

Fieldbus

Getting Started with Your PCMCIA-FBUS and the NI-FBUS™ Software for Windows NT

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

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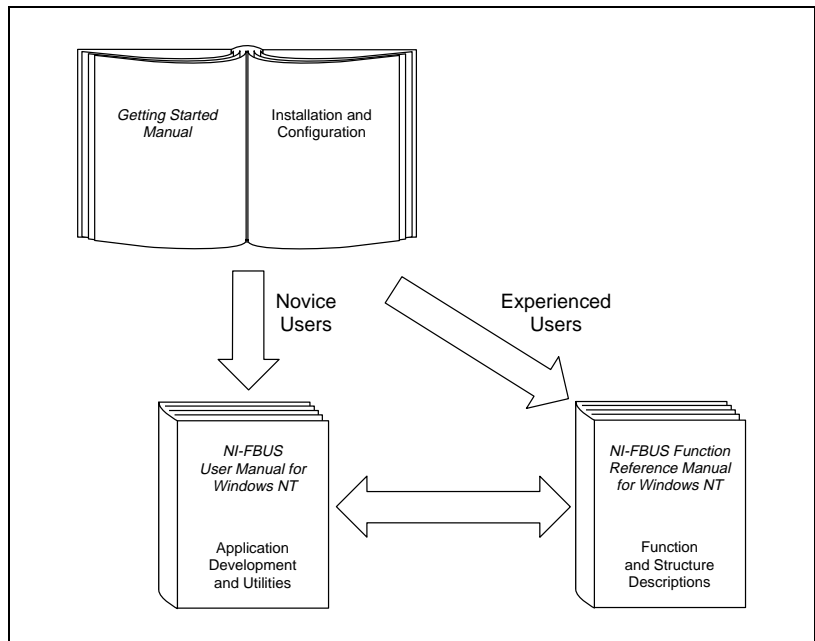
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***About
This
Manual***

This manual contains instructions for installing and configuring the National Instruments PCMCIA-FBUS interface card and the NI-FBUS software for Windows NT. The interface card is intended for use in laptop computers equipped with a Type II PCMCIA socket. The NI-FBUS software is intended for use with Windows NT. This manual assumes that you are already familiar with the Windows NT operating system.



How to Use the Manual Set

Use this getting started manual to install and configure your PCMCIA-FBUS card and the NI-FBUS software.

Use the *NI-FBUS Function Reference Manual for Windows NT* to look up specific information about NI-FBUS functions, such as input and output parameters, syntax, and error messages.

Use the *NI-FBUS User Manual for Windows NT* to learn how to use the NI-FBUS interface for your application.

Organization of This Manual

This manual is organized as follows:

- Chapter 1, *Introduction*, lists what you need to get started and includes a brief description of the PCMCIA-FBUS card and the NI-FBUS software.
- Chapter 2, *Hardware Installation*, contains instructions for installing your PCMCIA-FBUS card.
- Chapter 3, *Software Installation and Configuration*, contains instructions for installing and configuring your NI-FBUS software for Windows NT.
- Chapter 4, *Begin to Use the NI-FBUS Software*, helps you get started using the NI-FBUS software for Windows NT.
- Appendix A, *Specifications*, describes the electrical, physical, and environmental characteristics of the PCMCIA-FBUS hardware and the recommended operating conditions.
- Appendix B, *Pinout Information*, contains information about the pinout of the fieldbus connectors.
- 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

This manual uses the following conventions:

- » The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options»Substitute Fonts** directs you to pull down the **File** menu, select the **Page Setup** item, select **Options**, and finally select the **Substitute Fonts** options from the last dialog box.
- bold** Bold text denotes menus, menu items, or dialog box buttons or options.
- italic* Italic text denotes emphasis, a cross reference, or an introduction to a key concept. This font also denotes text for which you supply the appropriate word or value.
- bold italic*** Bold italic text denotes a note, caution, or warning.
- monospace Text in this font denotes text or characters that are to be 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, subprograms, subroutines, device names, functions, variables, filenames, and extensions, and for statements and comments taken from programs.
- < > Angle brackets enclose the name of a key on the keyboard—for example, <PageDown>.
- A hyphen between two or more key names enclosed in angle brackets denotes that you should simultaneously press the named keys—for example, <Control-Alt-Delete>.
- NI-FBUS In this manual, the term *NI-FBUS* refers to the NI-FBUS Communications Manager.

Related Documentation

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

- *Fieldbus Foundation System Management Services*
- *Function Block Application Process, Part 1*

- *Function Block Application Process, Part 2*
- *PC Card Standard, Release 2.1*, Personal Computer Memory Card International Association (PCMCIA)

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.

Introduction

This chapter lists what you need to get started and includes a brief description of the PCMCIA-FBUS card and the NI-FBUS software.

What You Need to Get Started

To install your NI-FBUS software, you need:

- PCMCIA-FBUS card
- PCMCIA-FBUS cable
- NI-FBUS Installation Diskettes
- Windows NT version 3.51 or 4.0 installed on your computer

Hardware Description

The PCMCIA-FBUS is a PC card that handles communication between a PCMCIA-compatible computer and a network configurable device that complies with the Fieldbus Foundation H1 specification. The PCMCIA-FBUS uses the Intel 386EX embedded processor, shared memory, and an interrupt to communicate with its driver. The PCMCIA-FBUS supports the fieldbus transfer rate of 31.25 kb/s.

Software Description

The NI-FBUS software for Windows NT is a high-level API you can use to interface with the National Instruments FOUNDATION Fieldbus (FF)

communication stack and hardware. NI-FBUS hides the low-level protocol details of interface boards, Virtual Communication Relationships (VCRs), connections, addresses, and Object Dictionary (OD) indices. NI-FBUS interfaces to the Fieldbus Messaging Specification (FMS) for you so you can use fieldbus communication protocols with only a general knowledge of the fieldbus architecture. The NI-FBUS software includes the following components:

- Windows Dynamic Link Libraries (DLLs)
- Static library for linking with the NI-FBUS process
- NI-FBUS process executable file
- Binary image of the Fieldbus Foundation communication stack
- NI-FBUS Dialog utility
- NI-FBUS Configuration utility
- Windows NT kernel-mode driver
- C language include files

Optional Fieldbus Network Tools

Your kit includes the NI-FBUS software for Windows NT. In addition, you can order the NI-FBUS Monitor and the Fieldbus Network Configuration utility.

The NI-FBUS Monitor is a good system for monitoring and debugging fieldbus data traffic. The NI-FBUS Monitor symbolically decodes data packets from the fieldbus, monitors the live list, and performs statistical analysis of packets. You can use the NI-FBUS Monitor to debug device and host applications. To order the NI-FBUS Monitor, contact National Instruments.

The Fieldbus Network Configuration utility allows you to easily configure a fieldbus network. The Fieldbus Network Configuration utility also provides a graphical environment for you to configure function block linkages, and to set data values and tags. It can automatically generate the schedule for the network, and can configure field devices and hosts to transmit and receive alarms and trends. Contact National Instruments for availability information.

Hardware Installation

This chapter contains instructions for installing your PCMCIA-FBUS card.

**Warning:**

Before you remove the card from the package, touch the antistatic plastic package to a metal part of your system chassis to discharge electrostatic energy, which can damage several components on your PCMCIA-FBUS card.

Install the Hardware

To install the PCMCIA-FBUS in your computer, complete the following steps:

1. Power off your system. Windows NT requires that you power off your system before inserting the PCMCIA card.
2. Insert the card into a free PC Card (PCMCIA) socket. The card has no jumpers or switches to set. Figure 2-1 shows how to insert the PCMCIA-FBUS and how to connect the PCMCIA-FBUS cable to the PCMCIA-FBUS card.
3. Turn on your computer and start Windows NT so you can install the NI-FBUS software.

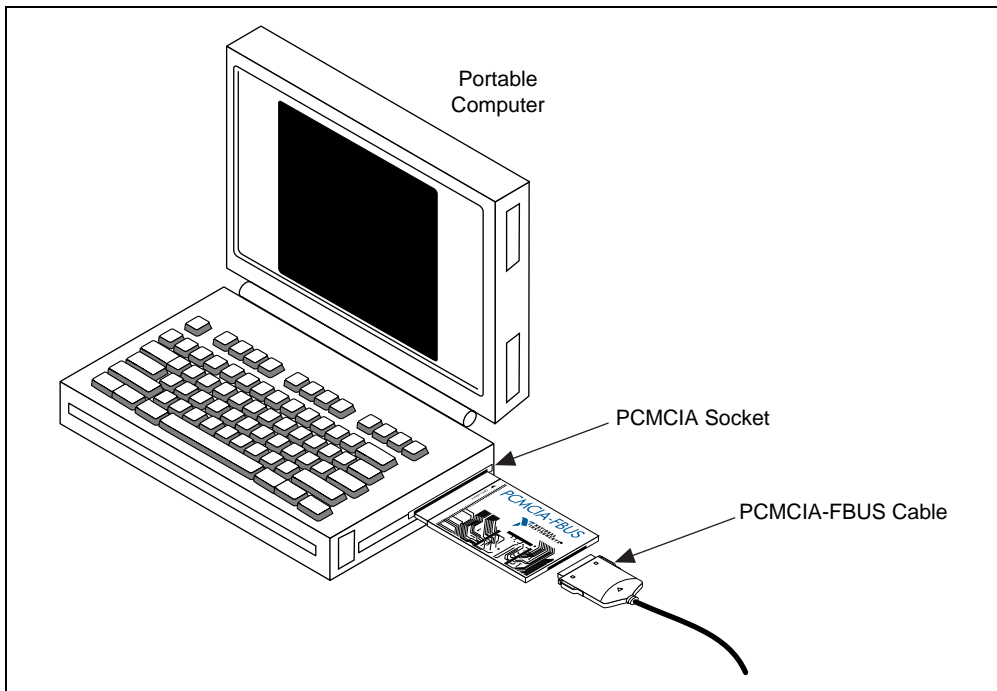


Figure 2-1. Inserting the PCMCIA-FBUS

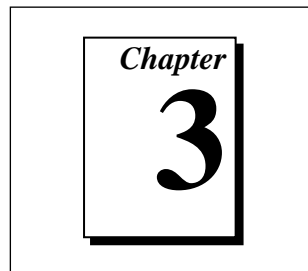
4. Connect the PCMCIA-FBUS to the fieldbus network.

One PCMCIA-FBUS cable is included in your kit. Refer to Appendix B, *Pinout Information*, if you need to make a longer cable than the PCMCIA-FBUS cable provided.

5. Power on your computer.

Now that you have installed and connected your PCMCIA-FBUS, you are ready to install and configure the NI-FBUS software. Continue to the next chapter, *Software Installation and Configuration*.

Software Installation and Configuration



This chapter contains instructions for installing and configuring your NI-FBUS software for Windows NT.

Install the Software

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

1. Log in as `Administrator` or as a user that has Administrator privileges.
2. Insert the NI-FBUS software distribution disk into an unused drive.
3. In the **Run...** dialog box, type the following:

```
x:\setup
```

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

The interactive setup program takes you through the necessary steps to install the software.

By default, the installer uses the `nifbus` default directory to install the software. You can change the directory if you want to install the NI-FBUS software somewhere else.

The installer copies `nifb.dll` and `drvintf.dll` into your Windows directory, and it copies the `nifb.sys` kernel driver into the `drivers` directory. The installer also adds information to the Windows NT Registry.

After it copies the software components to the appropriate directories, the installer starts the NI-FBUS Configuration utility. You must provide hardware information and other configuration

information for the NI-FBUS Configuration utility. You should follow the procedure to add a PCMCIA card. Refer to the *Configuring Software Settings* section in this chapter for help.

4. After the installation is complete, restart Windows NT. You must restart your computer before you can use the NI-FBUS software.

Installation Directory Structure

The installer puts the software components in the following directory structure:

utils

`nifbdlg.exe`—An interactive dialog utility for NI-FBUS

`fbconf.exe`—A utility to install PCMCIA-FBUS boards, assign base addresses, IRQ lines, and other configuration information

binaries

`ffstack.bin`—A binary image of the FF communication stack

`nifb.exe`—The NI-FBUS process, which must be running for your application using the NI-FBUS API to run

libs

`nifb.lib`—The static library that you should link with your application

includes

A list of 16 include files; you need to include only `nifbus.h` in your application; `nifbus.h` includes the other include files for you.

samples

`nifbtest.c`—An example program that uses many of the NI-FBUS functions

`nifbdd.c`—An example program that uses device description services

`nifb_mt.c`—A multi-threaded example program that uses NI-FBUS functions

`sched.ini`—An example Link Active Schedule file

data

Icon files and other data files that NI-FBUS accesses

The kit also contains two DLLs and a Windows NT device driver. The installer copies the DLLs `nifb.dll` and `drvintf.dll` into the Windows NT directory. The installer copies the driver `nifb.sys` into the `drivers` directory.

Configure and Test the Installation

After you have installed the software, you must configure the NI-FBUS software. You should use the NI-FBUS Configuration utility if you are adding a new fieldbus interface, or to view or change your software configuration settings.

Configure the NI-FBUS Software

Introduction to the NI-FBUS Configuration Utility

The NI-FBUS Configuration utility (`fbconf.exe`) helps you to configure the following information:

- Hardware information
 - Number of boards
 - Base address of each board
 - IRQ line assigned to each board
- Logical name for each fieldbus interface (port). You can use this information to access the port using the logical name
- Device Description (DD) information
 - Base directory for device descriptions
 - Location of the standard text dictionary

You need to change these only if you use NI-FBUS to communicate with devices that have manufacturer-specific blocks or parameters, meaning that you have device-manufacturer-supplied DDs.
- Fieldbus communication parameters for each fieldbus interface

You can run the NI-FBUS Configuration utility at any time to change, add, and delete configuration information for your fieldbus interfaces.

Configuring Software Settings

To view or change your base I/O address or IRQ settings, follow these steps.

1. Find conflict-free resources for your PCMCIA-FBUS.

To select conflict-free resources, you can use the Microsoft utility Windows NT Diagnostics, which displays a list of the I/O port addresses, interrupt levels, and DMA channels that are currently being used in your system. Assign resources this utility does not list to your fieldbus interface.

If you cannot find a free IRQ line, you can configure the PCMCIA-FBUS card operate in polled mode, without an IRQ line. In polled mode, NI-FBUS polls your board periodically.

2. To start the NI-FBUS Configuration utility, do one of the following:
 - If you are using Windows NT 3.51, double-click on the **fbconf** icon, which is part of the NI-FBUS program group, created in your Program Manager during installation.
 - If you are using Windows NT 4.0, select **Start»Programs»NI-FBUS»NI-FBUS Config**.
 - To use the command prompt, enter the command `fbconf.exe` to start the NI-FBUS Configuration utility executable, which is located in the `utils` subdirectory of your NI-FBUS installation directory.
3. In the NI-FBUS Configuration utility window, select the icon of the board you want to change and click on the **Edit** button.
4. Choose **PCMCIA** as the **Bus Type**. Before you change the settings in the NI-FBUS Configuration utility, it selects the default base address and IRQ line.
5. Change the settings if these default settings conflict with other hardware settings in your system. Set the base address and IRQ line to the conflict-free resources you found in Step 1.

If you want to configure your PCMCIA-FBUS to operate in polled mode (without interrupts), enter a valid IRQ line and check the polled mode checkbox. You must enter a valid IRQ for the PCMCIA card in polled mode because of the behavior of the Microsoft PCMCIA driver for Windows NT. NI-FBUS does not actually use an interrupt line in polled mode, but you must enter a valid IRQ, anyway.

To change your default interface name or communication parameters, do the following: Open the NI-FBUS Configuration utility, select the icon of the port you want to change, and click on the **Edit** button. The NI-FBUS Configuration utility displays the default logical interface name and some configuration information. You might want the logical interface name in your application to be independent of the actual hardware you are using. You can change these settings if necessary.

Configuring Fieldbus Communication Parameters

You must assign a unique address and a unique physical device tag to each of your fieldbus interfaces. Your interface must be at a fixed address or a visitor address for you to start using NI-FBUS.

To assign addresses and tags using the NI-FBUS Configuration utility, start the utility as described in step 2 of the previous section, click on the port you want to edit, and click on the **Edit** button.

If you want to assign a fixed address to your fieldbus interface, choose **Fixed Address** and enter a value in the range 0x10 to 0xF7. If you want your interface to be a temporary device that you do not intend to connect to the fieldbus for an extended time, choose **Visitor Address**. If you want a fieldbus network configuration utility to assign an address to your interface over the fieldbus, choose **Default Address**.

Enter a unique tag at the **Device Tag** prompt. You may leave this empty if you have set the address to **Default Address** and you want a fieldbus network configuration utility to assign a tag over the fieldbus.

NI-FBUS assigns default values for other communication parameters. Click on the **Advanced** button to view or change these parameters.

You do not have to reenter these configuration parameters every time you power up your PC because NI-FBUS saves them. NI-FBUS also saves changes made over the fieldbus.

Configuring the Link Active Schedule File

If you want to do scheduling and use publishers and subscribers, you must configure the Link Active Schedule file. Refer to Appendix A, *Configuring the Link Active Schedule File*, in the *NI-FBUS User Manual for Windows NT*, and then test the NI-FBUS software installation, as described in the next section. If you do not want to do scheduling or use

publishers and subscribers, continue to the next section to test the NI-FBUS software installation.

Test the Installation

To make sure that your NI-FBUS software is installed correctly and is working properly, follow these steps:

1. Start the kernel mode device driver `nifb` by entering the following command at the command prompt:

```
net start nifb
```

You can also start `nifb` by locating it in the **Devices** window of the **Control Panel**, double-clicking on the icon, and then clicking on the **Start** button.

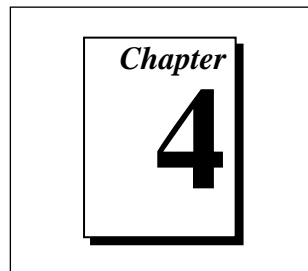
2. Start the NI-FBUS process by double-clicking on the **NIFB** icon.

On successful startup, `nifbus` displays a message saying that the process started up successfully, and the title bar of the `nifb` window changes to **NIFB (running)**.

If `nifbus` does not start up successfully, the base address, the IRQ line, or your network address is incorrect. Start the NI-FBUS Configuration utility by following the instructions in Step 2 of the *Configuring Software Settings* section, and make sure that you are assigning conflict-free resources to the PCMCIA-FBUS card, and that your network address is unique.

To begin to use NI-FBUS to compile the sample applications or to write your own applications, continue to Chapter 4, *Begin to Use the NI-FBUS Software*. You can also refer to Chapter 2, *Developing Your Application*, in the *NI-FBUS User Manual for Windows NT*. To use NI-FBUS to interact with your devices, refer to Chapter 3, *Fieldbus Control Dialog Utility*, in the *NI-FBUS User Manual for Windows NT*.

Begin to Use the NI-FBUS Software



This chapter helps you get started using the NI-FBUS software for Windows NT.

Starting NI-FBUS

The `nifb` process must be running in order to run an application that uses NI-FBUS.

You must start the `nifb` kernel driver manually, as follows. The installer defines the `StartupType` for the driver as `Manual`.

1. Type the following in a command window:

```
net start nifb
```

You can also start the driver from the **Devices** window of the **Control Panel**.

2. Start the `nifb` process by double-clicking on the **NIFB** icon.

If the process and the driver start up are successful, you can configure the `nifb` driver to load at system startup. Change the `StartupType` for the `nifb` driver to **Automatic** through the **Devices** window in the **Control Panel**. If you are using Windows NT 4.0, you can also move the **NIFB** shortcut to the **Start Up** folder to make it start up automatically when your computer restarts or boots.

Writing and Compiling Your Application

Use the following hints to help you compile your NI-FBUS application:

- You must include the `nifbus.h` header file in your program.
- You must specify the include directory in your project settings.
- You must link your program with the `nifb.lib` import library. National Instruments created this library using Microsoft Visual C/C++ version 4.0.
- You can create a console application using the `nifbtest.c` sample program included in your kit. Create a console application project in your compiler and add `nifbtest.c` and `nifb.lib` to the project. Build the project and execute the resulting application.

Using the NI-FBUS Dialog Utility

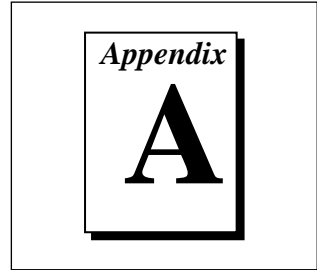
Use the NI-FBUS Dialog utility to interact with your devices over the fieldbus by opening descriptors, making single NI-FBUS calls, and viewing the results. You might want to use the NI-FBUS Dialog utility to verify installation and device operation, or to learn the NI-FBUS API.

You can run the NI-FBUS Dialog utility by double-clicking on the **NIFBus Dialog** icon in your **NI-FBUS** program group. When you open the Dialog utility, a window appears containing a single item called **Open Descriptors**. This is the root of a tree that shows an icon for each of the NI-FBUS descriptors you open using the utility. The area below the icon remains empty until you make an NI-FBUS call to open a descriptor.

The Dialog utility displays an icon for each descriptor, session, link, physical device, Virtual Field Device (VFD), and block you open. Click the right mouse button on an icon to find the list of valid NI-FBUS functions for that descriptor. When you choose a function from that list, a dialog box for that function appears and prompts you for input parameters.

Refer to the *NI-FBUS User Manual for Windows NT* for examples of how to use the NI-FBUS Dialog utility.

Specifications



This appendix describes the electrical, physical, and environmental characteristics of the PCMCIA-FBUS hardware and the recommended operating conditions.

Table A-1. Electrical Characteristics for the PCMCIA-FBUS

Characteristic	Specification
Power Requirement	500 mA Typical

Table A-2. Physical Characteristics for the PCMCIA-FBUS

Characteristic	Specification
Dimensions	85.6 by 54.0 by 5.0 mm (3.4 by 2.1 by 0.4 in.)
I/O Connector	Cable with DB-9 DSUB and 5-Position Screw Terminal

Table A-3. Environmental Characteristics for the PCMCIA-FBUS

Characteristic	Specification
Operating Environment:	
Component Temperature	0° to 70° C
Relative Humidity	10% to 90% Noncondensing
Storage Environment:	
Temperature	-40° to 125° C
Relative Humidity	5% to 90% Noncondensing
EMI	FCC Class A Verified

Pinout Information

This appendix contains information about the pinout of the fieldbus connectors.

One PCMCIA-FBUS cable is included in your kit. The following figures show the pinout of the fieldbus connectors so you can make your own cable if you need a longer cable than the PCMCIA-FBUS cable in your kit.

Figure B-1 shows the PCMCIA-FBUS cable. An arrow on the cable points to pin 1 of the screw terminal block.

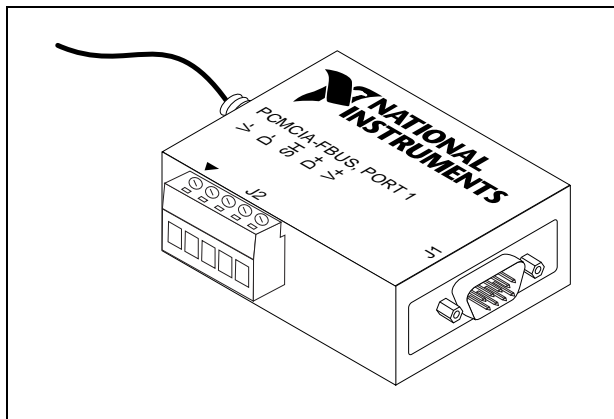


Figure B-1. PCMCIA-FBUS Cable

Figure B-2 shows J1, the fieldbus connector pinout.

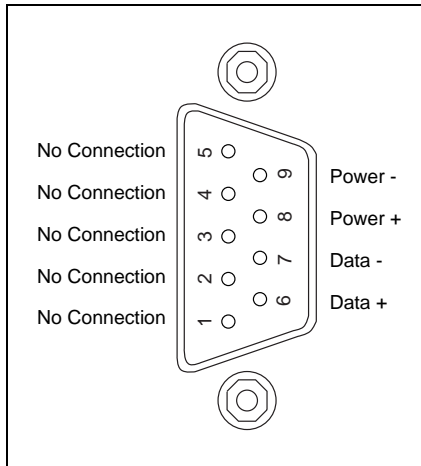


Figure B-2. Fieldbus Connector Pinout

Figure B-3 shows J2, the screw terminal block pinout.

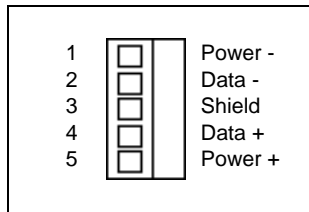


Figure B-3. Screw Terminal Block Pinout

The pinout of the PCMCIA-FBUS uses pins 6 and 7 of the J1 connector for the fieldbus signals, as specified in the *Fieldbus Standard for Use in Industrial Control Systems, Part 2, ISA-550.02.1992*. Pins 2 and 4 of the J2 screw terminal block provide an alternate connection to the fieldbus. See Figure B-2 for the connections of the PCMCIA-FBUS.



Note:

The screw terminal block is not a second, independent link.

All of the signals on the screw terminal block provide a direct connection to the 9-pin DSUB. National Instruments provides the Power+ and Power- connections as passive connections from the DSUB to the screw terminal. The PCMCIA-FBUS itself does not supply power to or draw power from these pins.

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.

Electronic Services



Bulletin Board Support

National Instruments has BBS and FTP sites dedicated for 24-hour support with a collection of files and documents to answer most common customer questions. From these sites, you can also download the latest instrument drivers, updates, and example programs. For recorded instructions on how to use the bulletin board and FTP services and for BBS automated information, call (512) 795-6990. You can access these services at:

United States: (512) 794-5422

Up to 14,400 baud, 8 data bits, 1 stop bit, no parity

United Kingdom: 01635 551422

Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

France: 1 48 65 15 59

Up to 9,600 baud, 8 data bits, 1 stop bit, no parity



FTP Support

To access our FTP site, log on to our Internet host, `ftp.natinst.com`, as anonymous and use your Internet address, such as `joesmith@anywhere.com`, as your password. The support files and documents are located in the `/support` directories.



Fax-on-Demand Support

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



E-Mail Support (currently U.S. only)

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

support@natinst.com

Telephone and Fax Support

National Instruments has branch offices all over the world. Use the following list to find the technical support number for your country. If there is no National Instruments office in your country, contact the source from which you purchased your software to obtain support.



Telephone



Fax

Australia	03 9879 5166	03 9879 6277
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Canada (Ontario)	905 785 0085	905 785 0086
Canada (Quebec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	90 527 2321	90 502 2930
France	01 48 14 24 24	01 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
Israel	03 5734815	03 5734816
Italy	02 413091	02 41309215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico	95 800 010 0793	5 520 3282
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
Spain	91 640 0085	91 640 0533
Sweden	08 730 49 70	08 730 43 70
Switzerland	056 200 51 51	056 200 51 55
Taiwan	02 377 1200	02 737 4644
U.K.	01635 523545	01635 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 (include version number) _____

Clock Speed _____ MHz RAM _____ MB Display adapter _____

Mouse ____yes ____no Other adapters installed _____

Hard disk capacity _____ MB Brand _____

Instruments used _____

National Instruments hardware product model _____ Revision _____

Configuration _____

National Instruments software product _____ Version _____

Configuration _____

The problem is _____

List any error messages _____

The following steps will reproduce the problem _____

Hardware and Software Configuration Form

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

National Instruments Products

Interrupt Level of Hardware _____

Base I/O Address of Hardware _____

Other Products

Computer Make and Model _____

Microprocessor _____

Clock Frequency _____

Operating System _____

Operating System Version _____

Operating System Mode _____

Programming Language _____

Programming Language Version _____

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 PCMCIA-FBUS and the NI-FBUSTM Software for Windows NT*

Edition Date: December 1996

Part Number: 321373A-01

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

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

Thank you for your help.

Name _____

Title _____

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A rectangular box containing the word "Glossary" in a bold, italicized serif font. The box has a double-line border.

Glossary

Prefix	Meaning	Value
n-	nano-	10^{-9}
μ -	micro-	10^{-6}
m-	milli-	10^{-3}

AI	Analog Input. A type of function block.
asynchronous	Communication that occurs at times which are not predetermined.
AT compatible	Compatible with the 16-bit Industry Standard Architecture.
Communication Stack	Performs the services required to interface the User Application to the Physical Layer.
Data Link Layer	The second lowest layer, layer two in the ISO seven layer model. The Data Link Layer splits data into frames to send on the physical layer, receives acknowledgment frames, and re-transmits frames if they are not received correctly. It also performs error checking to maintain a sound virtual channel to the next layer.
descriptor	A number returned to the application by NI-FBUS, used to specify a target for future NI-FBUS calls.
device ID	An identifier for a device that the manufacturer assigns. Device IDs must be unique to the device; no two devices can have the same device ID.
DRAM	Dynamic Random Access Memory. Memory that requires electricity to hold data.

Fieldbus Foundation	An organization that developed a fieldbus network specifically based upon the work and principles of the ISA/IEC standards committees.
FMS	Fieldbus Messaging Specification. The layer of the communication stack that defines a model for applications to interact over the fieldbus. The services FMS provides allow you to read and write information about the OD, read and write the data variables described in the OD, and perform other activities such as uploading/downloading data, and invoking programs inside a device.
FOUNDATION Fieldbus	The communications network that the Fieldbus Foundation created.
IRQ	interrupt request.
ISA	Industry Standard Architecture.
link	A group of fieldbus devices connected across a single wire pair with no intervening bridges.
Link Active Schedule	A schedule of times in the macrocycle when devices must publish their output values on the fieldbus.
Link Active Scheduler (LAS)	A device that is responsible for keeping a link operational. The LAS executes the link schedule, circulates tokens, distributes time and probes for new devices.
octet	A single 8-bit value.
OD	Object Dictionary. A structure in a device that describes data that can be communicated on the fieldbus. The OD is a lookup table that gives information such as data type and units about a value that can be read from or written to a device.
PC	Personal Computer.
PCMCIA	Personal Computer Memory Card International Association.
physical device	A single device residing at a unique address on the fieldbus.
physical device tag	A user-defined name for a physical device.

System Management Configuration	Configuration parameters that set up device identification and network time distribution.
VCR	Virtual Communication Relationship. Preconfigured or negotiated connections between virtual field devices on a network.