NRL-LS533

E1214

Intel® Pentium4™-based Motherboard
ServerWorks® GCSL SystemSet

User Guide

NRL-LS533

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Motherboard

E1214

Second Edition

March 2003

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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-LS533 motherboard.

How this guide is organized

This manual contains the following parts:

- **Chapter 1: Product introduction**

  This chapter describes the features of the NRL-LS533 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

ASUSTeK COMPUTER INC. (Asia-Pacific)

Address:	150 Li-Te Road, Peitou, Taipei, Taiwan 112
General Tel:	+886-2-2894-3447
General Fax:	+886-2-2894-3449
General Email:	info@asus.com.tw

Technical Support

MB/Others (Tel):	+886-2-2890-7121 (English)
Notebook (Tel):	+886-2-2890-7122 (English)
Desktop/Server (Tel):	+886-2-2890-7123 (English)
Support Fax:	+886-2-2890-7698
Support Email:	tsd@asus.com.tw
Web Site:	www.asus.com.tw

ASUS COMPUTER INTERNATIONAL (America)

Address:	44370 Nobel Drive, Fremont, CA 94538, USA
General Fax:	+1-510-608-4555
General Email:	tmd1@asus.com

Technical Support

Support Fax:	+1-510-608-4555
General Support:	+1-502-933-8713
Web Site:	www.asus.com
Support Email:	tsd@asus.com

ASUS COMPUTER GmbH (Germany & Austria)

Address:	Harkortstr. 25, 40880 Ratingen, BRD, Germany
General Fax:	+49-2102-442066
General Email:	sales@asuscom.de (for marketing requests only)

Technical Support

Support Hotline:	MB/Others: +49-2102-9599-0
Notebook (Tel):	+49-2102-9599-10
Support Fax:	+49-2102-9599-11
Support (Email):	www.asuscom.de/de/support (for online support)
Web Site:	www.asuscom.de

NRL-LS533 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)	400/533 MHz
Memory	4 x 184-pin DDR DIMM sockets Supports PC2100/PC1600 registered ECC DDR DIMMs Supports 128MB to 4GB system memory
Onboard LAN	Broadcom® BCM5702 32-bit PCI 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 ATA66) 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 20-pin/4-pin ATX power connectors IDE LED/Power LED, SCSI LED connectors 20-pin Front panel connector Chassis intrusion, SMBus, WOR, and WOL 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-LS533 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-LS533 motherboard!

The ASUS NRL-LS533 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-LS533 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-LS533 package for the following items.

- ✓ ASUS NRL-LS533 motherboard
- ✓ ASUS NRL-LS533 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-LS533 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 400/533MHz Pentium4™ Processor Technology: The NRL-LS533 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 2.0+GHz frequency, while the Northwood processor uses the 0.13 micron processor core with 512KB L2 cache for up to a speedy 2.8+ GHz frequency and a 400/533 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-LS533 motherboard supports up to 4GB of system memory using PC2100/ 1600 registered ECC DDR DIMMs. The ultra-fast 266MHz/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 ATA/66 support which provides more device connectivity in this server system.

Onboard LAN

The motherboard features the Broadcom® BCM5702 32-bit PCI Gigabit Ethernet controller to support 10/100/1000Mbit/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, Wake-On-LAN, and BIOS Wake-Up features.

Server management

The motherboard comes with an ASMC connector that supports the optional ASMC-HE 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 battery backup 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-LS533 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-LS533 motherboard as pointed out in the picture on page 1-7.

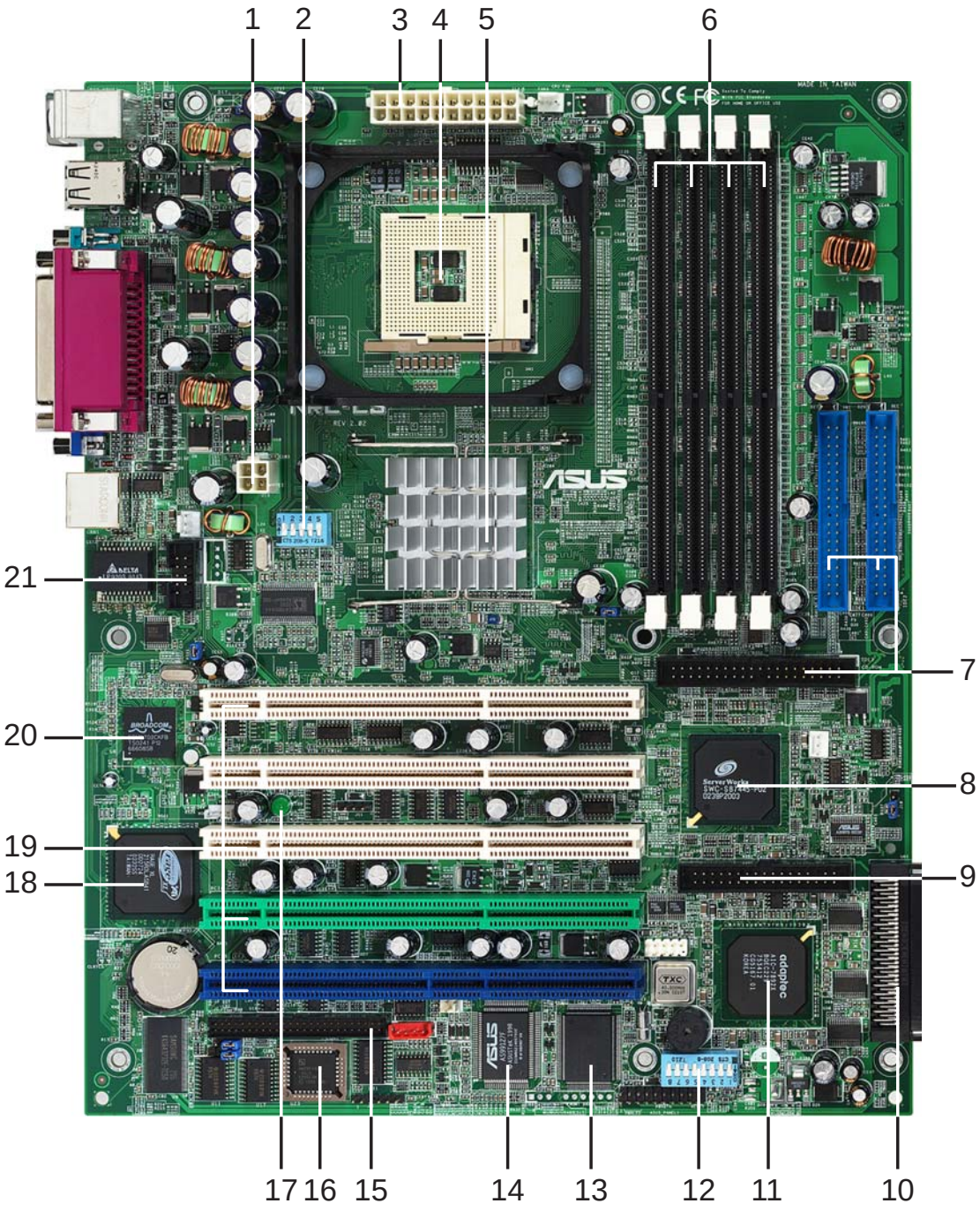
1. 4-pin 12V power connector
2. 20-pin ATX power connector
3. Intel® Pentium4™ CPU socket 478
4. ServerWorks® Grand Champion "Super-Lite" North Bridge, CMIC-SL
5. 4 DDR DIMM sockets
6. IDE connectors
7. ServerWorks® South Bridge, CSB6
8. Floppy disk connector
9. USB header
10. Ultra-160 SCSI connector
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. Broadcom® BCM5702 32-bit PCI 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.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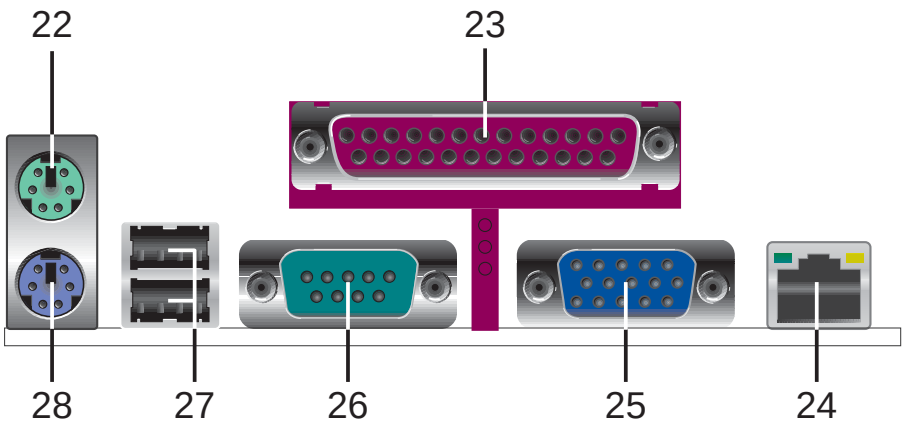
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1.4.2 Core specifications

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

2 **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 400/533 MHz system bus that allows up to 3.2/4.2GB/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 a 400/533MHz Front Side Bus, (4 x 100/133MHz), and provides 3.2/4.2GB/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 UltraDMA/66 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 connector.** These single-channel 68-pin Ultra-160 SCSI connector supports 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 connector 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 **Broadcom® BCM5702 32-bit PCI Gigabit Ethernet controller.** This controller is an integrated Ethernet LAN component that supports 1000Mbps, 100Mbps, and 10Mbps data rates. The **BCM5702** 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.

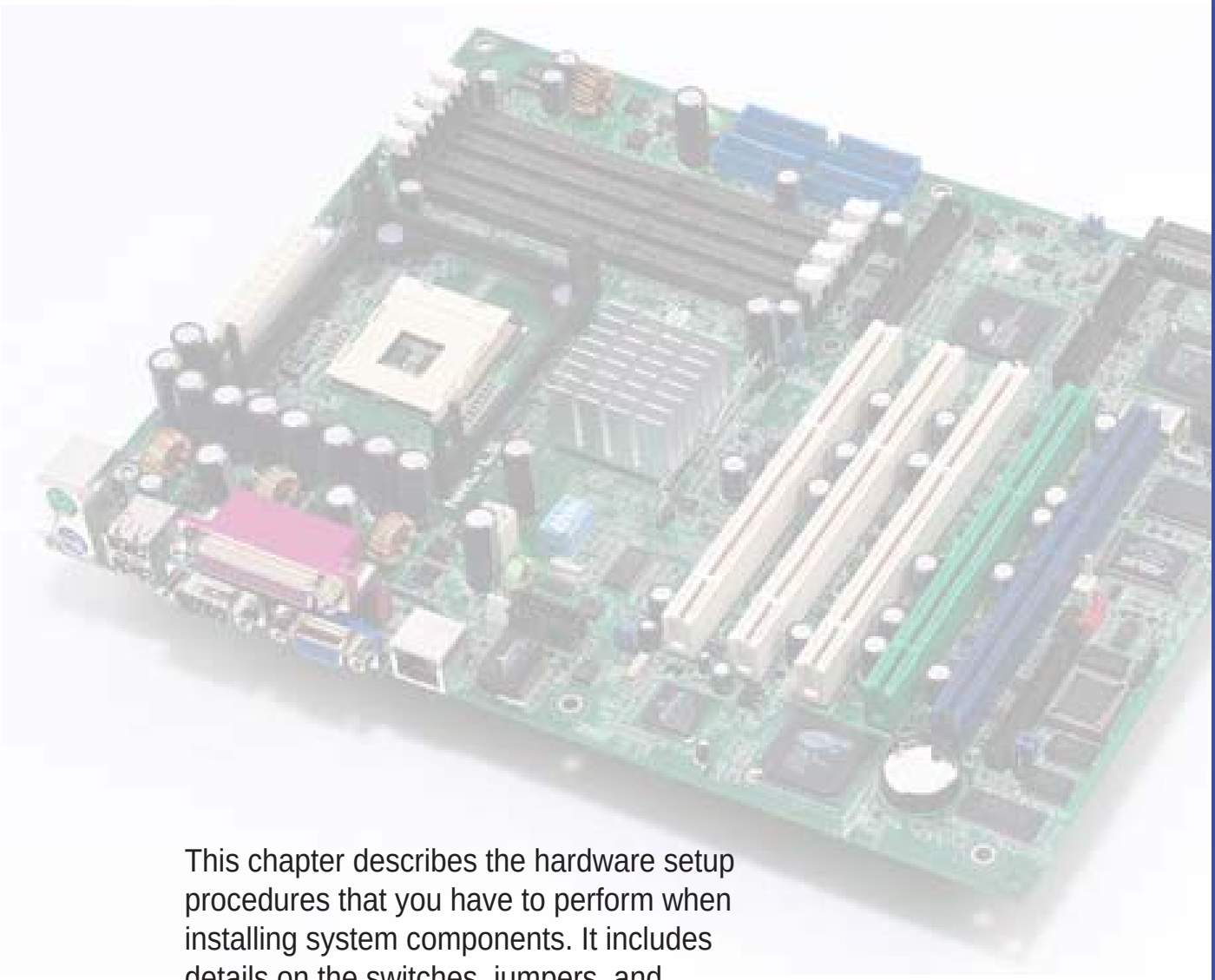
28 **VGA port.** This port is for a VGA-monitor or other VGA-compatible devices.

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-LS533 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

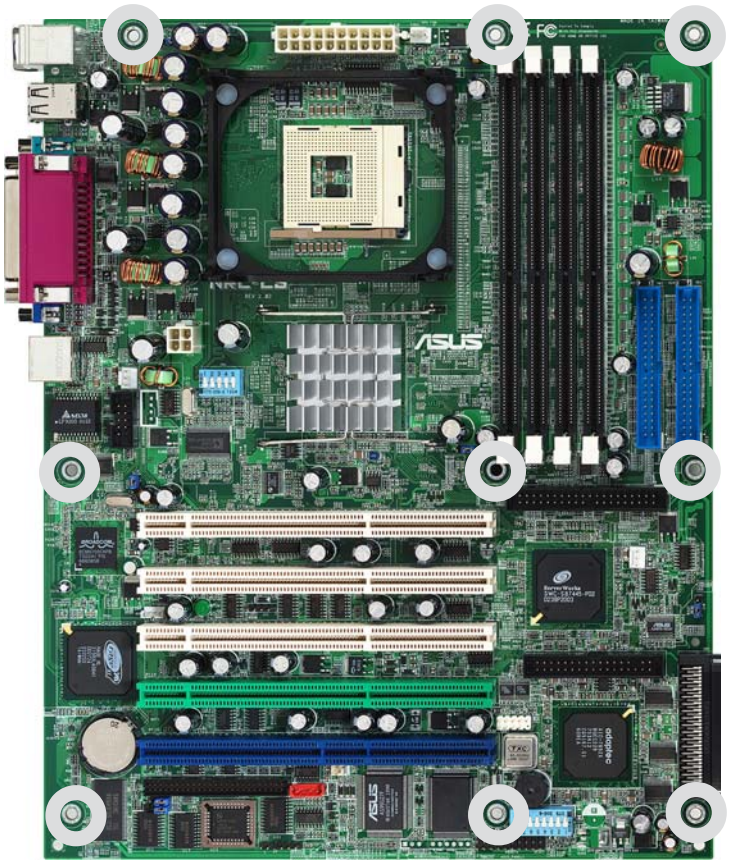
When installing the motherboard, make sure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

2.1.2 Screw holes

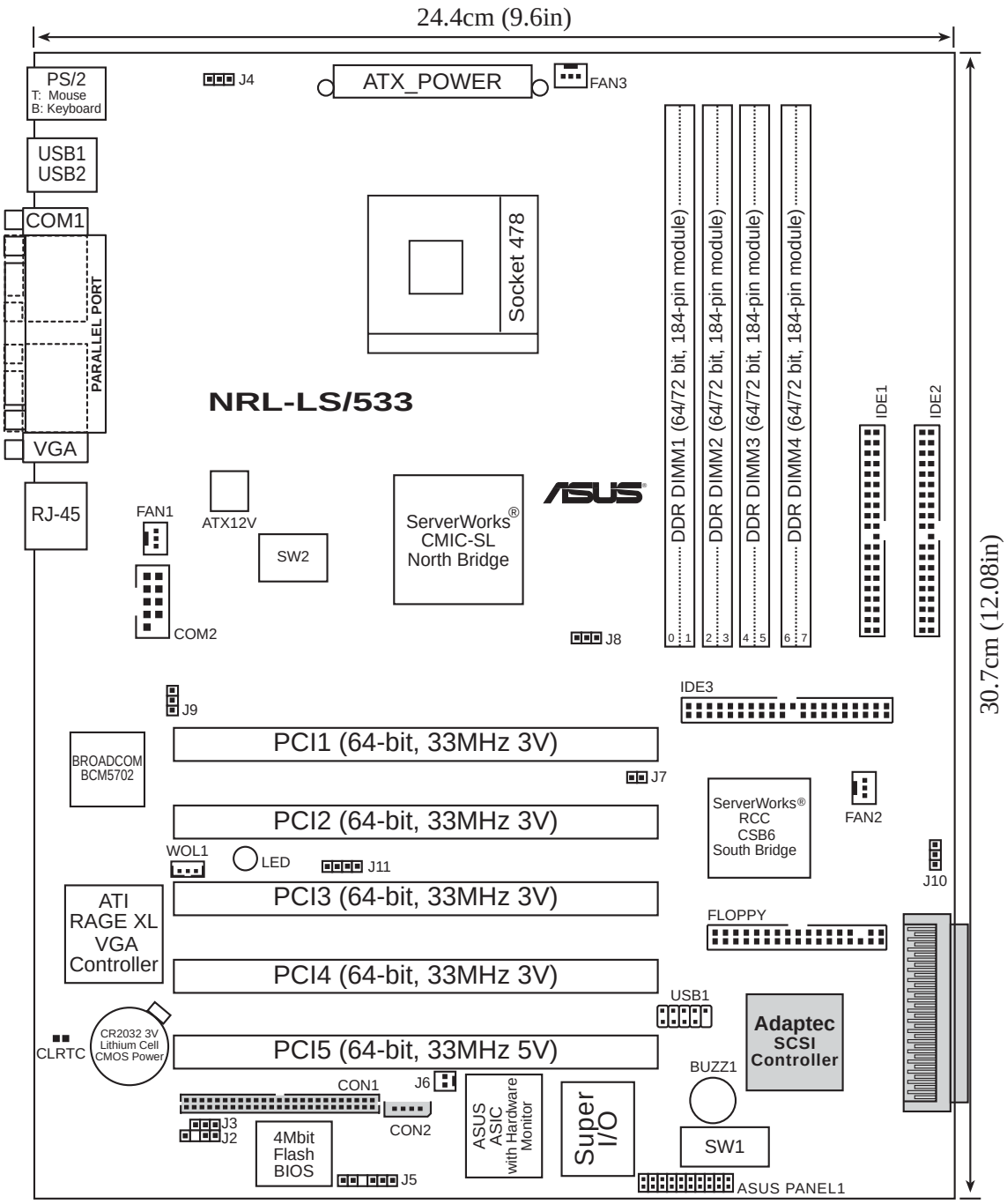
Place screws into the holes indicated by circles to secure the motherboard to the chassis.

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

Place this side towards the rear of the chassis



2.2 Motherboard layout



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

2.3 Before you proceed

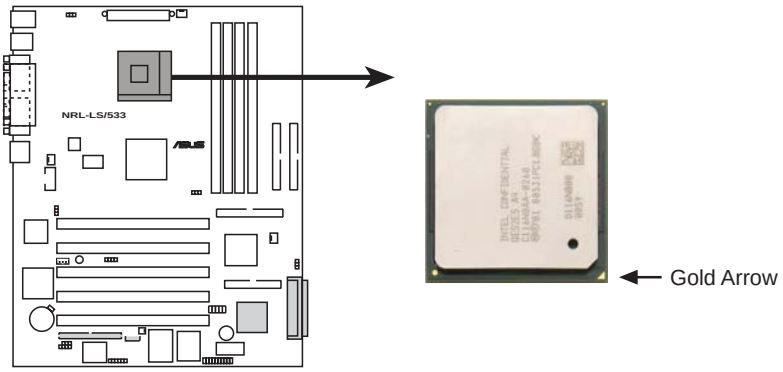
Take note of the following precautions before you install motherboard components or change any motherboard settings.

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, 400/533MHz 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 3.2/4.2GB/s.



NRL-LS/533 Socket 478

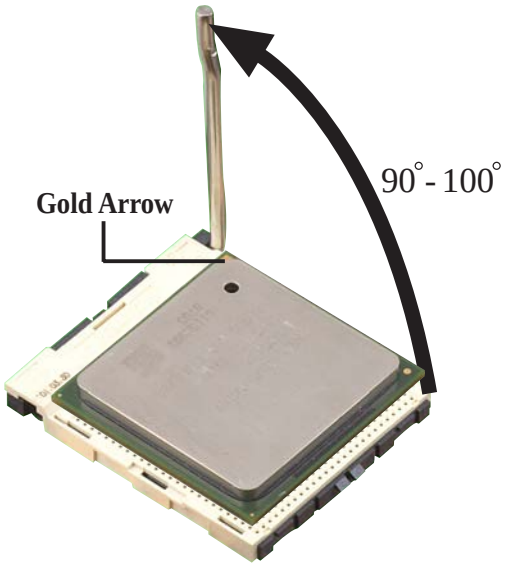
Note in the illustration that the CPU has a gold triangular mark on one corner. This mark indicates the processor Pin 1 that should match a specific corner of the CPU socket.

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.



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.

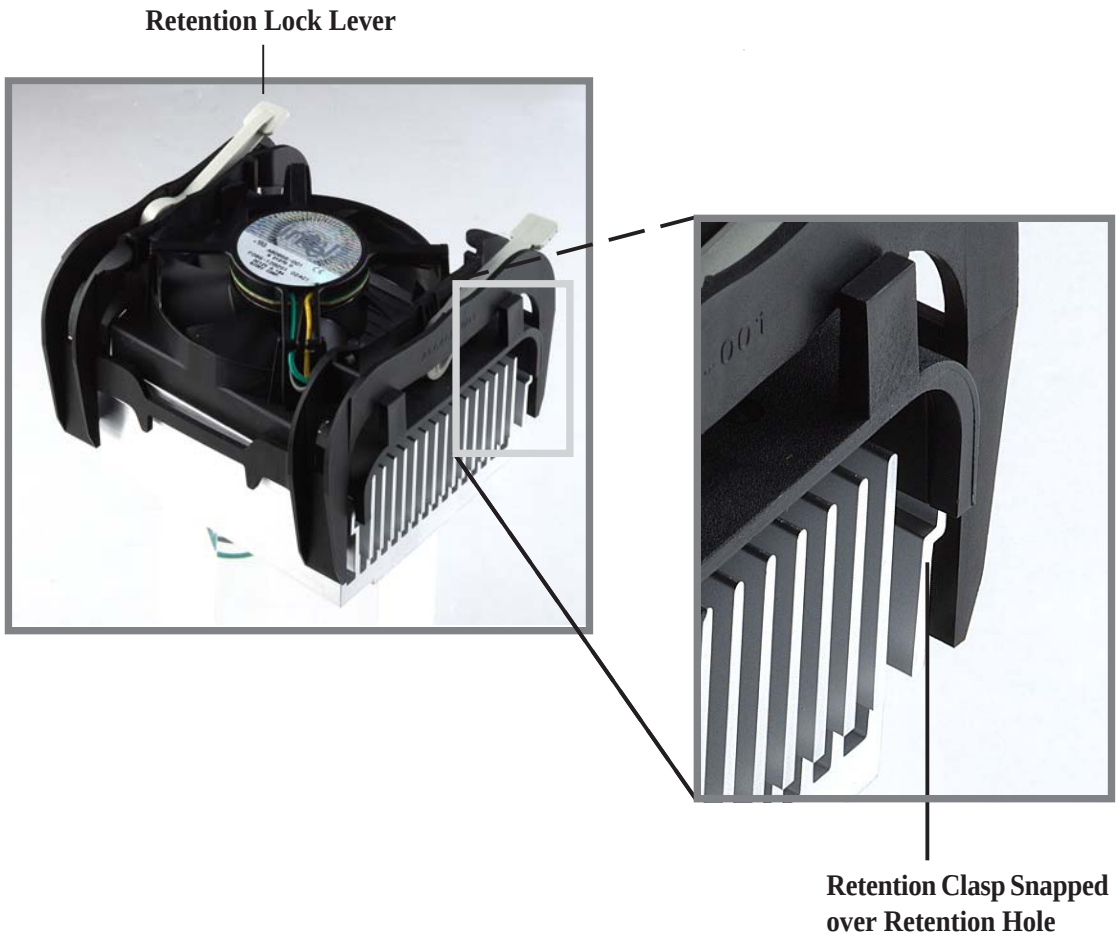
1. Place the heatsink on top of the installed CPU, making sure that the heatsink fits properly on the retention module base.

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.



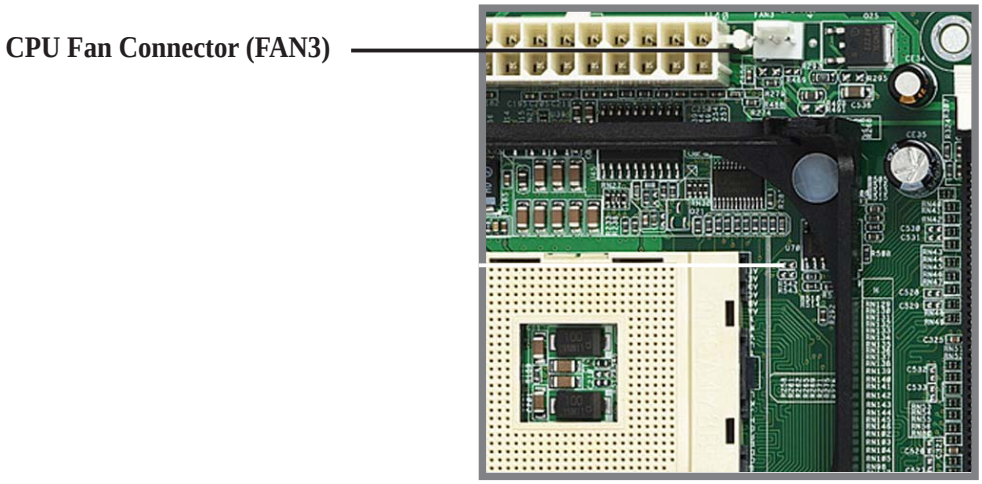
Keep the retention lock levers lifted upward while fitting the retention mechanism to the module base.

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.

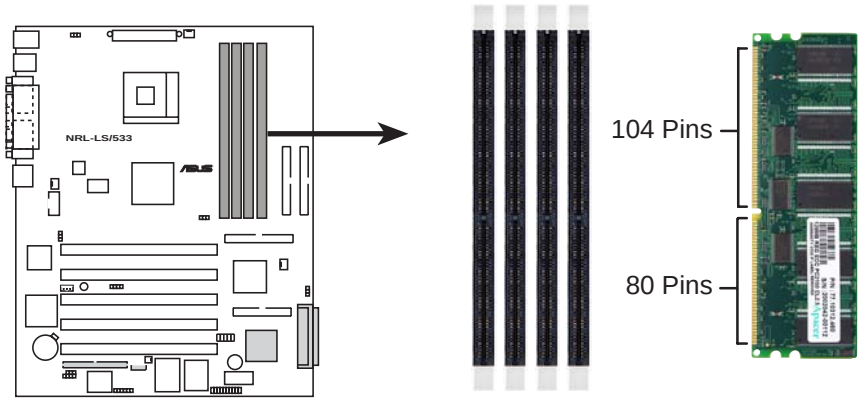


Don't forget to connect the CPU fan connector! Hardware monitoring errors may occur if you fail to plug this connector.

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/533 184-Pin DDR DIMM Sockets

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, 2GB	(x1) =
DDR2	SDRAM 128MB, 256MB, 512MB, 1GB, 2GB	(x1) =
DDR3	SDRAM 128MB, 256MB, 512MB, 1GB, 2GB	(x1) =
DDR4	SDRAM 128MB, 256MB, 512MB, 1GB, 2GB	(x1) =
	Total System Memory	**(Max. 4GB) =**

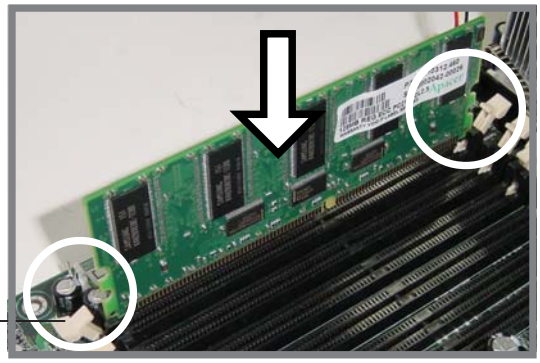
The system chipset only supports PC2100/1600 registered ECC DIMMs. Make sure to use only the specified DIMM types for stable system operation.

2.5.3 Installing a DIMM

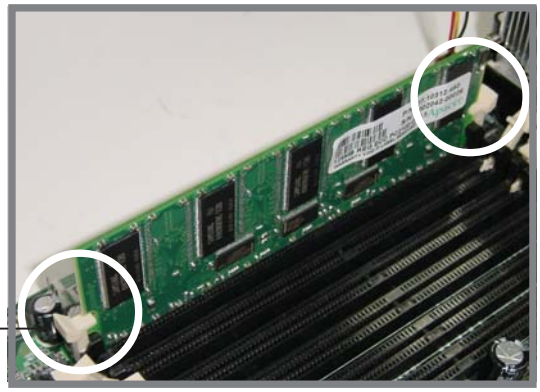
Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

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.



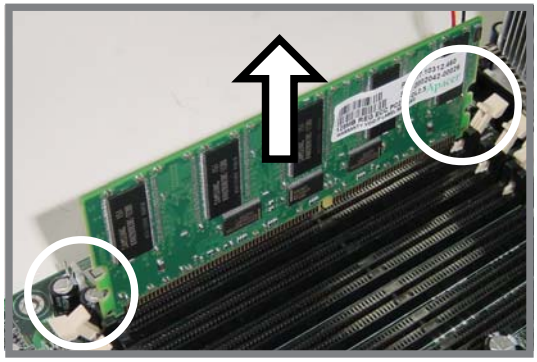
3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.



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 BCM5702 controller	2	—	—	—
Onboard VGA controller	1	—	—	—

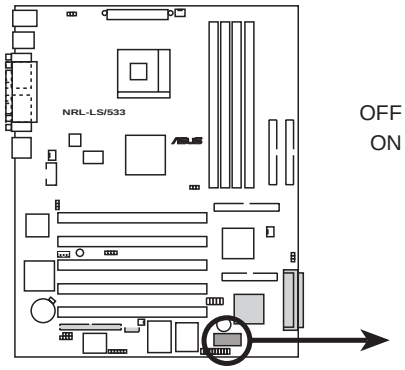
When using PCI cards on shared slots, ensure that the drivers support "Share IRQ" or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable.

2.7 Switches and jumpers

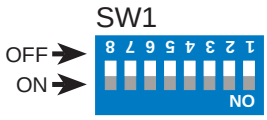
2.7.1 Switches

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

Keep the default settings for stable system operation.



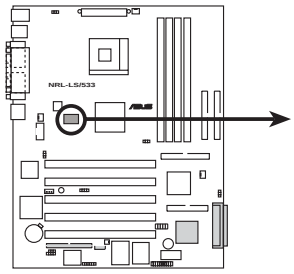
NRL-LS/533 DIP Switches



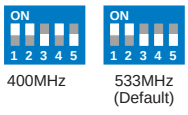
SW	Default	Selection
1		(Reserved)
2		(Reserved)
3		(Reserved)
4		(Reserved)
5	OFF	ON = Freq. Multiple Selection
6	OFF	ON = Freq. Multiple Selection
7	OFF	ON = Freq. Multiple Selection
8	OFF	ON = Freq. Multiple Selection

1. CPU external frequency selection (J8 and SW2)

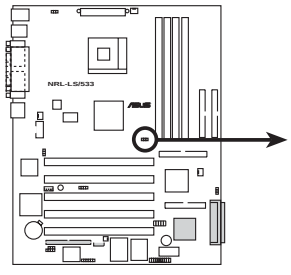
This option tells the clock generator what frequency to send the CPU. This allows the selection of the CPU's external frequency (or Bus Clock). The BUS Clock multiplied by the Frequency Multiple equals the CPU's internal frequency (the advertised CPU speed).



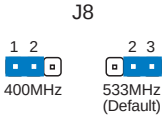
NRL-LS/533 CPU
External Frequency Selection



SW2 and J8 must be set to the same FSB frequency.

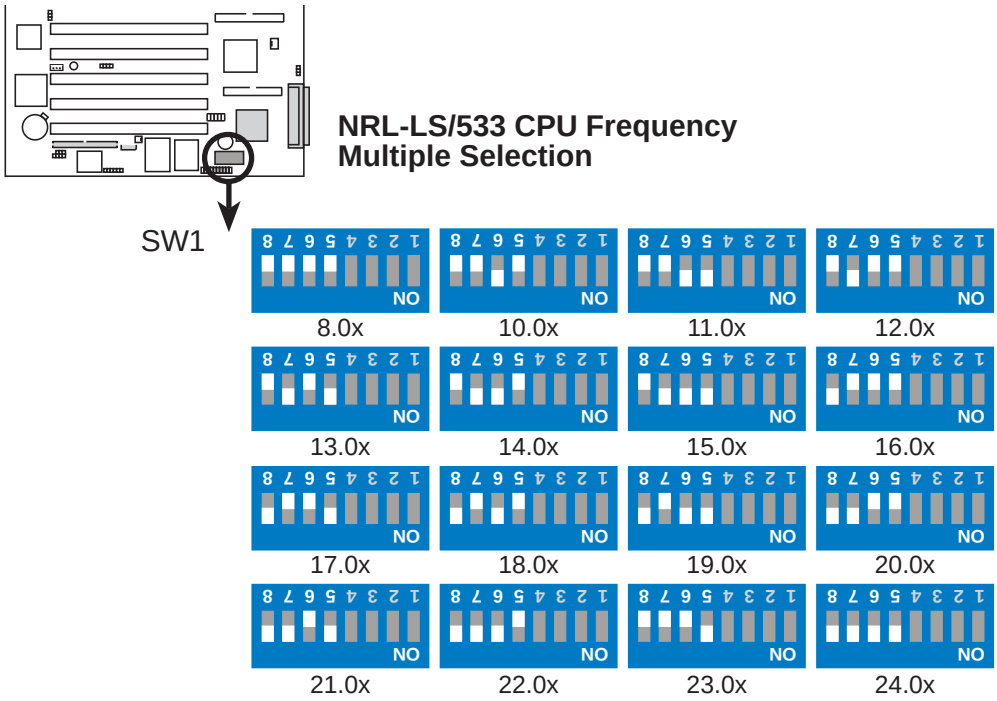


NRL-LS/533 FSB Setting



2. CPU Core:Bus frequency multiple (SW1 : Switches 5-8)

This option sets the frequency multiple between the CPU internal and external frequencies. This must be set in conjunction with the CPU Bus Frequency.



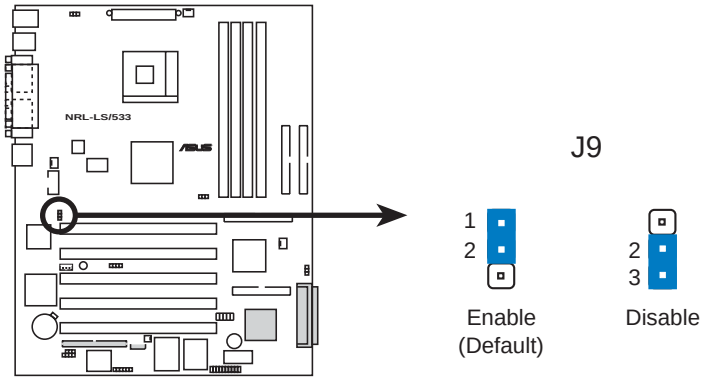
CPU FSB and Bus Frequency Multiple Selection Table

CPU (533) Speed	CPU (400) Speed	Bus Ratio	SW5	SW6	SW7	SW8
1.06GHz	0.80GHz	08	OFF	OFF	OFF	OFF
1.33GHz	1.00GHz	10	OFF	**ON**	OFF	OFF
1.46GHz	1.10GHz	11	**ON**	**ON**	OFF	OFF
1.60GHz	1.20GHz	12	OFF	OFF	**ON**	OFF
1.73GHz	1.30GHz	13	**ON**	OFF	**ON**	OFF
1.86GHz	1.40GHz	14	OFF	**ON**	**ON**	OFF
2.00GHz	1.50GHz	15	**ON**	**ON**	**ON**	OFF
2.13GHz	1.60GHz	16	OFF	OFF	OFF	**ON**
2.26GHz	1.70GHz	17	**ON**	OFF	OFF	**ON**
2.40GHz	1.80GHz	18	OFF	**ON**	OFF	**ON**
2.53GHz	1.90GHz	19	**ON**	**ON**	OFF	**ON**
2.66GHz	2.00GHz	20	OFF	OFF	**ON**	**ON**
2.80GHz	2.10GHz	21	**ON**	OFF	**ON**	**ON**
2.93GHz	2.20GHz	22	OFF	**ON**	**ON**	**ON**
3.06GHz	2.30GHz	23	**ON**	OFF	OFF	OFF
3.19GHz	2.40GHz	24	**ON**	**ON**	**ON**	**ON**

2.7.2 Jumpers

1. 32-bit PCI Gigabit Ethernet setting (3-pin J9)

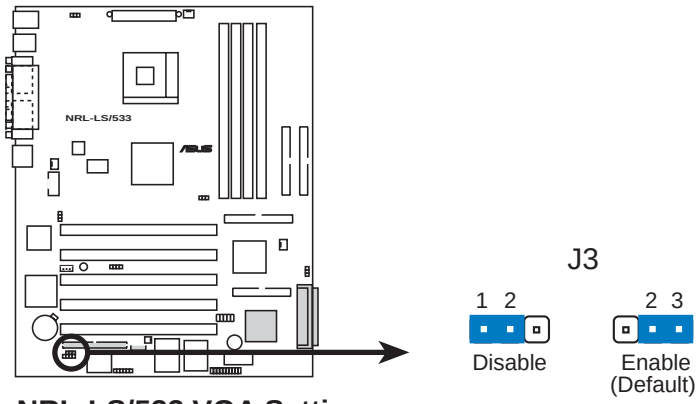
These jumpers are set by default, pins [1-2], to enable the onboard Gigabit Ethernet controller to support 10/100/1000BASE-TX networks. Set the jumper to pins [2-3] to disable the controller.



NRL-LS/533 Gigabit Ethernet Setting

2. VGA setting (3-pin J3)

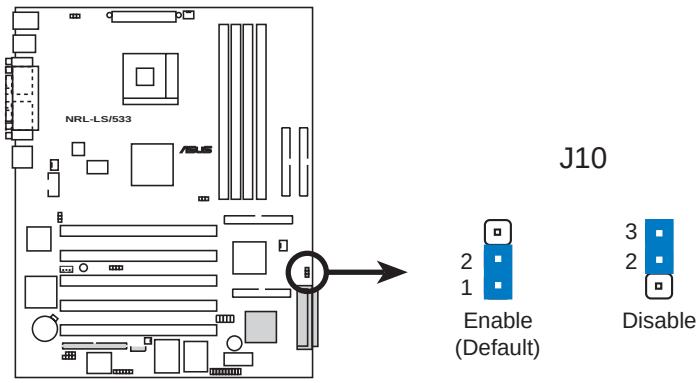
This jumper is set by default, pins [2-3], to enable the VGA controller. Set to pins [1-2] to disable the VGA controller.



NRL-LS/533 VGA Setting

3. SCSI Setting (3-pin J10)

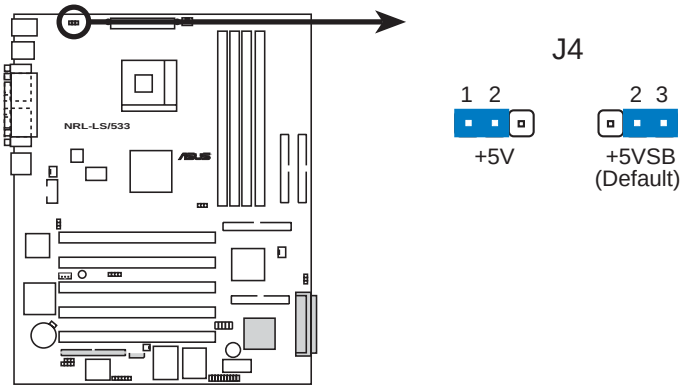
This jumper is set by default, pins [1-2], to enable the onboard SCSI controller. Set to pins [2-3] to disable the onboard SCSI controller.



NRL-LS/533 SCSI Setting

4. Keyboard Power setting (3-pin J4)

This jumper is set by default, pins [2-3], to enable keyboard power up. Set to pins [1-2] to disable keyboard power up.



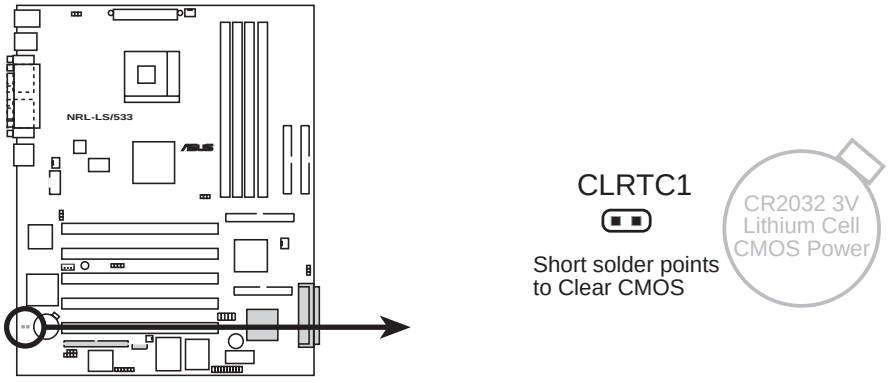
NRL-LS/533 Keyboard Power Setting

5. 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/533 Clear RTC RAM

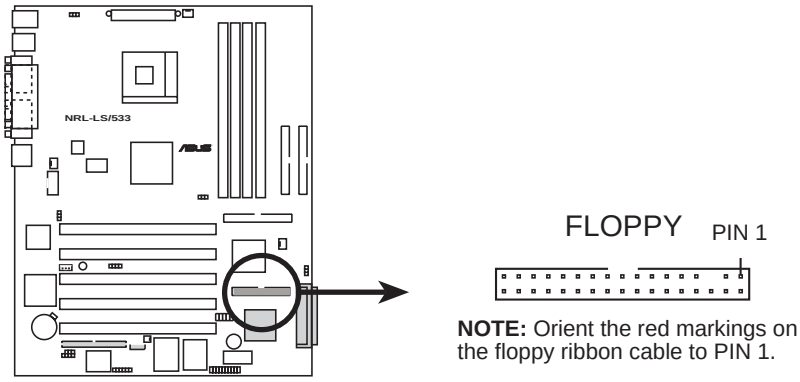
2.8 Connectors

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)

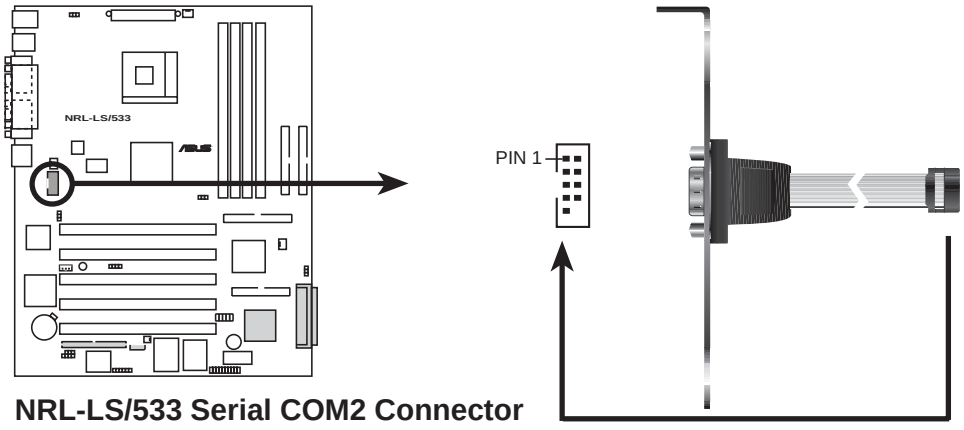
This connector supports the provided floppy drive ribbon cable. After connecting one end to the motherboard, connect the other end to the floppy drive. (Pin 5 is removed to prevent incorrect insertion when using ribbon cables with pin 5 plug).



NRL-LS/533 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.

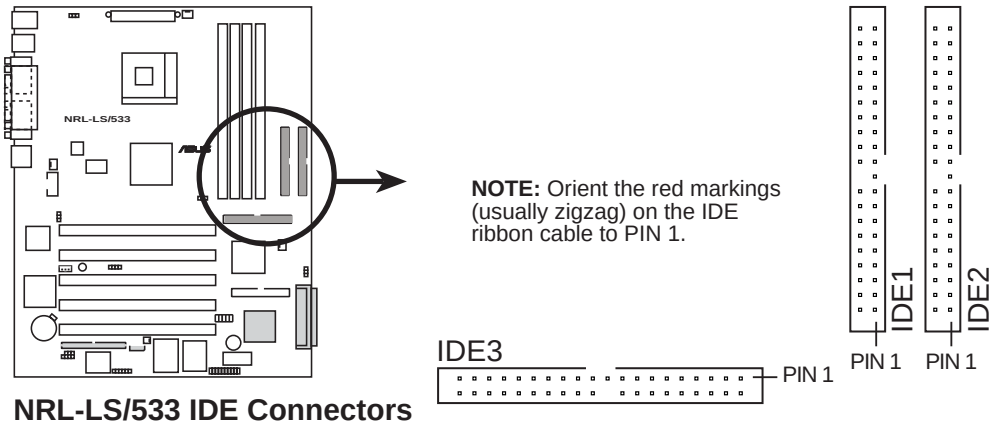


NRL-LS/533 Serial COM2 Connector

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 supports UltraDMA/66



NRL-LS/533 IDE Connectors

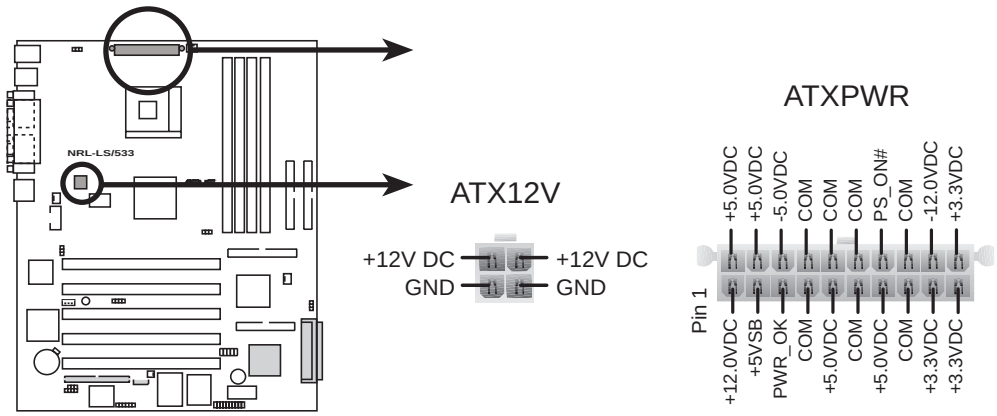
For UltraDMA/100/66 IDE devices, use an 80-conductor IDE cable. The UltraDMA/66 cable included in the motherboard package also supports UltraDMA/100.

4. ATX power connectors (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 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.

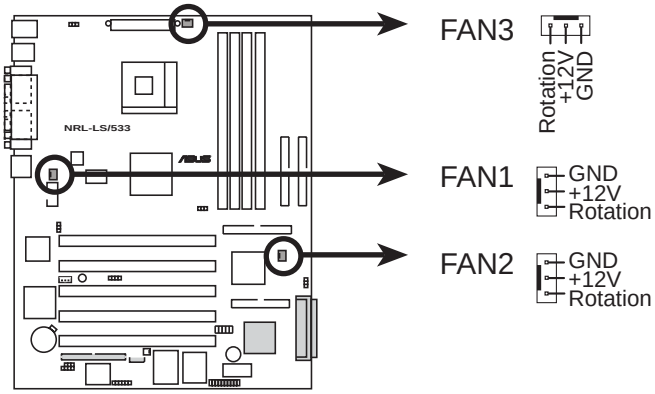


NRL-LS/533 ATX Power Connector

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.

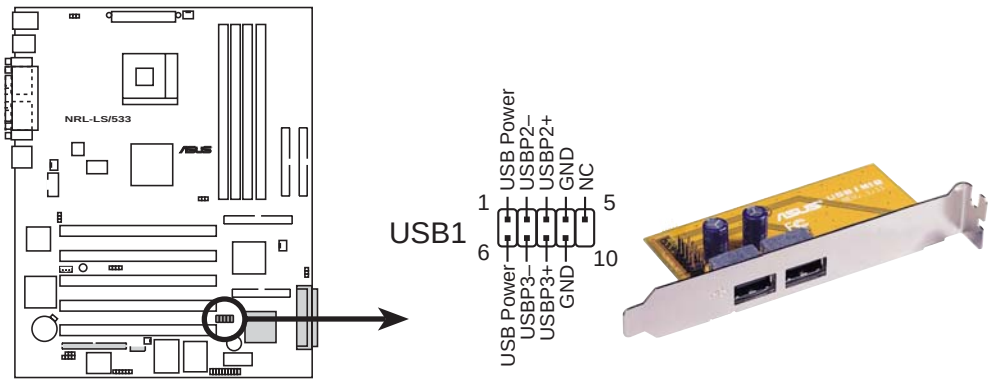
Do not forget to connect the fan cables to the fan connectors. Lack of sufficient air flow within the system may damage the motherboard components. These are not jumpers! DO NOT place jumper caps on the fan connectors!



NRL-LS/533 12-Volt Cooling Fan Power

6. USB header (10-1 pin USB1)

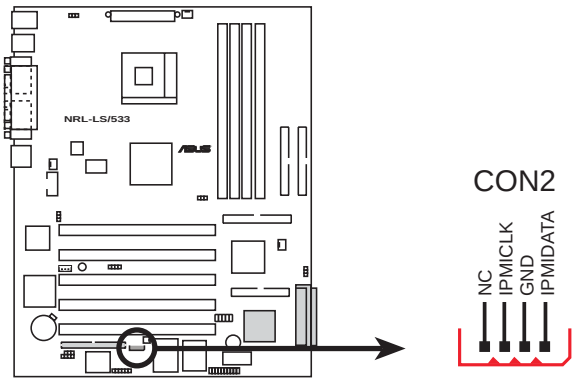
If the USB ports on the rear panel are inadequate, a USB header is available for additional USB ports. The USB header complies with USB 1.1 specification that supports up to 12 Mbps connection speed.



NRL-LS/533 USB Header

7. IPMI connector (4-pin CON2)

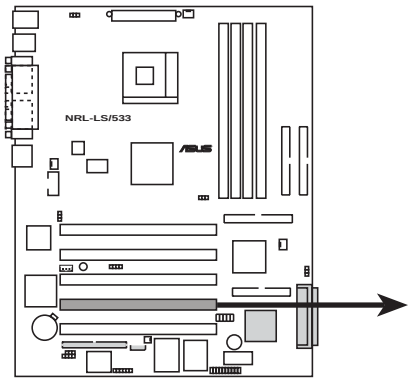
The Intelligent Platform Management Interface (IPMI) connector is for the ASMC card. Connect the 4-pin ASMC interface cable to this connector.



NRL-LS/533 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.

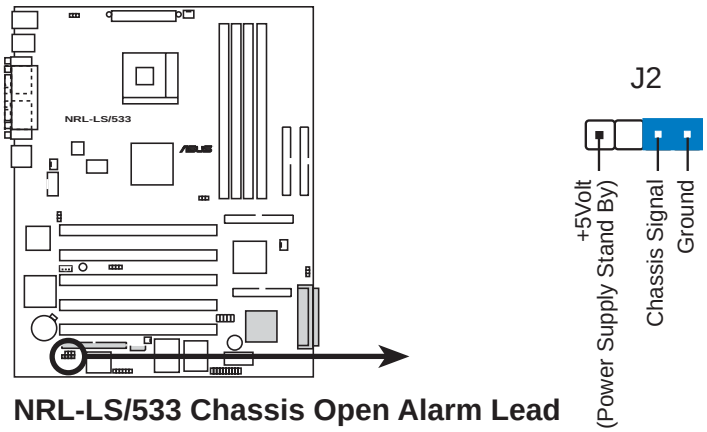


NRL-LS/533 Zero Channel RAID Slot

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.

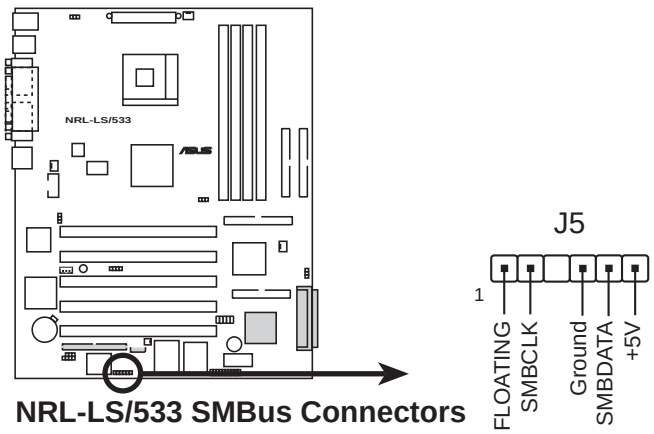
By default, the pins labeled “Chassis Signal” and “Ground” are shorted with a jumper cap. If you wish to use the chassis intrusion detection feature, remove the jumper cap from the pins.



NRL-LS/533 Chassis Open Alarm Lead

10. SMBus connector (6-1 pin J5)

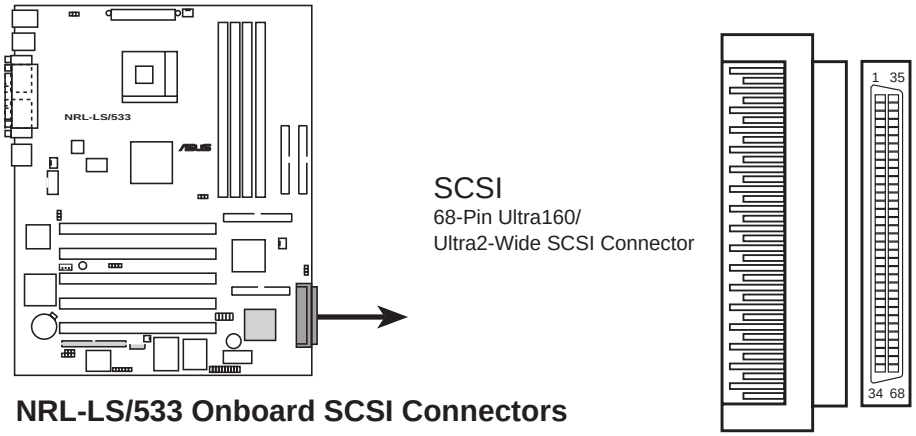
This connector allows you to connect SMBus (System Management Bus) devices. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface. SMBus is a specific implementation of an I^2C bus, a multi-device bus that allows multiple chips to connect to the same bus and enable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



NRL-LS/533 SMBus Connectors

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.



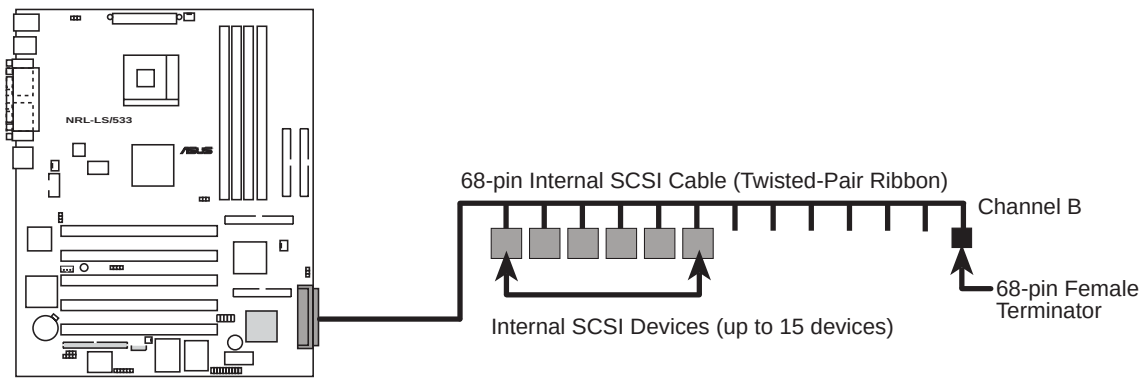
NRL-LS/533 Onboard SCSI Connectors

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.

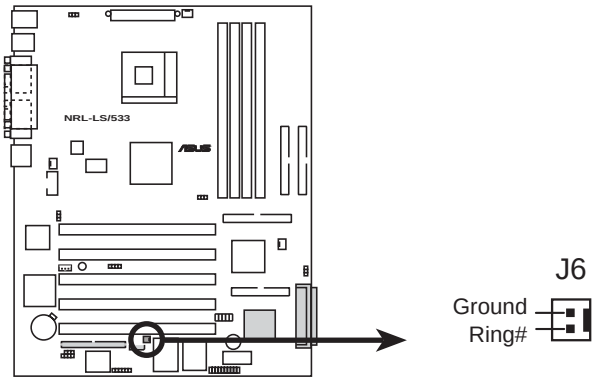


NRL-LS/533 SCSI Connection Example

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.

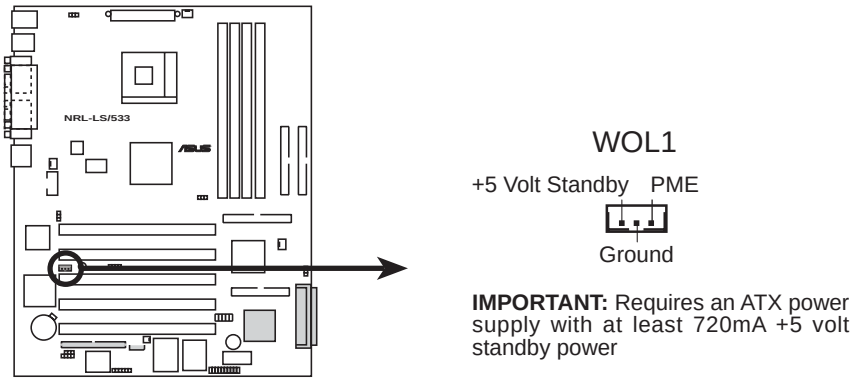
For external modems, Wake-On-Ring is detected through the COM port.



NRL-LS/533 Wake-On-Ring Connector

13. Wake-On-LAN Connector (3-pin WOL)

This connector connects to a PCI LAN card with Wake-On-LAN output. The connector powers up the system when Magic Packet is received through the PCI LAN card.

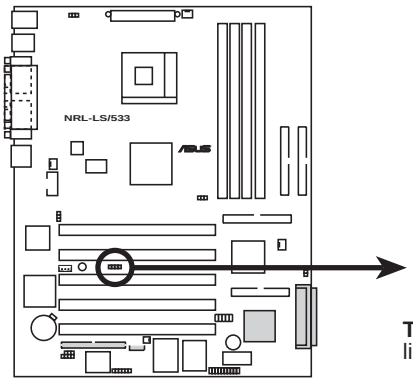


IMPORTANT: Requires an ATX power supply with at least 720mA +5 volt standby power

NRL-LS/533 Wake-On-LAN Connector

14. SCSI Activity LED Connector (4-pin J11)

This connector supports a chassis mounted LED which will illuminate during SCSI activity.

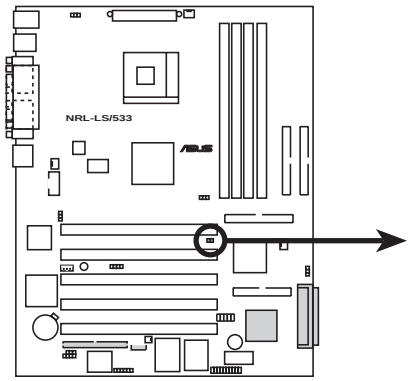


TIP: If the case-mounted LED does not light, try reversing the 2-pin plug.

NRL-LS/533 SCSI Activity LED

15. Hard disk activity LED (2-pin J7)

This connector supplies power to the hard disk activity LED. The read or write activities of any device connected to the primary or secondary IDE connector cause this LED to light up.

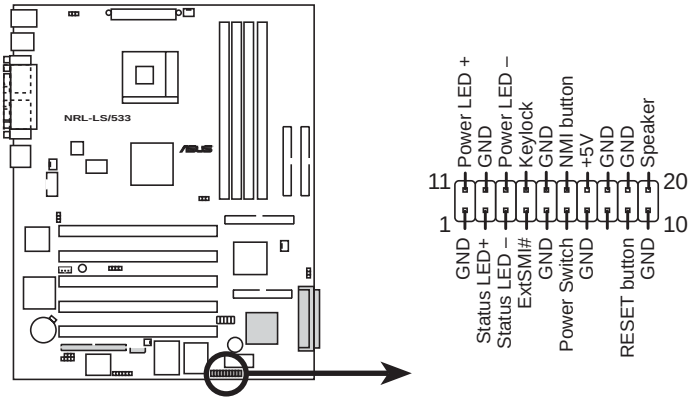


TIP: If the case-mounted LED does not light, try reversing the 2-pin plug.

NRL-LS/533 HD Activity LED

16. System panel connector (20-pin PANEL)

This connector accommodates several system front panel functions.



Pin	Connector
2 & 3	Status LED
4 & 5	SMI Switch
6 & 7	Power Switch
9 & 10	Reset Switch
11 & 13	Power LED
14	Keylock
15* & 16	NMI Button
17 & 20	Speaker
* Shared	

NRL-LS/533 System Panel Connectors

- **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.

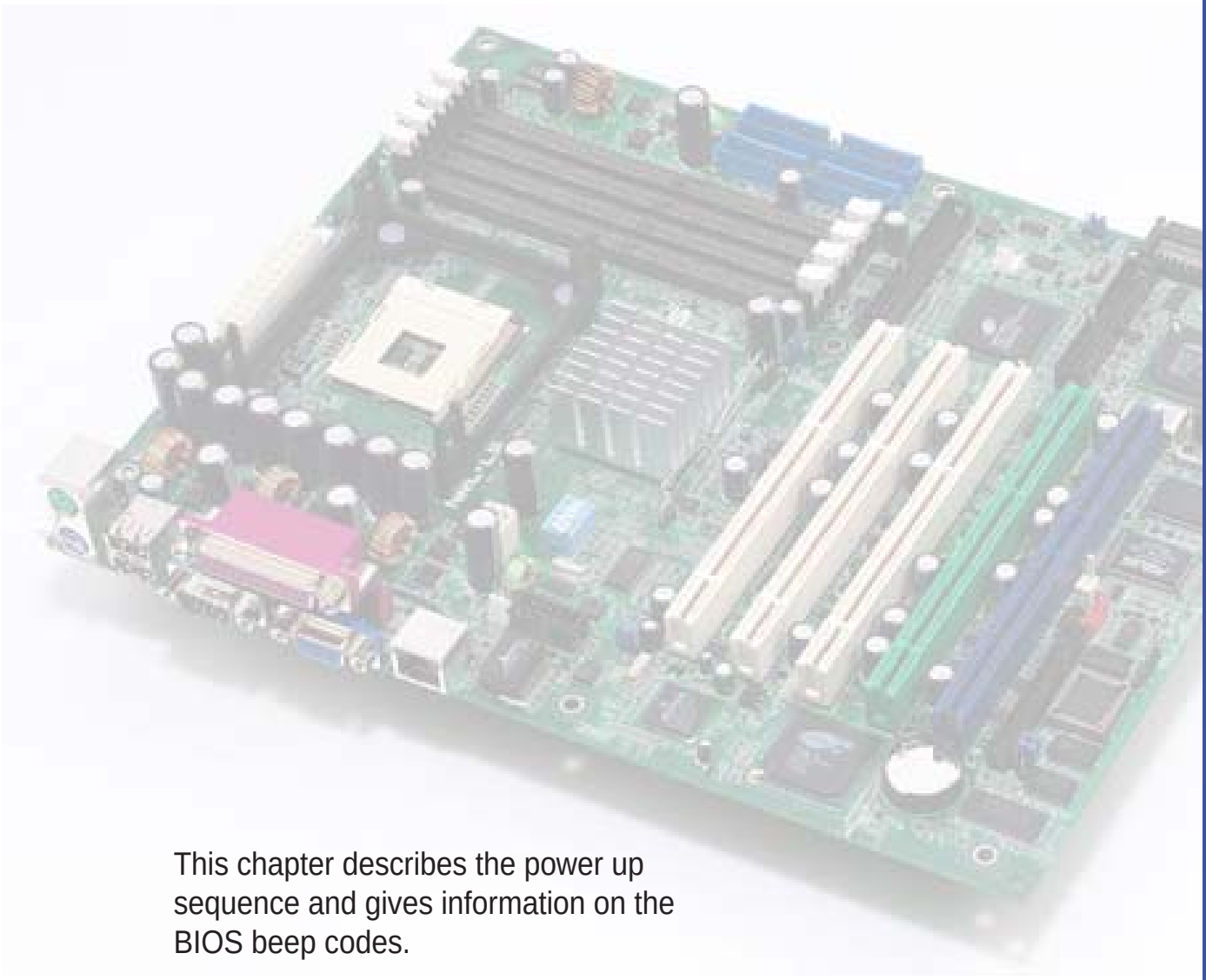
- **System Power LED Lead (3-1 pin PLED)**

  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

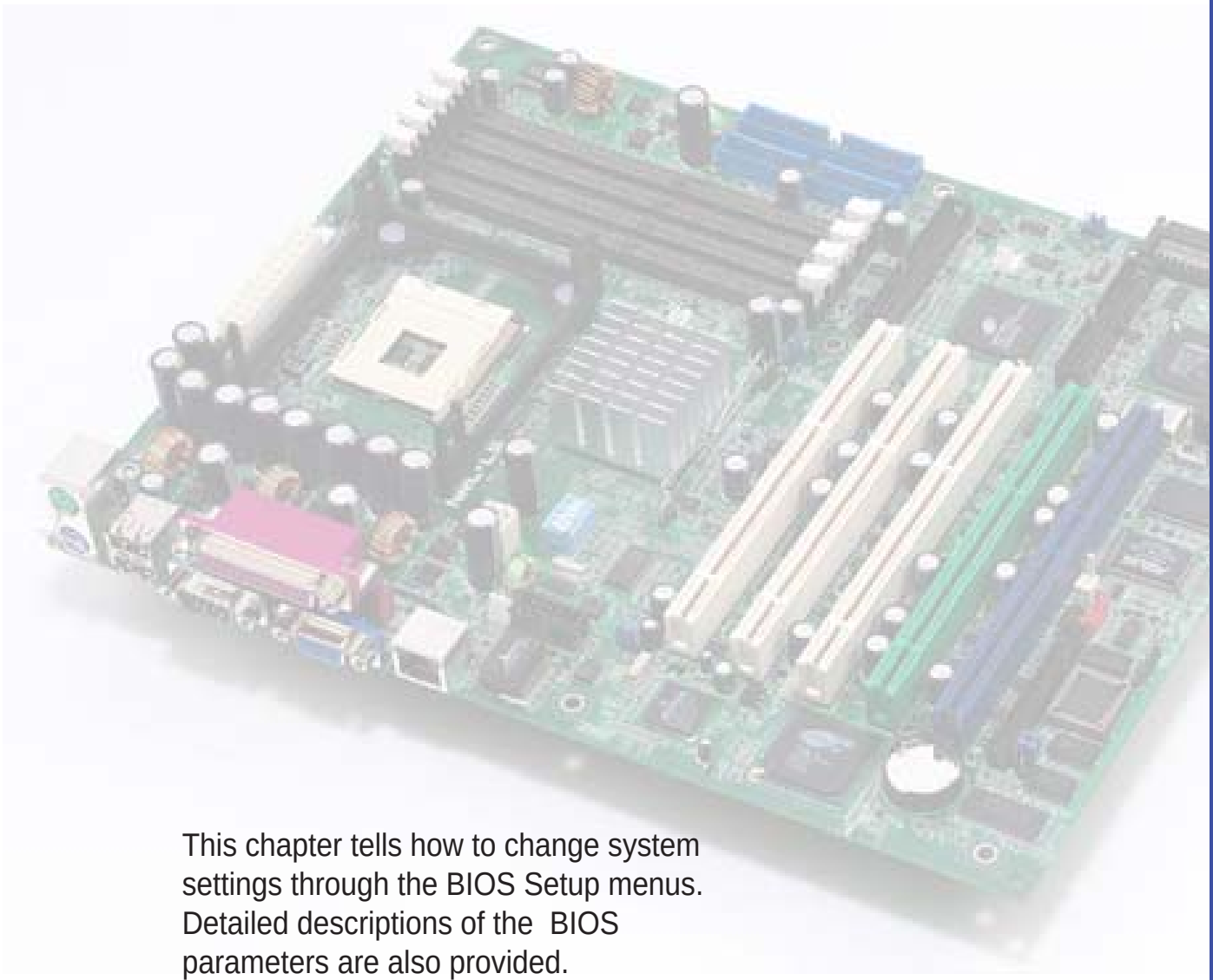
7. At power on, hold down <Delete> to enter BIOS Setup. Follow the instructions in Chapter 4.

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.

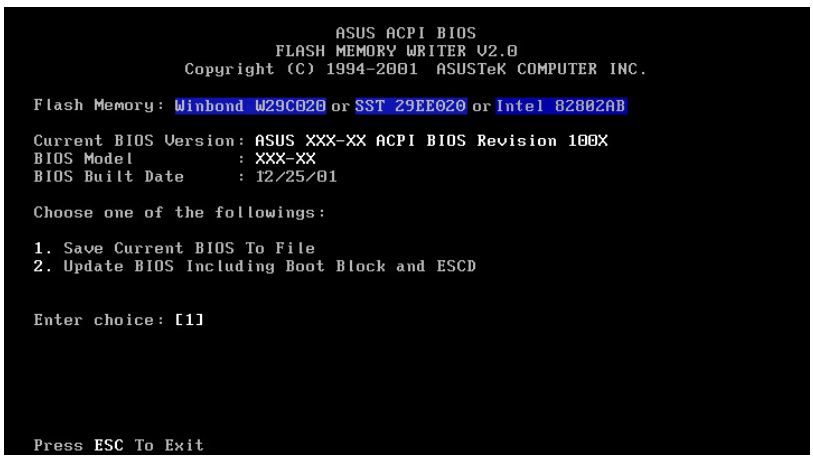
1. Type FORMAT A:/S at the DOS prompt to create a bootable system disk. DO NOT copy AUTOEXEC.BAT and CONFIG.SYS to the disk.
2. Type COPY D:\AFLASH\AFLASH.EXE A:\ (assuming D is your CD-ROM drive) to copy AFLASH.EXE to the boot disk you created.

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.

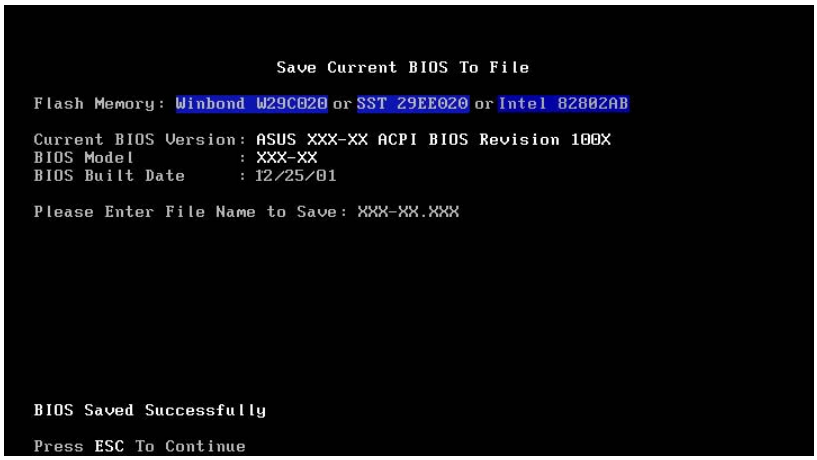
BIOS setup must specify “Floppy” as the first item in the boot sequence.

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



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.



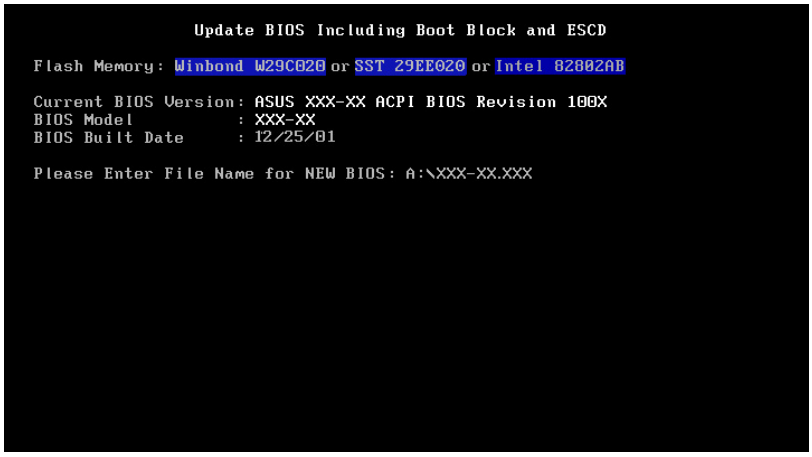
6. Type a filename and the path, for example, A:\XXX-XX.XXX, then press <Enter>.

4.1.2 Updating the BIOS

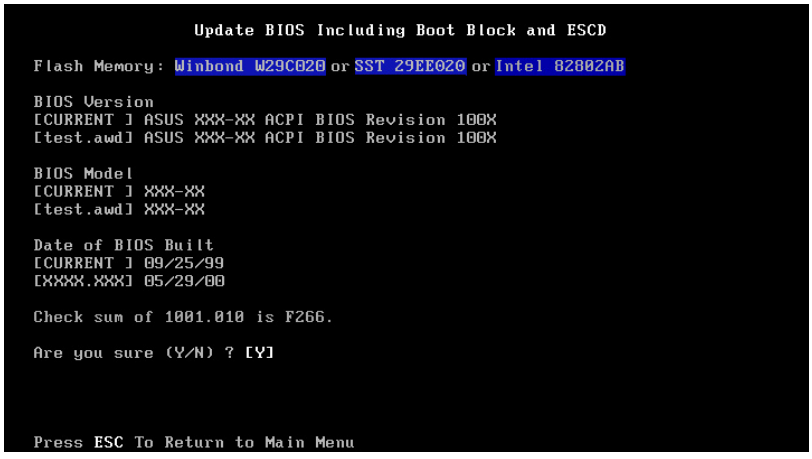
Update the BIOS only if you have problems with the motherboard and you are sure that the new BIOS revision will solve your problems. Careless updating may result to more problems with the motherboard!

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>.

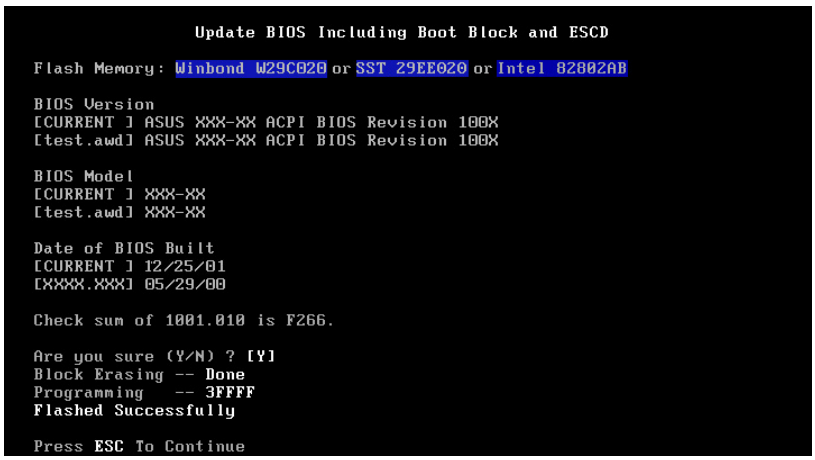
To cancel this operation, press <Enter>.



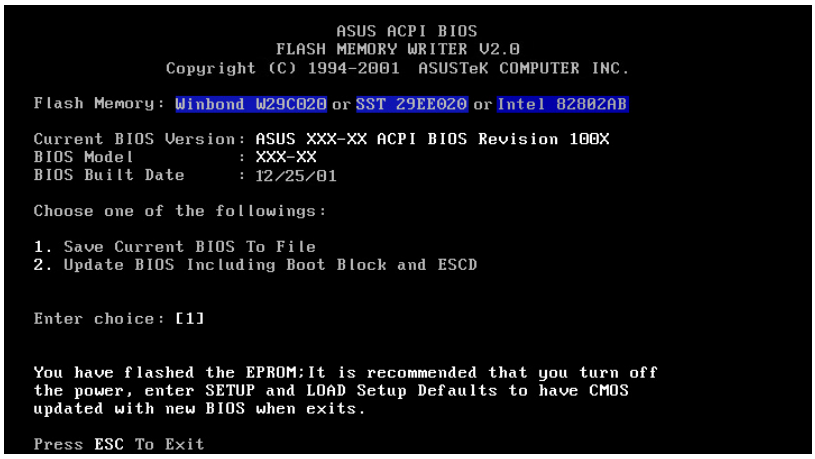
6. When prompted to confirm the BIOS update, press **Y** to start the update.



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.



8. Follow the onscreen instructions to continue.



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 anywhere 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 highlighted 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.

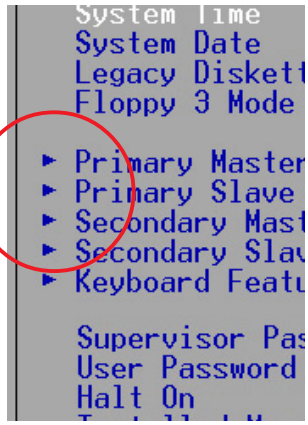
Saving changes and exiting the Setup program

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

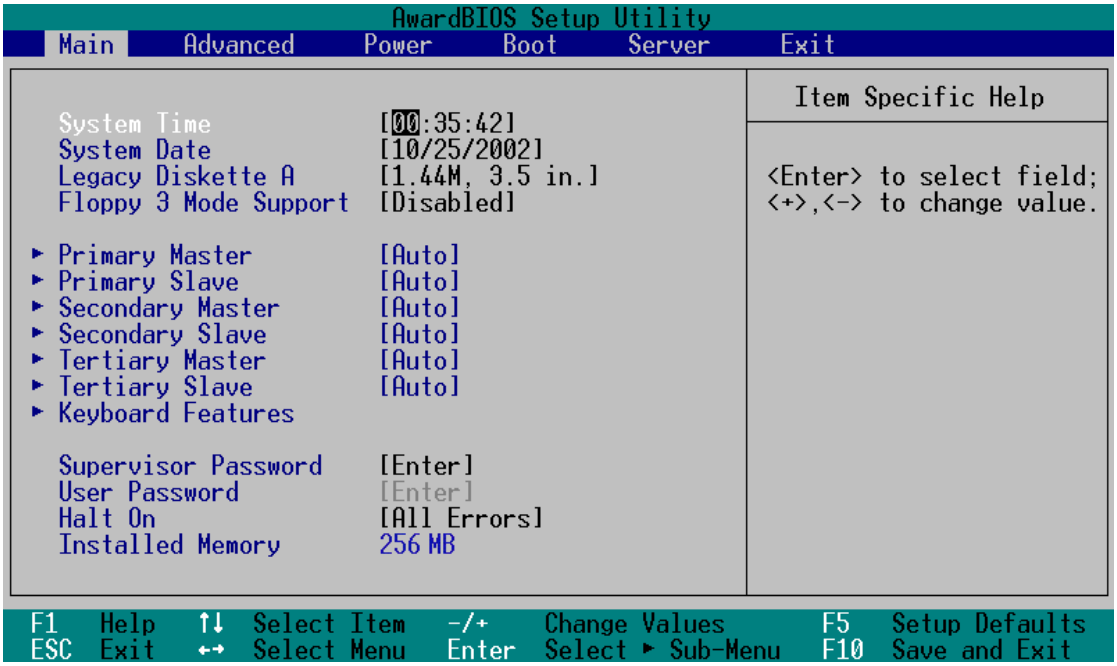


Note that a right pointer symbol (as shown on the left) appears to the left of certain fields. This pointer indicates that you can display a sub-menu from this field. A sub-menu contains additional options for a field parameter. To display a sub-menu, move the highlight to the field and press <Enter>. 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.



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 “2.7Switches and jumpers” for information on how to erase the R TC RAM.

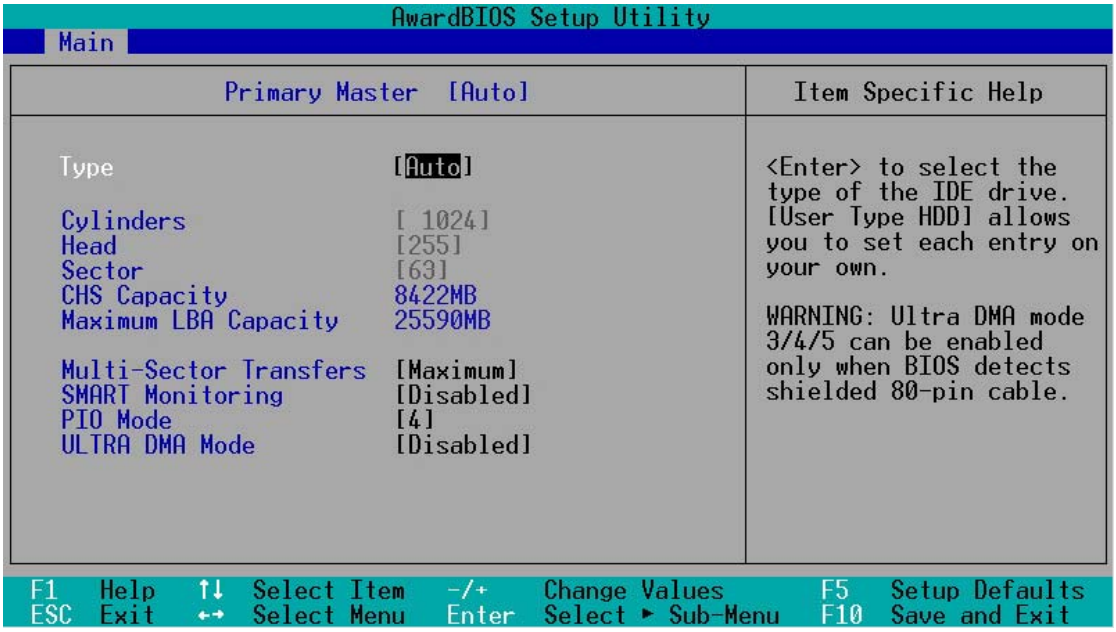
Halt On [All Errors]

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

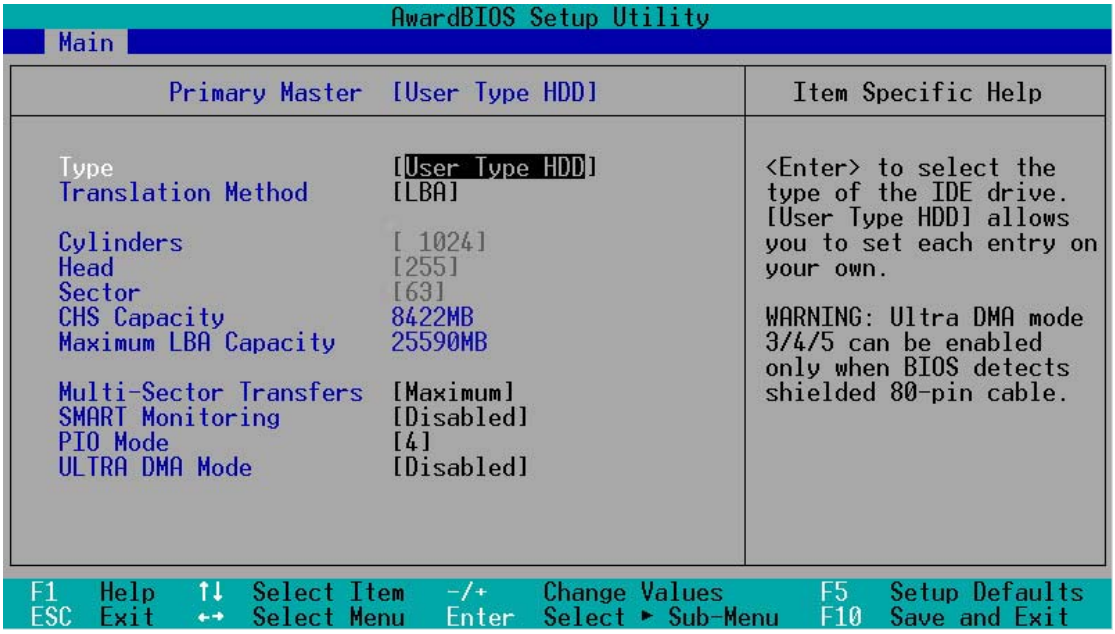


Type [Auto]

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]



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]

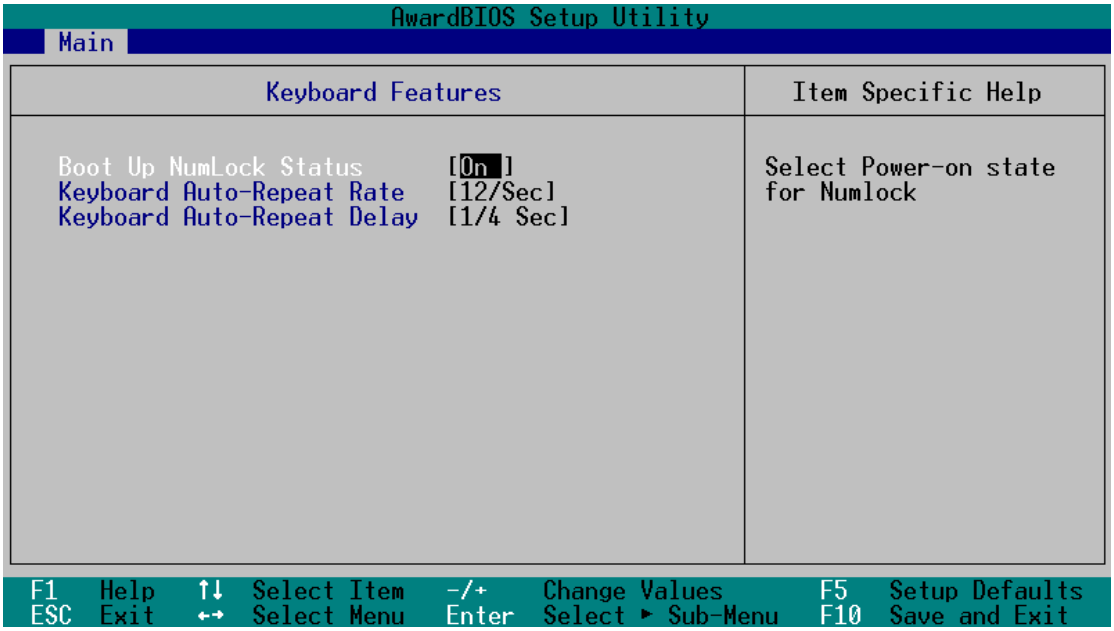
PIO Mode [4]

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



Boot Up NumLock Status [On]

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

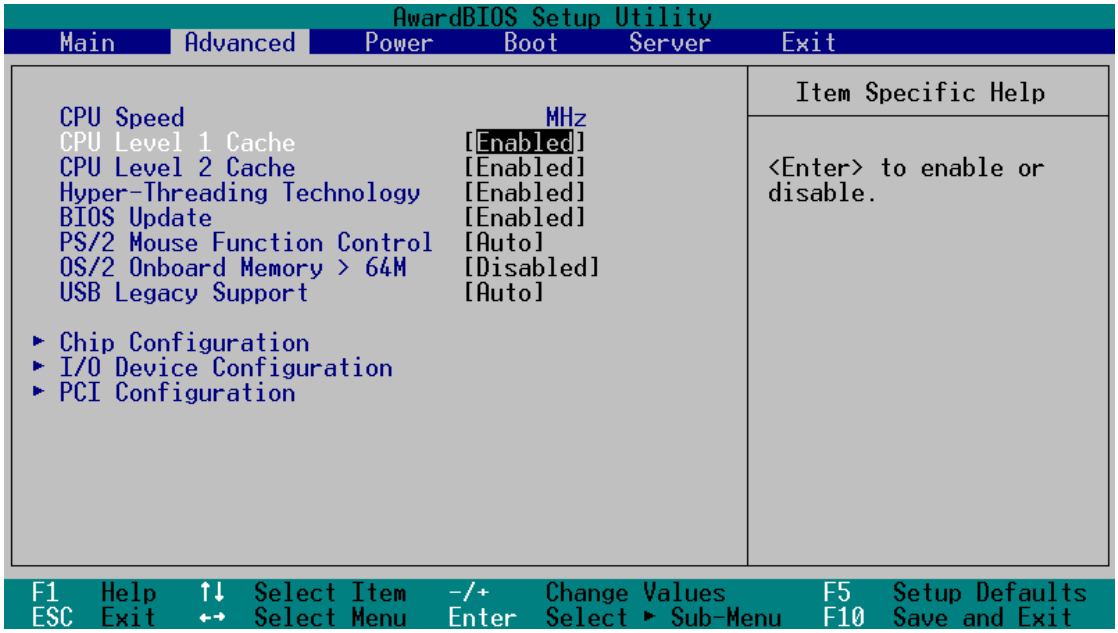
Keyboard Auto-Repeat Rate [6/Sec]

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



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]

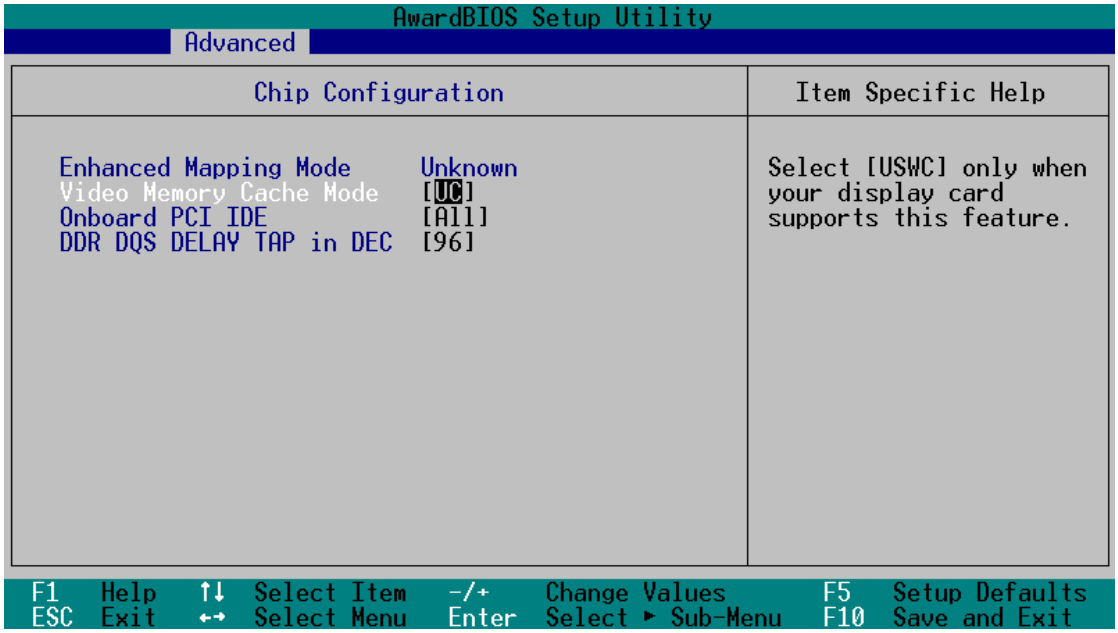
When using OS/2 operating systems with installed DRAM of greater than 64MB, you need to set this option to [Enabled]. Otherwise, leave to the default setting [Disabled]. Configuration options: [Disabled] [Enabled]

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



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]

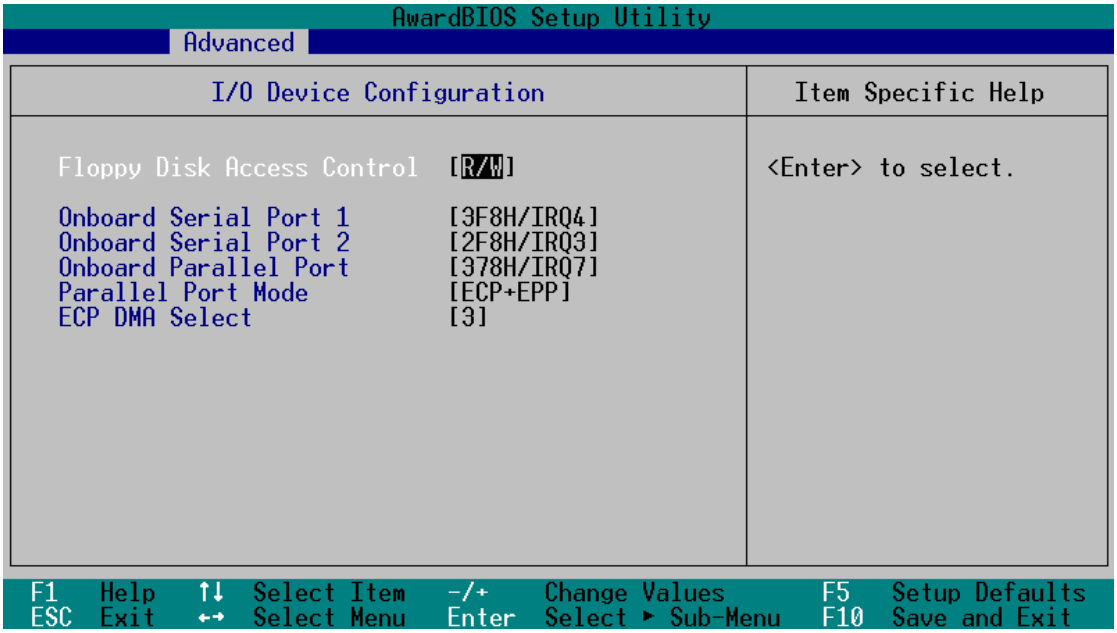
Onboard PCI IDE [All]

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



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]

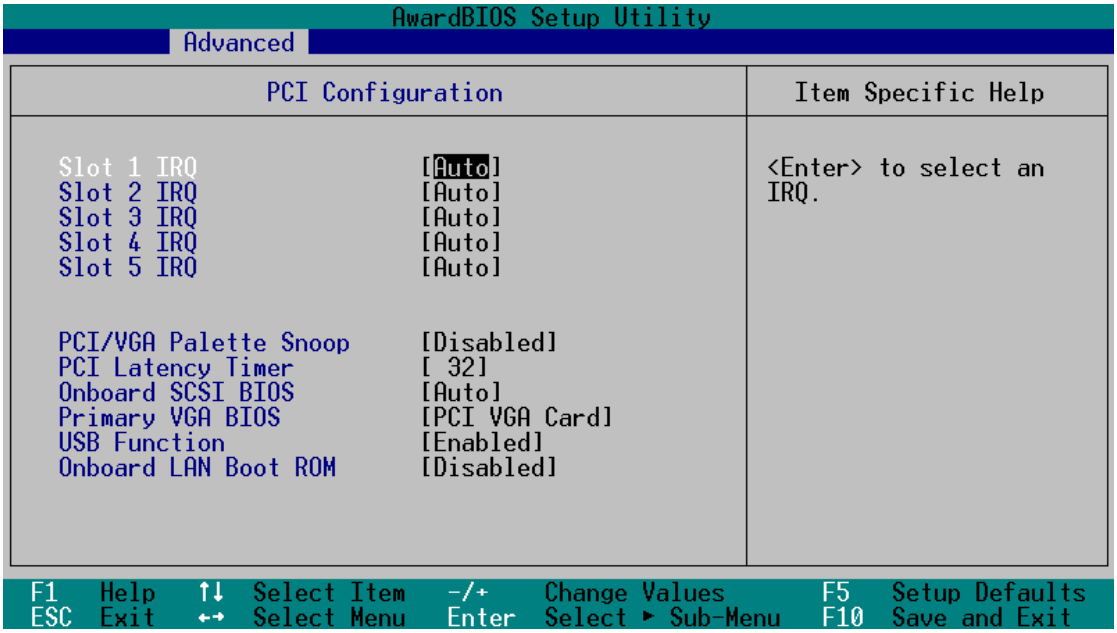
Parallel Port Mode [ECP+EPP]

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



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.

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]

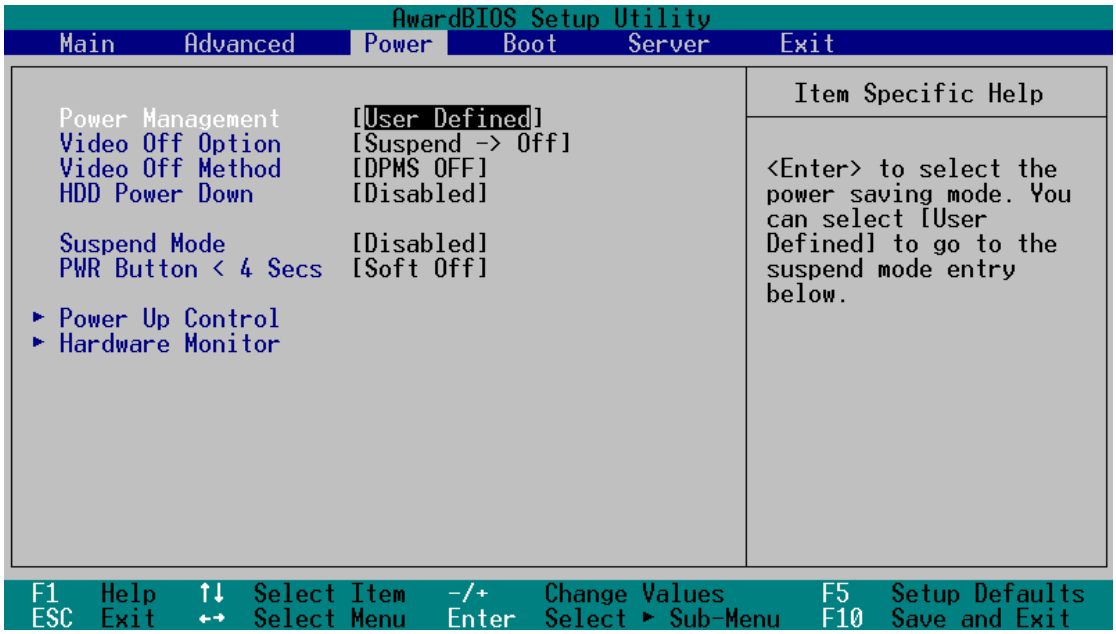
Primary VGA BIOS First [PCI VGA Card]
This field allows you to select the primary graphics card. Configuration options: [PCI VGA Card] [Onboard VGA]

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.



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]

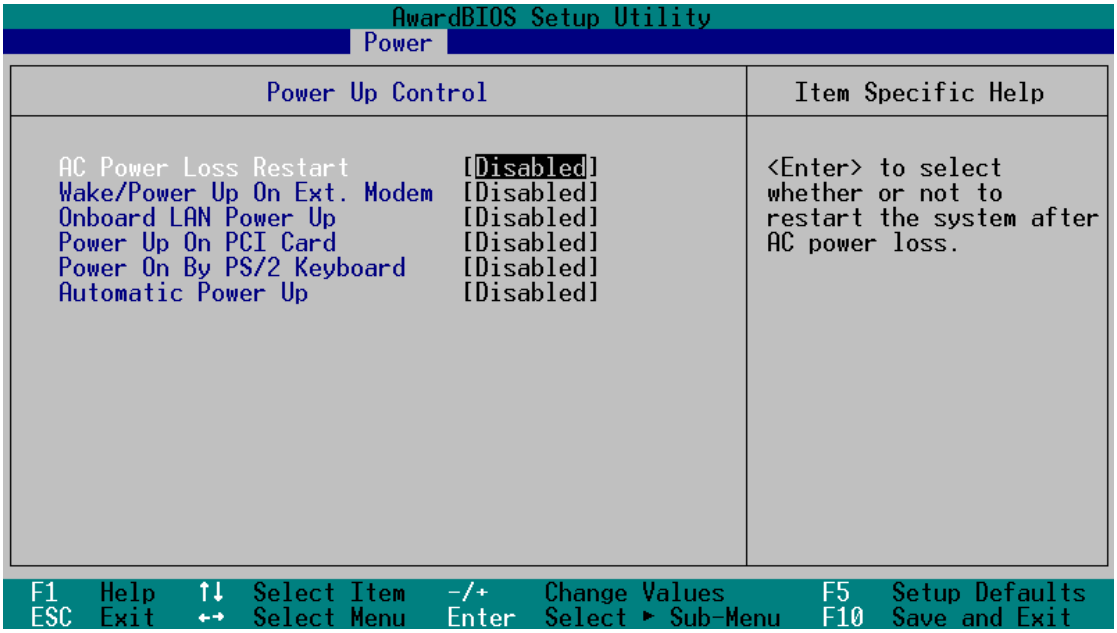
Suspend Mode [Disabled]

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



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. [Previous State] sets the system back to the state it was before the power interruption. Configuration options: [Disabled] [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]

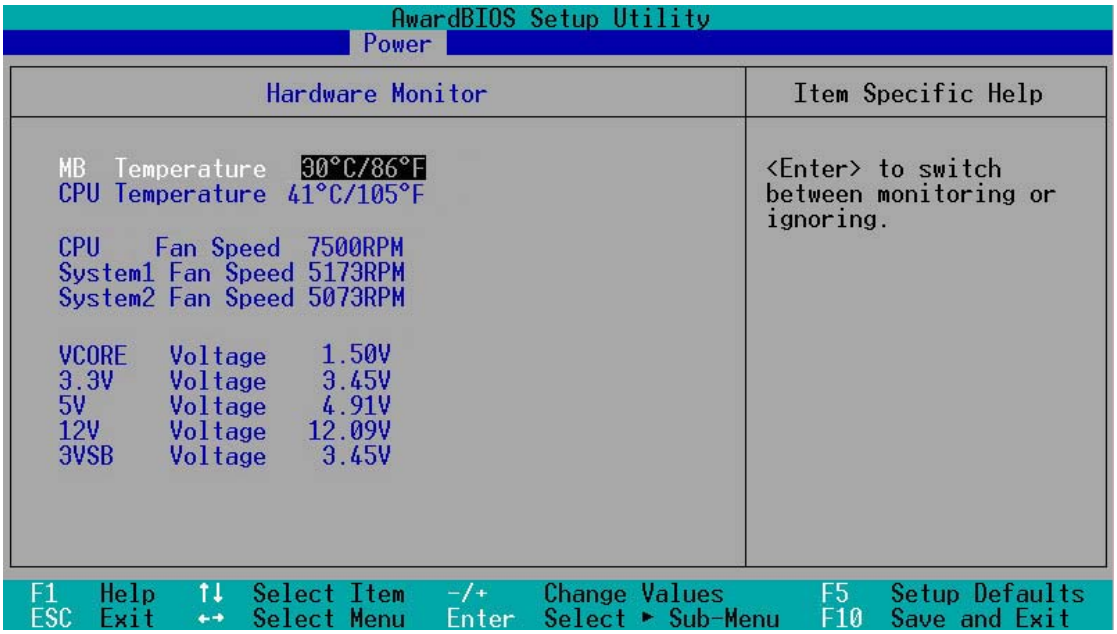
Power On By PS/2 Keyboard [Disabled]

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



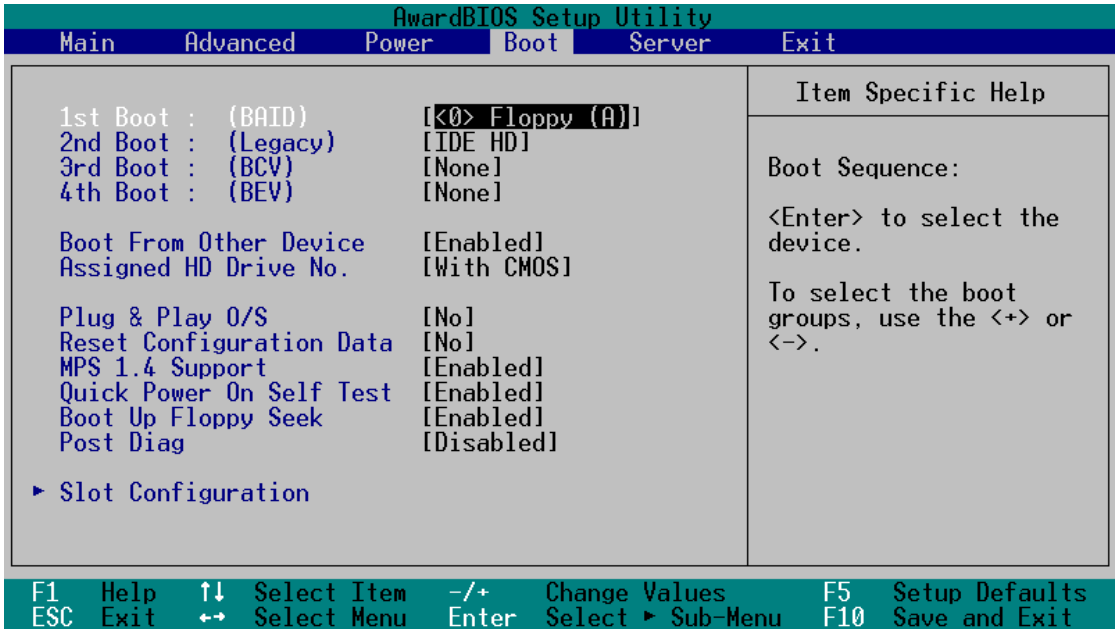
MB Temperature [xxxC/xxxF], CPU Temperature [xxxC/xxxF]
The onboard hardware monitor is able to detect the MB (motherboard) and CPU temperatures. Set to [Ignore] only if necessary.

CPU Fan Speed [xxxxRPM], System Fan Speed [xxxxRPM]
The onboard hardware monitor is able to detect the CPU and system 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.

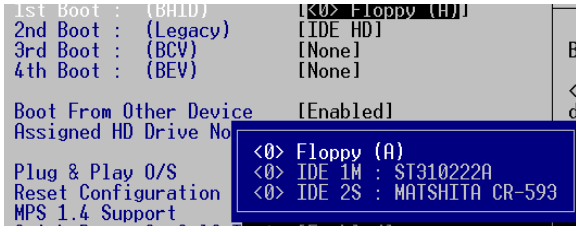
If any of the monitored items is out of range, the following error message appears: “Hardware Monitor found an error. Enter Power setup menu for details”. You will then be prompted to “Press F1 to continue or DEL to enter SETUP”.

4.6 Boot Menu

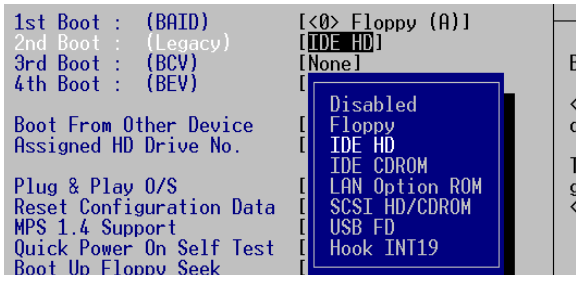


The motherboard BIOS supports the BIOS Boot Specification (BBS) version 1.01. BBS is an intelligent mechanism that provides flexible ways to set boot sequence for Initial Program Load (IPL) devices such as CD-ROMs, network remote boot ROM, and SCSI or RAID controllers on PnP cards.

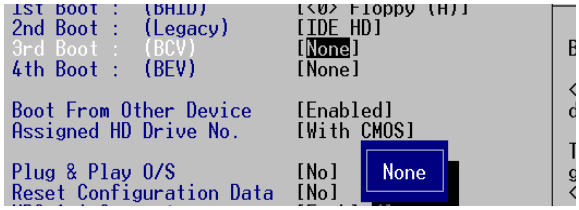
The IPL devices are classified into three categories:



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]

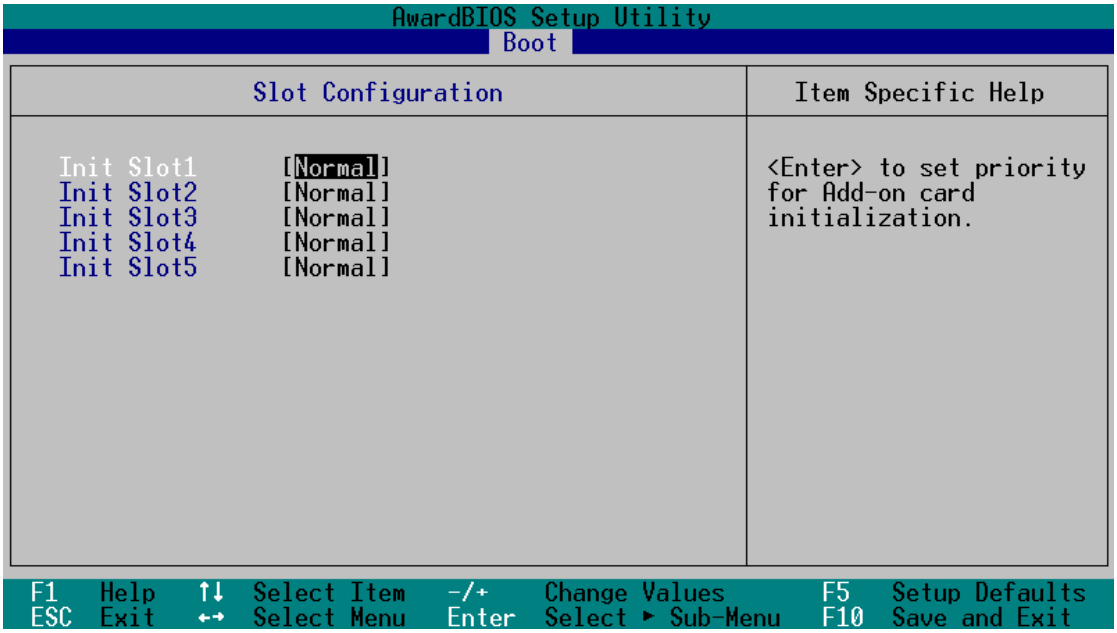
Boot Up Floppy Seek [Enabled]

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]

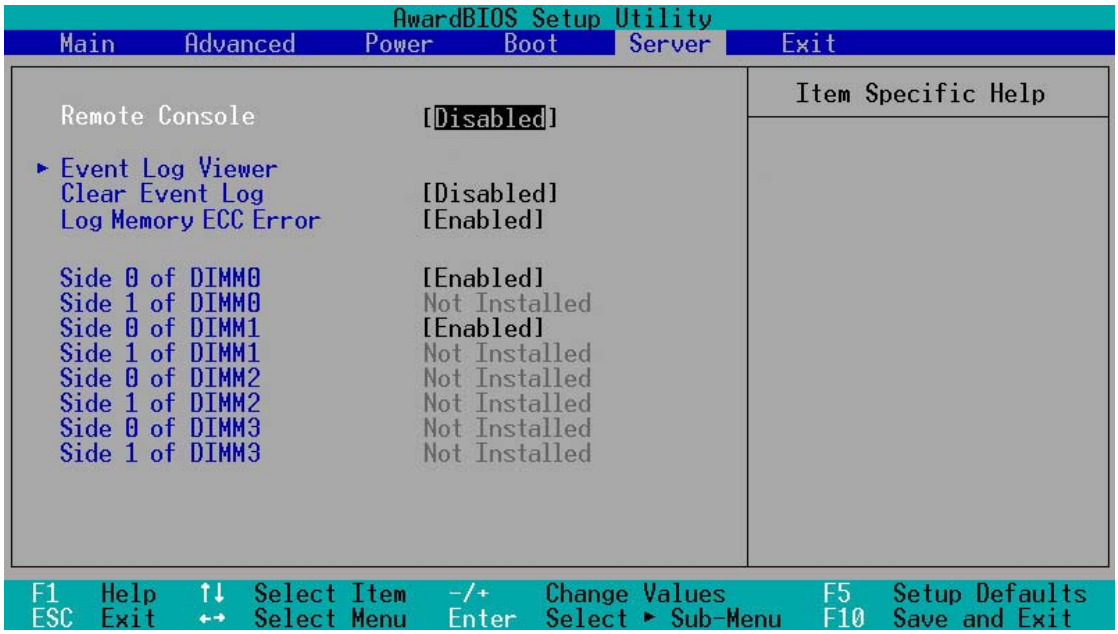
4.6.1 Slot Configuration



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



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”.

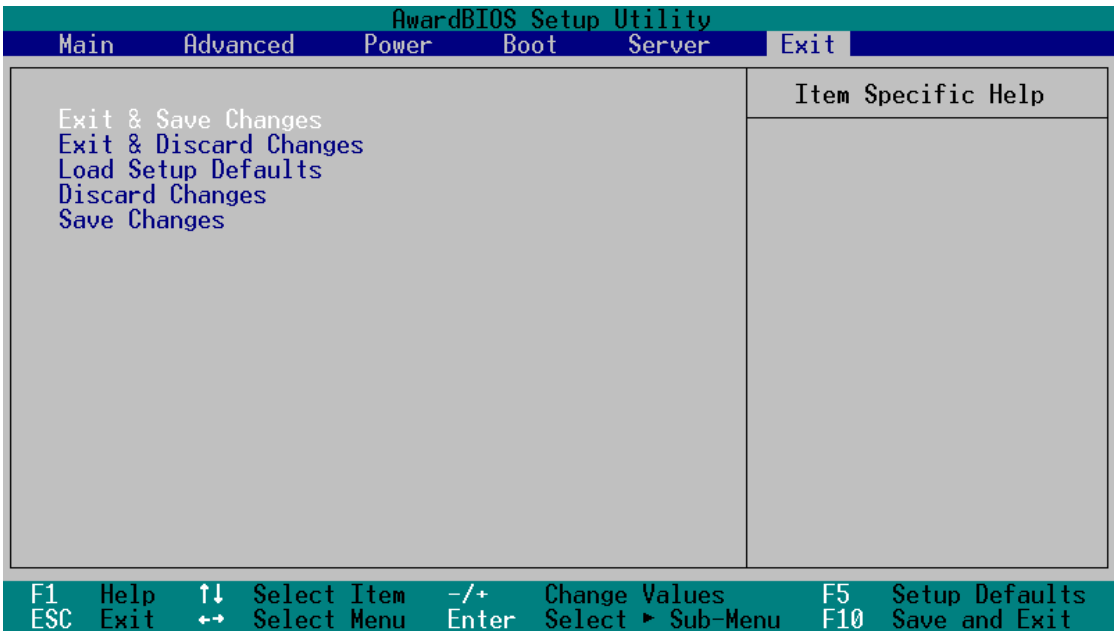
Clear Event Log [Disabled]
This field clears the event log recorded on the sub-menu. Select [Enabled] to automatically clear the event log. Reset to [Disabled] to store up event log data. An IPMI device must be connected to the server for this field to function. Configuration options: [Disabled] [Enabled]

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.

4.8 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.



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.

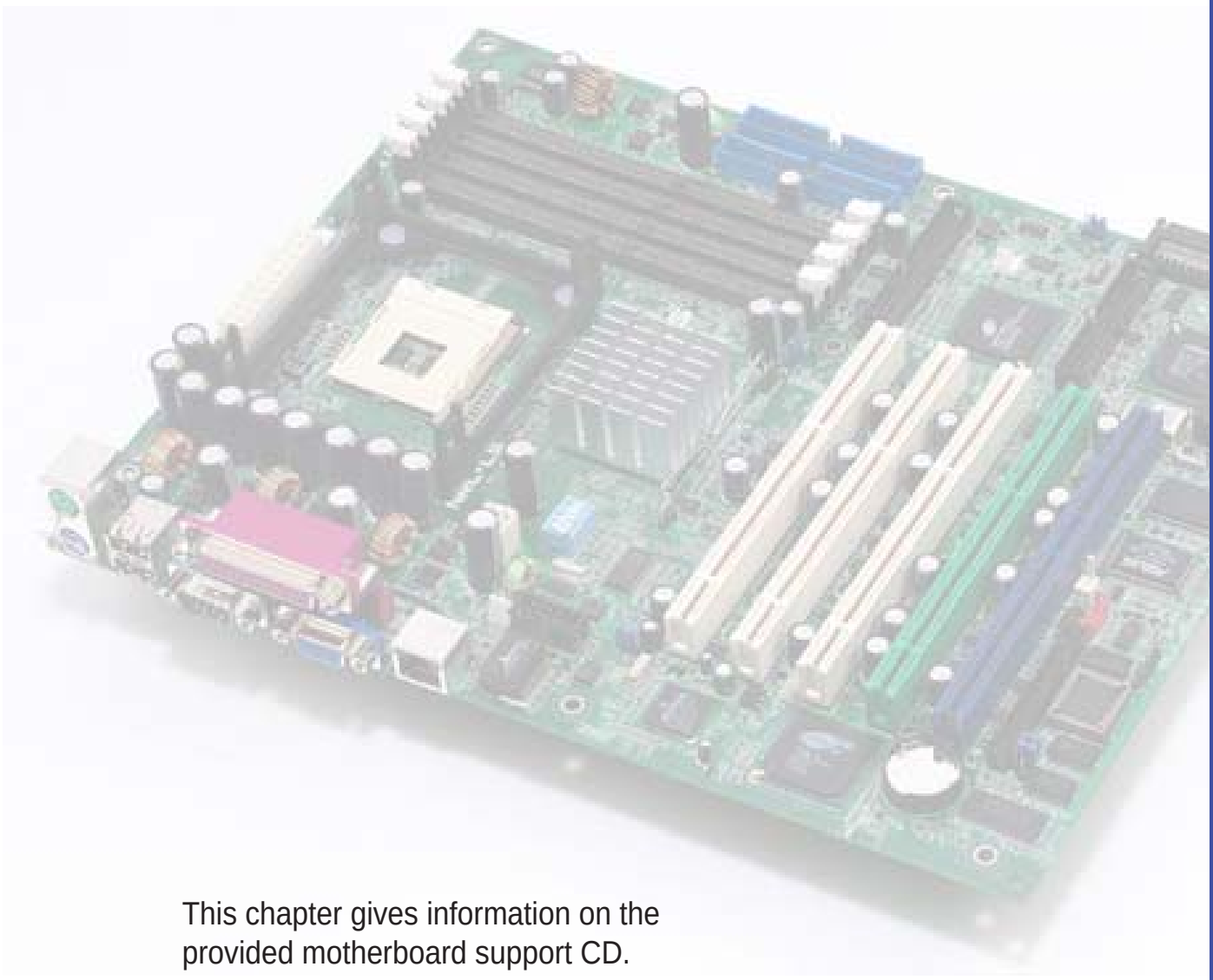
Discard Changes

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

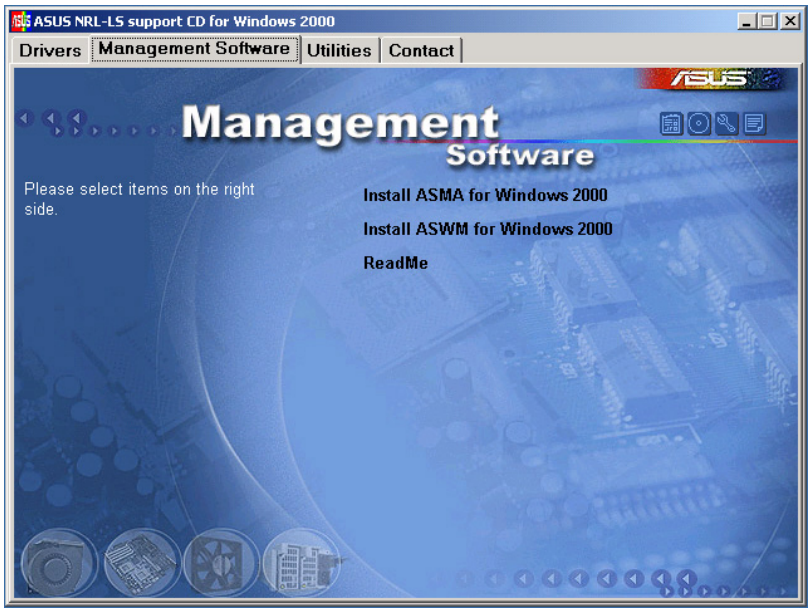
Support CD Contents

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.

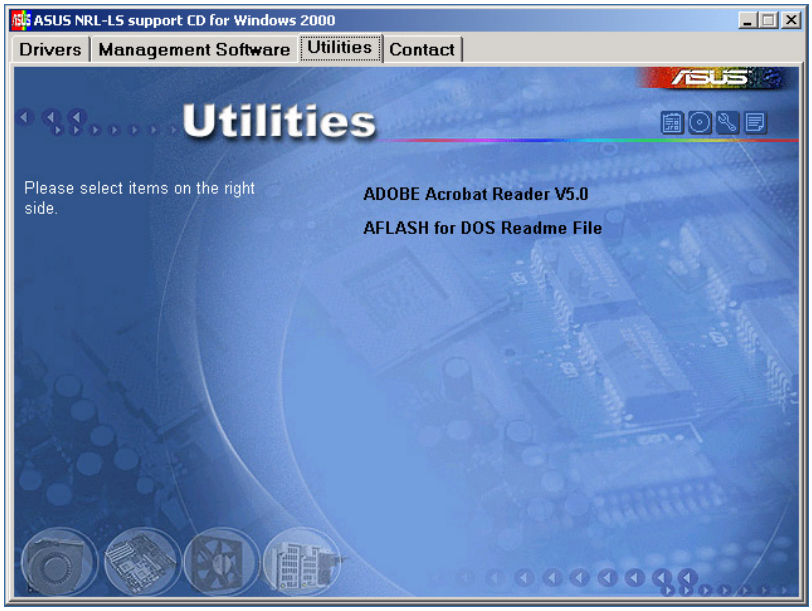
Management Software

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



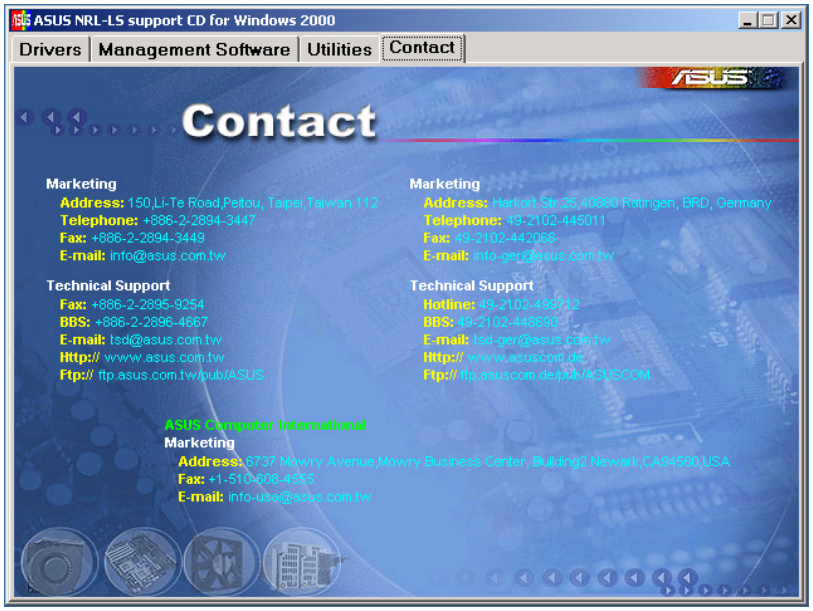
Utilities

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.



NOTE: 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. Broadcom Gigabit LAN Driver Installation

Installing the Driver Software

1. Verify that the Windows NT system is upgraded with Service Pack 4 or later.
2. Start your Windows NT system and log in. You must have Network Administrator privileges to install the driver software.
3. Open the Control Panel.
4. In the Control Panel, double-click the Network icon.
5. When the Network window opens, select the Adapters tab.
6. Click Add to install a new adapter. All previously installed drivers are listed under Network Adapters.
7. When the Select Network Adapter window opens, click Have Disk....
8. When prompted, insert the ASUS Support CD into your system's CD-ROM drive, type the path to the driver, and click OK.

   For example, to install the adapter driver software for Windows NT, type e:\Drivers\LAN\Broadcom\in the Insert Disk location box (where "e:" is the designation of the CD-ROM drive on your system).

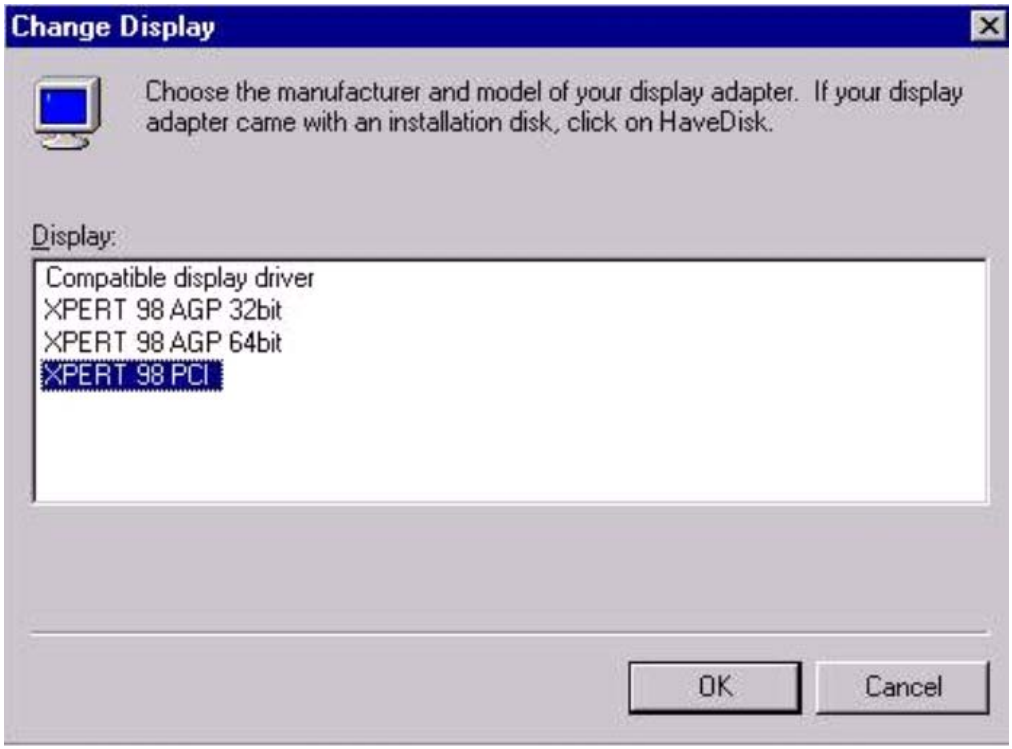
NOTE - If you acquired the adapter software on floppy disk or from the Broadcom support website, enter the path to where the adapter driver files reside on your system.

   With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click OK.

   The adapter files are installed, then the Network window is displayed showing the newly installed adapter.
9. Click Close, then the Microsoft TCP/IP Properties window appears.
10. Configure the TCP/IP protocol and click OK.
11. When prompted to restart your computer, click Yes.

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. Broadcom Gigabit LAN Driver Installation

Installing the Driver Software

1. Verify that the Windows 2000 system is upgraded any necessary Service Packs.
2. Start your Windows 2000 system and log in. You must have Network Administrator privileges to install the driver software.
3. Open the Control Panel.
4. In the Control Panel, double-click the Network icon.
5. When the Network window opens, select the Adapters tab.
6. Click Add to install a new adapter. All previously installed drivers are listed under Network Adapters.
7. When the Select Network Adapter window opens, click Have Disk....
8. When prompted, insert the ASUS Support CD into your system's CD-ROM drive, type the path to the driver, and click OK.

   For example, to install the adapter driver software for Windows 2000, type e:\Drivers\LAN\Broadcom\in the Insert Disk location box (where "e:" is the designation of the CD-ROM drive on your system).

NOTE - If you acquired the adapter software on floppy disk or from the Broadcom support website, enter the path to where the adapter driver files reside on your system.

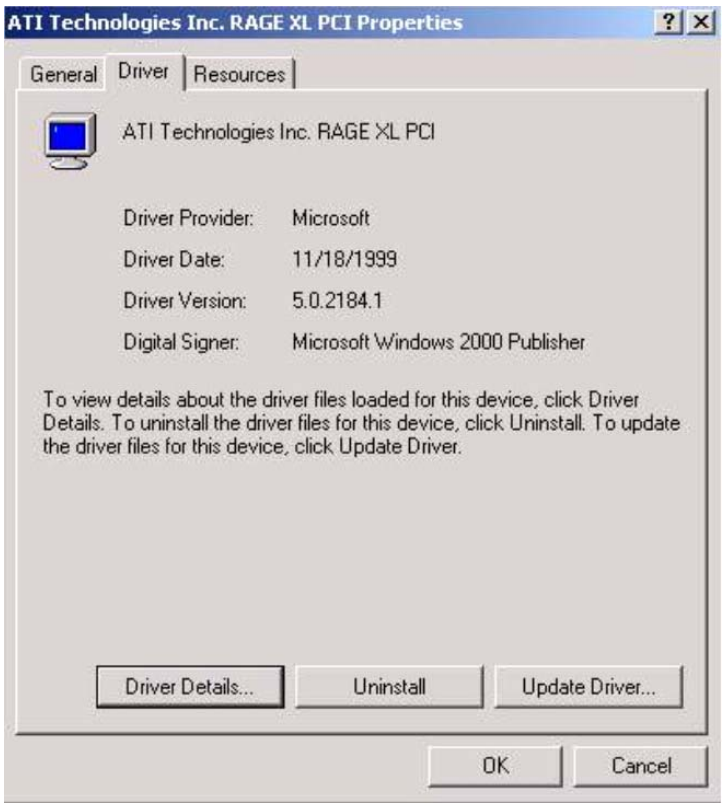
With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click OK.

The adapter files are installed, then the Network window is displayed showing the newly installed adapter.

9. Click Close, then the Microsoft TCP/IP Properties window appears.
10. Configure the TCP/IP protocol and click OK.
11. When prompted to restart your computer, click Yes.

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

II. Broadcom Gigabit LAN Driver Installation

Installing the Driver Software

1. Verify that the Windows XP system is upgraded with any necessary Service Packs.
2. Start your Windows XP system and log in. You must have Network Administrator privileges to install the driver software.
3. Open the Control Panel.
4. In the Control Panel, double-click the Network icon.
5. When the Network window opens, select the Adapters tab.
6. Click Add to install a new adapter. All previously installed drivers are listed under Network Adapters.
7. When the Select Network Adapter window opens, click Have Disk....
8. When prompted, insert the ASUS Support CD into your system's CD-ROM drive, type the path to the driver, and click OK.

   For example, to install the adapter driver software for Windows NT, type e:\Drivers\LAN\Broadcom\in the Insert Disk location box (where "e:" is the designation of the CD-ROM drive on your system).

NOTE - If you acquired the adapter software on floppy disk or from the Broadcom support website, enter the path to where the adapter driver files reside on your system.

With "Gigabit Ethernet Controller" highlighted in the Select OEM Option window, click OK.

The adapter files are installed, then the Network window is displayed showing the newly installed adapter.

9. Click Close, then the Microsoft TCP/IP Properties window appears.
10. Configure the TCP/IP protocol and click OK.
11. When prompted to restart your computer, click Yes.

III. ATI Rage XL Display Driver Installation

Windows XP 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

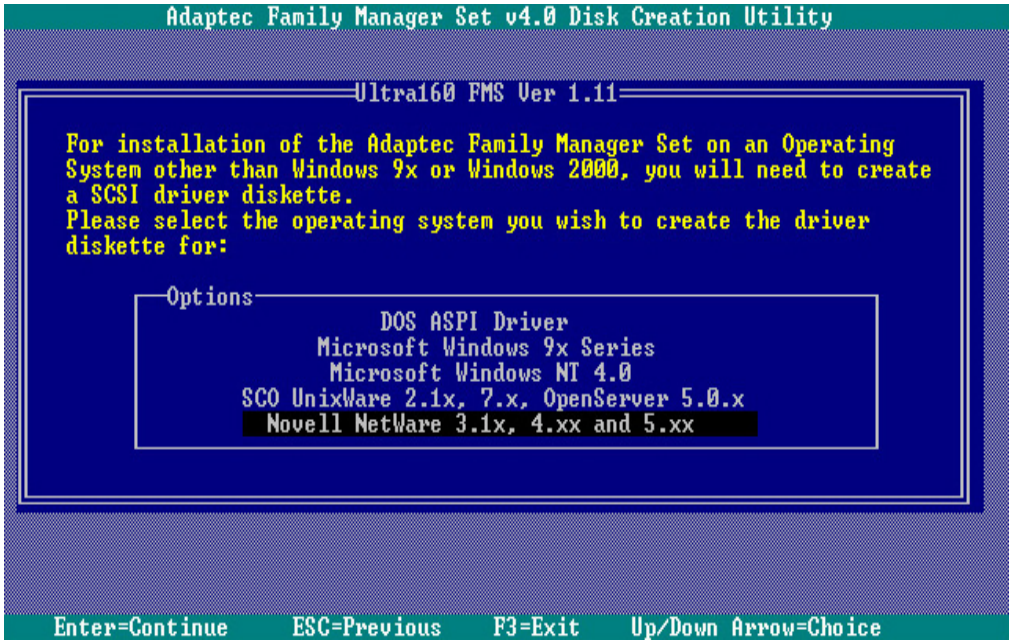
I. ADAPTEC SCSI Driver Installation

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.

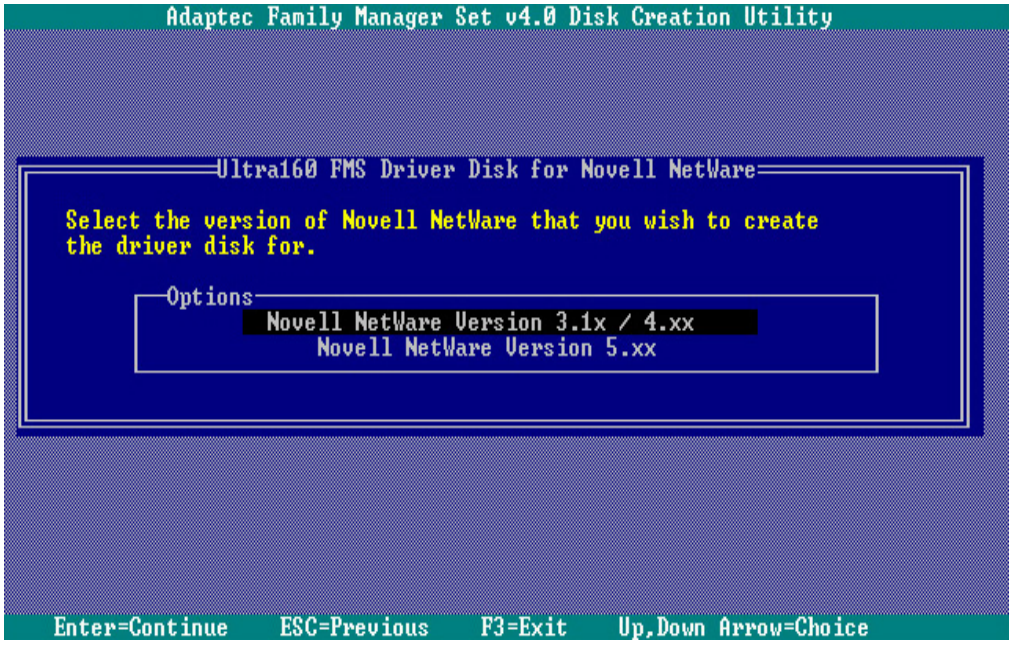
NOTE: Prepare one blank formatted high density floppy disk. Label the disk "Ultra160 FMS v1.11 for Novell Netware version 3.1x/4.xx Setup Disk" or "Ultra160 FMS v1.11 for Novell Netware version 5.xx Setup Disk".

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. Broadcom Gigabit LAN Driver Installation

Installing the Driver Software

Installing Novell NetWare Server 5.x/6.0

Please ensure that the server has the latest support pack available installed. The latest support packs can be found at: "http://support.novell.com/misc/patlst.htm". You may want to create an archive disk by copying all the files from the "\drivers\lan\broadcom\netware\driver" directory of the ASUS support CD onto a floppy disk. If you choose to use the CDROM directly, ensure that the CDROM.NLM is loaded and that you are aware of the NetWare Volume name for the CD ROM that you just installed.

1. From the NetWare Server console, type LOAD NWCONFIG (or just NWCONFIG) and press Enter.
2. From the Configuration Options screen, select Driver options and press Enter.
3. Select the Configure network drivers option and press Enter.
4. Choose the Load an additional driver option and press Enter.
5. Insert the CD or driver disk created using the Broadcom MakeDisk utility, and select the Install an unlisted driver option, by pressing Insert.
6. If you are using the archive disk that you created, insert the disk into drive A: and press Enter. If you have the CD ROM mounted as a NetWare volume, press F3 and enter <Volume Name>: Netware\Driver as the source path. Where <Volume Name> is the name of the NetWare Volume for the CD ROM and Netware\Driver is the directory of the specific files on the CD ROM needed for this installation.
7. The name of the driver displays.
8. Press Enter to select the highlighted driver.
9. A copy the driver prompt appears.
10. Select Yes and press Enter.
11. Select Yes and press Enter to copy the .LDI file. This is the installation script for the driver.
12. Follow the instructions for the installation.
13. Select Save parameters and load driver to continue.
14. Choose Exit to return to the server console prompt.

NOTE - If you are performing an initial installation of NetWare 5.x/6.0 and have more than two adapters installed, the install program will allow you to allocate the actual number of packet receive buffers needed by the adapter. During installation, the RxBuffers value should be set to 32, the minimum number of buffers the driver requires for each adapter. While this setting affects adapter performance, it allows installation of the operating system and up to eight adapters during initial install. Once installation is complete, you need to increase the number of buffers allocated to the driver, as described in Verifying or Modifying Adapter Parameters.

15. After NetWare 5.x/6.0 has been successfully installed, set the minimum packet receive buffers parameter in the startup.ncf file to 1500 for each adapter in the system. Set the maximum packet receive buffers to three times the minimum packet receive buffers. Typically 4 MB of RAM is required per 1000 receive buffers. For more information, see Verifying or Modifying Adapter Parameters.

16. In the autoexec.ncf file, delete the packet receive buffers parameter (RxBuffers=32) in the load statement for this adapter. Deleting the receive buffers phrase from the load statement resets the receive buffers parameter to the default value of 200 for this adapter.

NOTE - The server needs to be restarted for the new configuration.

Example: The default maximum number of receive buffers for the system is 500; the default minimum is 128. Edit the startup.ncf file to have the following entries. The actual numbers will be a function of the number of adapters in the system. The following is an example for a system with 8 adapters installed:

```
set maximum packet receive buffers = 36000
set minimum packet receive buffers = 12000
```

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

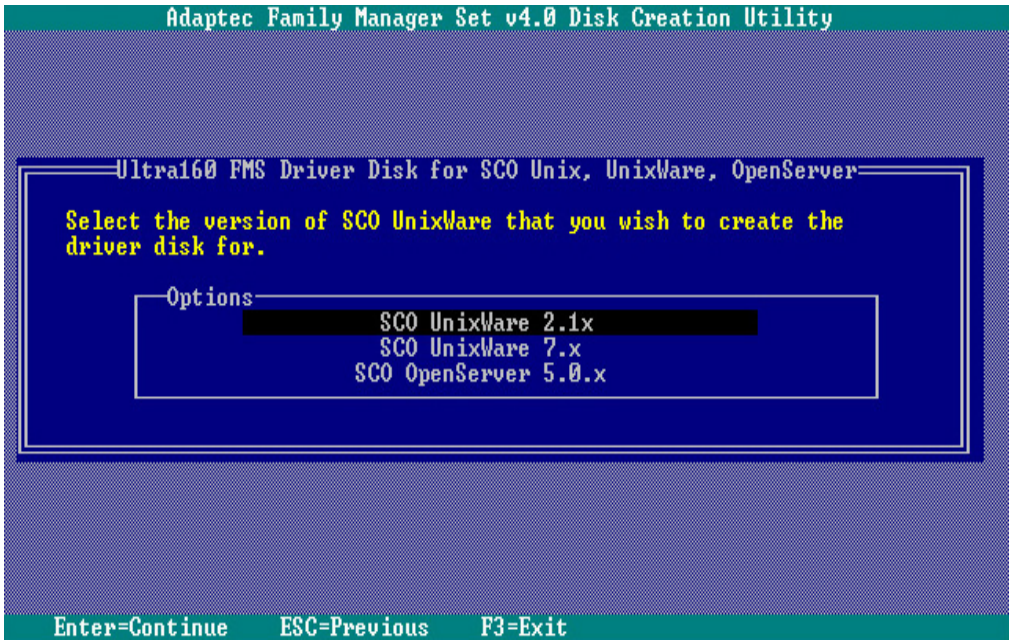
SCO Open Server 5.0.x does not include the drivers for the Adaptec SCSI controller. You must create a river disk prior to SCO Open Server installation.

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. Broadcom Gigabit LAN Driver Installation

Creating a Diskette

1. Copy the file VOL.000.000 to an SCO system. The file is located in "\drivers\lan\broadcom\sco\opensrv" of the ASUS Support CD.
2. Create a diskette using: dd if =VOL.000.000 of=/dev/rfd0135ds18.

Installing the Driver

1. Use custom or scoadmin software to install the SCO OpenServer driver from the media image or from the floppy created above.
2. After the package is installed, use netconfig to add the new network adapter.
3. Once added, modify the hardware configuration in Advanced Options to change the Line Speed and Flow Control if desired. The settings for these parameters are listed below:

Line Speed

- AutoNegotiate (default) (all speeds advertised)
- Fixed HalfDuplex10
- Auto HalfDuplex10 (only 10 Mbps half duplex advertised)
- Fixed FullDuplex10
- Auto FullDuplex10 (only 10 Mbps full duplex advertised)
- Fixed HalfDuplex100
- Auto HalfDuplex100 (only 100 Mbps half duplex advertised)
- Fixed FullDuplex100
- Auto FullDuplex100 (only 100 Mbps full duplex advertised)
- Auto HalfDuplex1000 (only 1000 Mbps half duplex advertised)
- Fixed FullDuplex1000 (Note 1)
- Auto FullDuplex1000 (only 1000 Mbps full duplex advertised)

NOTE: 1000 Mbps (1 Gbps) full duplex fixed speed is only valid for fiber connections. For copper, twisted-pair connections, 1 Gbps can only be set through autonegotiation with a 1 Gbps partner.

Flow Control

- Off (default)
- AutoNegotiate (Symmetric Pause advertised) (Note 2)
- RxPause
- TxPause
- RxPause/TxPause

NOTE: Autonegotiation of Flow Control is only valid when the Line Speed is set to AutoNegotiate (all speeds advertised or single speed advertised).

NOTE: A kernel relink and reboot is required before the new configuration will take effect.

Jumbo Frames and Other Advanced Parameters

Jumbo MTU sizes and other advanced, tunable parameters for the BCM5700 controller are located in the file space.c in the directory /etc/conf/pack.d/bcme. A description for each parameter is contained in space.c. Modify the desired parameter in space.c, rebuild the kernel by doing /etc/conf/bin/idbuild and rebooting the system. Note that the MTU sizes can be individually set for each adapter in the system, whereas all other parameters apply globally to all adapters.

NOTE: 5705 does not support jumbo frames. It can transmit jumbo packets by TCP segmentation, but the ethernet frame size is still limited to 1514 bytes. Receive frame size is also limited to 1514 bytes.

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. Broadcom Gigabit LAN Driver Installation

Packaging

The Linux driver is released in two packaging formats: source RPM and compressed tar formats. The file names for the two packages are bcm5700-<version>.src.rpm and bcm5700-<version>.tar.gz, respectively. Identical source files to build the driver are included in both packages. The tar file contains additional utilities such as patches and driver diskette images for network installation. The files are located in "\drivers\lan\broadcom\linux\driver" of the ASUS Support CD.

Installing Source RPM Package

1. Install the source RPM package:

   rpm -ivh bcm5700-<version>.src.rpm

NOTE: If installing the driver on SuSE 7.x distributions, refer to the Notes section below before continuing.

2. Change the directory to the RPM path and build the binary driver for your kernel:

   cd /usr/src/{redhat,OpenLinux,turbo,packages,rpm ..}

   rpm -bb SPECS/bcm5700.spec

Note that the RPM path is different for different Linux distributions.

3. Install the newly built package (driver and man page):

   rpm -ivh RPMS/i386/bcm5700-<version>.i386.rpm

Note that the --force option is needed if installing on Red Hat 7.1, 7.2, and others that already contain an older version of the driver.

The driver will be installed in the following paths:

2.2.x kernels:

/lib/modules/<kernel_version>/net/bcm5700.o

2.4.x kernels:

/lib/modules/<kernel_version>/kernel/drivers/net/bcm5700.o

2.4.x kernels with bcm5700 driver patched in (e.g. Red Hat 7.1, 7.2):

/lib/modules/<kernel_version>/kernel/drivers/net/bcm/bcm5700.o

or

/lib/modules/<kernel_version>/kernel/drivers/addon/bcm5700/bcm5700.o

4. Load the driver:

   insmod bcm5700

5. To configure the network protocol and address, refer to Linux-specific documentation.

Building Driver From TAR File

1. Create a directory and extract the TAR files:

   tar xvzf bcm5700-<version>.tar.gz

NOTE: If installing the driver on SuSE 7.x distributions, refer to the Notes section below before continuing.

2. Build the driver bcm5700.o as a loadable module for the running kernel:

   cd src

   make

3. Test the driver by loading it:

   insmod bcm5700.o

4. Install the driver and man page:

   make install

NOTE: See the RPM instructions above for the location of the installed driver.

5. To configure network protocol and address, refer to Linux-specific documentations.

> NOTE: If compiling the driver under SuSE's 7.x kernel and errors are reported, follow the general guidelines below to rebuild the kernel source tree.

Kernal Source Tree Guidelines

cd /usr/src/linux-<kernel_version>.SuSE

cp /boot/vmlinuz.config .config

cp /boot/vmlinuz.version.h include/linux/version.h

cp /boot/vmlinuz.autoconf.h include/linux/autoconf.h

make oldconfig

make dep

where <kernel_version> is the actual kernel version used in the SuSE distribution.

Example: /usr/src/linux-2.4.4.SuSE

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.