

Fieldbus

Getting Started with Your AT-FBUS and the NI-FBUS[™] Software for Windows NT

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Federal Communications Commission

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

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Canadian Department of Communications

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

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

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***About
This
Manual***

This manual contains instructions on how to install and configure the National Instruments AT-FBUS interface board and the NI-FBUS software for Windows NT. The AT-FBUS board is intended for use in PCs equipped with 16-bit ISA slots. The NI-FBUS software is intended for use with Windows NT. This manual assumes that you are already familiar with Windows NT.

This manual is included with either the NI-FBUS Communications Manager kit or the NI-FBUS Configurator kit.

How to Use the Manual Set

Use this getting started manual to install and configure your AT-FBUS board and the NI-FBUS software for Windows NT.

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.

If you are using the NI-FBUS Configurator, use the *NI-FBUS Configurator User Manual* to install the NI-FBUS Configurator software for Windows NT.

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 AT-FBUS board and the NI-FBUS software.
- Chapter 2, *Hardware Installation and Configuration*, contains instructions on how to install and configure your AT-FBUS board.
- Chapter 3, *Software Installation and Configuration*, contains instructions on how to install and configure 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 AT-FBUS hardware 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, 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.

AT-FBUS In this manual, the term *AT-FBUS* refers to both the single-port AT-FBUS board and the dual-port AT-FBUS/2 board, unless otherwise indicated.

bold	Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows, Windows NT tabs, or LEDs.
<i>bold italic</i>	Bold italic text denotes a note, caution, or warning.
<i>italic</i>	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, as in Windows 3.x.
<i>italic monospace</i>	Italic text in this font denotes that you must supply the appropriate words or values in the place of these items.
monospace	Text in this font denotes text or characters that you should literally enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames and extensions, and for statements and comments taken from programs.
NI-FBUS	In this manual, the term <i>NI-FBUS</i> refers to the NI-FBUS Communications Manager.
paths	Paths in this manual are denoted using backslashes (\) to separate drive names, directories, folders, and files.

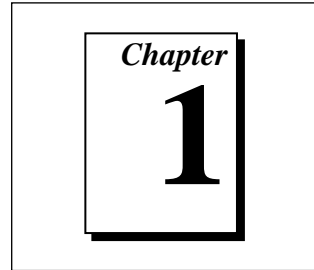
Related Documentation

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

- *Fieldbus Standard for Use in Industrial Control Systems, Part 2, ISA-S50.02.1992*
- *Fieldbus Foundation Specification*
- *Fieldbus Foundation System Management Services*
- *Function Block Application Process, Part 1*
- *Function Block Application Process, Part 2*

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.



Introduction

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

What You Need to Get Started

To install your NI-FBUS software, you need the following items:

- AT-FBUS plug-in board
- Cable compliant with the *Fieldbus Standard for Use in Industrial Control Systems, Part 2, ISA-S50.02.1992*
- Installation disks
- Windows NT version 3.51 or 4.0 installed on your computer

Hardware Description

The AT-FBUS is a plug-in board that handles communication between network-configurable devices that comply with the Fieldbus Foundation H1 specification and a PC AT-compatible computer that has 16-bit ISA slots. The AT-FBUS uses the Intel 386EX embedded processor, shared memory, and an interrupt to communicate with its driver. The AT-FBUS supports the fieldbus transfer rate of 31.25 kb/s.

The single-port AT fieldbus interface is called the *AT-FBUS* and the dual-port AT fieldbus interface is called the *AT-FBUS/2*. In this manual, the term *AT-FBUS* refers to both the single-port AT-FBUS board and the dual-port AT-FBUS/2 board, unless otherwise indicated.

Software Description

Your kit includes either the NI-FBUS software or NI-FBUS Configurator software. 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.

For a description of the NI-FBUS Configurator, refer to the *Optional Fieldbus Network Tools* section later in this chapter.

The NI-FBUS software and NI-FBUS Configurator software include the following components:

- NI-FBUS process executable file
- Binary image of the Fieldbus Foundation communication stack
- NI-FBUS Configuration utility
- Windows NT kernel mode driver

The NI-FBUS software also includes the following components not included with the NI-FBUS Configurator software:

- Windows Dynamic Link Libraries (DLLs)
- Static library for linking with the NI-FBUS process
- NI-FBUS Dialog utility
- C language include files

**Note:**

Because of some bug fixes and specification changes, the communication stack that NI-FBUS uses is not compatible with the communication stack in a Round Card using a National Instruments Device Developer Kit Release older than Version 2.0. If you are using National Instruments Round Card software older than Version 2.0, you need to upgrade your software to Version 2.0. Contact National Instruments for ordering information.

Optional Fieldbus Network Tools

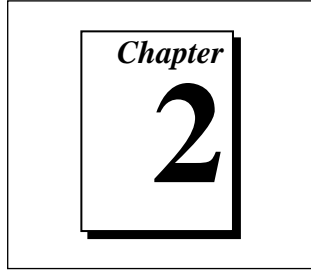
Your kit includes either the NI-FBUS software or NI-FBUS Configurator software for Windows NT. In addition, you can order the NI-FBUS Monitor, BridgeVIEW, and Lookout. If you have not already done so, you can also order the NI-FBUS Configurator.

The NI-FBUS Monitor helps you monitor and debug fieldbus data traffic. It 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 NI-FBUS Configurator helps you configure a fieldbus network. It 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. If you have not already ordered the NI-FBUS Configurator, contact National Instruments for availability information.

BridgeVIEW helps you perform data acquisition and analysis, create a man-machine interface (MMI), or develop an advanced supervisory control application in a graphical development environment. BridgeVIEW includes real-time process monitoring, historical trending, alarm and event reporting, online configuration, and PLC connectivity. To order BridgeVIEW, contact National Instruments.

Lookout helps you create graphical representations on a computer screen of real-world devices such as switches, dial gauges, chart recorders, pushbuttons, knobs, sliders, and meters. After linking these images to your field instruments, you can configure Lookout to generate alarms, log data to disk, animate custom graphics, print reports, automatically adjust setpoints, historically trend information, warn operators of malfunctions, and so on. To order Lookout, contact National Instruments.



Hardware Installation and Configuration

This chapter contains instructions on how to install and configure your AT-FBUS board.



Warning: *Before you remove the board 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 AT-FBUS board.*

Evaluate the Hardware Settings

Table 2-1 shows the default hardware settings for the AT-FBUS board.

Table 2-1. Hardware Default Settings

AT-FBUS Board Setting	Default
Memory Base Address (hex)	D0000 (physical)
Interrupt Line (IRQ)	11

The AT-FBUS board default settings are suitable for most PC AT-compatible computer systems. However, if these default settings conflict with another device in your system, or if you need to install more than one AT-FBUS board, you must change the default settings before you install the board.

To change the default settings of the AT-FBUS board, refer to the *Configure the Hardware (Optional)* section of this chapter. If you do not need to reconfigure the board, proceed to the next section, *Install the Hardware*.

Install the Hardware

To install the AT-FBUS board, complete the following steps:

1. Power off your computer. Keep the computer plugged in so that it remains grounded while you install the AT-FBUS board.
2. Remove the top cover or access port of the I/O channel.
3. Remove the expansion slot cover on the back panel of the computer.
4. As shown in Figure 2-1, insert the AT-FBUS board into any unused 16-bit ISA slot with the fieldbus connector sticking out of the opening on the back panel. It might be a tight fit, but do not force the board into place.

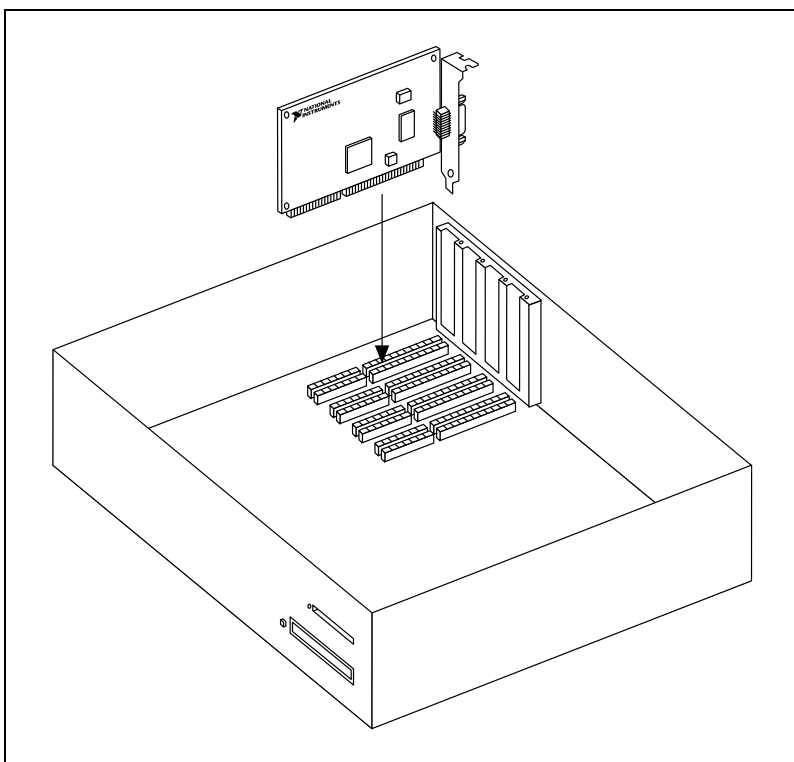


Figure 2-1. Installing the AT-FBUS Board

5. Screw the mounting bracket of the AT-FBUS board to the back panel rail of the computer.
6. Check the installation.

7. Replace the top cover or access port to the I/O channel.
8. Connect the AT-FBUS to the fieldbus network.

If you want to make your own fieldbus cable, make sure that it uses pins 6 and 7 for the fieldbus signals, as specified in the *Fieldbus Standard for Use in Industrial Control Systems, Part 2, ISA-S50.02.1992*. See Figure 2-2 for the connector pinout of the AT-FBUS.

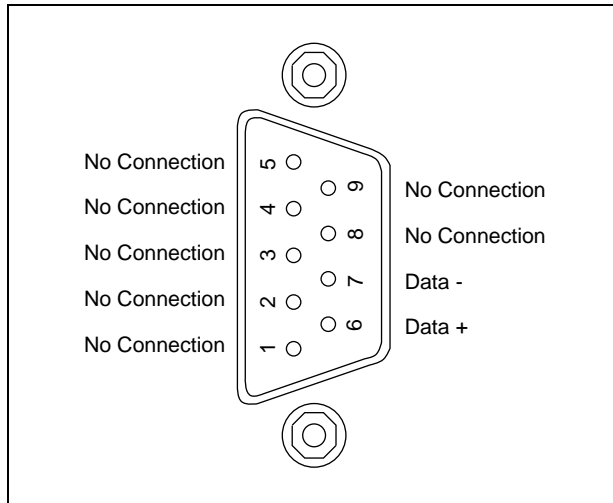


Figure 2-2. Fieldbus Connector Pinout for the AT-FBUS



Note:

On the AT-FBUS/2, the top connector is port 1 and the lower connector is port 2.

9. Power on your computer.

After you have installed your AT-FBUS board, and you are ready to install the NI-FBUS software, refer to Chapter 3, *Software Installation and Configuration*, for instructions on how to install the software.

Configure the Hardware (Optional)

Follow the instructions in this section if you need to change the hardware default settings of the AT-FBUS board. Refer to the *Evaluate the Hardware Settings* section at the beginning of this chapter for reasons to change the default settings of your AT-FBUS board.

Selecting the Memory Base Address

The AT-FBUS board is a memory-mapped device, which means that the driver software can use the AT-FBUS memory registers as if they were standard memory. The memory base address of the AT-FBUS is the first position in the total memory address space occupied by the AT-FBUS.

The AT-FBUS is configured to use memory base address D0000 hex by default. With this setting, the board uses the memory space from D0000 hex through D4000 hex. If this address range is already used by another device, or if you are installing more than one board, complete the following steps to reconfigure the memory base address setting. If you are installing more than one AT-FBUS board, each board must use a unique memory base address. Your computer's conventional DRAM and all other devices cannot use the memory space you assign to the AT-FBUS board.

1. Choose a new memory base address.

You can configure the AT-FBUS to use lower or upper memory. Lower memory is the memory residing in the first megabyte of address space. Upper memory is any memory that resides above the first megabyte. Because the AT bus can only access the first 16 MB of address space, and the AT-FBUS must have a unique base address in memory, you must have 8 MB or less of DRAM in your machine to place the AT-FBUS in upper memory. If these conditions are met, you must locate the AT-FBUS above your conventional memory and below the 16 MB upper limit for addresses.

Table 2-2 lists the possible switch settings, the corresponding memory base address, and the memory space used for each setting. ***Bold italic*** denotes the default setting.

Table 2-2. Memory Base Address Switch Settings

Switch Setting						Base Address
SW1	SW2	SW3	SW4	SW5	SW6	
ON	ON	OFF	ON	ON	OFF	0C0000
ON	ON	OFF	ON	OFF	OFF	0C4000
ON	ON	OFF	OFF	ON	OFF	0C8000
ON	ON	OFF	OFF	OFF	OFF	0CC000
<i>ON</i>	<i>ON</i>	<i>ON</i>	<i>ON</i>	<i>ON</i>	<i>OFF</i>	<i>0D0000</i>
ON	ON	ON	ON	OFF	OFF	0D4000

Table 2-2. Memory Base Address Switch Settings (Continued)

Switch Setting						Base Address
SW1	SW2	SW3	SW4	SW5	SW6	
ON	ON	ON	OFF	ON	OFF	0D8000
ON	ON	ON	OFF	OFF	OFF	0DC000
ON	OFF	OFF	ON	ON	OFF	0E0000
ON	OFF	OFF	ON	OFF	OFF	0E4000
ON	OFF	OFF	OFF	ON	OFF	0E8000
ON	OFF	OFF	OFF	OFF	OFF	0EC000
ON	OFF	ON	ON	ON	OFF	0F0000
ON	OFF	ON	ON	OFF	OFF	0F4000
ON	OFF	ON	OFF	ON	OFF	0F8000
ON	OFF	ON	OFF	OFF	OFF	0FC000
OFF	ON	OFF	ON	ON	OFF	8C0000
OFF	ON	OFF	ON	OFF	OFF	8C4000
OFF	ON	OFF	OFF	ON	OFF	8C8000
OFF	ON	OFF	OFF	OFF	OFF	8CC000
OFF	ON	ON	ON	ON	OFF	8D0000
OFF	ON	ON	ON	OFF	OFF	8D4000
OFF	ON	ON	OFF	ON	OFF	8D8000
OFF	ON	ON	OFF	OFF	OFF	8DC000
OFF	OFF	OFF	ON	ON	OFF	8E0000
OFF	OFF	OFF	ON	OFF	OFF	8E4000
OFF	OFF	OFF	OFF	ON	OFF	8E8000
OFF	OFF	OFF	OFF	OFF	OFF	8EC000
OFF	OFF	ON	ON	ON	OFF	8F0000
OFF	OFF	ON	ON	OFF	OFF	8F4000
OFF	OFF	ON	OFF	ON	OFF	8F8000
OFF	OFF	ON	OFF	OFF	OFF	8FC000

2. Locate the memory base address switch on your AT-FBUS board. Refer to Figure 2-3, *AT-FBUS/2 Parts Locator Diagram*.
3. Change the switch settings to configure the AT-FBUS board to the new memory base address as shown in Table 2-2. See Figure 2-4 for the default switch settings.

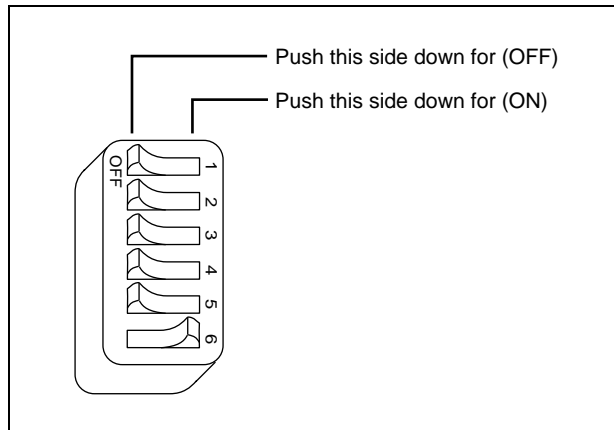


Figure 2-4. Memory Base Address Switch Settings for 0D0000

4. Record your new settings on the *Hardware and Software Configuration Form* in Appendix B, *Customer Communication*, for future reference.

Selecting the Interrupt Request Line

PC AT-compatible computers have a series of interrupt lines available to devices. Devices use interrupts to get immediate service from the CPU for asynchronous events. Your AT-FBUS board and the NI-FBUS software use interrupts to get service from the CPU when necessary.

If there are no interrupt request lines available in your system, you can configure the AT-FBUS not to use interrupts by removing the jumper completely. If you remove the jumper, NI-FBUS periodically polls your board.

By default, the AT-FBUS board uses interrupt request line 11. Figure 2-5 shows the setting for IRQ11.

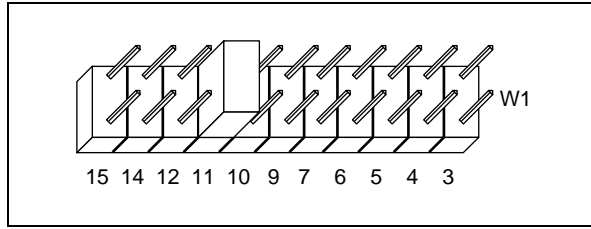



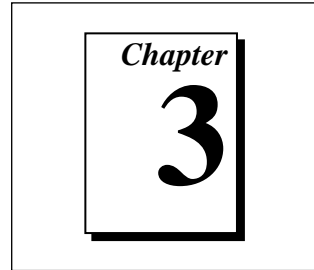
Figure 2-5. Interrupt Jumper Setting for IRQ11

If this is not an acceptable setting or if you are installing more than one board, complete the following steps to reconfigure the interrupt request line.

 **Note:** *The AT-FBUS cannot use an interrupt line that another device in your system is already using.*

1. Choose a new interrupt request line (IRQ) setting.
 You can configure the AT-FBUS board to use any of the following interrupt lines: IRQ3, 4, 5, 6, 7, 9, 10, 11, 12, 14, or 15.
 If you are installing more than one AT-FBUS board, each board must be configured to use a unique IRQ level. The AT-FBUS requires the use of interrupts to work with your NI-FBUS software properly.
2. Find the jumpers that set the interrupt request line. Refer to Figure 2-3, *AT-FBUS/2 Parts Locator Diagram*. The jumpers are located on the lower edge of your AT-FBUS board. The number on the board under each pair of pins corresponds to an AT bus interrupt level.
3. Change the jumper settings to configure the AT-FBUS board to the new interrupt request line. Place the jumper on the pair of pins directly above the number of the interrupt level you want.
4. Record your new settings on the *Hardware and Software Configuration Form* in Appendix B, *Customer Communication*, for future reference.

Software Installation and Configuration



This chapter contains instructions on how to install and configure your NI-FBUS software for Windows NT.

Install the Software

After you have installed and configured the hardware, you are ready to install the NI-FBUS software.

Before you install your NI-FBUS software, you must know the base address and IRQ settings of your AT-FBUS hardware. To read your base address from your board switch settings, use Table 2-2. To read your IRQ line from your board, look at the number printed on the board under the jumper.



Caution:

If you reinstall the NI-FBUS software over an existing version, you lose any existing board and port configuration information. Before you reinstall the NI-FBUS software, write down your board configuration. Also, if you changed any port configuration parameters from their defaults, write down the new parameters.

Complete the following steps to run the software installation program for either the NI-FBUS or NI-FBUS Configurator software:

1. Log in as Administrator or as a user that has Administrator privileges.
2. Insert installation disk 1 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 disk (usually a or b).

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

By default, the installation program installs the software into the `nifbus` directory. You can change this directory if you want to install the NI-FBUS software into a different directory.

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

After it copies the software components to the appropriate directories, the installation program starts the NI-FBUS Configuration utility. Proceed to the next section, *Configure the NI-FBUS Software*.

Configure the NI-FBUS Software

When you install the NI-FBUS software, the installation program starts the NI-FBUS Configuration utility.

Configure the Base Address and IRQ

To add, view, or change your base address or IRQ settings, complete the following steps:

1. In the **NI-FBUS Config** window, select the icon of the board you want to change and click on the **Edit** button. If you are adding a board, click on the **Add a Board** button.
2. Choose **ISA** as the **Bus Type**. The NI-FBUS Configuration utility displays the default base address and IRQ line.
3. Change the default settings if they do not match the settings on your board. The settings must match the settings on your hardware.

If you have configured your AT-FBUS not to use interrupts, select zero from the **IRQ** drop-down list, and check the **Polled Mode** checkbox.

4. Select the number of ports that matches your AT-FBUS. For example, select 2 ports for the AT-FBUS/2.

Configure the Fieldbus Communication Parameters and Interface Name

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, click on the port you want to edit, and click on the **Edit** button. The NI-FBUS Configuration utility displays the default logical interface name and some configuration information. Change these settings if necessary.

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 to these parameters over the fieldbus.

Configure the Link Active Schedule File

If you are using the NI-FBUS Configurator, you should not configure the Link Active Schedule file; continue to the next section, *Using the NI-FBUS Configuration Utility after Installation*. Or if you do not want to do scheduling or use publishers and subscribers, continue to the next section. 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 *Test the Installation* section later in this chapter.

Using the NI-FBUS Configuration Utility after Installation

You should use the NI-FBUS Configuration utility after installation in the following cases:

- To add or remove a fieldbus interface
- To change the software settings to match your physical hardware settings
- To view or change your software configuration settings

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 DDs
 - Location of the standard text dictionary

You need to change this DD information 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

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.

Test the Installation

To make sure that your NI-FBUS software is installed correctly and is working properly, complete the following steps:

1. After you configure your installation, restart Windows NT. You must restart your computer before you can use the NI-FBUS software.
2. Start the kernel-mode device driver `nifb` by entering the following command at the command prompt:

```
net start nifb
```

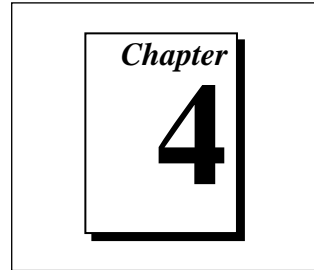
You can also start `nifb` by selecting **Start»Settings»Control Panel»Devices»nifb** and clicking on the **Start** button.

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

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

If NI-FBUS does not start up successfully, the base address, the IRQ line, or network address is incorrect. Start the NI-FBUS Configuration utility by following the instructions in the *Using the NI-FBUS Configuration Utility after Installation* section, and make sure that the hardware and software settings match. Also, make sure that your network address is unique.

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.

If you have not done so already, you must restart the `nifb` kernel-mode driver manually, as follows. The installation program defines the `StartupType` for the driver as `Manual`.

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

```
net stop nifb
```

2. Start `nifb` by entering the following command at the command prompt:

```
net start nifb
```

You can also start `nifb` by selecting **Start»Settings»Control Panel»Devices»nifb** and clicking on the **Start** button.

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


If NI-FBUS does not start up, and displays the message `Unable to download stack to board X`, you might have a memory base address conflict. Refer to the *Selecting the Memory Base Address* section in Chapter 2, *Hardware Installation and Configuration*, for instructions on how to reconfigure your board to use a different memory base address.

If the process and the driver start up successfully, 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 **StartUp** folder to make it start up automatically when your computer boots or restarts.

If you are using the NI-FBUS Configurator, refer to the *NI-FBUS Configurator User Manual* for more information on how to use the NI-FBUS software.


Writing and Compiling Your Application

 **Note:** *If you are using the NI-FBUS Configurator or you are not developing an NI-FBUS application, this section does not apply to you.*

When you compile your NI-FBUS application, consider the following items:

- 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. National Instruments used Borland C 4.5 to create `nifb_bor.lib`, a version of the library for Borland users.
- 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

 **Note:** *The NI-FBUS Dialog Utility is not included with the NI-FBUS Configurator.*

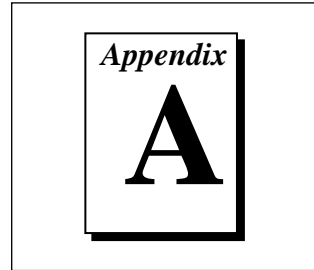
Use the NI-FBUS Dialog utility to interact with your devices over the fieldbus by opening descriptors, making single NI-FBUS calls, and viewing the results. You might want to use the NI-FBUS Dialog utility to verify installation and device operation, or to learn the NI-FBUS API.

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 NI-FBUS 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 NI-FBUS 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 view a 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 AT-FBUS hardware and the recommended operating conditions.

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

Characteristic	Specification
Power Requirement AT-FBUS	750 mA Typical
AT-FBUS/2	820 mA Typical

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

Characteristic	Specification
Dimensions	10.7 by 19.1 cm (4.2 by 7.5 in.)
I/O Connector	DB-9 DSUB (1 per fieldbus channel)

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

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

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:

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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: 01 48 65 15 59

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



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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.

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Telephone and Fax Support

National Instruments has branch offices all over the world. Use the list below 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.



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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	09 527 2321	09 502 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	5 520 2635	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

Hardware Revision _____

Interrupt Level of Hardware _____

Base I/O Address of Hardware _____

Fieldbus Software Product (NI-FBUS Communications Manager
or NI-FBUS Configurator) _____

Other Products

Computer Make and Model _____

Microprocessor _____

Clock Frequency _____

Type of Video Board Installed _____

Operating System _____

Operating System Version _____

Operating System Mode _____

Programming Language _____

Programming Language Version _____

Other Boards in System _____

Base I/O Address of Other Boards _____

DMA Channels of Other Boards _____

Interrupt Level of Other Boards _____

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.

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Edition Date: February 1997

Part Number: 321014C-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.

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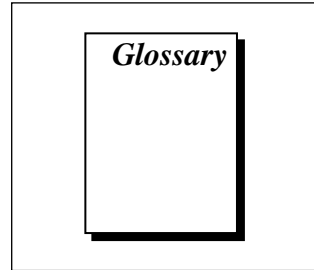
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Prefix	Meaning	Value
m-	milli-	10^{-3}
c-	centi-	10^{-2}
k-	kilo-	10^3
M-	mega-	10^6

°	degrees
A	amperes
API	Application Programmer Interface
AT-compatible	compatible with the 16-bit Industry Standard Architecture
b	bits
B	bytes
C	Celsius
CPU	central processing unit
DD	Device Description
DLL	Data Link Layer
DMA	direct memory access
DRAM	Dynamic Random Access Memory

EMI	Electromagnetic interference
FMS	Fieldbus Messaging Specification
FF	FOUNDATION Fieldbus
hex	hexadecimal
in.	inches
I/O	input/output
IRQ	interrupt request
ISA	Industry Standard Architecture
ISO	International Organization for Standardization
LAS	Link Active Scheduler
m	meters
Man-machine interface (MMI)	a graphical user interface for you to interact with the BridgeVIEW system
OD	Object Dictionary
octet	a single 8-bit value
Programmable Logic Control (PLC)	a device with multiple inputs and outputs that contains a program you can alter
s	seconds
Virtual Communication Relationship (VCR)	preconfigured or negotiated connections between virtual field devices on a network
Virtual Field Device (VFD)	a model for remotely viewing data described in the Object Dictionary