RELIANCE ELECTRIC

# PROFIBUS™ Communications Module

M/N RECOMM-PBUS

Instruction Manual D2-3479-1

Rockwell Automation

The information in this manual is subject to change without notice.

Throughout this manual, the following notes are used to alert you to safety considerations:

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

**Important:** Identifies information that is critical for successful application and understanding of the product.

The thick black bar shown on the outside margin of this page will be used throughout this instruction manual to signify new or revised text or figures.

**ATTENTION:** The drive may contain high voltages that can cause injury or death. Remove all power from the drive, and then verify power has been removed before installing or removing a PROFIBUS module. Failure to observe these precautions could result in severe bodily injury or loss of life.

**ATTENTION:** Only qualified electrical 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 module. Read and understand this manual in its entirety before proceeding. Failure to observe these precautions could result bodily injury and/or damage to equipment.

**ATTENTION:** DPI host products must not be directly connected together via RECBL-xxx cables. Unpredictable behavior due to timing and other internal procedures can result if two or more devices are connected in this manner. Failure to observe this precaution could result bodily injury and/or damage to equipment.

**ATTENTION:** If the PROFIBUS module is transmitting control I/O to the drive, the drive may fault when you reset the module. Determine how your drive will respond before resetting an module. Failure to observe this precaution could result bodily injury and/or damage to equipment.

**ATTENTION:** Comm Flt Action (parameter 9) and Idle Flt Action (parameter 10) let you determine the action of the module and connected drive if communications are disrupted. 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 hazard of injury or equipment damage. Failure to observe this precaution could result bodily injury and/or damage to equipment.

**ATTENTION:** 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. Failure to observe this precaution could result bodily injury and/or damage to equipment.

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# CHAPTER 1

# Introduction

This manual provides information about the PROFIBUS Communications module (RECOMM-PBUS) and using it with SP600 drives. It is intended for qualified electrical personnel familiar with installing, programming, and maintaining AC drives and networks.

The PROFIBUS™ module is an embedded communication option for DPI™ AC drives, such as the SP600™ drive. The module is mounted in the drive and receives its required power from the drive.

The module can be used with other products that implement DPI, a peripheral communication interface. Refer to the documentation for your product for specific information about how it works with the module.

## 1.1 PROFIBUS Module Features

The PROFIBUS module features the following:

- Switches that enable you set a node address before applying power to the drive. Alternatively, you can disable the switches and use parameters to configure this feature.
- A number of configuration tools that can be used to configure the module and connected drive. The tools include the LCD Operator Interface Module (OIM) on the drive and VS Utilities™ software.
- Status indicators that report the status of the drive communications, module, 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, that may be configured for your application using a parameter.
- Explicit messages that are supported using the Parameter Protocol.
- User-defined fault actions that determine how the module and the drive respond to communication disruptions on the network and controllers in idle mode.

## 1.2 Related Documentation

Refer to the following related publications as necessary for more information. All of the publications are available from **http://www.theautomationbookstore.com** or **http://www.reliance.com**.

- D2-3485 SP600 AC Drive User Manual
- D2-3501 SP600 AC Drive User Manual (6SB401 Series)
- D2-3488 VS Utilities Getting Results Manual
  Online help installed with the software
- 1747-6.2 SLC 500 Modular Hardware Style Installation and Operation Manual
- 1747-6.15 SLC 500 and MicroLogix 1000 Instruction Set

Documentation about the scanner, SST-PFB-SLC User's Guide, Version 2.03, can be obtained online at **http://www.mysst.com/download**.

## 1.3 Getting Assistance from Reliance Electric

If you have any questions or problems with the products described in this instruction manual, contact your local Reliance Electric sales office.

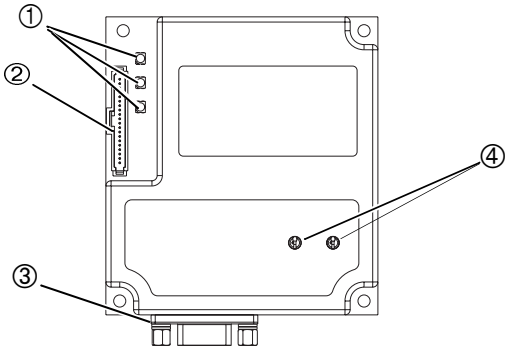
For technical assistance, call 1-800-726-8112. Before calling, please review the troubleshooting chapter in this manual and check the Reliance drives website for additional information. When you call this number, you will be asked for the drive model number and this instruction manual number.

# CHAPTER 2
# Getting Started

This chapter provides:

- A description of the PROFIBUS module components
- A list of parts shipped with the module
- A list of user-supplied parts required for installing the module
- An installation checklist

## 2.1 PROFIBUS Module Components




| | | |
|---|---|---|
| ① | Status Indicators | Three LEDs to indicate the status of the connected drive, module, and network. Refer to chapter 8 for more information about the LEDs. |
| ② | DPI Connector | A 20-pin, single-row shrouded male header. An Internal Interface cable connects to this connector and a connector on the drive. |
| ③ | PROFIBUS Connector | A 9-pin, female D-Sub connector. |
| ④ | Node Address Switches | Switches to set the node address. |

Figure 2.1 – Components of the PROFIBUS Module

## 2.2 Required Equipment

Table 2.1 lists the equipment shipped with the PROFIBUS module. When you unpack the module, verify that the package includes all of these items.

Table 2.1 – Equipment Shipped with the PROFIBUS Module

| Item Description |
|---|
| One RECOMM-PBUS PROFIBUS module |
| A 2.54 cm (1 in) and a 15.24 cm (6 in) Internal Interface cable (only one cable is needed to connect the module to the drive) |
| One grounding wrist strap |
| One floppy disc with GSD file |
| PROFIBUS Module User Manual (D2-3479) |

Table 2.2 lists user-supplied equipment also required to install and configure the PROFIBUS module.

Table 2.2 – Required User-Supplied Equipment

| Item Description |
|---|
| Small flathead screwdriver |
| PROFIBUS cable |
| One 9-pin, male D-Sub PROFIBUS connector.<br>**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 SP600 drives. |
| Configuration tool, such as:<br>• LCD OIM<br>• VS Utilities<br>  • with RECOMM-232 Serial Converter |
| PROFIBUS configuration software |
| Controller configuration software |

## 2.3 Installation Checklist

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

| ✔ | Step | Action | Refer to: |
|---|---|---|---|
| ❒ | 1 | **Review the safety precautions for the module.** | Throughout this manual |
| ❒ | 2 | **Verify that the drive is properly installed.** | *SP600 AC Drive User Manual* |
| ❒ | 3 | **Commission the module.**<br>Set a unique node address using the switches on the module. If desired, you can disable the switches and use parameter settings instead. | Chapter 3, Installing the PROFIBUS Module |
| ❒ | 4 | **Install the module.**<br>Verify that the drive is not powered. Then, connect the module 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 module to the drive. | Chapter 3, Installing the PROFIBUS Module |
| ❒ | 5 | **Apply power to the module.**<br>Apply power to the drive. The module receives power from the drive. The status indicators should be green. If they flash red, there is a problem. Refer to chapter 8, Troubleshooting the PROFIBUS Module and Network. | Chapter 3, Installing the PROFIBUS Module |
| ❒ | 6 | **Configure the module for your application.**<br>Set the parameters for the following features as required by your application:<br>• Node address.<br>• I/O configuration.<br>• Fault actions. | Chapter 4, Configuring the PROFIBUS Module |
| ❒ | 7 | **Apply power to the PROFIBUS master and other devices on the network.**<br>Verify that the master and network are installed and functioning in accordance with PROFIBUS standards, and then apply power to them. | |

| ✔ | Step | Action | Refer to: |
|---|---|---|---|
| ❒ | 8 | **Configure the scanner to communicate with the module.**<br>Use a network tool for PROFIBUS to configure the master on the network. | Chapter 5, Configuring the PROFIBUS Scanner |
| ❒ | 9 | **Create a ladder logic program.**<br>Use a programming tool to create a ladder logic program that enables you to do the following:<br>• Control the module and connected drive.<br>• Monitor or configure the drive using Explicit Messages. | Chapter 6, Using I/O Messaging.<br>Chapter 7, Using Explicit Messaging (Parameter Protocol) |

# CHAPTER 3

# Installing the PROFIBUS Module

Chapter 3 provides instructions for installing the PROFIBUS module in an SP600 drive.

## 3.1 Preparing for an Installation

Before installing the PROFIBUS module, verify that you have all required equipment. Refer to chapter 2, Getting Started.

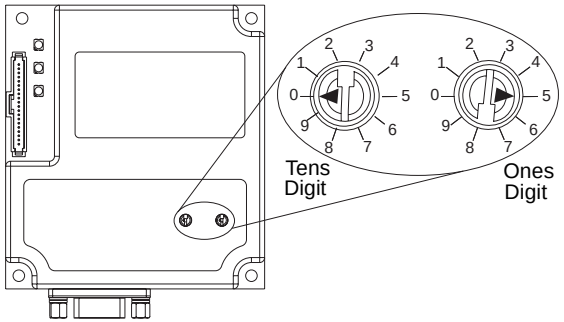
## 3.2 Commissioning the Module

To commission the module, 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 module. If you change a setting, cycle power.

**ATTENTION:** The PROFIBUS module 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 module. Failure to observe these precautions could result in damage to equipment.

Step 1. Set the node address switches as shown in figure 3.1.




| Setting | Description |
|---|---|
| 00 - 99 | Node address used by the module if switches are enabled. The default switch setting is 05.<br><br>**Important:**If the address switch is set to “00”, the module will use the setting of P-DP Addr Cfg (module parameter 3) for the node address. Refer to chapter 4, Configuring the PROFIBUS Module. |

Figure 3.1 – Setting the Node Address

## 3.3 Connecting the Module to the Network

**ATTENTION:** The drive may contain high voltages that can cause injury of death. Remove all power from the drive, and then verify power has been removed before installing or removing a PROFIBUS module. Failure to observe these precautions could result in severe bodily injury or loss of life.

Step 1. Remove power from the drive.

Step 2. Use static control precautions.

Step 3. Route the PROFIBUS cable through the bottom of the SP600 drive. (See figure 3.6.)

Step 4. Connect a PROFIBUS connector to the cable. (See figures 3.2 and 3.3.)

**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 SP600 and other Reliance Electric DPI-based drives.

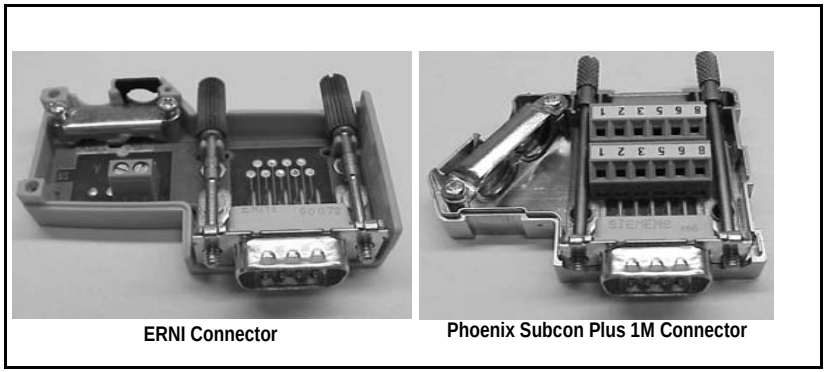



Figure 3.2 – ERNI and Phoenix Subcon Connectors

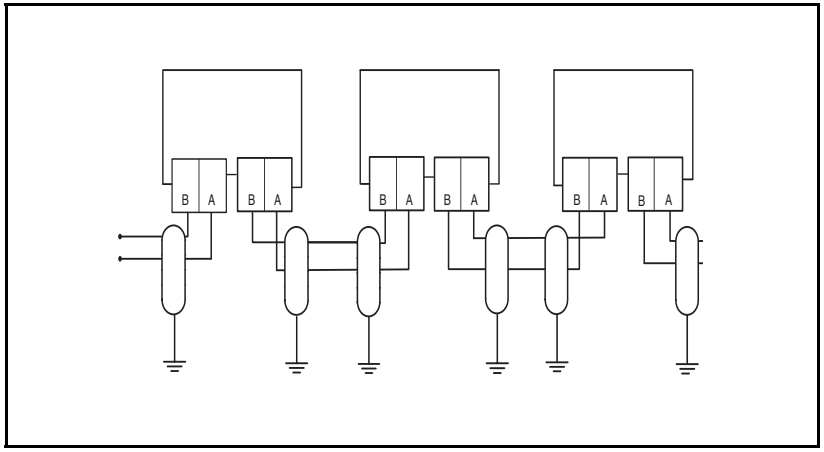



Figure 3.3 – Network Wiring Diagram

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

Table 3.1 – RECOMM-PBUS 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 |

Table 3.1 – RECOMM-PBUS DB-9 Pin Layout (Continued)

| Terminal | Signal | Function |
|---|---|---|
| 6 | +5V BUS | Isolated +5V from bus |
| 7 | Not connected | |
| 8 | A-LINE | Negative RxD/TxD according to RS485 specification |
| 9 | Not connected | |

Step 5. Connect the PROFIBUS cable to the module, and secure it with the two screws on the connector. (See figure 3.5.)

**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.

## 3.4 Terminating the Network

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 3.4.)

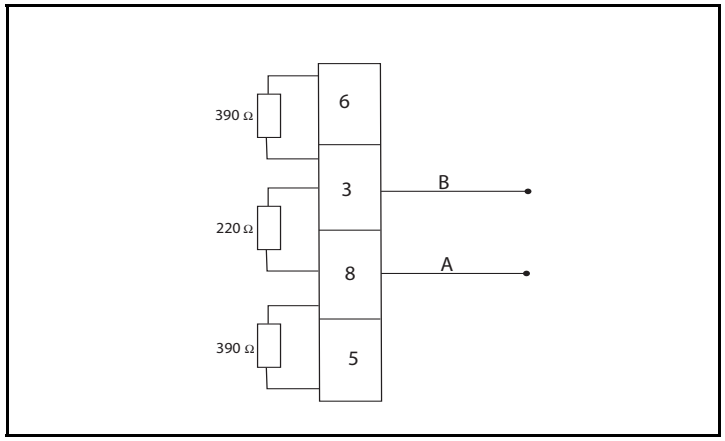


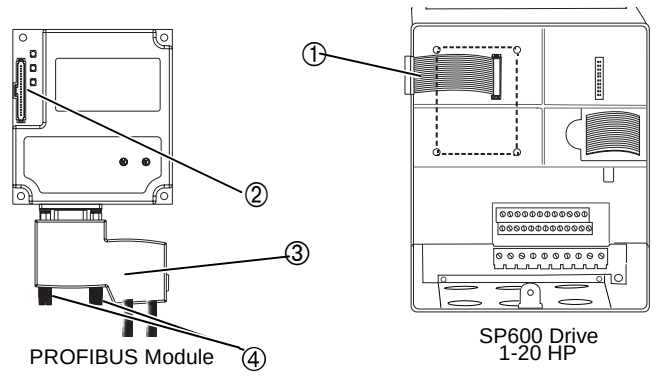

Figure 3.4 – Phoenix Subcon Plus M1 Connection for Terminating Resistors

## 3.5 Connecting the Module to the Drive

Step 1. Remove power from the drive.

Step 2. Use static control precautions.

Step 3. Connect the Internal Interface cable to the DPI port on the drive and then to the DPI connector on the module.




| | |
|---|---|
| ① | 15.24 cm (6 in) Internal Interface cable |
| ② | DPI connector |
| ③ | PROFIBUS connector |
| ④ | Retaining screws |
| ⑤ | 2.54 cm (1 in) Internal Interface cable |

Figure 3.5 – DPI Ports and Internal Interface Cables

Step 4. For 1-20 HP SP600 drives, fold the Internal Interface cable behind the module and mount the module on the drive using the four captive screws. See figure 3.6.

For frame 2 and larger SP600 drives, mount the module on the drive using the four captive screws to secure and ground it to the drive.

**Important:** All screws must be tightened since the module is grounded through a screw. The recommended tightening torque is 0.9 N-m (8 in-lb).

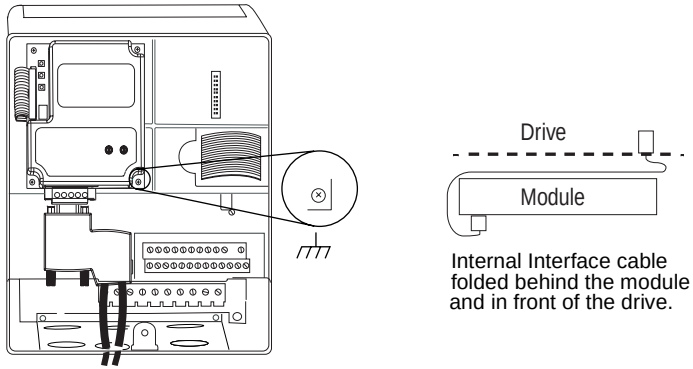



Figure 3.6 – Mounting and Grounding the PROFIBUS Module

## 3.6 Applying Power

**ATTENTION:** 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. Failure to observe these precautions could result in severe bodily injury or loss of life.

Step 1. Verify that the module will have a unique address on the network. If a new address is needed, reset its switches (refer to section 3.2, Commissioning the Module).

Step 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.

Step 3. Apply power to the drive. The module 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 are red, there is a problem. Refer to chapter 8, Troubleshooting the PROFIBUS Module and Network.

Step 4. If the node address switches are set to “00,” use a configuration tool to set the node address parameters in the module (refer to chapter 4, Configuring the PROFIBUS Module).

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

# CHAPTER 4

# Configuring the PROFIBUS Module

Chapter 4 provides instructions and information for setting the parameters in the module.

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

## 4.1 Configuration Tools

The PROFIBUS module stores parameters and other information in its own non-volatile memory. Therefore, you must access the module to view and edit its parameters. Table 4.1 lists the tools that can be used to access the module parameters.

Table 4.1 – Configuration Tools

| Tool | Refer to: |
|---|---|
| VS Utilities Software | VS Utilities online help |
| LCD OIM | Section 4.2 |

## 4.2 Using the LCD OIM to Configure the Module

Use the procedure in figure 4.1 to access the parameters on the PROFIBUS module using the LCD OIM. If you are unfamiliar with the operation of the LCD OIM, refer to the SP600 AC Drive User Manual (D2-3485 or D2-3501) for more information.

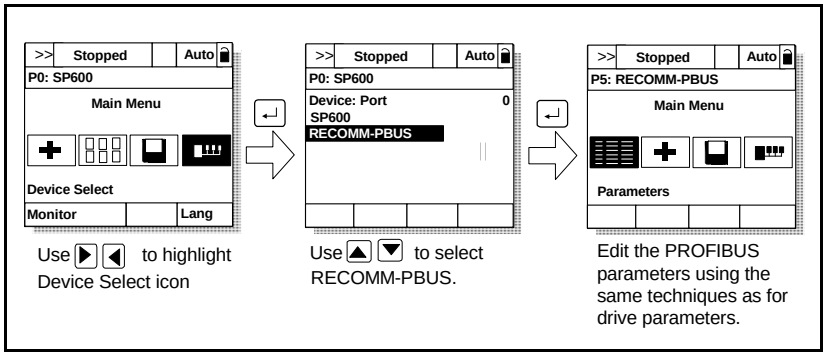



Figure 4.1 – Accessing the PROFIBUS Parameters Using the LCD OIM

## 4.3 Setting the Node Address

If the node address switches are set to “00”, the value of module parameter 3 (P-DP Addr Cfg) determines the node address.

Step 1. Set the value of parameter 3 (P-DP Addr Cfg) to a unique node address as shown in figure 4.2.

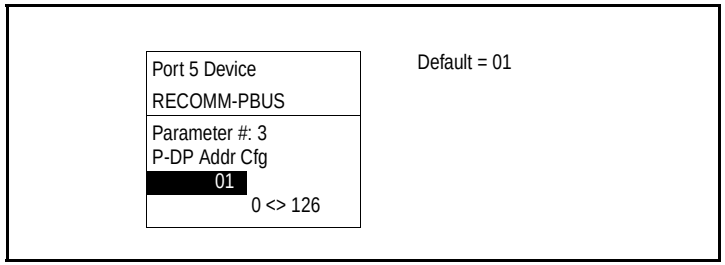


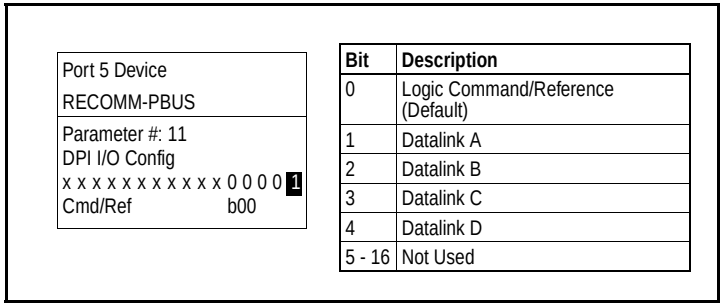

Figure 4.2 – PROFIBUS Node Address Screen on an LCD OIM

Step 2. Reset the module. Refer to section 4.5.2, Resetting the Module.

# 4.4 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.

Step 1. Set the bits in module parameter 11 (DPI I/O Config) as shown in figure 4.3. A “1” enables the I/O. A “0” disables it. Bit 0 is the right-most bit. In figure 4.3, it is highlighted and equals “1.”




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

Figure 4.3 – I/O Configuration Screen on an LCD OIM

Step 2. If Logic Command/Reference is enabled (default), configure the parameters in the drive to accept the Logic Command and Reference from the module. For example, set Speed Ref A Sel (SP600 drive parameter 90) to “Network” so that the drive uses the Reference from the network. Also, verify that Logic Source Sel (drive parameter 89) is configured to “Network” so that the drive uses the logic command from the network.

Step 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 module is the only module using the enabled Datalink(s).

Step 4. Reset the module. Refer to section 4.5.2, Resetting the Module.

The module 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 module. Refer to chapter 5, Configuring the PROFIBUS Scanner, for more information.

## 4.5 Setting a Fault Action

**ATTENTION:** Parameter 9 (Comm Flt Action) and parameter 10 (Idle Flt Action) let you determine the action of the module 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.

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 module parameter 9 (Comm Flt Action) and a different response to an idle scanner using parameter 10 (Idle Flt Action).

Set the values of parameter 9 (Comm Flt Action) and parameter 10 (Idle Flt Action) to the desired responses as shown in table 4.2. See figure 4.4 for sample LCD OIM Fault Action screens.

Table 4.2 – Selections for Drive Response to Communication Fault

| 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 13 through 22 (Flt Cfg Logic through Flt Cfg D2 In). |

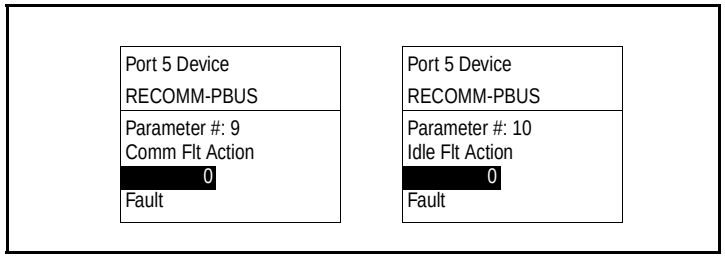



Figure 4.4 – Fault Action Screens on an LCD OIM

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

### 4.5.1 Setting the Fault Configuration Parameters

If you set module parameter 9 (Comm Flt Action) or module parameter 10 (Idle Flt Action) to “Send Flt Cfg,” the values in the parameters shown in table 4.3 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.

Table 4.3 – Fault Configuration Parameters

| 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 to 4294967295) sent to the drive as a Reference or Datalink.<br><br>**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 | |

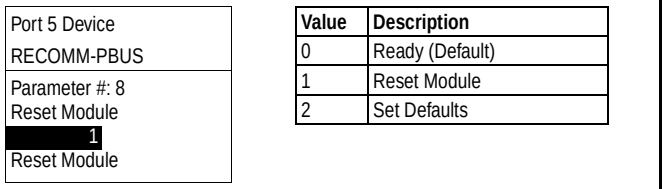
Changes to these parameters take effect immediately. A reset is not required.

## 4.5.2 Resetting the Module

Changes to switch settings or some module parameters require that you reset the module before the new settings take effect. You can reset the module by cycling power to the drive or by using module parameter 8 (Reset Module).

**ATTENTION:** If the module is transmitting control I/O to the drive, the drive may fault when you reset the module. Determine how your drive will respond before resetting a connected module. Failure to observe this precaution could result in bodily injury or damage to equipment.

Set parameter 8 (Reset Module) to “Reset Module.” See figure 4.5.




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

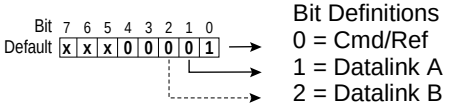
Figure 4.5 – Reset Screen on an LCD OIM

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

# 4.6 Viewing the Module Configuration

The parameters in table 4.4 provide information about how the module is configured. You can view these parameters at any time.

Table 4.4 – Module Configuration Status Parameters

| Number | Name | Description |
|---|---|---|
| 01 | DPI Port | The port on the drive to which the module is connected. Usually, it is port 5. |
| 02 | DPI Data Rate | The data rate used by DPI in the drive. It is set in the drive, and the module detects it. |
| 04 | P-DP Addr Actual | The node address used by the module. This will be one of the following values:<br>• The address set by the rotary switches.<br>• The value of module parameter 3 (P-DP Addr Cfg) if the switches have been disabled.<br>• An old address of the switches or parameter if they have been changed and the module 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 module automatically uses the correct size. |
| 07 | Datalink Size | The size of the Datalink word. It will either be 16 bits or 32 bits. It is set in the drive and the module automatically uses the correct size. |
| 12 | DPI I/O Active | The Reference/Feedback and Datalinks are used by the module. This value is the same as module parameter 11 (DPI I/O Config) unless the parameter was changed and the module was not reset.<br>  <br><br>Bit Definitions<br>0 = Cmd/Ref<br>1 = Datalink A<br>2 = Datalink B<br>3 = Datalink C<br>4 = Datalink D<br>5 = Not Used<br>6 = Not Used<br>7 = Not Used |

# CHAPTER 5

# Configuring the PROFIBUS 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 a module connected to a network.

PROFIBUS scanners are available from several manufacturers, including SST. SST PROFIBUS scanners come with a software tool for configuring the scanner (see figure 5.1).

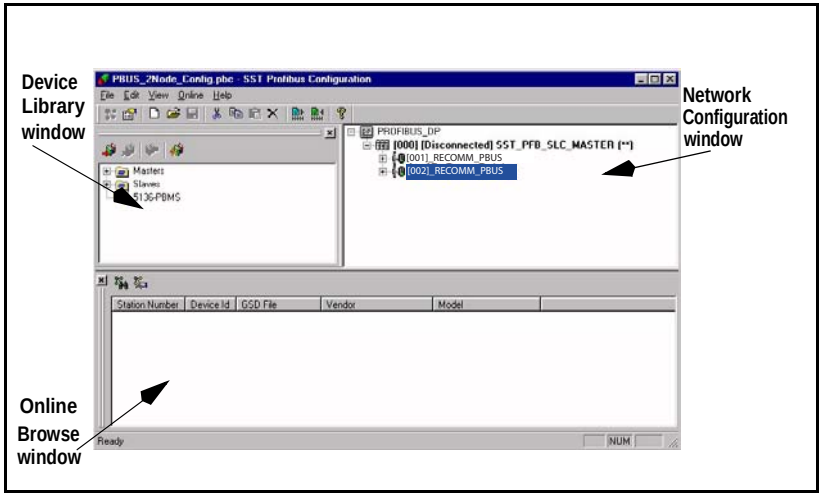



Figure 5.1 – SST PROFIBUS Configuration Software Tool

Chapter 4 provides instructions on how to utilize the SST PROFIBUS configuration software tool to:

- Install the RECOMM-PBUS GSD file in the software tool library.
- Configure the SST-PFB-SLC PROFIBUS scanner.

**Important:** The configuration of other manufacturer's scanners may differ significantly from this example. Please refer to your scanner manufacturer's documentation.

# 5.1 Configuring a Simple Network: An Example

In this example, we will be configuring two SP600 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 5.2.

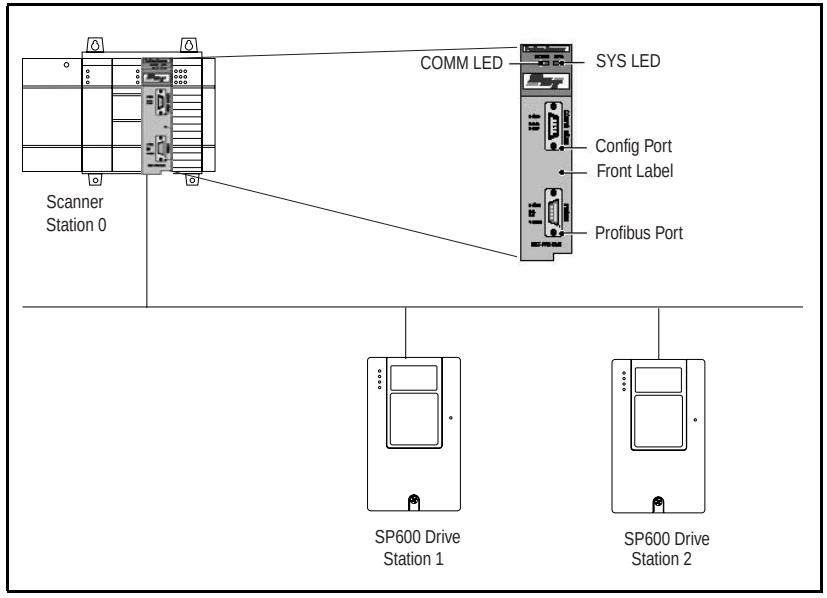



Figure 5.2 – Sample PROFIBUS Network

## 5.1.1 Installing the RECOMM-PBUS GSD File in the Software Tool Library

GSD files are used by software tools to configure the network, in other words, to map and define the I/O in a PROFIBUS scanner. A GSD file is required for each type of module on the network.

For example: The RECOMM-PBUS GSD file is "**Rele0573.gsd**" and a copy of the file is provided on a floppy disk with each RECOMM-PBUS PROFIBUS module. The file can also be downloaded from the Internet by going to: **www.reliance.com**.

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 RECOMM-PBUS on the network for the very first time with this software tool.

The software tool comes with standard data files as shown in figure 5.3. Additional data files, such as the RECOMM-PBUS GSD file, will need to be added to configure the RECOMM-PBUS in the scanner.

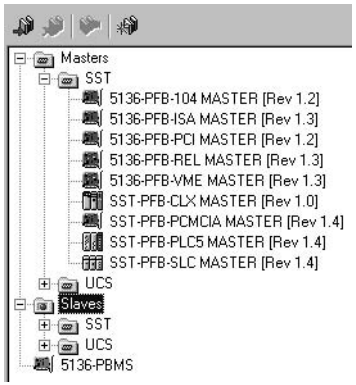



Figure 5.3 – Standard Data Files

Step 1. Click on the “New Device” icon to add GSD files to the software library tool.

Step 2. An “Add PROFIBUS devices” applet window will appear (see figure 5.4). Prompts for the location of the PROFIBUS data files to be added to the library will follow.

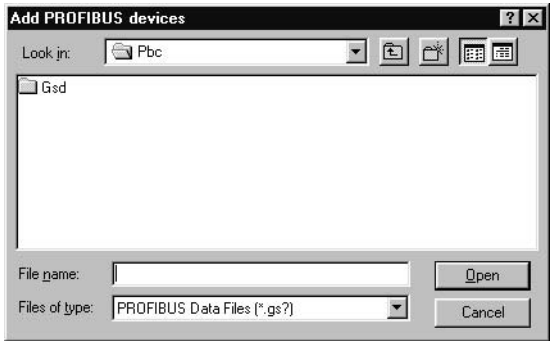



Figure 5.4 – Add PROFIBUS Devices Applet Window

Step 3. Find the directory location of the data file(s) you wish to add (typically, the source location is a floppy disk in drive A:). “Rele0573.gsd” is the GSD file for the RECOMM-PBUS as shown in figure 5.5.

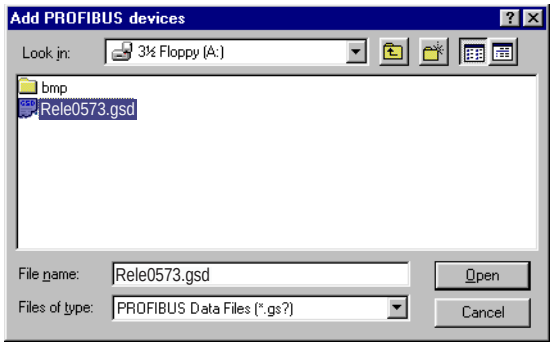



Figure 5.5 – Adding the GSD File for the RECOMM-PBUS

Step 4. Select “**Rele0573.gsd”** for the RECOMM-PBUS and click **Open**.

Step 5. Click on the (+) sign of the Slaves folder as shown in figure 5.6.

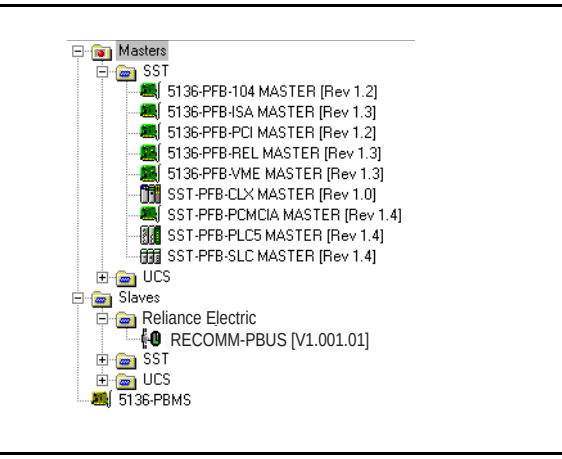



Figure 5.6 – Masters/Slaves Library Window

The software tool will automatically create a Reliance Electric sub-folder (in the Slaves folder) if it does not already exist. The RECOMM-PBUS is now shown in the library and the software tool is now ready to configure a RECOMM-PBUS on a PROFIBUS network.

## 5.2 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 SP600 drives. The ladder examples in the manual will use 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.

Step 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.

Step 2. Click on the (+) sign of the **Slaves** folder in the Library window and the **Reliance Electric** sub-folder to display the available DP slaves or the RECOMM-PBUS slave. Refer to figure 5.7.

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

Step 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 5.7.

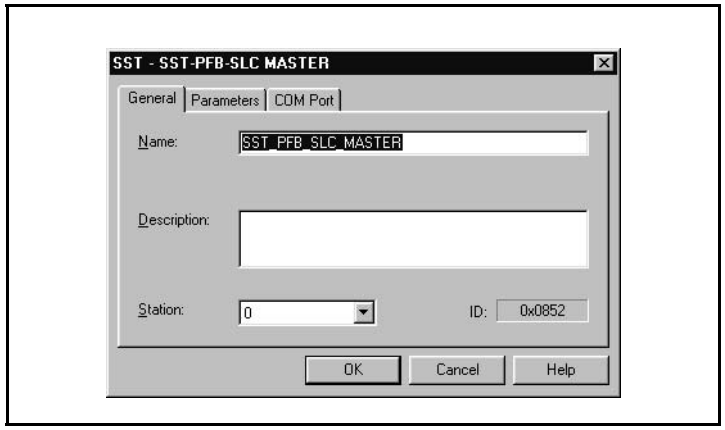



Figure 5.7 – SST-SST-PFB-SLC Master (General) Dialog Box

Step 5. Click on the Parameters tab to view the Scan Cycle Times.

In our example, use the default settings as shown in figure 5.8.

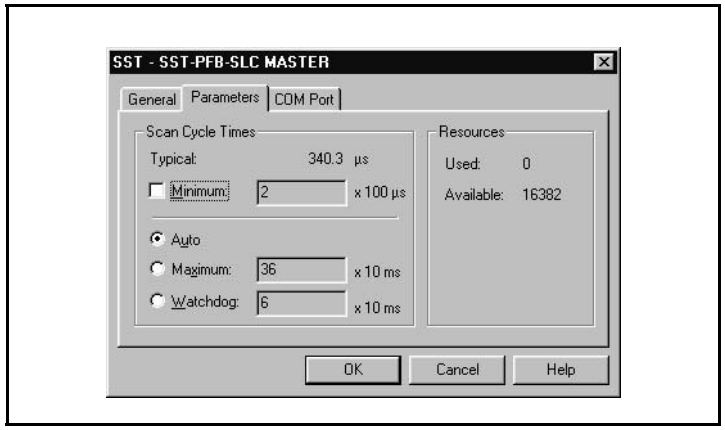



Figure 5.8 – Scan Cycle Times Dialog Box

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

Step 6. Click on the COM Port tab.

Step 7. Accept the settings in our example (COM1 on the PC at 115200 bps baud rate), as shown in figure 5.9.

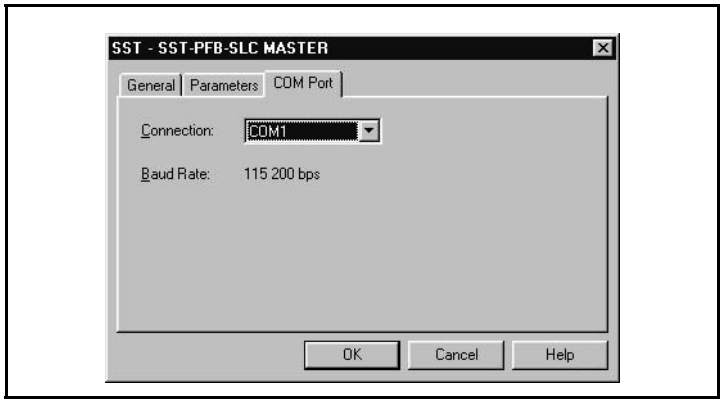



Figure 5.9 – COM Port Default Settings

Step 8. The scanner will appear in the network window as shown in figure 5.10. Double-click on the scanner in the network window.

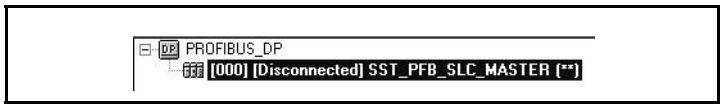



Figure 5.10 – Scanner Network Window

Step 9. Double-click on the **RECOMM-PBUS** listed in the Reliance Electric library folder. A user-defined **Name** and **Description** can be given to this RECOMM-PBUS.

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.

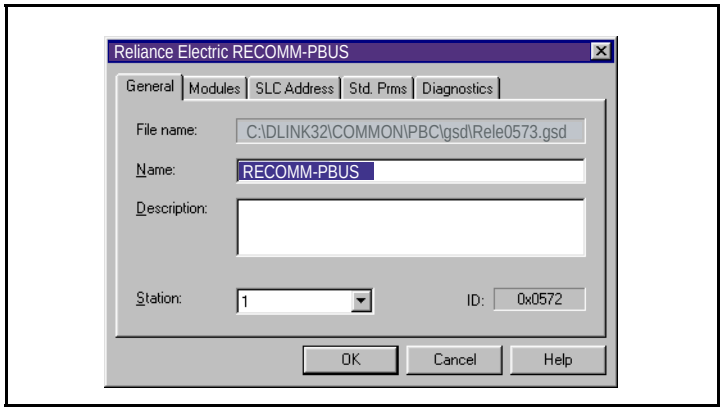



Figure 5.11 – Reliance Electric Library Dialog Window

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

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

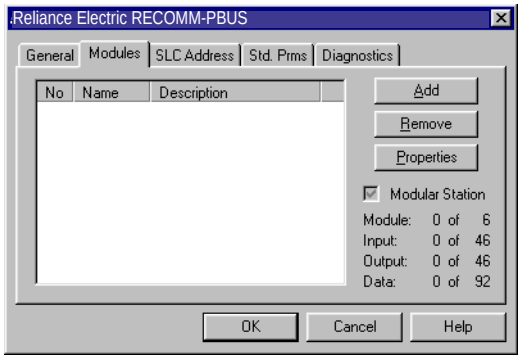



Figure 5.12 – RECOMM-PBUS Modules Tab

In our example, Station 1 will be controlled using Logic Command / Status and Reference / Feedback. The SP600 drive uses 16-bit Reference / Feedback (2 bytes).

Step 11. Select “Ctrl/Stat & Ref/Fdbk (2+2bytes)” from the “Available Modules” list as shown in figure 5.13. Click **OK**.

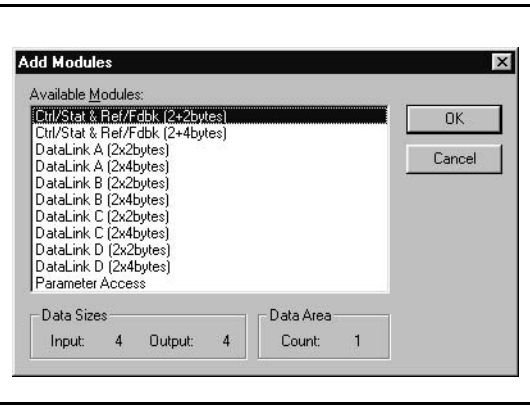



Figure 5.13 – Available Modules: Ctrl/Stat & Ref/Fdbk (2x2Bytes) Window

Step 12. The “Ctrl/Stat & Ref/Fdbk” (2+2 bytes) module has now been added as shown in figure 5.14.

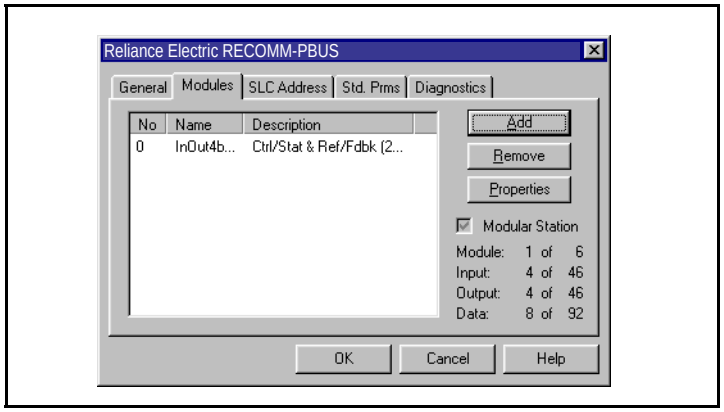



Figure 5.14 – Modules: Ctrl/Stat & Ref/Fdbk Viewing Window

Station 1 will be configured to use Datalinks A1 and A2. The SP600 drive uses 16-bit Datalinks.

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

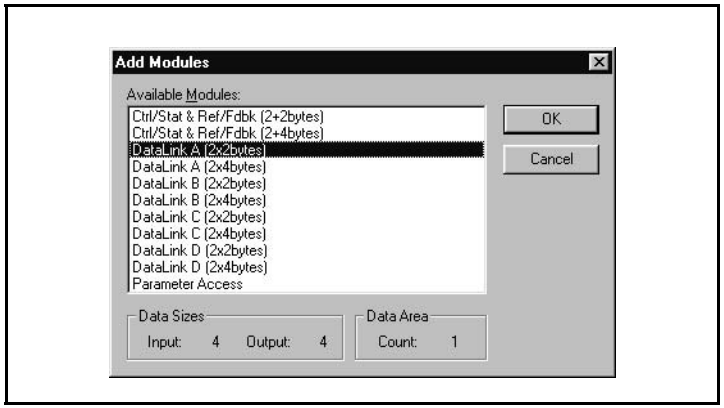



Figure 5.15 – Add Modules: Datalink A Selection Window

Step 14. The “Datalink A” module has now been added as shown in figure 5.16.

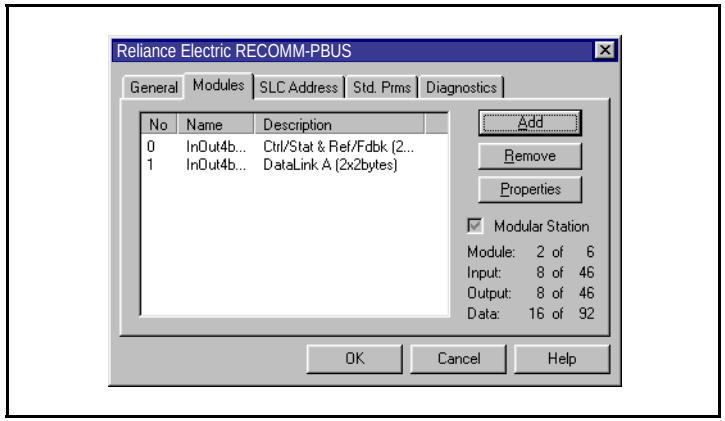



Figure 5.16 – Modules: Datalink A Viewing Window

Station 1 will also be configured to use Datalinks B1 and B2. The SP600 drive uses 16-bit Datalinks.

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

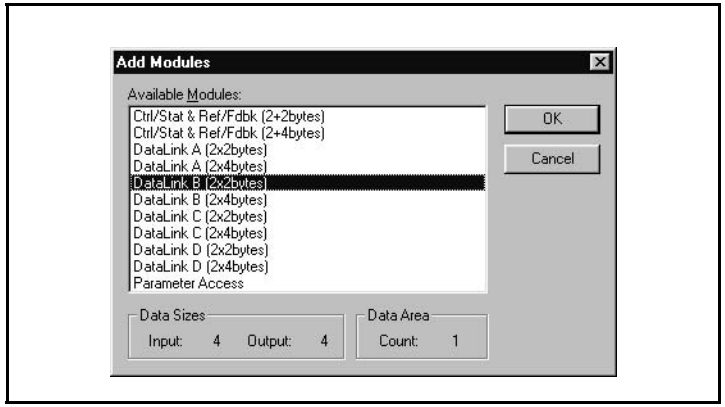



Figure 5.17 – Add Modules: Datalink B Selection Window

Step 16. The “Datalink B” module has now been added as shown in figure 5.18.

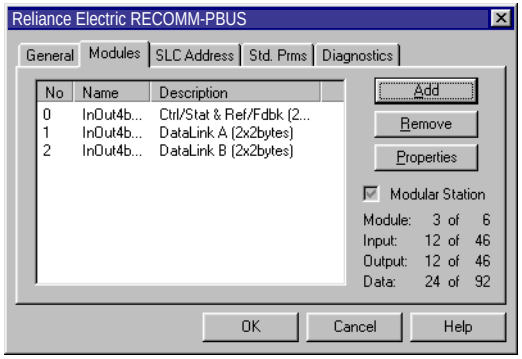



Figure 5.18 – Modules: Datalink B Viewing Window

Station 1 will also be configured to use Datalinks C1 and C2. The SP600 drive uses 16-bit Datalinks.

Step 17. Click **Add** to continue adding modules. Select “Datalink C (2x2bytes)” as shown in figure 5.19 and click **OK**.

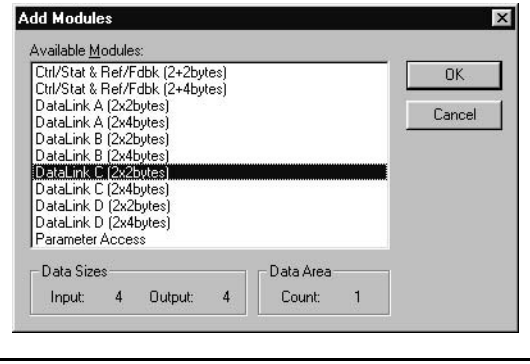



Figure 5.19 – Add Modules: Datalink C Selection Window

Step 18. The “Datalink C” module has now been added as shown in figure 5.20.

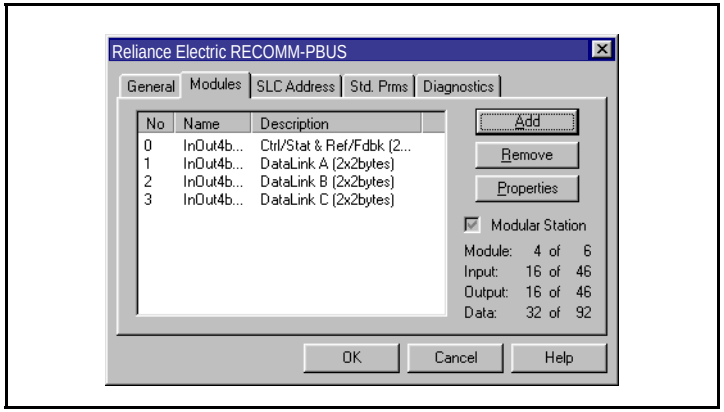



Figure 5.20 – Modules: Datalink C Viewing Window

Station 1 will also be configured to use Datalinks D1 and D2. The SP600 drive uses 16-bit Datalinks.

Step 19. Click **Add** to continue adding modules. Select “Datalink D (2x2bytes)” as shown in figure 5.21 and click **OK**.

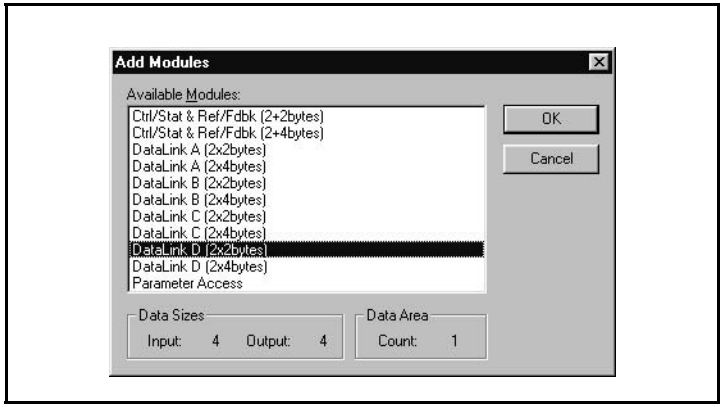



Figure 5.21 – Add Modules: Datalink D Selection Window

The “Datalink D” module has now been added.

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

Step 20. Click **Add** to continue adding modules. Select “Parameter Access” as shown in figure 5.22 and click **OK**.

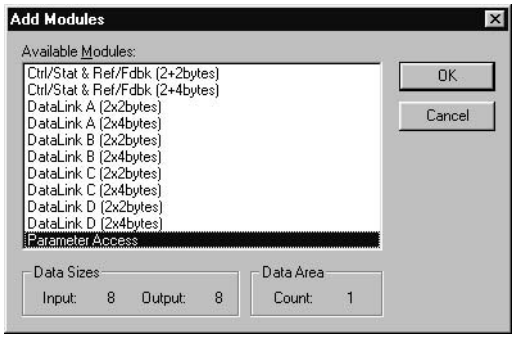



Figure 5.22 – Add Modules: Parameter Access Selection Window

Step 21. The “Parameter Access” module has now been added as shown in figure 5.23.

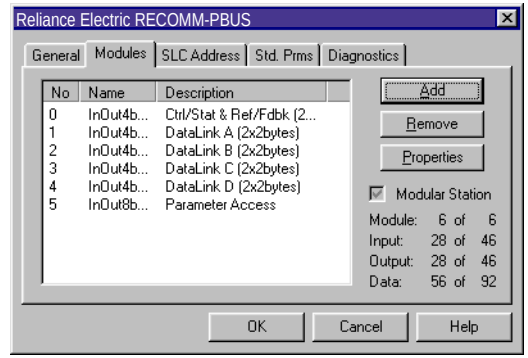



Figure 5.23 – Modules: Parameter Access Viewing Window

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.

Step 22. Click on the **SLC Address** tab as shown in figure 5.24.

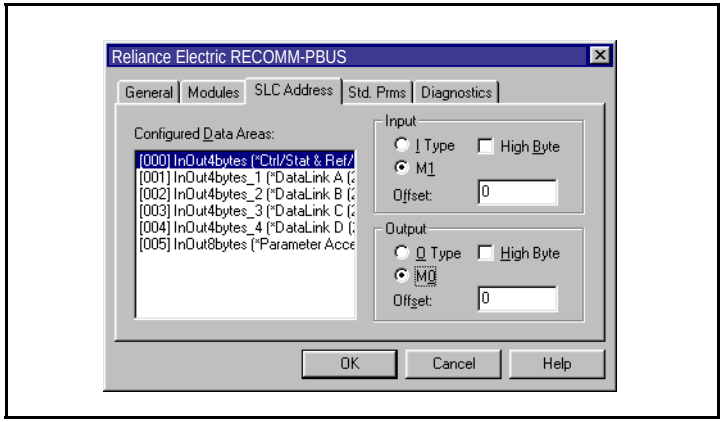



Figure 5.24 – SLC Address: M1/M0 (Ctrl/Stat & Ref/Fdbk)

Step 23. Datalink A is at word 2 in the M1/M0 files as shown in figure 5.25.

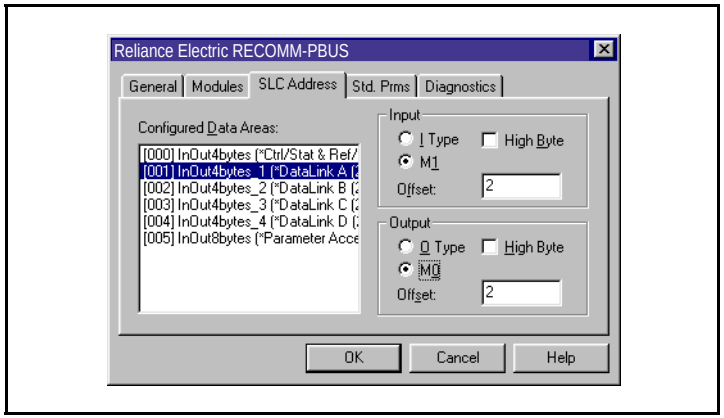



Figure 5.25 – SLC Address: M1/M0 (Datalink A)

Step 24. Datalink B is at word 4 in the M1/M0 files as shown in figure 5.26.

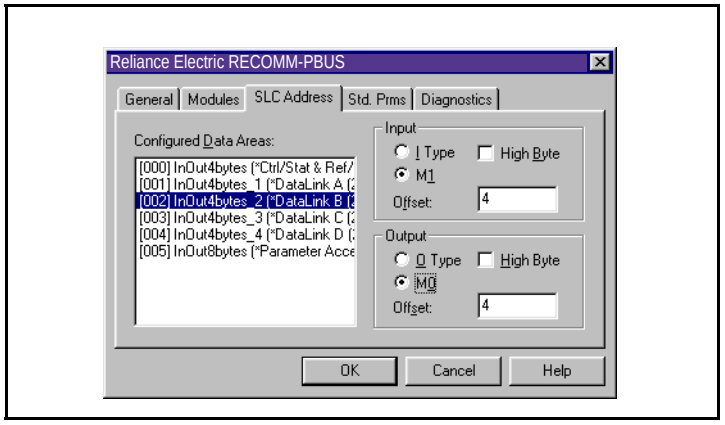



Figure 5.26 – SLC Address: M1/M0 (Datalink B)

Step 25. Datalink C is at word 6 in the M1/M0 files as shown in figure 5.27.

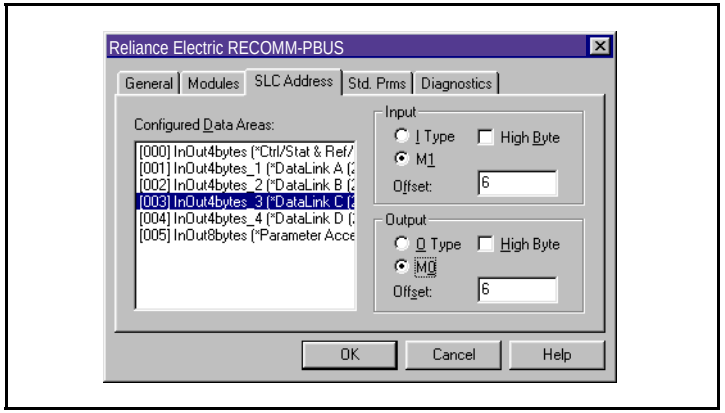



Figure 5.27 – SLC Address: M1/M0 (Datalink C)

Step 26. Datalink D is at word 8 in the M1/M0 files as shown in figure 5.28.

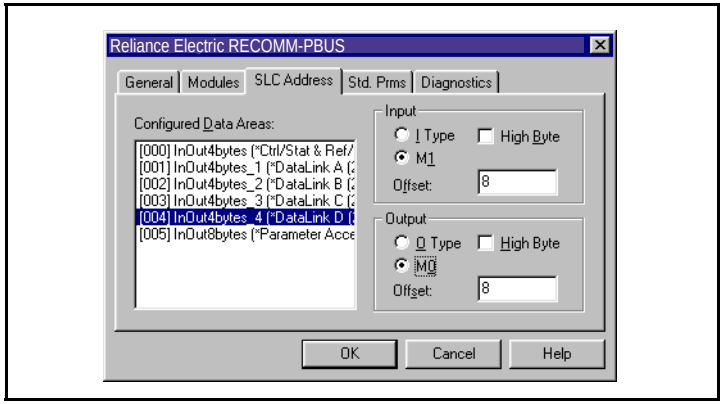



Figure 5.28 – SLC Address: M1/M0 (Datalink D)

Step 27. Parameter Access starts at word 10 in the M1/M0 files. Note that Parameter Access uses 4 words (10-13). See figure 5.29. Click **OK** when finished.

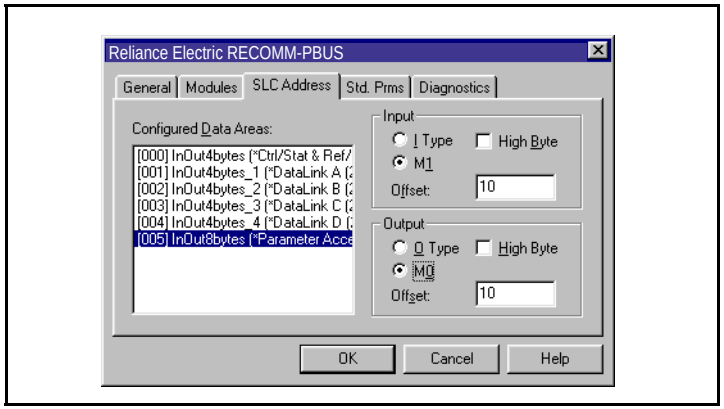



Figure 5.29 – SLC Address M1/M0 (Parameter Access)

Step 28. Station 1 is now displayed in the network window. See figure 5.30.

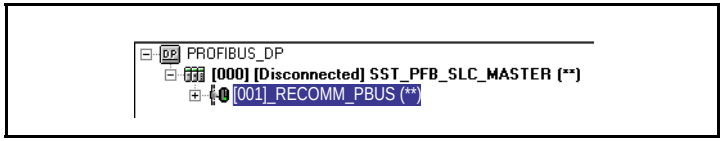



Figure 5.30 – Station 1 Network Window

Step 29. 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).

Step 30. The same steps for configuring Station 1 will be used for configuring Station 2. Refer to previous steps (starting at step 9,) for Configuring the SST-PFB-SLC PROFIBUS Scanner-Station 2. (See figure 5.31.)

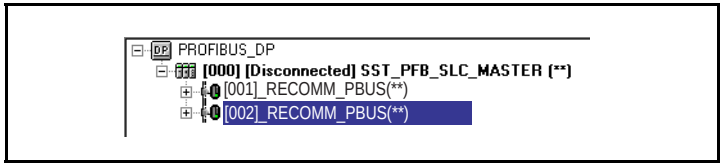



Figure 5.31 – Station 2 Network Window

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).

Step 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.

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

Step 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 5.32).

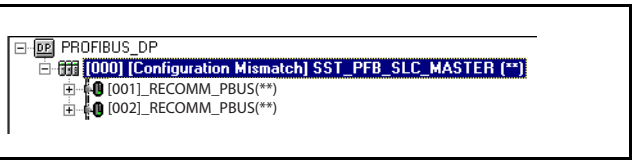



Figure 5.32 – Network Window Scanner Selection

Step 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 5.33.

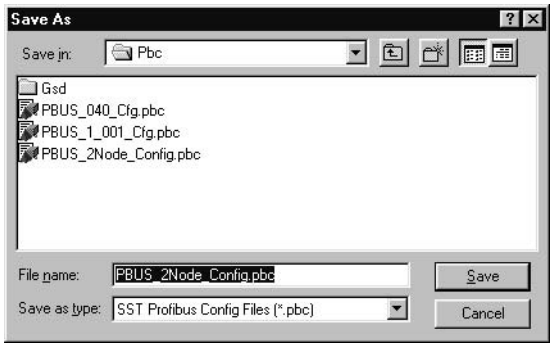



Figure 5.33 – Save As Dialog Window

Summary of the sample 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 |

## 5.3 GSD Diagnostic Messages

In the case of invalid GSD module configuration, the peripheral will send one of the messages shown in table 5.1.

Table 5.1 – GSD Diagnostic 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. |

# CHAPTER 6

# Using I/O Messaging

Chapter 6 provides information and examples that explain how to use I/O Messaging to control an SP600 drive.

**ATTENTION:** 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. Failure to observe this precaution could result in bodily injury or damage to equipment.

## 6.1 About I/O Messaging

I/O messaging is used to transfer the data which controls the SP600 drive and sets its Reference. I/O can also be used to transfer data to and from Datalinks in SP600 drives.

The PROFIBUS module provides options for configuring and using I/O, including the size of the I/O, which can be configured by enabling or disabling the Logic Command/Reference and Datalinks.

Chapter 4, Configuring the PROFIBUS Module, and chapter 5, Configuring the PROFIBUS Scanner, discuss how to configure the module 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 module and scanner.

## 6.2 Understanding the I/O Image

The terms **input** and **output** are defined from scanner's point of view. Therefore, **Output I/O** is data that is output from the scanner and consumed by the PROFIBUS module. **Input data** is status data that is produced by the module 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). If not all I/O is enabled, the image table is truncated. The image table always uses consecutive words starting at word 0.

Figure 6.1 illustrates an example of an I/O image with 16-bit words.

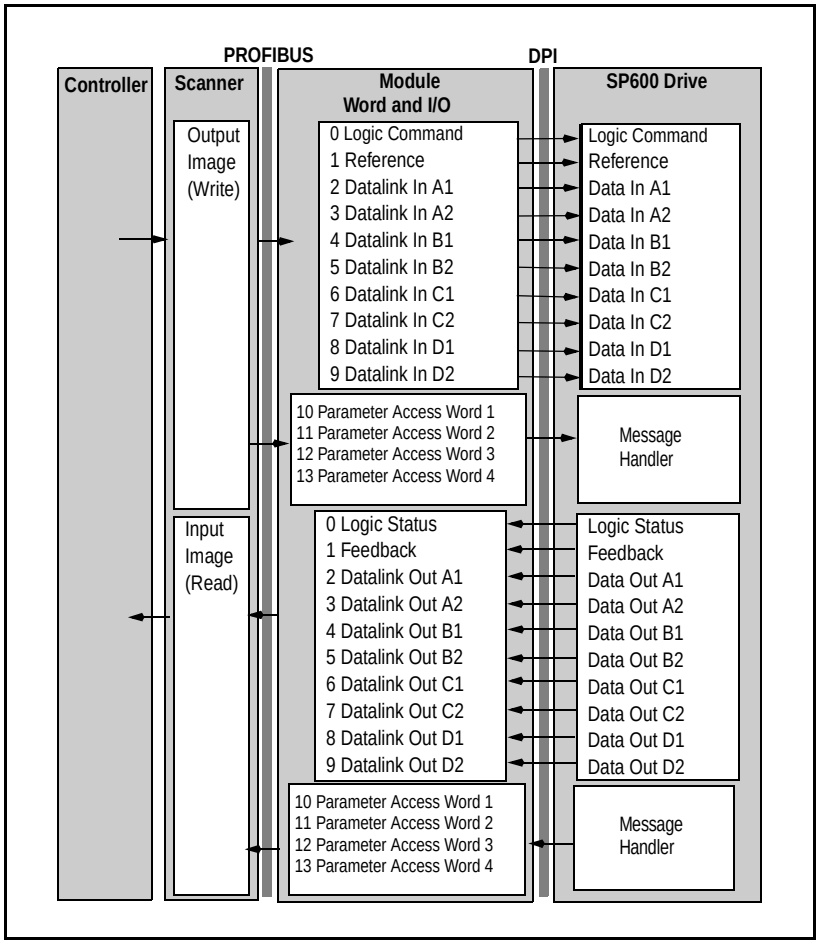



Figure 6.1 – Sample I/O Image with All I/O Enabled

An image that uses 32-bit words for Reference and Datalinks would change the I/O image in figure 6.1 as follows:

| Word | I/O | | Word | I/O |
|---|---|---|---|---|
| 0 | Logic Command/Status | | 7 - 10 | Datalink B |
| 1 - 2 | Reference/ Feedback | | 11 - 14 | Datalink C |
| 3 - 6 | Datalink A | | 15 - 18 | Datalink D |

Figure 6.2 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.

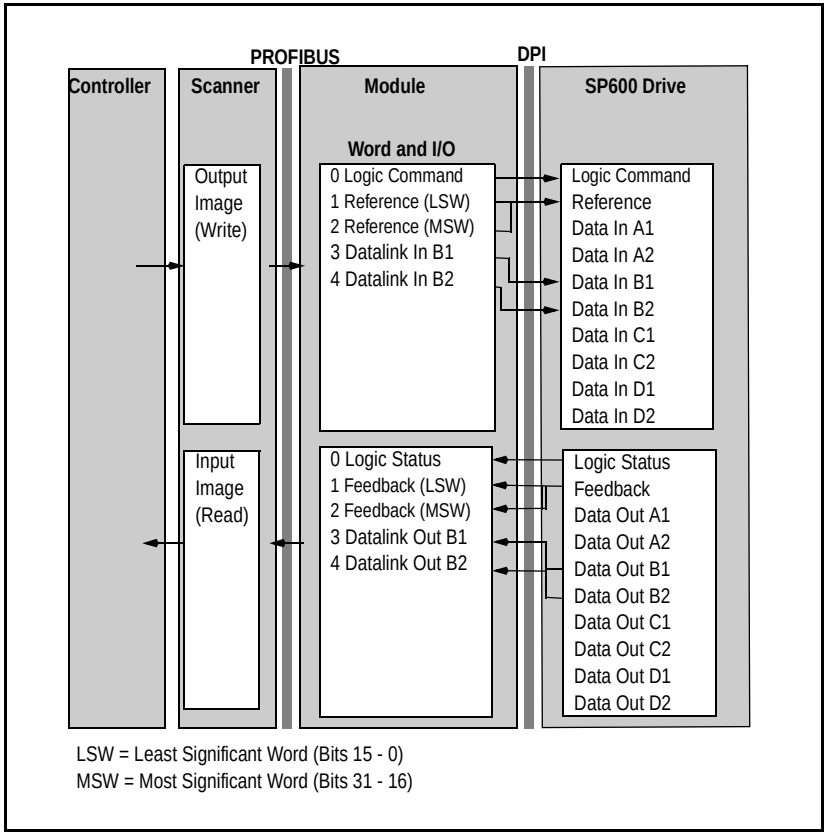



Figure 6.2 – Sample I/O Image with Only Logic/Reference and Datalink B Enabled

## 6.3 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 module. The **Logic Status** is a 16-bit word of status produced by the module 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.

## 6.4 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 module. The **Feedback** (16 bits or 32 bits) is produced by the module and consumed by the controller. The size of the Reference/Feedback is determined by the drive and displayed in module parameter 6 (Ref/Fdbk Size).

| Size | Valid Values | In I/O Image | Example |
|---|---|---|---|
| 16-bit | -32768 to 32767 | Word 1 | Figure 6.1 |
| 32-bit | -2147483648 to 2147483647 | Word 1 and Word 2 | Figure 6.2 |

## 6.5 Using Datalinks

A Datalink is a mechanism used by SP600 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 module parameter 7 (Datalink Size) in the module.

### 6.5.1 Rules for Using Datalinks

- Each set of Datalink parameters in an SP600 drive can be used by only one module. If more than one module is connected to a single drive, multiple modules 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.

### 6.5.2 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 Elapsed MWh (SP600 drive parameter 9), 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 5.8 MWh 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 Power Up Marker (drive parameter 242) 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:**

**Power Up Marker (242)** = 88.4541 hours
MSW = $13_{decimal} = 1101_{binary} = 2^{19} + 2^{18} + 2^{16} = 851968$
LSW = 32573
851968 + 32573 = 884541

## 6.6 Sample SLC Ladder Logic Program

The PROFIBUS sample program uses an SLC processor with an SST PROFIBUS scanner (SST-PFB-SLC) in the first slot of the rack and will work with SP600 drives.

### Function of the Sample Program

The program is written for two drives on the network and demonstrates the use of the following:

- Logic Command / Reference
- Logic Status / Feedback
- Datalinks
- Parameter Access (covered in chapter 7)

### Module Settings

The Node Address switch settings on the PROFIBUS modules are set to:

- “1” for Station 1
- “2” for Station 2

### Parameter Settings

Table 6.1 – Parameter Settings for Sample SLC Program

| Device | Parameter | Name | Value | Description |
|---|---|---|---|---|
| SP600 | 90 | Speed Ref A Sel | 22 | 'DPI Port 5' (RECOMM-PBUS) |
| | 300 | Data In A1 | 140 | Points to Accel Time 1 (140) |
| | 301 | Data In A2 | 142 | Points to Decel Time 1 (142) |
| | 302 | Data In B1 | 100 | Points to Jog Speed (100) |
| | 303 | Data In B2 | 155 | Points to Stop Mode A (155) |
| | 304 | Data In C1 | 101 | Points to Preset Speed 1 (101) |
| | 305 | Data In C2 | 102 | Points to Preset Speed 2 (102) |
| | 306 | Data In D1 | 103 | Points to Preset Speed 3 (103) |
| | 307 | Data In D2 | 104 | Points to Preset Speed 4 (104) |
| | 310 | Data Out A1 | 140 | Points to Accel Time 1 (140) |
| | 311 | Data Out A2 | 142 | Points to Decel Time 1 (142) |
| | 312 | Data Out B1 | 100 | Points to Jog Speed (100) |
| | 313 | Data Out B2 | 155 | Points to Stop Mode A (155) |
| | 314 | Data Out C1 | 101 | Points to Preset Speed 1 (101) |
| | 315 | Data Out C2 | 102 | Points to Preset Speed 2 (102) |
| | 316 | Data Out D1 | 103 | Points to Preset Speed 3 (103) |
| | 317 | Data Out D2 | 104 | Points to Preset Speed 4 (104) |
| RECOMM-PBUS | 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 set up as shown in figure 6.3.

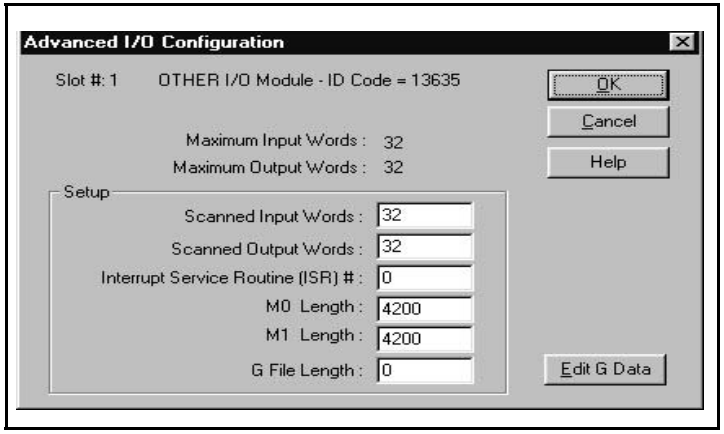



Figure 6.3 – Advanced I/O Configuration

The two PROFIBUS modules are set up as Station 1 and Station 2, and are configured as 14 words input & output each. See chapter 5.

### 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

The examples in sections 6.7 and 6.8 use the Logic Command word and Logic Status word for SP600 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.

# 6.7 Sample SLC Ladder Logic - Main Program

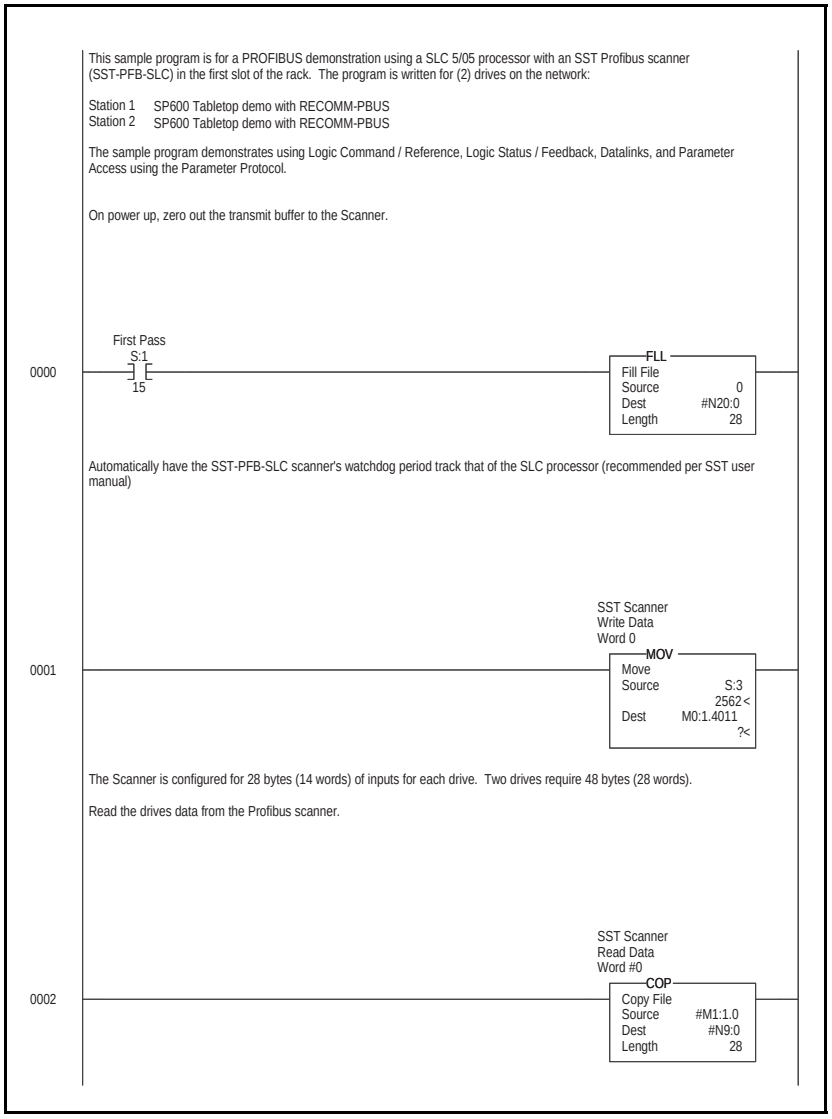



Figure 6.4 – Sample SLC Ladder Logic - Main Program

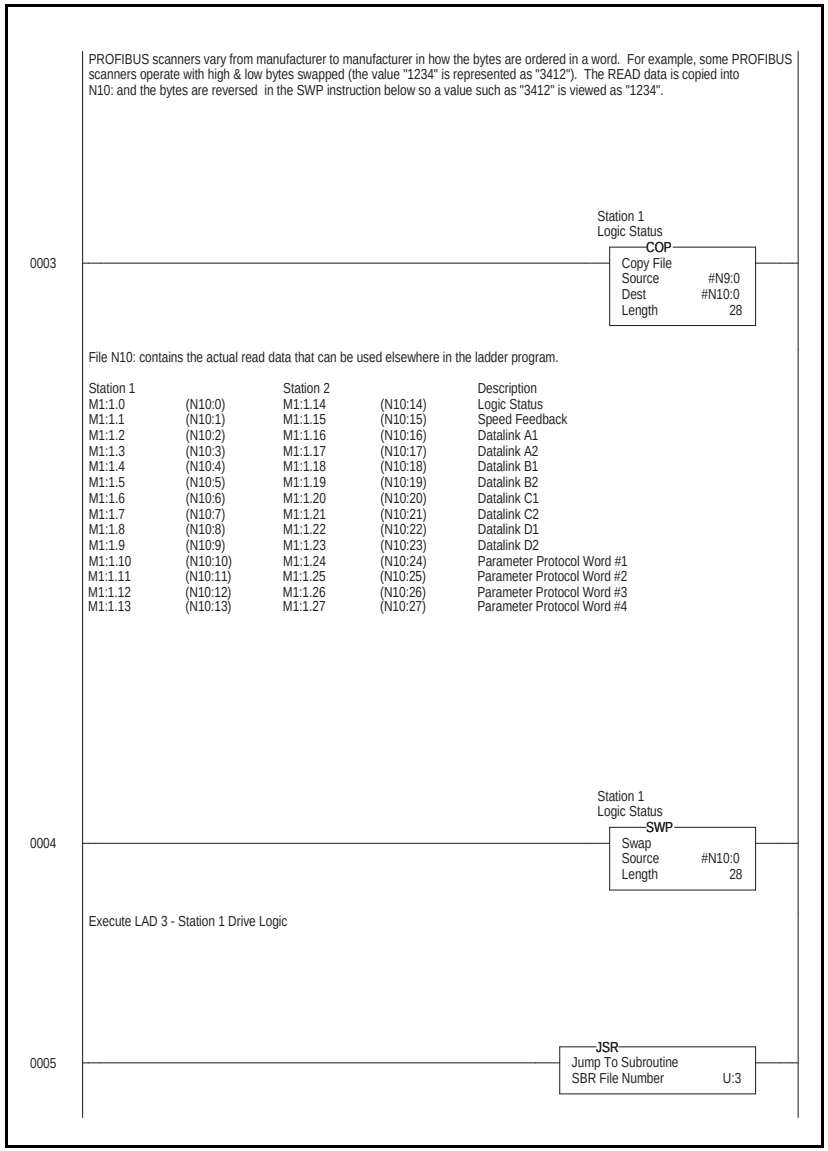



Figure 6.5 – Sample SLC Ladder Logic - Main Program (Continued)

For Ladder 3 Station 1 Drive Logic, see figure 6.5, Sample SLC Ladder - Station 1 Program.

For Ladder 4 Station 2 Drive Logic, see figure 6.6, Sample SLC Ladder - Station 2 Program.

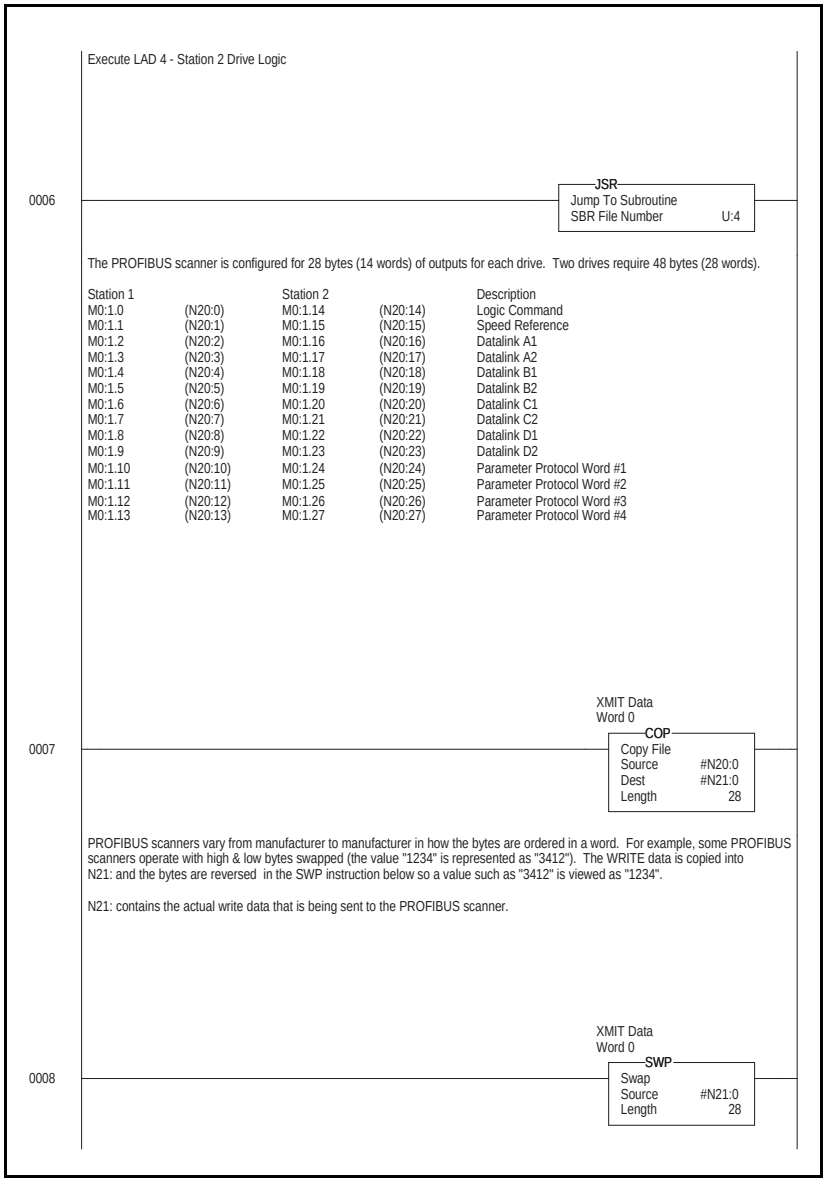



Figure 6.6 – Sample SLC Ladder Logic - Main Program (Continued)

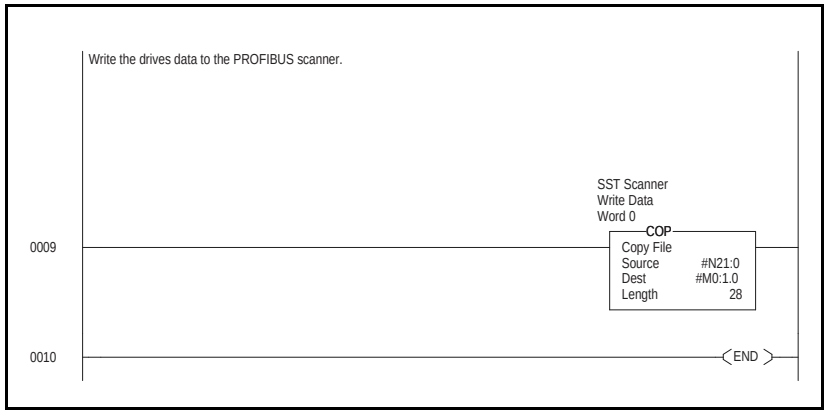



Figure 6.7 – Sample SLC Ladder Logic - Main Program (Continued)

# 6.8 Sample SLC Ladder Logic - Station 1 Program

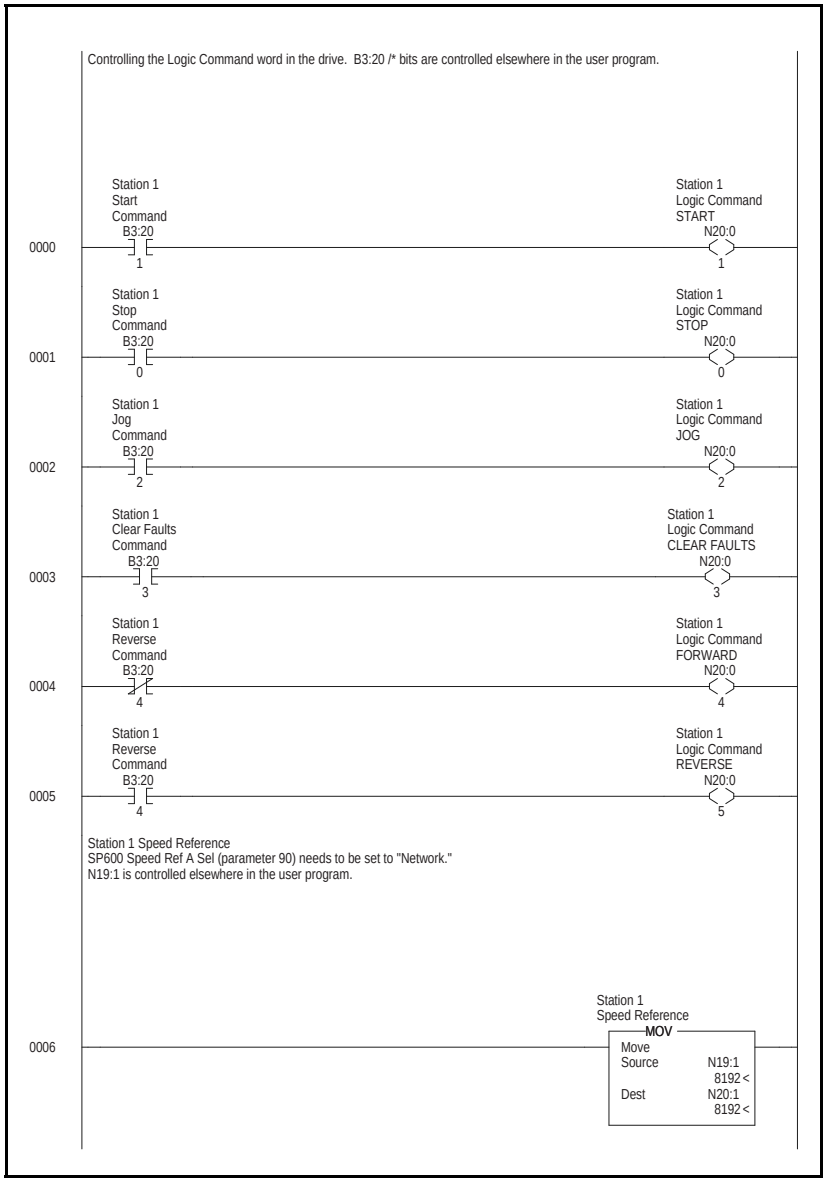



Figure 6.8 – Sample SLC Ladder Logic - Station 1 Program

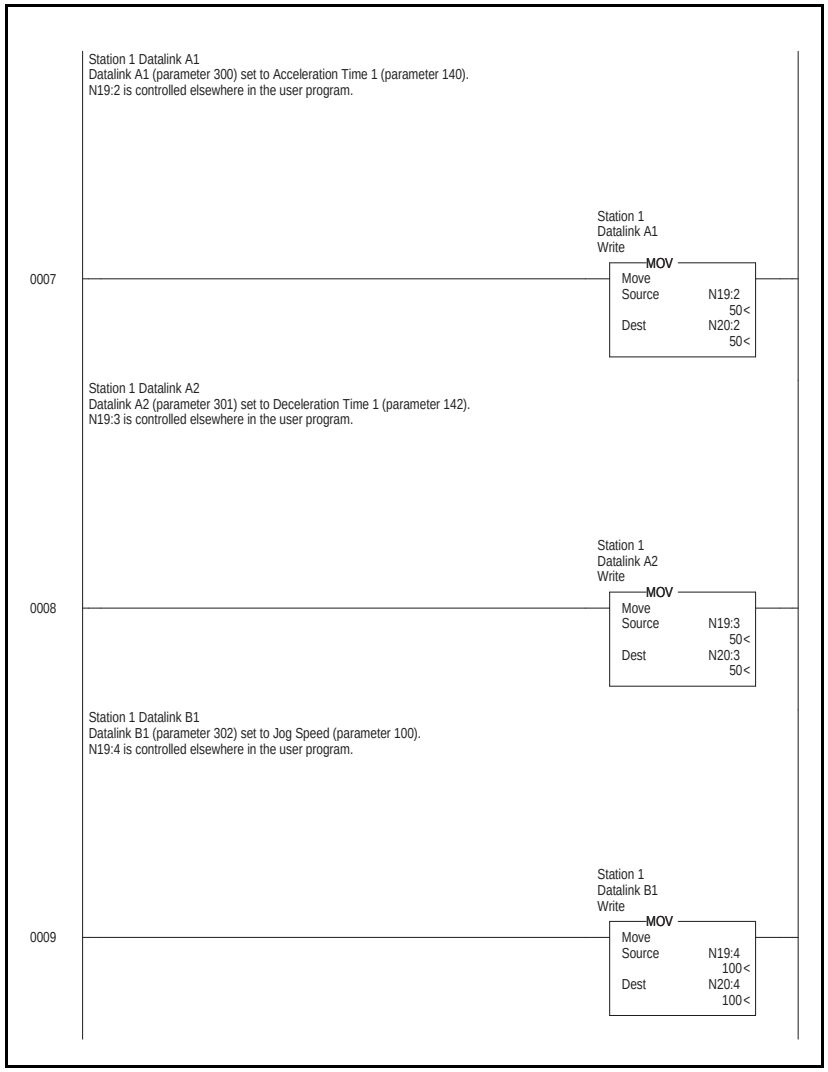



Figure 6.9 – Sample SLC Ladder Logic - Station 1 Program (Continued)

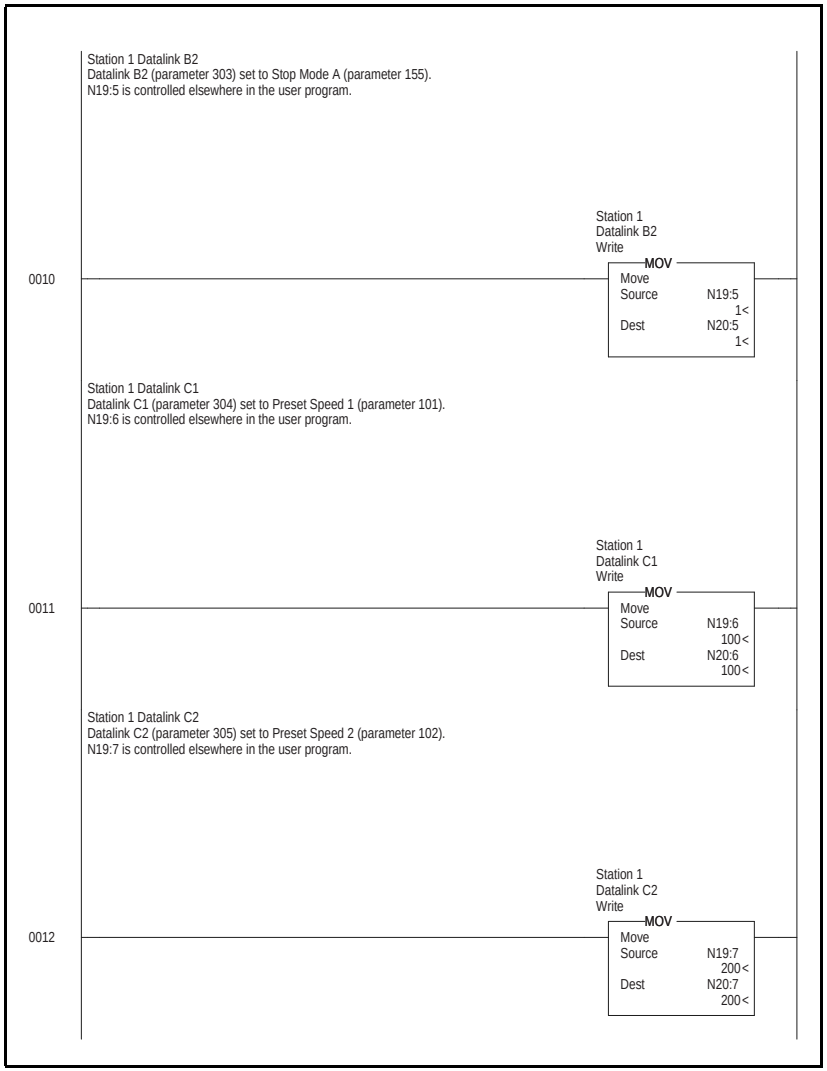



Figure 6.10 – Sample SLC Ladder Logic - Station 1 Program (Continued)

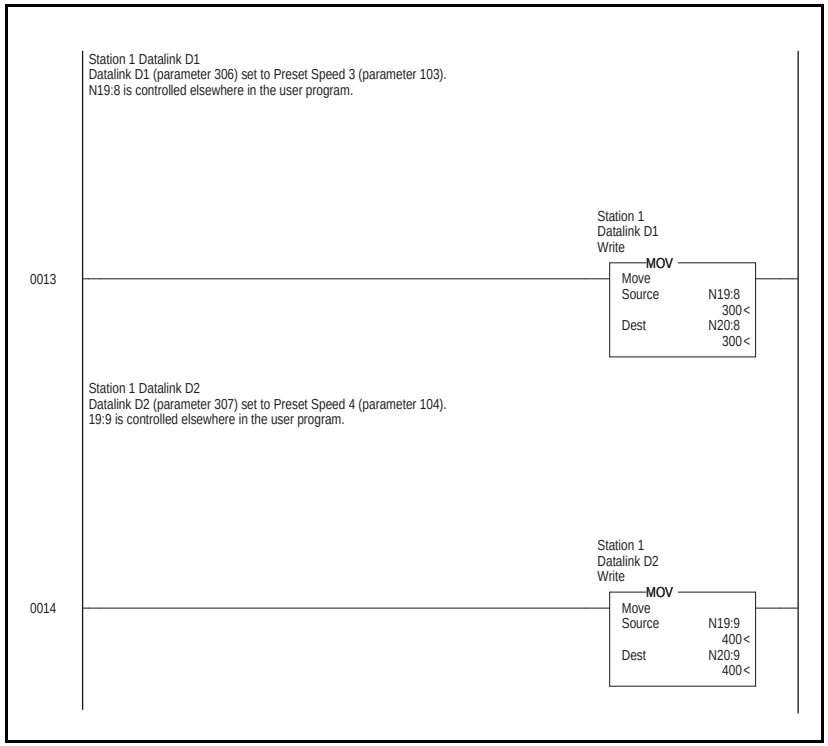



Figure 6.11 – Sample SLC Ladder Logic - Station 1 Program (Continued)

The Station 1 program can either end here or, if Explicit Messaging is needed, Parameter Protocol logic can be added. (See figure 7.5.)

# 6.9 Sample SLC Ladder Logic - Station 2 Program

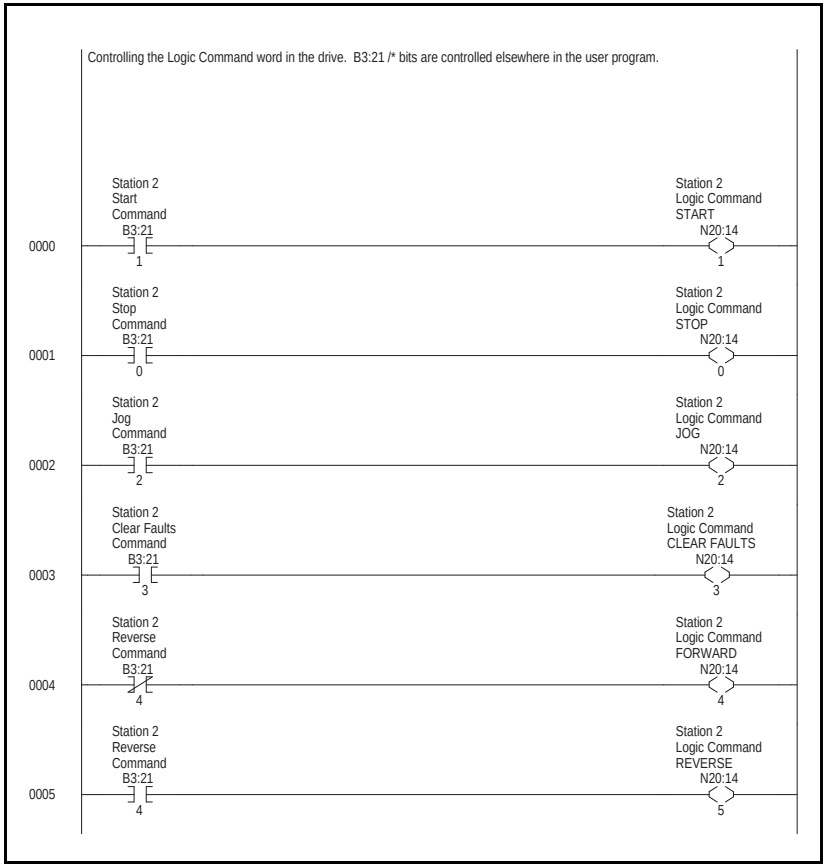



Figure 6.12 – Sample SLC Ladder Logic - Station 2 Program

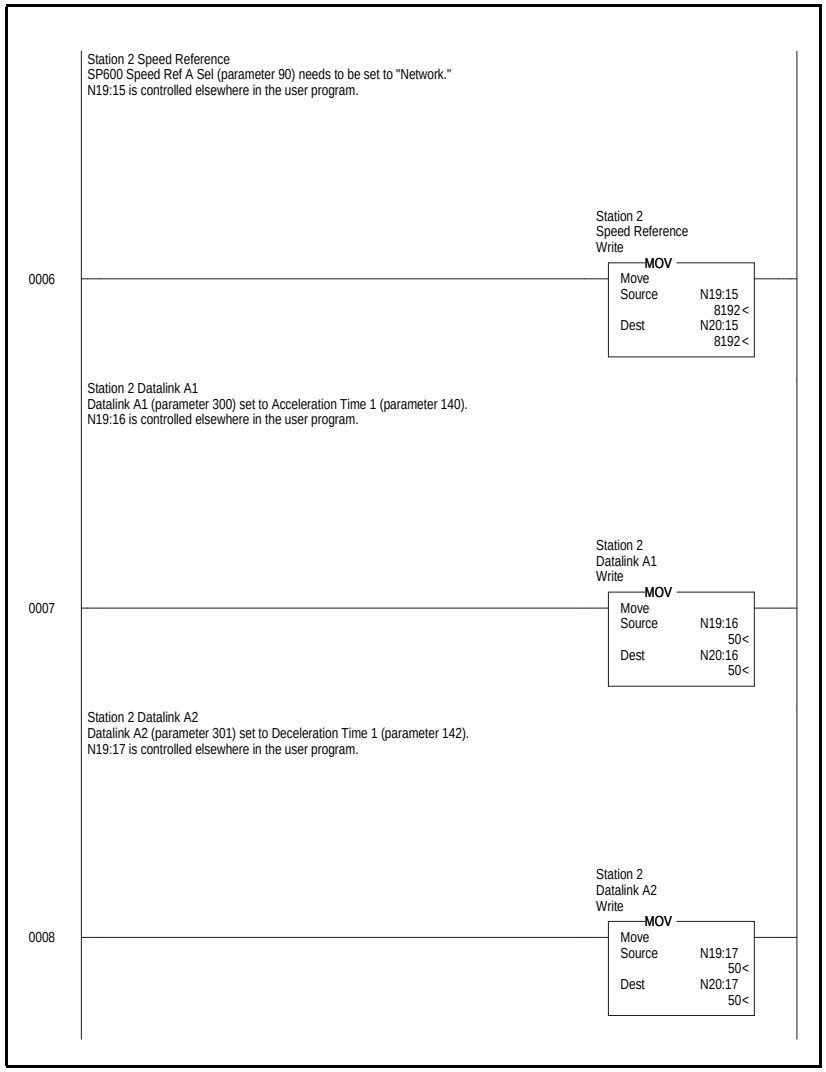



Figure 6.13 – Sample SLC Ladder Logic - Station 2 Program (Continued)

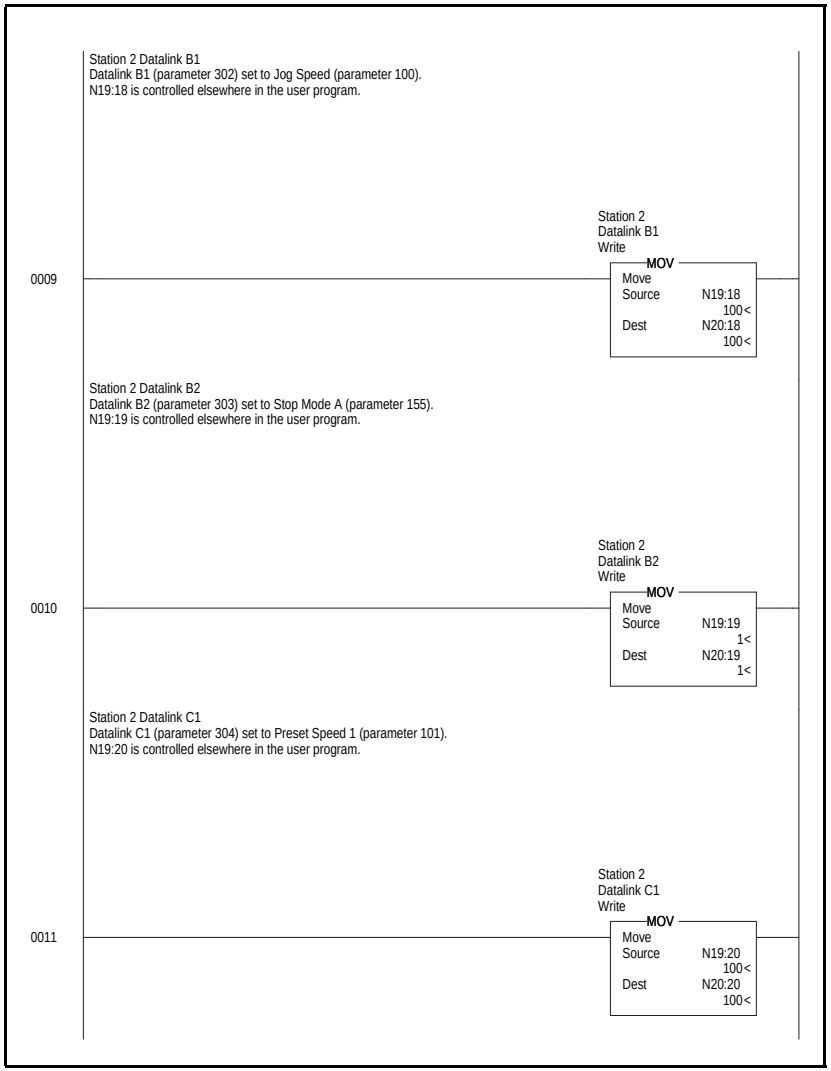



Figure 6.14 – Sample SLC Ladder Logic - Station 2 Program (Continued)

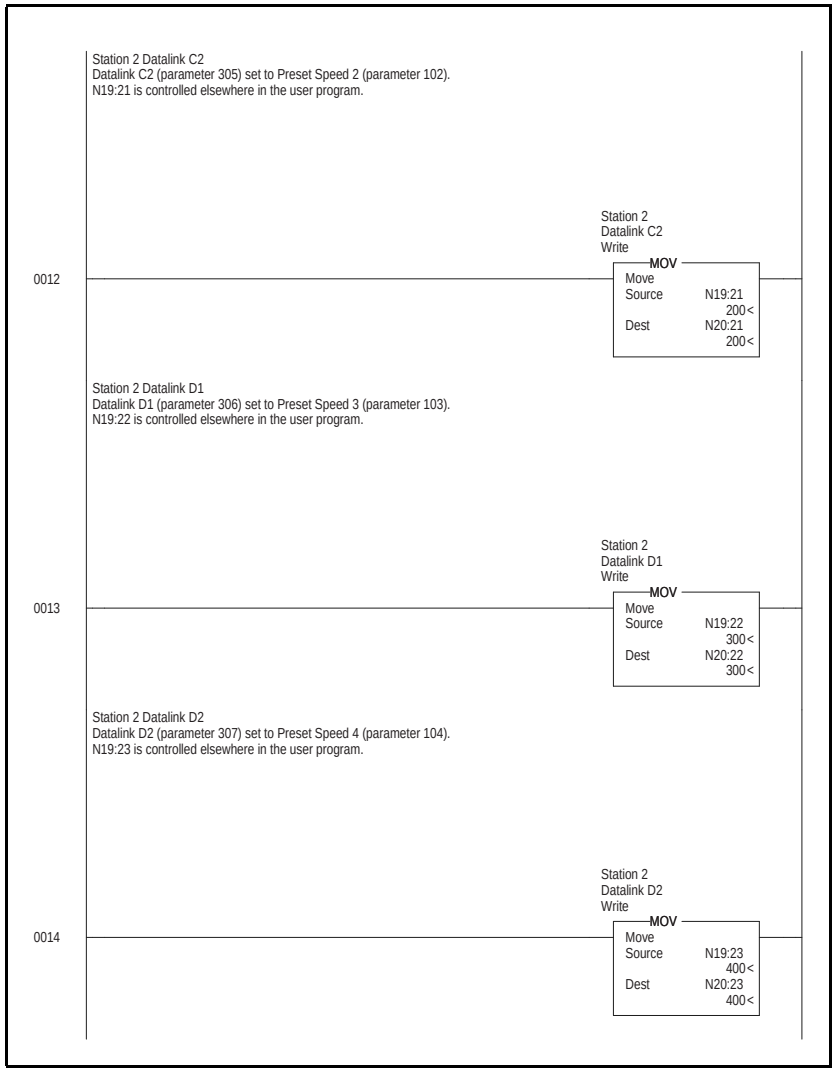



Figure 6.15 – Sample SLC Ladder Logic - Station 2 Program (Continued)

The Station 2 program can either end here or, if Explicit Messaging is needed, Parameter Protocol logic can be added (see figure 7.6).

# CHAPTER 7

# Using Explicit Messaging (Parameter Protocol)

Chapter 7 provides information and examples that explain how to use Explicit Messaging to monitor and configure the module and connected SP600 drive, as well as other peripherals.

**ATTENTION:** 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. Failure to observe this precaution could result in bodily injury or damage to equipment.

**ATTENTION:** 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. Failure to observe this precaution could result in damage to, or destruction of, equipment.

## 7.1 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 PROFIBUS module, the Parameter Access module in the GSD file must be added to the master configuration when configuring the network.

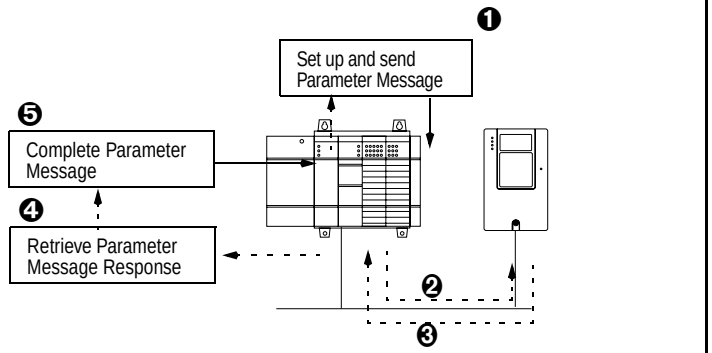
Refer to step 21 in chapter 5 to view the procedure for adding the “Parameter Access” module to a configuration. This maps four words input and output to the end of the I/O configuration, which is used as the request/response in the parameter message format (figure 7.2).

Parameter 23 (Parameter Mode) in the PROFIBUS module is used to configure the parameter protocol that is active. The default protocol is the Parameter Protocol.

## 7.2 Running Explicit Messages

There are five basic events in the Explicit Messaging process defined in figure 7.1. 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 a response message for all Explicit Messages, whether you are reading or writing data.




| | |
|---|---|
| ❶ | You format the required data and set up the ladder logic program to send an Explicit Message request to the scanner module (download). |
| ❷ | The scanner module transmits the Explicit Message Request to the slave device over the PROFIBUS network. |
| ❸ | The slave device transmits the Explicit Message Response back to the master. |
| ❹ | The controller retrieves the Explicit Message Response. |
| ❺ | The Explicit Message is complete. |

Figure 7.1 – Explicit Message Process

# 7.3 Parameter Protocol

This protocol uses four 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).

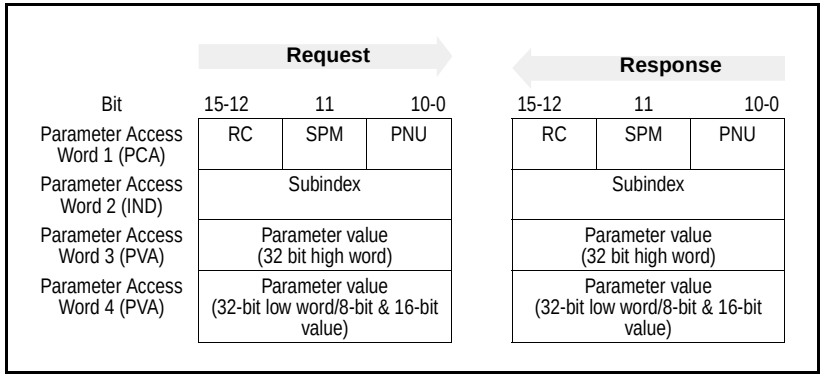



Figure 7.2 – Parameter Message Format

Refer to sections 7.3.1 and 7.3.2 for a description of the data that is required in each word.

### 7.3.1 Parameter Message Request

Table 7.1 – Parameter Message Request Data

| Word | Description |
|---|---|
| 1 | **PNU - Parameter Number** (Bit 0-10)<br>The parameter number determines which parameter to access in the selected peripheral. Parameters 1-1023 can be accessed.<br>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)<br>Reserved - Should always bet set to 0. |
| | **RC - Request Code** (Bit 12-15)<br>One of the following codes have to be used:<br>0 = No request<br>1 = Request parameter value<br>2 = Change parameter value (8-bit & 16-bit word)<br>3 = Change parameter value (32-bit word)<br>4 -15 = Reserved |
| 2 | **IND - Index**<br>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 PROFIBUS module can be determined from parameter 1 (DPI Port). This is Port 5 on SP600 drives. |
| 3 | **PVA - Parameter value** (32-bit high word)<br>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).<br>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. |

### 7.3.2 Parameter Message Response

Table 7.2 – Parameter Message Response Data

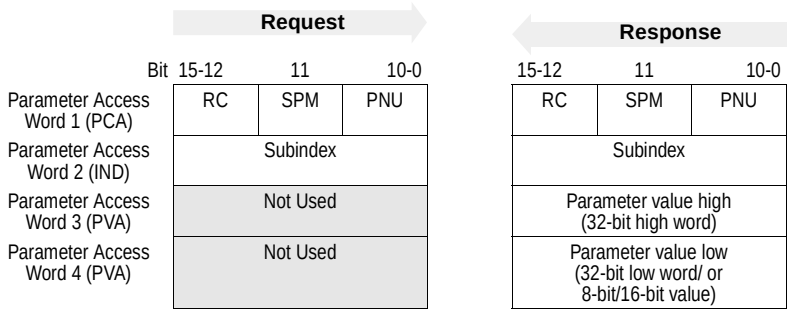
| Word | Description |
|---|---|
| 1 | **PNU - Parameter Number** (Bit 0-10)<br>Requested parameter number. |
| | **SPM** (Bit 11)<br>Reserved - is always set to 0. |
| | **RC - Response Code** (Bit 12-15)<br>One of the following codes will be sent:<br>0 = No request<br>1 = Transfer parameter value (8-bit & 16-bit word)<br>2 = Transfer parameter value (32-bit word)<br>3-6 = Reserved<br>7 = Request rejected. Error message is found in word 3. See table below for fault number description.<br>8 = No parameter change rights<br>9-15 = Reserved |
| 2 | **IND - Index**<br>Port ID of requested parameter |
| 3 | **PVA - Parameter value** (32-bit high word)<br>The parameter value. If the parameter is 32 bits, the most significant bytes are placed here.<br>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).<br>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.<br>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. |

Table 7.3 – Parameter Message Response Fault Numbers and Descriptions

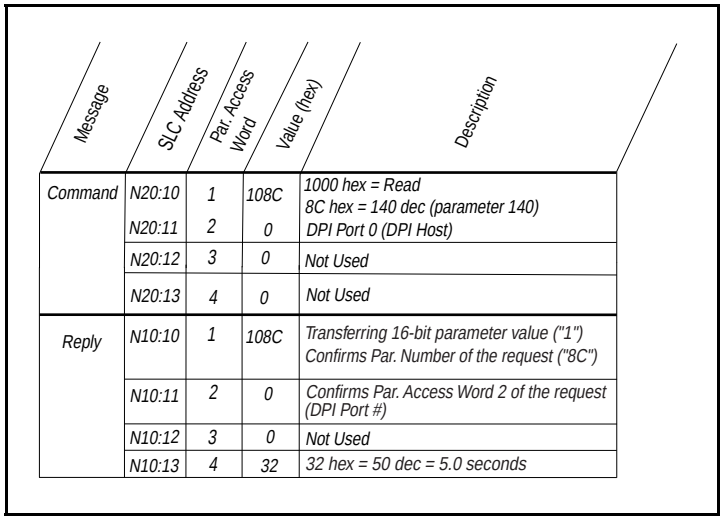
| Fault Number | Description |
|---|---|
| 101 | Service not supported (i.e., set service to a read-only parameter) |
| 102 | Service not valid |
| 104 | Parameter does not exist (i.e., parameter number>max number of parameters) |
| 106 | Data value out of range (i.e., set value is out of range) |
|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

## 7.3.3 Parameter Protocol Examples

### Read Examples

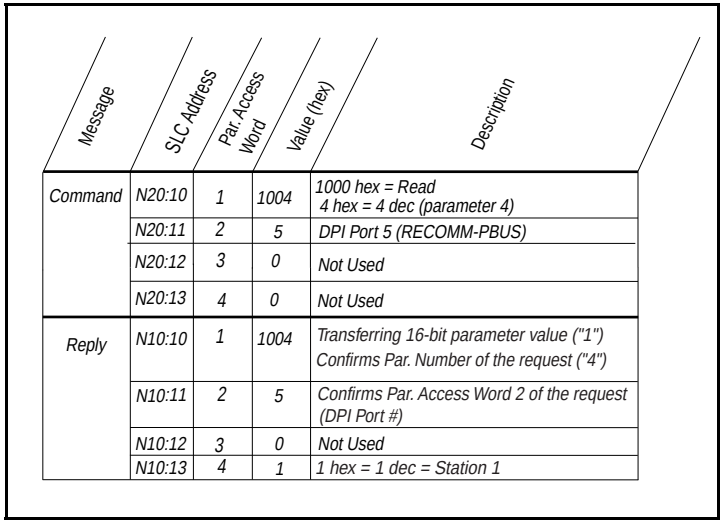



| Request | Response |
|---|---|
| **RC**<br>Set to “1” (‘0001’) binary to read | **RC**<br>“1” (‘0001’) Transferring 8-bit or 16-bit parameter value<br>“2” (‘0010’) Transferring a 32-bit parameter value<br>“7” (‘0111’) Request rejected (including fault code) |
| **SPM**<br>Not used | **SPM**<br>Not used |
| **PNU**<br>Parameter number to read | **PNU**<br>Confirms the Parameter number (if successful, equals the PNU from the request) |
| **Subindex**<br>Selects which DPI port to talk to (“0” = DPI Host, “5” = RECOMM-PBUS on SP600 drives). | **Subindex**<br>Confirms the DPI port (if successful, equals the Subindex from the request) |
| Not Used | **Parameter value high word**<br>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**<br>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”) |



| Message | SLC Address | Par. Access Word | Value (hex) | Description |
|---|---|---|---|---|
| Command | N20:10 | 1 | 108C | 1000 hex = Read<br>8C hex = 140 dec (parameter 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")<br>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 |

Figure 7.3 – Reading Accel Time 1 (Parameter 140) from the SP600 Drive (DPI Port 0)



| Message | SLC Address | Par. Access Word | Value (hex) | Description |
|---|---|---|---|---|
| Command | N20:10 | 1 | 1004 | 1000 hex = Read<br>4 hex = 4 dec (parameter 4) |
| | N20:11 | 2 | 5 | DPI Port 5 (RECOMM-PBUS) |
| | N20:12 | 3 | 0 | Not Used |
| | N20:13 | 4 | 0 | Not Used |
| Reply | N10:10 | 1 | 1004 | Transferring 16-bit parameter value ("1")<br>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 |

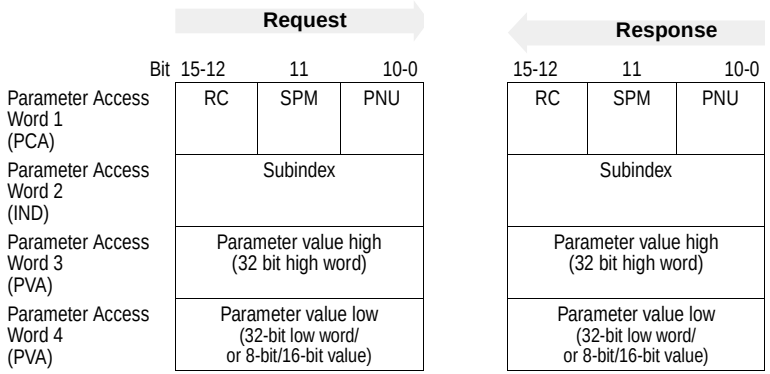
Figure 7.4 – Reading P-DP Addr Actual (Parameter 4) from the RECOMM-PBUS on an SP600 Drive (DPI Port 5)

| Message | SLC Address | Par. Access Word | Value (hex) | Description |
|---|---|---|---|---|
| Command | N20:10 | 1 | 10F4 | 1000 hex = Read<br>F4 hex = 244 dec (parameter 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")<br>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)

Figure 7.5 – Reading Fault 1 Time (Parameter 244) from the SP600 Drive (DPI Port 0)

### Write Examples




| Request | Response |
|---|---|
| **RC**<br>"2" ('0010' binary) to write a 8-bit or 16-bit parameter<br>"3" ('0011 binary) to write a 32-bit parameter | **RC**<br>"1" (0001') Transferring a 8-bit or 16-bit parameter value<br>"2" ('0010') Transferring a 32-bit parameter value<br>"7" ('0111') Request rejected (including fault number) |
| **SPM**<br>Not used | **SPM**<br>Not Used |
| **PNU**<br>Parameter number being written | **PNU**<br>Confirms the parameter number (equals the PNU from the request) |
| **Subindex**<br>Selects which DPI port to talk to ("0"= DPI Hosts "5"= RECOMM-PBUS on SP600 drives) | **Subindex**<br>Confirms the DPI port (equals the Subindex from the request) |
| **Parameter value high**<br>Contains the high word if writing a 32-bit parameter | **Parameter value high**<br>Confirms the high word if writing a 32-bit parameter. |
| **Parameter value low**<br>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**<br>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") |

| Message | SLC Address | Par. Access Word | Value (hex) | Description |
|---|---|---|---|---|
| Command | N20:10 | 1 | 2065 | 2000 hex = Change parameter value (word)<br>65 hex = 101 dec (parameter 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")<br>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 Par. Access Word 4 of the request |

Figure 7.6 – Writing Preset Speed 1 (Parameter 101) to the SP600 Drive (DPI Port 0)

| Message | SLC Address | Par. Access Word | Value (hex) | Description |
|---|---|---|---|---|
| Command | N20:10 | 1 | 2009 | 2000 hex = Change parameter value 8-bit/16-bit<br>9 hex = 9 dec (parameter 9) |
| | N20:11 | 2 | 5 | DPI Port 5 (RECOMM-PBUS) |
| | 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")<br>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 |

Figure 7.7 – Writing Comm Fault Action (Parameter 9) to the RECOMM-BUS on an SP600 Drive (DPI Port 5)

| Message | SLC Address | Par. Access Word | Value (hex) | Description |
|---|---|---|---|---|
| Command | N20:10 | 1 | 300F | 3000 hex = Change parameter value (32-bit)<br>F hex = 15 dec (parameter 15) |
| | N20:11 | 2 | 5 | DPI Port 5 (RECOMM-PBUS) |
| | 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")<br>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 |

Figure 7.8 – Writing Flt Cfg A1 In (Parameter 15) to a RECOMM-PBUS on an SP600 Drive (DPI Port 5)

# 7.4 Sample SLC Ladder Logic- Station 1 Parameter Protocol

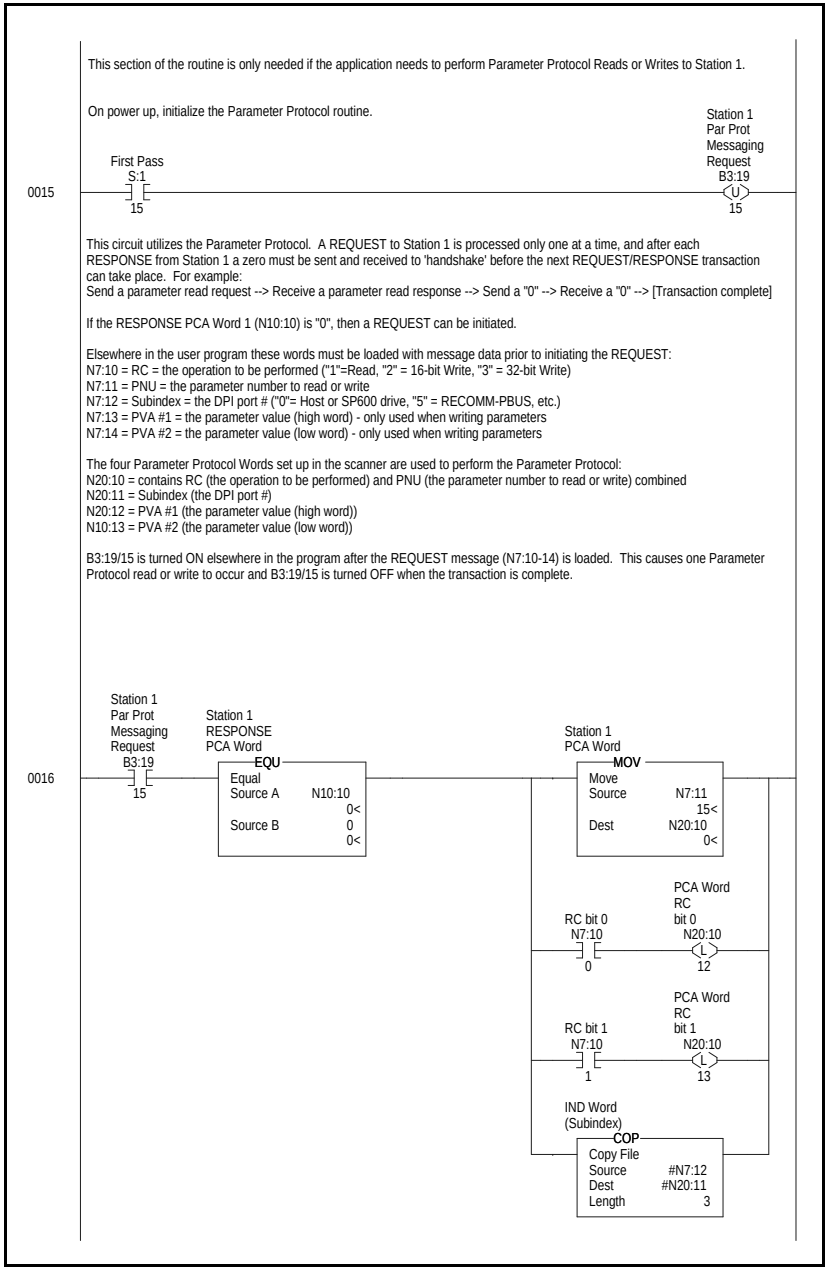



Figure 7.9 – Sample SLC Ladder Logic - Station 1 Parameter Protocol

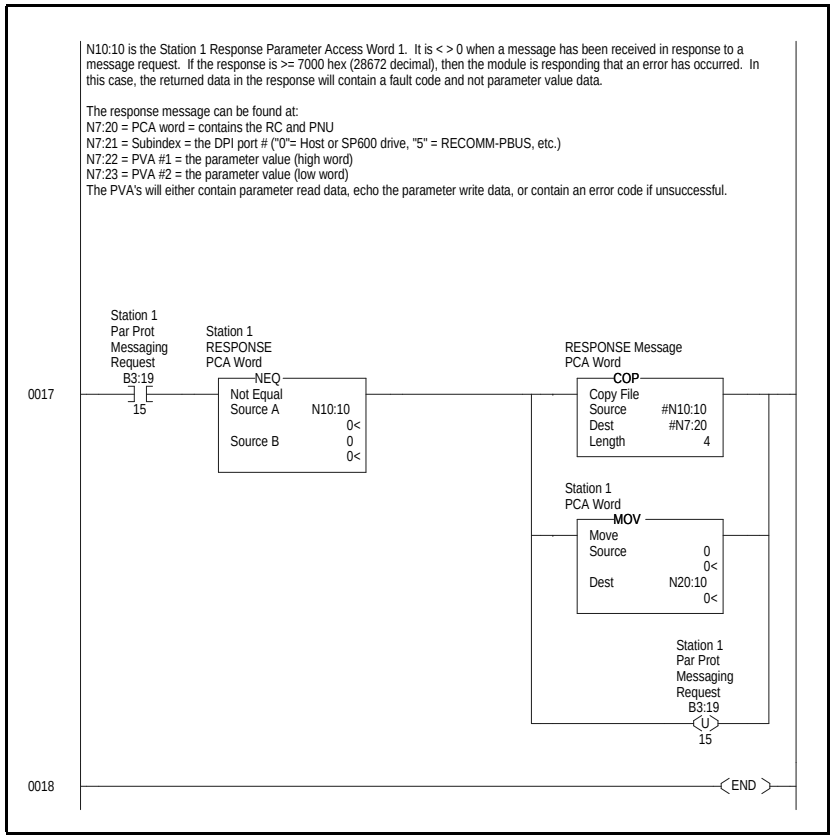



Figure 7.10 – Sample SLC Ladder Logic - Station 1 Parameter Protocol (Continued)

# 7.5 Sample SLC Ladder - Station 2 Parameter Protocol

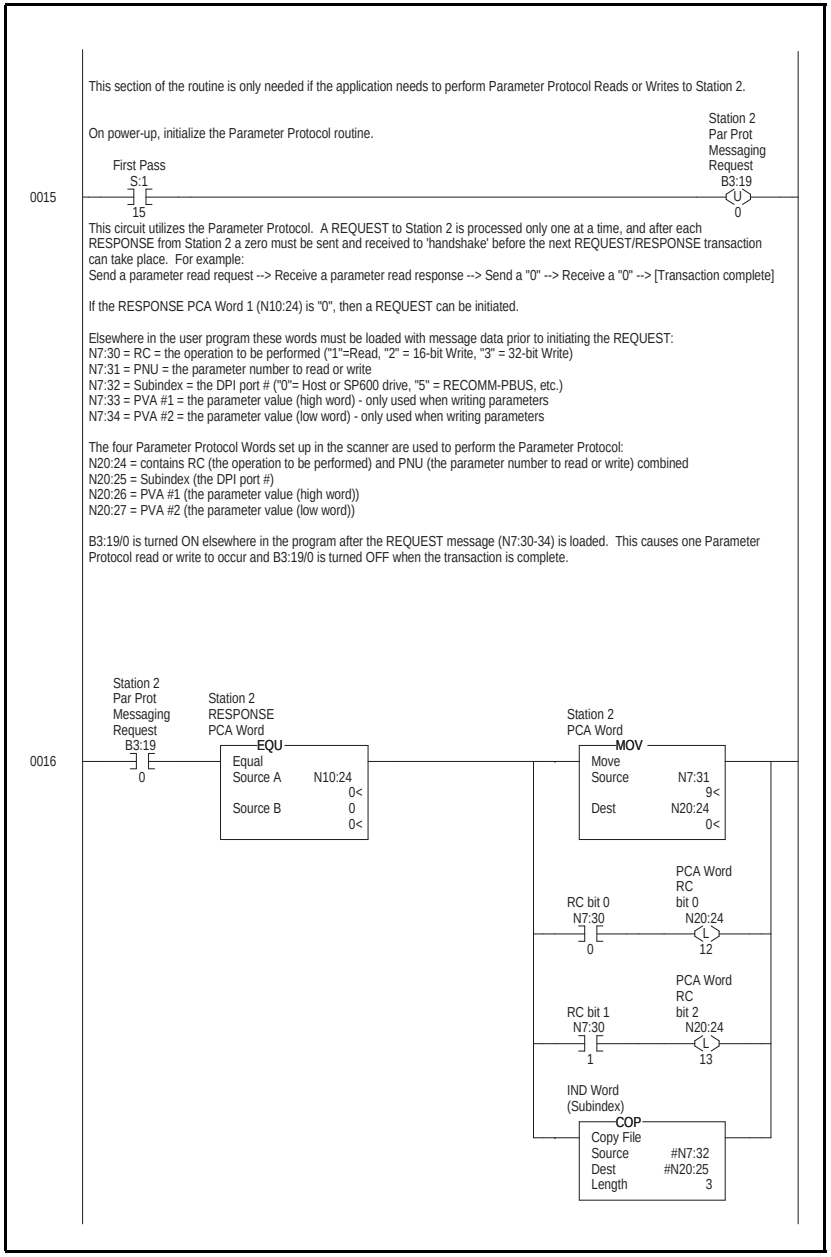



Figure 7.11 – Sample SLC Ladder Logic - Station 2 Parameter Protocol (Continued)

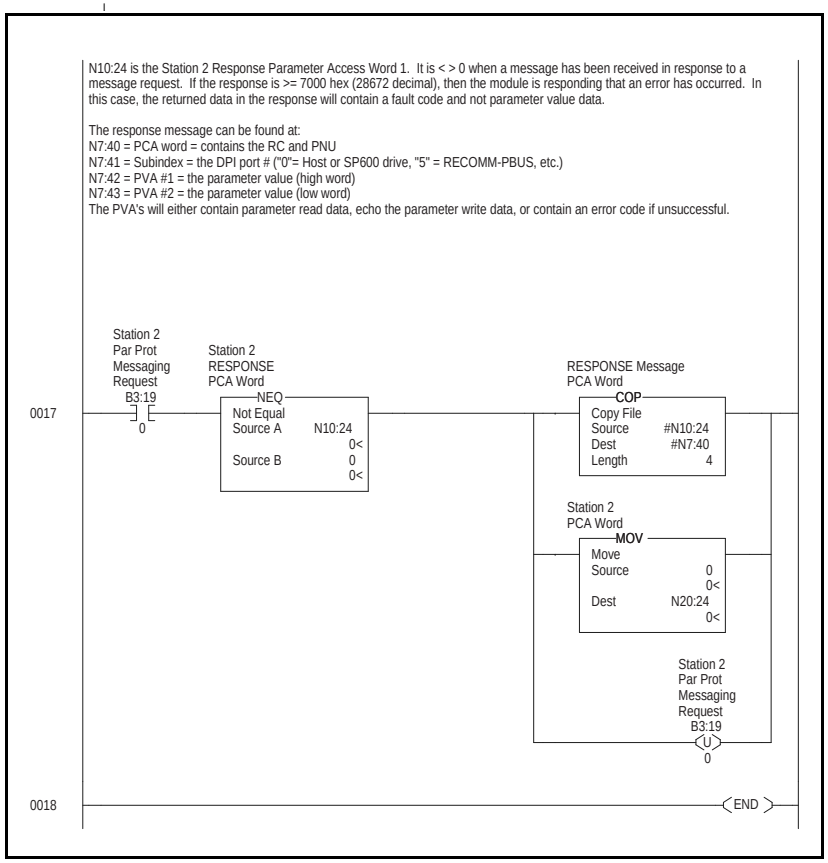



Figure 7.12 – Sample SLC Ladder Logic - Station 2 Parameter Protocol (Continued)

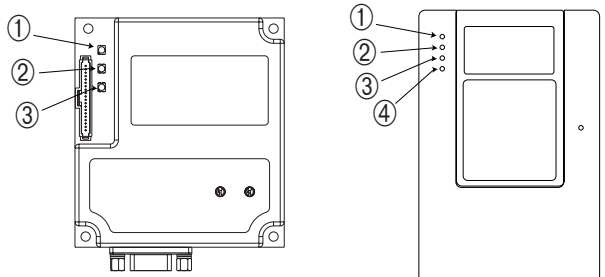
# CHAPTER 8

# Troubleshooting the PROFIBUS Module and Network

Chapter 8 contains information for troubleshooting the PROFIBUS module and the network.

## 8.1 Understanding the Status Indicators

The PROFIBUS module has three status indicators. They can be viewed on the module or through the drive cover. (See figure 8.1.)




| Number | Status Indicator | Description | Refer to... |
|---|---|---|---|
| ① | DRIVE | DPI Connection Status | Section 8.1.1 |
| ② | MS | Module Status | Section 8.1.2 |
| ③ | NET A | PROFIBUS Status | Section 8.1.3 |
| ④ | NET B | Not used | N/A |

Figure 8.1 – Status Indicators (Location on Drive May Vary)

### 8.1.1 DRIVE Status Indicator

Table 8.1 – DRIVE Status Indicator: State Definitions

| Status | Cause | Corrective Action |
|---|---|---|
| Off | The module is not powered or is not connected properly to the drive. | • Securely connect the module to the drive using the ribbon cable.<br>• Apply power to the drive. |
| Flashing Red | The module is not receiving a ping message from the drive. | • Verify that cables are securely connected.<br>• Cycle power to the drive. |
| Solid Red | The drive has refused an I/O connection from the module.<br><br>Another DPI peripheral is using the same DPI port as the module. | **Important:** Cycle power to the product after making any of the following corrections.<br>• Verify that all DPI cables on the SP600 drive are securely connected and not damaged. Replace cables if necessary.<br>• Verify that the SP600 drive supports Datalinks.<br>• Configure the module and SP600 drive to use a Datalink that is not already being used by another peripheral. |
| Orange | The module is connected to a product that does not support Reliance Electric DPI communications. | • Connect the module to a product that supports Reliance Electric DPI communications (for example, SP600 drives). |
| Flashing Green | The module is establishing an I/O connection to the drive. | • No action. This status indicator will turn solid green or red. |
| Solid Green | The module is properly connected and is communicating with the drive. | • No action. |

### 8.1.2 MS Status Indicator

Table 8.2 – MS Status Indicator: State Definitions

| Status | Cause | Corrective Action |
|---|---|---|
| Off | The module is not powered. | • Securely connect the module to the SP600 drive using the ribbon cable.<br>• Apply power to the drive and network. |
| Flashing Red | The module has failed the firmware test. | • Cycle power to the drive. Parameter settings may have been changed.<br>• Clear faults in the module.<br>• If cycling power does not correct the problem, the parameter settings may have been corrupted. Reset defaults and reconfigure the module.<br>• If resetting defaults does not correct the problem, flash the module with the latest firmware release. |
| Solid Red | The module has failed the hardware test. | • Cycle power to the drive.<br>• Replace the module. |
| Flashing Green | The module is operational but is not transferring I/O data. | • Place the scanner in RUN mode.<br>• Configure the module for the program in the controller.<br>• Program the controller to recognize and transmit I/O to the module. |
| Solid Green | The module is operational and transferring I/O data. | • No action. |

### 8.1.3 NET A Status Indicator

Table 8.3 – NET A Status Indicator: State Definitions

| Status | Cause | Corrective Actions |
|---|---|---|
| Off | The module is not powered or is not connected properly to the network. | • Securely connect the module to the drive using the Internal Interface cable and to the network using a PROFIBUS cable.<br>• Correctly connect the PROFIBUS cable to the PROFIBUS connector.<br>• 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.<br>• Re-configure the PROFIBUS scanner. |
| Solid Green | The module is properly connected and communicating on the network. | • No action required. |

## 8.2 Module Diagnostic Items

Table 8.4 lists diagnostic items that can be accessed using VS Utilities software or the LCD OIM.

Table 8.4 – Module Diagnostic Items

| 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. |

Table 8.4 – Module Diagnostic Items (Continued)

| No. | Event | Description |
|---|---|---|
| 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 1s digit) |
| 28 | Switch 1 | The value of Switch 1. (Node Address 10s digit) |

# 8.3 Viewing and Clearing Events

The module maintains an event queue that reports the history of its actions. You can view the event queue using an LCD OIM or VS Utilities software.

### To View and Clear Events Using an LCD OIM

Use the procedure shown in figure 8.2 to access the event queue using the LCD OIM. Note that you must have the RECOMM-PBUS module as the selected device to access the event queue.

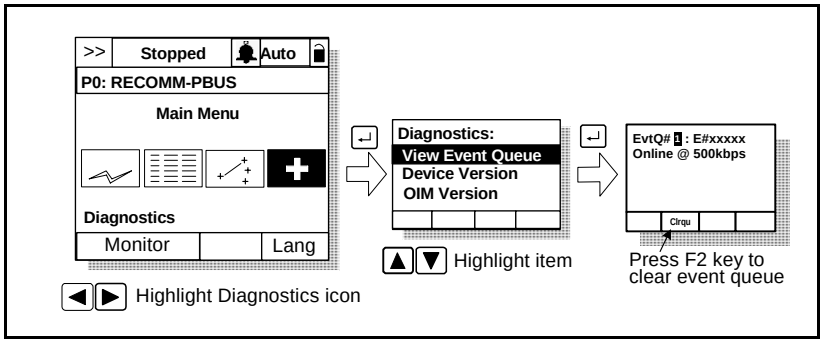



Figure 8.2 – Viewing and Clearing Events Using an LCD OIM

### Events

Many events in the event queue occur under normal operation. If you encounter unexpected communications problems, the events may help you or Reliance Electric personnel troubleshoot the problem. Table 8.5 lists events that may appear in the event queue.

Table 8.5 – Event Codes and Descriptions

| 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 module 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 module is corrupt. |

Table 8.5 – Event Codes and Descriptions

| Code | Event | Description |
|---|---|---|
| 8 | Online @ 125k bps | The module and DPI product are communicating at 125 kbps. |
| 9 | Online @ 500 kbps | The module and DPI product are communicating at 500 kbps. |
| 10 | Bad Host Flt | The module 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 module has logged in for type 0 control. |
| 13 | Type 0 Time Flt | The module has not received a type 0 status message within the specified time. |
| 14 | DL Login | The module 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 module has not received a datalink message within the specified time. |
| 17 | Control Disabled | The module has sent a “Soft Control Disable” command to the DPI product. |
| 18 | Control Enabled | The module 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 module. |
| 22 | Normal Startup | Peripheral completes a normal startup. |
| 23 | NET Comm Flt | The module 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 module has gone on-line the PROFIBUS network. |
| 26 | P-DP Offline | The PROFIBUS module has gone off-line the PROFIBUS network. |
| 27 | P-DP Idle | The PROFIBUS module received a network clear from the PROFIBUS master. |
| 28 | Language CRC Bad | The language flash segment is corrupt; flash the module. |

# APPENDIX A

# Technical Specifications

## Communications

| | |
|---|---|
| Network | |
| Protocol | PROFIBUS |
| Data Rates | 9.6K, 19.2K, 45.45K, 73.75K, 187.5K, 500K, 1.5M, 3M, 6M, 12M. The module has auto baud rate detection. |
| Drive | |
| Protocol | DPI |
| Data Rates | 125K or 500K |

## Electrical

| | |
|---|---|
| Consumption | 370 mA at 5 V supplied through the drive. |

## Mechanical

| | |
|---|---|
| Dimensions | |
| Height | 19 mm (0.75 in) |
| Length | 86 mm (3.33 in) |
| Width | 78.5 mm (3.09 in) |
| Weight | 57 g (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) |

# APPENDIX B

# PROFIBUS Module Parameters

The following information is provided for each PROFIBUS module parameter along with its description:

| | |
|---|---|
| **Parameter Number:** | Unique number assigned to each parameter. |
| **Parameter Name:** | Unique name assigned to each parameter. |
| **Range:** | Predefined parameter limits or selections. |
| **Default:** | Factory default setting. |
| **Type:** | Read Only or Read/Write |
| **Reset Required:** | Module must be reset before parameter value is recognized. |

The parameters in the PROFIBUS module are numbered sequentially. However, depending on the configuration tool used, they may have different numbers.

### 1 DPI Port

**Range:** 0 to 7

**Default:** 0

**Type:** Read Only

**Reset Required:** N/A

Displays the port to which the module is connected. This will usually be port 5.

### 2 DPI Data Rate

**Range:** 0 = 125 kbps
1 = 500 kbps

**Default:** 0 = 125 K

**Type:** Read Only

**Reset Required:** N/A

Displays the data rate used by the drive. This data rate is set in the drive and the module detects it. This will usually be 500 Kbps.

### 3 P-DP Addr Cfg

**Range:** 00 to 126

**Default:** 01

**Type:** Read/Write

**Reset Required:** Yes

Sets the node address if the node address switches are set to “00.”

### 4 P-DP Addr Actual

**Range:** 0 to 126

**Default:** N/A

**Type:** Read Only

**Reset Required:** N/A

Displays the PROFIBUS node address actually used by the module.

## 5 P-DP Rate Actual

**Range:** 0 = 9.6 K
1 = 19.2 K
2 = 45.45 K
3 = 93.75 K
4 = 187.5 K
5 = 500K
6 = 1.5 M
7 = 3 M
8 = 6 M
9 = 12 M
10 = Off-line

**Default:** N/A

**Type:** Read Only

**Reset Required:** N/A

Displays the PROFIBUS data rate.

## 6 Ref/Fdbk Size

**Range:** 0 = 16-bit
1 = 32-bit

**Default:** 0 = 16-bit

**Type:** Read Only

**Reset Required:** N/A

Displays the size of the Reference/Feedback. The drive determines the size of the Reference/Feedback.

## 7 Datalink Size

**Range:** 0 = 16-bit
1 = 32-bit

**Default:** 0 = 16-bit

**Type:** Read Only

**Reset Required:** N/A

Displays the size of each Datalink word. The drive determines the size of Datalinks.

## 8 Reset Module

**Range:** 0 = Ready (No action)
1 = Reset Module
2 = Set Defaults (Restores module to factory-default settings)

**Default:** 0 = Ready

**Type:** Read/Write

**Reset Required:** No

No action if set to “Ready.” Resets the module if set to “Reset Module.” Restores the module to 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.

**ATTENTION:** If the module is transmitting I/O that controls the drive, the drive may fault when you reset the module. Determine how your drive will respond before resetting a connected module. Failure to observe this precaution could result in bodily injury or damage to equipment.

## 9 Comm Flt Action

**Range:** 0 = Fault
1 = Stop
2 = Zero Data
3 = Hold Last
4 = Send Flt Cfg

**Default:** 0 = Fault

**Type:** Read/Write

**Reset Required:** No

Sets the action that the module and drive take if the module detects that PROFIBUS communications have been disrupted. This setting is effective only if I/O that controls the drive is transmitted though the module.

**ATTENTION:** Comm Flt Action (parameter 9) lets you determine the action the module and connected drive if communications are disrupted. By default, this parameter faults the drive. You can set this parameter so that the drive continues to run. Take precautions to ensure that the setting of this parameter does not create a hazard of injury or equipment damage. Failure to observe this precaution could result in bodily injury or damage to equipment.

## 10 Idle Flt Action

**Range:** 0 = Fault
1 = Stop
2 = Zero Data
3 = Hold Last
4 = Send Flt Cfg

**Default:** 0 = Fault

**Type:** Read/Write

**Reset Required:** No

Sets the action that the module and the drive take if the module detects that the scanner is idle because the controller was switched to program mode. This setting is effective only if the I/O that controls the drive is transmitted through the module.

**ATTENTION:** Idle Flt Action (parameter 10) lets you determine the action of the module and connected drive if the scanner is idle. By default, this parameter faults the drive. You can set this so that the drive continues to run. Ensure that the setting of this parameter does not create a hazard of injury or equipment damage. Failure to observe this precaution could result in bodily injury or damage to equipment.

## 11 DPI I/O Config

**Range:** See figure B.1.

**Default:** See figure B.1.

**Type:** Read/Write

**Reset Required:** N/A

Sets the I/O that is transferred through the module.

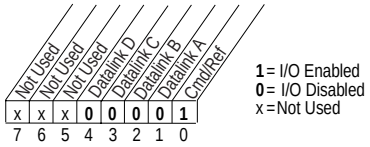



Figure B.1 – DPI I/O Config (Parameter 11)

## 12 DPI I/O Active

**Range:** See figure B.2.

**Default:** See figure B.2.

**Type:** Read Only

**Reset Required:** N/A

Sets the I/O that the module is actively transmitting. The value of this parameter will usually be equal to the value of DPI I/O Config (parameter 11).

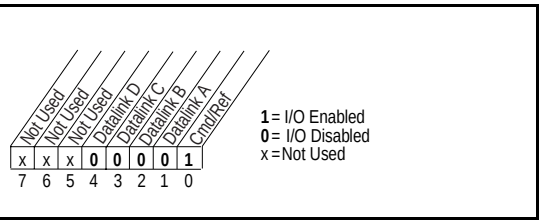



Figure B.2 – DPI I/O Active (Parameter 12)

## 13 Flt Cfg Logic

**Range:** 0000 0000 0000 0000 to 1111 1111 1111 1111

**Default:** 0000 0000 0000 0000

**Type:** Read/Write

**Reset Required:** No

Sets the Logic Command data that is sent to the drive if the following is true:

- Comm Flt Action (parameter 9) is set to Send Flt Cfg and communications are disrupted.
- Idle Flt Action (parameter 10) is set to Send Flt Cfg and the scanner is put into Program or Test mode.

The bit definitions will depend on the product to which the module is connected.

**14 Flt Cfg Ref**

**Range:** 0 to 4294967295

**Default:** 0

**Type:** Read/Write

**Reset Required:** No

Sets the Reference data that is sent to the drive if any of the following is true:

- Comm Flt Action (parameter 9) is set to Send Flt Cfg and communications are disrupted.
- Idle Flt Action (parameter 10) is set to Send Flt Cfg and the scanner is put into Program mode.

**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.

**15 Flt Cfg A1**
**16 Flt Cfg A2**
**17 Flt Cfg B1**
**18 Flt Cfg B2**
**19 Flt Cfg C1**
**20 Flt Cfg C2**
**21 Flt Cfg D1**
**22 Flt Cfg D2**

**Range:** 0 to 4294967295

**Default:** 0

**Type:** Read/Write

**Reset Required:** No

Sets the data that is sent to the Datalink in the drive if any of the following is true:

- Comm Flt Action (parameter 9) is set to Send Flt Cfg and communications are disrupted.
- Idle Flt Action (parameter 10) is set to Send Flt Cfg and the scanner is put into Program mode.

## 23 Parameter Mode

**Range:** 0 = Par Prot
1 = DPI Par Prot

**Default:** 0 = Par Prot

**Type:** Read/Write

**Reset Required:** No

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.

## 24 P-DP State

**Range:** 0 = WAIT_PRM
1 = WAIT_CFG
2 = DATA_EX
3= ERROR

**Default:** N/A

**Type:** Read Only

**Reset Required:** N/A

Displays the state of the PROFIBUS controller.

# APPENDIX C

# 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 module. If you do not see the Logic Command/Logic Status for the product that you are using, refer to your product's documentation.

## C.1 SP600 Drives

### Logic Command Word

| Logic Bits | | | | | | | | | | | | | | Command | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | |
| | | | | | | | | | | | | | | | x | Stop | 0 = Not Stop<br>1 = Stop |
| | | | | | | | | | | | | | | x | | Start[1] | 0 = Not Start<br>1 = Start |
| | | | | | | | | | | | | | x | | | Jog | 0 = Not Jog<br>1 = Jog |
| | | | | | | | | | | | | x | | | | Clear Faults | 0 = Not Clear Faults<br>1 = Clear Faults |
| | | | | | | | | | | x | x | | | | | Direction | 00 = No Command<br>01 = Forward Command<br>10 = Reverse Command<br>11 = Hold Direction Control |
| | | | | | | | | | x | | | | | | | Local Control | 0 = No Local Control<br>1 = Local Control |
| | | | | | | | | x | | | | | | | | MOP Increment | 0 = Not Increment<br>1 = Increment |
| | | | | | | x | x | | | | | | | | | Accel Rate | 00 = No Command<br>01 = Accel Rate 1 Command<br>10 = Accel Rate 2 Command<br>11 = Hold Accel Rate |
| | | | | x | x | | | | | | | | | | | Decel Rate | 00 = No Command<br>01 = Decel Rate 1 Command<br>10 = Decel Rate 2 Command<br>11 = Hold Decel Rate |

| Logic Bits | | | | | | | | | | | | | | | Command | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| | x | x | x | | | | | | | | | | | | | Reference Select | 000 = No Command<br>001 = Ref. 1 (Ref A Select)<br>010 = Reserved<br>011 = Ref. 3 (Preset 3)<br>100 = Ref. 4 (Preset 4)<br>101 = Ref. 5 (Preset 5)<br>110 = Ref. 6 (Preset 6)<br>111 = Ref. 7 (Preset 7) |
| x | | | | | | | | | | | | | | | | MOP Decrement | 0 = Not Decrement<br>1 = Decrement |

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

### Logic Status Word

| Logic Bits | | | | | | | | | | | | | | | Status | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| | | | | | | | | | | | | | | | x | Ready | 0 = Not Ready<br>1 = Ready |
| | | | | | | | | | | | | | | x | | Active | 0 = Not Active<br>1 = Active |
| | | | | | | | | | | | | | x | | | Command Direction | 0 = Reverse<br>1 = Forward |
| | | | | | | | | | | | | x | | | | Actual Direction | 0 = Reverse<br>1 = Forward |
| | | | | | | | | | | | x | | | | | Accel | 0 = Not Accelerating<br>1 = Accelerating |
| | | | | | | | | | | x | | | | | | Decel | 0 = Not Decelerating<br>1 = Decelerating |
| | | | | | | | | | x | | | | | | | Alarm | 0 = No Alarm<br>1 = Alarm |
| | | | | | | | | x | | | | | | | | Fault | 0 = No Fault<br>1 = Fault |
| | | | | | | | x | | | | | | | | | At Speed | 0 = Not At Reference<br>1 = At Reference |
| | | | | x | x | x | | | | | | | | | | Local Control | 000 = Port 0 (TB)<br>001 = Port 1<br>010 = Port 2<br>011 = Port 3<br>100 = Port 4<br>101 = Port 5 “Network”<br>110 = Port 6<br>111 = No Local |

| Logic Bits | | | | | | | | | | | | | | | Status | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | |
| x | x | x | x | | | | | | | | | | | | | Reference | 0000 = Ref A Auto<br>0001 = Reserved<br>0010 = Preset 2 Auto<br>0011 = Preset 3 Auto<br>0100 = Preset 4 Auto<br>0101 = Preset 5 Auto<br>0110 = Preset 6 Auto<br>0111 = Preset 7 Auto<br>1000 = Term Blk Manual<br>1001 = DPI 1 Manual<br>1010 = DPI 2 Manual<br>1011 = DPI 3 Manual<br>1100 = DPI 4 Manual<br>1101 = DPI 5 Manual<br>1110 = DPI 6 Manual<br>1111 = Jog Ref |

# GLOSSARY

**communications module** - Devices such as drives, controllers, and computers usually require a module to provide a communication interface between them and a network such as PROFIBUS. A module 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 RECOMM-PBUS PROFIBUS module is an module that connects SP600 drives to a PROFIBUS network. Modules are sometimes also called “adapters,” “cards,” “embedded communication options,” “gateways,” and “peripherals.”

**controller** - Also called programmable logic controller. 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.

**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:

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

**Datalink** - A type of pointer used by some SP600 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** - A peripheral communication interface used by various Reliance Electric drives and power products.

**DPI peripheral** - A device that provides an interface between DPI and a network or user. Peripheral devices are also referred to as “modules” and “modules.” The serial converter and SP600 OIM are examples of DPI peripherals.

**DPI product** - A device that uses the DPI communications interface to communicate with one or more peripheral devices. For example, a motor drive such as a SP600 drive is a DPI product. In this manual, a DPI product is also referred to as “product” or “host.”

**Explicit Messaging** - Explicit Messages are used to configure, monitor, and diagnose devices over PROFIBUS.

**fault action** - Determines how the module 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 module and SP600 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).

**flash update** - The process of updating firmware in the module. The module can be flash updated using the X-Modem protocol and a RECOMM-232 serial converter.

**GSD file -** Used by the network configuration tool to identify the type of module and its capabilities so that it can configure the module for the network. This is usually supplied on floppy disk as a text tile.

**hold last** - When communications are disrupted (for example, a cable is disconnected), the module and SP600 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 module, it will continue to run at the same reference.

**I/O data** - I/O data, sometimes called “implicit messages” or “input/output,” 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 module. Input is transmitted by the module and consumed by the scanner.

**Logic Command/Logic Status** - The Logic Command is used to control the SP600 drive (e.g., start, stop, direction). It consists of one 16-bit word of input to the module from the network. The definitions of the bits in this word depend on the drive.

The Logic Status is used to monitor the SP600 drive (for example, operating state, motor direction). It consists of one 16-bit word of output from the module to the network. The definitions of the bits in this word depend on the drive.

**master -** *see* scanner

**non-volatile storage** (NVS) - The permanent memory of a device. Devices such as the module 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.”

**operator interface module (OIM**) - A device that can be used to configure and control a SP600 drive.

**parameter messaging -** Used to configure, monitor, and diagnose devices over the PROFIBUS network.

**ping** - 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.

**PROFIBUS network -** A network that uses RS485 to connect devices (such as controller, 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.

**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 module 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 module to the network. The size of the word (either a 16-bit word or 32-bit word) is determined by the drive.

**scanner** - A separate module (of a multi-module controller) or a built-in component (of a single-module controller) that provides communication with modules connected to a network. Also called a master. *See also* controller.

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

**VS Utilities software** - A software tool for monitoring and configuring Reliance Electric products and modules. VS Utilities can be used to configure the PROFIBUS module and SP600 drives.

**zero data** - When communications are disrupted (for example, a cable is disconnected), the module 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 module, it will stay running but at zero reference.

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