

# **GPIB**

## **Getting Started with Your AT-GPIB/TNT or EISA-GPIB and the GPIB Software for Windows 95/98**

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This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual, may cause interference to radio and television reception. Classification requirements are the same for the Federal Communications Commission (FCC) and the Canadian Department of Communications (DOC). This equipment has been tested and found to comply with the following two regulatory agencies:

## Federal Communications Commission

This equipment has been tested and found to comply with the limits for a Class 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.

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

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

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

## Canadian Department of Communications

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

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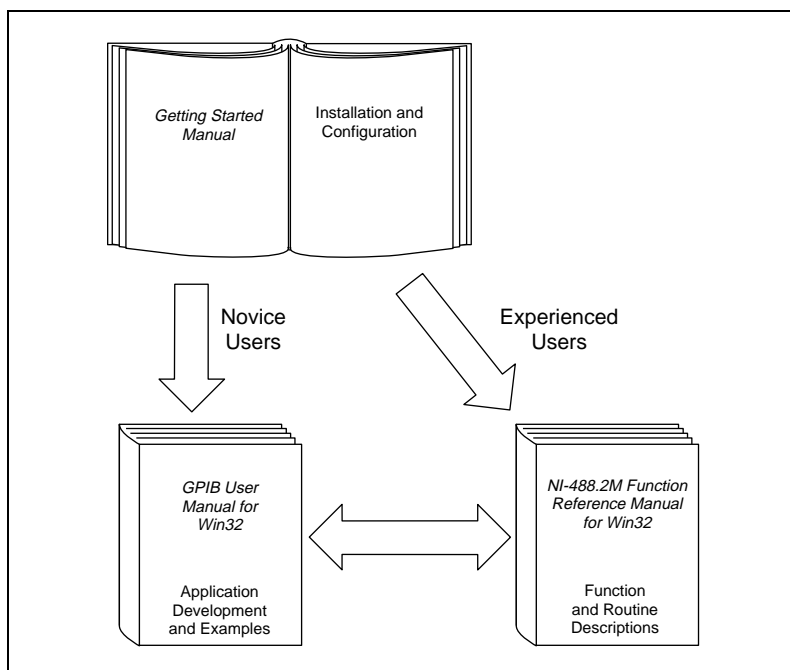
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This manual contains instructions to help you install and configure the National Instruments AT-GPIB/TNT or EISA-GPIB and the GPIB software.

## How to Use the Manual Set



Use this getting started manual to install and configure your AT-GPIB/TNT or EISA-GPIB and the GPIB software.

Use the *GPIB User Manual for Win32* to learn the basics of GPIB and how to develop an application program. The user manual also contains 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

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This manual is organized as follows:

- Chapter 1, *Introduction*, explains how to use this manual, lists what you need to get started and optional equipment you can order, and briefly describes the AT-GPIB/TNT and EISA-GPIB hardware and the GPIB software.
- Chapter 2, *Installation and Configuration*, describes how to install and configure the AT-GPIB/TNT and EISA-GPIB hardware and the GPIB software.
- Chapter 3, *Verify the Installation*, describes how to verify the hardware and software installation.
- Chapter 4, *Begin to Use the GPIB Software*, helps you get started with the GPIB software.
- Appendix A, *Uninstalling the Hardware and Software*, describes how to uninstall your AT-GPIB/TNT and EISA-GPIB and the GPIB software.
- Appendix B, *Forcing Windows to Detect the EISA-GPIB*, contains instructions to help you install your EISA-GPIB if Windows has not detected it properly.
- Appendix C, *Troubleshooting and Common Questions*, describes how to troubleshoot problems and answers some common questions.
- Appendix D, *Specifications*, describes the physical characteristics of the AT-GPIB/TNT and EISA-GPIB hardware, the transfer rates of the GPIB software, and the recommended operating conditions.
- Appendix E, *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 a description of terms used in this manual, including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.

# Conventions Used in This Manual

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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 <b>File»Page Setup»Options»Substitute Fonts</b> directs you to pull down the <b>File</b> menu, select the <b>Page Setup</b> item, select <b>Options</b> , and finally select the <b>Substitute Fonts</b> option from the last dialog box.   |
|  | This icon to the left of bold italicized text denotes a note, which alerts you to important information.  |
|  | This icon to the left of bold italicized text denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.  |
| <b>bold</b>   | Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows, Windows tabs, or LEDs.   |
| <b><i>bold italic</i></b>   | Bold italic text denotes a note, caution, or warning.   |
| <b>bold monospace</b>   | Bold text in this font denotes the messages and responses that the computer automatically prints to the screen. This font also emphasizes lines of code that are different from the other examples.   |
| IEEE 488 and<br>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.  |
| <i>italic</i>   | Italic text denotes emphasis, a cross reference, or an introduction to a key concept. This font also denotes text from which you supply the appropriate word or value, as in Windows 3.x.   |
| <i>italic monospace</i>   | 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 should literally enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames and extensions, and for statements and comments taken from programs. |

## Related Documentation

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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 95/98 Online Help, Microsoft Corporation

## Customer Communication

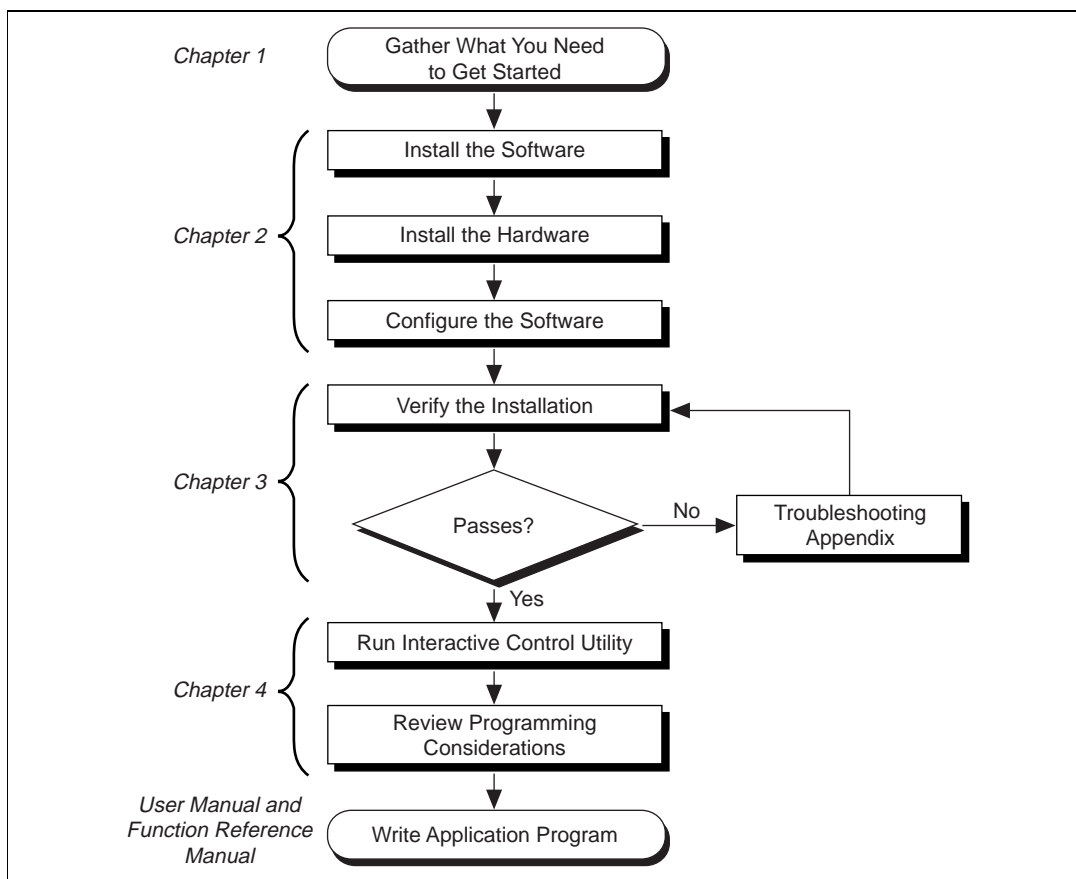
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National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual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

# Introduction

This chapter explains how to use this manual, lists what you need to get started and optional equipment you can order, and briefly describes the AT-GPIB/TNT and EISA-GPIB hardware and the GPIB software.

## How to Use This Manual



## What You Need to Get Started

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Make sure you have all of the following items before you attempt to install the hardware and software:

- ☐ Windows 95 or later installed on your computer
- ☐ One of the following GPIB interfaces:
  - AT-GPIB/TNT
  - EISA-GPIB
- ☐ The following 3.5 in., high-density (1.44 MB) disks, which come in your kit:
  - *GPIB Software for Windows 95/98 (Disk 1 of 2)*
  - *GPIB Software for Windows 95/98 (Disk 2 of 2)*
- ☐ GPIB cables—single-shielded or double-shielded, Type X1, X2, or X5, which you can order from National Instruments

## Optional Equipment

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Call National Instruments for more information about the following optional equipment:

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

## GPIB Hardware Overview

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Both the AT-GPIB/TNT and EISA-GPIB boards transform your computer into a full-functioning GPIB Talker/Listener/Controller. The TNT4882C chip on each 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 5.3 Mbytes/s, depending on the computer and the system configuration. For more information about transfer rates, refer to Appendix D, *Specifications*, in this manual. For more information about HS488, refer to Chapter 7, *GPIB Programming Techniques*, in the *GPIB User Manual for Win32*.

The AT-GPIB/TNT and EISA-GPIB boards contain one GPIB load. You can connect up to 14 instruments to one of these interfaces. If you want to use more than 14 instruments, you can order a bus extender or expander from National Instruments. Refer to Appendix D, [Specifications](#), for more information about the hardware specifications and recommended operating conditions.

## GPIB Software Overview

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The GPIB software includes a native, 32-bit multitasking driver that is fully Plug and Play aware. Because the AT-GPIB/TNT and EISA-GPIB are Non Plug and Play boards, Windows is unable to detect their addition to or removal from your system dynamically. You must manually inform Windows about the insertion or removal of the AT-GPIB/TNT from your system. The EISA-GPIB does not contain any DIP switches to configure its resources, so you must insert the board and configure its resources by running the EISA configuration utility that came with your computer. Then, when you restart your computer, Windows automatically detects the presence of the EISA-GPIB hardware.

The GPIB software supports the concurrent use of multiple types of GPIB hardware. For example, you can communicate with GPIB devices through both an AT-GPIB/TNT and an EISA-GPIB in the same system at the same time. The GPIB software is fully integrated into the Windows operating system. It is configurable through the System applet and uninstallable through the Add/Remove Programs applet of the Control Panel.

The GPIB software, along with the GPIB hardware, transforms a general-purpose PC into a GPIB Talker/Listener/Controller with complete communications and bus management capability. The GPIB software includes the following components:

- Device driver
- Diagnostic test utility
- Configuration utility
- Interactive control program
- Utilities for software development

- Language interface libraries for Microsoft Visual C/C++ 2.0 or later, Borland C/C++ 4.0 or later, and Microsoft Visual Basic 4.0 or later
- Example programs that use NI-488 functions and NI-488.2 routines

Refer to Appendix D, *Specifications*, for information about the GPIB software transfer rates.

## Time-Saving Development Tools

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

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

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

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

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



# Installation and Configuration

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*Chapter*

**2**

This chapter describes how to install and configure the AT-GPIB/TNT and EISA-GPIB hardware and the GPIB software.

## Install the GPIB Software

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Before installing the hardware, complete the following steps to install the GPIB software:

1. Select **Start»Settings»Control Panel**.
2. Double-click on the **Add/Remove Programs** icon in the Control Panel to launch the Add/Remove Programs applet. A dialog box similar to the one in Figure 2-1 appears.

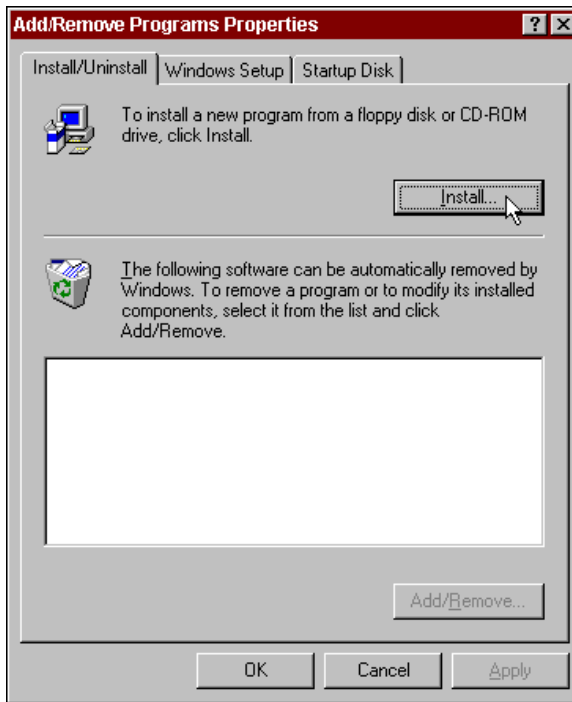


Figure 2-1. Add/Remove Programs Properties Dialog Box

You can use this same applet to uninstall the GPIB software at a later time. Refer to Appendix A, *Uninstalling the Hardware and Software*, for more information.

3. Click on the **Install** button.
4. Insert the *GPIB Software for Windows 95/98 (Disk 1 of 2)*, and click on the **Next** button to proceed.
5. The software installation wizard begins with the screen shown in Figure 2-2. Click on **Next** to begin installation.

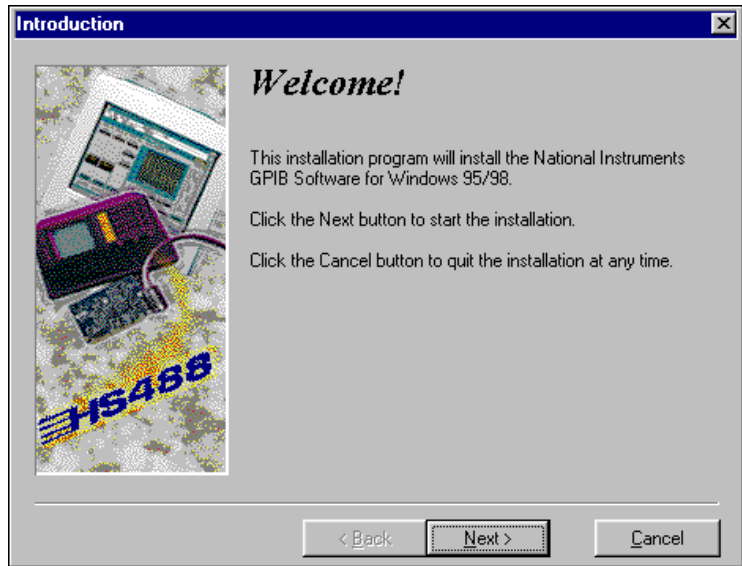


Figure 2-2. GPIB Software Setup Screen

The setup wizard guides you through the necessary steps to install the GPIB software. You may go back and change values where appropriate by clicking on the **Back** button. You can exit the setup if necessary by clicking on the **Cancel** button.

6. When the setup is complete, restart Windows.

## Install the GPIB Hardware

This section describes how to install your GPIB hardware. Refer to the section that describes the installation for your particular board.

If you have previously installed the GPIB Compatibility Release for Windows 95, you should remove any system-reserved resources for your AT-GPIB/TNT. System-reserved resources are only acquired manually. If you did not use the Device Manager to acquire system-reserved resources, you do not need to use the Device Manager to remove such resources. If you do need to remove system-reserved resources, refer to the [Removing System-Reserved Resources](#) section of Appendix C, [Troubleshooting and Common Questions](#).

## AT-GPIB Hardware Installation

Follow these steps to install the AT-GPIB/TNT.

### Identify Resources for the AT-GPIB/TNT

Before installing the AT-GPIB/TNT, use the **Add New Hardware Wizard** to inform Windows about the new hardware you are about to install in your system.

1. Select **Start»Settings»Control Panel**.
2. Launch the **Add New Hardware Wizard** by double-clicking on the **Add New Hardware** icon.
3. Click on the **Next** button in the first **Add New Hardware Wizard** dialog box.
4. Because the AT-GPIB/TNT is not a Plug and Play interface, Windows is unable to detect its presence automatically.

Windows 95:

When the next **Add New Hardware Wizard** dialog box offers to detect new hardware, check **No** instead of **Yes (Recommended)**, then click on the **Next** button to continue.

Windows 98:

- a. Click on the **Next** button in the next **Add New Hardware Wizard** dialog box.
  - b. In the next dialog box, check **No, the device isn't in the list**, then click on the **Next** button to continue.
  - c. In the next dialog box, check **No, I want to select the hardware from a list**, then click on the **Next** button to continue.
5. The next **Add New Hardware Wizard** dialog box lets you select the type of hardware you want to install. Select the **Other Devices** item, as shown in Figure 2-3. You may select the **National Instruments GPIB Interfaces** item instead, if it appears in the dialog box. Click on the **Next** button to continue.

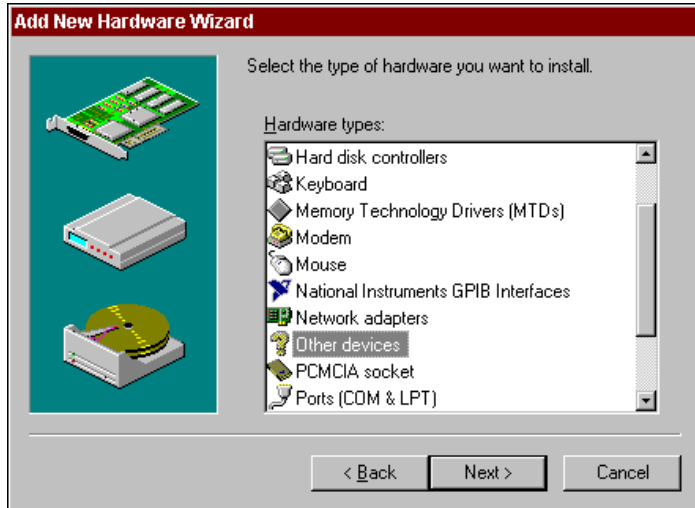


Figure 2-3. Add New Hardware Wizard Hardware Selection

6. The next **Add New Hardware Wizard** dialog box lets you select the manufacturer and model of your hardware. **Select National Instruments** as the manufacturer and **AT-GPIB/TNT** as the model, and click on the **Next** button to continue. Windows attempts to assign nonconflicting resources to the AT-GPIB/TNT.

If Windows is able to assign resources successfully, the next **Add New Hardware Wizard** dialog box describes the resources assigned to the AT-GPIB/TNT, as shown in the example dialog box in Figure 2-4. Skip to Step 7 to proceed.



Figure 2-4. AT-GPIB/TNT Resources Assigned Successfully

If Windows is unable to assign resources successfully, the next **Add New Hardware Wizard** dialog box explains the problem, as shown in the example dialog box in Figure 2-5.



Figure 2-5. AT-GPIB/TNT Resources Not Assigned Successfully

If this dialog box appears, click on the **Next** button to continue, then click on **Start Conflict Troubleshooter** to let Windows help you determine how to resolve the conflicts that are preventing it from assigning resources. Follow all of the steps recommended by the Conflict Troubleshooter help.

When you reach the step of looking for nonconflicting resources for the AT-GPIB/TNT, you need to change the **Setting based on** selection on the **Resources** page of the **AT-GPIB/TNT Properties** dialog box to a configuration other than **Basic configuration 0** or **Basic configuration 1**, as shown in Figure 2-6.

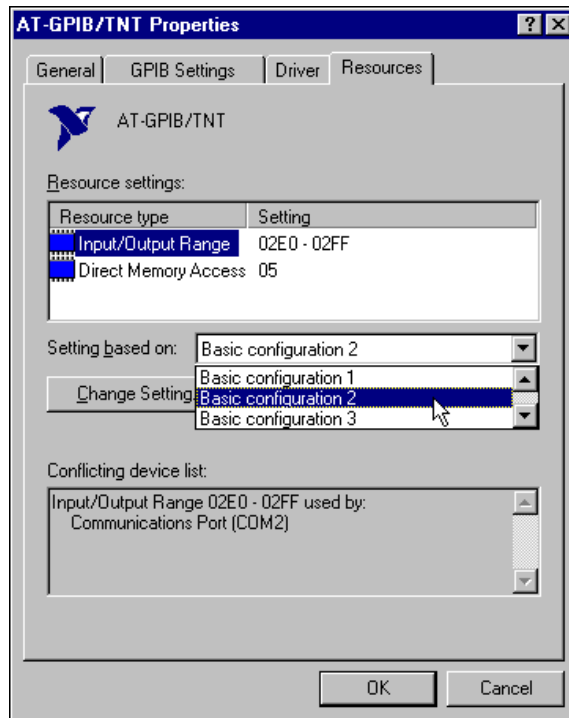


Figure 2-6. AT-GPIB/TNT Resources Settings

Continue following the instructions provided by the Conflict Troubleshooter to resolve the conflicts.

7. Write down the conflict-free resources that Windows assigned to the AT-GPIB/TNT.
8. Shut down Windows.

## Configure the AT-GPIB/TNT



**Caution:** *Electrostatic discharge can damage several components on the AT-GPIB/TNT. To avoid such damage in handling the board, touch the antistatic plastic package to a metal part of your computer chassis before removing the board from the package.*

Configure the AT-GPIB/TNT jumpers and switches to match the resources assigned to it by Windows. If the resources assigned to it match the default settings, you are ready to install the AT-GPIB/TNT.

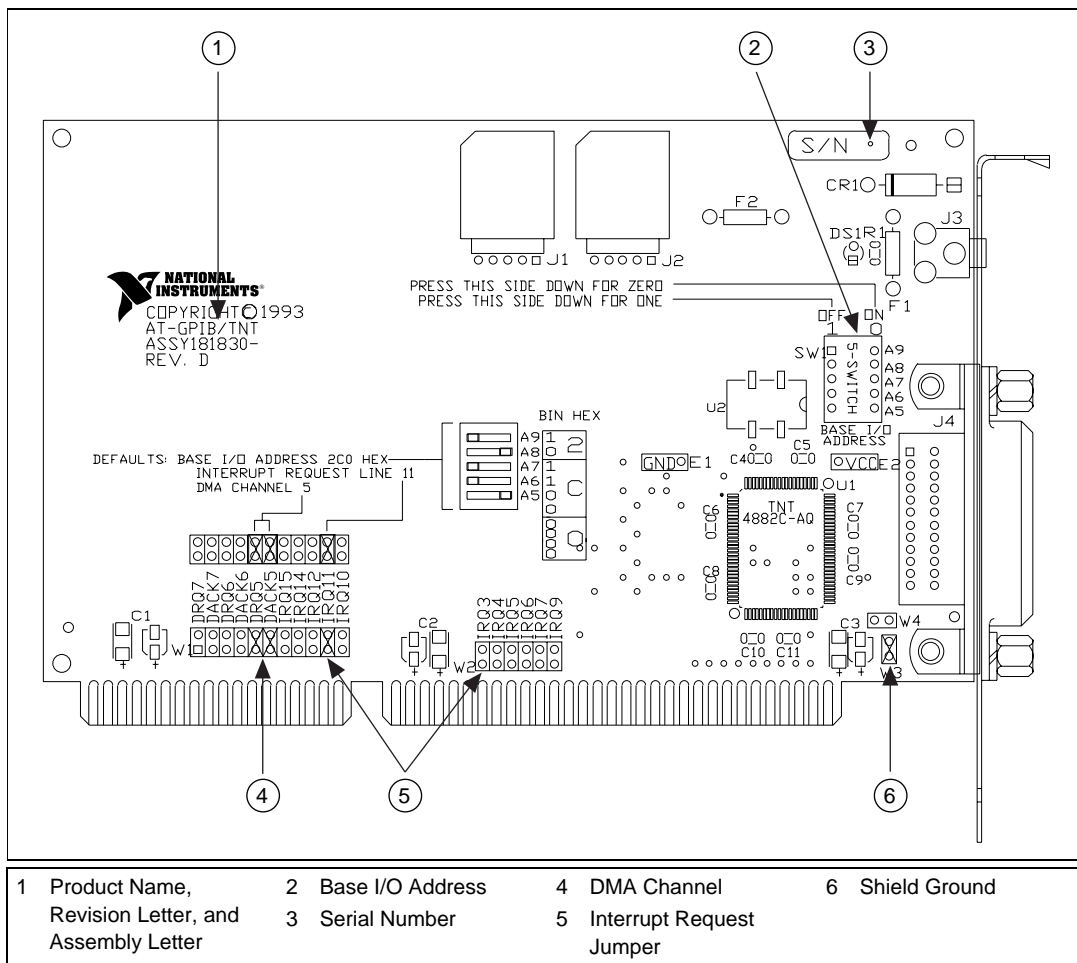
Table 2-1 shows the default settings for the switches and jumpers on the GPIB board.

**Table 2-1.** AT-GPIB/TNT Hardware Default Settings

| GPIB Board Setting   | Default |
|----------------------|---------|
| I/O range            | 2C0-2DF |
| DMA channel          | 5       |
| Interrupt line (IRQ) | 11      |

If the resources do not match the default settings, you must reconfigure the jumpers and switches, as described in the next few sections, to match the resources assigned to the AT-GPIB/TNT by Windows. Figure 2-7 shows the location of the configuration jumpers and switches on the AT-GPIB/TNT.





**Figure 2-7. AT-GPIB/TNT Parts Locator Diagram**

## Configure the AT-GPIB/TNT Input/Output Range

An I/O range is a segment of address space reserved for the input and output of a board. The base I/O address of an Input/Output Range is the first position in the Input/Output Range used by the plug-in interface board. By default, the AT-GPIB/TNT is configured to use base I/O address 2C0 hex. With this setting, the board uses an Input/Output Range of 2C0 hex to 2DF hex.

Follow these steps to reconfigure the base I/O address of the AT-GPIB/TNT:

1. Locate the base I/O address switch at SW1 on your AT-GPIB/TNT board. Refer to the parts locator diagram, Figure 2-7.
2. Change the switch settings to configure the GPIB board to match the base I/O address of the Input/Output Range assigned by Windows.

Press down on the side marked OFF to select a binary value of 1 for the corresponding address bit. Press down on the ON side of the switch to select a binary value of 0. Refer to Figure 2-8 for an example of the switch settings and corresponding base I/O addresses. Table 2-2 shows the possible switch settings, the corresponding base I/O addresses, and the I/O address space used for each setting. The default settings are in ***bold italics***.

**Table 2-2.** Possible Base I/O Address Switch Settings for AT-GPIB/TNT

| Switch Setting |    |    |    |    | Base I/O Address (hex) | I/O Address Space Used (hex) |
|----------------|----|----|----|----|------------------------|------------------------------|
| A9             | A8 | A7 | A6 | A5 |                        |                              |
| 0              | 1  | 0  | 0  | 0  | 100                    | 100 to 11F                   |
| 0              | 1  | 0  | 0  | 1  | 120                    | 120 to 13F                   |
| 0              | 1  | 0  | 1  | 0  | 140                    | 140 to 15F                   |
| 0              | 1  | 0  | 1  | 1  | 160                    | 160 to 17F                   |
| 0              | 1  | 1  | 0  | 0  | 180                    | 180 to 19F                   |
| 0              | 1  | 1  | 0  | 1  | 1A0                    | 1A0 to 1BF                   |
| 0              | 1  | 1  | 1  | 0  | 1C0                    | 1C0 to 1DF                   |
| 0              | 1  | 1  | 1  | 1  | 1E0                    | 1E0 to 1FF                   |
| 1              | 0  | 0  | 0  | 0  | 200                    | 200 to 21F                   |
| 1              | 0  | 0  | 0  | 1  | 220                    | 220 to 23F                   |
| 1              | 0  | 0  | 1  | 0  | 240                    | 240 to 25F                   |
| 1              | 0  | 0  | 1  | 1  | 260                    | 260 to 27F                   |

**Table 2-2.** Possible Base I/O Address Switch Settings for AT-GPIB/TNT (Continued)

| Switch Setting |          |          |          |          | Base I/O<br>Address (hex) | I/O Address<br>Space Used (hex) |
|----------------|----------|----------|----------|----------|---------------------------|---------------------------------|
| A9             | A8       | A7       | A6       | A5       |                           |                                 |
| 1              | 0        | 1        | 0        | 0        | 280                       | 280 to 29F                      |
| 1              | 0        | 1        | 0        | 1        | 2A0                       | 2A0 to 2BF                      |
| <b>1</b>       | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>2C0</b>                | <b>2C0 to 2DF</b>               |
| 1              | 0        | 1        | 1        | 1        | 2E0                       | 2E0 to 2FF                      |
| 1              | 1        | 0        | 0        | 0        | 300                       | 300 to 31F                      |
| 1              | 1        | 0        | 0        | 1        | 320                       | 320 to 33F                      |
| 1              | 1        | 0        | 1        | 0        | 340                       | 340 to 35F                      |
| 1              | 1        | 0        | 1        | 1        | 360                       | 360 to 37F                      |
| 1              | 1        | 1        | 0        | 0        | 380                       | 380 to 39F                      |
| 1              | 1        | 1        | 0        | 1        | 3A0                       | 3A0 to 3BF                      |
| 1              | 1        | 1        | 1        | 0        | 3C0                       | 3C0 to 3DF                      |
| 1              | 1        | 1        | 1        | 1        | 3E0                       | 3E0 to 3FF                      |

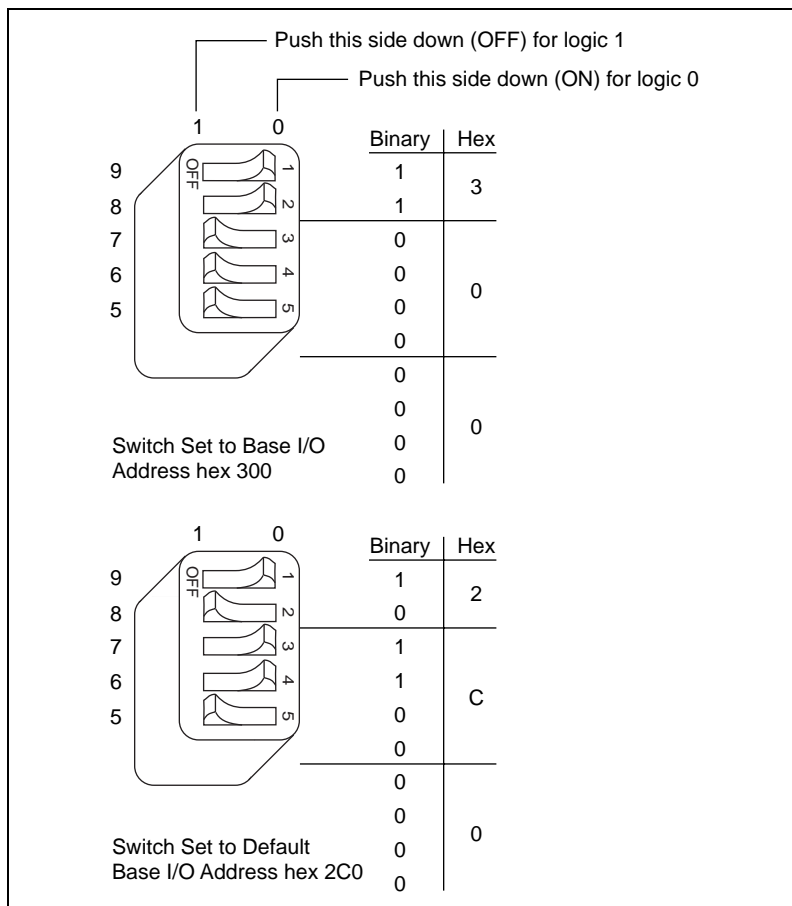


Figure 2-8. AT-GPIB/TNT Base I/O Address Switch Settings

## Configure the AT-GPIB/TNT Interrupt Request

PC AT compatible computers have a series of interrupt lines available to devices. Devices use interrupts to get immediate service from the CPU for asynchronous events. Your GPIB hardware and software use interrupts to get service from the CPU when necessary. By default, the AT-GPIB/TNT is configured to use interrupt request line 11.



### Note:

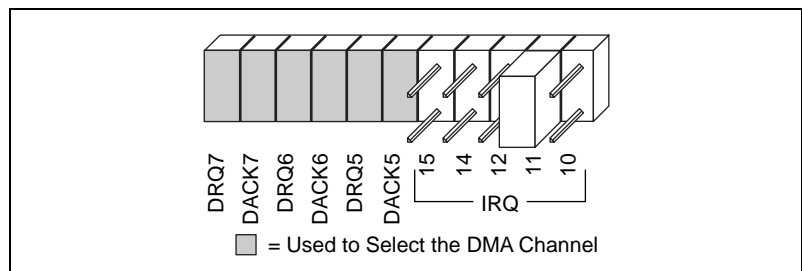
*If there are no interrupt lines available for your GPIB hardware, the jumpers that set the interrupt request line have no effect. You can leave them at the default setting.*

Follow these steps to reconfigure the interrupt request line:

1. Find the jumpers that set the interrupt request line. The jumpers are located on the lower edge of your AT-GPIB/TNT. Refer to the parts locator diagram, Figure 2-7.
2. Change the jumper settings to configure the AT-GPIB/TNT to the new interrupt request line.

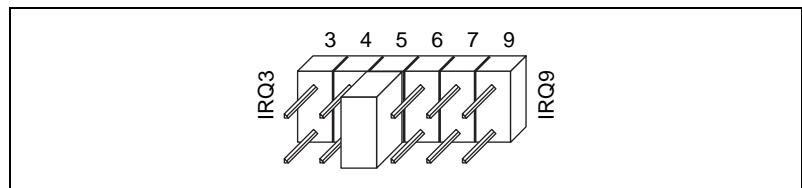
To use lines 10, 11, 12, or 15, use the jumper block shown in Figure 2-9. To use interrupt lines 3, 4, 5, 7, or 9, use the jumper block shown in Figure 2-10.

Figure 2-9 shows the setting for IRQ11.



**Figure 2-9.** AT-GPIB/TNT Interrupt Jumper Setting for IRQ11 (Default Setting)

Figure 2-10 shows the setting for IRQ5.



**Figure 2-10.** AT-GPIB/TNT Interrupt Jumper Setting for IRQ5

## Configure the AT-GPIB/TNT Direct Memory Access

Direct memory access (DMA) refers to data transfers directly to or directly from devices such as the AT-GPIB/TNT and computer memory. Your GPIB hardware and software are designed to perform DMA. In most cases, data transfers using DMA are significantly faster than programmed I/O transfers, which use more CPU time. However, if Windows is unable to assign a DMA resource to the AT-GPIB/TNT, you can configure DMA to none and still use the GPIB software. By default, the AT-GPIB/TNT is configured to use DMA channel 5.

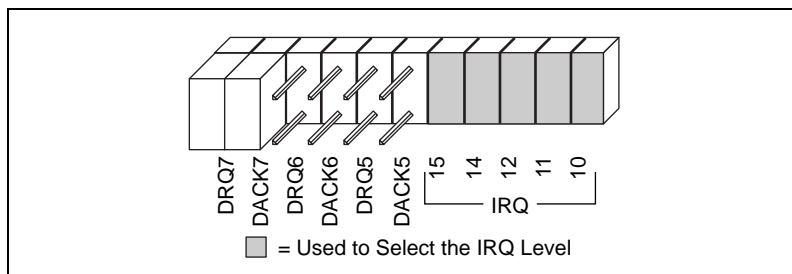
Follow these steps to reconfigure the DMA channel:

1. Locate the jumpers that select the DMA channel. Refer to the parts locator diagram, Figure 2-7.
2. Change the jumper settings to configure the GPIB board to the new DMA channel. To select a new DMA channel, you must set both the DMA Acknowledge and DMA Request lines, as shown in Table 2-3.

**Table 2-3.** AT-GPIB/TNT DMA Channel Settings

| DMA Channel | Signal Lines    |             |
|-------------|-----------------|-------------|
|             | DMA Acknowledge | DMA Request |
| 5           | DACK5           | DRQ5        |
| 6           | DACK6           | DRQ6        |
| 7           | DACK7           | DRQ7        |
| none        | —               | —           |

Figure 2-11 shows the jumper position for selecting DMA channel 7.



**Figure 2-11.** AT-GPIB/TNT DMA Jumper Setting for DMA Channel 7

Figure 2-12 shows the jumper position for selecting no DMA channel.

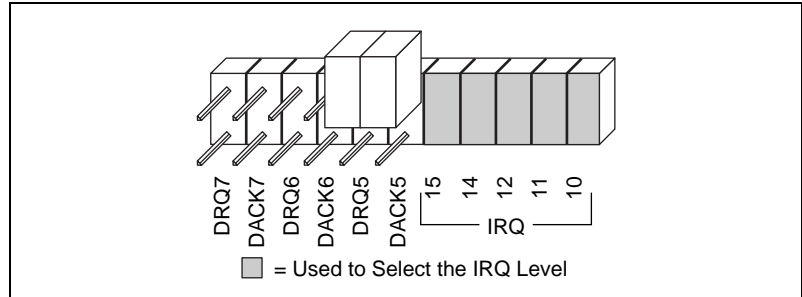


Figure 2-12. AT-GPIB/TNT DMA Jumper Setting for No DMA Channel

## Setting the AT-GPIB/TNT Shield Ground Configuration

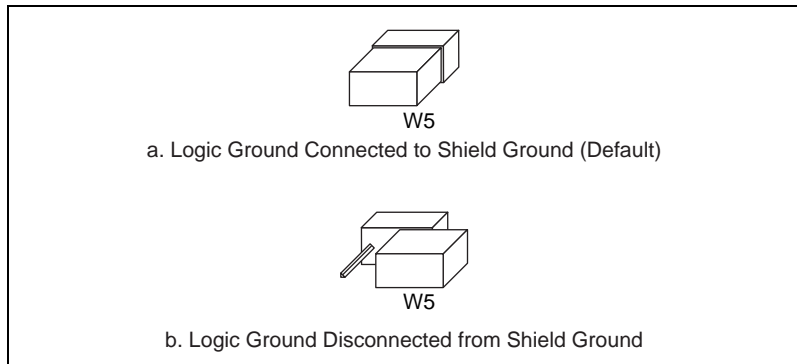
The AT-GPIB/TNT is set at the factory with the jumper in place to connect the logic ground of the AT-GPIB/TNT to its shield ground. This configuration minimizes EMI emissions.



**Caution:** *The AT-GPIB/TNT was tested for compliance with FCC standards with the shield ground connected to logic ground. Removing the jumper might cause EMI emissions to exceed any or all of the applicable standards.*

If your application requires that logic ground be disconnected from shield ground, follow these steps:

1. Refer to Figure 2-7 to locate the shield ground jumper W3 on the AT-GPIB/TNT.
2. Remove the jumper and place it across only one of the jumper pins, as shown in Figure 2-13.



**Figure 2-13.** AT-GPIB/TNT Ground Configuration Jumper Settings

3. Record the jumper setting on the *Hardware and Software Configuration Form* in Appendix E, *Customer Communication*.

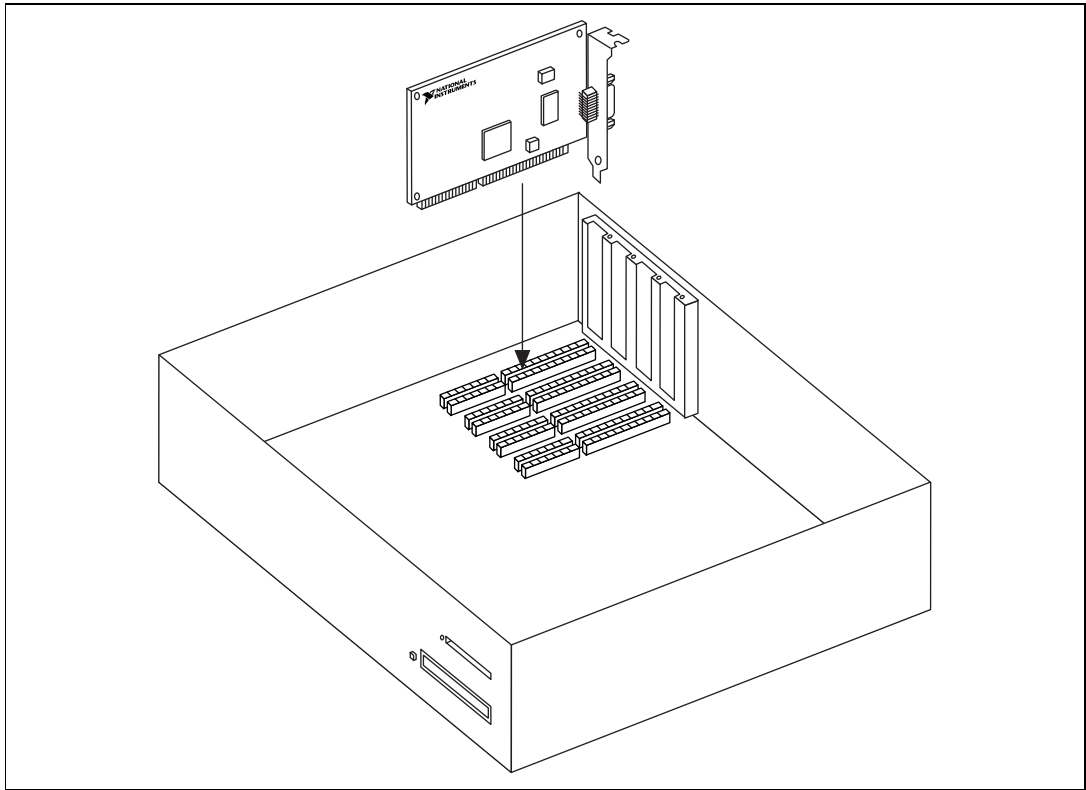
Now that you have properly configured the hardware, continue to the *Install the AT-GPIB/TNT* section for installation instructions.

## Install the AT-GPIB/TNT

Complete the following steps to install the AT-GPIB/TNT board:

1. Shut down Windows and 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 in your computer. The AT-GPIB/TNT requires a 16-bit ISA expansion slot.
4. Remove the corresponding slot cover on the back panel of the computer.
5. Insert the AT-GPIB/TNT into the slot with the GPIB connector sticking out of the opening on the back panel, as shown in Figure 2-14. It might be a tight fit, but do not force the board into place.





**Figure 2-14.** Installing the AT-GPIB/TNT

6. Screw the mounting bracket of the AT-GPIB/TNT to the back panel rail of the computer.
7. Replace the top cover (or the access port to the expansion slot).
8. Power on your computer and start Windows.

The AT-GPIB/TNT hardware installation is now complete. Proceed to the [Configure the GPIB Software](#) section later in this chapter.

## EISA-GPIB Hardware Installation

Follow these steps to install the EISA-GPIB.

### Identify Resources for the EISA-GPIB

Before installing the EISA-GPIB, you should determine what direct memory access (DMA) channel and interrupt request level (IRQ) resources are available for use by the board. To see which resources are in use by other devices, complete the following steps:

1. Select **Start»Settings»Control Panel**.
2. Run the System Properties applet by double-clicking on the **System** icon.
3. Select the **Device Manager** tab.
4. Click on the **Computer** icon at the top of the Device Manager list of devices.
5. Click on the **Properties** button.
6. Click on a resource type at the top of the dialog box to see which resource settings are in use. If all resources of a particular type are in use, you need to disable one or more other hardware devices to make the required resources available for the EISA-GPIB.

When you have determined which DMA and IRQ resources are available for use by the EISA-GPIB, you may want to write them down before proceeding to the next section, [Install the EISA-GPIB](#).

### Install the EISA-GPIB



**Caution:** *Electrostatic discharge can damage several components on the EISA-GPIB. To avoid such damage in handling the board, touch the antistatic plastic package to a metal part of your computer chassis before removing the board from the package.*

Before you install the EISA-GPIB, make sure you have a backup copy of the EISA configuration disk. If you do not have one, you can make one by following the instructions in the documentation that came with your computer.

Perform the following steps to install the EISA-GPIB:

1. Copy the .cfg file from the *GPIB Software for Windows 95/98 (Disk 1 of 2)* to your backup copy of the EISA configuration disk.

2. Power off your computer. Keep the computer plugged in so that it remains grounded while you install the GPIB hardware.
3. Remove the top cover (or other access panels) to give yourself access to the computer expansion slots.
4. Find an unused EISA expansion slot in your computer.
5. Remove the corresponding slot cover on the back panel of the computer.
6. Insert the EISA-GPIB 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 2-14 shows a similar installation for the AT-GPIB/TNT.
7. Screw the mounting bracket of the EISA-GPIB to the back panel rail of the computer.
8. Replace the top cover (or the access port to the expansion slot).
9. Restart your computer with the backup copy of the EISA configuration disk inserted into the disk drive. Follow the instructions that came with your computer to configure the computer automatically.

The EISA Configuration utility on the disk automatically configures the EISA-GPIB hardware by assigning values for the IRQ level and DMA channel of the board. However, you must modify these values to match the IRQ and DMA resources that you have previously determined are available for use under Windows. Refer to the [Identify Resources for the EISA-GPIB](#) section, earlier in this chapter, for details on how to determine available resources. To modify the EISA configuration, follow the instructions that came with your computer.

10. Remove the EISA configuration disk.
11. Restart your computer and start Windows. Windows should automatically detect the GPIB hardware, and should display a **New Hardware Found** dialog box for a short time.

If the **New Hardware Found** dialog box does not appear when you restart Windows, refer to Appendix B, [Forcing Windows to Detect the EISA-GPIB](#).

The EISA-GPIB hardware installation is now complete. Proceed to the next section, [Configure the GPIB Software](#).

## Configure the GPIB Software

The GPIB Configuration utility is fully integrated with the Windows Device Manager. You can use it to examine or modify the configuration of the GPIB software. The context-sensitive online help, available by right-clicking on any of the controls on the configuration utility tabs, includes all of the information that you need to configure the GPIB software properly.

To begin to configure the GPIB software, double-click on the **System** icon under **Start»Settings»Control Panel**. In the **System Properties** dialog box that appears, select the **Device Manager** tab, click on the **View devices by type** button at the top of the tab, and scroll down to the **National Instruments GPIB Interfaces** icon.

### Resolve Conflicts

If you have other Non Plug and Play hardware in your system, Windows might assign incorrect resources to your AT-GPIB/TNT. If this happens, Windows shows that the AT-GPIB/TNT is not working, and you must reconfigure the AT-GPIB/TNT module and the GPIB software.

On the **Device Manager** page, look at the items listed under the **National Instruments GPIB Interfaces** icon. If there is no **National Instruments GPIB Interfaces** icon or if a circled X or exclamation point (!) appears through the eagle icon, the AT-GPIB/TNT is not working properly. Figure 2-15 shows an example of a AT-GPIB/TNT that is working properly, and Figure 2-16 shows an example of a AT-GPIB/TNT that is not working properly.



Figure 2-15. GPIB Interface That Is Working Properly



Figure 2-16. GPIB Interface That Is Not Working Properly

You can see if the problem is a resource conflict by looking at what resources are conflicting, if the AT-GPIB/TNT appears under the **National Instruments GPIB Interfaces** icon. Double-click on the AT-GPIB/TNT name and click on the **Resources** tab, which provides information about the hardware resources assigned to the AT-GPIB/TNT. The **Conflicting Device List** lists any conflicts. If conflicts exist, use the **Setting based on** drop-down list and the **Change Setting** button to select conflict-free resources for the AT-GPIB/TNT.

If you cannot find conflict-free resources for the AT-GPIB/TNT, or if no conflicts are listed, refer to the [Troubleshooting Device Manager Problems](#) section of Appendix C, [Troubleshooting and Common Questions](#), to resolve the problem.

## Assign an Interface Name

If you are using more than one interface, you must configure the GPIB software to associate a logical name (GPIB0, GPIB1, and so on) with each physical GPIB interface. Follow these steps:

1. Double-click on the first interface immediately below **National Instruments GPIB Interfaces**.
2. Click on the **GPIB Settings** tab, which provides information about the software configuration for the AT-GPIB/TNT.
3. Use the **Interface Name** drop-down box to select a logical name (GPIB0, GPIB1, and so on) for the AT-GPIB/TNT.
4. Repeat this process for each interface you need to configure.

Figure 2-17 shows the **GPIB Settings** page for an AT-GPIB/TNT.

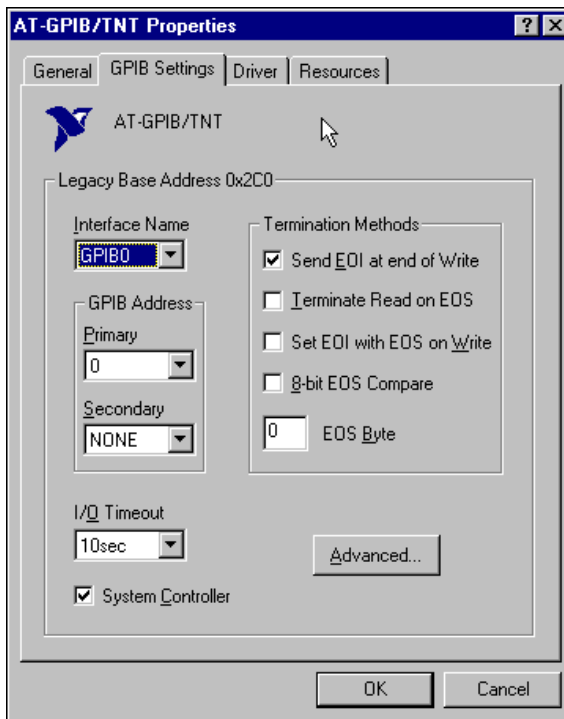
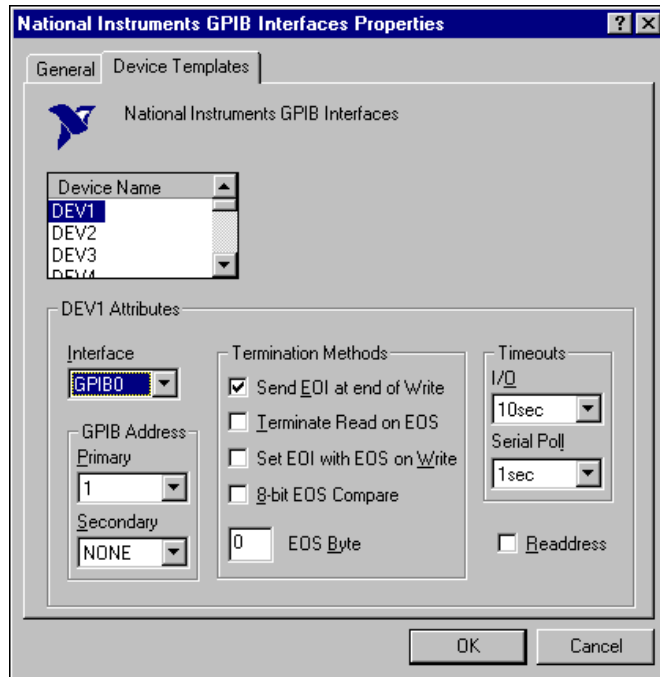


Figure 2-17. GPIB Settings Page for the AT-GPIB/TNT

## View or Modify Logical Device Templates (Optional)

If you want to examine or modify the logical device templates for the GPIB software, select the **National Instruments GPIB Interfaces** icon from the **Device Manager** page, and click on the **Properties** button. Select the **Device Templates** tab to view the logical device templates, as shown in Figure 2-18.



**Figure 2-18.** Device Templates Page for the Logical Device Templates

# Verify the Installation

## Chapter 3

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

The Diagnostic utility, installed with your GPIB software, verifies that your hardware and software are functioning properly. To run the utility, select the **Diagnostic** item under **Start»Programs»National Instruments GPIB**.

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

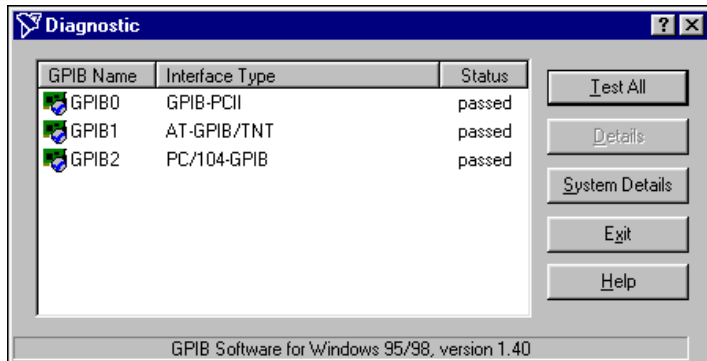


Figure 3-1. Diagnostic Utility after Testing

You can get details on any tested GPIB interface 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. Use that information and the information in Appendix C, *Troubleshooting and Common Questions*, to troubleshoot the problem. Troubleshooting information is also available in the online help for the Diagnostic utility, which you can access by clicking on the **Help** button.



# Begin to Use the GPIB Software

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Chapter

4

This chapter helps you get started with the GPIB software.

## Introduction to the Win32 Interactive Control Utility

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

- Verify GPIB communication with your device.
- 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.

To run this utility, select **Start»Programs»National Instruments GPIB»Win32 Interactive Control**. This utility includes extensive online help, available by entering `help` at the `:` prompt.

For more information about the Win32 Interactive Control utility, refer to the *GPIB User Manual for Win32*.

## Introduction to the NI Spy Utility

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

- Capture information about NI-488 functions and NI-488.2 routines as they are invoked by your GPIB applications.
- 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.

To run NI Spy, select **Start»Programs»National Instruments GPIB»NI Spy**. For more information about the NI Spy utility, refer to Chapter 5, *NI Spy Utility*, in the *GPIB User Manual for Win32*, or use its built-in, context-sensitive online help.

## Running Existing DOS GPIB Applications

---

With the GPIB software properly configured, you can run your existing DOS GPIB applications along with your Win16 and Win32 applications. No DOS device driver is required. In fact, make sure that no older version of the GPIB DOS device driver is being loaded from your `config.sys` file, a file located on the boot drive of your computer.



**Note:** *To determine if `config.sys` is loading an older GPIB DOS driver, look for the line `device=path\gpib.com` in your `config.sys` file, where `path` refers to the drive and directory where `gpib.com` is located. If that line appears, either comment it out by typing `REM` at the beginning of the line, or delete it. If you change the `config.sys` file, save it and restart your system.*

To configure the GPIB software to run existing DOS GPIB applications, first make sure that you have installed the GPIB software and your GPIB hardware. Then complete the following steps:

1. Double-click on the **System** icon under **Start»Settings»Control Panel**.
2. In the **System Properties** dialog box that appears, select the **Device Manager** tab.
3. Click on the **View devices by type** button at the top of the page.
4. Click on the **National Instruments GPIB Interfaces** icon.
5. Click on the **Properties** button to display the **General** property page for the GPIB software.
6. Click on the check box labeled **Enable Support for DOS GPIB Applications**, and click on the **OK** button.
7. Restart your computer.

After you restart your computer, you can begin to run your existing DOS GPIB applications.

## General Programming Considerations

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As you begin developing your Win32 GPIB application, remember the following points:

- For your C/C++ application, you must include the GPIB header file in your source code.
- The GPIB software is accessed through the 32-bit DLL, `gpiib-32.dll`, either by linking with one of the language interfaces provided with the GPIB software, or by using direct DLL entry from other programming environments.
- Several sample GPIB applications are included with the GPIB 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 *GPIB User Manual for Win32*. For detailed information about each NI-488 function and NI-488.2 routine, refer to the *NI-488.2M Function Reference Manual for Win32* or the online help file, which you can access by selecting **Start»Programs»National Instruments GPIB»GPIB32 Help**.

# Uninstalling the Hardware and Software

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*Appendix*

**A**

This appendix describes how to uninstall your AT-GPIB/TNT and EISA-GPIB and the GPIB software.

## Uninstalling the Hardware

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Before you physically remove the GPIB hardware from your system, you must remove the hardware information from the Windows Device Manager. Complete the following steps to remove the hardware information:

1. Select **Start»Settings»Control Panel** and double-click on the **System** icon.
2. In the **System Properties** dialog box, select the **Device Manager** tab, click on the **View devices by type** button, and double-click on the **National Instruments GPIB Interfaces** icon.
3. Select the interface you want to remove from the **National Instruments GPIB Interfaces** list, as shown in Figure A-1. Click on the **Remove** button to remove the hardware information.
4. Click on the **OK** button, shut down Windows, turn off your system, and physically remove the interface from your system.

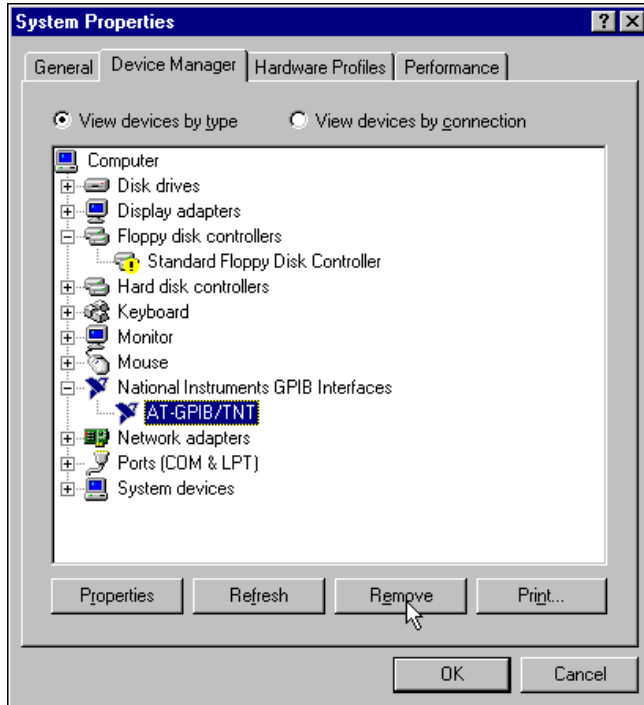


Figure A-1. Selecting an Interface to Remove

If you are removing an EISA-GPIB, you must run your EISA configuration utility before restarting Windows. Follow the instructions in the documentation that came with your computer.

## Uninstalling the Software

Before you uninstall the GPIB software, you should remove all GPIB hardware information from the Windows Device Manager, as described in the previous section. Complete the following steps to uninstall the GPIB software:

1. Select **Start»Settings»Control Panel** and double-click on the **Add/Remove Programs** icon. The dialog box shown in Figure A-2 lists the software available for removal.

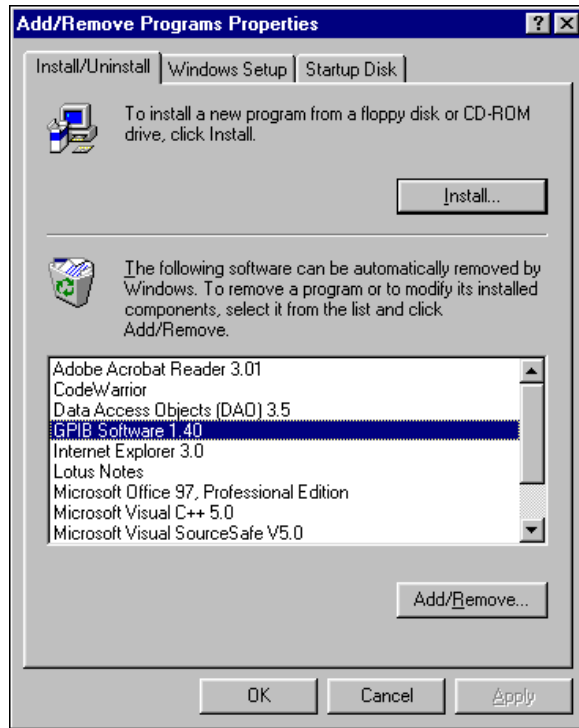


Figure A-2. Add/Remove Programs Properties Dialog Box

2. Select the GPIB software you want to remove and click on the **Add/Remove** button. The uninstall program removes all folders, programs, VxDs, DLLs, and registry entries associated with the GPIB software.

If you have not physically removed your hardware, shut down Windows, turn off your system, and remove the GPIB hardware.

The uninstall program removes only items that the GPIB setup program installed. If you add anything to a directory that was created by the GPIB setup program, the uninstall program does not delete that directory, because the directory is not empty after the uninstallation. You will need to remove any remaining components yourself.

If you want to reinstall the GPIB hardware and software, refer to Chapter 2, *Installation and Configuration*.

# Forcing Windows to Detect the EISA-GPIB

---

Appendix

B

This appendix contains instructions to help you install your EISA-GPIB if Windows has not detected it properly.

If Windows does not detect your EISA-GPIB interface properly, it may not display the **New Hardware Found** dialog boxes when expected, or the driver may return an EDVR error when you try to access the EISA-GPIB. This problem occurs if Windows has already configured the EISA-GPIB as an **Other Device**. To fix the problem, complete the following steps:

1. Select **Start»Settings»Control Panel**.
2. Double-click on the **System** icon to display the **System Properties** dialog box for the computer.
3. Click on the **Device Manager** tab at the top of the **System Properties** page to bring up the **Device Manager** property page. Make sure the **View devices by type** button at the top of the **Device Manager** page is selected.
4. Click on the + sign next to **Other Devices** to display a list of all the hardware devices that Windows has detected and configured as **Other Devices**.
5. For each National Instruments GPIB interface listed, select the interface by clicking on it, and then click on the **Remove** button to remove the interface from the list of **Other Devices**.
6. After you have removed all of the National Instruments GPIB interfaces from the list of **Other Devices**, click on the **Refresh** button to force Windows to detect each National Instruments GPIB interface and to display a **New Hardware Found** dialog box for each one.
7. Proceed with the hardware installation, as described in Chapter 2, *Installation and Configuration*.

# Troubleshooting and Common Questions

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Appendix

C

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

## Troubleshooting EDVR Error Conditions

---

In some cases, calls to NI-488 functions or NI-488.2 routines 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 3), 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 configuring the GPIB software and selecting an interface name. For information about how to configure the GPIB software, refer to the [Configure the GPIB Software](#) section of Chapter 2, *Installation and Configuration*.

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

If a call is made with a board number that is not within the range of allowed board numbers (typically 0 to 3), 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 Condition with `ibcntl` Set to 0xE0320029 (–533594071) or 0xE1050029 (–519765975)

If a call is made with a board number that is assigned to a GPIB interface that is unusable because of a resource conflict, an EDVR error condition occurs with `ibcntl` set to 0xE0320029 or 0xE1050029. This error indicates that the GPIB interface is not working properly. Refer to the [GPIB Interface Not Working Properly](#) section later in this appendix.

## EDVR Error Condition with `ibcntl` set to 0xE0140004 (–535560188)

This error may occur if the EISA-GPIB interface has not been correctly installed and detected by Windows. For details on how to install the GPIB hardware, refer to Chapter 2, [Installation and Configuration](#). If you have already followed those instructions and still receive this error, Windows might have configured the EISA-GPIB as an **Other Device**. For information about how to solve this problem, refer to Appendix B, [Forcing Windows to Detect the EISA-GPIB](#).

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

This error occurs if you have enabled DOS GPIB support and attempted to run an existing GPIB DOS application that was compiled with an older, unsupported DOS language interface.

# Troubleshooting Device Manager Problems

---

The Windows Device Manager contains configuration information for all of the GPIB hardware it is aware of that is installed in your system. To start the Windows Device Manager, double-click on the **System** icon under **Start»Settings»Control Panel**. In the **System Properties** box that appears, select the **Device Manager** tab and click on the **View devices by type** button at the top of the tab.

- If there is no **National Instruments GPIB Interfaces** item and you are certain you have a GPIB interface installed, refer to the [No National Instruments GPIB Interfaces Item](#) section of this appendix.
- If the **National Instruments GPIB Interfaces** item exists, but the GPIB interface you are looking for is not listed there, refer to the [Missing GPIB Interface](#) section of this appendix.

- If the GPIB interface you are looking for is listed, but has a circled X or exclamation mark (!) over its icon, refer to the [GPIB Interface Not Working Properly](#) section of this appendix.

## No National Instruments GPIB Interfaces Item

The **National Instruments GPIB Interfaces** item might be missing from the Device Manager because you have not yet used the **Add New Hardware Wizard** in the **Control Panel** to add the new GPIB hardware to the system. To start the **Add New Hardware Wizard**, double-click on the **Add New Hardware** icon under **Start»Settings»Control Panel**. For details on how to use the **Add New Hardware Wizard** to add information about GPIB hardware, refer to the appropriate hardware installation section in Chapter 2, [Installation and Configuration](#).

## Missing GPIB Interface

If the **National Instruments GPIB Interfaces** item exists, but the GPIB interface you are looking for is not listed there, the GPIB interface is not properly installed. For GPIB hardware, this means that the **Add New Hardware Wizard** has not been run to add the new hardware to your Windows system. To run the **Add New Hardware Wizard**, double-click on the **Add New Hardware** icon under **Start»Settings»Control Panel**. For details on how to use the **Add New Hardware Wizard** to add information about GPIB hardware, refer to the appropriate hardware installation section in Chapter 2, [Installation and Configuration](#).

## GPIB Interface Not Working Properly

If a GPIB interface is not working properly, its icon has a circled X or exclamation mark (!) overlaid on it, as shown in Figure C-1.



**Figure C-1.** GPIB Interface That Is Not Working Properly

This problem can occur for several reasons. If you encounter this problem, the Device Manager should list an error code that indicates why the problem occurred. To see the error code for a particular

interface, select the name of the interface and click on the **Properties** button to go to the **General** page for that GPIB interface. The **Device Status** section of the **General** page shows the error code. Locate the error code in the following list to find out why your GPIB interface is not working properly.

- Code 8: The GPIB software was incompletely installed. To solve this problem, reinstall the GPIB software.
- Code 22: The GPIB interface is disabled. To enable the GPIB interface, check the appropriate configuration checkbox in the **Device Usage** section of the **General** page.
- Code 24: The GPIB interface is not installed, or it is not configured to match the resources assigned to it. Either install the GPIB interface, or verify that the resources assigned to it on the **Resources** page match its settings.
- Code 27: Windows was unable to assign the GPIB interface any resources. To solve this problem, free up system resources by disabling other unnecessary hardware so that enough resources are available for the GPIB interface.

## Removing System-Reserved Resources

---

If you have previously installed the Compatibility Release for Windows 95/98, you should remove any system-reserved resources for your AT-GPIB/TNT. System-reserved resources are only acquired manually. If you did not use the Device Manager to acquire system-reserved resources, you do not need to use the Device Manager to remove such resources.

To remove any resources that you reserved for your AT-GPIB/TNT, complete the following steps:

1. Select **Start»Settings»Control Panel**.
2. Run the **System Properties** applet by double-clicking on the **System** icon.
3. In the **System Properties** dialog box that appears, select the **Device Manager** tab.
4. Click on the **View devices by type** button at the top of the **Device Manager** page.
5. Double-click on the **Computer** icon.

6. In the **Computer Properties** dialog box that appears, click on the **Reserve Resources** tab.
7. Remove the **Interrupt request (IRQ)**, **Input/output (I/O)**, and **Direct memory access (DMA)** resources that you reserved for the AT-GPIB/TNT.
8. Click on the **OK** button to exit the **Computer Properties** dialog box.
9. Click on the **OK** button again to exit the **Device Manager** dialog box.

## Troubleshooting Diagnostic Utility Failures

---

The following sections explain common error messages generated by the Diagnostic utility.

### Missing Software Components

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

### No Properly Configured GPIB Interfaces Found

This error occurs if no GPIB interfaces are physically present in the system, if the Device Manager detected problems with the GPIB interfaces, or if you have not assigned logical board names to your GPIB interfaces using the Device Manager. If you encounter this problem, use the Device Manager to examine the installed GPIB interfaces, resolve any problems reported by the Device Manager, and ensure that logical board names are assigned to each interface. Then, run the Diagnostic utility again.

To access this information in the Device Manager, complete the following steps:

1. Double-click on the **System** icon under **Start»Settings»Control Panel**.
2. In the **System Properties** dialog box that appears, select the **Device Manager** tab.
3. Click on the **View devices by type** button at the top of the **Device Manager** page.

4. Double-click on the **National Instruments GPIB Interfaces** icon. If there is no **National Instruments GPIB Interfaces** icon, either no GPIB interfaces are installed in your system or the GPIB software is installed incorrectly. If you see a **National Instruments GPIB Interfaces** icon, and a GPIB interface listed under it has a circled X or (!) over its icon, refer to the [Troubleshooting Device Manager Problems](#) section earlier in this appendix.
5. After you have opened the **National Instruments GPIB Interfaces** icon, double-click on the GPIB interface name and select the **GPIB Settings** tab to examine the logical board name associated with that interface. If it is set to **None**, change it to the appropriate name, such as **GPIB0**.

## 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 being used by other devices in the system. Resource conflicts typically occur when your system contains legacy boards that use resources that have not been reserved properly with the Device Manager. If a resource conflict exists, write down the resource that caused the conflict and refer to the Microsoft Windows Online Help for instructions on how to use the Device Manager to reserve I/O resources for legacy boards. After the conflict has been resolved, 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 being used by other devices in the system. Resource conflicts typically occur when your system contains legacy boards that use resources that have not been reserved properly with the Device Manager. If a resource conflict exists, write down the resource that caused the conflict and refer to the Microsoft Windows Online Help for instructions on how to use the Device Manager to reserve IRQ resources for legacy boards. After the conflict has been resolved, run the Diagnostic utility again.

## DMA Resource Conflict

This error occurs if the DMA resources assigned to a GPIB interface conflict with the DMA resources being used by other devices in the system. Resource conflicts typically occur when your system contains legacy boards that use resources that have not been reserved properly with the Device Manager. If a resource conflict exists, write down the resource that caused the conflict and refer to the Microsoft Windows Online Help for instructions on how to use the Device Manager to reserve DMA resources for legacy boards. After the conflict has been resolved, run the Diagnostic utility again.

## Single-Cycle DMA Required

This error occurs if the Diagnostic utility detects that it is unable to perform demand-mode DMA for the GPIB interface and that the GPIB software has not been configured to use single-cycle DMA. GPIB interfaces that use the system DMA controller (such as the AT-GPIB/TNT) normally use demand-mode DMA. If you get this error, you should use the Device Manager to configure the GPIB software to use single-cycle DMA for all DMA transfers, and then run the Diagnostic utility again.

To configure the GPIB software to use single-cycle DMA for a particular GPIB interface, complete the following steps:

1. Double-click on the **System** icon under **Start»Settings»Control Panel**.
2. In the **System Properties** dialog box that appears, select the **Device Manager** tab.
3. Click on the **View devices by type** button at the top of the **Device Manager** page.
4. Double-click on the **National Instruments GPIB Interfaces** icon.
5. Double-click on the GPIB interface to be configured.
6. Select the **GPIB Settings** tab.
7. Click on the **Advanced** button and make sure that the **Demand Mode DMA** item is unchecked.

## 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 get this error, shut down your computer, restart it, and run the Diagnostic utility again. If the problem persists, try reinstalling the GPIB software.

## Unknown Problem Encountered

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

## Common Questions

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**What do I do if my GPIB hardware is listed in the Windows Device Manager with a circled X or exclamation point (!) overlaid on it?**

Refer to the *[GPIB Interface Not Working Properly](#)* section of this appendix for information about what might cause this problem. If you have already completed the troubleshooting steps, fill out the forms in Appendix E, *[Customer Communication](#)*, and contact National Instruments.

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

Run the GPIB Configuration utility: select **Start»Settings»Control Panel**, and double-click on the **System** icon. Select the **Device Manager** tab in the **System Properties** dialog box. Click on the **View devices by type** button at the top of the page. If any GPIB hardware is correctly installed, a **National Instruments GPIB Interfaces** icon appears in the list of device types. Double-click on this icon to see a list of installed GPIB hardware.

**How can I determine which version of the GPIB software I have installed?**

Run the Diagnostic utility: select the **Diagnostic** item under **Start»Programs»National Instruments GPIB**. A banner at the bottom of the Diagnostic utility window displays the version of the GPIB software that is installed.

**I have a GPIB interface that the GPIB software for Windows 95 does not support. What should I do?**

Contact National Instruments to order the Compatibility Release for Windows 95/98 or to upgrade your hardware.

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

Use the Diagnostic utility online help, or refer to the [Troubleshooting Diagnostic Utility Failures](#) section earlier in this appendix. If you have already completed the troubleshooting steps, fill out the forms in Appendix E, [Customer Communication](#), and contact National Instruments.

**How many GPIB interfaces can I configure for use with my GPIB software?**

You can configure the GPIB software for Windows to communicate with up to 100 GPIB interfaces.

**How many devices can I configure for use with my GPIB software?**

The GPIB software for Windows provides a total of 1,024 logical devices for applications to use. The default number of devices is 32. The maximum number of physical devices you should connect to a single GPIB interface is 14, or fewer depending on your system configuration.

**Are interrupts and DMA required for the GPIB software ?**

Neither interrupts nor DMA are required.

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

Run the Diagnostic utility: select the **Diagnostic** item under **Start»Programs»National Instruments GPIB**. Refer to the [Troubleshooting Diagnostic Utility Failures](#) section in this appendix or the online help to troubleshoot any problems.



### **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 program. For more information, refer to the [Introduction to the Win32 Interactive Control Utility](#) section in Chapter 4, [Begin to Use the GPIB Software](#).

### **How do I use a GPIB language interface?**

For information about using GPIB language interfaces, refer to Chapter 3, *Developing Your Application*, in the *GPIB User Manual for Win32*.

### **How do I modify the hardware resources that Windows assigned to my AT-GPIB/TNT?**

To modify the hardware resources assigned to the AT-GPIB/TNT, double-click on the **System** icon under **Start»Settings»Control Panel**. In the **System Properties** dialog box that appears, select the **Device Manager** tab, click on the **View devices by type** button, and double-click on the **National Instruments GPIB Interfaces** icon. Next, double-click on the **AT-GPIB/TNT** item under **National Instruments GPIB Interfaces**, and click on the **Resources** tab. Use the **Settings based on** list box or the **Change Setting** button to modify the resources used by your AT-GPIB/TNT. Make sure to update the switches and jumpers on your board to match the new assigned resources.

### **Why does the uninstall program leave some components installed?**

The uninstall program removes only items that the GPIB setup program installed. If you add anything to a directory that was created by the GPIB setup program, the uninstall program does not delete that directory, because the directory is not empty after the uninstallation. You need to remove any remaining components yourself.

### **What information should I have before I call National Instruments?**

When you call National Instruments, you should have the results of the Diagnostic utility test. Also, make sure you have filled out the form in Appendix E, [Customer Communication](#).

# Specifications

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## Appendix D

This appendix describes the physical characteristics of the AT-GPIB/TNT and EISA-GPIB hardware, the transfer rates of the GPIB software, and the recommended operating conditions.

## Hardware Characteristics

---

Table D-1. AT-GPIB/TNT Hardware Characteristics

| Characteristic  | Specification                                |
|---|--|
| Dimensions  | 10.67 cm by 16.51 cm<br>(4.2 in. by 6.5 in.) |
| Power Requirement<br>(from PC AT I/O Channel)                       | +5 VDC      50 mA Typical<br>120 mA Maximum  |
| I/O Connector   | IEEE 488 Standard 24-Pin                     |
| Operating Environment<br>Component Temperature<br>Relative Humidity | 0° to 55° C<br>10% to 90%, Noncondensing     |
| Storage Environment<br>Temperature<br>Relative Humidity             | –20° to 70° C<br>5% to 90%, Noncondensing    |
| EMI   | FCC Class B Certified                        |

**Table D-2.** EISA-GPIB Hardware Characteristics

| <b>Characteristic</b>   | <b>Specification</b>                       |
|---|--|
| Dimensions  | 11.4 cm by 16.5 cm<br>(4.5 in. by 6.5 in.) |
| Power Requirement   | +5 VDC 300 mA                              |
| I/O Connector   | IEEE 488 Standard 24-Pin                   |
| Operating Environment<br>Component Temperature<br>Relative Humidity | 0° to 40° C<br>5% to 90%, Noncondensing    |
| Storage Environment<br>Temperature<br>Relative Humidity             | -20° to 70° C<br>5% to 90%, Noncondensing  |
| EMI   | FCC Class B Certified                      |

## Software Transfer Rates

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**Table D-3.** GPIB Software Transfer Rates for the AT-GPIB/TNT

| <b>Transfer Method</b>  | <b>Maximum GPIB Transfer Rate</b> |
|---|-----------------------------------|
| 3-Wire (IEEE 488)<br>In ISA Computer<br>In EISA Computer  | 1.5 Mbytes/s*<br>1.5 Mbytes/s*    |
| High Speed (HS488)<br>In ISA Computer<br>In EISA Computer   | 1.8 Mbytes/s*<br>2.8 Mbytes/s*    |
| * Actual speed may vary considerably from speed shown because of system and instrumentation capabilities. |                                   |

**Table D-4.** GPIB Software Transfer Rates for the EISA-GPIB

| <b>Transfer Method</b>  | <b>Maximum GPIB Transfer Rate</b> |
|---|-----------------------------------|
| 3-Wire (IEEE 488)   | 1.1 Mbytes/s*                     |
| High Speed (HS488)  | 5.3 Mbytes/s*                     |
| * Actual speed may vary considerably from speed shown because of system and instrumentation capabilities. |                                   |

# Customer Communication

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For your convenience, this appendix contains forms to help you gather the information necessary to help us solve your technical problems and a form you can use to comment on the product documentation. When you contact us, we need the information on the Technical Support Form and the configuration form, if your manual contains one, about your system configuration to answer your questions as quickly as possible.

National Instruments has technical assistance through electronic, fax, and telephone systems to quickly provide the information you need. Our electronic services include a bulletin board service, an FTP site, a fax-on-demand system, and e-mail support. If you have a hardware or software problem, first try the electronic support systems. If the information available on these systems does not answer your questions, we offer fax and telephone support through our technical support centers, which are staffed by applications engineers.

## 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

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: 01 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.

## Fax-on-Demand Support

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

## E-Mail Support (Currently USA Only)

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

[support@natinst.com](mailto: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.

| Country          | Telephone       | Fax              |
|------------------|-----------------|------------------|
| Australia        | 03 9879 5166    | 03 9879 6277     |
| Austria          | 0662 45 79 90 0 | 0662 45 79 90 19 |
| Belgium          | 02 757 00 20    | 02 757 03 11     |
| Brazil           | 011 288 3336    | 011 288 8528     |
| Canada (Ontario) | 905 785 0085    | 905 785 0086     |
| Canada (Québec)  | 514 694 8521    | 514 694 4399     |
| Denmark          | 45 76 26 00     | 45 76 26 02      |
| Finland          | 09 725 725 11   | 09 725 725 55    |
| France           | 01 48 14 24 24  | 01 48 14 24 14   |
| Germany          | 089 741 31 30   | 089 714 60 35    |
| Hong Kong        | 2645 3186       | 2686 8505        |
| Israel           | 03 6120092      | 03 6120095       |
| Italy            | 02 413091       | 02 41309215      |
| Japan            | 03 5472 2970    | 03 5472 2977     |
| Korea            | 02 596 7456     | 02 596 7455      |
| Mexico           | 5 520 2635      | 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      |
| United Kingdom   | 01635 523545    | 01635 523154     |
| United States    | 512 795 8248    | 512 794 5678     |

# 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 \_\_\_\_\_

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 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

GPIO Interface Type and Revision \_\_\_\_\_

GPIO Software for Windows 95/98 Version Number on Disk \_\_\_\_\_

Programming Language Interface Version \_\_\_\_\_

Diagnostic Utility Results \_\_\_\_\_

## Other Products

### Resources Summary Report from the Device Manager

To create this report, first display the **System Properties** dialog box for the computer by double-clicking on the **System** icon under **Start»Settings»Control Panel**. Then click on the **Device Manager** tab and highlight the **Computer** icon. Click on the **Print** button, and check the **Print to file** checkbox in the **Print** dialog box before clicking on **OK**.

\_\_\_\_\_  
\_\_\_\_\_

## Programming Environment Information

Programming Language \_\_\_\_\_

Compiler Vendor \_\_\_\_\_ Compiler Version \_\_\_\_\_

## Application Information

DOS Application \_\_\_\_\_ Win16 Application \_\_\_\_\_ Win32 Application \_\_\_\_\_

If Win16 or Win32, method of accessing DLL (link with language interface or direct entry?)

\_\_\_\_\_



# 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 AT-GPIB/TNT or EISA-GPIB and the GPIB Software for Windows 95/98*

**Edition Date:** June 1998

**Part Number:** 321036E-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 ( 

---

 ) 

---

 Fax ( 

---

 ) 

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**Mail to:** Technical Publications  
National Instruments Corporation  
6504 Bridge Point Parkway  
Austin, TX 78730-5039

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

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

|                  |  |
|------------------|--|
| °                | degrees                                      |
| %                | percent                                      |
| A                | amperes                                      |
| ANSI             | American National Standards Institute        |
| ASIC             | application-specific integrated circuit      |
| base I/O address | lowest I/O address used by the GPIB hardware |
| C                | Celsius                                      |
| CPU              | central processing unit                      |
| DIP              | dual inline package                          |
| DLL              | dynamic link library                         |
| DMA              | direct memory access                         |
| EISA             | Extended Industry Standard Architecture      |
| EMI              | electromagnetic interference                 |
| FCC              | Federal Communications Commission            |
| GPIB             | General Purpose Interface Bus                |

## *Glossary*

|              |  |
|--------------|--|
| hex          | hexadecimal  |
| Hz           | hertz  |
| IEEE         | Institute of Electrical and Electronic Engineers   |
| in.          | inches   |
| I/O          | input/output   |
| IRQ          | interrupt request  |
| ISA          | Industry Standard Architecture   |
| legacy board | ISA board whose system resources are chosen by changing physical DIP switches or jumpers on the board                      |
| m            | meters   |
| MB           | megabytes of memory  |
| PC           | personal computer  |
| RAM          | random-access memory   |
| resource     | hardware settings used by devices in a computer system, including ISA interrupt request, DMA channel, and base I/O address |
| s            | seconds  |
| VDC          | volts direct current   |