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PXI/VXI

NI 8350 User Manual

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NATIONAL INSTRUMENTS™

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Determining FCC Class

The Federal Communications Commission (FCC) has rules to protect wireless communications from interference. The FCC places digital electronics into two classes. These classes are known as Class A (for use in industrial-commercial locations only) or Class B (for use in residential or commercial locations). All National Instruments (NI) products are FCC Class A products.

Depending on where it is operated, this Class A product could be subject to restrictions in the FCC rules. (In Canada, the Department of Communications (DOC), of Industry Canada, regulates wireless interference in much the same way.) Digital electronics emit weak signals during normal operation that can affect radio, television, or other wireless products.

All Class A products display a simple warning statement of one paragraph in length regarding interference and undesired operation. The FCC rules have restrictions regarding the locations where FCC Class A products can be operated.

Consult the FCC Web site at `www.fcc.gov` for more information.

FCC/DOC Warnings

This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual and the CE marking Declaration of Conformity*, may cause interference to radio and television reception. Classification requirements are the same for the Federal Communications Commission (FCC) and the Canadian Department of Communications (DOC).

Changes or modifications not expressly approved by NI could void the user's authority to operate the equipment under the FCC Rules.

Class A

Federal Communications Commission

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user is required to correct the interference at their own expense.

Canadian Department of Communications

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Compliance with EU Directives

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* The CE marking Declaration of Conformity contains important supplementary information and instructions for the user or installer.

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About This Manual

The *NI 8350 User Manual* contains information about installing, configuring, using, and maintaining the NI 8350.

Conventions

The following conventions appear in this manual:

» The **»** symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.



This icon denotes a note, which alerts you to important information.



This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash. When this symbol is marked on a product, refer to the *Read Me First: Safety and Radio-Frequency Interference* for information about precautions to take.

bold Bold text denotes items that you must select or click in the software, such as menu items and dialog box options. Bold text also denotes parameter names.

italic Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. Italic text also denotes text that is a placeholder for a word or value that you must supply.

`monospace` Text in this font denotes text or characters that you should enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames, and extensions.

`monospace bold` Bold text in this font denotes the messages and responses that the computer automatically prints to the screen. This font also emphasizes lines of code that are different from the other examples.

Related Documentation

The following documents contain information that you might find helpful as you read this manual:

- *CompactPCI Specification PICMG 2.0 R 3.0*
- *PXI Hardware Specification*, Revision 2.1
- *PXI Software Specification*, Revision 2.1
- ANSI/IEEE Standard 1014-1987, *IEEE Standard for a Versatile Backplane Bus: VMEbus*
- ANSI/IEEE Standard 1155-1998, *IEEE VMEbus Extensions for Instrumentation: VXIbus*
- ANSI/VITA 1-1994, *VME64*
- VXI-6, *VXIbus Mainframe Extender Specification*, Rev. 2.0, VXIbus Consortium
- *NI-VISA User Manual*
- *NI-VISA Programmer Reference Manual*
- *Read Me First: Safety and Radio-Frequency Interference*, National Instruments

1

Getting Started

This chapter describes the key features of the NI 8350 and lists the kit contents and optional equipment you can order from National Instruments.

Unpacking

Carefully inspect the shipping container and the NI 8350 for damage. Check for visible damage to the metal work. Check to make sure all hardware and switches are undamaged. If damage appears to have been caused during shipment, file a claim with the carrier. Retain the packing material for possible inspection and/or reshipment.

What You Need to Get Started

The NI 8350 kit contains the following items:

- ❑ NI 8350 rack mount controller
- ❑ MXI-2 or MXI-4 kit
- ❑ *NI 8350 Installation Guide*
- ❑ Windows XP recovery CD
- ❑ NI driver CD
- ❑ NI-VXI/NI-VISA or MXI-4 software CD
- ❑ Rack mount kit
- ❑ AC power cable (refer to Table 1-1 for a list of AC power cables)

Table 1-1. AC Power Cables

Power Cable	Reference Standards
Standard 120 V (USA)	ANSI C73.11/NEMA 5-15-P/IEC83
Switzerland 220 V	SEV
Australia 240 V	AS C112
Universal Euro 230 V	CEE (7), II, IV, VII IEC83
North America 240 V	ANSI C73.20/NEMA 5-15-P/IEC83
United Kingdom 230 V	BS 1363/IEC83
Japan 100 V	ANSI C73.11/NEMA 5-15-P/IEC83

If you are missing any of the previously listed items, or if you have the incorrect AC power cable, contact National Instruments.

Key Features

The NI 8350 combines the performance of a PC with a National Instruments remote controller for PXI or VXI in a rack-mountable compact 1U form factor.

Mainboard Features

CPU

- Intel Pentium 4 3.0 GHz CPU with 800 MHz FSB and 1 MB L2 cache

Chipset

- Intel E7210 chipset

Memory

- 512 MB memory standard (2 × 256 MB non-ECC (32 M × 64 bit), unbuffered, DDR400 3-3-3 DIMM)
- Maximum memory supported: 4 GB DDR400 SDRAM in 4 DIMM sockets (184 pin)

Video

- ATI Rage XL with 8 MB SDRAM

HDD

- 80 GB (or greater) SATA hard drive
- 3.5 in. expansion bay SATA or ATA 100/66/33

CD-ROM

- Slim CD-ROM drive

Onboard LAN

- Intel 82547 GI Gigabit LAN
- Intel 82541 GI Gigabit LAN
- Programmed Ethernet MAC address and EEPROM

Onboard I/O

- PS/2 keyboard port
- PS/2 mouse port
- Serial port
- VGA port
- Parallel port
- Two USB 2.0 ports (rear)
- Two USB 2.0 ports (front)
- Two RJ-45 ports

Remote Controller

- MXI-2 or MXI-4 interface

Power Management Features

- RTC alarm and wake up
- Wake up on LAN (WOL)
- Wake up on serial ring
- Wake up on keyboard/mouse from sleep (S1)
- Wake up on USB from sleep (S1)
- Wake up on PCI
- Supports ACPI S1/S4/S5 functions

Devices

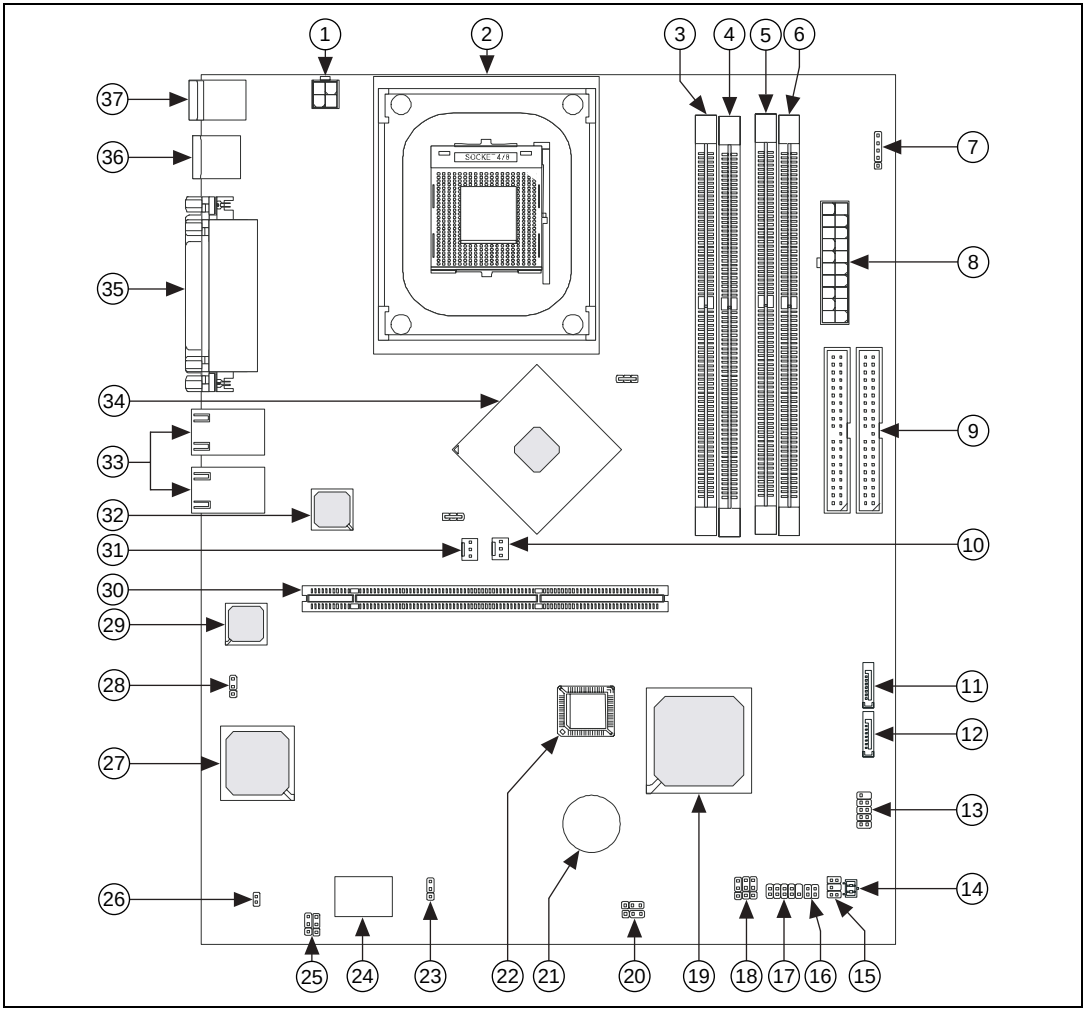
- 6 × 2 line LCD display panel
- Up, Enter, and Next buttons

Front Panel LEDs

- Power
- LAN activity
- HDD activity

NI 8350 Description

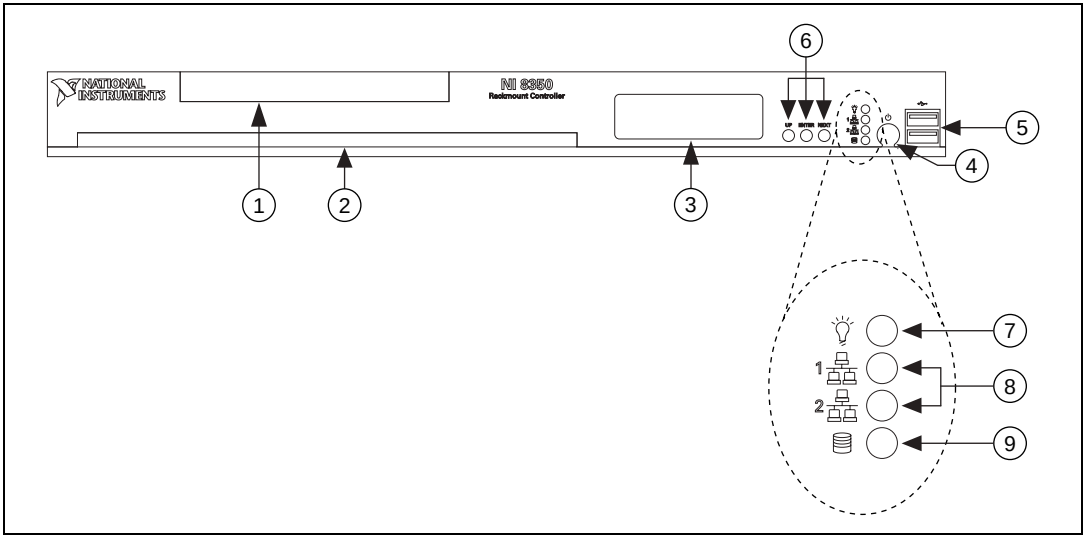
Figure 1-1 shows the key features of the NI 8350 mainboard.



1 JPWR1	11 SATA2	21 Battery	31 SYSFAN2
2 CPU Socket	12 SATA1	22 BIOS	32 Intel 82547GI
3 DIMM 1	13 JUSB2	23 JISA1	33 RJ45 LAN Jacks
4 DIMM 2	14 JCI1	24 NS PC87366	34 Intel E7210 MCH
5 DIMM 3	15 JLCD1	25 J10/J11	35 Top—LP1; Bottom—COM A, VGA Port
6 DIMM 4	16 JACT1/JACT2	26 J8	
7 JIPMB1	17 JFP1	27 ATI Rage XL	36 USB Ports
8 JPWR2	18 J3/J4/J5	28 J1	37 PS/2 Connectors (Top—Mouse; Bottom—Keyboard)
9 IDE1/IDE2	19 Intel 6300ESB I/O CH	29 Intel 82541GI	
10 SYSFAN3	20 JBAT1/J9	30 PCIX1	

Figure 1-1. NI 8350 Mainboard Layout

Figure 1-2 shows the key features of the NI 8350 front panel. For detailed information about the NI 8350 rear panel, refer to Chapter 3, *I/O Information*.



1	CD-ROM	4	Power Button (On/Standby)	7	Power Indicator
2	Air Inlet	5	USB Ports	8	LAN Status Indicator
3	LCD Front Panel	6	LCD Control Buttons	9	Hard Disk in Use Indicator

Figure 1-2. Front View of the NI 8350

The front panel includes the following LEDs:

- **Power indicator**—glows when the NI 8350 is powered on.
- **LAN status indicators**—flash when there is activity on LAN1 or LAN2.
- **Hard disk in use indicator**—flashes when the system is accessing data on the hard disk.

The front panel also includes the following LCD control buttons:

- **Up**—Use this button to return to the previous selection.
- **Enter**—Use this button to execute the command.
- **Next**—Use this button to go to the next selection.

Optional Equipment

Memory Upgrades

You can upgrade the NI 8350 memory to a maximum of 4 GB.

The NI 8350 supports dual-channel DDR 400/333 SDRAM unbuffered memory in four 184-pin DIMM sockets. The NI 8350 supports non-ECC and ECC memory.

Note National Instruments has tested and verified that the DDR DIMMs we sell work with the NI 8350. We recommend you purchase your DDR DIMM modules from National Instruments. Other off-the-shelf DDR DIMM modules are not guaranteed to work properly.

Rack Mount Kit

A rack mount kit is included for mounting the NI 8350 chassis into a 19 in. instrument cabinet.

USB Floppy Disk Drive

A USB floppy drive is available from National Instruments, part number 778492-02.

NI 8350 Overview

The NI 8350 is a 1U high rack-mountable PC with a remote controller for a PXI or VXI system. It is designed for PC control of a PXI or VXI test and measurement system using a minimum of rack space. A cable and PXI or VXI remote controller are included for connection to a PXI or VXI chassis.

The NI 8350 has an Intel Pentium 4 processor with hyperthreading technology for high performance. When hyperthreading technology is activated, the system looks and behaves like a multiprocessor system. This allows multithreaded software to better use the CPU. This often increases the throughput of multithreaded applications, but single-threaded applications may run more slowly. Hyperthreading is enabled by default in the NI 8350 BIOS. To disable hyperthreading, refer to the *BIOS Setup* section of Chapter 2, *Installation and Configuration*. A hyperthreaded system must also have a hyperthreading-capable OS such as Windows XP, which ships with the NI 8350. For more information about hyperthreading, refer to `ni.com/support`.

National Instruments Software

National Instruments has developed several software kits you can use with the NI 8350.

NI-DAQ has an extensive library of functions that you can call from your application programming environment. These functions include routines for analog input (A/D conversion), buffered data acquisition (high-speed A/D conversion), analog output (D/A conversion), waveform generation, digital I/O, counter/timer operations, SCXI, RTSI, self-calibration, messaging, and acquiring data to extended memory.

NI-VISA is the National Instruments implementation of the VISA specification. VISA is a uniform API for communicating and controlling Serial, GPIB, PXI, VXI, and various other types of instruments. This API aids in the creation of more portable applications and instrument drivers. For information about writing your own PXI instrument driver with NI-VISA, refer to the *NI-VISA Getting Started* manual and the `readme.txt` file in the `NI-VISA` directory.

You also can use the National Instruments LabVIEW, Measurement Studio, and LabWindows™/CVI™ application programs and instrument drivers to ease your programming task. These standardized programs match the modular virtual instrument capability of PXI and can reduce your PXI software development time. These programs feature extensive libraries of GPIB, Serial, and VXI instrument drivers written to take full advantage of direct PXI control. LabVIEW and Measurement Studio include all the tools needed for instrument control, data acquisition, analysis, and presentation.

LabVIEW is an easy-to-use, graphical programming environment you can use to acquire data from thousands of different instruments, including IEEE 488.2 devices, VXI devices, serial devices, PLCs, and plug-in data acquisition boards. After you have acquired raw data, you can convert it into meaningful results using the powerful data analysis routines in LabVIEW. LabVIEW also comes with hundreds of instrument drivers, which dramatically reduce software development time, because you do not have to spend time programming the low-level control of each instrument.

Measurement Studio allows you to choose from standard environments such as Microsoft Visual Basic, Visual C++, and Visual Studio .NET to create your application, using tools specific for each language. With Measurement Studio, you can write programs quickly and easily and modify them as your needs change.

LabWindows/CVI is an interactive ANSI C programming environment designed for building virtual instrument applications.

LabWindows/CVI delivers a drag-and-drop editor for building user interfaces, a complete ANSI C environment for building your test program logic, and a collection of automated code generation tools, as well as utilities for building automated test systems, monitoring applications, or laboratory experiments.

2

Installation and Configuration

This chapter describes how to install, configure, and use the NI 8350.

Before connecting the NI 8350 to a power source, read this chapter and the *Read Me First: Safety and Radio-Frequency Interference* document included with your NI 8350.

Safety Information

Caution Before undertaking any troubleshooting, maintenance, or exploratory procedure, carefully read the following caution notices.

This equipment contains voltage hazardous to human life and safety, and is capable of inflicting personal injury.

- **Chassis Grounding**—The NI 8350 requires a connection from the premise wire safety ground to the NI 8350 chassis ground. The earth safety ground *must* be connected during use of this equipment to minimize shock hazards. Refer to the *Connecting Safety Ground* section for instructions on connecting safety ground.
- **Live Circuits**—Operating personnel and service personnel *must* not remove protective covers when operating or servicing the NI 8350. Adjustments and service to internal components must be undertaken by qualified service technicians. During service of this product, the mains connector to the premise wiring must be disconnected. Dangerous voltages may be present under certain conditions; use extreme caution.
- **Explosive Atmosphere**—Do *not* operate the chassis in conditions where flammable gases are present. Under such conditions this equipment is unsafe and may ignite the gases or gas fumes.

- **Parts Replacement**—Only service this equipment with parts that are exact replacements, both electrically and mechanically. Contact National Instruments for replacement part information. Installation of parts with those that are not direct replacements may cause harm to personnel operating the chassis. Furthermore, damage or fire may occur if replacement parts are unsuitable.
- **Modification**—Do *not* modify any part of the NI 8350 from its original condition. Unsuitable modifications may result in safety hazards.

Chassis Cooling Considerations

The NI 8350 is designed to operate on a bench or in an instrument rack. Determine how you want to use the NI 8350 and follow the appropriate installation instructions.

Providing Adequate Clearance

Apertures in the front, rear, and along both sides of the chassis facilitate power supply and motherboard cooling. Air enters through the front and side inlets of the chassis and exits through the fans on the rear of the chassis. Place the NI 8350 on a bench top or in an instrument rack so that the fans (air outlets) and the air inlet apertures along both sides and the front of the chassis have adequate ventilation. Keep other equipment a minimum of 76.2 mm (3 in.) away from the air outlets on the rear of the chassis.

Installation

Follow these steps to connect devices to the NI 8350:

1. Connect a keyboard and mouse to the appropriate connectors on the NI 8350 rear panel.
2. Connect the VGA monitor video cable to the VGA connector on the rear panel.
3. Connect the network cable to LAN jack 1 on the rear panel.
4. Connect the USB, serial, and parallel devices as necessary to the NI 8350 front and rear panel ports.

Caution To minimize shock hazard, make sure the electrical power outlet you use to power the NI 8350 has an appropriate earth safety ground. Refer to the *Connecting Safety Ground* section for more information.

5. Connect the AC power cable to the AC inlet on the rear panel and to an AC power outlet. For more information, refer to the *Connecting to Power Source* section.
6. Connect the MXI-2 or MXI-4 port on the rear of the NI 8350 to the VXI or PXI chassis and power on the chassis.
7. Power on the NI 8350.
8. Verify that the NI 8350 boots. If it does not boot, refer to the *What if the NI 8350 does not boot?* section of Chapter 5, *Troubleshooting*.

Connecting Safety Ground

The NI 8350 is designed with a three-position NEMA 5-15 style plug for the U.S. that connects the ground line to the chassis ground. To minimize shock hazard, make sure the electrical power outlet you use to power the chassis has an appropriate earth safety ground.

Connecting to Power Source

Attach input power through the rear AC inlet using the appropriate AC power cable supplied.

Caution To completely remove power, you *must* disconnect the AC power cable.

The power switch allows you to power on the chassis or place it in standby mode. Push the power switch to the On position (if not already on). Observe that all fans become operational and the power indicator is lit.

BIOS Setup

Entering Setup

Power on the computer, and the system starts the POST (Power On Self Test) process. When the following message appears, press <Delete> to enter setup.

```
Press DEL to enter SETUP
```

If the message disappears before you respond, and you still want to enter setup, restart the system by turning it off and on. You may also restart the system by pressing <Ctrl-Alt-Delete>.

Control Keys

Table 2-1 lists the BIOS setup control keys.

Table 2-1. BIOS Setup Control Keys

Key	Function
↑	Move to the previous option
↓	Move to the next option
←	Move to the option on the left
→	Move to the option on the right
Enter	Select the option
Esc	Jump to the **Exit** menu or return to the main menu from a submenu
Page Up	Increase the numeric value or make changes
Page Down	Decrease the numeric value or make changes
F1	General help (only for the **Status Page Setup** menu and **Option Page Setup** menu)
F5	Restore the previous CMOS value from CMOS (only for the **Option Page Setup** menu)
F6	Load the default CMOS value from the Fail-Safe default table (only for the **Option Page Setup** menu)
F7	Load optimized defaults
F10	Save all CMOS changes and exit

Getting Help

After entering the setup menu, the first menu you see is the **Main** menu.

Main Menu

The **Main** menu lists the setup functions you can change. Use the arrow keys (↑↓) to select an option. The highlighted setup function online description appears at the bottom of the screen.

Submenu

If a triangle appears to the left of an option, you can launch a submenu from this option. A submenu contains additional options for a option parameter. Use the arrow keys (↑↓) to highlight the option and press <Enter> to access the submenu. Then use the control keys to enter values and move from option to option within a submenu. To return to the main menu, press <Esc>.

General Help <F1>

The BIOS setup program includes a general help screen. To access this screen from any menu, press <F1>. The help screen lists the appropriate keys to use and the possible selections for the highlighted option. Press <Esc> to exit the help screen.

Main Menu

When you enter the Phoenix-AwardBIOS CMOS Setup Utility, the **Main** menu appears. The **Main** menu displays 12 configurable functions and two exit choices. Use the arrow keys to navigate the options and press <Enter> to enter the submenus.

Standard CMOS Features

Use this menu for basic system configurations, such as time, date, and hard drive settings.

IPMI V1.5 BIOS Features (for Mainboards with the mBMC Chip)

Use this menu to configure the Platform Event Filter (PEF) status and watchdog features.

Advanced BIOS Features

Use this menu to configure the special enhanced features.

Advanced Chipset Features

Use this menu to change the values in the chipset registers and optimize your system performance.

Integrated Peripherals

Use this menu to specify your settings for integrated peripherals.

Power Management Setup

Use this menu to specify your settings for power management.

Frequency/Voltage Control

Use this menu to specify your settings for frequency/voltage control.

Load Fail-Safe Defaults

Use this menu to load the BIOS default values for minimal but stable system performance.

Load Optimized Defaults

Use this menu to load the BIOS factory default values for optimal system operation.

Set Supervisor/User Password

Use this menu to set user and supervisor passwords.

Save & Exit Setup

Use this menu to save changes to CMOS and exit setup.

Exit Without Saving

Use this menu to ignore all changes and exit setup.

Standard CMOS Features

Use the arrow keys to navigate the options in the **Standard CMOS Features** menu and use <Page Up> or <Page Down> to switch to the value you prefer.

Date (mm:dd:yy)

Use this menu to set the system date. The format is <day> <month> <date> <year>.

day	The day is determined by the BIOS and is read only.
month	Select the month using <Page Up> and <Page Down>.
date	Select the date using <Page Up> and <Page Down>.
year	Select the year using <Page Up> and <Page Down>.

Time (hh:mm:ss)

Use this menu to set the system time. The time format is <hour> <minute> <second>.

IDE Primary/Secondary Master/Slave

Press <Page Up> or <Page Down> to select **Manual**, **None**, or **Auto**. Your hard disk specifications must match the drive table. The hard disk will not work properly if you enter improper information in this menu. If your hard disk drive type is not matched or listed, use **Manual** to define your own drive type manually.

If you select **Manual**, you must enter the following related information. This information should be in the hard disk or system documentation.

Access Mode	The settings are **CHS**, **LBA**, **Large**, and **Auto**
Capacity	The formatted size of the storage device
Cylinder	The number of cylinders

Head	The number of heads
Precomp	The write precompensation
Landing Zone	The landing zone cylinder location
Sector	The number of sectors

If the HDD interface controller is a SCSI device or CD-ROM, select **None**.

Halt On

This setting determines whether the system stops if an error is detected at boot. The available options are:

- **All Errors**—The system stops for any detected error.
- **Disabled**—The system does not stop for any detected error.
- **All But Keyboard**—The system stops for any error except a keyboard error.
- **All But Diskette**—The system stops for any error except a disk error.
- **All But Disk/Key**—The system stops for any error except a disk or keyboard error.

Base/Extended/Total Memory

These read-only options show the system memory status.

IPMI V1.5 BIOS Features

PEF Configuration Status

This read-only option shows the current Platform Event Filter (PEF) configuration status.

Setting PEF Configuration

Use this setting to set the Platform Event Filter (PEF) configuration. When **Enabled** is selected, the server sends the event signal to the BMC.

BMC Event Log

Select **Enabled** to store POST error or initial messages to the BMC event log. If you do not want to write these messages to the DMI Event log, select **Disabled**. Select **Cleared** to clear the BMC event log at the next POST stage.

Watchdog Timeout Action

The Watchdog Timer (WDT) is a special hardware device to monitor whether the computer system functions normally. If the system does not function normally, it can take several actions when the Watchdog Timer expires—**No Action**, **Hard Reset**, **Power Down**, or **Power Cycle**.

Watchdog Timer Counter

Use this feature to set the time interval to reboot the computer if a timeout event occurs.

Advanced BIOS Features

Hard Disk Boot Priority

This option determines the boot priority of the installed hard disks.

Hyperthreading Technology

The Intel processor uses hyperthreading technology to increase transaction rates and reduce end-user response times. The technology treats the two cores inside the processor as two logical processors that can execute instructions simultaneously, thereby improving system performance. If you choose **Disabled**, the processor uses only one core to execute the instructions.

Note Enabling hyperthreading requires an Intel Pentium 4 processor, Intel chipset, BIOS, and operating system that support hyperthreading. For more information about hyperthreading, refer to `www.intel.com/info/hyperthreading`.

Quick Power On Self Test

This option decreases the time needed for the Power On Self Test (POST) after you power on the computer. If you select **Enabled**, the BIOS shortens or skips some check items during POST.

First/Second/Third Boot Device

Use this option to set the sequence of devices from which the BIOS loads the disk operating system.

Boot Other Device

If you set this option to **Enabled**, the system can boot from other devices if it fails to boot from the first, second, or third boot devices.

Boot Up NumLock Status

Use this option to set the Num Lock status when the system is powered on. Choose **On** to turn on the Num Lock key when the system is powered on. Choose **Off** to allow users to use the arrow keys on the numeric keypad.

Security Option

Use this option to specify the type of BIOS password protection. If you choose **Setup**, the password prompt appears only when the user runs setup. If you choose **System**, a password prompt appears every time the computer is powered on or when the user runs setup.

APIC Mode

Use this option to enable or disable the Advanced Programmable Interrupt Controller (APIC). Choose **Enable** to expand available IRQ resources for the system.

MPS Version Control for OS

Use this option to select the operating system Multiprocessor Specification (MPS). Select the MPS version (1.4 or 1.1) supported by your operating system. To find which version to use, consult your operating system vendor.

Console Redirection

Console redirection operates in host systems that do not have an attached monitor or keyboard. This setting enables/disables console redirection. When set to **Enabled**, the BIOS redirects and sends all contents that should be displayed on the screen to the serial COM port for display on the terminal screen. Also, all data received from the serial port is interpreted as keystrokes from a local keyboard.

Baud Rate

This option specifies the console redirection transfer rate as 9600, 19200, 38400, 57600, or 115200 bps.

Agent Connect Via

To use system console redirection, you need a terminal supporting ANSI terminal protocol and an RS-232 null modem cable connected between the host system and terminal(s). This read-only option indicates the type of device connected between the host system and terminal(s). NULL indicates a null modem.

Agent Wait Time (Min)

This option controls the timeout for the terminal console redirection connection to the host system.

Agent After Boot

This option determines whether to keep terminal console redirection running after the OS boots.

DMI Event Log

This option enables the BIOS to log Desktop Management Interface (DMI) events.

Clear All DMI Event Log

Select **Yes** to clear the DMI event log at the next POST stage. Then, the BIOS automatically resets this option to **No**.

View DMI Event Log

Press <Enter> to view all DMI event logs.

Mark DMI Events as Read

Press <Enter>, and a screen asks you to confirm whether to clear all DMI event logs immediately. Press <Y> and then <Enter>, and the BIOS clears all DMI event logs.

Event Log Capacity

This option allows the system to show whether there is enough space for event logs.

Event Log Validity

This option allows the system to show whether the event logs are valid.

Case Open Warning

This option is set to **Disabled** by default. Select **Enabled** to record the chassis intrusion status and issue a warning message if the chassis is opened. The case opened warning message appears at the startup screen the next time the computer is booted. To clear the warning message, enter the BIOS and set this option to **Reset**. The setting automatically returns to **Enabled** later.

CPU Feature

Press <Enter> to enter the CPU Feature submenu screen.

Delay Prior to Thermal

When the CPU temperature reaches a factory preset level, a thermal monitoring mechanism is enabled, following the appropriate timing delay specified in this option. With thermal monitoring enabled, clock modulation controlled by the processor internal thermal sensor is also activated to keep the processor within its allowable temperature limit.

Thermal Management

Choose **Thermal Monitoring 1 on die throttling** or **Thermal Monitoring 2 Ratio & VID transition** to specify the thermal monitoring system.

TM2 Bus Ratio (hidden for Prescott processor)

This option sets the frequency (bus ratio) of the throttled performance state that is initiated when the on die sensor goes from cool to hot. The range is 0 to 255.

TM2 Bus VID (hidden for Prescott processor)

This option sets the voltage of the throttled performance state that is initiated when the on die sensor goes from cool to hot. The range is 0.8375 V to 1.6000 V.

Advanced Chipset Features

Note Change these settings only if you are familiar with the chipset.

DRAM Timing Selectable

Use this option to select whether DRAM timing is controlled by the Serial Presence Detect (SPD) EEPROM on the DRAM module. If you select **By SPD**, DRAM timing is determined automatically by the BIOS based on the SPD configurations. Selecting **Manual** allows these options to be configured manually.

CAS Latency Time

This option controls the timing delay (in clock cycles) before the SDRAM starts a read command after receiving it. Choosing **2** increases the system performance the most, while **3** provides the most stable performance.

Active to Precharge Delay

The option specifies the idle cycles before precharging an idle bank.

DRAM RAS# to CAS# Delay

This option allows you to set the number of cycles for a timing delay between the CAS and RAS strobe signals, used when DRAM is written to, read from, or refreshed. Fast speed offers faster performance, while slow speed offers more stable performance.

DRAM RAS# Precharge

This option controls the number of cycles for Row Address Strobe (RAS) allowed to precharge. If insufficient time is allowed for the RAS to accumulate its charge before DRAM refresh, refresh may be incomplete and the DRAM may fail to retain data. This option applies only when synchronous DRAM is installed in the system.

Memory Frequency For

Use this option to configure the clock frequency of the installed DRAMs.

DRAM Data Integrity Mode

Select **ECC** (Error-Correcting Code) or **Non-ECC**, according to the type of installed DRAM.

Integrated Peripherals

On-Chip IDE Device

Press <Enter> to enter the OnChip IDE submenu.

IDE HDD Block Mode

This option allows your hard disk controller to use the fast block mode to transfer data to and from the hard disk drive. Block mode is also known as *block transfer*, *multiple commands*, or *multiple sector read/write*. **Enabled** enables the IDE controller to use block mode; **Disabled** allows the controller to use standard mode.

IDE DMA Transfer Access

Setting this option to **Enabled** opens DMA bus master and executes DMA action in DOS, which increases data transfer speed.

On-Chip Primary/Secondary PCI IDE

The integrated peripheral controller contains an IDE interface with support for two IDE channels. Choose **Enabled** to activate each channel separately.

IDE Primary/Secondary Master/Slave PIO

Use these four options to set a Programmed Input/Output (PIO) mode for each IDE device that the onboard IDE interface supports. Modes **0**–**4** provide increased performance. In **Auto** mode, the BIOS automatically determines the best mode for each IDE device.

IDE Primary/Secondary Master/Slave UDMA

Ultra DMA implementation is possible only if your IDE device supports it and your operating environment contains a DMA driver. If both your hard drive and software support Ultra DMA 33 (or higher), select **Auto** to enable BIOS support.

On-Chip Serial ATA

Use this option to determine how the RAID controller on the south bridge switches to a SATA controller. When set to **Auto**, the BIOS automatically switches from the RAID to the SATA and vice versa. If **Disabled** is selected, only the SATA controller is enabled.

Serial ATA Port 0/1 Mode

Select a compatible mode for Port 0 and Port 1 from the following chipset settings:

- **Primary Master**—Compatible Mode with Serial ATA Port 0 set to Primary Master
- **Primary Slave**—Compatible Mode with Serial ATA Port 0 set to Primary Slave
- **Secondary Master**—Compatible Mode with Serial ATA Port 0 set to Secondary Master
- **Secondary Slave**—Compatible Mode with Serial ATA Port 0 set to Secondary Slave
- **Logical Primary**—Compatible Mode with only Serial ATA Enabled and Port 0 set to Primary Master
- **Logical Secondary**—Compatible Mode with only Serial ATA Enabled and Port 0 set to Secondary Master
- **Enhance Mode Port 0 (Tertiary Master)**—Enhanced Mode with Port 0 set to Native Mode Master
- **Enhance Mode Port 1 (Quaternary Master)**—Enhanced Mode with Port 1 set to Native Mode Master

Onboard Device

Press <Enter> to enter the Onboard Device submenu.

USB Controller

Select **Enabled** to enable the Universal Serial Bus (USB) UHCI controller. Select **Disabled** to hide the USB controller from the operating system.

USB 2.0 Controller

Select **Enabled** to enable the USB 2.0 (EHCI) controller. Select **Disabled** to hide the USB 2.0 controller from the operating system.

USB Keyboard/Mouse Support

Select **Enabled** if you need to use a keyboard/mouse with an operating system the does not support USB.

CSA LAN (Giga-LAN)

Select Enabled to activate the onboard Gigabit LAN controller.

82547 LAN Boot ROM

This option enables/disables onboard LAN Boot ROM initialization during bootup. Selecting **Disabled** decreases the time needed for bootup.

Super IO Device

Press <Enter> to enter the Super IO Device submenu.

Onboard Serial Port 1

These options specify the base I/O port address and IRQ for the onboard Serial Port 1 (COM 1). Selecting **Auto** allows the BIOS to determine the correct base I/O port address automatically.

Onboard Parallel Port

This option specifies the I/O port address and IRQ of the onboard parallel port.

Parallel Port Mode

This option selects one of the following operating modes for the parallel port:

- **SPP**—Standard Parallel Port
- **EPP**—Enhanced Parallel Port
- **ECP**—Extended Capability Port
- **ECP** + **EPP**—Extended Capability Port and Enhanced Parallel Port

PWRON After PWR-Fail

This option specifies whether your system reboots after a power failure or interrupt occurs. Available settings are:

- **Off**—Leaves the computer in the power off state.
- **On**—Reboots the computer.
- **Former-Sts**—Restores the system to the status before the power failure or interrupt occurred.

Power Management Setup

ACPI Function

This option activates the Advanced Configuration and Power Management Interface (ACPI) function. If your operating system is ACPI aware, such as Windows 2000/XP/Me/98SE, select **Enabled**.

Wake Up by PCI Card, Power on by Ring, Wake Up on LAN

These options specify whether the system is awakened from power saving modes when it detects activity or an input signal from the specified hardware.

Resume by Alarm

This option enables or disables booting the system on a scheduled time and date.

Date (of Month) Alarm

This option specifies the date for Resume by Alarm. The range is 0–31.

Time (hh:mm:ss) Alarm

The option specifies the time for Resume by Alarm. The format is <hour><minute><second>.

Note If you change this setting, the system must reboot and enter the operating system for Resume by Alarm to work.

Frequency/Voltage Control

Use this menu to specify frequency/voltage control settings.

Auto Detect PCI Clk

Use this option to auto detect the PCI slots. When set to **Enabled**, the system removes (turns off) clocks from empty PCI slots to minimize electromagnetic interference (EMI).

Spread Spectrum

When the motherboard clock generator pulses, the pulse spikes create electromagnetic interference (EMI). The Spread Spectrum function reduces the EMI by modulating the pulses, so that pulse spikes are reduced to flatter curves. If EMI is not a problem, leave the setting at **Disabled** for optimal system stability and performance. If EMI is a problem, change the setting to **Enabled** for EMI reduction.

Load Fail-Safe/Optimized Defaults

These two main menu options allow users to restore all BIOS settings to the default fail-safe or optimized values. The optimized defaults are the values set by National Instruments for optimal performance. The fail-safe defaults are the values set by the BIOS vendor for stable system performance.

When you select **Load Optimized Defaults**, the following message appears: **`Load Optimized Defaults? (Y/N)?`**

Press <Y> to load the default factory settings for optimal system performance.

When you select **Load Fail-Safe Defaults**, the following message appears: **`Load Fail Safe Defaults (Y/N)?`**

Press <Y> to load the BIOS default values for the most stable, minimal system performance.

Set Supervisor/User Password

When you select this function, the following message appears: **`Enter Password:`**.

Type the password, up to eight characters, and press <Enter>. The new password replaces any previously set password in CMOS memory. You will be prompted to confirm the password. Retype the password and press <Enter>. You can also press <Esc> to abort the selection.

To clear a set password, press <Enter> when prompted to enter the password. A message will confirm that the password will be disabled. When the password is disabled, the system boots, and you can enter setup without entering a password.

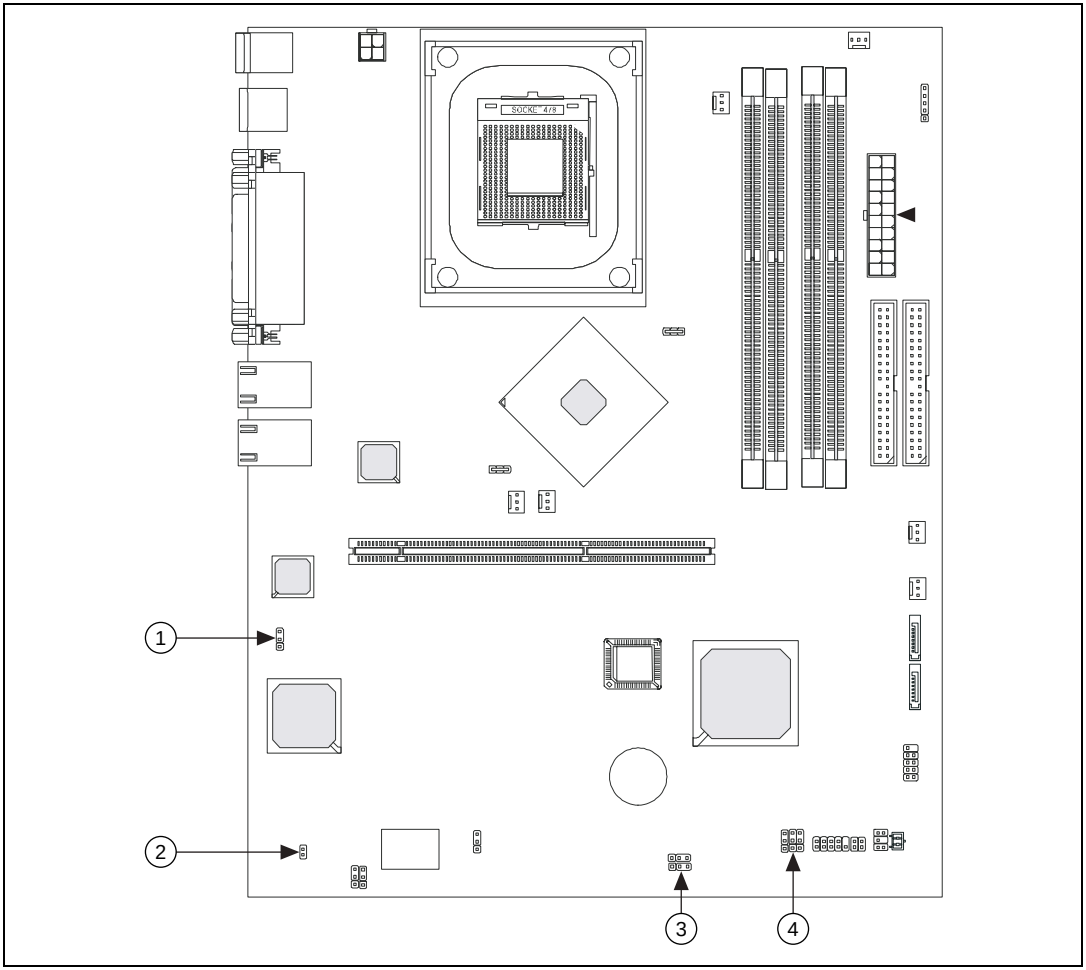
When you set a password, you will be prompted to enter it every time you enter setup. This prevents an unauthorized person from changing any part of your system configuration.

When a password is enabled, you can also have the BIOS request a password each time the system is booted to prevent unauthorized use of your computer. Use **Security Option** in the **Advanced BIOS Features** menu to set when the password prompt is required. If **Security Option** is set to **System**, the password is required both at boot and at setup entry. If set to **Setup**, password prompt occurs only when you enter setup.

Note Use the Supervisor password to enter and change the setup menu settings. Use the User password to enter but not change the setup menu settings.

Jumper Settings

Figure 2-1 shows the jumper locations on the NI 8350.



1	J1	2	J8	3	JBAT1/J9	4	J3/J4/J5

Figure 2-1. NI 8350 Jumper Locations

PCI-X Device Header: J4

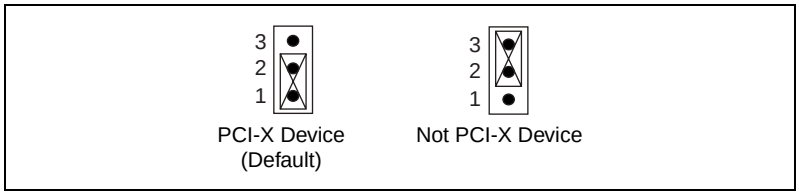


Figure 2-2. PCI-X Device Header: J4

PCI-X Bus Speed Header: J5

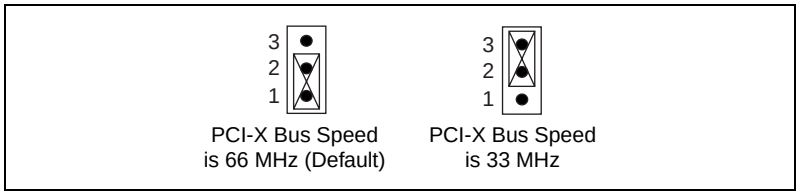


Figure 2-3. PCI-X Bus Speed Header: J5

FWH Write Protect Connector: J9

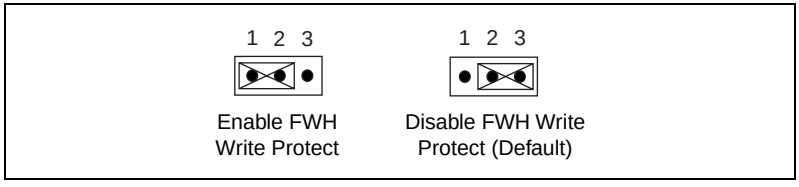


Figure 2-4. FWH Write Protect Connector: J9

Enable/Disable VGA Jumper: J8

This jumper enables or disables VGA IDSEL.

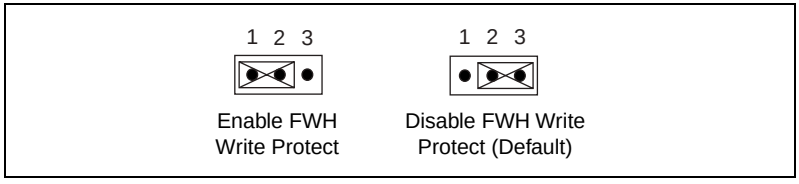


Figure 2-5. Enable/Disable VGA Jumper: J8

Enable/Disable 82541 GI LAN Jumper: J1

The LAN controller on the motherboard varies depending on the NI 8350 model. The default factory settings are properly configured for optimal system performance, and should be left unchanged.

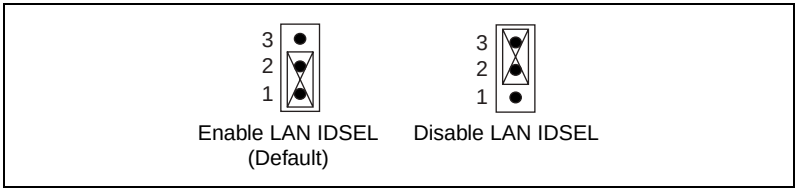


Figure 2-6. Enable/Disable 82541 GI LAN Jumper: J1

System Configure Jumper: J3

The J3 jumper determines which mode the system enters while powered on. In *Normal Mode*, the system enters the assigned OS as usual. In *Configure Mode*, the system directly enters the BIOS setup utility. In this mode, you can modify the BIOS configurations. In *Recovery Mode*, you must insert a boot disk into the floppy drive before powering on the system. After the system is powered on, it reads the boot disk and enters DOS. In this mode, you can update the BIOS with a Flash utility if necessary.

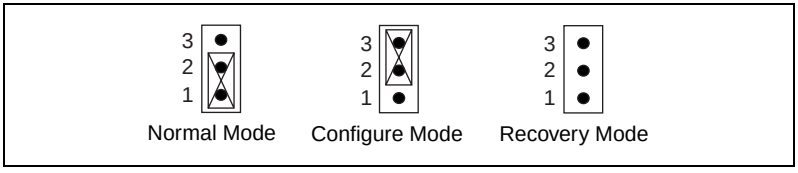


Figure 2-7. System Configure Jumper: J3

Clear CMOS Jumper: JBAT1

The CMOS RAM has a power supply from an external battery to preserve the system configuration data. With this power supply, the system can automatically boot the OS every time it is turned on. Use the JBAT1 (Clear CMOS) jumper to clear the system configuration by shorting pins 2–3.

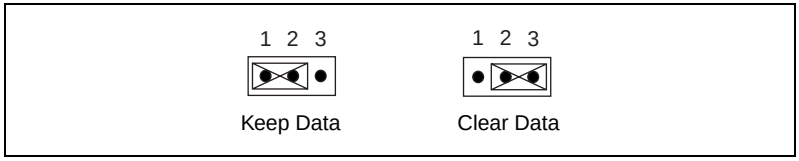


Figure 2-8. Clear CMOS Jumper: JBAT1

Caution To avoid damaging the mainboard, clear the CMOS only when the system is powered off. Also, be sure to return reconnect pins 1–2 after clearing the CMOS.

Drivers and Software

Files and Directories Installed on Your Hard Drive

Your hard drive includes a directory called `images` in its root that contains software and soft copies of manuals for the peripherals. The directory structure under the `images` directory is logically organized into several levels.

In the `images` directory, you will find a `manuals` directory, an `os` directory, and directories for each computer peripheral.

The `manuals` directory contains quick reference guides, technical reference manuals, and National Instruments software manuals, all in Adobe Acrobat format. To access any manual, change your directory to `c:\images\ni8350\manuals` and list the contents of that directory. You will see several files, one corresponding to each peripheral.

The `os` directory contains a subdirectory corresponding to the operating system installed on your computer.

The rest of the directories correspond to each peripheral in your system. Within these directories are the peripheral drivers. These files and directories are copied exactly from the manufacturer distribution disks, so the naming conventions vary from peripheral to peripheral.

LCD Function Menu

Three buttons control the LCD function panel:

- **Up**—Go to the previous selection.
- **Enter**—Execute the command.
- **Next**—Go to the next selection.

You can use the LCD front panel control buttons to access information under the **LCD Info**, **H/W Monitor**, and **System Conf** menus. The menu structures are shown in Figures 2-9 and 2-10.

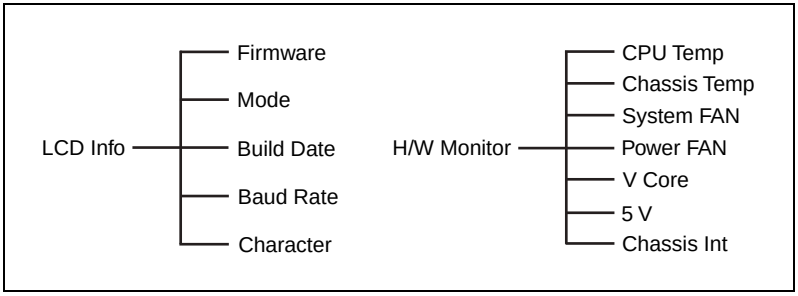


Figure 2-9. LCD Info and H/W Monitor Control Panel Menu Structure

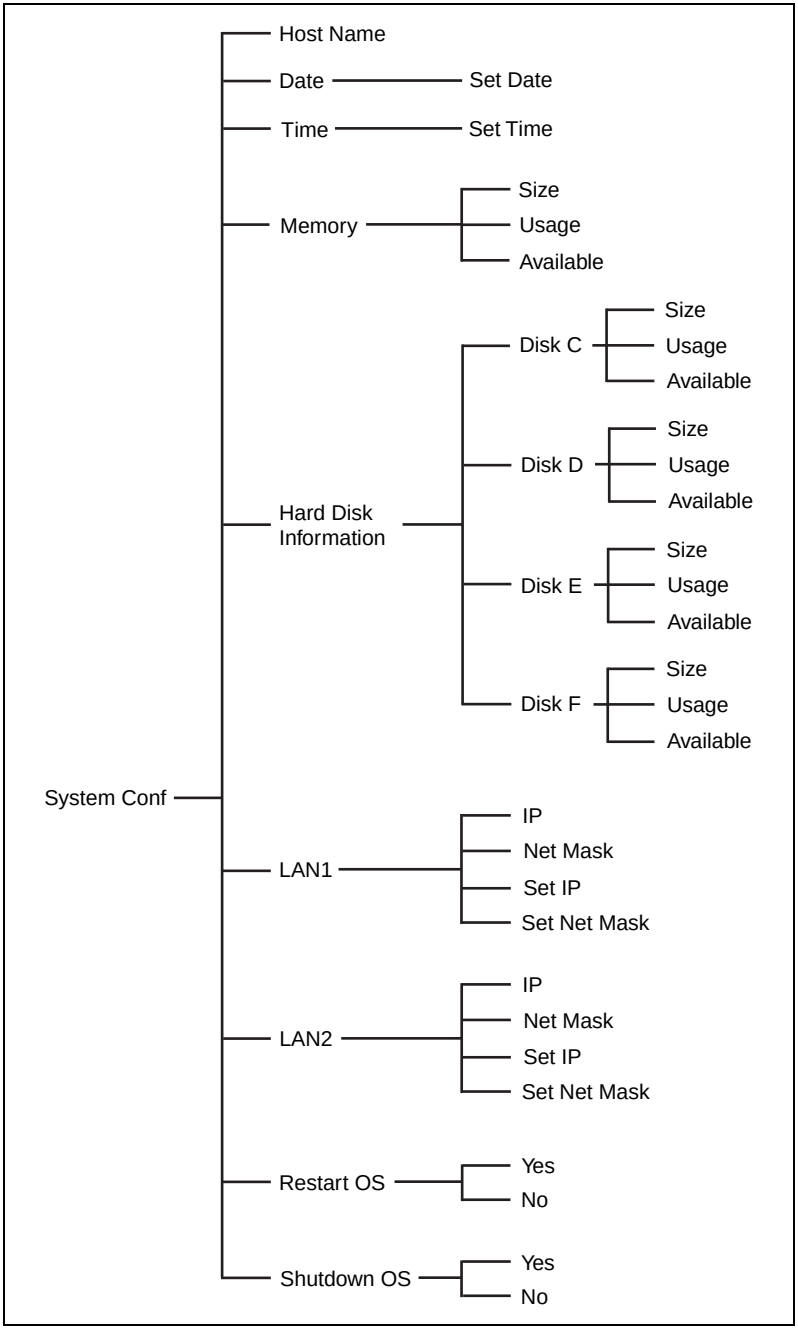


Figure 2-10. System Conf Control Panel Menu Structure

Table 2-2 describes the debug functions that appear in the LCD before the NI 8350 boots to OS.

Table 2-2. Debug Functions Before Boot to OS

Function	Description
LCD Panel v1.1 Initialize OK	Show product information and version.
BIOS POST: C1 Msg: Mem Sizing	If the system has memory problems, it stops at C1.
BIOS POST: C3 Msg: BIOS chsum	If the system has BIOS problems, it stops at C3.
BIOS POST: 18 Msg: CPU Init.	If the system has CPU problems, it stops at 18.
BIOS POST: 2B Msg: VGA Init.	If the system has VGA problems, it stops at 2B.
BIOS POST: 2D Msg: Sign-on Msg.	Shows information about logo processor brand name.
BIOS POST: 52 Msg: Ext. Mem Test	If the system has memory problems, it stops at 52.
BIOS POST: 75 Msg: IDE Init.	If the system has IDE problems, it stops at 75.
BIOS POST: 8B Msg: PCI ROM Init.	If the system has PCI problems, it stops at 8B.
BIOS POST: 94 Msg: disp summary	—
<Boot to OS>	If the system is problem free, it boots to OS.

Table 2-3 describes the LCD Info functions that appear in the LCD.

Table 2-3. LCD Info Functions

Function	Description
Firmware 1/5 V1.1	Show LCD firmware version
Mode 2/5 Communication	Show LCD working mode
Build Date 3/5 2002/03/25	Show LCD firmware build date
Baud Rate 4/5 9600	Show LCD communication speed with COM port For PC and LCD link
Character 5/5 16X2	Show LCD characters

Table 2-4 describes the H/W Monitor functions that appear in the LCD.

Table 2-4. H/W Monitor Functions

Function	Description
CPU 1/15 42C	Show CPU temperature information
Chassis 2/15 28C	Show chassis temperature information
System FAN 3/15 0 RPM	Show system fan speed information
Power FAN 4/15 4219 RPM	Show power fan speed information
V core 6/15 1.46 V	Show V core voltage information
+5 V 9/15 5.07 V	Show +5 V voltage information
Chassis int 15/15 OFF	Show chassis intrusion detect information

Table 2-5 describes the System Conf functions that appear in the LCD.

Table 2-5. System Conf Functions

Function		Description	
Host name	1/9	Show system host name	
Date 2002.8.21	2/9	Set Date 1/1	Show the date and allow to set the date
Time 13:24:50	3/9	Set Time 1.1	Show the time and allow to set the time
Memory	4/9	Size 1/3 511 MB	Show memory size
		Usage 2/3 153 MB	Unable to show used memory size
		Available 3/3 358 MB	Unable to show available memory size
Hard Disk Information	5/9	Can detect four hard disks on the system	
Disk C 3,698 MB	1/4	Size 1/3 3,698 MB	Show partition size
		Usage 2/3 1,485 MB	Unable to show the used size
		Available 3/3 2,213 MB	Unable to show the available size

Table 2-5. System Conf Functions (Continued)

Function		Description	
Disk D 15,393 MB	2/4	Size 1/3 15,393 MB	Show partition size
		Usage 2/3 494 MB	Unable to show the used size
		Available 3/3 14,899 MB	Unable to show the available size
Disk E 0 MB	3/4	Size 1/3 0 MB	Show partition size
		Usage 2/3 0 MB	Unable to show the used size
		Available 3/3 0 MB	Unable to show the available size
Disk F 0 MB	4/4	Size 1/3 0 MB	Show partition size
		Usage 2/3 0 MB	Unable to show the used size
		Available 3/3 0 MB	Unable to show the available size

Table 2-5. System Conf Functions (Continued)

Function		Description	
LAN1 100.100.100.101	6/9	IP 1/4 100.100.100.101	Show the system IP information
		Netmask 2/4 255.255.255.0	Show the system Net Mask information
		Set IP 000.000.000.000	Allow users to set the system IP
		Setmask 000.000.000.000	Allow users to set the system Net Mask
LAN2 100.100.100.101	7/9	IP 1/4 100.100.100.101	Show the system IP information
		Netmask 2/4 255.255.255.0	Show the system Net Mask information
		Set IP 000.000.000.000	Allow users to set the system IP
		Setmask 000.000.000.000	Allow users to set the system Net Mask
Restart Restart OS	8/9	Yes/No	Restart your Windows OS
Shutdown Shutdown OS	9/9	Yes/No	Shut down your Windows OS

Upgrading Memory

The mainboard includes four 184-pin ECC or non-ECC nonregistered DDR333/DDR400 SDRAM slots with maximum memory size of 4 GB. Install at least one memory module in the slots.

Figure 2-11 shows the DIMM location on the main board. DIMM1 is on the left; DIMM4 is on the right.

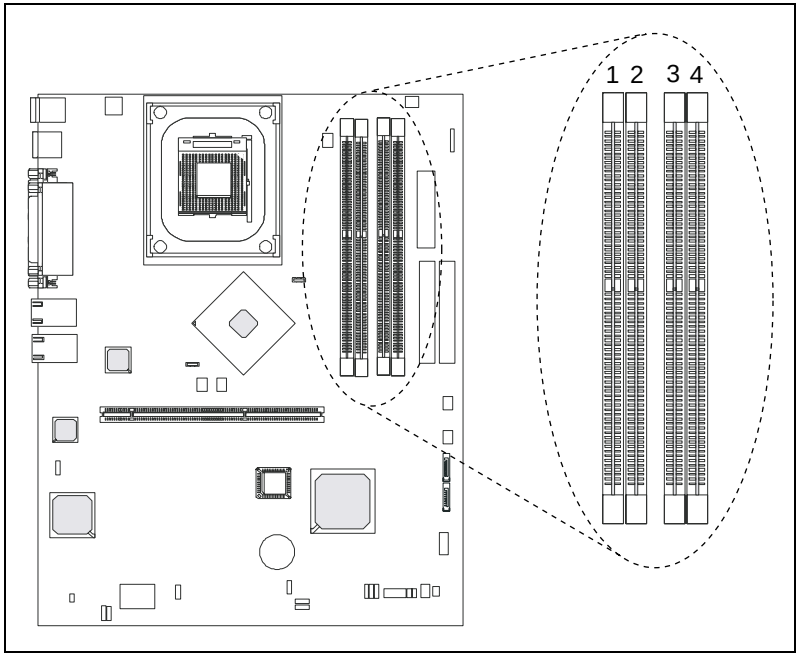


Figure 2-11. DIMM Location

Dual-Channel Memory Configuration

For optimum memory performance, you can use dual-channel memory configurations. In these configurations, identical memory is installed in channels A and B. Figures 2-12, 2-13, and 2-14 show allowed configurations for dual-channel memory mode.

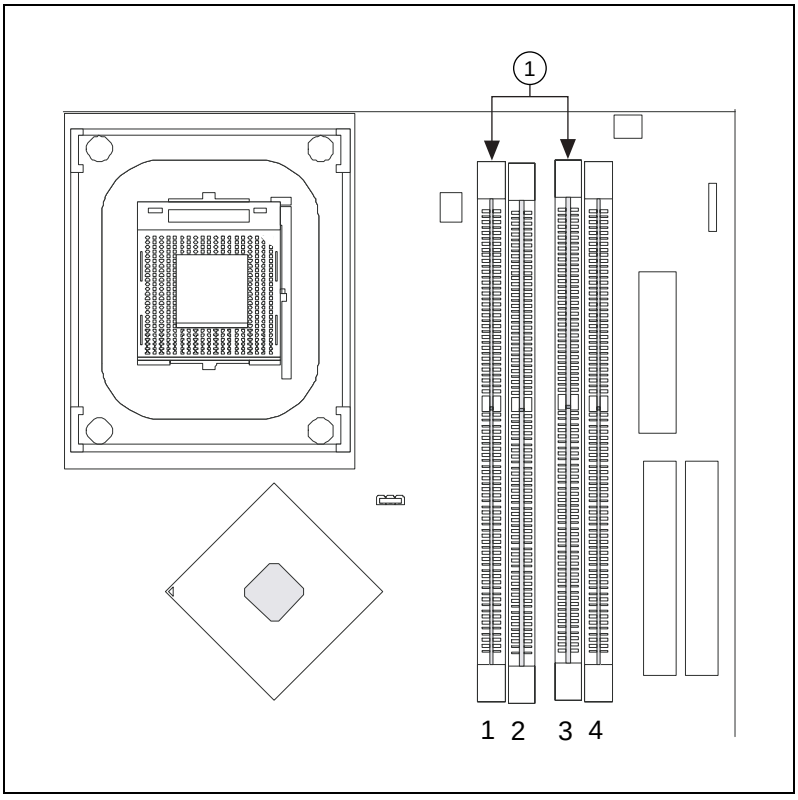
Table 2-6 shows all possible memory module combinations.

Table 2-6. Memory Module Combinations

DIMM1	DIMM2	DIMM3	DIMM4	Total Memory
128 MB~1 GB	—	—	—	128 MB~1 GB
—	128 MB~1 GB	—	—	128 MB~1 GB
—	—	128 MB~1 GB	—	128 MB~1 GB
—	—	—	128 MB~1 GB	128 MB~1 GB
128 MB~1 GB	128 MB~1 GB	—	—	256 MB~2 GB
128 MB~1 GB	—	128 MB~1 GB	—	256 MB~2 GB
128 MB~1 GB	—	—	128 MB~1 GB	256 MB~2 GB
—	128 MB~1 GB	128 MB~1 GB	—	256 MB~2 GB
—	128 MB~1 GB	—	128 MB~1 GB	256 MB~2 GB
—	—	128 MB~1 GB	128 MB~1 GB	256 MB~2 GB
128 MB~1 GB	128 MB~1 GB	128 MB~1 GB	—	384 MB~3 GB
128 MB~1 GB	128 MB~1 GB	—	128 MB~1 GB	384 MB~3 GB
128 MB~1 GB	—	128 MB~1 GB	128 MB~1 GB	384 MB~3 GB
—	128 MB~1 GB	128 MB~1 GB	128 MB~1 GB	384 MB~3 GB
128 MB~1 GB	128 MB~1 GB	128 MB~1 GB	128 MB~1 GB	512 MB~4 GB

Installing memory with different speeds is allowed, but the faster memory downshifts to the speed of the slower memory.

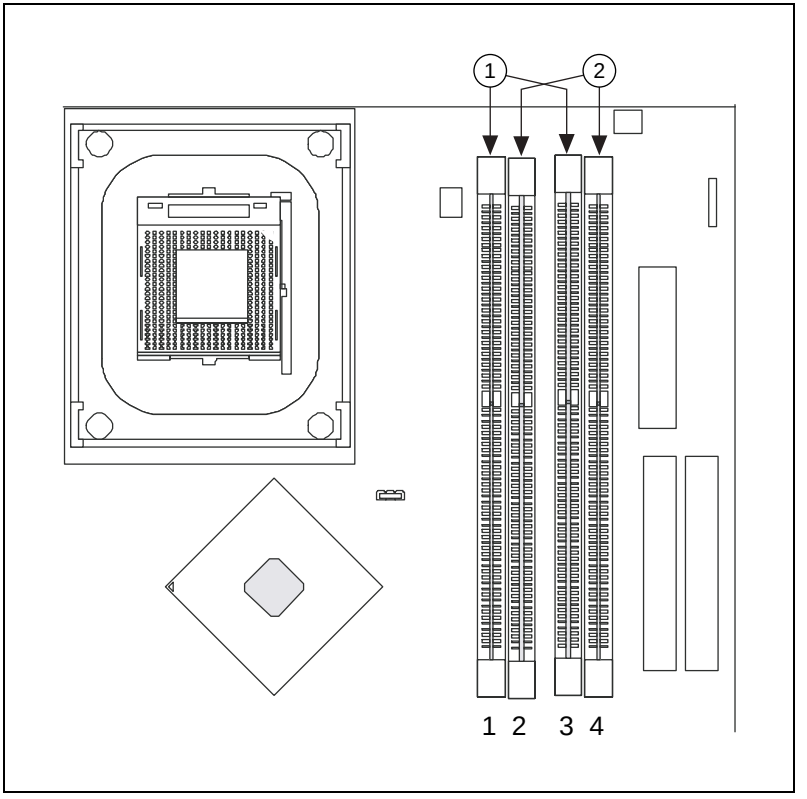
Figure 2-12 shows two identical DIMMs in DIMM 1 and DIMM 3. You can also install identical DIMMs in DIMM 2 and DIMM 4.



1	Two Identical DIMMs

Figure 2-12. Two Identical DIMMs in DIMM 1 and DIMM 3

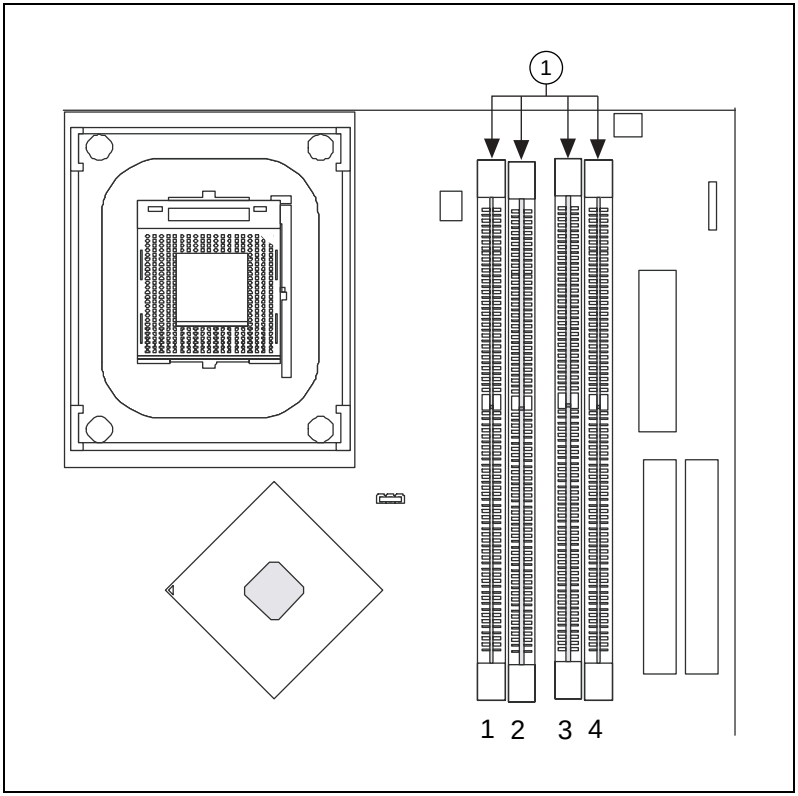
Figure 2-13 shows two different pairs of identical DIMMS—two identical DIMMs in DIMM 1 an DIMM 3 and two identical DIMMs in DIMM 2 and DIMM 4.



1	First Pair of Identical DIMMs	2	Second Pair of Identical DIMMs

Figure 2-13. Two Different Pairs of Identical DIMMs

Figure 2-14 shows four identical DIMMs installed in DIMM 1 through DIMM 4.



1 Four Identical DIMMs

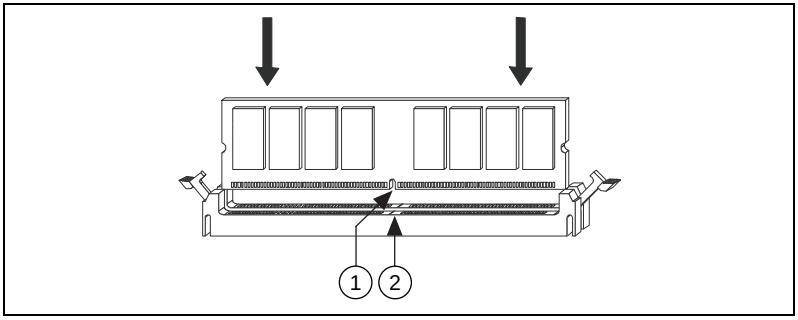
Figure 2-14. Four Identical DIMMs

Installing DDR Modules

Complete the following steps to install DDR modules:

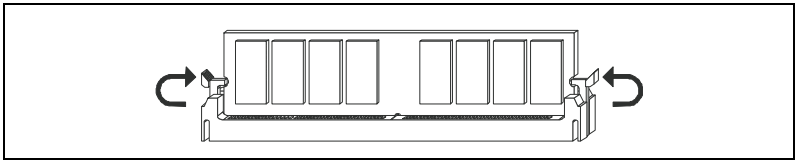
1. Press the cover release buttons on the top of the NI 8350.
2. Push the cover backward to remove it.

3. Align the notch in the center of the DDR DIMM module with the key on the DIMM slot. Insert the module vertically into the slot and push it in until the pins are fully inserted, as shown in the following figure.



1 Notch	2 Key

4. When the module is fully inserted, the plastic clip at each side of the slot automatically closes, as shown in the following figure.



5. Replace the NI 8350 cover by sliding the cover forward. Make sure the safety lock fits firmly.

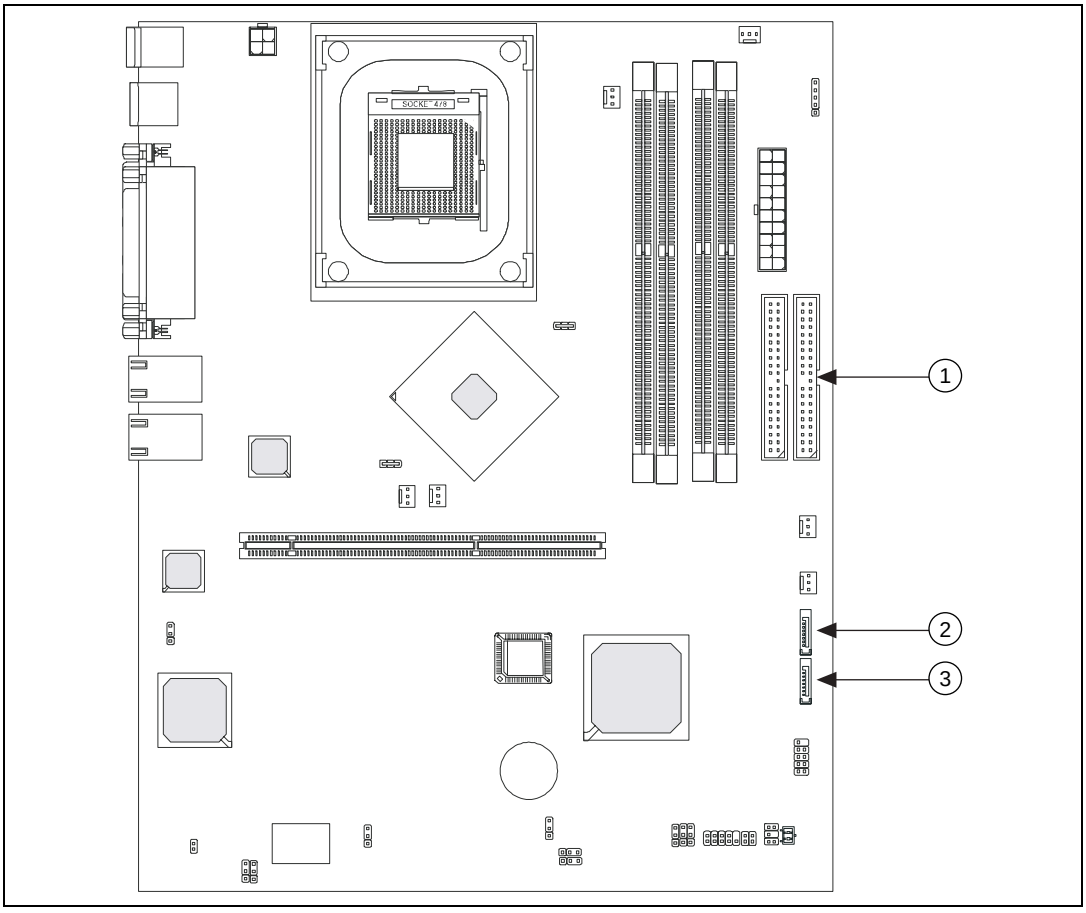
Removing DDR Modules

Complete the following steps to remove DDR modules:

1. Open the plastic clips on both sides of the module.
2. Remove the module from the slot.

Upgrading and Replacing Hard Disk Drives

Figure 2-15 shows the NI 8350 IDE and SATA connector locations.



1 IDE1/IDE2	2 SATA2	3 SATA1

Figure 2-15. NI 8350 IDE and SATA Connectors

Hard Disk Connectors: IDE1/2

The mainboard has a 32-bit Enhanced PCI IDE and Ultra DMA 33/66/100 controller that provides PIO mode 0~4, Bus Master, and Ultra DMA 33/66/100 functions. You can connect up to four hard disk drives, a CD-ROM, and other devices.

Figure 2-16 shows the IDE1 and IDE2 connectors.

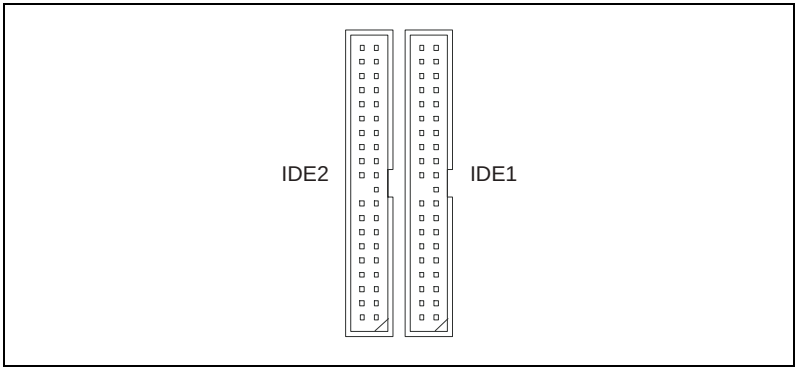


Figure 2-16. IDE1 and IDE2 Connectors

IDE1 (Primary IDE Connector)

You always should connect the first hard drive to IDE1. IDE1 can connect a Master and Slave drive. You must configure the second hard drive to Slave mode by setting the jumper accordingly.

IDE2 (Secondary IDE Connector)

IDE2 can also connect a Master and Slave drive.

Note If you install two hard disks on a cable, you must configure the second drive to Slave mode by setting its jumper. Refer to the hard disk documentation for jumper setting instructions.

SATA Connectors Supported by 6300ESB (ICH): SATA1 and SATA2

The 6300ESB chipset supports two Serial ATA connectors (SATA1 and SATA2).

SATA connectors are dual high-speed Serial ATA interface ports. Each supports first-generation Serial ATA data rates of 150 MB/s. All connectors are fully compliant with Serial ATA 1.0 specifications. Each Serial ATA connector can connect to one hard disk.

Figure 2-17 shows the SATA1 and SATA2 connector. Table 2-7 lists and describes the SATA1 and SATA2 connector signals.

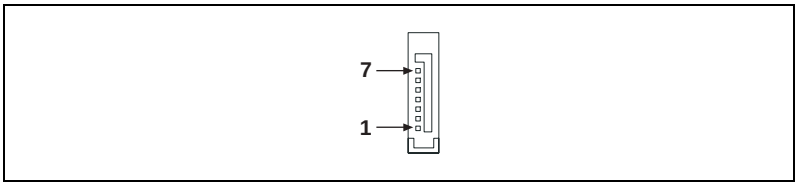
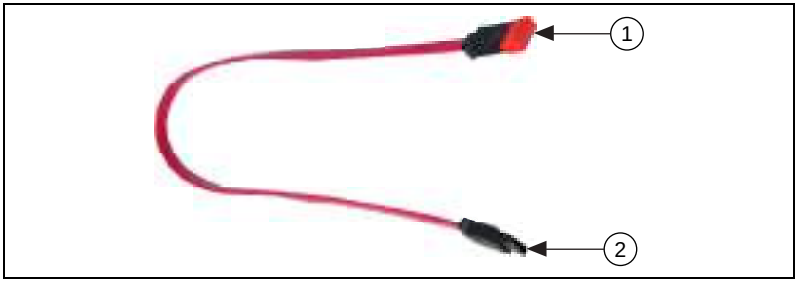


Figure 2-17. SATA1 and SATA2 Connector

Table 2-7. SATA Connector Signals

Pin	Signal	Pin	Signal
1	GND	5	RXN
2	TXP	6	RXP
3	TXN	7	GND
4	GND		

Figure 2-18 shows an optional serial ATA cable.



1 Connect to Hard Disk (Remove Dust Cover) 2 Connect to SATA 1/2

Figure 2-18. Serial ATA Cable

Hard Disk Removal

Caution Before removing or installing a hard disk drive, be sure the NI 8350 is powered off and not connected to AC power.

Complete the following steps to install a hard disk drive:

1. Press the cover release buttons on the top of the NI 8350.
2. Push the cover backward to remove it.
3. Unscrew the thumb screws securing the hard disk drive cover plate, slide the cover plate forward, and remove it.
4. Push the hard disk drive bracket backward to release the hard disk drive.
5. Disconnect the hard disk drive power cord and ATA 100 (or SATA) cable.
6. Remove the hard disk drive.

Hard Disk Installation

Caution Before removing or installing a hard disk drive, be sure the NI 8350 is powered off and not connected to AC power.

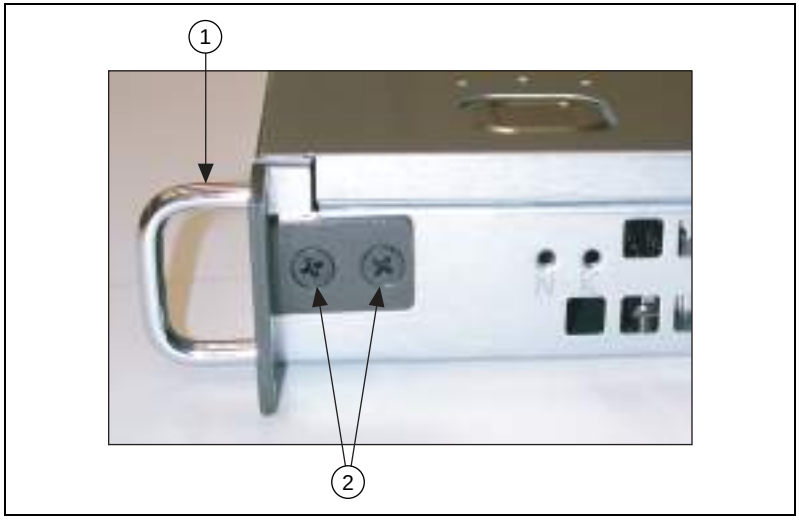
Complete the following steps to install a hard disk drive:

1. Press the cover release buttons on the top of the NI 8350.
2. Push the cover backward to remove it.
3. Unscrew the hard disk drive cover plate and slide it forward.
4. Turn over the hard disk drive cover plate and remove the hard disk drive brackets.
5. Place the first hard disk drive into the chassis. Be sure the hard disk drive screw holes align with the chassis disk drive mounting tabs.
6. Connect the hard disk drive power cord and ATA 100 (or SATA) cable.
7. Push the hard disk drive bracket forward to secure the hard disk drive.
8. To install a second hard disk drive, repeat steps 3 through 7.
9. Replace the hard disk drive bracket.
10. Replace the hard disk drive cover plate and tighten the screws to hold it in place.
11. Replace the NI 8350 cover by sliding the cover forward. Make sure the safety lock fits firmly.

Rack Mounting

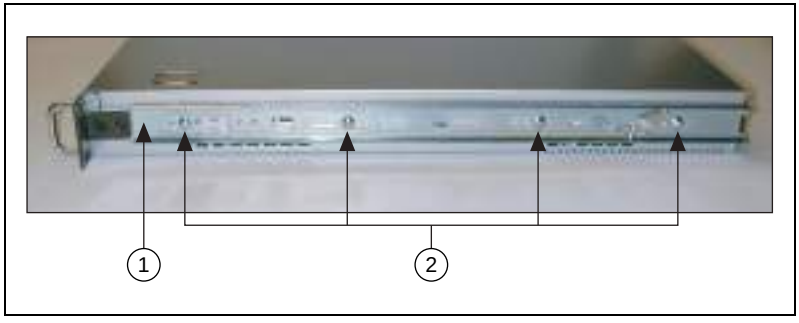
Complete the following steps to rack mount the NI 8350:

1. Attach the rack mount handles to the NI 8350 front panel using the black M4x6 screws.



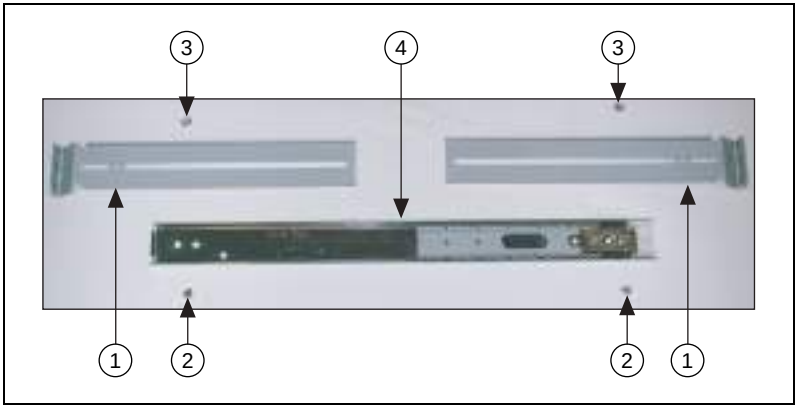
1	Rack Mount Handle	2	M4x6 Screws

2. Attach the side rails to the sides of the NI 8350 using four M4x6 screws on each side.



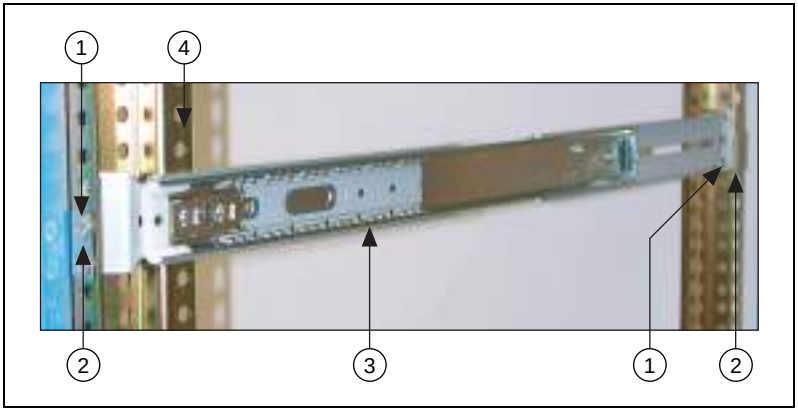
1	Side Rail	2	M4x6 Screws

3. Attach the mounting brackets to the rack rails using M4x6 screws and M4 nuts. The rear bracket position is adjustable; attach the rear bracket so that it aligns with the rear rail on the rack.



1	Mounting Bracket	3	M4 Nut
2	M4x6 Screw	4	Rack Rail

4. Attach the rack rails to the rack using the M5x8 screws and the two-hole rack mounting plates.



1	M5x8 Screw	3	Rack Rail
2	Two-Hole Mounting Plate	4	Rack

5. Align the rails on the NI 8350 with the rack rails. Slide the NI 8350 halfway into the rack.



6. Press the locking tabs on both sides of the NI 8350 and slide the NI 8350 fully into the rack.



1 Locking Tab

Note The locking tabs lock the NI 8350 halfway into the rack, so that it cannot slide out. When removing the NI 8350, pull the locking tabs forward to unlock them.

7. Secure the NI 8350 to the rack with the mounting screws.

Hard Drive Recovery

The NI 8350 includes two methods of restoring the original factory condition of your hard drive. Hard drive-based recovery stores a factory backup on a separate part of your hard drive, allowing you to restore your controller without additional media. The NI 8350 also ships with an OS Recovery CD that allows you to reinstall your operating system onto your hard drive via an external CD-ROM. For more information about these tools, refer to KnowledgeBase 2ZKC02OK at `ni.com/support`.

Note Recovering the OS erases the contents of your hard disk. Back up any files you want to keep.

Installing an OS

The NI 8350 includes a preinstalled OS. In some cases, you may want to reinstall the OS or install a different OS from the integrated CD-ROM drive. To install from the CD-ROM drive, you must change the boot device; refer to the *Advanced BIOS Features* section for more information.

Cleaning

Caution *Always* disconnect the AC power cable before cleaning or servicing the chassis.

Exterior Cleaning

Cautions Avoid getting moisture inside the chassis during exterior cleaning, especially through the top vents.

Do *not* wash the front- or rear-panel connectors or switches. Cover these components while cleaning the chassis.

Do *not* use harsh chemical cleaning agents; they may damage the chassis. Avoid chemicals that contain benzene, toluene, xylene, acetone, or similar solvents.

Clean the exterior surfaces of the chassis with a dry lint-free cloth or a soft-bristle brush. Do *not* use abrasive compounds on any part of the chassis.

3

I/O Information

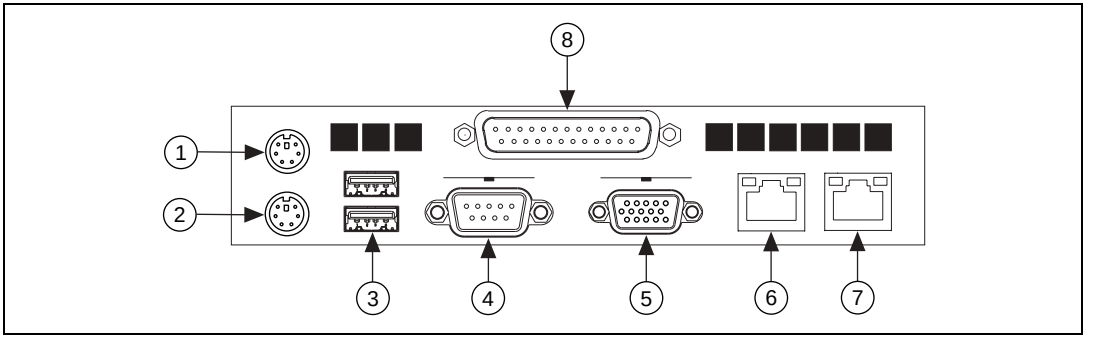
Rear Panel Connectors

Table 3-1 lists various peripherals and their corresponding NI 8350 external connectors, bus interfaces, and functions.

Table 3-1. NI 8350 Peripherals Overview

Peripheral	External Connector	Description
Keyboard	PS/2 (5-pin Din)	PS/2-style keyboard
Mouse	PS/2 (5-pin Din)	PS/2-style mouse
USB	USB 4-pin Series A stacked receptacle	USB 2.0 capable
USB	USB 4-pin Series A stacked receptacle	USB 2.0 capable
Parallel	Parallel Port (36-pin champ)	IEEE 1284
Serial	COM1 (9-pin DSUB)	16550 RS-232 serial port
Video	VGA (15-pin DSUB)	Intel Extreme Graphics controller
Ethernet	LAN (RJ45)	10/100 Ethernet connection
Ethernet	LAN (RJ45)	10/100 Ethernet connection

Figure 3-1 shows the rear panel layout of the NI 8350.



1	PS/2 Keyboard Connector	3	USB Ports	5	VGA Port	7	LAN 2
2	PS/2 Mouse Connector	4	Serial Port	6	LAN 1	8	Parallel Port

Figure 3-1. NI 8350 Rear Panel Layout

PS/2

Figure 3-2 shows the location and pinouts for the PS/2 keyboard and mouse connectors on the NI 8350. Table 3-2 lists and describes the PS/2 connector signals.

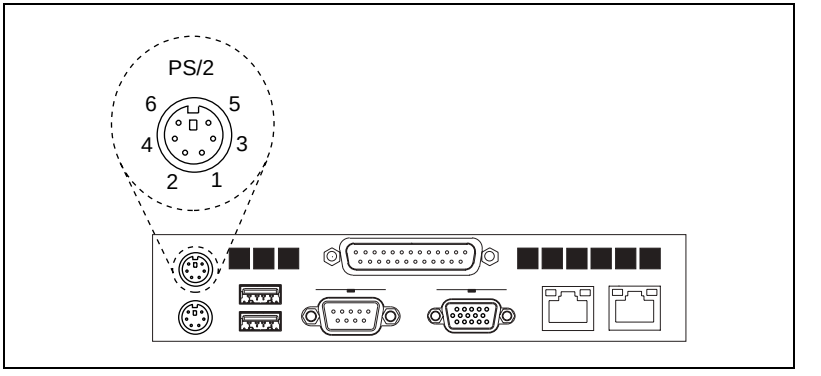


Figure 3-2. PS/2 Connector Location and Pinout

Table 3-2. PS/2 Connector Signals

Pin	Signal Name	Signal Description
1	DATA	Data Keyboard
2	NC	Data Mouse
3	GND	Ground

Table 3-2. PS/2 Connector Signals (Continued)

Pin	Signal Name	Signal Description
4	VCC	VCC
5	CLK	Clock Keyboard
6	NC	Clock Mouse

Universal Serial Bus

Figure 3-3 shows the location and pinouts for the Universal Serial Bus (USB) connectors on the NI 8350. Table 3-3 lists and describes the USB connector signals.

AMP manufactures a USB mating connector, part number 787633.

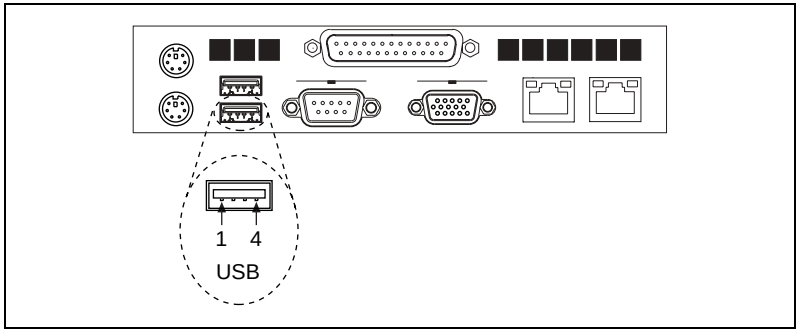


Figure 3-3. USB Connector Location and Pinout

Table 3-3. USB Connector Signals

Pin	Signal Name	Signal Description
1	VCC	Cable Power (+5 V)
2	–Data	USB Data–
3	+Data	USB Data+
4	GND	Ground

Parallel Port

Figure 3-4 shows the location and pinouts for the IEEE 1284 (parallel) connector on the NI 8350. Table 3-4 lists and describes the IEEE 1284 connector signals.

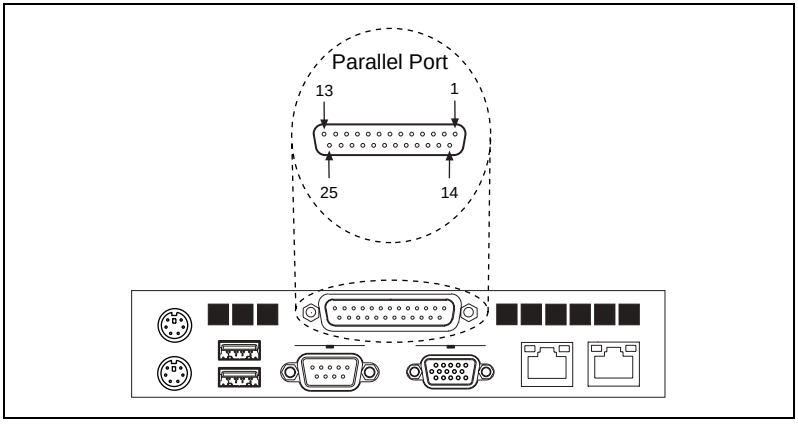


Figure 3-4. Parallel Port Connector Location and Pinout

Table 3-4. Parallel Port Connector Signals

Pin	Default Configuration (LPT)	
	Signal Name	**Signal Description**
1	BUSY	Device Busy
2	SLCT	Select
3	ACK*	Acknowledge
4	FAULT*(ERROR*)	Fault
5	PAPEREND	Paper End
6	PD0	Data Bit 0
7	PD1	Data Bit 1
8	PD 2	Data Bit 2
9	PD3	Data Bit 3
10	PD4	Data Bit 4
11	PD5	Data Bit 5

Table 3-4. Parallel Port Connector Signals (Continued)

Pin	Default Configuration (LPT)	
	Signal Name	**Signal Description**
12	PD6	Data Bit 6
13	PD7	Data Bit 7
14	INIT*	Initialize Printer
15	STROBE*	Strobe
16	SLCTIN*	Select Input
17	AUTOFD*	Auto Line Feed
18	+5V	+5 V
19–35	GND	Ground
36	NC	Not Connected

Serial

Figure 3-5 shows the location and pinouts for the serial connector on the NI 8350. Table 3-5 lists and describes the serial connector signal.

AMP manufactures a serial port mating connector, part number 745491-5.

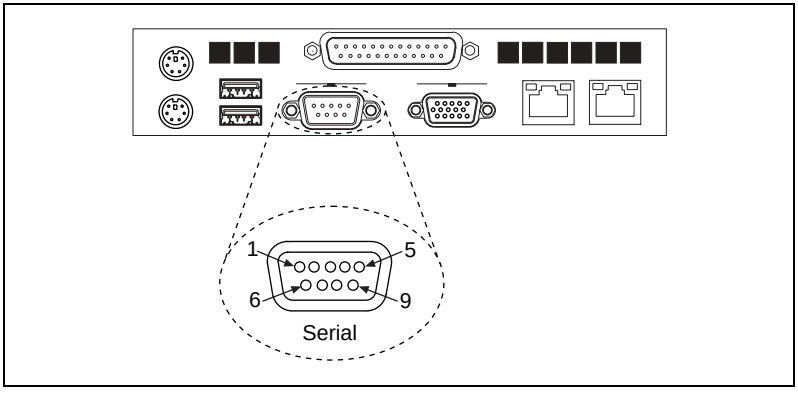


Figure 3-5. Serial Connector Location and Pinout

Table 3-5. Serial Connector Signals

Pin	Signal Name	Signal Description
1	DCD*	Data Carrier Detect
2	SIN*	Receive Data
3	SOUT*	Transmit Data
4	DTR*	Data Terminal Ready
5	GND	Ground
6	DSR*	Data Set Ready
7	RTS*	Ready to Send
8	CTS*	Clear to Send
9	RI*	Ring Indicator

VGA

Figure 3-6 shows the location and pinouts for the VGA connector on the NI 8350. Table 3-6 lists and describes the VGA connector signals.

AMP manufactures a mating connector with part numbers 748364-1 (housing) and 748333-2 (pin contact).

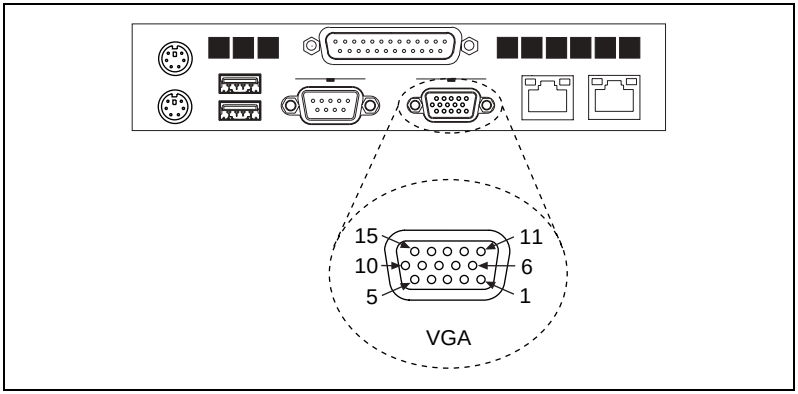


Figure 3-6. VGA Connector Location and Pinout

Table 3-6. VGA Connector Signals

Pin	Signal Name	Signal Description
1	R	Red
2	G	Green
3	B	Blue
4	NC	Not Connected
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	+5V	5 V
10	GND	Ground
11	NC	Not Connected
12	SD	Serial Data
13	HSync	Horizontal Sync
14	VSync	Vertical Sync
15	SC	Serial Clock

Ethernet

Figure 3-7 shows the location and pinouts for the Ethernet connectors on the NI 8350. Table 3-7 lists and describes the Ethernet connector signals.

AMP manufactures a mating connector, part number 554739-1.

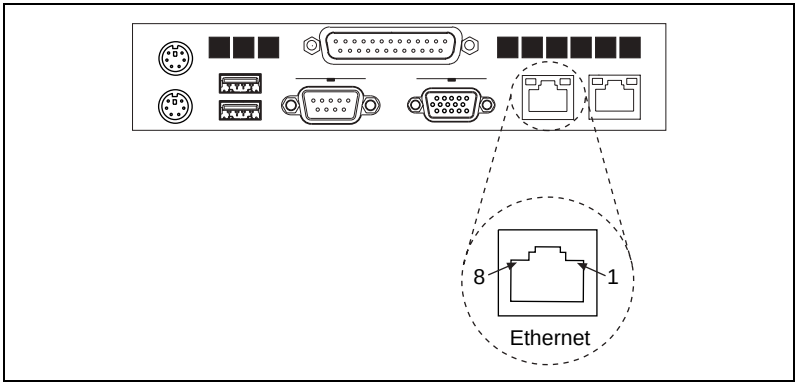


Figure 3-7. Ethernet Connector Location and Pinout

Table 3-7. Ethernet Connector Signals

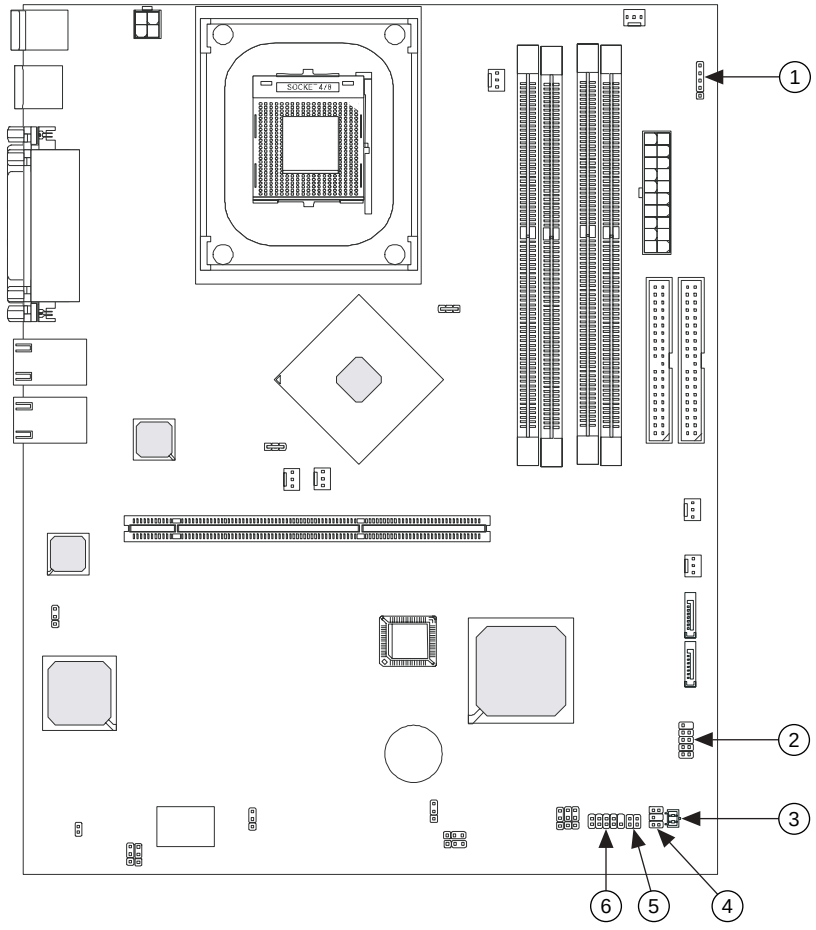
Pin	Signal Name	Signal Description
1	D0P	Differential Pair 0+
2	D0N	Differential Pair 0–
3	D1P	Differential Pair 1+
4	D2P	Differential Pair 2+
5	D2N	Differential Pair 2–
6	D1N	Differential Pair 1–
7	D3P	Differential Pair 3+
8	D3N	Differential Pair 3–

MXI-2 or MXI-4 Connectors

Refer to your MXI-2 or MXI-4 hardware user manual for connector information.

Other Connectors

Figure 3-8 shows the locations of other connectors on the NI 8350.



1	JIPMB1	3	JCI1	5	JACT1/JACT2
2	JUSB2	4	JLCD1	6	JFP1

Figure 3-8. NI 8350 Other Connector Locations

Chassis Intrusion Switch Connector: JCI1

This connector is connected to a 2-pin chassis switch. If the NI 8350 is opened, the switch shorts. The system records this status and shows a warning message on the startup screen during boot. To clear the warning, you must enter the BIOS utility and clear the record. Refer to the *Advanced BIOS Features* section of Chapter 2, *Installation and Configuration*, for information about the Case Open Warning feature.

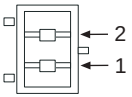


Figure 3-9. Chassis Intrusion Switch Connector (JCI1)

Table 3-8. Chassis Intrusion Switch Connector Signals

Pin	Signal Name
1	SIO_C_OPEN
2	GND

LCD Panel Connector: JLCD1 (Optional)

This connector is for connection to an LCD panel, which shows information about current status or mode of the connected system.

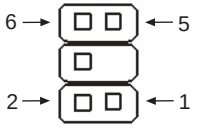


Figure 3-10. LCD Panel Connector (JLCD1)

Table 3-9. LCD Panel Connector Signals

Pin	Signal Name
1	SOUT
2	SIN
3	NC
4	GND1
5	GND0
6	VCC

I2C Bus Connector: JIPMB1 (Optional)

The mainboard includes one I2C (also known as I^2C) bus connector to connect to the System Management Bus (SMBus) interface.

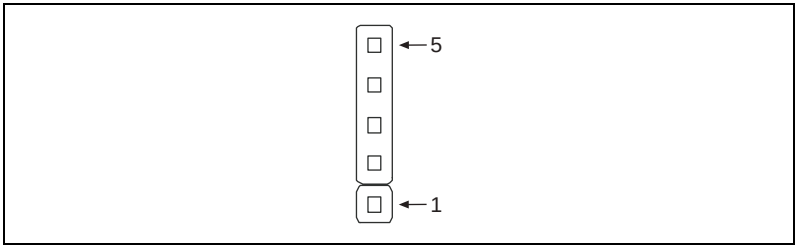


Figure 3-11. I2C Bus Connector (JIPMB1)

Table 3-10. I2C Bus Connector Signals

Pin	Signal Name
1	SMBCLK
2	SMBDATA
3	SMBALERT#
4	GND
5	VCC3

82547 GI LAN Active LED Connector: JACT1 and 82541 GI LAN Active LED Connector: JACT2

The LAN LED connectors connect to LAN LEDs, which show LAN activity. JACT1 is for LAN1 jack, and JACT2 is for LAN2 jack. Both LAN1 and LAN2 jacks are on the rear panel.

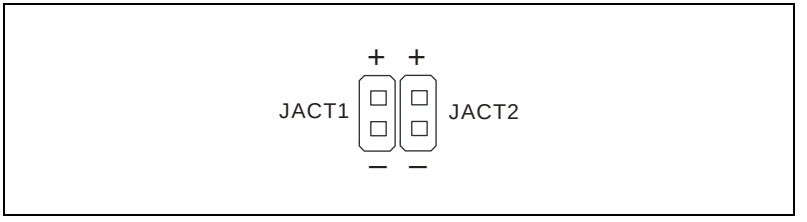
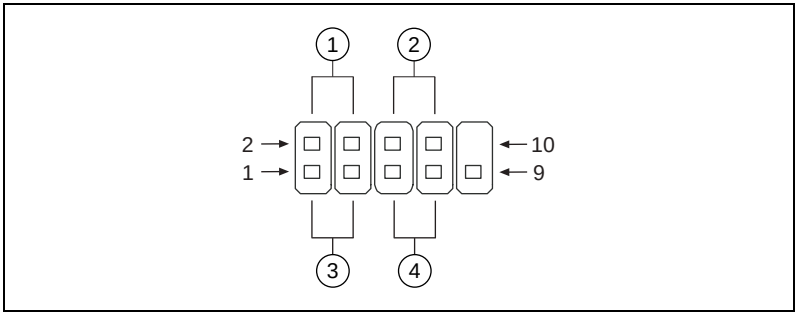


Figure 3-12. LAN LED Connectors (JACT1 and JACT2)

Front Panel Connector: JFP1

The mainboard includes one front panel connector for electrical connection to the front panel switches and LEDs. JFP1 is compliant with the *Intel Front Panel I/O Connectivity Design Guide*.



1	Power LED	3	HDD LED
2	Power Switch	4	Reset Switch

Figure 3-13. Front Panel Connector (JFP1)

Table 3-11. Front Panel Connector Signals

Pin	Signal Name	Signal Description
1	HD_LED_P	Hard disk LED pull-up
2	FP PWR/SLP	MSG LED pull-up
3	HD_LED_N	Hard disk active LED
4	FP PWR/SLP	MSG LED pull-up
5	RST_SW_N	Reset switch low reference pull-down to GND
6	PWR_SW_P	Power switch high reference pull-up
7	RST_SW_P	Reset switch high reference pull-up
8	PWR_SW_N	Power switch low reference pull-down to GND
9	RSVD_DNU	Reserved—do not use

Front USB Connector: JUSB2

The mainboard includes one USB 2.0 pin header, JUSB2, that is compliant with the *Intel I/O Connectivity Design Guide*. USB 2.0 technology increases data transfer rate up to a maximum throughput of 480 Mbit/s, which is 40 times faster than USB 1.1, and is ideal for connecting high-speed USB interface peripherals such as USB HDD, digital cameras, MP3 players, printers, modems, and so on.

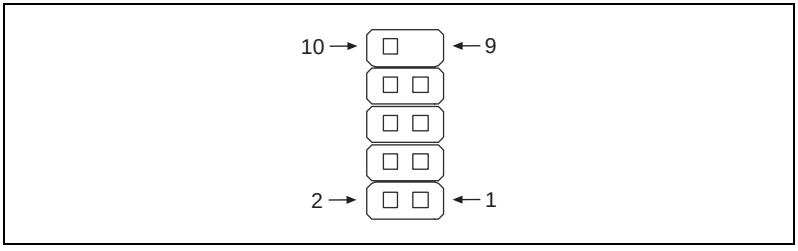


Figure 3-14. Front USB Connector (JUSB2)

Table 3-12. Front USB Connector Signals

Pin	Signal Name	Pin	Signal Name
1	VCC	6	USB1+
2	VCC	7	GND
3	USB0–	8	GND
4	USB1–	9	Key
5	USB0+	10	NC

4

Common Configuration Questions

This chapter answers common configuration questions you may have when using the NI 8350.

General Questions

What do the LEDs on the NI 8350 front panel mean?

The power indicator lights when the main power is turned on. The LAN status LEDs flash to when there is activity on LAN1 and LAN2. The hard drive LED lights when there is hard drive activity on the NI 8350. For more information, refer to Figure 1-2, *Front View of the NI 8350*.

How do I check the configuration of the memory, hard drive, time/date, and so on?

You can view these parameters in the BIOS setup. To enter the BIOS setup, reboot the NI 8350 and press <Delete> during the memory tests. Refer to the *BIOS Setup* section of Chapter 2, *Installation and Configuration*, for more information.

Can I use the internal IDE drive and an external SCSI hard drive at the same time?

Yes.

Boot Options

What devices can I boot from?

The NI 8350 can boot from the following devices:

- The internal IDE hard drive
- The internal CD-ROM drive
- A network PXE server on the same subnet
- An external USB mass storage device such as a USB hard drive or CD-ROM
- An external USB floppy drive

Note There are some limitations when booting from a USB device. Windows XP can be installed from a USB CD-ROM, but earlier versions of Windows cannot. The NI 8350 BIOS configures the USB devices so that they will work in a DOS environment.

How do I configure the controller to boot from these devices?

Press <Delete>, enter the BIOS, and select **Advanced BIOS Features**. You can set the boot order using <+> and <–>. Set the order by device type and set the order for the devices listed within the device type. Refer to the *BIOS Setup* section of Chapter 2, *Installation and Configuration*, for more information.

Chassis Configuration

How do I set up the NI 8350 to work with my chassis?

Configuration of the PXI system is handled through Measurement & Automation Explorer (MAX), included with the software pre-installed on your NI 8350. MAX creates the `pxisys.ini` file, which defines the layout and parameters of your PXI system.

The configuration steps for single or multiple-chassis systems are the same.

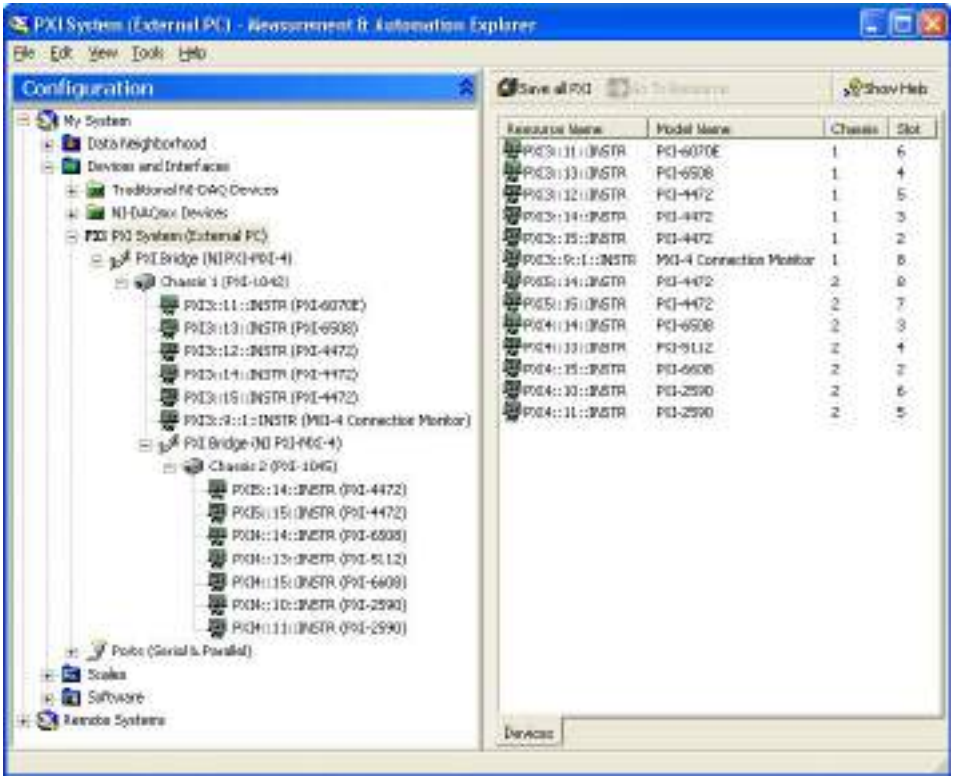


Figure 4-1. Multichassis Configuration in MAX

Basic PXI System Configuration

1. Launch MAX.
2. In the **Configuration** tree, click the **Devices and Interfaces** branch to expand it.
3. If the PXI system controller has not yet been configured, it is labeled **PXI System (Unidentified)**. Right-click this entry to display the shortcut menu, then select the appropriate controller model from the **Identify As** submenu.
4. Click the **PXI System** controller. The chassis (or multiple chassis in a multichassis configuration) is listed below it. Identify each chassis by right-clicking its entry, then selecting the appropriate chassis model through the **Identify As** submenu. Further expanding the **PXI System** branch shows all devices in the system that can be recognized by NI-VISA. When your controller and all your chassis are identified, the required `pxisys.ini` file is complete.

The PXI specification allows many combinations of PXI chassis and system modules. To assist system integrators, the manufacturers of PXI chassis and system modules must document the capabilities of their products. The minimum documentation requirements are contained in `.ini` files, which consist of ASCII text. System integrators, configuration utilities, and device drivers can use these `.ini` files.

The capability documentation for the chassis is contained in a `chassis.ini` file provided by the chassis manufacturer. The information in this file is combined with information about the system controller to create a single system initialization file called `pxisys.ini` (PXI System Initialization). The NI 8350 uses MAX to generate the `pxisys.ini` file from the `chassis.ini` file.

Device drivers and other utility software read the `pxisys.ini` file to obtain system information. For detailed information about initialization files, refer to the PXI specification at `www.pxisa.org`.

Upgrade Information

How do I upgrade system memory?

Refer to the *Upgrading Memory* section of Chapter 2, *Installation and Configuration*.

How do I flash a new BIOS?

You need to download the new BIOS from `ni.com/support/pxisupp.htm`. To download the new BIOS, follow the instructions on the Web site.

Where do I get the latest software drivers?

You can download the latest drivers from `ni.com/support/pxisupp.htm`.

My NI 8350 does not have an internal floppy drive. Is there a way to use an external drive?

Yes. The NI 8350 controller supports and can boot from USB floppy drives. A USB floppy drive will not work with Windows NT 4.0, but will work with Windows 2000/XP. Refer to the *Boot Options* section for more information.

A USB floppy drive is available from National Instruments, part number 778492-02.

5

Troubleshooting

This chapter answers common troubleshooting questions you may have when using the NI 8350.

What if the NI 8350 does not boot?

Several problems can cause a controller not to boot. Here are some things to look for and possible solutions.

Things to Notice:

- Which LEDs come on? The power indicator LED should stay lit. The hard disk drive LED should blink during boot as the disk is accessed.
- What appears on the display? Does it hang at some particular point (BIOS, Operating System, and so on)? If nothing appears on the screen, try a different monitor. Does your monitor work with a different PC? If it hangs, note the last screen output that you saw for reference when consulting National Instruments technical support.
- What has changed about the system? Did you recently move the system? Was there electrical storm activity? Did you recently add a new module, memory chip, or piece of software?

Things to Try:

- Make sure the chassis is plugged in to a working power source.
- Check any fuses or circuit breakers in the chassis or other power supply (possibly a UPS).
- Remove any nonessential cables or devices.
- Make sure the CPU and memory modules are properly seated in their slots.
- Clear the CMOS. (Refer to the *Clear CMOS Jumper: JBAT1* section of Chapter 2, *Installation and Configuration*.)
- Recover the hard drive on the NI 8350. (Refer to the *Hard Drive Recovery* section of Chapter 2, *Installation and Configuration*.)

My NI 8350 boots fine until I get to Windows, at which point I cannot read the screen. This may include garbled output, white screen, black screen, or an out of synch message from the monitor.

This problem usually results from having the video card output set past the limits of the monitor. You will need to boot Windows in Safe Mode. To do this, reboot the NI 8350. As Windows begins to boot, hold down <F8>. You should now be able to reset the video driver to lower settings. Try setting the resolution to 640 × 480 and the refresh rate to 60 Hz. After you reboot, you can raise these values again, using the test option in Windows. These settings are accessible through the **Advanced** tab of the **Display** item in the **Control Panel**. Alternately, you can try a different monitor, preferably a newer and larger one.

My system boots fine as long as a particular module is not in my chassis.

The most common cause of this is a damaged module. Try the module in a different chassis or with a different controller. Also, remove any external cables or terminal blocks connected to the system. If the module does not work in these cases, it is likely damaged. Contact the module manufacturer for further troubleshooting.

Refer to the KnowledgeBase or product manuals section at `ni.com` for more information specific to the chassis and controller with which you are having difficulties.

My PXI application hangs, or I sometimes get bad data.

This may be related to hyperthreading. Try disabling hyperthreading in the BIOS. (Refer to the *BIOS Setup* section of Chapter 2, *Installation and Configuration*, for more information.) If disabling hyperthreading solves the problems, refer to `ni.com/support` for driver updates and more information about hyperthreading.

How do I set Windows to prompt me before shutting down when I press the power button?

Select **Start»Control Panel»Power Options** to open the **Power Options Properties** window. Select the **Advanced** tab. In the **Power buttons** section, select **Ask me what to do** from the pull-down menu. When this is selected, Windows prompts you to cancel, shut down, or restart when you press the power button.

A

Specifications

This appendix lists the NI 8350 electrical, mechanical, and environmental specifications.

Electrical

AC Input

Input voltage range..... 100–240 VAC

Operating voltage range[1]..... 90–264 VAC

Input frequency ..... 50/60 Hz

Operating frequency range[1] ..... 47–63 Hz

Input current rating..... 6–3 A

Power disconnect ..... The AC power cable provides main power disconnect. Depressing the front panel power switch enables or inhibits the internal power supply.

Mainboard

Socket..... mPGA478B

Chipset ..... Intel E7210 chipset, supports 800 MHz FSB, 4 GB dual-channel DDR333/400 memory

Memory slots..... Four 184-pin DIMM slots, two per channel (supports ECC or non-ECC memory)

[1] Operating range is guaranteed by design.

PCI	One PCI-X slot using riser card
SATA	Two SATA ports compliant with the Serial-ATA 1.0 specification. Maximum data rate of 150 MB/s
IDE	One primary and one secondary IDE connector. Ultra DMA 33/66/100 support
USB ports	Four USB 2.0 ports
Keyboard	PS/2 keyboard port
Mouse	PS/2 mouse port
Video	VGA port, onboard ATI Rage XLwith with 8 MB SDRAM
Serial	One RS-232 serial port
Parallel	One parallel port
LAN	Two RJ45 LAN jacks
Onboard LAN controllers	Intel 82547 GI Gigabit LAN and Intel 82541 GI Gigabit LAN

CPU

CPU	Intel Pentium 4 with hyperthreading
Clock speed	3.0 GHz
Front side bus speed	800 MHz
L2 cache	1 MB
Process technology	90 nm
Package	FC-PGA4

Hard Disk Drive

Capacity ..... 80 GB or larger

Interface ..... Serial-ATA

Memory

Standard memory ..... 2 × 256 MB (32 M × 64 bit), DDR400 SDRAM 3–3–3, non-ECC, unbuffered, 184-pin DIMMs

2.5 GB memory upgrade ..... Standard memory plus 2 × 1 GB (128 M × 64 bit), DDR400 SDRAM 3–3–3, non-ECC, unbuffered, 184-pin DIMMs

4 GB memory upgrade ..... 4 × 1 GB (128 M × 64 bit), DDR400 SDRAM 3–3–3, non-ECC, unbuffered, 184-pin DIMMs

Mechanical

Overall dimensions (standard chassis)

- Height ..... 43.2 mm (1.70 in.)
- Width ..... 435.1 mm (17.13 in.)
- Depth ..... 434.4 mm (17.10 in.)

Weight ..... 8.6 kg (19.0 lbs)

Environmental

Operating temperature ..... 5 to 40 °C

Storage temperature ..... –10 to 60 °C

Relative humidity

- Operating ..... 10 to 90% noncondensing
- Nonoperational (storage) ..... 5 to 95% nonconducting

Operating location ..... Indoor use

Altitude .....2,000 m

Installation Category.....II

Pollution Degree 2

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 60950-1, EN 60950-1
- UL 60950-1
- CAN/CSA C22.2 No. 60950-1

Note For UL and other safety certifications, refer to the product label, or visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

Emissions.....EN 55011 Class A at 10 m
FCC Part 15A above 1 GHz

Immunity .....EN 61326:1997 + A2:2001, Table 1

CE, C-Tick, and FCC Part 15 (Class A) Compliant

Note For EMC compliance, operate this device with shielded cabling.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety).....73/23/EEC

Electromagnetic Compatibility
Directive (EMC).....89/336/EEC

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit `ni.com/certification`, search by model number or product line, and click the appropriate link in the Certification column.

B

Technical Support and Professional Services

Visit the following sections of the National Instruments Web site at ni.com for technical support and professional services:

- **Support**—Online technical support resources at ni.com/support include the following:
  - **Self-Help Resources**—For answers and solutions, visit the award-winning National Instruments Web site for software drivers and updates, a searchable KnowledgeBase, product manuals, step-by-step troubleshooting wizards, thousands of example programs, tutorials, application notes, instrument drivers, and so on.
  - **Free Technical Support**—All registered users receive free Basic Service, which includes access to hundreds of Application Engineers worldwide in the NI Developer Exchange at ni.com/exchange. National Instruments Application Engineers make sure every question receives an answer.

    For information about other technical support options in your area, visit ni.com/services or contact your local office at ni.com/contact.
- **Training and Certification**—Visit ni.com/training for self-paced training, eLearning virtual classrooms, interactive CDs, and Certification program information. You also can register for instructor-led, hands-on courses at locations around the world.
- **System Integration**—If you have time constraints, limited in-house technical resources, or other project challenges, National Instruments Alliance Partner members can help. To learn more, call your local NI office or visit ni.com/alliance.

If you searched ni.com and could not find the answers you need, contact your local office or NI corporate headquarters. Phone numbers for our worldwide offices are listed at the front of this manual. You also can visit the Worldwide Offices section of ni.com/niglobal to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

Glossary

Symbol	Prefix	Value
p	pico	10^{-12}
n	nano	10^{-9}
μ	micro	10^{-6}
m	milli	10^{-3}
k	kilo	10^{3}
M	mega	10^{6}
G	giga	10^{9}
T	tera	10^{12}

Symbols

°	Degrees
Ω	Ohms
%	Percent

A

A	Amperes
A/D	Analog-to-digital. Most often used as *A/D converter.*
AC	Alternating Current
ACPI	Advanced Configuration and Power Management Interface
ANSI	American National Standards Institute
API	Application Programming Interface. A standardized set of subroutines or functions along with the parameters that a program can call.

APIC	Advanced Programmable Interrupt Controller
ASCII	American Standard Code for Information Exchange
ASIC	Application-Specific Integrated Circuit
ATA	The specification formulated in the 1980s that defines the IDE drive interface.

B

B	Bytes
BIOS	Basic Input/Output System; BIOS functions are the fundamental level of any PC or compatible computer. BIOS functions embody the basic operations needed for successful use of the computer's hardware resources.

C

C	Celsius
CAS	Column Address Strobe
CMOS	Complementary Metal Oxide Semiconductor; a process used in making chips
COM	Communications port
CPU	Central Processing Unit
CSA	Carrier Serving Area

D

D/A	Digital-to-analog—most often used as an abbreviation for a D/A converter (also known as DAC)
DC	Direct Current
DDR	Double Data Rate
DIMM	Dual In-line Memory Module

DMA	Direct Memory Access; a method by which data is transferred between devices and internal memory without intervention of the central processing unit
DMI	Desktop Management Interface
DRAM	Dynamic RAM (Random Access Memory); storage that the computer must refresh at frequent intervals

E

ECC	Error-Correcting Code
EEPROM	Electronically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EPP	Enhanced Parallel Port

F

FCC	Federal Communications Commission

G

GB	Gigabytes of memory
GPIB	General Purpose Interface Bus (IEEE 488)

H

HDD	Hard Disk Drive
Hz	Hertz; cycles per second

I

I/O	Input/output; the techniques, media, and devices used to achieve communication between machines and users
IDE	Integrated Drive Electronics; hard disk and built-in controller
IEEE	Institute of Electrical and Electronics Engineers
IRQ*	Interrupt signal
ISA	Industry Standard Architecture; the original PC bus architecture, specifically the 16-bit AT bus

K

KB	Kilobytes of memory

L

LAN	Local Area Network; communications network that serves users within a confined geographical area. It is made up of servers, workstations, a network operating system, and a communications link.
LCD	Liquid Crystal Display—a display technology using polarizing filters and liquid crystal cells
LED	Light-emitting diode

M

MAX	Measurement & Automation Explorer
MB	Megabytes of memory
MPS	Multiprocessor Specification
MTBF	Mean Time Between Failure
MTTR	Mean Time to Repair
MXI	Multisystem eXtension Interface

N

NI-DAQ	The National Instruments software for data acquisition instruments
NI-VISA	The National Instruments implementation of the VISA standard; an interface-independent software that provides a unified programming interface for VXI, GPIB, and serial instruments

P

PCI	Peripheral Component Interconnect. The PCI bus is a high-performance 32-bit or 64-bit bus with multiplexed address and data lines.
PEF	Platform Event Filter
PIO	Programmed Input/Output
POSC	Power On Self Configuration
POST	Power On Self Test
PXI	PCI eXtensions for Instrumentation; an open implementation of CompactPCI that adds electrical features that meet the high-performance requirements of instrumentation applications by providing triggering, local buses, and system clock capabilities. PXI also offers two-way interoperability with CompactPCI products.

R

RAM	Random Access Memory; the computer’s primary workspace
RAS	Row Address Strobe
RMS	Root Mean Squared
RTC	Real Time Clock; an electronic circuit that maintains the time of day and also can provide timing signals for timesharing operations

S

SATA	Serial-ATA. *See also* ATA.
SCSI	Small Computer System Inteface
SDRAM	A form of dynamic RAM memory that is about 20% faster than EDO RAM. SDRAM interleaves two or more internal memory arrays so that while one array is being accessed, the next one is being prepared for access. SDRAM-II is a faster version of SDRAM technology.
SO-DIMM	Small Outline Dual In-line Memory Module
SPD	Serial Presence Detect EEPROM
SRAM	Static RAM; a memory chip that requires power to hold its content. It does not require refresh circuitry as a dynamic RAM chip, but it does take up more space and uses more power.

U

UDMA	Ultra Direct Memory Access. *See also* DMA.
USB	Universal Serial Bus

V

V	Volts
VGA	Video Graphics Array; the minimum video display standard for all PCs
VME	Versa Module Eurocard
VXI	VME eXtensions for Instrumentation

W

W	Watts
WDT	Watchdog Timer

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