Allen-Bradley

PowerFlex™ Communications

PROFIBUS Adapter

20-COMM-P
FRN 1.xxx

User Manual

Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. "*Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls*" (Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will the Allen-Bradley Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual we use notes to make you aware of safety considerations.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is especially important for successful application and understanding of the product.

Shock Hazard labels may be located on or inside the drive to alert people that dangerous voltage may be present.

Table of Contents

About This Manual

Related Documentation

For:	Refer to:	Publication
DriveExplorer™	*DriveExplorer Getting Results Manual* Online Help (installed with the software)	9306-5.2
DriveExecutive	www.ab.com/drives/drivetools_2000 Online Help (installed with the software)	
HIM	*HIM Quick Reference*	20OIM-QR001 …
PowerFlex™ 70 Drive	*PowerFlex 70 User Manual* *PowerFlex 70 Reference Manual*	20A-UM001… 20A-RM001…
PowerFlex 700 Drive	*PowerFlex 700 User Manual* *PowerFlex 700 Reference Manual*	20B-UM001… 20B-RM001…
Scanner	*SST-PFB-SLC User's Guide*	Version 2.03
SLC	*SLC 500 Modular Hardware Style Installation and Operation Manual*	1747-6.2
SLC	*SLC 500 and MicroLogix 1000 Instruction Set*	1747-6.15

Documentation for the above and this manual can be obtained online at http://www.ab.com/manuals.

Documentation from SST / Woodhead can be obtained online at http://www.mysst.com/download.

Conventions Used in this Manual

The following conventions are used throughout this manual:

- Parameter names are shown in the following format **Parameter xxx - [*]**. The xxx represents the parameter number. The * represents the parameter name. For example **Parameter 01 - [DPI Port]**.
- Menu commands are shown in bold type face and follow the format **Menu > Command**. For example, if you read "Select **File > Open**," you should click the **File** menu and then click the **Open** command.
- The firmware release is displayed as FRN X.xxx. The "FRN" signifies Firmware Release Number. The "X" is the major release number. The "xxx" is the minor update number. This manual is for Firmware release 1.xxx.
- This manual provides information about the PROFIBUS adapter and using it with PowerFlex drives. The adapter can be used with other products that implement DPI. Refer to the documentation for your product for specific information about how it works with the adapter.

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Contact your local Rockwell Automation representative for sales and order support, product technical training, warranty support, and support service agreements.

Technical Product Assistance

If you need to contact Rockwell Automation for technical assistance, please review the information in Chapter 7, Troubleshooting first. If you still have problems, then call your local Rockwell Automation representative.

U.S. Allen-Bradley Drives Technical Support:
E-mail: support@drives.ra.rockwell.com
Tel: (1) 262.512.8176
Fax: (1) 262.512.2222
Online: **www**.ab.com/support/abdrives

UK Customer Support Center:
E-mail: esupport2@ra.rockwell.com
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E-mail: ragermany-csc@ra.rockwell.com
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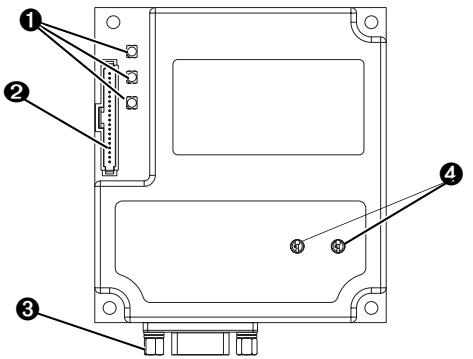
Getting Started

The 20-COMM-P PROFIBUS adapter is an embedded communication option for any one drive in the PowerFlex family. It can also be used with other Allen-Bradley products implementing DPI™, a functional enhancement to SCANport™.

Components

Figure 1.1 Components of the Adapter



#	Part	Description
❶	Status Indicators	Three LEDs that indicate the status of the connected drive, adapter, and network. Refer to Chapter 7, Troubleshooting.
❷	DPI Connector	A 20-pin, single-row shrouded male header. An Internal Interface cable is connected to this connector and a connector on the drive.
❸	PROFIBUS Connector	A 9-pin, female D-Sub connector.
❹	Node Address Switches	Switches for setting the node address.

Features

The PROFIBUS adapter features the following:

- The adapter is mounted in the PowerFlex drive. It receives the required power from the drive.
- Switches let you set a node address before applying power to the PowerFlex drive. Alternatively, you can disable the switches and use parameters to configure this feature.
- Captive screws are used to secure the adapter to the drive.
- A number of configuration tools can be used to configure the adapter and connected drive. The tools include the PowerFlex HIM on the drive, or drive-configuration software such as DriveExplorer (version 2.01 or higher) or DriveExecutive (version 1.01 or higher).
- Status indicators report the status of the drive, adapter, and network. They are visible both when the cover is opened and when it is closed.
- I/O, including Logic Command/Reference and up to four pairs of Datalinks, may be configured for your application using a parameter.
- Explicit messages are supported using the Parameter Protocol.
- User-defined fault actions determine how the adapter and PowerFlex drive respond to communication disruptions on the network and controllers in idle mode.

Compatible Products

The PROFIBUS adapter is compatible with Allen-Bradley PowerFlex drives and other products that support DPI. DPI is a second generation peripheral communication interface and is a functional enhancement to SCANport. At the time of publication, compatible products include:

- PowerFlex 70 drives
- PowerFlex 700 drives
- PowerFlex 7000 drives

Required Equipment

Equipment Shipped with the Adapter

When you unpack the adapter, verify that the package includes:

- ❑ One PROFIBUS adapter
- ❑ A 2.54 cm (1 in.) and a 15.24 cm (6 in.) Internal Interface cable (only one cable is needed to connect the adapter to the drive)
- ❑ One grounding wrist strap
- ❑ One floppy disc with GSD file
- ❑ This manual

User-Supplied Equipment

To install and configure the PROFIBUS adapter, you must supply:

- ❑ A small flathead screwdriver
- ❑ PROFIBUS cable
- ❑ One 9-pin, male D-Sub PROFIBUS connector.
  [**Note**: PROFIBUS connectors are available from a variety of sources and in various sizes. As such, there may be mechanical limitations that prohibit the use of some connectors. Phoenix Subcon Plus M1 (Part # 2761826) or ERNI Profibus vertical (Node Part # 103658 and Termination Part # 103659), are recommended for use with PowerFlex 70/700 drives.]
- ❑ Configuration tool, such as:
  - – PowerFlex HIM
  - – DriveExplorer (version 2.01 or higher)
    - with 1203-SSS Serial Converter (version 3.001 or higher)
  - – DriveExecutive (version 1.01 or higher)
    - with 1203-SSS Serial Converter (version 3.001 or higher)
- ❑ PROFIBUS configuration software
- ❑ Controller configuration software

Safety Precautions

Please read the following safety precautions carefully

ATTENTION: Risk of injury or equipment damage exists. Only personnel familiar with drive and power products and the associated machinery should plan or implement the installation, start-up, configuration, and subsequent maintenance of the product using a PROFIBUS adapter. Failure to comply may result in injury and/or equipment damage.

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove all power from the PowerFlex drive, and then verify power has been removed before installing or removing a PROFIBUS adapter.

ATTENTION: Risk of equipment damage exists. The PROFIBUS adapter contains ESD (Electrostatic Discharge) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, refer to *Guarding Against Electrostatic Damage*, Publication 8000-4.5.2.

ATTENTION: Risk of injury or equipment damage exists. If the PROFIBUS adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting an adapter.

ATTENTION: Risk of injury or equipment damage exists. **Parameters 9 - [Comm Flt Action]** and **10 - [Idle Flt Action]** let you determine the action of the adapter and connected PowerFlex drive if communications are disrupted. By default, these parameters fault the PowerFlex drive. You can set these parameters so that the PowerFlex drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a hazard of injury or equipment damage.

ATTENTION: Risk of injury or equipment damage exists. When a system is configured for the first time, there may be unintended or incorrect machine motion. Disconnect the motor from the machine or process during initial system testing.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

Quick Start

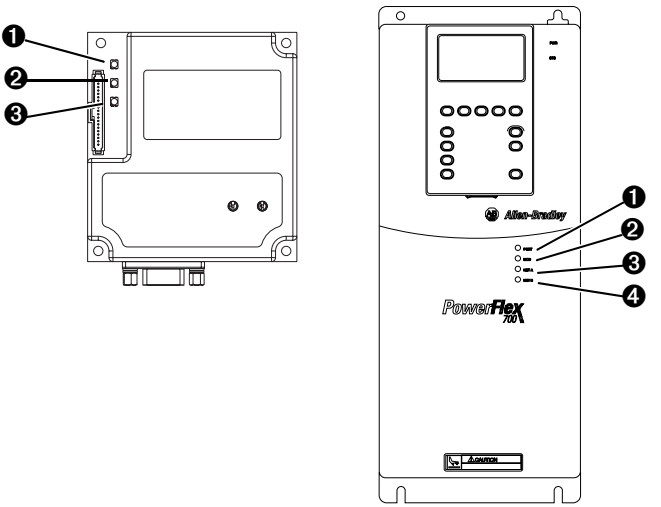
This section is designed to help experienced users start using the PROFIBUS adapter. If you are unsure about how to complete a step, refer to the referenced chapter.

Step		Refer to
1	**Review the safety precautions for the adapter.**	Throughout This Manual
2	**Verify that the PowerFlex drive is properly installed.**	Drive User Manual
3	**Commission the adapter.** Set a unique node address using the switches on the adapter. If desired, you can disable the switches and use parameter settings instead.	Chapter 2, Installing the Adapter
4	**Install the adapter.** Verify that the PowerFlex drive is not powered. Then, connect the adapter to the network using a PROFIBUS cable and to the drive using the Internal Interface cable. Use the captive screws to secure and ground the adapter to the drive.	Chapter 2, Installing the Adapter
5	**Apply power to the adapter.** The adapter receives power from the drive. Apply power to the drive. The status indicators should be green. If they flash red, there is a problem. Refer to Chapter 7, Troubleshooting.	Chapter 2, Installing the Adapter
6	**Configure the adapter for your application.** Set the parameters for the following features as required by your application: • Node address. • I/O configuration. • Fault actions.	Chapter 3, Configuring the Adapter
7	**Apply power to the PROFIBUS master and other devices on the network.** Verify that the master and network are installed and functioning in accordance with PROFIBUS standards, and then apply power to them.	
8	**Configure the scanner to communicate with the adapter.** Use a network tool for PROFIBUS to configure the master on the network.	Chapter 4, Configuring the Profibus Scanner
9	**Create a ladder logic program.** Use a programming tool to create a ladder logic program that enables you to do the following: • Control the adapter and connected drive. • Monitor or configure the drive using Explicit Messages.	Chapter 5, Using I/O Messaging Chapter 6, Using Explicit Messaging (Parameter Protocol)

Modes of Operation

The adapter uses three status indicators to report its operating status. They can be viewed on the adapter or through the drive cover. See Figure 1.2.

Figure 1.2 Status Indicators



#	Status Indicator	Status(1)	Description
❶	PORT	Green	Normal Operation. The adapter is properly connected and is communicating with the drive.
		Flashing Green	The adapter is establishing a connection to the drive.
❷	MOD	Green	Normal Operation. The adapter is operational and is transferring I/O data.
		Flashing Green	Normal Operation. The adapter is operational but is not transferring I/O data.
❸	NET A	Green	Normal Operation. The adapter is properly connected and Bus is on-line.
❹	NET B	Off	Not used for PROFIBUS adapter.

(1) If all status indicators are off, the adapter is not receiving power. Refer to Chapter 2, Installing the Adapter, for instructions on installing the adapter.

If any other conditions occur, refer to Chapter 7, Troubleshooting .

Installing the Adapter

Chapter 2 provides instructions for installing the adapter on a PowerFlex drive.

Preparing for an Installation

Before installing the PROFIBUS adapter:

- Verify that you have all required equipment. Refer to Chapter 1, Getting Started.

Commissioning the Adapter

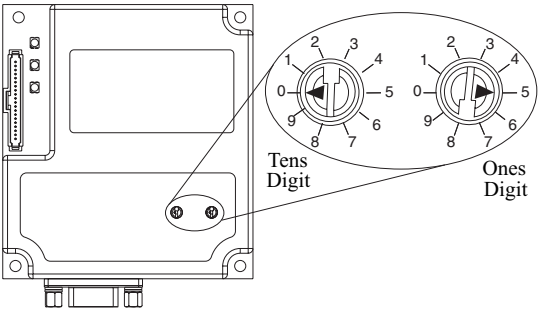
To commission the adapter, you must set a unique node address. (Refer to the Glossary for details about node addresses.)

Important: New settings are recognized only when power is applied to the adapter. If you change a setting, cycle power.

ATTENTION: Risk of equipment damage exists. The PROFIBUS adapter contains ESD (Electrostatic Discharge) sensitive parts that can be damaged if you do not follow ESD control procedures. Static control precautions are required when handling the adapter. If you are unfamiliar with static control procedures, refer to *Guarding Against Electrostatic Damage*, Publication 8000-4.5.2.

1. Set the node address switches.

Figure 2.1 Setting the Node Address



Setting	Description
0-99	Node address used by the adapter if switches are enabled. The default switch setting is 05. **Important:** If the address switch is set to "00", the adapter will use the setting of **Parameter 03 - [P-DP Addr Cfg]** for the node address. Refer to Chapter 3, Configuring the Adapter.

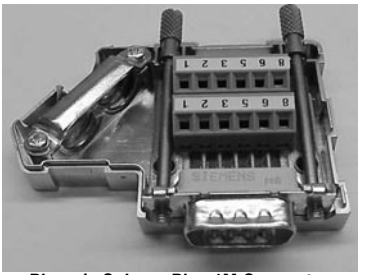
Connecting the Adapter to the Network

ATTENTION: Risk of injury or death exists. The PowerFlex drive may contain high voltages that can cause injury or death. Remove power from the drive, and then verify power has been discharged before installing or removing an adapter.

1. Remove power from the drive.
2. Use static control precautions.
3. Route the PROFIBUS cable through the bottom of the PowerFlex drive. (See Figure 2.7.)
4. Connect a Profibus connector to the cable. (See Figure 2.2 and Figure 2.3.)
   [**Note**: PROFIBUS connectors are available from a variety of sources and in various sizes. As such, there may be mechanical limitations that prohibit the use of some connectors. Phoenix Subcon Plus M1 (Part # 2761826) or ERNI Profibus vertical (Node Part # 103658 and Termination Part # 103659 connectors), are recommended for use with PowerFlex 70/700 drives.]

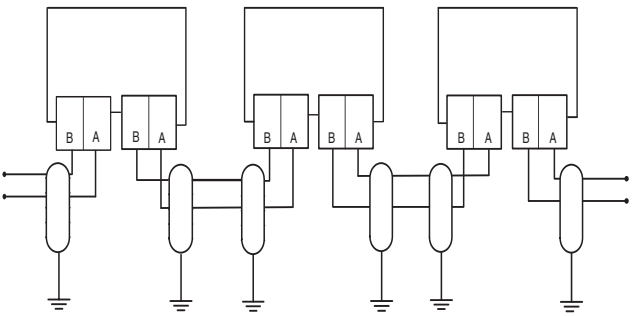
Figure 2.2 ERNI and Phoenix Subcon connectors

ERNI Connector



Phoenix Subcon Plus 1M Connector

Figure 2.3 Network Wiring Diagram



Only use cable that conforms to PROFIBUS cable standards. Belden #3079A PROFIBUS cable or equivalent is recommended.

Figure 2.4 20-COMM-P DB-9 pin layout

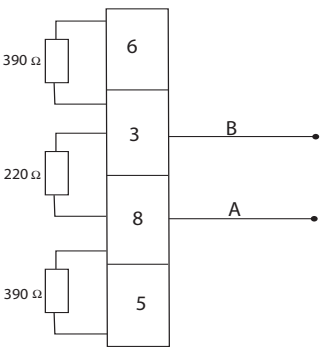
Terminal	Signal	Function
Housing	Shield	
1	Not connected	
2	Not connected	
3	B-LINE	Positive RxD/TxD, according to RS485 specification
4	RTS	Request to send
5	GND BUS	Isolated GND from bus
6	+5V BUS	Isolated +5V from bus
7	Not connected	
8	A-LINE	Negative RxD/TxD according to RS485 specification
9	Not connected	

5. Connect the PROFIBUS cable to the adapter, and secure it with the two screws on the connector. (See Figure 2.6.)
   Note: The screws on some connectors tie the Profibus cable ground/shield to the metal of the socket. In some cases, Profibus will not operate correctly without this connector.

Termination

The first and last node on the PROFIBUS network needs to be terminated by using a PROFIBUS connector with terminating resistors. Some connector manufacturers offer standard terminating connectors, such as the yellow ERNI Profibus termination vertical connector (Part # 103659). Standard Profibus node connectors, such as the Phoenix Subcon Plus M1 (Part #2761826), can be configured as a terminating connector by adding resistors (See Figure 2.5.)

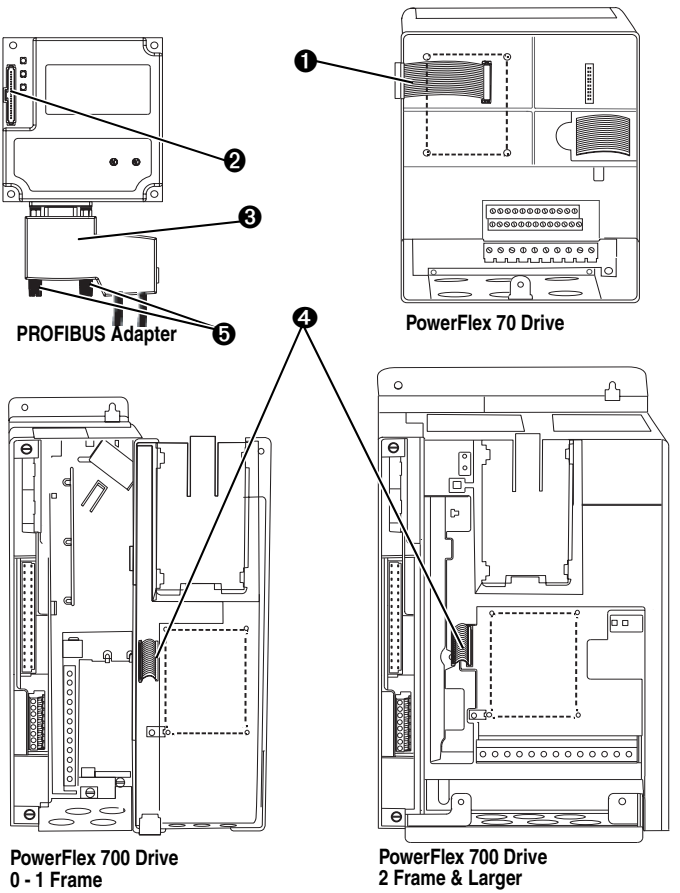
Figure 2.5 Phoenix Subcon Plus M1 connection for terminating resistors



Connecting the Adapter to the Drive

1. Remove power from the drive.
2. Use static control precautions.
3. Connect the Internal Interface cable to the DPI port on the drive and then to the DPI connector on the adapter.

Figure 2.6 DPI Ports and Internal Interface Cables



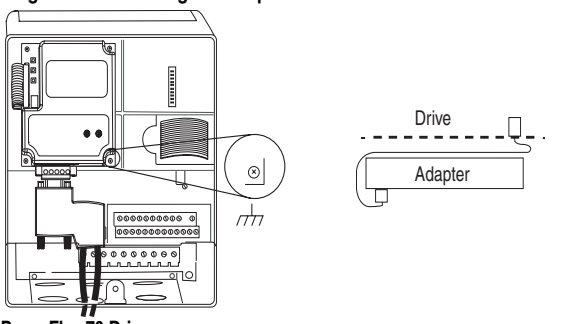
#	Description
❶	15.24 cm (6 in.) Internal Interface cable
❷	DPI Connector
❸	PROFIBUS Connector

#	Description
❹	2.54 cm (1 in.) Internal Interface cable
❺	Retaining screws

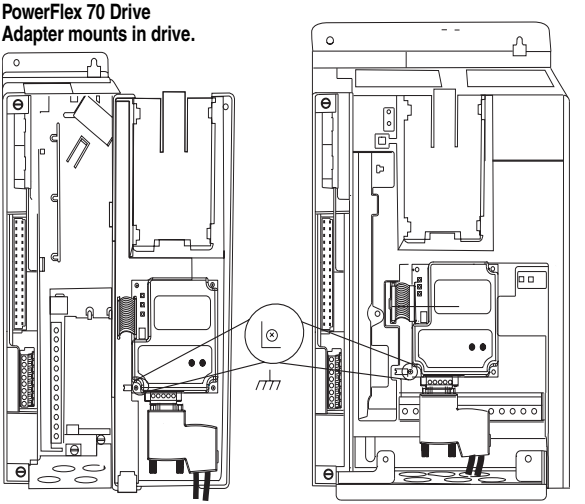
4. Fold the Internal Interface cable behind the adapter and mount the adapter on the drive using the four captive screws to secure and ground it to the drive.

Important: On a PowerFlex 70 drive, the screw in the lower right hole grounds the adapter.
On a PowerFlex 700 drive, the screw in the lower left hole grounds the adapter.

Figure 2.7 Mounting the Adapter



PowerFlex 70 Drive
Adapter mounts in drive.



PowerFlex 700 Drive (0 - 1 Frames)
Adapter mounts on door.

PowerFlex 700 Drive (2 Frame & Larger)
Adapter mounts in drive.

Applying Power

ATTENTION: Risk of equipment damage, injury, or death exists. Unpredictable operation may occur if parameter settings and switch settings are not compatible with your application. Verify that settings are compatible with your application before applying power to the drive.

1. Verify that the adapter will have a unique address on the network. If a new address is needed, reset its switches (refer to Commissioning the Adapter in this chapter).

2. Close the door or reinstall the cover on the drive. The status indicators can be viewed on the front of the drive after power has been applied.

3. Apply power to the PowerFlex drive. The adapter receives its power from the connected drive. When you apply power to the product the status indicators should be green after an initialization. If the status indicators go red, there is a problem. Refer to Chapter 7, Troubleshooting.

4. If the node address switches are set to “00,” use a configuration tool to set the node address parameters in the adapter (refer to Chapter 3, Configuring the Adapter).

5. Apply power to the master device and other devices on the network.

Configuring the Adapter

Chapter 3 provides instructions and information for setting the parameters in the adapter.

For a complete list of parameters, refer to Appendix B, Adapter Parameters. For definitions of terms in this chapter, refer to the Glossary.

Configuration Tools

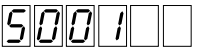
The PROFIBUS adapter stores parameters and other information in its own non-volatile memory. You must, therefore, access the adapter to view and edit its parameters. The following tools can be used to access the adapter parameters:

Tool	Refer To:
DriveExplorer Software (version 2.01 or higher)	*DriveExplorer Getting Results Manual*, Publication 9306-5.3, or the online help
DriveExecutive Software (version 1.01 or higher)	*DriveExecutive Online Help*
PowerFlex HIM	page 3-2

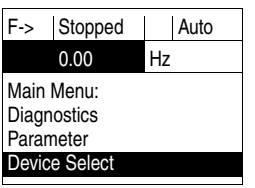
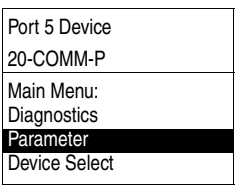
Using the PowerFlex HIM

If your drive has either an LED or LCD HIM (Human Interface Module), access parameters in the adapter as follows:

Using an LED HIM

Step	Key(s)	Example Screens
1. Press the ALT and then Sel (Device) to display the Device Screen.	Device ALT Sel	
2. Press the Up Arrow or Down Arrow to scroll to the **PROFIBUS** adapter. Letters represent files in the drive, and numbers represent ports. The adapter is usually connected to port 5.	OR	
3. Press the Enter key to enter your selection. A parameter database is constructed, and then the first parameter is displayed.		
4. Edit the parameters using the same techniques that you use to edit drive parameters.		

Using an LCD HIM

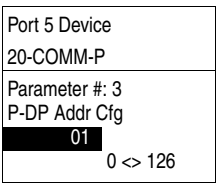
Step	Key(s)	Example Screens
1. In the main menu, press the Up Arrow or Down Arrow to scroll to **Device Select**.	OR	
2. Press Enter to enter your selection.		
3. Press the Up Arrow or Down Arrow to scroll to the **PROFIBUS** (20-COMM-P) adapter.	OR	
4. Press Enter to select the **PROFIBUS** adapter. A parameter database is constructed, and then the main menu for the adapter is displayed.		
5. Edit the parameters using the same techniques that you use to edit drive parameters.		

Setting the Node Address

If the node address switches are set to “00”, the value of **Parameter 03 - [P-DP Addr Cfg]** determines the node address.

1. Set the value of **Parameter 03 - [P-DP Addr Cfg]** to a unique node address.

Figure 3.1 PROFIBUS Node Address Screen on an LCD HIM



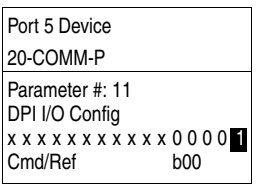
2. Reset the adapter. Refer to the Resetting the Adapter section in this chapter.

Setting the I/O Configuration

The I/O configuration determines the type of data sent to the drive. Logic Command/Status, Reference/Feedback, and Datalinks may be enabled or disabled. A “1” enables the I/O. A “0” disables it.

1. Set the bits in **Parameter 11 - [DPI I/O Config]**:

Figure 3.2 I/O Configuration Screen on an LCD HIM



Bit	Description
0	Logic Command/Reference (Default)
1	Datalink A
2	Datalink B
3	Datalink C
4	Datalink D
5 - 16	Not Used

Bit 0 is the right-most bit. In Figure 3.2, it is highlighted and equals “1.”

2. If Logic Command/Reference is enabled (default), configure the parameters in the drive to accept the Logic Command and Reference from the adapter. For example, set **Parameter 90 - [Speed Ref A Sel]** in a PowerFlex 70 or 700 drive to "DPI Port 5" so that the drive uses the Reference from the adapter. Also, verify that the mask parameters (for example, **Parameter 276 - [Logic Mask]**) in the drive are configured to receive the desired logic from the adapter.

3. If you enabled one or more Datalinks (optional), configure parameters in the drive to determine the source and destination of data in the Datalink(s). Also, ensure that the PROFIBUS adapter is the only adapter using the enabled Datalink(s).

4. Reset the adapter. Refer to the Resetting the Adapter section in this chapter.

The adapter is ready to receive I/O from the master (i.e., scanner). You must now configure the scanner to recognize and transmit I/O to the adapter. Refer to Chapter 4, Configuring the Profibus Scanner.

Setting a Fault Action

By default, when communications are disrupted (for example, a cable is disconnected) or the master is idle, the drive responds by faulting if it is using I/O from the network. You can configure a different response to communication disruptions using **Parameter 9 - [Comm Flt Action]** and a different response to an idle scanner using **Parameter 10 - [Idle Flt Action]**.

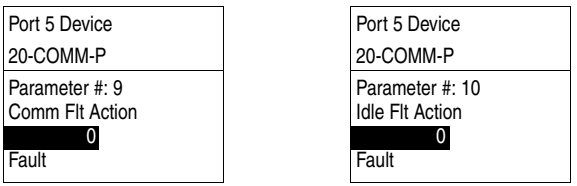
ATTENTION: Risk of injury or equipment damage exists. **Parameters 9 - [Comm Flt Action]** and **10 - [Idle Flt Action]** let you determine the action of the adapter and connected drive if communications are disrupted or the scanner is idle. By default, these parameters fault the drive. You can set these parameters so that the drive continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a risk of injury or equipment damage.

To change the fault action

- Set the values of **Parameters 9 - [Comm Flt Action]** and **10 - [Idle Flt Action]** to the desired responses:

Value	Action	Description
0	Fault (default)	The drive is faulted and stopped. (Default)
1	Stop	The drive is stopped, but not faulted.
2	Zero Data	The drive is sent 0 for output data after a communications disruption. This does not command a stop.
3	Hold Last	The drive continues in its present state after a communications disruption.
4	Send Flt Cfg	The drive is sent the data that you set in the fault configuration parameters (Parameters 13 - [Flt Cfg Logic] through 22 - [Flt Cfg D2 In]).

Figure 3.3 Fault Action Screens on an LCD HIM



Changes to these parameters take effect immediately. A reset is not required.

To set the fault configuration parameters

If you set **Parameter 9 - [Comm Flt Action]**, or **10 - [Idle Flt Action]** to the "Send Flt Cfg," the values in the following parameters are sent to the drive after a communications fault and/or idle fault occurs. You must set these parameters to values required by your application.

Number	Name	Description
13	Flt Cfg Logic	A 16-bit value sent to the drive for Logic Command.
14	Flt Cfg Ref	A 32-bit value (0 – 4294967295) sent to the drive as a Reference or datalink. **Important:** If the drive uses a 16-bit Reference or 16-bit Datalinks, the most significant word of the value must be set to zero (0) or a fault will occur.
15 – 22	Flt Cfg x1 In or Flt Cfg x2 In	

Changes to these parameters take effect immediately. A reset is not required.

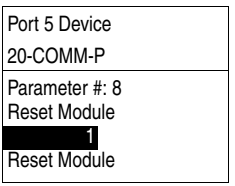
Resetting the Adapter

Changes to switch settings or some adapter parameters require that you reset the adapter before the new settings take effect. You can reset the adapter by cycling power to the drive or by using the following parameter:

ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting control I/O to the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.

- Set the **Parameter 08 - [Reset Module]** to **Reset Module**:

Figure 3.4 Reset Screen on an LCD HIM

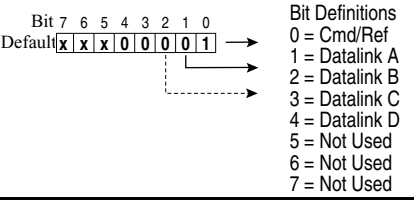


Value	Description
0	Ready (Default)
1	Reset Module
2	Set Defaults

When you enter **1 = Reset Module**, the adapter will be immediately reset. When you enter **2 = Set Defaults**, the adapter will set all adapter parameters to their factory-default settings. The value of this parameter will be restored to **0 = Ready** after the adapter is reset.

Viewing the Adapter Configuration

The following parameters provide information about how the adapter is configured. You can view these parameters at any time.

Number	Name	Description
01	DPI Port	The port on the drive to which the adapter is connected. Usually, it is port 5.
02	DPI Data Rate	The data rate used by DPI in the drive. It will be either 125 kbps or 500 kbps. It is set in the drive, and the adapter detects it.
04	P-DP Addr Actual	The node address used by the adapter. This will be one of the following values: • The address set by the rotary switches. • The value of Parameter 03 - [P-DP Addr Cfg] if the switches have been disabled. • An old address of the switches or parameter if they have been changed and the adapter has not been reset.
06	Ref/Fdbk Size	The size of the Reference/Feedback. It will either be 16 bits or 32 bits. It is set in the drive and the adapter automatically uses the correct size.
07	Datalink Size	The size of the Datalinks. It will either be 16 bits or 32 bits. It is set in the drive and the adapter automatically uses the correct size.
12	DPI I/O Active	The Reference/Feedback and Datalinks are used by the adapter. This value is the same as Parameter 11 - [DPI I/O Config] unless the parameter was changed and the adapter was not reset. 

Configuring the Profibus Scanner

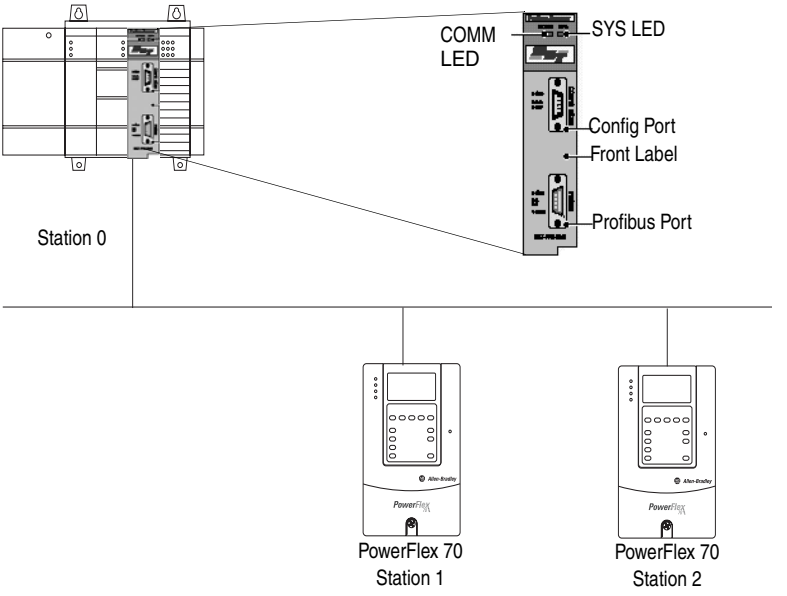
Profibus scanners are available from several manufacturers, including SST. Chapter 4 provides instructions on how to utilize the SST Profibus configuration software tool to:

- Install the 20-COMM-P GSD file in the software tool library
- Configure the SST-PFB-SLC Profibus Scanner.

Example Network

In this example, we will be configuring two **PowerFlex 70** drives, to be Station 1 and Station 2 on a Profibus network. This will be the configuration used throughout the manual, including the ladder examples. Apart from the node address and scanner mapping, they will have identical configurations. This chapter describes the steps to configure a simple network like the network in Figure 4.1.

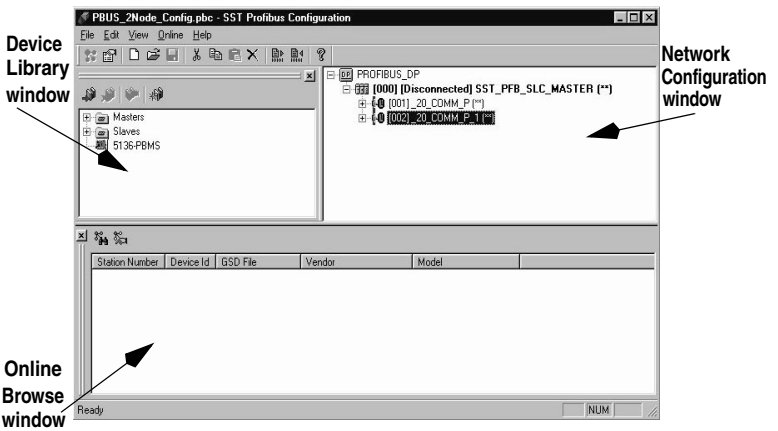
Figure 4.1 Example Profibus Network



SST Profibus Configuration Software Tool

SST Profibus scanners come with a software tool for configuring the scanner (See Figure 4.2.)

Figure 4.2 SST Profibus Configuration Software Tool



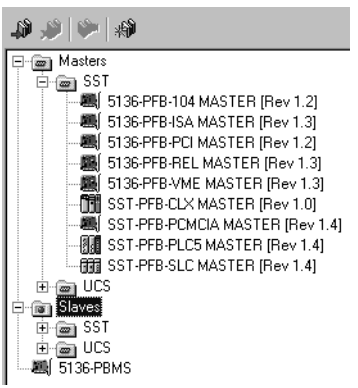
Installing the 20-COMM-P GSD file in the software tool library

GSD files are used by software tools to configure the network, i.e. to map and define the I/O in a Profibus scanner. A GSD file is required for each type of adapter on the network. For example: The 20-COMM-P GSD file is “A_B_0572.gsd” and a copy of the file is provided on a floppy disk with each 20-COMM-P. The file can also be downloaded from the Internet by going to: www.ab.com/drives/powerflex.

Follow the steps outlined below only when a new GSD file needs to be added to the SST PROFIBUS Configuration Software Tool. Typically, this is only done once, after the software tool is initially installed or if configuring a 20-COMM-P on the network for the very first time with this software tool.

1. The software tool comes with standard data files as shown in Figure 4.3. Additional data files, such as the 20-COMM-P GSD file, will need to be added to configure the 20-COMM-P in the scanner.

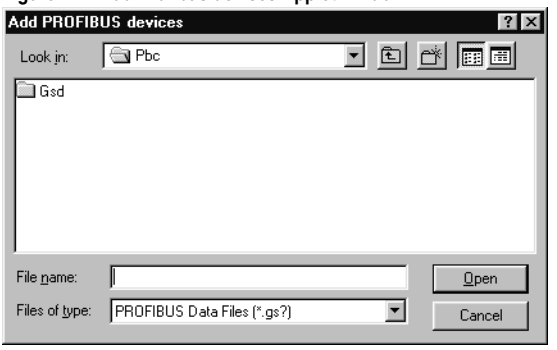
Figure 4.3 Standard Data Files



2. Click on the “New Device” icon  to add GSD files to the software library tool.

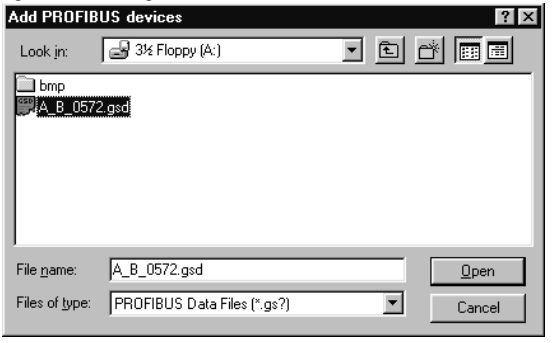
3. An “Add PROFIBUS devices” Applet window will appear (Figure 4.4). Prompts for the location of the PROFIBUS data files to be added to the library will follow.

Figure 4.4 Add Profibus devices Applet window.



4. Find the directory location of the data file(s) you wish to add (typically, the source location is a floppy disk in drive A:). "A_B_0572.gsd" is the GSD file for the 20-COMM-P as shown in Figure 4.5.

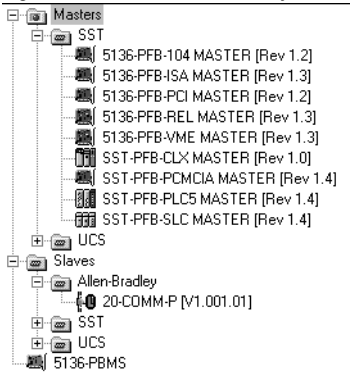
Figure 4.5 Adding the GSD file for the 20-COMM-P



5. Select "A_B_0572.gsd" for the 20-COMM-P and click **Open**.

6. Click on the (+) sign of the Slaves folder as shown in Figure 4.6.

Figure 4.6 Masters/Slaves Library window



The software tool will automatically create an Allen-Bradley sub-folder (in the Slaves folder) if it does not already exist. The 20-COMM-P is now shown in the library and the software tool is now ready to configure a 20-COMM-P on a PROFIBUS network.

Configuring the SST-PFB-SLC Profibus Scanner

The following steps are performed to configure the SST-PFB-SLC scanner using the SST PROFIBUS Configuration Software Tool. In our example, the PROFIBUS network will consist of a SLC master and two PowerFlex 70 drives. The ladder examples in the manual will utilize the following configuration:

- Logic Command / Status and Reference / Feedback enabled
- Datalink A enabled
- Datalink B enabled
- Datalink C enabled
- Datalink D enabled
- Parameter Access enabled (used to perform explicit messaging)

The SLC processor must be in Program mode to configure the scanner.

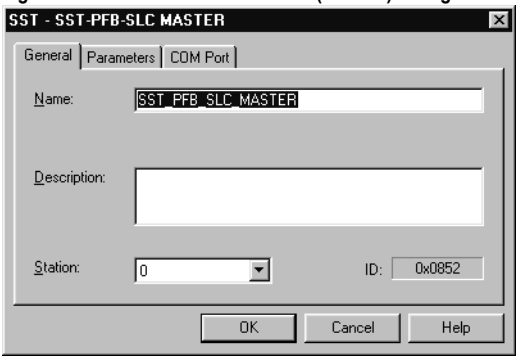
1. Click on the (+) sign of the **Masters** folder in the Library window to open the **SST** sub-folder. Available DP masters are displayed in this sub-folder.

2. Click on the (+) sign of the **Slaves** folder in the Library window and the **Allen-Bradley** sub-folder to display the available DP slaves or the 20-COMM-P slave. Refer to Figure 4.6.

3. Double-click the **SST-PFB-SLC MASTER** in the Masters folder in the Library window to add the scanner to the network.

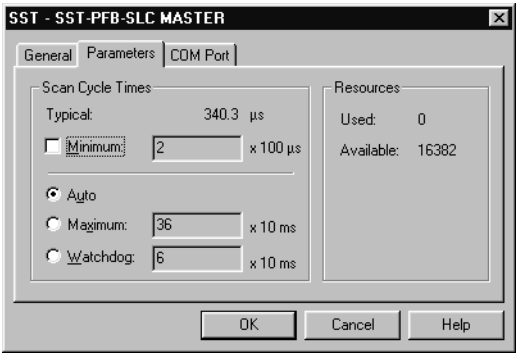
4. A user-defined **Name** and **Description** can be given to the scanner. In our example, the scanner will be **Station 0** on the network, as shown in Figure 4.7.

Figure 4.7 SST-SST-PFB-SLC Master (General) Dialogue Box.



5. Click on the Parameters tab to view the Scan Cycle Times. In our example, use the default settings as shown in Figure 4.8.

Figure 4.8 Scan Cycle Times Dialogue Box

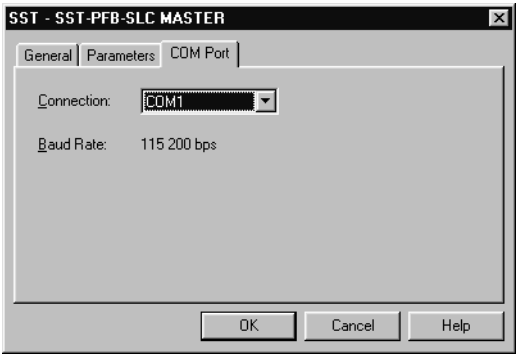


Connection and Baud Rate settings configure how the software tool will communicate with the CONFIG RS232 port on the scanner.

6. Click on the COM Port tab.

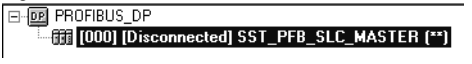
7. Accept the settings in our example (COM1 on the PC @ 115200 bps baud rate), as shown in Figure 4.9.

Figure 4.9 COM Port Default Settings



8. The scanner will appear in the network window as shown in Figure 4.10. Double-click on the scanner in the network window.

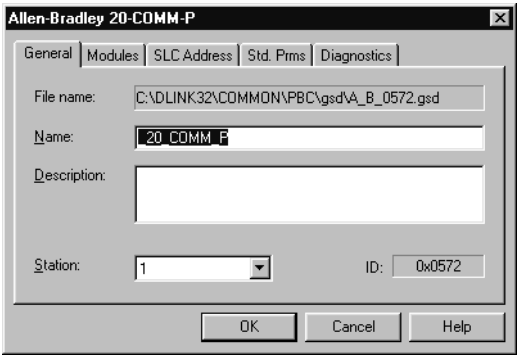
Figure 4.10 Scanner Network window



9. Double-click on the **20_COMM_P** listed in the Allen-Bradley library folder. A user-defined **Name** and **Description** can be given to this 20-COMM-P.

In our example, this device will be **Station 1** on the network. Other stations may be chosen by using the arrow to display a drop-down list in the **Station** window.

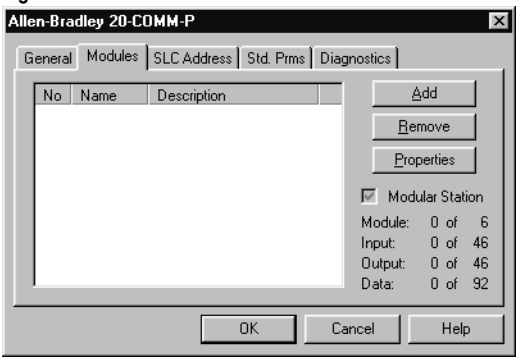
Figure 4.11 Allen-Bradley Library Dialogue window



Logic Command/ Status, Reference / Feedback, Datalinks and Parameter Access (explicit messaging) modules are added using the Modules tab.

10. Click on the **Modules** tab. Click **Add** to view the choice of modules.

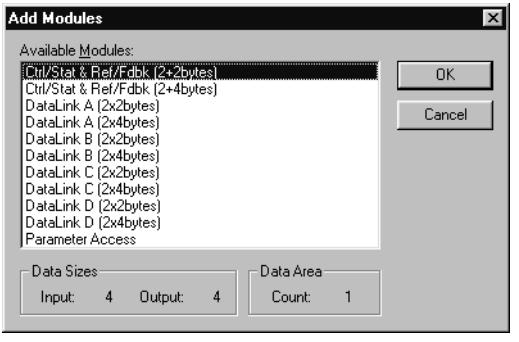
Figure 4.12 20-COMM-P Modules Tab



In our example, Station 1 will be controlled using Logic Command / Status and Reference / Feedback. The PowerFlex 70 utilizes 16-bit Reference / Feedback (2 bytes).

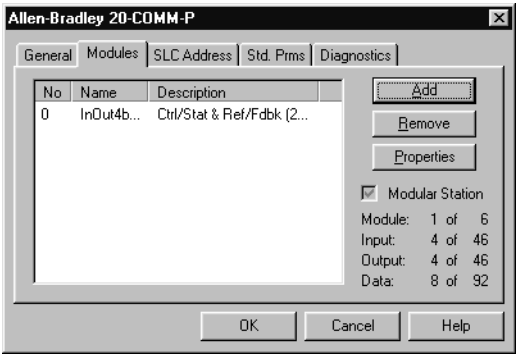
11. Select "Ctrl/Stat & Ref/Fdbk (2+2bytes)" from the "Available Modules" list as shown in Figure 4.13. Click **OK**.

Figure 4.13 Available Modules: Ctrl/Stat & Ref/Fdbk (2x2 bytes) Window



12. The "Ctrl/Stat & Ref/Fdbk" (2+2 bytes) module has now been added as shown in Figure 4.14.

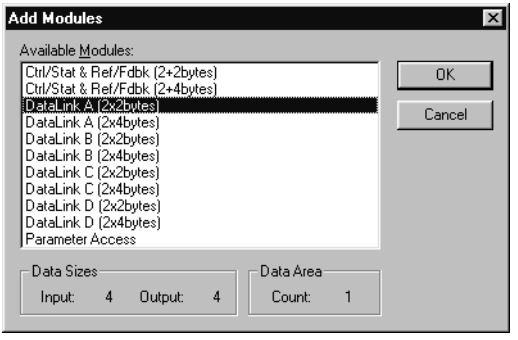
Figure 4.14 Modules: Ctrl/Stat & Ref/Fdbk Viewing Window



Station 1 will be configured to use Datalinks A1 and A2. The PowerFlex 70 utilizes 16-bit Datalinks.

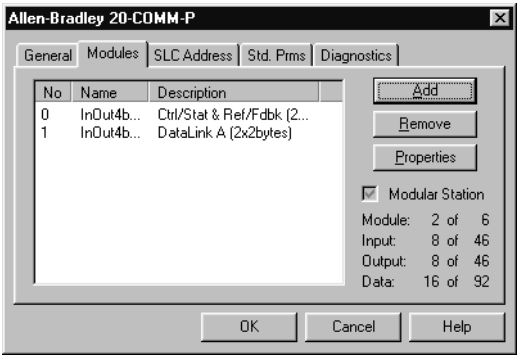
13. Click **Add** to continue adding modules. Select "Datalink A (2x2bytes)" and click **OK**.

Figure 4.15 Add Modules: Datalink A Selection Window



14. The "Datalink A" module has now been added as shown in Figure 4.16.

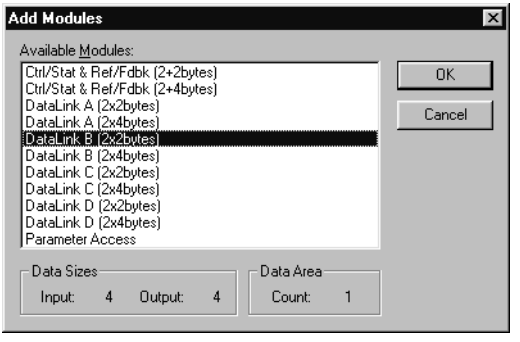
Figure 4.16 Modules: Datalink A Viewing Window



Station 1 will also be configured to use Datalinks B1 and B2. The PowerFlex 70 utilizes 16-bit Datalinks.

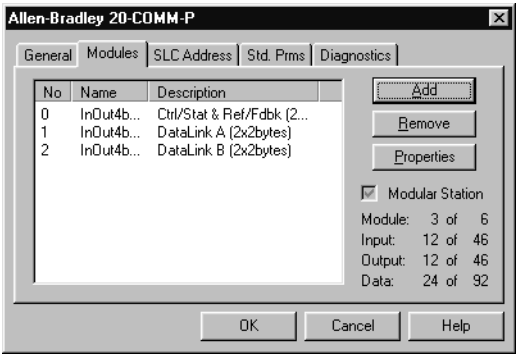
15. Click **Add** to continue adding modules. Select “Datalink B (2x2 bytes)” and click **OK**.

Figure 4.17 Add Modules: Datalink B Selection Window



16. The “Datalink B” module has now been added as shown in Figure 4.18.

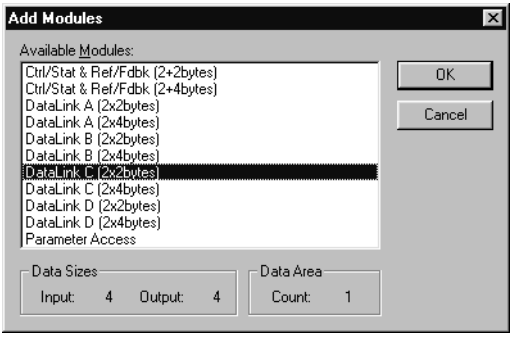
Figure 4.18 Modules: Datalink B Viewing Window



Station 1 will also be configured to use Datalinks C1 and C2. The PowerFlex 70 utilizes 16-bit Datalinks.

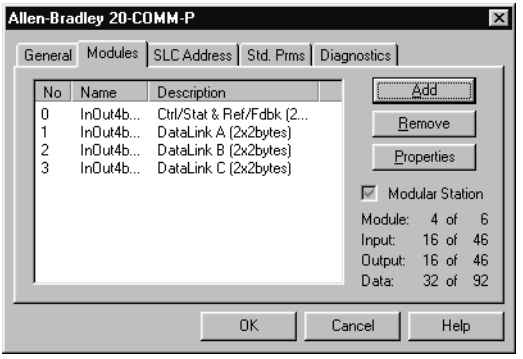
17. Click **Add** to continue adding modules. Select "Datalink C (2x2 bytes)" and click **OK**.

Figure 4.19 Add Modules: Datalink C Selection Window



18. The "Datalink C" module has now been added as shown in Figure 4.20.

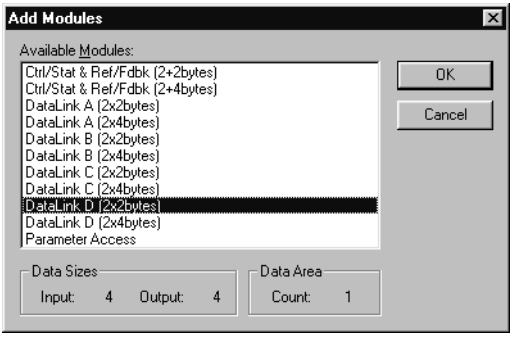
Figure 4.20 Modules: Datalink C Viewing Window



Station 1 will also be configured to use Datalinks D1 and D2. The PowerFlex 70 utilizes 16-bit Datalinks.

19. Click **Add** to continue adding modules. Select "Datalink D (2x2 bytes)" and click **OK**.

Figure 4.21 Add Modules: Datalink D Selection Window

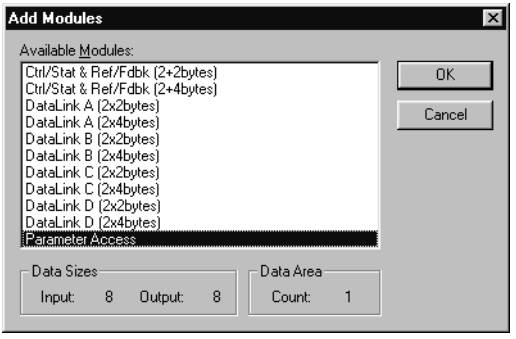


20. The "Datalink D" module has now been added.

Station 1 will also be configured to use Parameter Access for explicit messaging.

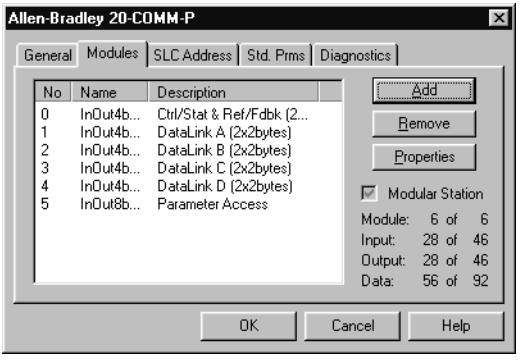
21. Click **Add** to continue adding modules. Select "Parameter Access" and click **OK**.

Figure 4.22 Add Modules: Parameter Access Selection Window



22. The "Parameter Access" module has now been added as shown in Figure 4.23.

Figure 4.23 Modules: Parameter Access Viewing Window

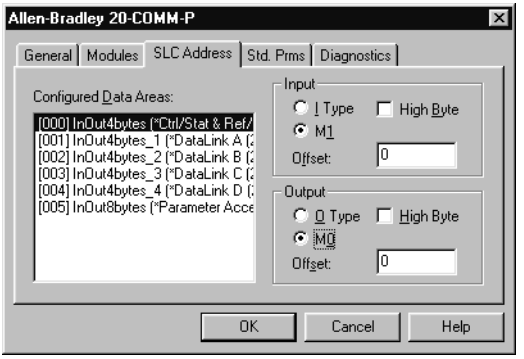


Settings can be chosen to map Station modules to SLC addresses. In our example M1/M0 files are used for Input / Output.

Note that the Reference/Feedback (Ctrl/Stat & Ref/Fdbk) start at word 0.

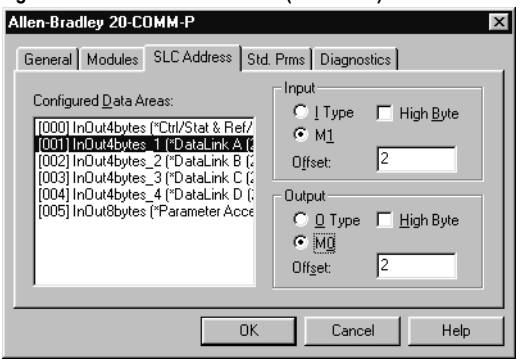
23. Click on the **SLC Address** tab as shown in Figure 4.24.

Figure 4.24 SLC Address: M1/M0 (Ctrl/Stat & Ref/Fdbk)



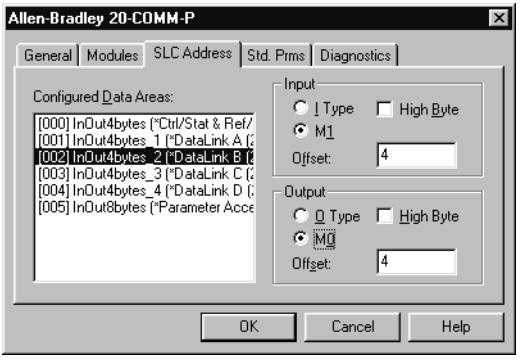
24. Datalink A is at word 2 in the M1/M0 files as shown in Figure 4.25.

Figure 4.25 SLC Address: M1/M0 (Datalink A)



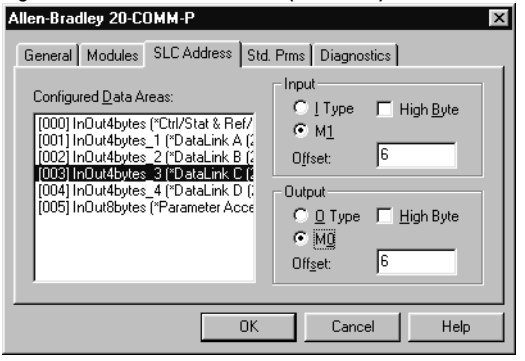
25. Datalink B is at word 4 in the M1/M0 files as shown in Figure 4.26.

Figure 4.26 SLC Address: M1/M0 (Datalink B)



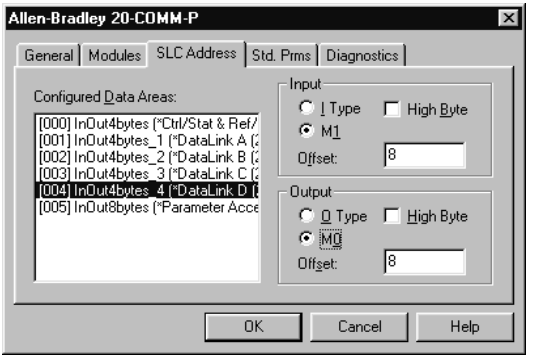
26. Datalink C is at word 6 in the M1/M0 files as shown in Figure 4.27.

Figure 4.27 SLC Address: M1/M0 (Datalink C)



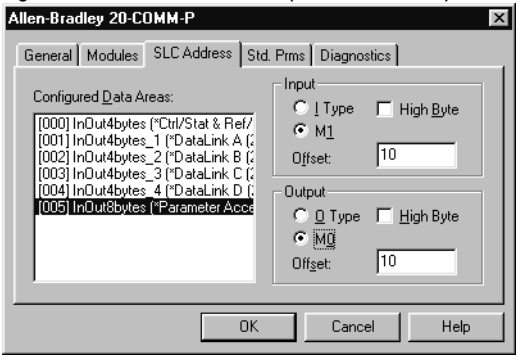
27. Datalink D is at word 8 in the M1/M0 files as shown in Figure 4.28.

Figure 4.28 SLC Address: M1/M0 (Datalink D)



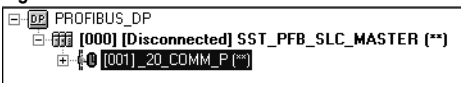
28. Parameter Access starts at word 10 in the M1/M0 files. Note that Parameter Access utilizes 4 words (10-13). Click **OK** when finished.

Figure 4.29 SLC Address: M1/M0 (Parameter Access)



29. Station 1 is now displayed in the network window.

Figure 4.30 Station 1 Network window



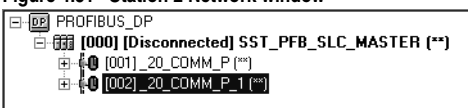
Station 1 is configured as follows:

Module	M1/M0 Word
Ctrl/Stat & Ref Fdbk	0
Datalink A	2
Datalink B	4
Datalink C	6
Datalink D	8
Parameter Access	10

Note that Station 1 occupies 14 words (0-13).

30. The same steps for configuring Station 1 will be used for configuring Station 2. Refer to previous steps (starting at step #9, Page 4-7) for Configuring the SST-PFB-SLC Profibus Scanner-Station 2. (See Figure 4.31.)

Figure 4.31 Station 2 Network window



Station 2 is configured as follows:

Module	M1/M0 Offset
Ctrl/Stat & Ref Fdbk	14
Datalink A	16
Datalink B	18
Datalink C	20
Datalink D	22
Parameter Access	24

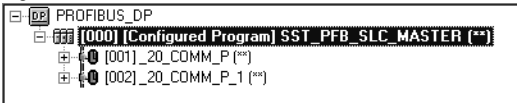
Note that Station 2 occupies 14 words (14-27).

31. Use the null modem cable that came with the scanner to connect COM1 on the PC and the CONFIG RS232 port on the scanner.

Note: The processor needs to be in program mode before proceeding.

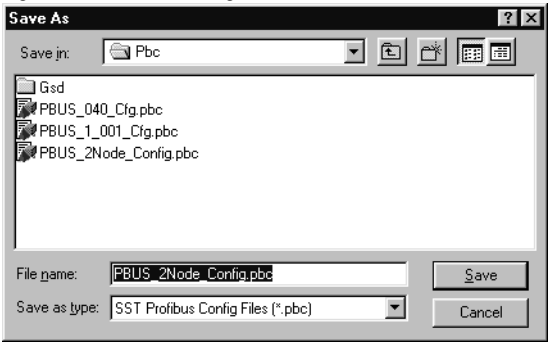
32. **Right-click** on the scanner in the network window and select "Connect". Then right-click again on the scanner in the network window and select "Load Configuration". If a minimum cycle time attention window pops up, click **OK** to continue. After the configuration has been loaded into the scanner, "Configured Program" will be displayed in the message window. (See Figure 4.32.)

Figure 4.32 Network window scanner selection



33. Click **File** and **Save As** from the tool bar, as a unique File **Name**. The configuration of the scanner is now complete. Note that cycling power to the scanner is recommended. (See Figure 4.33.)

Figure 4.33 Save As Dialogue window



Summary of the example scanner configuration:

Module	M0 / M1 Addressing	
	Station 1	Station 2
Logic Command / Status	0	14
Reference / Feedback	1	15
Datalink A1	2	16
Datalink A2	3	17
Datalink B1	4	18
Datalink B2	5	19
Datalink C1	6	20
Datalink C2	7	21
Datalink D1	8	22
Datalink D2	9	23
Parameter Access	10-13	24-27

GSD Diagnostic Messages

In the case of invalid GSD module configuration, the peripheral will send one of the following messages:

Fault	Description
No Ctrl/Stat & Ref/Fdbk	The Ctrl/Stat & Ref/Fdbk module must always be used and placed first in the configuration.
Module used more than once	A GSD module has been used more than once.
Not supported module	An unrecognized module has been used in the configuration.

Using I/O Messaging

Chapter 5 provides information and examples that explain how to use I/O Messaging to control a PowerFlex drive.

ATTENTION: Risk of injury or equipment damage exists. The examples in this publication are intended solely for purposes of example. There are many variables and requirements with any application. Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use of the examples shown in this publication.

About I/O Messaging

I/O messaging is used to transfer the data which controls the PowerFlex drive and sets its Reference. I/O can also be used to transfer data to and from Datalinks in PowerFlex drives.

The PROFIBUS adapter provides options for configuring and using I/O, including the following:

- The size of I/O can be configured by enabling or disabling the Logic Command/Reference and Datalinks.

Chapter 3, Configuring the Adapter and Chapter 4, Configuring the Profibus Scanner discuss how to configure the adapter and scanner on the network for these options. The Glossary defines the different options. This chapter discusses how to use I/O after you have configured the adapter and scanner.

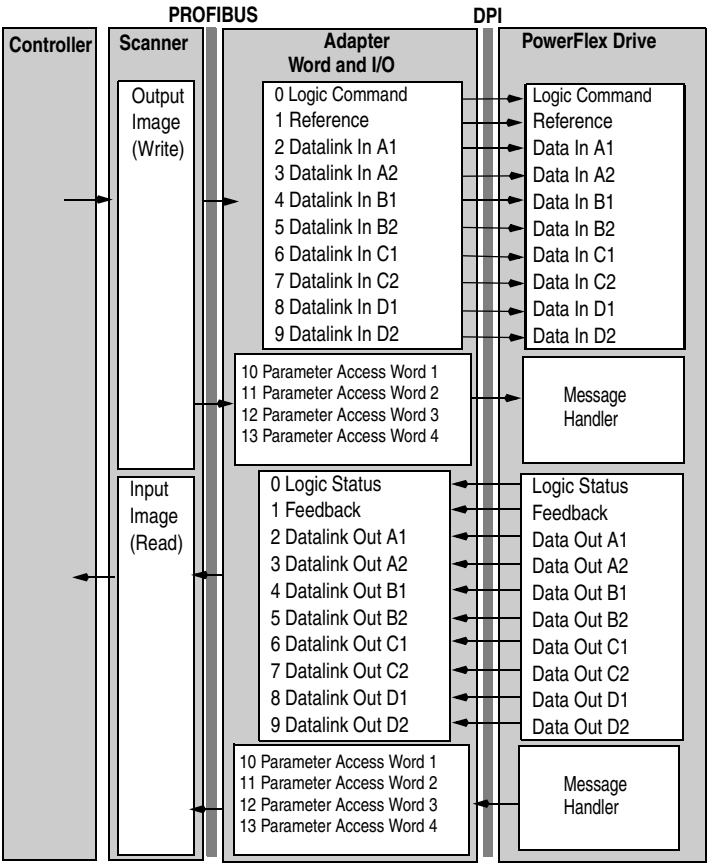
Understanding the I/O Image

The terms *input* and *output* are defined from scanner's point of view. Therefore, Outputs are data that is output from the scanner and consumed by the PROFIBUS adapter. Inputs are status data that is produced by the adapter and consumed as input by the scanner. The I/O image table will vary based on the following:

- Size (either 16-bit or 32-bit) of the Reference/Feedback word and Datalink words used by the drive.
- Configuration of **Parameter 11 - [DPI I/O Config]** in the adapter. If not all I/O is enabled, the image table is truncated. The image table always uses consecutive words starting at word 0.

Figure 5.1 illustrates an example of an I/O image with 16-bit words.

Figure 5.1 Example I/O Image with All I/O Enabled



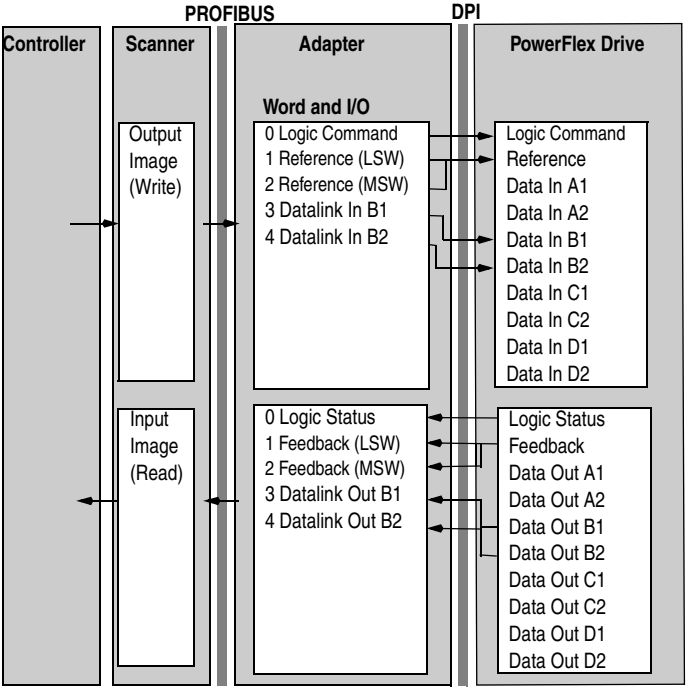
An image that uses 32-bit words for Reference and Datalinks would change the I/O image in Figure 5.1 as follows:

Word	I/O
0	Logic Command/Status
1 - 2	Reference/Feedback
3 - 6	Datalink A

Word	I/O
7 - 10	Datalink B
11 - 14	Datalink C
15 - 18	Datalink D

Figure 5.2 illustrates an example of an I/O image that does not use all of the I/O data. Only the Logic Command/Reference and Datalink B are enabled. In this example, the Reference is a 32-bit word, and Datalinks are 16-bit words.

Figure 5.2 Example I/O Image with Only Logic/Reference and Datalink B Enabled



LSW = Least Significant Word (Bits 15 - 0)
MSW = Most Significant Word (Bits 31 - 16)

Using Logic Command/Status

When enabled, the Logic Command/Status word is always word 0 in the I/O image. The *Logic Command* is a 16-bit word of control produced by the scanner and consumed by the adapter. The *Logic Status* is a 16-bit word of status produced by the adapter and consumed by the scanner.

This manual contains the bit definitions for compatible products available at the time of publication in Appendix C, Logic Command/ Status Words. For other products, refer to their documentation.

Using Reference/Feedback

When enabled, Reference/Feedback always begins at word 1 in the I/O image. The *Reference* (16 bits or 32 bits) is produced by the controller and consumed by the adapter. The *Feedback* (16 bits or 32 bits) is produced by the adapter and consumed by the controller. The size of the Reference/Feedback is determined by the drive and displayed in **Parameter 06 - [Ref/Fdbk Size]** in the adapter.

Size	Valid Values	In I/O Image	Example
16-bit	-32768 to 32767	Word 1	Figure 5.1
32-bit	-2147483648 to 2147483647	Word 1 and Word 2	Figure 5.2

Using Datalinks

A Datalink is a mechanism used by PowerFlex drives to transfer data to and from the controller. Datalinks allow a parameter value to be changed without using an Explicit Message. When enabled (optional), each datalink consumes either two 16 or 32-bit words in both the input and output image depending on its size. The size of Datalinks (16-bit words or 32-bit words) is determined by the drive and displayed in **Parameter 07 - [Datalink size]** in the adapter.

Rules for Using Datalinks

- Each set of Datalink parameters in a PowerFlex drive can be used by only one adapter. If more than one adapter is connected to a single drive, multiple adapters must not try to use the same Datalink.
- Parameter settings in the drive determine the data passed through the Datalink mechanism. Refer to the documentation for your drive.
- When you use a Datalink to change a value, the value is not written to the Non-Volatile Storage (NVS). The value is stored in volatile memory and lost when the drive loses power.

32-Bit Parameters using 16-Bit Datalinks

To read (and/or write) a 32-bit parameter using 16-bit Datalinks, typically both Datalinks (A,B,C,D) are set to the 32-bit parameter. For example, to read **Parameter 09 - [Elapsed MWh]**, both Datalink A1 and A2 are set to "9." Datalink A1 will contain the least significant word (LSW) and Datalink A2 the most significant word (MSW). In this example, the parameter 9 value of 5.8MWh is read as a "58" in Datalink A1.

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A1	LSW	9	58
A2	MSW	9	0

Regardless of the Datalink combination, x1 will always contain the LSW and x2 will always contain the MSW. In the following examples **Parameter 242 - [Power Up Marker]** contains a value of 88.4541 hours.

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A1	LSW	242	32573
A2	- Not Used -	0	0

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A1	- Not Used -	0	0
A2	MSW	242	13

Datalink	Most/Least Significant Word	Parameter	Data (decimal)
A2	MSW	242	13
B1	LSW	242	32573

32-bit data is stored in binary as follows:

MSW	2^{31} through 2^{16}
LSW	2^{15} through 2^{0}

Example:

Parameter 242 - [Power Up Marker] = 88.4541 hours

MSW = $13_{decimal} = 1101_{binary} = 2^{19} + 2^{18} + 2^{16} = 851968$

LSW = 32573

851968 + 32573 = 884541

SLC Example Ladder Logic Program

The Profibus example program uses a SLC processor with an SST Profibus scanner (SST-PFB-SLC) in the first slot of the rack and will work with PowerFlex 70 or PowerFlex 700 drives.

Function of the Example Program

The program is written for (2) drives on the network and demonstrates using:

- Logic Command / Reference
- Logic Status / Feedback
- Datalinks
- Parameter Access (covered in Chapter 6)

Adapter Settings

The Node Address switch settings on the 20-COMM-P's are set to:

- "1" for Station 1
- "2" for Station 2

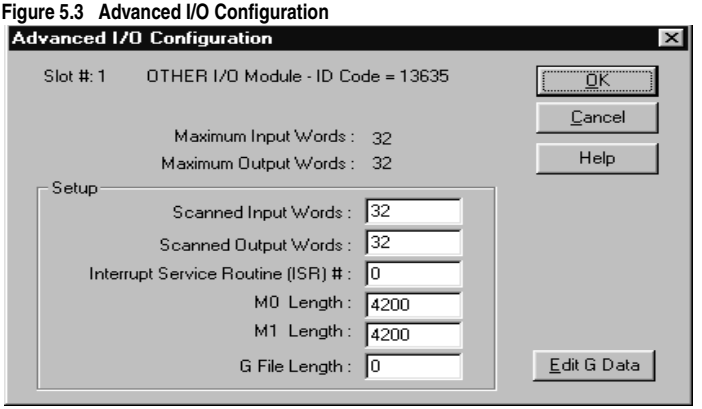
Parameter Settings

Device	Parameter	Name	Value	Description
PowerFlex 70	90	Speed Ref A Sel	22	'DPI Port 5' (20-COMM-P)
	300	Data In A1	140	Points to Pr. 140 [Accel Time 1]
	301	Data In A2	142	Points to Pr. 142 [Decel Time 1]
	302	Data In B1	100	Points to Pr. 100 [Jog Speed]
	303	Data In B2	155	Points to Pr. 155 [Stop Mode A]
	304	Data In C1	101	Points to Pr. 101 [Preset Speed 1]
	305	Data In C2	102	Points to Pr. 102 [Preset Speed 2]
	306	Data In D1	103	Points to Pr. 103 [Preset Speed 3]
	307	Data In D2	104	Points to Pr. 104 [Preset Speed 4]
	310	Data Out A1	140	Points to Pr. 140 [Accel Time 1]
	311	Data Out A2	142	Points to Pr. 142 [Decel Time 1]
	312	Data Out B1	100	Points to Pr. 100 [Jog Speed]
	313	Data Out B2	155	Points to Pr. 155 [Stop Mode A]
	314	Data Out C1	101	Points to Pr. 101 [Preset Speed 1]
	315	Data Out C2	102	Points to Pr. 102 [Preset Speed 2]
	316	Data Out D1	103	Points to Pr. 103 [Preset Speed 3]
	317	Data Out D2	104	Points to Pr. 104 [Preset Speed 4]
20-COMM-P	11	DPI I/O Config	xxx1 1111	Enables Cmd/Ref, Datalinks A-D

Scanner Settings

An SST-PFB-SLC scanner is in slot 1 of the SLC rack and configured as Station 0. The Advanced I/O Configuration is setup per Figure 5.3.

Figure 5.3 Advanced I/O Configuration



The two PROFIBUS adapters are setup as Station 1 and Station 2, and are configured as 14 words input & output each (See Chapter 4.)

SLC Data Table

Read Data

File N10: contains the actual read data that can be used elsewhere in the ladder program.

Station 1 Address	Station 2 Address	Function
N10:0	N10:14	Logic Status
N10:1	N10:15	Feedback
N10:2	N10:16	Datalink A1
N10:3	N10:17	Datalink A2
N10:4	N10:18	Datalink B1
N10:5	N10:19	Datalink B2
N10:6	N10:20	Datalink C1
N10:7	N10:21	Datalink C2
N10:8	N10:22	Datalink D1
N10:9	N10:23	Datalink D2
N10:10	N10:24	Parameter Access Word 1
N10:11	N10:25	Parameter Access Word 2
N10:12	N10:26	Parameter Access Word 3
N10:13	N10:27	Parameter Access Word 4

Write Data

The Profibus scanner is configured for 28 bytes (14 words) of outputs for each drive. Two drives require 48 bytes (28 words).

Station 1 Address	Station 2 Address	Function
N20:0	N20:14	Logic Command
N20:1	N20:15	Reference
N20:2	N20:16	Datalink A1
N20:3	N20:17	Datalink A2
N20:4	N20:18	Datalink B1
N20:5	N20:19	Datalink B2
N20:6	N20:20	Datalink C1
N20:7	N20:21	Datalink C2
N20:8	N20:22	Datalink D1
N20:9	N20:23	Datalink D2
N20:10	N20:24	Parameter Access Word 1
N20:11	N20:25	Parameter Access Word 2
N20:12	N20:26	Parameter Access Word 3
N20:13	N20:27	Parameter Access Word 4

Logic Command/Status Words

These examples use the Logic Command word and Logic Status word for PowerFlex 70 and PowerFlex 700 drives. Refer to Appendix C, Logic Command/Status Words for more information. The definition of the bits in these words may vary if you are using a different DPI Host product. Refer to the documentation for your Host product.

SLC Ladder Logic Example - Main Program

Figure 5.4 Example SLC Ladder Logic - Main Program

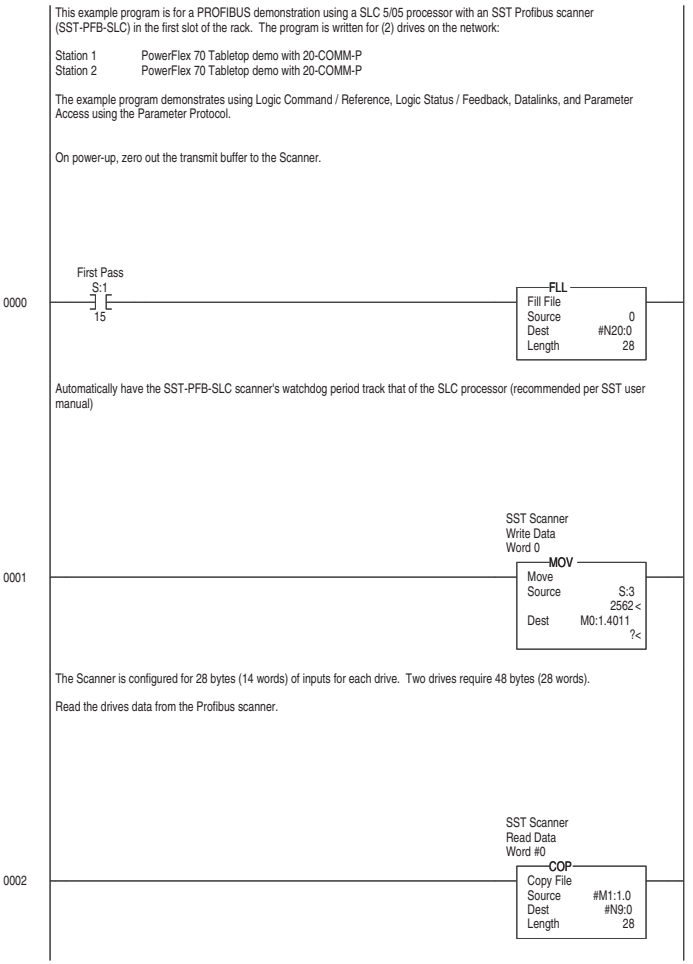
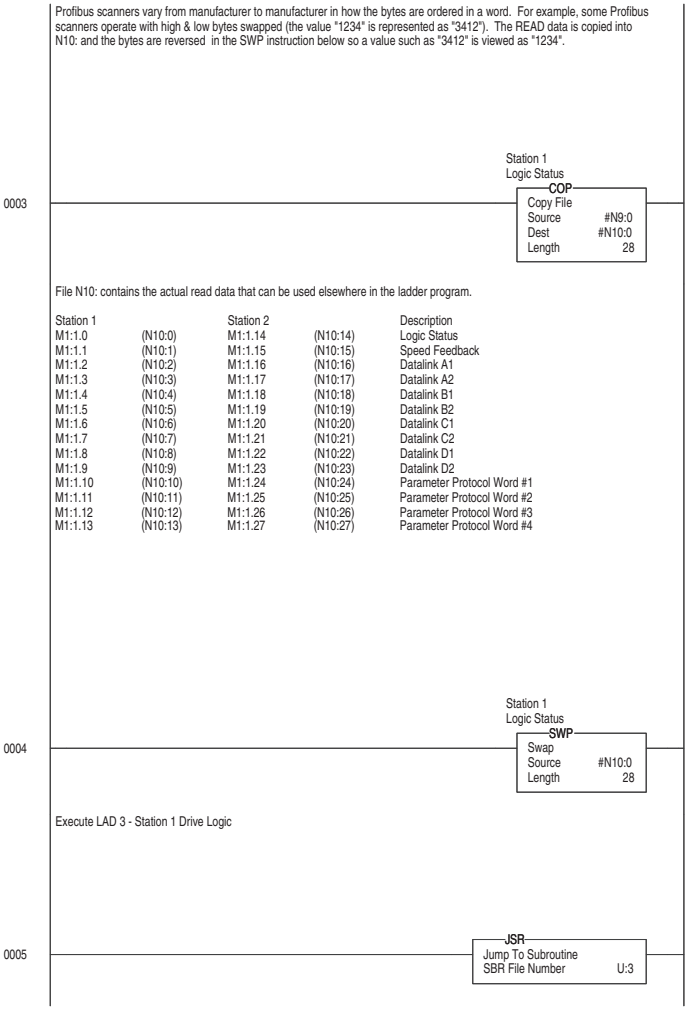


Figure 5.4 Example SLC Ladder Logic - Main Program (Continued)



For Ladder 3 Station 1 Drive Logic, see Figure 5.4 Example SLC Ladder - Station 1 Program.

For Ladder 4 Station 2 Drive Logic, see Figure 5.6 Example SLC Ladder - Station 2 Program.

Figure 5.4 Example SLC Ladder Logic - Main Program (Continued)

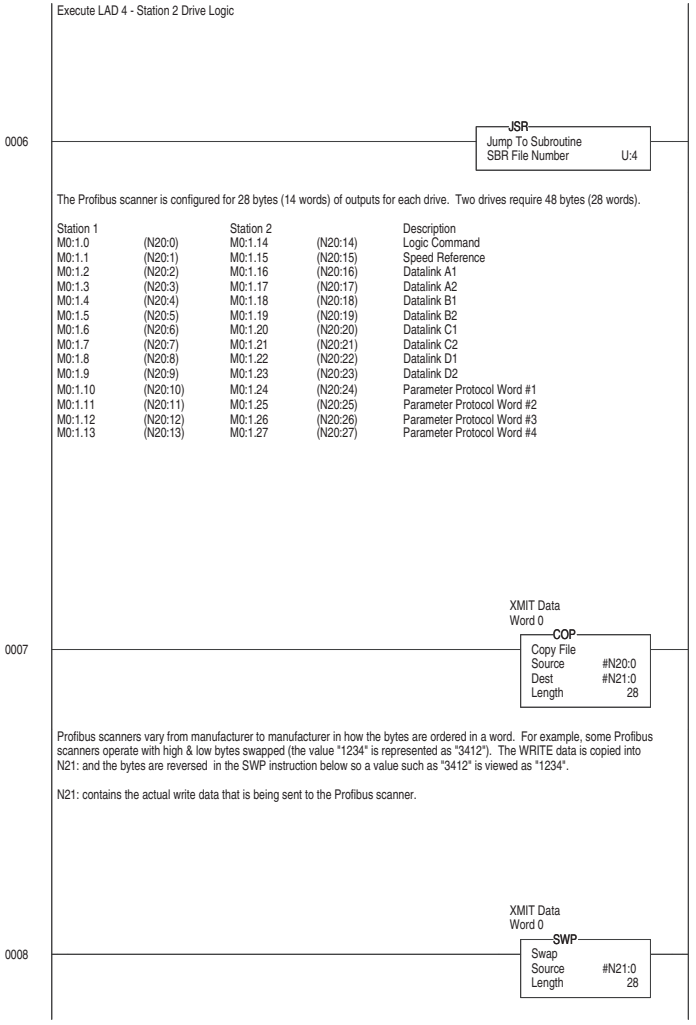
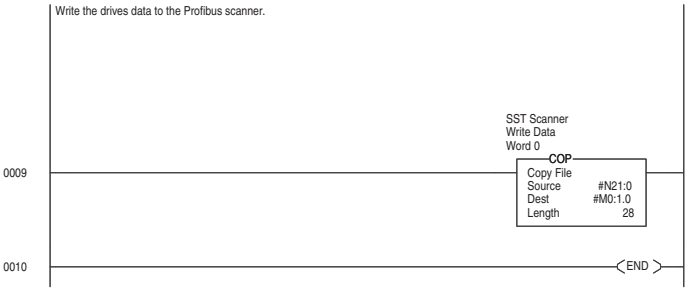


Figure 5.5 SLC Ladder Logic Example - Main Program



SLC Ladder Logic Example - Station 1 Program

Figure 5.6 Example SLC Ladder Logic - Station 1 Program

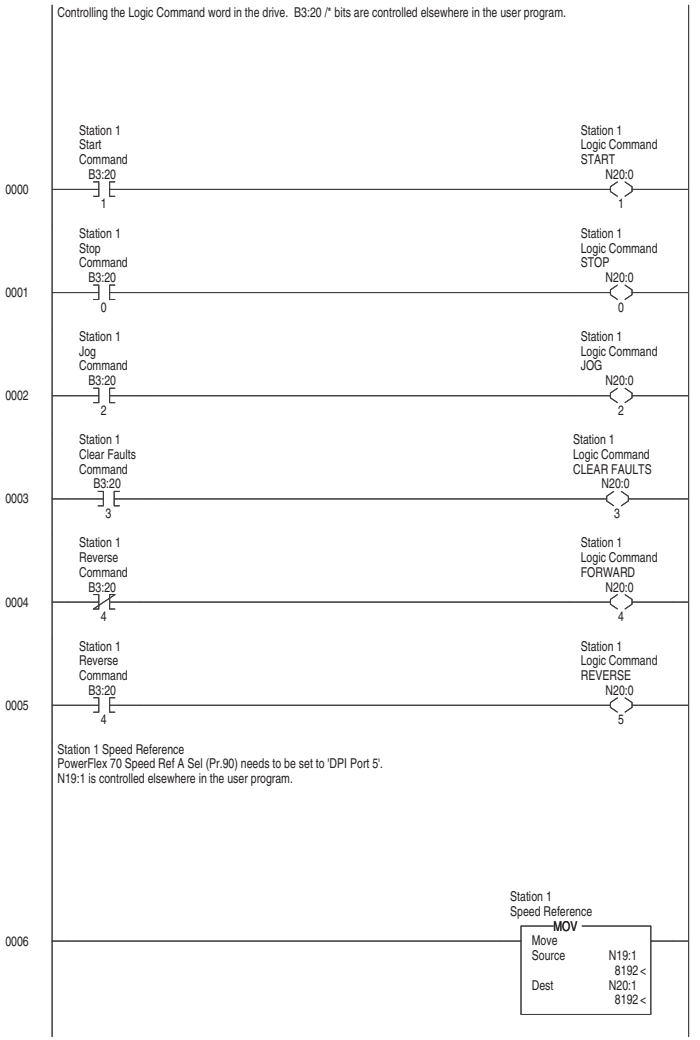


Figure 5.6 Example SLC Ladder Logic - Station 1 Program (Continued)

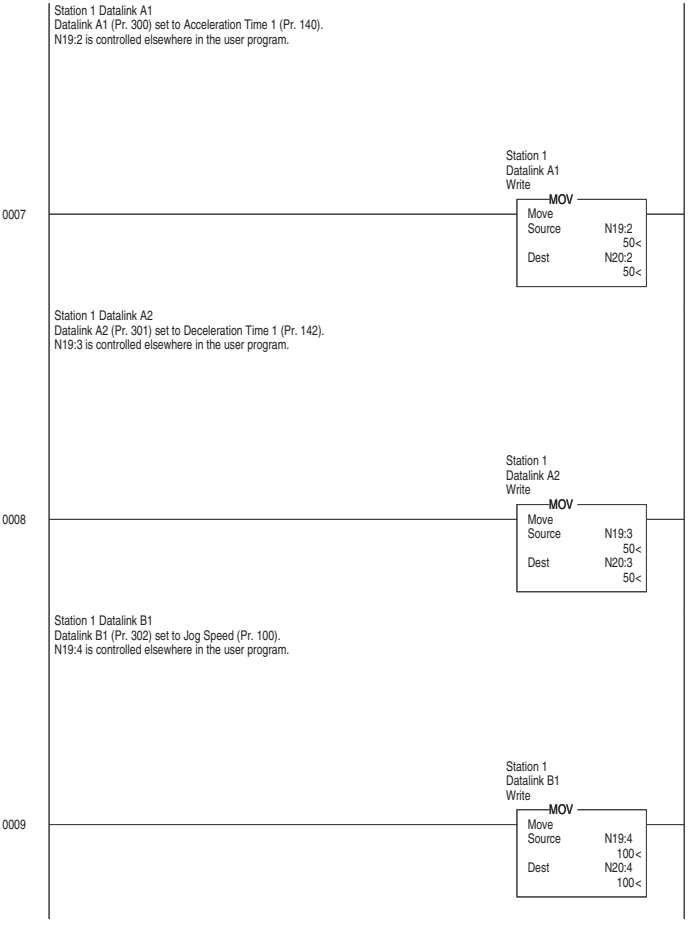


Figure 5.6 Example SLC Ladder Logic - Station 1 Program (Continued)

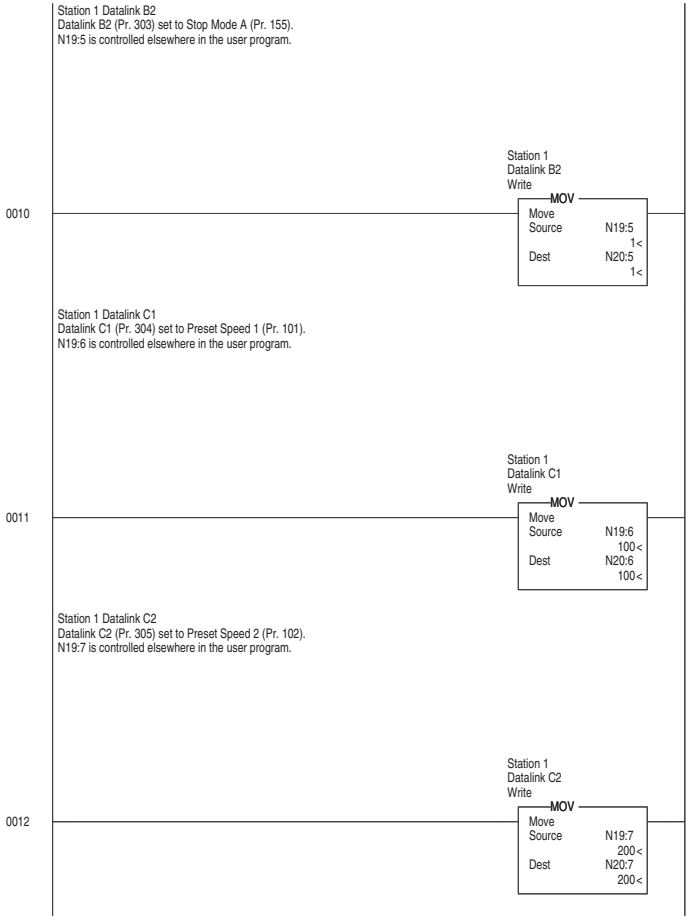
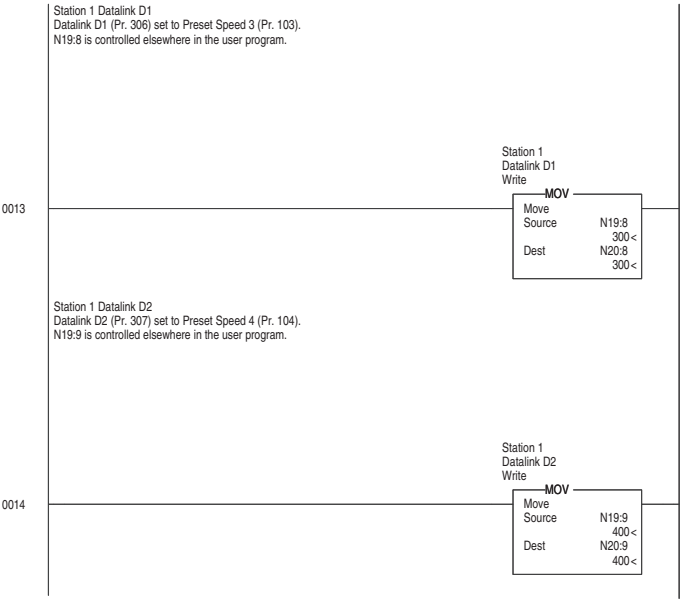


Figure 5.6 Example SLC Ladder Logic - Station 1 Program (Continued)



The Station 1 program can either end here or, if Explicit Messaging is needed, Parameter Protocol logic can be added. (See Figure 6.5.)

SLC Ladder Logic Example - Station 2 Program

Figure 5.7 Example SLC Ladder Logic - Station 2 Program

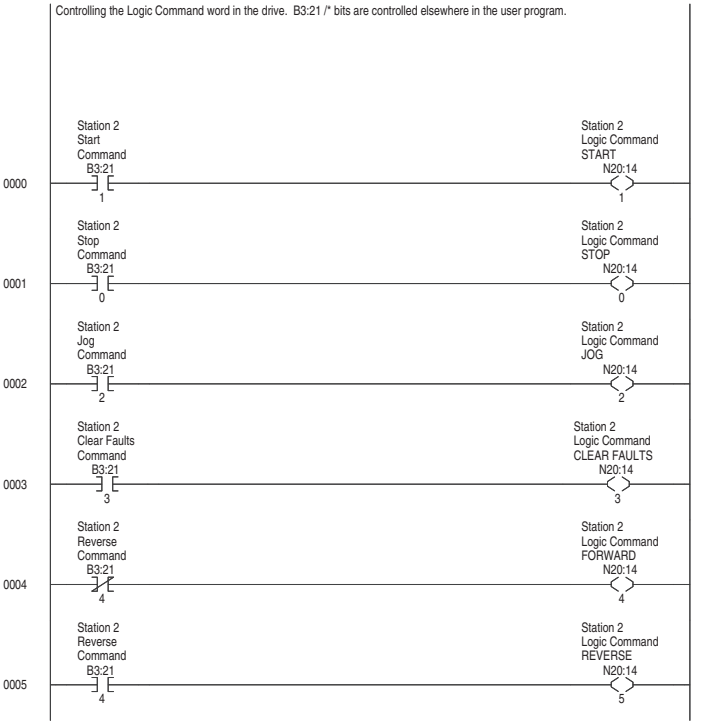


Figure 5.7 Example SLC Ladder Logic - Station 2 Program (Continued)

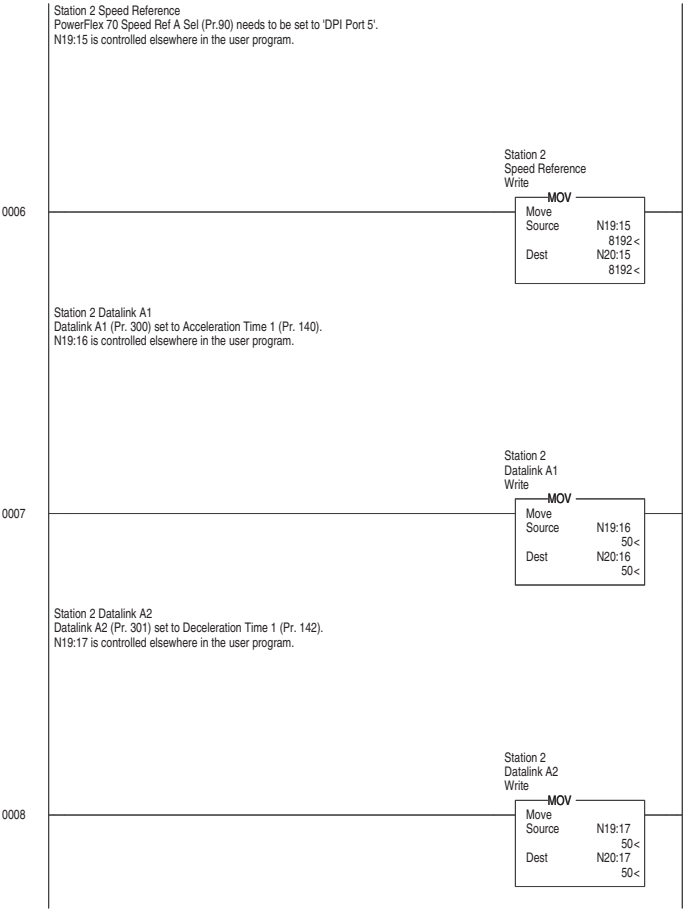


Figure 5.7 Example SLC Ladder Logic - Station 2 Program (Continued)

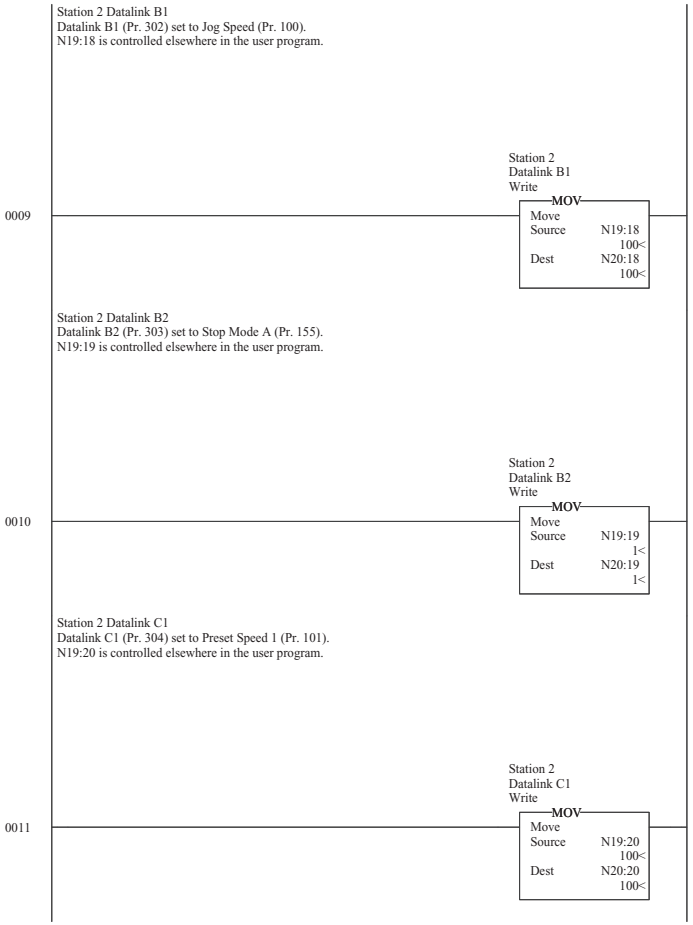
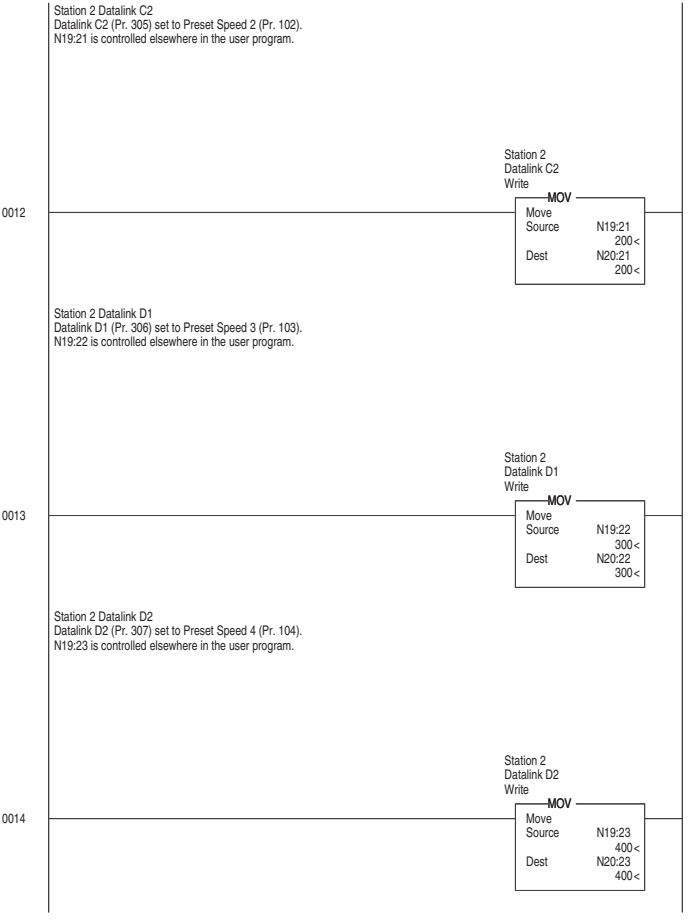


Figure 5.7 Example SLC Ladder Logic - Station 2 Program (Continued)



The Station 2 program can either end here or, if Explicit Messaging is needed, Parameter Protocol logic can be added
(See Figure 6.6.)

Using Explicit Messaging (Parameter Protocol)

Chapter 6 provides information and examples that explain how to use Explicit Messaging to monitor and configure the adapter and connected PowerFlex drive, as well as other peripherals.

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ATTENTION: Risk of equipment damage exists. If Explicit Messages are programmed to write parameter data to Non-Volatile Storage (NVS) frequently, the NVS will quickly exceed its life cycle and cause the drive to malfunction. Do not create a program that frequently uses Explicit Messages to write parameter data to NVS. Datalinks do not write to NVS and should be used for frequently changed parameters.

About Explicit Messaging

Explicit Messaging is used to transfer data that does not require continuous updates. With Explicit Messaging, you can configure and monitor a slave device's parameters on the PROFIBUS network.

To be able to use the parameter protocols in the 20-COMM-P, the Parameter Access module in the GSD file must be added to the master configuration when configuring the network. Refer to step #21, Page 4-13 to view the procedure for adding the "Parameter Access" module to a configuration. This maps 4 words input and output to the end of the I/O configuration, which is used as the request/response in the parameter message format (Figure 6.2).

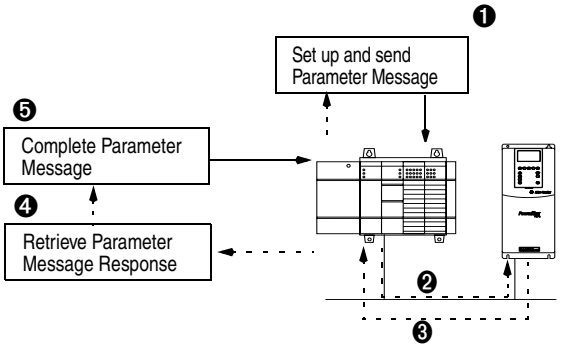
Parameter 23 - [Parameter Mode] in the 20-COMM-P module is used to configure the parameter protocol that is active. The default protocol is the Parameter Protocol.

Running Explicit Messages

There are five basic events in the Explicit Messaging process defined below. The details of each step will vary depending on the controller. Refer to the documentation for your controller.

Important: There must be a request message and an response message for all Explicit Messages, whether you are reading or writing a data.

Figure 6.1 Explicit Message Process



Event

1. You format the required data and set up the ladder logic program to send an Explicit Message request to the scanner module (download).
2. The scanner module transmits the Explicit Message Request to the slave device over the PROFIBUS network.
3. The slave device transmits the Explicit Message Response back to the master.
4. The controller retrieves the Explicit Message Response.
5. The Explicit Message is complete.

Parameter Protocol

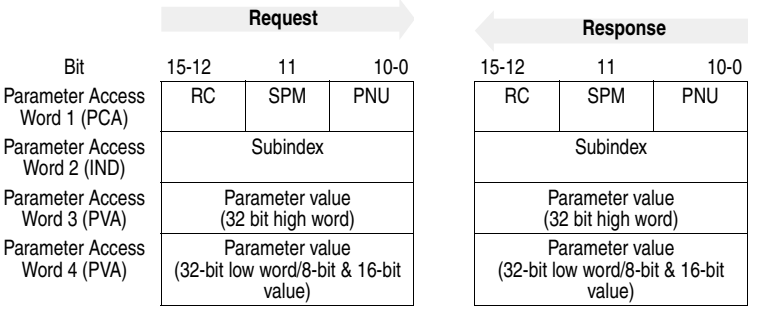
This protocol uses 4 words in the Profibus I/O area. Requests and responses are a handshake procedure and cannot be batched, meaning that if the master sends a request, it has to wait for the response before sending a new request.

With this protocol you can:

- Read 8-bit, 16-bit, or 32-bit parameters from any DPI port
- Write 8-bit, 16-bit, or 32-bit parameters to any DPI port
- Read the Host Fault object

To enable this protocol set **Parameter 23 - [Parameter Mode]** to “Par Prot” (default).

Figure 6.2 Parameter Message Format



Refer to Page 6-4 and Page 6-5 for a description of the data that is required in each word.

Parameter Message Request

Word	Description
1	**PNU - Parameter Number** (Bit 0-10) The parameter number determines which parameter to access, in the selected peripheral. Parameters 1-1023 can be accessed. Parameter numbers 1024 - 2048 are used to access the fault object. Parameter 1024 is equal to the latest fault, 1025 to the prior fault, and so on.
	SPM (Bit 11) Reserved - Should always bet set to 0.
	RC - Request Code (Bit 12-15) One of the following codes have to be used: 0 = No request 1 = Request parameter value 2 = Change parameter value (8-bit & 16-bit word) 3 = Change parameter value (32-bit word) 4 -15 = Reserved
2	**IND - Index** The index word contains the DPI Port number of the DPI Peripheral that the request is addressed to. The drive always has Port number 0, the Port number of the 20-COMM-P module can be determined from **Parameter 01 - [DPI PORT]**. This is Port 5 on PowerFlex 70 and PowerFlex 700.
3	**PVA - Parameter value** (32-bit high word) The Parameter value, if the parameter is 32 bits, the most significant bytes are placed here.
4	**PVA - Parameter value** (32-bit low word or 8-bit & 16-bit word) The Parameter value, if the parameter is 32 bits, the least significant bytes are placed here. If the parameter is 16-bit or lower, the entire result is placed in this word.

Parameter Message Response

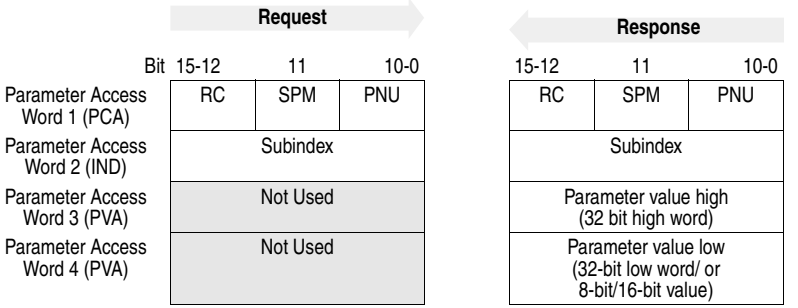
Word	Description
1	**PNU - Parameter Number** (Bit 0-10) Requested parameter number.
	SPM (Bit 11) Reserved - is always set to 0.
	RC - Response Code (Bit 12-15) One of the following codes will be sent: 0 = No request 1 = Transfer parameter value (8-bit & 16-bit word) 2 = Transfer parameter value (32-bit word) 3-6 = Reserved 7 = Request rejected. Error message is found in Word 3, see table below for fault number description. 8 = No parameter change rights 9-15 = Reserved
2	**IND - Index** Port ID of requested parameter
3	**PVA - Parameter value** (32-bit high word) The Parameter value, if the parameter is 32 bits, the most significant bytes are placed here. If a fault was requested (Parameter 1024-2048), this word contains the fault code, that identifies the fault.
4	**PVA - Parameter value** (32-bit low word or 8-bit & 16-bit word) The Parameter value, if the parameter is 32-bits, the least significant bytes are placed here. If the parameter is 16-bit or lower, the entire result is placed in this word. If a fault was requested (Parameter 1024-2048), the MSB contains the DPI Port number that caused the fault, and the LSB contains the DPI object instance that cause the fault.

Fault number	Description
101	Service not supported (i.e., Set service to a read-only parameter)
102	Service not valid
104	Parameter does not exist (i.e., Parameter number>max number of parameters)
106	Data value out of range (i.e., Set value is out of range)
107	State conflict (i.e., Parameter is not changeable while the product is in an operating state)

Parameter Protocol Examples

Read Examples

Figure 6.3 Overview Parameter Message Format (Read Request)



Request	Response
RC Set to “1” (‘0001’) binary to read	**RC** “1” (‘0001’) Transferring 8-bit or 16-bit parameter value “2” (‘0010’) Transferring a 32-bit parameter value “7” (‘0111’) Request rejected (including fault code)
SPM Not used	**SPM** Not used
PNU Parameter number to read	**PNU** Confirms the Parameter number (if successful, equals the PNU from the request)
Subindex Selects which DPI port to talk to (“0” = DPI Host, “5” =20-COMM-P on PowerFlex 70	**Subindex** Confirms the DPI port (if successful, equals the Subindex from the request)
Not Used	**Parameter value high word** Contains a “0” if returning a value from a 16-bit parameter and the high word from a 32-bit parameter
Not Used	**Parameter value low word** Contains the value from a 8-bit or 16-bit parameter, the low word if reading from a 32-bit parameter, or the fault code (if RC = “7”)

Reading Parameter **140 [Accel Time 1]** from the PowerFlex 70 (DPI Port 0)

Message	SLC Address	Par. Access Word	Value (hex)	Description
Command	N20:10	1	108C	1000 hex = Read 8C hex = 140 dec (Pr. 140)
	N20:11	2	0	DPI Port 0 (DPI Host)
	N20:12	3	0	Not Used
	N20:13	4	0	Not Used
Reply	N10:10	1	108C	Transferring 16-bit parameter value ("1") Confirms Par. Number of the request ("8C")
	N10:11	2	0	Confirms Par. Access Word 2 of the request (DPI Port #)
	N10:12	3	0	Not Used
	N10:13	4	32	32 hex = 50 dec = 5.0 seconds

Reading Parameter **4 [P-DP Addr Actual]** from the 20-COMM-P on a PowerFlex 70 (DPI Port 5)

Message	SLC Address	Par. Access Word	Value (hex)	Description
Command	N20:10	1	1004	1000 hex = Read 4 hex = 4 dec (Pr. 4)
	N20:11	2	5	DPI Port 5 (20-COMM-P)
	N20:12	3	0	Not Used
	N20:13	4	0	Not Used
Reply	N10:10	1	1004	Transferring 16-bit parameter value ("1") Confirms Par. Number of the request ("4")
	N10:11	2	5	Confirms Par. Access Word 2 of the request (DPI Port #)
	N10:12	3	0	Not Used
	N10:13	4	1	1 hex = 1 dec = Station 1

Reading Par. **244 [Fault 1 Time]** from the PowerFlex 70 (DPI Port 0)

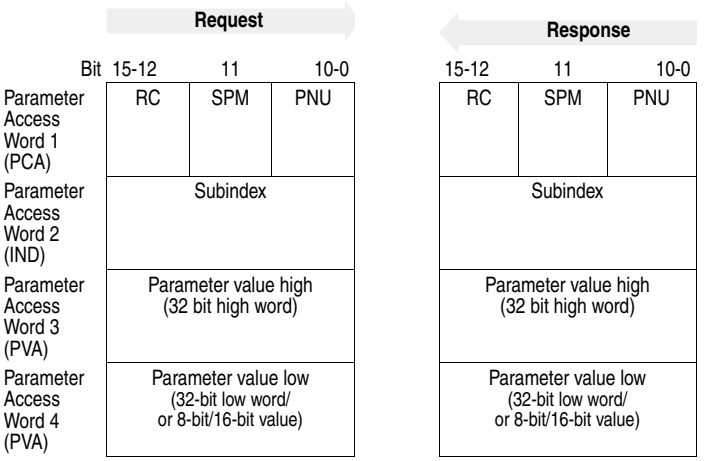
Message	SLC Address	Par. Access Word	Value (hex)	Description
Command	*N20:10*	*1*	*10F4*	*1000 hex = Read F4 hex = 244 dec (Pr. 244)*
	N20:11	*2*	*0*	*DPI Port 0 (DPI Host)*
	N20:12	*3*	*0*	*Not Used*
	N20:13	*4*	*0*	*Not Used*
Reply	*N10:10*	*1*	*10F4*	*Transferring 16-bit parameter value ("1") Confirms Par. Number of the request ("F4")*
	N10:11	*2*	*0*	*Confirms Par. Access Word 2 of the request (DPI Port #)*
	N10:12	*3*	*1B*	*Parameter value high word*[*1]
	N10:13	*4*	*518E*	*Parameter value low word*[*1]

**Note 1: 1B518E hex = 1,790,350 decimal equates to 179.0350 hours (fixed decimal point)*

Note 1: 1B518E hex = 1790350 decimal which equates to 170.0350 hours (fixed decimal point.)

Write Examples

Figure 6.4 Overview Parameter Message Format (Write Request)



Request	Response
RC "2" ('0010' binary) to write a 8-bit or 16-bit parameter "3" ('0011 binary) to write a 32-bit parameter	**RC** "1" (0001') Transferring a 8-bit or 16-bit parameter value "2" ('0010') Transferring a 32-bit parameter value "7" ('0111') Request rejected (including fault number)
SPM Not used	**SPM** Not Used
PNU Parameter number being written	**PNU** Confirms the Parameter number (equals the PNU from the request)
Subindex Selects which DPI port to talk to ("0"= DPI Hosts "5"= 20-COMM-P on PowerFlex 70)	**Subindex** Confirms the DPI Port (equals the Subindex from the request)
Parameter value high Contains the high word if writing a 32-bit parameter	**Parameter value high**. Confirms the high word if writing a 32-bit parameter.
Parameter value low Contains the write value for a 8-bit or 16-bit parameter, or the low word if writing a 32-bit parameter	**Parameter value low**. Confirms the write value for a 8-bit or 16-bit parameter, the low word (if writing a 32-bit parameter, or the fault code (if RC="7")

Writing Parameter **101 [Preset Speed 1]** to the PowerFlex 70 (DPI Port 0)

Message	SLC Address	Par. Access Word	Value (hex)	Description
Command	*N20:10*	*1*	*2065*	*2000 hex = Change parameter value (word)* *65 hex = 101 dec (Pr.101)*
	N20:11	*2*	*0*	*DPI Port 0 (DPI Host)*
	N20:12	*3*	*0*	*Not Used*
	N20:13	*4*	*64*	*64 hex = 100 dec = 10.0 Hz*
Reply	*N10:10*	*1*	*1065*	*Transferring 16-bit parameter value ("1")* *Confirms Par. Number of the request ("65")*
	N10:11	*2*	*0*	*Confirms Par. Access Word 2 of the request*
	N10:12	*3*	*0*	*Not Used*
	N10:13	*4*	*64*	*Confirms Param. Access Word 4 of the request*

Writing Parameter **9 [Comm Fault Action]** to the 20-COMM-P on a PowerFlex 70 (DPI Port 5)

Message	SLC Address	Par. Access Word	Value (hex)	Description
Command	N20:10	1	2009	2000 hex = Change parameter value 8-bit/16-bit 9 hex = 9 dec (Pr. 9)
	N20:11	2	5	DPI Port 5 (20-COMM-P)
	N20:12	3	0	Not Used
	N20:13	4	2	2 hex = 2 dec = Zero Data
Reply	N10:10	1	1009	Transferring 8-bit/16-bit parameter value ("1") Confirms Par. Number of the request ("9")
	N10:11	2	5	Confirms Par. Access Word 2 of the request
	N10:12	3	0	Not Used
	N10:13	4	2	Confirms Par. Access Word 4 of the request

Writing Parameter **15 [Flt Cfg A1 In]** to a 20-COMM-P on a PowerFlex (DPI Port 5)

Message	SLC Address	Par. Access Word	Value (hex)	Description
Command	N20:10	1	300F	3000 hex = Change parameter value (32-bit) F hex = 15 dec (Pr. 15)
	N20:11	2	5	DPI Port 5 (20-COMM-P)
	N20:12	3	0	Not Used
	N20:13	4	64	64 hex = 100 dec = 10.0 Hz
Reply	N10:10	1	200F	Transferring 32-bit parameter value ("2") Confirms Par. Number of the request ("F")
	N10:11	2	5	Confirms Par. Access Word 2 of the request
	N10:12	3	0	Confirms Par. Access Word 3 of the request
	N10:13	4	64	Confirms Par. Access Word 4 of the request

SLC Ladder Example - Station 1 Parameter Protocol

Figure 6.5 Example SLC Ladder Logic - Station 1 Parameter Protocol

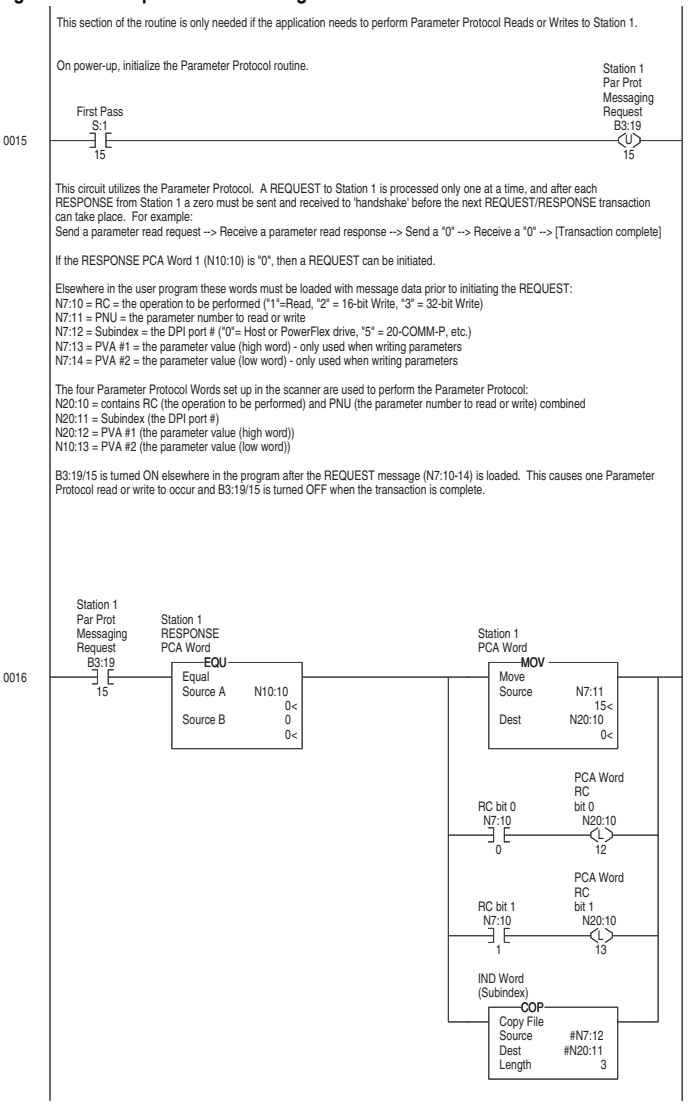
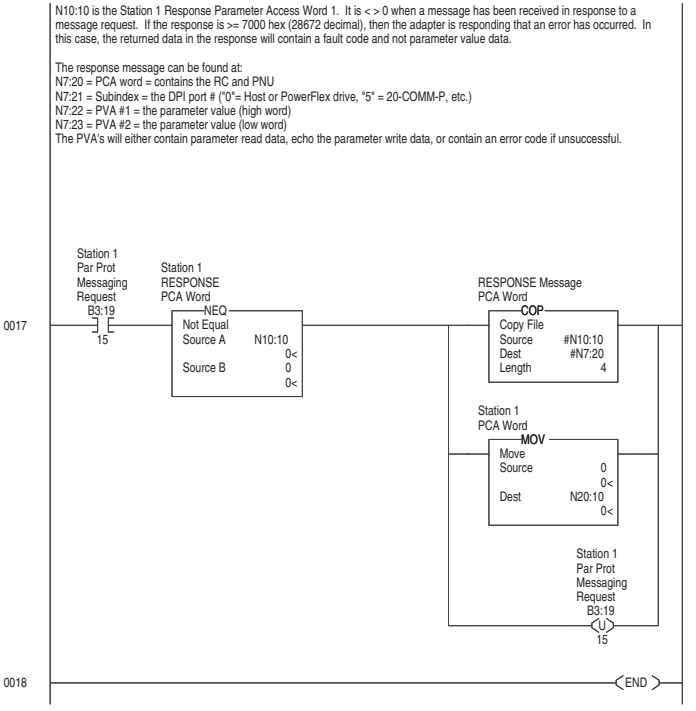


Figure 6.5 Example SLC Ladder Logic - Station 1 Parameter Protocol (Continued)



SLC Ladder Example - Station 2 Parameter Protocol

Figure 6.6 Example SLC Ladder Logic - Station 2 Parameter Protocol

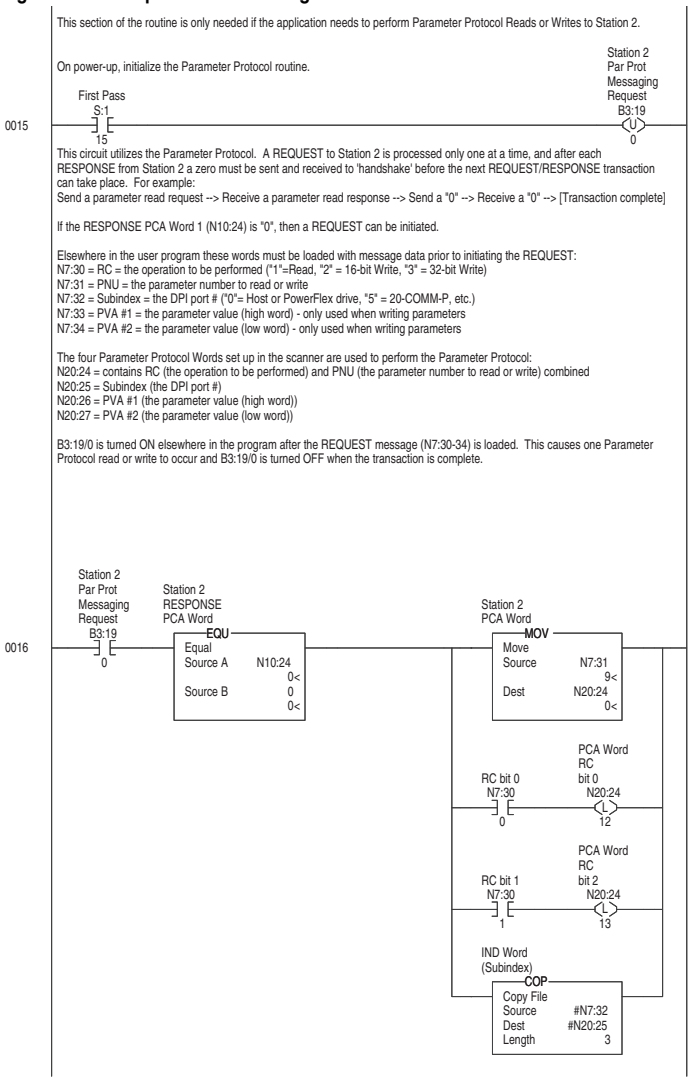
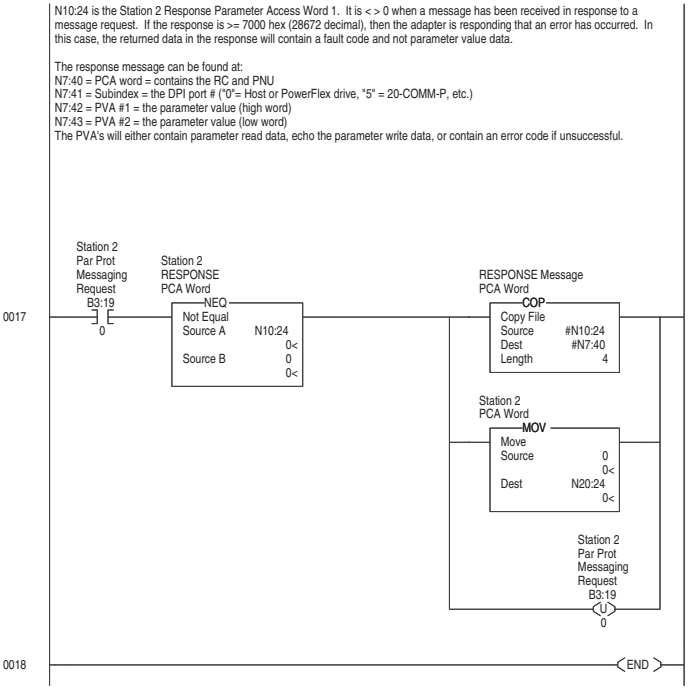


Figure 6.6 Example SLC Ladder Logic - Station 2 Parameter Protocol (Continued)



Notes:

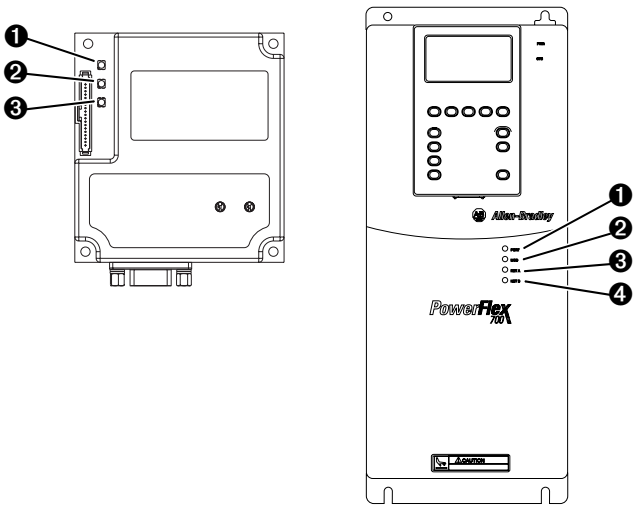
Troubleshooting

Chapter 7 contains troubleshooting information.

Locating the Status Indicators

The PROFIBUS adapter has three status indicators. They can be viewed on the adapter or through the drive cover. (See Figure 7.1.)

Figure 7.1 Status Indicators



Number	Status Indicator	Description	Page
❶	PORT	DPI Connection Status	7-2
❷	MOD	Adapter Status	7-3
❸	NET A	PROFIBUS Status	7-3
❹	NET B	Not used	

PORT Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered or is not connected properly to the drive.	• Securely connect the adapter to the drive using the ribbon cable. • Apply power to the drive.
Flashing Red	The adapter is not receiving a ping message from the drive.	• Verify that cables are securely connected. • Cycle power to the drive.
Solid Red	The drive has refused an I/O connection from the adapter. Another DPI peripheral is using the same DPI port as the adapter.	**Important:** Cycle power to the product after making any of the following corrections. • Verify that all DPI cables on the PowerFlex drive are securely connected and not damaged. Replace cables if necessary. • Verify that the PowerFlex drive supports Datalinks. • Configure the adapter and PowerFlex drive to use a Datalink that is not already being used by another peripheral.
Orange	The adapter is connected to a product that does not support Allen-Bradley DPI communications.	• Connect the adapter to a product that supports Allen-Bradley DPI communications (for example, PowerFlex drives).
Flashing Green	The adapter is establishing an I/O connection to the drive.	• No Action. This status indicator will turn solid green or red.
Solid Green	The adapter is properly connected and is communicating with the drive.	• No Action.

MOD Status Indicator

Status	Cause	Corrective Action
Off	The adapter is not powered.	• Securely connect the adapter to the PowerFlex drive using the ribbon cable. • Apply power to the drive and network.
Flashing Red	The adapter has failed the firmware test.	• Cycle power to the drive. Parameter settings may have been changed. • Clear faults in the adapter. • If cycling power does not correct the problem, the parameter settings may have been corrupted. Reset defaults and reconfigure the module. • If resetting defaults does not correct the problem, flash the adapter with the latest firmware release.
Solid Red	The adapter has failed the hardware test.	• Cycle power to the drive. • Replace the adapter.
Flashing Green	The adapter is operational but is not transferring I/O data.	• Place the scanner in RUN mode. • Configure the adapter for the program in the controller. • Program the controller to recognize and transmit I/O to the adapter.
Solid Green	The adapter is operational and transferring I/O data.	• No Action.

NET A Status Indicator

Status	Cause	Corrective Actions
Off	The adapter is not powered or is not connected properly to the network.	• Securely connect the adapter to the drive using the Internal Interface cable and to the network using a PROFIBUS cable. • Correctly connect the PROFIBUS cable to the PROFIBUS connector. • Apply power to the drive.
Flashing Red	Error in PROFIBUS configuration.	• Re-configure the PROFIBUS module.
Solid Red	Error in PROFIBUS controller initialization.	• Cycle power to the drive. • Re-configure the Profibus scanner.
Solid Green	The adapter is properly connected and communicating on the network.	• No action required.

Adapter Diagnostic Items

Adapter Diagnostic Items are viewable with DriveExplorer (version 2.01 or higher), DriveExecutive (version 1.01 or higher) or HIM (2.001) software.

No.	Event	Description
1	Common Logic Cmd	The current value of the Common Logic Command being transmitted to the host.
2	Prod Logic Cmd	The current value of the Product-specific Logic Command being transmitted to the host.
3	Reference	The current value of the Product-specific Reference being transmitted to the host.
4	Common Logic Sts	The current value of the Common Logic Status being received from the host.
5	Prod Logic Sts	The current value of the Product-Specific Status being received from the host.
6	Feedback	The current value of the Product-Specific Feedback being received from the host.
7	Datalink A1 In	The current value of Datalink A1 being transmitted to the host. (Value of 0 if datalink is not used).
8	Datalink A2 In	The current value of Datalink A2 being transmitted to the host. (Value of 0 if datalink is not used).
9	Datalink B1 In	The current value of Datalink B1 being transmitted to the host. (Value of 0 if Datalink is not used).
10	Datalink B2 In	The current value of Datalink B2 being transmitted to the host. (Value of 0 if Datalink is not used).
11	Datalink C1 In	The current value of Datalink C1 being transmitted to the host. (Value of 0 if Datalink not used).
12	Datalink C2 In	The current value of Datalink C2 being transmitted to the host. (Value of 0 if Datalink is not used).
13	Datalink D1 In	The current value of Datalink D1 being transmitted to the host. (Value of 0 if Datalink is not used).
14	Datalink D2 In	The current value of Datalink D2 being transmitted to the host. (Value of 0 if Datalink is not used).
15	Datalink A1 Out	The current value of Datalink A1 being received from the host.
16	Datalink A2 Out	The current value of Datalink A2 being received from the host.
17	Datalink B1 Out	The current value of Datalink B1 being received from the host.
18	Datalink B2 Out	The current value of Datalink B2 being received from the host.
19	Datalink C1 Out	The current value of Datalink C1 being received from the host.
20	Datalink C2 Out	The current value of Datalink C2 being received from the host.
21	Datalink D1 Out	The current value of Datalink D1 being received from the host.
22	Datalink D2 Out	The current value of Datalink D2 being received from the host.
23	Field Flash Cnt	The number of times this device has been flash updated.
24	DPI Rx Errors	The current value of the DPI CAN Receive error counter.
25	DPI Tx Errors	The current value of the DPI CAN Transmit error counter.
26	PbusImage Siz	Buffer size of Active I/O image (Profibus size) in bytes.
27	Switch 0	The value of Switch 0. (Node Address 1's digit)
28	Switch 1	The value of Switch 1. (Node Address 10's digit)

Viewing and Clearing Events

The adapter maintains an event queue that reports the history of its actions. You can view the event queue using an LCD PowerFlex HIM, DriveExplorer (2.01 or higher) software, or DriveExecutive (1.01 or higher).

Step	Keys	Example Screen
Viewing Events 1. Access parameters in the adapter. Refer to Using the PowerFlex HIM in Chapter 3.		Main Menu: Diagnostics Parameter Device Select
2. Press the Up Arrow or Down Arrow to scroll to **Diagnostics**.		
3. Press Enter to display the Diagnostics menu in the adapter.		Event Q: 1 E3 Ping Time Flt
4. Repeat steps 2 and 3 to enter the **Events** option and then **View Event Queue** option.		
5. Press the Up Arrow or Down Arrow to scroll through the events. The most recent event is Event 1.		
Clearing Events 1. Access parameters in the Adapter. Refer to Using the PowerFlex HIM in Chapter 3.		
2. Press the Up Arrow or Down Arrow to scroll to **Diagnostics**.		
3. Press Enter to display the Diagnostics menu in the adapter.		
4. Repeat steps 2 and 3 to enter the **Events** option and then the **Clr Event** option or **Clear Event Queue** option. A message will pop up to confirm that you want to clear the message or queue.		Dgn: Events View Event Queue Clear Event Clear Event Queue
5. Press Enter to clear all events out of the event queue. All event queue entries will then display “No Event.”		

Events

Many events in the Event queue occur under normal operation. If you encounter unexpected communications problems, the events may help you or Allen-Bradley personnel troubleshoot the problem. The following events may appear in the event queue:

Code	Event	Description
1	No Event	Empty event queue entry.
2	DPI Bus Off Flt	A bus-off condition was detected on DPI. This event may be caused by loose or broken cables or by noise.
3	Ping Time Flt	A ping message was not received on DPI within the specified time.
4	Port ID Flt	The adapter is not connected to a correct port on a DPI product.
5	Port Change Flt	The DPI port changed.
6	Host Sent Reset	The DPI product issued this because it was reset.
7	EEPROM Sum Flt	The EEPROM in the adapter is corrupt.
8	Online @ 125kbps	The adapter and DPI product are communicating at 125kbps.
9	Online @ 500kbps	The adapter and DPI product are communicating at 500kbps.
10	Bad Host Flt	The adapter was connected to an incompatible product.
11	Dup. Port Flt	Another peripheral with the same port number is already in use.
12	Type 0 Login	The adapter has logged in for type 0 control.
13	Type 0 Time Flt	The adapter has not received a type 0 status message within the specified time.
14	DL Login	The adapter has logged into a datalink.
15	DL Reject Flt	The host rejected an attempt to log in to a datalink because the datalink is not supported or is used by another peripheral.
16	DL Time Flt	The adapter has not received a datalink message within the specified time.
17	Control Disabled	The adapter has sent a “Soft Control Disable” command to the DPI product.
18	Control Enabled	The adapter has sent a “Soft Control Enable” command to the DPI product.
19	Message Timeout	A Client-Server message sent by the peripheral was not completed.
20	DPI Fault Msg	The Host faulted.
21	DPI Fault Clear	The user cleared a fault in the adapter.
22	Normal Startup	Peripheral completes a normal startup.
23	NET Comm Flt	The adapter detected a fault condition on the PROFIBUS network.
24	Fault Cfg Error	One of the Flt Cfg data Parameters is set to a value greater than 65535 and the host requires a 16-bit value.
25	P-DP Online	The PROFIBUS adapter has gone on-line the PROFIBUS network.

Code	Event	Description
26	P-DP Offline	The PROFIBUS adapter has gone off-line the PROFIBUS network.
27	P-DP Idle	The PROFIBUS adapter received a network clear from the PROFIBUS master.
28	Language CRC Bad	The language flash segment is corrupt - flash the adapter.

Specifications

This chapter presents the specifications for the adapter.

Communications

Network	
Protocol	PROFIBUS
Data Rates	9.6K, 19.2K, 45.45K, 93.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M. The adapter has auto baud rate detection.
Drive	
Protocol	DPI
Data Rates	125K or 500K

Electrical

Consumption	
Drive Network	370mA at 5 V supplied through the drive

Mechanical

Dimensions	
Height	19 mm (0.75 inches)
Length	86 mm (3.39 inches)
Width	78.5 mm (3.09 inches)
Weight	57g (2 oz.)

Environmental

Temperature	
Operating	-10 to 50°C (14 to 149°F)
Storage	-40 to +85°C (-40 to 185°F)
Relative Humidity	5 to 95% non-condensing

Regulatory Compliance

UL	508C and CUL
CE	EN50081-2 (1993) and EN61000-6-2 (1999)

Adapter Parameters

Appendix B provides information about the PROFIBUS adapter parameters.

About Parameter Numbers

The parameters in the adapter are numbered consecutively. However, depending on which configuration tool you use, they may have different numbers.

Configuration Tool	Numbering Scheme
• DriveExplorer • DriveExecutive • HIM • Explicit Messaging	The adapter parameters begin with parameter 1. For example, Parameter 01 - [DPI Port] is parameter 1 as indicated by this manual.

Parameter List

Parameter No.	Name and Description	Details	
01	**[DPI Port]** Port to which the adapter is connected. This will usually be port 5.	Default: Minimum: Maximum: Type:	0 0 7 Read Only
02	**[DPI Data Rate]** Data rate used by the drive. This data rate is set in the drive, and the adapter detects it.	Default: Values: Type:	0 = 125 K 0 = 125 K 1 = 500 K Read Only
03	**[P-DP Addr Cfg]** Node address to use if the Node address switches are set to “00”.	Default: Minimum: Maximum Type: Reset Required:	1 00 126 Read/Write Yes
04	**[P-DP Addr Actual]** PROFIBUS node address actually used by the adapter.	Default: Minimum: Maximum: Type:	N/A 00 126 Read Only

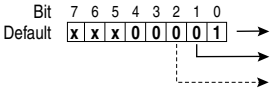
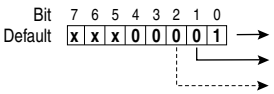
Parameter No.	Name and Description	Details	
05	**[P-DP Rate Actual]** PROFIBUS data rate.	Default: Values: Type:	N/A 0 = 9.6 K 1 = 19.2 K 2 = 45.45 K 3 = 93.75 K 4 = 187.5 K 5 = 500 K 6 = 1.5 M 7 = 3 M 8 = 6 M 9 = 12 M 10 = Off-line Read Only
06	**[Ref/Fdbk Size]** Size of the Reference/Feedback. The drive determines the size of the Reference/Feedback.	Default: Values Type:	0 = 16-bit 0 = 16-bit 1 = 32-bit Read Only
07	**[Datalink Size]** Size of each Datalink word. The drive determines the size of the Datalinks.	Default: Values Type:	0 = 16-bit 0 = 16-bit 1 = 32-bit Read Only
08	**[Reset Module]** No action if set to "Ready." Resets the adapter if set to "Reset Module." Restores the adapter to its factory default settings if set to "Set Defaults." This parameter is a command. It will be reset to "0 = Ready" after the command has been performed.	Default: Values Type: Reset Required:	0 = Ready 0 = Ready 1 = Reset Module 2 = Set Defaults Read/Write No

ATTENTION: Risk of injury or equipment damage exists. If the adapter is transmitting I/O that controls the drive, the drive may fault when you reset the adapter. Determine how your drive will respond before resetting a connected adapter.

09	**[Comm Flt Action]** Action that the adapter and drive take if the adapter detects that PROFIBUS communications have been disrupted. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: Values: Type: Reset Required:	0 = Fault 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Read/Write No

ATTENTION: Risk of injury or equipment damage exists. **Parameter 09- [Comm Flt Action]** lets you determine the action of the adapter and connected drive if the scanner is idle. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard of injury or equipment damage.

10	**[Idle Flt Action]** Sets the action that the adapter and drive take if the adapter detects that scanner is idle because the controller was switched to program mode. This setting is effective only if I/O that controls the drive is transmitted through the adapter.	Default: Values: Type: Reset Required:	0 = Fault 0 = Fault 1 = Stop 2 = Zero Data 3 = Hold Last 4 = Send Flt Cfg Read/Write No

Parameter No.	Name and Description	Details
11	**[DPI I/O Config]** I/O that is transferred through the adapter.  	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read/Write Reset Required: Yes **Bit Definitions** 0 = Cmd/Ref 1 = Datalink A 2 = Datalink B 3 = Datalink C 4 = Datalink D 5 = Not Used 6 = Not Used 7 = Not Used
12	**[DPI I/O Active]** I/O that the adapter is actively transmitting. The value of this parameter will usually be equal to the value of Parameter 11- DPI I/O Config.  	Default: xxx0 0001 Bit Values: 0 = I/O disabled 1 = I/O enabled Type: Read Only **Bit Definitions** 0 = Cmd/Ref 1 = Datalink A 2 = Datalink B 3 = Datalink C 4 = Datalink D 5 = Not Used 6 = Not Used 7 = Not Used
13	**[Flt Cfg Logic]** Sets the Logic Command data that is sent to the drive if any of the following is true: • Parameter 09 - [Comm Flt Action] is set to Send Flt Cfg and communications are disrupted. • Parameter 10 - [Idle Fault Action] is set to Send Flt Cfg and the scanner is put into Program mode. The bit definitions will depend on the product to which the adapter is connected.	Default: 0000 0000 0000 0000 Minimum: 0000 0000 0000 0000 Maximum: 1111 1111 1111 1111 Type: Read/Write Reset Required: No
14	**[Flt Cfg Ref]** Sets the Reference data that is sent to the drive if any of the following is true: • Parameter 09- [Comm Flt Action] is set to Send Flt Cfg and communications are disrupted. • Parameter 10 - [Idle Flt Action] is set to Send Flt Cfg and the scanner is put into Program mode.	Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No **Important:** If the drive uses a 16-bit Reference, the most significant word of this value must be set to zero (0) or a fault will occur.

Parameter No.	Name and Description	Details
15 16 17 18 19 20 21 22	**[Flt Cfg A1]** **[Flt Cfg A2]** **[Flt Cfg B1]** **[Flt Cfg B2]** **[Flt Cfg C1]** **[Flt Cfg C2]** **[Flt Cfg D1]** **[Flt Cfg D2]** Sets the data that is sent to the Datalink in the drive if any of the following is true: • Parameter 09 - [Comm Flt Action] is set to Send Flt Cfg and the scanner is put into Program mode. • Parameter 10 - [Idle Flt Action] is set to Send Flt Cfg and communications are disrupted.	Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Default: 0 Minimum: 0 Maximum: 4294967295 Type: Read/Write Reset Required: No **Important:** If the drive uses 16-bit Datalinks, the most significant word of this value must be set to zero (0) or a fault will occur.
23	**[Parameter Mode]** Sets the format used when performing explicit messages: • Par Prot (Parameter Protocol) is used to read or write single parameters. • DPI Par Prot is reserved for future use. Performing explicit messaging requires the "Parameter Access" module to be added when configuring the node with a network software tool.	Default: 0 = Par Prot Values: 0 = Par Prot 1 = DPI Par Prot Type: Read/Write Reset Required: No
24	**[P-DP State]** Displays the state of the Profibus controller.	Default: N/A Values: 0 = WAIT_PRM 1 = WAIT_CFG 2 = DATA_EX 3 = ERROR Type: Read Only

Notes:

Logic Command/Status Words

Appendix C provides the definitions of the Logic Command/Logic Status words that are used for some products that can be connected to the Profibus adapter. If you do not see the Logic Command/Logic Status for the product that you are using, refer to your product's documentation.

PowerFlex 70 and PowerFlex 700 Drives

Logic Command Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Command**	**Description**
															x	Stop	0 = Not Stop 1 = Stop
														x		Start*	0 = Not Start 1 = Start
													x			Jog	0 = Not Jog 1 = Jog
												x				Clear Faults	0 = Not Clear Faults 1 = Clear Faults
										x	x					Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Hold Direction Control
									x							Local Control	0 = No Local Control 1 = Local Control
								x								MOP Increment	0 = Not Increment 1 = Increment
						x	x									Accel Rate	00 = No Command 01 = Accel Rate 1 Command 10 = Accel Rate 2 Command 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decel Rate 1 Command 10 = Decel Rate 2 Command 11 = Hold Decel Rate
	x	x	x													Reference Select	000 = No Command 001 = Ref. 1 (Ref A Select) 010 = Ref. 2 (Ref B Select) 011 = Ref. 3 (Preset 3) 100 = Ref. 4 (Preset 4) 101 = Ref. 5 (Preset 5) 110 = Ref. 6 (Preset 6) 111 = Ref. 7 (Preset 7)
x																MOP Decrement	0 = Not Decrement 1 = Decrement

* A 0 = Not Stop condition (logic 0) must first be present before a 1 = Start condition will start the drive.

PowerFlex 70 and PowerFlex 700 Drives

Logic Status Word

Logic Bits																
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	**Status**	**Description**
															x	Ready	0 = Not Ready 1 = Ready
														x		Active	0 = Not Active 1 = Active
													x			Command Direction	0 = Reverse 1 = Forward
												x				Actual Direction	0 = Reverse 1 = Forward
											x					Accel	0 = Not Accelerating 1 = Accelerating
										x						Decel	0 = Not Decelerating 1 = Decelerating
									x							Alarm	0 = No Alarm 1 = Alarm
								x								Fault	0 = No Fault 1 = Fault
							x									At Speed	0 = Not At Reference 1 = At Reference
				x	x	x										Local Control	000 = Port 0 (TB) 001 = Port 1 010 = Port 2 011 = Port 3 100 = Port 4 101 = Port 5 110 = Port 6 111 = No Local
x	x	x	x													Reference	0000 = Ref A Auto 0001 = Ref B Auto 0010 = Preset 2 Auto 0011 = Preset 3 Auto 0100 = Preset 4 Auto 0101 = Preset 5 Auto 0110 = Preset 6 Auto 0111 = Preset 7 Auto 1000 = Term Blk Manual 1001 = DPI 1 Manual 1010 = DPI 2 Manual 1011 = DPI 3 Manual 1100 = DPI 4 Manual 1101 = DPI 5 Manual 1110 = DPI 6 Manual 1111 = Jog Ref

A

Adapter

Devices such as drives, controllers, and computers usually require an adapter to provide a communication interface between them and a network such as PROFIBUS. An adapter reads data on the network and transmits it to the connected device. It also reads data in the device and transmits it to the network.

The 20-COMM-P PROFIBUS adapter is an adapter that connects, PowerFlex drives to a PROFIBUS network. Adapters are sometimes also called “cards,” “embedded communication options,” “gateways,” “modules,” and “peripherals.”

C

ControlFLASH

ControlFLASH is an Allen-Bradley software tool that lets users electronically update firmware on printed circuit boards. The tool takes advantage of the growing use of flash memory (electronic erasable chips) across industrial control products.

Controller

A controller, also called programmable logic controller, is a solid-state control system that has a user-programmable memory for storage of instructions to implement specific functions such as I/O control, logic, timing, counting, report generation, communication, arithmetic, and data file manipulation. A controller consists of a central processor, input/output interface, and memory. See also Scanner.

D

Data Rate

The data rate is the speed at which data is transferred on the PROFIBUS network. The available data rates depend on the type of cable and total cable length used on the network:

Baudrate	Maximum Cable Length
9.6K	1000m
19.2K	1000m
45.45K	1000m
93.75K	1000m
187.5K	1000m
500K	400m
1.5M	200m
3M	100m
6M	100m
12M	100m

Datalinks

A Datalink is a type of pointer used by some PowerFlex drives to transfer data to and from the controller. Datalinks allow specified parameter value(s) to be accessed or changed without using explicit messages. When enabled, each Datalink consumes either four bytes or eight bytes in both the input and output image table of the controller. The drive determines the size of Datalinks.

DPI

DPI is a second generation peripheral communication interface used by various Allen-Bradley drives and power products. It is a functional enhancement to SCANport.

DriveExplorer Software

DriveExplorer software is a tool for monitoring and configuring Allen-Bradley products and adapters. It can be used on computers running Microsoft Windows 95, 98, ME, Windows NT (version 4.0, 2000), and Windows CE (version 2.11 and higher) operating systems. DriveExplorer (version 2.01 or higher) can be used to configure this adapter and PowerFlex drives. Information about DriveExplorer software and a free lite version can be accessed at http://www.ab.com/drives/driveexplorer.

DriveTools 2000 Software

A software suite designed for Microsoft Windows 98, Windows ME and Windows NT (4.0 or greater) and Windows 2000 operating systems. This software suite will provide a family of tools that you can use to program, monitor, control, troubleshoot, and maintain Allen Bradley products. DriveExecutive (version 1.01) can be used with PowerFlex drives. Information about DriveTools 2000 can be accessed at http://www.ab.com/drives/drivetools_2000.

F

Fault Action

A fault action determines how the adapter and connected product act when a communications fault (for example, a cable is disconnected) occurs or when the scanner is switched out of run mode. The former uses a communications fault action, and the latter uses an idle fault action.

Fault Configuration

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond with a user-defined fault configuration. The user sets the data that is sent to the drive in the fault configuration parameters (**Parameters 13 - [Flt Cfg Logic]** through **22 - [Flt Cfg D2]**). When a fault action parameter is set to use the fault configuration and a fault occurs, the data from these parameters is sent as the Command Logic, Reference, and/or Datalink(s).

Faulted Node Recovery

This DeviceNet feature lets you change a configuration of a device that is faulted on the network. For example, if you add a device to a network and it does not have a unique address, it will fault. If you have a configuration tool that supports faulted node recovery and your adapter is using parameters to set its node address and data rate, you can change the node address.

Feedback

See Reference/Feedback.

Flash Update

The process of updating firmware in the adapter. The adapter can be flash updated using the ControlFLASH tool or the X-Modem protocol and a 1203-SSS Smart Self-powered Serial converter (version 3.001 or higher firmware).

G

GSD File

A GSD File is a file used by the network configuration tool to identify the type of adapter and its capabilities, so that it can configure the adapter for the network. This is normally supplied on floppy disk as a text file.

HIM (Human Interface Module)

A device that can be used to configure and control a PowerFlex drive. New HIMs (20-HIM-x) can be used to configure connected peripherals.

Hold Last

When communications are disrupted (for example, a cable is disconnected), the adapter and PowerFlex drive can respond by holding last. Hold last results in the drive receiving the last data received via the PROFIBUS connection before the disruption. If the drive was running and using the Reference from the adapter, it will continue to run at the same Reference.

I

I/O Data

I/O transmit time-critical data such as a Logic Command and Reference. The terms “input” and “output” are defined from the scanner’s point of view. Output is transmitted by the scanner and consumed by the adapter. Input is transmitted by the adapter and consumed by the scanner.

L

Logic Command/Logic Status

The Logic Command is used to control the PowerFlex drive (e.g., start, stop, direction). It consists of one 16-bit word of input to the adapter from the network. The definitions of the bits in this word depend on the drive.

The Logic Status is used to monitor the PowerFlex drive (for example, operating state, motor direction). It consists of one 16-bit word of output from the adapter to the network. The definitions of the bits in this word depend on the drive.

M

Master

See Scanner.

N

Node Address

A PROFIBUS network can have as many as 126 devices connected to it. Each device on the network must have a unique node address between 0 and 126.

NVS (Non-Volatile Storage)

NVS is the permanent memory of a device. Devices such as the adapter and drive store parameters and other information in NVS so that they are not lost when the device loses power. NVS is sometimes called “EEPROM.”

P

Parameter Messaging

Parameter Messages are used to configure, monitor, and diagnose devices over PROFIBUS.

Ping

A ping is a message that is sent by a DPI product to its peripheral devices. They use the ping to gather data about the product, including whether it can receive messages and whether they can log in for control.

PowerFlex Drives

The Allen-Bradley PowerFlex family of drives includes PowerFlex 70, PowerFlex 700, and PowerFlex 7000 drives. These drives can be used for applications ranging from 0.37 kW (0.5 HP) to 3,000 kW (4,000 HP). All PowerFlex drives implement DPI, allowing them to use the 20-COMM-P PROFIBUS adapter. This manual focuses on using the adapter with PowerFlex drives. Other products that implement DPI can also use the adapter.

PROFIBUS Network

A PROFIBUS network uses RS485 to connect devices (for example, controllers, drives, and motor starters). A PROFIBUS network can support a maximum of 126 devices. Each device is assigned a unique node address and transmits data on the network at the same data rate.

A cable is used to connect devices on the network. It contains the bus signal. Devices can be connected to the network in a daisy chain connection.

General information about PROFIBUS and the PROFIBUS specification are maintained by the PROFIBUS Trade Organization (PTO). PTO is online at http://www.profibus.com.

R

Reference/Feedback

The Reference is used to send a Reference (for example, speed, frequency, torque) to the product. It consists of one word of input to the adapter from the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

Feedback is used to monitor the speed of a product. It consists of one word of output from the adapter to the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

S

Scanner

A scanner is a separate module (of a multi-module controller) or a built-in component (of a single-module controller) that provides communication with adapters connected to a network. See also Controller.

A scanner is often called Master.

Status Indicators

Status indicators are LEDs that are used to report the status of the adapter, network, and drive. They are on the adapter and can be viewed on the front cover of the drive when the drive is powered.

Z

Zero Data

When communications are disrupted (for example, a cable is disconnected), the adapter and drive can respond with zero data. Zero data results in the drive receiving zero as values for command data. If the drive was running and using the Reference from the adapter, it will stay running but at zero Reference.

E

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P

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