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**PCMCIA-GPIB**

# **NI-488.2™**

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## **Getting Started with Your GPIB-ENET and the NI-488.2 Software for Windows 98/95**

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For further support information, see the *Technical Support Resources* appendix of this manual.

# Important Information

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## Warranty

The GPIB-ENET hardware is warranted against defects in materials and workmanship for a period of two years from the date of shipment, as evidenced by receipts or other documentation. National Instruments will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

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# Compliance

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## FCC/DOC Radio Frequency Interference Class A Compliance

This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual, 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). This equipment has been tested and found to comply with the following two regulatory agencies:

### 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 will be required to correct the interference at his own expense.

**Notices to User:** *Changes or modifications not expressly approved by National Instruments could void the user's authority to operate the equipment under the FCC Rules.*

*This device complies with the FCC rules only if used with shielded interface cables of suitable quality and construction. National Instruments used such cables to test this device and provides them for sale to the user. The use of inferior or nonshielded interface cables could void the user's authority to operate the equipment under the FCC rules.*

If necessary, consult National Instruments or an experienced radio/television technician for additional suggestions. The following booklet prepared by the FCC may also be helpful: *Interference to Home Electronic Entertainment Equipment Handbook*. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402.

### 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.

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# About This Manual

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This manual contains instructions to help you install and configure the National Instruments GPIB-ENET hardware and the NI-488.2 software for Windows 98/95.

This manual assumes that you are already familiar with Windows 98/95 and with TCP/IP networks, and that your computer is connected to an Ethernet network. Before you can use the driver software for the GPIB-ENET, you must install a Windows Sockets (WinSock) interface, 1.1 or higher. Microsoft provides a WinSock interface with Windows 98/95. You can also use a WinSock interface purchased from another network vendor.

## Conventions Used in This Manual

---

This manual uses the following conventions:

- » 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.
-  This icon denotes a warning, which advises you of precautions to take to avoid being electrically shocked.
- bold** Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows, Windows 98/95 tabs, or LEDs.
- IEEE 488, IEEE 488.2, and IEEE 802.3 *IEEE 488*, *IEEE 488.2*, and *IEEE 802.3* refer to the ANSI/IEEE Standard 488.1-1987, the ANSI/IEEE Standard 488.2-1992, and the ANSI/IEEE Standard 802.3, respectively, which define the GPIB.
- italic* Italic text denotes emphasis, a cross reference, or an introduction to a key concept.

<code>monospace</code>	Text in this font denotes text or characters that should literally 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, and for statements and comments taken from programs.
<b>monospace bold</b>	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.
<i>monospace italic</i>	Italic text in this font denotes that you must enter the appropriate words or values in the place of these items.

## Related Documentation

---

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

- ANSI/IEEE Standard 488.1-1987, *IEEE Standard Digital Interface for Programmable Instrumentation*
- ANSI/IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols, and Common Commands*
- ANSI/IEEE Standard 802.3-1988, *Information Processing Systems, Local Area Networks, Part 3*

Additionally, you might need to refer to the documentation provided by your WinSock vendor.

---

# Introduction

This chapter lists what you need to get started and optional equipment you can order, and briefly describes the GPIB-ENET hardware and the NI-488.2 software for Windows 98/95.

## What You Need to Get Started

---

Before you install your GPIB hardware and the NI-488.2 software for Windows 98/95, make sure you have all of the following items:

- Windows 98/95 or higher installed on your computer
- WinSock interface 1.1 or higher installed on your computer
- The *NI-488.2 for Windows* CD, which is included in your kit
- One of the following boxes, which is included in your kit:
  - GPIB-ENET—10Base-T Version (100–120 VAC)
  - GPIB-ENET—10Base-T Version (220–240 VAC)
  - GPIB-ENET—Coax Version (100–120 VAC)
  - GPIB-ENET—Coax Version (220–240 VAC)
- One of the following power cords, which is included in your kit:
  - U.S. standard power cord
  - Switzerland power cord
  - Australian power cord
  - Universal European power cord
  - North American power cord
  - U.K. power cord
- One of the following shielded GPIB cables, which you can purchase from National Instruments:
  - Type X1 single-shielded cables (1, 2, or 4 m)
  - Type X2 double-shielded cables (1, 2, or 4 m)



**Caution** To meet FCC emission limits for this device, you must use a shielded (Type X1 or X2) GPIB cable. If you operate this equipment with a non-shielded cable, it may interfere with radio and television reception.

- ❑ One of the following Ethernet cables, which you can purchase from National Instruments:

Twisted pair (10Base-T) cables (1, 5, or 10 m)

Coax (10Base-2) cables (1, 5, or 10 m)

AUI (10Base-5) cables (1, 5, or 10 m)

## Optional Equipment

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This section lists optional equipment that you can order from National Instruments.

### Multiple-Computer Software License

A multiple-computer software license allows one or more hosts on a single physical network to access one or more GPIB-ENET boxes. For information about ordering a software license, contact National Instruments.

### Optional Hardware

For information about ordering the following optional equipment, contact National Instruments:

- Serial or parallel bus extender and cables
- Bus expander/isolator
- GPIB mechanical switch

## GPIB-ENET Hardware Overview

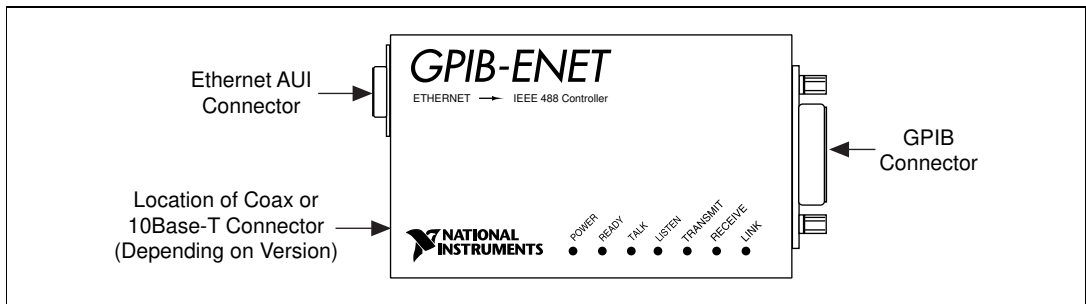
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The GPIB-ENET hardware transparently handles data transfers between an Ethernet-based TCP/IP host and the GPIB. With the GPIB-ENET, multiple hosts can share a set of GPIB instruments or a single host can control several GPIB systems.

The GPIB-ENET uses the GPIB software to transform any computer with the GPIB driver and an Ethernet port into a fully functional GPIB Talker/Listener/Controller with complete communication and bus management capability. The GPIB-ENET is powered by an internal 100–120 VAC or 220–240 VAC supply.

The GPIB-ENET includes all the software and logic needed to implement the physical and electrical characteristics of all versions of IEEE 488, including IEEE 488.2, and IEEE 802.3. The GPIB-ENET interprets and executes commands that you send to it over an Ethernet link and performs all necessary Ethernet-to-GPIB protocol conversions. For more information about hardware specifications, refer to Appendix D, *Specifications*.

Figure 1-1 shows the seven light-emitting diodes (LEDs) on the GPIB-ENET top panel.



**Figure 1-1.** GPIB-ENET Top Panel and LEDs

The LEDs show the current status of the GPIB-ENET. Table 1-1 describes each LED.

**Table 1-1.** LED Descriptions

LED	Description
<b>POWER</b>	Indicates that power has been supplied to the unit and the ON/OFF switch is in the ON position.
<b>READY</b>	Indicates that the box is ready for operation. Continuous flashing indicates an error occurred.
<b>TALK</b>	Indicates that the GPIB-ENET is configured as a GPIB Talker.
<b>LISTEN</b>	Indicates that the GPIB-ENET is configured as a GPIB Listener.
<b>TRANSMIT</b>	Indicates that the GPIB-ENET is transmitting to the Ethernet network.

**Table 1-1.** LED Descriptions (Continued)

LED	Description
<b>RECEIVE</b>	Indicates that the GPIB-ENET is receiving Ethernet network traffic.
<b>LINK</b>	Indicates that the GPIB-ENET detected a twisted pair (10Base-T) link. For GPIB-ENET coax and AUI options, this LED remains OFF.

## NI-488.2 Software Overview

---

The NI-488.2 software includes a native, 32-bit multitasking Windows 98/95 driver that is fully Plug and Play aware.

The NI-488.2 software supports the concurrent use of multiple types of GPIB hardware. For example, you can communicate with GPIB devices through an AT-GPIB/TNT, a PCMCIA-GPIB, and a GPIB-ENET in the same system at the same time. The NI-488.2 software is fully integrated into the operating system.

The NI-488.2 software, along with the GPIB hardware, transforms your computer into a GPIB Talker/Listener/Controller with complete communications and bus management capability. The NI-488.2 software includes the following components:

- Device driver
- Measurement & Automation Explorer, which gives you access to the NI-488.2 development utilities, including the NI-488.2 Getting Started Wizard and the NI-488.2 Troubleshooting Wizard
- Language interface libraries for Microsoft Visual C/C++ 2.0 or higher, Borland C/C++ 4.0 or higher, and Microsoft Visual Basic 4.0 or higher
- Example programs that use the NI-488.2 API

Refer to Appendix D, *Specifications*, for information about the NI-488.2 software transfer rates.

# Time-Saving Development Tools

---

Your kit includes the NI-488.2 software for Windows 98/95. In addition, you can order the LabWindows/CVI or LabVIEW software from National Instruments to speed your application development time and make it easier to communicate with your instruments.

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.

LabWindows/CVI is similar to LabVIEW, except that it combines an interactive, easy-to-use development approach with the programming power and flexibility of compiled ANSI C code.

The GPIB Analyzer is another optional tool available from National Instruments that is useful in troubleshooting a variety of IEEE 488 hardware and software problems. With its built-in time-stamping capability, you can easily determine the throughput and overhead of your GPIB systems. The GPIB Analyzer software for Windows 98/95 works with the AT-GPIB/TNT+ and PCMCIA-GPIB+ products, which provide GPIB Analyzer support along with the functionality of a high-performance GPIB Controller.

For ordering information, or to request free demonstration software, contact National Instruments.

# Installation and Configuration

This chapter describes how to install and configure your GPIB-ENET and the NI-488.2 software for Windows 98/95.

## Install the NI-488.2 Software

Before you install the GPIB-ENET hardware, complete the following steps to install the NI-488.2 software:

1. Insert the *NI-488.2 for Windows* CD.
2. Click on the **Install NI-488.2 Software for Windows** item, as shown in Figure 2-1.

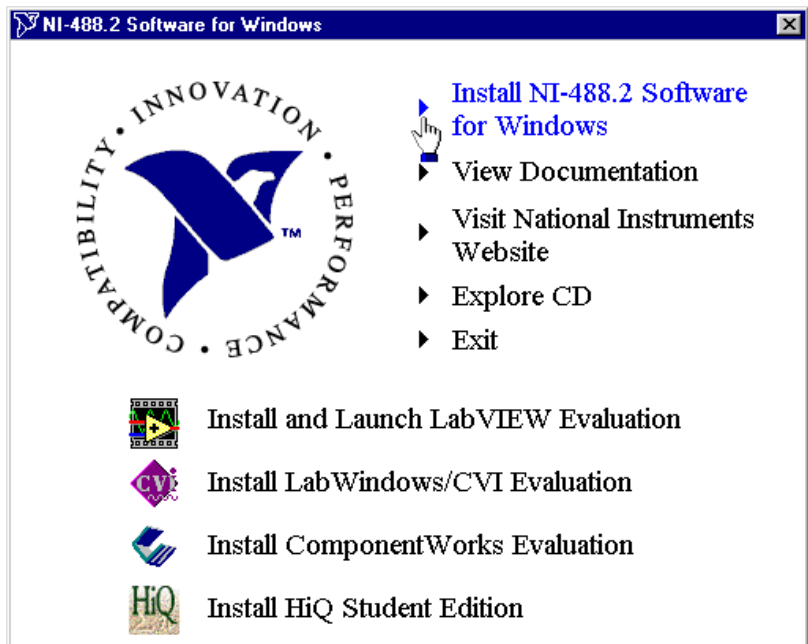


Figure 2-1. NI-488.2 Software for Windows CD Autorun Screen



The setup wizard guides you through the necessary steps to install the NI-488.2 software.

After you install the NI-488.2 software, you should install the GPIB-ENET hardware. Continue to the next section, *Add GPIB Hardware*.

## Add GPIB Hardware

Use the Add GPIB Hardware Wizard to inform Windows 98/95 that you are adding a GPIB-ENET to your system. To do so, complete the following steps:

1. Select **Start»Programs»National Instruments NI-488.2»Add GPIB Hardware**.
2. When the wizard prompts you for a type of hardware, select **GPIB-ENET** and click on the **Next** button to continue.

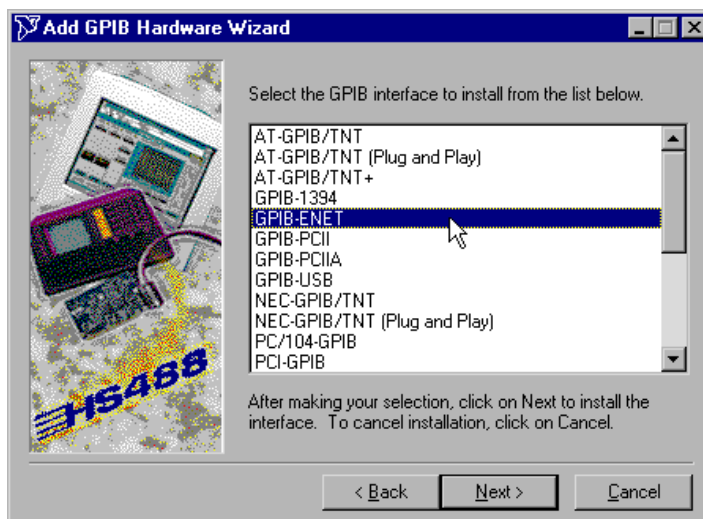


Figure 2-2. Add GPIB Hardware Wizard Dialog Box

## Restart Your System

Before you use the NI-488.2 software, you must restart your system.

When your system restarts, the NI-488.2 Getting Started Wizard launches automatically. Exit the NI-488.2 Getting Started Wizard. Later, you will be prompted to start the wizard again.

# Configure and Install the Hardware

To configure the NI-488.2 software and your GPIB-ENET, complete the following steps.

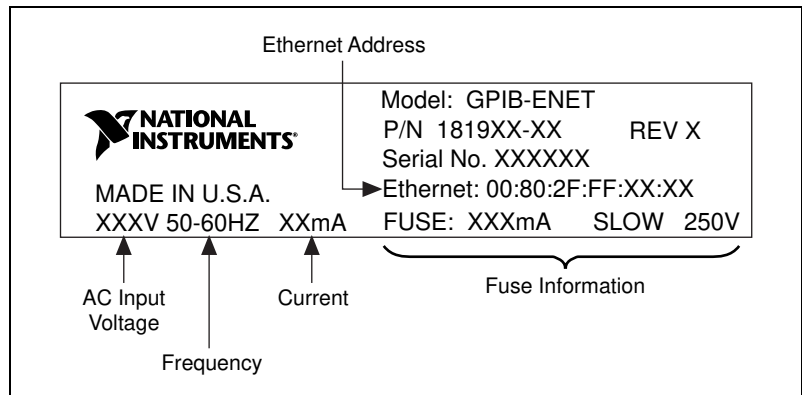
## Step 1. Determine IP and Ethernet Addresses

TCP/IP-based networks use the Internet Protocol (IP) address to route information to the appropriate network and host. If you are installing a GPIB-ENET in a network for the first time, or if your GPIB-ENET IP address changes, you must configure the IP address. To do so, complete the following steps:

1. Locate the Ethernet address on the bottom panel label of the GPIB-ENET, as shown in Figure 2-3.



**Note** The Ethernet address is not the IP address. All devices on an Ethernet network are assigned a physical address, the Ethernet address, so they can communicate with each other.



**Figure 2-3.** GPIB-ENET Bottom Panel Identification Label

2. Contact your network administrator to assign a unique, valid IP address or hostname for your GPIB-ENET. Your network administrator can determine whether the GPIB-ENET should have its IP address assigned by a RARP (Reverse Address Resolution Protocol) server, or configured manually, using the Assign IP Address utility.
3. Make a note of the IP address or hostname. You will use this information in the following steps.

## Step 2. Configure the NI-488.2 Software

To configure the NI-488.2 software, complete the following steps:

1. Select **Start»National Instruments NI-488.2»Explore GPIB** to start the Measurement & Automation Explorer.
2. Under **Measurement & Automation**, expand the **Devices and Interfaces** folder.
3. Right-click on the GPIB-ENET item and select **Properties** from the drop-down menu that appears.
4. To configure the network addresses assigned to your GPIB-ENET, complete the following steps:
  - a. Click on the **Network Settings** tab.
  - b. Type the IP Address reserved by your network administrator in the **IP Address** field, as shown in Figure 2-4.

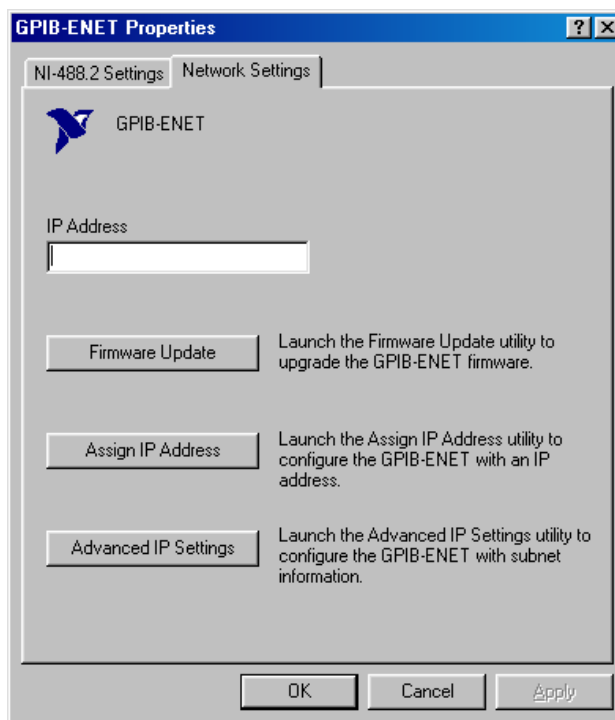


Figure 2-4. Network Settings Tab

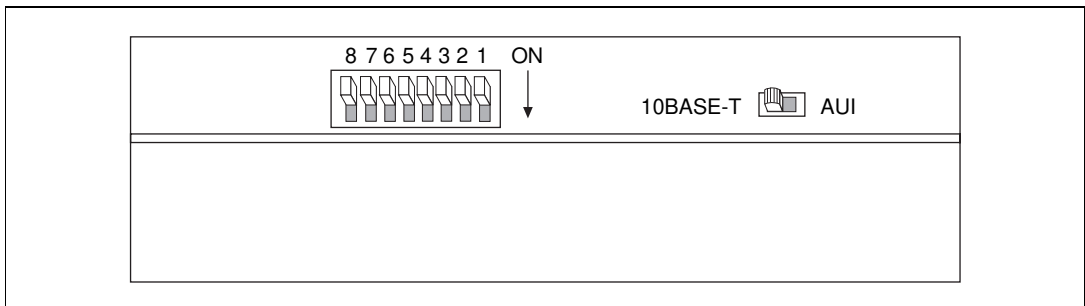
The **Network Settings** tab also gives you access to the three GPIB-ENET support utilities—Firmware Update, Assign IP Address, and Advanced IP Settings. To run any of these utilities, click on the corresponding button for that utility. Each utility includes built-in, context-sensitive online help.

The NI-488.2 Configuration utility context-sensitive online help contains all of the information that you need to configure the NI-488.2 software properly. To view the online help, click on the question mark button in the toolbar and click on any item about which you want more information.

### Step 3. Configure the GPIB-ENET Operating Characteristics

The GPIB-ENET has a two-position slide switch that you use to configure the network interface connector. The GPIB-ENET also has an 8-bit DIP switch that you use to configure the operating characteristics. These switches are located on the back panel of the GPIB-ENET, as shown in Figure 2-5.

To configure the GPIB-ENET operating characteristics, refer to the following sections.

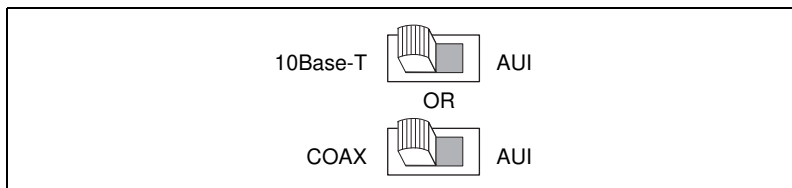


**Figure 2-5.** GPIB-ENET Back Panel Switches

## Configure the Slide Switch

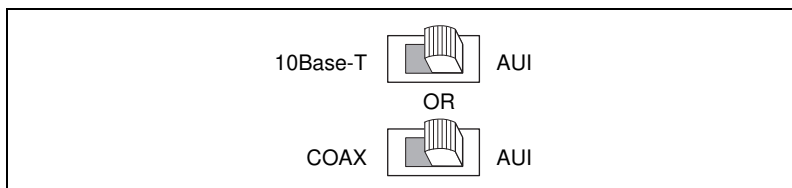
The GPIB-ENET has two network interface connectors: a 15-pin AUI connector, and either a 10Base-T or coax Ethernet connector.

Use the slide switch to select the connector that the GPIB-ENET uses. The default switch setting is either **10Base-T** or **COAX**, as shown in Figure 2-6.



**Figure 2-6.** Default Switch Setting for Ethernet Port Configuration

If you want to use the AUI connector, slide the switch setting to **AUI**, as shown in Figure 2-7.



**Figure 2-7.** Switch Setting for AUI Ethernet Port Configuration

## Verify the 8-Bit DIP Switch Setting

The 8-bit DIP switch sets the operating mode of the GPIB-ENET. The default switch setting is for normal operation mode. In normal operation mode, all the switches are in the OFF position.

Verify that all the DIP switches on your GPIB-ENET are in the OFF position. Do *not* change the DIP switch settings unless you run a utility that prompts you to do so. For more information about the 8-bit DIP switch, refer to Appendix A, [GPIB-ENET 8-Bit DIP Switch](#).

## Step 4. Connect the Cables



**Note** If you do not have both a GPIB cable and an Ethernet cable, as listed in the [What You Need to Get Started](#) section of Chapter 1, *Introduction*, contact National Instruments for ordering information.

To connect your cables, complete the following steps:

1. Connect one end of your Ethernet cable to your GPIB-ENET and securely fasten it. Connect the other end of the Ethernet cable to your Ethernet network. Make sure that you comply with all IEEE 802.3 cabling restrictions.
2. Connect one end of your GPIB cable to your GPIB-ENET and tighten the thumb screws on the connector. Connect the other end of your GPIB cable to your GPIB system. Make sure that you comply with all IEEE 488.1 cabling restrictions and that you use only shielded GPIB cables.
3. Plug the power cord into an AC outlet of the correct voltage.



**Caution** Do not operate your GPIB-ENET at any voltage other than the one specified on your GPIB-ENET bottom panel label. Doing so could damage the GPIB-ENET.

## Step 5. Switch on Your GPIB-ENET

The GPIB-ENET has either a 100–120 VAC or 220–240 VAC power supply. Before you use your GPIB-ENET, verify that the voltage rating listed on the bottom panel label matches the voltage that is supplied in your area. To see an illustration of the bottom panel label, refer to Figure 2-3.

Contact your network administrator to determine whether the IP address is assigned by a RARP server or must be assigned manually. After you contact your network administrator, refer to the following sections for instructions on how to assign the IP address.

### Assign IP Address with a RARP Server

To assign the IP address with a RARP server, power on your GPIB-ENET. The **POWER** LED comes on immediately. The **READY** LED flashes while the GPIB-ENET completes its power-on self tests and assigns the IP address. When the **READY** LED remains steady, the GPIB-ENET is ready to operate.



**Note** The power-on self tests take about 10 seconds to complete. The time required for the IP address assignment is dependent on your network and the configuration of your GPIB-ENET. If the **READY** LED continues to flash for more than one minute, refer to the [Troubleshooting Hardware Problems](#) section in Appendix C, [Troubleshooting and Common Questions](#).

## Assign IP Address with the Assign IP Address Utility

If your network administrator tells you to assign the IP address manually, run the Assign IP Address utility. To do so, complete the following steps:

1. Select **Start»National Instruments NI-488.2»Explore GPIB** to start the Measurement & Automation Explorer.
2. Under **Measurement & Automation**, expand the **Devices and Interfaces** folder.
3. Right-click on the GPIB-ENET item and select **Assign IP Address** from the drop-down menu that appears.

To view the built-in, context-sensitive online help for the Assign IP Address utility, click on the **Help** button.

## Step 6. Configure Advanced IP Settings

Before you use your GPIB-ENET for your application, you can use the Advanced IP Settings utility to configure the proper subnet information. Your GPIB-ENET may work properly if you skip this step, but National Instruments recommends that you configure the proper subnet information, including the broadcast IP address and netmask, and up to four router IP addresses.

To configure the proper subnet information with the Advanced IP Settings utility, complete the following steps:

1. Select **Start»National Instruments NI-488.2»Explore GPIB** to start the Measurement & Automation Explorer.
2. Under **Measurement & Automation**, expand the **Devices and Interfaces** folder.
3. Right-click on the GPIB-ENET item and select **Advanced IP Settings** from the drop-down menu that appears.

To view the built-in, context-sensitive online help for the Advanced IP Settings utility, click on the **Help** button.

After you configure the software and hardware, continue to Chapter 3, [Verify the Installation](#).

---

# Verify the Installation

This chapter describes how to verify the hardware and software installation.

## Power-On Self Tests

---

When you power on your GPIB-ENET, the **POWER** LED comes on immediately. The **READY** LED flashes while the GPIB-ENET completes its power-on self tests and assigns an IP address. When the tests are successful and the IP address is assigned, the **READY** LED remains steady, indicating that the GPIB-ENET is ready to operate.



**Note** The power-on self tests take about 10 seconds to complete. The time required for the IP address assignment is dependent on your network and the configuration of your GPIB-ENET. If the **READY** LED continues to flash for more than one minute, refer to the [Troubleshooting Hardware Problems](#) section in Appendix C, [Troubleshooting and Common Questions](#).

## Run the NI-488.2 Getting Started Wizard

---

To test the hardware and software installation, run the NI-488.2 Getting Started Wizard, as follows: select **Start»Programs»National Instruments NI-488.2»Getting Started** and follow the instructions on the screen.

The NI-488.2 Getting Started Wizard, shown in Figure 3-1, verifies the hardware and software installation and helps you begin to communicate with your GPIB instrument.





**Figure 3-1.** NI-488.2 Getting Started Wizard Dialog Box

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# Begin to Use the NI-488.2 Software

This chapter helps you get started with the NI-488.2 software.

## Getting Started

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The NI-488.2 Getting Started Wizard, shown in Figure 4-1, helps you get started with GPIB instrument communication using the Measurement & Automation Explorer. To run the NI-488.2 Getting Started Wizard, select **Start»Programs»National Instruments NI-488.2»Getting Started**.



**Figure 4-1.** NI-488.2 Getting Started Wizard Dialog Box

## Troubleshooting Problems

To troubleshoot problems with the NI-488.2 software, start the Measurement & Automation Explorer by selecting **Start»Programs»National Instruments NI-488.2»Explore GPIB**. Within the Measurement & Automation Explorer, select **Help»Troubleshooting»NI-488.2 Troubleshooting Wizard** to start the NI-488.2 Troubleshooting Wizard, shown in Figure 4-2.

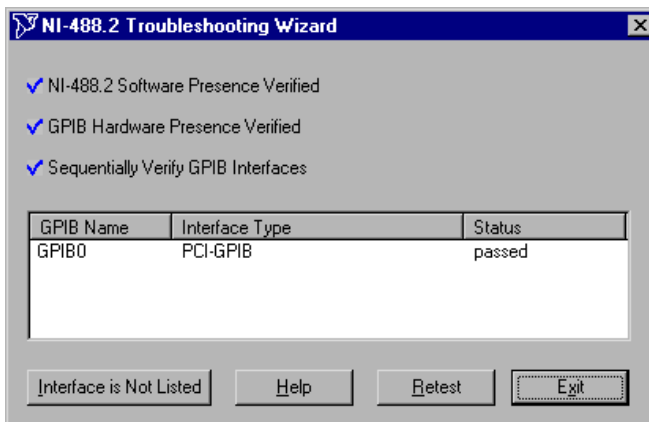


Figure 4-2. NI-488.2 Troubleshooting Wizard

# GPIB-ENET 8-Bit DIP Switch

This appendix describes how the 8-bit DIP switch on the back panel affects the operation of the GPIB-ENET.

The 8-bit DIP switch is located on the back panel of the GPIB-ENET, as shown in Figure A-1. The DIP switches are used to set the operation mode of the GPIB-ENET. The default switch setting is for normal operation mode; all the switches are in the OFF position.

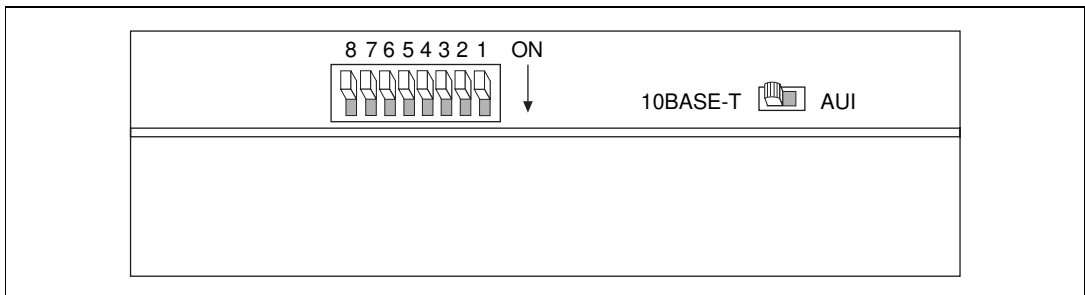


Figure A-1. GPIB-ENET Back Panel Switches

## 8-Bit DIP Switch Descriptions

Table A-1 shows the possible settings of the GPIB-ENET DIP switches and what each setting indicates. Default settings are in ***bold italics***.

Table A-1. DIP Switch Settings

Switch	Position	Indication
8	ON	Extended Factory Test
	<b><i>OFF</i></b>	<b><i>Normal Operation</i></b>
7	ON	Modify Mode
	<b><i>OFF</i></b>	<b><i>Normal Operation</i></b>

**Table A-1.** DIP Switch Settings

Switch	Position	Indication
6	ON*	Use Stored IP Address
	<i>OFF</i>	<i>Obtain IP Address</i>
5	ON	Manual IP Assignment
	<i>OFF</i>	<i>Automatic IP Assignment</i>
1-4	<i>OFF</i>	<i>These switches are reserved and should remain OFF.</i>
* When switch 6 is in the ON position, switch 5 is ignored.		

## Switch 8

This switch puts your GPIB-ENET in Extended Factory Test mode. In normal operating mode, switch 8 should be in the OFF position.

When this switch is in the ON position, the GPIB-ENET performs extended tests that require special connections to the GPIB and Ethernet ports. Without these connections, the GPIB-ENET cannot pass the extended factory tests.

## Switch 7

This switch puts your GPIB-ENET in Modify Mode. In normal operating mode, switch 7 should be in the OFF position.

The firmware controlling your GPIB-ENET is stored in EEPROM. When switch 7 is in the ON position, you can reprogram the firmware memory from the Ethernet network using the Update Firmware utility.



**Note** When you set switch 7 to the ON position, do not change any other switch settings.

To start the Update Firmware utility or any other GPIB-ENET utility, complete the following steps:

1. Select **Start»National Instruments NI-488.2»Explore GPIB** to start the Measurement & Automation Explorer.
2. Under **Measurement & Automation**, expand the **Devices and Interfaces** folder.
3. Right-click on the GPIB-ENET item and select the utility name, such as **Update Firmware**, from the drop-down menu that appears.

To view the built-in, context-sensitive online help for the utility, click on the **Help** button.

## Switch 6

This switch sets how the IP address is determined when you power on the GPIB-ENET. When switch 6 is in the OFF position, the GPIB-ENET receives the IP address from the network. Each time the GPIB-ENET receives the IP address from the network, the GPIB-ENET stores it in nonvolatile memory. When switch 6 is in the ON position, the GPIB-ENET retrieves the IP address that is stored in nonvolatile memory.

When switch 6 is in the ON position, the setting of switch 5 is ignored.

## Switch 5

This switch sets how the GPIB-ENET configures IP addresses. When switch 5 is in the OFF position, the GPIB-ENET issues Reverse Address Resolution Protocol (RARP) requests each time you power it on. The GPIB-ENET continues to issue RARP requests until it receives a valid RARP reply. If switch 5 is in the ON position, the GPIB-ENET does not issue RARP requests.

In most networks, the GPIB-ENET can use RARP to configure its IP address automatically; however, some networks, for security or other reasons, do not use RARP. If your network does not use RARP, you must manually configure the IP address. To do so, run the Assign IP Address utility, as described in the [Switch 7](#) section earlier in this appendix.

When switch 6 is in the ON position, the setting of switch 5 is ignored.

## Switches 1–4

These switches are reserved for future expansion. They should remain in the OFF position.

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# READY LED Signaling

This appendix describes how to interpret the **READY** LED error codes.

## Overview

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The **READY** LED has several purposes on the GPIB-ENET. When you power on the GPIB-ENET, the **READY** LED flashes while the GPIB-ENET completes its power-on self tests. When the tests successfully complete and the IP address is assigned, the **READY** LED remains steady, indicating that the GPIB-ENET is ready to operate.



**Note** The power-on self tests take about 10 seconds to complete. The time required for the IP address assignment is dependent on your network and the configuration of your GPIB-ENET. If the **READY** LED continues to flash for more than one minute, refer to the [Troubleshooting Hardware Problems](#) section in Appendix C, [Troubleshooting and Common Questions](#).

## Troubleshooting a Slowly Blinking READY LED

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During operation, the **READY** LED might blink slowly. This occurs after you run the Firmware Update utility, while the GPIB-ENET reports status on the operation. At other times, the **READY** LED blinks slowly to alert you of GPIB-ENET internal errors.

If the **READY** LED is blinking slowly, complete the following steps to try to resolve the problem:

1. Verify that all of your Ethernet cables are attached securely.
2. Turn your GPIB-ENET off and wait five seconds.
3. Turn your GPIB-ENET on and wait to see if the **READY** LED is still blinking slowly. If so, refer to the next section, [Recording the READY LED Pattern](#), for instructions on how to record the **READY** LED pattern.

## Recording the **READY LED** Pattern

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**READY LED** signaling can report up to 100 different errors. The errors are reported through sequences of **READY LED** flashes. A 3-second interval, during which the **READY LED** is OFF, separates each repetition of the sequence.

Before you contact National Instruments, use this appendix to record the pattern that the **READY LED** flashes. To record the pattern, complete the following steps:

1. Do *not* switch off power to your GPIB-ENET.
2. Count the number of long 1-second flashes—that is, one second ON, one second OFF. The long flashes appear in sets of one to ten.
3. Count the number of short flashes after the long flashes; each short flash lasts about one-fifth of a second. Flashes occur in sets of one to ten.
4. Make a note of the **READY LED** pattern.
5. Refer to Appendix E, *Technical Support Resources*, and contact National Instruments.





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# Troubleshooting and Common Questions

This appendix describes how to troubleshoot problems and answers some common questions.

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## Troubleshooting Hardware Problems

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**Warning** Do not try to open and service the box unless you are qualified personnel and equipped to do so. The GPIB-ENET contains circuitry that operates under hazardous voltages.

To troubleshoot problems with your GPIB-ENET, complete the following steps:

1. Make sure that all cables are securely connected to the GPIB-ENET.
2. Make sure that the GPIB-ENET is powered on. If the unit is powered on and plugged into an outlet of the proper voltage, but you see no LED activity, check the condition of the fuse. For fuse specifications, refer to Appendix D, *Specifications*.



**Warning** To prevent fire, replace the fuse with only the same type and rating of fuse. For fuse specifications, refer to Appendix D, *Specifications*.

3. Make sure that the Ethernet port configuration slide switch is set to the correct Ethernet port. For more information, refer to the *Configure the Slide Switch* section in Chapter 2, *Installation and Configuration*.
4. Make sure that the DIP switch settings are configured properly for your system. For more information, refer to Appendix A, *GPIB-ENET 8-Bit DIP Switch*.
5. Verify your IP address, as follows:
  - a. Verify with your network administrator that your IP address is valid and that the network is set up to recognize the IP address properly.

- b. If you configured the IP address manually using the Assign IP Address utility, make sure that you followed the instructions in the online help.

## READY LED Problems

If the **READY** LED continues to flash for more than one minute, you have a problem with your setup. If the **READY** LED flashes quickly, the GPIB-ENET cannot obtain its IP address from the network. In this case, check with your network administrator to verify your IP address and make sure that you recorded the Ethernet address correctly.

If the **READY** LED is blinking slowly, complete the following steps to try to resolve the problem:

1. Verify that all of your Ethernet cables are attached securely.
2. Turn your GPIB-ENET off and wait five seconds.
3. Turn your GPIB-ENET on and wait to see if the **READY** LED is still blinking slowly. If so, refer to Appendix B, *READY LED Signaling*, for instructions on how to record the **READY** LED pattern.

## Troubleshooting EDVR Error Conditions

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In some cases, calls to the NI-488.2 API may return with the ERR bit set in `ibsta` and the value EDVR in `iberr`. You can use the value stored in `ibcntl` to troubleshoot the error condition. If you receive an EDVR error condition, refer to the following sections to troubleshoot the error condition.

### EDVR Error Condition with `ibcntl` Set to 0xE028002C (-534249428)

If a call is made with a board number that is within the allowed range (typically 0 to 3), but the board has not been assigned to a GPIB interface, an EDVR error condition occurs with `ibcntl` set to 0xE028002C. To assign the board number to a GPIB interface, configure the NI-488.2 software and select an interface name. For instructions on how to do so, refer to the *Configure and Install the Hardware* section in Chapter 2, *Installation and Configuration*.

## EDVR Error Condition with `ibcntl` Set to `0xE0140025` (-535560155)

If a call is made with a board number that is not within the allowed range (typically 0 to 3), an EDVR error condition occurs with `ibcntl` set to `0xE0140025`. To solve this problem, change the board number to one within the allowed range. For instructions on how to do so, refer to the [Configure and Install the Hardware](#) section in Chapter 2, *Installation and Configuration*.

## EDVR Error Condition with `ibcntl` Set to `0xE0140035` (-535560139)

If a call is made with a device name that is not listed in the logical device templates that are part of the NI-488.2 Configuration utility, an EDVR error condition occurs with `ibcntl` set to `0xE0140035`. To solve this problem, rename the device template, as follows:

1. Select **Start»Settings»Control Panel**.
2. Double-click on the **System** icon.
3. Select the **Device Manager** tab and click on the **View devices by type** button.
4. Click on the **National Instruments GPIB Interfaces** icon.
5. Click on the **Properties** button.
6. Select the **Device Templates** tab and rename the device template as described in your application documentation.
7. Click on the **OK** button twice to save your changes and exit.

## EDVR Error Conditions with `ibcntl` in the Range of `0xE1002710` (-520083696) to `0xE1002EE0` (-520081696)

The WinSock interface returns errors in the range of `0xE1002710` to `0xE1002EE0`. The lower 16 bits of `ibcntl` specify the actual WinSock interface error. For more information about the specific error, refer to your WinSock interface documentation.

## EDVR Error Condition with `ibcntl` set to `0xE1030043` (-519897021)

If you enabled DOS NI-488.2 support and tried to run an existing DOS NI-488.2 application that was compiled with an older, unsupported DOS language interface, an EDVR error condition occurs with `ibcntl` set to `0xE1030043`.

## Missing WinSock Support

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If you have not enabled and configured WinSock support, complete the following steps:

1. Select **Start»Settings»Control Panel**.
2. Double-click on the **Network** icon.
3. In the **Network** dialog box, click on the **Configuration** tab and click on the **Add** button.
4. In the **Select Network Component Type** dialog box, select **Protocol** from the list box and click on the **Add** button.
5. In the **Select Network Protocol** dialog box, select the appropriate **Manufacturers** and **Network Protocols** from the list boxes.

Because many different network providers and protocols are available in this dialog box, consult your network provider documentation to determine which protocol provides WinSock support from that vendor. For example, to enable Microsoft WinSock support, select **Microsoft** in the **Manufacturers** list box and **TCP/IP** in the **Network Protocols** list box. For instructions on how to configure the selected protocol, consult your network provider documentation.

6. After you enable and configure WinSock support, run the NI-488.2 Troubleshooting Wizard. To do so, start the Measurement & Automation Explorer by selecting **Start»Programs»National Instruments NI-488.2»Explore GPIB**. Within the Measurement & Automation Explorer, select **Help»Troubleshooting»NI-488.2 Troubleshooting Wizard**.

## Common Questions

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**I do not have a WinSock interface installed. How do I install a WinSock interface?**

Before you use the driver software for the GPIB-ENET, you must install a WinSock interface, 1.1 or higher. You can install a WinSock interface from Microsoft or another network vendor. For instructions on how to install and configure WinSock support, refer to the *Missing WinSock Support* section earlier in this appendix.

**My driver is not communicating with the GPIB-ENET. What should I do?**

Make sure that your GPIB-ENET is configured properly. For instructions on how to configure your GPIB-ENET, refer to the [Configure and Install the Hardware](#) section in Chapter 2, *Installation and Configuration*.

**My I/O worked with a board interface, but it times out when I use the GPIB-ENET interface. What should I do?**

Network communication is slower than straight cable communication. You might need to raise the default **Timeout** value using the Device Manager. For instructions on how to run the Device Manager, refer to [Step 2. Configure the NI-488.2 Software](#) in Chapter 2, *Installation and Configuration*.

**I powered off my GPIB-ENET before recording the flashing READY LED pattern. What should I do?**

Before you contact National Instruments, try to duplicate the error. Recording the **READY** LED pattern is not critical to the operation of your GPIB-ENET, but it saves you time and helps National Instruments diagnose the problem quickly and accurately.

**How many GPIB interfaces can I configure for use with the NI-488.2 software?**

You can configure the NI-488.2 software to communicate with up to 100 GPIB interfaces.

**How many devices can I configure for use with the NI-488.2 software?**

You can configure the NI-488.2 software to use up to 1,024 logical devices. The default number of devices is 32. The maximum number of physical devices you should connect to a single GPIB interface is 14, or fewer, depending on your system configuration.

**How can I determine if my GPIB hardware and the NI-488.2 software are installed properly?**

Run the NI-488.2 Getting Started Wizard: select **Start»Programs»National Instruments NI-488.2»Getting Started**.

# Specifications

This appendix lists the electrical, physical, and environmental characteristics of the GPIB-ENET hardware and the transfer rates of the GPIB software, along with the recommended operating conditions.

## Electrical Characteristics

### Power supply unit

100–120 VAC .....  $\pm 10\%$ , 50–60 Hz

220–240 VAC .....  $\pm 10\%$ , 50–60 Hz

### Maximum current requirement

100–120 VAC ..... 110 mA

220–240 VAC ..... 55 mA

### Fuse rating and type

100–120 VAC ..... 300 mA, UL/CSA approved

220–240 VAC ..... 500 mA, IEC approved

## Environmental Characteristics

Operating temperature..... 0° to 40° C

Storage temperature ..... –20° to 70° C

Relative humidity ..... 10% to 90%, noncondensing

EMI ..... FCC Class A Verified

## Physical Characteristics

Overall case size (dimensions) .....3.5 by 5.65 by 1.62 in.  
(8.89 by 14.35 by 4.11 cm)

Case material .....All metal enclosure

Weight .....0.9 lb (0.41 kg)

## GPIB Software Transfer Rate for the GPIB-ENET

3-wire (IEEE 488) .....74 kbytes/s<sup>1</sup>

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<sup>1</sup> Actual speed may vary considerably from speed shown because of system and instrumentation capabilities.



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# Technical Support Resources

National Instruments offers technical support through electronic, fax, and telephone systems. The electronic services include our Web site, an FTP site, and a fax-on-demand system. If you have a hardware or software problem, please first try the electronic support systems. If the information available on these systems does not answer your questions, contact one of our technical support centers, which are staffed by applications engineers, for support by telephone and fax. To comment on the documentation supplied with our products, send e-mail to [techpubs@natinst.com](mailto:techpubs@natinst.com).

## Web Site

The InstrumentationWeb address is <http://www.natinst.com>.

From this Web site you can connect to our Web sites around the world (<http://www.natinst.com/niglobal/>) and access technical support (<http://www.natinst.com/support/>).

## FTP Site

To access our FTP site, log in to our Internet host, <ftp.natinst.com>, as `anonymous` and use your e-mail address, such as `yourname@anywhere.com`, as your password. The support files and documents are located in the `\support` directories.

## Fax-on-Demand Support

Fax-on-Demand is a 24-hour information retrieval system containing a library of documents in English on a wide range of technical information. You can access Fax-on-Demand from a touch-tone telephone at 512 418 1111.

## E-Mail Support

You can submit technical support questions to the applications engineering team through e-mail at [support@natinst.com](mailto:support@natinst.com). Remember to include your name, address, and phone number so we can contact you with solutions and suggestions.



## Telephone and Fax Support

National Instruments has branch offices all over the world. Use the following list to find the technical support number for your country. If there is no National Instruments office in your country, contact the source from which you purchased your software to obtain support.

Country	Telephone	Fax
Australia	03 9879 5166	03 9879 6277
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Brazil	011 284 5011	011 288 8528
Canada (Ontario)	905 785 0085	905 785 0086
Canada (Québec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	09 725 725 11	09 725 725 55
France	0 1 48 14 24 24	0 1 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
India	91805275406	91805275410
Israel	03 6120092	03 6120095
Italy	02 413091	02 4139215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico (D.F.)	5 280 7625	5 520 3282
Mexico (Monterrey)	8 357 7695	8 365 8543
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
Spain (Madrid)	91 640 0085	91 640 0533
Spain (Barcelona)	93 582 0251	93 582 4370
Sweden	08 587 895 00	08 730 43 70
Switzerland	056 200 51 51	056 200 51 55
Taiwan	02 2377 1200	02 2737 4644
United Kingdom	01635 523545	01635 523154
United States	512 795 8248	512 794 5678

# Glossary

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Prefix	Meanings	Value
m-	milli-	$10^{-3}$
c-	centi-	$10^{-2}$
k-	kilo-	$10^3$
M-	mega-	$10^6$

°	degrees
%	percent
A	amperes
AC	alternating current
ANSI	American National Standards Institute
AUI	attachment unit interface
C	Celsius
CSA	Canadian Standards Association
DIP	dual inline package
DLL	dynamic link library
EEPROM	electrically erasable programmable read-only memory
EMI	electromagnetic interference
FCC	Federal Communications Commission
g	grams
GPIO	General Purpose Interface Bus
Hz	hertz
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
in.	inches

*Glossary*

IP	Internet Protocol
lb	pounds
LED	light-emitting diode
m	meters
MB	megabytes of memory
PC	personal computer
RAM	random-access memory
RARP	Reverse Address Resolution Protocol
s	seconds
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
UL	Underwriters Laboratories
V	volts
VAC	volts alternating current