

# **GPIB**

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## **Getting Started with Your GPIB-1284CT and the NI-488.2™ Software for Windows**

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

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

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

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

### Canadian Department of Communications

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

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

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# About This Manual

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This manual contains instructions to help you install and configure the National Instruments GPIB-1284CT parallel-to-GPIB Controller and the NI-488.2 software for Windows. The NI-488.2 software is intended for use with Windows 3.x.

This manual assumes that you are already familiar with Windows 3.x.

## Conventions

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The following conventions appear in this manual:



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



This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.



This icon denotes a warning, which advises you of precautions to take to avoid being electrically shocked.

### **bold**

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

IEEE 488 and  
IEEE 488.2

*IEEE 488* and *IEEE 488.2* refer to the ANSI/IEEE Standard 488.1-1987 and ANSI/IEEE Standard 488.2-1992, respectively, which define the GPIB.

IEEE 1284

*IEEE 1284* refers to the ANSI/IEEE Standard 1284-1994.

*italic*

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

monospace

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

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

*monospace italic* Italic text in this font denotes text that is a placeholder for a word or value that you must supply.

## Related Documentation

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

- ANSI/IEEE Standard 488.1-1987, *IEEE Standard Digital Interface for Programmable Instrumentation*
- ANSI/IEEE Standard 488.2-1992, *IEEE Standard Codes, Formats, Protocols, and Common Commands*
- ANSI/IEEE Standard 1284-1994, *IEEE Standard Signaling Method for a Bidirectional Parallel Peripheral Interface for Personal Computers*

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# Introduction

This chapter lists what you need to get started and optional equipment you can order, and briefly describes the GPIB-1284CT hardware and the NI-488.2 software for Windows.

## What You Need to Get Started

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

- Windows 3.0 or higher installed on your computer
- 3.5 or 5.25 in. *NI-488.2 Software for Windows. Distribution Disk for the GPIB-1284CT*, which is included in your kit
- One of the following boxes, which is included in your kit:
  - GPIB-1284CT AC version (100–120 VAC)
  - GPIB-1284CT AC version (220–240 VAC)
  - GPIB-1284CT DC version
- If you have the GPIB-1284CT AC version, one of the following power cords:
  - U.S. standard power cord
  - Swiss power cord
  - Australian power cord
  - Universal European power cord
  - North American power cord
  - U.K. power cord
- If you have the GPIB-1284CT DC version, one of the following:
  - 9 V wall-mount power supply (100–120 VAC)
  - 9 V wall-mount power supply (220–240 VAC)
  - External keyboard connector DC power cable

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

Type X1 single-shielded cables (1, 2, or 4 m)

Type X2 double-shielded cables (1, 2, or 4 m)



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

- ❑ Parallel cables, which you can purchase from National Instruments

## Optional Equipment

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

- Parallel cables:
  - 25-pin D-Sub to 25-pin D-Sub (1 or 2 m)
- GPIB bus extenders:
  - GPIB-130
  - GPIB-140A

## GPIB-1284CT Hardware Overview

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The GPIB-1284CT is a high-performance parallel-to-GPIB interface. The GPIB-1284CT uses the NI-488.2 software to transform any PC AT-compatible computer with a parallel port into a fully functional Talker, Listener, or Controller with complete communication and bus management capability.

The GPIB-1284CT has all the logic required to implement the physical and electrical specifications of IEEE 488 and IEEE 1284. The GPIB-1284CT conforms to all versions of IEEE 488, including IEEE 488.2. The TNT4882C Controller chip implements all IEEE 488 Talker/Listener/Controller functionality.

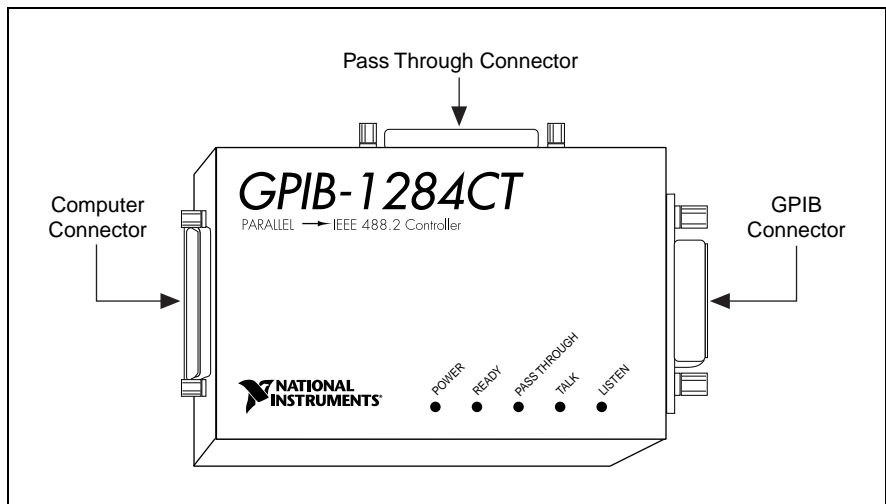
The GPIB-1284CT has two parallel ports—one for connecting to the host computer and another for transparent pass-through connection to other parallel port devices. Communication from the computer through the pass-through port of the GPIB-1284CT to another parallel port device can be only unidirectional. When the GPIB-1284CT is initially powered on,

it is in pass-through mode; all parallel port activity from the host computer is routed to the pass-through parallel port. The NI-488.2 driver switches the GPIB-1284CT into GPIB mode when a device or board is put online. For information about pass-through printing in Windows, refer to the [Use Pass-Through Printing](#) section in Chapter 3, [Install and Configure the Software](#).

The parallel-to-GPIB conversion circuitry is implemented in a field-programmable gate array, which you can reconfigure with the `ctupdate` utility. For more information, refer to Appendix A, [Updating Your Firmware](#). As parallel port standards evolve, National Instruments provides updates to keep your hardware and software up-to-date.

## Top Panel

Figure 1-1 shows the GPIB-1284CT top panel.



**Figure 1-1.** GPIB-1284CT Top Panel

Table 1-1 describes the light-emitting diodes (LEDs) on the GPIB-1284CT top panel.

**Table 1-1.** LED Descriptions

LED	Description
<b>POWER</b>	Indicates that power is supplied.
<b>READY</b>	Indicates that the NI-488.2 software found the GPIB-1284CT and is ready to communicate with it.
<b>PASS THROUGH</b>	Indicates that the GPIB-1284CT is in pass-through mode. All parallel port activity is transferred to the pass-through parallel port connector. The GPIB-1284CT powers up in this mode.
<b>TALK</b>	Indicates that the GPIB-1284CT is configured as a GPIB Talker.
<b>LISTEN</b>	Indicates that the GPIB-1284CT is configured as a GPIB Listener.

## I/O Connectors

You can connect the GPIB-1284CT to a standard AT-style unidirectional parallel port, a PS/2-style bidirectional parallel port, or an Enhanced Parallel Port (EPP). To determine if you can configure the parallel port on your computer for different parallel port types, refer to the documentation that came with your computer. To order parallel cables, contact National Instruments.

You can connect the GPIB-1284CT to as many as 14 GPIB instruments. If you need to connect more than 14 instruments, you can order a GPIB extender or expander from National Instruments.

If you have an additional unidirectional parallel port device (for example, a printer) that is accessed by standard printing services, you can connect it to the parallel port labeled PASS THROUGH on the GPIB-1284CT. The NI-488.2 software handles the multiplexing between the PASS THROUGH port and the GPIB port. For information about pass-through printing in Windows, refer to the [Use Pass-Through Printing](#) section in Chapter 3, [Install and Configure the Software](#).

# NI-488.2 Software Overview

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The NI-488.2 software, along with the GPIB-1284CT, transforms your PC AT-compatible computer into a GPIB Controller with complete communications and bus management capability.

The NI-488.2 driver is a dynamic link library (DLL) that loads when a Windows GPIB application executes one of the NI-488.2 calls. The NI-488.2 driver supports up to three GPIB-1284CT boxes connected to three separate parallel ports.

The NI-488.2 software includes the following components:

- Device driver
- Hardware and software diagnostic utilities
- Configuration utility
- Interactive control utility
- Software development utilities
- Language interface libraries for Microsoft C and Microsoft Visual Basic for Windows
- Example programs that use the NI-488.2 API

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# Install Your Hardware

This chapter describes how to install your GPIB-1284CT.

## Step 1. Verify the Voltage Requirement

---

Make sure that the voltage marked on your GPIB-1284CT or on the power supply matches the voltage that is supplied in your area.



**Caution** Do *not* operate your GPIB-1284CT at any voltage other than the one marked on your GPIB-1284CT or on the power supply. Doing so could damage the unit. Replacement fuses for the AC version must be the proper type and size. For fuse specifications, refer to Appendix C, *Specifications*.

## Step 2. Connect the Cables

---

To connect the cables to your GPIB-1284CT, complete the following steps:

1. Connect the parallel cable, as follows:
  - a. Make sure that the parallel cable is shielded and 2 m or less in length.
  - b. Connect the cable to your GPIB-1284CT 25-pin D-Sub connector labeled **COMPUTER**.
  - c. Securely fasten the holding screws.
  - d. Connect the other end of the cable to the parallel port on your computer.
2. Connect the GPIB cable, as follows:
  - a. Make sure that the GPIB cable is shielded and follow all IEEE 488 cabling restrictions.
  - b. Connect the cable to your GPIB-1284CT 24-pin Champ connector labeled **GPIB**.
  - c. Tighten the thumb screws.
  - d. Connect the other end of the cable to your GPIB device(s).

3. (Optional) Connect an additional unidirectional parallel device, such as a printer, to your GPIB-1284CT, as follows:
  - a. Make sure that the parallel cable is shielded.
  - b. Connect the parallel port cable to the 25-pin D-Sub connector labeled **PASS THROUGH**.
  - c. Securely fasten the holding screws.
  - d. Connect the other end of the cable to your parallel device.

## Step 3. Connect the Power Supply

---

Connect the power supply, as follows:

- **AC Version**—Connect the power cord to the power receptacle on your GPIB-1284CT. Then, plug the power cord into an AC outlet of the correct voltage.
- **DC Version**—You can obtain power from the wall-mount power supply or from an external keyboard connector, which is available on most laptop computers:
  - **Wall-Mount Supply**—Connect the power jack to your GPIB-1284CT. Then, plug the supply into an AC outlet of the correct voltage.
  - **External Keyboard Connector**—Connect the power jack end of the keyboard connector DC power cable to your GPIB-1284CT. Then, plug the other end into the external keyboard connector on your computer.

## Step 4. Switch on the GPIB-1284CT

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If you have an AC version, use the rocker switch to power on your GPIB-1284CT. If you have a DC version, use the slide switch to power on your GPIB-1284CT.

The **POWER** LED comes on immediately. The **PASS THROUGH** LED also comes on, indicating that your GPIB-1284CT is in pass-through mode. The **READY** LED does not come on until the NI-488.2 driver successfully finds your GPIB-1284CT.

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# Install and Configure the Software

This chapter describes how to install and configure the NI-488.2 software.

## Install the NI-488.2 Software

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After you install your GPIB-1284CT hardware, complete the following steps to install the NI-488.2 software:

1. Insert the NI-488.2 distribution disk into an unused drive.
2. In Program Manager, select **File»Run**.
3. In the **Run** dialog box, type the following:

```
x:\setup
```

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

After you install the NI-488.2 software, you can run `wibconf` to view or change the NI-488.2 driver configuration. If you installed more than one GPIB-1284CT, or if your single GPIB-1284CT is not connected to `lpt1`, you must configure the NI-488.2 software with `wibconf`. To run `wibconf`, refer to the [Configure the NI-488.2 Software](#) section later in this chapter. If you want to attach both a printer and a GPIB-1284CT to the same parallel port, refer to the next section, *Use Pass-Through Printing*.

Otherwise, skip to Chapter 4, [Verify Your Installation](#).

## Use Pass-Through Printing

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If you want to attach both a printer and a GPIB-1284CT to the same parallel port, you must use pass-through printing. When your GPIB-1284CT is powered on, it is in pass-through mode, as indicated by the **PASS THROUGH LED**. All data sent to the parallel port to which you have connected your GPIB-1284CT passes from the parallel port labeled **COMPUTER** to the parallel port labeled **PASS THROUGH**.

When your GPIB-1284CT is online, your GPIB-1284CT is not in pass-through mode. As long as the NI-488.2 software accesses your GPIB-1284CT, your GPIB-1284CT is not in pass-through mode. When your GPIB-1284CT is offline, it is in pass-through mode.

If your GPIB-1284CT is in pass-through mode, you can use pass-through printing. However, if you want to use the NI-488.2 software and pass-through printing at the same time, you must disable Windows default fast printing. To disable the fast printing feature, refer to one of the following sections.

## Disabling Fast Printing in Windows 3.1

In Windows 3.1, disable fast printing, as follows:

1. In the **Main** group of Program Manager, double-click on the **Control Panel** icon.
2. Double-click on the **Printers** icon.
3. Click on the **Connect** button.
4. Uncheck the **Fast Printing Direct to Port** box.
5. Click on the **OK** button and on the **Close** button to save your changes.

## Disabling Fast Printing in Windows 3.0

In Windows 3.0, disable fast printing, as follows:

1. In the **Main** group of Program Manager, double-click on the **Control Panel** icon.
2. Double-click on the **Printers** icon.
3. Click on the **Configure** button.
4. In the **Ports** list, select a parallel port with an .OS2 extension. For example, if your GPIB-1284CT is connected to lpt1, select **LPT1.OS2**.
5. Click on the **OK** button twice to save your changes.

# Configure the NI-488.2 Software

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You can use `wibconf` to view or change the configuration of the NI-488.2 driver. If you installed more than one GPIB-1284CT, or if your single GPIB-1284CT is not connected to `lpt1`, you must configure the NI-488.2 software with `wibconf`.

To run `wibconf`, complete the following steps:

1. In the **GPIB** group of Program Manager, double-click on the **wibconf** icon.
2. Type the drive, path, and name of the GPIB configuration file, usually `c:\windows\gpiib.ini`.
3. Click on the **OK** button.
4. Use the cursor keys to select different fields and view corresponding help information.
5. (Optional) Configure the NI-488.2 driver.

If you know the type of your parallel port, set the **Type of parallel port** field to the correct type—**UNIDIR**, **BIDIR**, or **EPP**. All parallel port types support the unidirectional protocol, **UNIDIR**.



**Note** If you have a PS/2 computer, set the **Type of parallel port** field in `wibconf` to **BIDIR**.



**Note** The NI-488.2 driver does not safely detect an EPP parallel port at I/O address 0x3BC. If the parallel port is at I/O address 0x3BC and the **Type of parallel port** field is set to **AUTO**, the driver detects a unidirectional port.

6. To save your changes and exit `wibconf`, press `<Esc>` or `<F9>`. For the changes to take effect, you must restart all of your Windows GPIB applications.

After you install and configure the software, continue to Chapter 4, [Verify Your Installation](#).

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# Verify Your Installation

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

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## Verify Your Hardware Installation

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To verify your hardware installation, run the `ibdiag` utility, as follows:

1. If a parallel cable is connected to the pass-through port, disconnect it.
2. Exit Windows to enter the DOS shell.
3. Switch to the directory where the software is installed, usually `c:\1284ctw`.
4. Type `ibdiag`.

If `ibdiag` completes with no errors, your hardware is functioning properly. If `ibdiag` returns an error message, refer to the [Troubleshooting `ibdiag` Errors](#) section in Appendix B, [Troubleshooting and Common Questions](#).

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## Verify Your Software Installation

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To verify your software installation, run the `wibtest` utility, as follows:

1. Disconnect any GPIB cables.
2. In the **GPIB** group of Program Manager, double-click on the **wibtest** icon.

If `wibtest` completes with no errors, the NI-488.2 software is installed correctly. If `wibtest` returns an error message, refer to the [Troubleshooting `wibtest` Errors](#) section in Appendix B, [Troubleshooting and Common Questions](#).

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# Begin to Use the NI-488.2 Software

This chapter describes the `wibic` utility and lists some programming considerations.

## Using the `wibic` Utility

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To enter NI-488.2 calls interactively and to see the values returned by the calls without writing an application, use `wibic`, the Windows Interface Bus Interactive Control utility. You can also use `wibic` to do the following:

- Verify GPIB communication with your device.
- Learn the syntax of the NI-488.2 calls before you write your application.
- Become familiar with the commands of your device.
- Receive data from your GPIB device.
- Learn new NI-488.2 calls before you use them in your application.

For more information about `wibic`, refer to the *NI-488.2 User Manual for Windows*.

## Programming Considerations

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Before you develop your GPIB application, consider the following requirements:

- You must include the GPIB header file in your source code.
- You must link the GPIB library with your compiled source code.

Also, the NI-488.2 software includes readme files for most language interfaces, as well as sample programs.

For information about choosing a programming method, developing your application, or compiling and linking, refer to the *NI-488.2 User Manual for Windows*. For information about each NI-488.2 call, refer to the *NI-488.2 Function Reference Manual for DOS/Windows*.

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# Updating Your Firmware

This appendix describes how to update your firmware for your GPIB-1284CT.

You can use the `ctupdate` utility to update your firmware (`*.mcs`). As parallel port standards evolve or as the hardware and/or software is enhanced, National Instruments provides updates of the software and the firmware.



**Caution** Do *not* update your firmware when your electrical power is unstable, such as during a weather storm. After you start `ctupdate`, do *not* power off your GPIB-1284CT until the update is complete.

To run the `ctupdate` utility, complete the following steps:

1. At a DOS prompt, type `ctupdate`, an *imagefile.mcs* name, and the parallel port number, as shown in the following example:

```
ctupdate 702314b.mcs 1
```

The utility transfers the imagefile into the EEPROM of your GPIB-1284CT. The utility then reads back the contents of the EEPROM to verify that the transfer was successful.



**Caution** Do *not* power off your GPIB-1284CT until the update is complete.

2. If `ctupdate` reports an error, do *not* power off your GPIB-1284CT. Make sure that your GPIB-1284CT is connected to the parallel port that you typed, and run `ctupdate` again. If errors persist, *leave the box powered on*, make a note of the error message, and contact National Instruments.
3. After `ctupdate` completes, power off your GPIB-1284CT and then back on to load the new EEPROM contents.

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# Troubleshooting and Common Questions

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

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## Troubleshooting `ibdiag` Errors

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**Warning** Do not try to open and service the box unless you are qualified personnel and equipped to do so. The GPIB-1284CT contains circuitry that operates under hazardous voltages.

If `ibdiag` returns an error message, complete the following steps:

1. Make sure that your GPIB-1284CT is connected to the parallel port you selected in `ibdiag`.
2. Make sure that a parallel cable is not connected to the pass-through parallel port.
3. Make sure that the **POWER** and **PASS THROUGH** LEDs are lit. If the **PASS THROUGH** LED does not come on when the box is powered on, contact National Instruments. If the **POWER** LED is not lit, do the following:
  - a. Make sure that the power switch is in the ON position.
  - b. Make sure that the power cable is securely plugged into the power outlet.
  - c. If you have the AC version, check the power cord connection and the fuse. If you have the DC version, check the connection to the power supply.



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

4. Make sure that you select the correct parallel port information, including the name of the parallel port (such as `lpt1`), its type (unidirectional, bidirectional, or EPP), and its interrupt level. To determine what type of parallel port you have, refer to the documentation that came with your computer.
  - If you do not know what type of parallel port you have, select unidirectional to run `ibdiag`. Unidirectional communication works on all types of parallel ports. You can then use `ibdiag` to determine whether your parallel port is capable of either bidirectional or EPP communication.
  - If you do not know the interrupt level of your parallel port, select `No Interrupt` to run `ibdiag`. Typically, interrupt level 7 is associated with `lpt1` and interrupt level 5 is associated with `lpt2`. You can then use `ibdiag` to determine whether you can use interrupts with your parallel port.
5. Check the parallel port cable connection. The cable should be shielded and no longer than 2 m. If you need a parallel cable, contact National Instruments.

## Troubleshooting wibtest Errors

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If `wibtest` returns an error message, complete the following steps:

1. Make sure that your GPIB-1284CT is *not* connected to a GPIB device.
2. Make sure that your GPIB-1284CT is powered on.
3. Make sure that the **READY** LED is lit. If not, either the software is not installed or configured properly, or the cable connection between your computer and your GPIB-1284CT is not secure.
4. Make sure that your Windows directory (usually `c:\windows`) contains the `gpib.dll` and `gpib.ini` files. If the files are not in your Windows directory, reinstall the NI-488.2 software.
5. Make sure that your GPIB-1284CT passes `ibdiag` successfully.
6. Make sure that the NI-488.2 software is configured properly by running `wibconf`. Specifically, make sure that the **Use this GPIB interface**, **Parallel port number**, **Type of parallel port**, and **Interrupt Level** fields are correct. For more information about `wibconf`, refer to the [Configure the NI-488.2 Software](#) section in Chapter 3, [Install and Configure the Software](#).

7. Check the parallel port cable connection. The cable should be shielded and no longer than 2 m. If you need a parallel cable, contact National Instruments.
8. If you complete these steps and the error persists, refer to the following sections to troubleshoot specific error messages.

## No Driver Present Error

If the **File Error: Cannot find GPIB.DLL** warning appears and `wibtest` displays the **No driver present for GPIBx.** error message, make sure that the `gpib.dll` and `gpib.ini` files are in your Windows directory (usually `c:\windows`). If the files are not in your Windows directory, reinstall the NI-488.2 software.

## No Board Present Error

If `wibtest` displays the **No board present for GPIBx.** error message, do the following:

1. Run `wibconf` and set the **Use this GPIB interface** field to **Yes**.
2. Run `wibconf` and make sure that the software settings match the parallel port hardware settings.
3. Your GPIB-1284CT might not be properly installed. Refer to Chapter 2, [Install Your Hardware](#), to reinstall your GPIB-1284CT.

## GPIB Cables Error

If `wibtest` displays the following error message, disconnect all GPIB cables and run `wibtest` again:

```
Call(25) 'ibcmd " " failed, ibsta (0x134) not what was
expected (0x8130)
```

```
Call(25) 'ibcmd " " failed, expected ibsta (0x100) to
have the ERR bit set.
```

## Common Questions

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### **Which NI-488.2 software (DOS or Windows) should I install?**

If you want to run a GPIB application under DOS, install the NI-488.2 software for DOS. If you want to run a GPIB application in Windows, install the NI-488.2 software for Windows.

### **Can I have the DOS and Windows drivers for NI-488.2 installed at the same time?**

Yes, but you should not access both drivers at the same time.

### **How can I determine which type of GPIB controller I have?**

Run the `GPIBInfo` utility without specifying any parameters. It displays information about the GPIB controllers configured for use in your system. For more information about `GPIBInfo`, refer to the *NI-488.2 User Manual for Windows*.

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

Run the `GPIBInfo` utility without specifying any parameters. It displays information about the version of the NI-488.2 software installed. For more information about `GPIBInfo`, refer to the *NI-488.2 User Manual for Windows*.

### **What should I type into the popup window that appears when I start `wibconf`?**

The popup window is prompting you for the drive and path of the `gpib.ini` file. If Windows is installed in the default directory (`c:\windows`), press <Enter>. If Windows is *not* installed in the default directory, enter the path and directory where Windows is installed.

### **What do I do if `ibdiag` or `wibtest` fails with an error?**

Refer to the troubleshooting sections in this chapter.

### **How do I use `wibic`?**

You can use `wibic` to practice communication with your instrument, troubleshoot problems, and develop your application program. For more information, refer to the *NI-488.2 User Manual for Windows*.

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

For information about using the language interfaces, refer to the *NI-488.2 User Manual for Windows*.

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

Before you call National Instruments, make a note of the results of the `ibdiag` and `wibtest` tests and the output from `GPIBInfo`.



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# Specifications

This appendix lists the electrical, environmental, and physical characteristics of the GPIB-1284CT, along with recommended operating conditions.

## Electrical Characteristics

### AC Version

Power supply unit

100–120 VAC $\pm 10\%$ .....	50–60 Hz
220–240 VAC $\pm 10\%$ .....	50–60 Hz

Current requirement

100–120 VAC .....	55 mA
220–240 VAC .....	45 mA

Fuse rating and type

100–120 VAC .....	300 mA, UL/CSA approved
220–240 VAC .....	500 mA, IEC approved

### DC Version

DC input .....

.....	+5 to +13 VDC, regulated
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Minimum current requirement .....

.....	700 mA
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## Environmental Characteristics

Operating temperature.....

.....	0 to 40 °C
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Storage temperature .....

.....	0 to 70 °C
-------	------------

Relative humidity .....

.....	10% to 95%, noncondensing
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EMI .....

.....	FCC Class A Verified
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## Physical Characteristics

### AC Version

Overall case size (dimensions) .....4.65 by 3.05 by 1.74 in.  
(11.8 by 7.75 by 4.42 cm)

Case material .....All metal enclosure

Weight .....11.52 oz (327 g)

### DC Version

Overall case size (dimensions) .....4.65 by 3.05 by 1.12 in.  
(11.8 by 7.75 by 2.84 cm)

Case material .....All metal enclosure

Weight .....7.68 oz (218 g)

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# Technical Support Resources

This appendix describes the comprehensive resources available to you in the Technical Support section of the National Instruments Web site and provides technical support telephone numbers for you to use if you have trouble connecting to our Web site or if you do not have internet access.

## NI Web Support

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To provide you with immediate answers and solutions 24 hours a day, 365 days a year, National Instruments maintains extensive online technical support resources. They are available to you at no cost, are updated daily, and can be found in the Technical Support section of our Web site at [www.ni.com/support](http://www.ni.com/support)

### Online Problem-Solving and Diagnostic Resources

- **KnowledgeBase**—A searchable database containing thousands of frequently asked questions (FAQs) and their corresponding answers or solutions, including special sections devoted to our newest products. The database is updated daily in response to new customer experiences and feedback.
- **Troubleshooting Wizards**—Step-by-step guides lead you through common problems and answer questions about our entire product line. Wizards include screen shots that illustrate the steps being described and provide detailed information ranging from simple getting started instructions to advanced topics.
- **Product Manuals**—A comprehensive, searchable library of the latest editions of National Instruments hardware and software product manuals.
- **Hardware Reference Database**—A searchable database containing brief hardware descriptions, mechanical drawings, and helpful images of jumper settings and connector pinouts.
- **Application Notes**—A library with more than 100 short papers addressing specific topics such as creating and calling DLLs, developing your own instrument driver software, and porting applications between platforms and operating systems.

## Software-Related Resources

- **Instrument Driver Network**—A library with hundreds of instrument drivers for control of standalone instruments via GPIB, VXI, or serial interfaces. You also can submit a request for a particular instrument driver if it does not already appear in the library.
- **Example Programs Database**—A database with numerous, non-shipping example programs for National Instruments programming environments. You can use them to complement the example programs that are already included with National Instruments products.
- **Software Library**—A library with updates and patches to application software, links to the latest versions of driver software for National Instruments hardware products, and utility routines.

## Worldwide Support

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National Instruments has offices located around the globe. Many branch offices maintain a Web site to provide information on local services. You can access these Web sites from [www.ni.com/worldwide](http://www.ni.com/worldwide)

If you have trouble connecting to our Web site, please contact your local National Instruments office or the source from which you purchased your National Instruments product(s) to obtain support.

For telephone support in the United States, dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

Australia 03 9879 5166, Austria 0662 45 79 90 0, Belgium 02 757 00 20,  
Brazil 011 284 5011, Canada (Calgary) 403 274 9391,  
Canada (Ontario) 905 785 0085, Canada (Québec) 514 694 8521,  
China 0755 3904939, Denmark 45 76 26 00, Finland 09 725 725 11,  
France 01 48 14 24 24, Germany 089 741 31 30, Greece 30 1 42 96 427,  
Hong Kong 2645 3186, India 91805275406, Israel 03 6120092,  
Italy 02 413091, Japan 03 5472 2970, Korea 02 596 7456,  
Mexico (D.F.) 5 280 7625, Mexico (Monterrey) 8 357 7695,  
Netherlands 0348 433466, Norway 32 27 73 00, Poland 48 22 528 94 06,  
Portugal 351 1 726 9011, Singapore 2265886, Spain 91 640 0085,  
Sweden 08 587 895 00, Switzerland 056 200 51 51,  
Taiwan 02 2377 1200, United Kingdom 01635 523545

# Glossary

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

°	degrees
%	percent
A	amperes
AC	alternating current
ANSI	American National Standards Institute
C	Celsius
CSA	Canadian Standards Association
DC	direct current
EEPROM	electrically erasable programmable read-only memory
EMI	electromagnetic interference
EPP	Enhanced Parallel Port
FCC	Federal Communications Commission
g	grams
GPIB	General Purpose Interface Bus
Hz	hertz
IEC	International Electrotechnical Commission
IEEE	Institute for Electrical and Electronic Engineers
in.	inches
I/O	Input/Output
LED	light-emitting diode

*Glossary*

m	meters
oz	ounces
PC	personal computer
PS/2	IBM Personal System/2
RAM	random-access memory
UL	Underwriters Laboratories
V	volts
VAC	volts alternating current
VDC	volts direct current