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GPIB

Getting Started with Your GPIB-ENET/100 and NI-488.2™ for Windows Me/98/95

NATIONAL INSTRUMENTS™

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Worldwide Technical Support and Product Information

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FCC/Canada Radio Frequency Interference Compliance*

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). Depending on where it is operated, this 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. By examining the product you purchased, you can determine the FCC Class and therefore which of the two FCC/DOC Warnings apply in the following sections. (Some products may not be labeled at all for FCC; if so, the reader should then assume these are Class A devices.)

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

FCC Class B products display either a FCC ID code, starting with the letters **EXN**, or the FCC Class B compliance mark that appears as shown here on the right.



Consult the FCC web site `http://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 Mark 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 National Instruments 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 will be required to correct the interference at his 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.

Class B

Federal Communications Commission

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Canadian Department of Communications

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

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

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* Certain exemptions may apply in the USA, see FCC Rules §15.103 **Exempted devices**, and §15.105(c). Also available in sections of CFR 47.

** The CE Mark Declaration of Conformity will contain important supplementary information and instructions for the user or installer.

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About This Manual

This manual contains instructions to help you install and configure the National Instruments GPIB-ENET/100 and NI-488.2 for Windows Me/98/95.

This manual assumes that you are already familiar with Windows Me/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/100, your host must be configured with TCP/IP protocols that conform to Windows sockets (WinSock) version 1.1 or higher.

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.

♦ The ♦ symbol indicates that the following text applies only to a specific operating system.

 This icon denotes a tip, which alerts you to advisory information.

 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.

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

italic Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font 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, and code excerpts.
`monospace bold`	Bold text in this font denotes the messages and responses that the computer automatically prints to the screen.

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
- *Microsoft Win32 Software Developer Kit, Online Documentation for Win32 Overviews*, and *Win32 Reference*

1

Introduction

This chapter lists what you need to get started and optional equipment you can order, and briefly describes the GPIB-ENET/100 hardware and NI-488.2 for Windows Me/98/95.

What You Need to Get Started

Before you install your GPIB-ENET/100 hardware and NI-488.2 for Windows Me/98/95, make sure you have all of the following items:

- ❑ Windows Me/98/95 installed on your computer
- ❑ TCP/IP protocol installed on your computer
- ❑ GPIB-ENET/100, which is included in your kit
- ❑ GPIB-ENET/100 power supply, which is included in your kit
- ❑ 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
- ❑ The *NI-488.2 for Windows* CD, which is included in your kit
- ❑ One of the following Category 5 twisted-pair network cables, which you can purchase from National Instruments:
  - Straight-through cable for connecting the GPIB-ENET/100 to a network hub
  - Cross-over cable for connecting the GPIB-ENET/100 directly to a computer's network interface card (NIC)

- ❑ 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.

Optional Equipment

This section lists optional equipment that you can order from 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

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/100 boxes. For information about ordering a software license, contact National Instruments.

GPIB-ENET/100 Hardware Overview

The GPIB-ENET/100 high-speed interface controls GPIB instruments across Ethernet networks. You can use the GPIB-ENET/100 to access remote test equipment from anywhere in the world via TCP/IP protocols on 10Base-T and 100Base-TX networks. By incorporating a new architecture, 100Base-TX Ethernet, and HS488, the GPIB-ENET/100 delivers performance comparable to that of plug-in boards.

The GPIB-ENET/100 automatically detects if the available network is 10Base-T (10 Mbits/s) or 100Base-TX (100 Mbits/s) and communicates at the highest available speed.

You can use either the Dynamic Host Configuration Protocol (DHCP) or a simple Ethernet configuration utility to configure the GPIB-ENET/100 without the need for any dip switches or jumpers. Installation options include rack mounting, DIN rail mounting, wall mounting, and stackable stand-alone use. You can stack the unit with other GPIB-ENET/100 units and additional National Instruments products including the ENET-232 Series and ENET-485 Series serial controllers.

For more information about hardware specifications, refer to Appendix C, *Specifications*.

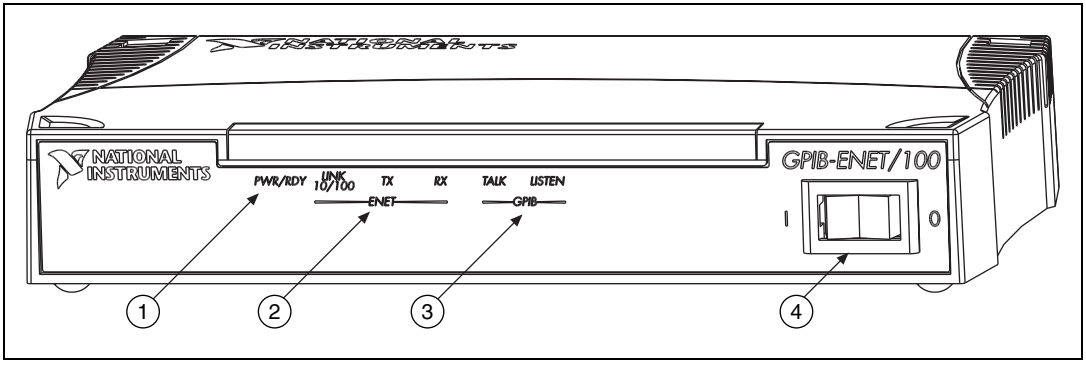
Feature Overview

With the GPIB-ENET/100, you gain all the features inherent in a networked device: fewer cabling distance restrictions, device sharing, and communication with devices throughout the Internet.

In a GPIB application, you are restricted to the distance limitations of the GPIB specification. However, you can overcome these restrictions because the GPIB-ENET/100 uses Ethernet, and can add an unlimited distance to your application simply by utilizing the distances available to you by using a networked device. Because the GPIB-ENET/100 uses standard Internet protocols, you can exploit the Internet to communicate with your GPIB instruments throughout the world.

LED Overview

Figure 1-1 shows the six light-emitting diodes (LEDs) on the GPIB-ENET/100. The LEDs are visible from the top and front of the unit.



1 Power/Ready LED	3 GPIB Port LEDs
2 Ethernet LEDs	4 Power Switch

Figure 1-1. GPIB-ENET/100 Front Panel

The LEDs show the current status of the GPIB-ENET/100. Table 1-1 describes each LED.

Table 1-1. LED Descriptions

LED	Description
PWR/RDY	Flashes rapidly at start-up while performing self tests and when acquiring network parameters. A steady yellow state indicates the box is ready for operation. Slow flashing pattern indicates an error occurred.
LINK 10/100	Indicates the GPIB-ENET/100 detected a twisted pair (10Base-T or 100Base-TX) link. The color indicates the connection speed. If yellow, the speed is 10 Mbits/s. If green, the speed is 100 Mbits/s.
TX	Indicates the GPIB-ENET/100 is transmitting to the Ethernet network.
RX	Indicates the GPIB-ENET/100 is receiving Ethernet network traffic.
TALK	Indicates the GPIB-ENET/100 is configured as a GPIB Talker.
LISTEN	Indicates the GPIB-ENET/100 is configured as a GPIB Listener.

NI-488.2 Overview

NI-488.2 includes a native, 32-bit multitasking Windows Me/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/100 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

Time-Saving Development Tools

Your kit includes NI-488.2 for Windows Me/98/95. After you install your GPIB-ENET/100 and NI-488.2, you can use standard GPIB I/O functions in LabVIEW and Measurement Studio with your GPIB interface. If you already have one or more of these applications and want to use them with your GPIB-ENET/100, refer to your product documentation for information about GPIB I/O functions. For ordering information, contact National Instruments.

LabVIEW is a 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 acquire raw data, you can convert it into meaningful results using the data analysis routines in LabVIEW. The LabVIEW instrument drivers reduce software development time because you do not have to program the low-level control of each instrument.

Measurement Studio bundles LabWindows/CVI for C, and measurement tools for Microsoft Visual C++ and Microsoft Visual Basic. Measurement Studio is designed for building measurement and automation applications with the programming environment of your choice:

- 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.

- Measurement Studio Tools for Visual C++ takes advantage of COM and ActiveX technologies to help you build measurement and automation applications. With the Visual C++ application wizard and instrument classes, you can use the IEEE 488.2 library to send and receive commands to and from instruments, and you can use VISA, an industry-standard I/O library, to communicate with GPIB, VXI, or serial devices using the same set of components.
- For Visual Basic programmers, Measurement Studio includes a collection of ActiveX controls designed for building virtual instrumentation systems. You can use the GPIB, serial, and VISA I/O controls and property pages to configure communication with your instruments.

GPIB Analyzer is an 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 easily can determine the throughput and overhead of your GPIB systems. The GPIB Analyzer software for Windows Me/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.

2

Installation

This chapter describes how to install NI-488.2 for Windows Me/98/95 and the GPIB-ENET/100.

Note If you have a GPIB-ENET instead of a GPIB-ENET/100, refer to *Getting Started with Your GPIB-ENET and NI-488.2 for Windows Me/98/95* for installation instructions.

Installing NI-488.2

Before you install the GPIB-ENET/100 hardware, complete the following steps to install the NI-488.2 software:

1. Insert the *NI-488.2 for Windows* CD.
2. When the NI-488.2 Software for Windows screen appears, click the **Install NI-488.2 Software for Windows** item, as shown in Figure 2-1.

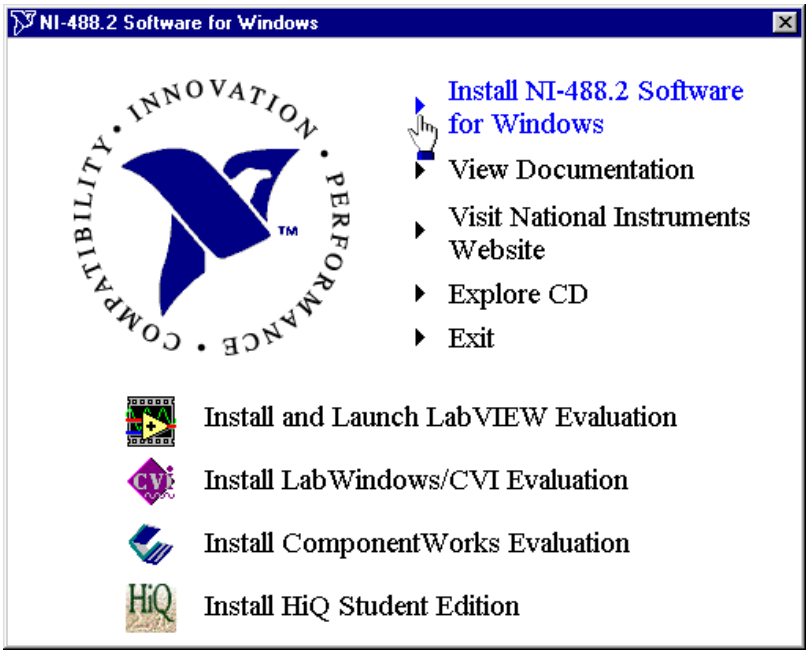


Figure 2-1. NI-488.2 Software for Windows CD Autorun Screen

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

After you install NI-488.2, you are ready to install the GPIB-ENET/100 hardware.

Add GPIB Hardware

Use the Add GPIB Hardware Wizard to inform Windows Me/98/95 that you are adding a GPIB-ENET/100 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/100** and click **Next** to continue.

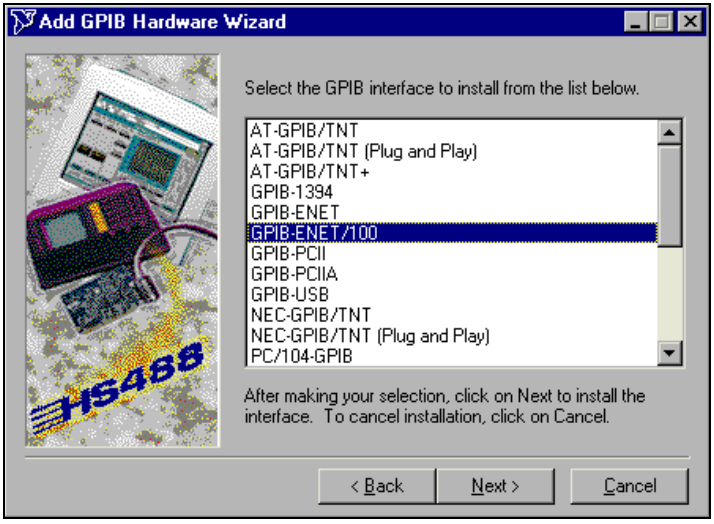


Figure 2-2. Add GPIB Hardware Wizard Dialog Box

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.

Installing the GPIB-ENET/100 Hardware

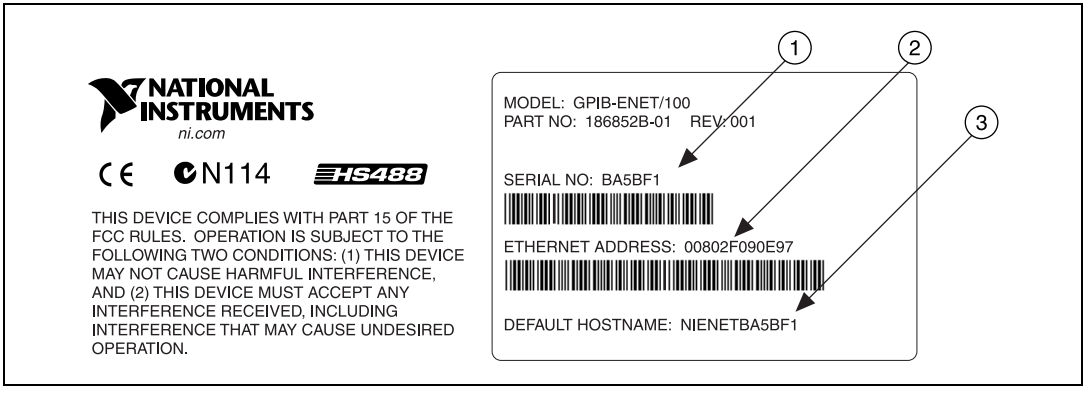
Complete the following steps to install your GPIB-ENET/100.

Step 1. Record the Serial Number, Ethernet Address, and Default Hostname

When you configure the GPIB-ENET/100 for use on your network, you will need to differentiate it from other network devices. Every GPIB-ENET/100 has a unique serial number, Ethernet address, and default hostname.

1. Locate the serial number, Ethernet address, and default hostname on the GPIB-ENET/100 baseplate label, as shown in Figure 2-3.
2. Write down this information and keep it available so you can refer to it later as you configure the GPIB-ENET/100.

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



1 Serial Number	3 Default Hostname
2 Ethernet Address	

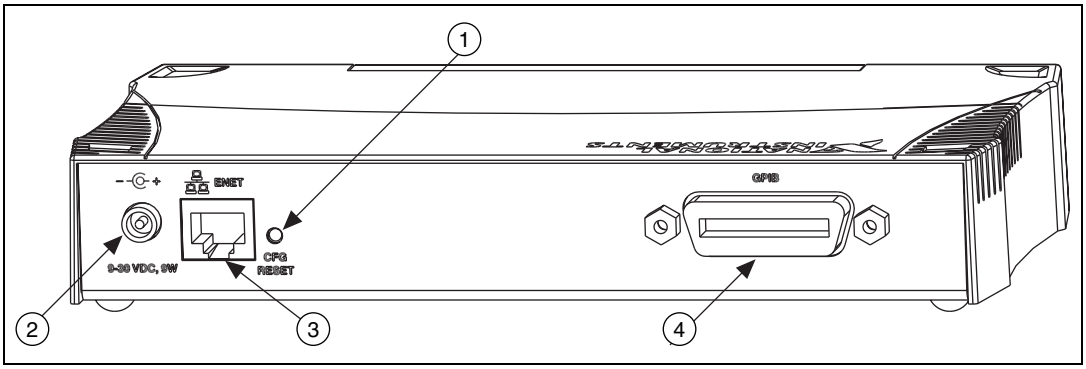
Figure 2-3. GPIB-ENET/100 Baseplate Identification Label

You can change the hostname after you finish the installation and configuration steps in this chapter. Refer to the *Changing the Network Settings* section in Chapter 3, *Ethernet Configuration*, for more information.

Step 2. Connect the Cables

Note If you do not have an Ethernet cable, as listed in the *What You Need to Get Started* section of Chapter 1, *Introduction*, contact National Instruments for ordering information.

Figure 2-4 shows the locations of the power, Ethernet, and GPIB connections on the rear panel of the GPIB-ENET/100.

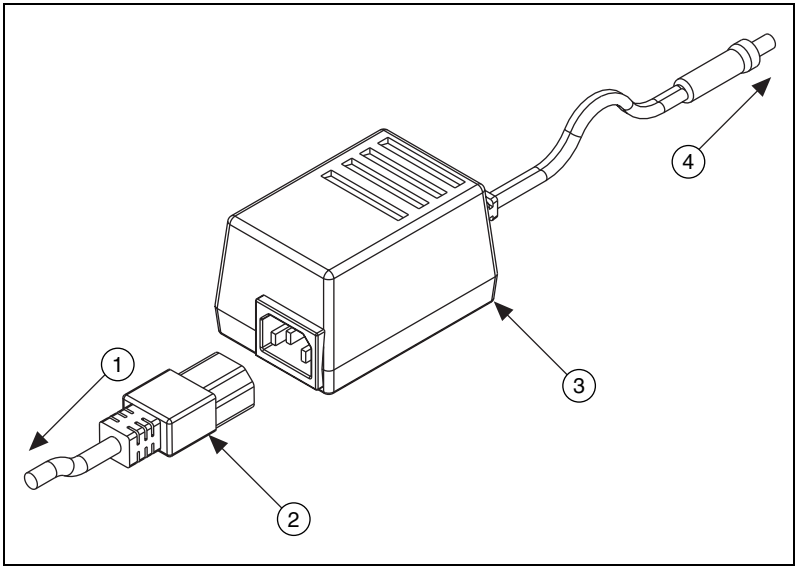


1 Configuration Reset Switch	3 Ethernet Connection
2 Power Connection	4 GPIB Connector

Figure 2-4. GPIB-ENET/100 Rear Panel

To connect your cables, complete the following steps:

1. Connect one end of your Ethernet cable to your GPIB-ENET/100. Connect the other end of the Ethernet cable to your Ethernet network. Make sure you comply with all IEEE 802.3 cabling restrictions.
2. Because AC outlets vary throughout the world, your kit includes a power cord that meets your local requirements in addition to a power supply. Figure 2-5 shows how to hook up your power cord and power supply.
   a. Plug one end of the power cord you received in your kit into the power supply.
   b. Screw the power connector on the other end of the power supply onto the power jack of the GPIB-ENET/100.
   c. Plug the other end of the power cord into an AC outlet.



1	To AC Outlet	3	Power Supply
2	Power Cord	4	To GPIB-ENET/100 Power Jack

Figure 2-5. Connecting Power to the GPIB-ENET/100

Note Do *not* connect GPIB devices to your GPIB port until you configure NI-488.2 as described in Chapter 4, *GPIB Configuration*, and verify the installation as described in Chapter 5, *Verify the Installation*.

Step 3. Switch on Your GPIB-ENET/100

Before you power-on your GPIB-ENET/100, contact your network administrator to determine whether you need to configure your network settings manually using the NI Ethernet Device Configuration utility or use the Dynamic Host Configuration Protocol (DHCP) to perform the configuration automatically. For more information about DHCP, refer to the *Using DHCP* section in Chapter 6, *Using Your GPIB-ENET/100 and NI-488.2*.

When you turn on the front-panel power switch, the **PWR/RDY** LED alternates rapidly between red and yellow while the GPIB-ENET/100 completes its power-on self-tests and attempts to acquire its network parameters. Each Ethernet and GPIB LED lights up as its functionality is tested. By default, the GPIB-ENET/100 attempts its network configuration through DHCP.

The time required for assigning the IP address depends on your network and the configuration of your GPIB-ENET/100. Allow up to 90 seconds and observe the state of the **PWR/RDY** LED to determine the outcome of the self tests. One of the following should occur:

- A steady yellow **PWR/RDY** LED indicates the GPIB-ENET/100 passed its self tests and acquired its IP address. The unit is now ready to operate. When using DHCP, the GPIB-ENET/100 typically is ready to operate about 15 seconds after you power it on. Run the GPIB Configuration utility as described in Chapter 4, *GPIB Configuration*, to add the unit to your GPIB system.
- If the **PWR/RDY** LED continues to alternate rapidly between red and yellow, the unit was unable to use DHCP to configure its network parameters. If your network does not have DHCP, you must use the NI Ethernet Device Configuration utility, as described in Chapter 3, *Ethernet Configuration*, to give your unit its network configuration. If this utility is successful, the **PWR/RDY** LED should become steady yellow. Then you can run the GPIB Configuration utility as described in Chapter 4, *GPIB Configuration*. Refer to Appendix B, *Troubleshooting and Common Questions*, if the LED does not change to steady yellow.
- If the **PWR/RDY** LED is steady red, the GPIB-ENET/100 has an unrecoverable error. Contact National Instruments Technical Support.
- If the **PWR/RDY** LED blinks a slow red/yellow pattern, the GPIB-ENET/100 did not pass its self tests. Refer to Appendix A, *PWR/RDY LED Signaling*, to interpret the flash pattern before calling National Instruments Technical Support.

You can skip Chapter 3, *Ethernet Configuration*, if your GPIB-ENET/100 can use DHCP, although you do need to use the NI Ethernet Device Configuration utility if you want to change the hostname from the default hostname listed on the baseplate label.

Note If at any time you want to return the GPIB-ENET/100 to its default configuration state as given on the baseplate label, press and hold the CFG RESET switch for three seconds while you switch the power on. This switch is located on the rear panel, as shown in Figure 2-4. Refer to the *Using the CFG RESET Switch* section in Chapter 6, *Using Your GPIB-ENET/100 and NI-488.2*, for more information.

3

Ethernet Configuration

This chapter describes how to use the NI Ethernet Device Configuration utility to configure the network parameters of the GPIB-ENET/100. You can use this utility for any of the following purposes:

- Manually configure the network parameters or enable DHCP
- Verify or change the hostname
- Add or change a comment to help identify the device

If DHCP is available on your network, it configures the network parameters for your GPIB-ENET/100 at startup, as described in the *Step 3. Switch on Your GPIB-ENET/100* section of Chapter 2, *Installation*. In this case, using the NI Ethernet Device Configuration utility is not required.

If DHCP is not available, the unit automatically enters network configuration mode if it is configured with the factory default settings. The GPIB-ENET/100 must be in this mode before you can make changes to the network parameters.

You also can enter this mode during normal operation by pressing and holding the CFG RESET switch for three seconds. Refer to the *Using the CFG RESET Switch* section in Chapter 6, *Using Your GPIB-ENET/100 and NI-488.2* for more information on using this switch.

While in network configuration mode, the **PWR/RDY** LED alternates rapidly between red and yellow, and normal operation is halted.

Using the NI Ethernet Device Configuration Utility

If your network administrator tells you to assign the IP address manually, run the NI Ethernet Device Configuration utility. To do so, complete the following steps:

1. Select **Start»Programs»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 the appropriate **GPIB-ENET/100** item and select **Device Configuration** from the drop-down menu that appears. You can identify your device by the Ethernet address or the serial number found on the GPIB-ENET/100 baseplate label.

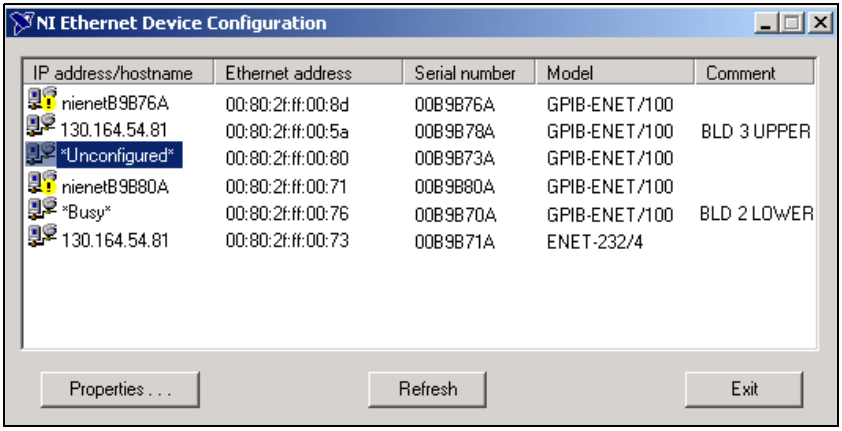


Figure 3-1. NI Ethernet Device Configuration Utility

4. The **NI Ethernet Device Configuration** window displays a list of National Instruments Ethernet devices found on your subnet, sorted by model. Figure 3-1 shows an example of this display. The listed devices can be in one of four possible states, as indicated in the **IP address/hostname** column:
   - A hostname indicates the device has successfully been configured by DHCP.
   - A numerical IP address indicates the device has successfully been configured with a static IP address.
   - ***Unconfigured*** indicates the device is configured to use DHCP, but DHCP failed to attain network parameters.
   - ***Busy*** indicates the device is configured to use DHCP and currently is attempting to acquire network parameters.

   Click **Properties...** for any of the following reasons:
   - You need to configure an unconfigured IP address.
   - You need to change the current network parameters.
   - You previously used DHCP, but it is no longer available.
   - You are using DHCP and need to change the hostname of the GPIB-ENET/100.

- The **IP address/hostname** column displays an exclamation point (**!**) next to your GPIB-ENET/100, indicating a configuration problem. Refer to the *Verifying the Hostname* section for help fixing this problem.
- You want to add or change a comment to help identify the device.

Click **Refresh** if you do not see your GPIB-ENET/100 in the list of Ethernet devices, or to discover a device that you recently added to the subnet.

Click **Exit** if you are using DHCP and you do not need to change the hostname of the GPIB-ENET/100, or if you are finished using the NI Ethernet Device Configuration utility.

Changing the Network Settings

1. When you select **Properties...** from the **NI Ethernet Device Configuration** window, a **Properties** window for your GPIB-ENET/100 appears, similar to the example shown in Figure 3-2.

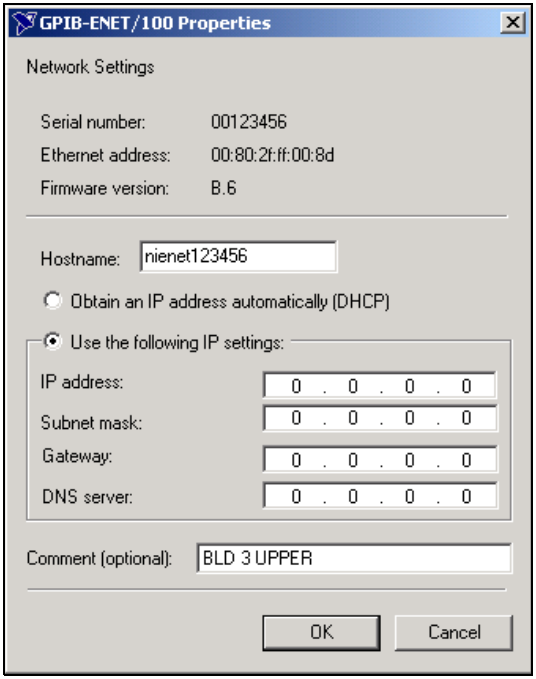


Figure 3-2. Properties Window for an Unconfigured GPIB-ENET/100

The current hostname is displayed. The hostname associates a name with a numerical IP address. **Hostname** is a required field.

The GPIB-ENET/100 attempts to use the hostname when registering with DHCP. Many DHCP servers have the ability to register the hostname and the assigned IP address. You then can reliably use the hostname to communicate with your GPIB-ENET/100 even if the numerical IP address changes.

However, some DHCP servers do not implement hostname registration. The GPIB-ENET/100 requires Domain Name Server (DNS) registration when using DHCP. If your DHCP server does not support DNS registration, you must use static network parameters. Consult your network administrator for more details.

2. In the **Properties** window, select either **Obtain an IP address automatically (DHCP)** or **Use the following IP settings**.
3. If you select **Obtain an IP address automatically (DHCP)**, you do not need to enter any network parameters unless you want to change the hostname of the Ethernet device. If you select **Use the following IP settings**, enter the network parameters you have chosen for the host IP address, subnet mask, gateway IP, and DNS server IP, as in the example shown in Figure 3-3. Refer to the next section, *Static IP Parameters*, for more information.

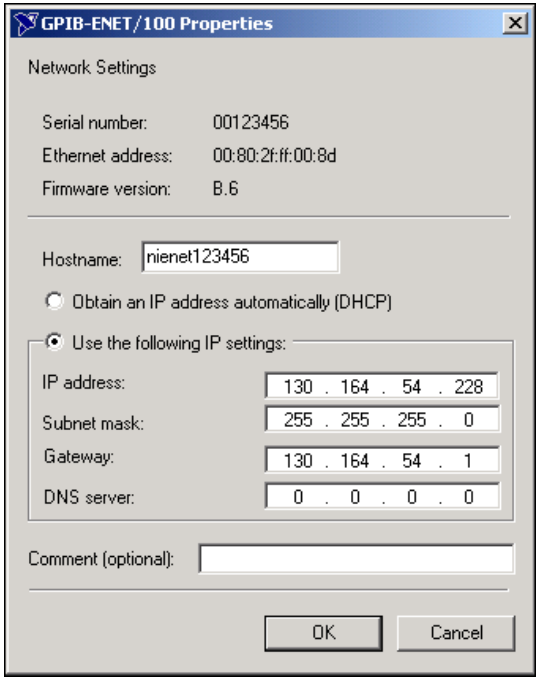


Figure 3-3. Specifying IP Settings

Note The IP settings in Figure 3-3 are shown only as an example of the format.

4. You can enter an optional comment to help you identify each device.
5. Click **OK** to configure the device, or **Cancel** to exit without saving the configuration changes.
6. Click **Exit** to close the NI Ethernet Device Configuration utility.

The device automatically reboots with the new configuration in effect.

Static IP Parameters

If DHCP is not available, you must provide the GPIB-ENET/100 with several important network parameters. These parameters are listed below.

- **IP address**—The unique, computer-readable address of a device on your network. An IP address typically is represented as four decimal numbers separated by periods (for example, `130.164.54.215`). Refer to the next section, Choosing a Static IP Address.
- **Subnet mask**—A code that helps the network device determine whether another device is on the same network or a different network.
- **Gateway IP**—The IP address of a device that acts as a gateway, which is a connection between two networks. If your network does not have a gateway, set this parameter to `0.0.0.0`.
- **DNS Server**—The IP address of a network device that stores hostnames and translates them into IP addresses. If your network does not have a DNS server, set this parameter to `0.0.0.0`.

Choosing a Static IP Address

For a Network Administered by a Network Administrator

If you are adding the GPIB-ENET/100 to an existing Ethernet network, you must choose IP addresses carefully. Contact your network administrator to obtain an appropriate static IP address for your GPIB-ENET/100. Also have the network administrator assign the proper subnet mask, gateway, and DNS server addresses.

For a Network without a Network Administrator

If you are assembling your own small Ethernet network, you can choose your own IP addresses. The format of the IP addresses is determined by the subnet mask. You should use the same subnet mask as the computer you are using with your GPIB-ENET/100. If your subnet mask is `255.255.255.0`, the first three numbers in every IP address on the network must be the same. If your subnet mask is `255.255.0.0`, only the first two numbers in the IP addresses on the network must match.

For either subnet mask, numbers between 1 and 254 are valid choices for the last number of the IP address. Numbers between 0 and 255 are valid for the third number of the IP address, but this number must be the same as other devices on your network if your subnet mask is `255.255.255.0`.

Table 3-1 shows examples of valid and invalid IP addresses for a network using subnet mask `255.255.255.0`. All valid IP addresses contain the same first three numbers. The IP addresses in this table are for example purposes only.

Table 3-1. Valid and Invalid IP Addresses for Subnet Mask 255.255.255.0

IP Address	Comment
`123.234.45.211`	Valid.
`123.234.45.213`	Valid. The first three numbers match the previous IP address. The fourth number must be a unique number in the range of 1 to 254.
`123.202.45.214`	Invalid. Second number does not match the previous IP addresses. The first three numbers must match on all IP addresses with subnet mask `255.255.255.0`.
`123.234.45.0`	Invalid. The first three numbers are valid but the fourth number cannot be 0.
`123.234.45.255`	Invalid. The first three numbers are valid but the fourth number cannot be 255.

If you are setting up your own network, you probably do not have a gateway or DNS server, so you should set these values to `0.0.0.0`.

Tip To find out the network settings for your computer, perform the following steps:

- **Windows Me/98**
  1. Open a DOS prompt.
  2. Type `IPCONFIG`.
  3. Press <Enter>.

  If you need more information, you can run `ipconfig` with the `/all` option by typing `IPCONFIG /all` at the DOS prompt. This shows you all of the settings for the computer. Make sure you use the settings for the Ethernet adapter you are using to communicate with the GPIB-ENET/100.

- **Windows 95**
  1. Open a DOS prompt.
  2. Type `WINIPCFG`.
  3. Press <Enter>.
  4. Select the Ethernet adapters you are using to communicate with the GPIB-ENET/100 from the drop-down list.

Verifying the Hostname

The NI Ethernet Device Configuration utility automatically verifies that the hostname for each DHCP-enabled device matches the DNS entry for the assigned IP address. This verification process automatically occurs when you either run the utility or click **Refresh**. The utility alerts you as shown in Figure 3-4 if it detects a problem with the network settings.

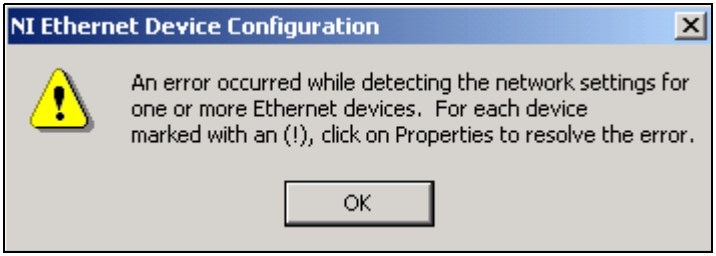


Figure 3-4. Hostname Verification Error Detected

To correct the problem with the hostname, complete the following steps:

1. Locate the device that has a problem. This is indicated by an (**!**) on the device icon, as shown previously in Figure 3-1.
2. Select **Properties...**. A dialog box similar to the following appears.



Figure 3-5. Resolving a Hostname Verification Error

3. The utility gives you four options for resolving the verification error. Select the one that best fits your situation and click **OK**.
   - **Change the device's hostname to match the DNS entry.** Use this option if you want to accept the hostname assigned by the DHCP server, or if you cannot contact the network administrator to change the DNS entry.
   - **Use static network parameters instead of DHCP.** Use this option if you cannot use the hostname assigned by the DHCP server. Contact your network administrator to obtain a valid IP address, subnet, and gateway. This option disables DHCP on the device.
   - **Edit the current hostname.** Use this option to change the hostname to a name other than either the configured hostname or the name assigned by the DHCP server. Contact your network administrator to obtain a valid name.

- **Keep the existing hostname**. Use this option if you wish to keep the previously assigned hostname. If you select this option, contact your network administrator to change the DNS entry.

4. Review the network parameter settings in the **Properties** window.
5. Confirm that the device is in network configuration mode and click **OK**. The device reboots with the new settings in effect.
6. After the device reboots, click **Refresh** to verify that the hostname is now valid.

4

GPIB Configuration

This chapter describes how to configure your Windows Me/98/95 machine to use the GPIB-ENET/100.

Configuring the NI-488.2 Software Characteristics

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

1. Select **Start»Programs»National Instruments»NI-488.2»Explore GPIB** to start the Measurement & Automation Explorer.
2. Under **Measurement & Automation**, expand the **Devices and Interfaces** folder.
3. Run the NI Ethernet Device Configuration utility. Right-click the **GPIB-ENET/100** item and select **Device Configuration** from the drop-down menu that appears.
4. Record the IP Address or hostname of your device from the **IP address/hostname** column. You can identify your device by the Ethernet address or serial number found on the GPIB-ENET/100 baseplate label.
5. Exit the NI Ethernet Device Configuration utility.
6. Right-click the **GPIB-ENET/100** item and select **Properties** from the drop-down menu that appears. This launches the GPIB Configuration utility.
7. To configure the network addresses assigned to your GPIB-ENET/100, complete the following steps:
   a. Click on the **Network Settings** tab.
   b. Type the IP address or hostname that you recorded in step 4 in the **IP Address** field, as shown in Figure 4-1.

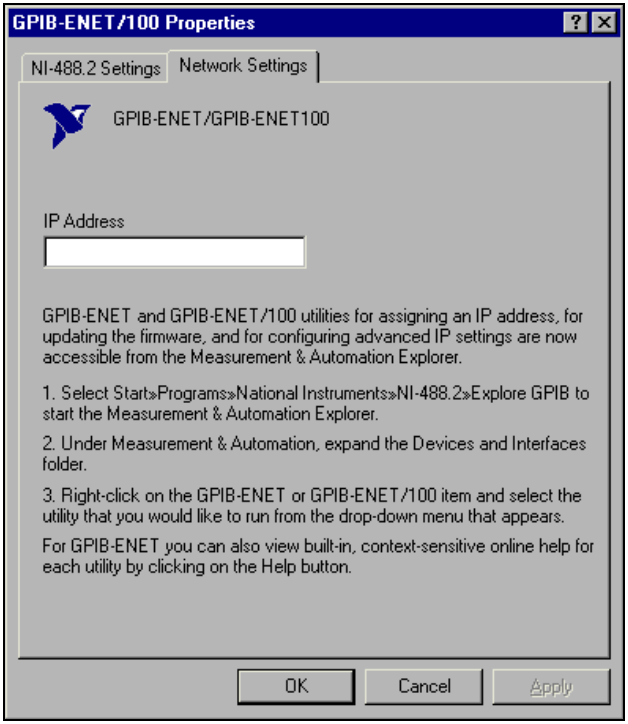


Figure 4-1. Network Settings Tab

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 for more information about it.

Note In the online help, all references to the GPIB-ENET apply also to the GPIB-ENET/100.

5

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/100, the **PWR/RDY** LED alternates rapidly between red and yellow while the GPIB-ENET/100 completes its power-on self-tests and acquires its network parameters, as described in the *Step 3. Switch on Your GPIB-ENET/100* section in Chapter 2, *Installation*.

The power-on self tests take about 15 seconds to complete when using DHCP. The time required for the IP address assignment is dependent on your network and the configuration of your GPIB-ENET/100. When the tests are successful and the IP address is assigned, the **PWR/RDY** LED remains steady yellow, indicating that the GPIB-ENET/100 is ready to operate.

If the **PWR/RDY** LED continues to flash for more than one minute, refer to the *Troubleshooting Hardware Problems* section in Appendix B, *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. 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 5-1, verifies the hardware and software installation and helps you begin to communicate with your GPIB instrument.

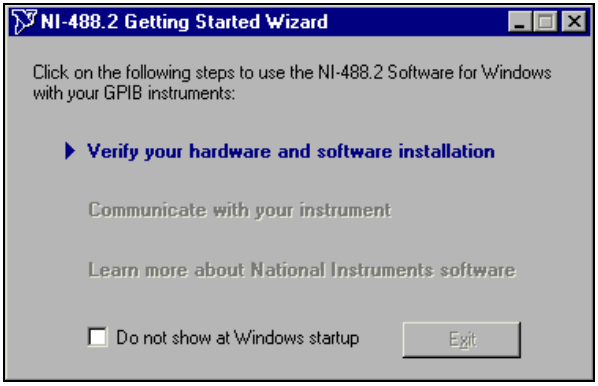


Figure 5-1. NI-488.2 Getting Started Wizard Dialog Box

When you click **Verify your hardware and software installation**, the NI-488.2 Troubleshooting Wizard tests your GPIB interface and displays the results, as shown in as shown in Figure 5-2.

Note The GPIB cable must be disconnected from your GPIB interface before you run the NI-488.2 Troubleshooting Wizard.

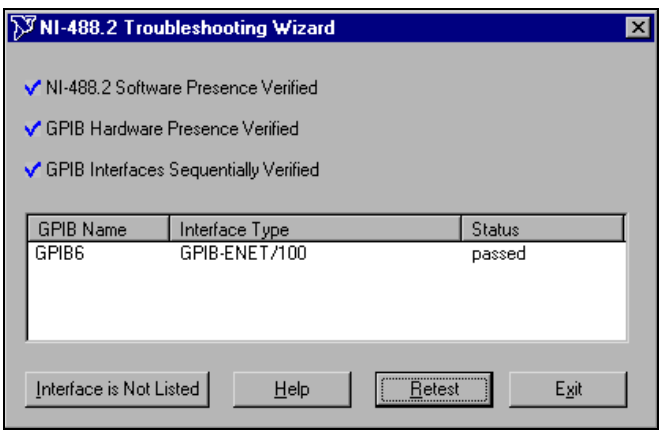


Figure 5-2. NI-488.2 Troubleshooting Wizard

Connecting the GPIB Cable

When you finish verifying the installation, you can connect the GPIB cable to your GPIB-ENET/100.



Note If you do not have a GPIB cable, as listed in the *What You Need to Get Started* section of Chapter 1, *Introduction*, contact National Instruments for ordering information.

Connect one end of your GPIB cable to your GPIB-ENET/100 and tighten the thumb screws on the connector. Connect the other end of your GPIB cable to your GPIB system. Make sure you comply with all IEEE 488.1 cabling restrictions and use only shielded GPIB cables.

6

Using Your GPIB-ENET/100 and NI-488.2

This chapter describes how to use the following options available with the GPIB-ENET/100 and NI-488.2 for Windows Me/98/95:

- NI-488.2 Getting Started Wizard
- Dynamic Host Configuration Protocol (DHCP)
- Configuration Reset (CFG RESET) switch
- Firmware update utility

NI-488.2 Getting Started Wizard

The NI-488.2 Getting Started Wizard 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**.

After the NI-488.2 Getting Started Wizard runs the NI-488.2 Troubleshooting Wizard to verify the installation, click **Communicate with your instrument**. The Getting Started Wizard then steps you through communicating with your GPIB instruments via the Measurement & Automation Explorer.

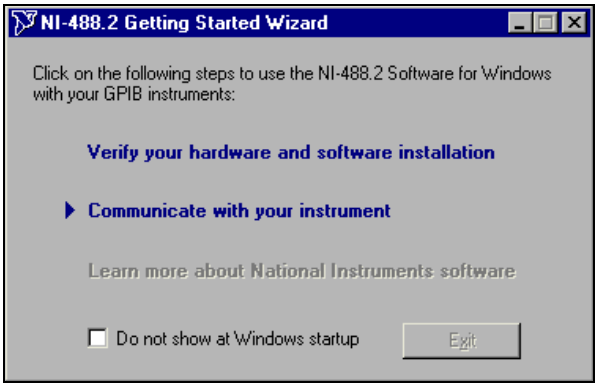


Figure 6-1. Communicating with Your Instrument

Using DHCP

The Dynamic Host Configuration Protocol (DHCP) is designed for large networks in which networking devices are transient and network parameters cannot be statically assigned and thus tied to specific devices. DHCP eases the addition of networking devices onto a network by having a server assign necessary network parameters, including the IP address, the netmask, and router information, to a newly attached network device. Optionally, if the device provides a hostname with the configuration request, DHCP may attempt to configure your network to recognize the device with the requested hostname.

DHCP requires a Domain Name Server (DNS) to associate the numerical IP address assigned with the requested hostname. Within the past few years, an Internet community standard has emerged to provide a standardized way for these services to provide dynamic domain name services. Using this standard, after DHCP assigns the numerical IP address, it can communicate with DNS to register the newly assigned IP address with the requested hostname. However, the complexity of DHCP and dynamic name registration typically requires active management by a corporate MIS department, or equivalent, because of several risks for failure.

One possible failure can occur if the pool of available addresses contains no more unassigned IP addresses. This problem is evident if DHCP fails to work and the **PWR/RDY** LED continues to flicker for longer than 90 seconds at power on. In this situation, you will need to obtain a static IP address from your network administrator and configure the device yourself using the NI Ethernet Device Configuration utility. Refer to the *Choosing a Static IP Address* section in Chapter 3, *Ethernet Configuration*, for more

information. Notice that if DHCP fails to assign you an address, the current subnet might not have an address available for you to use. In this case, you may have to move your product to another subnet where there is an available IP address.

Failure also happens if communication between DHCP and DNS does not occur. In this situation, DHCP assigns an address to the device, but you cannot communicate to it using the hostname you assigned. Your network administrator may have to manually insert the hostname into the DNS table. Alternatively, you can use the NI Ethernet Device Configuration utility to determine the hostname associated with your assigned IP address, and change the hostname to match the DNS entry. Refer to the *Verifying the Hostname* section in Chapter 3, *Ethernet Configuration*, for more information.

Because there are many other possible reasons for failure, contact your network administrator if you are having problems getting DHCP to work. When you can use DHCP and DNS successfully, you can use the hostname form of the IP address to communicate with your product—even if the numerical IP address changes with successive reboots.

If you are setting up a small network for your instrumentation system, it is recommended to use static IP addresses, because they are easier to implement and maintain. In this system, you can safely use the numerical form of the IP address to communicate with your product because the address is unlikely to change. Small networks are less likely to have domain name services available that would resolve the hostname into a numerical IP address.

Using the CFG RESET Switch

The Configuration Reset (CFG RESET) switch is a recessed switch located beside the ENET connector on the rear panel. Refer to Figure 2-4 for an illustration of its location.

This switch performs two functions, depending on whether you press it while switching the power on or during operation.

Using the CFG RESET Switch during Operation

While the GPIB-ENET/100 is operational, as indicated by a steady yellow **PWR/RDY** LED, you can use the CFG RESET switch to place the box into network configuration mode. You then can use the NI Ethernet Device Configuration utility as described in Chapter 3, *Ethernet Configuration*.

This special mode ensures that network parameters are not changed while in use. Because you cannot change the network parameters unless you deliberately place the GPIB-ENET/100 into network configuration mode, the parameters are protected while in normal operation. Hosts cannot connect to the GPIB-ENET/100 while it is in network configuration mode.

Note Pressing the CFG RESET switch has no effect if hosts are currently connected.

Close all connections, then press and hold the CFG RESET switch for three seconds. If you release the switch prior to three seconds, the GPIB-ENET/100 continues to operate normally.

The **PWR/RDY** LED goes through the following changes during these three seconds:

1. The LED begins slowly alternating between red and yellow.
2. The alternating pattern increases in tempo.
3. At three seconds, the **PWR/RDY** LED becomes steady red. This indicates the GPIB-ENET/100 is ready to enter network configuration mode.
4. Now release the CFG RESET switch. The **PWR/RDY** LED alternates rapidly between red and yellow to indicate the GPIB-ENET/100 is now in network configuration mode.

This mode remains in effect until you switch off the GPIB-ENET/100 or you use the NI Ethernet Device Configuration utility to change its network characteristics. The GPIB-ENET/100 automatically reboots when you exit the utility.

Using the CFG RESET Switch at Power-On

If you want to reset the unit to its default network characteristics, you can use the CFG RESET switch at power-on. By pressing and holding the CFG RESET switch while you power on the GPIB-ENET/100, the network parameters revert to the default settings as defined on the baseplate label.

You must press and hold the switch for three seconds. If you release the switch prior to three seconds, no change occurs to the network configuration, and the GPIB-ENET/100 continues to boot normally.

The **PWR/RDY** LED goes through the following changes during these three seconds:

1. The LED begins slowly alternating between red and yellow.
2. The alternating pattern increases in tempo.
3. At three seconds, the **PWR/RDY** LED becomes steady red. This indicates the network configuration will be set to the factory default settings.
4. When you release the CFG RESET switch, the box continues to boot as normal, and the **PWR/RDY** LED indicates the boot process as described in Table 1-1, *LED Descriptions*.

Updating the Firmware

NI-488.2 for the GPIB-ENET/100 and Windows Me/98/95 contains a firmware update utility you can use to access new features that may be added to the GPIB-ENET/100 in the future. You must update the firmware to take advantage of any new features.

The GPIB-ENET/100 always ships with the most recent firmware. You do not need to run the firmware update utility on a new product. You can obtain the latest upgrade at the following path:

`ftp://ftp.ni.com/support/gpib/firmware/GPIBENET100/`

You need to know either the IP address or hostname of your GPIB-ENET/100 before you run the NI Ethernet Device Firmware Update utility. If you do not remember this information, first run the NI Ethernet Device Configuration utility, as follows.

1. Select **Start»Programs»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/100** item and select **Device Configuration** from the drop-down menu that appears.

Refer to Chapter 3, *Ethernet Configuration*, for more information on using the NI Ethernet Device Configuration utility.

Caution Do *not* power-off the GPIB-ENET/100 or disconnect the power supply while running the NI Ethernet Device Firmware Update utility. Doing so will damage the unit. The GPIB-ENET/100 reboots automatically when the update completes.

Note The NI Ethernet Device Firmware Update utility cannot update the firmware while any network connections are active. Close any open connections before you attempt a firmware update. Hosts cannot connect to the GPIB-ENET/100 while it is updating the firmware.

To start the Update Firmware utility, complete the following steps:

1. Select **Start»Programs»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/100** item and select **Update Firmware** from the drop-down menu that appears.

   Figure 6-2 shows the NI Ethernet Device Firmware Update utility.

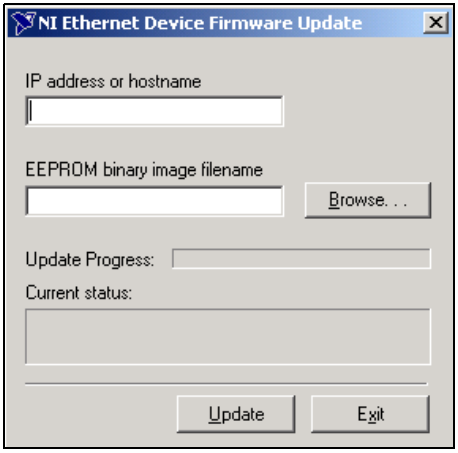


Figure 6-2. NI Ethernet Device Firmware Update Utility

4. Enter the IP address or the hostname of the GPIB-ENET/100 in the **IP address or hostname** edit box. An example of an IP address is `137.65.220.40`. An example of a hostname is `myenet1`.
5. Enter the full path of the binary file where the firmware is located in the **EEPROM binary image filename** edit box. You also can click **Browse...** to locate the file.
6. Click **Update** to update the firmware. The NI Ethernet Device Firmware Update utility communicates with the specified GPIB-ENET/100 to verify the box has no open network connections and determine the current version of the firmware in the unit. A dialog box reports that the update utility is searching for the Ethernet device.

7. The utility prompts you to confirm the change you are about to perform. Click **OK** to continue. As the update utility transfers the firmware image to your GPIB-ENET/100, the **Update Progress** status bar fills, and the **Current status** box describes each step in the process. The **Current status** box reports whether the firmware update completed successfully or failed. The GPIB-ENET/100 automatically reboots with the new firmware in effect.
8. Click **Exit** to close the NI Ethernet Device Firmware Update utility.

A

PWR/RDY LED Signaling

This appendix describes how to interpret the **PWR/RDY** LED error codes.

PWR/RDY LED Overview

The **PWR/RDY** LED has several purposes on the GPIB-ENET/100. When you first power on the unit, the **PWR/RDY** LED alternates rapidly between red and yellow while it completes its power-on self-tests and acquires network parameters. When the tests complete successfully and the IP address is assigned from either nonvolatile memory or the network, the **PWR/RDY** LED remains steady yellow, indicating that the unit is ready to operate.

The **PWR/RDY** LED also alternates rapidly between red and yellow while the device is in network configuration mode. At other times, the **PWR/RDY** LED blinks slowly in a recognizable pattern to alert you of internal errors. Use this appendix to interpret and record the pattern that the **PWR/RDY** LED flashes, and then contact National Instruments.

Note By recording the **PWR/RDY** LED status messages before calling National Instruments, you can save yourself time, and the Product Support Department can answer your questions more accurately and efficiently. Do not switch off power to your GPIB-ENET/100 before recording the flashing **PWR/RDY** LED pattern.

PWR/RDY LED signaling can report up to 81 different errors. The errors are numbered from 11 to 99 and are reported through sequences of **PWR/RDY** LED flashes.

Note There is no zero in any error message. This means that error message numbers 0–10, 20, 30, 40, 50, 60, 70, 80, and 90 are not possible.

Step 1. Count the Long Flashes

A three-second interval, during which the **PWR/RDY** LED is yellow, separates each repetition of the sequence. The sequence begins with a series of long one-second flashes—that is, one second red, one second yellow. These long flashes represent the digit in the tens column. There can be one to nine long flashes, which represent digits 1 through 9. For example, one long flash represents the digit 1 in the tens column, and nine long flashes represent the digit 9 in the tens column.

Step 2. Count the Short Flashes

The long flashes are followed by shorter flashes; each short flash lasts about one-fifth of a second—that is, one-fifth of a second red, one-fifth of a second yellow. These short flashes represent the digit in the ones column. Again, there can be one to nine flashes, which represent the digits 1 through 9. For example, one short flash represents the digit 1 in the ones column, and nine short flashes represent the digit 9 in the ones column.

Using this method, the **PWR/RDY** LED flashes the following sequence to represent status message 11:

<three seconds yellow> <one long red flash> <one short red flash> <three seconds yellow>…

The **PWR/RDY** LED flashes the following sequence to represent status message 31:

<three seconds yellow> <three long red flashes> <one short red flash> <three seconds yellow>…

Step 3. Record Your Status Code Number

When you have computed your error message number, write it down and also note the ON/OFF state of the **LINK**, **TX**, and **RX** LEDs. Have this information available when calling National Instruments.

B

Troubleshooting and Common Questions

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

Troubleshooting Hardware Problems

- Verify that all cables are securely connected to the GPIB-ENET/100.
- Verify that the unit is plugged in and powered on.
- Verify with the network administrator that your IP address is valid and that the network is set up to recognize the IP address properly.
- If you configured the IP address manually using the NI Ethernet Device Configuration utility, verify that you have correctly followed the steps in Chapter 3, *Ethernet Configuration*.
- If the **PWR/RDY** LED continues to flash rapidly after 90 seconds, the GPIB-ENET/100 is unable to obtain its IP address from the network. Check with your network administrator to verify your IP address and make sure that you recorded the Ethernet address correctly.
- If the **PWR/RDY** LED is blinking in a slower red/yellow pattern, the GPIB-ENET/100 is reporting an internal error. Refer to Appendix A, *PWR/RDY LED Signaling*, to interpret the error code and contact National Instruments.

Troubleshooting EDVR Error Conditions

In some cases, calls to NI-488 functions or IEEE 488.2-style functions may return with the ERR bit set in `ibsta` and the value EDVR in `iberr`. The value stored in `ibcntl` is useful in troubleshooting 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 range of allowed board numbers (typically 0 to 31), but which has not been assigned to a GPIB interface, an EDVR error condition occurs with `ibcntl` set to 0xE028002C. You can assign a board number to a GPIB interface by running the GPIB Configuration utility and selecting an interface name. Refer to *Configuring the NI-488.2 Software Characteristics*, in Chapter 4, *GPIB Configuration*, for information about how to configure NI-488.2.

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

If a call is made with a board number outside the range of allowed board numbers (typically 0 to 31), an EDVR error condition occurs with `ibcntl` set to 0xE0140025.

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 GPIB Configuration utility, an EDVR error condition occurs with `ibcntl` set to 0xE0140035.

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

These errors are returned from the WinSock Interface. The lower 16 bits of `ibcntl` specify the actual WinSock Interface error. Refer to your WinSock Interface documentation for more information about the specific error.

EDVR Error Condition with ibcntl Set to 0xE1000054 (-520093612)

You are attempting to communicate with a GPIB-ENET/100 that does not have a hostname (IP address) specified in the GPIB Configuration utility. Refer to *Configuring the NI-488.2 Software Characteristics*, in Chapter 4, *GPIB Configuration*, for information about how to configure NI-488.2.

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.

EDVR Error Condition with ibcntl Set to 0xE100004E (-520093618)

You are attempting to communicate with a GPIB-ENET/100 that has a firmware revision that is incompatible with the current driver. Use the NI Ethernet Device Firmware Update utility to upgrade the firmware to a compatible version.

1. Select **Start»Programs»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/100** item and select **Update Firmware** from the drop-down menu that appears.

Missing WinSock Support

WinSock support is enabled and configured in the Network Control Panel applet. To configure WinSock support, perform the following steps:

1. Select **Start»Settings»Control Panel**.
2. Double-click the **Network** icon.

   For Windows Me, if you do not see the **Network** icon, select **view all Control Panel options** on the left side of the window.
3. In the **Network** dialog box, click the **Configuration** tab and click **Add**.
4. In the **Select Network Component Type** dialog box, select **Protocol** from the list box and click **Add**.
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. Click **OK**.
7. 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

I currently do not have a WinSock provider installed. What do I need to do to install a WinSock provider?

Before you can use the driver software for the GPIB-ENET/100, you must have a WinSock interface, version 1.1 or higher, installed. You can install a WinSock interface from Microsoft or another network vendor. Refer to the *Missing WinSock Support* section of this appendix for information about how to install and configure WinSock support.

My driver is not communicating with the GPIB-ENET/100. What should I do?

Make sure that the GPIB-ENET/100 is configured properly, as described in Chapter 4, *GPIB Configuration*. Then run the Troubleshooting Wizard as described in Chapter 5, *Verify the Installation*.

My I/O worked with a board interface, but it times out when I use the GPIB-ENET/100. What should I do?

Network communication is slower than straight cable communication.You might need to raise the default **Timeout** value.

1. Select **Start»Programs»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/100** item and select **Properties** from the drop-down menu that appears.
4. Click on the **NI-488.2 Settings** tab and change the **I/O Timeout** setting.

I powered off my GPIB-ENET/100 before recording the flashing PWR/RDY LED pattern. What should I do?

Try to duplicate the error before calling National Instruments for assistance. Recording the **PWR/RDY** LED pattern is not critical to the operation of your GPIB-ENET/100, but it saves you time and helps National Instruments diagnose the problem quickly and accurately.

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 by selecting **Start»Programs» National Instruments»NI-488.2»Getting Started**.

Can I control the GPIB-ENET/100 and other GPIB interfaces from the same computer?

Yes. The Windows Me/98/95 driver supports a full range of GPIB interfaces simultaneously.

I have a GPIB-ENET. Can I use the GPIB-ENET and GPIB-ENET/100 in the same system?

Yes, this version of NI-488.2 supports systems containing both products as well as systems containing only one of the two products. Measurement & Automation Explorer will guide you through the configuration of the product.

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 NI-488.2 for Windows Me/98/95?

NI-488.2 for Windows provides a total of 1,024 logical devices for applications to use. The maximum number of physical devices you should connect to a single GPIB interface is 14, or fewer, depending on your system configuration.

Can I use the NI-488 and NI-488.2 calls together in the same application?

Yes, you can mix NI-488 functions and IEEE 488.2-style-functions.

How should I check for errors in my GPIB application?

Examine the value of `ibsta` after each NI-488 or NI-488.2 call. If a call fails, the ERR bit of `ibsta` is set and an error code is stored in `iberr`. For more information about global status variables, refer to Chapter 3, *Developing Your Application*, in the *NI-488.2 User Manual for Windows.*

Why does the NI Ethernet Device Configuration utility list my box as `*BUSY*` when I know my network uses DHCP?

For up to one minute, the GPIB-ENET/100 attempts to retrieve network parameters from a DHCP server. During this time, **`*BUSY*`** appears in the NI Ethernet Device Configuration utility display. If this status does not change, there are several reasons why DHCP may fail to respond. One of the most likely reasons is that your subnet has no more available addresses to assign using DHCP. Please consult your network administrator to determine the specific reason for the problem.

I just added a GPIB-ENET/100 to the network, but it does not show up in the NI Ethernet Device Configuration utility. What is the problem?

Allow at least 15 seconds for the GPIB-ENET/100 to complete its power-on self tests before launching the utility or clicking **Refresh**.

Communication between the NI Ethernet Device Configuration utility and the GPIB-ENET/100 is not guaranteed. Though unlikely, it is possible that the communication gets lost in the network. Click **Refresh** more than once before concluding the device is not discovered.

Verify that the GPIB-ENET/100 shares the same subnet as the computer running the NI Ethernet Device Configuration utility. The utility cannot communicate with devices through gateways on the network and will not discover devices on another subnet.

I have GPIB-ENET interfaces as well as GPIB-ENET/100 interfaces. Why can't I see the GPIB-ENET interfaces in the NI Ethernet Device Configuration utility?

The GPIB-ENET/100 uses a configuration protocol that can communicate with the NI Ethernet Device Configuration utility. Because GPIB-ENET interfaces are not compatible with this configuration protocol, the utility does not recognize them on the network.

C

Specifications

This appendix describes the characteristics of the GPIB-ENET/100 and the transfer rates of the NI-488.2 software, along with the recommended operating conditions.

Electrical Characteristics

Input power requirements ..... 9–30 VDC

Current requirements

9–30 VDC ..... 425 mA maximum

@ 15 VDC ..... 250 mA typical

Environmental Characteristics

Operating temperature..... 0 to 40 °C

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

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

Relative humidity, storage ..... 5 to 90% noncondensing conditions

EMI ..... FCC Class A Verified

Physical Characteristics

Overall case size (dimensions)..... 21.0 by 12.4 by 3.7 cm (8.25 by 4.89 by 1.44 in.)

Case material..... Hard plastic with metal baseplate

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

Software Characteristics

Maximum software transfer rate[1] .....Over 800 kbytes/s

Electrostatic Discharge Protection

Non-isolated devices.....1.5 kV

Connectors

Ethernet connector.....RJ-45

GPIB connector .....IEEE 488 standard 24 pin

Network Specifications

Connection type.....IEEE 802.3 compliant
100BaseTX (100 Mbits/s)
10BaseT (10 Mbits/s)

Duplex mode.....Half duplex

[1] Actual speed may vary considerably from speed shown due to system, network, and instrumentation capabilities.

D

Technical Support Resources

Web Support

National Instruments Web support is your first stop for help in solving installation, configuration, and application problems and questions. Online problem-solving and diagnostic resources include frequently asked questions, knowledge bases, product-specific troubleshooting wizards, manuals, drivers, software updates, and more. Web support is available through the Technical Support section of `ni.com`. You also can contact our application engineers by visiting `ni.com/ask` and filling out an e-mail request form.

NI Developer Zone

The NI Developer Zone at `ni.com/zone` is the essential resource for building measurement and automation systems. At the NI Developer Zone, you can easily access the latest example programs, system configurators, tutorials, technical news, as well as a community of developers ready to share their own techniques.

Customer Education

National Instruments provides a number of alternatives to satisfy your training needs, from self-paced tutorials, videos, and interactive CDs to instructor-led hands-on courses at locations around the world. Visit the Customer Education section of `ni.com` for online course schedules, syllabi, training centers, and class registration.

System Integration

If you have time constraints, limited in-house technical resources, or other dilemmas, you may prefer to employ consulting or system integration services. You can rely on the expertise available through our worldwide network of Alliance Program members. To find out more about our Alliance system integration solutions, visit the System Integration section of `ni.com`.

Worldwide Support

National Instruments has offices located around the world to help address your support needs. You can access our branch office Web sites from the Worldwide Offices section of `ni.com`. Branch office Web sites provide up-to-date contact information, support phone numbers, e-mail addresses, and current events.

If you have searched the technical support resources on our Web site and still cannot find the answers you need, contact your local office or National Instruments corporate. Phone numbers for our worldwide offices are listed at the front of this manual.

Glossary

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

°	degrees
%	percent
A	amperes
ANSI	American National Standards Institute
API	Application Programming Interface
b	bits
B	bytes
bps	bits per second
C	Celsius
DHCP	Dynamic Host Configuration Protocol
DLL	dynamic link library
DNS	Domain Name Server
EMI	electromagnetic interference
FCC	Federal Communications Commission
g	grams
GPIB	General Purpose Interface Bus
Hz	hertz
IEEE	Institute of Electrical and Electronic Engineers
in.	inches

I/O	input/output
IP	Internet Protocol
LED	light-emitting diode
lb.	pounds
m	meters
MB	megabytes of memory
NIC	network interface card
s	seconds
V	volts
VAC	volts alternating current
Win16	describes a 16-bit Windows application
Win32	describes a 32-bit Windows application

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