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NRL-LS

Intel® Pentium4™-based Motherboard
ServerWorks® GCSL SystemSet

User Guide

NRL-LS

User Guide

Motherboard

E1098

First Edition
November 2002

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FCC/CDC statements

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:

- Reorient 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.

> 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.

This class B digital apparatus complies with Canadian ICES-003.

Safety information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.

- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.

- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.

- Seek professional assistance before using an adpater or extension cord. These devices could interrupt the grounding circuit.

- Make sure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.

- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety

- Before installing the product and adding devices on it, carefully read all the documentation that came with the package.

- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.

- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.

- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.

- Place the product on a stable surface.

- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

About this guide

This user guide contains the information you need when installing the ASUS NRL-LS motherboard.

How this guide is organized

This manual contains the following parts:

- **Chapter 1: Product introduction**

  This chapter describes the features of the NRL-LS motherboard. It includes brief descriptions of the special attributes of the motherboard and the new technology it supports.

- **Chapter 2: Hardware information**

  This chapter lists the hardware setup procedures that you have to perform when installing system components. It includes description of the switches, jumpers, and connectors on the motherboard.

- **Chapter 3: Powering up**

  This chapter describes the power up sequence and gives information on the BIOS beep codes.

- **Chapter 4: BIOS setup**

  This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

- **Chapter 5: Driver Installation**

  This chapter tells how to install SCSI, LAN, and VGA drivers for various operating systems.

Conventions used in this guide

To make sure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

WARNING: Information to prevent injury to yourself when trying to complete a task.

CAUTION: Information to prevent damage to the components when trying to complete a task.

IMPORTANT: Information that you MUST follow to complete a task.

NOTE: Tips and additional information to aid in completing a task.

Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. **ASUS Websites**

   The ASUS websites worldwide provide updated information on ASUS hardware and software products. The ASUS websites are listed in the ASUS Contact Information on page x.

2. **Optional Documentation**

   Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

ASUS contact information

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Support Email: tsd@asus.com.tw
Web Site: www.asus.com.tw
Newsgroup: cscnews.asus.com.tw

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Support Fax: +49-2102-9599-11
Support (Email):   www.asuscom.de/de/support (for online support)
Web Site: www.asuscom.de

NRL-LS specifications summary

CPU	Support for Intel® Pentium4™ processor On-die 512KB L2 cache
Chipsets	ServerWorks® Grand Champion "Super-Lite" North Bridge, CMIC-SL, ServerWorks® South Bridge, CSB6
Front Side Bus (FSB)	400 MHz
Memory	4 x 184-pin DDR DIMM sockets Supports PC2100/PC1600 registered ECC DDR DIMMs Supports 128MB to 4GB system memory
Onboard LAN	Intel® 82540EM Gigabit Ethernet controller
Onboard SCSI	Adaptec AIC-7892X Ultra 160 SCSI controller
Onboard VGA	ATI® RAGE-XL PCI-based VGA controller
Expansion slots	4 x PCI 64-bit / 33MHz 3V (PCI-1 to PCI-4) 1 x PCI 64-bit / 33MHz 5V (PCI-5)
Rear panel I/O	1 x Parallel port 1 x Serial port 1 x VGA port 1 x PS/2 keyboard port 1 x PS/2 mouse port 2 x USB 1.1 ports 1 x RJ-45 port (with LED)
Internal connectors	1 x 68-pin Ultra-160 SCSI connectors 3 x IDE connectors (2 x ATA100, 1 x PIO Mode 3/4) 1 x Floppy disk connector 1 x USB 1.1 connector for two additional USB ports 1 x Serial Port 2 (COM2) connector eRMC and IPMI connectors (for ASMC card) CPU/PCI/Chassis fan connectors 24-pin/4-pin ATX power connectors IDE LED/Power LED connectors 20-pin Front panel connector Chassis intrusion, SMBus and WOR connectors
BIOS features	4Mb Flash ROM, Award BIOS with ACPI, DMI, Green, PnP features, and Enhanced Server BIOS features
Form Factor	ATX form factor: 12 in x 9.6 in (30.5 cm x 24.4 cm)

* Specifications are subject to change without notice.

Chapter 1
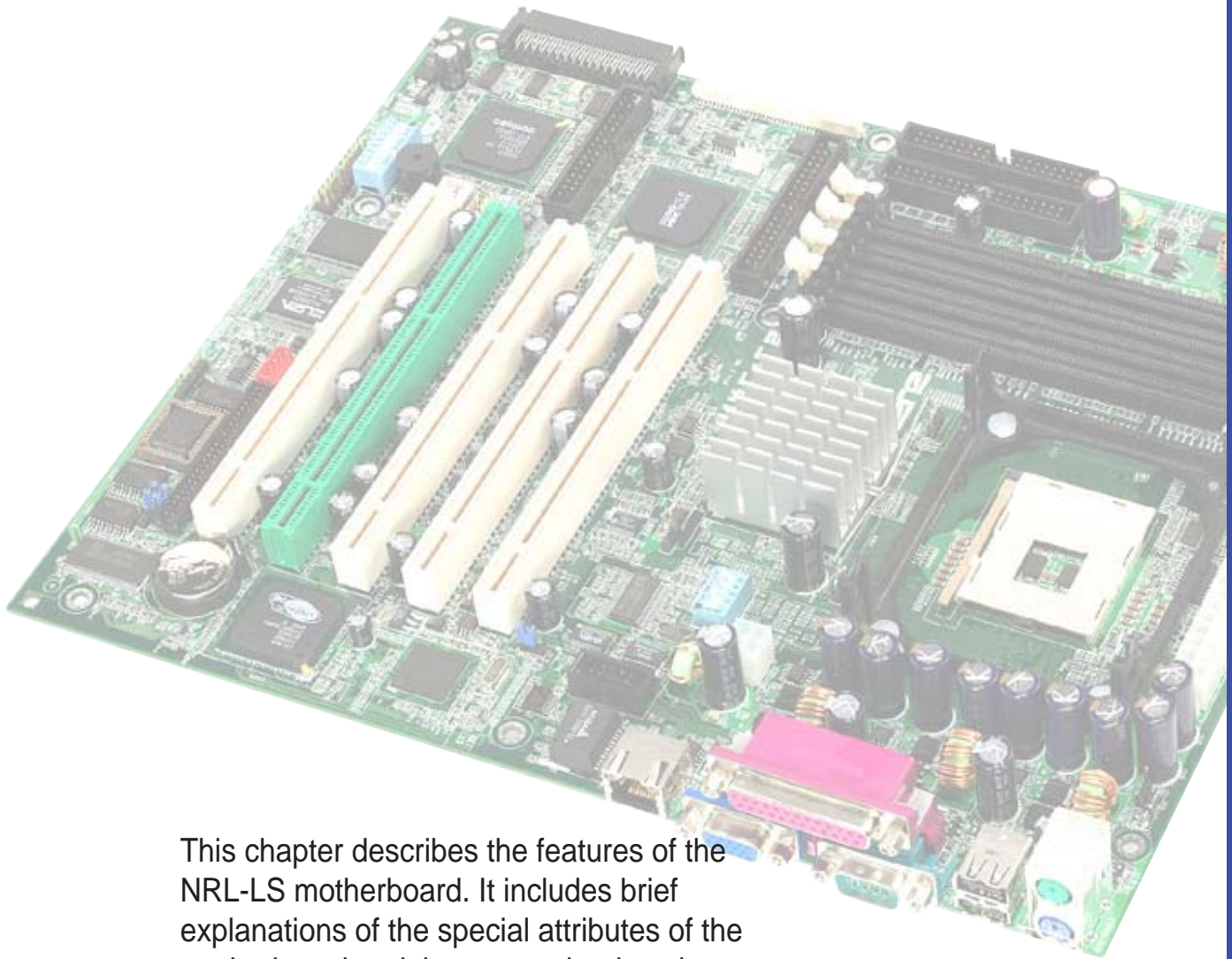
This chapter describes the features of the NRL-LS motherboard. It includes brief explanations of the special attributes of the motherboard and the new technology it supports.

1. Product introduction

Chapter summary

1.1   Welcome!

Thank you for buying the ASUS® NRL-LS motherboard!

The ASUS NRL-LS motherboard delivers a host of new features and latest technologies making it another standout in the long line of ASUS quality server motherboards!

The NRL-LS incorporates Intel® Pentium4™ processors coupled with the ServerWorks® Grand Champion Super Lite (GCSL) SystemSet to deliver a reliable and high performance server platform.

Before you start installing the motherboard, and hardware devices on it, check the items in your package with the list below.

1.2   Package contents

Check your NRL-LS package for the following items.

✓   ASUS NRL-LS motherboard

✓   ASUS NRL-LS support CD

✓   I/O shield

✓   80-conductor ribbon cable for UltraDMA100/66//33 IDE drives

✓   68-pin LVD SCSI cable for Ultra 160 SCSI devices

✓   Ribbon cable for a 3.5-inch floppy drive

✓   Bag of extra jumper caps

✓   NRL-LS User Guide

> If any of the above items is damaged or missing, contact your retailer.

1.3   Special features

1.3.1   Product highlights

Latest processor technology

Latest 400MHz Pentium4™ Processor Technology: The NRL-LS motherboard supports the Intel® Pentium 4 Socket 478 Northwood/ Willamette Processor. The Pentium 4 processor utilizes the advanced 0.18 micron processor core in FC-PGA2 package for a 2.66+GHz frequency, while the Northwood processor uses the 0.13 micron processor core with 512KB L2 cache for up to a speedy 2.66+ GHz frequency and a 400 MHz FSB. The Pentium4™ offers optimized performance for audio, video, and Internet applications.

DDR memory support

Employing the Double Data Rate (DDR) memory technology, the NRL-LS motherboard supports up to 4GB of system memory using PC2100/1600 registered ECC DDR DIMMs. The ultra-fast 200MHz memory bus doubles the speed of the PC100 SDRAM to deliver the required bandwidth for the latest 3D graphics, multimedia, and Internet applications. See page 2-10.

Single-Channel Ultra-160 SCSI

The Adaptec AIC-7892X Ultra 160 SCSI controller, is onboard to support single-channel Ultra-160 SCSI connectors that provide high-speed data transfer interfaces.

Advanced 64-bit PCI slots

The 64-bit/33MHz PCI slots maximize I/O bandwidth for current 64-bit PCI cards that support 33MHz bus.

ATA/100 IDE support

The dual-channel bus master IDE connectors comply with the ATA/100 protocol and supports ATA/100, PIO modes 3 & 4 IDE devices such as ATAPI IDE CD-ROM, CD-R/RW, ZIP, and LS-120 drives.

Third IDE Channel support

The CSB6 South Bridge chip provides a third IDE with PIO mode 3/4 support which provides more device connectivity in this server system.

Onboard LAN

The motherboard features the Intel® 82540EM Gigabit Ethernet controller to support 10/100/1000 Mbit/sec transfer rates for a high-speed and highly-compatible network connection.

Onboard VGA

The ATI Rage-XL PCI-based VGA controller integrates an 8MB display SDRAM to provide onboard video solution.

1.3.2 Value-added solutions

Temperature, fan, and voltage monitoring

The CPU temperature is monitored by the ASUS ASIC to prevent overheating and damage. The system fan rotations per minute (RPM) is monitored for timely failure detection. The system voltage levels are monitored to ensure stable supply of current for critical components.

Dual function power switch

While the system is ON, pressing the power switch for less than 4 seconds puts the system to sleep mode or to soft-off mode, depending on the BIOS setting. Pressing the power switch for more than 4 seconds lets the system enter the soft-off mode regardless of the BIOS setting.

Remote Ring In

This feature allows the system to wake up remotely through an internal or external modem, if present.

Wake-Up support

The motherboard includes Wake-On-Ring, and BIOS Wake-Up features.

Server management

The motherboard comes with an ASMC connector that supports the optional ASMC-HE/ME/LE card to comply with server reliability, availability, and serviceability requirements. Remote management response via remote diagnostics and troubleshooting still works even when the operating system has stopped functioning.

ACPI ready

The Advanced Configuration power Interface (ACPI) provides more energy saving features for operating systems that support OS Direct Power Management (OSPM).

Concurrent PCI

This feature allows multiple PCI transfers from PCI master buses to the memory and processor.

Auto fan off

The system fans power off automatically when the system is in sleep mode. This feature reduces both power consumption and system noise.

Chassis intrusion detection

The motherboard supports chassis intrusion monitoring through the ASUS ASIC. A chassis intrusion event is retained in the system memory for more protection.

Smart BIOS

The 4Mbit firmware gives an easy-to-use interface that provides more control and protection to the motherboard. The BIOS has a boot block write protection and HD/SCSI/MO/ZIP/CD/Floppy boot selection, and is Year 2000 certified.

Compliance

Both the BIOS and the hardware levels of the motherboard meet the stringent requirements for SDG 2.0 certification. The new SDG 2.0 requirements for systems and components are based on the following high-level goals: support for Plug-and-Play compatibility and power management for configuring and managing all system components, 32-bit device drivers, and installation procedures for Windows NT/2000/XP. Color-coded connectors and descriptive icons make identification easy as required by the PC '99 specification.

1.4 Motherboard overview

Before you install the NRL-LS motherboard, familiarize yourself with its physical configuration and available features to facilitate the motherboard installation and future upgrades. A sufficient knowledge of the motherboard specifications will also help you avoid mistakes that may damage the board and its components.

1.4.1 Major components

The following are the major components of the NRL-LS motherboard as pointed out in the picture on page 1-7.

1. 4-pin 12V power connector
2. 24/20-pin ATX power connector
3. Intel® Pentium4™ CPU socket 478
4. ServerWorks® Grand Champion "Super-Lite" North Bridge, CMIC-SL
5. 4 DDR DIMM sockets
6. IDE connectors
7. ServerWorks® South Bridge, CSB6
8. Floppy disk connector
9. USB header
10. Ultra-160 SCSI connectors
11. Adaptec® AIC-7892X SCSI controller
12. DIP switches
13. Panel connector
14. LPC super I/O controller
15. ASUS ASIC

16. 2-pin WOR connector
17. 4-pin IPMI connector (ASMC)
18. 50-pin eRMC connector (ASMC)
19. 4MB Flash BIOS
20. Onboard standby power LED
21. ATI Rage-XL VGA controller
22. 5 PCI slots*
23. Intel® 82540EM Gigabit Ethernet controller
24. Onboard COM2 port
25. PS/2 mouse port
26. Parallel port
27. RJ-45 ports
28. VGA port
29. Serial port
30. USB ports 1 and 2
31. Keyboard port

> See page 1-8 for the specifications of each component. Refer to Chapter 2 for detailed information on the components.

* PCI Slots 4 and 5

PCI4 - The 64-bit/33MHz PCI-4 slot (colored green) supports the Adaptec SCSI RAID 2000S Zero-Channel RAID card to provide advanced RAID functionality.

PCI5 - This is a 64-bit/33MHz 5V (slots 1 to 4 are 3V) PCI slot.
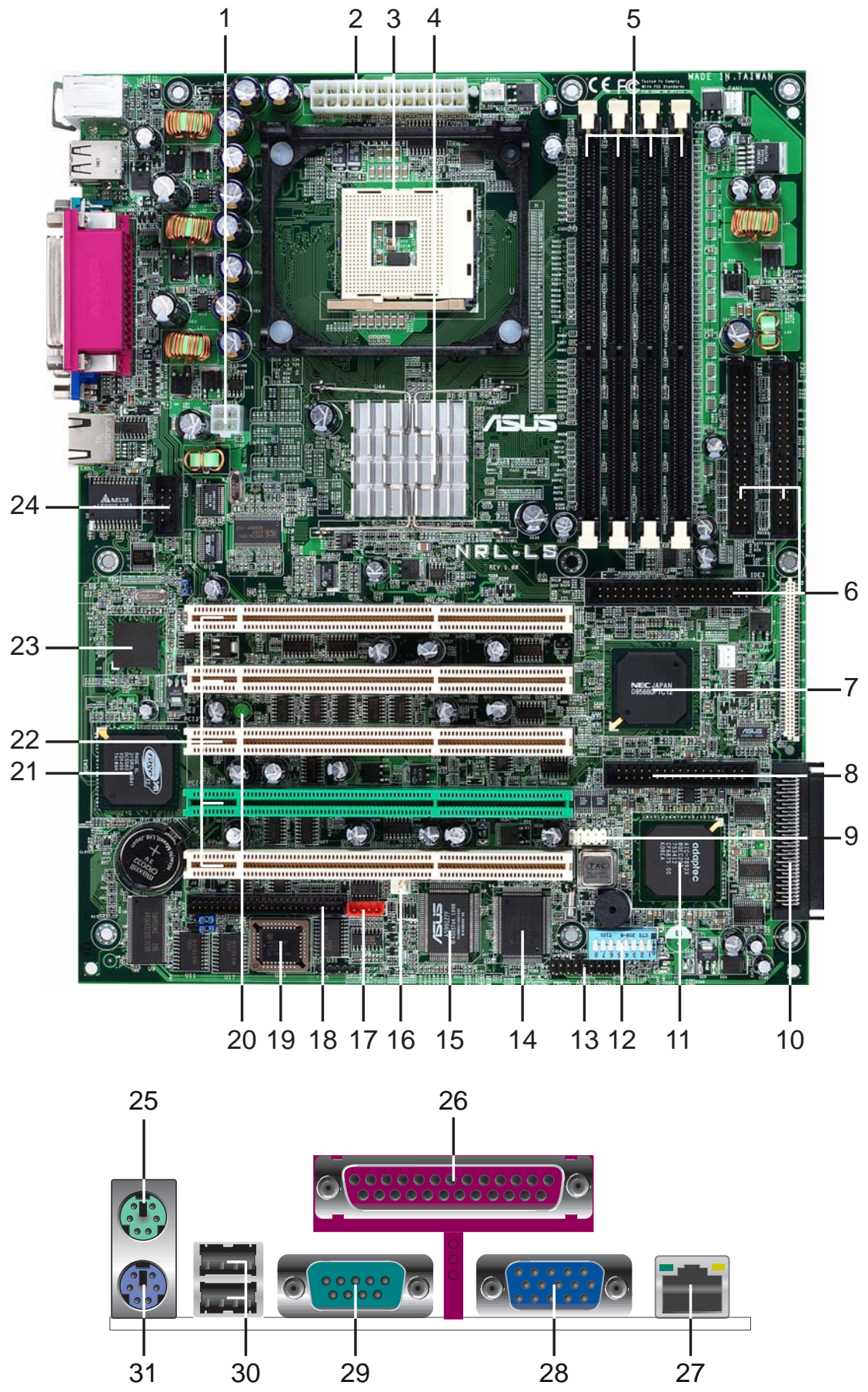
1.4.2 Core specifications

1 **4-pin 12V power connector.** This power connector is for an ATX power supply.

2 **24/20-pin ATX power connector.** This power connector is for an ATX power supply.

3 **CPU sockets.** A 478-pin surface mount, Zero Insertion Force (ZIF) socket for the Intel® Pentium4™ processor with 512KB L2 cache and a 400 MHz system bus that allows up to 3.2GB/s data transfer rate.

4 **ServerWorks® Grand Champion "Super-Lite" North Bridge, *CMIC-SL.*** The Grand Champion (CMIC-SL) north bridge serves as a memory and IO controller, and perfroms two main functions: main memory sub-system and IMBus interface, a data path between the processor bus and the IO sub-system bus. The processor interface supports an 400MHz Front Side Bus, (4 x 100MHz), and provides 3.2GB/s bandwidth, with up to 4GB registered ECC PC2100/1600 DDR DIMMs.

5 **DDR DIMM sockets.** These four 184-pin DIMM sockets support up to 4GB system memory using registered ECC PC2100/1600 DDR DIMMs.

6 **IDE connectors.** These three-channel bus master IDE connectors support up to four Ultra DMA/100/66, PIO Modes 3 & 4 IDE devices. Both the primary (blue) and secondary (blue) connectors are slotted to prevent incorrect insertion of the IDE ribbon cable. Third IDE (black) with PIO mode 3/4 support provides more device connectivity in this server system.

7 **ServerWorks® South Bridge, *CSB6*** performs as a PCI to LPC (Low Pin Count) Bridge and integrates PCI master/slave functions, DMA controller, ATA100 IDE interface, USB contoller, SMBus host, ACPI and other integral functions.

8 **Floppy disk connector.** This connector accommodates the provided ribbon cable for the floppy disk drive. One side of the connector is slotted to prevent incorrect insertion of the floppy disk cable.

9 **USB header.** This 10-1 pin Universal Serial Bus (USB) ports is available for connecting additional USB devices.

10 **Ultra-160 SCSI connectors.** These single-channel 68-pin Ultra-160 SCSI connectors support up to 15 SCSI devices.

11   **Adaptec® SCSI controller.** The AIC-7892X SCSI controller supports up to 15 SCSI devices through the onboard single-channel SCSI connectors at rates up to 160MB/sec.

12   **DIP switches.** This 8-switch Dual Inline Package (DIP) sets the CPU frequency multiple.

13   **Panel Connector.** This connector suports all basic system connections.

14   **LPC super I/O controller.** This Low Pin Count (LPC) interface provides the commonly used Super I/O functionality. The chipset supports UART compatible serial ports, one parallel port with EPP and ECP capabilities, a floppy drive, and PS/2 keyboard and mouse.

15   **ASUS ASIC.** This chip performs multiple system functions that include hardware and system voltage monitoring, thermal monitoring, among others.

16   **2-pin WOR connector.** This lead supports Wake-On_Ring modems.

17   **4-pin IPMI connector.** This connector allows you to connect devices that support Intelligent Platform Management Interface (IPMI) Rev 1.0 or 1.5.

18   50-pin eRMC connector: This connector supports control connection of ASUS Server Management Card (ASMC) daughter cards.

19   **4MB Flash ROM.** This 4Mb firmware contains the programmable BIOS program.

20   **Onboard Standby Power LED.** This green LED indicates the standby power is on for the motherboard.

21   **ATI Rage-XL VGA controller.** This PCI-based VGA controller supports up to 8MB display SDRAM for 1280x1024 and true color resolutions.

22   **PCI slots.** Four 64-bit/33MHz 3.3V and one 64-bit/33MHz 5V PCI slots support bus master PCI cards. The 64-bit/33MHz PCI-4 slot (colored green) supports the Adaptec SCSI RAID 2000S Zero-Channel RAID card to provide advanced RAID functionality. PCI5 is a 64-bit/33MHz 5V PCI slot.

23   **Intel® 82540EM Gigabit Ethernet controller.** This controller is an integrated Ethernet LAN component that supports 1000Mbps, 100Mbps, and 10Mbps data rates. The 82540EM is optimized for LAN on Motherboard designs (LOM), enterprise networking, and Internet appliances that use PCI bus. The controller provides a 32-bit/33MHz interface to the PCI bus that supports PCI Specification Rev. 2.2.

24   **Onboard COM2 Port.** This header supports a COM2 bracket for extra serial connections.

25   **PS/2 mouse port.** This green 6-pin connector is for a PS/2 mouse.

26   **Parallel port.** This 25-pin port connects a parallel printer, a scanner, or other devices.

27   **RJ-45 ports.** These ports allows connection to a Local Area Network (LAN) through a network hub.

28   **VGA port.** This port is for a VGA-monitor or other VGA-compatible devices.

29   **Serial port.** This 9-pin COM1 port is for serial devices.

30   **USB ports 1 and 2.** Two 4-pin Universal Serial Bus (USB) ports are available for connecting USB devices.

31   **PS/2 keyboard port.** This purple 6-pin connector is for a PS/2 keyboard.

Chapter 2
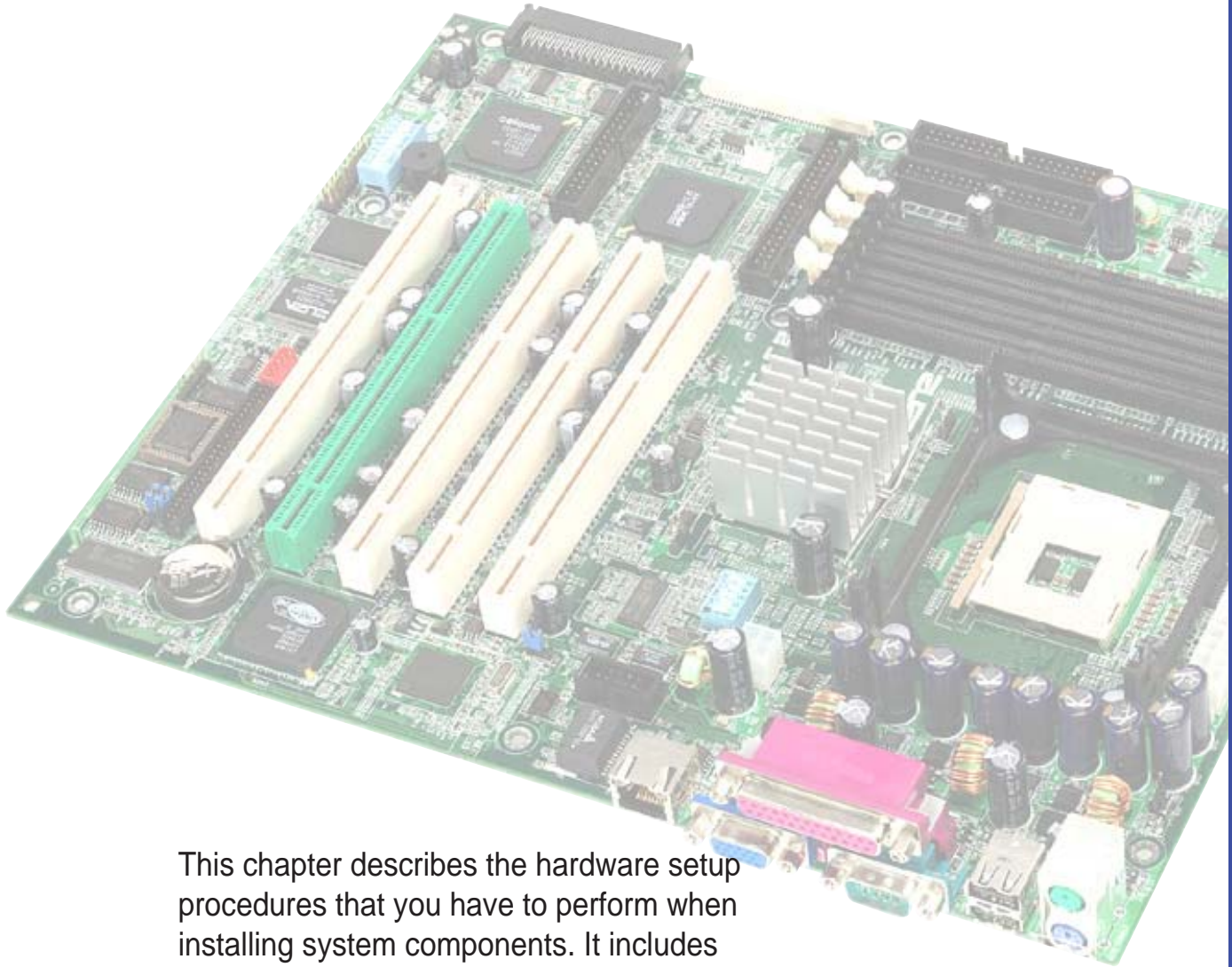
This chapter describes the hardware setup procedures that you have to perform when installing system components. It includes details on the switches, jumpers, and connectors on the motherboard.

2. Hardware information

Chapter summary

2.1   Motherboard installation

Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it. The NRL-LS uses the ATX form factor that measures 12 inches x 9.6 inches (30.5 x 24.4 cm).

> Make sure to unplug the power cord before installing or removing the motherboard. Failure to do so may cause you physical injury and damage motherboard components.

2.1.1   Placement direction

When installing the motherboard, make sure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

2.1.2   Screw holes

Place screws into the holes indicated by circles to secure the motherboard to the chassis.

> Do not overtighten the screws! Doing so may damage the motherboard.

Place this side towards the rear of the chassis

2.2 Motherboard layout

24.4cm (9.6in)

30.7cm (12.08in)

PS/2 T: Mouse B: Keyboard	J4 · ATX_POWER · FAN3
USB1 USB2	Socket 478
COM1	
PARALLEL PORT	ServerWorks® CMIC-SL North Bridge
VGA	DDR DIMM1 (64/72 bit, 184-pin module) DDR DIMM2 (64/72 bit, 184-pin module) DDR DIMM3 (64/72 bit, 184-pin module) DDR DIMM4 (64/72 bit, 184-pin module)
RJ-45	FAN1 ATX12V
	COM2

NRL-LS

IDE1 IDE2

IDE3

J1

RC82540EM   PCI1 (64-bit, 33MHz 3V)

J7

PCI2 (64-bit, 33MHz 3V)

LED

ServerWorks® RCC CSB6 South Bridge   FAN2

ATI RAGE XL VGA Controller   PCI3 (64-bit, 33MHz 3V)

FLOPPY

PCI4 (64-bit, 33MHz 3V)

USB1

CLRTC   CR2032 3V Lithium Cell CMOS Power   PCI5 (64-bit, 33MHz 5V)

Adaptec SCSI Controller

BUZZ1

CON1   J6

J3   J2   4Mbit Flash BIOS   CON2

ASUS ASIC with Hardware Monitor   Super I/O   SW1

J5   ASUS PANEL1

The SCSI features are optional. These components are grayed out in the above motherboard layout.

2.3   Before you proceed

Take note of the following precautions before you install motherboard components or change any motherboard settings.

1. Unplug the power cord from the wall socket before touching any component.

2. Use a grounded wrist strap or touch a safely grounded object or to a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.

3. Hold components by the edges to avoid touching the ICs on them.

4. Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.

5. **Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply.** Failure to do so may cause severe damage to the motherboard, peripherals, and/or components.

2.4 Central Processing Unit (CPU)

2.4.1 Overview

The motherboard comes with a surface mount 478-pin Zero Insertion Force (ZIF) socket. The socket is designed for the Intel® Pentium4™ Processor in the 478-pin package with 512KB L2 cache. The processor includes the Intel® NetBurst™ micro-architecture that features the hyper-pipelined technology, rapid execution engine, 400MHz system bus, and execution trace cache. Together, these attributes improve system performance by allowing higher core frequencies, faster execution of integer instructions, and data transfer rate of up to 3.2GB/s.

NRL-LS Socket 478
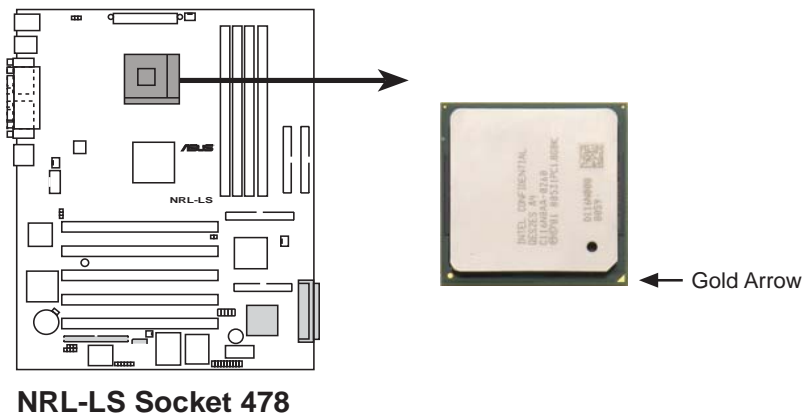
Note in the illustration that the CPU has a gold triangular mark on one corner. This mark indicates the processor Pin 1 that should match a specific corner of the CPU socket.

> Incorrect installation of the CPU into the socket may bend the pins and severely damage the CPU!

2.4.2 Installing the CPU

Follow these steps to install a CPU:

1. Locate the Socket 478 and open it by pulling the lever gently sideways away from the socket. Then lift the lever upwards. The socket lever must be fully opened (90 to 100 degrees).

2. Insert the CPU with the correct orientation. The **gold arrow** of the CPU must be oriented toward the inner corner of the socket base nearest to the hinge of the lever handle.

Gold Arrow

$90^{\circ} - 100^{\circ}$
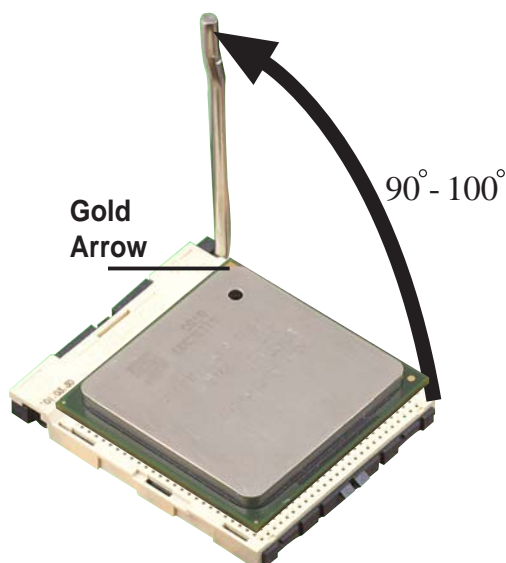
> The CPU fits in one orientation and should drop easily into place. **Do not force the CPU** into the socket to avoid bending the pins. If the CPU does not fit, check its alignment and look for bent pins.

3. Once completely inserted, press the CPU firmly and close the socket lever until it snaps into its locked position.

4. Install an Intel fan heatsink.

5. Place the CPU fan and heatsink on the CPU. The heatsink should entirely cover the CPU. Carefully attach the heatsink locking brace to the plastic clips on the socket base. With the added weight of the CPU fan and heatsink locking brace, no extra force is required to keep the CPU in place

Take care not to scrape the motherboard surface when mounting a clamp-style processor fan, or else damage may occur. When mounting a heatsink onto your CPU, make sure that exposed CPU capacitors do not touch the heatsink, or damage may occur!

Do not neglect to set the correct Bus Frequency and Multiple (frequency multiple setting is available only on unlocked processors) for your Socket 478 processor or else boot-up may not be possible. Socket 478 processors provide internal thermal sensing: a socket mounted thermal resistor is not needed.

2.4.3   Installing the heatsink and fan

The Intel® Pentium4™ 478 Processor requires a specially designed heatsink and fan assembly to ensure optimum thermal condition and performance.

When you buy a boxed Intel Pentium 4™ 478 Processor, the package includes the heatsink, fan, and retention mechanism.

In case you buy a CPU separately, make sure that you use only Intel certified heatsink and fan.

Follow these steps to install the CPU heatsink and fan.

1. Place the heatsink on top of the installed CPU, making sure that the heatsink fits properly on the retention module base.

The retention module base is already installed on the motherboard upon purchase. You do not have to remove the retention module base when installing the CPU or installing other motherboard components.

Your boxed Intel Pentium 4™ 478 Processor package should come with installation instructions for the CPU, heatsink, and the retention mechanism. If the instructions in this section do not match the CPU documentation, follow the latter.

2. Position the fan with the retention mechanism on top of the heatsink.
    Align and snap the four clasps on the retention mechanism over the
    holes on each corner of the module base.

> Make sure that the fan and retention mechanism assembly perfectly
> fits the heatsink and module base, otherwise you cannot snap the
> hooks into the holes.

Retention Lock Lever

**Retention Clasp
Snapped over
Retention Hole**
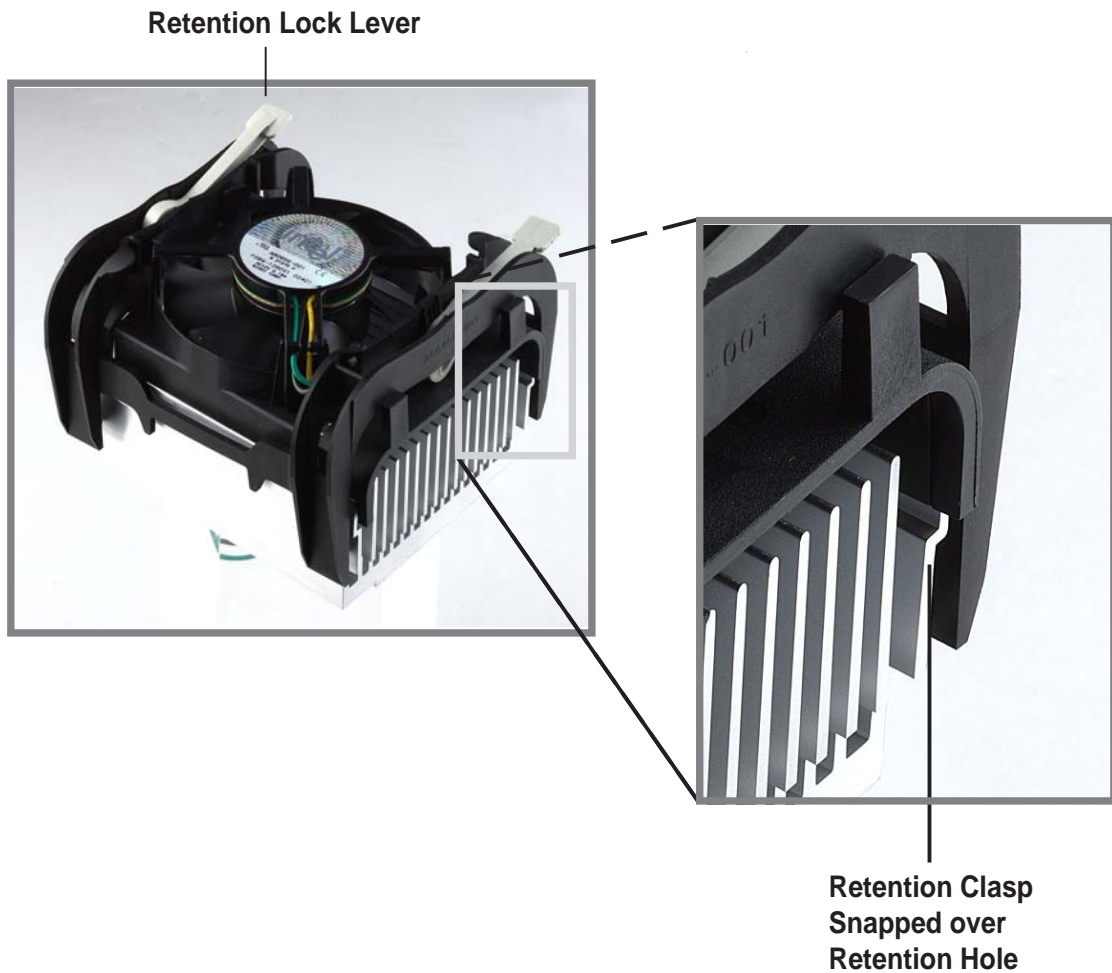
> Keep the retention lock levers lifted upward while fitting the retention
> mechanism to the module base.

3. Push down the locks on the retention mechanism to secure the heatsink and fan to the module base.

When secure, the retention lock levers should point to opposite directions.

2.4.4   Connecting the CPU fan cable

When the fan, heatsink, and the retention mechanism are in place, connect the CPU fan cable to the connector on the motherboard labeled FAN3.

CPU Fan Connector (FAN3)
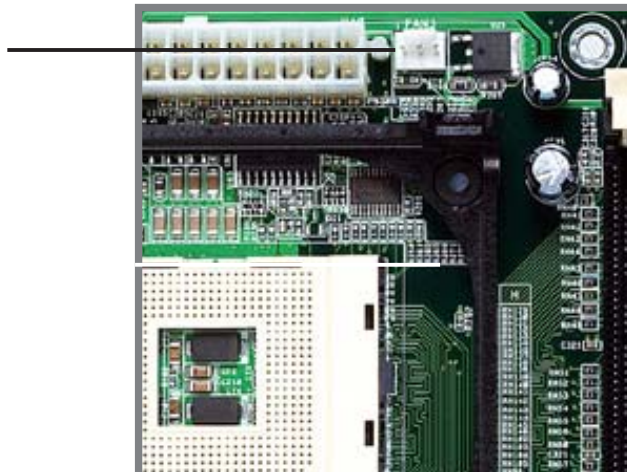
Don't forget to connect the CPU fan connector! Hardware monitoring errors may occur if you fail to plug this connector.

2.5 System memory

2.5.1 Overview

The motherboard comes with four Double Data Rate (DDR) Dual Inline Memory Module (DIMM) sockets. These sockets support up to 4GB system memory using 184-pin registered PC2100/1600 DIMMs with Serial Presence Detect (SPD) and Error Check and Correction (ECC).

NRL-LS 184-Pin DDR DIMM Sockets

104 Pins

80 Pins
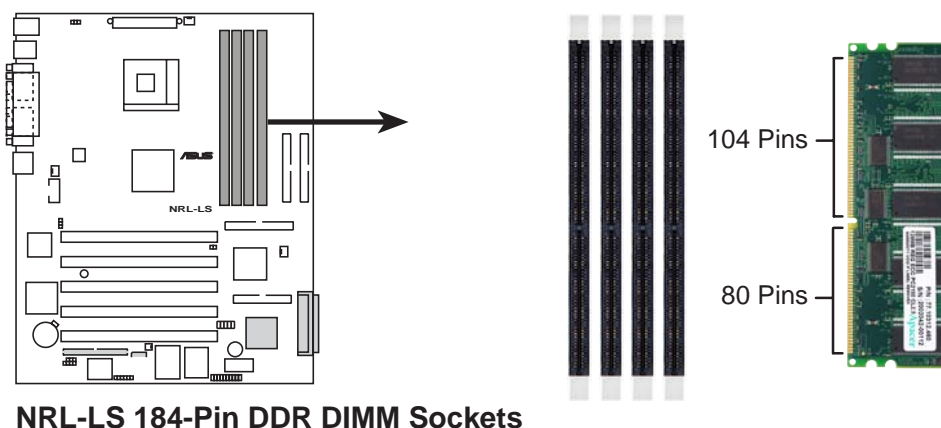
> ⚠️ A DDR DIMM is keyed with a notch so that it fits in only one direction. DO NOT force a DIMM into a socket to avoid damaging the DIMM.

The DDR SDRAM technology evolved from the mainstream PC66, PC100, PC133 memory known as Single Data Rate (SDR) SDRAM. DDR memory however, has the ability to perform two data operations in one clock cycle, thus providing twice the throughput of SDR memory. For example, a 200MHz DDR DIMM will support a 100MHz memory bus, and a 266MHz DDR DIMM will support a 133MHz memory bus.

DDR Data Transfer Rate	DDR Base Frequency
266MHz ➡	133MHz
200MHz ➡	100MHz

A DDR DIMM has the same physical dimensions as an SDR DIMM, but it has a 184-pin footprint compared to the 168-pin of the SDR DIMM. Also, a DDR DIMM is single notched while an SDR DIMM is double notched. Therefore, a DDR DIMM is not backward compatible with SDR, and should be installed only in a socket specially designed for DDR DIMMs.

2.5.2 Memory Configurations

The motherboard supports system memory of up to 4GB in a one-way non-interleaved configuration.

Memory configuration table

DIMM Socket	184-pin ECC DDR DIMM		Total Memory
DDR1	SDRAM 128MB, 256MB, 512MB, 1GB		(x1) =
DDR2	SDRAM 128MB, 256MB, 512MB, 1GB		(x1) =
DDR3	SDRAM 128MB, 256MB, 512MB, 1GB		(x1) =
DDR4	SDRAM 128MB, 256MB, 512MB, 1GB		(x1) =
	Total System Memory	**(Max. 4GB) =**	

The system chipset only supports PC2100/1600 registered ECC DIMMs. Make sure to use only the specified DIMM types for stable system operation.

2.5.3 Installing a DIMM

⚠️ Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

Follow these steps to install a DIMM.

1. Unlock a DIMM socket by pressing the retaining clips outward.

2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket.

Unlocked Retaining Clip
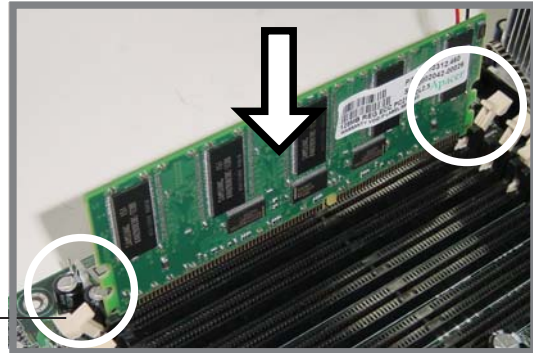
3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.

Locked Retaining Clip
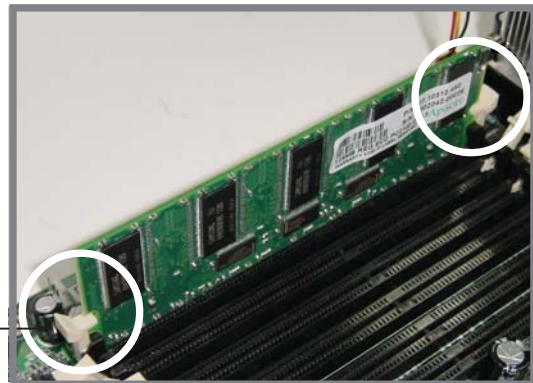
2.5.4 Removing a DIMM

Follow these steps to remove a DIMM.

1. Simultaneously press the retaining clips outward to unlock the DIMM.

2. Remove the DIMM from the socket.

⚠️ Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.
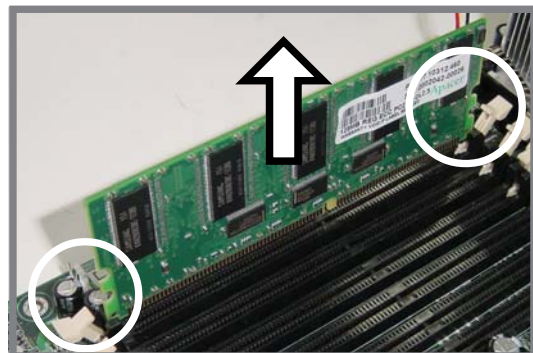
2.6 Expansion slots

In the future, you may need to install expansion cards. The following sub-sections describe the slots and the expansion cards that they support.

⚡ Make sure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

2.6.1 Installing an expansion card

Follow these steps to install an expansion card.

1. Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.
2. Remove the system unit cover (if your motherboard is already installed in a chassis).
3. Remove the bracket opposite the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw you removed earlier.
6. Replace the system cover.

2.6.2 Configuring an expansion card

After installing the expansion card, configure the it by adjusting the software settings.

1. Turn on the system and change the necessary BIOS settings, if any. See Chapter 4 for information on BIOS setup.
2. Assign an IRQ to the card. Refer to the tables on the next page.
3. Install the software drivers for the expansion card.

Standard Interrupt Assignments

IRQ	Priority	Standard Function
0	1	System Timer
1	2	Keyboard Controller
2	N/A	Programmable Interrupt
3*	11	Communications Port (COM2)
4*	12	Communications Port (COM1)
5*	13	Sound Card (sometimes LPT2)
6	14	Floppy Disk Controller
7*	15	Printer Port (LPT1)
8	3	System CMOS/Real Time Clock
9*	4	ACPI Mode when used
10*	5	IRQ Holder for PCI Steering
11*	6	IRQ Holder for PCI Steering
12*	7	PS/2 Compatible Mouse Port
13	8	Numeric Data Processor
14*	9	Primary IDE Channel
15*	10	Secondary IDE Channel

* These IRQs are usually available for ISA or PCI devices.

IRQ assignments for this motherboard

	PCI INTA	PCI INTB	PCI INTC	PCI INTD
PCI slot 1	3	8	13	10
PCI slot 2	4	9	14	11
PCI slot 3	5	10	15	12
PCI slot 4	6	11	8	13
PCI slot 5	7	12	9	14
Onboard 82540EM controller	2	—	—	—
Onboard SCSI controller	15	—	—	—
Onboard VGA controller	1	—	—	—

When using PCI cards on shared slots, ensure that the drivers support "Share IRQ" or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable.

2.7 Switches and jumpers

2.7.1 Switches

The following figure shows the location and default settings of the DIP switches on the motherboard.

Keep the default settings for stable system operation.

NRL-LS DIP Switches

SW1

OFF
ON

NO

SW	Default	Selection
1	(Reserved)	
2	(Reserved)	
3	(Reserved)	
4	(Reserved)	
5	OFF	ON = Freq. Multiple Selection
6	OFF	ON = Freq. Multiple Selection
7	OFF	ON = Freq. Multiple Selection
8	OFF	ON = Freq. Multiple Selection
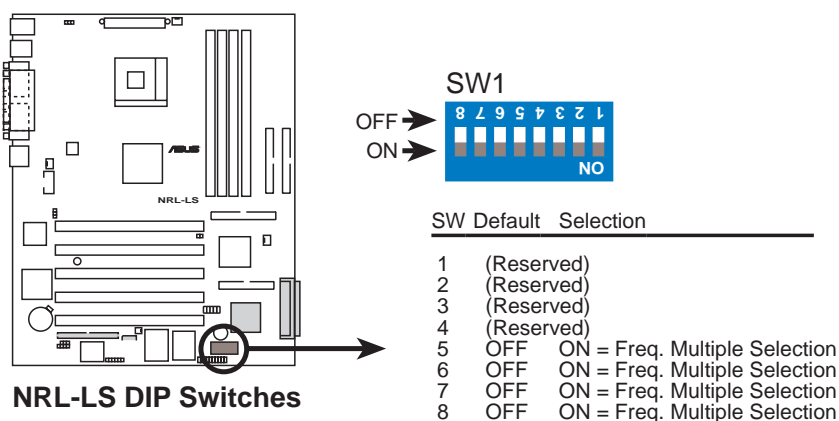
CPU Multiplier Table

CPU Speed	Bus Ratio	SW5	SW6	SW7	SW8
0.80GHz	08	OFF	OFF	OFF	OFF
1.00GHz	10	OFF	**ON**	OFF	OFF
1.10GHz	11	**ON**	**ON**	OFF	OFF
1.20GHz	12	OFF	OFF	**ON**	OFF
1.30GHz	13	**ON**	OFF	**ON**	OFF
1.40GHz	14	OFF	**ON**	**ON**	OFF
1.50GHz	15	**ON**	**ON**	**ON**	OFF
1.60GHz	16	OFF	OFF	OFF	**ON**
1.70GHz	17	**ON**	OFF	OFF	**ON**
1.80GHz	18	OFF	**ON**	OFF	**ON**
1.90GHz	19	**ON**	**ON**	OFF	**ON**
2.00GHz	20	OFF	OFF	**ON**	**ON**
2.10GHz	21	**ON**	OFF	**ON**	**ON**
2.20GHz	22	OFF	**ON**	**ON**	**ON**
2.30GHz	23	**ON**	OFF	OFF	OFF
2.40GHz	24	**ON**	**ON**	**ON**	**ON**

2.7.2   Jumpers

1. Fast Ethernet setting (3-pin J1)

These jumpers are set by default, pins [1-2], to enable the onboard INTEL 82540 Fast Ethernet controller to support 10/100/1000BASE-TX networking. Set the jumper to pins 2-3 to disable the controller.

J1

Enable (Default)   Disable

NRL-LS LAN Setting
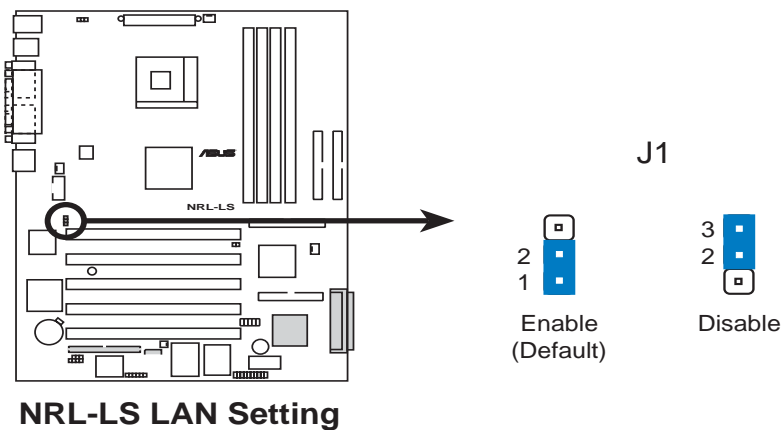
2. VGA setting (3-pin J3)

This jumper is set by default, pins [2-3], to enable the onboard the onboard ATI Rage XL VGA controller. Reset to pins 1-2 to disable the VGA controller.

J3

Disable   Enable (Default)

NRL-LS VGA Setting
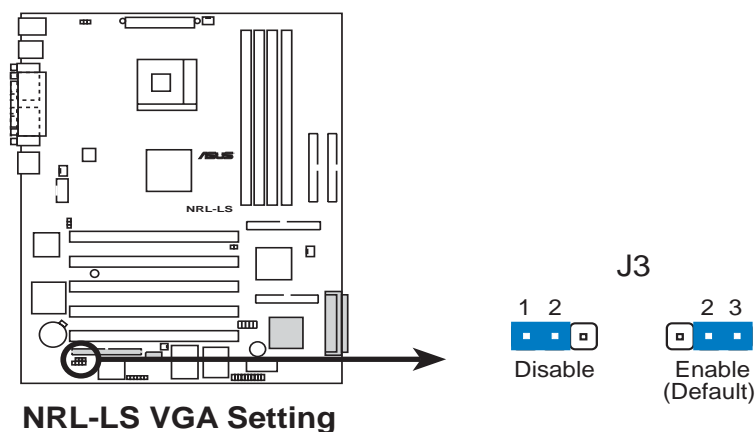
3. Keyboard Power setting (3-pin J4)

This jumper is set by default, pins [2-3], to enable keyboard power up. Reset to pins [1-2] to disable keyboard power up.
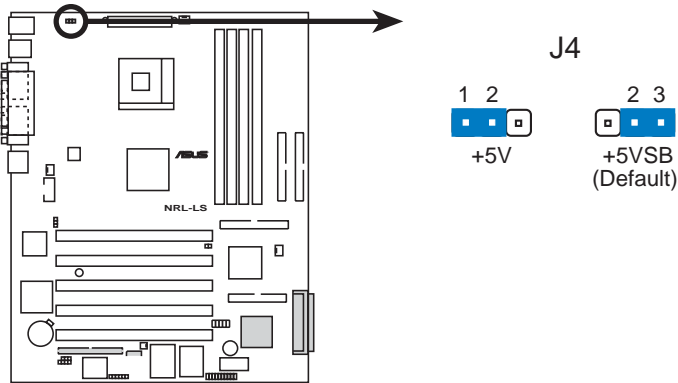
NRL-LS Keyboard Power Setting

4. Clear RTC RAM (CLRTC1)

These solder pads allow you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The RAM data in CMOS, that include system setup information such as system passwords, is powered by the onboard button cell battery.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the battery.
3. Short the solder pads for about 5 seconds.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.
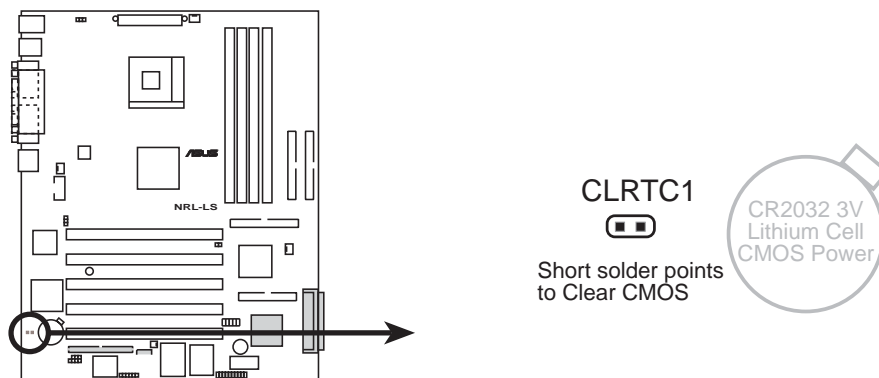
NRL-LS Clear RTC RAM

2.8 Connectors

This section describes and illustrates the internal connectors on the motherboard.

> Always connect ribbon cables with the red stripe to Pin 1 on the connectors. Pin 1 is usually on the side closest to the power connector on hard drives and CD-ROM drives, but may be on the opposite side on floppy disk drives.

1. Floppy disk drive connector (34-1 pin FLOPPY)

This connector supports the provided floppy drive ribbon cable. After connecting one end to the motherboard, connect the other end to the floppy drive. (Pin 5 is removed to prevent incorrect insertion when using ribbon cables with pin 5 plug).

FLOPPY   PIN 1

NOTE: Orient the red markings on the floppy ribbon cable to PIN 1.
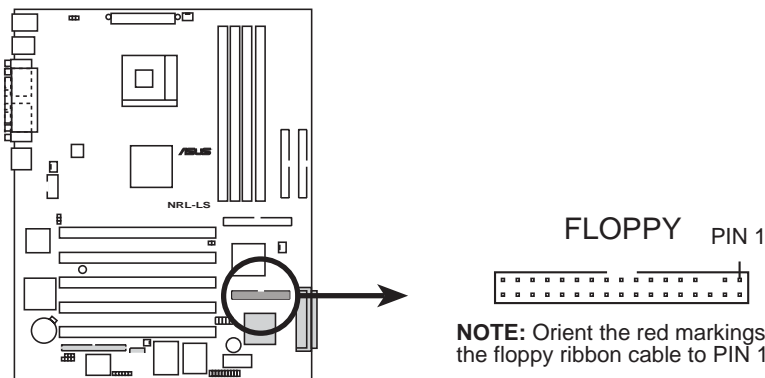
NRL-LS Floppy Disk Drive Connector

2. Serial port 2 connector (10-1 pin COM2)

This connector accommodates a second serial port using an optional serial port bracket. Connect the bracket cable to this connector then install the bracket into a slot opening at the back of the system chassis.

PIN 1
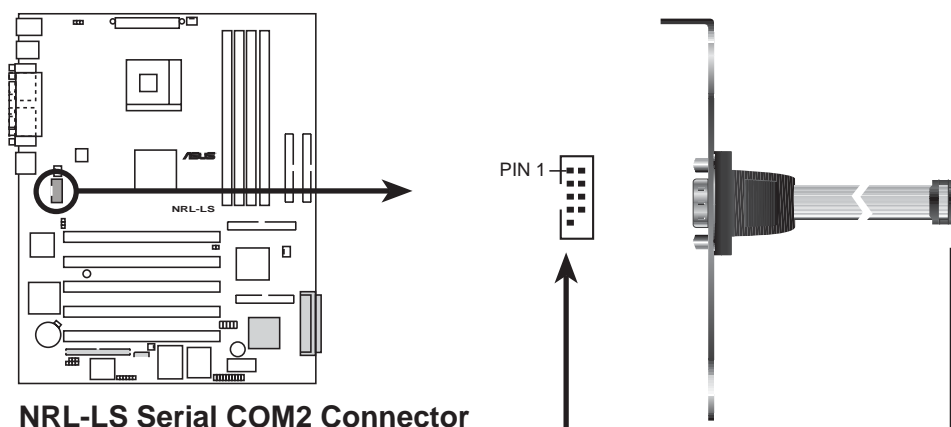
NRL-LS Serial COM2 Connector

3. IDE connectors (three 40-1 pin IDE1 / IDE2 / IDE3)

This connector supports the provided UltraDMA/100/66 IDE hard disk ribbon cable. Connect the cable's blue connector to the primary (recommended) or secondary IDE connector, then connect the gray connector to the UltraDMA/100/66 slave device (hard disk drive) and the black connector to the UltraDMA/100/66 master device. It is recommended that you connect non-UltraDMA/100/66 devices to the secondary IDE connector. If you install two hard disks, you must configure the second drive as a slave device by setting its jumper accordingly. Refer to the hard disk documentation for the jumper settings. BIOS supports specific device bootup. If you have more than two UltraDMA/100/66 devices, purchase another UltraDMA/100/66 cable. You may configure two hard disks to be both master devices with two ribbon cables – one for the primary IDE connector and another for the secondary IDE connector.

1. Pin 20 on each IDE connector is removed to match the covered hole on the UltraDMA cable connector. This prevents incorrect orientation when you connect the cables.

2. The hole near the blue connector on the UltraDMA/100/66 cable is intentional.

3. IDE3 only supports PIO Mode 3/4

NOTE: Orient the red markings (usually zigzag) on the IDE ribbon cable to PIN 1.

IDE3   PIN 1

IDE1   IDE2

PIN 1   PIN 1

NRL-LS IDE Connectors
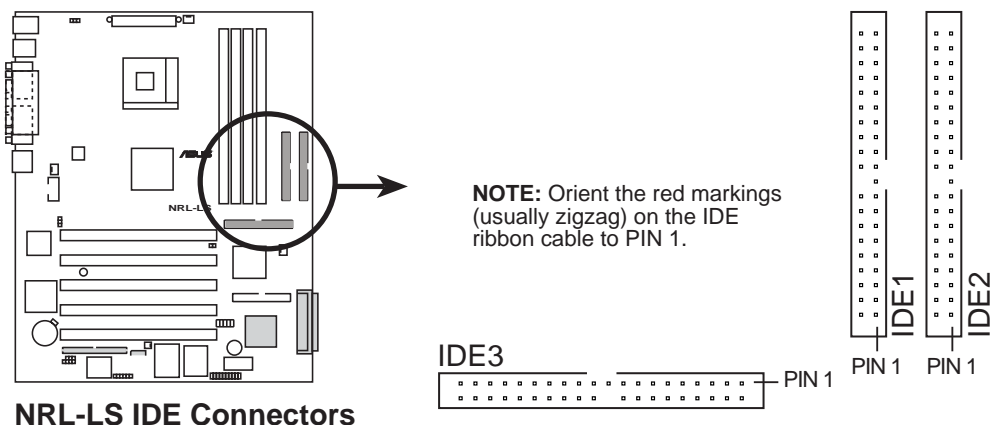
For UltraDMA/100/66 IDE devices, use an 80-conductor IDE cable. The UltraDMA/66 cable included in the motherboard package also supports UltraDMA/100.

4. ATX power connectors (24/20-pin ATXPWR, 4-pin ATX12V)

These connectors connect to an ATX 12V power supply. The plugs from the power supply are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.

In addition to the 24/20-pin ATXPWR connector, this motherboard requires that you connect the 4-pin ATX +12V power plug to provide sufficient power to the CPU.

Make sure that your ATX 12V power supply can provide 8A on the +12V lead and at least 1A on the +5-volt standby lead (+5VSB). The minimum recommended wattage is 250W, or 300W for a fully configured system. The system may become unstable and may experience difficulty powering up if the power supply is inadequate.

24-pin Power Connector

ATXPWR

Ground
+5 Volts
+5 Volts
+5 Volts
-5 Volts
Ground
Ground
Ground
PSON#
Ground
-12 Volts
+3 Volts

+3 Volts
+12 Volts
+12 Volts
+5V Standby
Power OK
Ground
+5 Volts
Ground
+5 Volts
Ground
+3 Volts
+3 Volts

1

For Power Supply with
20-pin Power Connector

ATX12V

GND ————— GND
+12V DC ————— +12V DC

NRL-LS ATX Power Connector

NRL-LS
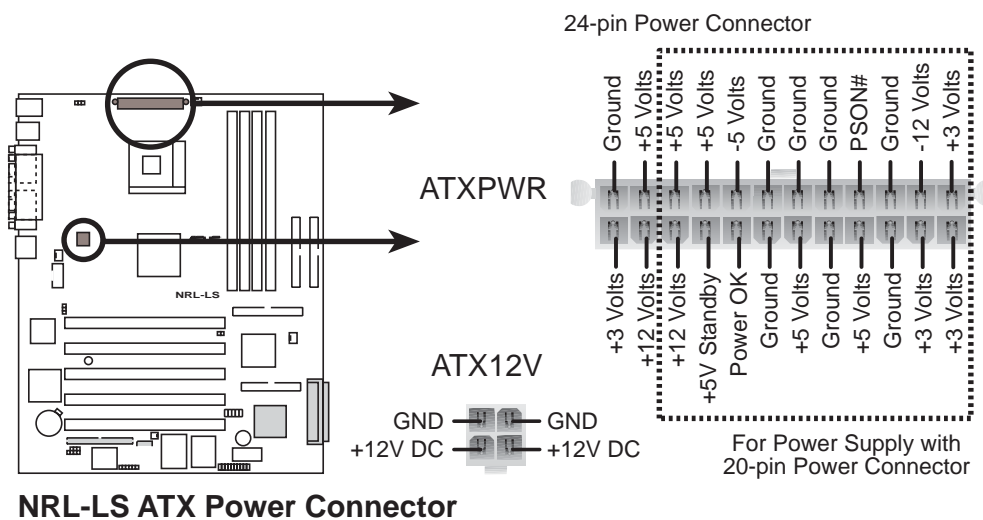
5. CPU, Chassis, and Power Fan Connectors (3-pin FAN1, FAN2, FAN3)

The fan connectors support cooling fans of 350mA~740mA (8.88W max.) or a total of 1A~2.22A (26.64W max.) at +12V. Connect the fan cables to the fan connectors on the motherboard, making sure that the black wire of each cable matches the ground pin of the connector.

> ⚠ Do not forget to connect the fan cables to the fan connectors. Lack of sufficient air flow within the system may damage the motherboard components. These are not jumpers! DO NOT place jumper caps on the fan connectors!

FAN3 — Rotation / +12V / GND

FAN1 — GND / +12V / Rotation

FAN2 — GND / +12V / Rotation
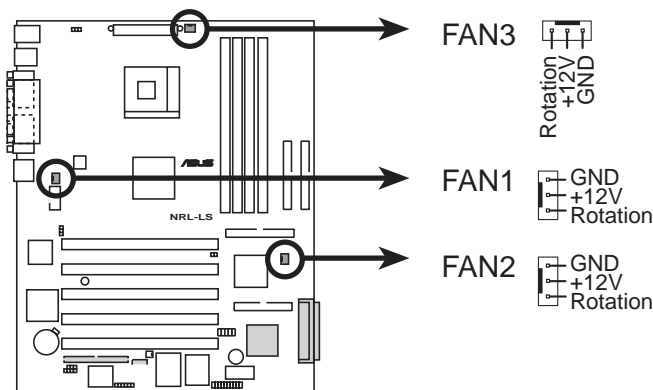
NRL-LS 12-Volt Cooling Fan Power

6. USB header (10-1 pin USB1)

If the USB ports on the rear panel are inadequate, a USB header is available for additional USB ports. The USB header complies with USB 1.1 specification that supports up to 12 Mbps connection speed.

USB1

2 — USB Power / USBP3– / USBP3+ / GND / NC — 10

USB Power / USBP2– / USBP2+ / GND / GND
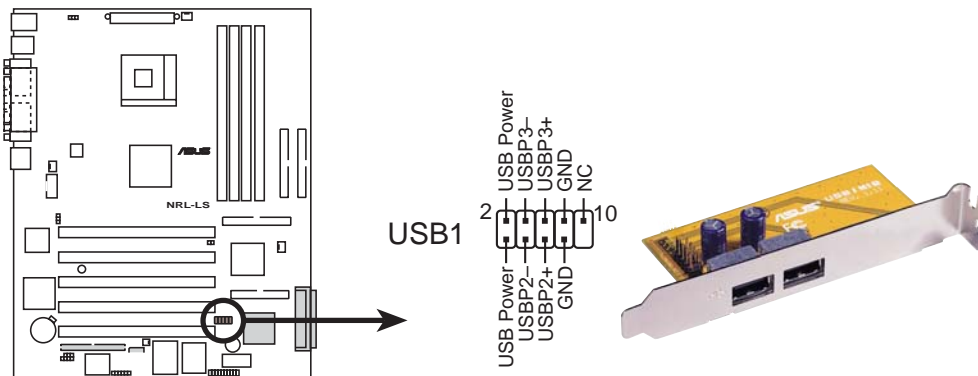
NRL-LS USB Header

7. IPMI connector (4-pin CON2)

The Intelligent Platform Management Interface (IPMI) connector is for the ASMC card. Connect the 4-pin ASMC interface cable to this connector.

NRL-LS IPMI Connector
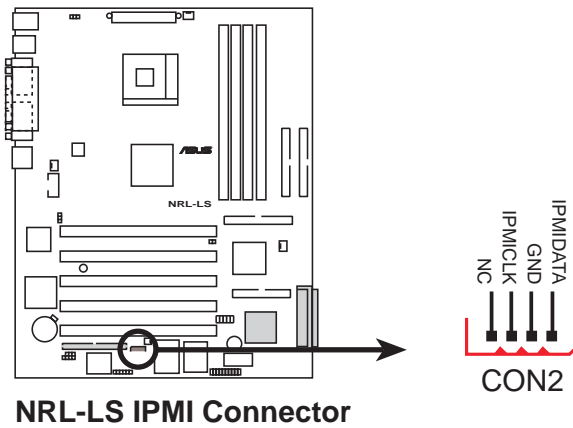
8. Zero Channel RAID slot (PCI-4)

The 64-bit/33MHz PCI-4 slot (colored green) supports the Adaptec SCSI RAID 2000S Zero-Channel RAID card to provide advanced RAID functionality. The card supports RAID levels 0, 1, 5, multilevel 0/1 and 0/5, cache memory modules with ECC.

NRL-LS Zero Channel RAID Slot
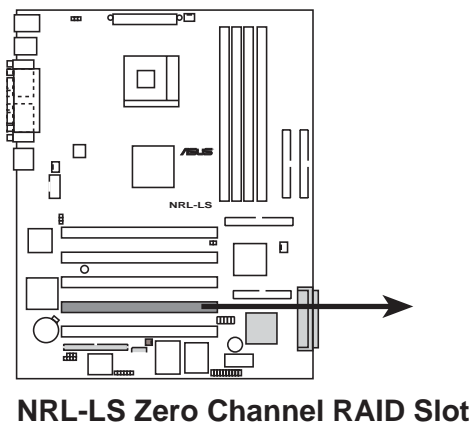
9. Chassis alarm lead (4-1 pin J2)

This lead is for a chassis designed with intrusion detection feature. This requires an external detection mechanism such as a chassis intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high-level signal to this lead to record a chassis intrusion event.

By default, the pins labeled "Chassis Signal" and "Ground" are shorted with a jumper cap. If you wish to use the chassis intrusion detection feature, remove the jumper cap from the pins.

NRL-LS Chassis Open Alarm Lead

J2

+5Volt (Power Supply Stand By)

Chassis Signal

Ground
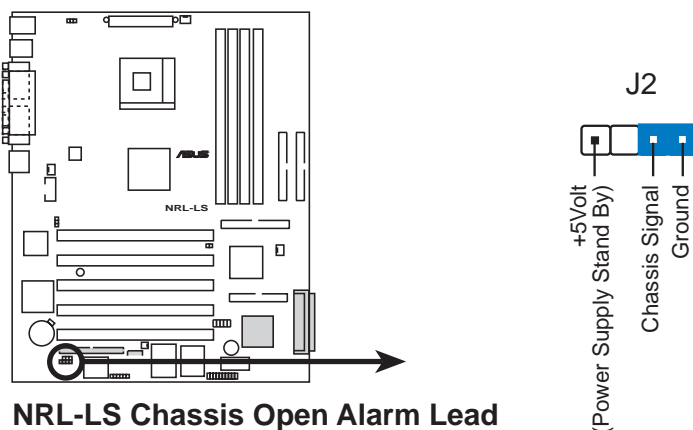
10. SMBus connector (6-1 pin J5)

This connector allows you to connect SMBus (System Management Bus) devices. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface. SMBus is a specific implementation of an I^2C bus, a multi-device bus that allows multiple chips to connect to the same bus and enable each one to act as a master by initiating data transfer.

NRL-LS SMBus Connectors

J5

1

FLOATING

SMBCLK

Ground

SMBDATA

+3V
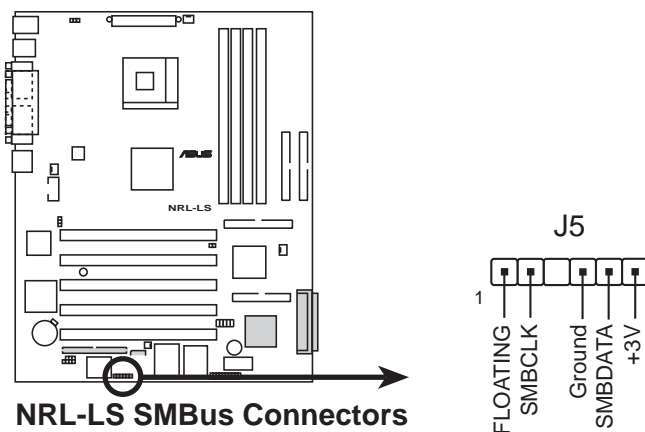
11. One 68-pin Ultra160 SCSI Connectors (SCSI)

This motherboard has one 68-Pin Ultra160 SCSI connector. The channel can support a maximum of 15 devices as specified by Ultra160 standards.

SCSI
68-Pin Ultra160/
Ultra2-Wide SCSI Connector

1 35

34 68

NRL-LS Onboard SCSI Connectors
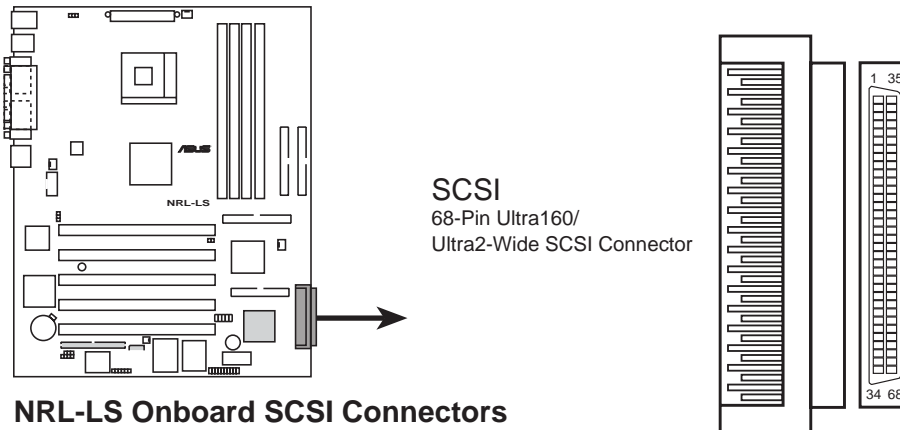
SCSI Connection Notes

This motherboard has one 68-Pin Ultra160 SCSI connectors.

The onboard SCSI chipset incorporates an advanced multimode I/O cell that supports both single-ended (SE), Ultra2, and Ultra160 devices. With Ultra160 devices, the SCSI bus platform performs at full Ultra160 speeds (up to 160MB/s) and extended cabling 12m (or 25m in a point-to-point configuration). When an SE device is attached, the bus defaults to an SE speed and 1.5m cable length.

Connect SCSI devices as shown. The channel should have only one type of SCSI standard (e.g. Ultra160, Ultra2, Ultra-Wide). Mixing SCSI devices on the same channel decreases maximum performance on that channel to that of the slowest device.

68-pin Internal SCSI Cable (Twisted-Pair Ribbon)

68-pin Female Terminator

Internal SCSI Devices (up to 15 devices)
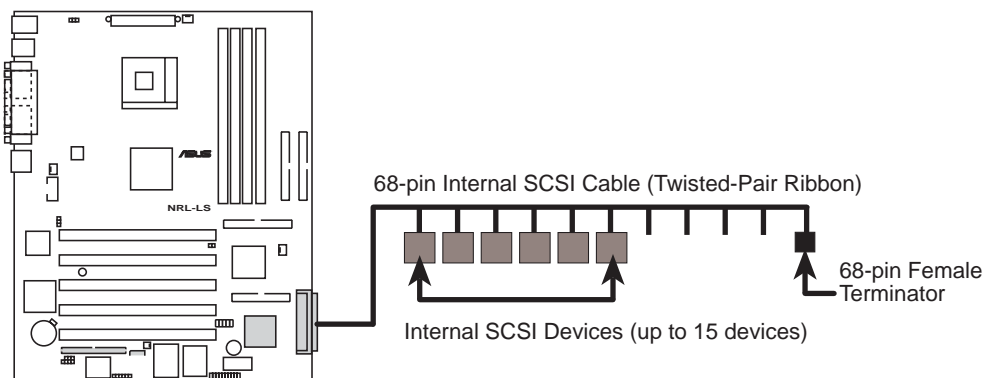
NRL-LS SCSI Connection Example

12. Wake-On-Ring Connector (2-pin WOR)

This connector connects to internal modem cards with a Wake-On-Ring output. The connector powers up the system when a ringup packet or signal is received through the internal modem card.

> For external modems, Wake-On-Ring is detected through the COM port.
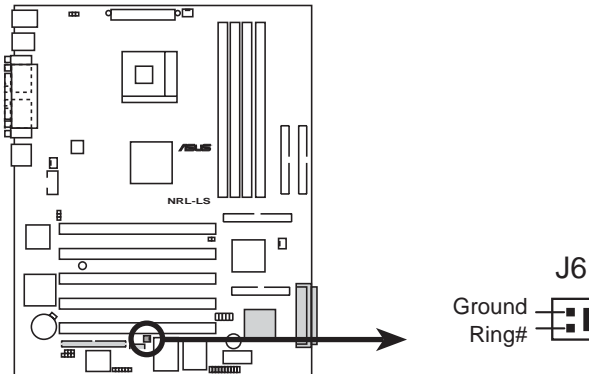
NRL-LS Wake-On-Ring Connector

13. HD Activity LED Connector (2-pin J7)

This connector supports the hard disk activity LED and illuminates whenever the HD is operating.

TIP: If the case-mounted LED does not light, try reversing the 2-pin plug.
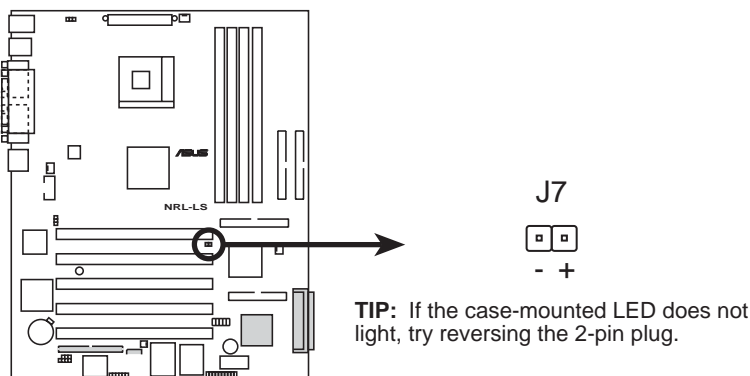
NRL-LS HD Activity LED

14. System panel connector (20-pin PANEL)

This connector accommodates several system front panel functions.

NRL-LS System Panel Connectors

Pin	Connector
2 & 3	Status LED
6 & 7	Power Switch
9 & 10	Reset Switch
11 & 13	Power LED
17 & 20	Speaker
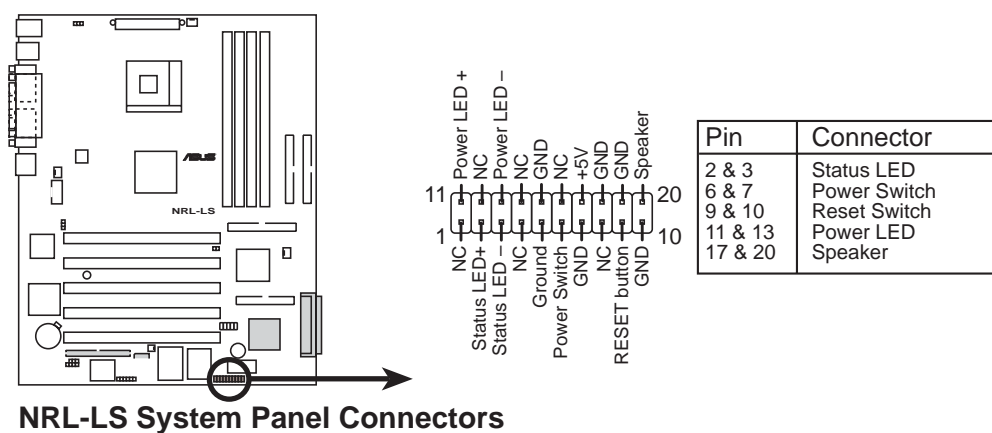
- **System Status LED Lead (2-pin MLED)**

  This 2-pin connector is for the system message LED that indicates receipt of messages from a fax/modem. The normal status for this LED is ON, when there is no incoming data signal. The LED blinks when data is received. The system message LED feature requires an ACPI OS and driver support.

- **ATX Power Switch / Soft-Off Switch Lead (2-pin PWRBTN)**

  This connector connects a switch that controls the system power. Pressing the power switch turns the system between ON and SLEEP, or ON and SOFT OFF, depending on the BIOS or OS settings. Pressing the power switch while in the ON mode for more than 4 seconds turns the system OFF.

- **Reset Switch Lead (2-pin RESET)**

  This 2-pin connector connects to the case-mounted reset switch for rebooting the system without turning off the system power.

- **System Power LED Lead (3-1 pin PLED)**

  This 3-1 pin connector connects to the system power LED. The LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

- **System Warning Speaker Lead (4-pin SPEAKER)**

  This 4-pin connector connects to the case-mounted speaker and allows you to hear system beeps and warnings.

Chapter 3
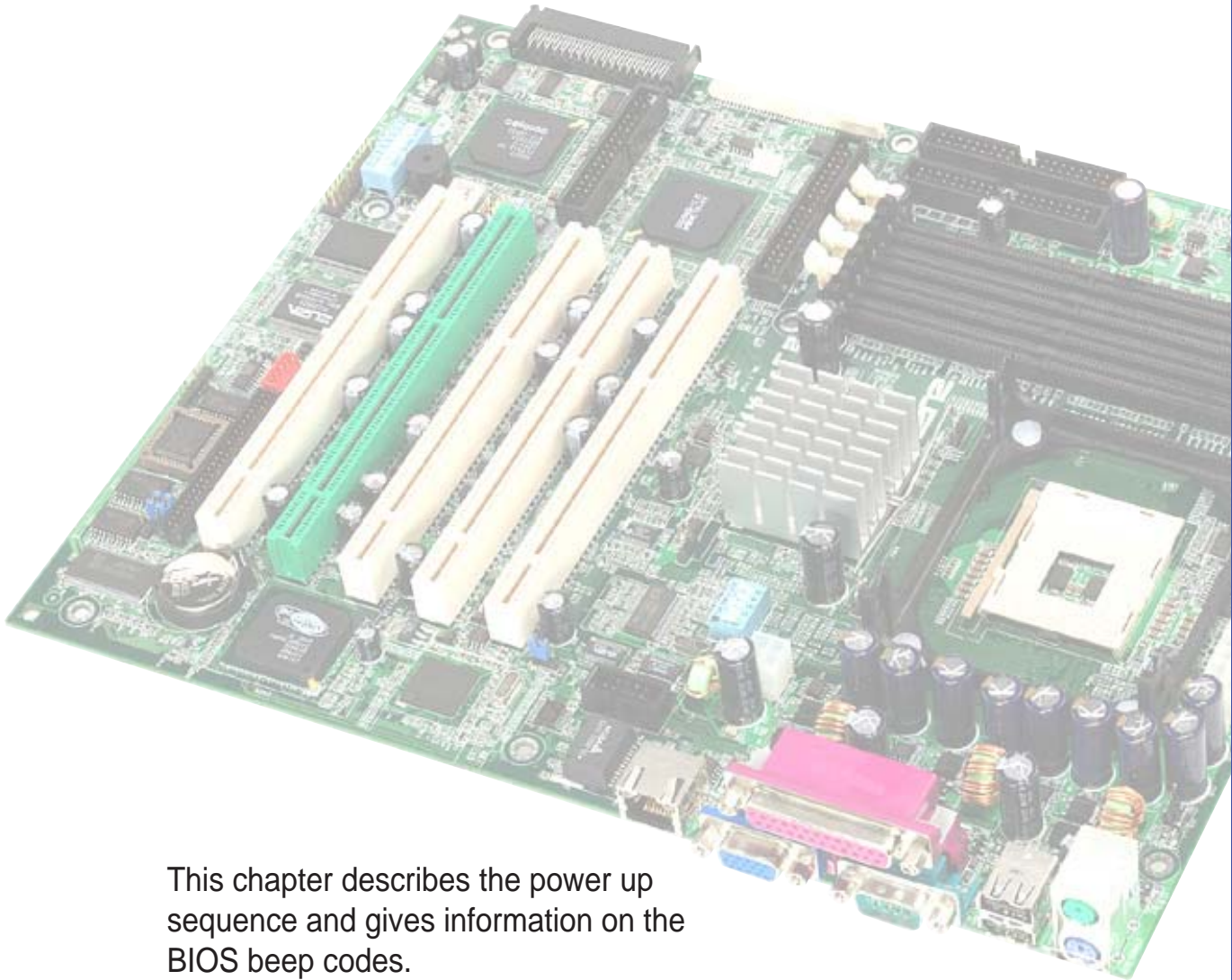
This chapter describes the power up
sequence and gives information on the
BIOS beep codes.

3. Powering up

Chapter summary

3.1 Starting up for the first time

1. After making all the connections, replace the system case cover.

2. Be sure that all switches are off.

3. Connect the power cord to the power connector at the back of the system chassis.

4. Connect the power cord to a power outlet that is equipped with a surge protector.

5. Turn on the devices in the following order:

   a. Monitor

   b. External SCSI devices (starting with the last device on the chain)

   c. System power (if you are using an ATX power supply, you need to switch on the power supply as well as press the ATX power switch on the front of the chassis).

6. After applying power, the power LED on the system front panel case lights up. For ATX power supplies, the system LED lights up when you press the ATX power switch. If your monitor complies with "green" standards or if it has a "power standby" feature, the monitor LED may light up or switch between orange and green after the system LED turns on. The system then runs the power-on tests. While the tests are running, the BIOS beeps or additional messages appear on the screen. If you do not see anything within 30 seconds from the time you turned on the power, the system may have failed a power-on test. Check the jumper settings and connections or call your retailer for assistance.

Award BIOS Beep Codes

Beep	Meaning
One short beep when displaying logo	No error during POST
Long beeps in an endless loop	No DRAM installed or detected
One long beep followed by three short beeps	Video card not found or video card memory bad
High frequency beeps when system is working	CPU overheated; System running at a lower frequency

7. At power on, hold down <Delete> to enter BIOS Setup. Follow the instructions in Chapter 4.

3.2 Powering off the computer

You must first exit the operating system and shut down the system before switching off the power. For ATX power supplies, you can press the ATX power switch after exiting or shutting down the operating system. If you use Windows 95/98/2000/XP, click the Start button, click Shut Down, then click the OK button to shut down the computer. The power supply should turn off after Windows shuts down.

The message "You can now safely turn off your computer" does not appear when shutting down with ATX power supplies.

Chapter 4
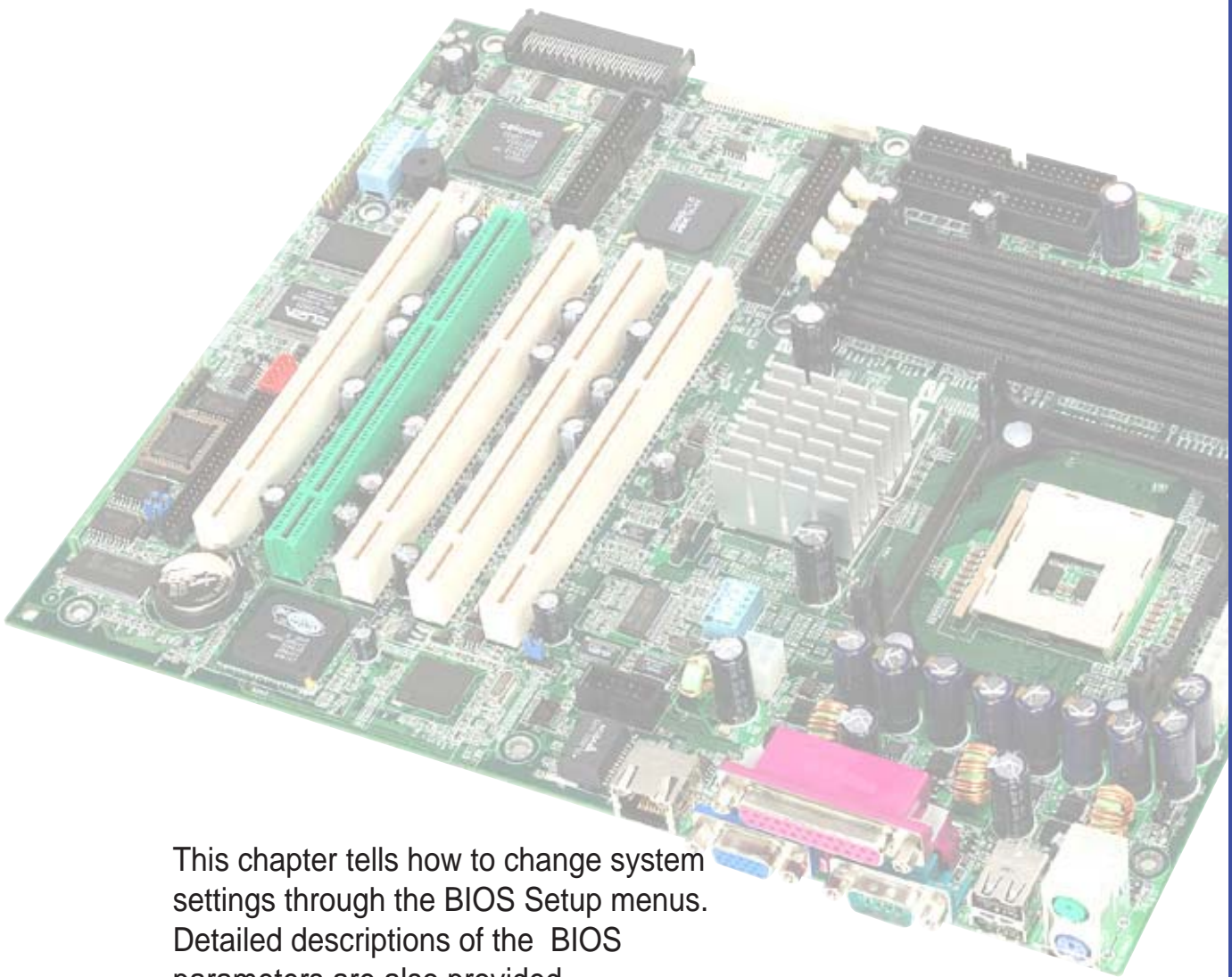
This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

4. BIOS setup

Chapter summary

4.1 Managing and updating your BIOS

4.1.1 Creating a bootable disk

AFLASH.EXE is a Flash Memory Writer utility that updates the BIOS by uploading a new BIOS file to the programmable flash ROM on the motherboard. This file works only in DOS mode. To determine the BIOS version of your motherboard, 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.

1. Type FORMAT A:/S at the DOS prompt to create a bootable system disk. DO NOT copy AUTOEXEC.BAT and CONFIG.SYS to the disk.

2. Type COPY D:\AFLASH\AFLASH.EXE A:\ (assuming D is your CD-ROM drive) to copy AFLASH.EXE to the boot disk you created.

> AFLASH works only in DOS mode. It does not work in the DOS prompt within Windows, and does not work with certain memory drivers that may be loaded when you boot from the hard drive. It is recommended that you reboot using a floppy disk.

3. Reboot the computer from the floppy disk.

> BIOS setup must specify "Floppy" as the first item in the boot sequence.

4. In DOS mode, type A:\AFLASH <Enter> to run AFLASH.

```
                    ASUS ACPI BIOS
                 FLASH MEMORY WRITER V2.0
            Copyright (C) 1994-2001  ASUSTeK COMPUTER INC.

Flash Memory: Winbond W29C020 or SST 29EE020 or Intel 82802AB

Current BIOS Version: ASUS XXX-XX ACPI BIOS Revision 100X
BIOS Model          : XXX-XX
BIOS Built Date     : 12/25/01

Choose one of the followings:

1. Save Current BIOS To File
2. Update BIOS Including Boot Block and ESCD


Enter choice: [1]




Press ESC To Exit
```

> If the word "unknown" appears after Flash Memory:, the memory chip is either not programmable or is not supported by the ACPI BIOS and therefore, cannot be programmed by the Flash Memory Writer utility.

5. Select 1. Save Current BIOS to File from the Main menu and press <Enter>. The Save Current BIOS To File screen appears.

```
                    Save Current BIOS To File

Flash Memory: Winbond W29C020 or SST 29EE020 or Intel 82802AB

Current BIOS Version: ASUS XXX-XX ACPI BIOS Revision 100X
BIOS Model         : XXX-XX
BIOS Built Date    : 12/25/01

Please Enter File Name to Save: XXX-XX.XXX






BIOS Saved Successfully

Press ESC To Continue
```
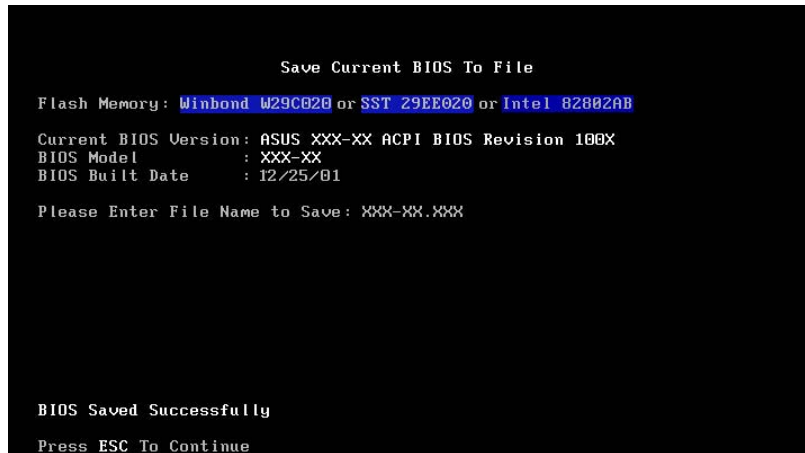
6. Type a filename and the path, for example, A:\XXX-XX.XXX, then press <Enter>.

4.1.2   Updating the BIOS

⚠️ Update the BIOS only if you have problems with the motherboard and you are sure that the new BIOS revision will solve your problems. Careless updating may result to more problems with the motherboard!

1. Download an updated ASUS BIOS file from the Internet (WWW or FTP) (see ASUS CONTACT INFORMATION on page x for details) and save to the boot floppy disk you created earlier.

2. Boot from the floppy disk.

3. At the "A:\" prompt, type AFLASH and then press <Enter>.

4. At the Main Menu, type 2 then press <Enter>. The Update BIOS Including Boot Block and ESCD screen appears.

5. Type the filename of your new BIOS and the path, for example, A:\XXX-XX.XXX, then press <Enter>.

To cancel this operation, press <Enter>.

```
            Update BIOS Including Boot Block and ESCD

Flash Memory: Winbond W29C020 or SST 29EE020 or Intel 82802AB

Current BIOS Version: ASUS XXX-XX ACPI BIOS Revision 100X
BIOS Model          : XXX-XX
BIOS Built Date     : 12/25/01

Please Enter File Name for NEW BIOS: A:\XXX-XX.XXX
```

6. When prompted to confirm the BIOS update, press **Y** to start the update.

```
            Update BIOS Including Boot Block and ESCD

Flash Memory: Winbond W29C020 or SST 29EE020 or Intel 82802AB

BIOS Version
[CURRENT ] ASUS XXX-XX ACPI BIOS Revision 100X
[test.awd] ASUS XXX-XX ACPI BIOS Revision 100X

BIOS Model
[CURRENT ] XXX-XX
[test.awd] XXX-XX

Date of BIOS Built
[CURRENT ] 09/25/99
[XXXX.XXX] 05/29/00

Check sum of 1001.010 is F266.

Are you sure (Y/N) ? [Y]

Press ESC To Return to Main Menu
```

7. The utility starts to program the new BIOS information into the Flash ROM. The boot block is updated automatically only when necessary. This minimizes the possibility of boot problems in case of update failures. When the programming is done, the message *"Flashed Successfully"* appears.

```
                Update BIOS Including Boot Block and ESCD

Flash Memory: Winbond W29C020 or SST 29EE020 or Intel 82802AB

BIOS Version
[CURRENT ] ASUS XXX-XX ACPI BIOS Revision 100X
[test.awd] ASUS XXX-XX ACPI BIOS Revision 100X

BIOS Model
[CURRENT ] XXX-XX
[test.awd] XXX-XX

Date of BIOS Built
[CURRENT ] 12/25/01
[XXXX.XXX] 05/29/00

Check sum of 1001.010 is F266.

Are you sure (Y/N) ? [Y]
Block Erasing -- Done
Programming   -- 3FFFF
Flashed Successfully

Press ESC To Continue
```

8. Follow the onscreen instructions to continue.

```
                        ASUS ACPI BIOS
                    FLASH MEMORY WRITER V2.0
          Copyright (C) 1994-2001  ASUSTeK COMPUTER INC.

Flash Memory: Winbond W29C020 or SST 29EE020 or Intel 82802AB

Current BIOS Version: ASUS XXX-XX ACPI BIOS Revision 100X
BIOS Model         : XXX-XX
BIOS Built Date    : 12/25/01

Choose one of the followings:

1. Save Current BIOS To File
2. Update BIOS Including Boot Block and ESCD


Enter choice: [1]


You have flashed the EPROM;It is recommended that you turn off
the power, enter SETUP and LOAD Setup Defaults to have CMOS
updated with new BIOS when exits.

Press ESC To Exit
```

> If you encounter problems while updating the new BIOS, DO NOT turn off the system because this may cause boot problems. Just repeat the process, and if the problem persists, load the original BIOS file you saved to the boot disk. If the Flash Memory Writer utility is not able to successfully update a complete BIOS file, the system may not boot. If this happens, call the ASUS service center for support.

4.2 BIOS Setup program

This motherboard supports a programmable Flash ROM that you can update using the provided utility described in section "4.1 Managing and updating your BIOS."

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to "Run Setup". This section explains how to configure your system using this utility.

Even if you are not prompted to use the Setup program, you may want to change the configuration of your computer in the future. For example, you may want to enable the security password feature or make changes to the power management settings. This requires you to reconfigure your system using the BIOS Setup program so that the computer can recognize these changes and record them in the CMOS RAM of the Flash ROM.

The Flash ROM on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press <Delete> during the Power-On Self Test (POST) to enter the Setup utility, otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, restart the system by pressing <Ctrl> + <Alt> + <Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

The Setup program is designed to make it as easy to use as possible. It is a menu-driven program, which means you can scroll through the various sub-menus and make your selections among the predetermined choices.

Because the BIOS software is constantly being updated, the following BIOS setup screens and descriptions are for reference purposes only, and may not exactly match what you see on your screen.

4.2.1 BIOS menu bar

The top of the screen has a menu bar with the following selections:

MAIN   Use this menu to make changes to the basic system configuration.

ADVANCED Use this menu to enable and make changes to the advanced features.

POWER   Use this menu to configure power management features.

BOOT   Use this menu to configure the default system device used to locate and load the Operating System.

SERVER   Use this menu to set server-related items

EXIT   Use this menu to exit the current menu or to exit the Setup program.

To access the menu bar items, press the right or left arrow key on the keyboard until the desired item is highlighted.

4.2.2 Legend bar

At the bottom of the Setup screen is a legend bar. The keys in the legend bar allow you to navigate through the various setup menus. The following table lists the keys found in the legend bar with their corresponding functions.

Navigation Key(s)	Function Description
<F1> or <Alt + H>	Displays the General Help screen from any-where in the BIOS Setup
<Esc>	Jumps to the Exit menu or returns to the main menu from a sub-menu
Left or Right arrow	Selects the menu item to the left or right
Up or Down arrow	Moves the highlight up or down between fields
- (minus key)	Scrolls backward through the values for the highlighted field
+ (plus key) or spacebar	Scrolls forward through the values for the high-lighted field
<Enter>	Brings up a selection menu for the highlighted field
<Home> or <PgUp>	Moves the cursor to the first field
<End> or <PgDn>	Moves the cursor to the last field
<F5>	Resets the current screen to its Setup Defaults
<F10>	Saves changes and exits Setup

General help

In addition to the Item Specific Help window, the BIOS setup program also provides a General Help screen. You may launch this screen from any menu by simply pressing <F1> or the <Alt> + <H> combination. The General Help screen lists the legend keys and their corresponding functions.

Saving changes and exiting the Setup program

See *"4.8 Exit Menu"* for detailed information on saving changes and exiting the setup program.

Scroll bar

When a scroll bar appears to the right of a help window, it indicates that there is more information to be displayed that will not fit in the window. Use <PgUp> and <PgDn> or the up and down arrow keys to scroll through the entire help document. Press <Home> to display the first page, press <End> to go to the last page. To exit the help window, press <Enter> or <Esc>.

Sub-menu
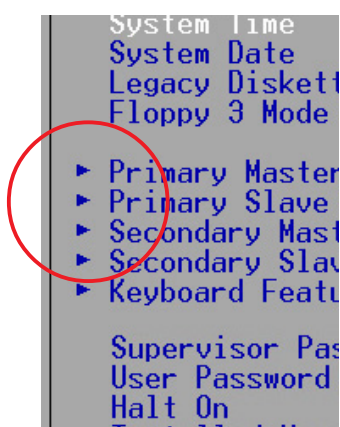
Note that a right pointer symbol (as shown on the left) appears to the left of certain fields. This pointer indicates that you can display a sub-menu from this field. A sub-menu contains additional options for a field parameter. To display a sub-menu, move the highlight to the field and press <Enter>. The sub-menu appears. Use the legend keys to enter values and move from field to field within a sub-menu as you would within a menu. Use the <Esc> key to return to the main menu.

Take some time to familiarize yourself with the legend keys and their corresponding functions. Practice navigating through the various menus and sub-menus. If you accidentally make unwanted changes to any of the fields, use the set default hot key <F5> to load the Setup default values. While moving around through the Setup program, note that explanations appear in the Item Specific Help window located to the right of each menu. This window displays the help text for the currently highlighted field.

4.3 Main Menu

When you enter the Setup program, the following screen appears.

```
                    AwardBIOS Setup Utility
   Main    Advanced    Power    Boot    Server    Exit
 ┌──────────────────────────────────────────┬────────────────────────┐
 │                                          │  Item Specific Help    │
 │  System Time         [00:35:42]          ├────────────────────────┤
 │  System Date         [10/25/2002]        │                        │
 │  Legacy Diskette A   [1.44M, 3.5 in.]    │ <Enter> to select field;│
 │  Floppy 3 Mode Support  [Disabled]       │ <+>,<-> to change value.│
 │                                          │                        │
 │ ► Primary Master      [Auto]             │                        │
 │ ► Primary Slave       [Auto]             │                        │
 │ ► Secondary Master    [Auto]             │                        │
 │ ► Secondary Slave     [Auto]             │                        │
 │ ► Tertiary Master     [Auto]             │                        │
 │ ► Tertiary Slave      [Auto]             │                        │
 │ ► Keyboard Features                      │                        │
 │                                          │                        │
 │  Supervisor Password  [Enter]            │                        │
 │  User Password        [Enter]            │                        │
 │  Halt On              [All Errors]       │                        │
 │  Installed Memory     256 MB             │                        │
 │                                          │                        │
 ├──────────────────────────────────────────┴────────────────────────┤
 │ F1   Help   ↑↓  Select Item   -/+   Change Values   F5  Setup Defaults│
 │ ESC  Exit   ↔   Select Menu   Enter Select ► Sub-Menu F10 Save and Exit│
 └────────────────────────────────────────────────────────────────────┘
```

System Time [XX:XX:XX]

Sets the system to the time that you specify (usually the current time). The format is hour, minute, second. Valid values for hour, minute and second are Hour: (00 to 23), Minute: (00 to 59), Second: (00 to 59). Use the <Tab> or <Shift> + <Tab> keys to move between the hour, minute, and second fields.

System Date [XX/XX/XXXX]

Sets the system to the date that you specify (usually the current date). The format is month, day, year. Valid values for month, day, and year are Month: (1 to 12), Day: (1 to 31), Year: (up to 2099). Use the <Tab> or <Shift> + <Tab> keys to move between the month, day, and year fields.

Legacy Diskette A [1.44M, 3.5 in.]

Sets the type of floppy drive installed. Configuration options: [None] [360K, 5.25 in.] [1.2M , 5.25 in.] [720K , 3.5 in.] [1.44M, 3.5 in.] [2.88M, 3.5 in.]

Floppy 3 Mode Support [Disabled]

This is required to support older Japanese floppy drives. The Floppy 3 Mode feature allows reading and writing of 1.2MB (as opposed to 1.44MB) on a 3.5-inch diskette. Configuration options: [Disabled] [Enabled]

Supervisor Password [Disabled] / User Password [Disabled]

These fields allow you to set passwords. To set a password, highlight the appropriate field and press <Enter>. Type in a password then press <Enter>. You can type up to eight alphanumeric characters. Symbols and other characters are ignored. To confirm the password, type the password again and press <Enter>. The password is now set to [Enabled]. This password allows full access to the BIOS Setup menus. To clear the password, highlight this field and press <Enter>. The same dialog box as above appears. Press <Enter>. The password is set to [Disabled].

A note about passwords

The BIOS Setup program allows you to specify passwords in the Main menu. The passwords control access to the BIOS during system startup. Passwords are not case sensitive, meaning, passwords typed in either uppercase or lowercase letters are accepted. The BIOS Setup program allows you to specify two different passwords: a Supervisor password and a User password. If you did not set a Supervisor password, anyone can access the BIOS Setup program. If you did, the Supervisor password is required to enter the BIOS Setup program and to gain full access to the configuration fields.

Forgot the password?

If you forget your password, you can clear it by erasing the CMOS Real Time Clock (RTC) RAM. The RAM data containing the password information is powered by the onboard button cell battery. See section "2.7 Switches and jumpers" for information on how to erase the RTC RAM.

Halt On [All Errors]

This field specifies the types of errors that will cause the system to halt. Configuration options: [All Errors] [No Error] [All but Keyboard] [All but Disk] [All but Disk/Keyboard]

Installed Memory [XXX MB]

This field automatically displays the amount of conventional memory detected by the system during the boot process.

4.3.1 Primary/Secondary/Tertiary Master/Slave

```
                      AwardBIOS Setup Utility
  Main

         Primary Master  [Auto]              Item Specific Help

  Type                      [Auto]          <Enter> to select the
                                            type of the IDE drive.
  Cylinders                 [ 1024]         [User Type HDD] allows
  Head                      [255]           you to set each entry on
  Sector                    [63]            your own.
  CHS Capacity              8422MB
  Maximum LBA Capacity      25590MB         WARNING: Ultra DMA mode
                                            3/4/5 can be enabled
  Multi-Sector Transfers    [Maximum]       only when BIOS detects
  SMART Monitoring          [Disabled]      shielded 80-pin cable.
  PIO Mode                  [4]
  ULTRA DMA Mode            [Disabled]



  F1   Help    ↑↓  Select Item   -/+    Change Values    F5  Setup Defaults
  ESC  Exit    ↔   Select Menu    Enter  Select ► Sub-Menu  F10  Save and Exit
```

Type [Auto]

Select [Auto] to automatically detect an IDE hard disk drive. If automatic detection is successful, Setup automatically fills in the correct values for the remaining fields on this sub-menu. If automatic detection fails, this may be because the hard disk drive is too old or too new. If the hard disk was already formatted on an older system, Setup may detect incorrect parameters. In these cases, select [User Type HDD] to manually enter the IDE hard disk drive parameters. Refer to the next section for details.

> ⚠ Before attempting to configure a hard disk drive, make sure you have the correct configuration information supplied by the drive manufacturer. Incorrect settings may cause the system to fail to recognize the installed hard disk.

[User Type HDD]

```
                    AwardBIOS Setup Utility
    Main

        Primary Master  [User Type HDD]              Item Specific Help

     Type                    [User Type HDD]      <Enter> to select the
     Translation Method      [LBA]                type of the IDE drive.
                                                  [User Type HDD] allows
     Cylinders               [ 1024]              you to set each entry on
     Head                    [255]                your own.
     Sector                  [63]
     CHS Capacity            8422MB               WARNING: Ultra DMA mode
     Maximum LBA Capacity    25590MB              3/4/5 can be enabled
                                                  only when BIOS detects
     Multi-Sector Transfers  [Maximum]            shielded 80-pin cable.
     SMART Monitoring        [Disabled]
     PIO Mode                [4]
     ULTRA DMA Mode          [Disabled]




    F1   Help    ↑↓  Select Item   -/+    Change Values    F5   Setup Defaults
    ESC  Exit    ↔   Select Menu   Enter  Select ► Sub-Menu F10  Save and Exit
```

Manually enter the number of cylinders, heads and sectors per track for
the drive. Refer to the drive documentation or on the drive label for this
information.

> After entering the IDE hard disk drive information into BIOS, use a disk
> utility, such as FDISK, to partition and format new IDE hard disk drives.
> This is necessary so that you can write or read data from the hard disk.
> Make sure to set the partition of the Primary IDE hard disk drives to
> active.

If no drive is installed or if you are removing a drive and not replacing it,
select [None].

Other options for the Type field are:

[CD-ROM] - for IDE CD-ROM drives

[LS-120] - for LS-120 compatible floppy disk drives

[ZIP] - for ZIP-compatible disk drives

[MO] - for IDE magneto optical disk drives

[Other ATAPI Device] - for IDE devices not listed here

After making your selections on this sub-menu, press the <Esc> key to
return to the Main menu. When the Main menu appears, the hard disk
drive field displays the size for the hard disk drive that you configured.

Translation Method [LBA]

Select the hard disk drive type in this field. When Logical Block Addressing (LBA) is enabled, the 28-bit addressing of the hard drive is used without regard for cylinders, heads, or sectors. Note that LBA Mode is necessary for drives with more than 504MB storage capacity. Configuration options: [LBA] [LARGE] [Normal] [Match Partition Table] [Manual]

Cylinders

This field configures the number of cylinders. Refer to the drive documentation to determine the correct value. To make changes to this field, set the Type field to [User Type HDD] and the Translation Method field to [Manual].

Head

This field configures the number of read/write heads. Refer to the drive documentation to determine the correct value. To make changes to this field, set the Type field to [User Type HDD] and the Translation Method field to [Manual].

Sector

This field configures the number of sectors per track. Refer to the drive documentation to determine the correct value. To make changes to this field, set the Type field to [User Type HDD] and the Translation Method field to [Manual].

CHS Capacity

This field shows the drive's maximum CHS capacity as calculated by the BIOS based on the drive information you entered.

Maximum LBA Capacity

This field shows the drive's maximum LBA capacity as calculated by the BIOS based on the drive information you entered.

Multi-Sector Transfers [Maximum]

This option automatically sets the number of sectors per block to the highest number that the drive supports. Note that when this field is automatically configured, the set value may not always be the fastest value for the drive. You may also manually configure this field. Refer to the documentation that came with the hard drive to determine the optimum value and set it manually. To make changes to this field, set the Type field to [User Type HDD]. Configuration options: [Disabled] [2 Sectors] [4 Sectors] [8 Sectors] [16 Sectors] [32 Sectors] [Maximum]

SMART Monitoring [Disabled]

This field allows you to enable or disable the S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) system that utilizes internal hard disk drive monitoring technology. This parameter is normally disabled because the resources used in the SMART monitoring feature may decrease system performance. Configuration options: [Disabled] [Enabled]

PIO Mode [4]

This option lets you set a PIO (Programmed Input/Output) mode for the IDE device. Modes 0 through 4 provide successive increase in performance. Configuration options: [0] [1] [2] [3] [4]

Ultra DMA Mode [Disabled]

Ultra DMA capability allows improved transfer speeds and data integrity for compatible IDE devices. Set to [Disabled] to suppress Ultra DMA capability. To make changes to this field, set the Type field to [User Type HDD]. Configuration options: [0] [1] [2] [3] [4] [5] [Disabled]

4.3.2 Keyboard Features

```
                      AwardBIOS Setup Utility
   Main

          Keyboard Features                    Item Specific Help

   Boot Up NumLock Status       [On ]          Select Power-on state
   Keyboard Auto-Repeat Rate    [12/Sec]       for Numlock
   Keyboard Auto-Repeat Delay   [1/4 Sec]




   F1   Help    ↑↓  Select Item   -/+    Change Values        F5   Setup Defaults
   ESC  Exit    ←→  Select Menu    Enter  Select ► Sub-Menu    F10  Save and Exit
```

Boot Up NumLock Status [On]

This field enables users to activate the Number Lock function upon system boot. Configuration options: [Off] [On]

Keyboard Auto-Repeat Rate [6/Sec]

This controls the speed at which the system registers repeated keystrokes. Options range from 6 to 30 characters per second. Configuration options: [6/Sec] [8/Sec] [10/Sec] [12/Sec] [15/Sec] [20/Sec] [24/Sec] [30/Sec]

Keyboard Auto-Repeat Delay [1/4 Sec]

This field sets the time interval for displaying the first and second characters. Configuration options: [1/4 Sec] [1/2 Sec] [3/4 Sec] [1 Sec]

4.4   Advanced Menu

```
                        AwardBIOS Setup Utility
   Main    Advanced    Power     Boot     Server     Exit
  ┌─────────────────────────────────────────┬─────────────────────────┐
  │                                          │   Item Specific Help    │
  │   CPU Speed              32984 MHz        │                         │
  │   CPU Level 1 Cache      [Enabled]        │   <Enter> to enable or  │
  │   CPU Level 2 Cache      [Enabled]        │   disable.              │
  │   Hyper-Threading Technology  [Enabled]   │                         │
  │   BIOS Update            [Enabled]        │                         │
  │   PS/2 Mouse Function Control  [Auto]     │                         │
  │   OS/2 Onboard Memory > 64M   [Disabled]  │                         │
  │   USB Legacy Support     [Auto]           │                         │
  │                                          │                         │
  │ ▶ Chip Configuration                      │                         │
  │ ▶ I/O Device Configuration                │                         │
  │ ▶ PCI Configuration                       │                         │
  │                                          │                         │
  │                                          │                         │
  │                                          │                         │
  └─────────────────────────────────────────┴─────────────────────────┘
   F1   Help    ↑↓  Select Item   -/+    Change Values     F5   Setup Defaults
   ESC  Exit    ↔   Select Menu    Enter  Select ▶ Sub-Menu F10  Save and Exit
```

CPU Speed [Manual]

This field displays the auto-detected CPU speed.

CPU Level 1 Cache, CPU Level 2 Cache [Enabled]

These fields allow you to choose from the default [Enabled] or choose [Disabled] to turn on or off the CPU Level 1 and Level 2 built-in cache. Configuration options: [Disabled] [Enabled]

Hyper-Threading Technology [Enabled]

This item allows you to enable or disable support for Hyper-Threading Technology enabled processors which contain multiple logical processors per physical processor package. Configuration options: [Disabled] [Enabled]

BIOS Update [Enabled]

This field functions as an update loader integrated into the BIOS to supply the processor with the required data. When set to [Enabled], the BIOS loads the update on all processors during system bootup. Configuration options: [Disabled] [Enabled]

PS/2 Mouse Function Control [Auto]

The default setting [Auto] allows the system to detect a PS/2 mouse at startup. If a mouse is detected, the BIOS assigns IRQ12 to the PS/2 mouse. Otherwise, IRQ12 can be used for expansion cards. When you set this field to [Enabled], BIOS reserves IRQ12, whether or not a PS/2 mouse is detected at startup. Configuration options: [Enabled] [Auto]

OS/2 Onboard Memory > 64M [Disabled]

When using OS/2 operating systems with installed DRAM of greater than 64MB, you need to set this option to [Enabled]. Otherwise, leave to the default setting [Disabled]. Configuration options: [Disabled] [Enabled]

USB Legacy Support [Auto]

This motherboard supports Universal Serial Bus (USB) devices. The default of [Auto] allows the system to detect a USB device at startup. If detected, the USB controller legacy mode is enabled. If not detected, the USB controller legacy mode is disabled.

When you set this field to [Disabled], the USB controller legacy mode is disabled whether or not you are using a USB device. Configuration options: [Disabled] [Enabled] [Auto]

4.4.1 Chip Configuration

```
                     AwardBIOS Setup Utility
    Advanced
------------------------------------------------------------------
          Chip Configuration                  Item Specific Help
------------------------------------------------------------------
    Enhanced Mapping Mode      Unknown         Select [USWC] only when
    Video Memory Cache Mode    [UC]            your display card
    Onboard PCI IDE            [All]           supports this feature.
    DDR DQS DELAY TAP in DEC   [ 5]



------------------------------------------------------------------
    F1   Help    ↑↓  Select Item   -/+    Change Values      F5   Setup Defaults
    ESC  Exit    ↔   Select Menu    Enter  Select ▶ Sub-Menu F10  Save and Exit
```

Video Memory Cache Mode [UC]

USWC (uncacheable, speculative write combining) is a new cache
technology for the video memory of the processor. It can greatly improve
the display speed by caching the display data. You must set this to UC
(uncacheable) if your display card cannot support this feature; otherwise
your system may not boot. Configuration options: [UC] [USWC]

Onboard PCI IDE [All]

You can select to enable the primary, secondary, tertiary IDE channel, all
channels, or disable all channels. Configuration options: [All]
[Primary\Secondary] [Primary\Tertiary] [Primary] [Secondary\Tertiary\
[Secondary] [Tertiary] [Disabled]

DDR DQS Delay TAP in DEC [5]

Default setting is 5. User settings are from 0 to 96. The last setting, 96, is
for auto selection. Configuration options: [0...96]

4.4.2 I/O Device Configuration

```
                        AwardBIOS Setup Utility
        Advanced

            I/O Device Configuration              Item Specific Help

    Floppy Disk Access Control    [R/W]            <Enter> to select.

    Onboard Serial Port 1         [3F8H/IRQ4]
    Onboard Serial Port 2         [2F8H/IRQ3]
    Onboard Parallel Port         [378H/IRQ7]
    Parallel Port Mode            [ECP+EPP]
    ECP DMA Select                [3]




    F1   Help    ↑↓  Select Item   -/+   Change Values      F5   Setup Defaults
    ESC  Exit    ←→  Select Menu   Enter Select ► Sub-Menu   F10  Save and Exit
```

Floppy Disk Access Control [R/W]

When set to [Read Only], this parameter protects files from being copied to floppy disks by allowing reads from, but not writes to, the floppy disk drive. The default setting [R/W] allows both reads and writes. Configuration options: [R/W] [Read Only]

Onboard Serial Port 1 [3F8H/IRQ4]
Onboard Serial Port 2 [2F8H/IRQ3]

These fields allow you to set the addresses for the onboard serial connectors. Serial Port 1 and Serial Port 2 must have different addresses. Configuration options: [3F8H/IRQ4] [2F8H/IRQ3] [3E8H/IRQ4] [2E8H/IRQ10] [Disabled]

Onboard Parallel Port [378H/IRQ7]

This field allows you to set the address of the onboard parallel port connector. If you disable this field, the Parallel Port Mode and ECP DMA Select configurations are not available. Configuration options: [Disabled] [378H/IRQ7] [278H/IRQ5]

Parallel Port Mode [ECP+EPP]

This field allows you to set the operation mode of the parallel port. [Normal] allows normal-speed operation but in one direction only; [EPP] allows bidirectional parallel port operation; [ECP] allows the parallel port to operate in bidirectional DMA mode; [ECP+EPP] allows normal speed operation in a two-way mode. Configuration options: [Normal] [EPP] [ECP] [ECP+EPP]

ECP DMA Select [3]

This field allows you to configure the parallel port DMA channel for the selected ECP mode. This selection is available only if you select [ECP] or [ECP+EPP] in Parallel Port Mode above. Configuration options: [1] [3]

4.4.3 PCI Configuration

```
                        AwardBIOS Setup Utility
      Advanced

              PCI Configuration                    Item Specific Help

      Slot 1 IRQ                 [Auto]         <Enter> to select an
      Slot 2 IRQ                 [Auto]         IRQ.
      Slot 3 IRQ                 [Auto]
      Slot 4 IRQ                 [Auto]
      Slot 5 IRQ                 [Auto]
      Slot 6 IRQ                 [Auto]

      PCI/VGA Palette Snoop      [Disabled]
      PCI Latency Timer          [ 32]
      Sparse PCI Host Bus        [3BUS]
      Onboard SCSI BIOS          [Auto]
      Primary VGA BIOS           [PCI VGA Card]
      USB Function               [Enabled]
      Onboard LAN Boot ROM       [Disabled]



      F1   Help    ↑↓  Select Item   -/+    Change Values     F5   Setup Defaults
      ESC  Exit    ↔   Select Menu   Enter  Select ► Sub-Menu F10  Save and Exit
```

Slot 1, Slot 2, Slot 3, Slot 4, Slot 5, Slot 6 IRQ [Auto]

These fields set how IRQ use is determined for each PCI slot. The default setting for each field is [Auto], which utilizes auto-routing to determine IRQ use. Configuration options: [Auto] [NA] [3] [4] [5] [7] [9] [10] [11] [12] [14] [15]

PCI/VGA Palette Snoop [Disabled]

Some non-standard VGA cards, like graphics accelerators or MPEG video cards, may not show colors properly. Setting this field to [Enabled] corrects this problem. If you are using standard VGA cards, leave this field to the default setting [Disabled]. Configuration options: [Disabled] [Enabled]

PCI Latency Timer [32]

Leave on default setting for best performance vs. stability.

Sparse PCI Host Bus [3 BUS]

This field allows you to reserve the bus number for the PCI slots. Configuration options: [Disabled] [2 BUS] [3 BUS] [4 BUS]

Onboard SCSI BIOS [Auto]

[Auto] allows the motherboard BIOS to detect whether you have a Adaptec SCSI controller. If the SCSI controller is detected, the SCSI BIOS will be enabled. If no SCSI controller is detected, the onboard SCSI BIOS will be disabled.

Setting to [Disabled] deactivates the onboard SCSI BIOS so that the BIOS on an add-on SCSI card can be used. If your SCSI card does not have a BIOS, the SCSI card will not function. Configuration options: [Auto] [Disabled]

Primary VGA BIOS First [PCI VGA Card]

This field allows you to select the primary graphics card. Configuration options: [PCI VGA Card] [Onboard VGA]

USB Function [Enabled]

Set this field to [Enabled] if you want to use Universal Serial Bus devices. Configuration options: [Disabled] [Enabled]

Onboard LAN Boot ROM [Disabled]

When set to [Enabled], these fields allow the system to boot from the network using the onboard LAN controller boot ROM. Configuration options: [Disabled] [Enabled]

4.5   Power Menu

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

```
                    AwardBIOS Setup Utility
   Main     Advanced    Power     Boot     Server     Exit

                                              Item Specific Help
  Power Management     [User Defined]
  Video Off Option     [Suspend -> Off]
  Video Off Method     [DPMS OFF]          <Enter> to select the
  HDD Power Down       [Disabled]          power saving mode. You
                                           can select [User
  Suspend Mode         [Disabled]          Defined] to go to the
  PWR Button < 4 Secs  [Soft Off]          suspend mode entry
                                           below.
  ▶ Power Up Control
  ▶ Hardware Monitor




  F1  Help   ↑↓  Select Item  -/+    Change Values    F5   Setup Defaults
  ESC Exit   ←→  Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```

Power Management [User Defined]

This field allows you to activate or deactivate the automatic power saving features. When set to [Disabled], the power management features do not function regardless of the other settings on this menu. The [User Defined] option allows you to set the period of inactivity before the system enters suspend mode. Refer to "Suspend Mode" item.

When set to [Max Saving], system power is conserved to its greatest amount. This setting automatically puts the system into suspend mode after a brief period of system inactivity. [Min Saving] allows the least power saving as the system enters suspend mode only after a long period of inactivity. Configuration options: [User Defined] [Disabled] [Min Saving] [Max Saving]

You should install the Advanced Power Management (APM) utility to keep the system time updated even when the computer enters suspend mode. In Windows 3.x and Windows 95, you need to install Windows with the APM feature. In Windows 98 or later, APM is automatically installed as indicated by a battery and power cord icon labeled "Power Management" in the Control Panel. Select the item "Advanced" in the Power Management Properties dialog box.

Video Off Option [Suspend -> Off]

This field determines when to activate the video off feature for monitor power management. Configuration options: [Always On] [Suspend -> Off]

Video Off Method [DPMS OFF]

This field defines the video off features. The Display Power Management System (DPMS) feature allows 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.

> Even if installed, your screen saver does not display when you select [Blank Screen] for the above field.

[V/H SYNC+Blank] blanks the screen and turns off vertical and horizontal scanning. Configuration options: [Blank Screen] [V/H SYNC+Blank] [DPMS Standby] [DPMS Suspend] [DPMS OFF] [DPMS Reduce ON]

HDD Power Down [Disabled]

Shuts down any IDE hard disk drives in the system after a period of inactivity as set in this user-configurable field. This feature does not affect SCSI hard drives. Configuration options: [Disabled] [1 Min] [2 Min] [3 Min]...[15 Min]

Suspend Mode [Disabled]

Sets the time period before the system goes into suspend mode. Configuration options: [Disabled] [1~2 Min] [2~3 Min] [4~5 min] [8~9 Min] [20 Min] [30 Min] [40 Min] [1 Hour]

PWR Button < 4 Secs [Soft Off]

When set to [Soft off], the ATX switch can be used as a normal system power-off button when pressed for less than 4 seconds. [Suspend] allows the button to have a dual function where pressing less than 4 seconds puts the system in sleep mode. Regardless of the setting, holding the ATX switch for more than 4 seconds powers off the system. Configuration options: [Soft off] [Suspend]

4.5.1   Power Up Control

```
                     AwardBIOS Setup Utility
                 ┌─────────┐
                 │  Power  │
─────────────────┴─────────┴──────────────────────────────────────────
     Power Up Control                     │      Item Specific Help
                                          │
                                          │
  AC Power Loss Restart      [Disabled]   │   <Enter> to select
  Wake/Power Up On Ext. Modem [Disabled]  │   whether or not to
  Onboard LAN Power Up        [Disabled]  │   restart the system after
  Power Up On PCI Card        [Disabled]  │   AC power loss.
  Power On By PS/2 Keyboard   [Disabled]  │
  Automatic Power Up          [Disabled]  │
                                          │
                                          │
                                          │
                                          │
                                          │
                                          │
                                          │
──────────────────────────────────────────────────────────────────────
  F1    Help    ↑↓   Select Item   -/+   Change Values      F5   Setup Defaults
  ESC   Exit    ←→   Select Menu   Enter Select ► Sub-Menu   F10  Save and Exit
```

AC PWR Loss Restart [Disabled]

This allows you to set whether or not to reboot the system after power interruptions. [Disabled] leaves your system off while [Enabled] reboots the system. [Previous State] sets the system back to the state it was before the power interruption. Configuration options: [Disabled] [Enabled] [Previous State]

Wake/Power Up On Ext. Modem [Disabled]

This allows either settings of [Enabled] or [Disabled] for powering up the computer when the external modem receives a call while the computer is in Soft-off mode. Configuration options: [Disabled] [Enabled]

> The computer cannot receive or transmit data until the computer and applications are fully running. Thus, connection cannot be made on the first try. Turning an external modem off and then back on while the computer is off causes an initialization string that turns the system power on.

Onboard LAN Power Up [Disabled]
Power Up on PCI Card [Disabled]

These fields allow you to boot your computer from another computer by sending a wake-up frame or signal to the LAN device, or the PCI modem card if present. Configuration options: [Disabled] [Enabled]

Power On By PS/2 Keyboard [Disabled]

This parameter allows you to use specific keys on the keyboard to turn on the system. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead. Configuration options: [Disabled] [Space Bar] [Ctrl-Esc] [Power Key]

Automatic Power Up [Disabled]

This allows an unattended or automatic system power up. You may configure your system to power up at a certain time of the day by selecting [Everyday] or at a certain time and day by selecting [By Date]. Configuration options: [Disabled] [Everyday] [By Date]

4.5.2 Hardware Monitor

```
                    AwardBIOS Setup Utility
                 Power

            Hardware Monitor                    Item Specific Help

  MB  Temperature    30°C/86°F            <Enter> to switch
  CPU Temperature    41°C/105°F           between monitoring or
                                          ignoring.
  CPU    Fan Speed   7500RPM
  System Fan Speed   5073RPM

  VCORE   Voltage       1.50V
  3.3V    Voltage       3.45V
  5V      Voltage       4.91V
  12V     Voltage      12.09V
  3VSB    Voltage       3.45V




  F1   Help    ↑↓  Select Item   -/+    Change Values      F5   Setup Defaults
  ESC  Exit    ←→  Select Menu    Enter  Select ► Sub-Menu  F10  Save and Exit
```

MB Temperature [xxxC/xxxF], CPU Temperature [xxxC/xxxF]
The onboard hardware monitor is able to detect the MB (motherboard) and
CPU temperatures. Set to [Ignore] only if necessary.

CPU Fan Speed [xxxxRPM], System Fan Speed [xxxxRPM]
The onboard hardware monitor is able to detect the CPU fan speeds in
rotations per minute (RPM). The presence of the fans is automatically
detected.

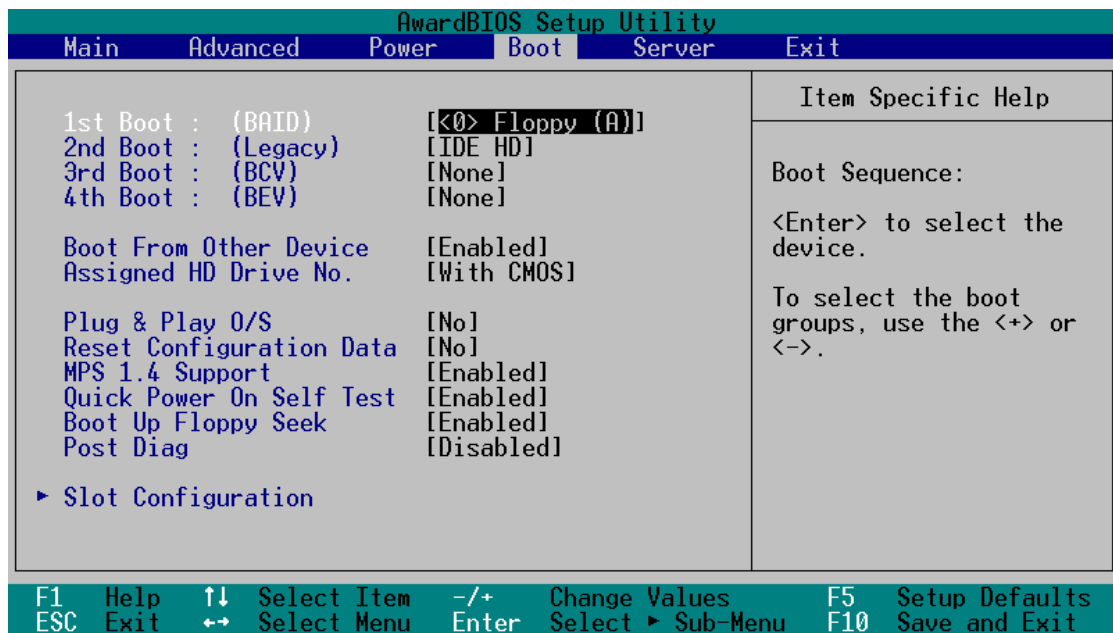**VCORE Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage, 3VSB Voltage**
The onboard hardware monitor is able to detect the voltage output by the
onboard voltage regulators.


If any of the monitored items is out of range, the following error
message appears: "Hardware Monitor found an error. Enter Power
setup menu for details". You will then be prompted to "Press F1 to
continue or DEL to enter SETUP".

4.6   Boot Menu

```
                    AwardBIOS Setup Utility
   Main     Advanced    Power    Boot    Server    Exit

                                            Item Specific Help

  1st Boot :  (BAID)      [<0> Floppy (A)]
  2nd Boot :  (Legacy)    [IDE HD]
  3rd Boot :  (BCV)       [None]          Boot Sequence:
  4th Boot :  (BEV)       [None]
                                          <Enter> to select the
  Boot From Other Device   [Enabled]      device.
  Assigned HD Drive No.    [With CMOS]
                                          To select the boot
  Plug & Play O/S          [No]           groups, use the <+> or
  Reset Configuration Data [No]           <->.
  MPS 1.4 Support          [Enabled]
  Quick Power On Self Test [Enabled]
  Boot Up Floppy Seek      [Enabled]
  Post Diag                [Disabled]

  ► Slot Configuration


   F1   Help    ↑↓  Select Item   -/+    Change Values    F5   Setup Defaults
   ESC  Exit    ↔   Select Menu    Enter  Select ► Sub-Menu  F10  Save and Exit
```

The motherboard BIOS supports the BIOS Boot Specification (BBS) version 1.01. BBS is an intelligent mechanism that provides flexible ways to set boot sequence for Initial Program Load (IPL) devices such as CD-ROMs, network remote boot ROM, and SCSI or RAID controllers on PnP cards.

The IPL devices are classified into three categories:
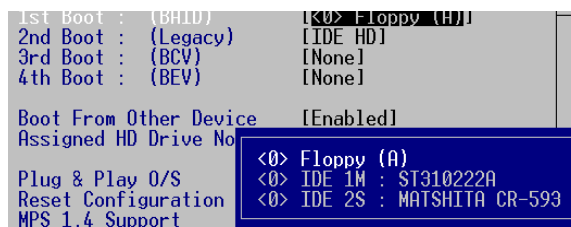
BIOS Aware IPL Devices (BAID)
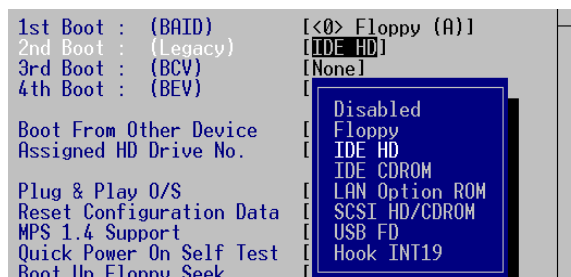
Legacy devices

PnP devices, includes Boot Connection Vector (BCV) and Bootstrap Entry Vector (BEV) devices

1st Boot : (BAID) [None]

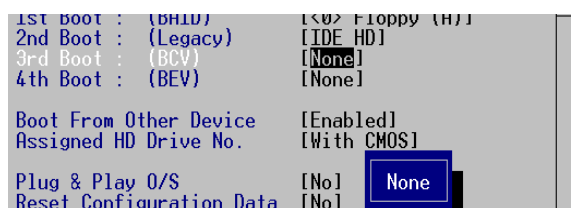This field allows you to select a BIOS Aware IPL Devices (BAID) to boot from. A BAID is any device that can boot on an operating system but requires a specific BIOS code for support. Bootable FDDs, ATA HDD, ATAPI CD-ROM, ATA ZIP, and ATA MO drives are classified as BAID. The drives present in the system will appear as options for this field.

2nd Boot : (Legacy)   [Disabled]

This field reserves the boot sequence selection only to legacy devices including FDD, HDD, CD-ROM, SCSI, and LAN. This mode does not allow booting from a boot device on an add-on card or controller. If you wish to assign a device as a 1st Boot device for a specific application, you must set that legacy device at the 1st Boot sequence.

For this motherboard, the following options are present onboard: [Disabled] [Floppy] [HDD] [CD-ROM] [LAN Option ROM] [SCSI]

3rd Boot : (BCV) [None]

This field allows you to select a Boot Connection Vector (BCV) device to boot from. BCV devices include SCSI controllers or SCSI cards, RAID cards, and other devices on add-on cards with option ROM that hooks INT 13 to BIOS. The BCV devices present in the system will appear as options for this field. The field shows [None] if no BCV device is installed.

4th Boot : (BEV)   [<0> Intel Corporation]

This field allows you to select a Bootstrap Entry Vector (BEV) device to boot from. BEV devices include network controllers or cards. The BEV devices present in the system will appear as options for this field. For this motherboard, the following options are present onboard: [None]

Boot From Other Device [Enabled]

This field allows you to enable or disable booting from an unselected device. Configuration options: [Disabled] [Enabled]

Assigned HD Drive No. [With CMOS]

This field allows you to select the algorithm of assigning drive numbers for hard disk drives. Configuration options: [With CMOS] [In Sequence]

Plug & Play O/S [No]

This field allows you to use a Plug-and-Play (PnP) operating system to configure the PCI bus slots instead of using the BIOS. When [Yes] is selected, interrupts may be reassigned by the OS. If you installed a non-PnP OS or if you want to prevent reassigning of interrupt settings, keep the default setting [No]. Configuration options: [No] [Yes]

Reset Configuration Data [No]

The Extended System Configuration Data (ESCD) contain information about non-PnP devices. It also holds the complete record of how the system was configured the last time it was booted. Select [Yes] if you want to clear these data during the Power-On-Self-Test (POST). Configuration options: [No] [Yes]

MPS 1.4 Support [Enabled]

This field allows you to enable or disable the MultiProcessor Specification 1.4 support. Configuration options: [Disabled] [Enabled]

Quick Power On Self Test [Enabled]

This field speeds up the Power-On-Self Test (POST) routine by skipping retesting a second, third, and fourth time. Configuration options: [Disabled] [Enabled]

Boot Up Floppy Seek [Enabled]

When enabled, the BIOS will seek the floppy disk drive to determine whether the drive has 40 or 80 tracks. Configuration options: [Disabled] [Enabled]

Post Diag [Disabled]

Configuration options: [Disabled] [Enabled]

4.6.1 Slot Configuration

```
                    AwardBIOS Setup Utility
                          Boot

           Slot Configuration              Item Specific Help

     Init Slot1        [Normal]           <Enter> to set priority
     Init Slot2        [Normal]           for Add-on card
     Init Slot3        [Normal]           initialization.
     Init Slot4        [Normal]
     Init Slot5        [Normal]




  F1   Help    ↑↓  Select Item    -/+    Change Values    F5   Setup Defaults
  ESC  Exit    ←→  Select Menu    Enter  Select ► Sub-Menu F10  Save and Exit
```

Init Slot 1, 2, 3, 4, 5 IRQ [Normal]

This field allows you to set the priority level for each expansion slot in
order to determine expansion card initialization order. Configuration
options: [High] [Normal] [Low] [Skip]

4.7   Server Menu

```
                     AwardBIOS Setup Utility
    Main    Advanced    Power    Boot    Server    Exit

                                              Item Specific Help
    Remote Console          [Disabled]

  ► Event Log Viewer
    Clear Event Log         [Disabled]
    Log Memory ECC Error    [Enabled]

    Side 0 of DIMM0         [Enabled]
    Side 1 of DIMM0         Not Installed
    Side 0 of DIMM1         [Enabled]
    Side 1 of DIMM1         Not Installed
    Side 0 of DIMM2         Not Installed
    Side 1 of DIMM2         Not Installed
    Side 0 of DIMM3         Not Installed
    Side 1 of DIMM3         Not Installed




    F1   Help    ↑↓  Select Item   -/+    Change Values    F5   Setup Defaults
    ESC  Exit    ↔   Select Menu    Enter  Select ► Sub-Menu  F10  Save and Exit
```

Remote Console [Disabled]
This field allows the text mode VGA display to be sent out to VT100
terminal through COM1. This function is effective at BIOS POST and DOS
environment. Configuration options: [Disabled] [Enabled] [POST Only]

Event Log Viewer
Pressing <Enter> on this item gives you a sub-menu. You will be shown all
events such as "no bootable media" or "fan speed out of range".

Clear Event Log [Disabled]
This field clears the event log recorded on the sub-menu. Select [Enabled]
to automatically clear the event log. Reset to [Disabled] to store up event
log data. An IPMI device must be connected to the server for this field to
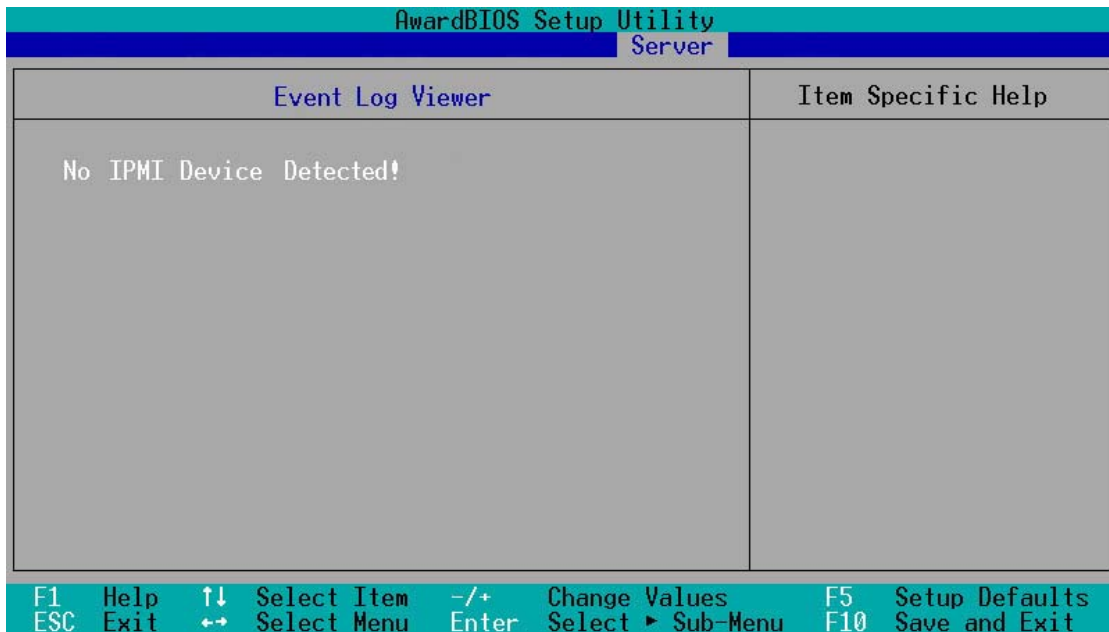function. Configuration options: [Disabled] [Enabled]

Log Memory ECC Error [Enabled]
This field allows you to set whether "Error Checking and Correcting"
memory errors are logged. Configuration options: [Disabled] [Enabled]

Side 0 of DIMM0 -- Side 1 of DIMM3 [Enabled]
This field displays the presence of ECC DIMMS in the slots. Installed
DIMMs automatically display [Enabled]. If the DIMM slot is empty, the
gray "Not Installed" message is displayed. Configuration options:
[Enabled] Not Installed.

4.7.1 Event Log Viewer

```
                        AwardBIOS Setup Utility
                                           Server
┌──────────────────────────────────────────┬──────────────────────────┐
│          Event Log Viewer                 │    Item Specific Help    │
├──────────────────────────────────────────┼──────────────────────────┤
│                                           │                          │
│   No IPMI Device Detected!                │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
│                                           │                          │
├──────────────────────────────────────────┴──────────────────────────┤
│ F1   Help   ↑↓  Select Item   -/+   Change Values    F5   Setup Defaults│
│ ESC  Exit   ←→  Select Menu   Enter Select ► Sub-Menu F10  Save and Exit │
└──────────────────────────────────────────────────────────────────────┘
```
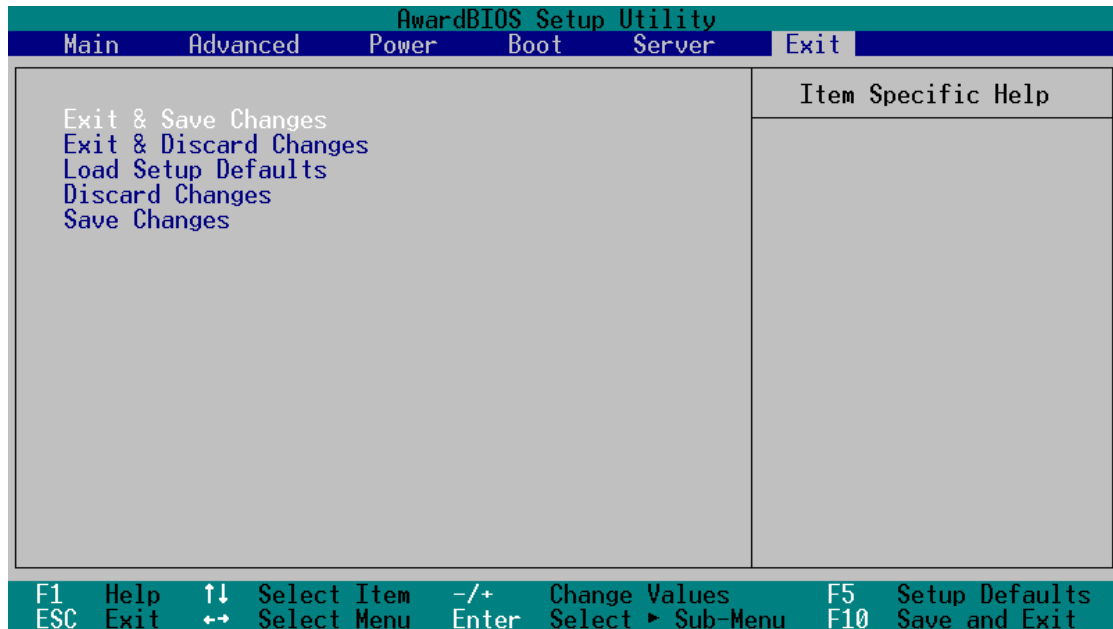
No IPMI Device Detected

Unless an IPMI device, like the ASMC-LE/HE server management card is installed, the Event Log Viewer will not display any data. If installed, a detailed range of server data is displayed.

4.8 Exit Menu

When you have made all of your selections from the various menus in the Setup program, save your changes and exit Setup. Select Exit from the menu bar to display the following menu.

```
                        AwardBIOS Setup Utility
    Main     Advanced     Power      Boot     Server     Exit

                                               Item Specific Help
   Exit & Save Changes
   Exit & Discard Changes
   Load Setup Defaults
   Discard Changes
   Save Changes












   F1   Help   ↑↓  Select Item   -/+   Change Values    F5   Setup Defaults
   ESC  Exit   ←→  Select Menu  Enter  Select ▶ Sub-Menu  F10  Save and Exit
```

✎ Pressing <Esc> does not immediately exit this menu. Select one of the options from this menu or <F10> from the legend bar to exit.

Exit Saving Changes

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. The CMOS RAM is sustained by an onboard backup battery and stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select [Yes] to save changes and exit.

✎ If you attempt to exit the Setup program without saving your changes, the program prompts you with a message asking if you want to save your changes before exiting. Pressing <Enter> saves the changes while exiting.

Exit Discarding Changes

Select this option only if you do not want to save the changes that you made to the Setup program. If you made changes to fields other than system date, system time, and password, the BIOS asks for a confirmation before exiting.

Load Setup Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select [Yes] to load default values. Select Exit Saving Changes or make other changes before saving the values to the non-volatile RAM.

Discard Changes

This option allows you to discard the selections you made and restore the previously saved values. After selecting this option, a confirmation appears. Select [Yes] to discard any changes and load the previously saved values.

Save Changes

This option saves your selections without exiting the Setup program. You can then return to other menus and make further changes. After you select this option, a confirmation window appears. Select [Yes] to save any changes to the non-volatile RAM.

Chapter 5
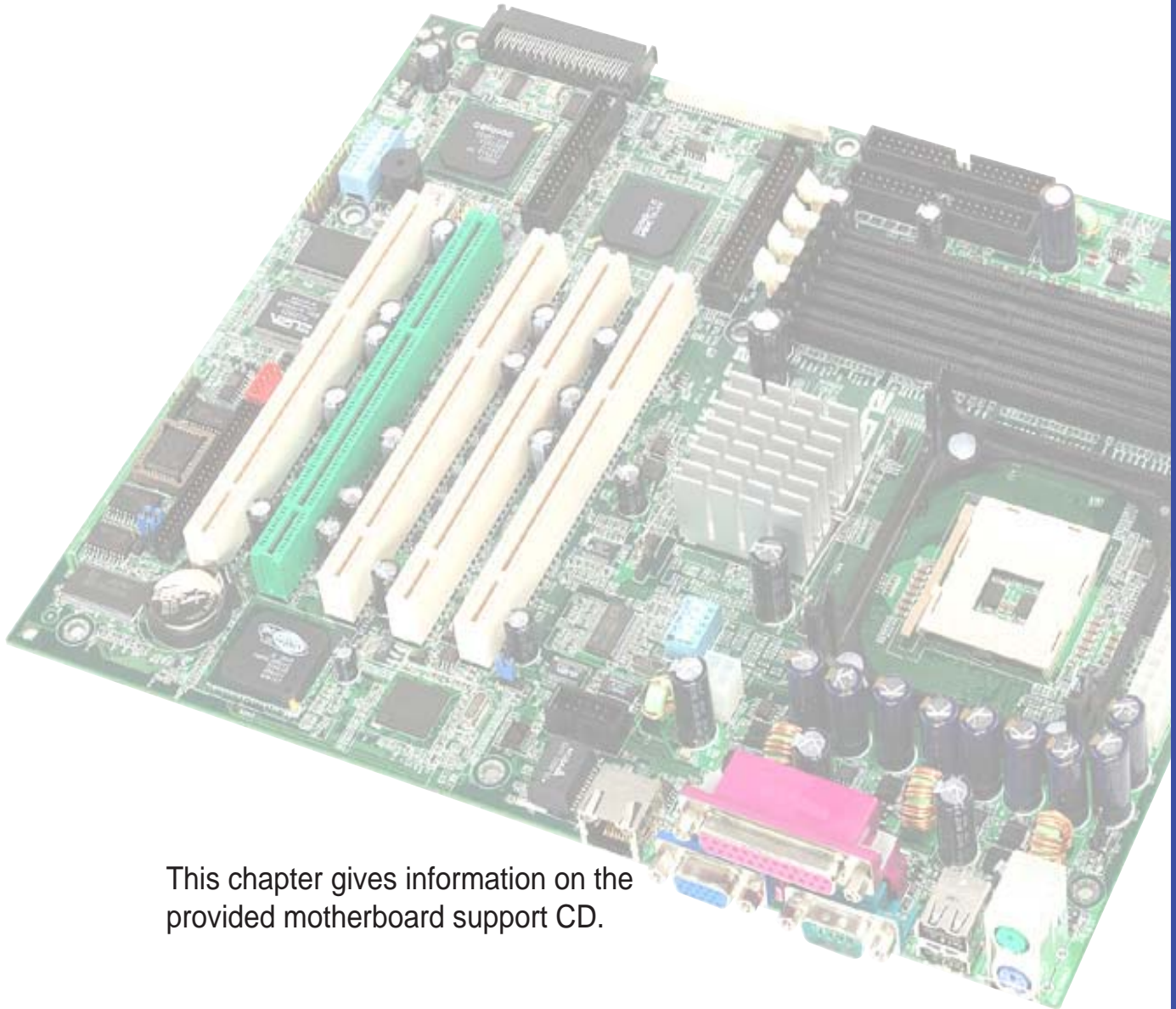
This chapter gives information on the provided motherboard support CD.

5. Driver Installation

Chapter summary

Support CD Contents

Drivers

The support CD will detect your operating system and display relevant drivers for you to install. This is where you can find drivers for the onboard devices. Follow the installation wizards or find additional instructions as text files in each of the drivers' folders.
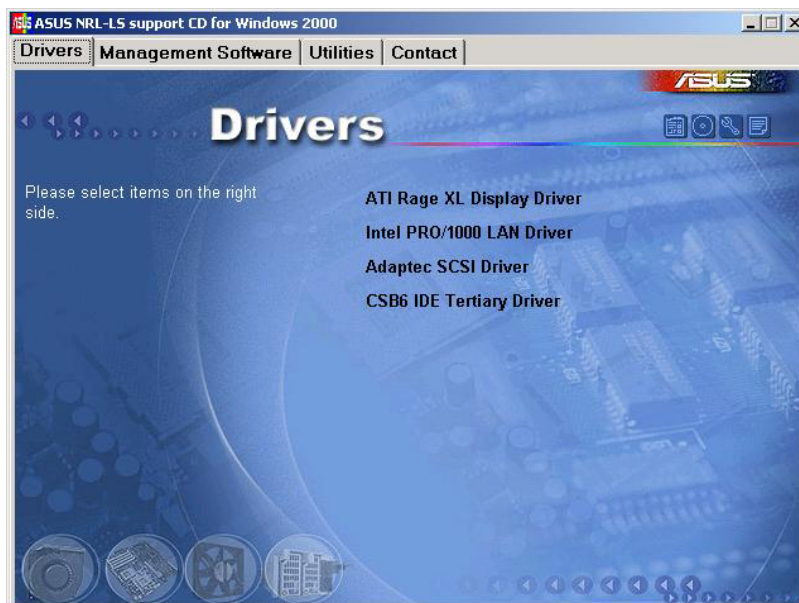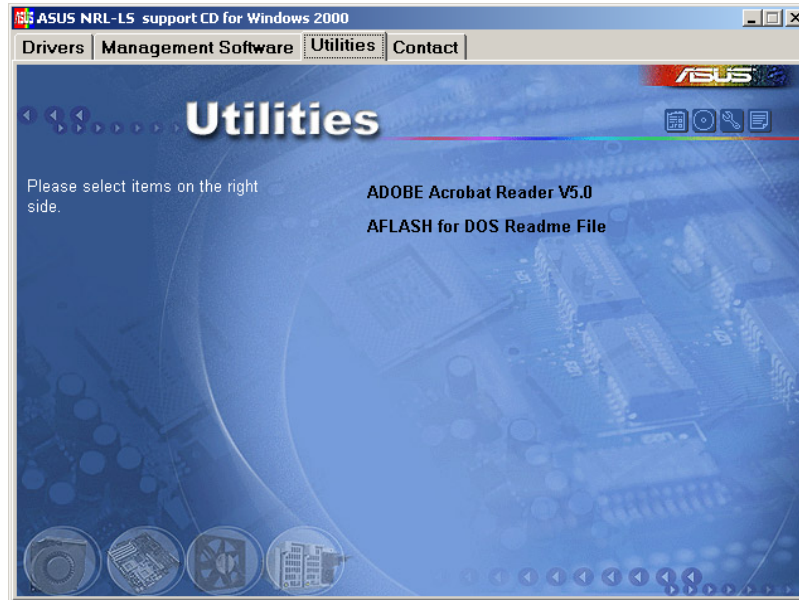

Management Software

This is where you will find ASUS' specially designed server management software.

Utilities

This is where you can install Adobe Acrobat Reader for viewing User's Manuals contained in this support CD or from ASUS' Web Site.

Contact

This is where you can find contact information for ASUS technical support.

The following pages will give information on certain drivers for server systems using different operating systems.

---

1. Microsoft Windows NT Server 4.0

I. ADAPTEC SCSI Driver Installation

Windows NT 4.0 do not have drivers for such new SCSI controllers, the user must load the driver manually prior to Windows NT 4.0 installation.

NOTE: Prepare one blank formatted high density floppy disk. Label the disk "Ultra160 FMS v1.11 for Microsoft Windows NT 4.0 Setup Disk."
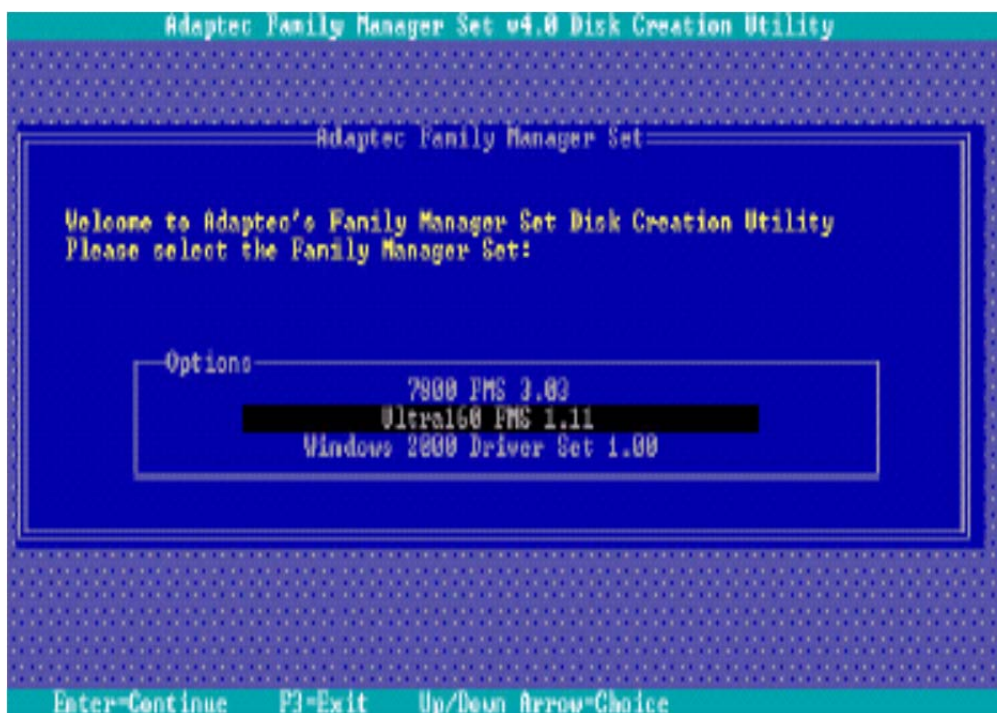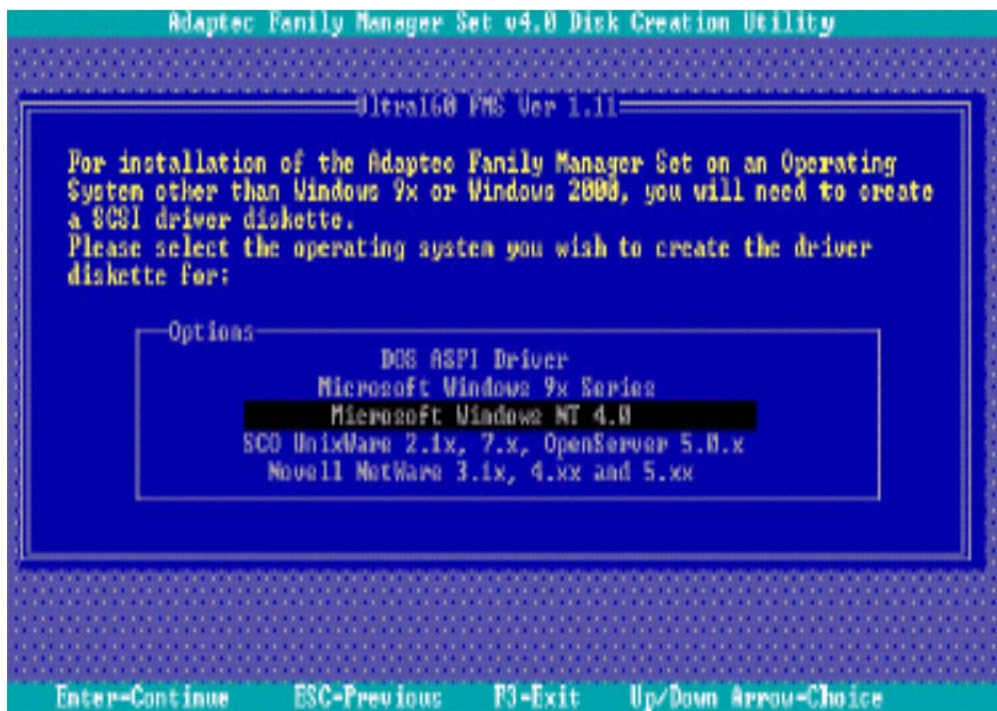

A. Preparing an Adaptec Driver Disk

1. Insert the ASUS support CD into your CD-ROM drive.

2. Run the Adaptec Disk Creation Utility from the following path:

   `\Drivers\Adaptec\fmsutil.exe`

The following window appears.

3. Select Ultra160 FMS 1.11 from the options. Press Enter.

4. Select Microsoft Windows NT 4.0. Press Enter.

5. When prompted, insert the floppy disk that you labeled "Ultra160 FMS v1.11 for Microsoft Windows NT 4.0 Setup Disk."

6. Press Enter and follow the succeeding screen instructions.

B. New System Installation

This section describes installing and using the Adaptec Family Manager Set (FMS) Driver for Windows NT. If you are performing a first time Windows NT installation, see the "Completing a Fresh Windows NT v4.0 Installation from Floppy Disk" or the "Completing a Fresh Windows NT v4.0 Installation from CD-ROM" sections below. If Windows NT is already installed on your system, see the "Updating the Adaptec driver under Windows NT v4.0" section below. For more complete instructions, the Ultra160 FMS User's Guide is available in this CD.

B1. CD-ROM Installation

1. Create the Windows NT driver diskette. Refer to selection A Preparing an Adaptec Driver Disk section "Creating Family Manager Set Driver Disks".

2. Ensure your Windows NT v4.0 CD is inserted into the CD-ROM drive.

3. Start your system. Immediate press and release the F6 key when you see the following message: "Setup is inspecting your computer's hardware configuration..." If you do not see this message, your system may not be setup to boot from CD-ROM. You will need to install from floppy diskettes. See Completing a Fresh Windows NT v4.0 Installation from Floppy Disk.

4. When prompted, press S to specify an additional device.

5. Press Enter to select Others; insert the Adaptec driver diskette in your floppy drive.

6. Use the arrow keys to highlight and select the desired driver, then press Enter.

7. To add other host adapters that are not part of the Ultra160 Family, press S and repeat from Step 4 for each additional adapter and insert the appropriate driver disk.

8. Press Enter to continue with the Windows NT operating system setup. Follow the instructions onscreen and in the Windows NT documentation to complete the installation.

B2. Boot Floppy Disk Installation

1. Create the Windows NT driver diskette. Refer to selection A Preparing an Adaptec Driver Disk section "Creating Family Manager Set Driver Disks".

2. Start your system with the Windows NT Boot Diskette in the floppy drive.

3. Insert diskette #2 when prompted. After a few moments you will see a blue screen. To setup Windows NT now, press ENTER.

4. Press S to skip Windows NT Setup's auto detection of your SCSI adapter.

5. Press S again to specify an additional device.

6. Press ENTER to select Others, and insert the driver diskette created in step 1.

7. Use the arrow keys to highlight and select the desired driver, then press Enter.

8. If you want to add other host adapters (that are not a part of the Ultra160 Family), do so at this time by pressing 'S' and repeating step 5 for each additional adapter and inserting the appropriate disk provided by the hardware manufacturer. The Adaptec Ultra160 Family host adapters use the same driver; it is not necessary to install the ADPU160M.SYS driver again.

9. Press ENTER to continue with the Windows NT operating system setup. Follow the instructions given on screen and in the Windows NT installation documentation.

C. Existing System Installation

1. Boot Windows NT system and log on as Administrator. Click the Start button on the Windows NT task bar, and the point to Settings.

2. Open the Control Panel, double-click on SCSI Adapters.

3. Select the Drivers tab, and click the Add button.

4. In the "Install Driver" window, click the Have Disk button.

5. Insert the Adaptec Family Manager Set CD-ROM.

6. At the "Copy manufacturer's files from" text box, type d:\fmsimage\fms111\windows\nt4_0\nt4, and click OK.

7. At the Install Driver window, select the driver, then click OK.

8. In response to "Do you want to use the currently installed driver(s) or install new one(s)", select the New button. .

9. Type d:\fmsimage\fms111\windows\nt4_0\nt4 and click continue. The driver is now installed.

10. You must restart your computer for the changes to take effect. Click Yes to restart your computer. Click No to return to the SCSI Adapters window.

II. Intel 82540EM Network Driver Installation

A. Preparing Intel 82540EM Lan Driver Diskette

If you need to use a floppy disk to install the on-board Intel 82550 network adapter drivers, use the dcreat.exe utility located in the\Drivers\LAN\MAKEDISK directory on ASUS Driver Support CD.

Make sure you have a 1.44 MB formatted, non-bootable diskette in the floppy drive when using this utility.

Choose check bottom of Windows NT4.0 to create Windows NT diskette (two diskette) when appeared create window disk screen.

Note: To enable the Intel 82540EM Lan under Windows NT4, you need to upgrade to Windows NT Service Pack 5 or later.
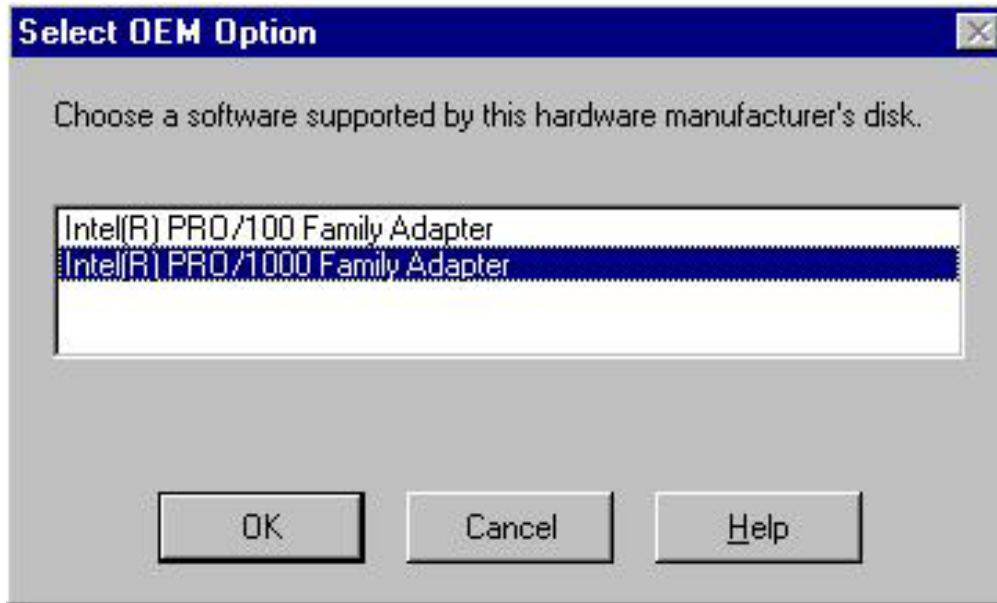
B. New System Installation

1. Press Next when Installing Windows NT Networking screen appears.

2. Select Wired to the Network: Press Next. You can select install IIS or not.

3. Press Select from list.. Insert the Intel(R) PRO LAN Adapter diskette and click Have Disk.

Caution: Don't let the Windows NT system to detect the on-board network device. The bundled driver cannot support Intel 82550 network controller and will cause the system installation failure.

4. Type A:\ (for floppy) in the dialog box and click OK. Then follow the prompts to complete installation. When the adapter is added you'll see a new adapter "Intel(R) PRO/1000 Family Adapter"," listed in the Network adapters list.

```
┌─────────────────────────────────────────────────────────┐
│ Select OEM Option                                    [X] │
├─────────────────────────────────────────────────────────┤
│                                                          │
│  Choose a software supported by this hardware            │
│  manufacturer's disk.                                    │
│                                                          │
│  ┌─────────────────────────────────────────────────┐    │
│  │ Intel(R) PRO/100 Family Adapter                  │    │
│  │ Intel(R) PRO/1000 Family Adapter                 │    │
│  │                                                  │    │
│  │                                                  │    │
│  └─────────────────────────────────────────────────┘    │
│                                                          │
│                                                          │
│     ┌─────────┐   ┌─────────┐   ┌─────────┐              │
│     │   OK    │   │ Cancel  │   │  Help   │              │
│     └─────────┘   └─────────┘   └─────────┘              │
│                                                          │
└─────────────────────────────────────────────────────────┘
```

5. Click Next to finish and configure any protocols as prompted.

C. Existing System Installation

1. Double-click the Network icon in the Control Panel.

2. Select the Adapter tab.

3. Click Add. You'll see a list of adapters.

4. Don't select an adapter from this list. Instead, insert the Intel(R) PRO LAN Adapter diskette and click Have Disk.

5. Type A:\ (for floppy) in the dialog box and click OK. Then follow the prompts to complete installation. When the adapter is added you'll see a new adapter listed in the Network adapters list.

6. Click OK to finish and configure any protocols as prompted

7. Restart Windows NT when prompted.

III. ATI Rage XL Display Driver Installation

1. Start up Windows NT in VGA mode.

2. Run the Windows NT Display program located in the Control Panel, under Settings in the Start menu or right click the mouse button on the desktop and select Properties from the popup menu.

3. Select the Settings tab.

4. Select Display Type....

5. Select Change... from the display options.

6. Select Have Disk...

7. Windows NT system will prompt you for the correct path, enter the path of the driver, such as D:\ Drivers\ATI\Nt40\ATIDrive (assuming your CD-ROM drive is letter D)

8. A list of video adapters will be displayed. Select the "XPERT 98 PCI", then click on OK button.

9. Windows NT will once again prompt for confirmation. All appropriate files are then copied to the hard disk. Select Apply in Control Panel.

10. The installed driver will become active once you restart Windows NT.
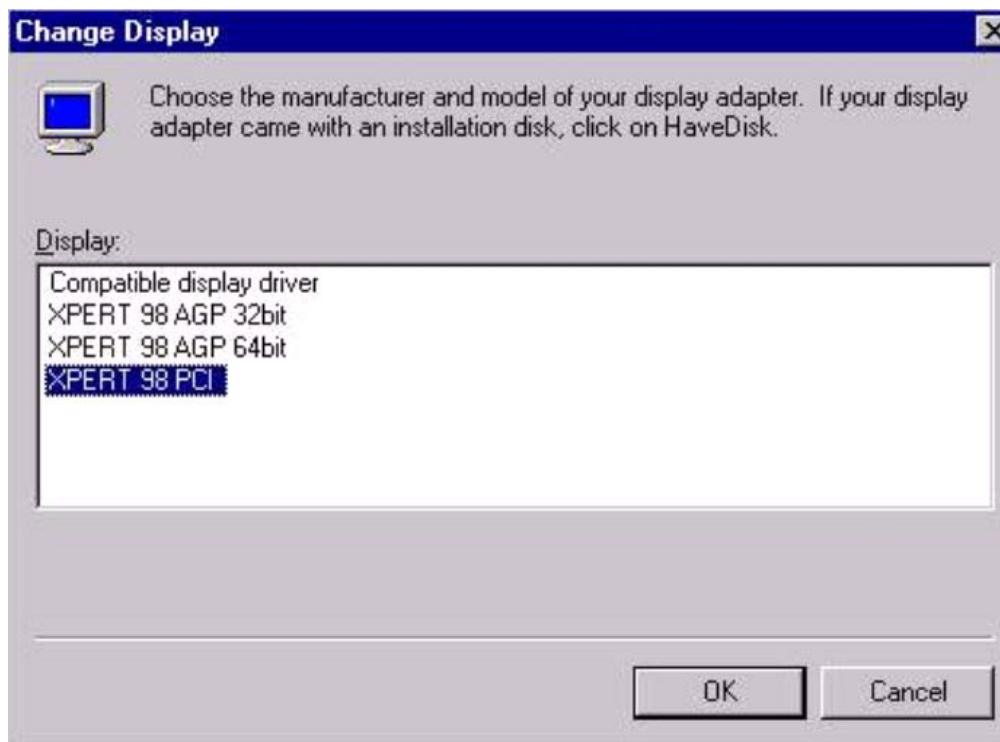
2. Microsoft Windows 2000 Server

I. ADAPTEC SCSI Driver Installation

The Microsoft Windows 2000 Server can auto detect the onboard AIC7892X SCSI controller on the motherboard. You don't need to load or modify the SCSI driver.

II. Intel 82540EM Network Driver Installation

A. Preparing Intel 82540EM Lan Driver Diskette

If you need to use a floppy disk to install the on-board Intel 82540EM network adapter drivers, use the dcreat.exe utility located in the\Drivers\LAN\MAKEDISK directory on ASUS Driver Support CD.

Make sure you have a 1.44 MB formatted, non-bootable diskette in the floppy drive when using this utility.

Choose check bottom of Windows 2000 to create Windows 2000 diskette (one diskette) when appeared create window disk screen.

B. Update Driver on an Existing System Installation

1. Boot Windows 2000 system and log on as Administrator.

2. Click on the Start button. Select Settings-->Control Panel.

3. Double-click the System icon in the Control Panel. Select the Hardware tab. Click on Device Manager. Button.

4. Click the Other Devices. And highlight "Ethernet Controller". Click right-button on the mouse. Select Properties.

5. Select the Driver tab. Click on Update Drivers.. Button.

6. Click Next. Select the "Display a list of the known drivers for this device .".

7. Select "Network adapters" in Hardware Type and Click Next.

8. Click Have Disk. Select A: floppy diskette for the network driver and click OK.

9. Select "Intel PRO/1000MT Network Connection" from the listed Network Adapters. Click Next. System would prompt you an Update Driver Warning message. Click Yes to continue installing driver.

10. Click Finish. Windows 2000 system will prompt if you want to restart the system now. After system been restarted, the new driver will be loaded into the system.
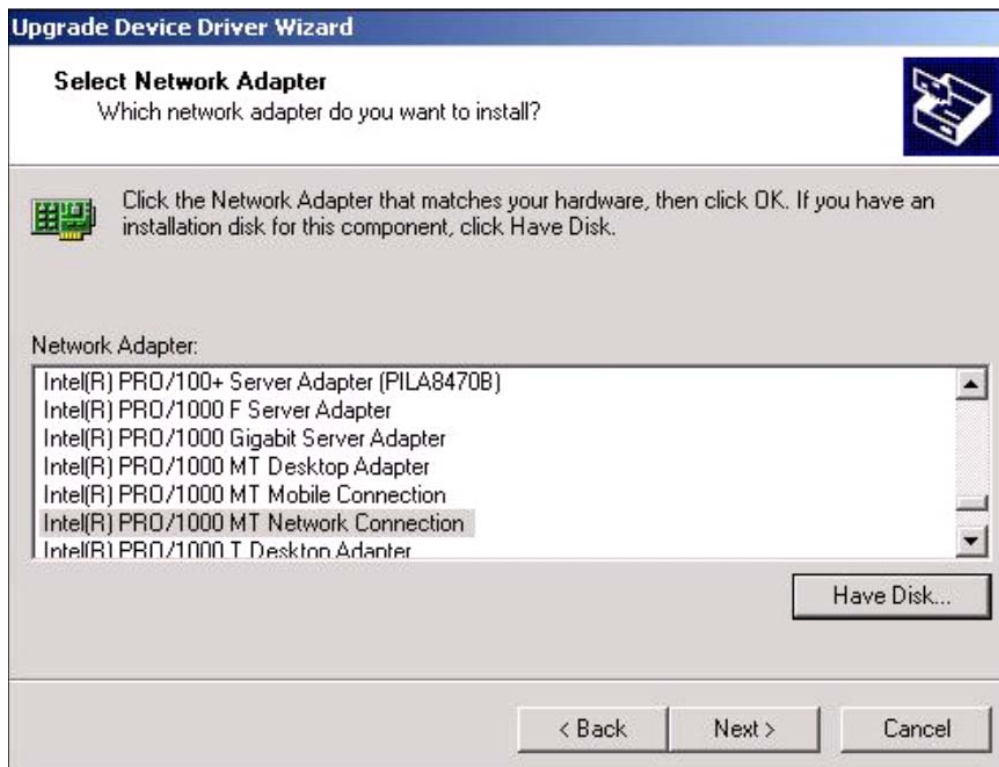
III. ATI Rage XL Display Driver Installation

Windows 2000 system can correctly recognize ATI RAGE XL PCI driver during system installation. User needs not to load any driver for supporting the on-board ATI RAGE XL graphics chip.

IV. Enabling ATA100 Feature in Windows 2000

To enable the ATA100 feature under Windows 2000, you need to upgrade to Windows 2000 Service Pack 2 or later.

3. Microsoft Windows XP Professional

I. ADAPTEC SCSI Driver Installation

The Microsoft Windows XP Professional can auto detect the onboard AIC7892X SCSI controller on the motherboard. You don't need to load or modify the SCSI driver.

II. Intel 82540EM Network Driver Installation

A. Preparing Intel 82540EM Lan Driver Diskette

If you need to use a floppy disk to install the on-board Intel 82540EM network adapter drivers, use the dcreat.exe utility located in the\Drivers\LAN\MAKEDISK directory on ASUS Driver Support CD.

Make sure you have a 1.44 MB formatted, non-bootable diskette in the floppy drive when using this utility.

Choose check bottom of Windows XP to create Windows XP diskette (one diskette) when appeared create window disk screen.

B. Update Driver on an Existing System Installation

1. Boot Windows XP system and log on as Administrator.

2. Click on the Start button. Select Settings-->Control Panel.

3. Double-click the System icon in the Control Panel. Select the Hardware tab. Click on Device Manager. Button.

4. Click the Other Devices. And highlight "Ethernet Controller". Click right-button on the mouse. Select Properties.

5. Select the Driver tab. Click on Update Drivers.. Button.

6. Click Next. Select the "Install from a list or specific location[Advanced]".

7. Click Next. Select A: floppy diskette for the network driver.

8. Select "Intel PRO/1000MT Network Connection" from the listed Network Adapters. Click Next. System would prompt you an Update Driver Warning message. Click Yes to continue installing driver.

9. Click Finish. Windows XP system will prompt if you want to restart the system now. After system been restarted, the new driver will be loaded into the system.

III. ATI Rage XL Display Driver Installation

Windows 2000 system can correctly recognize ATI RAGE XL PCI driver during system installation. User needs not to load any driver for supporting the on-board ATI RAGE XL graphics chip.

4. Novell NetWare Server

I. ADAPTEC SCSI Driver Installation

A single driver (*HAM) is provided for the Novell NetWare 4.XX, and 5.X environments. This document explains how to install and use Adaptec SCSI Host Adapter Module (HAM) driver for NetWare. The Adaptec solution that consists of the device drivers ADPT160M.DDI and ADPT160M are Host Adapter Modules (HAMs). HAM. To support SCSI devices, load the HAM in conjunction with a SCSI Custom Device Module (CDM). Novell has developed generic CDMs to support SCSI-2 hard drives, SCSI CD-ROM devices, SCSI Magneto Optical devices, SCSI tape devices, and SCSI changer devices. In addition, third party vendors are developing CDMs to support their specific devices. Novell Netware does not include the drivers for the Adaptec SCSI controller. You must create a driver disk prior to Novell Netware installation.
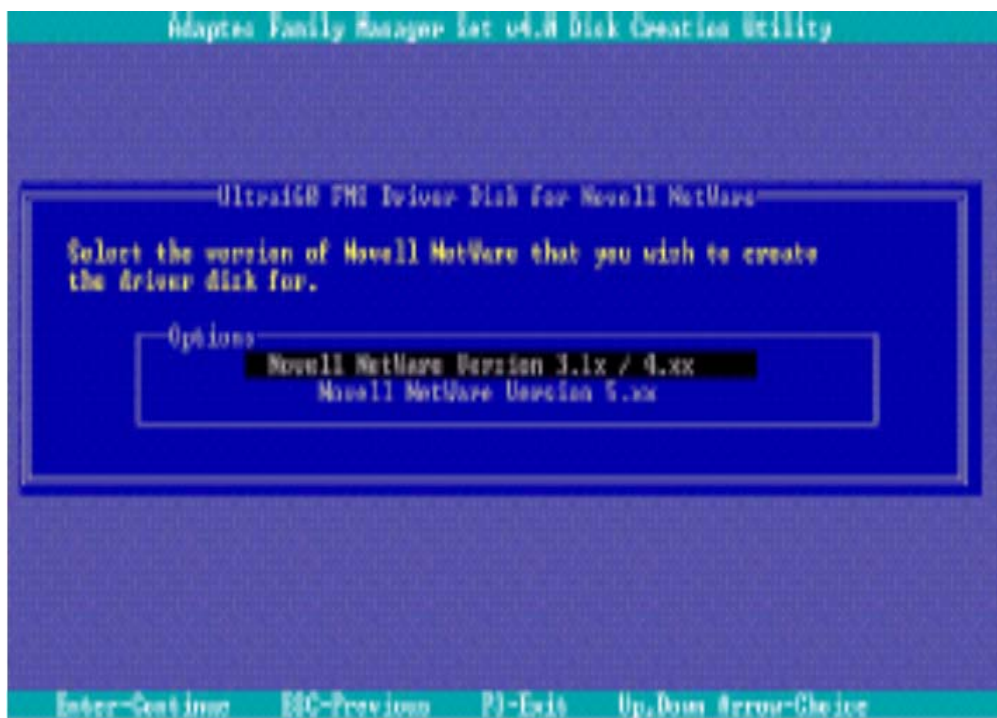
NOTE: Prepare one blank formatted high density floppy disk. Label the disk "Ultra160 FMS v1.11 for Novell Netware version 3.1x/4.xx Setup Disk" or "Ultra160 FMS v1.11 for Novell Netware version 5.xx Setup Disk".

A. Preparing an Adaptec Driver Disk

1. Insert the ASUS support CD into your CD-ROM drive.

2. Run the Adaptec Disk Creation Utility from the following path: \Drivers\Adaptec\fmsutil.exe

3. Select Ultra160 FMS 1.11 from the options that appear. Press Enter to display the following.
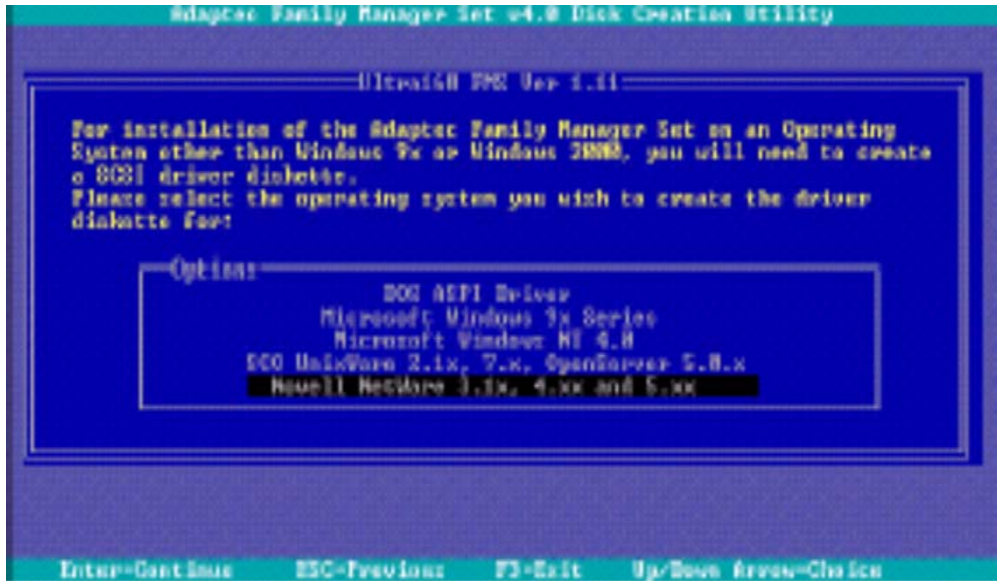
4. Select Novell Netware 3.1x, 4.xx and 5.xx. Press Enter.

5. Select either "Novell Netware Version 3.1x/4.xx" or "Novell Netware Version 5.xx." Press Enter.

6. When prompted, insert the floppy disk that you labeled "Ultra160 FMS v1.11 for Novell Netware Version 3.1x/4.xx Setup Disk" or "Ultra160FMS v1.11 for Novell Netware version 5.xx Setup Disk"

7. Press Enter and follow the succeeding screen instructions.

B. NetWare 5.X New Installations

1. Begin the file server installation according to the instructions in the file server installation chapter in the Novell NetWare Installation Manual.

2. When the NetWare installation procedure prompts you a Device type screen, press Modify to add a Storage adapters: (Default only IDEATA available). Press INS for adding a new driver. Please put the ADAPTEC driver for NetWare diskette into drive A: Then use the INS key to select an unlisted driver. A dialog box appears. If the driver diskette is in the A: drive, press Enter to continue. The ADPT160M.HAM drivers appear as a selection.

3. Highlight Disk and CD-ROM Drivers (e.g., IDEATA). Press Enter and load an additional driver. Then press the INS key. The system always defaults to the A: path. Highlight the HAM driver and press Enter. Select Yes to save and move the driver into the operating system. Press Enter, the system will copy the files.

4. Load a separate instance of the driver for every ADAPTEC controller SCSI channel or host adapter present in the system.

5. When prompted for a slot number, accept the slot numbers displayed. Make sure to write these slot numbers down for future reference.

6. When asked to edit the STARTUP.NCF file, make sure the ADPT160M.HAM is loaded once for each ADAPTEC SCSI controller channel present in the system. Add the statement SLOT=<slot number> to each load line in the STARTUP.NCF, by specifying the slot numbers written down in step 5 above, with only one slot number per load instance. The HAM driver(s) are loaded for each ADAPTEC SCSI controller channel from the first LOAD statement to the last LOAD statement.

C. NetWare 4.XX New Installations

1. Begin the file server installation according to the instructions in the file server installation chapter in the Novell NetWare Installation Manual.

2. When the NetWare installation procedure prompts you for a driver disk, insert the ADAPTEC driver for NetWare diskette into drive A: Then use the INS key to select an unlisted driver. A dialog box appears. If the driver diskette is in the A: drive, press Enter to continue. The ADPT160M.HAM driver appears as a selection.

3. Highlight Disk and CD-ROM Drivers (e.g., IDEATA). Press Enter and load an additional driver. Then press the INS key. The system always defaults to the A: path. Highlight the HAM driver and press Enter. Select Yes to save and move the driver into the operating system. Press Enter, the system will start to copy the files.

4. Load a separate instance of the driver for every ADAPTEC SCSI controller channel or host adapter present in the system. User must load twice for ADAPTEC SCSI driver with different slot number from STARTUP.NCF file as below.

   ```
   load ADPT160M.HAM Slot=10012

   load ADPT160M.HAM Slot=10013
   ```

5. When prompted for a slot number, accept the slot numbers displayed. Make sure to write these slot numbers down for future reference.

6. When asked to edit the STARTUP.NCF file, make sure the ADPT160M.HAM is loaded once for each ADAPTEC controller SCSI channel present in the system. Add the statement SLOT=<slot number> to each load line in the STARTUP.NCF, by specifying the slot numbers written down in step 5 above, with only one slot number per load instance.

II. Intel 82540EM Network Driver Installation

A. Preparing Intel 82540EM Lan Driver Diskette

1. Use the self-extracting image files:

For the Intel(R) PRO/1000 Server Adapter driver, the executable file is located here:

```
\Drivers\Lan\makedisk\makenw.bat
```

2. Use the manual to create driver diskette:

If you need to use a floppy disk to install the on-board Intel 82550 network adapter drivers, use the MAKEDISK.BAT utility located in the \Drivers\LAN\MAKEDISK directory on ASUS Driver Support CD.

```
MAKEDISK [operating system] [destination]
```

where [operating system] is the OS for which you are creating the diskette, and [destination] is the drive letter and path (such as A:). If no destination is specified, the A: drive will be used. The possible [operating system] options are:

```
NT = Microsoft Windows NT

W2K = Microsoft Windows* 2000

NW = Novell NetWare servers and clients
```

Make sure you have a 1.44 MB formatted, non-bootable diskette in the floppy drive when using this utility.

B. NetWare 4.XX & 5.X Installations

1. Prepare the Intel(R) PRO LAN Adapter diskette from previous section.

2. Install NetWare 4.xx or 5.x according to the NetWare instructions.

3. When the NetWare installation procedure prompts you for a Network Driver, insert the Intel PRO/1000 driver diskette into drive A: Then use the INS key to select an unlisted driver. A dialog box appears. The "CE1000.LAN - - Intel 8254X Based Network Connection" driver appear as a selection.

Caution: If the "Loader could not find public symbol: <symbol name>" error message   prompted when system is loading Intel(R) PRO LAN Adapter driver, it's because   the related network driver modules are too old. User must download the latest   Netware Support Pack from Novell web site at: http://support.novell.com/products/nw411/patches.htm (For example: the support pack   for NetWare 4.11)

4. Installation of the Intel 82540EM Network Adapter for NetWare 5.x or 4.xx is complete.

Add or check the load and bind statements you need to the server's AUTOEXEC.NCF file so the Intel(R) PRO LAN Adapter driver loads automatically load and bind the server driver as follows:

```
LOAD CE1000 LAN SLOT=10004 FRAME=ETHERNET_II
NAME=CE1000_1_EII BIND IP CE1000_1_EII addr=xxx.xxx.xxx.xxx
mask=xxx.xxx.xxx.xxx gate=xxx.xxx.xxx.xxx
```

III. ATI Rage XL Display Driver Installation

User can select the "Super VGA" for the X Server on NetWare 5.x server system. The other NetWare system didn't support X Server and user didn't need the VGA driver support.
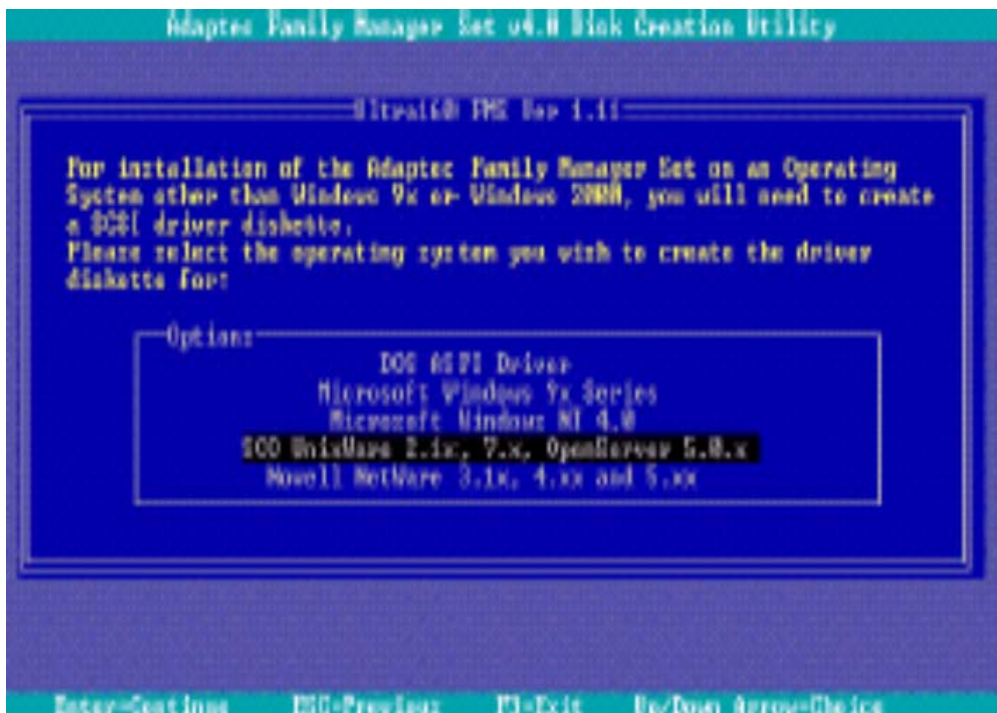
5. SCO Open Server 5.0.6

I. ADAPTEC SCSI Driver Installation

SCO Open Server 5.0.x does not include the drivers for the Adaptec SCSI controller. You must create a river disk prior to SCO Open Server installation.
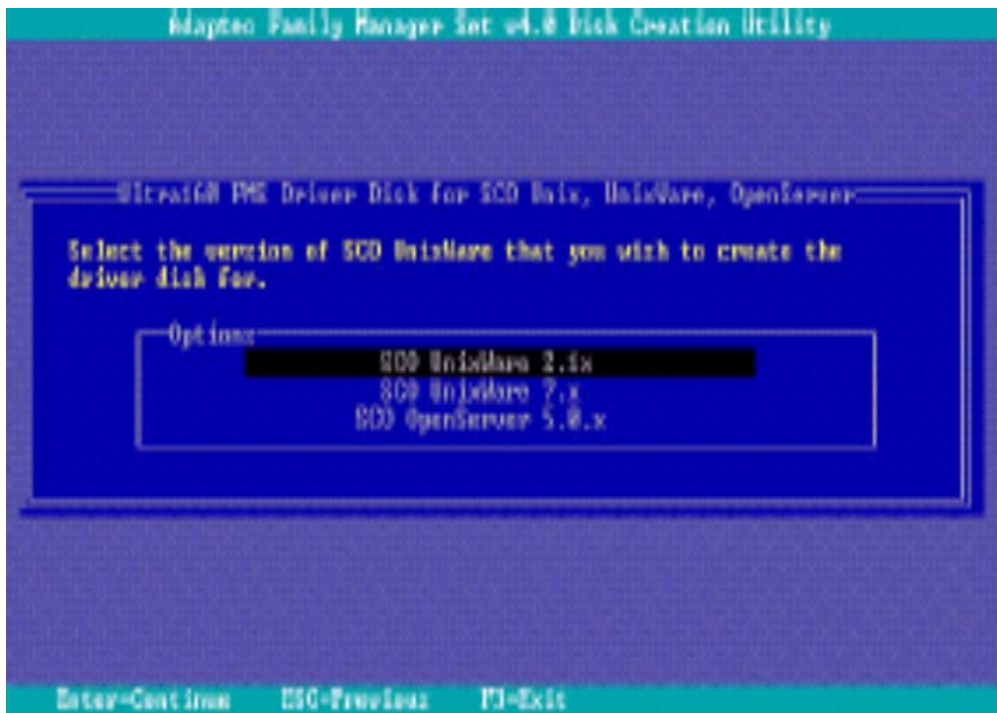
NOTE: Prepare one blank formatted high-density floppy disk. Label the disk "Ultra160 FMS v1.11 for SCO UnixWare 2.1x Setup Disk" or"Ultra160 FMS v1.11 for SCO UnixWare 7.x Setup Disk" or"Ultra160 FMS v1.11 for SCO Open Server 5.0.x Setup Disk".

A. Preparing an Adaptec Driver Disk

1. Insert the ASUS support CD into your CD-ROM drive.

2. Run the Adaptec Disk Creation Utility from the following path: \Drivers\Adaptec\fmsutil.exe

3. Select Ultra160 FMS 1.11 from the options that appear. Press Enter todisplay the following.

4. Select SCO UnixWare 2.1x, 7.x, OpenServer 5.0.x. Press Enter.

5. Select either "SCO UnixWare 2.1x" or "SCO UnixWare 7.x" or "SCO OpenServer 5.0.x". Press Enter.

6. When prompted, insert the floppy disk that you labeled "Ultra160 FMS v1.11 for SCO UnixWare 2.1x Setup Disk" or "Ultra160 FMS v1.11 for SCO UnixWare 7.x Setup Disk" or "Ultra160 FMS v1.11 for SCO OpenServer 5.0.x Setup Disk".

7. Press Enter and follow the succeeding screen instructions.

Where: SLOT=x Specifies the NBI (NetWare Bus Interface) slot number. Substitute x with the valid value for the adapter. You will be prompted with the slot number(s) of installed PRO/100+ adapters. The NBI numbers are different from the slot number indicated in the SETUP.EXE utility. NET=xxxxxxxx is the unique network address for that LAN segment. The default frame type is 802.2. If your workstation needs to use the 802.3 frame type, see the section later in this document about using multiple frame types on one adapter.

II. Intel 82540EM Network Driver Installation

SCO OpenServer 5.0.6 system can correctly recognize Intel 82540 network controller during installation. User doesn't need to load or modify the network driver for the onboard LAN device.

User also can find the Intel 82540 Network driver from ASUS Driver Support CD at:

`\Drivers\Lan\UNIX\SCO5`

Instructions for Installing the eeE Driver for SCO OpenServer

1. Copy the eee.vol file to any directory, say /tmp, on the SCO system, renaming the file as VOL.000.000. Also, make the file read-only by using 'chmod'.

For example,

```
# cp eeE.vol /tmp/VOL.000.000
```

```
# chmod 444 /tmp/VOL.000.000
```

2. If there is an older version of the driver on the system, you must first remove it. To do this, run 'netconfig'. Remove all instances of the "Intel ..." adapters. Exit netconfig without opting to relink the kernel.

3. Install the new driver using 'custom'. When asked for the installation media, choose 'media images', and type the directory path to the VOL.000.000 file. (In step 1, if you copied it to /tmp, type '/tmp'). After the installation of the driver is complete, exit 'custom'.

4. Run 'netconfig' and add the adapters. For each adapter that is present in the system, enter the appropriate TCP/IP parameters. By default, the driver automatically detects the line speed and duplex mode. If you want to force any of these settings, choose 'Advanced Options' and set the speed and duplex modes. Exit'netconfig' and choose to relink the kernel.

5. Reboot the system.At the command prompt, type:

```
# reboot (or init 6)
```

III. ATI Rage XL Display Driver Installation

SCO OpenServer 5.0.6 system can correctly recognize ATI Rage XL graphic controller (ATI RAGE PRO/LT-PRO/XL/Mobility (P/M/M1)) during installation. User doesn't need to load or modify the video driver for the onboard VGA device.

6. Linux RedHat 7.2

I. ADAPTEC SCSI Driver Installation

The RedHat 7.2 versions already bundle with Adaptec AIC-7892X Ultra 160 SCSI driver support.

II. Intel 82540EM Network Driver Installation

This file describes the Linux* Base Driver for the Intel PRO/1000 Family of Adapters, version 4.1.x. This driver is intended for 2.2.x and 2.4.x kernels; it is known to build properly on 2.2.x kernels through 2.2.20 and on 2.4.x kernels through 2.4.17. Intel focused testing on Intel processor-based systems running kernels 2.4.7 and 2.2.16. This driver includes support for Itaniumô-based systems.

The Intel PRO/1000 driver is only supported as a loadable module at this time. Intel is not supplying patches against the kernel source†to allow for static linking of the driver. For questions related to hardware requirements, refer to the documentation supplied with your Intel PRO/1000 adapter. All hardware requirements listed apply to use with Linux.

New features include support for the Intel PRO/1000 MT Desktop Adapter.

Update Driver on an Existing System Installation

To build a binary RPM* package of this driver, run

```
'rpm -tb <filename.tar.gz>'
```

Replace <filename.tar.gz> with the specific file name of the driver.

NOTE: For the build to work properly, the currently running kernel MUST match the version and configuration of the installed kernel sources. If you have just recompiled the kernel reboot the system now.

---

1. Move the base driver tar file to the directory of your choice. For example, use:

```
'/home/username/e1000' or '/usr/local/src/e1000'
```

2. Untar/unzip the archive, where x.x.x is the version number for the driver tar:

```
tar zxf e1000-x.x.x.tar.gz
```

3. Change to the driver src directory, where x.x.x is the version number for the driver tar:

```
cd e1000-x.x.x/src/
```

4. Compile the driver module:

```
make install
```

The binary will be installed as:

For Linux 2.2.x systems:

```
/lib/modules/[KERNEL_VERSION]/net/e1000.o
```

For Linux 2.4.x systems:

```
/lib/modules/[KERNEL_VERSION]/kernel/drivers/net/e1000.o
```

NOTE: The install locations listed above are the default locations. They may not be correct for certain Linux distributions. For more information, go to ldistrib.htm.

5. Install the module:

```
insmod e1000 <parameter>=<value>
```

6. Assign an IP address to the interface by entering the following, where x is the interface number:

```
ifconfig ethx <IP_address>
```

7. Verify that the interface works. Enter the following, where <IP_address> is the IP address for another machine on the same subnet as the interface that is being tested:

```
ping <IP_address>
```

III. ATI Rage XL Display Driver Installation

The RedHat 7.x system can correctly recognize ATI Rage XL graphic controller (ATI MACH64) during installation. User doesn't need to load or modify the video driver for the onboard VGA device.