Getting Started with Your GPIB-SCSI-A and the NI-488.2M™ Software for Solaris 2

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This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual, may cause interference to radio and television reception. 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.

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About This Manual

This manual contains instructions for installing and configuring the National Instruments GPIB-SCSI-A Controller box and NI-488.2M multitasking software driver for use with the Sun SPARCstation running under the Solaris 2.0 or higher operating system. This manual is meant to be used with the *NI-488.2M Software Reference Manual*.

The material in this manual is for users who have knowledge of the Sun SPARCstation running under Solaris 2.0 or higher operating system. This manual also assumes that the user has already received a GPIB-SCSI-A Controller box.

How to Use the Manual Set

Use this getting started manual to install and configure your GPIB-SCSI-A and NI-488.2M software for Solaris 2.

Use the *NI-488.2M Software Reference Manual* to learn the basics of GPIB and how to develop an application program. The software reference manual contains specific information about each NI-488 function and NI-488.2 routine such as format, parameters, and possible errors. It also contains debugging information and detailed examples.

If you are using the Solaris 1 operating system, please refer to *Getting Started with Your GPIB-SCSI-A and NI-488.2M Software for the Sun SPARCstation.*

Organization of This Manual

This manual is organized as follows:

*   Chapter 1, *Introduction*, explains how to use this manual, lists what you need to get started, and briefly describes the GPIB-SCSI-A and NI-488.2M software.

*   Chapter 2, *Hardware Configuration and Installation*, describes how to configure the GPIB-SCSI-A and how to connect the GPIB-SCSI-A to the Sun SPARCstation.

*   Chapter 3, *Software Installation and Configuration*, contains instructions to help you install and configure your NI-488.2M software.

*   Chapter 4, *Installation Verification and Troubleshooting*, describes how to verify the software installation and how to troubleshoot problems.

*   Chapter 5, *Using Your NI-488.2M Software*, describes the `ibic` utility and lists some programming considerations.

- Appendix A, *Hardware Specifications*, lists the electrical, environmental, and physical specifications of the GPIB-SCSI-A and the recommended operating conditions.

- Appendix B, *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, symbols, and terms.

Conventions Used in This Manual

The following conventions are used in this manual.

bold   Bold text denotes an LED name.

italic   Italic text denotes emphasis, a cross reference, or an introduction to a key concept.

bold italic   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, paths, directories, programs, device names, field names, functions, variables, and filenames.

IEEE 488 and   IEEE 488 and IEEE 488.2 are used throughout this
IEEE 488.2   manual to refer to the ANSI/IEEE Standard 488.1-1987 and the 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:

- *GPIB-SCSI-A User Manual*, National Instruments Corporation

- ANSI X3.131-1986, *Small Computer System Interface (SCSI)*

- 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*

- *Solaris 2.x Answerbook* (part number 704-3138-xx), section titled *SunOS 5.0 Writing Device Drivers* (section number 800-6502-10), SunSoft, Inc., 2550 Garcia Avenue, Mountain View, California 94043

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 B, *Customer Communication*, at the end of this manual.

Chapter 1
Introduction

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

How to Use This Manual

```
Chapter 1          ( Gather What You Need )
                   (   to Get Started     )
                            |
                            v
Chapter 2          [ Install the Hardware ]
                            |
                            v
                   [ Install the Software ]
                            |
                            v
Chapter 3          <  Need to        >  Yes   [ Configure the Software ]
                   < Change Software  >----------->
                   <    Settings?     >
                            |
                           No
                            v
                   [ Verify the Installation ]  <----
Chapter 4                   |
                            v
                   <   Passes?   >   No   [ Troubleshooting ]
                            |
                           Yes
                            v
Chapter 5          [      Run ibic       ]
                            |
                            v
                   [ Review  Programming  ]
                   [    Considerations     ]
                            |
                            v
Software Reference ( Write Application Program )
   Manual
```
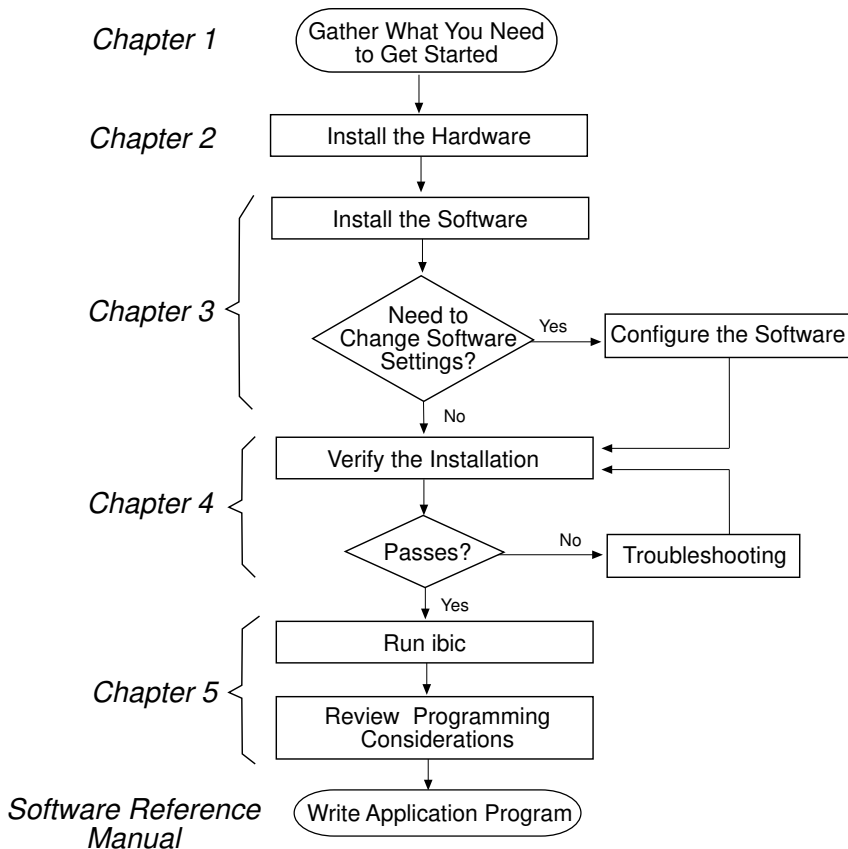
What You Need to Get Started

❑   One of the following GPIB-SCSI-A boxes:
•   100-120 VAC
•   220-240 VAC

❑   One of the following power cords:
     •   U.S.A. standard power cord
     •   U.K. power cord
     •   Switzerland power cord
     •   Australian power cord
     •   Universal European power cord
     •   North American power cord

❑   Standard 50-pin SCSI-1 terminator

❑   Type SCSI-G Cable: GPIB-SCSI-A (50-pin SCSI-1) to Sun SPARCstation (SCSI-2 50-pin)–1 m

❑   3.5 in. *NI-488.2M Distribution Disk for GPIB-SCSI-A Solaris 2 Driver and C Interface*

❑   Solaris version 2.0 or higher installed on your SPARCstation

Hardware Description

The GPIB-SCSI-A is a high-performance interface product that transparently handles data transfers between the SCSI and the GPIB. The GPIB-SCSI-A is actually an 8-bit microcomputer that operates as a full-function IEEE 488.2/SCSI Controller. It can turn any computer with a SCSI port into a GPIB Talker/Listener/Controller or it can make any device on the SCSI bus look like a GPIB device.

The GPIB-SCSI-A has all the software and logic required to implement the physical and electrical characteristics of the ANSI/IEEE Standard 488.2-1987 and the ANSI Standard X3T9.2. It is able to interpret and to execute commands that you send to it over the GPIB or SCSI ports and to perform all necessary GPIB-to-SCSI protocol conversions.

Standard GPIB cables can connect the GPIB-SCSI-A with up to 14 devices. If you need to connect to more than 14 devices, you can add them to your system using an IEEE 488 extender or expander, such as the National Instruments GPIB-130, GPIB-120A, or GPIB-110. Refer to Appendix A, *Hardware Specifications*, for more information about the GPIB hardware specifications and recommended operating conditions.

Software Description

The NI-488.2M software consists of a loadable driver and utilities that transform a Sun SPARCstation running Solaris 2 into an IEEE 488.2 Controller with complete communications and bus management capabilities.

The NI-488.2M driver can support multiple GPIB-SCSI-A boxes installed in a SPARCstation. The driver is compatible with both IEEE 488 and IEEE 488.2 instruments.

Chapter 2
Hardware Configuration and Installation

This chapter describes how to configure the GPIB-SCSI-A and how to connect the GPIB-SCSI-A to the Sun SPARCstation.

Figure 2-1 shows the rear panel of the GPIB-SCSI-A.
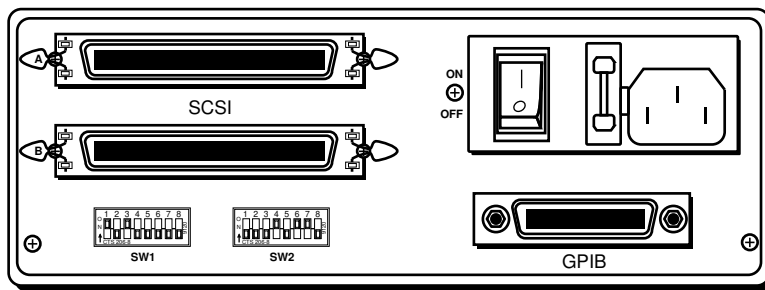
Figure 2-1. GPIB-SCSI-A Rear Panel

Configure the Hardware

The hardware configurations of the SCSI ID (Target ID) and the GPIB primary address must match the software configuration in the system configuration files and the NI-488.2M software.

The GPIB-SCSI-A is shipped from the factory with a 100-120 V or a 220-240 V power supply. Before you use the GPIB-SCSI-A, verify that the voltage on the power supply matches the voltage that is supplied in your area.

Warning: *Operating the GPIB-SCSI-A at any voltage other than the one specified on the bottom of the unit could damage the unit. Replacement fuses must be the proper type and rating. See Appendix A, Hardware Specifications, for fuse information.*

The GPIB-SCSI-A is shipped from the factory configured to operate in SCSI (S) mode. Optional parity checking on the SCSI port is disabled. The SCSI ID that the GPIB-SCSI-A responds to is set at 5, and the primary GPIB address is set at 0. Additionally, the GPIB-SCSI-A kit is shipped from the factory with a SCSI terminating resistor installed. Depending on how you connect the GPIB-SCSI-A to your system, you may want to remove the terminating resistor.

Note: *The only parameters available for configuration with this kit are the SCSI ID and the GPIB address. Do not change any other switch settings from the factory default settings.*

The factory default setting of the GPIB-SCSI-A Target ID is 5. To confirm that a Target ID of 5 is available in your system, print out the startup messages from the last time you booted with the following command:

```
dmesg
```

Among the startup messages are the devices found on the SCSI bus and their respective Target ID numbers. If a Target ID of 5 is not available in your system, select an unused Target ID (a number between 0 and 7) and set the appropriate switch to that Target ID number (refer to the next section, *Configuration Switch Settings for SW1*). Typically, Targets 1 and 3 are used by the internal disks, Target 4 is used by a tape drive (if you have a tape drive), and Target 0 is used by an external disk drive. Target 7 is always used by the Sun SPARCstation central processing unit.

Configuration Switch Settings for SW1

The DIP switch at location SW1 on the rear panel (see Figure 2-1) is used to configure the power-on primary GPIB address and SCSI ID of the GPIB-SCSI-A. Figure 2-2 shows the factory default settings.
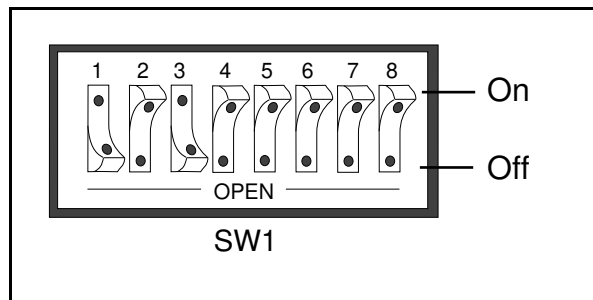

Figure 2-2. SW1 Default Mode Switch Settings

The default settings of switches 1 through 3 are ON, OFF, ON, respectively, to select the SCSI ID of 5. Switches 4 through 8 are OFF, indicating that the GPIB primary address of the GPIB-SCSI-A is 0.

Tables 2-1 and 2-2 show the possible configurations of the eight switches for SW1 and what each configuration indicates. Factory default settings are in ***bold italics***.

Table 2-1. SW1 Configuration Parameters for Switches 1 through 3

Switches			Indication
1	**2**	**3**	
OFF	OFF	OFF	SCSI ID of 0
OFF	OFF	ON	SCSI ID of 1
OFF	ON	OFF	SCSI ID of 2
OFF	ON	ON	SCSI ID of 3
ON	OFF	OFF	SCSI ID of 4
ON	***OFF***	***ON***	***SCSI ID of 5***
ON	ON	OFF	SCSI ID of 6
ON	ON	ON	SCSI ID of 7

Table 2-2. SW1 Configuration Parameters for Switches 4 through 8

Switches					**Indication**
4	**5**	**6**	**7**	**8**	
OFF	***OFF***	***OFF***	***OFF***	***OFF***	***GPIB Primary address 0***
OFF	OFF	OFF	OFF	ON	GPIB Primary address 1
OFF	OFF	OFF	ON	OFF	GPIB Primary address 2
OFF	OFF	OFF	ON	ON	GPIB Primary address 3
OFF	OFF	ON	OFF	OFF	GPIB Primary address 4
OFF	OFF	ON	OFF	ON	GPIB Primary address 5
OFF	OFF	ON	ON	OFF	GPIB Primary address 6
OFF	OFF	ON	ON	ON	GPIB Primary address 7
OFF	ON	OFF	OFF	OFF	GPIB Primary address 8
OFF	ON	OFF	OFF	ON	GPIB Primary address 9
OFF	ON	OFF	ON	OFF	GPIB Primary address 10
OFF	ON	OFF	ON	ON	GPIB Primary address 11
OFF	ON	ON	OFF	OFF	GPIB Primary address 12
OFF	ON	ON	OFF	ON	GPIB Primary address 13
OFF	ON	ON	ON	OFF	GPIB Primary address 14
OFF	ON	ON	ON	ON	GPIB Primary address 15

Table 2-2. SW1 Configuration Parameters for Switches 4 through 8 (Continued)

Switches					Indication
4	5	6	7	8	
ON	OFF	OFF	OFF	OFF	GPIB Primary Address 16
ON	OFF	OFF	OFF	ON	GPIB Primary Address 17
ON	OFF	OFF	ON	OFF	GPIB Primary Address 18
ON	OFF	OFF	ON	ON	GPIB Primary Address 19
ON	OFF	ON	OFF	OFF	GPIB Primary Address 20
ON	OFF	ON	OFF	ON	GPIB Primary Address 21
ON	OFF	ON	ON	OFF	GPIB Primary Address 22
ON	OFF	ON	ON	ON	GPIB Primary Address 23
ON	ON	OFF	OFF	OFF	GPIB Primary Address 24
ON	ON	OFF	OFF	ON	GPIB Primary Address 25
ON	ON	OFF	ON	OFF	GPIB Primary Address 26
ON	ON	OFF	ON	ON	GPIB Primary Address 27
ON	ON	ON	OFF	OFF	GPIB Primary Address 28
ON	ON	ON	OFF	ON	GPIB Primary Address 29
ON	ON	ON	ON	OFF	GPIB Primary Address 30
ON	ON	ON	ON	ON	GPIB Primary Address 0

Configuration Switch Settings for SW2

The DIP switch at location SW2 on the rear panel (see Figure 2-1) is used to configure the mode of operation for the GPIB-SCSI-A. These switch settings should *not* be changed for use with the Sun SPARCstation. Figure 2-3 shows the factory default settings. Make sure that these switches are set as shown in Figure 2-3. If they are not, set these switches as indicated.
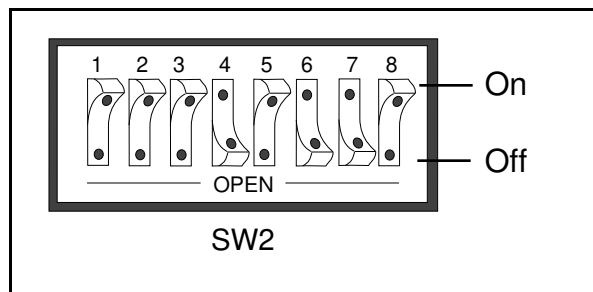

Figure 2-3. SW2 Default Mode Switch Settings

Table 2-3 shows the factory default configurations of the eight switches for SW2.

Table 2-3. Factory Default Configurations for SW2

Switch	Position	Indication
1-3	OFF	Reserved and should remain OFF
4	ON	Double buffering is enabled
5	OFF	GPIB-SCSI-A completes all data requests to the count specified
6	ON	GPIB-SCSI-A buffers data during data transfer commands
7	ON	GPIB-SCSI-A neither notices nor reports SCSI parity errors
8	OFF	Operating in S (SCSI) mode

Using SCSI Terminating Resistors

Because of its high-speed capabilities, the SCSI bus is sensitive to the electrical characteristics of the SCSI cabling. When a signal is sent through the SCSI bus, it bounces back and creates echoes along the cabling. Any device in the middle of the daisy-chained SCSI bus receives these signal echoes. You should use terminating resistor packs to prevent echoes and ensure proper termination of a signal. Read the documentation for each device in your system to find out what kind of termination it provides.

If your GPIB-SCSI-A is located at the end of a SCSI bus, you can prevent echoes by leaving the terminating resistor pack installed on one of the ports on the rear panel of the GPIB-SCSI-A. Also, ensure that the device at the other end of the SCSI bus (for example, the SCSI host in Figure 2-4) has a terminating resistor installed. Remove the terminating resistor packs on all devices except for the one at each end because SCSI signals are not reliably passed along the SCSI bus after they reach a device with a terminator.

Caution: ***Never connect more than two sets of terminating resistors on a SCSI bus because more than two sets might overload the signals and generate errors.***

Figure 2-4 shows where to install terminating resistors if the GPIB-SCSI-A is located at the end of a system.
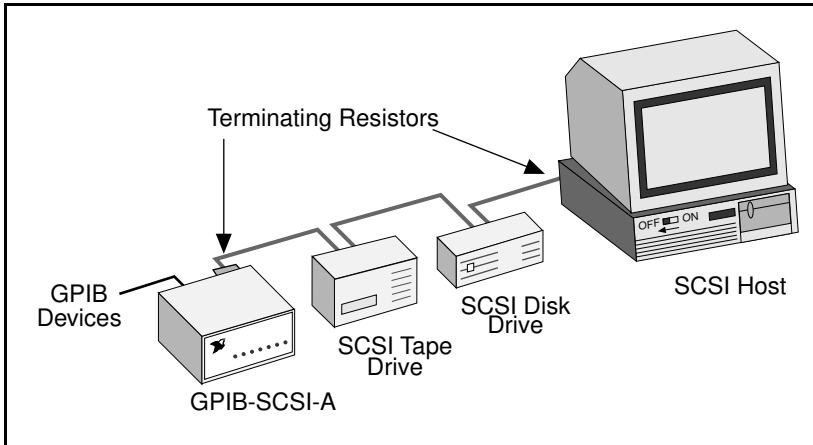
Figure 2-4. Location of Terminating Resistors for GPIB-SCSI-A at End of SCSI Bus

If your GPIB-SCSI-A is not located at the end of the SCSI bus, remove the terminating resistor pack from the rear panel of the GPIB-SCSI-A. Also ensure that all other devices in the middle of the bus (for example, the SCSI disk drive in Figure 2-5) do not have terminating resistors installed. The devices at each end of the SCSI bus should have terminating resistors installed.

Figure 2-5 shows where to install terminating resistors if the GPIB-SCSI-A is at a location other than the end of a system.

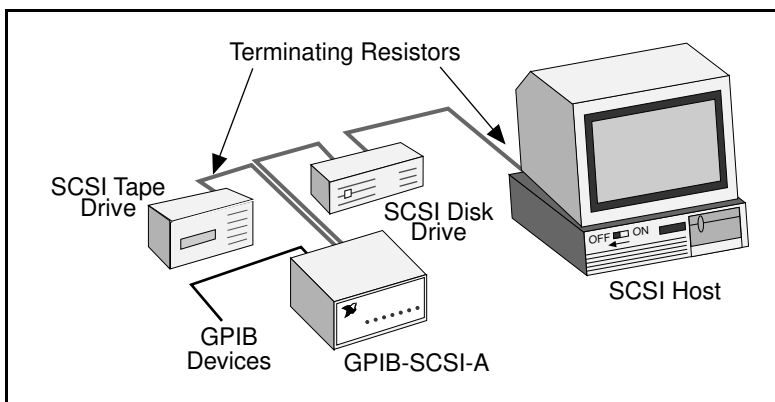Figure 2-5. Location of Terminating Resistors for GPIB-SCSI-A Not at End of SCSI Bus

Connect the Hardware

The following are general instructions for connecting the GPIB-SCSI-A to the Sun SPARCstation. Consult the chapter on installing external drives in the installation guide that came with your Sun SPARCstation for specific instructions and warnings.

There are two methods for connecting the GPIB-SCSI-A to the Sun SPARCstation. One method is connecting the GPIB-SCSI-A directly to the SPARCstation system unit by using a cable with the proper connectors at each end. The other method is daisy-chaining. *Daisy-chaining* is a means of connecting a number of SCSI devices to a host; thereby, a single port on the host can serve a variable number of devices. Daisy-chaining is the suggested method for connecting the GPIB-SCSI-A to the Sun SPARCstation.

Whether you are using a direct connection or daisy-chaining, there are four basic steps to connecting the GPIB-SCSI-A.

1.   Shut down your system and turn off your computer.

2.   Connect the cables.

3.   Switch on your GPIB-SCSI-A.

4.   Power on your system.

Step 1. Shut Down the System

Complete the following steps to shut down your system:

1.   Enter the `shutdown` command and turn off your computer. (You need super-user privilege to do a shutdown.)

2.   Unplug the power cord from the power outlet.

Step 2. Connect the Cables

Warning: ***Never connect or disconnect SCSI cables when any device (computer, tape drive, GPIB-SCSI-A, and so on) is powered on. Doing so can cause fuses to blow inside the GPIB-SCSI-A and inside other SCSI devices that supply termination power (TERMPWR) to the SCSI bus.***

Complete the following steps to connect the cables:

1.   Connect the SCSI cable to the GPIB-SCSI-A and fasten it securely. Connect the other end to your SCSI system. Be sure to use only shielded SCSI cables. Total cable length in your SCSI system should be less than 6 m, and terminating resistors should be installed on both ends, as described earlier in this chapter.

2.   Connect the GPIB cable to the GPIB-SCSI-A and tighten the thumb screws on the
      connector. Connect the other end to your GPIB system. Be sure to use only
      shielded GPIB cables. Total cable length in your GPIB system should be less than
      20 m, with a maximum separation of 4 m between any two devices. You should
      have no more than 15 devices in a GPIB system, and at least two-thirds of those
      devices must be powered on.

3.   Plug the power cord into an AC outlet of the correct voltage.

Step 3. Switch On Your GPIB-SCSI-A

Switch on your GPIB-SCSI-A by using the rocker switch on the rear panel. The
POWER LED should come on immediately and the **READY** indicator on the front
panel should come on after the GPIB-SCSI-A has passed its power-on self-test,
indicating that the unit is ready for operation.

If the **READY** indicator does not come on within 10 seconds after the unit is powered
on, recheck all connections and switch settings and retry the power-on sequence. If the
READY light still fails to come on, fill out the configuration forms in Appendix B,
Customer Communication, and then contact National Instruments for support.

Step 4. Power On Your System

Complete the following steps to power on your system:

1.   Plug the power cords of the Sun SPARCstation and any other SCSI equipment into a
      power outlet.

2.   Power on all devices.

3.   Power on your system.

Chapter 3
Software Installation and Configuration

This chapter contains instructions to help you install and configure your NI-488.2M software.

NI-488.2M Software Components

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

- `ib` is the NI-488.2M driver for the GPIB board.

- `ugpib.h` is the include file for user programs.

- `libgpib.so` is the dynamic link library containing the C language interface.

- `libgpib.a` is the static linked library containing the C language interface.

- `cib.c` is the source of the C language interface library.

- `ibconf` is the software configuration utility.

- `ibic` is the interactive control utility.

- `ibtsta` tests the software installation.

- `minibconf` is a utility used during installation.

Install the Software

After you have installed the hardware, you are ready to install the NI-488.2M software. Follow these steps to install the NI-488.2M software:

1. Log on as super-user (`root`).

2. Insert the NI-488.2M distribution diskette.

3. Add the NI-488.2M software to the operating system by entering the following command:

   ```
   pkgadd –d /dev/rdiskette NICscsia
   ```

   This command installs the NI-488.2M software components. During the installation you are prompted to enter the SCSI Target ID and GPIB bus number for each GPIB-SCSI-A that you have connected to your SPARCstation. After you have entered the information for all GPIB-SCSI-A boxes connected to your computer, enter `0` when prompted for the SCSI Target ID.

For example, if you want to configure the GPIB-SCSI-A at Target ID 5 as `gpib0`, enter 5 when prompted for `scsi-id` and 0 when prompted for the GPIB bus number.

4. Wait for the NI-488.2M software package to be successfully added, then eject the distribution diskette by entering the following command:

```
eject
```

Configure the Software with ibconf (Optional)

`ibconf` is an interactive utility you can use to examine or modify the configuration of the driver. You might want to run `ibconf` to change the settings of the software parameters. You must have super-user privilege to run `ibconf`.

`ibconf` is largely self-explanatory and contains help screens that explain all commands and options. For more information on using `ibconf`, refer to the *NI-488.2M Software Reference Manual*.

Follow these steps to change the default parameters of your NI-488.2M software. Before you configure the driver, make sure it is *not* in use.

1. Log on as super-user (`root`).

2. Run `ibconf` on the `ib` driver in the system modules directory (`/usr/kernel/drv`) by entering the following command.

```
ibconf <driver>
```

where `<driver>` refers to the directory path and name of the driver you want to modify. The default is `/usr/kernel/drv/ib`.

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

Remove the NI-488.2M Software (Optional)

If you ever decide to stop using your GPIB-SCSI-A, you can remove the NI-488.2M software. To remove the NI-488.2M software from the kernel configuration, you must have super-user privilege and the driver must *not* be in use. Enter the following command to unload the software:

```
pkgrm NICscsia
```

Chapter 4
Installation Verification and Troubleshooting

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

Run the Software Diagnostic Program ibtsta

The software installation test ibtsta verifies that the driver is installed correctly. It checks for correct access to the device driver.

Run ibtsta by entering the following command.

```
ibtsta
```

If no error occurs in ibtsta, the NI-488.2M software is installed correctly.

If ibtsta fails, it displays an error message that explains why the test failed and how you can correct the problem. If you are unable to run ibtsta successfully after you have followed the on-screen instructions, fill out the forms in Appendix B, *Customer Communication*, and contact National Instruments.

Troubleshooting

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

• The SCSI cable must be securely connected to the GPIB-SCSI-A.

• If the GPIB-SCSI-A is the last device on the SCSI bus, make sure that you have placed the terminating resistor pack on one of the SCSI ports on the rear panel of the GPIB-SCSI-A to terminate the SCSI bus. Refer to the *Using SCSI Terminating Resistors* section of Chapter 2, *Hardware Configuration and Installation*, for more information.

• The SW1 DIP switch settings on the GPIB-SCSI-A should be set to the correct SCSI ID (Target ID) and the correct GPIB primary address. Refer to the *Configuration Switch Settings for SW1* section of Chapter 2 for more information.

• The SW2 DIP switch should remain in the default configuration. Refer to the *Configuration Switch Settings for SW2* section of Chapter 2 for more information.

- Check the fuse.

Warning: ***Replacement fuses must be of the proper type and rating. See***
Appendix A**, Hardware Specifications**, for fuse information.

- The GPIB-SCSI-A must be powered on.

Common Questions

How do I know that my GPIB-SCSI-A and driver are installed correctly?

The `ibtsta` test verifies that both the hardware and software are installed correctly. If the test fails, and you cannot correct the problem, fill out the forms in Appendix B, *Customer Communication*, and contact National Instruments.

What could be causing a problem if the installation process fails?

The most probable reason is that the GPIB-SCSI-A is at a different SCSI Target ID than what you entered during installation. Reinstall using the correct ID.

Can I use the NI-488.2M driver for Solaris 2 with a Solaris 1.x operating system?

No, the NI-488.2M software for Solaris 2 is not compatible with Solaris 1.x (SunOS 4.x). If you are running Solaris 1.x, use the NI-488.2M software for Solaris 1 and the corresponding manual. The kit that you received includes disks and manuals for both Solaris 1 and Solaris 2.

What do I do if `ibtsta` fails with an error?

If you cannot correct the problem by following the on-screen instructions, fill out the forms in Appendix B, *Customer Communication*, and contact National Instruments.

What is wrong if `ibfind` returns a -1?

The driver may not be installed correctly, or the nodes may not have been created when the driver was loaded. Try installing the NI-488.2M software again. Refer to Chapter 3, *Software Installation and Configuration*, for more information.

Also, the file may require read/write privileges you do not have if you changed the default settings, or you may have renamed a device. Make sure that the device names in your application program match the device names in `ibconf`.

What could be causing a problem with accessing the NI-488.2M distribution diskette?

Check that the special file `/dev/rdiskette` is the correct file for the diskette driver. The codes should give you read/write access for `root.` Another possibility is that the data on the distribution diskette is corrupted.

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

For information about using the NI-488.2M language interface refer to Chapter 5, *Using Your NI-488.2M Software*.

When would I use `ibic`?

You can use `ibic` to test and verify instrument communication, troubleshoot problems, and develop your application program. For more information about `ibic`, refer to the *NI-488.2M Software Reference Manual*.

What information should I have before I call National Instruments?

When you call National Instruments, you should have the results of the diagnostic test `ibtsta.` You should also have run `ibic` to try to find the source of your problem. Also, make sure you have filled out the configuration form in Appendix B, *Customer Communication*.

Chapter 5
Using Your NI-488.2M Software

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

Introduction to ibic

You can use `ibic`, the Interface Bus Interactive Control utility, to enter NI-488 functions and NI-488.2 routines interactively and display the results of the function calls automatically. Without writing an application, you can use `ibic` to do the following:

*   Verify GPIB communication with your device quickly and easily

*   Learn the NI-488 functions and NI-488.2 routines before you write your application

*   Become familiar with the commands of your device

*   Receive data from your GPIB device

*   Troubleshoot problems with your application

For more information about `ibic`, refer to the *NI-488.2M Software Reference Manual.*

Programming Considerations

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

*   The application program must include the `ugpib.h` header file as follows:

    ```
    # include <sys/ugpib.h>
    ```

*   When you compile your application, you must link it to the GPIB C language interface library using one of the following commands, where *example.c* is your application name:

    ```
    cc example.c -lgpib
    ```

    or

    ```
    cc example.c -dy -lgpib
    ```

    or

    ```
    cc example.c -dn -lgpib
    ```

-dy specifies dynamic linking, which is the default method. It links the application to libgpib.so. -dn specifies static linking in the link editor. It links the application to libgpib.a. For more information about compiling and linking, see the man pages for cc and ld.

For information about choosing a programming method, developing your application, or compiling and linking, refer to the *NI-488.2M Software Reference Manual*. The reference manual also contains detailed information about each NI-488 function and NI-488.2 routine.

Appendix A
Hardware Specifications

This appendix lists the electrical, environmental, and physical specifications of the GPIB-SCSI-A and the recommended operating conditions.

Table A-1. Electrical Characteristics

Characteristic	Specification
Power Supply Unit	100-120 VAC ±10%, 50/60 Hz input or 220-240 VAC ±10%, 50/60 Hz input
Maximum Current Requirement	100-120 VAC, 90 mA 220-240 VAC, 45 mA
Fuse Rating and Type	100-120 VAC, 200 mA UL/CSA approved 220-240 VAC, 125 mA IEC approved

Table A-2. Environmental Characteristics

Characteristic	Specification
Operating Temperature	0° to 40° C
Storage Temperature	-20° to 70° C
Relative Humidity	10% to 90% noncondensing conditions
EMI	FCC Class A Verified

Table A-3. Physical Characteristics

Characteristic	Specification
Overall Case Size	74.5 mm by 190.2 mm by 250.9 mm (2.934 in. by 7.489 in. by 9.88 in.)
Case Material	All metal enclosure
Rack Mounting	Single or dual kits available
Weight	1.81 kg (4 lb)

Appendix B
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

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

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

Name   _____

Company   _____

Address   _____

  _____

Fax   (_____)   Phone   (_____) _____

Computer brand_____

    Model _____   Processor   _____

    Operating system _____

    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   _____

(continues)

National Instruments software product _____

    Version _____

    Configuration_____

The problem is_____

_____

_____

_____

_____

_____

_____

_____

List any error messages _____

_____

_____

_____

_____

_____

_____

_____

The following steps will reproduce the problem _____

_____

_____

_____

_____

_____

_____

GPIB-SCSI-A Hardware and Software Configuration Form

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

National Instruments Products

- GPIB-SCSI-A Model _____

- NI-488.2M Software Revision Number
  on Distribution media _____

- SW1 Switch Setting _____

- SW2 Switch Setting _____

- Terminating Resistor Pack Installed (yes or no)_____

Other Products

- Application Programming Language _____

- Solaris Version _____

- Other SCSI devices in System _____

Documentation Comment Form

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

Title: **Getting Started with Your GPIB-SCSI-A and the NI-488.2M™ Software for Solaris 2**

Edition Date: **October 1994**

Part Number: **320639-01**

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

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

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Thank you for your help.

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Glossary

Prefix	Meaning	Value
m-	milli- kilo-	10^{-3} 10^3 10^6

M-
mega-

o	degrees
%	percent
A	amperes
ANSI	American National Standards Institute
C	Celsius
DIP	dual inline package
DMA	direct memory access
EMI	electromagnetic interference
g	grams
GPIB	General Purpose Interface Bus
Hz	hertz
IEEE	Institute of Electrical and Electronic Engineers
in.	inches
lb	pounds
LED	light-emitting diode
m	meters
MB	megabytes of memory
RAM	random-access memory
SCSI	Small Computer System Interface (bus)
s	seconds
V	volts
VAC	volts alternating current
VDC	volts direct current