

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

June 1994 Edition

Part Number 320645-01

**© Copyright 1994 National Instruments Corporation.
All Rights Reserved.**

National Instruments Corporate Headquarters

6504 Bridge Point Parkway

Austin, TX 78730-5039

(512) 794-0100

Technical support fax: (800) 328-2203

(512) 794-5678

Branch Offices:

Australia (03) 879 9422, Austria (0662) 435986, Belgium 02/757.00.20,
Canada (Ontario) (519) 622-9310, Canada (Québec) (514) 694-8521,
Denmark 45 76 26 00, Finland (90) 527 2321, France (1) 48 14 24 24,
Germany 089/741 31 30, Italy 02/48301892, Japan (03) 3788-1921,
Mexico 95 800 010 0793, Netherlands 03480-33466, Norway 32-84 84 00,
Singapore 2265886, Spain (91) 640 0085, Sweden 08-730 49 70,
Switzerland 056/20 51 51, Taiwan 02 377 1200, U.K. 0635 523545

Limited Warranty

The GPIB-1284CT is warranted against defects in materials and workmanship for a period of two years from the date of shipment, as evidenced by receipts or other documentation. National Instruments will, at its option, repair or replace equipment that proves to be defective during the warranty period. This warranty includes parts and labor.

The media on which you receive National Instruments software are warranted not to fail to execute programming instructions, due to defects in materials and workmanship, for a period of 90 days from date of shipment, as evidenced by receipts or other documentation. National Instruments will, at its option, repair or replace software media that do not execute programming instructions if National Instruments receives notice of such defects during the warranty period. National Instruments does not warrant that the operation of the software shall be uninterrupted or error free.

A Return Material Authorization (RMA) number must be obtained from the factory and clearly marked on the outside of the package before any equipment will be accepted for warranty work. National Instruments will pay the shipping costs of returning to the owner parts which are covered by warranty.

National Instruments believes that the information in this manual is accurate. The document has been carefully reviewed for technical accuracy. In the event that technical or typographical errors exist, National Instruments reserves the right to make changes to subsequent editions of this document without prior notice to holders of this edition. The reader should consult National Instruments if errors are suspected. In no event shall National Instruments be liable for any damages arising out of or related to this document or the information contained in it.

EXCEPT AS SPECIFIED HEREIN, NATIONAL INSTRUMENTS MAKES NO WARRANTIES, EXPRESS OR IMPLIED, AND SPECIFICALLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S RIGHT TO RECOVER DAMAGES CAUSED BY FAULT OR NEGLIGENCE ON THE PART OF NATIONAL INSTRUMENTS SHALL BE LIMITED TO THE AMOUNT THEREFORE PAID BY THE CUSTOMER. NATIONAL INSTRUMENTS WILL NOT BE LIABLE FOR DAMAGES RESULTING FROM LOSS OF DATA, PROFITS, USE OF PRODUCTS, OR INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF ADVISED OF THE POSSIBILITY THEREOF. This limitation of the liability of National Instruments will apply regardless of the form of action, whether in contract or tort, including negligence. Any action against National Instruments must be brought within one year after the cause of action accrues. National Instruments shall not be liable for any delay in performance due to causes beyond its reasonable control. The warranty provided herein does not cover damages, defects, malfunctions, or service failures caused by owner's failure to follow the National Instruments installation, operation, or maintenance instructions; owner's modification of the product; owner's abuse, misuse, or negligent acts; and power failure or surges, fire, flood, accident, actions of third parties, or other events outside reasonable control.

Copyright

Under the copyright laws, this publication may not be reproduced or transmitted in any form, electronic or mechanical, including photocopying, recording, storing in an information retrieval system, or translating, in whole or in part, without the prior written consent of National Instruments Corporation.

Trademarks

NI-488[®] and NI-488.2[™] are trademarks of National Instruments Corporation.

Product and company names listed are trademarks or trade names of their respective companies.

WARNING REGARDING MEDICAL AND CLINICAL USE OF NATIONAL INSTRUMENTS PRODUCTS

National Instruments products are not designed with components and testing intended to ensure a level of reliability suitable for use in treatment and diagnosis of humans. Applications of National Instruments products involving medical or clinical treatment can create a potential for accidental injury caused by product failure, or by errors on the part of the user or application designer. Any use or application of National Instruments products for or involving medical or clinical treatment must be performed by properly trained and qualified medical personnel, and all traditional medical safeguards, equipment, and procedures that are appropriate in the particular situation to prevent serious injury or death should always continue to be used when National Instruments products are being used. National Instruments products are NOT intended to be a substitute for any form of established process, procedure, or equipment used to monitor or safeguard human health and safety in medical or clinical treatment.

FCC/DOC Radio Frequency Interference Compliance

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

Federal Communications Commission

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules for a Class A digital device. Operation is subject to the following two conditions:

1. This device may not cause harmful interference in commercial environments.
2. This device must accept any interference received, including interference that may cause undesired operation.

Canadian Department of Communications

This device complies with the limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications (DOC).

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministère des communications du Canada.

Instructions to Users

These regulations are designed to provide reasonable protection against harmful interference from the equipment to radio reception in commercial areas. 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.

There is no guarantee that interference will not occur in a particular installation. However, the chances of interference are much less if the equipment is installed and used according to this instruction manual.

If the equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, one or more of the following suggestions may reduce or eliminate the problem.

- Operate the equipment and the receiver on different branches of your AC electrical system.

- Move the equipment away from the receiver with which it is interfering.
- Reorient or relocate the receiver's antenna.
- Be sure that the equipment is plugged into a grounded outlet and that the grounding has not been defeated with a cheater plug.

Notice 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.

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: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock Number 004-000-00345-4.

Contents

About This Manual	ix
How to Use the Manual Set	ix
Organization of This Manual	x
Conventions Used in This Manual.....	x
Related Documentation	xi
Customer Communication	xii
Chapter 1	
Introduction	1-1
How to Use This Manual	1-1
What You Need to Get Started	1-2
Optional Equipment	1-3
Hardware Description	1-3
The GPIB-1284CT Top Panel	1-4
I/O Connectors.....	1-5
Software Description	1-5
Chapter 2	
Hardware Installation	2-1
Step 1. Verify the Voltage Requirement.....	2-1
Step 2. Connect the Cables	2-1
Step 3. Switch on the GPIB-1284CT	2-2
Chapter 3	
Software Installation and Configuration	3-1
NI-488.2 Software Components	3-1
Install the Software	3-1
Pass-Through Printing in Windows	3-2
Disabling Fast Printing in Windows 3.1	3-3
Disabling Fast Printing in Windows 3.0	3-3
Configure the Software with wibconf.....	3-4
Chapter 4	
Installation Verification and Troubleshooting	4-1
Run the Hardware Diagnostic Program.....	4-1
Troubleshooting ibdiag Error Messages	4-1
Run the Software Diagnostic Program	4-2
Troubleshooting wibtest Error Messages	4-3
Presence Test of Driver	4-4
Presence Test of GPIB-1284CT	4-4
GPIB Cables Connected	4-5
Common Questions	4-5

Chapter 5	
Using Your NI-488.2 Software	5-1
Introduction to wibic.....	5-1
Programming Considerations.....	5-1
Appendix A	
Hardware Specifications	A-1
Appendix B	
The ctupdate Utility	B-1
Appendix C	
Customer Communication	C-1
Glossary	Glossary-1

Figures

Figure 1-1.	GPIB-1284CT Top Panel.....	1-4
Figure 3-1.	Software Installation Screen	3-2

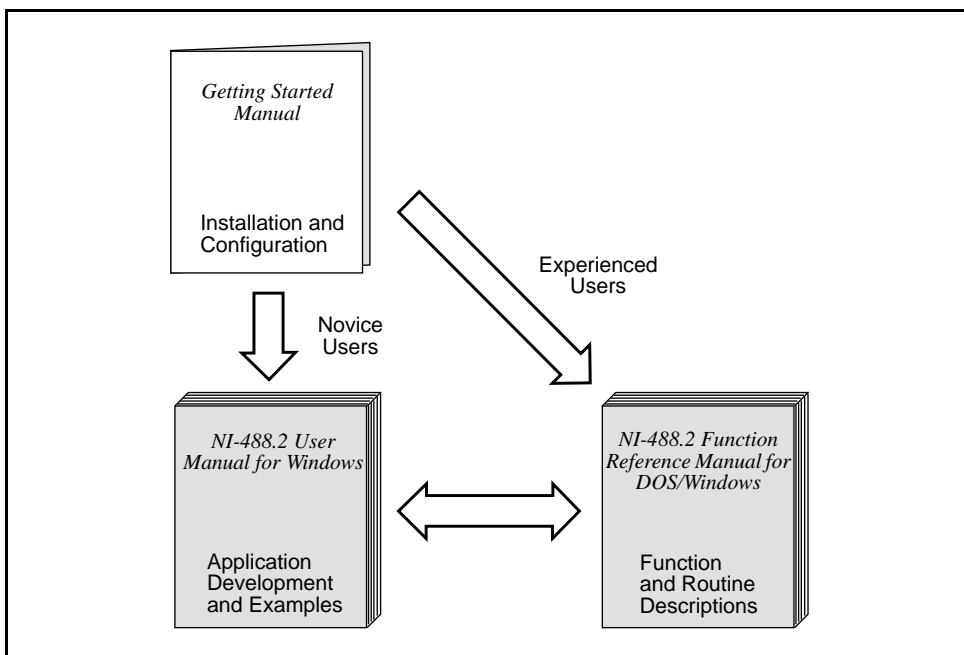
Tables

Table 1-1.	GPIB-1284CT Top Panel LEDs	1-4
Table A-1.	Electrical Characteristics - AC Version	A-1
Table A-2.	Electrical Characteristics - DC Version	A-1
Table A-3.	Environmental Characteristics	A-1
Table A-4.	Physical Characteristics - AC Version	A-2
Table A-5.	Physical Characteristics - DC Version	A-2

About This Manual

This manual contains instructions for installing and configuring the National Instruments GPIB-1284CT parallel-to-GPIB Controller and NI-488.2 software for Windows. The NI-488.2 software is intended for use with Windows version 3.0 or higher. This manual assumes that you are already familiar with the Windows operating system.

How to Use the Manual Set



Use this getting started manual to install and configure your GPIB hardware and NI-488.2 software for Windows.

Use the *NI-488.2 User Manual for Windows* 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-488.2 Function Reference Manual for DOS/Windows* for specific information, such as format, parameters, and possible errors, for each NI-488 function and NI-488.2 routine.

Organization of This Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, explains how to use this manual, lists what you need to get started, and gives a brief overview of the GPIB-1284CT hardware and NI-488.2 software.
- Chapter 2, *Hardware Installation*, contains instructions for connecting your GPIB-1284CT to your computer.
- Chapter 3, *Software Installation and Configuration*, contains instructions for installing and configuring your NI-488.2 software.
- Chapter 4, *Installation Verification and Troubleshooting*, explains how to verify the hardware and software installation and troubleshoot problems.
- Chapter 5, *Using Your NI-488.2 Software*, describes the `wibic` utility and lists some programming considerations.
- Appendix A, *Hardware Specifications*, specifies the electrical, environmental, and physical characteristics of the GPIB-1284CT and the recommended operating conditions.
- Appendix B, *The ctupdate Utility*, contains information on the `ctupdate` utility for the GPIB-1284CT.
- Appendix C, *Customer Communication*, contains forms you can use to request help from National Instruments or to comment on our products and manuals.
- The *Glossary* contains an alphabetical list and description of terms used in this manual including abbreviations, acronyms, metric prefixes, mnemonics, and symbols.

Conventions Used in This Manual

The following conventions are used in this manual.

bold	Bold text denotes menus, menu items, dialog buttons, LEDs, or options.
<i>italic</i>	Italic text denotes emphasis, a cross reference, or an introduction to a key concept.
<i>bold italic</i>	Bold italic text denotes a note, caution, or warning.

monospace	Text in this font denotes text or characters that are to be literally input from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, directories, programs, subprograms, subroutines, device names, functions, variables, field names, and filenames.
bold monospace	Bold text in this font denotes the messages and responses that the computer automatically prints to the screen.
<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.
<>	Angle brackets enclose the name of a key on the keyboard—for example, <PageDown>.
<Enter>	Key names are capitalized.
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 488.2-1987, respectively, which define the GPIB.

Abbreviations, acronyms, metric prefixes, mnemonics, symbols, and terms are listed in the *Glossary*.

Related Documentation

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

- ANSI/IEEE Standard 488.1-1987, *IEEE Standard Digital Interface for Programmable Instrumentation*
- ANSI/IEEE Standard 488.2-1987, *IEEE Standard Codes, Formats, Protocols, and Common Commands*
- ANSI/IEEE Standard P1284, *Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers*
- *Microsoft Windows User's Guide*, Microsoft Corporation
- *Microsoft Win 32 Software Development Kit for Windows: Tools*, Microsoft Corporation

Customer Communication

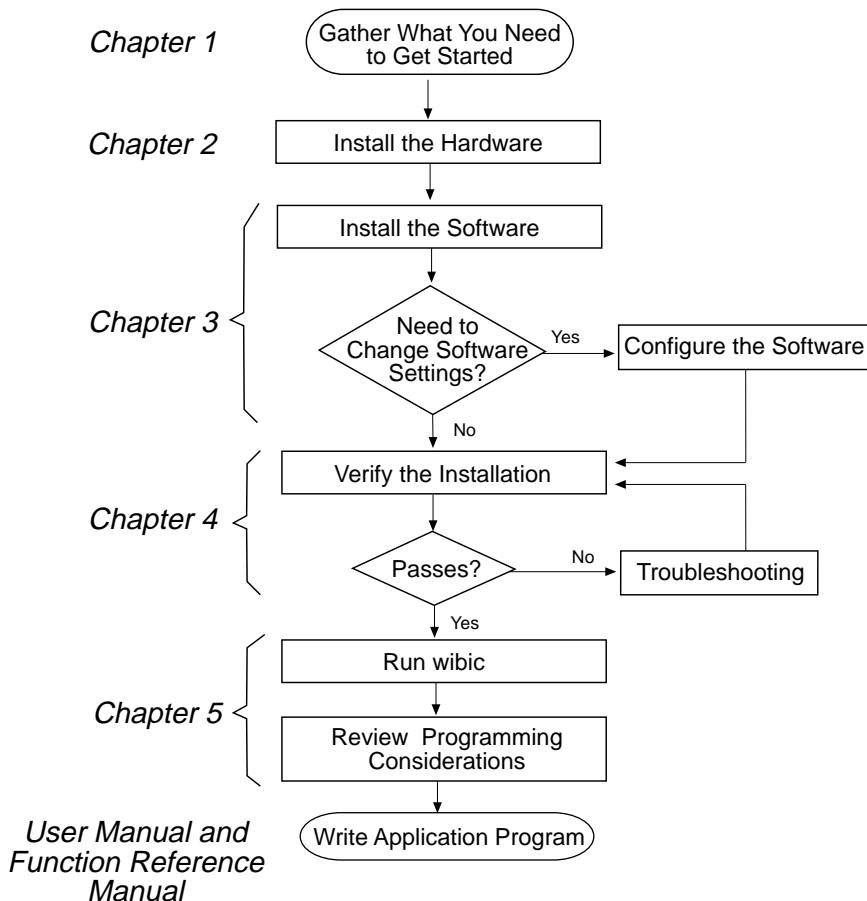
National Instruments wants to receive your comments on our products and manuals. We are interested in the applications you develop with our products, and we want to help if you have problems with them. To make it easy for you to contact us, this manual contains comment and configuration forms for you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

Chapter 1

Introduction

This chapter explains how to use this manual, lists what you need to get started, and gives a brief overview of the GPIB-1284CT hardware and NI-488.2 software.

How to Use This Manual



What You Need to Get Started

- One of the following boxes:
 - GPIB-1284CT AC version, 100 to 120 VAC
 - GPIB-1284CT AC version, 220 to 240 VAC
 - GPIB-1284CT DC version

- NI-488.2 Software for Windows. Distribution Disk for the GPIB-1284CT.*
 - 3.5 in.
 - or
 - 5.25 in.

- If you have the GPIB-1284CT AC version, you need one of the following power cords:
 - U.S.A. standard power cord
 - Switzerland 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, you need one of the following:
 - 9 V wall-mount power supply, 100 to 120 VAC
 - 9 V wall-mount power supply, 220 to 240 VAC
 - External keyboard connector DC power cable

- Windows version 3.0 or higher installed on your computer

- Parallel cables
 - Refer to the *Optional Equipment* section of this chapter for information on National Instruments parallel cables that you can order.

Optional Equipment

You can call National Instruments to order the following optional equipment.

- Parallel Cables
 - 25 pin D-Sub to 25-pin D-Sub (1 m or 2 m)
 - GPIB Bus Extenders
 - GPIB-130, 100 to 120 VAC
 - GPIB-130, 220 to 240 VAC
 - Shielded GPIB Cables*
 - Type X1 Single-Shielded Cable (1 m, 2 m, or 4 m)
 - Type X2 Cable Double-Shielded Cable (1 m, 2 m, or 4 m)
- * To meet FCC emission limits for a Class A device, you must use a shielded (Type X1 or X2) GPIB cable. Operating this equipment with a non-shielded cable may cause interference to radio and television reception in commercial areas.

Hardware Description

The GPIB-1284CT is a high-performance parallel-to-GPIB interface. Using a GPIB-1284CT, any PC AT compatible computer with a parallel port can become a Controller, Talker, or Listener on the GPIB. The GPIB-1284CT has all the logic required to implement the physical and electrical specifications of ANSI/IEEE Standard 488.1-1987 and ANSI/IEEE Standard P1284. The GPIB-1284CT conforms to all versions of the IEEE 488 standard, including ANSI/IEEE Standard 488.2-1987. 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 unidirectional only. 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. See the section *Pass-Through Printing in Windows* in Chapter 3, *Software Installation and Configuration*, for information on pass-through printing in Windows.

The parallel-to-GPIB conversion circuitry is implemented in a field-programmable gate array, which you can reconfigure with the `ctupdate` utility. Refer to Appendix B, *The ctupdate Utility*, for more information. As parallel port standards evolve, National Instruments will provide updates to keep your hardware and software up-to-date.

The GPIB-1284CT Top Panel

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

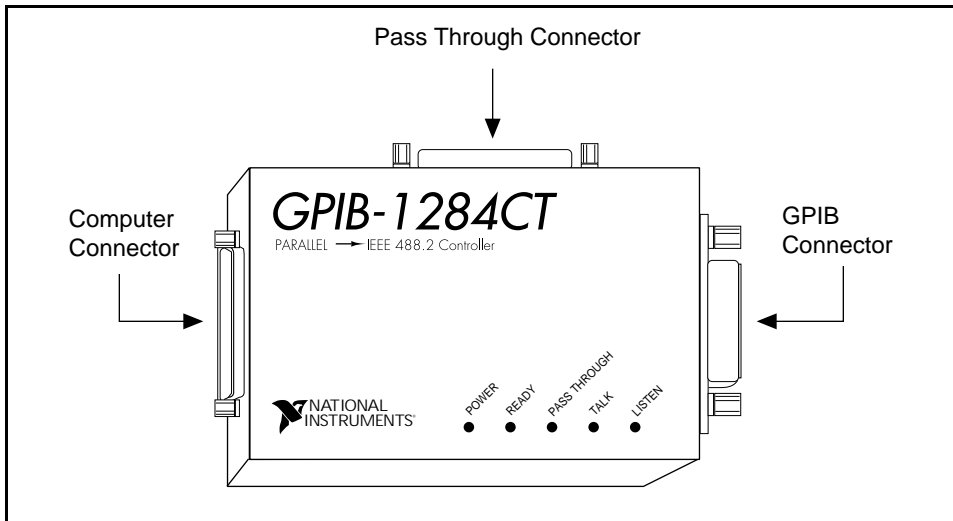


Figure 1-1. GPIB-1284CT Top Panel

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

Table 1-1. GPIB-1284CT Top Panel LEDs

LED	Description
POWER	Indicates that power is supplied.
READY	Indicates that the NI-488.2 software has found the GPIB-1284CT and is ready to communicate with it.
PASS THROUGH	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.
TALK	Indicates that the GPIB-1284CT is configured as a GPIB Talker.
LISTEN	Indicates that the GPIB-1284CT is configured as a GPIB Listener.

I/O Connectors

Connect the parallel port labeled COMPUTER on the GPIB-1284CT to a parallel port on your computer using a shielded parallel (printer) cable that is 2 meters or less in length. 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). Refer to the documentation that came with your computer to determine if you can configure the parallel port on your computer for different parallel port types. If you need parallel cables, you can order them from National Instruments.

Connect the GPIB connector to your GPIB instruments. If you need single-shielded or double-shielded GPIB cables, you can order them from 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, 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. See the section *Pass-Through Printing in Windows* in Chapter 3, *Software Installation and Configuration*, for specific information on pass-through printing in Windows.

Software Description

The NI-488.2 software for Windows consists of a driver and utilities that enable a PC AT compatible computer to act as a GPIB Controller with complete communications and bus management support.

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

Chapter 2

Hardware Installation

This chapter contains instructions for connecting your GPIB-1284CT to your computer.

Step 1. Verify the Voltage Requirement

The GPIB-1284CT is shipped from the factory with a 100 to 120 V or 220 to 240 V, built-in or wall-mount power supply. Verify that the voltage marked on the GPIB-1284CT or on the power supply matches the voltage that is supplied in your area.

Caution: *Operating the GPIB-1284CT at any voltage other than the one specified might damage the unit. Replacement fuses for the AC version must be of the proper type and size. Refer to Appendix A, Hardware Specifications, for fuse specifications.*

Step 2. Connect the Cables

Complete the following steps to connect the cables.

1. Connect the parallel cable to the GPIB-1284CT 25-pin D-Sub connector labeled COMPUTER, and securely fasten the holding screws. Connect the other end of the cable to the parallel port on your computer. Be sure to use only shielded parallel cables that are two meters or less in length.
2. Connect the GPIB cable to the GPIB-1284CT 24-pin Champ connector labeled GPIB and tighten the thumb screws on the connector. Connect the other end to your GPIB device(s). Be sure to follow all IEEE 488 cabling restrictions, and use only shielded GPIB cables.
3. If you want to connect an additional unidirectional parallel device, such as a printer, to the GPIB-1284CT, connect the parallel port cable to the 25-pin D-sub connector labeled PASS THROUGH. Securely fasten the holding screws. Connect the other end of the cable to your parallel device. Be sure to use only shielded parallel cables.
4. If you have an AC version, connect the power cord to the power receptacle on the GPIB-1284CT. Then plug the supply into an AC outlet of the correct voltage.

If you have a 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. To use the wall-mount power supply, connect the power jack to the GPIB-1284CT, then plug the supply into an AC outlet of the correct voltage. To use the external keyboard connector, connect the power jack end of the keyboard

connector DC power cable to the GPIB-1284CT, then plug the other end into the external keyboard connector on your computer.

Step 3. Switch on the GPIB-1284CT

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

Chapter 3

Software Installation and Configuration

This chapter contains instructions for installing and configuring your NI-488.2 software.

NI-488.2 Software Components

The NI-488.2 software includes the following components:

- Device driver
- Hardware and software diagnostic tests
- Configuration utility
- Interactive control program
- Utilities for software development
- Language interface libraries for Microsoft C and Microsoft Visual Basic for Windows
- Sample programs that use NI-488 functions and NI-488.2 routines

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

Install the Software

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

1. Insert the NI-488.2 distribution disk into an unused drive.
2. Choose **Run...** from the **File** menu in the **Program Manager** window.
3. Type the following command in the dialog box:

```
x:\setup
```

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

The software installation begins with the screen shown in Figure 3-1.

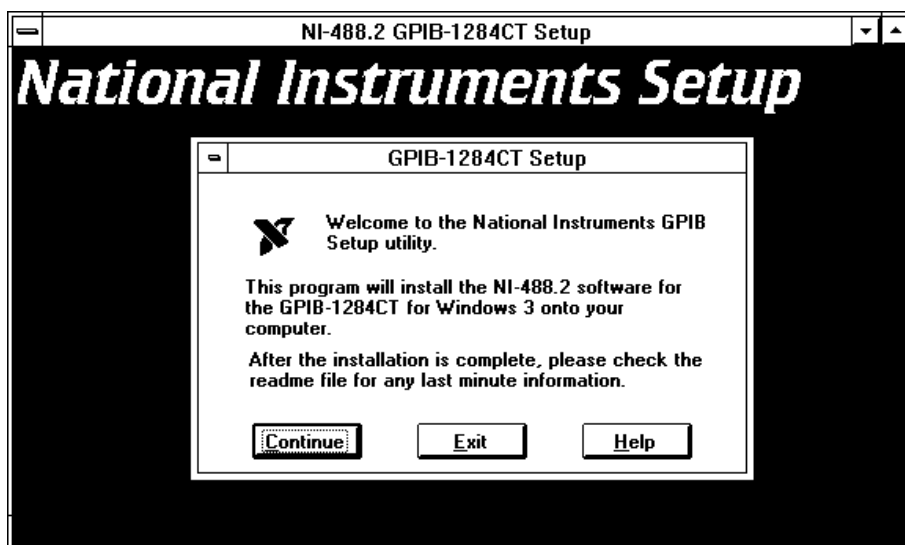


Figure 3-1. Software Installation Screen

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

After you have installed your software, you might want to run `wibconf` to view or modify the driver configuration. If you installed more than one GPIB-1284CT, or your single GPIB-1284CT is not connected to `lpt1`, you must reconfigure the software with `wibconf`. Refer to the section *Configure the Software with wibconf*, later in this chapter, for instructions on running `wibconf`. If you do not need to run `wibconf`, refer to Chapter 4, *Installation Verification and Troubleshooting*, for instructions on verifying the hardware and software installation.

Pass-Through Printing in Windows

If you want to attach both a printer and a GPIB-1284CT to the same parallel port, you must use pass-through printing. When the 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 the GPIB-1284CT passes from the parallel port labeled **COMPUTER** to the parallel port labeled **PASS THROUGH**.

When the NI-488.2 software places the GPIB-1284CT online, the GPIB-1284CT is taken out of pass-through mode. As long as the NI-488.2 software is accessing the GPIB-1284CT, the GPIB-1284CT is not in pass-through mode. When the GPIB-1284CT is taken offline, it is placed back into pass-through mode.

If the GPIB-1284CT is in pass-through mode, you do not have to do anything special to use pass-through printing in Windows. However, if you want to use the NI-488.2 software and pass-through printing at the same time, you must disable the default fast printing feature of Windows so that the NI-488.2 software can correctly multiplex between GPIB and printing activity. To disable the fast printing feature, refer to one of the next two sections, depending on which version of Windows you are using.

Disabling Fast Printing in Windows 3.1

In Windows 3.1, you can disable the fast printing feature of Windows by completing the following steps.

1. Open the control panel by double-clicking on the **Control Panel** icon in the **Main** group of the **Program Manager**.
2. Double-click on the **Printers** icon in the control panel.
3. Click on the **Connect** button.
4. In the dialog box that appears, uncheck the **Fast Printing Direct to Port** box and then click **OK** to exit the dialog box.
5. Click on the **Close** button to exit the **Printers** control panel.

Disabling Fast Printing in Windows 3.0

In Windows 3.0, you can disable the fast printing feature of Windows by completing the following steps.

1. Open the control panel by double-clicking on the **Control Panel** icon in the **Main** group of the **Program Manager**.
2. Double-click on the **Printers** icon in the control panel.
3. Click on the **Configure...** button.
4. In the dialog box that appears, select a parallel port with an **.OS2** extension from the **Ports** list. For example, if your GPIB-1284CT is connected to **lpt1**, select **LPT1.OS2**. Click **OK** to exit the dialog box.
5. Click **OK** to exit the **Printers** control panel.

Configure the Software with wibconf

wibconf is an interactive utility you can use to examine or modify the configuration of the driver. You must run wibconf if you installed more than one GPIB-1284CT, or if your single GPIB-1284CT is not connected to lpt1.

Follow these steps to run wibconf:

1. Double-click on the **wibconf** icon in the **GPIB** group of the **Program Manager**. A parameters dialog box appears.
2. Enter the drive, path, and name that describes the location of the Windows GPIB configuration file `gpib.ini` in the dialog box, and press <Enter> or click on the **OK** button. For example, if you installed Windows on drive `c` in a directory named `windows`, you would enter `c:\windows\gpib.ini` into the parameters dialog box. Changes made using wibconf are recorded in the `gpib.ini` file.
3. Use the cursor keys to select different fields and view corresponding help information.
4. Make any necessary changes.

Notice that the `Type of parallel port` field in wibconf is set to `AUTO` by default. When the field is set to `AUTO`, the NI-488.2 software attempts to determine the type of the corresponding parallel port automatically. 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, so it is always safe to select `UNIDIR`, the unidirectional protocol.

Notes: *All PS/2 computers have bidirectional parallel ports. If you have a PS/2 computer, set the `Type of parallel port` field in wibconf to `BIDIR`.*

The NI-488.2 software is unable to safely detect an EPP parallel port at I/O address 0x3BC. For this reason, if the parallel port is at I/O address 0x3BC and the `Type of parallel port` field is set to `AUTO`, the driver treats the port as a unidirectional port.

5. Exit wibconf by pressing <Esc> or the function key <F9>, and save your changes. The changes are effective immediately, so there is no need to restart Windows. However, you must restart all of your Windows GPIB applications for the changes to take effect.

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

After you have installed and configured the software, refer to Chapter 4, *Installation Verification and Troubleshooting*, to verify the installation.

Chapter 4

Installation Verification and Troubleshooting

This chapter explains how to verify the hardware and software installation and troubleshoot problems.

Run the Hardware Diagnostic Program

To verify and test the hardware installation, run the `ibdiag` hardware diagnostic program that came with your NI-488.2 software. `ibdiag` verifies that your hardware is connected and functioning properly.

Follow these steps to run `ibdiag`:

1. If a parallel cable is connected to the pass-through port, disconnect it.
2. Exit Windows to enter the DOS shell.
3. Go to the directory where the software is installed (for example, `c:\1284ctw`).
4. Enter the following command:

```
ibdiag
```

If `ibdiag` completes with no errors, your hardware is functioning properly. If `ibdiag` returns an error message, refer to the next section for troubleshooting instructions.

Troubleshooting `ibdiag` Error Messages

Warning: *The GPIB-1284CT contains circuitry that operates with hazardous voltages. Refer service requirements to qualified personnel.*

If `ibdiag` returns an error message, do the following:

- Verify that the GPIB-1284CT is connected to the parallel port you have selected in `ibdiag`.
- Verify that a parallel cable is not connected to the pass-through parallel port.
- Verify that the correct LEDs are lit. The box should power on with the **POWER** and **PASS THROUGH** LEDs lit.

If the **POWER** LED is not lit, check the following items:

- Check that the power switch is in the ON position.
- Check that the power cable is securely plugged into the power outlet.
- If you have an AC version, check the power cord connection and the fuse.

Warning: *For continued protection against fire, replace the fuse only with the same type and rating of fuse. See Appendix A, Hardware Specifications, for fuse specifications.*

- If you have a DC version, check the connection to the power supply.

If the **PASS THROUGH** LED does not come on when the box is powered on, contact National Instruments.

- Make sure that when you run `ibdiag`, you enter the correct parallel port information for the parallel port to which the GPIB-1284CT is connected. You must enter the name of the parallel port (for example, `lpt1`), its type (unidirectional, bidirectional, or EPP), and its interrupt level. Refer to the documentation that came with your computer to determine what type of parallel port you have and how it can be configured.

If you do not know what type of parallel port you have, choose unidirectional to run `ibdiag`. Unidirectional communication works properly on all types of parallel ports. You can 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, choose `No Interrupt` when you run `ibdiag`. Typically, interrupt level 7 is associated with `lpt1` and interrupt level 5 is associated with `lpt2`. You can use `ibdiag` to determine whether you can use interrupts with your parallel port.

- Check the parallel port cable connection. The cable should be no longer than 2 m, and should be a shielded parallel cable. If you suspect cable problems, you can order a parallel cable from National Instruments. See the *Optional Equipment* section of Chapter 1, *Introduction*, for specific information on parallel cables you can order.

Run the Software Diagnostic Program

To verify and test the software installation, run the `wibtest` software diagnostic program that came with your NI-488.2 software. The `wibtest` program is a Windows application that requires minimal user interaction.

Follow these steps to run `wibtest`:

1. Disconnect any GPIB cables.
2. Double-click on the **wibtest** icon in the **GPIB** group in the **Program Manager**.

If `wibtest` completes with no errors, you have installed the NI-488.2 software correctly. If `wibtest` returns an error message, refer to the next section for troubleshooting instructions.

Troubleshooting wibtest Error Messages

If an error occurs when you run `wibtest`, check the following:

- The GPIB-1284CT should *not* be connected to a GPIB device.
- The GPIB-1284CT must be powered on.
- The **READY** LED should be on. If it is not, the NI-488.2 software has not accessed the GPIB-1284CT. Either the software is not installed or configured properly, or the cable connection between the computer and the GPIB-1284CT is not secure.
- Your Windows directory should contain the files `gpib.dll` and `gpib.ini`.
- Verify that the GPIB-1284CT passes `ibdiag` successfully.
- Verify that the NI-488.2 software is configured correctly by running `wibconf`. Specifically, verify that the `Use this GPIB interface`, `Parallel port number`, `Type of parallel port`, and `Interrupt Level` fields are all set properly.
- Check the parallel port cable connection. The cable should be no longer than 2 m, and should be a shielded parallel cable. If you suspect cable problems, you can order a parallel cable from National Instruments. See the *Optional Equipment* section of Chapter 1, *Introduction*, for specific information on parallel cables you can order.

If you have performed these steps and there is still a problem, refer to the following sections to check the hardware and software.

Note: *In the following paragraphs, `gpibx` refers to `gpib0`, `gpib1`, `gpib2`, or `gpib3` as appropriate.*

Presence Test of Driver

The `wibtest` program tests for the presence of the NI-488.2 driver `gpib.dll` and the NI-488.2 configuration information file `gpib.ini`. If `gpib.dll` is not in the Windows directory, a warning box pops up with the following text:

```
File Error: Cannot find GPIB.DLL
```

Click on the **Close** button. `wibtest` displays the following error message when it fails:

```
<<< No driver present for GPIBx. >>>
```

To correct the problem, make sure that `gpib.dll` is located in the Windows directory (usually `c:\windows`).

If `gpib.ini` is not in the Windows directory, `wibtest` displays the same error message when it fails:

```
<<< No driver present for GPIBx. >>>
```

To correct this problem, make sure that `gpib.ini` is located in the Windows directory (usually `c:\windows`).

If you are unable to locate `gpib.dll` or `gpib.ini`, you should reinstall the software.

Presence Test of GPIB-1284CT

The following error message appears if the GPIB-1284CT is not installed or if the software is not configured properly:

```
<<< No board present for GPIBx. >>>
```

If this message appears, you could have one of the following situations:

- The Use this GPIB interface field in `wibconf` might be set to No for `gpibx`. If you want to use the GPIB-1284CT, you must set this field to Yes.
- The GPIB-1284CT might not be properly installed. Refer to Chapter 2, *Hardware Installation*, for detailed instructions.
- The software settings do not match the parallel port hardware settings. You can run `wibconf` to check the current configuration of the software.

GPIB Cables Connected

The following error message appears if a GPIB cable is connected to the GPIB-1284CT when you run `wibtest`:

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

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

Disconnect all GPIB cables before trying the test again.

Common Questions

Which NI-488.2 software (DOS or Windows) do I need to 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, you must 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, there is nothing wrong with installing both. However, it is unsafe to access them both at the same time.

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

Run the `GPIBInfo` utility. If you run `GPIBInfo` without specifying any parameters, it returns information about the GPIB controllers currently 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. If you run `GPIBInfo` without specifying any parameters, it returns information about the version of the NI-488.2 software currently 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`), just press <Enter>. If

Windows is *not* installed in the default directory, enter the path and directory where Windows is installed so that `wibconf` can find the correct `gpib.ini` file to modify.

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

Refer to the troubleshooting sections of this chapter for specific information about what might cause these tests to fail.

How do I use `wibic`?

You can use `wibic` to practice communication with your instrument, troubleshoot problems, and develop your application program. For instructions, refer to Chapter 5, *wibic—Windows Interface Bus Interactive Control*, in 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 Chapter 3, *Developing Your Application*, in the *NI-488.2 User Manual for Windows*.

What information should I have before I call National Instruments?

When you call National Instruments, you should have the results of the diagnostic tests `ibdiag` and `wibtest` and the output from `GPIBInfo`. Also, make sure you have filled out the configuration form in Appendix C, *Customer Communication*.

Chapter 5

Using Your NI-488.2 Software

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

Introduction to `wibic`

You can use `wibic`, the Windows Interface Bus Interactive Control utility, to enter NI-488 functions and NI-488.2 routines interactively and to see the values returned by the function calls. Without writing an application, you can use `wibic` to do the following:

- Verify GPIB communication with your device quickly and easily.
- Learn the syntax of the functions and routines before writing your application.
- Become familiar with the commands of your device.
- Receive data from your GPIB device.
- Learn new functions and routines before integrating them into your application.

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

Programming Considerations

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

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

Also, notice that 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 detailed information about each NI-488 function and NI-488.2 routine, refer to the *NI-488.2 Function Reference Manual for DOS/Windows*.

Appendix A

Hardware Specifications

The appendix specifies the electrical, environmental, and physical characteristics of the GPIB-1284CT and the recommended operating conditions.

Table A-1. Electrical Characteristics - AC Version

Characteristic	Specification
Power Supply Unit	100 to 120 VAC \pm 10%, 50 to 60 Hz or 220 to 240 VAC \pm 10%, 50 to 60 Hz
Current	100 to 120 VAC 37 mA or 220 to 240 VAC 39 mA
Fuse Rating and Type	100 to 120 VAC 300 mA, UL/CSA approved or 220 to 240 VAC 500 mA, IEC approved

Table A-2. Electrical Characteristics - DC Version

Characteristic	Specification
DC Input	+5 to +13 VDC Regulated
Current	340 mA maximum

Table A-3. Environmental Characteristics

Characteristic	Specification
Operating Temperature	10° to 40° C
Storage Temperature	0° to 70° C
Relative Humidity	10% to 95% noncondensing conditions
EMI	FCC Class A Verified

Table A-4. Physical Characteristics - AC Version

Characteristic	Specification
Case Size	4.65 in. by 3.05 in. by 1.74 in. (11.8 cm by 7.75 cm by 4.42 cm)
Case Material	All metal enclosure
Weight	11.52 oz. (327 g)

Table A-5. Physical Characteristics - DC Version

Characteristic	Specification
Case Size	4.65 in. by 3.05 in. by 1.12 in. (11.8 cm by 7.75 cm by 2.84 cm)
Case Material	All metal enclosure
Weight	7.68 oz. (218 g)

Appendix B

The ctupdate Utility

This appendix contains information on the `ctupdate` utility for the GPIB-1284CT.

The `ctupdate` utility is included with your NI-488.2 software so that you can easily update your firmware, if necessary, in the future. As parallel port standards evolve or as the hardware and/or software is enhanced, National Instruments provides updates of the software and the firmware (the `.mcs` file).

The parallel-to-GPIB conversion circuitry is implemented in a field-programmable gate array, which is loaded from an EEPROM (electrically erasable programmable read-only memory) when the GPIB-1284CT is powered on. You can use the `ctupdate` utility to upgrade the firmware in the EEPROM. The `.mcs` file is the latest revision of the firmware.

Caution: *Because of the potential loss of EEPROM information, do not attempt to update the firmware when your electrical power is unstable; that is, during a weather storm or similar situation. Once you have started the update process, do not switch off power to your GPIB-1284CT until the `ctupdate` program completes.*

Run the `ctupdate` utility as follows:

1. Invoke the `ctupdate` utility with two parameters, an *imagefile* `.mcs` name and the parallel port number, as shown in the following example.

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

`ctupdate` transfers the imagefile into the EEPROM within the GPIB-1284CT. `ctupdate` then reads back the contents of the EEPROM to verify that the transfer was successful.

Do not power off the GPIB-1284CT until the program reports completion. If the `ctupdate` utility reports an error, do *not* power off the GPIB-1284CT. Confirm that the GPIB-1284CT is connected to the parallel port indicated on the command line, and execute `ctupdate` again. If errors persist, *leave the box powered on*, write down the error message that appears on the screen, and contact National Instruments.

2. Power the GPIB-1284CT off and then back on to load the new EEPROM contents into the field-programmable gate array.
3. Record the *imagefile* `.mcs` filename on the configuration form in Appendix C, *Customer Communication*.

Appendix C

Customer Communication

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

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

Corporate Headquarters

(512) 795-8248

Technical support fax: (800) 328-2203
(512) 794-5678

Branch Offices	Phone Number	Fax Number
Australia	(03) 879 9422	(03) 879 9179
Austria	(0662) 435986	(0662) 437010-19
Belgium	02/757.00.20	02/757.03.11
Denmark	45 76 26 00	45 76 71 11
Finland	(90) 527 2321	(90) 502 2930
France	(1) 48 14 24 00	(1) 48 14 24 14
Germany	089/741 31 30	089/714 60 35
Italy	02/48301892	02/48301915
Japan	(03) 3788-1921	(03) 3788-1923
Mexico	95 800 010 0793	95 800 010 0793
Netherlands	03480-33466	03480-30673
Norway	32-848400	32-848600
Singapore	2265886	2265887
Spain	(91) 640 0085	(91) 640 0533
Sweden	08-730 49 70	08-730 43 70
Switzerland	056/20 51 51	056/20 51 55
Taiwan	02 377 1200	02 737 4644
U.K.	0635 523545	0635 523154

Technical Support Form

Technical support is available at any time by fax. Include the information from your configuration form. Use additional pages if necessary.

Name _____

Company _____

Address _____

Fax (____) _____ Phone (____) _____

Computer brand _____

Model _____ Processor _____

Operating system _____

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 _____

(continues)

The problem is _____

List any error messages _____

The following steps will reproduce the problem _____

GPIB-1284CT Hardware and Software Configuration Form

Record the settings and revisions of your hardware and software on the line to the right of each item. Update this form each time you revise your software or hardware configuration, and use this form as a reference for your current configuration.

National Instruments Products

- GPIB-1284CT Model and Revision _____
- GPIB-1284CT *imagefile.mcs* filename _____
- NI-488.2 Software Version Number on Disk(s) _____

Other Products

- Computer Make and Model _____
- Computer Parallel Port Type _____
- Memory Capacity on Computer _____
- Windows Version _____
- Number of GPIB Devices on Bus _____
- Other Hardware Devices in System _____
- Type of Monitor _____
- Device Connected to Pass-Through Parallel Port _____

Glossary

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

°	degrees
%	percent
A	amperes
AC	alternating current
ANSI	American National Standards Institute
BIOS	Basic Input/Output System
C	Celsius
CSA	Canadian Standards Association
DC	direct current
DIP	dual inline package
EEPROM	electrically erasable programmable read-only memory
EMI	electromagnetic interference
EPP	Enhanced Parallel Port
FCC	Federal Communications Commission
GPIB	General Purpose Interface Bus
Hz	hertz
IEC	International Electrotechnical Commission
IEEE	Institute for Electrical and Electronic Engineers
in.	inches
I/O	Input/Output
KB	kilobytes of memory
LED	light-emitting diode
m	meters
MB	megabytes of memory
oz	ounces
PC	personal computer
PS/2	IBM Personal System/2
RAM	random-access memory
s	seconds
UL	Underwriters Laboratories
V	volts
VAC	volts alternating current
VDC	volts direct current
wibic	Windows Interface Bus Interactive Control