



# USER'S MANUAL

# PCI-4302

High-Speed Bus Master DMA Transfer GPIB Interface Board

	<b>Transfer rate</b> 1.1 MB/s (max.)	<b>1 channel</b>
<b>DMA transfer mode</b>	<b>Interface original controller</b>	
<b>LabVIEW compatible</b>	<b>Transmission length</b> Between equipment : 4 m (13.12 ft.) (max.) Total cable length : 20 m (65.62 ft.) (max.)	

## Notes to Users

The specifications of the product are under continuous improvement and while every effort is made to keep this manual up-to-date, we reserve the right to update the contents of this user's manual without prior notice. Therefore, you should thoroughly read this user's manual even if you have often purchased this product before.

Using this product requires technical knowledge of hardware and software.

Use this product only under the specified conditions such as power supply, voltage, temperature, and humidity range. Interface Corporation's products are not designed with components intended to ensure a level of reliability suitable for use under conditions that might cause serious injury or death.

Please consult our Technical Support Center if you intend to use our products for special purpose, such as use for moving vehicles, medical treatment, aerospace engineering, controlling nuclear power, submerged translators and so on. This product is made under strict quality management, however, when using this product for the purposes that may result in any damages, lost profits, or any other incidental or consequential damages resulting from breakdown of this product, the user is required to take adequate and appropriate measures, such as installing safety devices to avoid possible serious accidents.

### Conventions Used in This Manual

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

## Indemnification

Interface Corporation makes no warranties regarding damages resulting from installation or use of this product, whether hardware or software, and the user assumes all risk.

Interface Corporation shall not be liable for any incidental or consequential damages, including damages or other costs resulting from defects which might be contained in the product, product supply delay or product failure, even if advised of the possibility thereof. Customer's right to recover damages caused by fault or negligence on the part of Interface Corporation shall be limited to product improvement or exchange. Interface Corporation does not assume the responsibility for compensation.

This product including its software may be used only in Japan. Interface Corporation cannot be responsible for the use of this product outside Japan. Interface Corporation does not provide technical support service outside Japan.

## Warranty

Interface Corporation products are warranted for a period of either one year or two years from the date of shipment, as evidenced by receipts or other documentation. This warranty does not apply to the software products and expendable supplies such as batteries.

**Note:** You can determine the warranty period at our Web site by the serial number of your product. Those without Internet access should contact the Sales Information Center.

During the warranty period Interface Corporation will, as a general rule, replace or recondition the defective product without charge, in which case the user will be required to pay the shipping costs, except as set forth below.

The Warranty provided herein does not cover expendable supplies such as batteries and damages, defects, malfunctions, or failures caused by impact during transportation while under owner's responsibility; owner's failure to follow the instructions and the precautions contained in this manual; modification and/or repair of the product by other than Interface Corporation, trouble caused by use with peripherals not specified by Interface Corporation, power failure or surges, fire, earthquake, tidal wave and/or flood.

This warranty applies only when the product is used in Japan.

Interface Corporation warrants its repairs for six months, and will again repair the same defective part without additional charge provide the product is economically repairable. In that case, the user should attach a copy of the most recent repair report to the repair request form. If no repair report is attached, it will be considered as a new repair request.

## Before You Export Interface Products

The foreign exchange and foreign trade law of Japan controls the export of this product, due to its possible use as a STRATEGIC MATERIAL. Therefore, before you export this product, you must secure an export permit from the Ministry of Economy, Trade and Industry of Japan.

## Revision History

Version	Date	Comments
1.0	August 2002	English version of user's manual PCI-4302 published.
1.1	January 2003	Windows Millennium Edition and Windows XP supported. Manual revised: Section 3.6 How to Use with LabVIEW by National Instruments Corporation added. Section 5.3 FAQ <LabVIEW> added. Section 6.1 Features 6.1.8 Using LabVIEW of National Instruments Corporation added. Chapter 7 Version Considerations added.
1.2	January 2004	Manual revised: Descriptions of software in Japanese version (GPC-4301N) deleted. Format is revised.
1.3	May 2005	Manual revised: Manual title changed from PCI-4302 to MPB-E4302. Warning of the CE Marking added. Section 1.1 Packing List deleted. Section 4.1 Cabling in Difficult Situations The figure added. Section 4.6 Optional Product deleted. Section 6.1.8 PCI 5 V/3.3 V Signaling Environment added. Section 6.6 Signals added.

Refer to "Chapter 7 Version Considerations," page 33, about the version number of the actual hardware.

Due to constant product improvements, the information in this user's manual is subject to change without prior notice.

● CE Marking



● This product is Information Technology Equipment (ITE) that complies with EU Directive 89/336/EEC, using the EMC standards EN55022 (Class A). The main purpose of this product is use in the light industry environment.

● Environmental Specifications, Periodic Inspections, and Storage

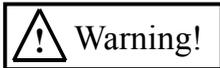
For your safety, follow all warnings and instructions described in this manual.

● Environmental Specifications

Use this product only under the conditions as shown below.

Parameter	Specification
Temperature Range	0 °C to 50 °C
Relative Humidity Range	20% to 90% (non-condensing)
Dust	Typical office environment
Corrosive Gas	None
Voltage Requirements	+5 Vdc (+/-5%)
Other	Within normal parameters for electronic equipment

Failure to follow this warning may result in electric shock, burns, serious injury, and in some cases, even cause death.



● Keep this PCI board away from flammable gases.

● Periodic Inspections

The following inspections should be carried out on this board periodically.

✓ Check these items! ✓

Be sure that all connectors and cables are connected correctly.

Board surfaces should be free of dust and foreign matter.

Check for dirt or corrosion on the card edge and connector contacts.

● Storage

This board should be stored exactly the same way as when it was received. Proceed as follows:

1. Put the board back in its electro-conductive bag.
2. Wrap the board with the original packing material.
3. Avoid excessive humidity.
4. Do not expose the board to the direct rays of the sun.
5. Store the board at room temperature.

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# Chapter 1 Introduction

## 1.1 Getting Started

The following steps illustrate the basic flow of how to use the **PCI-4302**, from the installing the board to running the GPIB utility programs. Please refer to the followings when you use this product for the first time.

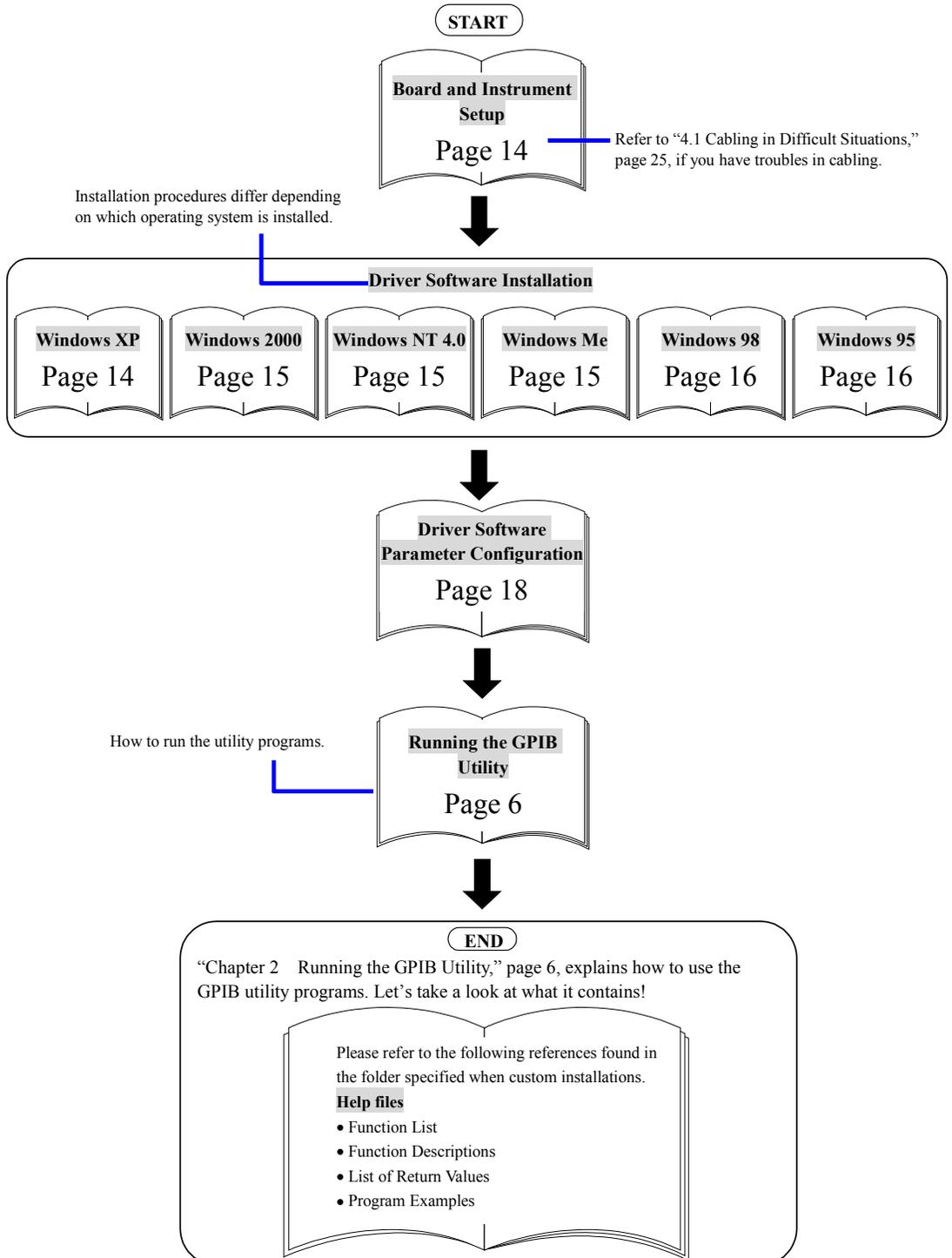


Figure 1.1 Getting started flow chart

## Chapter 2 Running the GPIB Utility

This chapter describes basic communications between the **PCI-4302** and connected GPIB devices by using the utility program included with the driver software. Proceed as follows:

1. Install the **PCI-4302** in your computer. Then connect the board and GPIB devices using GPIB cables. Refer to “3.2 Board Installation,” page 13 and “3.3 Cabling,” page 14.
2. Install the device driver software. Refer to “3.4 Driver Software Installation,” page 14.
3. Configure the driver software parameters. Refer to “3.8 Configuring the Driver Software Parameters,” page 18.

If you do not know the address of the GPIB devices, you should refer to the documentation that came with them to make sure of their addresses.

### 2.1 Initializing the GPIB Interface Board

The following steps show how to run the GPIB utility program and initialize the **PCI-4302**.

1. When you have successfully installed the driver software, **Interface GPF-4301** is registered in the **Programs** folder. To run the GPIB utility program, click the **Start** button, point to **Programs**, point to **Interface GPF-4301**, and then click **GPIB Utility**. The **Interface GPIB Board Utility Program** main window will appear.

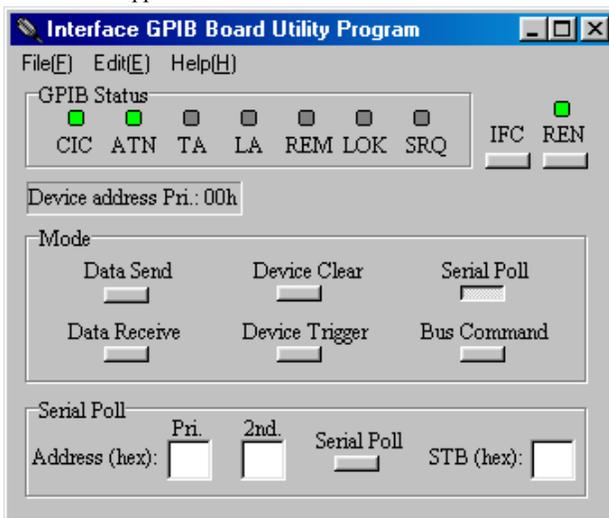


Figure 2.1 The GPIB utility program main window

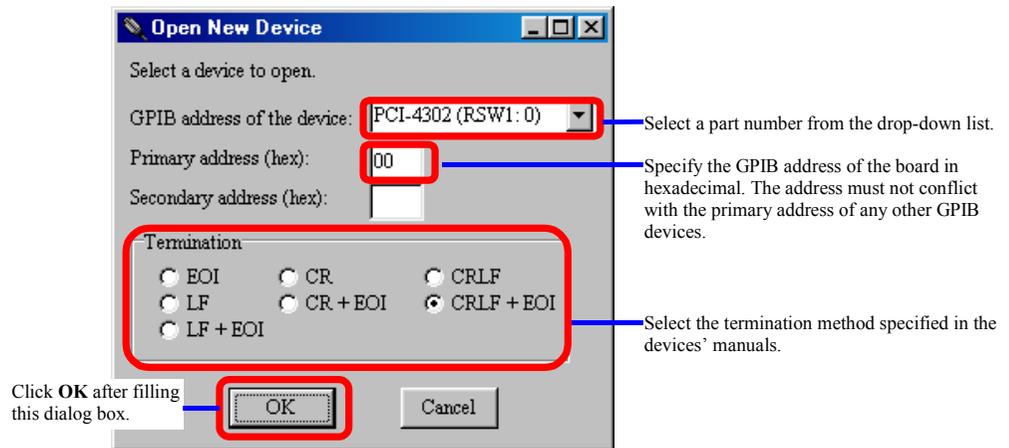
The following table shows available menu items and commands.

Menu	Command	Description
File	Open New Device	Selects a device to use.
	Close the Device	Closes the device.
	Exit	Closes the program.
Edit	Clear the Data Buffer	Clears the data buffer.
Help	Version Information	Displays the version information.

2. Click **Open New Device** on the **File** menu.



3. The **Open New Device** dialog box will appear. Then select the board model you want to use, the GPIB addresses, and termination method of the connected GPIB devices. Then click **OK**.



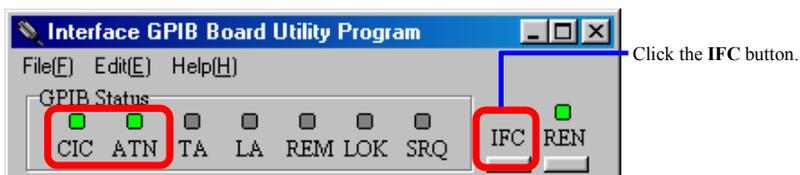
Notes:

- The GPIB board list box contains part numbers of the boards installed in the host computer. Click the board that you want to access. Refer to “6.3 Interface PCI Board Identification (RSW1),” page 31.
- Type the GPIB address of the board in **Primary Address**. By default, this box has a value configured by the control panel applet **Interface GPIB Board System Configuration**. Refer to “3.8 Configuring the Driver Software Parameters,” page 18.
- Select the termination method corresponding with connected devices.

4. Initialize the devices connected to the GPIB.

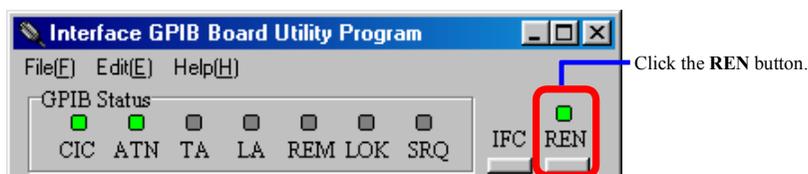
- a. Sending the IFC message

When the IFC line is asserted, every interface connected on the GPIB is initialized and the board becomes Controller-in-charge. The CIC indicator is turned on as well as the ATN indicator.



- b. Sending the REN message

Click the **REN** button to assert the REN line.

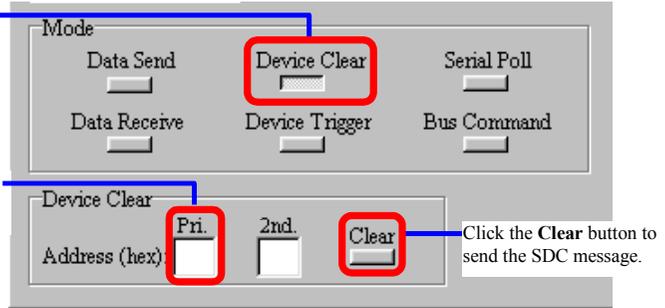


c. Sending the SDC message

When the SDC message is sent, each device addressed to listen will be initialized. Check the primary address of the GPIB device is not conflict with the GPIB address of the board.

Click the **Device Clear** button.

Specify the GPIB address of the device to clear in hexadecimal.



## Glossary

**GPIB address:**

The GPIB address is required to control the GPIB device. Specify this address to GPIB device so as not to conflict with any other devices including the board.

**Primary address, Secondary address:**

Specify these addresses according to the GPIB devices. The secondary address may be required according to the device.

- Primary address range: 00h through 1Eh
- Secondary address range: 60h through 7Eh

**IFC (Interface clear):**

The System Controller asserts the IFC line to initialize the bus. The devices on the bus are unaddressed. The System Controller becomes Controller-in-charge.

**Controller-in-charge:**

A controller is a GPIB device that can address other devices to talk or to listen. The System Controller can take control whenever it asserts the IFC line. Only one System Controller can exist in a GPIB system throughout the operation. The System Controller capability cannot be passed to other devices. Only one active controller (Controller-in-charge) can exist in a GPIB system at a time.

**REN (Remote enable):**

The System Controller asserts the IFC line to put the devices into remote programming mode.

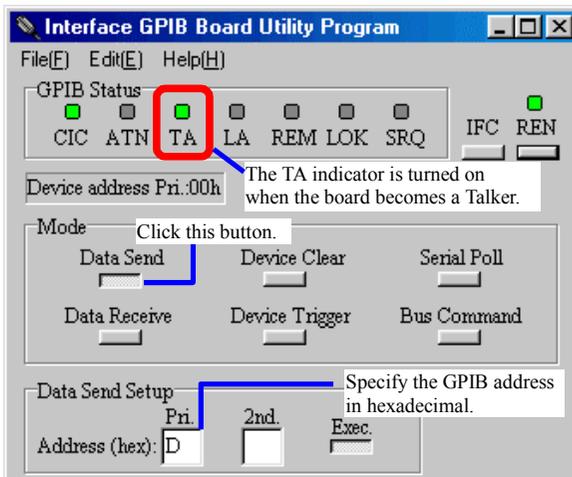
**SDC (Selected device clear):**

This command is used to reset the devices currently addressed as Listener. The devices become device-specific initial state.

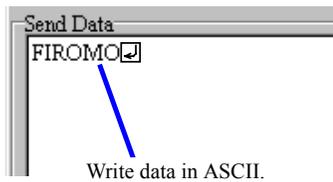
## 2.2 Sending Data

This section describes how to send data to a device addressed as a Listener.

1. Click the **Data Send** button, and type the GPIB addresses of the device to which you want to send data, and then click the **Exec** button. You can see that the PCI-4302 has become a Talker when the TA indicator is turned on.



2. Type a message to send to the Listener in the **Send Data** text box, and then press the **ENTER** key.



### Glossary

**Talker:**

A Talker is a GPIB device that can send data to Listeners.

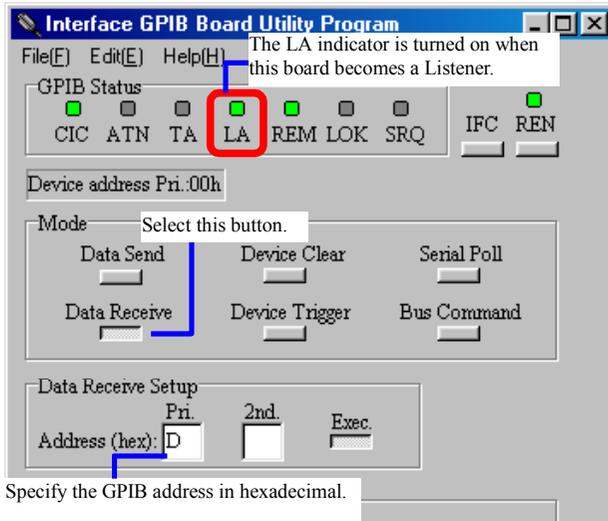
**Listener:**

A Listener is a GPIB device that can receive data from a Talker.

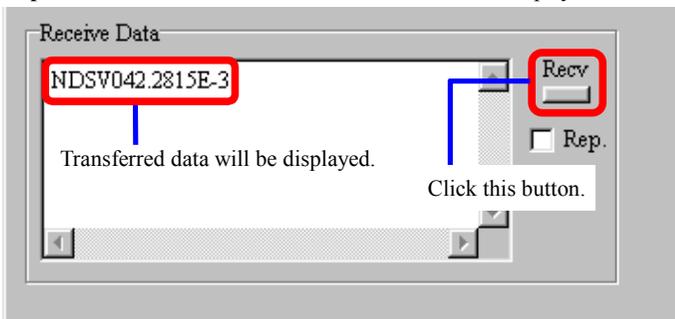
## 2.3 Receiving Data

This section describes how to receive data from a device addressed as a Talker.

1. Click the **Data Receive** button, and type the GPIB addresses of the device from which you want to receive data, and then click the **Exec** button.



2. Click the **Recv** button, and then the received data will be displayed in the **Receive Data** text box. When the **Rep** check box is selected, the data will be received and displayed continuously.



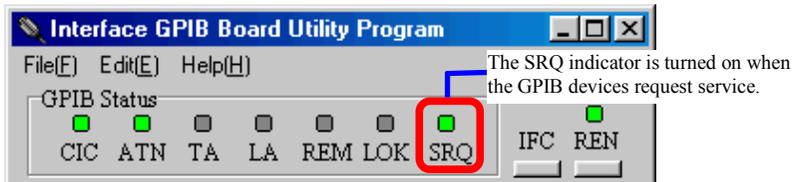
## 2.4 Serial Polling

This section describes how to execute a serial poll. The following summarizes the serial poll.

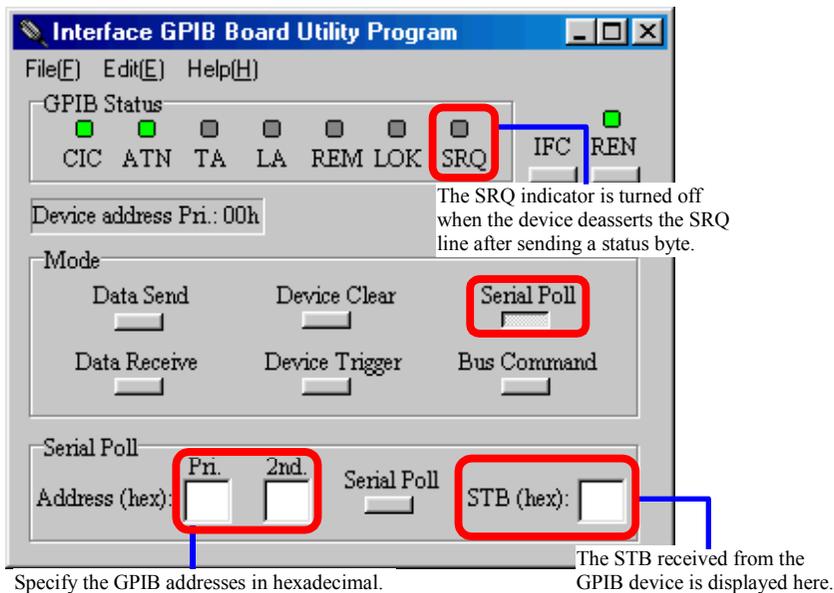
- The GPIB devices request service from the Controller-in-charge by asserting the SRQ line.
- The Controller serial polls each of the device to see if it requested service. Once the controller has determined which one of the devices requires service, it reads a status byte (STB) from that device.

Note: Conditions for requesting service differ depending on the GPIB devices. Refer to those devices' manuals.

The SRQ indicator is turned on when the GPIB devices request service.



1. Specify the GPIB address in hexadecimal in the **Serial Poll** group box.



2. Click the **Serial Poll** button in the **Mode** group box.
3. The **STB** box will receive a status byte from the device.

**Glossary**

**SRQ (Service request):**

A device asserts the SRQ line to request services from the Controller.

**STB (Status byte):**

Status byte is a data byte sent by a device when it is serial polled.

**Serial Poll:**

Serial poll is a process in which the Controller-in-charge determines which device requests service and reads the status byte from the requesting device. The Controller-in-charge performs a serial poll for one device at a time.

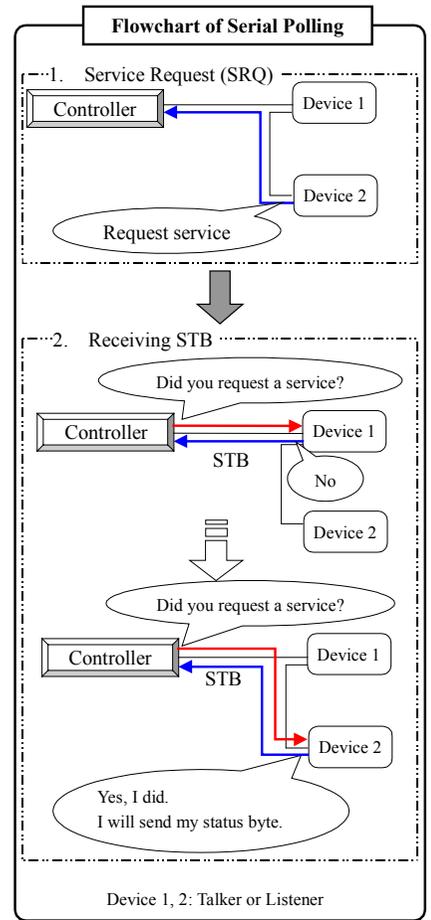


Figure 2.2 Serial polling

## 2.5 Closing the GPIB Interface Board

To exit the GPIB utility program and close the board, click **Close the Device** on the **File** menu. After closing the board, click **Exit** on the **File** menu.

## Chapter 3 Installation

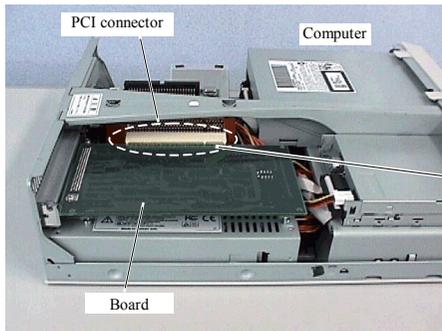
### 3.1 General

You need to install the device driver from the CD-ROM before getting started with this board. Installation procedures differ depending on which operating system being used.

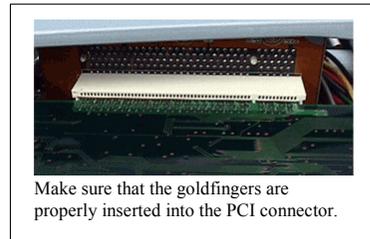
### 3.2 Board Installation

1. Set the PCI board identification switch and any other switches correctly according to your system.
2. Make sure that the computer is turned off and the power cord is unplugged. Remove the PC case cover and a slot cover.
3. Insert the board into an open PCI slot.

<Example>



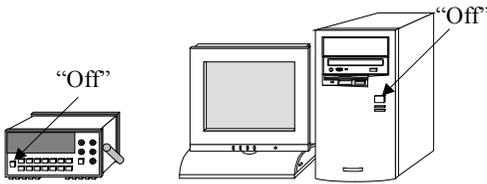
Insert the board into an open slot in your computer.



4. Screw in the bracket.
5. Replace the cover, plug in the power cord, and turn on the computer.

### 3.3 Cabling

1. Make sure that your computer and GPIB devices are turned off.



2. Connect the **PCI-4302** in your computer and the devices with GPIB cables.
3. First, turn on the devices. Second, turn on your computer.

**Before operating the GPIB, follow the notes below:**

- Make sure that every device connected to the GPIB is turned on before the computer is turned on.
- Minimize the possibility of EMI.
- Use Interface cables, or other IEEE Std. 488.1 cables.

### 3.4 Driver Software Installation

Installation procedure differs depending on your operating system.

- **Windows XP** (Refer to page 14.)
- **Windows 2000** (Refer to page 15.)
- **Windows NT 4.0** (Refer to page 15.)
- **Windows Millennium Edition** (Refer to page 15.)
- **Windows 98** (Refer to page 16.)
- **Windows 95** (Refer to page 16.)

After the installation of the software is successfully completed, configure the driver software parameters. Refer to "3.8 Configuring the Driver Software Parameters," page 18.

#### 3.4.1 Windows XP

The driver may only be installed by a member of the System Administrators group.

1. When you log on to Windows XP, the device driver wizard will start automatically.
2. The **Found New Hardware Wizard** dialog box will appear, click **Install from a list or specific location [Advanced]**, and then click **Next**.
3. Insert the CD into your CD-ROM drive.
4. Click **Search for the best driver in these locations**, and select **Search removable media [floppy, CD-ROM...]**. Then click **Next**.
5. Installation will start automatically.
6. Follow further instructions on your screen.

Make sure that there are no conflicts in setting up the computer resources, such as I/O addresses and interrupt request levels.

### 3.4.2 Windows 2000

The driver may only be installed by a member of the System Administrators group.

1. When you log on to Windows 2000, the device driver wizard will start automatically.
2. In the **Found New Hardware Wizard** dialog box, click **Next**.
3. Click **Search for a suitable driver for my device [recommended]**, and then click **Next**.
4. Select the **Specify a location** check box, and then click **Next**.
5. Insert the CD into your CD-ROM drive.
6. Click **Browse** and specify the \GPF4301\Win2000 folder on the CD, and then click **OK**.
7. To install the driver Windows found, click **Next**.
8. Follow further instructions on your screen.

Make sure that there are no conflicts in setting up the computer resources, such as I/O addresses and interrupt request levels.

### 3.4.3 Windows NT 4.0

The driver may only be installed by a member of the System Administrators group.

1. Log on to Windows NT 4.0.
2. Insert the CD into your CD-ROM drive.
3. Right-click the GPC4301.INF file in the \GPF4301\WinNT folder on the CD, and click **Install** on the shortcut menu.
4. Follow further instructions on your screen.

Make sure that there are no conflicts in setting up the computer resources, such as I/O addresses and interrupt request levels.

### 3.4.4 Windows Millennium Edition

1. When you log on to Windows Millennium Edition, the device wizard will start automatically.
2. Insert the CD into your CD-ROM drive.
3. In the **Add New Hardware Wizard** dialog box, click **Automatic search for a better driver [Recommended]**, and then click **Next**.
4. Follow further instructions on your screen.

Make sure that there are no conflicts in setting up the computer resources, such as I/O addresses and interrupt request levels.

### **3.4.5 Windows 98**

1. When you log on to Windows 98, the device wizard will start automatically.
2. Insert the CD into your CD-ROM drive.
3. In the **Add New Hardware Wizard** dialog box, click **Search for the best driver for your device [Recommended]**, and then click **Next**.
4. Select the **Specify a location** check box, and then click **Browse**.
5. Specify the \GPF4301\Win95 folder on the CD, and then click **Next**.
6. Follow further instructions on your screen.

Make sure that there are no conflicts in setting up the computer resources, such as I/O addresses and interrupt request levels.

### **3.4.6 Windows 95**

1. When you log on to Windows 95, the device driver wizard will start automatically.
2. Insert the CD into your CD-ROM drive, and then click **Next**.
3. Click **Other locations**, and then click **Browse**.
4. Specify the \GPF4301\Win95 folder on the CD, and then click **Finish**.
5. When prompted to insert the CD, click **OK**.
6. In the **Copy Files** dialog box, click **Browse**.
7. Specify the \GPF4301\Win95 folder on the CD, and then click **OK**.
8. Follow further instructions on your screen.

Make sure that there are no conflicts in setting up the computer resources, such as I/O addresses and interrupt request levels.

## 3.5 Installation of Sample Programs and Other Driver Related Files

1. Insert the CD into your CD-ROM drive.
2. The installer will start automatically. If the installer doesn't start, run the SETUP.EXE file on the CD. Select **GPF-4301** in the list, and then click **Install**.
3. Follow further instructions on your screen.
4. To verify you have successfully installed the software package, check that **Interface GPF-4301** is registered in the **Programs** folder.

## 3.6 Software Uninstallation

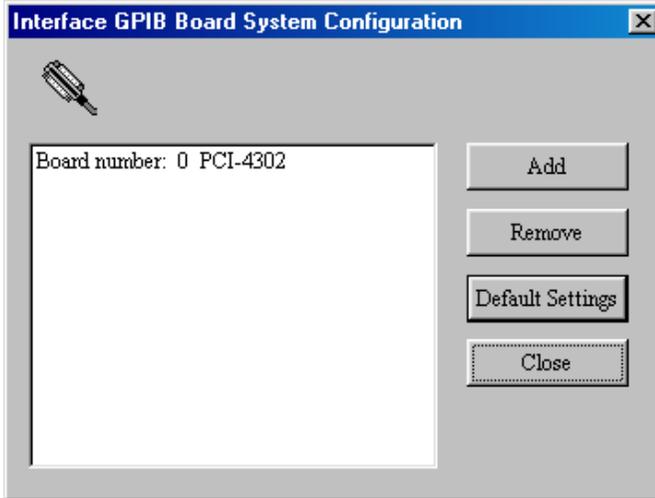
1. Click the **Start** button, point to **Settings**, and then click **Control Panel**.
2. Double-click **Add/Remove Programs**, and then click the **Install/Uninstall** tab.
3. Click **Interface GPF-4301** in the list, and then click **Add/Remove**.
4. Follow further instructions on your screen.

## 3.7 Board Uninstallation

1. Make sure that your computer is turned off, and the power cord is unplugged from the AC outlet. Remove the PC case cover.
2. Remove the screw from the board.
3. Remove the board from the slot, rocking it gently back and forth, being careful not to flex it.

### 3.8 Configuring the Driver Software Parameters

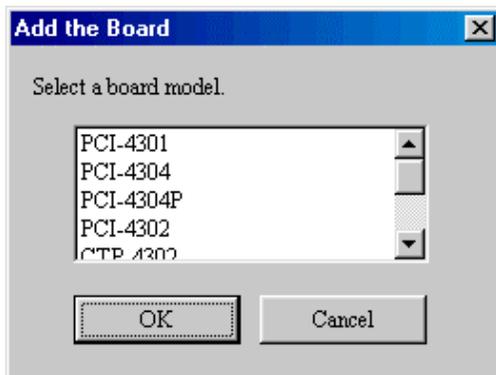
1. After installing the driver software, click the **Start** button and point to **Settings**, and then click **Control Panel**.
2. Double-click **Interface PCI GPIB**, and then the **Interface GPIB Board System Configuration** dialog box will appear.



The following table shows available commands.

Command	Description
Add	Opens the <b>Add the Board</b> dialog box.
Remove	Removes the selected board.
Default Settings	Opens the <b>Default Settings</b> dialog box.
Close	Closes this dialog box.

3. Click **Add** on the **Interface GPIB Board System Configuration** dialog box, and then the **Add the Board** dialog box will appear.



4. Click the board model that you installed, and then click **OK**.
5. A dialog box contains a message of “Is it OK to add the board?” will be displayed, and then click **OK**. The board model will appear in the list on the **Interface GPIB Board System Configuration**.

6. Configure the software parameters for each board.
  - a. Click a board model in the list to configure, and then click **Default Settings**. The **Default Settings** dialog box will appear.
  - b. Configure parameters properly, and then click **OK**. Refer to Table 3.1, for more details.

Note: After restarting your computer, the changes are valid.

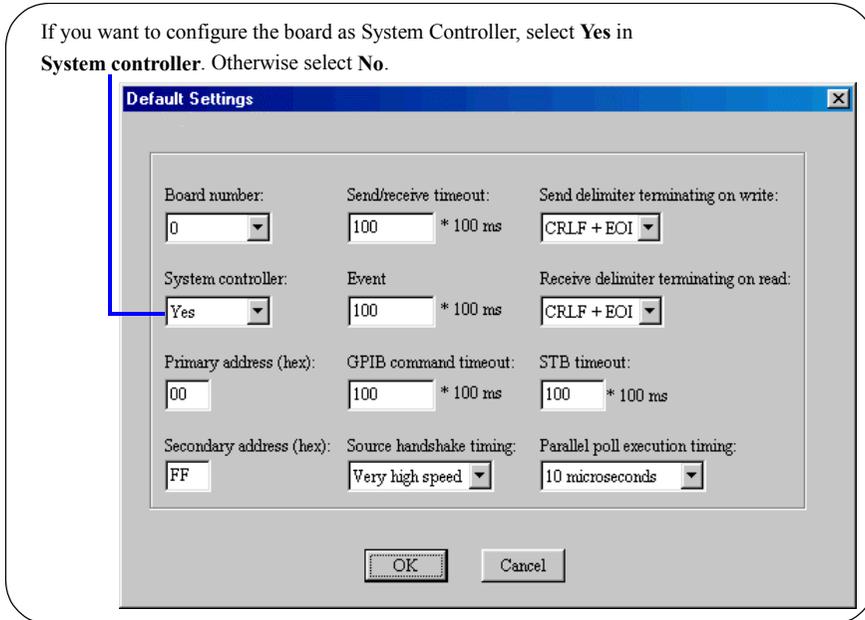


Figure 3.1 Driver software parameters

The control panel applet configures the following parameters when the device is opening.

Table 3.1 Driver Software Parameters

<b>Parameter</b>	<b>Description</b>	<b>Default Setting</b>
Board number	Specify the same number as RSW1 setting on the board.	0
System controller	Select <b>Yes</b> to configure the board as the System Controller. Yes: Controller-in-charge No: Talker/Listener	Yes
Primary address	Assign a different primary address, in the range of 00h through 1Eh to each interface in the system.	00 (h)
Secondary address	Freely assign any value in the range of 60h through 7Eh. Some GPIB devices have or need no secondary address, specify FFh in the <b>Secondary address</b> box.	FF (h)
Send/receive time-out	Specify enough time for completing data transfers.	100 (× 100 ms)
Event time-out	Specify an amount of time within the range of 1 through 65535 for waiting to detect events.	100 (× 100 ms)
GPIB command time-out	Specify an amount of time within the range of 1 through 65535 for the time-out of multi-line messages and GPIB commands.	100 (× 100 ms)
Source handshake timing	Select <b>Very high speed</b> (350 ns), <b>High speed</b> (500 ns), or <b>Normal speed</b> (2 μs) for the settling time T <sub>1</sub> for multi-line messages. Note: We recommend to change the handshake timing when an error message appears.	Very high speed
Send delimiter terminating on write	Select the proper parameters that connected GPIB devices support.	CRLF + EOI
Receive delimiter terminating on read		
STB time-out	Specify an amount of time within the range of 1 through 255 for waiting to receive a status byte from the device.	10 (× 100 ms)
Parallel poll execution timing	If your system has optical fiber cables, select <b>10 microseconds</b> .	2 microseconds

## Chapter 4 Notes for Users

### 4.1 Cabling in Difficult Situations

Lack of clearance between slots or limited spaces in back panels of computer results in conflicts in cabling. In such a case, use an adapter to expand clearance. We recommend the following adapter:

EXN01 (BLACK BOX Network Service Co., Ltd.)

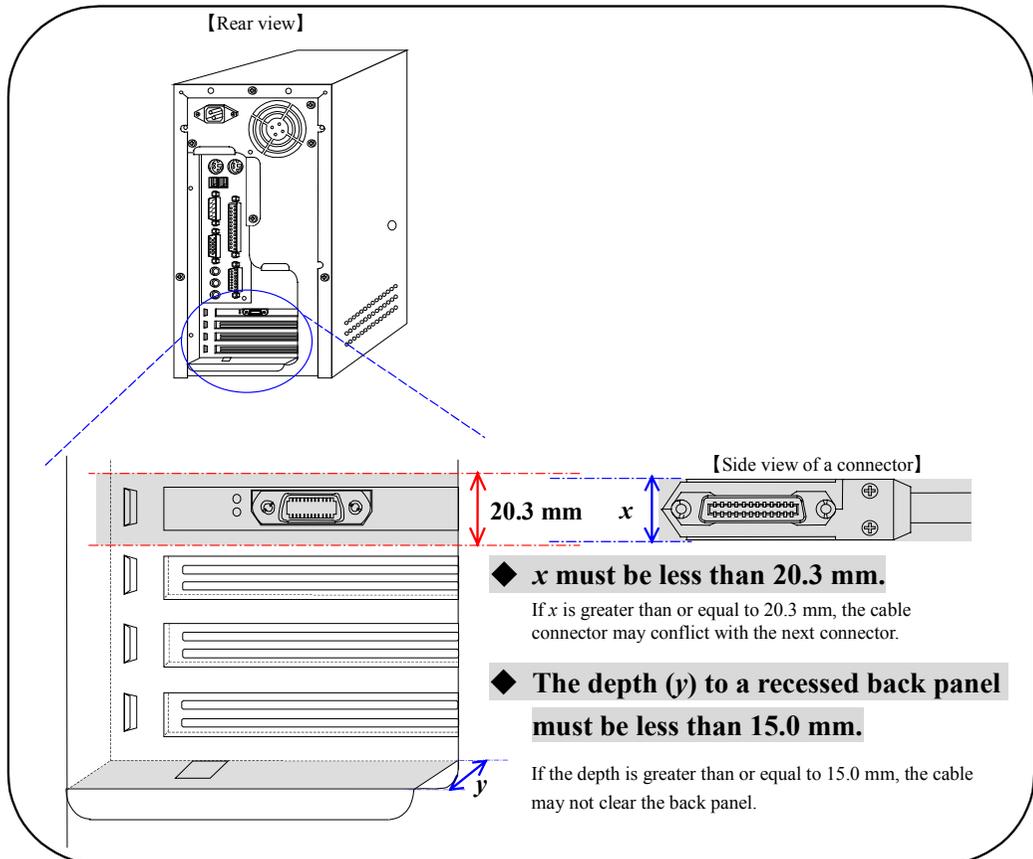
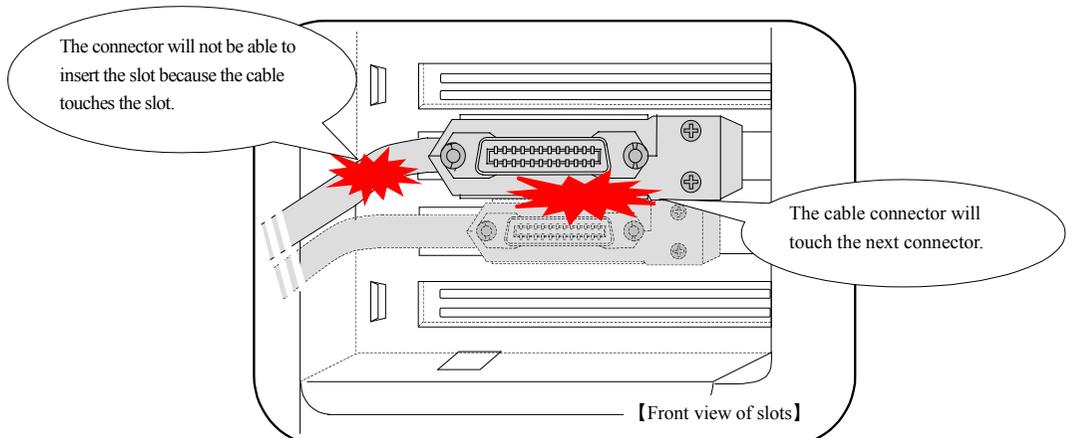


Figure 4.1 Cabling in difficult situations

>> If you use the cable and adapter that doesn't fulfill the above, the following phenomenon may occur.



## 4.2 System Requirements and Guidelines

### 4.2.1 Maximum Number of Devices

The maximum number of devices that can be connected together in one system is 15.

### 4.2.2 Cable Assembly Length Limitation

The maximum length of any single cable in the system is 4.0 m.

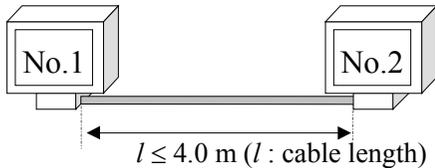


Figure 4.2 Single cable length

### 4.2.3 Total Cable Length

If the number of devices is less than or equal to 10 in one system, the maximum total cable length is less than or equal to 2.0 meters times the number of devices. If the number of devices is greater than 10, the total length of cable is less than or equal to 20.0 meters.

For your convenience, use the following expression to evaluate the acceptable total length of cables:

$$L \leq 2N \text{ (if } N \leq 10) \text{ or } L \leq 20.0 \text{ m (if } N > 10)$$

Here,

$N$ : number of devices on the bus

$L$ : total length of cables (m)

- Two meters times the number of devices.

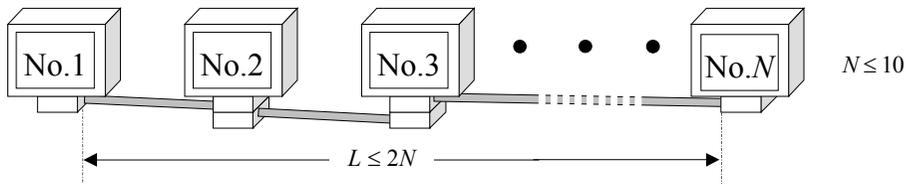


Figure 4.3 Total cable length for the system that has less than or equal to 10 devices

- Or 20.0 m, whichever is less.

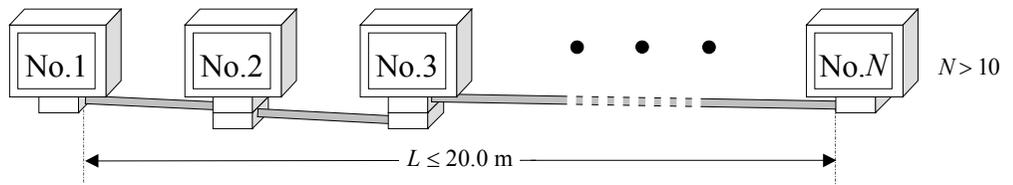


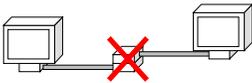
Figure 4.4 Total cable length for the system that has greater than 10 devices

## 4.2.4 Cabling Configurations

Cables can be interconnected in any configuration such as star, linear, or any combinations thereof. To reduce noise interference, avoid loop configuration for cabling.



For reliable operations of a GPIB, you should not connect two cable assemblies without connecting a proper load or a GPIB device.



## 4.2.5 Address Assignment

A GPIB address consists of a primary address and a secondary address. Assign a different primary address, in the range of 0 through 30, or 00h through 1Eh, to each interface in the system. The secondary address of each interface may be freely assigned to any value.

Refer to “3.8 Configuring the Driver Software Parameters,” page 18, for the GPIB address assignment.

## 4.2.6 Powered-on Devices

When the GPIB is in use, at least two-thirds of all devices must be powered on.

### 4.3 Multiple GPIB Boards

Keep in mind these notes below, when two or more GPIB boards are installed in a computer.

◆ **Configuring the rotary switch for the PCI board identification**

Configure the rotary switch for the PCI board identification not to conflict with numbers assigned for other boards. Refer to “6.3 Interface PCI Board Identification (RSW1),” page 31.

◆ **Configuring driver software parameters**

Configure the driver software parameters for each board.

Refer to “3.8 Configuring the Driver Software Parameters,” page 18.

Specify the same number as the RSW1 value on the board in **Board number**.

The screenshot shows a 'Default Settings' dialog box with the following configuration:

- Board number: 0
- System controller: Yes
- Primary address (hex): 00
- Secondary address (hex): FF
- Send/receive timeout: 100 \* 100 ms
- Event: 100 \* 100 ms
- GPIB command timeout: 100 \* 100 ms
- Source handshake timing: Very high speed
- Send delimiter terminating on write: CRLF + EOI
- Receive delimiter terminating on read: CRLF + EOI
- STB timeout: 100 \* 100 ms
- Parallel poll execution timing: 10 microseconds

## Chapter 5 Troubleshooting and Diagnosis

### 5.1 Checkpoints

If the PCI-4302 doesn't work correctly, check the following points.

Table 5.1 Checkpoints for Troubleshooting

Problem	Solution
The device manager shows an exclamation point or X beside <b>Interface PCI GPIB</b> in the device tree.	< <b>Windows XP, Windows 2000, Windows Me, Windows 98, and Windows 95</b> > Enable the Plug and Play capability in the BIOS setup program on the computer.
	< <b>Windows NT 4.0</b> > Disable the Plug and Play capability in the BIOS setup program on the computer.
The board does not operate correctly.	Double-check all cable connections.
	If the power requirements exceeds the system power budget, the circuits on the board or connected external circuits cannot be powered properly. Prepare an external power supply for your PCI board.
	Remove and re-install the device driver correctly. See "Chapter 3 Installation," page 13.
	The device driver checks the RSW1 value of each board for identification purposes. If the RSW1 value of one board conflicts with that on another identical board in the same system, then the device driver may not work. When two or more identical boards are installed in a single system, each RSW1 must be set to a unique value. See "6.3 Interface PCI Board Identification (RSW1)," page 31.
Driver software does not work as expected.	Register the board by using the control panel applet <b>Interface GPIB Board System Configuration</b> in the <b>Control Panel</b> . See "3.8 Configuring the Driver Software Parameters," page 18.
	Specify the same number as on the RSW1 value on the board in <b>Board number</b> in the control panel applet <b>Interface GPIB Board System Configuration</b> in the <b>Control Panel</b> . See "3.8 Configuring the Driver Software Parameters," page 18.
When running a sample program, an error message is displayed.	Register the board by using the control panel applet <b>Interface GPIB Board System Configuration</b> in the <b>Control Panel</b> . See "3.8 Configuring the Driver Software Parameters," page 18.
	< <b>Windows XP, Windows 2000, Windows NT 4.0</b> > A System Administrator should install the driver correctly.
Errors occur during data transfer.	Configure the termination method of the board properly corresponding to that of the devices on the bus.
	Make sure that the target device is correctly addressed as a Talker or a Listener.
	Make sure that there are no conflicting GPIB address.
	Configure the time-out value enough long to enable devices to respond the request of the transfer.
The control for indefinite period at data transfer does not respond. It seems to be hung.	Make sure that GPIB addresses of the devices on the bus are configured properly and your program correctly addresses the devices. In this case, your program is waiting for a completion of the data transfer. After the transfer has been successfully completed or time-out has occurred, your application returns the control.
An error code of -7 is returned when sending the Device Clear message.	Configure the time-out value for GPIB bus commands longer by using the control panel applet <b>Interface GPIB Board System Configuration</b> in the <b>Control Panel</b> . See "3.8 Configuring the Driver Software Parameters," page 18.
The computer does not respond after Standby mode. (Input and output are disabled.)	Set the System standby setting to "Never".

## 5.2 Diagnostic Program

This program can determine if a malfunction is located in the software or in the hardware. If the problem is located in the software, this program can diagnose the problem in detail. Before starting diagnosis, configure the board as the System Controller and set the RSW1 rotary switch on each board so as not to conflict with any other.

This program diagnoses following items:

- Driver software installation
- I/O port access
- Interrupt line

### 5.2.1 Required Items for the Diagnostic Program

- PCI-4302 board
- Interface GPIB diagnostic program

### 5.2.2 Starting the Diagnostic Program

1. Click the **Start** button, point to **Programs**, point to **Interface GPF-4301**, and then click **GPIB Diagnostic Program**.
2. The **Interface GPIB Board Diagnostic Program** main window will appear.

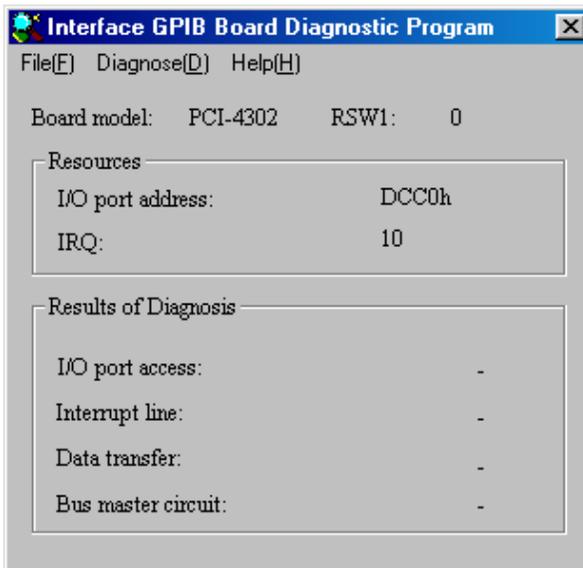
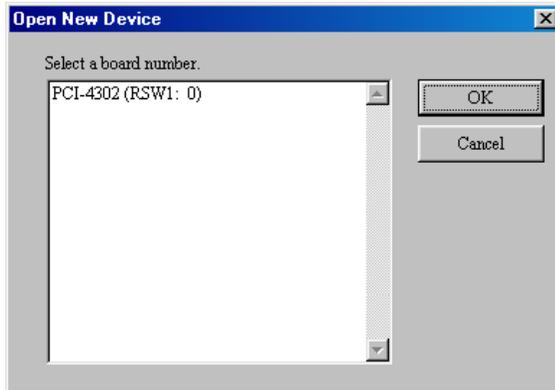


Figure 5.1 The GPIB diagnostic program main window

3. The board model, I/O address, and IRQ will be displayed on the main window. The following table shows available menu items and commands.

Menu	Command	Description
File	Open New Device	Selects a device to diagnose.
	Save	Saves the diagnostic results.
	Exit	Closes the program.
Diagnose	Start to Diagnose	Starts to diagnose.
	Clear the Results	Clears the diagnostic results.
Help	Version Information	Displays the version information.

- On the **File** menu, click **Open New Device** and the list will be displayed on the window. Select the board you want to diagnose, and click **OK**. This program can open only one device at a time.

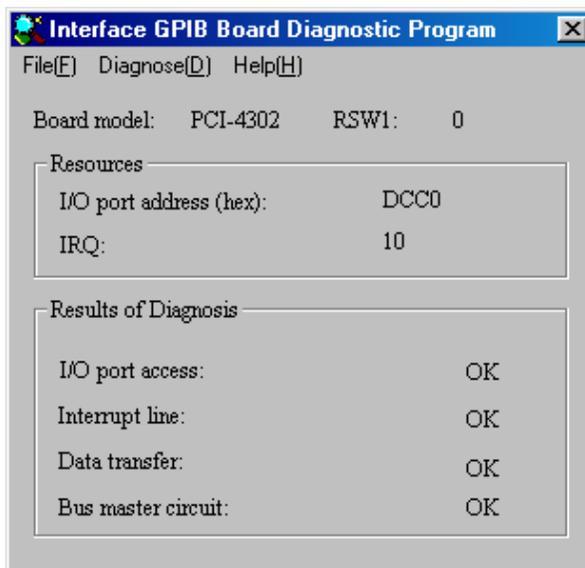


- If you cannot find the board you want to diagnose in the **Open New Device** dialog box, check the following points:
  - Have you installed the driver software correctly? If not so, uninstall and reinstall the driver software. See “3.4 Driver Software Installation,” page 14.
  - Does the PCI BIOS or Windows correctly initialize and configure the Interface GPIB boards?

Please inquire of our Technical Support Center about solutions for the unresolved problems.

### 5.2.3 Checking the PCI Configuration and Other Operations

- To check the PCI configuration and other operations, click the **Start to Diagnose** on the **Diagnose** menu.
- Make sure that the GPIB address are disconnected from the board.
- Each diagnosis starts automatically and each result will be displayed in the **Results of Diagnosis** group box.



- When the result is **NG**, click **Save** on the **File** menu. And please send the result to our Technical Support Center by fax or e-mail.

## **5.3 FAQ**

Q1) When assembling a 4-meter cable from two 2-meter cables, can I use the assembled cable for my GPIB system?

A1) No, the assembled cable for reliable operations of the system cannot be used. Inquire of our Sales Information Center for non-standard length cables.

Q2) How can a driver software be updated?

A2) Follow the procedure below.

1. Make a new directory in the hard disk.
2. Copy each downloaded file to the directory.
3. Decompress these files, then the directory and file are created.
4. Prepare formatted and blank floppy disks.
5. Copy the files in the directory to the floppy disk prepared, respectively.
6. The installation disk for update is created.

Refer to "README.HTM" on CD about the update method by using the installation disk.

Note: On README.HTM, CD can be interpreted as the same meaning as floppy disk.

Q3) When using the GPF-4301 driver, do we need Visual C++ and Visual Basic to control measurement devices?

A3) Yes. Various development languages are required when using the GPF-4301 driver. Refer to README.HTM or Help files for supported languages.

## Chapter 6 Appendix

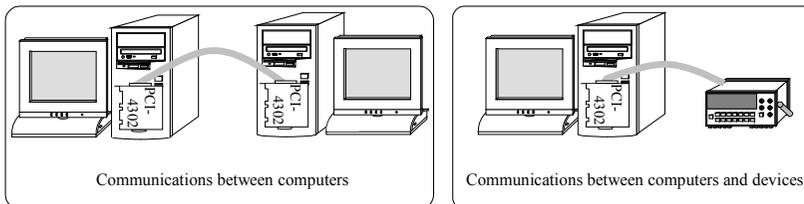
### 6.1 Features

#### 6.1.1 Various Useful Software

You can use either standard or advanced versions of DLL or Active X Control, in addition to Active X Control for Excel to develop your application. These software will meet your requirements.

#### 6.1.2 IEEE Std. 488.1-1987 Fully Compatible

The **PCI-4302** boards are fully compatible with IEEE std. 488.1-1987. They can communicate with various instruments and controllers.



#### 6.1.3 High-Performance GPIB Controller

Interface Corporation has developed high-performance GPIB controller chips. The GPIB controller has a complete PCI interface bridge circuit, and is compliant with PCI specification 2.1. The GPIB controller chip provides complete Talker, Listener, and Controller capabilities.

#### 6.1.4 PCI Bus Master DMA Transfer

The GPIB controller chip is capable of PCI bus master DMA transfer. Using this capability significantly reduces software overheads at data transfer.

#### 6.1.5 Asynchronous Data Transfer Capability

The driver software can perform an asynchronous operation at data transfer, so you can process other tasks without waiting for the completion of the asynchronous data transfer.

#### 6.1.6 Low Power Consumption

The GPIB controller chip operates at 3.3 Vdc, so low power consumption is achieved.

#### 6.1.7 Monitor LEDs

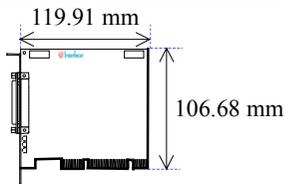
A general purpose LED shows whether the **PCI-4302** has a controller capability. An I/O access LED blinks when the device driver accesses to the **PCI-4302**. A GPIB access LED blinks when the **PCI-4302** participates in activities on the GPIB. The locations of these LEDs are described in "6.4 LEDs," page 31.

#### 6.1.8 PCI 5 V/3.3 V Signaling Environment

The **PCI-4302** is compliant with both the PCI 5 V and 3.3 V signaling environments.

## 6.2 Hardware Specifications

Table 6.1 Hardware Specifications

Parameter		Specification
GPIB	Number of channels	1
	GPIB compatibility	IEEE Std 488.1 fully compatible
	Signal line driver/receiver	75160 or equivalent (data lines) 75162 or equivalent (control lines)
	Interface function	AH1, C1, C2, C3, C4, C5, DC1, DT1, L3/LE3, PP1/PP2, RL1, SH1, SR1, T5/TE5
	Transfer protocol	8-bit parallel, three wire handshake
	Maximum transfer rates	1.1 MB/s (Actual transfer rates depend on your system configurations and instruments on the GPIB.)
	Maximum data transfer length	Total cable length: less than or equal to 20 m Each cable assembly: less than or equal to 4 m
	Number of devices	15 devices (max.)
	I/O connector	IEEE Std 488.1 standard or equivalent
Bus requirements	PCI local bus (Rev. 2.1 or later), 32 bit, 33 MHz 5 V and 3.3 V signaling environment	
Number of I/O ports	32 ports	
Interrupts	1 level	
LED	General purpose, GPIB access, and I/O access	
Data transfer	Programmed I/O transfer and bus master DMA transfer	
Environmental conditions	Operating temperature: 0 °C to 50 °C Relative humidity: 20% to 90% (non-condensing)	
Supply voltage	+5 Vdc	
Power consumption	0.3 A (typ.)	
Board dimensions	 <p>119.91 mm 106.68 mm</p>	

### 6.3 Interface PCI Board Identification (RSW1)

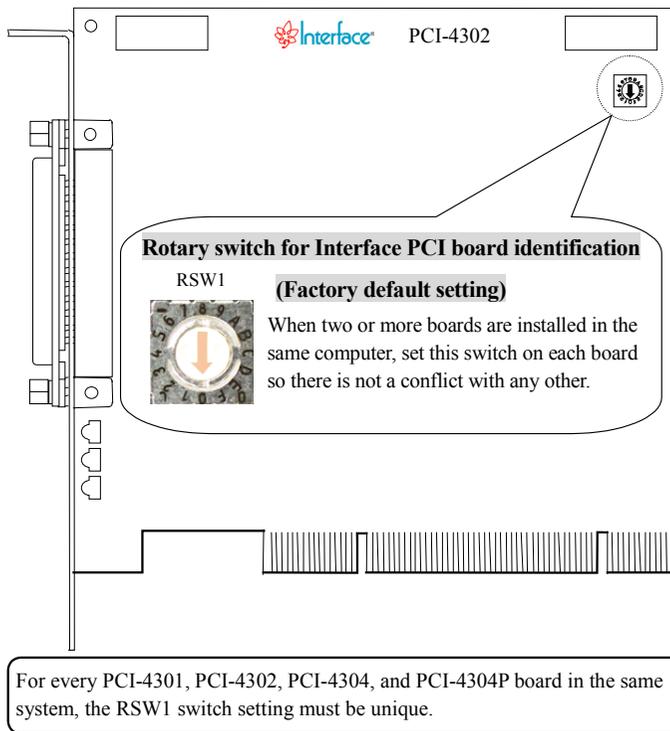


Figure 6.1 PCI board identification switch

### 6.4 LEDs

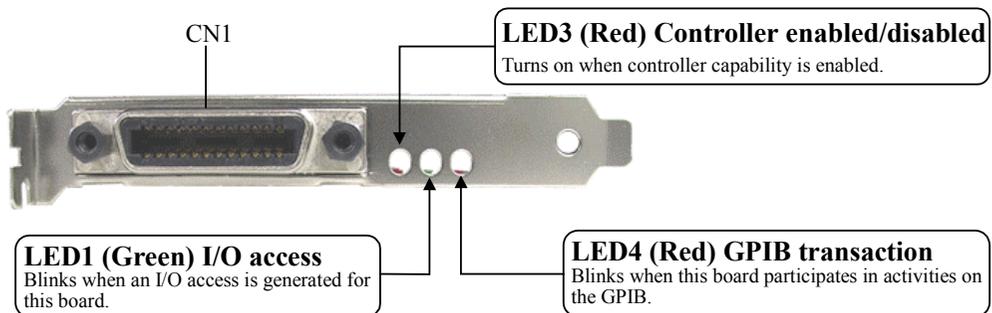


Figure 6.2 LED locator

## 6.5 Interface Product Pin Assignments

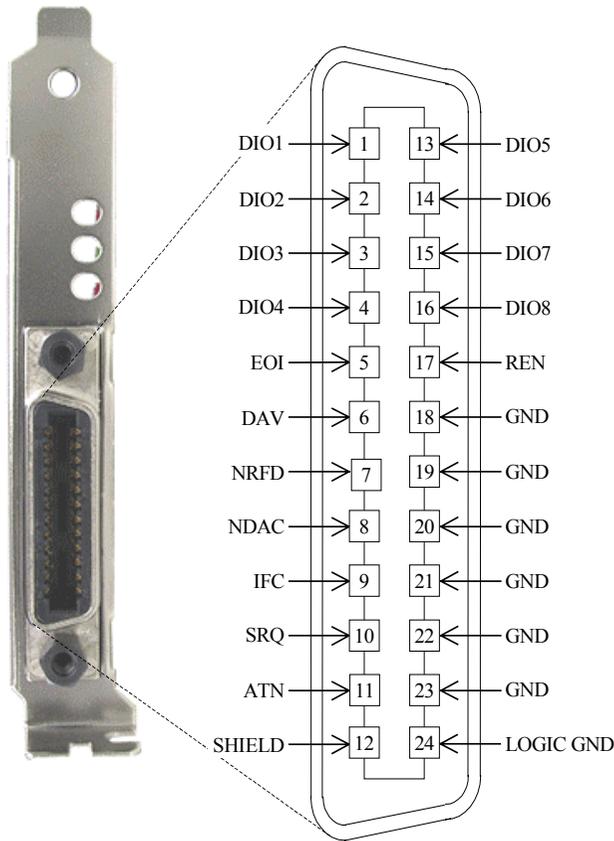


Figure 6.3 I/O connector pin assignment

## 6.6 Signals

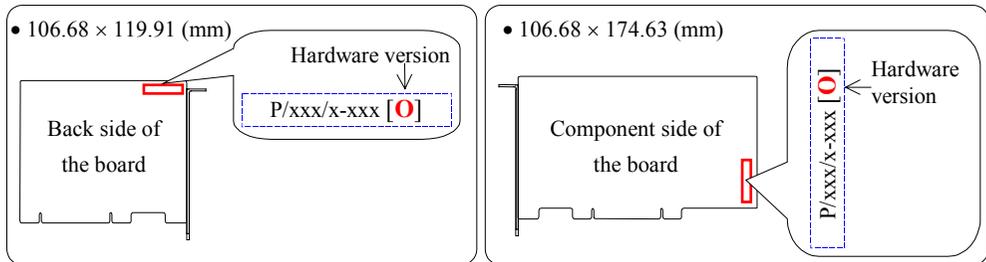
Signal Description

Signal	Pin Number	Direction	Description	
DIO1 through /DIO4	1 through 4	Input/Output	Transmits data. (command, address, and so on)	
DIO5 through /DIO8	13 through 16			
EOI	5		Marks the end of a data message/executes a parallel poll. (End or Identity)	
DAV	6		Indicates data is enabled. (Data Valid)	
NRFD	7		Indicates the device is ready or not ready to receive data. (Not Ready For Data)	
NDAC	8		Indicates the device accepts/does not accept data. (Not Data Accepted)	
IFC	9		Initializes an interface. (Interface Clear)	
SRQ	10		Requests a service. (Service request)	
ATN	11		Classifies data. (Attention)	
SHIELD	12		—	Indicates signal ground.
REN	17		Input/Output	Indicates the switching of a device remort/rocal control (Remort Enable)
GND	18 through 23	—	Indicates ground.	
LOGIC GND	24	—	Indicates logic ground.	

## Chapter 7 Version Considerations

### 7.1 Hardware Version

The location of the hardware version number depends on the form factor of the board as shown in the following figure.



### 7.2 Correspondence Table

The version of the user's manual and version of the hardware correspond as follows.

Manual Version	Hardware Version
Ver. 1.0	11
Ver. 1.1	11
Ver. 1.2	13
Ver. 1.3	13

**-Index-**

<b>A</b>		IFC.....8, 9
Address		Installation.....14, 15
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	Manual.....35	

## For Assistance:

If you would like to inquire our products, please contact below.

<b>E-mail</b>	support@interface.co.jp
<b>URL</b>	www.interface.co.jp/support/

## Repair and Maintenance:

We provide repair and maintenance service for your damaged product. If you need this service, please refer to “**Repair and Maintenance**” of a user’s manual of Japanese version and follow the procedures for repair and maintenance applications.

PLEASE NOTE: We do not accept the repair for the product which is **not** used in Japan. If you use our products in other countries, please contact the store where you purchased them.

You can download a user’s manual of Japanese version from our Web site below.

URL: [www.interface.co.jp](http://www.interface.co.jp)

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Technical Support	Online questions and answers, rental service, frequently asked questions, and glossary
Sales	Mail order, distributors list
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