GPIB

Getting Started with Your PCI-GPIB or PCMCIA-GPIB and the NI-488.2M™ Software for Windows NT

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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

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

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Federal Communications Commission

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- 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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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.

Table of Contents

Chapter 3
Installation Verification

Chapter 4
Begin to Use the GPIB Software

Appendix A
Hardware Specifications

Appendix B
Troubleshooting and Common Questions

Appendix C
Customer Communication

Glossary

Figures

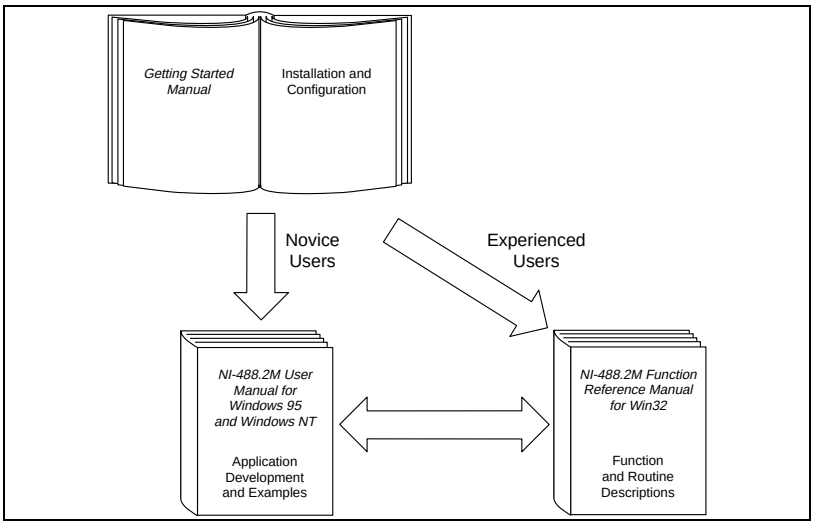
Tables

About This Manual

This manual contains instructions for installing and configuring the National Instruments PCMCIA-GPIB or PCI-GPIB and the NI-488.2M software for Windows NT. The NI-488.2M software is intended for use with Microsoft Windows NT version 3.51 or higher.

This manual assumes that you are already familiar with the Windows NT operating system.

How to Use the Manual Set



Use this getting started manual to install and configure your GPIB board and the NI-488.2M software for Windows NT.

Use the *NI-488.2M User Manual for Windows 95 and Windows NT* to learn the basics of GPIB and how to develop an application program. You can also use the User Manual as a reference for debugging information and detailed examples.

Use the *NI-488.2M Function Reference Manual for Win32* for specific NI-488 function and NI-488.2 routine information, such as format, parameters, and possible errors.

Organization of This Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, explains how to use this manual, lists what you need to get started, and briefly describes the GPIB hardware and the NI-488.2M software.
- Chapter 2, *Installation and Configuration*, contains instructions to help you configure and install your GPIB hardware.
- Chapter 3, *Installation Verification*, describes how to verify the hardware and software installation.
- Chapter 4, *Begin to Use the GPIB Software*, helps you get started with the NI-488.2M software for Windows NT.
- Appendix A, *Hardware Specifications*, describes the electrical, physical, and environmental characteristics of the GPIB hardware and the recommended operating conditions.
- Appendix B, *Troubleshooting and Common Questions*, contains troubleshooting information and the answers to common questions.
- Appendix C, *Customer Communication*, contains forms you can use to request help from National Instruments or to comment on our products and manuals.
- The *Glossary* contains an alphabetical list and description of terms that appear in this manual, including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.

Conventions Used in This Manual

The following conventions are used 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»Substitute Fonts** directs you to pull down the **File** menu, select the **Page Setup** item, select **Options**, and finally select the **Substitute Fonts** options from the last dialog box.
bold	Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows, or LEDs.
bold italic	Bold italic text denotes a note, caution, or warning.
`bold monospace`	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 unique from the other examples.
GPIB hardware	GPIB hardware refers generically to either the PCI-GPIB or PCMCIA-GPIB board when information can apply to either board.
IEEE 488 and IEEE 488.2	IEEE 488 and IEEE 488.2 refer to the ANSI/IEEE Standard 488.1-1987 and the ANSI/IEEE Standard 488.2-1992, respectively, which define the GPIB.
italic	Italic text denotes emphasis, a cross reference, or an introduction to a key concept. This font also denotes text for which you supply the appropriate word or value, as in Windows 3.*x*.
`italic monospace`	Italic text in this font denotes that you must supply the appropriate words or values in the place of these items.
`monospace`	Text in this font denotes text or characters that you should literally enter from the keyboard, sections of code, programming examples, and syntax examples. This font can also denote 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.

The *Glossary* lists abbreviations, acronyms, metric prefixes, mnemonics, symbols, and terms.

Related Documentation

The following documents contain information that you may 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*
- *Microsoft Windows NT System Guide*, Microsoft Corporation

Customer Communication

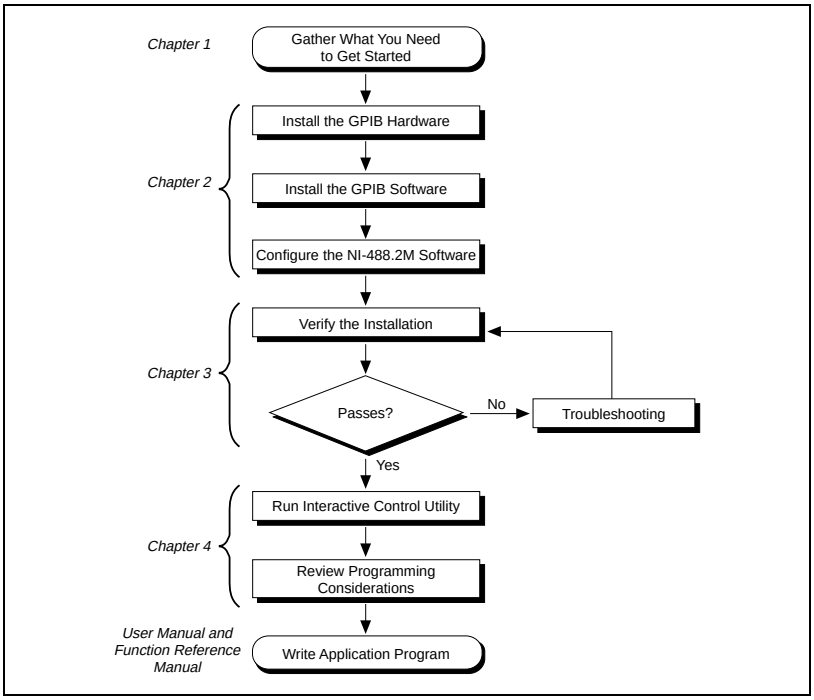
National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual contains comment and configuration forms for you to complete. These forms are in Appendix C, *Customer Communication*, at the end of this manual.

Chapter 1

Introduction

This chapter explains how to use this manual, lists what you need to get started, and briefly describes the GPIB hardware and the NI-488.2M software.

How to Use This Manual



What You Need to Get Started

- ❑ One of the following:
  PCMCIA-GPIB
  PCI-GPIB

- ❑ The following 3.5 in., high density (1.44 MB) disks, which your kit contains:
  GPIB Software for Windows NT (Setup Disk)
  GPIB Software for Windows NT (NI-488.2M Software)

- ❑ Windows NT Version 3.51 or higher installed on your computer

Hardware Description

The Plug and Play GPIB hardware, along with the NI-488.2M software, transforms any PC-compatible computer into a fully functional GPIB Talker/Listener/Controller that has complete communications and bus management capability. The TNT4882C chip on each Plug and Play GPIB board combines the circuitry of the NAT4882 ASIC, the Turbo488 ASIC, and GPIB transceivers to create a single-chip IEEE 488.2 interface. The TNT4882C also implements the HS488 high-speed protocol, which increases the maximum data transfer rate to up to 8 Mbytes/s, depending on the computer and the system configuration. For more information about transfer rates, refer to Appendix A, *Hardware Specifications*, in this manual. For more information about HS488, refer to Chapter 7, *GPIB Programming Techniques*, in the *NI-488.2M User Manual for Windows 95 and Windows NT.*

The PCI-GPIB and PCMCIA-GPIB each contain one GPIB load; you can connect up to 14 instruments to one of these interfaces. If you want to use more instruments, you can order a bus extender or expander from National Instruments. Refer to Appendix A, *Hardware Specifications,* for more information about the GPIB hardware specifications and operating conditions.

Software Description

The NI-488.2M software for Windows NT includes a loadable Windows NT kernel device driver and supporting utilities.

NI-488.2M Software Components

The NI-488.2M software package includes the following components:

- Device driver
- Diagnostic test
- Configuration utility
- Interactive control program
- Utilities for software development and debugging
- Language interface library for Microsoft Visual C/C++, Borland C/C++, and Visual Basic
- Virtual device driver and special DOS and Windows 3 drivers for running existing NI-488.2 for DOS and Windows 3 applications under Windows NT
- Example programs that use NI-488 functions and NI-488.2 routines

For a detailed list of files, refer to the *NI-488.2M User Manual for Windows 95 and Windows NT*.

Installation and Configuration

Chapter 2

This chapter contains instructions to help you configure and install your GPIB hardware.

Install the Hardware

Install the PCI-GPIB

Warning: ***Electrostatic discharge can damage several components on your GPIB hardware. To avoid electrostatic damage when you handle the hardware, touch the antistatic plastic package to a metal part of your computer chassis before you remove the hardware from the package.***

If your GPIB hardware is already installed, but this is your first time to install the GPIB software, skip to step 8. Otherwise, perform the following steps to install the GPIB hardware.

1. Turn off your computer. Keep the computer plugged in so that it remains grounded while you install the GPIB hardware.
2. Remove the top cover (or other access panels) to give yourself access to the computer expansion slots.
3. Find an unused expansion slot of the appropriate type in your computer.
4. Remove the corresponding slot cover on the back panel of the computer.
5. Insert the GPIB board into the slot with the GPIB connector sticking out of the opening on the back panel. It might be a tight fit, but do

not force the board into place. Figure 2-1 shows how to install the PCI-GPIB into an expansion slot.

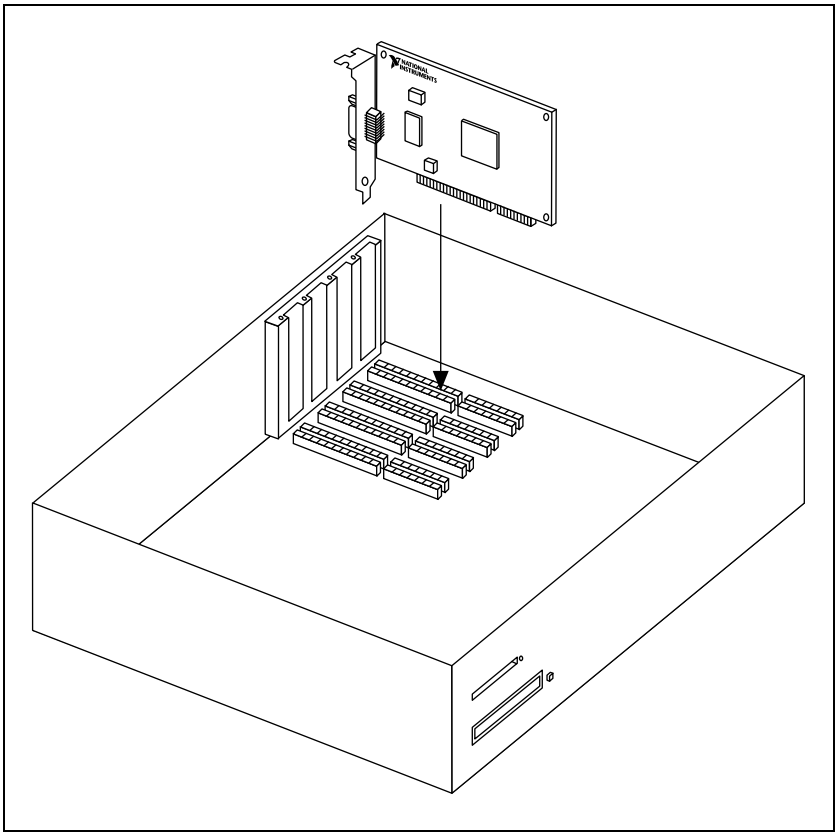


Figure 2-1. Installing the PCI-GPIB

6. Screw the mounting bracket of the GPIB board to the back panel rail of the computer.
7. Replace the top cover (or the access panel to the expansion slot).
8. Turn on your computer and start Windows NT so you can install the NI-488.2M software.

The GPIB hardware installation is now complete. Proceed to the *Install the Software* section, later in this chapter.

Install the PCMCIA-GPIB

To install the PCMCIA-GPIB in your computer, insert the card into a free PC Card (PCMCIA) socket the same way you insert a disk into a floppy drive. The card has no jumpers or switches to set. Windows NT requires that you power off your system before inserting the PCMCIA card. After you have inserted the card, turn on your computer and start Windows NT so you can install the NI-488.2M software. Figure 2-2 shows how to insert the PCMCIA-GPIB and how to connect the PCMCIA-GPIB cable.

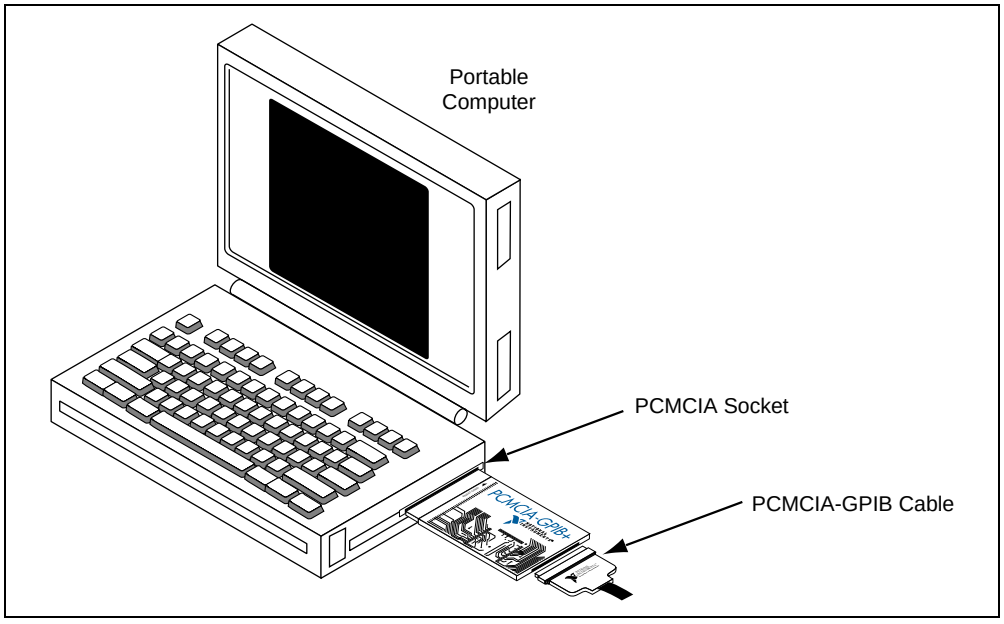


Figure 2-2. Inserting the PCMCIA-GPIB

The PCMCIA-GPIB hardware installation is now complete. Proceed to the next section, *Install the Software*.

Install the Software

After you have installed and configured the hardware, you are ready to install the NI-488.2M software. Complete the following steps to run the software installation program.

1. Log onto your Windows NT system using the `Administrator` account. The NI-488.2M installation program must have `Administrator` privileges because the program modifies the configuration registry of your computer.
2. Insert the GPIB Software for Windows NT (Setup Disk) into an unused drive.
3. Windows NT 3.51: Select **Run...** from the **File** menu in the **Program Manager**.

   Windows NT 4.0 or higher: Select **Run...** from the **Start** menu.

   Type the following command into the dialog box:

   x`:\setup`

   where *x* is the letter of the drive containing the distribution disk (usually `a` or `b`).

   The software installation begins with the following screen.

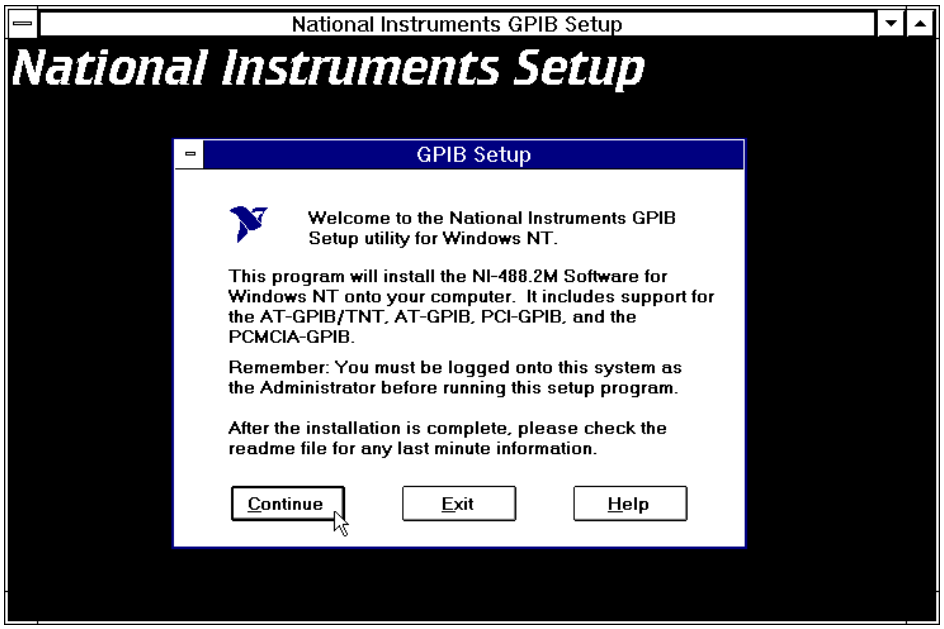


Figure 2-3. NI-488.2M Software for Windows NT Installation Screen

The setup program takes you through the necessary steps to install the NI-488.2M software. For help during the installation, click on the **Help** button. You can exit the setup program at any time by clicking on the **Exit** button.

When the setup program has finished copying the software onto your computer, it attempts to start the NI-488.2M driver. If the setup program cannot start the driver, it instructs you to run the GPIB Configuration utility in order to check your system configuration and then to restart Windows NT, which forces the driver to load.

Before you use the NI-488.2M software with your PCI-GPIB or PCMCIA-GPIB, you must reconfigure the software. Refer to the next section, *Configure the Software*, for instructions on running the GPIB Configuration utility.

Configure the Software

The GPIB Configuration utility is an interactive utility you can use to examine or modify the configuration of the driver. You must run the GPIB Configuration utility before you can use the NI-488.2M software for Windows NT. Follow these steps to run the utility:

1. Double-click on the **GPIB** icon in the **Control Panel**.

   Windows NT 3.51: Open the **Control Panel** in the **Main** group of the **Program Manager**.

   Windows NT 4.0 or higher: Select **Start»Settings»Control Panel**.

   The GPIB Configuration utility displays a list of all the GPIB boards and device names.
2. Use the **Board Type** button to specify the type of GPIB interface you are using.
3. Double-click on any name to examine or edit it. You can use the online help if you have any questions. For more information about GPIB Configuration utility options, refer to the *NI-488.2M User Manual for Windows 95 and Windows NT*.
4. Click on the **OK** button to save your changes.

After you have installed and configured the software, you should verify the installation. Continue to the next chapter, Chapter 3, *Installation Verification*.

Chapter 3

Installation Verification

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

You can use the Diagnostic utility, installed with your GPIB software, to test the hardware and software installation. The Diagnostic utility verifies that your hardware and software are functioning properly and that the configuration of your GPIB interfaces does not conflict with anything else in your system.

Follow these instructions to run the Diagnostic utility:

Windows NT 3.51: Double-click on the **Diagnostic** icon in the **NI-488.2M Software for Windows NT** group of the **Program Manager**.

Windows NT 4.0 or higher: Select the **Diagnostic** item under **Start»Programs»NI-488.2M Software for Windows NT**.

When you have started the Diagnostic utility, test your GPIB interfaces by clicking on the **Test All** button. If the Diagnostic utility test is successful, it puts a check mark next to the interface and changes its status from "untested" to "passed." If the Diagnostic utility test fails, it puts an X next to the interface, and changes its status from "untested" to "failed." Figure 3-1 shows the Diagnostic utility dialog box after it has tested some GPIB interfaces.

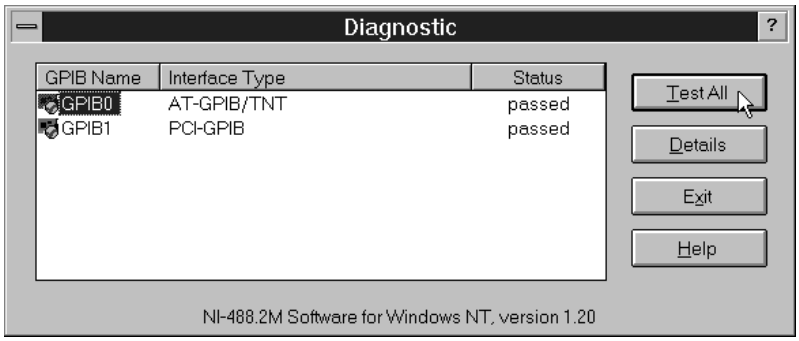


Figure 3-1. Diagnostic Utility after Testing

You can get details on any of the tested GPIB interfaces by selecting the interface and clicking on the **Details** button. For each failed GPIB interface, select it and click on the **Details** button to get a description of the failure encountered. Use that information and the information in Appendix B, *Troubleshooting and Common Questions*, to troubleshoot the problem. There is also extensive troubleshooting information in the Diagnostic utility online help.

Begin to Use the GPIB Software

Chapter 4

This chapter helps you get started with the NI-488.2M software for Windows NT.

Introduction to the Win32 Interactive Control Utility

You can use the interactive control utility to enter NI-488 functions and NI-488.2 routines interactively and see the values the function calls return. You can use this utility to do the following:

- Verify GPIB communication with your device quickly and easily.
- Learn the NI-488 functions and NI-488.2 routines before you write your application.
- Become familiar with the commands of your device.
- Receive data from your GPIB device.
- Troubleshoot problems with your application.

Follow these instructions to run the Win32 Interactive Control Utility.

Windows NT 3.51: Double-click on the **Win32 Interactive Control** icon in the **NI-488.2M Software for Windows NT** group of the **Program Manager**.

Windows NT 4.0 or later: Select the **Win32 Interactive Control** item under **Start»Programs»NI-488.2M Software for Windows NT**.

This utility includes extensive online help. For more information about the Win32 Interactive Control utility, refer to the *NI-488.2M User Manual for Windows 95 and Windows NT.*

Introduction to the GPIB Spy Utility

Included with the NI-488.2M software is GPIB Spy, a Win32 utility that you can use to monitor NI-488.2M calls made by Win32, Win16, and DOS GPIB applications. You can use GPIB Spy to do the following:

- Capture information about NI-488 functions and NI-488.2M routines as your GPIB applications invoke them.
- Display captured information, including, but not limited to, input and output parameter values, I/O buffer contents, and return values.
- Save, restore, and print captured information.

Follow these instructions to run GPIB Spy:

Windows NT 3.51: Double-click on the **GPIB Spy** icon in the **NI-488.2M Software for Windows NT** group of the **Program Manager**.

Windows NT 4.0 or higher: Select the **GPIB Spy** item under **Start»Programs»NI-488.2M Software for Windows NT**.

For more information about the GPIB Spy utility, refer to Chapter 5, *GPIB Spy Utility*, in the *NI-488.2M User Manual for Windows 95 and Windows NT*, or use the GPIB Spy context-sensitive online help.

General Programming Considerations

As you begin developing your Win32 NI-488.2M application, remember the following points:

- For your C/C++ application, you must include the NI-488.2M header file in your source code.
- You can access the NI-488.2M software through the 32-bit DLL, `gpib-32.dll`, either by linking with one of the language interfaces provided with the NI-488.2M software, or by using direct DLL entry from any programming environment.
- Several sample GPIB applications are included with the NI-488.2M software. Use these as a guide for your own application development.

For information about choosing a programming method, developing your application, or compiling and linking, refer to the *NI-488.2M User Manual for Windows 95 and Windows NT.* For detailed information about each NI-488 function and NI-488.2 routine, refer to the *NI-488.2M Function Reference Manual for Win32*.

Running Existing DOS and Windows GPIB Applications

You can run existing DOS and Windows GPIB applications under Windows NT by using the GPIB Virtual Device Driver, `gpib-vdd.dll`, which is included with your NI-488.2M software.

To run DOS GPIB applications, load the special GPIB device driver `gpib-nt.com` instead of `gpib.com`, which you normally use with DOS. When you install the NI-488.2M software, the installation program copies `gpib-nt.com` into a new subdirectory called `doswin16`. To use `gpib-nt.com`, you must modify your `config.nt` file to load `gpib-nt.com` whenever a DOS application runs. The `config.nt` file is located in your *`winnt`*`\system32` directory, where *`winnt`* is your Windows NT directory, for example, `c:\windows`. To load `gpib-nt.com`, add the following line to your `config.nt` file:

`device=`*`path`*`\doswin16\gpib-nt.com`

where *`path`* is the directory where you installed the GPIB software (the default installation directory is `c:\gpib-nt`).

To run 16-bit Windows GPIB applications, the system uses the special GPIB dynamic link library, `gpib.dll`. When you install the NI-488.2M software, the installation program copies `gpib.dll` into the *`winnt`*`\system32` directory, where *`winnt`* is your Windows NT directory, for example `c:\windows`. As long as `gpib.dll` is in your Windows NT directory, your system automatically accesses `gpib.dll` whenever you launch a 16-bit Windows GPIB application.

Hardware Specifications

Appendix
A

This appendix describes the electrical, physical, and environmental characteristics of the GPIB hardware and the recommended operating conditions.

Table A-1. Electrical Characteristics for the PCI-GPIB

Characteristic	Specification
Maximum GPIB Transfer Rates: Reads Writes	 1.3 Mbytes/s* 1.3 Mbytes/s*
Power Requirement (from PCI bus)	+5 VDC 600 mA Typical
* Actual speed may vary considerably from speed shown due to system and instrumentation capabilities.	

Table A-2. Electrical Characteristics for the PCMCIA-GPIB

Characteristic	Specification
Maximum GPIB Transfer Rates: 3-Wire (IEEE 488) High Speed (HS488):	 1.4 Mbytes/s* 1.7 Mbytes/s*
Power Requirement (from PCMCIA expansion slot)	+5 VDC 50 mA Typical 120 mA Maximum
* Actual speed may vary considerably from speed shown due to system and instrumentation capabilities.	

Table A-3. Physical Characteristics for the PCI-GPIB

Characteristic	Specification
Dimensions	4.2 in. by 6.5 in. (10.67 cm by 16.51 cm)
I/O Connector	IEEE 488 Standard 24-Pin

Table A-4. Physical Characteristics for the PCMCIA-GPIB

Characteristic	Specification
Dimensions	3.370 in. by 2.126 in. by 0.197 in. (85.6 cm by 54.0 cm by 5.0 mm)
I/O Connector	Special IEEE 488 Cable with 24-Pin Converter for PC Card

Table A-5. Environmental Characteristics for the PCI-GPIB

Characteristic	Specification
Operating Environment:	
Component Temperature	0° to 55° C
Relative Humidity	10% to 90%, Noncondensing
Storage Environment:	
Temperature	-20° to 70° C
Relative Humidity	5% to 90%, Noncondensing
EMI	FCC Class B Certified

Table A-6. Environmental Characteristics for the PCMCIA-GPIB

Characteristic	Specification
Operating Environment:	
Component Temperature	0° to 55° C
Relative Humidity	10% to 90%, Noncondensing
Storage Environment:	
Temperature	-20° to 70° C
Relative Humidity	5% to 90%, Noncondensing
EMI	FCC Class A Certified

Troubleshooting and Common Questions

Appendix
B

This appendix contains troubleshooting information and the answers to common questions.

Troubleshooting Diagnostic Utility Failures

The following sections explain common error messages the Diagnostic utility generates.

Missing Software Components

This error occurs if the software components that are necessary for the GPIB Software for Windows NT to function correctly are not present in the system. If you encounter this problem, reinstall the GPIB Software for Windows NT and run the Diagnostic utility again.

No GPIB Interfaces Present

This error occurs if there are no GPIB interfaces physically present in the system or there is a resource conflict with the interfaces that are installed. If you encounter this problem, use the GPIB Configuration utility to examine the installed GPIB interfaces and the resources assigned to each. Then, run the Diagnostic utility again.

To access this information in the GPIB Configuration utility, complete the following steps:

1. Double-click on the **GPIB** icon in the **Control Panel**.

   Windows NT 3.51: Open the **Control Panel** in the **Main** group of the **Program Manager**.

   Windows NT 4.0 or higher: Select **Start»Settings»Control Panel**.

2. Click on the **Board Type** button and verify that the type of GPIB interface listed for each logical board name is correct. Click on the **OK** button to return to the main dialog box.
3. Double-click on each board name and verify that the hardware settings displayed in the dialog box match your actual hardware settings.

GPIB Cables Need To Be Disconnected

This error occurs if you have any GPIB cables connected to the GPIB interface. Disconnect all GPIB cables and run the Diagnostic utility again.

Address Resource Conflict

This error occurs if the address resources assigned to a GPIB interface conflict with the address resources that other devices in the system are using. To resolve an address resource conflict, refer to the *Resolving Resource Conflicts* section, later in this appendix. After you have resolved the conflict, run the Diagnostic utility again.

Interrupt Resource Conflict

This error occurs if the interrupt resources assigned to a GPIB interface conflict with the interrupt resources that other devices in the system are using. To resolve an interrupt resource conflict, refer to the *Resolving Resource Conflicts* section, later in this appendix. After you have resolved the conflict, run the Diagnostic utility again.

GPIB Software Problem Encountered

This error occurs if the Diagnostic utility detects that it is unable to communicate correctly with the GPIB hardware using the installed GPIB software. If you encounter this error, shut down your computer, restart it, and run the Diagnostic utility again. If the problem persists, try reinstalling the GPIB software for Windows NT.

Unknown Problem Encountered

This error occurs if an unknown problem is encountered when you try to execute the Diagnostic utility. If this error occurs, shut down your computer, restart it, and run the Diagnostic utility again. If the problem persists, try reinstalling the GPIB software for Windows NT.

Resolving Resource Conflicts

Resource conflicts occur when your system contains hardware that is configured to use the same resources as your GPIB interface. The NI-488.2M driver detects some resource conflicts when it loads. When the driver detects conflicts as it loads, it records an error message describing the conflict. You can use the **Event Viewer**, as described in the following section, *Using Windows NT Diagnostic Tools*, to see which resource is in conflict.

Once you have identified the resource that caused the conflict, use the GPIB Configuration utility to reconfigure your GPIB interface so that it uses conflict-free resources. To help in the selection of conflict-free resources, Microsoft has provided a utility called **Windows NT Diagnostics**. This utility displays a list of the I/O port addresses, interrupt levels, and DMA channels that are currently being used in your system. Assign resources this utility does not list to your GPIB interface.

Follow these instructions to run the Windows NT Diagnostics:

Windows NT 3.51: Double-click on the **Windows NT Diagnostics** icon in the **Administrative Tools** group of the **Program Manager**.

Windows NT 4.0 or higher: Select **Start»Programs»Administrative Tools»Windows NT Diagnostics**.

Using Windows NT Diagnostic Tools

There are many reasons why the NI-488.2M driver might not load. If the software is not properly installed or if there is a conflict between the GPIB hardware and the other hardware in the system, the NI-488.2M driver fails to start. Two Windows NT utilities are useful in determining the source of the problem: the **Devices** applet in the **Control Panel**, and the **Event Viewer**. The following sections describe the information available through each utility.

Examining NT Devices to Verify the NI-488.2M Installation

To verify whether the NI-488.2M devices are installed correctly (that is, that the devices are started), run the **Devices** applet in the **Control Panel**, as shown in the following paragraphs.

Windows NT 3.51: Open the **Control Panel** in the **Main** group of the **Program Manager**.

Windows NT 4.0 or later: Select **Start»Settings»Control Panel**.

This utility lists all of the devices Windows NT detects. Each device has a status associated with it. If the NI-488.2M driver is installed correctly, the following lines appear in the list of NT devices:

```
Device                          Status      Started
GPIB Board Class Driver         Started     Automatic
GPIB Device Class Driver        Started     Automatic
```

You should also see one or more lines similar to the following:

```
Device                          Status      Started
GPIB Port Driver (AT-GPIB)      ****        System
GPIB Port Driver (PCI-GPIB)     ****        System
```

The **GPIB Board Class Driver**, the **GPIB Device Class Driver**, and at least one of the **GPIB Port Drivers** listed by the **Devices** applet should have a status of **Started**. If not, refer to the next section, *Examining the NT System Log Using the Event Viewer.*

If the GPIB Class Driver lines are not present or at least one GPIB Port Driver line is not present, the NI-488.2M software is not installed properly. You must reinstall the NI-488.2M software.

Examining the NT System Log Using the Event Viewer

Windows NT maintains a system log. If the NI-488.2M driver is unable to start, it records entries in the system log explaining why it failed to start. You can examine the system log by running the **Event Viewer** utility, as shown in the following paragraphs.

Windows NT 3.51: Double-click on the **Event Viewer** icon in the **Administrative Tools** group of the **Program Manager**.

Windows NT 4.0 or higher: Select **Start»Programs»Administrative Tools»Event Viewer**.

Events that might appear in the system log include the following:

- The system cannot locate the device file for one or more of the devices that make up the NI-488.2M driver and an event is logged that **`The system cannot find the file specified`**. In this case, the NI-488.2M software is incorrectly installed. You should reinstall the software.
- A conflict exists between the GPIB hardware and the other hardware in the system. If this is the case, an event is logged that indicates the nature of the resource conflict. To correct this conflict, reconfigure the GPIB hardware and the NI-488.2M software. Refer to Chapter 2, *Installation and Configuration*, for configuration information.

Common Questions

How can I determine which type of GPIB hardware I have installed?

Run the GPIB Configuration utility. To run the utility, open your Windows NT Control Panel and select the National Instruments eagle icon.

How can I determine which version of the NI-488.2M software I have installed?

Run the Diagnostic utility, as follows:

Windows NT version 3.51: Start the Diagnostic utility by double-clicking on the **Diagnostic** icon in the **NI-488.2M Software for Windows NT** group of the **Program Manager**.

Windows NT version 4.0 or later: Start the Diagnostic utility by choosing the **Diagnostic** item under **Start»Programs»NI-488.2M Software for Windows NT**.

Which GPIB interfaces does version 1.2 of the NI-488.2M Software for Windows NT support?

Version 1.2 of the NI-488.2M Software for Windows NT supports the AT-GPIB, AT-GPIB/TNT, PCMCIA-GPIB, and PCI-GPIB.

How many GPIB interfaces can I configure for use with my NI-488.2M Software for Windows NT?

You can configure the NI-488.2M Software for Windows NT to communicate with up to 4 GPIB interfaces.

How many devices can I configure for use with my NI-488.2M Software for Windows NT?

The NI-488.2M Software for Windows NT provides a total of 100 logical devices for applications to use. The default number of devices is 32.

Are interrupts and DMA required with the NI-488.2M Software for Windows NT?

Interrupts are required, but DMA is not.

How can I determine if my GPIB hardware and software are correctly installed?

Run the Diagnostic utility, as follows:

Windows NT version 3.51: Start the Diagnostic utility by double-clicking on the **Diagnostic** icon in the **NI-488.2M Software for Windows NT** group of the **Program Manager**.

Windows NT version 4.0 or later: Start the Diagnostic utility by choosing the **Diagnostic** item under **Start»Programs»NI-488.2M Software for Windows NT**.

When should I use the Win32 Interactive Control utility?

You can use the Win32 Interactive Control utility to test and verify instrument communication, troubleshoot problems, and develop your application. For more information, refer to Chapter 6, *Win32 Interactive Control Utility* in the *NI-488.2M User Manual for Windows 95 and Windows NT.*

How do I use an NI-488.2M language interface?

For information about using NI-488.2M language interfaces, refer to Chapter 3, *Developing Your Application* in the *NI-488.2M User Manual for Windows 95 and Windows NT.*

What do I do if the Diagnostic utility fails with an error?

Use the Diagnostic online help, or refer to the getting started manual, to troubleshoot specific problems. If you have already completed the troubleshooting steps, fill out the support forms in Appendix C, *Customer Communication*, and contact National Instruments.

How do I communicate with my instrument over the GPIB?

Refer to the documentation that came from the instrument manufacturer. The command sequences you use are totally dependent on the specific instrument. The documentation for each instrument should include the GPIB commands you need to communicate with it. In most cases, NI-488 device-level calls are sufficient for communicating with instruments. Refer to Chapter 3, *Developing Your Application* in the *NI-488.2M User Manual for Windows 95 and Windows NT*, for more information.

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

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

What can I do to 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-488.2M User Manual for Windows 95 and Windows NT*.

What information should I have before I call National Instruments?

When you call National Instruments, you should have the results of the Diagnostic test. Also, make sure you have filled out the technical support form in Appendix C, *Customer Communication*.

Customer Communication

Appendix
C

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve technical problems you might have as well as a form you can use to comment on the product documentation. Filling out a copy of the *Technical Support Form* before contacting National Instruments helps us help you better and faster.

National Instruments provides comprehensive technical assistance around the world. In the U.S. and Canada, applications engineers are available Monday through Friday from 8:00 a.m. to 6:00 p.m. (central time). In other countries, contact the nearest branch office. You may fax questions to us at any time.

Electronic Services

Bulletin Board Support

National Instruments has BBS and FTP sites dedicated for 24-hour support with a collection of files and documents to answer most common customer questions. From these sites, you can also download the latest instrument drivers, updates, and example programs. For recorded instructions on how to use the bulletin board and FTP services and for BBS automated information, call (512) 795-6990. You can access these services at:

United States: (512) 794-5422 or (800) 327-3077
Up to 14,400 baud, 8 data bits, 1 stop bit, no parity

United Kingdom: 01635 551422
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

France: 1 48 65 15 59
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

FTP Support

To access our FTP site, log on to our Internet host, `ftp.natinst.com`, as `anonymous` and use your Internet address, such as `joesmith@anywhere.com`, as your password. The support files and documents are located in the /`support` directories.

FaxBack Support

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

E-Mail Support (currently U.S. only)

You can submit technical support questions to the appropriate applications engineering team through e-mail at the Internet addresses listed below. Remember to include your name, address, and phone number so we can contact you with solutions and suggestions.

GPIB: `gpib.support@natinst.com`
DAQ: `daq.support@natinst.com`
VXI: `vxi.support@natinst.com`
LabWindows: `lw.support@natinst.com`
LabVIEW: `lv.support@natinst.com`
HiQ: `hiq.support@natinst.com`
VISA: `visa.support@natinst.com`

Telephone and Fax Support

National Instruments has branch offices all over the world. Use the list below 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.

	Telephone	Fax
Australia	03 9 879 9422	03 9 879 9179
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Canada (Ontario)	519 622 9310	
Canada (Quebec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	90 527 2321	90 502 2930
France	1 48 14 24 24	1 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
Italy	02 413091	02 41309215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico	95 800 010 0793	5 520 3282
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
Spain	91 640 0085	91 640 0533
Sweden	08 730 49 70	08 730 43 70
Switzerland	056 200 51 51	056 200 51 55
Taiwan	02 377 1200	02 737 4644
U.K.	01635 523545	01635 523154

Technical Support Form

Photocopy this form and update it each time you make changes to your software or hardware, and use the completed copy of this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

If you are using any National Instruments hardware or software products related to this problem, include the configuration forms from their user manuals. Include additional pages if necessary.

Name _____

Title _____

Company _____

Address _____

_____

Fax (____) _____ Phone (____) _____

Computer brand _____ Model _____ Processor _____

Operating system (include version number) _____

Clock Speed _____ MHz RAM _____ MB Display adapter _____

Mouse ____ yes _____ no Other adapters installed _____

Hard disk capacity _____ MB Brand _____

Instruments used _____

National Instruments hardware product model _____ Revision _____

Configuration _____

National Instruments software product _____ Version _____

Configuration _____

The problem is _____

_____

_____

_____

List any error messages _____

_____

_____

The following steps will reproduce the problem _____

_____

_____

Hardware and Software Configuration Form

Record the settings and revisions of your hardware and software on the line to the right of each item. Complete a new copy of this form each time you revise your software or hardware configuration, and use this form as a reference for your current configuration. Completing this form accurately before contacting National Instruments for technical support helps our applications engineers answer your questions more efficiently.

National Instruments Products

GPIB Board and Revision Number

— PCMCIA-GPIB Card Revision _____

or

— PCI-GPIB Board Revision _____

NI-488.2M Software for Windows NT Revision Number on Disk _____

Programming Language Interface Version _____

Shield Ground Connected to Logic Ground (yes or no) _____

Board Settings:

	Base I/O Address	Interrupt Level	DMA Channel
gpib0	_____	_____	_____
gpib1	_____	_____	_____
gpib2	_____	_____	_____
gpib3	_____	_____	_____

Other Products

Computer Make and Model _____

Microprocessor _____

Clock Frequency _____

Type of Monitor Card Installed _____

Windows NT Version _____

Application Programming Language (Microsoft C, and so on) _____

Other Boards in System _____

Base I/O Address of Other Boards _____

Interrupt Level of Other Boards _____

DMA Channels of Other Boards _____

Documentation Comment Form

National Instruments encourages you to comment on the documentation supplied with our products. This information helps us provide quality products to meet your needs.

Title: *Getting Started with Your PCI-GPIB or PCMCIA-GPIB and the NI-488.2M™ Software for Windows NT*

Edition Date: July 1996

Part Number: 321289A-01

Please comment on the completeness, clarity, and organization of the manual.

_____
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_____
_____
_____

If you find errors in the manual, please record the page numbers and describe the errors.

_____
_____
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_____

Thank you for your help.

Name _____

Title _____

Company _____

Address _____

_____

Phone (____) _____

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National Instruments Corporation
6504 Bridge Point Parkway
Austin, TX 78730-5039

Fax to: Technical Publications
National Instruments Corporation
(512) 794-5678

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
ASIC	application-specific integrated circuit
C	Celsius
DIP	dual inline package
DMA	direct memory access
EISA	Extended Industry Standard Architecture
EMI	electromagnetic interference
FCC	Federal Communications Commission
GPIB	General Purpose Interface Bus
Hz	hertz
I/O	input/output
IEEE	Institute of Electrical and Electronic Engineers
in.	inches
ISA	Industry Standard Architecture
kernel	The set of programs in an operating system that implements basic system functions
m	meters

MB	megabytes of memory
PC	personal computer
PCI	peripheral component interconnect
PCMCIA	Personal Computer Memory Card International Association
RAM	random-access memory
s	seconds
VDC	volts direct current