

**MD65 PROFIBUS™
Communications Module**

M/N MDCOMM-PBUS

Instruction Manual D2-3530

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.



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 in bodily injury and/or damage to equipment.

ATTENTION: MDI 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 in 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 in 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 in 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 in bodily injury and/or damage to equipment.

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CONTENTS

Chapter 1	Introduction	
	1.1 PROFIBUS Module Features	1-1
	1.2 Related Documentation	1-2
	1.3 Getting Assistance from Reliance Electric.....	1-2
Chapter 2	Getting Started	
	2.1 PROFIBUS Module Components	2-1
	2.2 Required Equipment	2-2
	2.3 Installation Checklist	2-3
	2.4 Modes of Operation	2-4
Chapter 3	Installing the PROFIBUS Module	
	3.1 Preparing for an Installation.....	3-1
	3.2 Commissioning the Module	3-1
	3.3 Connecting the Module to the Network.....	3-4
	3.4 Terminating the Network.....	3-7
	3.5 Connecting the Module to the Drive	3-8
	3.6 Applying Power.....	3-10
Chapter 4	Configuring the PROFIBUS Module	
	4.1 Configuration Tools.....	4-1
	4.2 Using the LCD OIM to Configure the Module	4-2
	4.3 Using V*S Utilities via MDCOMM-232	4-3
	4.4 Setting the Node Address.....	4-4
	4.5 Setting the I/O Configuration	4-5
	4.6 Setting a Fault Action.....	4-6
	4.6.1 Changing the Fault Action	4-6
	4.6.2 Setting the Fault Configuration Parameters	4-7
	4.6.3 Resetting the Module.....	4-7
	4.7 Viewing the Module Configuration	4-8
Chapter 5	Configuring the PROFIBUS Scanner	
	5.1 Configuring a Simple Network: An Example.....	5-1
	5.2 SST Profibus Configuration Software Tool	5-2
	5.3 Installing the MDCOMM-PBUS GSD File in the Software Tool Library	5-3
	5.4 Configuring the SST-PFB-SLC PROFIBUS Scanner	5-5

Chapter 6	Using I/O Messaging	
6.1	About I/O Messaging	6-1
6.2	Understanding the I/O Image	6-1
6.3	Using Logic Command/Status	6-2
6.4	Using Reference/Feedback	6-3
Chapter 7	Using Explicit Messaging (Parameter Protocol)	
7.1	About Explicit Messaging	7-1
7.2	Running Explicit Messages	7-2
7.3	Parameter Protocol	7-3
	7.3.1 Parameter Message Request	7-4
	7.3.2 Parameter Message Response	7-5
Chapter 8	Using Multi-Drive Mode	
8.1	Single Mode vs. Multi-Drive Mode	8-1
8.2	System Wiring	8-4
8.3	Understanding the I/O Image	8-5
8.4	Configuring the RS-485 Network	8-6
8.5	Multi- Mode Explicit Messaging	8-7
8.6	Additional Information	8-7
Chapter 9	Troubleshooting the PROFIBUS Module and Network	
9.1	Understanding the Status Indicators	9-1
	9.1.1 DRIVE Status Indicator	9-2
	9.1.2 MS Status Indicator	9-3
	9.1.3 NET A Status Indicator	9-4
9.2	Module Diagnostic Items in Single Drive Mode	9-5
9.3	Module Diagnostic Items in Multi-Drive Mode	9-5
9.4	Viewing and Clearing Events	9-7
Appendix A	Technical Specifications	A-1
Appendix B	PROFIBUS Module Parameters	B-1
Appendix C	Logic Command/Status Word	C-1
Appendix D	SLC Ladder Logic Examples	D-1
Glossary		
Index		

List of Figures

Figure 2.1 – Components of the PROFIBUS Module	2-1
Figure 2.2 – Status Indicators	2-5
Figure 3.1 – Setting the Node Address	3-2
Figure 3.2 – ERNI and Phoenix Subcon Connectors	3-5
Figure 3.3 – Network Wiring Diagram	3-5
Figure 3.4 – Optional Clamp-On Ferrite Cable Clamp	3-6
Figure 3.5 – Connection for Terminating Resistors	3-7
Figure 3.6 – MDI Ports and Internal Interface Cables	3-9
Figure 3.7 – Mounting the Adapter	3-10
Figure 4.1 – Using V*S Utilities	4-3
Figure 4.2 – Setting the Node Address	4-4
Figure 4.3 – Fault Action Screens on an LCD OIM	4-6
Figure 4.4 – Reset Screen on an LCD OIM	4-8
Figure 5.1 – Example PROFIBUS Network	5-2
Figure 5.2 – SST PROFIBUS Configuration Software Tool	5-2
Figure 5.3 – Standard Data Files	5-3
Figure 5.4 – Add PROFIBUS Devices Applet Window	5-4
Figure 5.5 – Adding the GSD File for the RECOMM-PBUS	5-4
Figure 5.6 – Masters/Slaves Library Window	5-5
Figure 5.7 – SST-SST-PFB-SLC Master (General) Dialog Box	5-6
Figure 5.8 – Scan Cycle Times Dialog Box	5-6
Figure 5.9 – COM Port Default Settings	5-7
Figure 5.10 – Scanner Network Window	5-7
Figure 5.11 – Reliance Electric Library Dialog Window	5-8
Figure 5.12 – Available Modules: Ctrl/Stat & Ref/Fdbk (2x2Bytes) Window	5-8
Figure 5.13 – Modules: Ctrl/Stat & Ref/Fdbk Viewing Window	5-9
Figure 5.14 – Add Modules: Parameter Access Selection Window	5-10
Figure 5.15 – Modules: Parameter Access Viewing Window	5-10
Figure 5.16 – SLC Address: M1/M0 (Ctrl/Stat & Ref/Fdbk)	5-11
Figure 5.17 – SLC Address: M1/M0 (Parameter Access)	5-11
Figure 5.18 – Station 1 Network Window	5-11
Figure 5.19 – Station 2 Network Window	5-12
Figure 5.20 – Network Window Scanner Selection	5-13
Figure 5.21 – Save As Dialog Window	5-13
Figure 6.1 – Single Drive Example of I/O Image	6-2
Figure 7.1 – Explicit Message Process	7-2
Figure 7.2 – Parameter Message Format	7-3

Figure 8.1 – Single Mode Example for Network..... 8-1
Figure 8.2 – MDI Peripheral Devices for Single Mode Connection..... 8-2
Figure 8.3 – Multi-Drive Mode Example for Network 8-2
Figure 8.4 – AK-U0-RJ45-TB2P Terminal Block Connector 8-4
Figure 8.5 – Multi-Drive Mode Example for Network 8-4
Figure 8.6 – Multi-Drive Mode Example of I/O Image..... 8-5

Figure 9.1 – Status Indicators (Location on Drive May Vary)..... 9-1
Figure 9.2 – Viewing and Clearing Events Using an LCD OIM..... 9-7

List of Tables

Table 2.1 – Equipment Shipped with the PROFIBUS Module	2-2
Table 2.2 – Required User-Supplied Equipment	2-2
Table 2.3 – Status Indicator Descriptions	2-5
Table 3.1 – SW8 Setting	3-2
Table 3.2 – Node Address Switch Settings (UP = OPEN = 1)	3-3
Table 3.3 – Jumper Settings	3-4
Table 3.4 – MDCOMM-PBUS DB-9 Pin Layout	3-5
Table 4.1 – Configuration Tools	4-1
Table 4.2 – Using the LCD OIM or CopyCat Keypad	4-2
Table 4.3 – Selections for Drive Response to Communication Fault	4-6
Table 4.4 – Fault Configuration Parameters	4-7
Table 4.5 – Module Configuration Status Parameters	4-8
Table 5.1 – Input/Output Size Configurations	5-9
Table 5.2 – Station 1 Configurations	5-12
Table 5.3 – Station 2 Configurations	5-12
Table 7.1 – Parameter Message Request Data	7-4
Table 7.2 – Parameter Message Response Data	7-5
Table 7.4 – Parameter Message Response Fault Numbers and Descriptions	7-6
Table 7.3 – Module Fault Code	7-6
Table 8.1 – Parameters for daisy-chained drives	8-6
Table 8.2 – Parameters for MDCOMM-PBUS	8-6
Table 8.3 – Accessing Accel Time (Parameter 39)	8-7
Table 9.1 – DRIVE Status Indicator: State Definitions	9-2
Table 9.2 – MS Status Indicator: State Definitions	9-3
Table 9.3 – NET A Status Indicator: State Definitions	9-4
Table 9.4 – Module Diagnostic Items for Single Drive Mode	9-5
Table 9.5 – Module Diagnostic Items for Multi-Drive Mode	9-5
Table 9.6 – Event Codes and Descriptions	9-7

CHAPTER 1

Introduction

This manual provides information about the PROFIBUS Communications module (MDCOMM-PBUS) and using it with MD65 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 MDI™ AC drives, such as the MD65™ 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 MDI, 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:

- The low seven bits of 8-bit DIP switch let you set a node address, and the MSB bit provides write access for the Flash update of module firmware.
- Depending on the jumper position, “1X” or “5X”, the two operation modes “Single” and “Multiple” are supported:
 - In Single Drive Mode (default mode), the module represents a single drive on one node and can support one external peripheral (for example, an OIM) over MDI.
 - In Multi-Drive Mode, the module represents up to 5 drives on one node daisy-chained over the RS-485 interface. In this case, the unit will not operate with MDI peripheral devices such as the OIM or the MDCOMM-232.
- Status indicators that report the status of the drive communications, module, and network.
- The I/O messages (i.e. Control/Status, Reference/Feedback) will be exchanged with Profibus master in every bus cycle. I/O configuration is fixed and Datalinks are not supported.
- The slave device's parameters on the PROFIBUS network can be configured and monitored using explicit messaging.

- User-defined fault actions determine how the module and MD65 drive respond to communication disruptions (faults) on the network and controllers in idle mode.
- For Single Drive mode, the slave device's parameters on the Profibus network can be configured and monitored by the software tool V*S Utilities.

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>.

- D2-3519 MD65 AC Drive User Manual
- 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 1-864-284-5350. 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 and a list of user-supplied parts required for installing the module
- An installation checklist

2.1 PROFIBUS Module Components

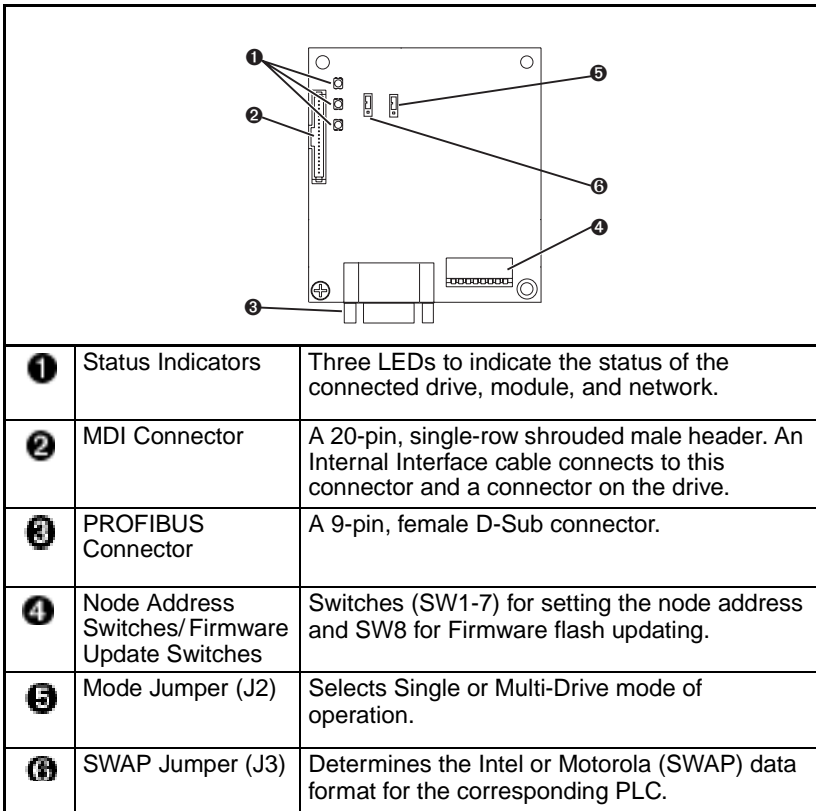


Figure 2.1 – Components of the PROFIBUS Module

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 MDCOMM-PBUS PROFIBUS module
A 2.54 cm (1 in) and a 12.7 cm (5 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 (D2-3530)

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. 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.
Configuration tool, such as: <ul style="list-style-type: none">• LCD OIM• VS Utilities<ul style="list-style-type: none">• with MDCOMM-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.

4	Step	Action	Refer to:
<input type="checkbox"/>	1	Review the safety precautions for the module.	Throughout this manual
<input type="checkbox"/>	2	Verify that the MD65 drive is properly installed.	<i>MD65 AC Drive User Manual (D2-3519)</i>
<input type="checkbox"/>	3	Commission the module. Set a unique node address using the DIP-switch for Bit 1 to 7 on the module.	Chapter 3, Installing the PROFIBUS Module
<input type="checkbox"/>	4	Install the module. Verify that the drive and PROFIBUS network are 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
<input type="checkbox"/>	5	Apply power to the module. Apply power to the drive and to the network. The module receives power from the drive. The status indicators should be green. If they flash red, there is a problem. Refer to chapter 9, Troubleshooting the PROFIBUS Module and Network.	Chapter 3, Installing the PROFIBUS Module
<input type="checkbox"/>	6	Set up the drive parameters. Before starting, configuring and working with the Profibus module, the following parameters must be set: <ul style="list-style-type: none"> • Start Source (P036) to 5 "RS485(MDI) port" if Start is controlled from the network. • Speed Reference (P038) to 5 "RS485(MDI) port" if the Speed Reference is controlled from the network. For Multi-Drive mode , the following drive parameters must be set: A103, A104, A107.	Chapter 4, Configuring the PROFIBUS Module

4	Step	Action	Refer to:
<input type="checkbox"/>	7	<p>Configure the module for your application.</p> <p>Set the parameters for the following features as required by your application:</p> <ul style="list-style-type: none"> • Node address • I/O configuration • Fault actions 	Chapter 4, Configuring the PROFIBUS Module
<input type="checkbox"/>	8	<p>Apply power to the PROFIBUS master and other devices on the network.</p> <p>Verify that the master and network are installed and functioning in accordance with PROFIBUS standards, and then apply power to them.</p>	
<input type="checkbox"/>	9	<p>Configure the scanner to communicate with the module.</p> <p>Use a network tool for PROFIBUS to configure the master on the network.</p> <p>Be sure to:</p> <ul style="list-style-type: none"> • Set up the scan list. • Map the module data to the scan list. • Save your PROFIBUS configuration to the scanner and a file. 	Chapter 5, Configuring the PROFIBUS Scanner
<input type="checkbox"/>	10	<p>Create a ladder logic program.</p> <p>Use a programming tool such as RSLogix to create a ladder logic program that enables you to do the following:</p> <ul style="list-style-type: none"> • Control the module and connected drive. • Monitor or configure the drive using Explicit Messages. 	Chapter 6, Using I/O Messaging. Chapter 7, Using Explicit Messaging (Parameter Protocol)

2.4 Modes of Operation

The PROFIBUS module uses three status indicators to report its operating status. They can be viewed through the drive cover.

Table 2.3 describes the status indicators shown in figure 2.2.

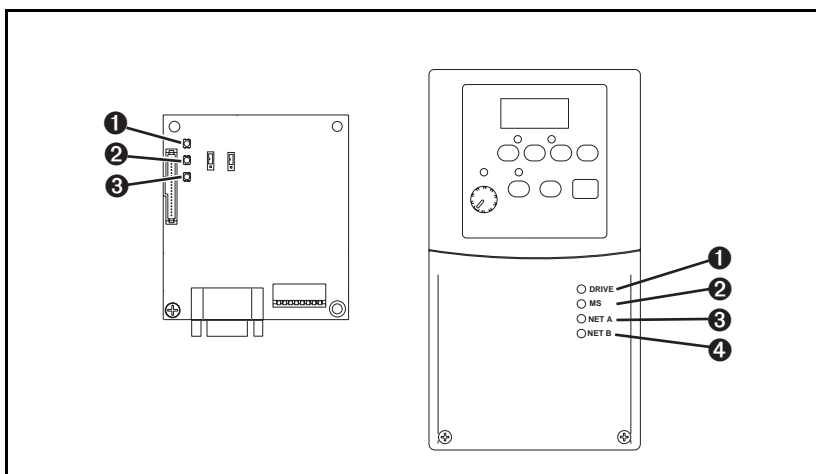


Figure 2.2 – Status Indicators

Table 2.3 – Status Indicator Descriptions

Item	Status Indicator	Status ¹	Description
1	DRIVE	Green	Normal Operation. The module is properly connected and is communicating with the drive.
		Flashing Green	Not used.
2	MS	Green	Normal Operation. The module is operational and is transferring I/O data.
		Flashing Green	Normal Operation. The module is operational but is not transferring I/O data.
3	NET A	Green	Normal Operation. The module is properly connected and communicating on the network.
		Flashing Green	Not used.
4	NET B	Off	Not used for Profibus module.

1. If all status indicators are off, the module is not receiving power. Refer to Chapter 3, Installing the PROFIBUS Module for installation instructions. For other conditions, refer to Chapter 9, Troubleshooting the PROFIBUS Module and Network.

CHAPTER 3

Installing the PROFIBUS Module

Chapter 3 provides instructions for installing the PROFIBUS module in a MD65 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 and check the data rate that is used by the network and set in the GSD-file.

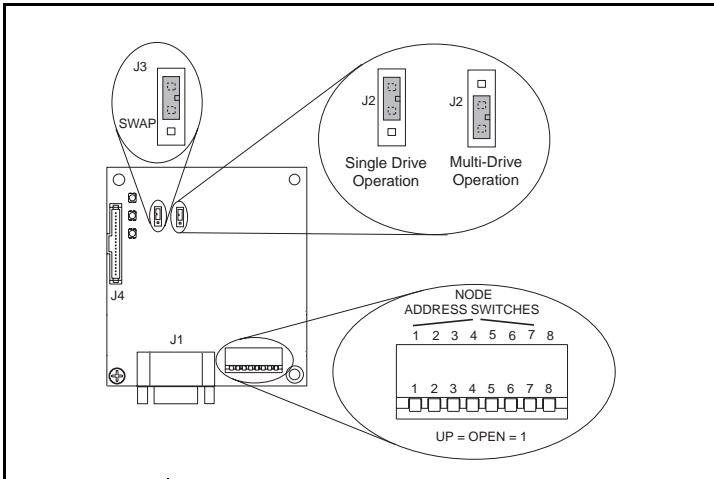
Important: New settings are recognized only when power is applied to the module. If you change a setting, cycle power.



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.

The PROFIBUS Node address/Firmware Update State is set through the use of an 8-bit DIP switch. The low seven bits let you set a node address and the valid address allows binary coding 1 through 125. New settings of node address are recognized only when power is applied to the module, cycle power, or a Reset Module Command. The MSB bit provides write access for the module flash firmware update. In normal operating state, SW8 should be set to 1.



Switches ¹	Description
SW1	Least Significant Bit (LSB) of Node Address
SW 2	Bit 1 of Node Address
SW 3	Bit 2 of Node Address
SW 4	Bit 3 of Node Address
SW 5	Bit 4 of Node Address
SW 6	Bit 5 of Node Address
SW 7	Most Significant Bit (MSB) of Node Address
SW 8	SW8 Firmware Update

Figure 3.1 – Setting the Node Address

1. The factory default states of all switches are UP, and have the default address of 3.

Table 3.1 – SW8 Setting

SW 8 Setting	Description
0	Write Access Firmware Update
1	Normal Operating State

Table 3.2 – Node Address Switch Settings (UP = OPEN = 1)

Switch Setting							Node
SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	Addr
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1
0	1	0	0	0	0	0	2
1	1	0	0	0	0	0	3
0	0	1	0	0	0	0	4
1	0	1	0	0	0	0	5
0	1	1	0	0	0	0	6
1	1	1	0	0	0	0	7
0	0	0	1	0	0	0	8
1	0	0	1	0	0	0	9
0	1	0	1	0	0	0	10
1	1	0	1	0	0	0	11
0	0	1	1	0	0	0	12
1	0	1	1	0	0	0	13
0	1	1	1	0	0	0	14
1	1	1	1	0	0	0	15
0	0	0	0	1	0	0	16
1	0	0	0	1	0	0	17
0	1	0	0	1	0	0	18
1	1	0	0	1	0	0	19
0	0	1	0	1	0	0	20
1	0	1	0	1	0	0	21
0	1	1	0	1	0	0	22
1	1	1	0	1	0	0	23
0	0	0	1	1	0	0	24
1	0	0	1	1	0	0	25
-	-	-	-	-	-	-	-
0	0	0	0	1	1	1	112
1	0	0	0	1	1	1	113
0	1	0	0	1	1	1	114
1	1	0	0	1	1	1	115
0	0	1	0	1	1	1	116
1	0	1	0	1	1	1	117
0	1	1	0	1	1	1	118
1	1	1	0	1	1	1	119
0	0	0	1	1	1	1	120
1	0	0	1	1	1	1	121
0	1	0	1	1	1	1	122
1	1	0	1	1	1	1	123
1	1	0	1	1	1	1	124
1	0	1	1	1	1	1	125

- Step 2. Verify the Network Baud rate, which is set by the network master and depends on cable length.

The MDCOMM-PBUS module uses the Auto-Baud and supports the following different data rates: 9.6 kpbs, 19.2 kpbs, 45.45 kpbs, 93.75 kpbs, 187.5kpbs, 500 kpbs, 1.5 Mbps, 3 Mbps, 6 Mbps, and 12 Mbps.

The Auto-Baud function allows the module to recognize the current baud rate and sets itself to the transmission rate by the master automatically. After detecting the correct baud rate, the baud rate that was found is monitored continuously. Auto-Baud is always active.

- Step 3. Set the Byte Swap jumper J3, which determines the Intel or Motorola (position SWAP) data format depending on the corresponding PLC. See Figure 3.1.
- Step 4. Verify that the jumper J2 is in position “1X” for Single Drive operation, or set J2 in “5X” for Multi Drive operation.

Table 3.3 – Jumper Settings

Jumper Setting	Description
Right position or jumper missing	Sets the module for Single drive mode (default setting) using a single drive connection. Important: In this mode, connections to multiple drives must be removed since all powered and connected hosts will respond to any message sent by the module.
Left position	Sets the module for Multi-Drive operation mode using up to 5 different drives. MDI peripherals do not operate with the module in this mode.

3.3 Connecting the Module to the Network



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.

- Step 1. Remove power from the drive.
- Step 2. Use static control precautions.
- Step 3. Remove the drive cover.

- Step 4. Connect a PROFIBUS connector to the cable. Only use cable that conforms to Profibus cable standards. Belden #3079A Profibus cable or equivalent is recommended.

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 MD65 and other Reliance Electric MDI-based drives.

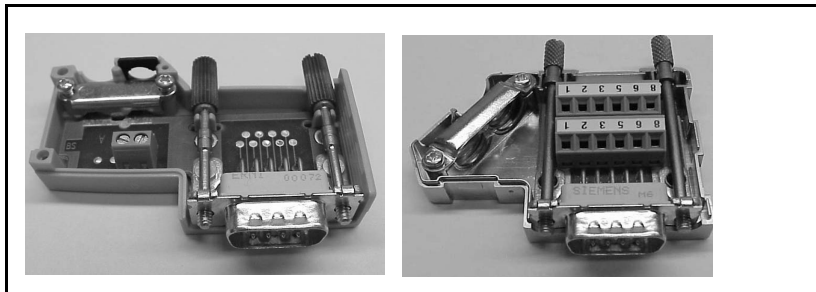


Figure 3.2 – ERNI and Phoenix Subcon Connectors

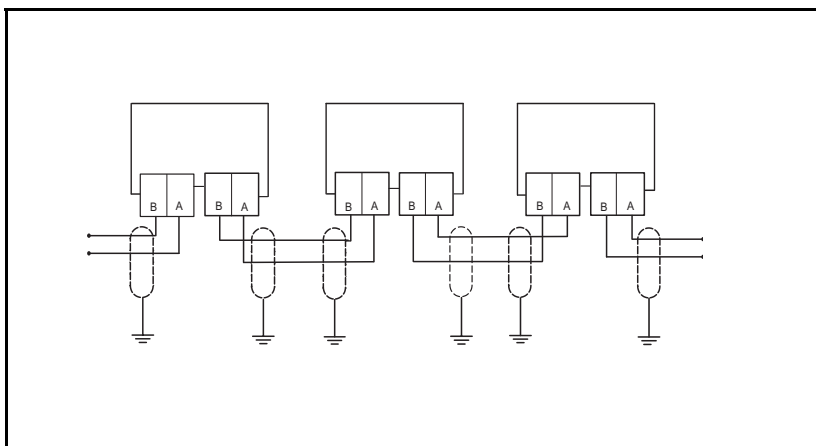


Figure 3.3 – Network Wiring Diagram

Table 3.4 – MDCOMM-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

Table 3.4 – MDCOMM-PBUS DB-9 Pin Layout (Continued)

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

- Step 5. Connect the PROFIBUS cable to the module, secure it with the two screws on the connector, and route it through the bottom of the MD65 drive. See figure 3.3.

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.

Keep communication wiring away from high noise sources such as motor cables.

- Step 6. Depending on the switching frequency of the MD65, it is optional to use the ferrite cable clamp around the communication cables next to the D-Sub connector, to reduce high frequency emission. See figure 3.4.

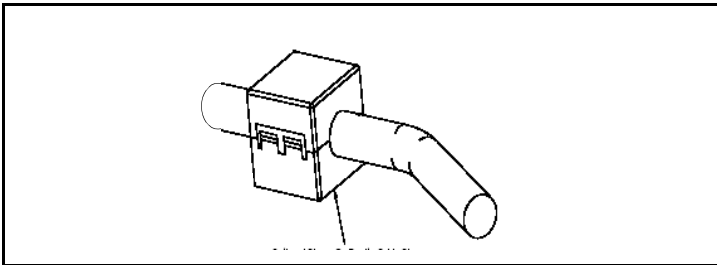


Figure 3.4 – Optional Clamp-On Ferrite Cable Clamp

To meet the requirements of EN55011 Class A or B, the conditions listed below must be satisfied.

Switching Frequency of MD65	EN55011 Class A	EN55011 Class B
4 kHz	No ferrite required	Use one ferrite Ferrishield (part No. HI28B2039) or Fair-Rite (part No. 0443164151)
6 kHz		
8 kHz		
16 kHz		Use three clip ferrites TDK, type ZCAT 3035-1330

Note: For the conditions to satisfy the essential requirements for CE compliance on MD65 drives, please refer to the MD65 manual, D2-3519.

In applications where first environment, unrestricted distribution is requested (EN55011 group 1, class B), the installation requires a shielded enclosure.

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. See figure 3.5.

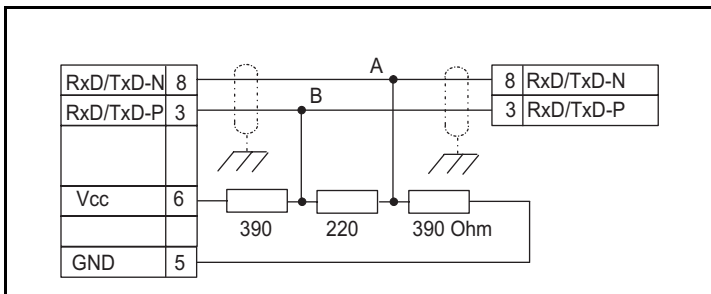


Figure 3.5 – Connection for Terminating Resistors

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.

3.5 Connecting the Module to the Drive

- Step 1. Remove power from the drive.
- Step 2. Use static control precautions.
- Step 3. Mount the module on the required special drive cover (ordered separately).
 - C Frame: Use the module screw to secure the module to the cover.
 - B Frame: Disregard the screw and snap the module in place.

Important: For C Frame drives, tighten the module's lower left screw to ground the module. For B Frame drives, install the special drive cover onto the drive using both cover fasteners to ground the module.

- Step 4. Connect the Internal Interface cable to the MDI port on the drive and then to the MDI connector on the module.

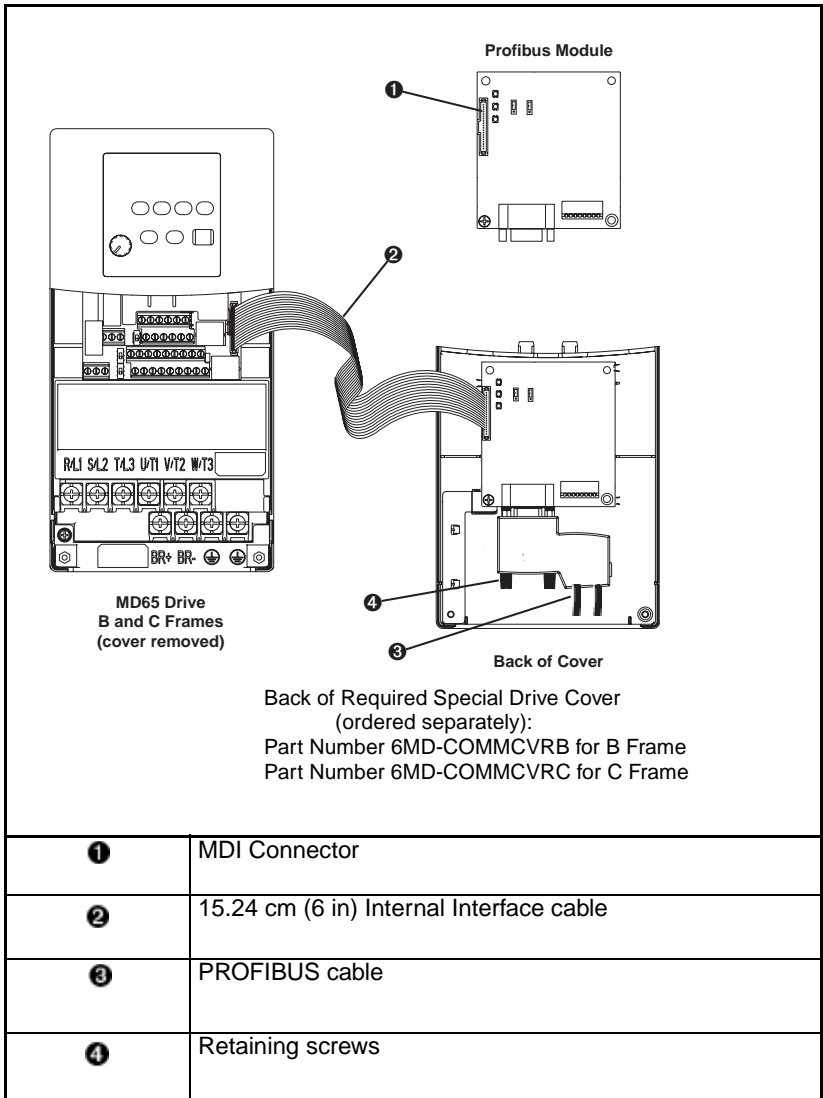


Figure 3.6 – MDI Ports and Internal Interface Cables

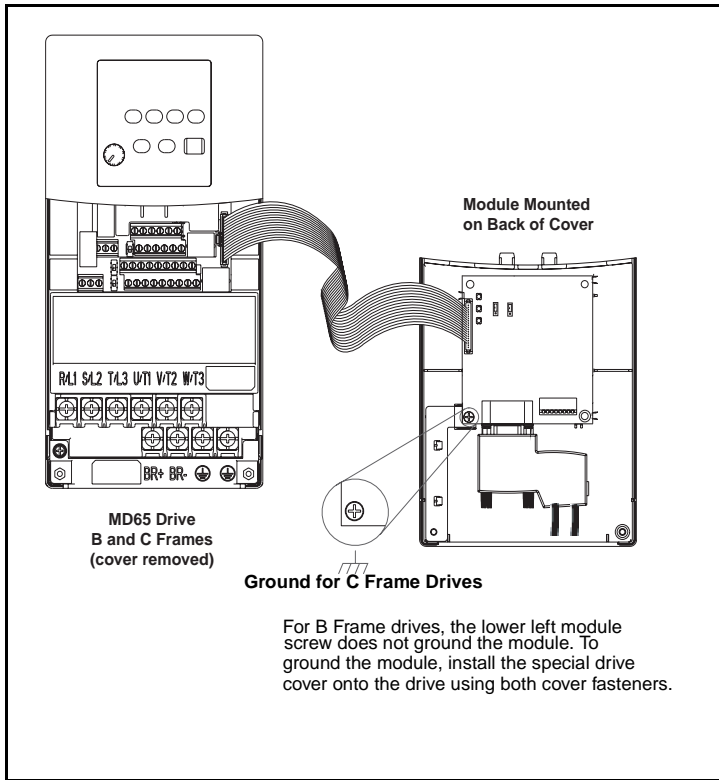


Figure 3.7 – Mounting the Adapter

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. Install the required special cover on the drive. The status indicators can be viewed on the front of the drive after power has been applied.
- Step 2. Ensure that the module will have a unique address on the network. If a new address is needed, reset its switches. See section 3.2, Commissioning the Module.

- Step 3. Apply power to the drive. The module receives its power from the connected drive and the network. When you apply power to the product and network for the first time, 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. 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 MD65 AC Drive User Manual (D2-3519) for more information.

Table 4.2 – Using the LCD OIM or CopyCat Keypad

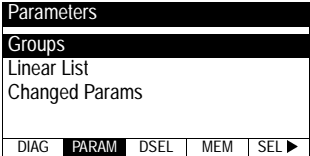

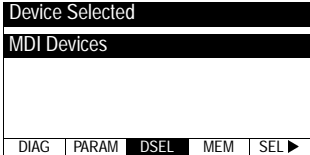


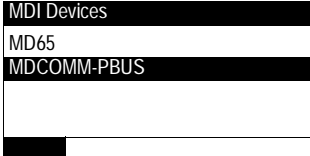

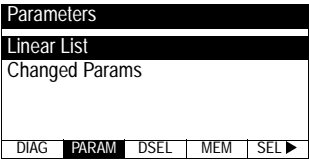

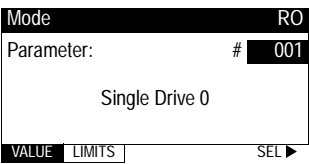
Step	Key(s)	Example Screens
1. Power up the drive. Plug the OIM or CopyCat Keypad into the drive. The Parameters menu for the drive will be displayed.		
2. Press Sel key once to display the Device Select menu.		
3. Press Enter to display the MDI Devices menu. Press Down Arrow to scroll to MDCOMM-PBUS.	 and 	

Table 4.2 – Using the LCD OIM or CopyCat Keypad

Step	Key(s)	Example Screens
4. Press Enter to select the Profibus module. The Parameters menu for the module will be displayed.		
5. Press Enter to access the parameters. Edit the module parameters using the same techniques that you use to edit parameters.		

4.3 Using V*S Utilities via MDCOMM-232

V*S Utilities can be used to access parameters in the module. Use V*S Utilities (version 4.0) and the MDCOMM-232 (version 2.001 or higher). For more information on V*S Utilities, see instruction manual D2-3488.

- Step 1. Connect the MDCOMM-232 to the MD65 and to a PC serial COM port, then apply power to the MD65 drive.
- Step 2. Open V*S Utilities and press the “Connect Serial” button in the toolbar. In the left window under “Devices,” “Node 1: MD65” appears. There are three configurable devices: the MD65, the Profibus module and the serial module MDCOMM-232.

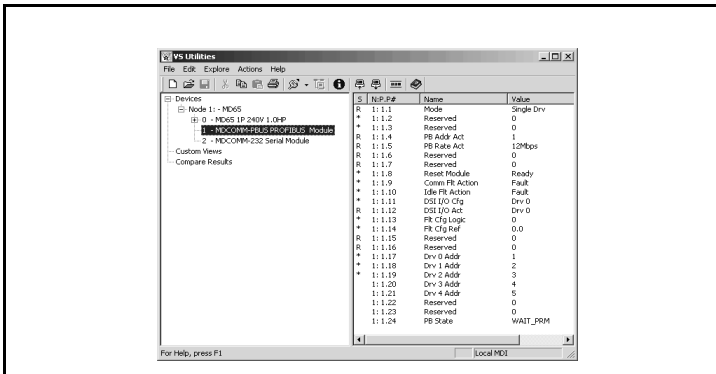


Figure 4.1 – Using V*S Utilities

4.4 Setting the Node Address

The PROFIBUS Node address/Firmware Update State is set through the use of an 8-bit DIP switch. The low seven bits let you set a node address and the valid address allows binary coding 1 through 125. New settings of node address are recognized only when power is applied to the module, cycle power, or a Reset Module Command. The MSB bit provides write access for the module flash firmware update. In normal operating state, SW8 should be set to 1.

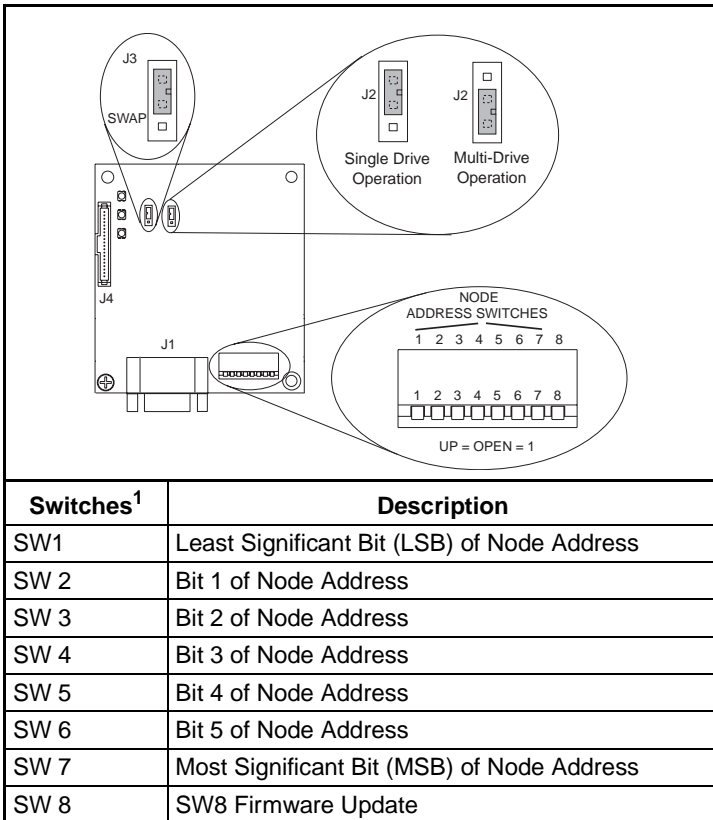


Figure 4.2 – Setting the Node Address

1. The factory default states of all stitches are UP. The fault address is 3.

SW 8 Setting	Description
0	Write Access Firmware Update
1	Normal Operating State

Refer to section 3.2, Commissioning the Module, for more information.

4.5 Setting the I/O Configuration

The I/O configuration determines the number of drives that will be represented on the network as one node by the module. If the Mode Jumper is set to the Single mode position, only one drive is represented by the module and MDI I/O Cfg (parameter 11) has no effect. If the Mode Jumper J2 is set to the Multi-Drive position, up to five drives can be represented as one node by the module.

Step 1. Set the value in MDI I/O Cfg (parameter 11):

MDI I/O Cfg	
Parameter:	# 011
Drive 0	0
VALUE	LIMITS
SEL ▶	

Value	Description	Mode Jumper Position	
		Single	Multi-Drive
0	Drive 0 (Default)	✓	✓
1	Drives 0-1		✓
2	Drives 0-2		✓
3	Drives 0-3		✓
4	Drives 0-4		✓

Drive 0 is the MD65 with the MDCOMM-PBUS module installed. Drives 0-1 through 0-4 are MD65 and/or MD60 drives that multi-drop to the RJ45 (RS-485) port on Drive 0. Refer to Chapter 8, Using Multi-Drive Mode, for more information.

Step 2. If a drive is enabled, configure the parameters in the drive to accept the Logic Command and Reference from the module. For example, set Start Source (parameter 36) and Speed Reference (parameter 38) in a MD65 drive to "MDI Port 5."

Step 3. Reset the module. Refer to section 4.6.2, 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.

4.6 Setting a Fault Action



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

4.6.1 Changing the Fault Action

Set the values of Comm Flt Action (parameter 9) and Idle Flt Action (parameter 10) to the desired responses as shown in table 4.3.

Table 4.3 – 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 and 14 (Flt Cfg Logic and Flt Cfg Ref).

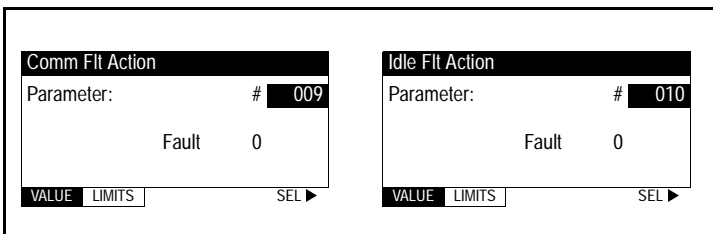


Figure 4.3 – Fault Action Screens on an LCD OIM

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

If Multi-Drive mode is used, the same fault action is used by the module for all of the drives it controls (Drive 0, Drives 0-1 to Drives 0-4).

4.6.2 Setting the Fault Configuration Parameters

If you set module Comm Flt Action (parameter 9) or module Idle Flt Action (parameter 10) to “Send Flt Cfg,” the values in the parameters shown in table 4.4 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 4.4 – 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 16-bit value sent to the drive as a Reference

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

4.6.3 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 Reset Module (parameter 8).



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 4.4.

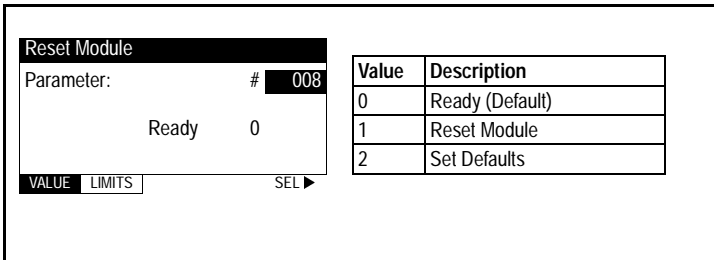


Figure 4.4 – Reset Screen on an LCD OIM

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.

4.7 Viewing the Module Configuration

The parameters in table 4.5 provide information about how the module is configured. You can view these parameters at any time.

Table 4.5 – Module Configuration Status Parameters

No.	Name	Description
01	Mode	Displays the Single or Multi-Drive operating mode selected with the jumper J2 on the module. <u>Values</u> 0 = Single drive operation 1 = Multi-Drive operation
04	P-DP Addr Actual	PROFIBUS Node Address actually used by the module.
05	P-DP Rate Actual	PROFIBUS actual operating data rate.
12	MDI I/O Actual	Displays the Drives that are active in the Multi-Drive mode: <u>Bit Values</u> 0 = Drive 0 Active 1 = Drives 0-1 Active 2 = Drives 0-2 Active 3 = Drives 0-3 Active 4 = Drives 0-4 Active

CHAPTER 5

Configuring the PROFIBUS Scanner

PROFIBUS scanners are available from several manufacturers, including SST. SST PROFIBUS scanners come with a software tool for configuring the scanner (see figure 5.2).

Chapter 5 provides instructions on how to utilize the SST PROFIBUS configuration software tool to:

- Install the MDCOMM-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 MD65 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 5.1.

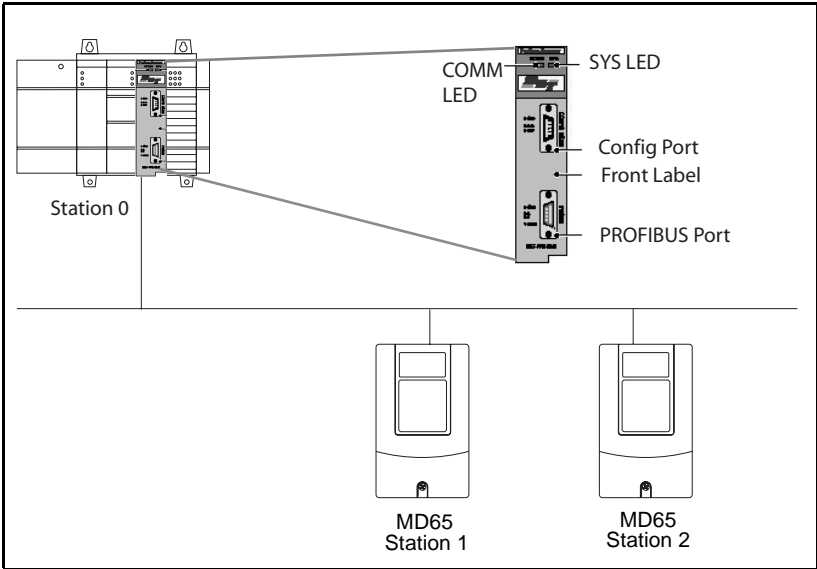


Figure 5.1 – Example PROFIBUS Network

5.2 SST Profibus Configuration Software Tool

SST Profibus Scanners come with a software tool for configuring the scanner. See figure 5.2.

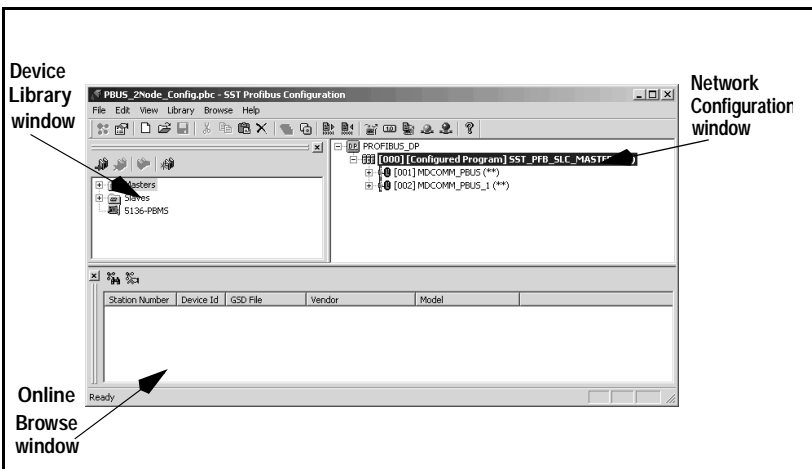


Figure 5.2 – SST PROFIBUS Configuration Software Tool

5.3 Installing the MDCOMM-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 MDCOMM-PBUS GSD file is “**R_E_07FF.gsd**” and a copy of the file is provided on a floppy disk with each MDCOMM-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 MDCOMM-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 MDCOMM-PBUS GSD file, will need to be added to configure the MDCOMM-PBUS in the scanner.

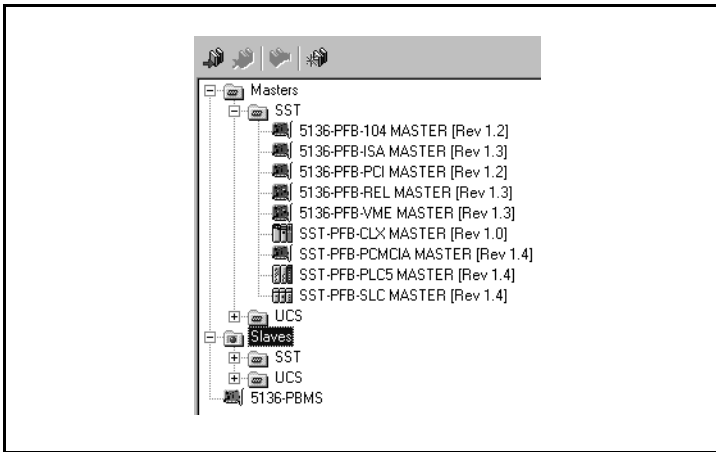



Figure 5.3 – Standard Data Files

- 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.

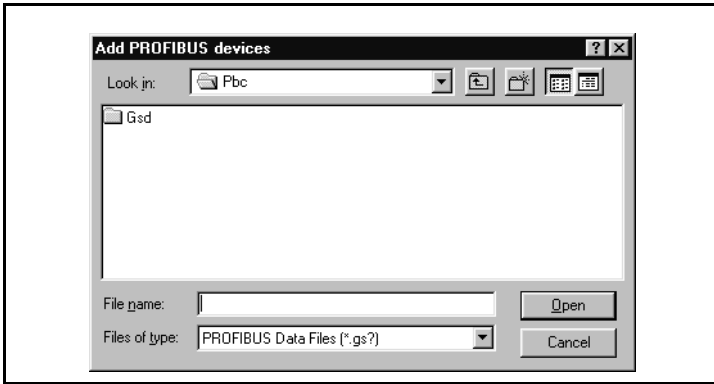


Figure 5.4 – Add PROFIBUS Devices Applet Window

- 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:). “R_E_07FF.gsd” is the GSD file for the MDCOMM-PBUS as shown in figure 5.5.

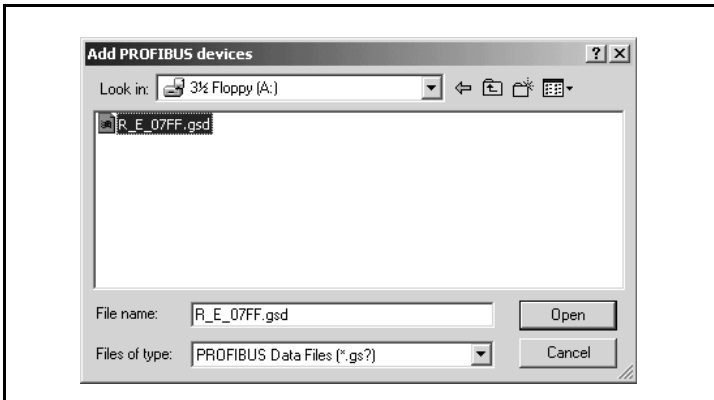


Figure 5.5 – Adding the GSD File for the RECOMM-PBUS

- Step 4. Select “**R_E_07FF.gsd**” for the MDCOMM-PBUS and click **Open**.

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

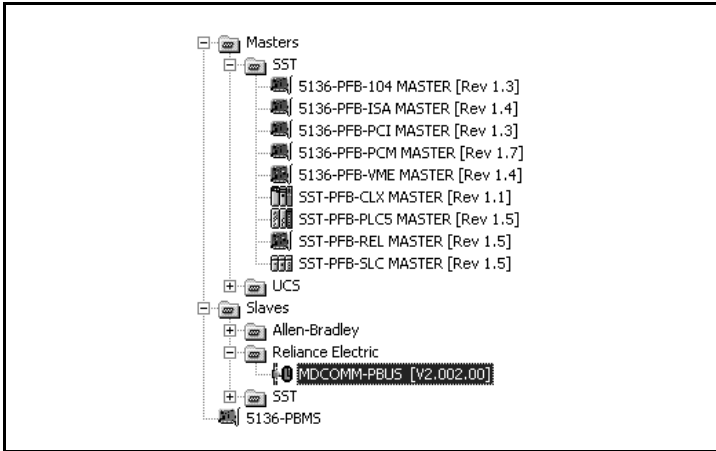


Figure 5.6 – Masters/Slaves Library Window

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

5.4 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 MD65 drives working in Single drive mode. The configuration example is as follows:

- Drive 0: Ctrl/Stat & Ref/Fdbk enabled - Parameter Access enabled
- Drive 1: Ctrl/Stat & Ref/Fdbk enabled - Parameter Access enabled

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 Profibus 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 Profibus DP slaves or the RECOMM-PBUS slave. Refer to figure 5.6.
- 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.

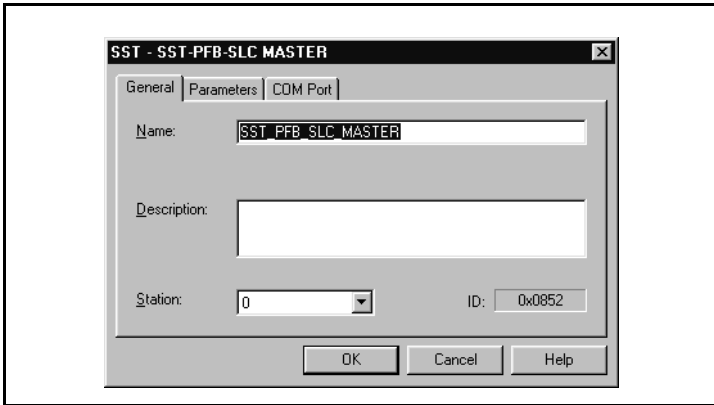


Figure 5.7 – SST-SST-PFB-SLC Master (General) Dialog Box

- 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.

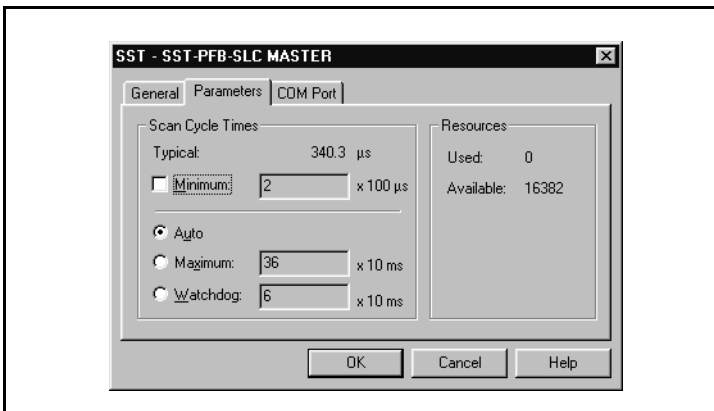


Figure 5.8 – Scan Cycle Times Dialog Box

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.

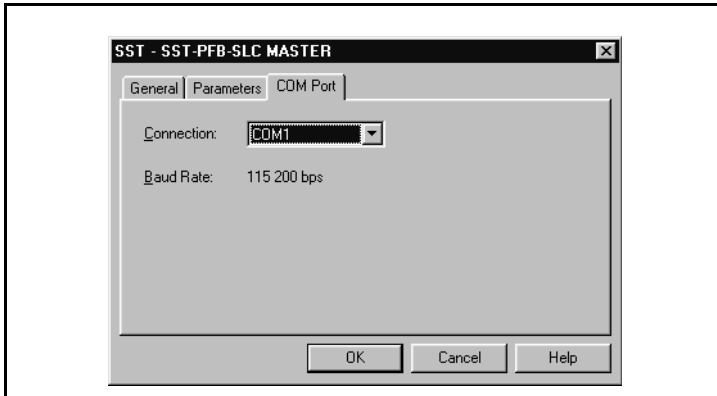


Figure 5.9 – COM Port Default Settings

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.

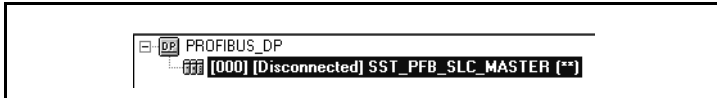


Figure 5.10 – Scanner Network Window

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

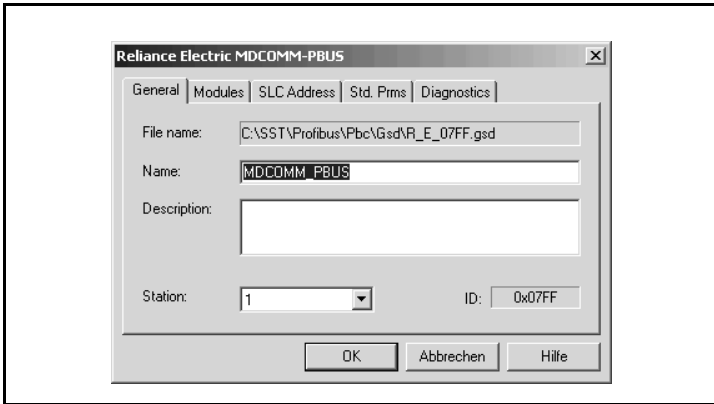


Figure 5.11 – Reliance Electric Library Dialog Window

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.

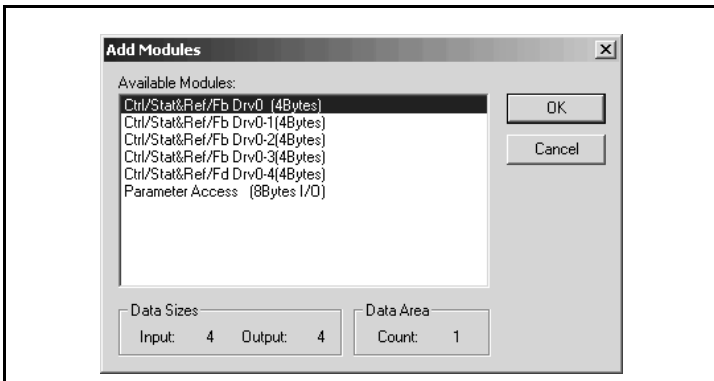


Figure 5.12 – Available Modules: Ctrl/Stat & Ref/Fdbk (2x2Bytes) Window

In our example, Station 1 will be controlled using Logic Command / Status and Reference / Feedback. The Parameter Access will also be used. Because the Mode Jumper J2 on the module is set to “1X” for Single Drive (default) and MDI I/O Cfg (parameter 11) is set to Drive 0. Logic Command/Reference uses 4 bytes and Logic Status/Feedback uses 4 bytes.

Table 5.1 – Input/Output Size Configurations

Input Size	Output Size	Logic Command/ Feedback	Reference/ Feedback	MDI I/O Cfg (11)	Mode (1)
4	4	✓	✓	Drive 0	Single
8	8	✓	✓	Drives 0-1	Multi-Drive
12	12	✓	✓	Drives 0-2	
16	16	✓	✓	Drives 0-3	
20	20	✓	✓	Drives 0-4	

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

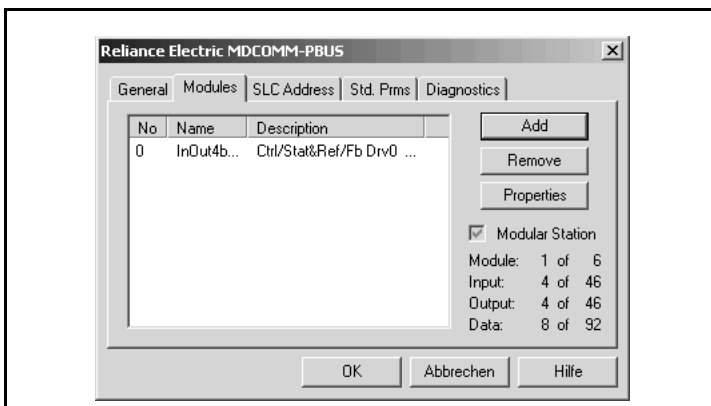


Figure 5.13 – Modules: Ctrl/Stat & Ref/Fdbk Viewing Window

Step 12. Click **Add** to continue adding modules. Select “Parameter Access” and click **OK**.

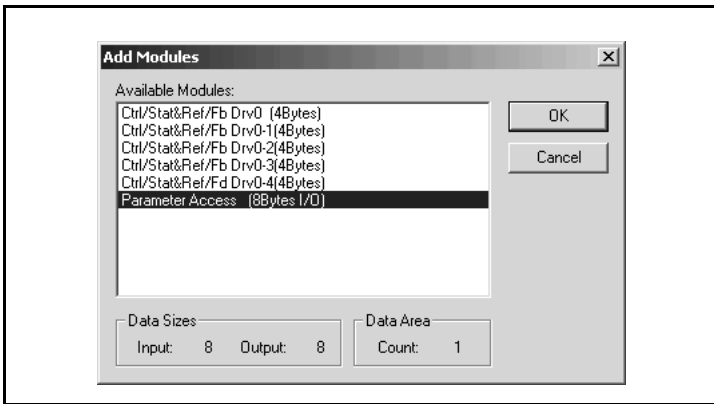


Figure 5.14 – Add Modules: Parameter Access Selection Window

Step 13. The “Parameter Access” module has now been added as shown in figure 5.15.

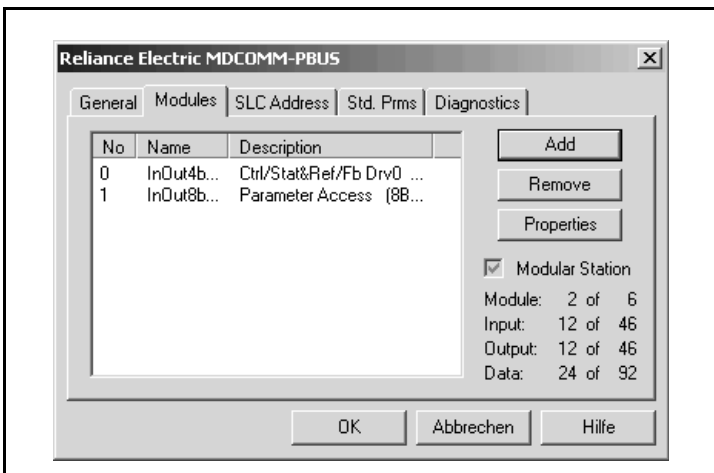


Figure 5.15 – Modules: Parameter Access Viewing Window

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

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

Step 14. Click on the **SLC Address** tab as shown in figure 5.16.

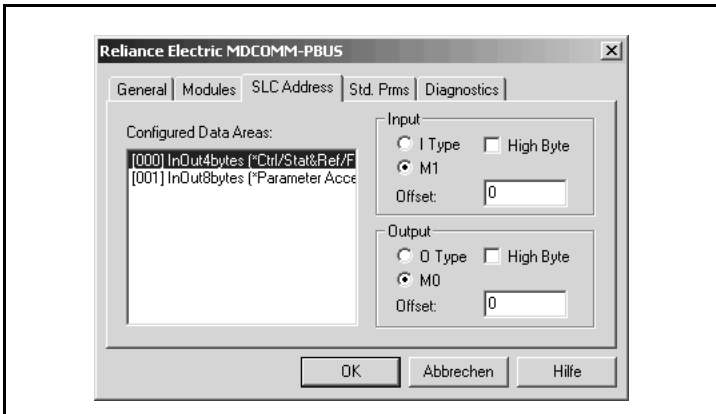


Figure 5.16 – SLC Address: M1/M0 (Ctrl/Stat & Ref/Fdbk)

Step 15. Parameter Access starts at word 10 in the M1/M0 files. Note that Parameter Access utilizes 4 words. Click **OK** when finished.

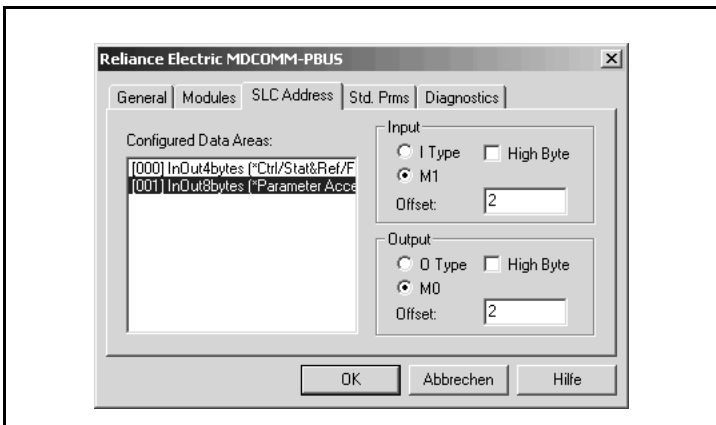


Figure 5.17 – SLC Address: M1/M0 (Parameter Access)

Step 16. Station 1 is now displayed in the network window.



Figure 5.18 – Station 1 Network Window

Station 1 is configured as follows:

Table 5.2 – Station 1 Configurations

Module	M1/M0 Word
Ctrl/Stat & Ref Fdbk Drive 0	0
Parameter Access	2

Note that Station 1 occupies 6 words.

Step 17. The same steps for configuring Station 1 will be used to configure Station 2. Refer to previous steps (beginning with step 9) for Configuring the SST-PFB-SLC PROFIBUS Scanner Station 2. Refer to figure 5.19.

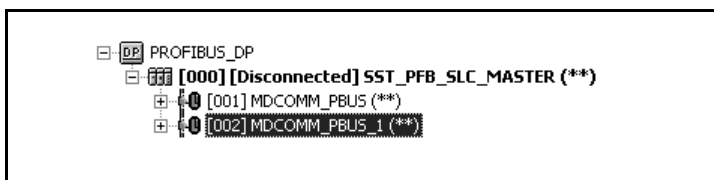


Figure 5.19 – Station 2 Network Window

Station 2 is configured as follows:

Table 5.3 – Station 2 Configurations

Module	M1/M0 Word
Ctrl/Stat & Ref Fdbk Drive 0	6
Parameter Access	8

Note that Station 2 occupies 6 words.

Step 18. 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 19. **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 5.20).

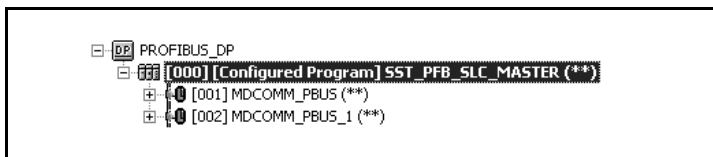


Figure 5.20 – Network Window Scanner Selection

- Step 20. 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 5.21.

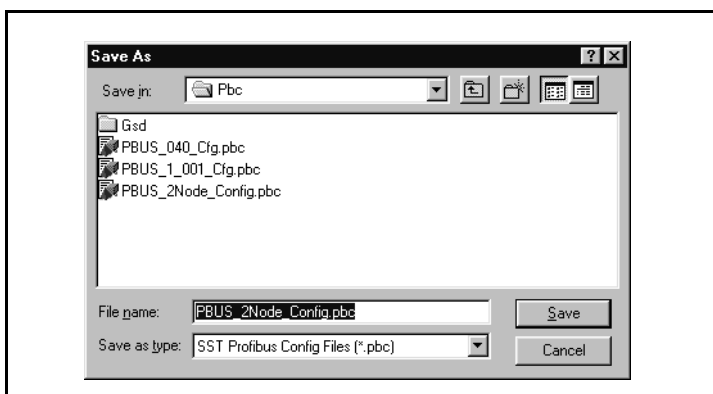


Figure 5.21 – Save As Dialog Window

Summary of the example scanner configuration:

Module	M0 / M1 Addressing	
	Station 1	Station 2
Logic Command / Status	0	6
Reference / Feedback	1	7
Parameter Access	2	8

CHAPTER 6

Using I/O Messaging

Chapter 6 provides information and examples that explain how to use I/O Messaging to control an MD65 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 MD65 drive and sets its Reference.

The PROFIBUS module provides options for configuring and using I/O, including the size of the I/O, which can be configured by selecting the number or attached drives (Single or Multi-Drive mode).

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 I/O** is the data that is produced by the module and consumed as input by the scanner.

The I/O image table will vary based on the configuration of the Mode Jumper (J2) on the module and MDI I/O Cfg (parameter 11). The image table always uses consecutive words starting at word 0.

Figure Figure 6.1 illustrates an example of a drive I/O image (16-bit words).

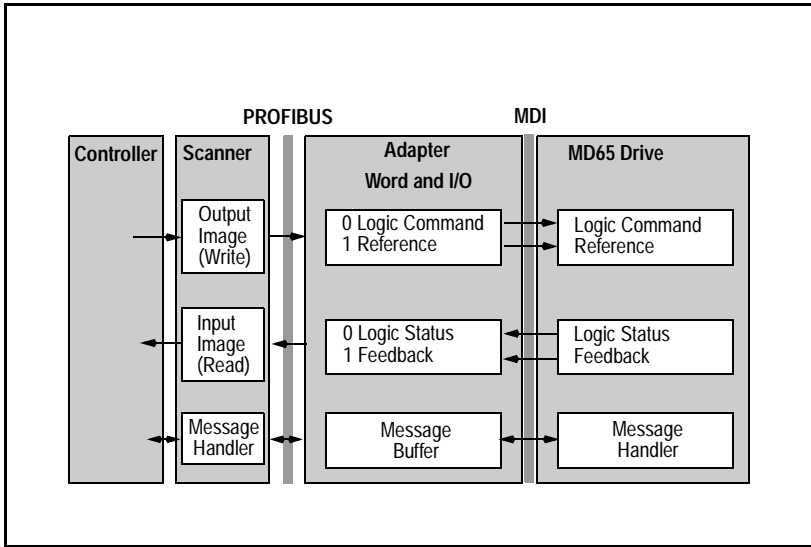


Figure 6.1 – Single Drive Example of I/O Image

Single drive mode is the typical configuration, where one node consists of a MD65 drive with a MDCOMM-PBUS module.

For Multi-Drive mode, where one node can consist of up to five drives, refer to chapter 8, Using Multi-Drive mode.

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) is produced by the controller and consumed by the module. The **Feedback** (16 bits) is produced by the module and consumed by the controller.

Size	Valid Values ¹	In I/O Image	Example
16-bit	0.0 to 4000 0.0 to 240.0 Hz (MD60) or 0.0 to 400.0 Hz (MD65)	Word 1	Figure 6.1

¹ The Reference for a MD65 or MD60 is set in Hz. For example, “300” equates to 30.0 Hz (the decimal point is always implied).

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 MD65 drive, as well as other peripherals.



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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 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).

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.

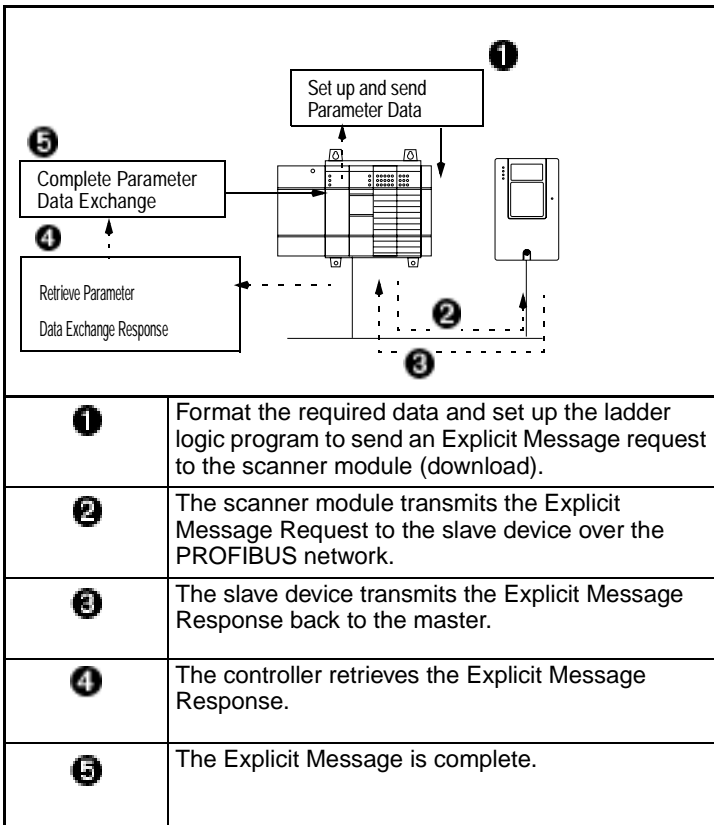


Figure 7.1 – Explicit Message Process

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 or 16-bit parameters from any MDI port
- Write 8-bit or 16-bit parameters to any MDI port
- Read the Module Fault Code
- Read Events
- Read Diagnostic Items

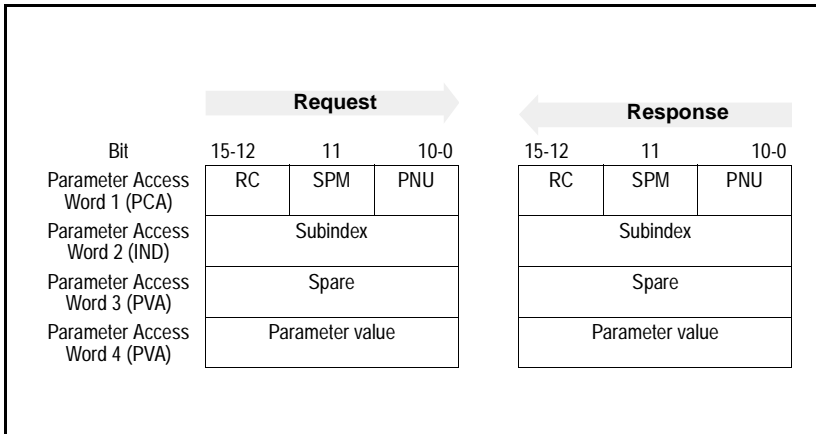


Figure 7.2 – Parameter Message Format

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	<p>PNU - Parameter Number (Bit 0-10)</p> <p>The parameter number determines which parameter to access in the selected peripheral. Parameters 1-1023 can be accessed.</p> <p>Parameter numbers 1024 - 2047 are used to access the fault object. Parameter 1024 is equal to the latest fault, 1025 to the prior fault, and so on.</p> <p><u>Bit Definitions</u></p> <p>1-1023 Parameters (Drive or Module) 1024 Module Fault Code 1025-1056 Module Events 1280-1289 Diagnostic Items (Single Drive) 1280-1304 Diagnostic Items (Multi-Drive)</p>
	<p>SPM - Spontaneous Message (Bit 11)</p> <p>Reserved - Should always be set to 0.</p>
	<p>RC - Request/Response Code (Bit 12-15)</p> <p>One of the following codes have to be used:</p> <p>0 = No request 1 = Request parameter value 2 = Change parameter value (8-bit & 16-bit word) 3 = Spare 4 = Parameter minimum 5 = Parameter maximum 6 = Default Value 7 - 15 = Reserved</p>

Table 7.1 – Parameter Message Request Data

Word	Description
2	<p>IND - Index The IND is used to specify which drive will receive a message. 0-2 bits = MDI port</p> <p><u>Bit Definitions</u> 000 Drive 0 single drive mode 001 Drives 0-1 multi-drive mode 010 Drives 0-2 multi-drive mode 011 Drives 0-3 multi-drive mode 101 Drives 0-4 multi-drive mode 3 - 15 = Reserved</p>
3	<p>PVA - Parameter value Spare</p>
4	<p>PVA - Parameter value (8-bit & 16-bit word). Read Request: Not used Write Request: Contents the write value for a 8-bit or 16-bit parameter.</p>

7.3.2 Parameter Message Response

Table 7.2 – Parameter Message Response Data

Word	Description
1	<p>PNU - Parameter Number (Bit 0-10) Requested parameter number.</p>
	<p>SPM - Spontaneous Message (Bit 11) Reserved - is always set to 0.</p>
	<p>RC - Request/Response Code (Bit 12-15) One of the following codes will be sent: 0 = No request 1 = Transfer parameter value (8-bit & 16-bit word) 2 = Spare 3-6 = Reserved 7 = Request rejected (including Module Fault Code and Parameter Message Fault Code, see table below) 9-15 = Reserved</p>

Table 7.2 – Parameter Message Response Data

Word	Description
2	IND - Index Port ID of requested parameter
3	PVA - Parameter value Spare
4	PVA - Parameter value (8-bit & 16-bit word). Read Response: Contents the value from a 8-bit or 16-bit parameter or the Fault Code (if RC = 7). Write Response: Confirms the write value for a 8-bit or 16-bit parameter or the Fault Code (if RC = 7).

Table 7.3 – Module Fault Code


Fault Code	Description
51	MDI Port watchdog
52	Profibus network loss
53	Not compatible product
54	MDI time-out or additional MDI master connected

Table 7.4 – 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)

Using Multi-Drive Mode

Chapter 8 provides information to explain how to use Multi-Drive mode.



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8.1 Single Mode vs. Multi-Drive Mode

The MDI interface provides a means to connect up to five drives on one node daisy-chained over the RS-485. Two different operation modes, single and multiple drive modes, are possible.

Single mode is a typical network installation, where a single Profibus node consists of a single drive with a MDCOMM-PBUS module. In this mode, the module can talk to one host, and the host can support one additional external peripheral (OIM or MDCOMM-232) over MDI.

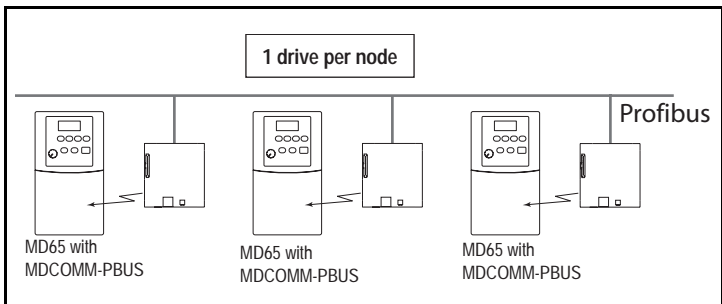


Figure 8.1 – Single Mode Example for Network

Figure 8.2 shows that the Single Drive mode provides the possibility of connecting one additional external peripheral.

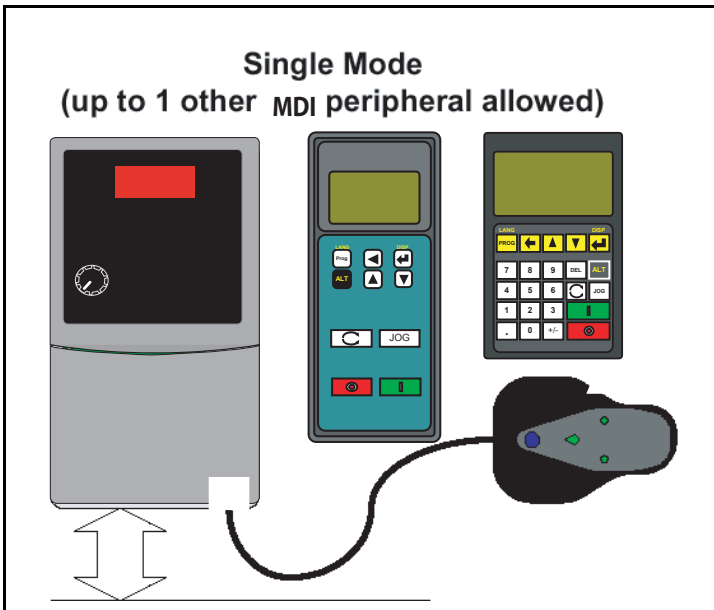


Figure 8.2 – MDI Peripheral Devices for Single Mode Connection

Multi-Drive mode is an alternative to the typical network installation, where a single Profibus node can consist of one to five drives (see figure 8.3). The first drive must be a MD65 with a MDCOMM-PBUS module. The remaining drives can be MD65 or MD60 drives that are daisy-chained over RS-485 with the first drive.

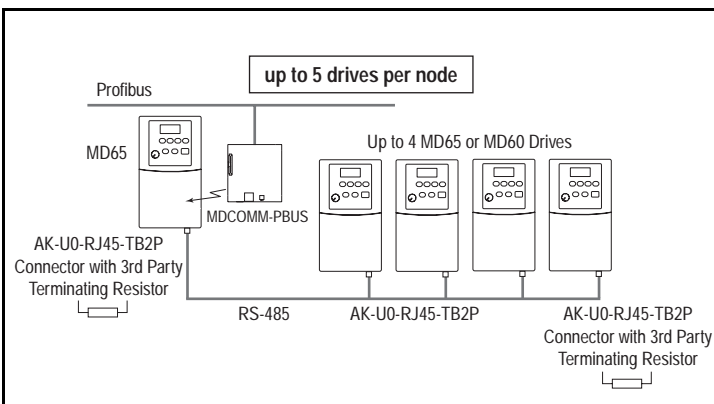


Figure 8.3 – Multi-Drive Mode Example for Network

The multiple drive connectivity, up to five drives with at least one MD65 drive, for example, one MD65 and four MD60 drives, provides a low cost Profibus solution in the industry for multiple drives.

Important: In Multi-Drive mode, the unit will not operate with MDI peripheral devices such as the OIM or the MDCOMM-232 and the application of any other peripheral will be prohibited.

Benefits of Multi-Drive mode include:

- Lower hardware costs. Only one MDCOMM-PBUS module is needed for up to five drives. The MD60 can also be used for the daisy-chained drives instead of MD65 drives.
- Reduces the network node count. For example, in Single mode 30 drives would consume 30 nodes. In Multi-Drive mode, 30 drives can be connected in 6 nodes.
- Provides a means to put MD60 drives on Profibus (MD60 drives do not have an internal communications module slot).
- Controller can control, monitor, and read/write parameters for all five drives.

The trade-offs of Multi-Drive mode include:

- If the MD65 drive with the MDCOMM-PBUS module is powered down, then communications with the daisy-chained drives is disrupted and the drives will take the appropriate communications loss action set in each drive.
- Communications throughput to the daisy-chained drives will be slower than if each drive was a separate node on Profibus (Single mode). This is because the MDCOMM-PBUS module must take the Profibus data for the other drives and sequentially send the respective data to each drive over RS-485.
- Since the RS-485 ports are used for daisy-chaining the drives, there is no connection for a peripheral device such as an OIM. The AK-U0-RJ45-SCI MDI Splitter Cable cannot be used to add a connection for a peripheral device.

8.2 System Wiring

To daisy-chain the drives of the MD65 with the MDCOMM-PBUS module (Drive 0), the AK-U0-RJ45-TB2P terminal block connector (Figure 8.4) can be used for easy installation.



Figure 8.4 – AK-U0-RJ45-TB2P Terminal Block Connector

The wiring diagram for using AK-U0-RJ45-TB2P terminal block connectors is shown in figure 8.5.

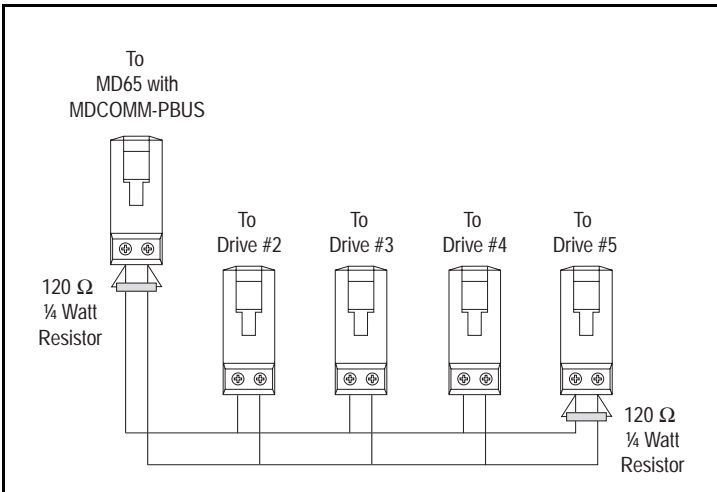


Figure 8.5 – Multi-Drive Mode Example for Network

The AK-U0-RJ45-TB2P comes with five (5) terminal block connectors and two (2) terminating resistors.

8.3 Understanding the I/O Image

The terms **input** and **output** are defined from the scanner's point of view. Therefore, Output I/O is data that is output from the scanner and consumed by the Profibus module. Input I/O 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:

Configuration of the Mode Jumper (J2) on the module and MDI I/O Cfg (parameter 11). The image table always uses consecutive words starting at word 0.

Figure 8.6 illustrates the Multi-Drive I/O image with 16-bit words.

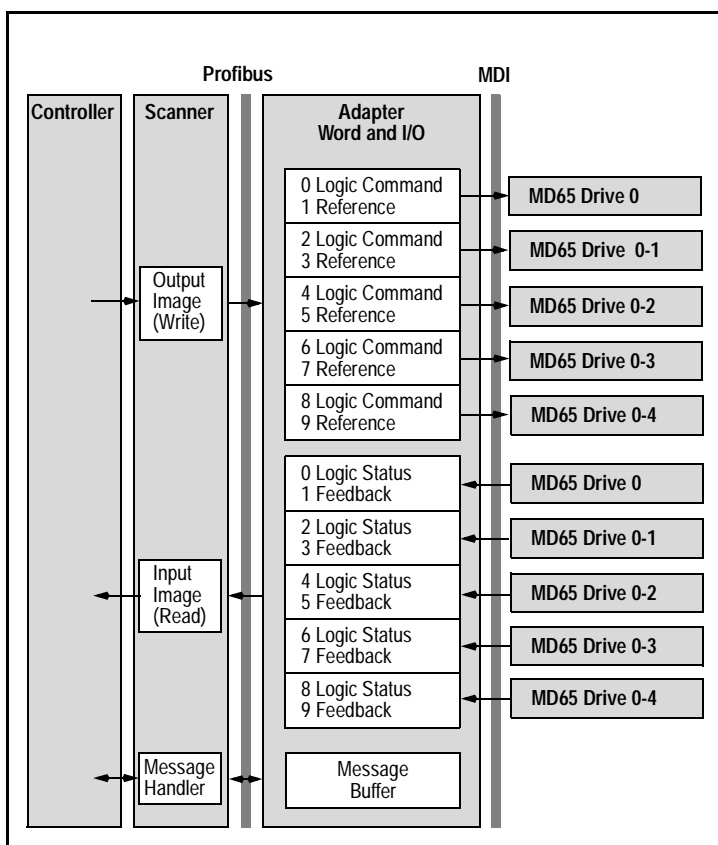


Figure 8.6 – Multi-Drive Mode Example of I/O Image

8.4 Configuring the RS-485 Network

Table 8.1 shows the parameters that must be set in the daisy-chained drives.

Table 8.1 – Parameters for daisy-chained drives

Parameter	Value
P36 (Start Source)	5 (RS485 (MDI) Port)
P38 (Speed Reference)	5 (RS485 (MDI) Port)
A103 (Comm Data Rate)	4 ("19.2K")
A104 (Comm Node Addr)	1-247 (must be unique)
A107 (Comm Format)	0 ("RTU 8-N-1")

Note: The RS-485 network is fixed at 19.2K baud, 8 data bits, no parity, and 1 stop bit.

Important: Parameter A105 (Comm Loss Action) in the daisy-chained drives is still used in Multi-Drive mode. If the RS-485 cable is disconnected or broken, the disconnected drive(s) will **immediately** take the corresponding Comm Loss Action(s). Parameter A106 (Comm Loss Time) is not used in Multi-Drive mode. On the Profibus, Comm Flt Action (parameter 09) and Idle Flt Action (parameter 10) in the MDCOMM-PBUS determine the action taken for ALL of the drives on the Multi-Drive node.

Table 8.2 shows the Multi-Drive parameters that must be set in the MDCOMM-PBUS.

Table 8.2 – Parameters for MDCOMM-PBUS

Parameter	Value
11 (MDI I/O Cfg)	0 = Drive 0 connected 1 = Drives 0-1 connected 2 = Drives 0-2 connected 3 = Drives 0-3 connected 4 = Drives 0-4 connected
17 (Drv 0 Addr)	= Parameter A104 (Comm Node Address) in Drive 0
18 (Drv 1 Addr)	= Parameter A104 (Comm Node Address) in Drive 0-1
19 (Drv 2 Addr)	= Parameter A104 (Comm Node Address) in Drive 0-2
20 (Drv 3 Addr)	= Parameter A104 (Comm Node Address) in Drive 0-3
21 (Drv 4 Addr)	= Parameter A104 (Comm Node Address) in Drive 0-4

After setting the MDCOMM-PBUS parameters, set the Module Mode Jumper from Single drive operation to Multi-Drive operation, and reset the module or cycle power.

Important: MDCOMM-PBUS parameters can be set using MDI peripheral (OIM, V*S Utilities with MDCOMM-232, etc.) ONLY when the Mode Jumper is in Single mode position.

8.5 Multi- Mode Explicit Messaging

Parameter addressing for Explicit messaging in Multi-Drive is similar to that in Single mode.

The parameter numbers range from 1 to 2047. Parameter numbers 1-1023 are used to access the drive or module parameters. Parameter numbers 1024-2047 are used to access the Module Fault Codes, Events and Diagnostic Items.

For example, to access Accel Time (parameter 39) for Drive 0, Drive 0-1 to Drive 0-4 in Multi-Drive mode:

Table 8.3 – Accessing Accel Time (Parameter 39)

Module	IND (0-2 bits)	Parameter Number
Drive 0 Single Drive	000	39
Drives 0-1 Multi Drive	001	39
Drives 0-2 Multi Drive	010	39
Drives 0-3 Multi Drive	011	39
Drives 0-4 Multi Drive	100	39

8.6 Additional Information

- When the MD65 with the MDCOMM-PBUS module (Drive 0) is powered up, all configured daisy-chained drives must be present before an I/O connection is allowed on Profibus (i.e. before the drives can be controlled).
- If the MD65 with the MDCOMM-PBUS module (Drive 0) is powered down, communications with the four daisy-chained drives (Drives 0-1 to Drives 0-4) are disrupted and the drives will fault.
- If any of the daisy-chained drives (Drive 0-1 to Drive 0-4) are powered down, the respective Input Image (Logic Status and Feedback) sent to the scanner will be zeros, and the NET A and DRIVE LEDs on the MDCOMM-PBUS module will flash red. Status information from the scanner will not indicate there is a fault at the node.

CHAPTER 9

Troubleshooting the PROFIBUS Module and Network

Chapter 9 contains information for troubleshooting the PROFIBUS module and the network.

9.1 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 9.1.)

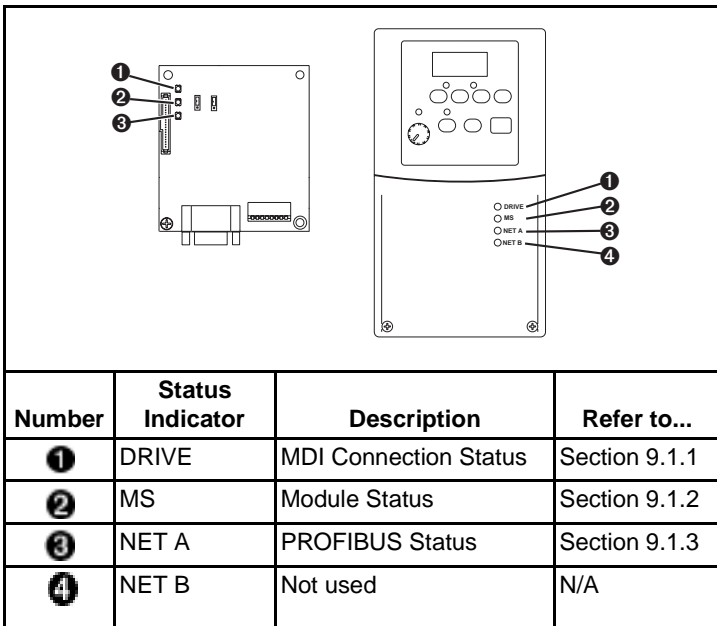


Figure 9.1 – Status Indicators (Location on Drive May Vary)

9.1.1 DRIVE Status Indicator

Table 9.1 – DRIVE Status Indicator: State Definitions

Status	Cause	Corrective Action
Off	The module is not powered or is not connected properly to the drive.	<ul style="list-style-type: none"> Securely connect the module to the drive using the ribbon cable. Apply power to the drive.
Flashing Red	The module is not receiving a ping message from the drive.	<ul style="list-style-type: none"> Verify that cables are securely connected. Cycle power to the drive.
Solid Red	<p>The drive has refused an I/O connection from the module.</p> <p>Another MDI peripheral is using the same MDI port as the module.</p>	<p>Important: Cycle power to the product after making following correction:</p> <ul style="list-style-type: none"> Verify that all MDI cables on the MD65 drive are securely connected and not damaged. Replace cables if necessary. Check the Events, replace the module with a compatible Reliance Electric branded product (MDCOMM-PBUS).
Flashing Green	Not Used	
Solid Green	The module is properly connected and is communicating with the drive.	<ul style="list-style-type: none"> No action.
Solid Orange	The module is booting.	Wait until boot program is complete.
Flashing Orange	<p>The module is in flash mode (SW8 down).</p> <p>Application Failure</p>	<ul style="list-style-type: none"> Wait until Firmware Update is complete, then switch SW8 to 1. Download Application code.

9.1.2 MS Status Indicator

Table 9.2 – MS Status Indicator: State Definitions

Status	Cause	Corrective Action
Off	The module is not powered.	<ul style="list-style-type: none"> Securely connect the module to the MD65 drive using the ribbon cable. Apply power to the drive.
Flashing Red	The module has faults or a drive is missing in Multi-Drive mode.	<ul style="list-style-type: none"> Clear faults in the drive. Disconnect additional MDI peripheral and cycle power to the drive. If cycling power does not correct the problem, the parameter settings may have been corrupted. Reset defaults and reconfigure the module. If resetting defaults does not correct the problem, flash the module with the latest firmware release. For Multi-Drive mode, determine which drive is missing or faulted. Check cabling and configuration settings.
Solid Red	The module has failed the hardware test.	<ul style="list-style-type: none"> Cycle power to the drive. Replace the module.
Flashing Green	The module is operational but is not transferring I/O data.	<ul style="list-style-type: none"> Place the scanner in RUN mode. Configure the module for the program in the controller. Program the controller to recognize and transmit I/O to the module.
Solid Green	The module is operational and transferring I/O data.	<ul style="list-style-type: none"> No action.

9.1.3 NET A Status Indicator

Table 9.3 – NET A Status Indicator: State Definitions

Status	Cause	Corrective Actions
Off	The module is not powered or is not connected properly to the network or the Node Address is wrong.	<ul style="list-style-type: none"> Securely connect the module to the drive using the Internal Interface cable and to the network using a PROFIBUS cable. (Screw D-shell to the module.) Check the SW8 of DIP-Switches and set it to one - Normal operating state. Check the DIP-Switches (SW1-SW7) node address and the Scanner setting. Apply power to the drive.
Flashing Red	Error in PROFIBUS configuration.	<ul style="list-style-type: none"> Re-configure the PROFIBUS module.
Solid Red	Not Used.	
Flashing Green	Not Used.	
Solid Green	The module is properly connected and communicating on the network.	<ul style="list-style-type: none"> No action required.

Important: For the Multi-Daisy mode, disconnecting a MDI cable from a daisy-chained drive does not cause an error. The module has no indication that the drive has been removed, except that commands to the missing drive have no effect.

9.2 Module Diagnostic Items in Single Drive Mode

Table 9.4 lists diagnostic items that can be accessed using V*S Utilities software or the LCD OIM.

Table 9.4 – Module Diagnostic Items for Single Drive Mode

No.	Event	Description
1	Field Flash Cnt	The number of Firmware Updates.
2	Module Events	The number of events in the event queue.
3	Reference	Reference from PROFIBUS returned to MDI drive.
4	Logic Cmd	Command from PROFIBUS returned to MDI drive.
5	Logic Sts	Status of the drive returned to PROFIBUS.
6	Feedback	Feedback from drive returned to PROFIBUS.
7	PROFIBUS Rx Errors	Current value of the PROFIBUS Receive Error Counter register.
8	PROFIBUS Tx Errors	Current value of the PROFIBUS Transmit Error Counter register.
9	Data Rate	Current setting of the PROFIBUS baud rate.
10	Node Address	Current setting of the module Node address switch.

9.3 Module Diagnostic Items in Multi-Drive Mode

For the Multi-Drive mode it is not possible to connect a peripheral device such as an OIM or MDCOMM-232 (V*S Utilities). Table 9.5 lists diagnostic items that can only be accessed via Profibus network in Multi-Drive mode.

Table 9.5 – Module Diagnostic Items for Multi-Drive Mode

No.	Event	Description
1	Field Flash Cnt	The number of Firmware Updates.
2	Module Events	The number of events in the event queue.
3	Drv 0 Reference	Reference from Profibus returned to MDI Drive 0.
4	Drv 0 Logic Cmd	Command from Profibus returned to MDI Drive 0.
5	Drv 0 Logic Sts	Status of the Drive 0 returned to Profibus.
6	Drv 0 Feedback	Feedback from Drive 0 returned to Profibus
7	Drv 1 Reference	Reference from Profibus returned to MDI Drives 0-1.
8	Drv 1 Logic Cmd	Command from Profibus returned to MDI Drive s0-1.
9	Drv 1 Logic Sts	Status of the Drives 0-1 returned to Profibus.

Table 9.5 – Module Diagnostic Items (Continued)for Multi-Drive Mode

No.	Event	Description
10	Drv 1 Feedback	Feedback from Drives0-1 returned to Profibus
11	Drv 2 Reference	Reference from Profibus returned to MDI Drives 0-2.
12	Drv 2 Logic Cmd	Command from Profibus returned to MDI Drives 0-2.
13	Drv 2 Logic Sts	Status of the Drives 0-2 returned to Profibus.
14	Drv 2 Feedback	Feedback from Drives 0-2 returned to Profibus
15	Drv 3 Reference	Reference from Profibus returned to MDI Drives 0-3.
16	Drv 3 Logic Cmd	Command from Profibus returned to MDI Drives 0-3.
17	Drv 3 Logic Sts	Status of the Drives 0-3 returned to Profibus.
18	Drv 3 Feedback	Feedback from Drives 0-3 returned to Profibus
19	Drv 4 Reference	Reference from Profibus returned to MDI Drives 0-4.
20	Drv 4 Logic Cmd	Command from Profibus returned to MDI Drives 0-4.
21	Drv 4 Logic Sts	Status of the Drives 0-4 returned to Profibus.
22	Drv 4 Feedback	Feedback from Drives 0-4 returned to Profibus
23	Profibus Rx Errors	Current value of the Profibus Receive Error Counter register.
24	Profibus Tx Errors	Current value of the Profibus Transmit Error Counter register.
25	Active drives number	The number of active slave drives.

9.4 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.

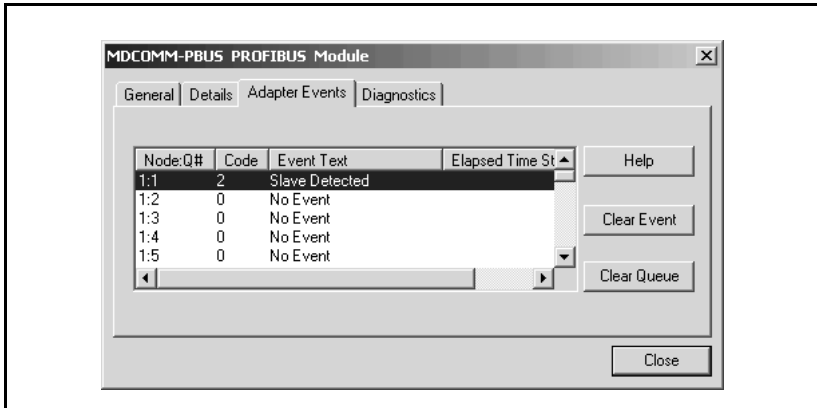


Figure 9.2 – Viewing and Clearing Events Using an LCD OIM

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 9.6 lists events that may appear in the event queue.

Table 9.6 – Event Codes and Descriptions

Code	Event	Description
0	No Event	Text displayed in an empty event queue entry.
1	EEPROM Sum Flt	Startup sequence detected corrupt EEPROM storage in the module.
2	Slave Detected	A MDI slave was detected on the slave I/O line.
3	Slave Removed	A MDI slave was removed on the slave I/O line.
7	Bad I/O Config	The actual connected drives are different from I/O configuration (parameter 11).
8	Host Timeout	Parameter data to a Drive Host timed out waiting for a response.
9	Slave Timeout	Parameter data to a Slave time out waiting for a response.
10	Bad Host Flt	The module was connected to an incompatible device.

Table 9.6 – Event Codes and Descriptions

Code	Event	Description
11	MDI Bus Off Flt	A bus-off condition was detected on MDI. This event may be caused by loose or broken cables or by noise.
13	P-DP Idle	The PROFIBUS Module received a Network Clear from the PROFIBUS Master.
14	P-DP Online	The PROFIBUS Module has gone on-line the PROFIBUS network.
15	P-DP Offline	The PROFIBUS Module has gone off-line the PROFIBUS network.
17	MDI Fault Msg	The Host Faulted.
18	MDI Fault Clear	The user cleared a fault in the module.
19	Not COMM Flt	The module detected a fault condition on the Profibus network.
21	Program Damage	The checksum of the program is wrong.

APPENDIX A

Technical Specifications

Communications

Network	
Protocol	PROFIBUS
Data Rates	9.6 kpbs, 19.2 kpbs, 93.75 kpbs, 187.5 kpbs, 500 kpbs, 1.5 Mbps, 3 Mbps, 6 Mbps, 12 Mbps. The module has auto baud rate detection.
Drive	
Protocol	MDI

Electrical

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

Mechanical

Dimensions	
Height	19 mm (0.75 in)
Length	86 mm (3.39 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
Vibration	1.0 G Operational 2.5 G Non-operational
Shock	15.0 G Operational 30.0 G Non-operational
Altitude	1,000m (3,300 ft.) without derating

Regulatory Compliance

Certification	Specification
UL	UL508C
CE	EN50178 and EN61800-3

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 Mode

Range: 0 = Single Drive
1 = Multiple Drive

Default: N/A

Type: Read Only

Reset Required: N/A

Displays the Single or Multi-Drive operating mode selected with the jumper J2 on the module.

4 P-DP Addr Actual

Range: 0 to 125

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 kpbs
1 = 19.2 kpbs
2 = 45.45 kpbs
3 = 93.75 kpbs
4 = 187.5 kpbs
5 = 500 kpbs
6 = 1.5 Mbps
7 = 3 Mbps
8 = 6 Mbps
9 = 12 Mbps
10 = Off-line

Default: N/A

Type: Read Only

Reset Required: N/A

Displays the PROFIBUS actual operating data rate.

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 through the module.



ATTENTION: Comm Flt Action (parameter 9) and Idle Flt Action (parameter 10) lets you determine the action of 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 MDI I/O Cfg

Range: 0 = Drive 0
1 = Drives 0-1
2 = Drives 0-2
3 = Drives 0-3
4 = Drives 0-4

Default: 0

Type: Read/Write

Reset Required: Yes

Sets the configuration of the Drives that are active in the Multi-Drive mode. Identifies the connections that would be attempted on a reset or power cycle.

12 MDI I/O Actual

Range: 0 = Drive 0
1 = Drives 0-1
2 = Drives 0-2
3 = Drives 0-3
4 = Drives 0-4

Default: N/A

Type: Read Only

Reset Required: N/A

Displays the Drives that are active in the Multi-Drive mode.

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 mode.

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

14 Flt Cfg Ref

Range: 0 to 4000

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.

-
- 17 **Drv 0 Addr**
 - 18 **Drv 1 Addr**
 - 19 **Drv 2 Addr**
 - 20 **Drv 3 Addr**
 - 21 **Drv 4 Addr**

Range: 1 - 125
Default: Drv 0 Addr = 1
 Drv 1 Addr = 2
 Drv 2 Addr = 3
 Drv 3 Addr = 4
 Drv 4 Addr = 5
Type: Read/Write
Reset Required: Yes

Sets the corresponding node addresses of the daisy-chained drives when the module Mode Jumper (J2) is set for Multi-Drive operation.

Important: The settings for these parameters must match the Comm Node Addr (parameter A104) settings in the respective drives. Each setting must also be unique (no duplicate node address).

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 MD65 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 1 = Stop
															x	Start ¹	0 = Not Start 1 = Start
														x		Jog	0 = Not Jog 1 = Jog
												x				Clear Faults	0 = Not Clear Faults 1 = Clear Faults
									x	x						Direction	00 = No Command 01 = Forward Command 10 = Reverse Command 11 = Change Direction (toggle)
									x							Not Used	
									x							MOP Increment	0 = Not Increment 1 = Increment
							x	x								Accel Rate	00 = No Command 01 = Accel Rate 1 Command 10 = Accel Rate 2 Command 11 = Hold Accel Rate
				x	x											Decel Rate	00 = No Command 01 = Decel Rate 1 Command 10 = Decel Rate 2 Command 11 = Hold Decel Rate

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 001 = Freq Source = Select 010 = Freq Source = Int. Freq 011 = Freq Source = Comm 100 = Preset Freq 1 101 = Preset Freq 2 110 = Preset Freq 3 111 = Preset Freq 4
x																MOP Decrement	0 = Not Decrement 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 1 = Ready
															x	Active	0 = Not Active 1 = Active
															x	Command Direction	0 = Reverse 1 = Forward
															x	Actual Direction	0 = Reverse 1 = Forward
															x	Accel	0 = Not Accelerating 1 = Accelerating
															x	Decel	0 = Not Decelerating 1 = Decelerating
															x	Alarm	0 = No Alarm 1 = Alarm
															x	Fault	0 = No Fault 1 = Fault
															x	At Speed	0 = Not At Reference 1 = At Reference
															x	Main Freq	0 = Not Controlled By Comm 1 = Controlled By Comm
															x	Operation Command	0 = Not Controlled By Comm 1 = Controlled By Comm
															x	Parameters	0 = Not Locked 1 = Locked
															x	Digital Input 1 Status	
															x	Digital Input 2 Status	

Logic Bits																Status	Description
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
	x															Digital Input 3 Status ¹	
x																Digital Input 4 Status ¹	

¹ This status is available only with firmware revision 2.0 and higher.

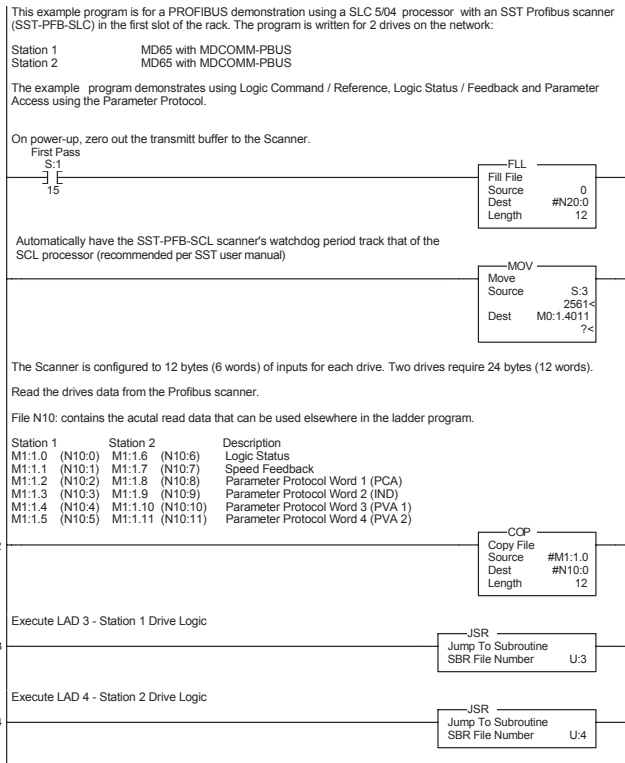
APPENDIX D

SLC Ladder Logic Examples

Appendix D provides examples that explain how to use a SLC controller to send I/O Messaging to control, configure, and monitor an MD65 drive in Single Drive and Multi-Drive mode.

D.1 Single Drive Example

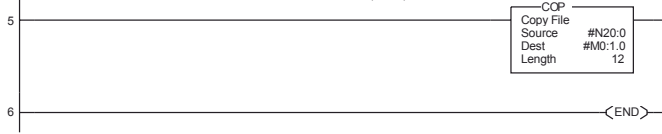
D.1.1 Main Routine



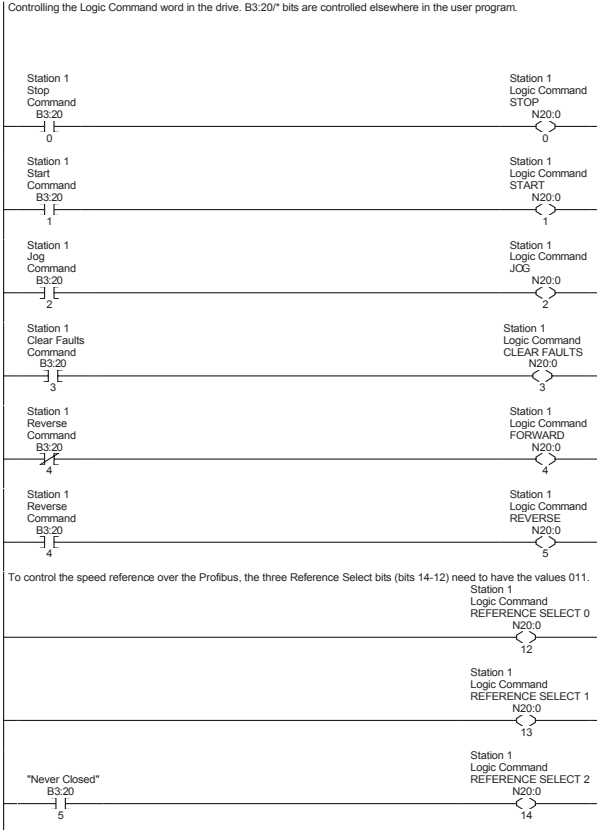
Write the drives' data to the profibus scanner.

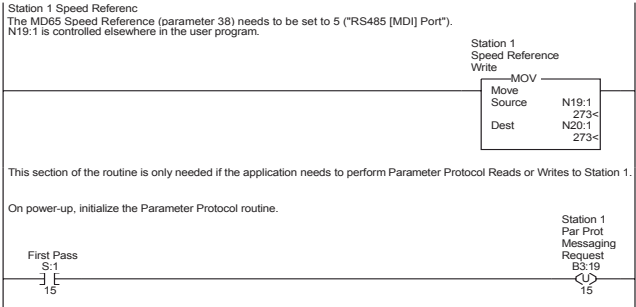
File N20: contains the actual write data generated elsewhere in the ladder program.

Station 1	Station 2	Description
M0:1.0 (N20:0)	M0:1.6 (N20:6)	Logic Command
M0:1.1 (N20:1)	M0:1.7 (N20:7)	Speed Reference
M0:1.2 (N20:2)	M0:1.8 (N20:8)	Parameter Protocol Word 1 (PCA)
M0:1.3 (N20:3)	M0:1.9 (N20:9)	Parameter Protocol Word 2 (IND)
M0:1.4 (N20:4)	M0:1.10 (N20:10)	Parameter Protocol Word 3 (PVA1)
M0:1.5 (N20:5)	M0:1.11 (N20:11)	Parameter Protocol Word 4 (PVA2)



D.1.2 Drive 0 Control/Reference/Parameter Access Routine





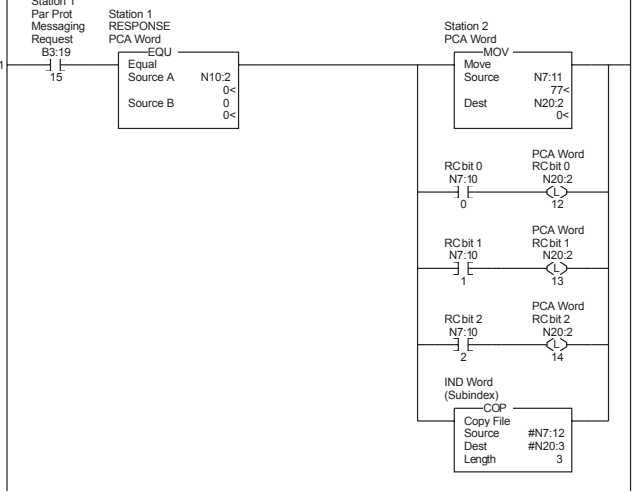
This circuit utilizes the Parameter Protocol. A REQUEST to Station 1 is processed only one at a time, and after each RESPONSE from Station 1 a zero must be sent and received to 'handshake' before the next REQUEST/RESPONSE transaction can take place. For example:
 Send a param. read request -> Receive a parameter read response -> Send a "0" -> Receive a "0" -> [Transaction compl.]

If the RESPONSE PCA Word 1 (N10:2) is "0", then a REQUEST can be initiated.

Elsewhere in the user program these words must be loaded with message data prior to initiating the REQUEST.
 N7:10 = RC = the operation to be performed ("1" = Read, "2" = 16-bit Write)
 N7:11 = PNU = the parameter number to read or write
 N7:12 = SubIndex = the MDI port # ("0" = Host or MD65 drive, "5" = MDCOMM-PBUS, etc.)
 N7:13 = PVA #1 (the parameter value (high word)) - only used when writing parameters
 N7:14 = PVA #2 (the parameter value (low word)) - only used when writing parameters

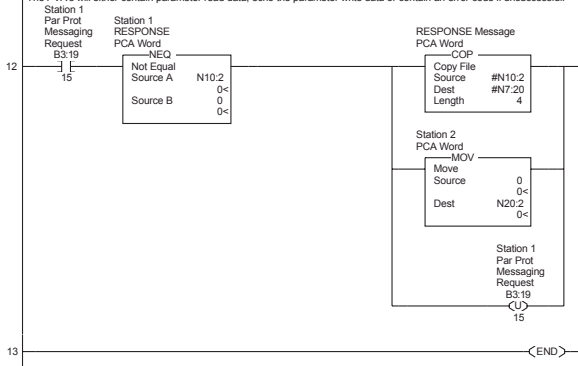
The four Parameter Protocol Words set up in the scanner are used to perform the Parameter Protocol:
 N20:2 = contains RC (the operation to be performed) and PNU (the parameter number to read or write) combined
 N20:3 = Subindex (the MDI port #)
 N20:4 = PVA #1 (the parameter value (high word))
 N20:5 = PVA #2 (the parameter value (low word))

B3:19/15 is turned ON elsewhere in the program after a REQUEST message (N7:10-14) is loaded. This causes one Param. Protocol read or write to occur and B3:19/15 is turned OFF when the transaction is complete.

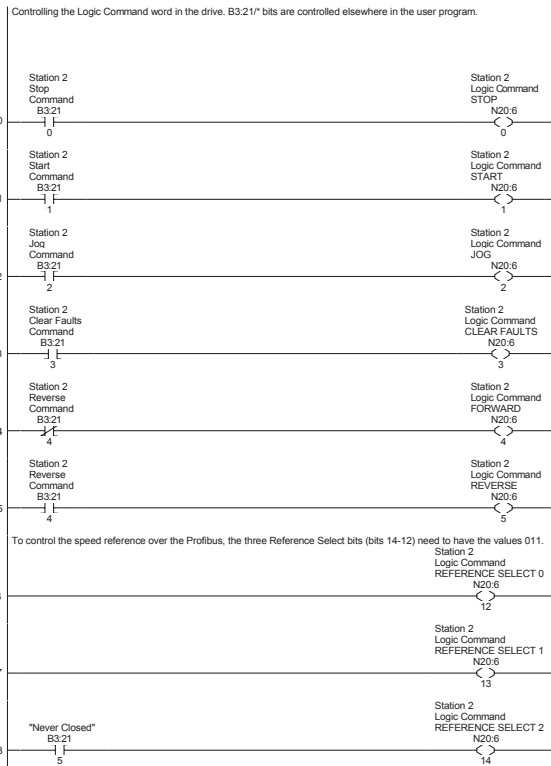


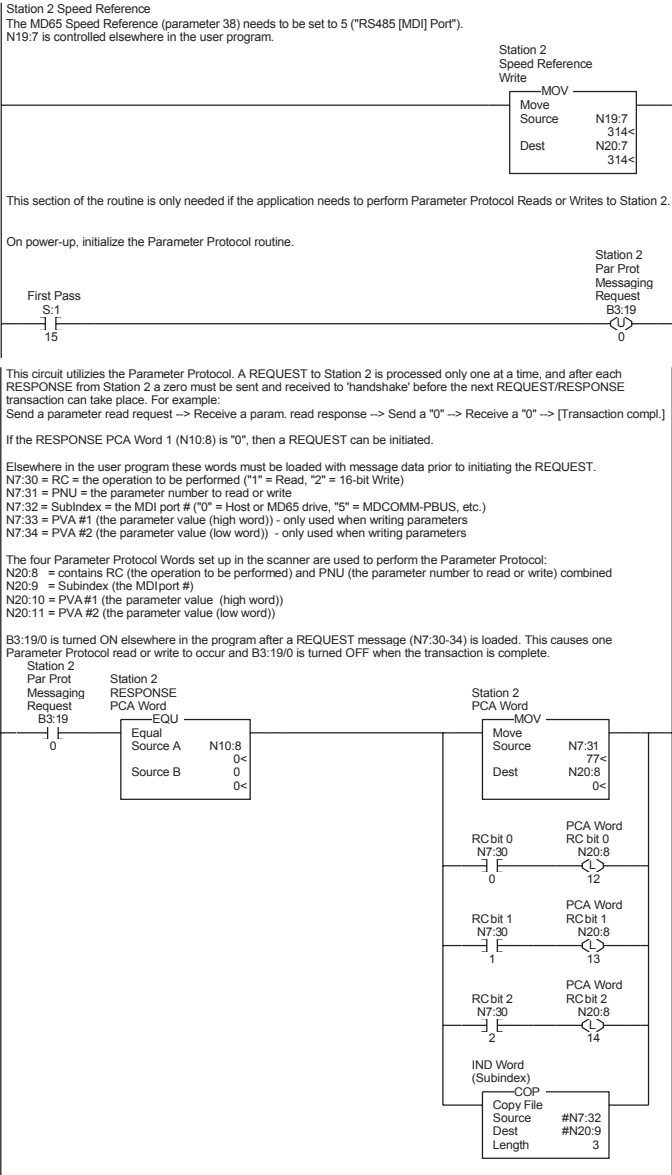
N10.2 is the Station 1 Response Parameter Access Word 1. It is <= 0 when a message has been received in response to a message request. If the response is >= 7000 hex (28672 decimal), then the adapter is responding that an error has occurred. In this case, the returned data in the response will contain a fault code and not the parameter value data.

The response message can be found at:
 N7.20 = PCA Word = contains RC and PNU
 N7.21 = Subindex = the MDI port # ("0" = Host or MD65 drive, "5" = MDCOMM-PBUS, etc.)
 N7.22 = PVA #1 = the parameter value (high word)
 N7.23 = PVA #2 = the parameter value (low word)
 The PVA's will either contain parameter read data, echo the parameter write data or contain an error code if unsuccessful.



D.1.3 Drive 1 Control/Reference/Parameter Access Routine

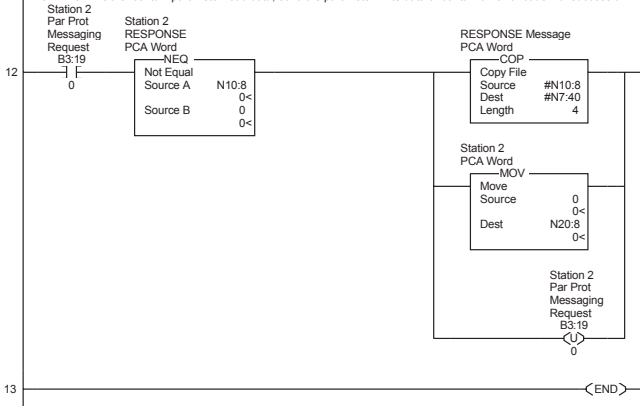




N10:8 is the Station 2 Response Parameter Access Word 1. It is <-> 0 when a message has been received in response to a message request. If the response is != 7000 hex (28672 decimal), then the adapter is responding that an error has occurred. In this case, the returned data in the response will contain a fault code and not the parameter value data.

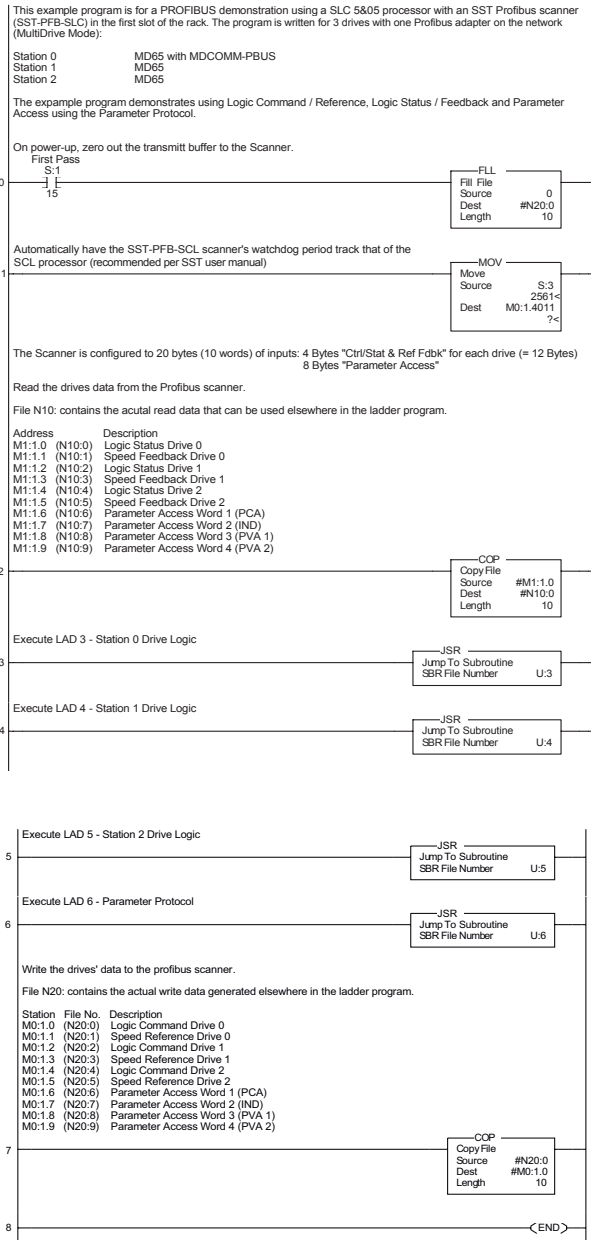
The response message can be found at:

- N7:40 = PCA Word = contains RC and PNU
 - N7:41 = Subindex = the MDI port # ("0" = Host or MD65 Drive, "5" = MDCOMM-PBUS, etc.)
 - N7:42 = PVA #1 = the parameter value (high word)
 - N7:43 = PVA #2 = the parameter value (low word)
- The PVA's will either contain parameter read data, echo the parameter write data or contain an error code if unsuccessful.

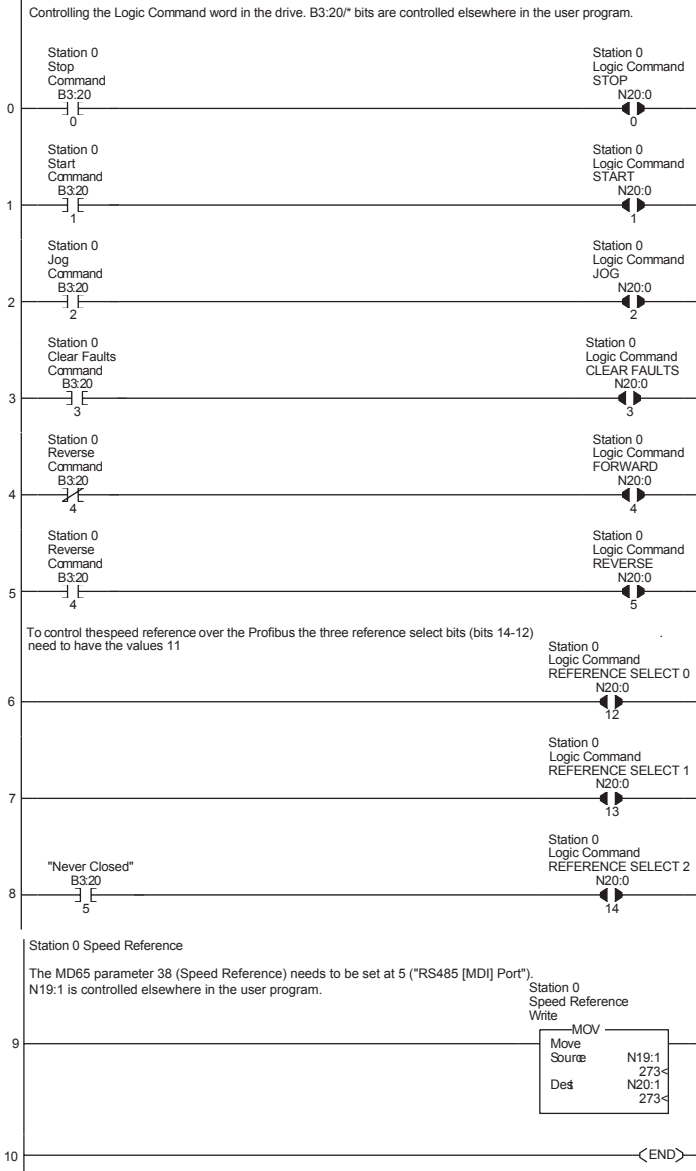


D.2 Multi-Drive Example

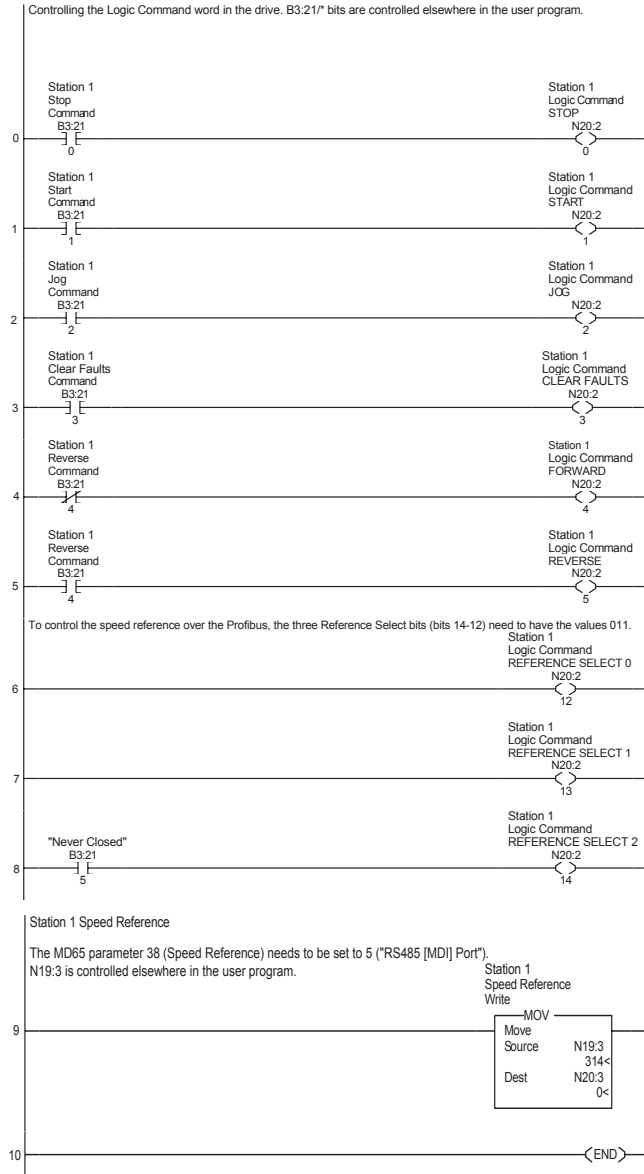
D.2.1 Main Routine



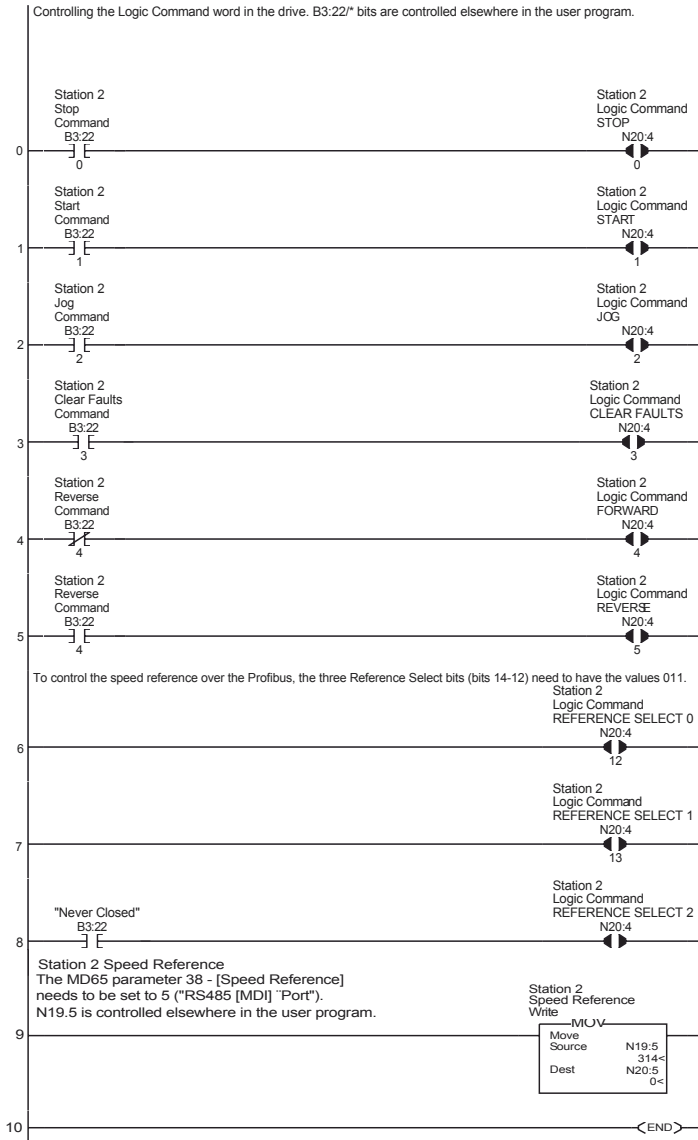
D.2.2 Drive 0 Control/Reference Routine



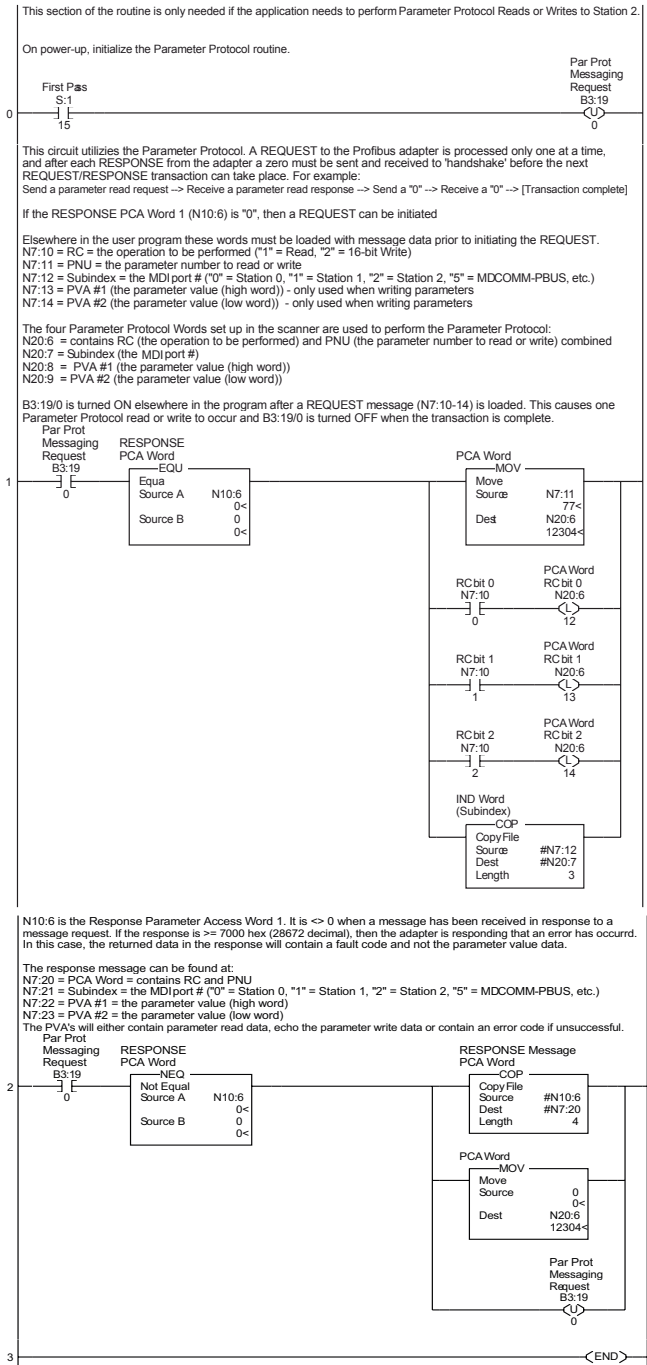
D.2.3 Drive 0-1 Control Reference Routine



D.2.4 Drive 0-2 Control/Reference Routine



D.2.5 Parameter Accessing Routine



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 MDCOMM-PBUS PROFIBUS module is an module that connects MD65 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 kpbs	1000 m
19.2 kpbs	1000 m
93.75 kpbs	1000 m
187.5 kpbs	1000 m
500 kpbs	400 m
1.5 Mbps	200 m
3 Mbps	100 m
6 Mbps	100 m
12 Mbps	100 m

MDI - Micro Drive Interface - A modification of the serial communication protocol used by various Reliance Electric drives and power products.

MDI peripheral - A device that provides an interface between MDI and a network or user. Peripheral devices are also referred to as “modules-” The serial converter and MD65 OIM are examples of MDI peripherals.

MDI product - A device that uses the MDI communications interface to communicate with one or more peripheral devices. For example, a motor drive such as a MD65 drive is a MDI product. In this manual, a MDI 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 MD65 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 and/or Reference

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

flash update - The process of updating firmware in the module. The module can be flash updated using the X-Modem protocol and a MDCOMM-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 file.

hold last - When communications are disrupted (for example, a cable is disconnected), the module and MD65 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 MD65 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 MD65 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 MD65 drive.

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

ping - A message that is sent by a MDI 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.

A

assistance, technical, 1-2

C

cables, Internal Interface, 3-9
Comm Flt Action (9), B-3
communications specifications, A-1

D

dimensions, module, A-1
DRIVE status indicator, 8-2
Drv 0 Addr (17), B-6
Drv 1 Addr (18), B-6
Drv 2 Addr (19), B-6
Drv 3 Addr (20), B-6
Drv 4 Addr (21), B-6

E

Equipment required for installation, 2-2
events
 codes and descriptions, 9-7
 viewing and clearing, 9-7
examples
 configuring a simple network, 5-1
Explicit Messaging, using, 7-1

F

fault action, setting, 4-6
fault configuration parameters,
 setting, 4-7
Flt Cfg Logic (13), B-5
Flt Cfg Ref (14), B-5

G

GSD file, adding to software library
 tool, 5-3

I

I/O configuration, 4-5
Idle Flt Action (10), B-4
installation checklist, 2-3
installing the module, 3-1 to 3-11
Internal Interface cables, 3-9

L

LCD OIM *see* OIM
Logic Command/Status words, C-1 to
 C-3
Logic Command/Status, using, C-2

M

MDI connector, 2-1
MDI I/O Active (12), B-5
MDI I/O Config (11), B-4
MDI ports, 3-9
mechanical specifications, A-1
Mode (1), B-2
Mode Jumper (J2), 2-1
Module
 Features, 1-1
module
 components, 2-1
 configuration, viewing, 4-8
 connecting to network, 3-4
 diagnostic items, 9-5
 dimensions, A-1
 installing, 3-1 to 3-11
 parameters, B-1 to B-6
 resetting, 4-7
 specifications, A-1
 troubleshooting, 9-1 to 9-8
MS status indicator, 9-3

N

NET A status indicator, 9-4
network
 connecting module to, 3-4
 connectors, 3-5

termination, 3-7
troubleshooting, 9-1 to 9-8

node address
 setting with parameter, 4-3
 setting with switches, 3-1
 switches, location of, 2-1

O

OIM (Operator Interface Module)
 configuring the module with, 4-2

P

parameter protocol, 7-1
parameters, module, B-1 to B-6
 P-DP Addr Actual (4), B-2
 P-DP Rate Actual (5), B-2
 P-DP State (24), B-6
power consumption, A-1
PROFIBUS connector, 2-1
PROFIBUS scanner, configuring, 5-1 to
 5-13
protocol, A-1
publications, related, 1-2

R

Reference/Feedback, using, C-3
regulatory compliance, A-2
Reset Module (8), B-3
resetting the module, 4-7
Rockwell Automation, getting assistance
 from, 1-2

S

specifications, A-1
SST PROFIBUS configuration software
 tool, 5-1
status indicators, 9-1
SWAP Jumper (J3), 2-1
switches, setting, 3-1

T

troubleshooting, 9-1 to 9-8

V

VS Utilities, documentation for, 1-2

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