Expansion Cards

> **WARNING!** Make sure that you unplug your power supply when adding or removing expansion cards or other system components. Failure to do so may cause severe damage to both your motherboard and expansion cards.

First read your expansion card documentation on any hardware and software settings that may be required to setup your specific card.

Expansion Card Installation Procedure:

1. Read the documentation for your expansion card.
2. Set any necessary jumpers on your expansion card.
3. Remove your computer system's cover.
4. Remove the bracket on the slot you intend to use. Keep the bracket for possible future use.
5. Carefully align the card's connectors and press firmly.
6. Secure the card on the slot with the screw you removed in step 4.
7. Replace the computer system's cover.
8. Setup the BIOS if necessary
   (such as "IRQ xx Used By ISA: Yes" in PNP AND PCI SETUP)
9. Install the necessary software drivers for your expansion card.

Assigning IRQs for Expansion Cards

Some expansion cards need to use an IRQ to operate. Generally an IRQ must be exclusively assigned to one use. In an standard design there are 16 IRQs available but most of them are already in use by parts of the system which leaves 6 free for expansion cards.

Both ISA and PCI expansion cards may need to use IRQs. System IRQs are available to cards installed in the ISA expansion bus first, and any remaining IRQs are then used by PCI cards. Currently, there are two types of ISA cards.

III. INSTALLATION

The original ISA expansion card design, now referred to as "Legacy" ISA cards, requires that you configure the card's jumpers manually and then install it in any available slot on the ISA bus. You may use Microsoft's Diagnostic (MSD.EXE) utility included in the Windows directory to see a map of your used and free IRQs. For Windows 95 users, the "Control Panel" icon in "My Computer," contains a "System" icon which gives you a "Device Manager" tab. Double clicking on a specific device give you "Resources" tab which shows the Interrupt number and address. Make sure that no two devices use the same IRQs or your computer will experience problems when those two devices are in use at the same time.

To simplify this process this motherboard has complied with the Plug and Play (PNP) specification, which was developed to allow automatic system configuration whenever a PNP-compliant card is added to the system. For PNP cards, IRQs are assigned automatically from those available.

If the system has both Legacy and PNP ISA cards installed, IRQs are assigned to PNP cards from those not used by Legacy cards. The PCI and PNP configuration of the BIOS setup utility can be used to indicate which IRQs are being used by Legacy cards. For older Legacy cards that does not work with the BIOS, you can contact your vendor for an ISA Configuration Utility.

An IRQ number is automatically assigned to PCI expansion cards after those used by Legacy and PNP ISA cards. In the PCI bus design, the BIOS automatically assigns an IRQ to a PCI slot that has a card in it that requires an IRQ. To install a PCI card, you need to set something called the INT (interrupt) assignment. Since all the PCI slots on this motherboard use an INTA #, be sure that the jumpers on your PCI cards are set to INT A.

Assigning DMA Channels for ISA Cards

Some ISA cards, both legacy and PnP, may also need to use a DMA (Direct Memory Access) channel. DMA assignments for this motherboard are handled the same way as the IRQ assignment process described earlier. You can select a DMA channel in the PCI and PnP configuration section of the BIOS Setup utility.

IMPORTANT: To avoid conflicts, reserve the necessary IRQs and DMAs for legacy ISA cards (under PNP AND PCI SETUP of the BIOS SOFTWARE, choose *Yes* in *IRQ xx Used By ISA* and *DMA x Used By ISA* for those IRQs and DMAs you want to reserve).

ISA Cards and Hardware Monitor

The onboard hardware monitor uses the address 290H-297H so legacy ISA cards must not use this address or else conflicts will occur.

III. INSTALLATION

5. External Connectors

> **WARNING!** Some pins are used for connectors or power sources. These are clearly delineated from jumpers in the motherboard layout (page 10). Placing jumper caps over these pins will damage your motherboard.

IMPORTANT: Ribbon cables should always be connected with the red stripe on the Pin 1 side of the connector. The four corners of the connectors are labeled on the motherboard. Pin 1 is the side closest to the power connector on hard drives and floppy drives. IDE ribbon cable must be less than 18in. (46cm), with the second drive connector no more than 6in. (15cm) from the first connector.

1. **PS/2 Keyboard Connector (6-pin Female)**
   This connector is for a standard keyboard using an PS/2 plug (mini DIN). **This connector will not allow standard AT size (large DIN) keyboard plugs. You may use a DIN to mini DIN adapter on standard AT keyboards.**

2. **PS/2 Mouse Connector (6-pin Female)**
   The system will direct IRQ12 to the PS/2 mouse if one is detected. If not detected, expansion cards can use IRQ12. See "PS/2 Mouse Control" in BIOS Features Setup of the BIOS SOFTWARE.

PS/2 Mouse (6-pin Female)

PS/2 Keyboard (6-pin Female)
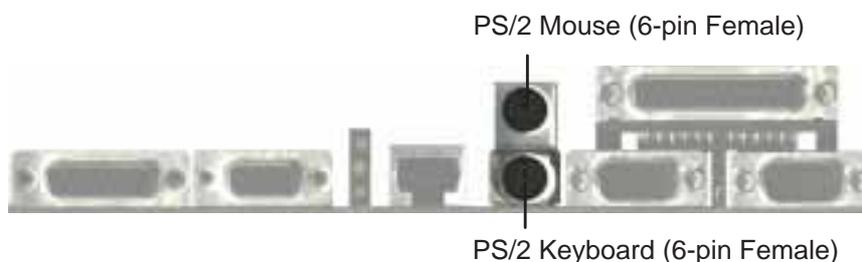
3. **Joystick/MIDI Connector (15-pin Female)**
   This connector is for a standard joystick or MIDI device.

Joystick/Midi (15-pin Female)

III. INSTALLATION

4. **Parallel Port Connector (25-pin Female)**

   You can enable the parallel port and choose the IRQ through "Onboard Parallel Port" in Chipset Features Setup of the BIOS SOFTWARE. **NOTE**: Serial printers must be connected to the serial port.

   Parallel Port (25-pin Female)

5. **Serial Port COM1 and COM2 Connectors (Two 9-pin Male)**

   The two serial ports can be used for pointing devices or other serial devices. See "Onboard Serial Port" in Chipset Features Setup of the BIOS SOFTWARE.

   COM 1   COM 2
   Serial Ports (9-pin Male)

6. **VGA Connector (15-pin Female)**

   This connector is for displaying on a standard VGA-compatible device.

   VGA Monitor (15-pin Female)

7. **RJ-45 Connector (8-pin Female)**

   This connector can be used to connect the built-in 32-bit 10/100 MBs Ethernet network LAN Controller to a host or a Hub.

   RJ-45 (8-pin Female)
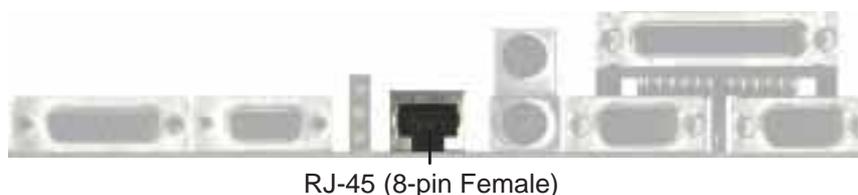
8. **LAN Condition LED (3-diode Indicator)**

   This LED indicates the speed (green, bottom), activity (yellow), and link (green, top) status of network conditions. See "VII. ASUS Network Interface" for more information.

   LAN Condition LED (3-diode Indicator)
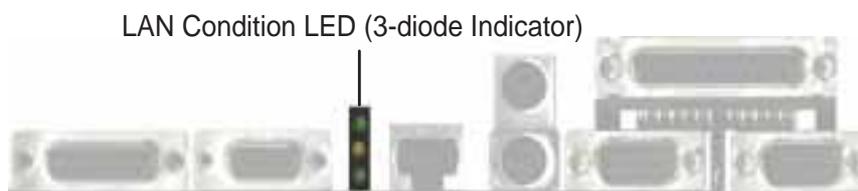
III. INSTALLATION

9. Universal Serial BUS Ports 1 & 2 (Two 4-pin Female Sockets)

Two USB ports are available for connecting USB devices.

Riser Card Back

USB Connectors

Port 1   Port 2

The USB connectors show through the front system panel.
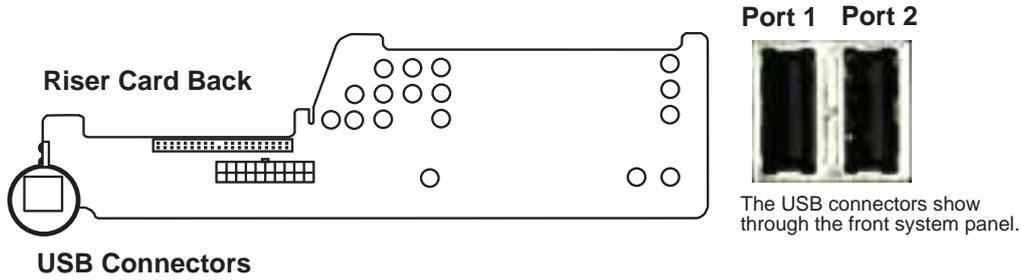
10. IrDA / Fast IR-Compliant Infrared Module

This is an onboard infrared module for wireless transmitting and receiving data through the front panel infrared lens.

Infrared Port

The infrared port sends data through the front system panel.
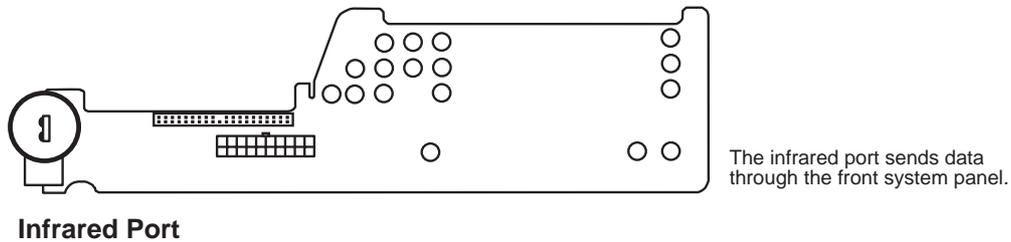
11. NLX Power Supply Connector (20-pin NLXPWR)

This connector connects to an NLX power supply. The plug from the power supply will only insert in one orientation because of the different hole sizes. Find the proper orientation and push down firmly making sure that the pins are aligned.

IMPORTANT: Be sure that the NLX power supply can deliver at least 720mAmp on the 5volt standby lead (5VSB). You may experience difficulty in powering on your system without this specification.

NLX Power Connector

+5.0 Volts
+5.0 Volts
-5.0 Volts
Ground
Ground
Ground
Pwr Sup On
Ground
-12.0 Volts
+3.3 Volts

+12.0 Volts
+5V Standby
Power OK
Ground
5.0 Volts
Ground
+5.0 Volts
Ground
+3.3 Volts
+3.3 Volts
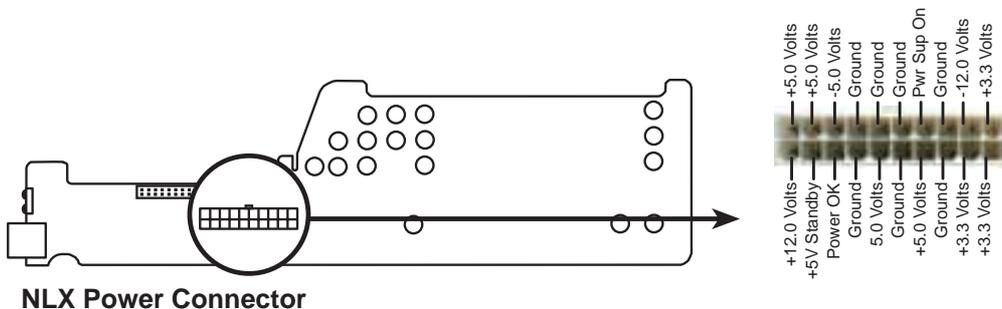
III. INSTALLATION

12. Primary IDE Connector (40-1pin IDE)

This connector supports the provided IDE hard disk drive ribbon cable. After connecting one end to the riser card, connect the other end to a hard disk drive. The primary IDE channel supports both a master and a slave IDE device but the system housing size only permits a standard IDE hard drive to be installed.

Primary IDE Connector

Pin 1

Orient the red stripe on the
IDE ribbon cable to Pin 1
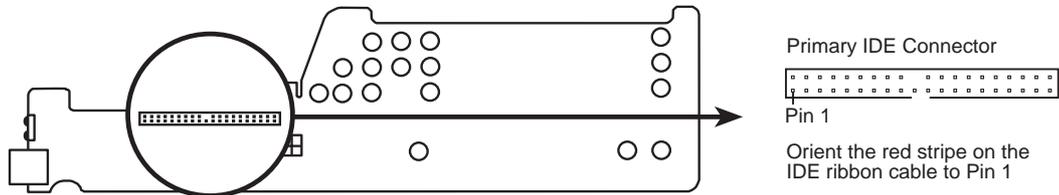
IDE (Hard Disk Drive) Connector

13. 3.5-inch Floppy Disk Drive Connector (34-1pin FLOPPY)

This connector supports the provided floppy drive ribbon cable. After connecting the single end to the riser card, connect the other end to a 3.5-inch floppy disk drive.

Riser Card Front

Pin 1

Orient the red stripe on the
floppy ribbon cable to Pin 1
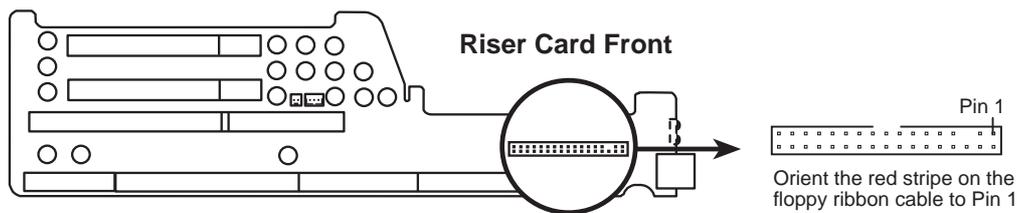
Floppy Disk Drive Connector

14. LAN Activity Connectors (2-pin LAN_LED & 3-pin WOL_CON)

These connectors support Local Area Network (LAN) cards, such as the ASUS PCI-L101, with output signals for data transfer activity. The LAN_LED connector allows the front panel LED to blink during transfer activity between the network and the computer. The WOL_CON connector allows the system to power up when there is a wakeup package (signal) received from the network.

LAN activity LED

Riser Card Front

Wake on LAN activity
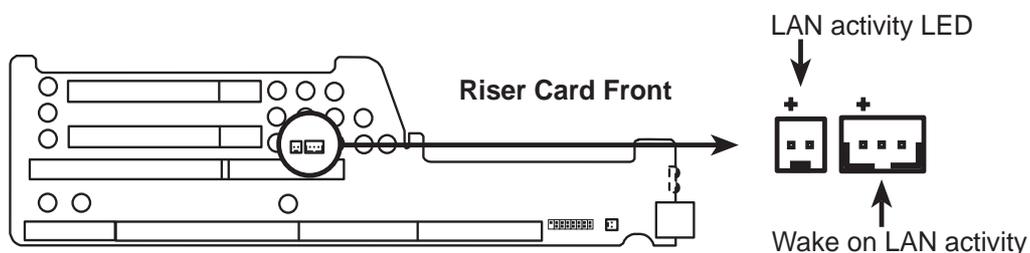
LAN Activity Connectors

III. INSTALLATION

15. Riser Front Panel Connector (16-1 pin)

This connector is used to connect the front panel display LED's and buttons to the motherboard through a ribbon cable.

Riser Card Front

The front panel display & buttons connect to the riser card through a ribbon cable.

Pin 1

Front Panel Display and Buttons
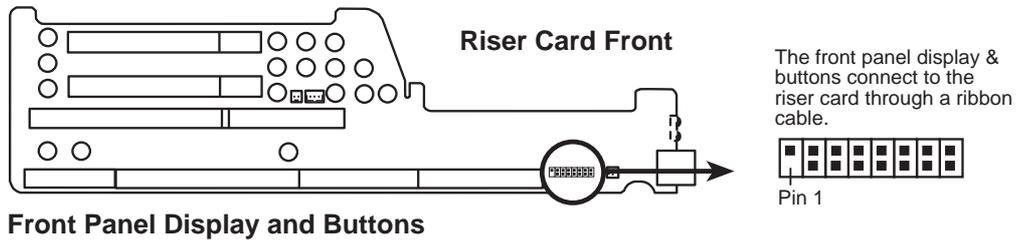
16. Riser Front Panel Microphone Connector (2 pin)

This connector is used to connect the front panel microphone jack to the motherboard through a ribbon cable.

Riser Card Front

The front panel's 1/8inch microphone jack connects to the riser card through a ribbon cable.

Front Panel Microphone Jack

III. INSTALLATION
Connectors
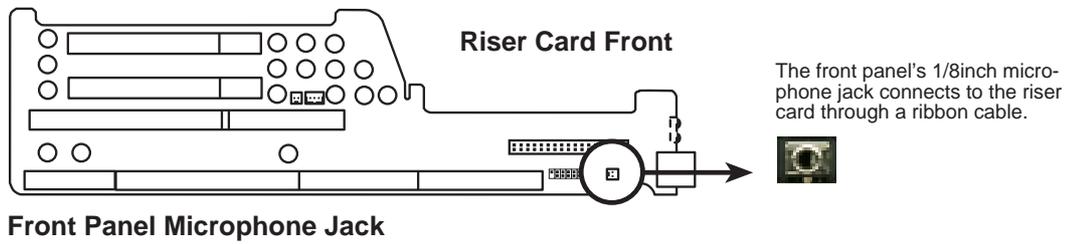
III. INSTALLATION

Front Panel Features
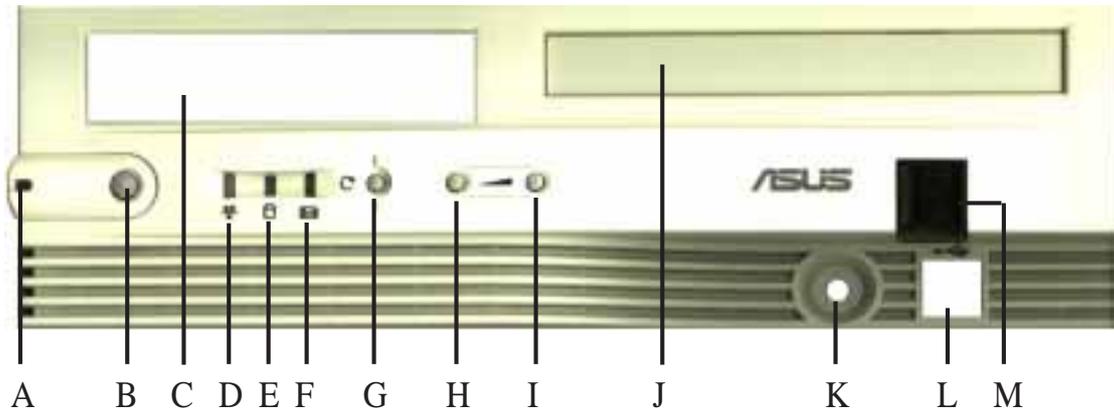
A. **System Power LED**
   Lights when the system is powered on and blinks when it is in sleep mode.
B. **NLX Power Button/ Soft Power Button**
   Switches between ON, OFF, and SLEEP mode.
C. **Floppy Drive Bay**
   Accepts a standard 3.5inch floppy drive, LS-120, or other compatible devices.
D. **Network Activity LED**
   Blinks when data is transfered to or from a network card. (The network card requires an external LED wire connected to the Riser card's LAN_LED.)
E. **IDE Activity LED**
   Blinks when data is transfered via the IDE channels, includes the CD-ROM.
F. **Message LED**
   The LED will remain lit when there is no modem activity and blink when there is data being transfered or waiting in the inbox.
G. **Reset Button**
   Switch used for rebooting the computer without having to use the power switch
H. **Volume Down Button**
   Decreases the onboard audio amplifier's volume.
I. **Volume Up Button**
   Increases the onboard audio amplifier's volume.
J. **CD-ROM Drive Bay**
   Accepts only a notebook-size CD-ROM.
K. **Microphone Jack**
   Accepts a 1/8inch connector from a microphone or other audio source.
L. **USB Port1 and Port 2**
   Accepts 15 USB devices on each port.
M. **Infrared Window**
   Allows transmission and reception of infrared signals by the onboard module.

17. CPU Fan Connector (3-pin)

This connector support a cooling fan of 500mAMP (6WATT) or less.

CPU Fan Power

FANSTP#
+12 Volt
FSCPU#

SP98-N 12Volt Cooling Fan Power
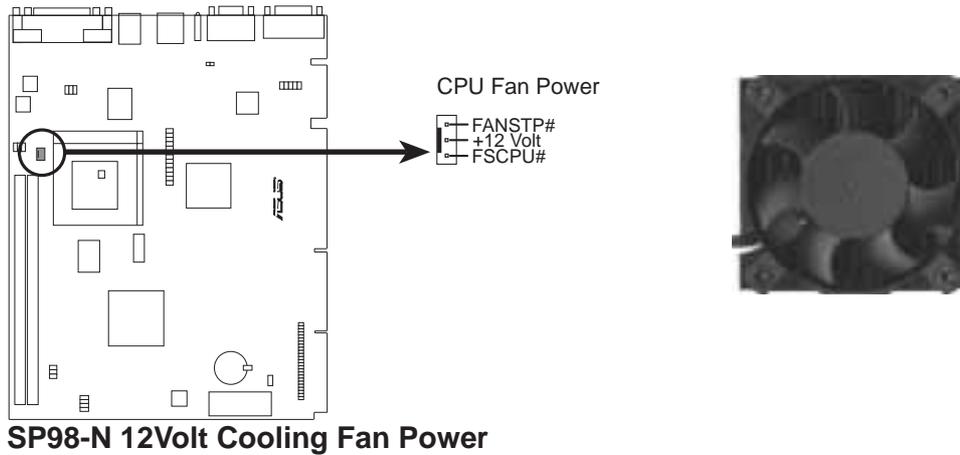
18. Audio Connectors (10-1 pin JACK_CON, Three 1/8-inch jack Female)

These connectors are provided for audio input and output signals.

Motherboard Audio Conn.

Back Panel Audio Conn.

A ribbon cable connects the Motherboard
Audio Conn. to the Back Panel Audio Conn.

Back Panel Audio Jacks

Speaker Out   Line Out   Line In

SP98-N Audio Jack Connector
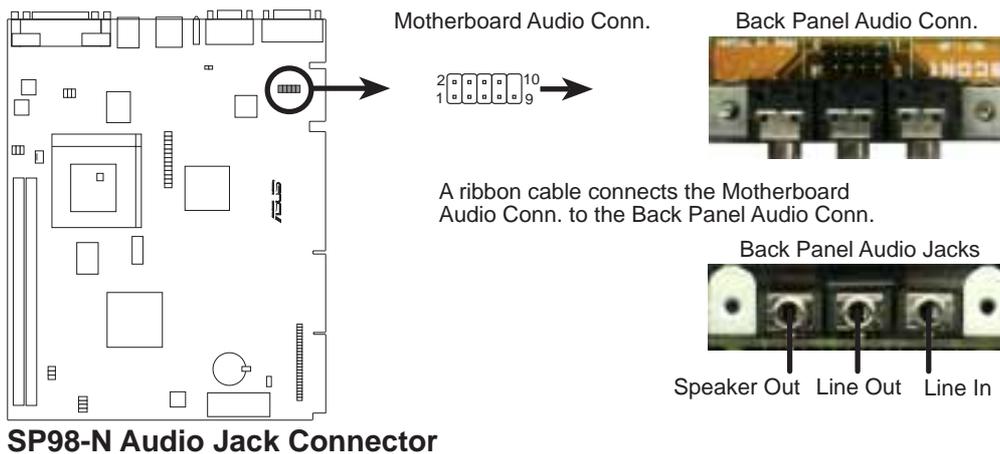
19. Internal Speaker Connector (4-pin Female)

This connector is used to connect to an internal speaker.

AGND-A
AGND-A
PCSPKR-LFT
PCSPKR-RT

SP98-N Internal Speaker Connector
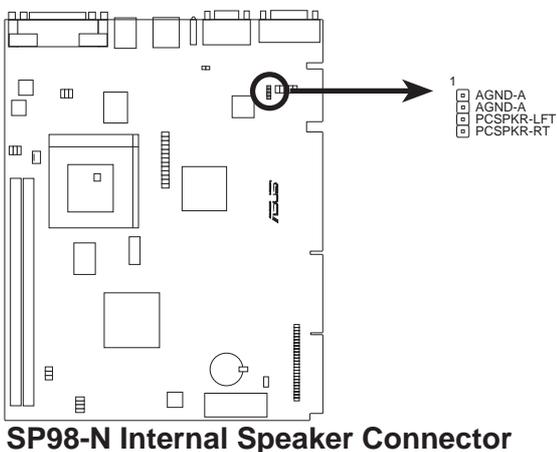
III. INSTALLATION
Connectors

20. CD-ROM Connector (50-1 pin CDROM)

This is a proprietary CD-ROM connector which requires a converter in order to attach to a slim CD-ROM. Only a slim CD-ROM will fit in the NLX system housing.
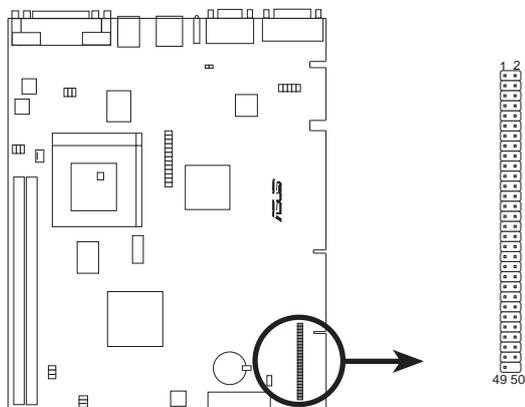
SP98-N CD-ROM Drive Connector

21. Video Feature Connector (26 pin FEATURE)

This connector is used for third party video accessories, such as video capture cards or television tuners.
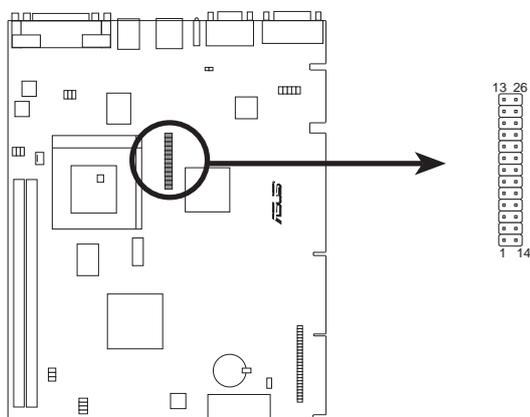
SP98-N Video Feature Connector

III. INSTALLATION

Power Connection Procedures

1. After all jumpers settings and connections are made, close and secure the system housing cover.

2. Make sure that all your computer's peripherals are switched off.

3. Connect the power supply cords into your computer's peripherals and system power supply.

4. Connect the power cords into a power source that is equipped with a surge protector such as a UPS or protected power strip.

5. Turn on your computer by pressing the power switch on the front of the case.

6. The power LED on the front panel of the system case will light. The system will then run power-on tests. While the tests are running, additional messages will appear on the screen. If you do not see anything within 30 seconds from the time you turn on the power, the system may have failed a power-on test. Recheck your jumper settings and connections or call your retailer for assistance.

7. During power-on, press <Delete> to enter the BIOS setup. Follow the instructions on the next section, "BIOS SOFTWARE."

* **Powering Off Your Computer:** You must first exit or shut down your operating system before pressing the power switch. For Windows 95/NT users, click the **Start** button, **Shut Down...,** then **Yes** when asked **Shut down the computer?** The operating system will close Windows 95/NT and power off your computer.

   NOTE: The message, **It's now safe to turn off your computer**, will not be shown in Windows 95/NT when using Shut Down with NLX power supplies.

IV. BIOS SOFTWARE

Support Software

PFLASH.EXE - This is the Flash Memory Writer utility that updates the BIOS by uploading a new BIOS file to the 1-Mbit programmable flash ROM chip on the motherboard. To determine the BIOS version, check the last four numbers of the code displayed on the upper left-hand corner of your screen during bootup. Larger numbers represent a newer BIOS file. This file works in DOS or Windows mode.

NOTE: A binary BIOS file is no longer included with the support software. Save the motherboard's BIOS file to a floppy disk as soon as your system is operational. See "Flash Memory Writer Utility" in this section to "Save Current BIOS to File."

NOTE: The following screen contents in this user's manual are provided as examples only and may not reflect the screen contents displayed on your system.

Flash Memory Writer Utility


```
                    ASUSTek PNP BIOS
                 FLASH MEMORY WRITER V1.5
            Copyright (C) 1995, ASUSTek COMPUTER INC.


Flash Type -- INTEL 28F001BXT

Current BIOS Revision: #401A0-0204-8

Choose one of the following:

1. Save Current BIOS To File
2. Update BIOS Main Block From File
3. Advanced Feature


Enter choice: [1]




Press ESC To Exit
```

IMPORTANT! If "unknown" is displayed after **Flash Type --** , the memory chip is either not programmable or is not supported with the PnP BIOS and therefore cannot be programmed by the Flash Memory Writer utility.

Main Menu

1. Save Current BIOS To File
This option allows you to save a copy of the original motherboard BIOS in case you need to reinstall it. It is recommended that you save PFLASH2 and the BIOS file to a bootable floppy diskette.

2. Update BIOS Main Block From File
This option updates the BIOS from a file on the disk. The file can be either a new file or a backup file created by the "Save Current BIOS To File" option. If the boot block in the file is different from the current boot block, this option will not update the main block. Instead, it will display the following messages.

IV. BIOS SOFTWARE

3. Advanced Features

This option displays the Advanced Features screen for clearing the PnP configuration record and updating the motherboard BIOS.

Advanced Features Menu

1. Clear PNP ESCD Parameter Block

This option erases the Plug-and-Play (PnP) configuration record.

2. Update BIOS Including Boot Block and ESCD

This option updates the boot block, the baseboard BIOS, and the PnP extended system configuration data (ESCD) parameter block from a new BIOS file.

IV. BIOS
Flash Memory Writer

IV. BIOS SOFTWARE

Managing and Updating Your Motherboard's BIOS

Upon First Use of the Computer System
1. Create a bootable system floppy diskette by typing [FORMAT A:/S] from the DOS prompt without creating "AUTOEXEC.BAT" and "CONFIG.SYS" files.
2. Copy PFLASH.EXE to your new diskette.
3. Run PFLASH.EXE from your new diskette and select option 1 "Save Current BIOS to File." Enter the "Current BIOS Revision:" for the file name.

Updating BIOS Procedures (only when necessary)
1. Download an updated ASUS BIOS file from the Internet (WWW or FTP) or a BBS (Bulletin Board Service) (see ASUS CONTACT INFORMATION on page 3 for details) and save to the disk you created earlier.
2. Boot from the disk you created earlier.
3. At the "A:\" prompt, type PFLASH and then press <Enter>.
4. Enter 2 "Update BIOS Main Block From File" from the Main Menu or option 2 "Update BIOS Including Boot Block and ESCD" from the Advanced Features Menu if prompted by option 2 of the Main Menu.
5. The program displays a second screen prompting you for the name of the BIOS file. Type in the complete file name and extension of the new BIOS, and then press <Enter>. The utility then updates the BIOS file from disk.

> **WARNING!** If you encounter problems while updating the new BIOS, DO NOT turn off your system since this might prevent your system from booting up. Just repeat the process, and if the problem still persists, update the original BIOS file you saved to disk above. If the Flash Memory Writer utility was not able to successfully update a complete BIOS file, your system may not be able to boot up. If this happens, your system will need service.

6. After successfully updating the new BIOS file, exit the Flash Memory Writer utility and then reboot.
7. Hold down <Delete> to enter BIOS setup. You must select "Setup Default" to effect the new BIOS, after which you may set the other items from the Main Menu.

IV. BIOS SOFTWARE

6. BIOS Setup

The motherboard supports two programmable Flash ROM chips: 5 volts and 12 volts. Either of these memory chips can be updated when BIOS upgrades are released. Use the Flash Memory Writer utility to download the new BIOS file into the ROM chip as described in detail in this section.

All computer motherboards provide a Setup utility program for specifying the system configuration and settings. If your motherboard came in a computer system, the proper configuration entries may have already been made. If so, run the Setup utility, as described later, and take note of the configuration settings for future reference, in particular, the hard disk specifications.

If you are installing the motherboard, reconfiguring your system or you receive a Run Setup message, you will need to enter new setup information. This section describes how to configure your system using this utility.

The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the system provides you with the opportunity to run this program. This appears during the Power-On Self Test (POST). Press <Delete> to call up the Setup utility. If you are a little bit late pressing <Delete>, POST will continue with its test routines, thus preventing you from calling up Setup. If you still need to call Setup, reset the system by pressing <Ctrl> + <Alt> + <Delete>, or by pressing the Reset button on the system case. You can also restart by turning the system off and then back on again. Do this only, however, if the first two methods fail.

When you run Setup, the CMOS SETUP UTILITY main program screen will appear with the following options:

IV. BIOS SOFTWARE

Load Defaults

Load BIOS Defaults loads the minimized settings for troubleshooting. **Load Setup Defaults**, on the other hand, is for loading optimized defaults for regular use. Choosing defaults at this level will modify all applicable settings.

A section at the bottom of the preceding screen displays the control keys for this screen. Take note of these keys and their respective uses. Another section just below the control keys section displays information on the currently highlighted item in the list.

Standard CMOS Setup

Standard CMOS Setup allows you to record some basic system hardware configuration and set the system clock and error handling. If the motherboard is already installed in a working system, you will not need to select this option anymore. However, if the configuration stored in the CMOS memory on the board gets lost or damaged, or if you change your system hardware configuration, you will need to respecify the configuration values. The configuration values usually get lost or corrupted when the power of the onboard CMOS battery weakens.

User-configurable fields appear in a different color. If you need information on the selected field, press <F1>. The help menu will then appear to provide you with the information you need. The memory display at the lower right-hand side of the screen is read-only and automatically adjusts accordingly.

IV. BIOS SOFTWARE

Details of Standard CMOS Setup:

Date

To set the date, highlight the "Date" field and then press either <Page Up>, <Page Down>, plus or minus signs (on the numeric keypad) to set the current date. Follow the month, day and year format. Valid values are **Month: (1 to 12), Day: (1 to 31), Year: (up to 2079)**.

Time

To set the time, highlight the "Time" field and then press either <Page Up>, <Page Down>, plus or minus signs (on the numeric keypad) to set the current time. Follow the hour, minute and second format. Valid values are **Hour: (00 to 23), Minute: (00 to 59), Second: (00 to 59)**.

NOTE: You can bypass the date and time prompts by creating an AUTOEXEC.BAT file. For information on how to create this file, please refer to the MS-DOS manual.

Hard Disk Drives

This field records the specifications for all non-SCSI hard disk drives installed in your system. The onboard PCI IDE connectors provide Primary and Secondary channels for connecting up to four IDE hard disks or other IDE devices. Each channel can support up to two hard disks; the first of which is the "master" and the second is the "slave".

Specifications for SCSI hard disks need not to be entered here because they operate using device drivers and are not supported by any BIOS. If you install the optional PCI-SC200 SCSI controller card into the motherboard (see section VI for instructions). If you install other vendor's SCSI controller card, refer to the documentation that came with the card on how to install the required SCSI drivers.

For IDE hard disk drive setup, you can:
*   Use the *Auto* setting for detection during bootup.
*   Use the IDE HDD AUTO DETECTION in the main menu to automatically enter the drive specifications.
*   Enter the specifications yourself manually by using the "User" option.

The entries for specifying the hard disk type include **CYLS** (number of cylinders), **HEAD** (number of read/write heads), **PRECOMP** (write precompensation), **LANDZ** (landing zone), **SECTOR** (number of sectors) and **MODE**. The **SIZE** field automatically adjusts according to the configuration you specify. The documentation that came with your hard disk should provide you with the information regarding the drive specifications.

IV. BIOS SOFTWARE

The **MODE** entry is for IDE hard disks only, and can be ignored for MFM and ESDI drives. This entry provides three options: *Normal, Large, LBA*, or *Auto* (see below). Set **MODE** to the *Normal* for IDE hard disk drives smaller than 528MB; set it to *LBA* for drives over 528MB that support Logical Block Addressing (LBA) to allow larger IDE hard disks; set it to *Large* for drives over 528MB that do not support LBA. *Large* type of drive can only be used with MS-DOS and is very uncommon. Most IDE drives over 528MB support the *LBA* mode.

Autodetection of Hard Disks on Bootup
For each field, Primary Master, Primary Slave, Secondary Master, and Secondary Slave, you can select *Auto* under the TYPE and MODE fields. This will enable auto detection of your IDE disk drives during bootup. This will allow you to change your hard disks (with the power off) and then power on without having to reconfigure your hard disk type. If you use older hard disks that do not support this feature, then you must configure the hard disk in the standard method as described earlier using the "User" option.

NOTE: After the IDE hard disk drive information has been entered into BIOS, new IDE hard disk drives must be partitioned (such as with FDISK) and then formatted before data can be read from and write on. Primary IDE hard disk drives must have its partition set to *active* (also possible with FDISK).

NOTE: SETUP Defaults are noted in parenthesis next to each function heading.

Drive A / Drive B (None)
These fields record the types of floppy disk drives installed in your system. The available options for drives A and B are *360KB, 5.25 in.; 1.2MB, 5.25 in.; 720KB, 3.5 in.; 1.44MB, 3.5 in.; 2.88MB, 3.5 in.; None.*

To enter the configuration value for a particular drive, highlight its corresponding field and then select the drive type using the left or right arrow keys.

Floppy 3 Mode Support (Disabled)
This is the Japanese standard floppy drive. The standard stores 1.2MB in a 3.5-inch disk drive. This is normally disabled but you may choose from either *Drive A*, *Drive B*, *Both*, or *Disabled.*

Video (EGA/VGA)
Set this field to the type of video display card installed in your system. The options are *EGA/VGA*, *CGA 40*, *CGA 80*, and *Mono* (for Hercules or MDA). If you are using a VGA or any higher resolution card, choose *EGA/VGA*.

Halt On (All Errors)
This field determines which types of errors will cause the system to halt. Choose from either *All Errors*; *No Errors*; *All, But Keyboard*; *All, But Diskette*; or *All, But Disk/Key.*

IV. BIOS SOFTWARE

BIOS Features Setup

BIOS Features Setup consists of configuration entries that allow you to improve your system performance, or let you set up some system features according to your preference. Some entries are required by the motherboard's design to remain in their default settings.

```
              ROM PCI/ISA BIOS (<SP98_N>)
                   BIOS FEATURES SETUP
                   AWARD SOFTWARE, INC.

Virus Warning               Disabled   Video  ROM BIOS  Shadow : Enabled
CPU Internal Cache        : Enabled    C8000  -  CBFFF   Shadow : Disabled
External Cache            : Enabled    CC000  -  CFFFF   Shadow : Disabled
Quick Power On Self Test  : Enabled    D0000  -  D3FFF   Shadow : Disabled
HDD Sequence SCSI/IDE First: IDE       D4000  -  D7FFF   Shadow : Disabled
Boot Sequence             : C,A        D8000  -  DBFFF   Shadow : Disabled
Boot Up Floppy Seek       : Disabled   DC000  -  DFFFF   Shadow : Disabled
Floppy Disk Access Control: R/W
IDE HDD Block Mode Sectors: HDD MAX    Boot Up NumLock Status    : On
Security Option           : System     Typematic Rate Setting    : Disabled
PS/2 Mouse Function Control: Auto      Typematic Rate (Chars/Sec): 6
PCI/VGA Palette Snoop     : Disabled   Typematic Delay (Msec)    : 250
OS/2 Onboard Memory > 64M : Disabled

                                       ESC : Quit          ↑↓→← : Select Item
                                       F1  : Help          PU/PD/+/- : Modify
                                       F5  : Old Values    (Shift)F2 : Color
                                       F6  : Load BIOS  Defaults
                                       F7  : Load Setup Defaults
```

NOTE: SETUP Defaults are noted in parenthesis next to each function heading.

Details of BIOS Features Setup

Virus Warning (Disabled)
This field protects the boot sector and partition table of your hard disk against accidental modifications. Any attempt to write to them will cause the system to halt and display a warning message. If this occurs, you can either allow the operation to continue or use a bootable virus-free floppy disk to reboot and investigate your system. This setting is recommended because of conflicts with new operating systems or some programs. Installation of these programs requires that you disable *Virus Warning* to prevent write errors.

CPU Internal Cache (Enabled)
Choose *Disable* to turn off the CPU's built-in level 1 cache.

External Cache (Enabled)
Choose *Disable* to turn off the CPU's external level 2 cache.

Quick Power On Self Test (Enabled)
This field speeds up the Power-On Self Test (POST) routine by skipping retesting a second, third, and forth time. Setup default setting for this field is *Enabled*. A complete test of the system is done on each test.

HDD Sequence SCSI/IDE First (IDE)
When using both SCSI and IDE hard disk drives, IDE is always the boot disk using drive letter C (default setting of *IDE*). This new feature allows a SCSI hard disk drive to be the boot disk when set to *SCSI*. This allows multiple operating systems to be used on both IDE and SCSI drives or the primary operating system to boot using a SCSI hard disk drive.

IV. BIOS SOFTWARE

Boot Sequence (C,A)

This field determines where the system looks first for an operating system. Options are *C,A*; *A,CDROM,C*; *CDROM,C,A*; *D,A*; *E,A*; *F,A*; *C only*; *LS/ZIP, C*; and *A,C*. The default is to check first the hard disk and then the floppy disk drive, that is, *C, A*.

Boot Up Floppy Seek (Disabled)

When enabled, the BIOS will seek drive A one time.

Floppy Disk Access Control (R/W)

This allows protection of files from the computer system to be copied to floppy disk drives by allowing the setting of *Read Only* to only allow reads from the floppy disk drive but not writes. The setup default *R/W* allows both reads and writes.

IDE HDD Block Mode Sectors (HDD MAX)

This field enhances hard disk performance by making multi-sector transfers instead of one sector per transfer. Most IDE drives, except older versions, can utilize this feature. Selections are *HDD MAX*, *Disabled*, *2*, *4*, *8*, *16*, and *32*.

Security Option (System)

This field determines when the system prompts for the password. The default setting is *System*, where the system prompts for the User Password every time you boot up. The other option is *Setup*, where the system always boots up, and prompts for the Supervisor Password only when the Setup utility is called up. You can specify a password by using the *Supervisor Password* or *User Password* option from the main screen as explained later in this section.

PS/2 Mouse Function Control (Auto)

Auto allows the BIOS to detect the PS/2 mouse on bootup. If detected, IRQ12 will be used for the PS/2 Mouse. If not detected, IRQ12 will be reserved for expansion cards. *Enabled* will always reserve IRQ12 for devices on the PS/2 mouse port.

PCI/VGA Palette Snoop (Disabled)

Some display cards that are nonstandard VGA such as graphics accelerators or MPEG Video Cards may not show colors properly. The setting *Enabled* should correct this problem. Otherwise leave this on the setup default setting of *Disabled*.

OS/2 Onboard Memory > 64M (Disabled)

When using OS/2 operating systems with installed DRAM of greater than 64MB, you need to *Enable* this option otherwise leave this on the setup default of *Disabled*.

....

Video ROM BIOS Shadow (Enabled)

This field allows you to change the video BIOS location from ROM to RAM. Relocating to RAM enhances system performance, as information access is faster than the ROM.

C8000-CBFFF to DC000-DFFFF (Disabled)

These fields are used for shadowing other expansion card ROMs. If you install other expansion cards with ROMs on them, you will need to know which addresses the ROMs use to shadow them specifically. Shadowing a ROM reduces the memory available between 640KB and 1024KB by the amount used for this purpose.

IV. BIOS SOFTWARE

Boot Up NumLock Status (On)
This field enables users to activate the Number Lock function upon system boot.

Typematic Rate Setting (Disabled)
When enabled, you can set the two typematic controls listed next. Setup default setting is *Disabled*.

Typematic Rate (Chars/Sec) (6)
This field controls the speed at which the system registers repeated keystrokes. Options range from 6 to 30 characters per second. Setup default setting is *6;* other settings are *8, 10, 12, 15, 20, 24,* and *30*.

Typematic Delay (Msec) (250)
This field sets the time interval for displaying the first and second characters. Four delay rate options are available: 250, 500, 750, and 1000.

Chipset Features Setup

This "Chipset Features Setup" option controls the configuration of the board's chipset. Control keys for this screen are the same as for the previous screen.

NOTE: SETUP Defaults are noted in parenthesis next to each function heading.

Details of Chipset Features Setup
EDO/FPM Configuration (60ns DRAM)
The default setting of *60ns DRAM* automatically sets the optimal timings for items 2–7 for 60ns DRAM modules. If you are using 70ns DRAM modules, change this item to *70ns DRAM*. See section III for DRAM installation information. *Disabled* allows you to configure RAS Precharge Time, RAS to CAS Delay, CAS Precharge Time, CAS Pulse Width (Read and Write), and Refresh RAS Assertion. For DRAM Read Leadoff Time, leave this item on its default setting of **5T**.

SDRAM Configuration (12ns SDRAM): Leave on default setting.

SDRAM Read Leadoff Time (Normal): Leave on default setting.

CPU to PCI Posted Write (Enabled)
This is a mechanism that, when *Enabled*, improves the performance of CPU to PCI memory write and CPU to Idle data port write.

ROM Cycle Wait States (1-Wait): Timing for 16-bit ISA cards. Leave on default.

16-bit I/O Recovery Time (5 BUSCLK): Timing for 16-bit ISA cards. Leave on default.

8-bit I/O Recovery Time (8 BUSCLK): Timing for 8-bit ISA cards. Leave on default.

ISA Bus Clock (PCICLK/4): Timing for the ISA bus clock. Leave on default.

Memory Hole at Address (None)
This feature reserves memory address space, *15M-16M*, *14M-16M*, or *12M-16M*, to ISA expansion cards that specifically require this setting. This, however, makes the memory from the specified and up unavailable to the system because expansion cards can only access memory up to 16MB.

Refresh Cycle Time (187.2 us)
This function sets the DRAM refresh rate. A slow refresh cycle time increases the bandwidth available for data transfers. **NOTE:** Some DRAMs are known to lose data without frequent refreshing so the default is set at *187.2 us*.

Delayed Transaction (Enabled)
The default setting of *Enabled* frees the PCI Bus during CPU accessing of 8-bit ISA cards, which normally consume about 50–60 PCI clocks without PCI delayed transaction. For PCI bus masters that cannot use the PCI Bus and some ISA cards that are not PCI 2.1 compliant, set this to *Disabled*.

Onboard VGA Memory Size (1MB)
This function allows the user to allocate either 1MB, 2MB or 4MB memory for the onboard video controler. Larger memory allows more colors and a higher resoultion to be selected within each operating system.

Onboard VGA Memory Clock (Leave on default setting of Fast)
This function allows the selection of the video speed. Normal uses 50MHz, Fast uses 60MHz, and Fastest uses 66MHz. If your monitor displays unrecognizable information, *you must* decrease the speed to match your monitor's frequency rate.
....

Onboard FDC Controller (Enabled)
When enabled, this field allows you to connect your floppy disk drives to the onboard floppy drive connector instead of a separate controller card. If you want to use a different controller card, set this field to *Disabled*.

Onboard FDC Swap A & B (No Swap)
This field allows you to reverse the hardware drive letter assignments of your floppy disk drives. Two options are available: *No Swap* and *Swap AB*. If you want to switch drive letter assignments through the onboard chipset, set this field to *Swap AB*.

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Onboard Serial Port 1 (3F8H/IRQ4)
Settings are *3F8H/IRQ4, 2F8H/IRQ3, 3E8H/IRQ4, 2E8H/IRQ10,* and *Disabled* for the onboard serial connector.

Onboard Serial Port 2 (2F8H/IRQ3)
Settings are *3F8H/IRQ4, 2F8H/IRQ3, 3E8H/IRQ4, 2E8H/IRQ10,* and *Disabled* for the onboard serial connector.

Onboard Parallel Port (378H/IRQ7)
This field sets the address of the onboard parallel port connector. You can select either *3BCH / IRQ 7, 378H / IRQ 7, 278H / IRQ 5,* or *Disabled.* If you install an I/O card with a parallel port, ensure that there is no conflict in the address assignments. The PC can support up to three parallel ports as long as there are no conflicts for each port.

Parallel Port Mode (ECP+EPP)
This field allows you to set the operation mode of the parallel port. The setting *Normal,* allows normal-speed operation but in one direction only; *EPP* allows bidirectional parallel port operation at maximum speed; *ECP* allows the parallel port to operate in bidirectional mode and at a speed faster than the maximum data transfer rate; *ECP+EPP* allows normal speed operation in a two-way mode.

ECP DMA Select (3)
This selection is available only if you select *ECP* or *ECP+EPP* in the **Parallel Port Mode**. Select either DMA Channel *1, 3,* or *Disabled.*

UART2 Use Infrared (Disabled)
When *Enabled*, this field activates the onboard infrared feature and sets the second serial UART to support the infrared module connector on the motherboard using the IrDA standard. Select *ASKIR* to enable the Japanese infrared standard. If your system already has a second serial port connected to the onboard COM2 connector, it will no longer work if you enable the infrared feature. By default, this field is set to ***Disabled***, which leaves the second serial port UART to support the COM2 serial port connector.

Onboard PCI IDE Enable (Both)
You can select to enable the *Primary* IDE channel, *Secondary* IDE channel, *Both*, or *Disable* both channels (for systems with only SCSI drives).

IDE Ultra DMA Mode (Auto)
This sets the IDE UltraDMA to be active when using UltraDMA-capable IDE devices. The BIOS will automatically adjust or disable this setting for slower IDE devices so that Auto or high settings will not cause problems for older IDE devices. Choose *Disable* if you do not want this feature for all devices.

IDE 0 Master/Slave PIO/DMA Mode, IDE 1 Master/Slave PIO/DMA Mode (Auto)
Each channel (0 & 1) has both a master and a slave making four IDE devices possible. Because each IDE device may have a different Mode timing (*0, 1, 2, 3, 4*), it is necessary for these to be independent. PIO and DMA timings can be independently set. The default setting of *Auto* will allow autodetection to ensure optimal performance.

IV. BIOS SOFTWARE

Power Management Setup

This "Power Management Setup" option allows you to reduce power consumption. This feature turns off the video display and shuts down the hard disk after a period of inactivity.

NOTE: SETUP Defaults are noted in parenthesis next to each function heading.

Details of Power Management Setup

Power Management (User Define)

This field acts as the master control for the power management modes. *User Define* allows you to set power saving options according to your preference; *Disable* disables the power saving features; *Min Saving* puts the system into power saving mode after 40 min of system inactivity; *Max Saving* puts the system into power saving mode after 30 sec of system inactivity.

IMPORTANT: Advanced Power Management (APM) should be installed to keep the system time updated when the computer enters suspend mode activated by the BIOS Power Management. For DOS environments, you need to add DEVICE=C:\DOS\POWER.EXE in you CONFIG.SYS. For Windows 3.x and Windows 95, you need to install Windows with the APM feature. A battery and power cord icon labeled "Power" will appear in the "Control Panel." Choose "Advanced" in the Power Management Field.

Video Off Option (Susp,Stby -> Off)

This field determines when to activate the video off feature for monitor power management. The settings are *All Modes -> Off*; *Always On*; *Suspend -> Off*; and *Susp,Stby -> Off* .

IV. BIOS SOFTWARE

Video Off Method (DPMS OFF)
This field defines the video off features. The following options are available: *DPMS OFF*, *DPMS Reduce ON*, *Blank Screen*, *V/H SYNC+Blank, DPMS Standby,* and *DPMS Suspend*. The DPMS (Display Power Management System) features allow the BIOS to control the video display card if it supports the DPMS feature. *Blank Screen* only blanks the screen (use this for monitors without power management or "green" features. If set up in your system, your screen saver will not display with *Blank Screen* selected). *V/H SYNC+Blank* blanks the screen and turns off vertical and horizontal scanning.

....

PM Timers
This section controls the time-out settings. The fields included in this section are **HDD Power Down**, which places the hard disk into its lowest power consumption mode, and the **Doze**, **Standby** and **Suspend** system inactivation modes. The system automatically "wakes up" from any power saving mode when there is system activity, such as when a key is pressed from the keyboard, or when there is activity detected from the enabled IRQ channels.

HDD Power Down (Disable)
This shuts down any IDE hard disk drives in the system after a period of inactivity, configurable to *1 Min-10 Min*, *20 Min* or *Disable*. This feature does not affect SCSI hard disks.

Doze Mode, Standby Mode, Suspend Mode (Disable)
These fields set the period of time after which each of these modes activate: *20 Sec*, *1 Min*, *5 Min*, *10 Min*, *15 Min*, *20 Min*, *30 Min*, *40 Min*, and *Disable*.

....

Power Up Control
This section determines the ways the system can be controlled when modem activity is detected, or when power to the computer is interrupted and reapplied.

Ring Power Up Act (Enable)
Allows either settings of *Enable* or *Disable* for powering up the computer (turns the ATX power supply on) when the modem begins receiving or transmitting data while the computer is off.

Automatic Power Up (Disable)
This field allows you to have an unattended or automatic power up of your system. You may configure your system to power up at a certain time of the day by selecting *Enable*, which will allow you to set the days (*SUN–SAT*) and time (hh:mm:ss) when you want this function to activate.

....

IRQ3 (*device*)-IRQ15 (*device*)
You can individually *Enable* or *Disable* each IRQ to include in the sleep function. IRQ8 (RTC Alarm) is usually set to *Disable* so that any software alarm clock or event calendar can wake up the system.

IV. BIOS SOFTWARE

PNP and PCI Setup

This "PNP and PCI Setup" option configures the PCI bus slots. All PCI bus slots on the system use INTA#, thus all installed PCI cards must be set to this value.

NOTE: SETUP Defaults are noted in parenthesis next to each function heading.

Details of PNP and PCI Setup

PNP OS Installed (No)
When Plug and Play operating systems (OS) are installed, interrupts may be reassigned by the OS when *Yes* is selected. When a non-Plug and Play OS is installed or to prevent reassigning of interrupt settings, select *No*.

Slot 1 (RIGHT) IRQ/Slot 2 IRQ (Auto)
The first two fields on the screen set how IRQ use is determined for each PCI slot. Slot 1 (RIGHT) is the bottom PCI slot. The default setting for each field is *Auto*, which uses autorouting to determine IRQ use. The other options are the manual settings of *NA, 5, 7, 9, 10, 11, 12, 14*, or *15* for each slot.

PCI Latency Timer (32 PCI Clock)
The default setting enables maximum PCI performance for this motherboard.

IRQ xx Used By ISA (No/ICU)
These fields indicate whether or not the displayed IRQ for each field is being used by a legacy (non-PnP) ISA card. Two options are available: *No/ICU* and *Yes*. *No/ICU* indicates either that the displayed IRQ is not used or an ISA Configuration Utility (ICU) is being used to determine if an ISA card is using that IRQ. If you install a legacy (non-PnP) ISA card that requires a unique IRQ, and you are not using an ICU, set the field for that IRQ to *Yes*.

....

DMA x Used By ISA (No/ICU)
These fields indicate whether or not the displayed DMA channel for each field is being used by a legacy ISA card. Available options include: *No/ICU* and *Yes*. *No/ICU* indicates either that the displayed DMA channel is not used or an ICU is being used to determine if an ISA card is using that channel. If you install a legacy ISA card that requires a unique DMA channel, and you are not using an ICU, you must set the field for that channel to *Yes*.

ISA MEM Block BASE (No/ICU)

This field allows you to set the base address and block size of a legacy ISA card that uses any memory segment within the C800, CC00, D000, D400, D800, and DC00 address range. If you have such a card, and you are not using an ICU to specify its address range, select a base address from the six available options; the **ISA MEM Block SIZE** field will then appear for selecting the block size. If you have more than one legacy ISA card in your system that requires to use this address range, you can increase the block size to either 8K, 16K, 32K, or 64K. If you are using an ICU to accomplish this task, leave **ISA MEM Block BASE** to its default setting of *No/ICU*.

SYMBIOS SCSI BIOS (Auto)

The default uses *Auto* settings for the onboard SCSI BIOS. If you do not want to use the onboard SCSI BIOS, choose *Disabled.*

USB Function (Disabled)

The motherboard supports Universal Serial Bus (USB) devices but current operating systems do not. The default is set to *Disabled*. If you have the necessary support disks and USB devices, set this function to *Enabled* to use the onboard USB connector.

USB IRQ (Auto)

When USB devices are connected to the onboard USB connector, the resource settings or IRQs for these devices are, by default, automatically assigned by the BIOS. You may manually select the settings: *5*, *7*, *9*, *10*, *11*, *12*, *14*, and *15.* If you are not using any USB devices, you may set this field to *N/A*.

Load BIOS Defaults

This "Load BIOS Defaults" option allows you to load the troubleshooting default values permanently stored in the BIOS ROM. These default settings are non-optimal and disable all high performance features. This feature does not affect the fields on the Standard CMOS Setup screen.

IV. BIOS SOFTWARE

Load Setup Defaults

This "Load Setup Defaults" option allows you to load the default values to the system configuration fields. These default values are the optimized configuration settings for the system. This feature does not affect the fields on the Standard CMOS Setup screen.

Smart Alarm (LM78/LM75) Setup

The "Smart Alarm (LM78/LM75) Setup" option allows you to set up your hardware monitoring options. This feature monitors the fan, CPU and motherboard temperature, and voltage.

Fan Monitor (xxxxRPM)
The onboard hardware monitor is able to detect the CPU Fan Speed in Rotations Per Minute (RPM). These values refresh upon any key entries in the BIOS setup screen. Set to *Ignore* if one of these are not used so that error messages will not be given.

Thermal Monitor (xxxC/xxxF)
The onboard hardware monitor is able to detect the CPU and MB (motherboard) temperatures. These values refresh upon key entries. Set to *Ignore* only if necessary.

Voltage Monitor (xx.xV)
The onboard hardware monitor is able to detect the voltages put out by the voltage regulators. These values refresh upon key entries. Set to *Ignore* only if necessary.

NOTE: If any of the monitored items are out of range, you will be prompted by this message: "Hardware Monitor found an error, enter POWER MANAGEMENT SETUP for details" The bottom of the screen will instruct you to: "Press **F1** to continue, **DEL** to enter SETUP".

IV. BIOS SOFTWARE

Supervisor Password and User Password

These two options set the system passwords. "Supervisor Password" sets a password that will be used to protect the system and the Setup utility; "User Password" sets a password that will be used exclusively on the system. By default, the system comes without any passwords. To specify a password, highlight the type you want and then press <Enter>. A password prompt appears on the screen. Taking note that the password is case sensitive, and can be up to 8 alphanumeric characters long, type in your password and then press <Enter>. The system confirms your password by asking you to type it again. After setting a password, the screen automatically reverts to the main screen.

To implement the password protection, specify in the "Security Option" field of the BIOS Features Setup screen when the system will prompt for the password. If you want to disable either password, press <Enter> instead of entering a new password when the "Enter Password" prompt appears. A message confirms the password has been disabled.

NOTE: If you forget the password, see CMOS RAM in section III for procedures on clearing the CMOS.

IV. BIOS SOFTWARE

IDE HDD Auto Detection

This "IDE HDD Auto Detection" option detects the parameters of an IDE hard disk drive, and automatically enters them into the "Standard CMOS Setup" screen.
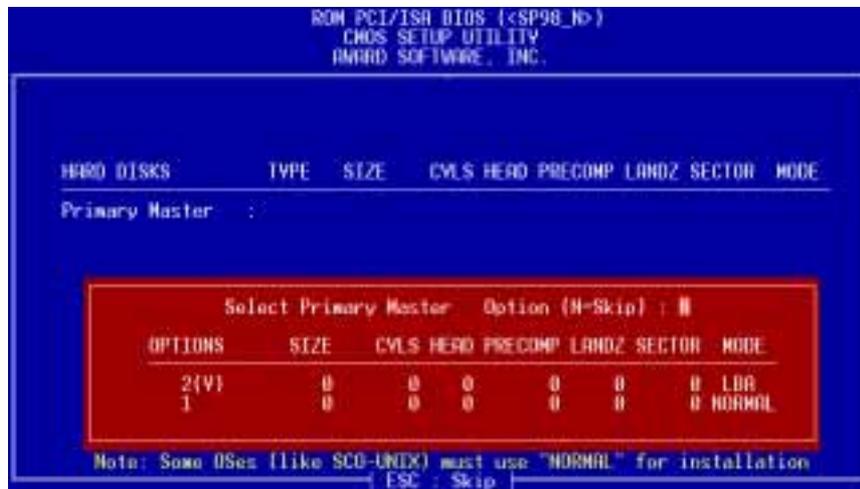
Up to four IDE drives can be detected, with parameters for each listed inside the box. To accept the optimal entries, press <Y>, otherwise select from the numbers displayed under the OPTIONS field (2, 1, 3 in this case); to skip to the next drive, press <N>. If you accept the values, the parameters will appear listed beside the drive letter on the screen. The process then proceeds to the next drive letter. Pressing <N> to skip rather than to accept a set of parameters causes the program to enter zeros after that drive letter.

If you are using another IDE controller that does not feature Enhanced IDE support for four devices, you can only install two IDE hard disk drives. Your IDE controller must support the Enhanced IDE features to use Drive E and Drive F. The onboard PCI IDE controller supports Enhanced IDE, with two connectors for connecting up to four IDE devices. If you want to use another controller that supports four drives, you must disable the onboard IDE controller in the Chipset Features Setup screen.

When autodetection is completed, the program automatically enters all entries you accepted on the field for that drive in the "Standard CMOS Setup" screen. Skipped entries are ignored and are not entered in the screen.

If you are autodetecting a hard disk that supports the LBA mode, three lines will appear in the parameter box. Choose the line that lists LBA for an LBA drive. Do not select Large or Normal.

The autodetection feature can only detect one set of parameters for a particular IDE hard disk. Some IDE drives can use more than one set. This is not a problem if the drive is new and there is nothing on it.

IV. BIOS SOFTWARE

IMPORTANT: If your hard disk was already formatted on an older previous system, incorrect parameters may be detected. You will need to enter the correct parameters manually or use low-level format if you do not need the data stored on the hard disk.

If the parameters listed differ from the ones used when the drive was formatted, the drive will not be readable. If the autodetected parameters do not match the ones that should be used for your drive, do not accept them. Press <N> to reject the presented settings and enter the correct ones manually from the "Standard CMOS Setup" screen.

Save and Exit Setup

Select this option to save into the CMOS memory all modifications you specify during the current session. To save the configuration changes, highlight "Save & Exit Setup" on the main screen, type "Y", and then press <Enter>.

Exit Without Saving

Select this option to exit the Setup utility without saving the modifications you specify during the current session. To exit without saving, highlight "Exit Without Saving" on the main screen, type "Y", and then press <Enter>.

V. SUPPORT SOFTWARE

Desktop Management Interface (DMI)

Introducing the ASUS DMI Configuration Utility

This motherboard supports DMI within the BIOS level and provides a DMI Configuration Utility to maintain the Management Information Format Database (MIFD). DMI is able to autodetect and record information pertinent to a computer's system such as the CPU type, CPU speed, and internal/external frequencies, and memory size. The onboard BIOS will detect as many system information as possible and store those collected information in a 4KB block in the motherboard's Flash EPROM and allow the DMI to retrieve data from this database. Unlike other BIOS software, the BIOS on this motherboard uses the same technology implemented for Plug and Play to allow dynamic real-time updating of DMI information versus creating a new BIOS image file and requiring the user to update the whole BIOS. This DMI Configuration Utility also allows the system integrator or end user to add additional information into the MIFD such as serial numbers, housing configurations, and vendor information. Those information not detected by the motherboard BIOS and has to be manually entered through the DMI Configuration Utility and updated into the MIFD. This DMI Configuration Utility provides the same reliability as PnP updating and will prevent the refreshing failures associated with updating the entire BIOS.

System Requirements

The DMI Configuration Utility (DMICFG.EXE) must be used in real mode in order for the program to run, the base memory must be at least 180K. Memory managers like HIMEM.SYS (required by windows) must not be installed. You can boot up from a system diskette without AUTOEXEC.BAT and CONFIG.SYS files, "REM" HIMEM.SYS in the CONFIG.SYS, or press <F5> during bootup to bypass your AUTOEXEC.BAT and CONFIG.SYS files.

V. SUPPORT SOFTWARE

Using the ASUS DMI Configuration Utility

Edit DMI (or delete)

Use the ←→ (left-right) cursors to move the top menu items and the ↑↓ (up-down) cursor to move between the left hand menu items. The bottom of the screen will show the available keys for each screen. Press enter at the menu item to enter the right hand screen for editing. "Edit component" appears on top. The reversed color field is the current cursor position and the blue text are available for editing. The orange text shows autodetected information and are not available for editing. The blue text "Press [ENTER] for detail" contains a second pop-up menu is available, use the + - (plus-minus) keys to change the settings. Enter to exit *and save*, ESC to exit *and not save*.

If the user has made changes, ESC will prompt you to answer Y or N. Enter Y to go back to the left-hand screen *and save*, enter N to go back to left-hand screen and *not save*. If editing has not been made, ESC will send you back to the left hand menu without any messages.

Notes

A heading, ***** BIOS Auto Detect *****, appears on the right for each menu item on the left side that has been auto detected by the system BIOS.

A heading, ***** User Modified *****, will appear on the right for menu items that has been modified by the user.

V. SUPPORT SOFTWARE

Save MIFD

You can save the MIFD (normally only saved to flash ROM) to a file by entering the drive and path here. If you want to cancel save, you may press ESC and a message "Bad File Name" appears here to show it was not saved.

Load MIFD

You can load the disk file to memory by entering a drive and path and file name here.

Load BIOS Defaults

You can load the BIOS defaults from a MIFD file and can clear all user modified and added data. You must reboot your computer in order for the defaults to be saved back into the Flash BIOS.

VI. ASUS PCI SCSI Cards

Symbios SCSI BIOS and Drivers

NOTE: The ASUS PCI-SC860 is not supported on this motherboard because the EEPROM space is required for the onboard VGA BIOS.

Aside from the system BIOS, the Flash memory chip on the motherboard also contains the Symbios SCSI BIOS. This Symbios SCSI BIOS works in conjunction with the optional ASUS PCI-SC200 controller card to provide Fast SCSI-2 interface when using compatible SCSI devices or the ASUS PCI-SC860 SCSI controller cards to provide Ultra-Fast SCSI-2 interface when using Ultra-Fast SCSI-2 devices.

All SCSI devices you install on your system require driver software to function. The Symbios SCSI BIOS directly supports SCSI hard disks under the DOS, Windows and OS/2 environments. It also uses device drivers from the DOS floppy disk included in the ASUS PCI-SC200 and ASUS PCI-SC860 controller card packages to support hard disks and other SCSI devices working under DOS, Microsoft Windows, Microsoft Windows NT, Novell NetWare and IBM OS/2. These drivers provide higher performance than the direct BIOS support. To use these drivers, you must install them into your system and add them to your system configuration files. Driver support for SCSI devices used with SCO UNIX is also provided. These drivers are included in the second SCO UNIX floppy disk. Windows 95 support is also available using the device drivers included within the Windows software. The ASUS PCI-SC200 and ASUS PCI-SC860 are Plug and Play adapters that are auto detected by BIOS and current operating systems that support Plug and Play features.

For information about these drivers and their usage, please view the Readme files included in the driver packages.

ASUS PCI-SC200 & PCI-SC860 SCSI Cards

The ASUS PCI-SC200 or the ASUS PCI-SC860 may be bundled with your motherboard or purchased separately. Both cards provide the option of connecting internal or external SCSI devices for a total of 7 devices on each SCSI card.

VI. ASUS PCI SCSI Cards

Setting Up the ASUS PCI-SC200 & PCI-SC860

There are two jumper settings you may need to make on the ASUS PCI-SC200 to set it up. One setting assigns the PCI INT interrupt, the other sets the card's termination. The ASUS PCI-SC860 has no jumper settings but you should read the "Terminator Requirements."

Setting the INT Assignment for the ASUS PCI-SC200

You must use PCI INT A setting in order to properly assign the ASUS PCI-SC200's interrupt. On the ASUS PCI-SC200, you assign the INT by setting jumper JP1 or JP2. The default setting for the card already is INT A, so you do not need to change the setting to use the ASUS PCI-SC200 with this motherboard.

Interrupt Settings (A, B, C, or D)
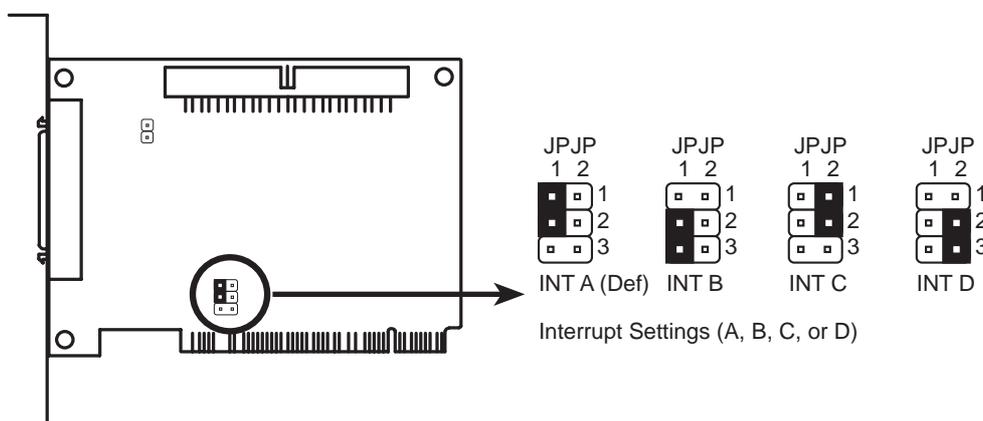
Terminator Requirements for SCSI Devices

SCSI devices are connected together in a "chain" by cables. Internal devices connect to the ASUS PCI-SC200 or ASUS PCI-SC860 with a fifty-pin flat ribbon cable. External devices connect to the external port with a SCSI-2 cable. If there are more than one internal or external devices, additional devices are connected with cables to form a "daisy chain." Terminating the devices on the ends of the SCSI Bus "chain" is necessary for SCSI devices to work properly. Termination of the devices between the ends must be *Disabled*.

VI. ASUS PCI SCSI Cards

Terminator Settings for the ASUS PCI-SC860

Many SCSI devices including the ASUS PCI-SC860 use a set of onboard active resistors to terminate the devices at the ends automatically. Automatic termination requires that the SCSI devices be connected in a straight linear connection or "chain." Connect SCSI devices to one or two of the SCSI connectors in a linear "chain" for auto termination of the ASUS PCI-SC860 to be effective. Other formations will cause your SCSI devices to not mount properly. You must use the **end** of the ribbon cable when using the internal connector(s) to keep a linear path.

Additional Note: The Symbios Logic SCSI Configuration Utility is a powerful tool. If, while using it, you somehow disable all your controllers or cannot enter the configuration utility, pressing "Ctrl-A" after memory count during reboot allows you to recover and reconfigure.

Terminator Settings for the ASUS PCI-SC200

The ASUS PCI-SC200, on the other hand, has "active" termination that you must set using jumper JP5. There are two settings, "terminated" and "not terminated," as shown below.

JP 5
Terminated (Default)

JP 5
Not Terminated

Terminator Setting (Terminated / Not Terminated)
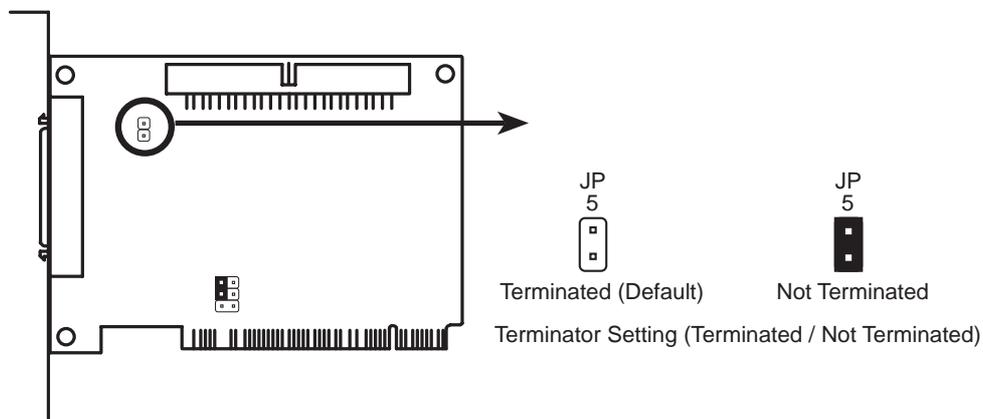
Decide whether or not you need to terminate the ASUS PCI-SC200 based on its position in the SCSI chain. Only the devices at each end of the chain need to be terminated. If you have **only** internal or **only** external devices connected to the ASUS PCI-SC200, then you **must** terminate the ASUS PCI-SC200. If you have **both** internal and external devices connected, you **must not** terminate the card. See the following examples which illustrate this concept.

VI. ASUS PCI SCSI Cards
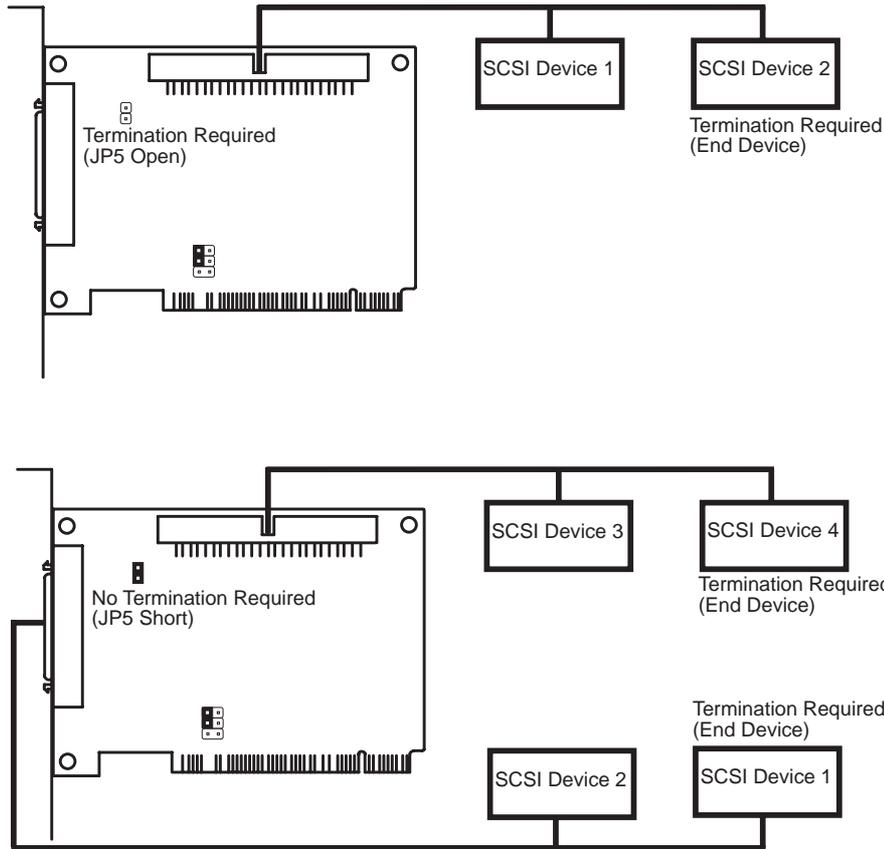
SCSI ID Numbers for SCSI Devices

All SCSI devices, including the ASUS PCI-SC200 and ASUS PCI-SC860 interface card must have a SCSI identification number that is not in use by any other SCSI device. There are eight possible ID numbers, 0 through 7. The ASUS PCI-SC200 and ASUS PCI-SC860 cards have fixed SCSI IDs of 7. The SCSI ID serves two purposes:

• It uniquely defines each SCSI device on the bus.
• It determines which device controls the bus when two or more devices try to use it at the same time.

SCSI IDs on one channel do not interfere with the IDs on another channel. This applies to two SCSI host adapters that implement different buses as well as dual channels on a single host adapter. You can connect up to seven SCSI devices to the interface card. You must set a SCSI ID number (ID 0 to ID 6) for each device. SCSI devices vary in how they set the ID number. Some use jumpers, others have some kind of selector switch. Refer to the manual for any device you install for details on how to set its ID number.

SCSI ID Priority

The ASUS PCI-SC200 and ASUS PCI-SC860 are 8bit single-channel SCSI cards. SCSI ID 7 has the highest priority, and SCSI ID 0 has the lowest priority.

VII. ASUS Network Interface

This motherboard has a 32-bit 10/100Mbps Ethernet network interface. It supports the bus mastering architecture and auto-negotiation feature, which makes it possible to use the common twisted-pair cabling with RJ45 connectors for both 10Mbps and 100Mbps connections. Extensive driver support for commonly-used network systems is also provided.

Features

- Intel 82558 Ethernet LAN Controller (Fully integrated 10BASE-T/100BASE-TX)
- Wake-On-LAN Remote Control Function Supported
- PCI Bus Master Complies to PCI Rev. 2.1
- Consists of MAC & PHY (10/100Mbps) interfaces
- Complies to IEEE 802.3 10BASE-T and IEEE 802.3U 100BASE-TX interfaces
- Fully supports 10BASE-T & 100BASE-TX operations
- Single RJ-45 Connector: Auto-Detection of 10Mbps or 100Mbps Network Data Transfer Rates and Connected Cable Types
- 32 bit Bus Master Technology / PCI Rev. 2.1
- Plug and Play
- Enhancements on ACPI & APM
- Adheres to PCI Bus Power Management Interface Rev. 1.0, ACPI Rev. 1.0, and Device Class Power Management Rev. 1.0

Software Driver Support

NetWare ODI Drivers - Novell Netware 3.x, 4.x; NetWare LAN WorkPlace TCP/IP; Novell LAN Analyzer for Netware

Packet Drivers - FTP PC/TCP, NCSA TCP/IP, Accton LANSoft

NDIS Drivers - LAN Manager V2.x; Windows 3.x, 95, NT (Server/Workstation) V3.x, V4.0; IBM LAN Server 2.x, 3.0; IBM LAN Support V1.x; IBM OS/2 EE V2.0; DEC Pathworks V4.x & V5.0; Sun PC-NFS; Banyan VINES; IBM TCP/IP for DOS & OS/2; Wollongong Pathway Access

Unix Driver - SCO Unix

SP98-N Network Interface Layout

SP98-N Network Interface

LAN_LED   RJ45

Link
Activity
On: 100Base-TX
Off: 10Base-T   Speed
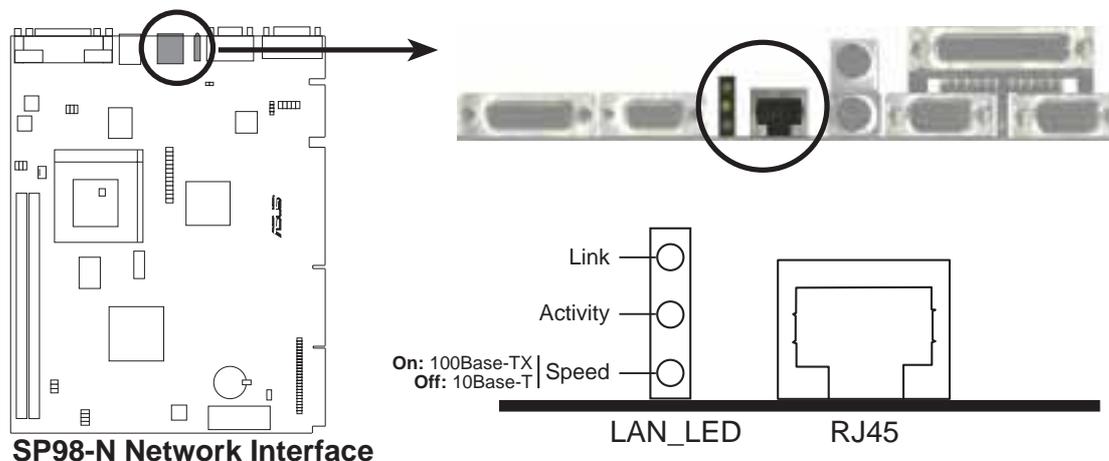
LED Indicators

Link Indicator (green, top): This LED monitors 10Base-T and 100Base-TX connections. This LED lights to indicate a successful network connection, and remains steady if the connection is stable. If this indicator is off, the cable connection between the hub and the computer may be faulty or the driver configuration may be faulty.

Activity Indicator (yellow): This LED lights when there are network packets sent or received through the RJ45 port. The rate of flashing is proportional to the amount of network traffic. If this is off, the computer is not sending or receiving network data.

Speed Indicator (green, bottom): This LED lights (**On**) when connection is made to a 100Base-TX host. If **Off**, the network connection is operating at 10Mbps.

Installation

Connect the Network Cable

Twisted Pair Ethernet (TPE) - Connect a single network cable to the RJ45 connector. For 100BASE-TX, your network cable must be category 5 (not category 3), twisted-pair wiring with RJ45 connectors. If you plan on running the interface at 100 Mbps, it must be connected to a 100BASE-TX hub (not a 100BASE-T4 hub). For 10BASE-T, use category 3, 4, or 5 twisted-pair wiring.

VII. ASUS Network Interface

DOS and Windows 3.1 Setup for Novell

Automatic configuration

Some computers automatically detect and configure adapters and interfaces while boot-ing. The ASUS SP98-N network interface's IRQ level and I/O memory address are automatically set by the BIOS each time you start your computer.

Start your computer to automatically configure the network interface. Configuration is complete when the DOS prompt appears. You can now continue with the procedure below.

If your computer displays an error while booting, it may require additional steps.

Run Setup to install network drivers

Setup can automatically install NetWare DOS ODI client drivers for you or display a README file with installation instructions for other NOS drivers.

1. If your computer already has network drivers installed, restart the computer with-out loading them. If the drivers are loaded from the AUTOEXEC.BAT or CONFIG.SYS file, type REM in front of each line that loads a network driver. Or, with DOS 6.x or later press "F5" as DOS starts, to bypass the drivers.

2. Insert the ASUS Configuration and Drivers disk in a floppy drive, switch to that drive, and at the DOS prompt, type "SETUP".

3. If you have another network adapter in your computer, an adapter selection menu appears on the screen. Select the adapter you want by noting the Ethernet address.

4. Select Automatic Setup from the Main menu. Then follow the instructions on the screen. (If you want to test the interface with a responder on the network, see the next procedure.) Setup displays the configuration, then runs a series of diagnostic tests that makes sure the network interface or adapter and network are functioning properly. If Setup finds a problem, it displays the results and some possible solu-tions.

5. When Setup finishes the tests, you'll see the Install Network Drivers screen.

6. Select the driver you want to install. Setup can install a NetWare client driver for you. If you're installing other drivers, Setup displays a README file with instal-lation instructions.

Troubleshooting

If you can't connect to a server, first try the suggestions here, then turn to the Trouble-shooting section if necessary.

- Make sure you're using the drivers for this interface. The driver filename contains the letter B (for example, E100BODI.COM).

- If you're replacing an existing adapter, make sure the LINK statement in your NET.CFG is correct for the new interface or adapter. For example, the LINK statement for a NetWare client should be: "LINK DRIVER E100BODI"

- Verify that the frame type in your NET.CFG file matches your network.

- If setting up a server, check your LOAD and BIND statements.

- Test the interface by running diagnostics in Setup. Additional testing is available by using a responder.

- Check the README files.

Responder testing on the network (optional)

Setup can test the interface more thoroughly if you have a responder on the network while running the tests.

1. Go to a computer on the network with any EtherExpress adapter or interface installed (except EtherExpress 32 or EtherExpress 16 MCA).

2. Run the appropriate configuration program for the installed interface and set it up as a responder.

3. Return to the computer with the new adapter or interface. Run Setup and make the new interface the sender. Test the interface.

Windows NT Server or Workstation

Automatic configuration

Some computers automatically detect and configure adapters or interfaces while booting. The network interface's IRQ level and I/O address are automatically set by the BIOS each time you start your computer.

Start your computer to automatically configure the network interface. Configuration is complete when Windows NT starts or the DOS prompt appears.

If your computer displays an error while booting, it may require additional steps to configure.

Install network drivers - Windows NT Version 4.0 only

After starting Windows NT, you need to install the device drivers. Have the Windows NT CD-ROM disk available for this procedure.

VII. ASUS Network Interface

NOTE: If you are installing Windows NT 4.0 at this time, click the Start Search button when the network network interface or adapter installation window appears. This allows NT to autodetect the network interface or adapter. You may then skip steps 1 - 4 below.

1. Double-click the Network icon in the Control Panel.
2. Click the Adapters tab in the window that appears.
3. Click Add. A list of network interface or adapter appears.
4. Select "Intel EtherExpress PRO Adapter" and click OK.

Install network drivers - Windows NT Version 3.5x only.
After setting up the network interface and starting Windows NT, you need to install the Intel drivers and test the network interface or adapter.

1. Double-click the Network icon in the Control Panel.
2. Click Add Adapter.
3. When the list of adapters appears, scroll to the end of the list and select <Other> Requires disk from manufacturer.
4. Insert the ASUS Configuration and Drivers disk in the A: drive and click OK.
5. Select the "Intel EtherExpress PRO Adapter" and click OK.
6. Click OK in the Network Settings dialog box and remove the installation disk. When prompted, restart Windows NT.

To install multiple network interface or adapters, repeat this procedure for each new network interface or adapter.

Troubleshooting
If Windows NT reports an error or you can't connect to the network, try the suggestions here first, then turn to the Troubleshooting section if necessary.

• Make sure you're using the drivers for this network interface or adapter. Drivers are located on the Windows NT CD-ROM or on the ASUS Drivers and Configuration disk.

• Make sure the driver is loaded and the protocols are bound. Check the Network Bindings dialog box in Windows NT.

• Check the Windows NT Event Viewer for error messages.

• If you are attaching to a NetWare network, check your frame type and verify that NetWare client software has been installed.

• Check with your LAN administrator — you may need to install supplemental networking software.

Windows 95

Automatic Configuration

Some computers automatically detect and configure adapters or interfaces while booting. The ASUS SP98-N network interface's IRQ level and I/O address are automatically set by the BIOS each time you start your computer.

Start your computer to automatically configure the network interface or adapter. Configuration is complete when Windows 95 starts. If your computer displays an error while booting, it may require additional steps to configure.

Install Network Drivers from Diskette

Have your Windows 95 installation CD-ROM or disks available, as Windows 95 prompts for them when you install the new network interface or adapter.

1. After you have set up your SP98-N for network use, start Windows 95. The New Hardware Found dialog box appears. If this box does not appear and Windows 95 starts normally, you may need to manually add the network interface or adapter.

2. Click "Driver from disk provided by hardware manufacturer," then click OK. The Install From Disk dialog box appears.

3. Insert the ASUS Configuration and Drivers disk.

4. Specify A:\ (or B:\) as the path, then click OK.

5. Follow prompts for any Windows 95 installation disks and restart when prompted. (If you installed from CD-ROM, the installation files are typically located at D:\Win95, where D is your CD-ROM drive.)

After restarting Windows 95, you should be able to connect to your network by double-clicking the Network Neighboorhood.

Troubleshooting

If you can't connect to a server or if Windows 95 reports an error after you double-click Network Neighborhood, try the suggestions here first, then the Troubleshooting section if necessary.

• Make sure you're using the drivers that are on the drivers diskette that ships with this network interface or adapter.

• Make sure the driver is loaded and the protocols are bound. Check Device Properties list for trouble indicators (an X or ! symbol).

• Check with your LAN administrator — you may need to install supplemental networking software.

NetWare Server, Client 32, UNIX, OS/2, Banyan, and Other Operating Systems

For these, refer to our online documents. On a DOS computer, view the appropriate README file for information on installing your network driver.

VII. ASUS Network Interface

Select Duplex Mode (optional)

Duplexing is a performance option that lets you choose how the network interface or adapter sends and receives data packets over the network. The SP98-N netowrk interface can operate at full duplex only when connected to a full duplex 10BASE-T, 100BASE-TX switching hub, or another full duplex network interface or adapter. To summarize:

*   **Auto (requires a full duplex network interface or adapter or switching hub with auto-negotiation capability).** The network interface or adapter negotiates with the hub to send and receive packets at the highest rate. This is the default setting. If the hub does not provide auto-negotiation, the network interface or adapter runs at half duplex.

*   **Full duplex (requires a full duplex switching hub or network interface or adapter).** The network interface or adapter can send and receive packets at the same time. This mode can increase network interface or adapter performance capability. If the full duplex hub provides auto-negotiation, the network interface or adapter runs at full duplex. If the full duplex hub does not provide auto-negotiation, you need to set the network interface or adapter duplex mode manually (see following paragraphs)

*   **Half duplex.** The network interface or adapter performs one operation at a time; it either sends or receives.

NOTE: If your hub is running at 100 Mbps and half duplex, your potential bandwidth is higher than if you run at 10 Mbps and full duplex.

Manually Configuring for Full Duplex

If your switch supports auto-negotiation with the N-way standard, duplex configuration is automatic and no action is required on your part. However, few switches in the current installed base support auto-negotiation. Check with your network system administrator to verify. Most installations will require manual configuration to change to full duplex.

Configuration is specific to the driver you're loading for your network operating system (NOS), as shown in the following paragraphs. To set up the duplex mode, refer to the section below that corresponds to your operating system. The performance of the network interface or adapter may suffer or your network interface or adapter may not operate if your hub does not support full duplex and you configure the network interface or adapter to full duplex. Leave the network interface or adapter on half duplex if you are not sure what type of hub you are connected to.

DOS ODI, NDIS 2.01 Clients
Edit the NET.CFG or PROTOCOL.INI file. Add keywords to Link Driver section:

    FORCEDUPLEX 2
    SPEED 100 (or 10 if 10BASE-T)

NetWare server

In AUTOEXEC.NCF, Load E100B.LAN and add the following statement (you must include the equal sign for servers):

FORCEDUPLEX=2
SPEED=100 (or 10 if 10BASE-T)

For more information, see the README file for NetWare servers.

Windows NT

While running Windows NT:

1. From the Control Panel, double-click the Intel PROSet icon.

2. PROSet examines your system and displays the Adapter Setup window.

Windows 95

While running Windows 95:

1. From the Control Panel, double-click the Intel PROSet icon.

2. PROSet examines your system and displays the Adapter Setup window. If you have multiple adapters, click the adapter you are configuring (you can identify it by its Ethernet address). Each adapter must be configured separately.

3. From the window that appears, click Change.

4. From the Adapter Setup window, click the menu for Network Speed.

5. Click 100 or 10 Mbps, depending on hub speed.

6. Click the menu for Duplex Mode

7. Click Full.

8. Click OK when finished.

9. Click OK to restart Windows 95.

Other operating systems

See the *Adapter Installation and Special Configurations* README file. "Push" Installation for Windows 95

If you are a LAN Administrator setting up server-based push installation of Windows 95 as defined in Microsoft Windows 95 Resource Kit, additional steps are required for this network interface or adapter.

VII. ASUS Network Interface

Troubleshooting

If the interface can't connect to the network

Make sure the cable is installed properly.

The network cable must be securely attached at both RJ-45 connections (interface and hub). If the cable is attached but the problem persists, try a different cable. The maximum allowable distance from network interface or adapter or interface to hub is 100 meters.

If you're directly connecting two computers (no hub), use a crossover cable. Most hubs require a straight-through cable, while most switches require a crossover cable (see your hub or switch documentation to verify).

Check the LED lights on the network interface or adapter.

The SP998-N has three diagnostic LEDs near the RJ45 port (see layout on page 60 for location). These lights help indicate if there's a problem with the connector, cable, or hub. The table below describes the LEDs.

LED	Indication	Meaning
LNK	On	The interface and hub have acknowledged a connection; the link between the hub and interface is good.
	Off	The cable connection between the hub and interface is faulty; or you have a driver configuration problem.
ACT	On or flashing	The interface is sending or receiving network data. The frequency of the flashes varies with the amount of network traffic.
	Off	The interface is not sending or receiving network data.
SPD	On	Network connection operating at 100 Mbps.
	Off	Network connection operating at 10 Mbps.

Make sure you're using the correct drivers.

Make sure you're using the drivers that come with your motherboard. The driver filename contains the letter B (for example, E100BODI.DOS).

Make sure the hub port and the network interface or adapter have the same duplex setting.

If you configured the network interface for full duplex, make sure the hub port is also configured for full duplex. Setting the wrong duplex mode can degrade performance, cause data loss, or result in lost connections.

VII. ASUS Network Interface

Testing the network interface or adapter

Test the network interface or adapter by running Intel diagnostics. For DOS or Windows 3.1 computers, run Setup on the ASUS Configuration and Drivers disk. For Windows NT and Windows 95 run Intel PROSet by double-clicking the Intel PROSet Icon in the Control Panel. Click Help from the main PROSet window to get complete diagnostics information and instructions.

Common problems and solutions

SETUP.EXE reports the network interface or adapter is "Not enabled by BIOS".
- The PCI BIOS isn't configuring the network interface or adapter correctly. Try the PCI installation tips.

The computer hangs when the drivers are loaded.
- Change the PCI BIOS interrupt settings. See the next page for PCI installation tips.
- If you are using EMM386, it must be version 4.49 or newer (this version ships with MS-DOS 6.22 or newer).

Diagnostics pass, but the connection fails or errors occur.
- At 100 Mbps use category 5 wiring and make sure the network cable is securely attached.
- For NetWare clients, make sure you specify the correct frame type in the NET.CFG file.
- Make sure the duplex mode setting on the network interface or adapter matches the setting on the hub.
- At 100 Mbps, connect to a 100BASE-TX hub only (not T4).

The LNK LED doesn't light.
- Make sure you've loaded the network drivers.
- Check all connections at the network interface or adapter and the hub.
- Try another port on the hub.
- Make sure the duplex mode setting on the network interface or adapter matches the setting on the hub.
- Make sure you have the correct type of cable between the network interface or adapter and the hub. 100 BASE-TX requires two pairs. Some hubs require a cross-over cable while others require a straight-through cable. See the *Cabling* README file for more information on cabling.

The ACT LED doesn't light.
- Make sure you've loaded the correct network drivers.
- The network may be idle. Try accessing a server.
- The network interface or adapter isn't transmitting or receiving data. Try another network interface or adapter.
- May not be using four-pair cable for TX wiring.

VII. ASUS Network Interface

The network interface or adapter stopped working when another network interface or adapter was added to the computer.
- Make sure the cable is connected to the SP98-N network interface or RJ45 port.
- Make sure your PCI BIOS is current.
- Make sure the other network interface or adapter supports shared interrupts. Also, make sure your operating system supports shared interrupts — OS/2* doesn't.

The interface stopped working without apparent cause.
- Try reconnecting the cable to the RJ45 port first.
- The network driver files may be corrupt or deleted. Delete and then reinstall the drivers.
- Try another SP98-N motherboard.
- Run the diagnostics.

The Wake On LAN feature is not working.
- Make sure the WOL cable is attached and power is applied to the computer.
- Check the BIOS for its WOL setting. Some computers may need to be configured to WOL.
- Make sure the network cable is fully attached to the network interface or adapter.

Link LED does not light when power is connected.
- Make sure WOL cable is attached and power is applied to computer.
- Make sure network cable is attached at both ends.

VII. ASUS Network Interface

Technical Information

Fast Ethernet Wiring

100BASE-TX Specification: The 100BASE-TX specification supports 100 Mbps transmission over two pairs of category 5 twisted-pair Ethernet (TPE) wiring. One pair is for transmit operations and the other for receive operations. Segment lengths are limited to 100 meters with 100BASE-TX for signal timing reasons. This complies with the EIA 568 wiring standard.

Fast Ethernet Hubs and Switches

The two basic types of hubs are shared hubs and switching hubs. ASUS SP98-N's network interface can be used with either type of hub for 10 Mbps. At 100 Mbps, a TX hub or switch is required.

Shared hubs

In a shared network environment, computers are connected to hubs called repeaters. All ports of the repeater hub share a fixed amount of bandwidth, or data capacity. On a 100 Mbps shared hub, all nodes on the hub must share the 100 Mbps of bandwidth. As stations are added to the hub, the effective band-width available to any individual station gets smaller. Shared hubs do not support full duplex.

Think of a shared repeater hub as a single-lane highway that everyone shares. As the number of vehicles on the highway increases, the traffic becomes con-gested and transit time increases for individual cars.

On a shared hub all nodes must operate at the same speed, either 10 Mbps or 100 Mbps. Fast Ethernet repeaters provide 100 Mbps of available bandwidth, ten times more than what's available with a 10BASE-T repeater.

Repeaters use a well-established, uncomplicated design, making them highly cost effective for connecting PCs within a workgroup. These are the most common type of Ethernet hubs in the installed base.

Switching hubs

In a switched network environment, each port gets a fixed, dedicated amount of bandwidth. In the highway scenario, each car has its own lane on a multi-lane highway and there is no sharing.

In a switched environment, data is sent only to the port that leads to the pro-per destination station. Network bandwidth is not shared among all stations, and each new station added to the hub gets access to the full bandwidth of the network.

If a new user is added to a 100 Mbps switching hub, the new station receives its own dedicated 100 Mbps link and doesn't impact the 100 Mbps bandwidth of another station. Switching hubs can effectively increase the overall bandwidth available on the network, significantly improving performance. Switching hubs can also support full duplex.

VII. ASUS Network Interface

Using Wake On LAN

The Wake On LAN feature operates according to a published specification. In simple terms, the specification allows designers to build network adapters or interfaces that are capable of "listening to" network activity even when the computer is turned off. WOL adapters or interfaces have a special low power standby mode that is active when the rest of the computer is without power. The network interface or adapter will respond to a special "wake-up" packet sent by another computer or network device. Typically this wake-up packet causes the network interface or adapter to signal the computer to power up and run a pre-defined program.

Question and Answer

Q: What is Wake-On-LAN ?

A: The Wake-On-LAN feature provides the capability to remotely power on systems supporting Wake-On-LAN by simply sending a wake-up frame. With this feature, remotely uploading/downloading data to/from systems during off-peak hours will be feasible.

Q: What can Wake-On-LAN do for you ?

A: Wake-On-LAN is a remote management tool with advantages that can reduce system management workload, provide flexibility to the system administrator's job, and then of course save you time-consuming efforts and costs.

Q: What components does Wake-On-LAN require to be enable?

A: To enable Wake-On-LAN function, your system requires an Ethernet LAN adapter card or interface that can activate the Wake-On-LAN function, a client with Wake-On-LAN capability, and software such as LDCM Rev. 3.10 or up that can trigger the wake-up frame.

VII. ASUS Network Interface

Pin Definitions

RJ45 Connector

Pin 1   Output Transmit Data +
Pin 2   Output Transmit Data -
Pin 3   Input Receive Data +
Pin 6   Input Receive Data -
Pin 4, 5, 7, 8   (Reserved)
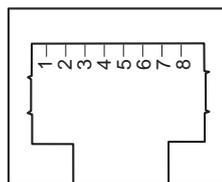
Twisted-Pair Cable

The cable used to connect the Ethernet card to a host (generally a Hub) is called a straight-through twisted-pair. The end connectors are called RJ45 connectors, which are not compatible with the standard RJ11 telephone connectors. The illustration shows a connection between a typical Hub and the ASUS SP98-N's network interface.

Straight-Through Cable

Hub	Card
1 IRD+	1 OTD+
2 IRD-	2 OTD-
3 OTD+	3 IRD+
6 OTD-	6 IRD-

Glossary

100Base-TX
IEEE's specification for running 100Mbps Ethernet using twisted-pair cables.

10Base-T
IEEE's specification for running 10Mbps Ethernet using twisted-pair cables.

10Base2
IEEE's specification for running Ethernet using thick coaxial cables.

BNC
A connector with a half-twick locking shell typically used for thin coaxial cables.

Boot ROM
Read-only memory chip that allows a workstation to communicate with LAN cards or other network interfaces.

Driver
A program that enables the network operating system to communicate with LAN cards.

IEEE 802.3 standard
Standard for the physical and electrical connections in local area networks developed by the IEEE (Institute of Electrical and Electronics Engineers).

IEEE 802.3u standard
IEEE standard for Local Area Networks (LAN) employing CSMA/CD as the access method. This standard is intended to encompass several media types and techniques for signal rates from 1Mb/s to 100Mb/s.

Interrupt (IRQ)
Signal suspending a program temporarily and transfers control to the operating system when input or output is required.

LED
Light emitting diode

Mbps
Megabits per second

ASUS SP98-N
Pentium NLX Motherboard

VIDEO SOFTWARE
USER'S MANUAL

CONTENTS

VIII. DOS UTILITY

1. SVGAUTL.EXE

1.1 General Description

SVGAUTL.EXE is one of the utilities of SiS 5597/5598. It supports three functions:

  (1) Video Mode Setting

  (2) Frame Rate Setting

  (3) Power Saving Setting

Since SiS 5597/5598 supports many enhanced Text Mode and Graphic Mode, you can use SVGAUTL.EXE to select the desired video mode.

For 640x480, 800x600, 1024x768, and 1280x1024 resolutions, SiS 5597/5598 supports multiple frame rates.

If your monitor could synchronize with these frame rates, you can use SVGAUTL.EXE to get advantage.

SiS 5597/5598 also supports VESA DPMS Power Saving Modes.

SVGAUTL.EXE can help you to set the capability.

1.2 General Usage

To use SVGAUTL.EXE:

1. Type SVGAUTL in the directory where it resides.

   For example,   **C:\> SVGAUTL <Enter>** (assuming SVGAUTL.EXE is in C:\)

2. The Main Menu would appear and direct you to configure SiS 5597/5598.

3. When you complete configuration, you may save your preferences to "AUTOEXEC.BAT file and use it as your power-on (or hardware reset) default environment.

VIII. DOS UTILITY

1.3 Commandline Options

The meaning of parameters used by SVGAUTL.EXE are explained below.

Syntax:

>SVGAUTL [/D:mode_no] [/F0:n0] [/F1:n1] [/F2:n2] [/F3:n3] [/PA:ta] [/PB:tb]

where

/D: Set the Video Mode to be mode_no which is a hex number.
    For example: Set 1024x768 256 color graphic mode.
    >SVGAUTL /D:38 <Enter>

/F0: For 640x480, set frame rate to be n0 Hz.
    Three availabe frame rates are 60, 72, and 75 Hz.
    For example : Set 640x480 graphic mode with 60Hz frame rate
    >SVGAUTL /F0:60 <Enter>

/F1: For 800x600, set frame rate to be n1 Hz.
    Four availabe frame rates are 56, 60, 72, and 75 Hz.
    For example : Set 800x600 graphic mode with 72Hz frame rate.
    >SVGAUTL /F1:72 <Enter>

/F2: For 1024x768, set frame rate to be n2 Hz.
    Four availabe frame rates are 87 (Interlace), 60, 70, and 75 Hz.
    For example : Set 1024x768 graphic mode with 60Hz frame rate.
    >SVGAUTL /F2:60 <Enter>

/F3: For 1280x1024, set frame rate to be n3 Hz.
    Two availabe frame rates are 87 (Interlace) and 60 Hz.
    For example : Set 1280x1024 graphic mode with 60Hz frame rate.
    >SVGAUTL /F3:60 <Enter>

/PA: Set Standby Timer to be ta minutes. ($0 < ta < 15$ min.)
    For example : Set Standby Timer be 5 minutes.
    >SVGAUTL /PA:5 <Enter>

/PB: Set Suspend Timer to be tb minutes. ($0 < tb < 15$ min.)
    For example : Set Suspend Timer be 5 minutes.
    >SVGAUTL /PB:5 <Enter>

Note: 1. Suspend Time would be "ta + tb". (i.e. standby time + suspend time)
      2. The timers will not be very accurate and would just be around the time.

VIII. DOS UTILITY

A1. Video Modes

A1.1 Standard VGA Modes

MODE	TYPE	DISPLAY SIZE	COLORS SHADES	ALPHA FORMAT	BUFFER START	BOX SIZE	MAX PAGES
0	A/N	320x200	16	40x25	B800	8x8	8
0*	A/N	320x350	16	40x25	B800	8x14	8
0+	A/N	360x400	16	40x25	B800	9x16	8
1	A/N	320x200	16	40x25	B800	8x8	8
1*	A/N	320x350	16	40x25	B800	8x14	8
1+	A/N	360x400	16	40x25	B800	9x16	8
2	A/N	640x200	16	80x25	B800	8x8	8
2*	A/N	640x350	16	80x25	B800	8x14	8
2+	A/N	720x400	16	80x25	B800	9x16	8
3	A/N	640x200	16	80x25	B800	8x8	8
3*	A/N	640x350	16	80x25	B800	8x14	8
3+	A/N	720x400	16	80x25	B800	9x16	8
4	APA	320x200	4	40x25	B800	8x8	1
5	APA	320x200	4	40x25	B800	8x8	1
6	APA	640x200	2	80x25	B800	8x8	1
7	A/N	720x350	4	80x25	B000	9x14	8
7+	A/N	720x400	4	80x25	B000	9x16	8
0D	APA	320x200	16	40x25	A000	8x8	8
0E	APA	640x200	16	80x25	A000	8x8	4
0F	APA	640x350	2	80x25	B000	8x14	2
10	APA	640x350	16	80x25	A000	8x14	2
11	APA	640x480	2	80x30	A000	8x16	1
12	APA	640x480	16	80x30	A000	8x16	1
13	APA	320x200	256	40x25	A000	8x8	1

NOTE: 1. A/N: Alpha/Numeric

2. APA: All Point Addressable (Graphics)

VIII. DOS UTILITY

MODE	DISPLAY SIZE	COLORS SHADES	FRAME RATE.	H-SYNC.	VIDEO FREQ.
0	320x200	16	70	31.5 K	25.1 M
0*	320x350	16	70	31.5 K	25.1 M
0+	360x400	16	70	31.5 K	28.3 M
1	320x200	16	70	31.5 K	25.1 M
1*	320x350	16	70	31.5 K	25.1 M
1+	360x400	16	70	31.5 K	28.3 M
2	640x200	16	70	31.5 K	25.1 M
2*	640x350	16	70	31.5 K	25.1 M
2+	720x400	16	70	31.5 K	28.3 M
3	640x200	16	70	31.5 K	25.1 M
3*	640x350	16	70	31.5 K	25.1 M
3+	720x400	16	70	31.5 K	28.3 M
4	320x200	4	70	31.5 K	25.1 M
5	320x200	4	70	31.5 K	25.1 M
6	640x200	2	70	31.5 K	25.1 M
7*	720x350	4	70	31.5 K	28.3 M
7+	720x400	4	70	31.5 K	28.3 M
0D	320x200	16	70	31.5 K	25.1 M
0E	640x200	16	70	31.5 K	25.1 M
0F	640x350	2	70	31.5 K	25.1 M
10	640x350	16	70	31.5 K	25.1 M
11	640x480	2	60	31.5 K	25.1 M
12	640x480	16	60	31.5 K	25.1 M
13	320x200	256	70	31.5 K	25.1 M

NOTE: i - interlaced mode
         n - noninterlaced mode

VIII. DOS UTILITY

A1.2 Enhanced Video Modes

MODE	TYPE	DISPLAY SIZE	COLORS SHADES	ALPHA FORMAT	BUFFER START	BOX SIZE	MAX. PAGES
22	A/N	1056x352	16	132x44	B800	8x8	2
23	A/N	1056x350	16	132x25	B800	8x14	4
24	A/N	1056x364	16	132x28	B800	8x13	4
25	APA	640x480	16	80x60	A000	8x8	1
26	A/N	720x480	16	80x60	B800	9x8	3
29	APA	800x600	16	100x37	A000	8x16	1
2A	A/N	800x600	16	100x40	B800	8x15	4
2D	APA	640x350	256	80x25	A000	8x14	1
2E	APA	640x480	256	80x30	A000	8x16	1
2F	APA	640x400	256	80x25	A000	8x16	1
30	APA	800x600	256	100x37	A000	8x16	1
37	APA	1024x768	16	128x48	A000	8x16	1
38	APA	1024x768	256	128x48	A000	8x16	1
39	APA	1280x1024	16	160x64	A000	8x16	1
3A	APA	1280x1024	256	160x64	A000	8x16	1
40	APA	320x200	32K	40x25	A000	8x8	1
41	APA	320x200	64K	40x25	A000	8x8	1
42	APA	320x200	16.8M	40x25	A000	8x8	1
43	APA	640x480	32K	80x30	A000	8x16	1
44	APA	640x480	64K	80x30	A000	8x16	1
45	APA	640x480	16.8M	80x30	A000	8x16	1
46	APA	800x600	32K	100x37	A000	8x16	1
47	APA	800x600	64K	100x37	A000	8x16	1
48	APA	800x600	16.8M	100x37	A000	8x16	1
49	APA	1024x768	32K	128x48	A000	8x16	1
4A	APA	1024x768	64K	128x48	A000	8x16	1
4B	APA	1024x768	16.8M	128x48	A000	8x16	1
4C	APA	1280x1024	32K	160x64	A000	8x16	1
4D	APA	1280x1024	64K	160x64	A000	8x16	1

NOTE: 1. A/N: Alpha/Numeric
       2. APA: All Point Addressable (Graphics)

MODE	DISPLAY SIZE	COLORS SHADES	FRAME RATE.	H-SYNC.	VIDEO FREQ.
22	1056x352	16	70	30.5 K	40.0 M
23	1056x350	16	70	30.5 K	40.0 M
24	1056x364	16	70	30.5 K	40.0 M
25	640x480	16	60	31.5 K	25.1 M
26	720x480	16	60	31.5 K	25.1 M
29	800x600	16	56	35.1 K	30.0 M
29*	800x600	16	60	37.9 K	40.0 M
29+	800x600	16	72	48.0 K	50.0 M
29#	800x600	16	75	46.8 K	50.0 M
29##	800x600	16	85	53.7 K	56.3 M
2A	800x600	16	56	35.1 K	36.0 M
2D	640x350	256	70	31.5 K	25.1 M
2E	640x480	256	60	31.5 K	25.1 M
2E*	640x480	256	72	37.9 K	31.5 M
2E+	640x480	256	75	37.5 K	31.5 M
2E++	640x480	256	85	43.4 K	36.0 M
2F	640x400	256	70	31.5 K	25.1 M
30	800x600	256	56	35.1 K	36.0 M
30*	800x600	256	60	37.9 K	40.0 M
30+	800x600	256	72	48.0 K	50.0 M
30#	800x600	256	75	46.8 K	50.0 M
30##	800x600	256	85	53.7 K	56.3 M
37i	1024x768	16	87	35.5 K	44.9 M
37n	1024x768	16	60	48.4 K	65.0 M
37n+	1024x768	16	70	56.5 K	75.0 M
37n#	1024x768	16	75	60.2 K	80.0 M
37n##	1024x768	16	85	68.7 K	94.5 M
38i	1024x768	256	87	35.5 K	44.9 M
38n	1024x768	256	60	48.4 K	65.0 M
38n+	1024x768	256	70	56.5 K	75.0 M
38n#	1024x768	256	75	60.2 K	80.0 M
38n##	1024x768	256	85	68.7 K	94.5 M
39i	1280x1024	16	87	48.8 K	80.0 M
39n	1280x1024	16	60	65.0 K	110.0 M
39n+	1280x1024	16	75	80.0 K	135.0 M
3Ai	1280x1024	256	87	48.8 K	80.0 M
3An	1280x1024	256	60	65.0 K	110.0 M
3An+	1280x1024	256	75	80.0 K	135.0 M
40	320x200	32K	70	31.5 K	25.1 M
41	320x200	64K	70	31.5 K	25.1 M
42	320x200	16.8M	70	31.5 K	25.1 M
43	640x480	32K	60	31.5 K	25.1 M
43*	640x480	32K	72	37.9 K	31.5 M
43+	640x480	32K	75	37.5 K	31.5 M
43++	640x480	32K	85	43.4 K	36.0 M
44	640x480	64K	60	31.5 K	25.1 M
44*	640x480	64K	72	37.9 K	31.5 M
44+	640x480	64K	75	37.5 K	31.5 M

MODE	DISPLAY SIZE	COLORS SHADES	FRAME RATE.	H-SYNC.	VIDEO FREQ.
44++	640x480	64K	85	43.4 K	36.0 M
45	640x480	16.8M	60	31.5 K	25.1 M
45*	640x480	16.8M	72	37.9 K	31.5 M
45+	640x480	16.8M	75	37.5 K	31.5 M
45++	640x480	16.8M	85	43.4 K	36.0 M
46	800x600	32K	56	35.1 K	36.0 M
46*	800x600	32K	60	37.9 K	40.0 M
46+	800x600	32K	72	48.0 K	50.0 M
46#	800x600	32K	75	46.8 K	50.0 M
46##	800x600	32K	85	53.7 K	56.3 M
47	800x600	64K	56	35.1 K	36.0 M
47*	800x600	64K	60	37.9 K	40.0 M
47+	800x600	64K	72	48.0 K	50.0 M
47#	800x600	64K	75	46.8 K	50.0 M
47##	800x600	64K	85	53.7 K	56.3 M
48	800x600	16.8M	56	35.1 K	36.0 M
48*	800x600	16.8M	60	37.9 K	40.0 M
48+	800x600	16.8M	72	48.0 K	50.0 M
48#	800x600	16.8M	75	46.8 K	50.0 M
48##	800x600	16.8M	85	53.7 K	56.3 M
49i	1024x768	32K	87	35.5 K	44.9 M
49n	1024x768	32K	60	48.4 K	65.0 M
49n+	1024x768	32K	70	56.5 K	75.0 M
49n#	1024x768	32K	75	60.2 K	80.0 M
49n##	1024x768	32K	85	68.7 K	94.5 M
4Ai	1024x768	64K	87	35.5 K	44.9 M
4An	1024x768	64K	60	48.4 K	65.0 M
4An+	1024x768	64K	70	56.5 K	75.0 M
4An#	1024x768	64K	75	60.2 K	80.0 M
4An##	1024x768	64K	85	68.7 K	94.5 M
4Bi	1024x768	16.8M	87	35.5 K	44.9 M
4Bn	1024x768	16.8M	60	48.4 K	65.0 M
4Bn+	1024x768	16.8M	70	56.5 K	75.0 M
4Bn#	1024x768	16.8M	75	60.2 K	80.0 M
4Bn##	1024x768	16.8M	85	68.7 K	94.5 M
4Ci	1280x1024	32K	89	48.8 K	80.0 M
4Di	1280x1024	64K	89	48.8 K	80.0 M

NOTE: i - interlaced mode
  n - noninterlaced mode

* For the limitation of memory bandwidth in 1MB DRAM configuration, the following video modes is not supported in 1MB configuration: modes 45*, 45+, 46+, 46#, 47+, and 47#.

IX. SOFTWARE DRIVERS

To make use of the advance features of SiS 5597/5598, extended graphic and text modes are supported by software application drivers developed by SiS. The following applications are currently supported:

- Microsoft Windows 3.1
- Microsoft Windows 95
- Microsoft Windows NT Ver. 3.1, 3.5, 3.51, 4.0
- AutoCAD/386 Release 11, 12
- Auto Shade/386 Ver. 2.0
- 3D Studio Ver. 3.0
- OS/2 Presentation Manager 2.1 & 3.0

1. Windows 3.1

1.1 Version Notes

The following description apply to "SiS 5597/5598 Driver Release V1.03" and maybe later release version but not guaranteed.

1.2 Driver Files

1. The enclosed SiS 5597/5598 Windows 3.1 driver contains SETUP.EXE and other installation-related files.

1.3 Installation

1.3.1 Unpack & Copy

To unpack and copy drivers to where they should reside, please follow the following procedures:

1. Boot up Windows using standard VGA mode.
2. In Windows Program Manager Screen, choose "File" item.
3. In "File Item List", choose "Run" item.
4. In "Run" Screen, select your driver source. e.g. D:\MM\WIN31\SETUP.EXE
5. Follows the directions appeared on the screen to complete the unpack & copy procedures.
6. After unpack & copy complete, a SiS Multimedia Vx.xx" program group would be created and shown on screen.

7. In the "SiS Multimedia Vx.xx" program group, there would be five icons:

   (1) SiS Multimedia Manager: To create a small "SiS Multimedia" icon on the corner of the screen.

   (2) SVGA Setup: SiS VGA graphics configuration system

   (3) SiS MMPlayer: To create a SiS MMPlayer" VCP-like icon on the screen.

   (4) Center Screen:An utility to adjust the position of display on the screen.

   (5) Uninstall utility.

1.3.2 Graphics Setup

1. In "SiS Multimedia Vx.xx" program group, choose "SVGA Setup" icon to enter "SiS VGA Configuration System" screen.

2. In "SiS VGA Configuration System" Screen, choose which options you would like to use.

3. After completing your selections, choose "OK" to make all your selections effective.

4. Choose "Restart Winodws" to re-boot Windows using new settings. Or, choose "Continue" to continue your current Windows processes. (But when you re-boot Windows, the new settings would take effect.)

1.3.3 Power Saving Setup in Windows

1. In "SiS VGA Configuration System" screen, choose "power saver" item to enter "Power Saver" screen.

2. In "Power Saver" Screen, choose which options you would like to use.

3. After completing the selections, choose "OK" to make all your selections effective.

4. After complete setup, the power_saver would take effect as you request when time up and you may continue your normal process.

1.3.4 Zoom_Key Setup

In "SiS VGA Configuration System" screen, choose "zooming" item to define "hot keys" for zoom-in or zoom-out screen without entering setup program.

The operating principles of zoom-in and zoom-out are as follow:

   (1) The resolution change sequence for zoom-in is

      1024x768 ===> 800x600 ===> 640x480 .

   (2) The resolution change sequence for zoom-out is

      640x480 ===> 800x600 ===> 1024x768 .

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Windows 3.1

(3) You must first be able to zoom-in before you may zoom-out, that means you can not get a resolution larger than that you setup.

To use this feature, please follow the following procedures.

1. In "SiS VGA Configuration System" screen, choose "zooming" item to enter "Zooming Hotkey" screen.

2. In "Zooming Hotkey" Screen, choose which "hot key" you would like to use and enable it.

3. After completing the selections, choose "OK" to make all your selections effective.

4. After complete setup, you may use your own defined hot key to zoom-in or zoom-out screen.

1.3.5 Notes

1. The power saver's timer settings would still be effective even you exit Windows to go back to DOS.

1.4 Video Operations

1.4.1 DCI Function

SiS 5597/5598 supports DCI driver for software MPEG playback and other media player programs which could take advantage of DCI.

The SiS 5597/5598 DCI driver is automatically loaded during "Windows Driver Unpack & Copy" process. Therefore it should be transparent to the end-user and any media players could take advantage of it.

1.4.2 SiS MMPlay (SW MPEG)

To make SW MPEG playback more friendly than original SW MPEG player supplier provided, SiS provide an MMPlayer application program to provide an VCP-like (Video Cassette Player) interface.

To take advantage of the SiS MMPlayer, you must first install "SW MPEG Player". All the SiS provided is just an interface but not a SW MPEG Player at present. If the SW MPEG Player does not exist, the SiS MMPlayer will not work. (Xing or Mediamatics SW MPEG Player supported)

To use the SiS MMPlayer, you just follow the procedures below:

1. In "SiS Multimedia Vx.xx" program group, choose "SiS MMPlayer" icon and SiS MMPlayer VCP-like icon would appear.

2. Enjoy the SW MPEG playback as you like.

IX. SOFTWARE DRIVERS

MMPLAY.EXE Button Description

Button	Description
:	Power On/Off
:	Open File & Type Control
:	Minimize This Application
:	Eject CD Title (Not implemented yet.)
:	Fast Backward
:	Fast Forward
:	Mark in
:	Mark out
:	Pause
:	Play
:	Stop
:	End
:	Begin
:	Volume increase (Not implemented yet.)
:	Volume decrease (Not implemented yet.)
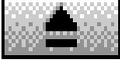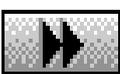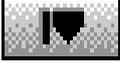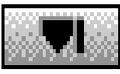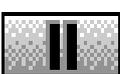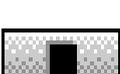
IX. SOFTWARE DRIVERS

2. Windows 95

2.1 Version Note

The following description apply to "SiS 5597/5598 Driver Release V1.03" and maybe later release version but not guaranteed.

2.2 Driver Files

1. The enclosed SiS 5597/5598 Windows 95 drivers files are:

   SETUP.EXE   **SIS597.DRV**   **SIS597.INF**

   SISMINI.VXD   **Other Files**

2. All the 16-color, 256-color, 32K/64K-color, and 16M-color drivers are available.

2.3 Installation

1. Boot up Windows 95.

2. In Windows 95 "Booted" Screen, select "My Computer" icon.

3. In "My computer" Screen, select "Control Panel" icon.

4. In "Control Panel" Screen, select "Display" icon.

5. In "Display Properties" Screen, select "Settings" item.

6. In refreshed "Display Properties" Screen, select "Change Display_Type" item.

7. In "Change Display Type" Screen, select "Adapter Type ==> Change" item.

8. In "Select Device" Screen, select "Have Disk..." item.

9. In "Install From Disk" Screen, select your driver source.e.g. A:\WIN95

10. In new "Select Device" Screen, "SiS 5597/5598" would appear and select "OK". Then Windows 95 would perform driver installation.

11. After completing installation, Windows 95 would go back to "Change Display Type" Screen, select "Close" item.

12. Windows 95 would go back to "Display Properties" Screen, select "Close" or "Apply" item.

13. In "System Settings Change" Screen, select "Yes" item to restart your computer.

14. After restarting, Windows 95 will run on 640x480x256 color, 60NI.

2.4 Using "Display Modes"

1. Go to "Display Properties" Screen and you will find that "Display Modes" item had been added.

2. First select "Display Modes" item and you may select desired resolution by changing "Desktop area" pointer, desired color by changing "Color palette" value, desired font size by changing "Font size", and desired refresh rate by changing "Refresh rate".

3. After completing selection, select "OK" or "Apply" to complete the installation.

4. In "SiS 5597/5598 Settings" Screen, select "OK".

5. Two cases may happen :

   a). You did not change "color" and/or "font size".

        1. "SiS 5597/5598 Settings" Screen appears again,
        2. Select "Yes" and you may work on your selected mode now.

   b). You changed "color" and/or "font size".

        1. System will reboot.
        2. You may work on your selected mode now.

2.5 Utilities

2.5.1 Installation

1. From "Start Menu", select "Run" item.

2. In "Run" Screen, select your source execution file.

   For example, D:\MM\WIN95\SETUP.EXE

3. In "SiS Multimedia Setup Ver x.xx", select "OK".

4. A "SiS Multimedia Vx.xx" program group would be created and shown on screen, select "Restart Now".

5. In the "SiS Multimedia Vx.xx" program group, there are three icons:

   (1) SiS Multimedia Package: To create a small "SiS Multimedia" icon on the corner of the screen.

   (2) SiS MMPlayer: To create a "SiS MMPlayer" VCP-like icon on the screen.

   (3) Center Screen: An utility to adjust the position of display on the screen.

6. "SiS Multimedia V x.xx" program group has been created, select "Restart Now".

2.5.2 Operation

1. For Video Operations ("SiS MMPlayer"), please refer to section 1.3.

IX. SOFTWARE DRIVERS

3. Windows NT 3.5 & 3.51

3.1 Version Note

The following description apply to "SiS 5597/5598 Driver Release V1.03" and maybe later release version but not guaranteed.

3.2 Driver Files

(1) The enclosed SiS 5597/5598 Windows NT 3.5 & 3.51 drivers are SISTAG, SISV.SYS, SISV256.DLL, SISV.DLL, OEMSETUP.INF.

(2) All the 16-color, 256-color, 32K/64K-color, and 16M-color drivers are available.

3.3 Installation

1. Select the Display icon under Control Panel from Main group.
2. Select Change Display Type from Display Settings.
3. Select Change from Display Type.
4. Select Other from Select Device.
5. Place the SiS 5597/5598 CD-title Disk into CD-ROM Drive.
6. When the "Install from Disk" dialog box appears, type the directory storing the drivers and click "OK".
   The directory in CD-Title is at "D:\MM\WINNT\WINNT35".
7. Select Install and click "Yes" when the "Installing Driver" dialog box appears.
8. Select New when the "Windows NT Setup" dialog box appears.
9. Click "Continue" - A message will appear stating that the drivers were successfully installed. Click "OK". You must now restart Windows NT 3.51.

3.4 Selecting resolution and color depth

1. Select the Display icon under Control Panel from Main group.
2. Select Color Palette to change between 16 colors, 256 colors, 32768 colors, 65536 colors, and 16777216 colors.
3. To select desktop resolution size, go to the Desktop area and use the slide bar to change resolution from 640x480, 800x600, 1024x768, and 1280x1024.
4. Select Test to test the resolution.
   If the display test screen was good then select "Yes" when the "Testing Mode" dialog box appears. If the display test screen was bad then select "No". Windows NT will give you an error message.
5. If the display test screen was good and you select "Yes", Windows NT 3.51 will prompt you to restart Windows NT 3.51.

IX. SOFTWARE DRIVERS

4. Windows NT 4.0

4.1 Version Note

The following description apply to "SiS 5597/5598 Driver Release V1.03" and maybe later release version but not guaranteed.

4.2 Driver Files

(1) The enclosed SiS 5597/5598 Windows NT 4.0 drivers are SISV.SYS, SISV256.DLL, SISV.DLL, SISV5597.INF.

(2) All the 16-color, 256-color, 32K/64K-color, and 16M-color drivers are available.

4.3 Installation

1. Click "Start" menu and select Display icon under Control Panel from Settings group.
2. Select Settings of Display Properties.
3. Select Display Type.
4. Select Change from the Adapter Type area.
5. Select Have Disk of Change Display.
6. Place the SiS 5597/5598 CD-Title Disk into CD-ROM Drive.
7. When the "Install from Disk" dialog box appears, type the directory storing the drivers and click "OK".
   The directory in CD-Title is at "D:\MM\WINNT\WINNT40".
8. When the "Change Display" dialog box appears, click "OK".
9. When the "Third-party Drivers" dialog box appears, click "Yes" - A message will appear stating that the drivers were successfully installed.
10. Click "OK". You must now restart Windows NT 4.0.

4.4 Selecting resolution and color depth

1. Click "Start" menu and select Display icon under Control Panel from Settings group.
2. Select Settings.
3. Select Color Palette to change between 16 colors, 256 colors, 32768 colors, 65536 colors, and 16,777,216 colors.
4. To select desktop resolution size, go to the Desktop area and use the slide bar to change resolution from 640x480, 800x600, 1024x768, and 1280x1024.
5. Select Test to test the resolution. If the display test screen was good then select "Yes" when the "Testing Mode" dialog box appears. If the display test screen was bad then select "No". Windows NT 4.0 will give you an error message.
6. Click "OK". If the display test screen was good and you select "Yes", Windows NT 4.0 will change the mode without restarting Windows NT 4.0.

IX. SOFTWARE DRIVERS

5. Autodesk ADI 4.2 -Protected Mode

5.1 General Description

5.1.1 Driver Files

1. The enclosed SiS 5597/5598 ADI driver contains the following file:

   RCPSIS.EXP SiS ADI Driver (for all resolutions & colors)

   Note: This version of ADI driver does not support 16-color operation.

2. This driver fits for a series of Autodesk Inc. products including:

   (1) AutoCAD/386 R11

   (2) AutoCAD/386 R12

   (3) AutoShade/386 V2.0

   (4) 3D Studio V3.0

3. Their installation procedures are different from one program to the others. But the first step of installation is the same for all these programs, that is "To unpack and copy drivers to where you would like them to reside." Therefore, we will state this step below.

4. As to the real installation procedures for each program, we will give a detail description in Sec. 5.1 to Sec. 5.4.

5.1.2 Unpack & Copy

To unpack and copy drivers to where they should reside, please follow the following procedures:

1. Run "INSTDRV.EXE" where it resides.

2. In "SiS Super VGA Drivers Installation" menu, select "A. ADI 4.2" to unpack and copy drivers. (To select, type "A")

3. In "Unpack & Copy ADI 4.2 Drivers" screen, **keyin the "drive:\directory" where these drivers would reside** (default C:\ADI42). Program would unpack & copy all related driver files to where you assign.

4. After "unpack and copy" completed, exit the INSTDRV.EXE program.

5. Refer to Sec. 5.1 to Sec. 5.4 for the real installation procedures for each program.

IX. SOFTWARE DRIVERS

5.2 AutoCAD R11 Setup

1. The following procedures assume that

   (1) You have complete "unpack & copy" procedure.
   (2) Your ADI 4.2 drivers are located in C:\ADI42.

2. Add the following setting to your own batch file for AutoCAD R11 (say ACADR11.BAT) or to your "AUTOEXEC.BAT" file:

   SET DSPADI=\ADI42\RCPSIS.EXP <Enter>

3. Delete the configure file ACAD.CFG resides in \ACAD directory.

4. Type ACADR11 <Enter> to configure your AutoCAD R11 system.

5. In "Select Display Device:" item, choose "ADI P386 V4.0/4.1 display"

6. In "Select Display Resolution" screen, choose which display driver you want to use.

7. Go through the whole instructions, and the system would start with the desired display setting.

5.3 AutoCAD R12 Setup

1. The following procedures assume that

   (1) You have complete "unpack & copy" procedure.
   (2) Your SiS ADI 4.2 drivers are located in C:\ADI42.
   (3) Your AutoCAD R12 program is located in C:\ACADR12.
   (4) Your AutoCAD R12 default drivers are located in C:\ACADR12\DRV.
   (5) Your AutoCAD R12 configure file ACAD.CFG is located in C:\ACADR12.

2. Copy the following driver file to C:\ACADR12\DRV: RCPSIS.EXP.

   You may complete this step by COPY C:\ADI42\RCPSIS.EXP C:\ACADR12\DRV.

3. Delete your original ACAD.CFG file. You may complete this step by DEL C:\ACADR12\ACAD.CFG.

4. Restart your AutoCAD R12 program as usual.

5. AutoCAD R12 will ask you to complete the configuration procedures since it can't find the configure file ACAD.CFG.

6. Follow the instructions of AutoCAD R12 to proceed configuration.

7. In "Available Video Displays:" item, choose the "SiS Super VGA ADI v4.2 Display and Rendering driver" item.

8. In "Select Display Resolution" screen, choose which display driver you want to use.

9. Go through the whole instructions, and the system would start with the selected display setting.

IX. SOFTWARE DRIVERS

5.4 AutoShade R2.0 Setup

1. The following procedures assume that

   (1) You have complete "unpack & copy" procedure.
   (2) Your ADI 4.2 drivers are located in C:\ADI42.

2. Add the following settings to your batch file for AutoShade R2.0 (say SHADE2.BAT) or to your "AUTOEXEC.BAT" file.

   (a) For display driver setting, SET DSPADI=\ADI42\RCPSIS.EXP.
   (b) For rendering driver setting, SET RDPADI=\ADI42\RCPSIS.EXP.

3. Delete the configure file SHADE.CFG.

4. Type SHADE2 <Enter> to re-configure the AutoShade.

5. While prompting "Select display device:", choose "P386 AutoDesk Device Interface display driver."

6. While prompting "Select rendering display driver:", choose "P386 AutoDesk Device Interface rendering driver."

7. Go through all the instructions, the system would start with the desired display setting.

5.5 3D Studio Version 3.0 Setup

1. The following procedures assume that

   (1) You have complete "unpack & copy" procedure.
   (2) Your ADI 4.2 drivers are located in C:\ADI42.

2. Create your own **3D Studio V3.0 batch file (say 3DS3.BAT)** and add the following settings to it, or add the following settings to your **"AUTOEXEC.BAT"** file.

   (1) **SET RCPADI=C:\ADI42\RCPSIS.EXP**
   (2) **SET RDPADI=C:\ADI42\RCPSIS.EXP**

3. Execute the new 3DS batch file or reboot the computer using the new "AUTOEXEC.BAT" as to make the new settings effective.

4. Change your current working directory to \3DS3 (where your 3D Studio V3.0 usually resides).

5. Delete original configuration file "3DADI.CFG".

6. Type **3DS VIBCGF <Enter>** to configure your display environment.

7. After the "Company Register Screen" appears, press **<Enter>** to continue.

8. The "Video Environment Configuration Screen" will appear.

   Please follow the following procedures to configure your video display environment.

   (1) In Main-Display" item,

      (a) Press **<Enter>** The selection menu will appear.

      (b) In selection menu, move cursor to **"RCPADI"**. Press **<Enter>** to select.

   (2) In "Material-Display" item,

      (a) Press **<Enter>** The selection menu will appear.

      (b) In selection menu, move cursor to **"RCPADI"**. Press **<Enter>** to select.

   (3) In "Render-Display" item,

      (a) Press **<Enter>** The selection menu will appear.

      (b) In selection menu, move cursor to **"RCPADI"** or **"RDPADI".** Press **<Enter>** to select.

   (4) Complete the other selections and exit configuration.

9. After exit configure, 3DS will boot automatically using the environment you just select.

10. If your previous configuration is OK, 3DS will ask you to make detail configuration for SiS 5597/5598 drivers. If this didn't happen, please check your previous procedures or contact the technical support people.

11. In the detail configuration for SiS 5597/5598 drivers, just follow the instructions appear on the screen and make your own choice. If you are confused in anything, contact the technical support people for solution.

12. After detail configuration, you will enter the 3DS main display screen and you may begin your 3D Studio work in the environment you make before.

13. Once completing the detail configuration,   you may enter 3D Studio in the same configuration simply by type **\3DS3\3DS <Enter>** next time.

14. If you want to change your video configuration, just follow the procedures mentioned before to re-configure.

IX. SOFTWARE DRIVERS

GENERAL NOTES FOR THE OS/2 DRIVERS:

- The descriptions apply to "SiS 5597/5598 Driver Release V1.03" and may also apply to later release versions but not guaranteed.
- All OS/2 Warp Versions up to SiS 5597/5598 driver Rev. 1.03 would be installed as described in "7. OS/2 V3.0 (Warp)" except for Double Bytes OS/2 Warp (e.g., Chinese, Japanese, and Korea).
- •. For Double Bytes OS/2 Warp installation, refer to "8. Double Bytes OS/2 Warp".

6. OS/2 V2.1

6.1 Driver Files

1. The enclosed SiS 5597/5598 OS/2 2.1 driver contains the following files:

SISINST.CMD	SiS driver install program
SVGA.EXE	SiS PMI Generator
S768256.DL@	SiS IBMDEV32.DLL Display Driver
OTHERS	other files required during installation

6.2 Installation

Before install SiS 5597/5598 OS/2 drivers, make sure:

1. Install your OS/2 system using **"VGA display"** option (i.e. standard VGA).

2. Start your OS/2 system.

Install SiS 5597/5598 OS/2 2.1 drivers as following procedures:

1. Enter "OS/2 window" or "OS/2 full screen".

2. Change directory to which holds the SiS 5597/5598 OS/2 2.1 display drivers and type SISINST <Enter>.

   For example, A:\OS2\SBCS.21>SISINST

3. All the Driver Files will be copied to a subdirectory C:\SISDRV and the "Select Screen parameters for SiS SVGA" menu appears and all the resolution (and color) and frame rate supported would be shown on the screen.

4. Choose which one you would like to use and click "OK".

5. Then installation program would complete all installation process and create a "SiS Setup" for future change mode usage.

6. Shutdown and re-boot OS/2 to make your selection effectively.

7. OS/2 V3.0 (Warp)

7.1 Driver Files

The enclosed SiS 5597/5598 OS/2 3.0 driver contains the following files:

SISINST.CMD	SiS driver install program
SVGA.EXE	SiS PMI Generator
S768256.DL@	SiS IBMDEV32.DLL Display Driver
OTHERS	other files required during installation

7.2 Installation

Before install SiS 5597/5598 OS/2 drivers, make sure:

1. Install your OS/2 system using **"VGA display"** option (i.e. standard VGA).

2. Start your OS/2 system.

Install SiS 5597/5598 OS/2 Warp drivers as following procedures:

1. Enter "OS/2 window" or "OS/2 full screen".

2. Change directory to which holds the SiS 5597/5598 OS/2 3.0 display drivers and type SISINST <Enter>. For example, A:\OS2\SBCS.30>SISINST

3. All the Driver Files will be copied to a subdirectory C:\SISDRV and the "Select Screen parameters for SiS SVGA" menu appears and all the resolution (and color) and frame rate supported would be shown on the screen.

4. Choose which one you would like to use and click "OK".

5. Then installation program would complete all installation process and create a "SiS Setup" for future change mode usage.

6. Shutdown and re-boot OS/2 to make your selection effectively.

IX. Software Drivers
OS/2 V3.0 Warp

IX. SOFTWARE DRIVERS

8. Double Bytes OS/2 Warp

8.1 Driver Files
The enclosed SiS 5597/5598 Double Byte OS/2 3.0 driver contains the following files:

SETUP.CMD	SiS driver install program
SVGA.EXE	SiS PMI Generator
S768256.DL@	SiS IBMDEV32.DLL Display Driver
OTHERS	other files required during installation

8.2 Installation
For Double Byte OS/2 Warp limitation, the installation process is a two phase installation and can't complete the whole installation in one-time-process.

1st phase: copy files, modify "config.sys", create "SiS Install" icon then shutdown and re-boot OS/2.
2nd phase: double click "SiS Install" icon to complete the installation

Before install SiS 5597/5598 OS/2 drivers, make sure:

1. Install your OS/2 system using **"VGA display"** option (i.e. standard VGA).
2. Start your OS/2 system.

Install SiS 5597/5598 OS/2 Warp drivers as following procedures:

1st phase:
1. Enter "OS/2 window" or "OS/2 full screen".
2. Change directory to which holds the SiS 5597/5598 OS/2 3.0 display drivers and type SETUP <Enter>, For example, A:\OS2\DBCS.30>SETUP
3. All the Driver Files will be copied to a subdirectory C:\SISDRV and "SiS Install" icon would be created.
4. After completing "setup" program, shutdown and re-boot OS/2.

2nd phase:
5. After re-booting OS/2, double clicks "SiS Install" icon. Then the "SiS Install" icon would be executed automatically and "Select Screen parameters for SiS SVGA" screen would appeared on the screen.
6. Select the desired resolution (and color) and frame rate on this screen, then click "OK" to complete installation and "SiS Setup" icon would be created for future change modes and frame rate usage.
7. After completing installation, shutdown and re-boot OS/2 to make your selection effectively.