RELIANCE ELECTRIC

DeviceNet Option Board for use with the VSM500 Integrated Drive/Motor

Instruction Manual D2-3463

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 VSM500 unit and a DeviceNet network may contain hazardous voltage levels. Before working on the VSM500 unit or DeviceNet Option board, remove power from the drive, and verify that the VSM500 unit has discharged to safe voltage levels. Failure to observe these precautions could result severe bodily injury or loss of life.

ATTENTION: Only personnel familiar with the VSM500 unit and DeviceNet should plan or implement the installation, start-up, configuration and subsequent maintenance of the VSM500 unit. Failure to observe these precautions could result in bodily injury and/or damage to equipment.

ATTENTION: Parameter 109 [DNET FAULT MODE] and **Parameter 110 [DNET IDLE MODE]** determine the action of the option and connected VSM500 unit if communications are disrupted or a scanner is put in idle mode. By default, these parameters stop the VSM500 unit. You can set them so that the VSM500 unit continues to run. Precautions should be taken to ensure that the settings of these parameters do not create a hazard. Failure to observe these precautions could result in bodily injury and/or damage to equipment.

ATTENTION: When a system is configured for the first time, the motor must be disconnected from the machine or process during initial system testing. Injury or equipment damage may occur due to unintended or incorrect machine motion. Failure to observe these precautions could result in bodily injury and/or damage to equipment.

ATTENTION: The DeviceNet Option board contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Component damage may result if ESD control procedures are not followed. Static control precautions are required when handling this product. If you are not familiar with static control procedures, refer to any applicable ESD protection handbook. Failure to observe these precautions could result in damage to equipment.

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PREFACE

The purpose of this manual is to provide you with information needed to apply the DeviceNet™ option board to the VSM500 Integrated Drive/Motor. It includes methods for installing, configuring, and troubleshooting this option board. Read this manual in its entirety before installing, operating, or servicing the VSM500 Integrated Drive/Motor with a DeviceNet option board.

Audience for this Manual

This manual is intended for qualified personnel. To use the DeviceNet option, you must understand the parameters and functions of the VSM500 Integrated Drive/Motor. You must also understand DeviceNet networks, including how slave devices operate on the network and communicate with a master.

Conventions

- Parameter numbers and names are shown in bold typeface and follow the following format: **parameter XXX [*]**. The XXX represents the parameter number in the EDS file. The [*] represents the parameter name. For example, **parameter 01 [CMD FREQUENCY]**.
- Menu commands are shown in bold typeface and follow the format **Menu > Command**. For example, if you read “Select **File > Open**,” click the File menu and then click the Open command.
- The VSM500 Integrated drive/motor is also referred to as “VSM500 unit” or “unit.”
- The DeviceNet option board is also referred to as the “option board.”

Related Documentation

Refer to the following publications as necessary for more information. Most of these Rockwell Automation publications are available online from The Automation Bookstore. The URL is: http://www.theautomationbookstore.com/

- D2-3400 VSM500 Integrated Drive/Motor User Manual
- DN-2.5 DeviceNet Product Overview
- 1485-6.7.2 DeviceNet Cable System Planning and Installation Manual
- 1787-6.5.3 DeviceNet Manager Software User Manual
- 1771-5.14 DeviceNet Scanner Module Installation Instructions
- 1771-6.5.118 DeviceNet Scanner Module Configuration Manual
- 9399-RL53GR RSLogix 5 Getting Results Guide
- 9399-RL50GR RSLogix 500 Getting Results Guide
- 9398-DNETGR RSNetWorx for DeviceNet Getting Results Guide
- 1747-5.8 DeviceNet Scanner Module Installation Instructions
- 1747-6.5.2 DeviceNet Scanner Module Configuration Manual

Getting Assistance from Reliance Electric

If you have any questions or problems with the products described in this instruction manual, contect your local Reliance Electric sales ofice. For technical assistance, call 1-800-726-8112.

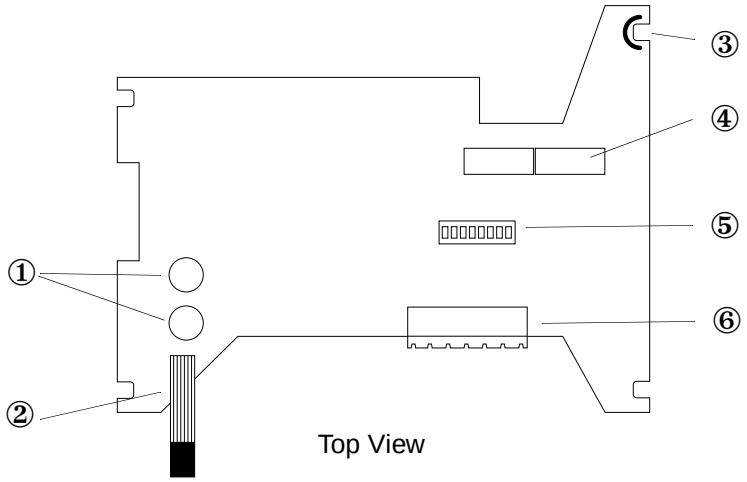
CHAPTER 1

Getting Started

This chapter provides an overview of the VSM500 DeviceNet option board and the steps that you need to start using it.

1.1 Components

The following figure illustrates some of the DeviceNet option board components.



Top View

#	Part	Description
1	Access to Unit Switches	Rotary switches and DIP switches on the VSM500 unit can be accessed through the holes and underneath the DeviceNet option board.
2	Unit Cable	A ribbon cable that connects to the VSM500 unit.
3	Ground	A ground for the DeviceNet option board. When the lock washer and a screw from the installation kit are secured in the upper right corner, the option board is grounded.
4	Label	Labels identifying the ASA serial number, manufacture date, manufacturer, catalog number, and firmware release.
5	DIP Switches	Switches that you set to configure the node address and data rate.
6	DeviceNet Connector	A DeviceNet connector that will accept an open-style linear plug.
	Installation Kit (not shown)	An installation kit consisting of one grounding wrist strap, one 10-pin open-style linear plug for DeviceNet, screws, and a lock washer. These items are used to secure the DeviceNet option board to the VSM500 unit and connect it to the network.

Figure 1.1 – DeviceNet Option Board Components

1.2 Option Features

The DeviceNet option board supports the following:

- Polled I/O, change of state, and cyclic data exchange
- Explicit messaging
- Explicit Unconnected Message Manager (UCMM)
- Autobaud
- Self-generating EDS files
- Faulted node recovery
- Parameters for the VSM500 unit and for the DeviceNet option board

1.3 Required Equipment

The following equipment is supplied with the DeviceNet option board. When unpacking your DeviceNet option board, verify that the package contains the following:

- DeviceNet option board
- One open-style 10-pin linear plug for DeviceNet
- Screws and a washer
- Grounding wrist strap
- This user manual

The following equipment is user-supplied. Before attempting to install or configure the DeviceNet option board, verify that you have the following:

- Small flathead and small Phillips screwdrivers
- DeviceNet cable. Refer to the DeviceNet Cable System Planning and Installation Manual.
- Tools for configuring the DeviceNet network and devices on it (e.g., a computer running DeviceNet Manager or RSNetWorx). For information on these products, refer to the Preface.
- Tools for configuring the processor and scanner on the network. For example, a computer running RSLogix5 or RSLogix500. For information on these products, refer to the Preface.

1.4 Quick Start

This quick start is for users who have previously installed and configured a DeviceNet network and Rockwell Automation drives. It may help reduce the time of installation. Because this is a start up guide for experienced users, it does not contain detailed instructions. It does, however, reference other chapters in this manual where detailed information can be found.

Important: If you have questions or are unfamiliar with a term or step, always read the referenced chapters or related documentation.

Steps		Reference
1	**Review the Attention statements for this product.**	Throughout this manual.
2	**Verify that you have all required equipment.**	Chapter 1
3	**Ensure that the VSM500 unit is correctly installed and wired.**	VSM500 Integrated Drive/Motor user manual
4	**Install the DeviceNet option board on the VSM500 unit.** Mount and secure the option on the VSM500 unit. Ground the option by using a screw and lock washer in top right corner (Figure 1.1). Then, connect the ribbon cable on the DeviceNet board to the VSM500 unit.	Chapter 2
5	**Connect the DeviceNet option board to the network.** Use a DeviceNet cable to connect the option to the DeviceNet network.	Chapter 2
6	**Commission the VSM500 unit for the DeviceNet network.** Set the switches on the drive and DeviceNet option board. On the VSM500 unit, DIP switch 10, which enables parameters, must be set to On before power is applied to the VSM500 unit. On the DeviceNet option board, the DIP switches must be set so that the VSM500 unit has a unique DeviceNet address and uses the data rate used by the network.	Chapter 2
7	**Apply power to the VSM500 unit and network.** Verify that the VSM500 unit is properly installed and configured (e.g., a unique node address and the correct data rate). Apply power to the network and then to the VSM500 unit. The COMM status indicator flashes green for 1/4 second, red for 1/4 second, and then goes blank while the option finishes its initialization. If the COMM status indicator goes red, there is a problem. Refer to Chapter 7 for troubleshooting information.	Chapter 2
8	**Apply power to the DeviceNet master and other devices on the network.** Verify that the master and network are installed and functioning in accordance with DeviceNet standards, and then apply power to them.	DeviceNet Cable System Planning and Installation Manual
9	**Configure the unit for your application.** Use software such as RSNetWorx to set the parameters in the drive. If you set both baud rate switches to On, you must set the parameters for the node address and data rate. To receive control I/O and a reference via the DeviceNet network, you must set the parameters for start source, speed reference source, output assembly, and input assembly. In addition, you should verify that the settings of the fault mode and idle mode parameters meet the needs of your application.	Chapter 3 Appendix B
10	**Configure the DeviceNet scanner.** Use software such as RSNetWorx to configure the scanner to communicate with the VSM500 unit.	Chapter 4
11	**Create a ladder logic program.** Create a ladder logic program that uses I/O to control the drive and/or explicit messages to monitor and program the drive.	Chapter 5 Chapter 6

CHAPTER 2

Installing the DeviceNet Option Board

This chapter provides instructions for installing and wiring the DeviceNet option board on the VSM500 Integrated Drive/Motor.

Read this chapter and referenced information completely before you attempt to install or configure the DeviceNet option board. Before you apply power, review the attention statements on the inside front cover of this manual.

2.1 Preparing for the Installation

Before installing the drive, do the following:

- Read and understand the DeviceNet Cable System Planning and Installation Manual. See the Preface in this manual for how to obtain this manual.
- Read and understand the VSM500 Integrated Drive/Motor User Manual.
- Verify that you have the required equipment. Refer to Chapter 1.

2.2 Complying with EMC Directive 89/336/EEC

This product complies with Electromagnetic Compatibility (EMC) Directive 89/336/EEC when conforming with the following installation requirements:

- The essential requirements for a conforming installation for the VSM500 Integrated Drive/Motor are employed as specified in the *VSM500 Integrated Drive/Motor User Manual*.

2.3 Complying with Low Voltage Directive 73/23/EEC

This product complies with Low Voltage Directive 73/23/EEC when conforming with the following installation requirements:

- The essential requirements for a conforming installation for the VSM500 Integrated Drive/Motor are employed as specified in the VSM500 Integrated Drive/Motor User Manual.
- Review the Safety Precautions on the inside front cover of this manual and the Attention statements throughout this manual prior to installation of the option.

2.4 Connecting the Option to the VSM500 Unit

ATTENTION: A VSM500 Integrated Drive/Motor and DeviceNet network may contain voltages that can cause injury or death. Remove power from the VSM500 unit and network, and then verify that bus voltage has discharged to a zero before working on them. Failure to observe these precaution could result in severe bodily injury or loss of life.

ATTENTION: The option 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 drive. If you are unfamiliar with static control procedures, refer to any applicable ESD protection handbook. Failure to observe these precaution could result in damage to equipment.

Step 1. Verify that power has been removed from the VSM500 unit and network.

Step 2. Use static control precautions.

Step 3. Remove the cover on the VSM500 unit by loosening the four cover screws (see figure 2.1). The display cable is designed to disconnect when the cover is removed.

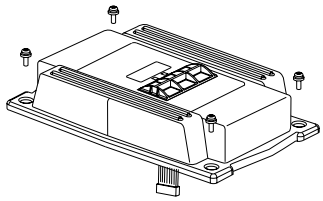


Figure 2.1 – Removing the Cover

Step 4. Mount the DeviceNet option board. Tighten all screws to 2.6 Nm (23 in-lb.). Use the washer in the location shown in figure 2.2 to ground the option board.

Step 5. Connect the unit cable on the DeviceNet option board to connector P3 on the VSM500 unit. Connector P3 is next to the control signal terminal block.

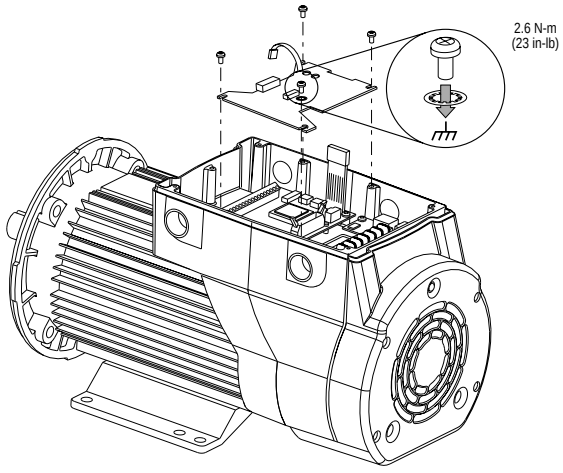


Figure 2.2 – Mounting the DeviceNet Option Board

Step 6. Before reconnecting the cover (shown in figure 2.5), commission the VSM500 unit and connect it to the network (instructions in sections 2.5 and 2.6).

2.5 Commissioning the VSM500 Unit for DeviceNet

ATTENTION: Pen ink or pencil lead may damage the switches on the DeviceNet option board. Do not use a pen or pencil to set the switches. Failure to observe these precaution could result in damage to equipment.

Step 1. Verify that power has been removed from the VSM500 unit and network.

Step 2. On the VSM500 Integrated drive/motor, set the drive setup DIP switch in position 10. The setting takes effect when the VSM500 unit first receives power. Cycle power after changing this setting.

Table 2.1 – Drive Setup Switch 10 Settings

Setting	Description
0 (OFF)	VSM500 unit uses settings of DIP switches and rotary switches. You can use DeviceNet only for monitoring the VSM500 unit.
1 (ON)	VSM500 unit uses settings of parameters in EEPROM. You can use DeviceNet to program, control, and monitor the VSM500 unit.

Important: The drive requires a stop input at the control terminal bock, regardless of the setting of **parameter 34 [START SOURCE]**.

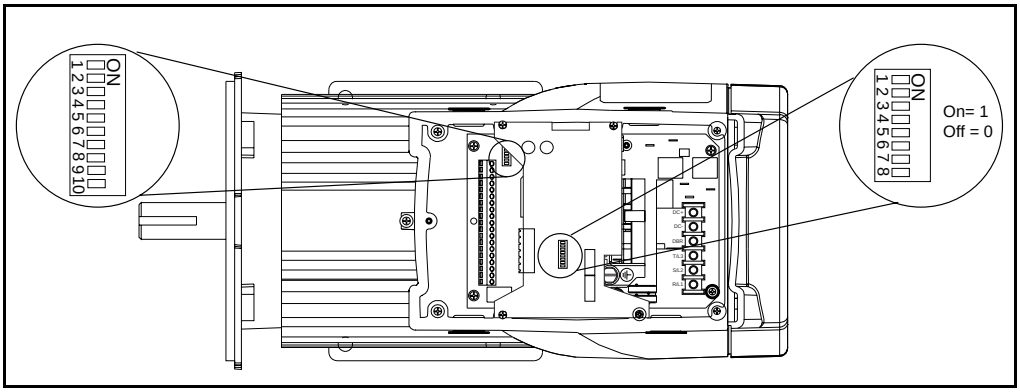


Figure 2.3 – Switches on the VSM500 Drive Unit and DeviceNet Option Board

Step 3. On the DeviceNet option board, set switches 6 through 1 to a unique DeviceNet address between 0 and 63. The default switch setting is 63.

Table 2.2 – DeviceNet Option Board Switch Settings (Switches 1-6)

Node Address[1]	Switch 6 ----> 1	Node Address[1]	Switch 6 ----> 1	Node Address[1]	Switch 6 ----> 1	Node Address[1]	Switch 6 ----> 1
0	000000	16	010000	32	100000	48	110000
1	000001	17	010001	33	100001	49	110001
2	000010	18	010010	34	100010	50	110010
3	000011	19	010011	35	100011	51	110011
4	000100	20	010100	36	100100	52	110100
5	000101	21	010101	37	100101	53	110101
6	000110	22	010110	38	100110	54	110110
7	000111	23	010111	39	100111	55	110111
8	001000	24	011000	40	101000	56	111000
9	001001	25	011001	41	101001	57	111001
10	001010	26	011010	42	101010	58	111010
11	001011	27	011011	43	101011	59	111011
12	001100	28	011100	44	101100	60	111100
13	001101	29	011101	45	101101	61	111101
14	001110	30	011110	46	101110	62	111110
15	001111	31	011111	47	101111	63	111111

[1]If switches 7 and 8 are both On (1), then the DeviceNet option board uses the node address from **parameter 103 [NV MAC ID]**. The default parameter setting is 63.

Step 4. On the DeviceNet option board, set switches 7 and 8 to select the data rate at which the network is operating. The default switch setting is to use the setting of **parameter 104 [NV BAUD RATE]**.

Table 2.3 – DeviceNet Option Board Switch Settings (Switches 7-8)

Data Rate	Switch 8	Switch 7
125 kBPS	0	0
250 kBPS	0	1
500 kBPS	1	0
Set by **parameter 104 [NV BAUD RATE]**[1]	1	1

[1]The default parameter setting is autobaud.

2.6 Connecting the DeviceNet Option Board and VSM500 Unit to the Network

Step 1. Verify that power has been removed from the VSM500 unit and network.

Step 2. Connect a DeviceNet cable to the network.

Important: Maximum cable length depends on data rate. Refer to the DeviceNet Cable System Planning and Installation Manual.

Step 3. Connect a Linear plug to the DeviceNet cable.

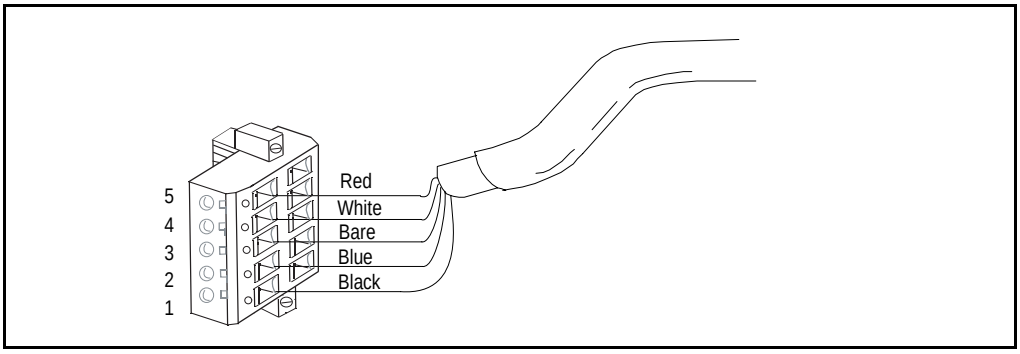


Figure 2.4 – Connecting a 10-Pin Linear Plug to the Cable

Table 2.4 – Linear Plug Terminal Connections

Terminal	Color	Signal	Function
5	Red	VDC+	Power Supply
4	White	CAN_H	Signal High
3	Bare	SHIELD	Shield
2	Blue	CAN_L	Signal Low
1	Black	COMM	Common

Step 4. Connect the DeviceNet cable to the VSM500 unit. Figure 2.5 shows an example.

2.7 Reinstalling the Cover on the VSM500 Unit

ATTENTION: The cover screws must be securely tightened in order to properly ground the cover. Verify that all four cover screws are tightened to 1.46 Nm (13 in-lb) before applying power to the VSM500 unit. Failure to obsere this precaution could result in severe bodily injury or loss of life.

Step 1. Connect the display cable and install the cover (see figure 2.5).

Step 2. Tighten the screws on the cover to 1.46 Nm (13 in-lb).

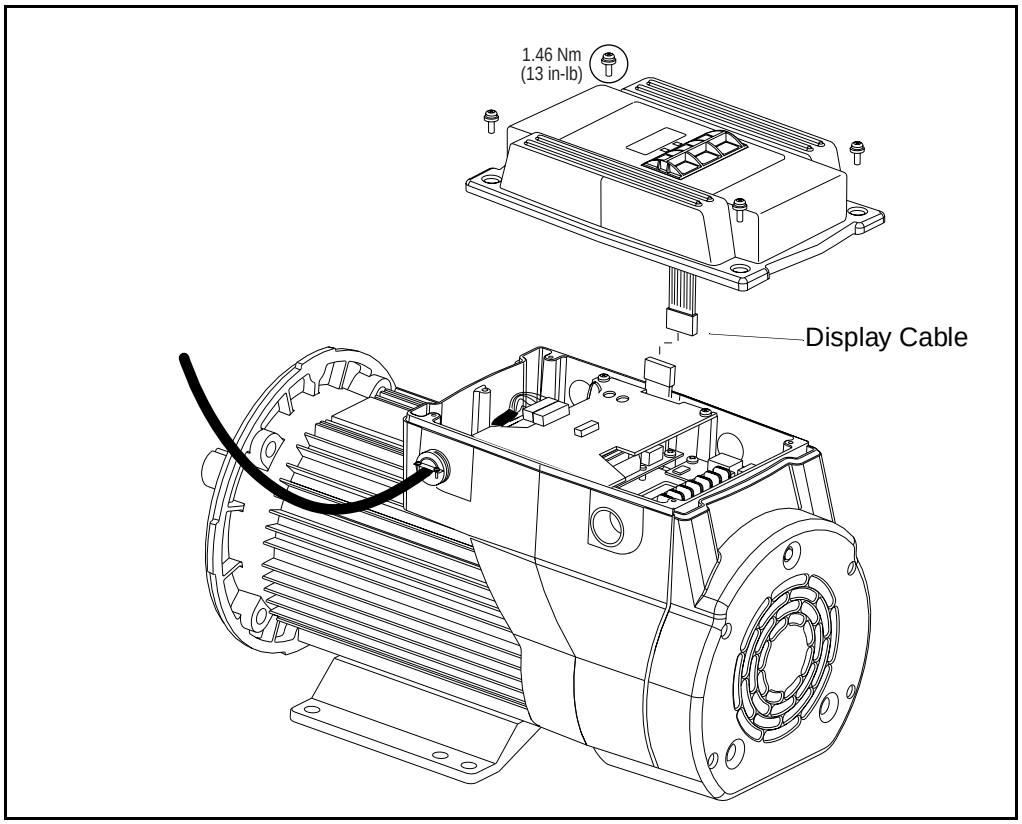


Figure 2.5 – Reinstalling the Cover

2.8 Applying Power

ATTENTION: Unpredictable operation may occur if you fail to verify that connections and switch settings are compatible with your application. Verify that connections and parameter settings are compatible with your application before applying power to the VSM500 unit. Failure to observe this precaution could result in severe bodily injury or loss of life.

Step 1. Apply power to the network.

Step 2. Apply power to the VSM500 unit. The DeviceNet option board receives its power from the VSM500 unit and from the network. When you apply power to the option board for the first time, the COMM status indicator flashes green for 1/4 second, red for 1/4 second, and then turns off while the option board finishes its initialization. If it stays red, there is a problem. Refer to chapter 7 for troubleshooting information.

Step 3. Verify that the option board is set for the correct data rate and has a unique node address. If a new data rate or address is needed, reconfigure the option board switches (see section 2.5). If switches 7 and 8 are On, create a point-to-point connection to the option board with a configuration tool to set its data rate and node address parameters (see chapter 3).

Step 4. Apply power to the master device (scanner) and other network devices.

CHAPTER 3

Configuring the VSM500 Unit and DeviceNet Option Board

This chapter provides information and instructions for configuring the VSM500 Integrated drive/motor and DeviceNet option board to communicate on a DeviceNet network.

This chapter does not contain information on all possible configurations. Refer to Appendix B in this manual for a complete list of parameters. Refer to the VSM500 Integrated Drive/Motor User Manual for information on configuring the VSM500 unit.

Important: In order to configure a VSM500 unit and DeviceNet option board, they must be properly installed, commissioned for the DeviceNet network, and powered (see chapter 2).

3.1 Configuration Tools

The VSM500 Integrated drive/motor and DeviceNet option board act as a single device on the DeviceNet network. You can determine how it behaves by setting parameters using DeviceNet Manager or RSNetWorx for DeviceNet as a software configuration tool.

This manual contains instructions for using DeviceNet Manager with a VSM500 unit and SLC scanner. Note that explicit messaging can also be used to configure the VSM500 unit and DeviceNet option board. Refer to chapter 6.

3.2 Going Online with DeviceNet Manager

You can configure a VSM500 unit/DeviceNet option board device offline and then download the configuration, or you can configure it online. We recommend configuring it online.

Step 1. Start DeviceNet Manager.

Step 2. Select **Utilities > Set Up Online Connection** to display the DeviceNet Driver Selection dialog box.

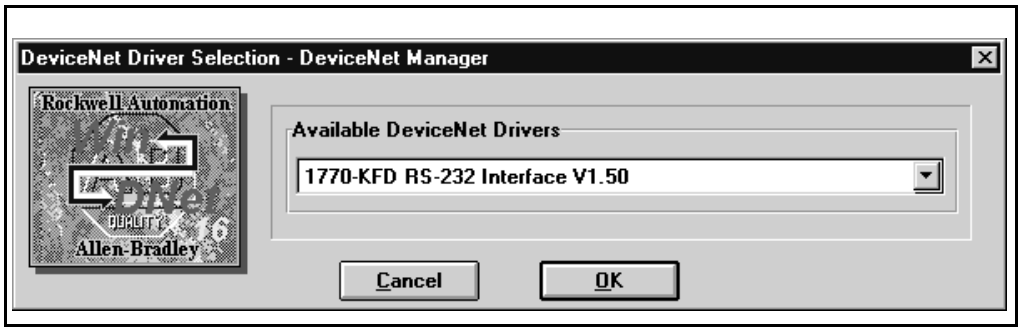


Figure 3.1 – DeviceNet Driver Selection Dialog Box

Step 3. Under Available DeviceNet Drivers, select a DeviceNet driver, and then click **OK**. The Driver Configuration dialog box appears.

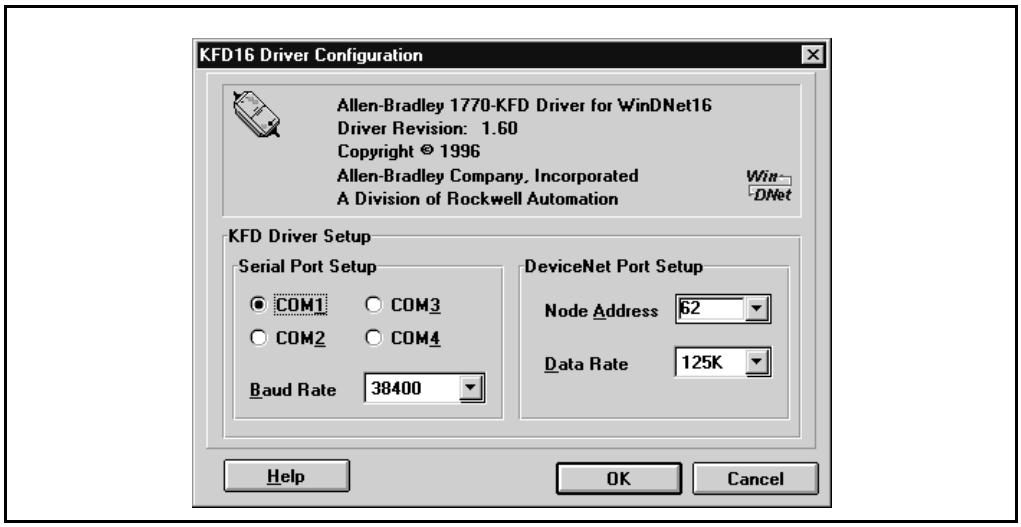


Figure 3.2 – Driver Configuration Dialog Box

Step 4. Select the appropriate settings for the following:

Box	Description
Serial Port Setup	Select the communications port on your computer to which the DeviceNet adapter is connected.
Baud Rate	Select the baud rate that is used by your computer communications port.
Node Address	Type a unique node address for the computer on the DeviceNet network. Usually, computers use the node address 62. Do not use 63 because this is the factory-default setting for new devices on the network.
Data Rate	Select the data rate that devices on the DeviceNet network are using.

Step 5. Click **OK** to go online. The online icon is displayed under Comm in the lower right corner of the main window.

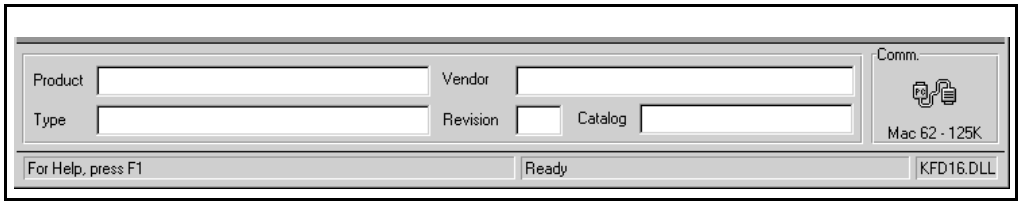


Figure 3.3 – DeviceNet Manager in Online Mode Icon

3.3 Creating an EDS File

After you go online, you can download an EDS (Electronic Data Sheet) file from any device on the network. An EDS file is a specially formatted ASCII file that provides all the information necessary for a configuration tool such as DeviceNet Manager to access and edit the parameters in a device. To create an EDS file for a VSM500 unit with a DeviceNet option board:

Step 1. Select **Utilities > Create EDS Stub** to display the Create EDS Stub dialog box.

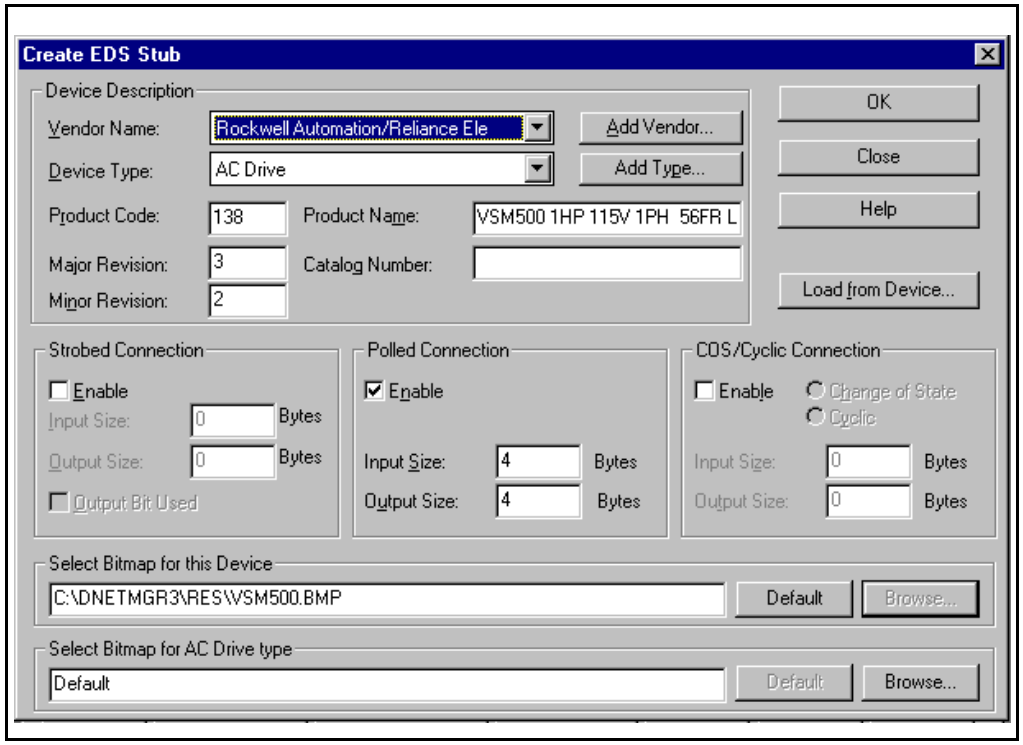


Figure 3.4 – Create EDS Stub Dialog Box

Step 2. Under Polled Connection, select **Enable** (a check appears), type **4** into the Input Size box, and type **4** into the Output Size box.

Step 3. Click **Load from Device**. The Load from Device dialog box appears.

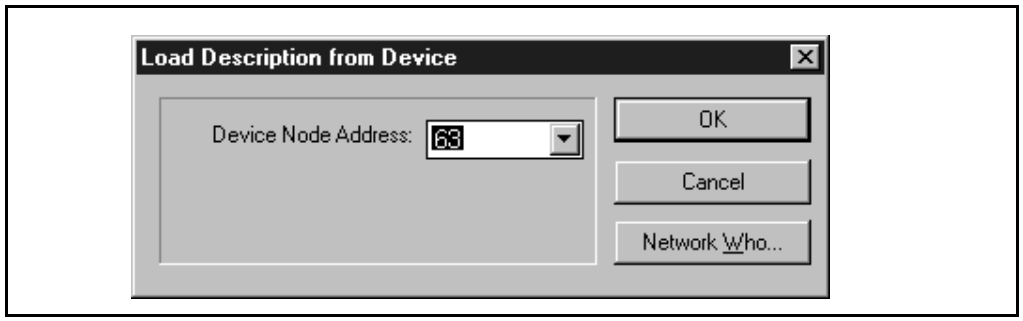


Figure 3.5 – Load from Device Dialog Box

Step 4. Type the node address of the VSM500 unit and DeviceNet option board, and then click **OK**. DeviceNet Manager downloads an EDS file. When it is finished, the Create EDS Stub dialog box reappears.

Step 5. Under Select Bitmap for this Device in the Create EDS Stub dialog box (see figure 3.4), click **Browse**. An Open dialog box appears.

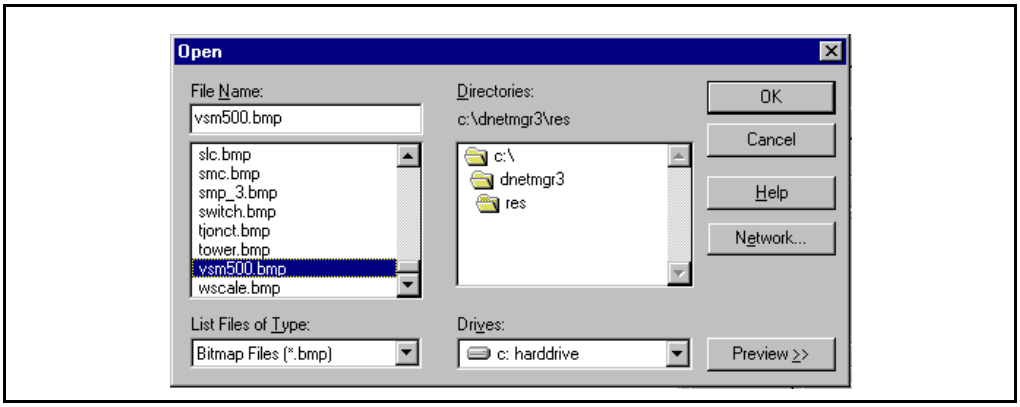


Figure 3.6 – Open Dialog Box

Step 6. Select the **VSM500.bmp** in the list box, and then click **OK**. The Create EDS Stub dialog box reappears.

Step 7. Click **OK**. A DeviceNet Manager message box appears and asks if you want to save the EDS file to the EDS library.

Step 8. Click **OK** to save the EDS file. The EDS Description dialog box appears.

Step 9. Type a description (if desired), and then click **OK**. The EDS file, description (if added), and icon that represents the VSM500 unit are saved. The new icon will appear the next time you scan the network.

3.4 Accessing Parameters in the VSM500 Unit and Device Option Board

The parameters in the VSM500 unit and the connected DeviceNet option board can be accessed with DeviceNet Manager. To access parameters:

Step 1. Select **Who > Network Who**. The Network Who window appears, and DeviceNet Manager scans the network for devices. You can wait for it to scan the entire network, or click Stop after it displays your VSM500 unit.

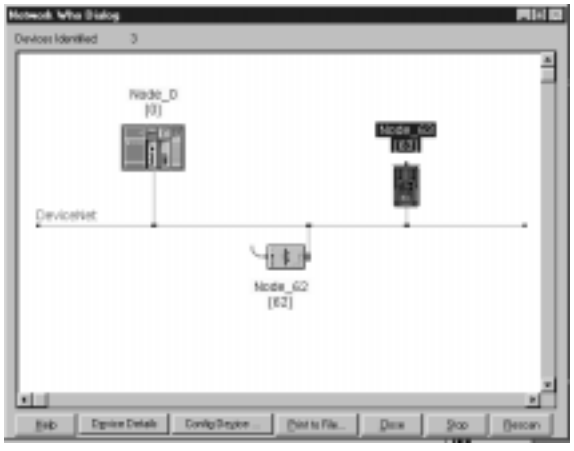


Figure 3.7 – Example Network Who Window

Step 2. Double-click the icon for the VSM500 unit. The Device Configuration - Enhanced Mode dialog box appears.

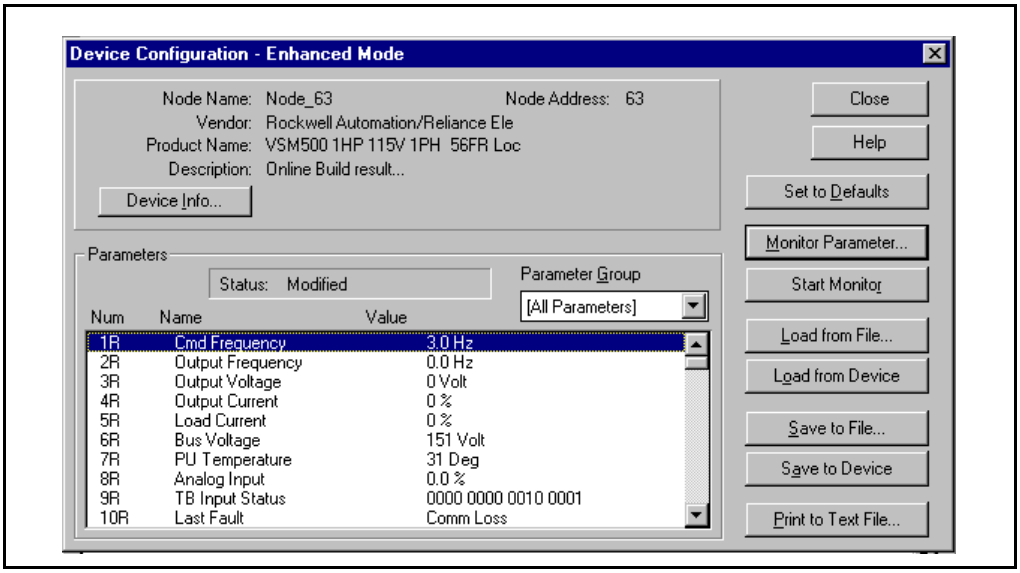


Figure 3.8 – Device Configuration - Enhanced Mode Dialog Box

Parameters for the VSM500 unit and DeviceNet option board are displayed under Parameters. You can either scroll through the parameters in the list, or you can select a specific group of parameters in the Parameter Group box. Appendix B contains a complete list of the parameters and parameter groups for the VSM500 unit and DeviceNet option board.

3.5 Setting the Node Address

If switches 7 and 8 on the DeviceNet option board are On, the value of parameter 103 [NV MAC ID] determines the node address. By default, this parameter sets the node address to 63. We recommend changing the node address to a new, unique node address because all new devices use 63 as a default node address.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 103 [NV MAC ID]**. The Device Configuration - Modify Numeric Parameter dialog box appears.

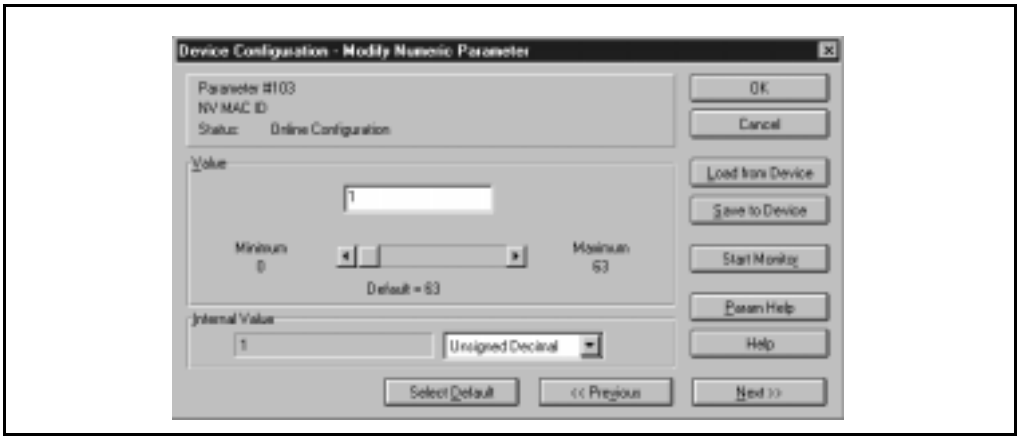


Figure 3.9 – Modifying the Node Address Parameter

Step 2. Type a unique node address, and then click **Save to Device**.

Step 3. Click **OK** to close the dialog box.

Step 4. Reset the DeviceNet option board. The new setting for this parameter will take effect after a reset. See section 3.13 for more information.

After setting a new node address, you must scan the network. DeviceNet Manager will then display the new address in the Network Who window (see figure 3.7) and be able to communicate with the drive so that future parameter changes take place.

3.6 Setting the Data Rate

If switches 7 and 8 on the DeviceNet option board are On, the value of parameter 104 [NV BAUD RATE] determines the data rate at which the unit communicates on the network. By default, this parameter sets the data rate to autobaud. If another device on the network is setting a specific DeviceNet data rate, use autobaud to automatically set the adapter to it. Otherwise, you must set the parameter to the data rate at which the network is operating.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 104 [NV BAUD RATE]**. The Device Configuration - Modify Enumerated Parameter dialog box appears.

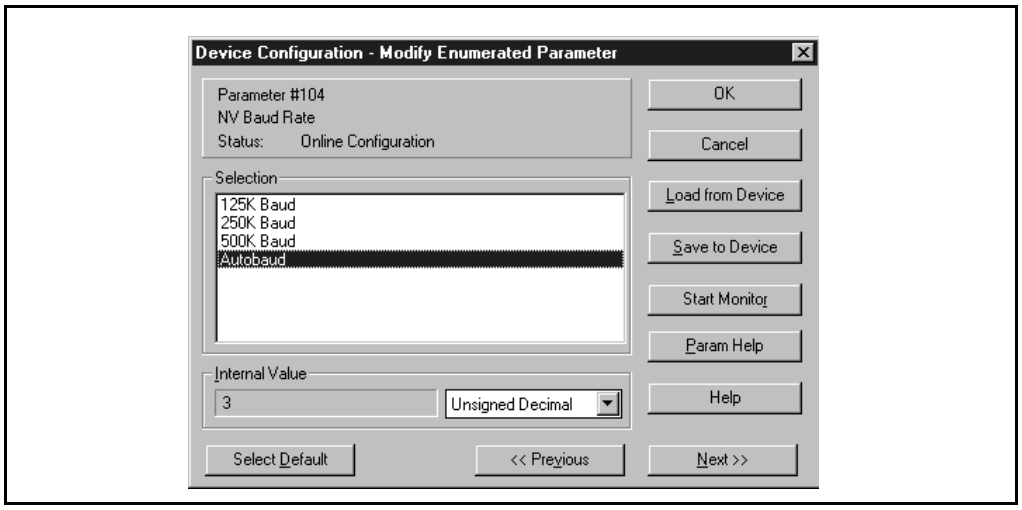


Figure 3.10 – Modifying the Data Rate Parameter

Step 2. Select the data rate at which the network is operating or autobaud, and then click **Save to Device**.

Step 3. Click **OK** to close the dialog box.

Step 4. Reset the DeviceNet option board. The new setting for this parameter will take effect after a reset. See section 3.13. See section 3.13 for more information.

Step 5. The VSM500 unit will fault after it is reset because it will not be operating at the same data rate as other devices (e.g., the computer) on the network. Clear the fault.

Communications with DeviceNet Manager will be disrupted because the VSM500 unit and DeviceNet Manager will not be operating at the same data rate. Disconnect the software and then reconnect at the new data rate.

3.7 Selecting Input and Output Assemblies

The VSM500 unit uses Assembly Objects to send data to and from a scanner over an I/O connection. The terms *input* and *output* are defined from the scanner's point of view. An output assembly is the information that is *output* by the scanner and consumed by the VSM500 unit. An input assembly is the status data that is sent by the VSM500 unit and consumed as *input* by the scanner. Refer to Chapter 5 for a discussion on control I/O and assemblies.

DeviceNet **parameters 107 [OUTPUT ASSEMBLY]** and **108 [INPUT ASSEMBLY]** must be set with the output or input assembly for your system.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 107 [OUTPUT ASSEMBLY]**. The Device Configuration - Modify Numeric Parameter dialog box appears.

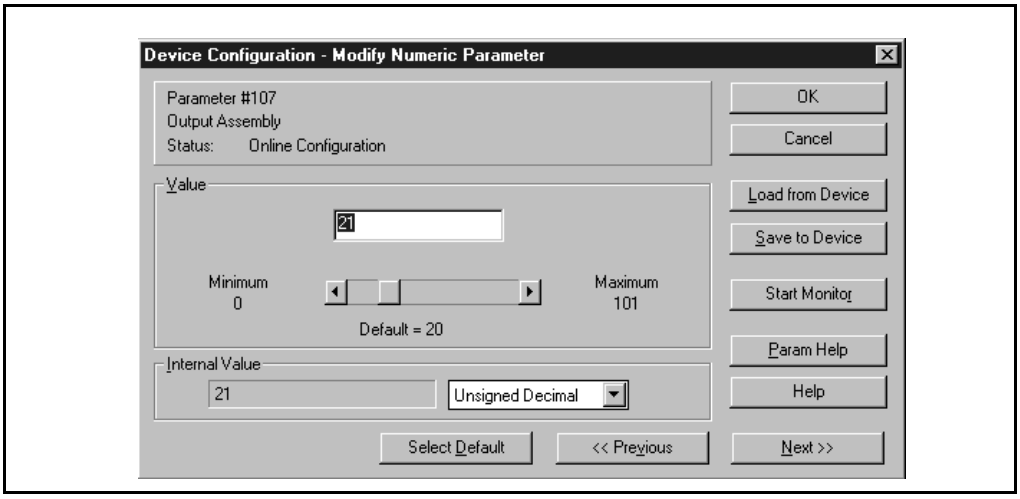


Figure 3.11 – Modifying the Output Assembly Parameter

Step 2. Select the desired assembly number, and then click **Save to Device**. Refer to the Parameter List in Appendix B for a list of values.

Step 3. Click **OK** to close the dialog box.

Step 4. Repeat steps 1 through 3 for **parameter 108 [INPUT ASSEMBLY]**.

3.8 Enabling Network Control

In order for a scanner to control the VSM500 unit (e.g., start or stop), the VSM500 unit must be configured to accept commands from the network.

ATTENTION: Changing the source of control may cause unpredictable network conditions, resulting in equipment damage, injury, or death. Ensure that you understand how a change affects your application. Failure to observe these precautions could result in severe bodily injury or loss of life.

Important: The drive requires a stop input at the control terminal bock, regardless of the setting of **parameter 34 [START SOURCE]**.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 34 [START SOURCE]**. The Device Configuration - Modify Enumerated Parameter dialog box appears.

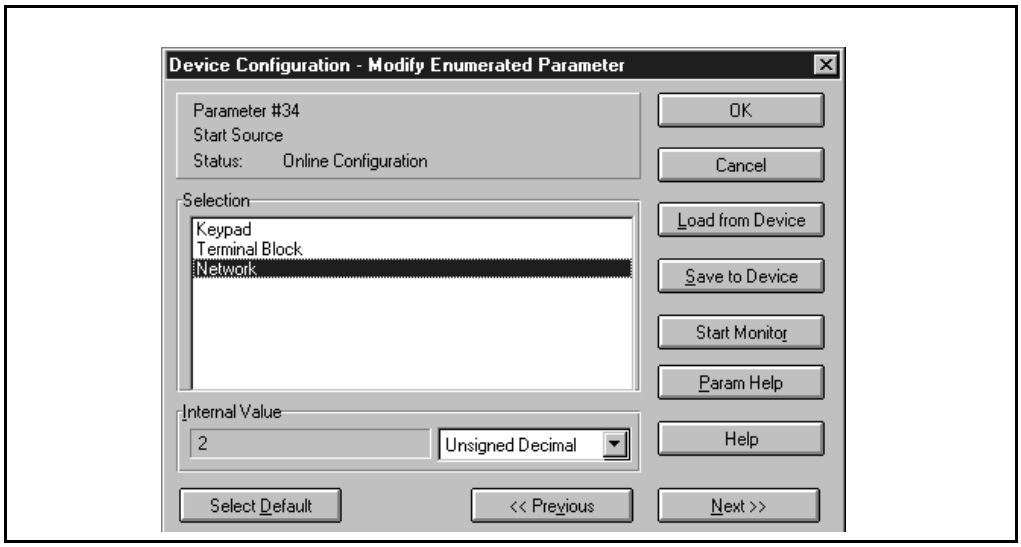


Figure 3.12 – Modifying the Network Control Parameter

Step 2. Select **Network**, and then click **Save to Device**.

Step 3. Click **OK** to close the dialog box.

3.9 Enabling Network Speed Reference

In order for a scanner to change the speed of the VSM500 unit, the unit must be configured to accept its speed reference from the network.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 36 [SPEED REF SOURCE]**. The Device Configuration - Modify Enumerated Parameter dialog box appears.

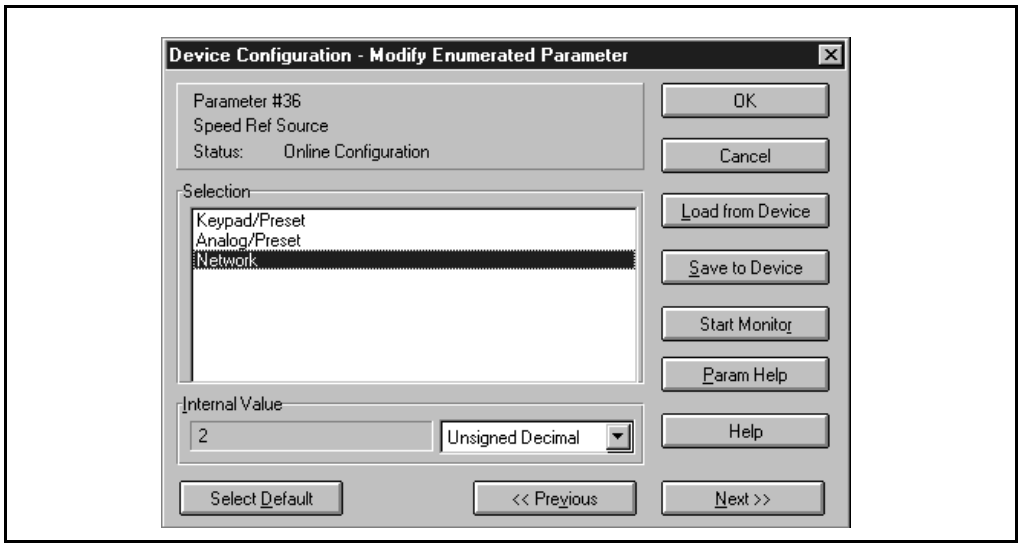


Figure 3.13 – Modifying the Speed Reference Parameter

Step 2. Select **Network**, and then click **Save to Device**.

Step 3. Click **OK** to close the dialog box.

3.10 Setting the Communications Fault Action

The communications fault action determines how the VSM500 unit and DeviceNet option board respond when communications are disrupted (e.g., disconnected cable). By default, the VSM500 unit is faulted and stopped. You can change this setting if your application requires a different setting.

ATTENTION: Parameter 109 [DNET FAULT MODE] determines the action of the option and connected VSM500 unit if communications are disrupted. By default, this parameter faults and stops the VSM500 unit. You can set this parameter so that the VSM500 unit continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard of injury or equipment damage. Failure to observe these precautions could result in bodily injury or damage to equipment.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 109 [DNET FAULT MODE]**. The Device Configuration - Modify Boolean Parameter dialog box appears.

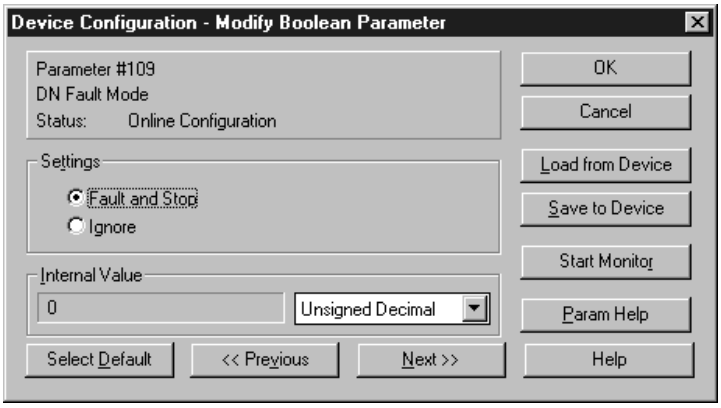


Figure 3.14 – Modifying the Fault Action Parameter

Step 2. Select the appropriate setting for your application, and then click **Save to Device.**

Setting	Description
Fault and Stop	The VSM500 unit is faulted and stopped.
Ignore	The disruption is ignored and the VSM500 unit continues to run. If this setting us used, another method of stopping the drive must be available (via the Function Loss terminal or the Stop terminal).

Step 3. Click **OK** to close the dialog box.

3.11 Setting the Idle Action

The idle action determines how the VSM500 unit and DeviceNet option board respond when the scanner is placed in idle/program mode. By default, the VSM500 unit is sent zero data. You can change these settings if your application requires it.

ATTENTION: Parameter 110 [DNET IDLE MODE] determines the action of the option and connected VSM500 unit if the scanner is placed in idle mode. By default, this parameter sends zero data to the unit. You can set this parameter so that the unit continues to run. Precautions should be taken to ensure that the setting of this parameter does not create a hazard. Failure to observe these precautions could result in bodily injury or damage to equipment.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 110 [DNET IDLE MODE]**. The Device Configuration - Modify Boolean Parameter dialog box appears.

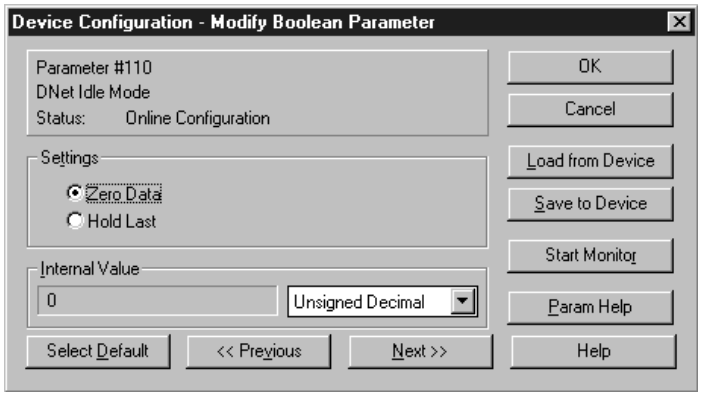


Figure 3.15 – Modifying the Idle Action Parameter

Step 2. Select the appropriate setting for your application, and then click **Save to Device**.

Setting	Description
Zero Data	The VSM500 unit is sent 0 for output data when the scanner is in idle mode. This stops the VSM500 unit.
Hold Last State	The VSM500 unit continues in its present state after the scanner is in idle mode. This may not stop the VSM500 unit. If this setting us used, another method of stopping the drive must be available (via the Function Loss terminal or the Stop terminal).

Step 3. Click **OK** to close the dialog box.

3.12 Setting the COS (Change of State) Mask

If you are using COS data exchange, you need to set a mask. The mask determines which bits in the network status can trigger an I/O message.

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 112 [CHANGE OF STATE]**. The Device Configuration - Modify Bit Parameter dialog box appears.

Figure 3.16 – Modifying the Change of State Mask

Step 2. Select the bits (an “X” appears) that you want reviewed for changes, and then click **Save to Device**.

Step 3. Click **OK** to close the dialog box.

3.13 Resetting the Devicenet Option Board

ATTENTION: Resetting the option may fault the VSM500 unit, resulting in equipment damage, injury, or death. Ensure that the VSM500 unit can stop safely before resetting it. Failure to observe this precaution could result in severe bodily injury or loss of life.

For changes to some parameters in the option board to take effect, you must reset the option board. **Parameter 113 [RESET]** can be used to reset the option board, restore the option board parameters to their factory default settings, or restore the drive parameters to their factory default settings. To reset the option:

Step 1. In the Device Configuration - Enhanced Mode dialog box (see figure 3.8), double-click **parameter 113 [RESET]**. The Device Configuration - Modify Enumerated Parameter dialog box appears.

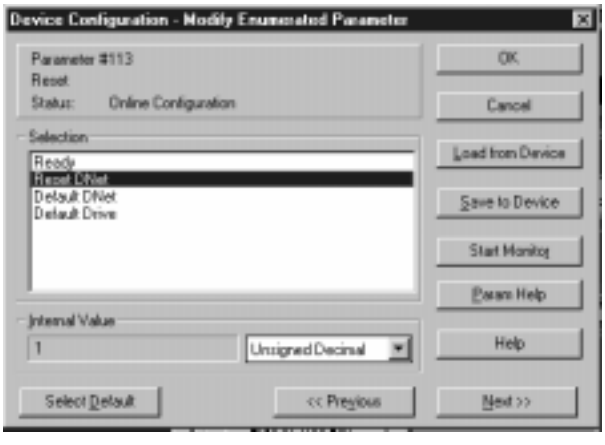


Figure 3.17 – Modifying the Reset Parameter

Step 2. Select **Reset DNet**, and then click **Save to Device**. The DeviceNet option board will be reset. To view the new settings in DeviceNet Manager, you may need to scan the network.

Step 3. Click **OK** to close the dialog box.

CHAPTER 4

Configuring a Scanner

This chapter provides the procedures that are needed to configure the simple network that is illustrated in figure 4.1. It provides information and instructions for configuring an SLC 500 controller with a 1747-SDN scanner to communicate with a VSM500 Integrated drive/motor using a DeviceNet option board.

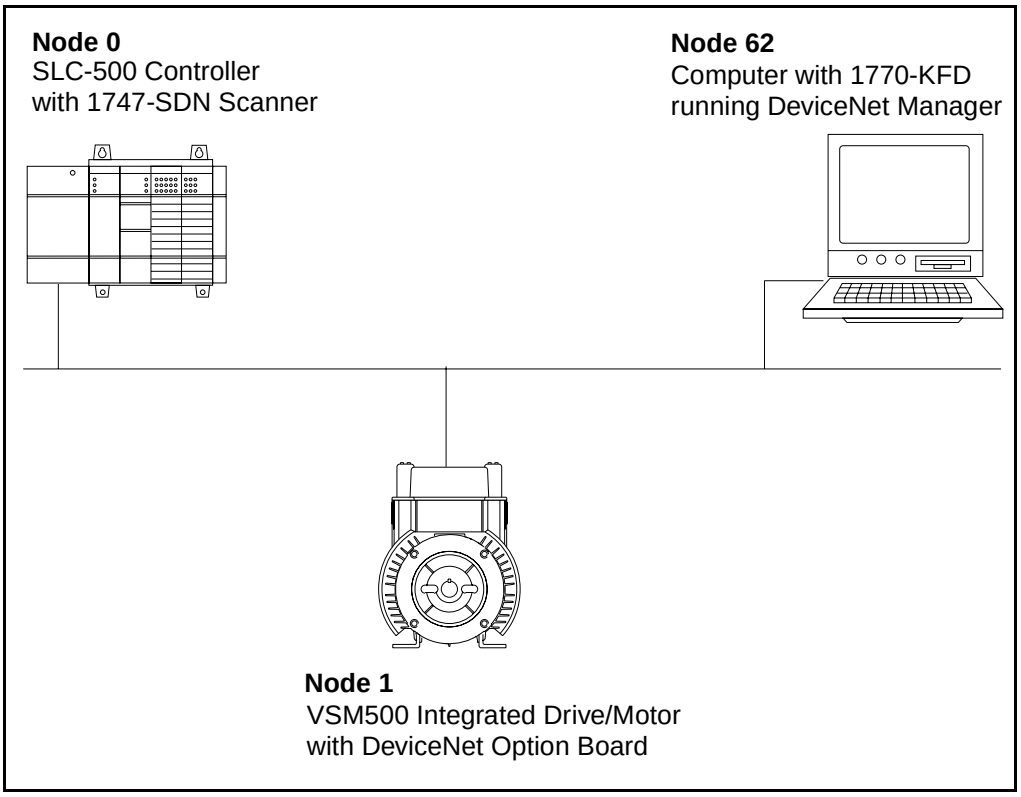


Figure 4.1 – Example DeviceNet Network

4.1 Setting Up the Scan List

For the scanner to communicate with a VSM500 unit, the scanner must be configured and the VSM500 unit's node number must be added to its scan list.

Step 1. Go online with DeviceNet Manager. Refer to section 3.2

Step 2. Select **Who > Network Who**. The Network Who window appears, and DeviceNet Manager scans the network for devices. You can wait for DeviceNet Manager to scan the entire network, or click Stop after it displays your VSM500 unit and scanner.

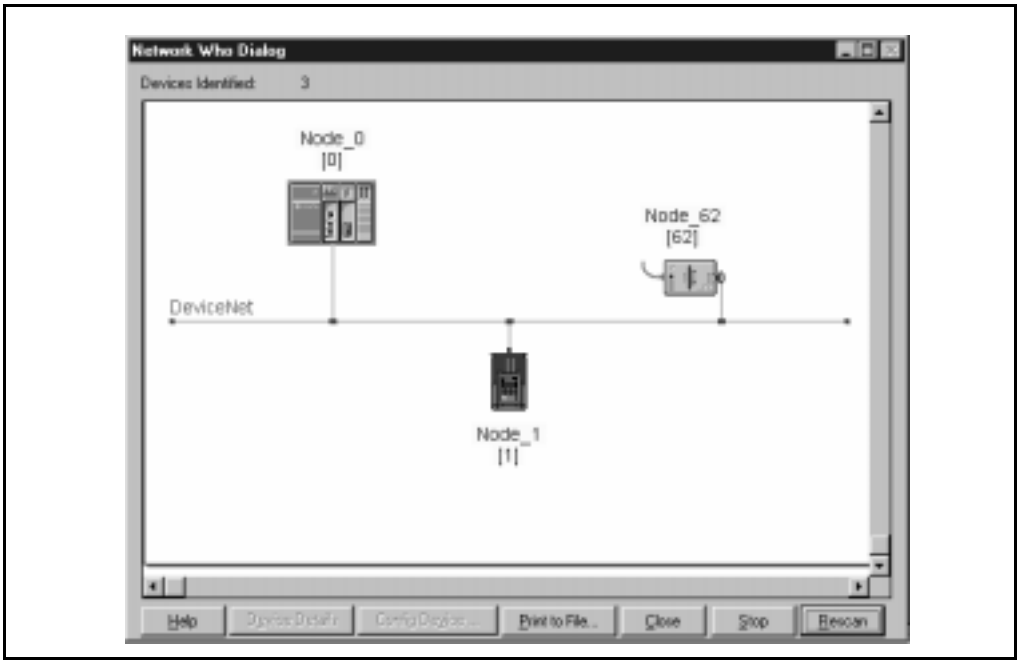


Figure 4.2 – Network Who Window

Step 3. Double-click the scanner icon to display the 1747-SDN Module Configuration dialog box.

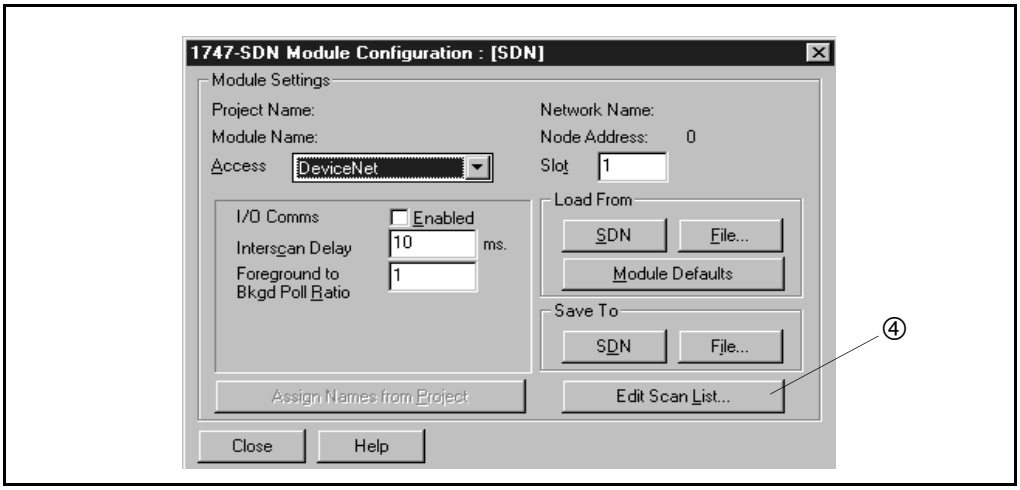


Figure 4.3 – 1747-SDN Module Configuration Dialog Box

Step 4. Click **Edit Scan List**. The 1747-SDN Scan List Editor dialog box appears.

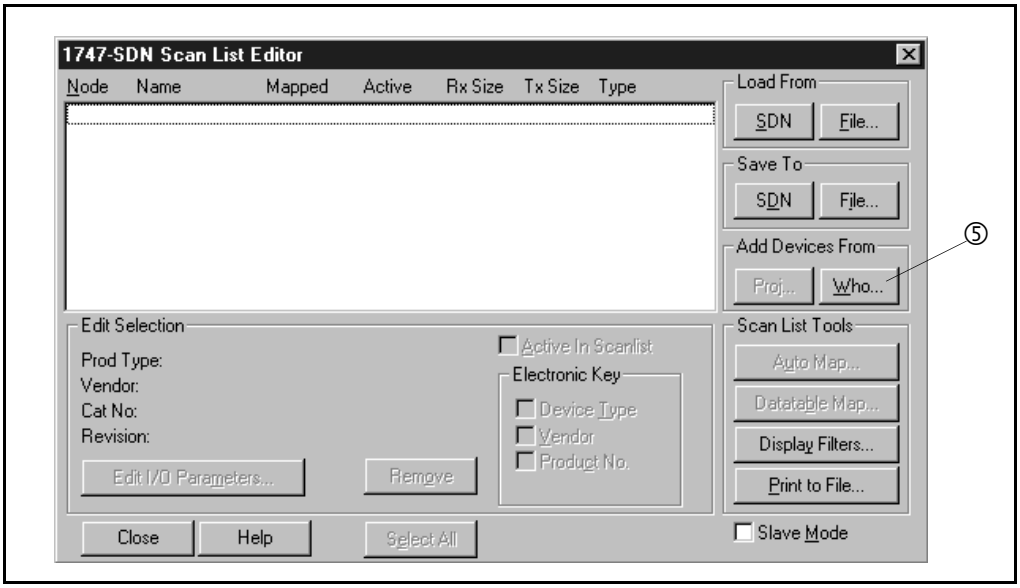


Figure 4.4 – 1747-SDN Scan List Editor Dialog Box

Step 5. Under Add Devices From, click **Who**. The Add Devices to Scan List dialog box appears.

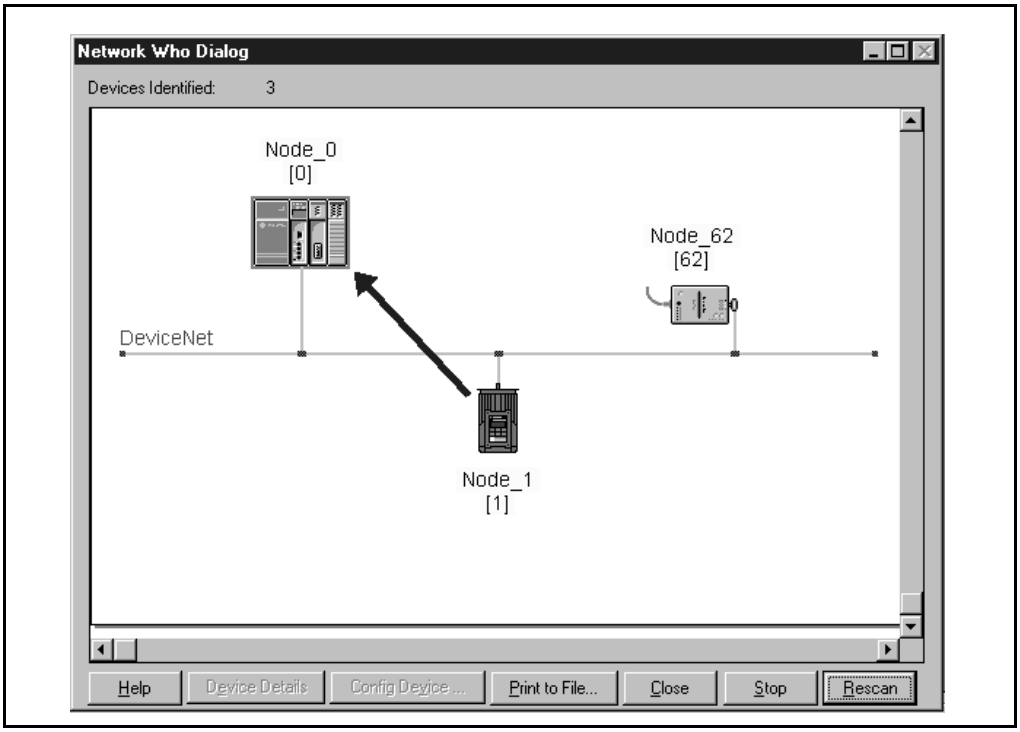


Figure 4.5 – Add Devices to Scan List Dialog Box

Step 6. Drag and drop the icon for the VSM500 unit onto the scanner icon. The VSM500 icon will be outlined with a square.

Step 7. Click **OK**. The Scan List Editor dialog box reappears, and the VSM500 node appears in the scan list.

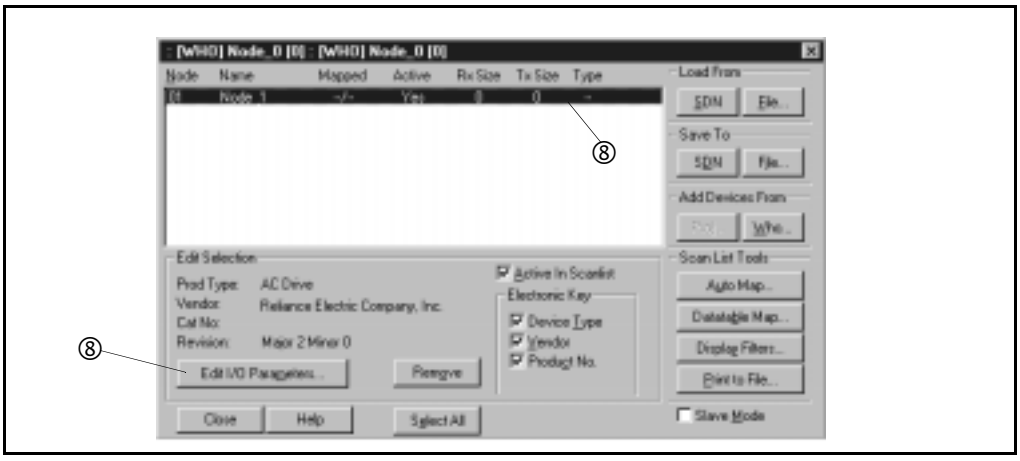


Figure 4.6 – Scan List Editor Dialog Box

Step 8. Click the new node to highlight it, and then click **Edit I/O Parameters**. The Edit Device I/O Parameters dialog box appears.

Figure 4.7 – Edit Device I/O Parameters Dialog Box

Step 9. Set up the scanner for Polled I/O, Change of State, or Cyclic data exchange. Refer to your settings for **parameter 108 [INPUT ASSEMBLY]** and **parameter 107 [OUTPUT ASSEMBLY]** to determine your I/O sizes:

108 - [INPUT ASSEMBLY]	Rx Size	107 - [OUTPUT ASSEMBLY]	Tx Size
0 = No Data	0	0 = No Data	0
50 = Basic Overload	1	1 = Basic Contactor	1
51 = Extended Overload	1	2 = Two Command Contactor	1
52 = Basic Motor Control	1	3 = Basic Overload	1
53 = Extended Motor Control	1	4 = Basic Motor Control	1
54 = Extended Motor Control 2	1	5 = 2 Command Motor	1
70 = Basic Speed Control	4	20 = Basic Speed Control	4
71 = Extended Speed Control	4	21 = Extended Speed Control	4
		100 = Speed Control in Hz	4
		106 = Preset Control with Speed	4

Figure 4.7 shows an example that uses polled I/O. The Enable box was selected, 4 was typed in the Rx box because Input Assembly 71 is being used, and 4 was typed in the Tx box because Output Assembly 21 is being used. Finally, Every Scan was selected in the Poll Rate box.

Step 10. Click **OK**. A DeviceNet Manager message appears.

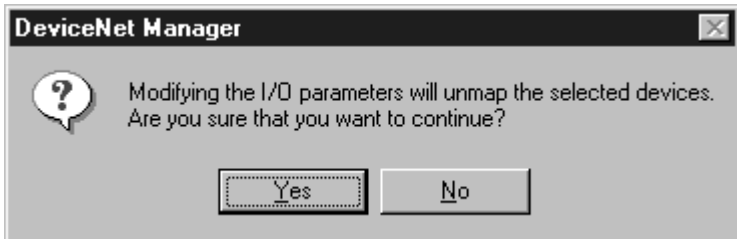


Figure 4.8 – DeviceNet Manager Message

Step 11. Click **Yes**. The Scan List Editor dialog box reappears. It should have the size of I/O in the RX Size and Tx Size columns.

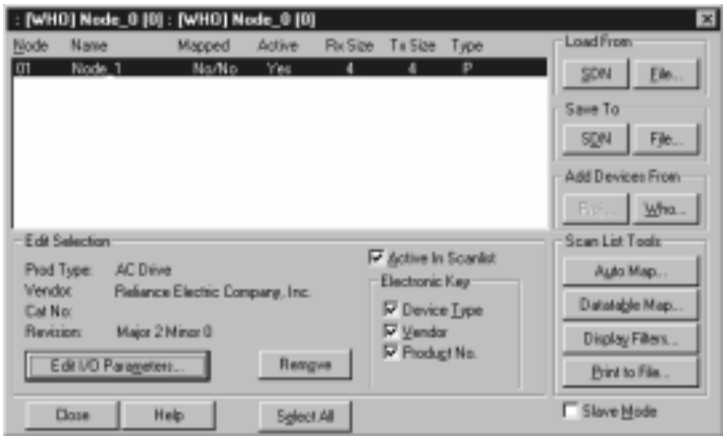


Figure 4.9 – 1747-SDN Scan List Editor Dialog Box

The scan list is now set up, and the VSM500 is in the scan list. You are now ready to map the VSM500 unit's data in the scanner.

4.2 Mapping the VSM500 Unit's Data in the Scanner

Data from I/O messages may be mapped to the SLC's discrete I/O area or to an I/O area located in the M0 and M1 files. This mapping determines where a ladder logic program can find data that is transmitted over the network. In our example, we will use the discrete area.

You must map both the input I/O and the Output I/O.

4.2.1 Mapping the Input I/O

Step 1. In the Scan List Editor dialog box (see figure 4.9), click **Datatable Map** under Scan List Tools. The Datatable Map dialog box appears.

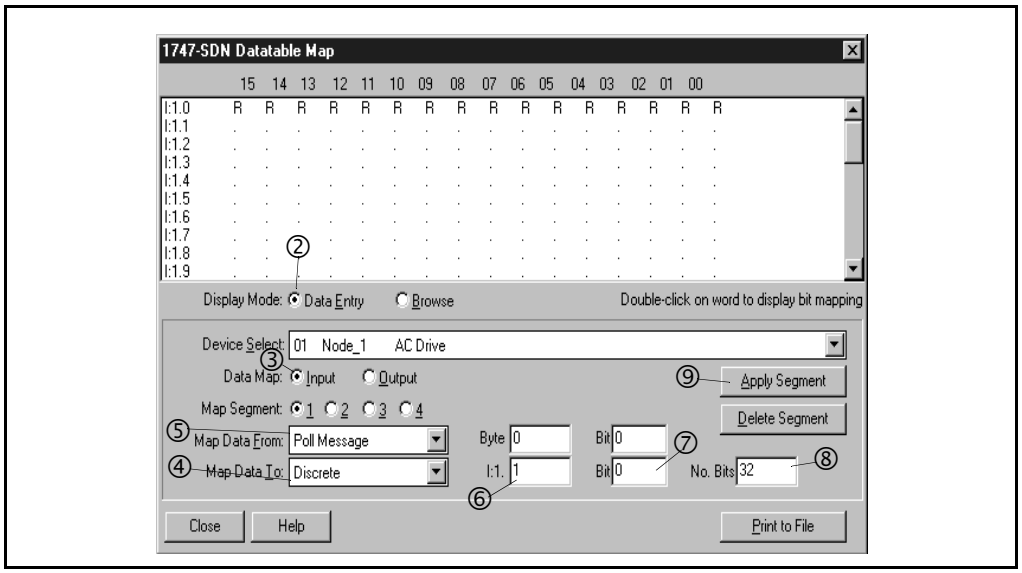


Figure 4.10 – Datatable Map Dialog Box

Step 2. Next to Display Mode, select **Data Entry**. A dot appears in the circle.

Step 3. Next to Data Map, select **Input** to map the input data.

Step 4. In the Map Data To box, select where the data is to be placed.

Step 5. In the Map Data From box, select from where the data is received.

Step 6. In the I:1. box, type the word where the data will be mapped. In the example, it is mapped to word 1 (second word).

Step 7. In the Bit box, type the bit at which the data starts.

Step 8. In the No. Bits box, type the number of bits that your data requires.

Step 9. Click **Apply Segment**. A new datatable map appears in the dialog box.

Figure 4.11 – Input Datatable Map

4.2.2 Mapping the Output I/O

Step 1. In the Datatable Map dialog box (see figure 4.11), select **Output** to map the Output data. A dot appears in the circle.

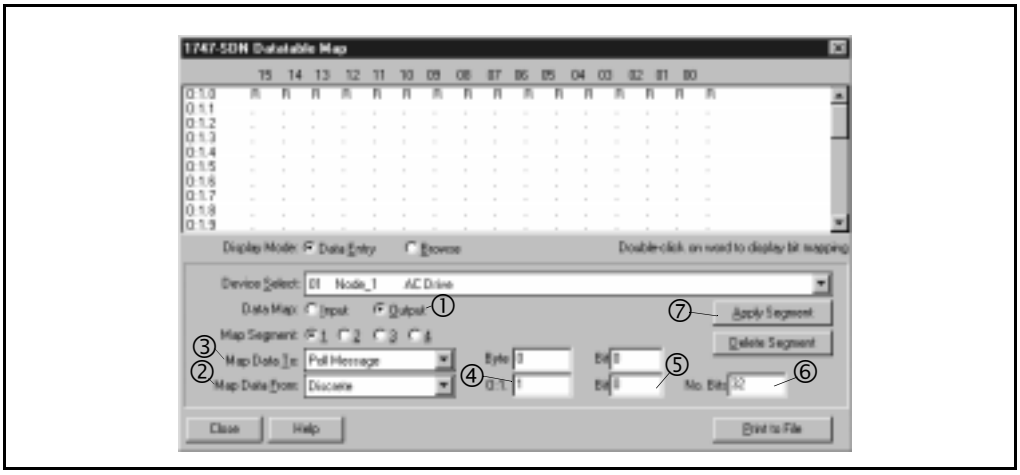


Figure 4.12 – Output Datatable Map

Step 2. In the Map Data From box, select from where the data is transmitted.

Step 3. In the Map Data To box, select the destination of the data.

Step 4. In the O:1 box, type the word where the data will be found.

Step 5. In the Bit box, type the bit at which the data starts.

Step 6. In the No. Bits box, type the number of bits that your data requires.

Step 7. Click **Apply Segment**. A new datatable map appears in the dialog box.

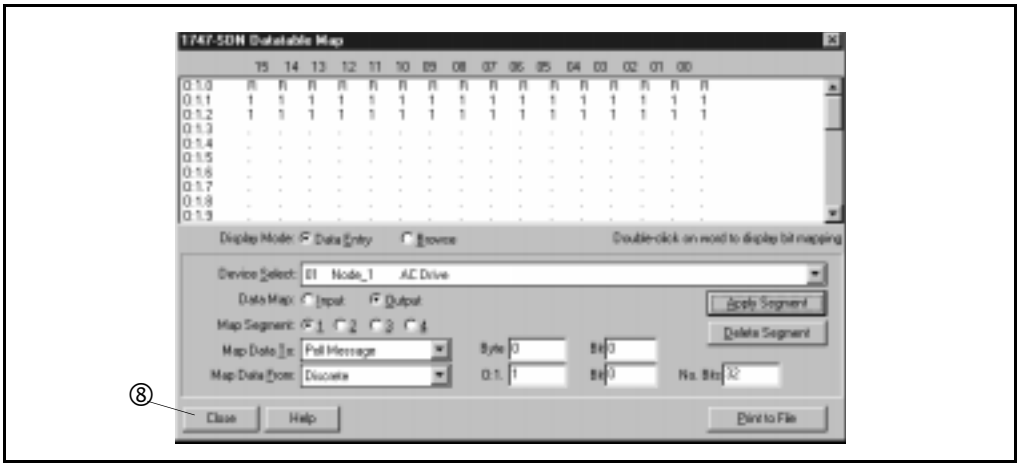


Figure 4.13 – Output Datatable Map

Step 8. Click **Close**. The Scan List Editor dialog box reappears.

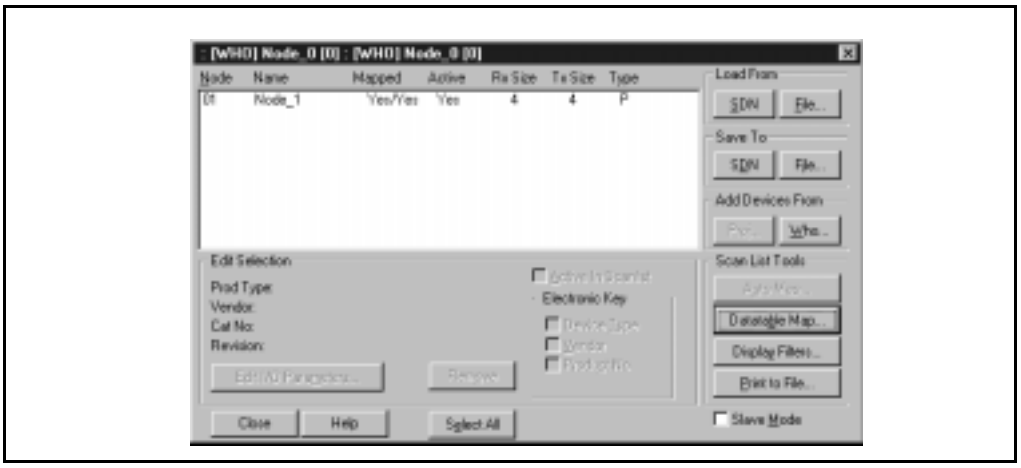


Figure 4.14 – Scan List Editor Dialog Box

The data transmitted between the VSM500 unit and SLC scanner is now mapped to the scanner.

4.3 Saving the Configuration

After creating a configuration, you should download it to the scanner.

Step 1. In the Scan List Editor dialog box, click **SDN** under Save To. The Scan List Editor - Download dialog box appears.

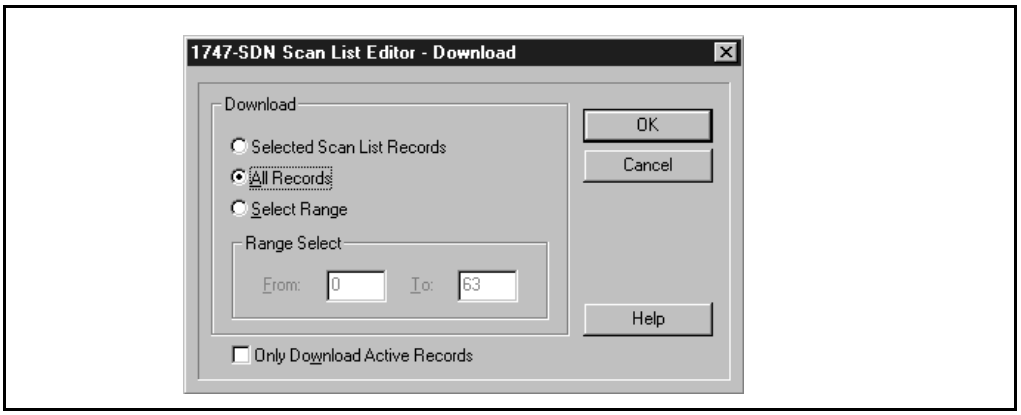


Figure 4.15 – Scan List Editor - Download Dialog Box

Step 2. Select **All Records**, and then click **OK**. A DeviceNet Manager message will appear and inform you that the scanner will not be available for a period of time.

Step 3. Click **OK** to download the new configuration to the SLC. The Scan List Editor dialog box (see figure 4.14) reappears.

Step 4. Click **Close** to close the Scan List Editor dialog box. A message box appears and prompts you to save the configuration to a file. If desired, save to a file. The 1747-SDN dialog box (see figure 4.3) appears.

Step 5. Click **Close** to close the 1747-SDN dialog box. A message box appears and prompts you to save the configuration to a file. If desired, save to a file. The Network Who window (see figure 4.2) appears.

CHAPTER 5

Using I/O Messaging

This chapter provides information about using control I/O. It includes information on understanding I/O messaging and assemblies, an example of I/O messaging, and an example SLC ladder logic program.

Important: To use control I/O, you must have already configured the VSM500 unit and DeviceNet option (refer to chapter 3) and scanner (refer to chapter 4).

5.1 Understanding I/O Messaging and Assemblies

On DeviceNet, I/O messaging, sometimes called implicit messaging, is used to transfer the I/O data, which controls the VSM500 unit and its speed.

The control I/O messages that are transmitted between the scanner and VSM500 unit depend on the output assembly and input assembly that you select. You can choose between various input and output assemblies, thereby choosing the data format of the control I/O messages. The assemblies that are supported are numbered and are part of a DeviceNet defined “Motor Control Hierarchy.” This feature lets you use a VSM500 unit to replace motor starters or contactors on a network without the need to reprogram the scanner.

You select the output assembly using **parameter 107 [OUTPUT ASSEMBLY]** and the input assembly using **parameter 108 [INPUT ASSEMBLY]**. These parameters are described in the parameter list in Appendix B (section B.3). Data formats for assemblies are in Appendix C (section C.5).

5.2 Example of I/O Messaging

For example, Output Assembly 21 uses the following data format:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		NetRef	Net Control			Fault Reset	RunRev	RunFwd
1	Not Used							
2	Speed Reference RPM (Low Byte)							
3	Speed Reference RPM (High Byte)							

Input Assembly 71 uses the following data format:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Reference	RefFrom Net	CtrlFrom Net	Ready	Running Reverse	Running Forward		Faulted
1	Not Used							
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

Figure 5.1 illustrates how data in Output Assembly 21 and Input Assembly 71 will be transmitted between a VSM500 unit and an SLC processor. Notice that the terms *input* and *output* are defined from the scanner's point of view. Also notice that explicit messaging can be transmitted as well.

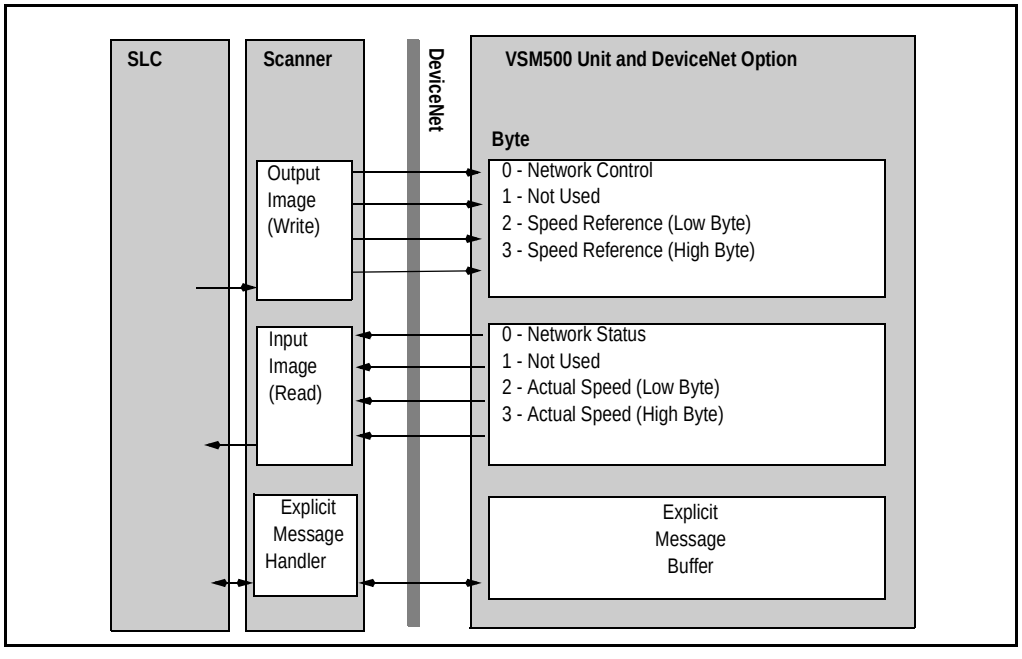


Figure 5.1 – Example I/O Image

5.3 Example SLC Ladder Logic Program

The example program runs the VSM500 unit in the forward and reverse direction. It also provides a speed reference. Note that the scanner must be in Slot 1 of the SLC 500 rack for this example.

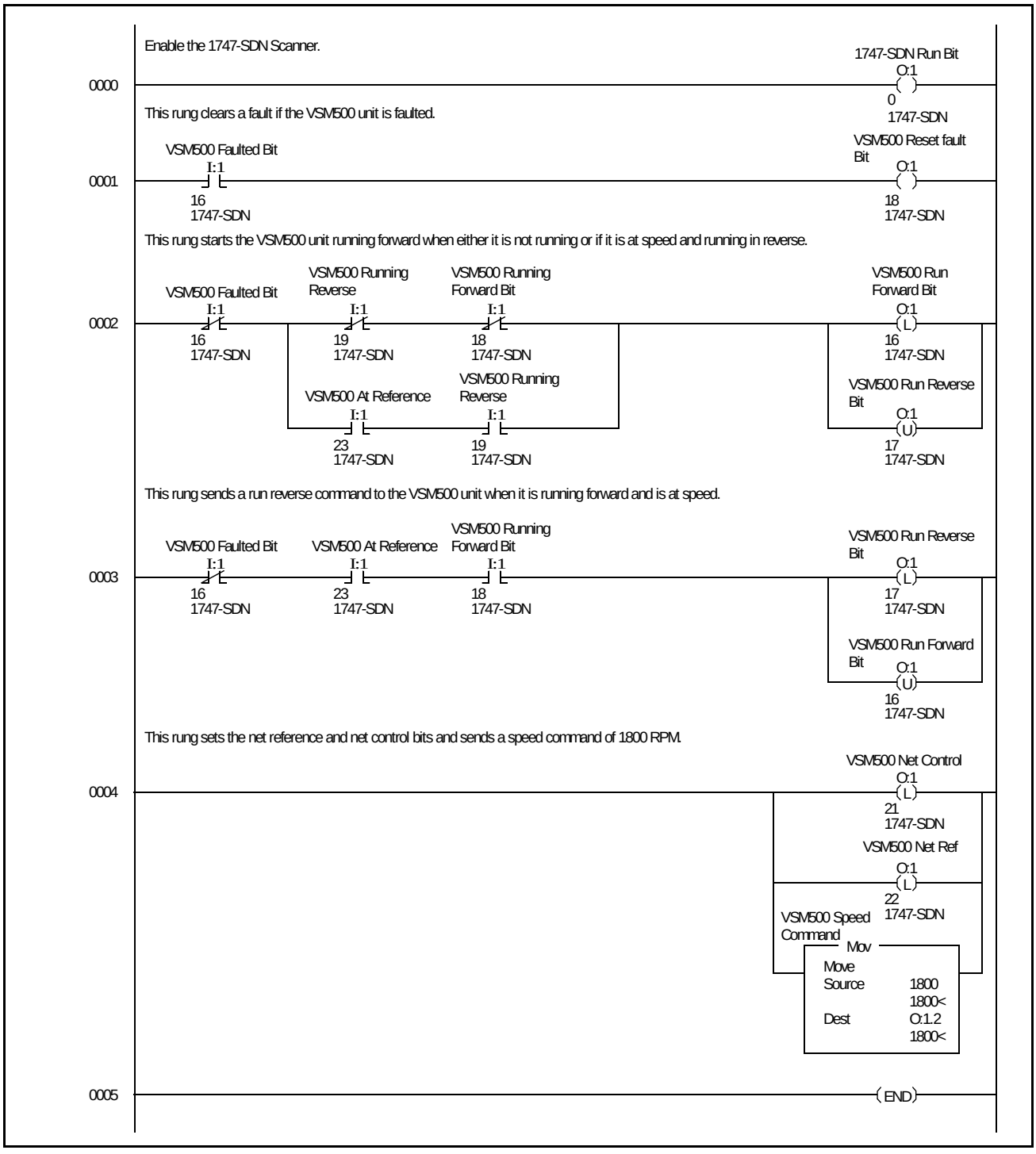


Figure 5.2 – Example SLC Ladder Logic Program

CHAPTER 6

Using Explicit Messaging

This chapter provides information about using explicit messaging. It includes information on about using explicit messaging, how to format explicit messages, and an example of an SLC ladder logic program.

Important: In order to use explicit messaging, you must have already configured the VSM500 unit and DeviceNet option (see chapter 3) and the scanner (see chapter 4).

6.1 About Explicit Messaging

Explicit messaging is a way of configuring and monitoring a slave device's parameters on the DeviceNet network. This form of messaging is performed by copying data to and from the SLC controller M0 and M1 file. Explicit messaging can only be done by the SLC controller to slave devices that are mapped in the scanner module's scan list.

6.2 Using Explicit Messaging

With an SLC 500, there are five steps to the explicit messaging process.

Step 1. Format an M0 file transfer in the processor to send an explicit message request to the scanner module (download).

Step 2. The scanner module transmits the explicit message request to the slave device over the DeviceNet network.

Step 3. The slave device transmits the explicit message response back to the scanner and is queued into a file transfer buffer.

Step 4. The processor uses an M1 file transfer to retrieve the explicit message response from the scanner's buffer (upload).

Step 5. Format an M0 file transfer with a Delete Response Command, and use the current transaction ID read in step 4. The transaction IDs are deleted and can be reused.

Important: There must be a request message and an response message whether you are reading or writing a parameter.

6.3 Formatting Explicit Messages

There are ten 32-word transaction blocks within the scanner module reserved for explicit message program control. These transaction blocks accommodate both downloading explicit message requests and uploading explicit message responses. The scanner module can accommodate one request or response for each transaction block. Each transaction block must be formatted as shown in figure 6.1.

Request

15	0
TXID	Command
Port	Size
Service	MAC ID
Class	
Instance	
Attribute	
Service Data	

Response

15	0
TXID	Status
Port	Size
Service	MAC ID
Service Response Data	

Figure 6.1 – Explicit Message Format

Data Field	Description	
TXID	The transaction ID is a 1-byte integer in word 31 with a range of 1 to 255. It is assigned in the ladder logic program when the processor creates and downloads a request to the scanner. The scanner uses it to track the transaction to completion. It returns this value with the response that matches the request downloaded by the processor.	
Command	One of the following command codes instructs the scanner how to administer the request during each download:	
	0 = Ignore transaction block (empty)	3 = Reset all client/server transactions
	1 = Execute this transaction block	4 = Delete this transaction block
	2 = Get status of transaction TXID	5 – 255 = Reserved
Status	One of the following status codes is provided during each upload:	
	0 = Ignore transaction block (empty)	9 = Scanner out of buffers.
	1 = Transaction completed successfully	10 = Other client/server transaction in progress
	2 = Transaction in progress (not ready)	11 = Could not connect to slave device
	3 = Slave not in scan list.	12 = Response data too large for block.
	4 = Slave offline.	13 = Invalid port.
	5 = DeviceNet port disabled or offline.	14 = Invalid size specified.
	6 = Transaction TXID unknown.	15 = Connection busy.
	7 = Unused	16 – 255 = Reserved
	8 = Invalid command code.	
Port	The port used by the message is always zero (Channel A) on a 1747-SDN scanner.	
Size	The size of the service data is in bytes. The maximum size is 58 bytes (29 words).	
Service	The service attribute contains the DeviceNet service request and response codes that match the corresponding TXID.	
MAC ID	The node address of the slave device to which the transaction is sent. This value has a range of 0 to 63. The slave device must be listed in the scanner's scan list and be online for the explicit message transaction to be completed.	

6.4 Example SLC Ladder Logic Program

The example ladder logic program (see figure 6.2) can be used to do explicit messaging from an SLC. This ladder program will allow the SLC 500 to use explicit messaging to read and write parameters to a VSM500 Integrated drive/motor.

To run the example program:

Step 1. Enter data into the program.

The request information will be placed in the N10 file. The *first* word in N10 will be the TXID and command information, which both receive a value of one. The *second* word will be the port and size information. The port value will be zero when using an SLC, and the size will be the number of bytes for the class, instance, attribute, and service data. The *third* word will contain the service and Node Address. The service will be either a set (write) or a get (read) attribute. The value for a set is 0x10, and the value for a get is 0x0E. The node address will be the node address assigned to the slave device (VSM500 Integrated drive/motor). Finally, the class, instance, and attribute for the parameter have to be entered. These values can be found in Appendix B and Appendix C.

Step 2. Run the program.

After entering the request into the N10 file, the program needs to be triggered to run. Triggering the program is done by changing the address N7:0/0 from a zero to a one. The program will change the address back to zero when the explicit message is complete.

Step 3. Receive Data from the program.

After the program has been run, the results can be seen in the N11 address. The SLC program should read/copy the data before performing another explicit message request. It is important to note that the command byte in node N10:0/0 is changed when the program executes and must be changed back to a one before the program can be run again.

Data Format for a Read and Write Parameter

The data in this example is for a VSM500 unit with a DeviceNet option at node address 1.

Request Data for Read of Parameter 32 - [ACCEL TIME]

N10 address

address	0	1	2	3	4	5	6	7	8	9
N10:0	0101	0006	0E01	000F	0020	0001	0000	0000	0000	0000
N10:10	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N10:20	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N10:30	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Response Data for Read of Parameter 32 - [ACCEL TIME]

N11 address

address	0	1	2	3	4	5	6	7	8	9
N11:0	0101	0002	8E01	0032	0000	0000	0000	0000	0000	0000
N11:10	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N11:20	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N11:30	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Request Data for Write to Parameter 32 - [ACCEL TIME]

N10 address

address	0	1	2	3	4	5	6	7	8	9
N10:0	0101	0008	1001	000F	0020	0001	0064	0000	0000	0000
N10:10	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N10:20	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N10:30	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Response Data for Write to Parameter 32 - [ACCEL TIME]

N11 address

address	0	1	2	3	4	5	6	7	8	9
N11:0	0101	0000	9001	0000	0000	0000	0000	0000	0000	0000
N11:10	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N11:20	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000
N11:30	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

Example Ladder Logic Program

Note that the scanner must be in Slot 1 of the SLC 500 rack for this example.

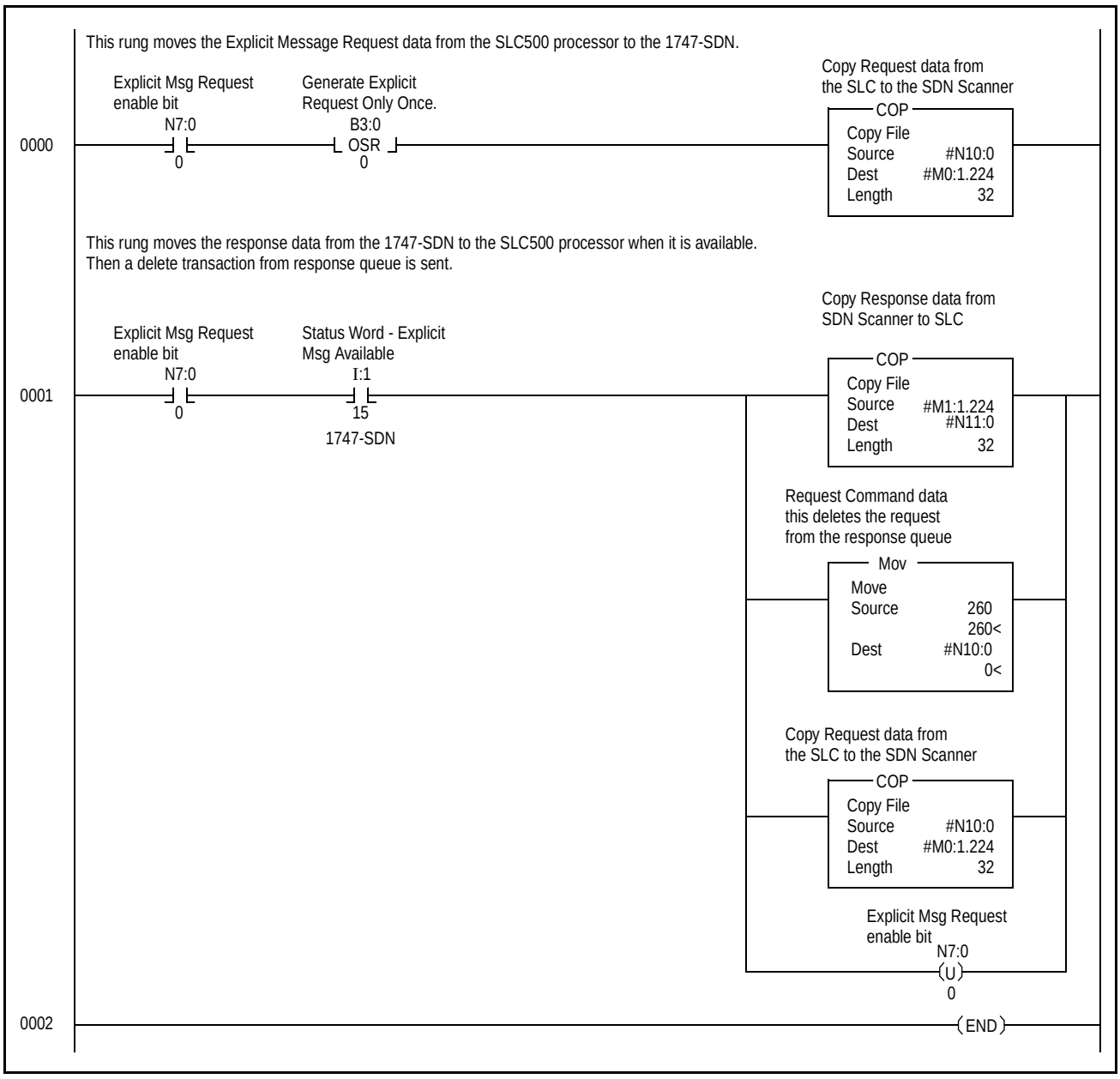


Figure 6.2 – Example SLC Ladder Logic Program

For more information on explicit messaging, refer to the documentation for your scanner.

CHAPTER 7
Troubleshooting

This chapter contains information for diagnosing and correcting potential problems.

7.1 Locating the COMM Status Indicator

The VSM500 Integrated drive/motor has a COMM status indicator that you can use to determine the status of the VSM500 unit and DeviceNet communications.

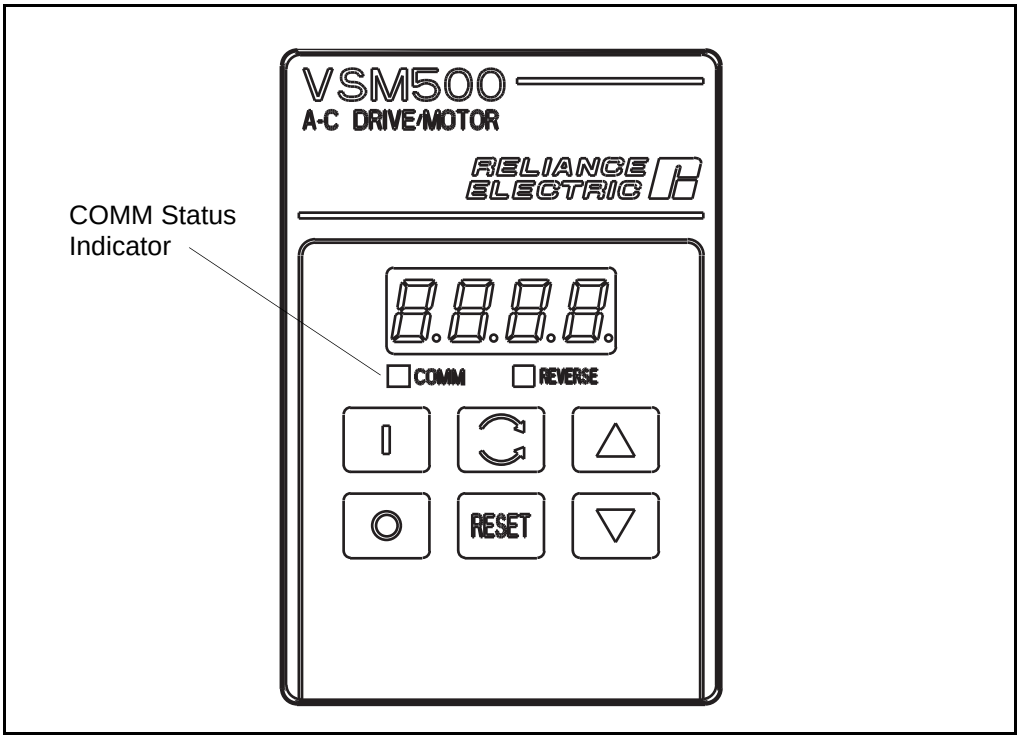


Figure 7.1 – VSM500 Integrated Drive/Motor COMM Status Indicator

7.2 Understanding the COMM Status Indicator

The COMM status indicator provides status information on the DeviceNet option board.

Important: When power is first applied to the DeviceNet option board, the COMM status indicator flashes green for 1/4 second, red for 1/4 second, and then turns off while the communication module finishes its initialization.

Color	State	What It Means:	What To Do:
None		The option board is not receiving power from the network.	Check DeviceNet power and cable connections and the power connection on the DeviceNet terminal block.
Red	Solid	Diagnostics test failed on power-up/reset. Internal fault exists.	• Cycle power to the VSM500 unit and network. • If the fault still exists, return the option board.
		Duplicate DeviceNet node address. Two nodes cannot have the same address.	• Reset DIP switches 1 through 6 on the DeviceNet option board using a unique address and then cycle power. • If DIP switches 7 and 8 on the DeviceNet option board are both set to ON, change the value of **P103 [NV MAC ID]** to a unique address and then cycle power.
		Invalid data rate.	• Reset DIP switches 7 and 8 on the DeviceNet option board to a valid data rate and the cycle power. • If DIP switches 7 and 8 on the DeviceNet option board are both set to ON, change the value of **P104 [NV BAUD RATE]** to a valid data rate and then cycle power.
Red	Flashing	I/O connection timed out.	Reset the DeviceNet master device.
Green	Solid	Normal operating state and device is allocated to a master.	No action required.
Green	Flashing	Device is online but not allocated to a master.	Verify that the DeviceNet master has the correct configuration information for the DeviceNet option board (node address, input assembly, and output assembly).

7.3 Fault Codes

When there is a fault, you can view the fault code using the value in **parameter 10 [LAST FAULT]**, the value of Class 0x29 (Control Supervisor Object), Instance 1, Attribute 13 (Fault Code), or the display on the keypad.

Fault Codes [1]			Name	Description	Corrective Action
Parameter Value	DeviceNet	Display			
0	0x0000		No Fault	Normal operation.	No action required.
1	0x5300	F.FL	Function Loss	Open connection on Function Loss control terminal block inputs (terminals 7 and 11).	- Check and restore the Function Loss connection on the terminal block. Refer to *VSM500 Integrated Drive/Motor User Manual*. - Check the external sensors wired into the Function Loss string.
2	0x2220	F.OC	Over Current	Shaft rotation blocked. Excessive driven load. Input power is not correctly wired to the VSM500 unit. Motor section ground fault.	- Check for obstructions to shaft rotation. - Reduce excessive load. - Increase accel/decel time using the rotary switches or **parameter 32 [ACCEL TIME]** and **parameter 33 - [DECEL TIME]**. - Verify that input wiring is correctly connected. Refer to the VSM500 Integrated Drive/Motor User Manual. - Check motor section for ground fault. Replace VSM500 unit if a ground fault is detected.
3	0x7122	F.OL	Motor Overload	Excessive current to motor for an extended time due to excessive load or short circuit.	- Check for obstruction to shaft rotation. - Reduce the driven load. - Check input wiring is correctly connected. Refer to the VSM500 Integrated Drive/Motor User Manual. - Check for blower obstruction. - Replace blower if required.
4	0x3210	F.HU	Over Voltage	High input line. Deceleration time is too fast or overhauling load.	- Check input line to verify that voltage is within operating specification. - Increase deceleration time using the accel/decel rotary switch. Refer to the VSM500 Integrated Drive/Motor User Manual.
5	0x3220	F.LU	Under Voltage while Stopped	Low input line or temporary loss of input line.	Check input line to verify voltage is within operating specifications.
6	0x4310	F.OH	Over Temperature	Operating environment is too hot. Blower is blocked or not operating. Excessive driven load.	- Check the application site and verify the ambient temperature is within the operating specification. - Check for blower obstruction. Replace blower if required. - Reduce load or make sure VSM500 unit matches the application requirement.
7	0x7510	F.CL	Communication Loss	Communication between the DeviceNet option board and the drive has failed.	Check cable connection between the regulator board and DeviceNet option board.
8	0x6310	F.dCH	Parameter Checksum	Contents of the EEPROM is corrupted.	Reset parameters to default values and cycle power.

[1]Parameter fault codes are viewed in **parameter 10 [LAST FAULT]**. DeviceNet fault codes are read from Class 0x29, Instance 1, Attribute 13. Display fault codes are viewed on the LED display on the local operator control keypad.

Fault Codes [1]			Name	Description	Corrective Action
Parameter Value	DeviceNet	Display			
9	0x6312	F.Id	EEPROM Drive ID	Contents of the EEPROM is corrupted.	- Reset parameters to default values and cycle power. - If fault persists, replace VSM500 unit.
10	0x7700	F.dcn	Keypad Disconnect	Keypad cable disconnected while VSM500 unit under power.	Remove power from the VSM500 unit. Check keypad cable connection. Reapply power to the VSM500 unit.
11	0x7701	F.ddP	Keypad Fixed Pattern	Keypad cable connected while VSM500 unit under power.	Remove power from the VSM500 unit. Check the keypad cable connection. Reapply power to the VSM500 unit.
12	0x7702	F.dSF	Keypad Redundant Start	Keypad hardware failure.	Remove power from the VSM500 unit. Check the keypad cable connection. Reapply power to the VSM500 unit.
13	0x5301	F.rSF	TB Redundant Start	Regulator board failure.	Remove power from the VSM500 unit. Check the keypad cable connection. Reapply power to the VSM500 unit.
14	0x7703	F.drc	Keypad Connect	Keypad cable connected while VSM500 unit under power.	Remove power from the VSM500 unit. Check the keypad cable connection. Reapply power to the VSM500 unit.
15	0x3221	F.LU	Under Voltage while Running	Low input line or temporary loss of input line.	Check input line to verify voltage is within operating specifications.
20	0x6311	F.dnE	DNet EEPROM Fault	DeviceNet option board EEPROM has invalid data.	Use **parameter 113 [RESET]** to reset option board parameters to factory defaults.
21	0x7502	F.dnU	DNet Unrecoverable Fault	No communication is occurring. Fault occurs when duplicate node address exists or wrong data rate is set.	Check DIP switch settings on the DeviceNet option board for proper data rate and node address. If DIP switches 7 and 8 on the DeviceNet option board are both set to On, check **parameter 103 [NV MAC ID]** and **parameter 104 [NV BAUD RATE]**. Then reset the option board.
22	0x7500	F.dnP	No DNet Power	24 volt network power is not detected.	Check DeviceNet connector at Communication Module. Also, check network's power supply.
23	0x7501	F.dnL	DNet Lost I/O Connection	Polled I/O connection timed out.	Check DeviceNet master device for correct operation (i.e., powered up, scanner online, etc.).
24	0x7504	F.dnF	DNet Forced Fault	Control Supervisor Object (Class Code 0x29) attribute 17 was set to 1.	Clear fault.
25	0x7505	F.dnC	DNet Comm Fault	Communication failure between DeviceNet option board and unit.	Check the unit cable connecting the DeviceNet option board and VSM500 unit.

[1]Parameter fault codes are viewed in parameter 10 [LAST FAULT]. DeviceNet fault codes are read from Class 0x29, Instance 1, Attribute 13. Display fault codes are viewed on the LED display on the local operator control keypad.

7.4 Solving Potential Problems

Description	Solution
Parameters settings are not taking effect, or switch settings are not taking effect.	Check the setting of DIP switch 10 on the VSM500 unit (Figure 2.3). If this switch is On, then the VSM500 unit uses the settings of the drive parameters in EEPROM. If it is Off, then the VSM500 unit uses the settings of the DIP switches and rotary switches on the board. 1. Set the switch as desired. 2. Cycle power to the VSM500 unit.
Unit uses an incorrect data rate or node address.	Check the setting of DIP switch 7 and 8 on the DeviceNet option board (see figure 2.3). If both switches are On, the VSM500 unit uses the node address set in **parameter 103 [NV MAC ID]** and the data rate set in **parameter 104 [NV BAUD RATE]**. Otherwise, the VSM500 unit uses the values set using the DIP switches as specified in section 2.5.

APPENDIX A

Technical Specifications

Electrical

Network Supply Voltage: 11 to 25 VDC

Power Consumption: 0.5 Watt maximum

Node Current Consumption: 40 mA (Use this value to size the network current draw from the power supply.)

Environmental

Ambient Temperature
Operating: 0 to 40 °C (32 to 104 °F)
Storage: -40 to 85 °C (-40 to 185 °F)

Relative Humidity: 0 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: 1,000 m (3,300 ft.) without derating

Communications

Protocol: DeviceNet

Data Rates: 125, 250, 500 k BPS

Distance maximum: 500 m (1640 ft.) @ 125 k BPS
200 m (820 ft.) @ 250 k BPS
100 m (328 ft.) @ 500 k BPS

Mechanical

Dimensions
Height: 120.65 mm (4.75 in.)
Width: 155.57 mm (6.125 in)
Depth: 12.70 mm (0.5 in.)

APPENDIX B

Parameters

Appendix B contains a list of the parameters in the VSM500 Integrated drive/motor and the DeviceNet option board.

B.1 Product Codes and EDS Files

Catalog Number	Power Rating (HP)	Voltage	Motor Frame	Version	Product Code	EDS File
10XS1011	1	115V, 1 Phase	56C	Std	137	137.cod/3.eds
10XW1011	1	115V, 1 Phase	56C	Loc	138	138.cod/3.eds
11XS1011	1	115V, 1 Phase	143TC	Std	139	139.cod/3.eds
11XW1011	1	115V, 1 Phase	143TC	Loc	140	140.cod/3.eds
10XS3011	1	230V, 1 Phase	56C	Std	141	141.cod/3.eds
10XW3011	1	230V, 1 Phase	56C	Loc	142	142.cod/3.eds
11XS3011	1	230V, 1 Phase	143TC	Std	143	143.cod/3.eds
11XW3011	1	230V, 1 Phase	143TC	Loc	144	144.cod/3.eds
21XS3011	2	230V, 1 Phase	145TC	Std	145	145.cod/3.eds
21XW3011	2	230V, 1 Phase	145TC	Loc	146	146.cod/3.eds
10XS2011	1	230V, 3 Phase	56C	Std	147	147.cod/3.eds
10XW2011	1	230V, 3 Phase	56C	Loc	148	148.cod/3.eds
11XS2011	1	230V, 3 Phase	143TC	Std	149	149.cod/3.eds
11XW2011	1	230V, 3 Phase	143TC	Loc	150	150.cod/3.eds
21XS2011	2	230V, 3 Phase	145TC	Std	151	151.cod/3.eds
21XW2011	2	230V, 3 Phase	145TC	Loc	152	152.cod/3.eds
10XS4011	1	460V, 3 Phase	56C	Std	153	153.cod/3.eds
10XW4011	1	460V, 3 Phase	56C	Loc	154	154.cod/3.eds
11XS4011	1	460V, 3 Phase	143TC	Std	155	155.cod/3.eds
11XW4011	1	460V, 3 Phase	143TC	Loc	156	156.cod/3.eds
21XS4011	2	460V, 3 Phase	145TC	Std	157	157.cod/3.eds
21XW4011	2	460V, 3 Phase	145TC	Loc	158	158.cod/3.eds
32XS4011	3	460V, 3 Phase	182TC	Std	159	159.cod/3.eds
32XW4011	3	460V, 3 Phase	182TC	Loc	160	160.cod/3.eds
52XS4011	5	460V, 3 Phase	184TC	Std	161	161.cod/3.eds
52XW4011	5	460V, 3 Phase	184TC	Loc	162	162.cod/3.eds

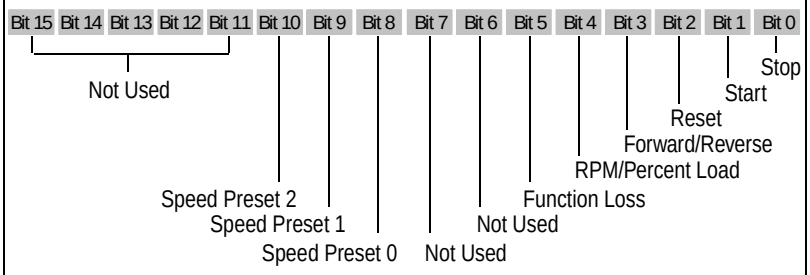
B.2 Parameter Groups

Parameters in the VSM500 Integrated drive/motor are grouped into either the Display group or the Program group. Parameters in the Display group are read only. You can get their values, but you cannot change their values. Parameters in the Program group are read/write. You can get and set their values. When a DeviceNet option board is connected, its parameters are grouped in the DNet Config group. Its parameters are also read/write. Figure B.1 illustrates the parameter groups of a VSM500 Integrated drive/motor with a DeviceNet option board.

Table B.1 – Parameter Groups

Drive Display	Drive Program	DNet Config
01 - Command Frequency	30 - Minimum Frequency	101 - Switches MAC ID
02 - Output Frequency	31 - Maximum Frequency	102 - Switches Baud
03 - Output Voltage	32 - Accel Time	103 - NV MAC ID
04 - Output Current	33 - Decel Time	104 - NV Baud Rate
05 - Load Current	34 - Start Source	105 - Bus Off Error
06 - Bus Voltage	35 - Run On Power Up	106 - Bus Off Count
07 - Power Unit Temperature	36 - Speed Ref Source	107 - Output Assembly
08 - Analog Input	37 - Relay Control Output	108 - Input Assembly
09 - TB Input Status	38 - Auto Restart Attempts	109 - DNet Fault Mode
10 - Last Fault	39 - Auto Restart Delay	110 - DNet Idle Mode
	40 - Torque Curve	111 - DNet SW Mode
	41 - Torque Boost	112 - COS Mask
	42 - Base Frequency	113 - Reset
	43 - Base Voltage	
	44 - Stop Select	
	45 - Reverse Disable	
	46 - IR Compensation	
	47 - Slip Compensation	
	48 - Analog Minimum	
	49 - Analog Maximum	
	50 - Fault Reset	
	51 - Preset Speed 1	
	52 - Preset Speed 2	
	53 - Preset Speed 3	
	54 - Preset Speed 4	
	55 - Preset Speed 5	
	56 - Preset Speed 6	
	57 - Preset Speed 7	

B.3 Parameter List

#	Object Mapping	Name and Description	Access Rule[1]	Units/ Range	Factory Default
Drive Display Parameters					
01	0x0F-1-1	**Command Frequency** Value of the presently selected speed reference.	Get	0.1 Hz	None
02	0x0F-2-1	**Output Frequency** Output frequency to the motor.	Get	0.1 Hz	None
03	0x0F-3-1	**Output Voltage** Output voltage to the motor.	Get	1 Volt	None
04	0x0F-4-1	**Output Current** Output current to the motor.	Get	0.1% of Rated Current	None
05	0x0F-5-1	**Load Current** Output current to the motor due to the load.	Get	0.1% of Rated Current	None
06	0x0F-6-1	**Bus Voltage** DC Bus voltage level.	Get	1 Volt	None
07	0x0F-7-1	**Power Unit Temperature** Temperature of the VSM500 unit.	Get	1 °C	None
08	0x0F-8-1	**Analog Input** The value of the analog speed reference input (terminal 2 or 3 on the control signal terminal block).	Get	0.1% of Full Scale	None
09	0x0F-9-1	**TB Input Status** The on (1) and off (0) state of the inputs to the control signal terminal block:  	Get	Bits	None
10	0x0F-10-1	**Last Fault** Fault number for the most recent fault. 0 = No Fault 1 = Function Loss 2 = Over Current 3 = Motor Overload 4 = Over Voltage 5 = Under Voltage Stop 6 = Over Temperature 7 = Communication Loss 8 = Parameter Checksum 9 = EEPROM Drive ID 10 = Keypad Disconnect 11 = Keypad Fixed Pattern 12 = Keypad Redundant Start 13 = TB Redundant Start 14 = Keypad Connect 15 = Under Voltage Running 20 = DNet EEPROM Fault 21 = DNet Unrecoverable Fault 22 = No DNet Power 23=DNetLostI/OConnection 24 = DNet Forced Fault Refer to Chapter 7 for troubleshooting procedures.	Get	0 to 24	None

[1] Get = Read. Set = Write. Set access is allowed only if DIP switch 10 on the VSM500 Integrated drive/motor is set to On (figure 2.3).
[2] The parameter can be set only when the drive is stopped.
[3] The parameter can be set only then the VSM500 Integrated drive/motor does not have an active I/O connection.

#	Object Mapping	Name and Description	Access Rule[1]	Units/ Range	Factory Default
Drive Program Parameters					
30	0x0F-30-1	**Minimum Frequency** Lowest frequency that the drive will output continuously. Its value must be less that **parameter 31 - [MAXIMUM FREQUENCY]**.	Get/ Set[2]	0 Hz to 60 Hz	0 Hz
31	0x0F-31-1	**Maximum Frequency** Highest frequency that the drive will output. Its value must be greater that the value of **parameter 30 [MINIMUM FREQUENCY]**.	Get/ Set[2]	50 Hz to 120 Hz	60 Hz
32	0x0F-32-1	**Accel Time** Time for the drive to ramp from 0 Hz to the value of **parameter 31 [MAXIMUM FREQUENCY]**. The accel time is linear.	Get/ Set	1.0 Sec. to 90.0 Sec.	5.0 Sec.
33	0x0F-33-1	**Decel Time** Time for the drive to ramp from the value of **parameter 31 [MAXIMUM FREQUENCY]** to 0 Hz. The decel ramp is linear.	Get/ Set	1.0 Sec. to 90.0 Sec.	5.0 Sec.
34	0x0F-34-1	**Start Source** Source of the start command. 0 = Keypad 1 = Terminal Block 2 = Network **Important:** The drive requires a stop input at the control terminal block, regardless of the start source selection.	Get/ Set[2]	0 to 2	0
35	0x0F-35-1	**Run On Power Up** If enabled, output power is applied to the motor automatically at drive power up. 0 = Disabled 1 = Enabled **Important:** This parametrer is ignored if **parameter 34 [START SOURCE]** is set to 2 = Network. The drive will start in network mode if the network run command is set. **ATTENTION:** When this feature is enabled, the drive may start at any moment. This feature may only be used as outlined in NFPA 79, Under Voltage Protection for specialized applications. Failure to observe these precautions could result in severe bodily injury or loss of life.	Get/ Set	0 to 1	0
36	0x0F-36-1	**Speed Reference Source** Source of the speed reference. 0 = Keypad/Preset Speeds 1 = Analog/Preset Speeds 2 = Network	Get/ Set	0 to 2	0
37	0x0F-37-1	**Relay Control** Status indication provided by the normally open (N.O.) relay control output (control terminals 19 and 20). Refer to the VSM500 Integrated Drive/Motor User Manual information on these terminals. 0 = Running 1 = No Fault 2 = At Reference	Get/ Set	0 to 2	0
38	0x0F-38-1	**Auto Restart Attempts** Maximum number of times that the drive will try to reset a fault.	Get/ Set	0 to 10	0

[1] Get = Read. Set = Write. Set access is allowed only if DIP switch 10 on the VSM500 Integrated drive/motor is set to On (figure 2.3).
[2] The parameter can be set only when the drive is stopped.
[3] The parameter can be set only then the VSM500 Integrated drive/motor does not have an active I/O connection.

#	Object Mapping	Name and Description	Access Rule[1]	Units/ Range	Factory Default
Drive Program Parameters (continued)					
39	0x0F-39-1	**Auto Restart Delay** Time between restart attempts.	Get/ Set	1 Sec. to 60 Sec.	5 Sec.
40	0x0F-40-1	**Torque Curve** Type of torque curve used by the VSM500 unit. A variable torque curve provides a squared V/Hz curve, 110% electronic thermal overload, and 110% current limit for one minute. A constant torque curve provides a linear V/Hz curve, 150% electronic thermal overload, and 150% current limit for one minute. 0 = Variable Torque 1 = Constant Torque	Get/ Set	0 to 1	0
41	0x0F-41-1	**Torque Boost** Commanded voltage when the drive output frequency is 0 Hz.	Get/ Set	0.0% to 250.0%	100.0%
42	0x0F-42-1	**Base Frequency** Set value to rated nameplate frequency of the motor.	Get/ Set	10 Hz to 120 Hz	60 Hz
43	0x0F-43-1	**Base Voltage** Commanded voltage when the drive output frequency is equal to **parameter 42 [BASE FREQUENCY].**	Get/ Set	20 to Rated Voltage	Rated Voltage
44	0x0F-44-1	**Stop Select** Stopping mode used by the drive when a stop is initiated. 0 = Coast to stop 1 = Ramp to stop	Get/ Set	0 to 1	0
45	0x0F-45-1	**Reverse Disable** Disables reverse rotation of the motor. 0 = Reverse enabled 1 = Reverse disabled	Get/ Set[2]	0 to 1	0
46	0x0F-46-1	**IR Compensation** Compensation for the voltage drop across the stator resistance in an induction motor. A voltage is added to the commanded output voltage based on the load current. The default value of 100% is the factory determined optimum for the drive. It can be adjusted higher or lower to suit the needs of the application. A setting of 0% disables this function.	Get/ Set	0% to 150%	100%
47	0x0F-47-1	**Slip Compensation** Compensation for the inherent slip in an induction motor. A frequency is added to the commanded output frequency based on load current. The default value of 100% is the factory determined optimum for the drive. It can be adjusted higher or lower to suit the needs of the application. A setting of 0% disables this function.	Get/ Set	0.0% to 150.0%	100.0%
48	0x0F-48-1	**Analog Minimum** The percent of analog input used to represent **parameter 30 [MINIMUM FREQUENCY]**. If the minimum analog input equals minimum frequency, no action is needed. If it is desired to adjust the analog input to equal **parameter 30 [MINIMUM FREQUENCY]**, use **parameter 08 -[ANALOG INPUT]** to adjust the analog input to the desired level and then enter the value in parameter 48.	Get/ Set[2]	0.0% to 100.0%	0%

[1] Get = Read. Set = Write. Set access is allowed only if DIP switch 10 on the VSM500 Integrated drive/motor is set to On (figure 2.3).
[2] The parameter can be set only when the drive is stopped.
[3] The parameter can be set only then the VSM500 Integrated drive/motor does not have an active I/O connection.

	Object Mapping	Name and Description	Access Rule[1]	Units/ Range	Factory Default
Drive Program Parameters (continued)					
49	0x0F-49-1	**Analog Maximum** The percent of analog input used to represent **parameter 31 [MAXIMUM FREQUENCY]**. If the maximum analog input equals maximum frequency, no action is needed. If it is desired to adjust the analog input to equal **parameter 31 [MAXIMUM FREQUENCY],** use **parameter 08 [ANALOG INPUT]** to adjust the analog input to the desired level and then enter the value in parameter 49.	Get/ Set[2]	0.0% to 100.0%	100.0%
50	0x0F-50-1	**Fault Reset** Resets the drive after a fault. This parameter is a command. It will be reset to 0 = No Action after the command is completed. 0 = No Action 1 = Reset Fault	Get/ Set[2]	0 to 1	0
51	0x0F-51-1	**Preset Speed 1** Programmed value that sets the frequency that the drive outputs when this preset is selected.	Get/ Set	0.0 Hz to 120.0 Hz	10.0 Hz
52	0x0F-52-1	**Preset Speed 2** Programmed value that sets the frequency that the drive outputs when this preset is selected.	Get/ Set	0.0 Hz to 120.0 Hz	20.0 Hz
53	0x0F-53-1	**Preset Speed 3** Programmed value that sets the frequency that the drive outputs when this preset is selected.	Get/ Set	0.0 Hz to 120.0 Hz	30.0 Hz
54	0x0F-54-1	**Preset Speed 4** Programmed value that sets the frequency that the drive outputs when this preset is selected.	Get/ Set	0.0 Hz to 120.0 Hz	40.0 Hz
55	0x0F-55-1	**Preset Speed 5** Programmed value that sets the frequency that the drive outputs when this preset is selected.	Get/ Set	0.0 Hz to 120.0 Hz	50.0 Hz
56	0x0F-56-1	**Preset Speed 6** Programmed value that sets the frequency that the drive outputs when this preset is selected.	Get/ Set	0.0 Hz to 120.0 Hz	60.0 Hz
57	0x0F-57-1	**Preset Speed 7** Programmed value that sets the frequency that the drive outputs when this preset is selected.	Get/ Set	0.0 Hz to 120.0 Hz	70.0 Hz
DeviceNet Parameters					
101	0x0F-101-1	**Switches MAC ID** The state of the node address DIP switches (1 - 6). This address may not reflect the present address of the module if the baud rate DIP switches are set to 3. In this case, **parameter 103 [NV MAC ID]** is used.	Get	0 to 63	63
102	0x0F-102-1	**Switches Baud** The state of the baud rate DIP switches (7 - 8). 0 = 125K BPS 1 = 250K BPS 2 = 500K BPS 3 = Use nonvolatile parameters for node address and baud rate settings.	Get	0 to 3	0

[1] Get = Read. Set = Write. Set access is allowed only if DIP switch 10 on the VSM500 Integrated drive/motor is set to On (figure 2.3).
[2] The parameter can be set only when the drive is stopped.
[3] The parameter can be set only then the VSM500 Integrated drive/motor does not have an active I/O connection.

	Object Mapping	Name and Description	Access Rule[1]	Units/ Range	Factory Default
DeviceNet Parameters (continued)					
103	0x0F-103-1	**NV MAC ID** Node address independent of the node address DIP switches. To use this address, set both baud rate switches to On before power up. Changes to this parameter take effect only after power is cycled.	Get/ Set	0 to 63	63
104	0x0F-104-1	**NV Baud Rate** Baud address independent of the baud rate DIP switches. To use this baud rate, set both baud rate switches to On before power up. Changes to this parameter take effect only after power is cycled. If you use the autobaud option, another node on the network must set the data rate. 0 = 125 K BPS 1 = 250 K BPS 2 = 500 K BPS 3 = Autobaud	Get/ Set	0 to 3	3
105	0x0F-105-1	**Bus Off Error** Action of the DeviceNet option board during a CAN Bus Off condition. 0 = Hold CAN chip in its bus off (reset) state when bus off is detected. 1 = If possible, fully reset the CAN chip and continue communicating when a bus off condition is detected.	Get/ Set	0 to 1	0
106	0x0F-106-1	**Bus Off Count** The number of times the CAN chip went to a bus off state. The counter stops counting when the count reaches 255. Any write to this parameter will reset the counter to 0.	Get/ Set	0 to 255	0
107	0x0F-107-1	**Output Assembly** The output assembly instance that is used for polled messaging with the master. The output assembly defines the data format that the VSM500 unit receives from the master. This parameter determines the format of data being sent to the VSM500 unit by the master. It is named *output assembly* because the DeviceNet specification refers to all assemblies as they relate to the master. The following assembly instances are valid for this parameter: 0 = No Data (0 bytes) 1 = Basic Contactor Output (1 byte) 2 = Two Command Contactor Output (1 byte) 3 = Basic Overload Output (1 byte) 4 = Basic Motor Control Output (1 byte) 5 = 2 Command Motor Control (1 byte) 20 = Basic Speed Control (4 bytes) 21 = Extended Speed Control (4 bytes) 100 = Speed Control in Hz (4 bytes) 106 = Preset Control with speed (4 bytes) Refer to the Assembly Object in <Link>Appendix C for the formats of the output assembly.	Get/ Set[3]	0 to 106	20

[1] Get = Read. Set = Write. Set access is allowed only if DIP switch 10 on the VSM500 Integrated drive/motor is set to On (figure 2.3).
[2] The parameter can be set only when the drive is stopped.
[3] The parameter can be set only then the VSM500 Integrated drive/motor does not have an active I/O connection.

	Object Mapping	Name and Description	Access Rule[1]	Units/ Range	Factory Default
DeviceNet Parameters (continued)					
108	0x0F-108-1	**Input Assembly** The input assembly instance that is used for polled messaging with the master. The input assembly defines the data format that the drive sends to the master in response to a polled message from the master. This parameter determines the format of data being sent to the master. It is named input assembly because the DeviceNet specification refers to all assemblies as they relate to the master. The following assembly instances are valid for this parameter: 0 = No Data (0 bytes) 50 = Basic Overload Input (1 byte) 51 = Extended Overload Input (1 byte) 52 = Basic Motor Control Input (1 byte) 53 = Extended Motor Control Input (1 byte) 54 = Extended Motor Control 2 (1 byte) 70 = Basic Speed Control Input (4 bytes) 71 = Extended Speed Control Input (4 bytes) Refer to the Assembly Object in section C.5 (Appendix C) for the formats of the input assembly.	Get/ Set[3]	0 to 71	70
109	0x0F-109-1	**DNet Fault Mode** The action of the VSM500 unit when a communication fault such as loss of DeviceNet power occurs. The following behavior choices are used: 0 = Fault the VSM500 unit and issue a stop command 1 = Ignore the communication fault **ATTENTION:** This parameter determines the action of the option and connected VSM500 unit if communications are disrupted. By default, this parameter faults the VSM500 unit. You can set this parameter so that the VSM500 unit continues to run. Failure to observe these precautions could result in bodily injury or damage to equipment.	Get/ Set	0 to 1	0
110	0x0F-110-1	**DNet Idle Mode** The action of the VSM500 unit when the scanner is in idle mode. 0 = Zero data 1 = Hold last state **ATTENTION:** This parameter determines the action of the option and connected VSM500 unit if the scanner is put in idle mode. By default, this parameter stops the VSM500 unit. You can set this parameter so that the VSM500 unit continues to run. Failure to observe these precautions could result in damage to, or destruction of, the equipment.	Get/ Set	0 to 1	0
111	0x0F-111-1	**DNet SW Version** Software version of the DeviceNet option board board. The number is in the form of xx.yyy where xx indicates the major revision level and yyy indicates the minor revision level.	Get	0.000 to 10.000	None

[1] Get = Read. Set = Write. Set access is allowed only if DIP switch 10 on the VSM500 Integrated drive/motor is set to On (figure 2.3).
[2] The parameter can be set only when the drive is stopped.
[3] The parameter can be set only then the VSM500 Integrated drive/motor does not have an active I/O connection.

	Object Mapping	Name and Description	Access Rule[1]	Units/ Range	Factory Default
DeviceNet Parameters (continued)					
112	0x0F-112-1	**COS Mask** A 16-bit mask used to enable automatic change of state messages. A 0 disables the indicated status from causing an automatic message. A 1 enables the status. The mask is applied to the defined input status assembly. The default value is 0xFFFF.	Get/ Set	0000 0000 0000 0000 (0x00) to 1111 1111 1111 1111 (0xFFFF)	1111 1111 1111 1111 (0xFFFF)
113	0x0F-113-1	**Reset** Reset functions for the option and VSM500 unit. This parameter is a command. It will be reset to 0 = Ready after the command is completed. 0 = Ready (No action.) 1 = Reset DNet (Resets the DeviceNet option board board so that new node address or data rate settings are used.) 2 = Default DNet (Restores the parameters in the DeviceNet group to their factory-default settings.) 3 = Default Drive (Restores the parameters in the Drive Program group to their factory-default settings.)	Get/ Set[2]	0 to 3	0

[1] Get = Read. Set = Write. Set access is allowed only if DIP switch 10 on the VSM500 Integrated drive/motor is set to On (figure 2.3).
[2] The parameter can be set only when the drive is stopped.
[3] The parameter can be set only then the VSM500 Integrated drive/motor does not have an active I/O connection.

APPENDIX C

DeviceNet Objects

This appendix provides information on the DeviceNet objects supported by the VSM500 Integrated drive/motor for DeviceNet.

C.1 DeviceNet Message Types

The DeviceNet option board supports the following message types:

CAN Identifier Field	Group 1 Message Type
01101xxxxxx	Slave's I/O COS/Cyclic Message
01111xxxxxx	Slave Poll Response Messages

CAN Identifier Field	Group 2 Message Type
10xxxxxx010	Master's COS/Cyclic Acknowledge Message
10xxxxxx011	Slave Explicit Response Messages
10xxxxxx100	Master Explicit Request Messages
10xxxxxx101	Master I/O Poll Command Messages
10xxxxxx111	Duplicate MAC ID Check Messages

CAN Identifier Field	Group 3 Message Type
11000xxxxxx 11001xxxxxx 11010xxxxxx 11011xxxxxx 11100xxxxxx	Explicit Request/Response Messages
11101xxxxxx	Unconnected Explicit Response Messages
11110xxxxxx	Unconnected Explicit Request Messages

CAN Identifier Field	Group 4 Message Type
11111101100	Communication Faulted Response Messages
11111101101	Communication Faulted Request Messages

C.2 Class Code 0x01 – Identity Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	2
3	Get	Number of Instances	UINT	2
6	Get	Max ID Class	UINT	7
7	Get	Max ID Instance	UINT	7

Number of Instances: 2

Instance 1 Attributes Drive Instance

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Vendor ID	UINT	5
2	Get	Device Type	UINT	2
3	Get	Product Code	UINT	See Product Codes in Appendix B
4	Get	Revision Major Revision Minor Revision	Structure of USINT USINT	 3 2
5	Get	Status	WORD	Bit 0 = Owned Bit 2 = Configured Bit 10 = Recoverable Fault Bit 11 = Unrecoverable Fault
6	Get	Serial Number	UDINT	Unique 32 bit number
7	Get	Product Name String Length ASCII String	Structure of USINT STRING	 32 See Product Codes in Appendix B
9	Get	Configuration Consistency Value	UINT	Checksum

Instance 2 Attributes: DeviceNet Option Instance

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Vendor ID	UINT	5
2	Get	Device Type	UINT	12
3	Get	Product Code	UINT	75
4	Get	Revision Major Revision Minor Revision	Structure of USINT USINT	 1 7
5	Get	Status	WORD	Bit 0 = Owned Bit 2 = Configured Bit 10 = Recoverable Fault Bit 11 = Unrecoverable Fault
6	Get	Serial Number	UDINT	Unique 32 bit number
7	Get	Product Name String Length ASCII String	Structure of USINT STRING	 29 “VSM500 DeviceNet Interface”

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x05	No	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x11	Yes	No	Find_Next_Object_Instance

C.3 Class Code 0x02 – Message Router Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
6	Get	Max ID Class	UINT	7
7	Get	Max ID Instance	UINT	4

Instance Attributes

Attribute ID	Access Rule	Name	Data Type	Value
2	Get	Number Available	UINT	8
3	Get	Number Active	UINT	Number of connections currently used by system components
4	Get	Active Connections	Array of: UINT	A list of the connection IDs of the currently active connections

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single

C.4 Class Code 0x03 – DeviceNet Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	2

Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get/Set	MAC ID	USINT	0 to 63
2	Get/Set	Baud Rate	USINT	0 to 2
3	Get/Set	Bus Off Interrupt	BOOL	0 = Hold in error state 1 = Reset CAN chip
4	Get/Set	Bus-off Counter	USINT	0 to 255
5	Get	Allocation Information Allocation Choice Master Node Address	Structure of: Byte USINT	 Allocation Byte[1] 0 to 63 = Address 255 = Unallocated
6	Get	MAC ID Switch Changed	BOOL	0 = No Change 1 = Change since last reset or power up
7	Get	Baud Rate Switch Changed	BOOL	0 = No Change 1 = Change since last reset or power up
8	Get	MAC ID Switch Value	USINT	0 to 63
9	Get	Baud Rate Switch Value	USINT	0 to 3

[1]Allocation Byte
- Bit 0 = Explicit Messaging
- Bit 1 = Polled I/O
- Bit 4 = Change of State
- Bit 5 = Cyclic
- Bit 6 = Acknowledge Suppressed

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x4B	No	Yes	Allocate_Master/Slave_Connection_Set
0x4C	No	Yes	Release_Master/Slave_Connection_Set

C.5 Class Code 0x04 – Assembly Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	2
2	Get	Max Instance	UINT	106

Instance 1 to 106 Attributes: I/O Instances

Attribute ID	Access Rule	Name	Data Type	Min/Max	Default	Description
3	Get	Data	See instance data format for individual I/O assemblies on pages C-7 to C-9.			

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	No	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

Instance Data Format: Output Assemblies

Instance 1 Data Format (Basic Contactor Output Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0								Run

Instance 2 Data Format (Basic Overload Output Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset		

Instance 3 Data Format (Basic Motor Starter Output Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset		Run

Instance 4 Data Format (Extended Contactor Output Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0							RunRev	RunFwd

Instance 5 Data Format (Extended Motor Starter Output Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset	RunRev	RunFwd

Instance 20 Data Format (Basic Speed Control Output Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset		RunFwd
1								
2[1]	Speed Reference RPM (Low Byte)							
3[1]	Speed Reference RPM (High Byte)							

Instance 21 Data Format (Reversing Speed Control Output Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0		NetRef	Net Control			Fault Reset	RunRev	RunFwd
1								
2[1]	Speed Reference RPM (Low Byte)							
3[1]	Speed Reference RPM (High Byte)							

Instance 100 Data Format (Reversing Speed Control Output Assembly (Hz)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset	RunRev	RunFwd
1								
2[1]	Speed Ref Hz (0.1 Hz) (Low Byte)[2]							
3[1]	Speed Ref Hz (0.1 Hz) (High Byte)[2]							

[1] If speed references are outside of their min/max limits, the drive ignores them and previous speed reference will be maintained.

[2] 0 = 0 Hz, 1200 = 120.0 Hz.

Instance Data Format: Output Assemblies (Continued)

Instance 106 Data Format (Preset Control with Speed)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset	RunRev	RunFwd
1						Preset 2	Preset 1	Preset 0
2[1]	Speed Ref Hz (0.1 Hz) (Low Byte)[2]							
3[1]	Speed Ref Hz (0.1 Hz) (High Byte)[2]							

[1] If speed references are outside of their min/max limits, the drive ignores them and previous speed reference will be maintained.
[2] 0 = 0 Hz, 1200 = 120.0 Hz.

The following table defines the possible settings of the Preset bits in Instance 106.

Preset 2	Preset 1	Preset 0	Source of Speed Reference
0	0	0	Speed Ref Hz (bytes 2 and 3 of the output assembly)
0	0	1	**Parameter 51 [PRESET 1]**
0	1	0	**Parameter 52 [PRESET 2]**
0	1	1	**Parameter 53 [PRESET 3]**
1	0	0	**Parameter 54 [PRESET 4]**
1	0	1	**Parameter 55 [[PRESET 5]**
1	1	0	**Parameter 56 [PRESET 6]**
1	1	1	**Parameter 57 [[PRESET 7]**

The following table indicates the I/O Assembly Data Attribute mapping for Output Assemblies.

Data Component Name	Class		Instance Number	Attribute	
	Name	**Number**		**Name**	**Number**
RunFwd	Supervisor	0x29	1	Run 1	3
RunRev	Supervisor	0x29	1	Run 2	4
Fault Reset	Supervisor	0x29	1	Fault Reset	12
NetCtrl	Supervisor	0x29	1	NetCtrl	5
DN Preset Cmd	Supervisor	0x29	1	DNet Preset Command	102
NetRef	AC Drive	0x2A	1	Net Ref	4
Speed Ref RPM	Supervisor	0x29	1	DNet Speed Ref RPM	103
Speed Ref Hz	Supervisor	0x29	1	DNet Speed Ref Hz	104

Instance Data Format: Input Assemblies

Instance 50 Data Format (Basic Overload/Contactor Input Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0								Faulted

Instance 51 Data Format (Extended Overload/Contactor Input Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0			CtrlFrom Net					Faulted

Instance 52 Basic Motor Control								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Running1		Faulted/Trip

Instance 53 Extended Motor Control 1 (see table for functional assignments)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0			CtrlFrom Net	Ready		Running1		Faulted/Trip

Instance 54 Extended Motor Control 2 (see table for functional assignments)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0			CtrlFrom Net	Ready	Running2	Running1		Faulted/Trip

Instance 70 Data Format (Basic Speed Control Input Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Running1		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

Instance 71 Data Format (Extended Speed Control Input Assembly)								
Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	AtReference	RefFromNet	CtrlFrom Net	Ready	Running Reverse	Running Forward		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

The following table indicates the I/O Assembly Data Attribute mapping for Input Assemblies.

Data Component Name	Class		Instance Number	Attribute	
	Name	**Number**		**Name**	**Number**
Faulted	Supervisor	0x29	1	Faulted	10
Running 1	Supervisor	0x29	1	Running 1	7
Running 2	Supervisor	0x29	1	Running 2	8
Ready	Supervisor	0x29	1	Ready	9
CtrlFromNet	Supervisor	0x29	1	Ctrl From Net	15
RefFromNet	AC Drive	0x2A	1	Ref From Net	29
At Reference	AC Drive	0x2A	1	At Reference	3
Speed Actual RPM	AC Drive	0x2A	1	Speed Actual	7

C.6 Class Code 0x05 – Connection Object

Class Attribute

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1

Instance 1 Attributes: Master/Slave Explicit Message Connection

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 3 = Established 4 = Timed out 5 = Deferred delete
2	Get	Instance Type	USINT	0 = Explicit Message
3	Get	Transport Class Trigger	USINT	0x83
4	Get	Produced Connection ID	UINT	10xxxxxx011 xxxxxx = Node Address
5	Get	Consumed Connection ID	UINT	10xxxxxx100 xxxxxx = Node Address
6	Get	Initial Comm. Characteristics	BYTE	0x21
7	Get	Produced Connection Size	UINT	99
8	Get	Consumed Connection Size	UINT	159
9	Get/ Set	Expected Packet Rate	UINT	Timer Resolution of 2 msec.
12	Get/ Set	Watchdog Timeout Action	USINT	1 = Auto delete 3 = Deferred delete
13	Get	Produced Connection Path Length	UINT	0
14	Get	Produced Connection Path		Null (no data)
15	Get	Consumed Connection Path Length	UINT	0
16	Get	Consumed Connection Path		Null (no data)

Instance 2 Attributes: Polled I/O Connection

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	1 = I/O Message
3	Get	Transport Class Trigger	USINT	0x83
4	Get	Produced Connection ID	UINT	01111xxxxxx xxxxxx = Node Address
5	Get	Consumed Connection ID	UINT	10xxxxxx101 xxxxxx = Node Address
6	Get	Initial Comm. Characteristics	BYTE	0x01
7	Get	Produced Connection Size	UINT	0 to 4
8	Get	Consumed Connection Size	UINT	0 to 4
9	Get/Set	Expected Packet Rate	UINT	Timer Resolution of 2 msec
12	Get/Set	Watchdog Timeout Action	USINT	0 = Transition to time out 1 = Auto delete 2 = Auto reset
13	Get	Produced Connection Path Length	UINT	6
14	Get	Produced Connection Path		0x20, 0x04, 0x24, XX, 0x30, 0x03[1]
15	Get	Consumed Connection Path Length	UINT	6
16	Get	Consumed Connection Path		0x20, 0x04, 0x24, XX, 0x30, 0x03[1]

[1]Refer to the DeviceNet specification for a description of the connection path.

Instance 4 Attributes: Change of State/Cyclic I/O Message Connection

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	1 = I/O Message
3	Get	Transport Class Trigger	USINT	0x00 = Cyclic, ack inhibited 0x03 = Cyclic 0x10 = COS, ack inhibited 0x13 = COS
4	Get	Produced Connection ID	UINT	01101xxxxxx xxxxxx = Node Address
5	Get	Consumed Connection ID	UINT	**Ack inhibited** 0xFFFF **Ack enabled** 10xxxxxx010 xxxxxx = Node Address
6	Get	Initial Comm. Characteristics	BYTE	0x01 = ack enabled 0x0F = ack inhibited
7	Get	Produced Connection Size	UINT	0 to 4
8	Get	Consumed Connection Size	UINT	0 to 4
9	Get/Set	Expected Packet Rate	UINT	Timer Resolution of 2 msec
12	Get/Set	Watchdog Timeout Action	USINT	0 = Transition to time out 1 = Auto delete 2 = Auto reset
13	Get	Produced Connection Path Length	UINT	6
14	Get	Produced Connection Path		0x20, 0x04, 0x24, XX, 0x30, 0x03[1]
15	Get	Consumed Connection Path Length	UINT	0 = ack inhibited 1 = ack enabled
16	Get	Consumed Connection Path		**Ack inhibited** Null (no data) **Ack enabled** 0x20, 0x2B, 0x24, XX, 0x30, 0x01[1]
17	Get/Set	Production Inhibit Time	UINT	Timer Resolution of 2 msec

[1]Refer to the DeviceNet specification for a description of the connection path.

Instances 6 through 10: Explicit Message Connections

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0 = Nonexistent 1 = Configuring 3 = Established 4 = Timed out 5 = Deferred delete
2	Get	Instance Type	USINT	0 = Explicit Message
3	Get	Transport Class Trigger	USINT	0x83
4	Get	Produced Connection ID	UINT	11yyyxxxxxx yyy = Group 3 Message ID xxxxxx = Node Address
5	Get	Consumed Connection ID	UINT	11yyyxxxxxx yyy = Group 3 Message ID xxxxxx = Client Node Address
6	Get	Initial Comm. Characteristics	BYTE	0x33
7	Get	Produced Connection Size	UINT	99
8	Get	Consumed Connection Size	UINT	159
9	Get/Set	Expected Packet Rate	UINT	Timer Resolution of 2 msec.
12	Get/Set	Watchdog Timeout Action	USINT	1 = Auto delete 3 = Deferred delete
13	Get	Produced Connection Path Length	UINT	0
14	Get	Produced Connection Path		Null (no data)
15	Get	Consumed Connection Path Length	UINT	0
16	Get	Consumed Connection Path		Null (no data)

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x05	No	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x11	Yes	No	Find_Next_Object_Instance

C.7 Class Code 0x0F – Parameter Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	113
8	Get	Parameter Class Descriptor	WORD	0x0B
9	Get	Configuration Assembly Instance	UINT	0
10	Get	Native Language	USINT	0 = English

Instance 1 through 113 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get/Set	Parameter Value	(1)	(2)
2	Get	Link Path Size	USINT	7
3	Get	Link Path		0x20, 0x0F, 0x25, XX, XX, 0x30, 0x01[3]
4	Get	Descriptor	WORD	Bit 1 Supports enum strings Bit 2 Supports scaling Bit 4 Read only Bit 5 Monitor Bit 6 Extended precision scaling
5	Get	Data Type	USINT	1 = 16 bit word 2 = 16 bit unsigned integer 3 = 16 bit signed integer
6	Get	Data Size	USINT	2
7	Get	Parameter Name String	SHORT_STRING	(2)
8	Get	Units String	SHORT_STRING	(2)
9	Get	Help String	SHORT_STRING	0
10	Get	Minimum Value	data type	(2)
11	Get	Maximum Value	data type	(2)
12	Get	Default Value	data type	(2)
13	Get	Scaling Multiplier	UINT	1
14	Get	Scaling Divisor	UINT	1
15	Get	Scaling Base	UINT	1
16	Get	Scaling Offset	INT	0
17	Get	Multiplier Link	UINT	0
18	Get	Divisor Link	UINT	0
19	Get	Base Link	UINT	0
20	Get	Offset Link	UINT	0
21	Get	Decimal Precision	USINT	(2)

[1] Specified in descriptor, data type, and data size.
[2] Value varies based on parameter instance.
[3] Refer to the DeviceNet specification for a description of the connection path.

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x01	Yes	Yes	Get_Attributes_All
0x05	Yes	No	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single
0x4B	No	Yes	Get_Enum_String

C.8 Class Code 0x10 – Parameter Group Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	3
8	Get	Native Language	USINT	0 = English

Instance 1 Attributes: Drive Display Instance

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Group Name String	SHORT_STRING	Drive Display
2	Get	Number of Members in Group	UINT	10
3	Get	1st Parameter Number in Group	UINT	1
4	Get	2nd Parameter Number in Group	UINT	2
5	Get	3rd Parameter Number in Group	UINT	3
6	Get	4th Parameter Number in Group	UINT	4
7	Get	5th Parameter Number in Group	UINT	5
8	Get	6th Parameter Number in Group	UINT	6
9	Get	7th Parameter Number in Group	UINT	7
10	Get	8th Parameter Number in Group	UINT	8
11	Get	9th Parameter Number in Group	UINT	9
12	Get	10th Parameter Number in Group	UINT	10

Instance 2 Attributes: Drive Program Instance

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Group Name String	SHORT_STRING	Drive Program
2	Get	Number of Members in Group	UINT	28
3	Get	1st Parameter Number in Group	UINT	30
4	Get	2nd Parameter Number in Group	UINT	31
5	Get	3rd Parameter Number in Group	UINT	32
6	Get	4th Parameter Number in Group	UINT	33
7	Get	5th Parameter Number in Group	UINT	34
8	Get	6th Parameter Number in Group	UINT	35
9	Get	7th Parameter Number in Group	UINT	36
10	Get	8th Parameter Number in Group	UINT	37
11	Get	9th Parameter Number in Group	UINT	38
12	Get	10th Parameter Number in Group	UINT	39
13	Get	11th Parameter Number in Group	UINT	40
14	Get	12th Parameter Number in Group	UINT	41
15	Get	13th Parameter Number in Group	UINT	42
16	Get	14th Parameter Number in Group	UINT	43
17	Get	15th Parameter Number in Group	UINT	44
18	Get	16th Parameter Number in Group	UINT	45
19	Get	17th Parameter Number in Group	UINT	46
20	Get	18th Parameter Number in Group	UINT	47
21	Get	19th Parameter Number in Group	UINT	48
22	Get	20th Parameter Number in Group	UINT	49
23	Get	21st Parameter Number in Group	UINT	50
24	Get	22nd Parameter Number in Group	UINT	51
25	Get	23rd Parameter Number in Group	UINT	52
26	Get	24th Parameter Number in Group	UINT	53
27	Get	25th Parameter Number in Group	UINT	54
28	Get	26th Parameter Number in Group	UINT	55
29	Get	27th Parameter Number in Group	UINT	56
30	Get	28th Parameter Number in Group	UINT	57

Instance 3 Attributes: DNet Config Instance

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Group Name String	SHORT_STRING	DNet Config
2	Get	Number of Members in Group	UINT	13
3	Get	1st Parameter Number in Group	UINT	101
4	Get	2nd Parameter Number in Group	UINT	102
5	Get	3rd Parameter Number in Group	UINT	103
6	Get	4th Parameter Number in Group	UINT	104
7	Get	5th Parameter Number in Group	UINT	105
8	Get	6th Parameter Number in Group	UINT	106
9	Get	7th Parameter Number in Group	UINT	107
10	Get	8th Parameter Number in Group	UINT	108
11	Get	9th Parameter Number in Group	UINT	109
12	Get	10th Parameter Number in Group	UINT	110
13	Get	11th Parameter Number in Group	UINT	111
14	Get	12th Parameter Number in Group	UINT	112
15	Get	13th Parameter Number in Group	UINT	113

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x01	Yes	Yes	Get_Attributes_All
0x0E	Yes	Yes	Get_Attribute_Single

C.9 Class Code 0x28 – Motor Data Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	1
6	Get	Max ID Class	UINT	7
7	Get	Max ID Instance	UINT	15

Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Number of Attributes	USINT	12
2	Get	Attributes List	Array of USINT	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 15
3	Get	Motor Type	USINT	7 = Squirrel Cage Induction Motor
4	Get	Catalog Number	SHORT_STRING	[1]
5	Get	Manufacturer	SHORT_STRING	“Reliance Electric”
6	Get	Rated Current	UINT	0.1 Amps[1]
7	Get	Rated Voltage	UINT	Volts [1]
8	Get	Rated Power at Rated Frequency	UDINT	Watts[1]
9	Get	Rated Electrical Frequency	UINT	1
11	Get/ Set[2]	Maximum Allowed Motor Speed	UINT	1500 to 3600 RPM
12	Get	Pole Count	UINT	4
15	Get/ Set	Base Speed	UINT	300 to 3600 RPM

[1] Value varies based on drive model.

[2] This attribute can be set only when the drive is stopped.

Common Servicesl

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

C.10 Class Code 0x29 – Control Supervisor Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	1
6	Get	Max ID Class	UINT	7
7	Get	Max ID Instance	UINT	17

Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Number of Attributes	USINT	17
2	Get	Attributes List	Array of USINT	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17
3	Get/Set [1]	Run 1	BOOL	See Run/Stop Event Matrix on page C-22.
4	Get/ Set[1]	Run 2	BOOL	See Run/Stop Event Matrix on page C-22.
5	Get/ Set[1]	NetCtrl	BOOL	0 = TB or keypad control 1 = Network control
6	Get	State	USINT	3 = Ready 4 = Enabled 5 = Stopping 7 = Faulted
7	Get	Running 1	BOOL	0 = Not running forward 1 = Running forward
8	Get	Running 2	BOOL	0 = Not running reverse 1 = Running reverse
9	Get	Ready	BOOL	0 = Other state 1 = Ready or Enabled or Stopping
10	Get	Faulted	BOOL	0 = No faults present 1 = Fault occurred (latched)
11	Get	Warning	BOOL	0
12	Get/ Set	Fault Reset	BOOL	0 = No action 0 -> 1 = Fault Reset

[1] This attribute can be set only when the expected packet rate (EPR) for the explicit connection is non-zero and the VSM500 unit does not have an active I/O connection.

Attribute ID	Access Rule	Name	Data Type	Value
13	Get	Fault Code	UINT	0x0000 = No fault 0x1000 = general fault 0x2220 = over current 0x3210 = high bus 0x3220 = low bus (stopped) 0x3221 = low bus (running) 0x4310 = drive overtemp 0x5300 = function loss 0x5301 = tb redundant start 0x6310 = eeprom parameter checksum 0x6311 = devicenet eeprom 0x6312 = eeprom drive id 0x7122 = thermal overload 0x7500 = no devicenet power 0x7501 = devicenet lost i/o connection 0x7502 = devicenet unrecoverable fault 0x7504 = devicenet forced fault 0x7505 = devicenet communication fault 0x7510 = communication loss 0x7700 = keypad disconnected 0x7701 = display fixed pattern 0x7702 = keypad redundant start 0x7703 = keypad connected
14	Get	Warn Code	UINT	0
15	Get	Ctrl From Net	BOOL	0 = TB or keypad control 1 = Network control
16	Get/Set	DNet Fault Mode	USINT	0 = Fault and Stop 1 = Ignore
17	Get/Set	Force Fault/Trip	BOOL	0 -> 1 = Force fault
102[1]	Get/Set	DNet Preset Command	USINT	0 to 7
103[1)]	Get/Set	DNet Speed Ref RPM	UINT	0 to 3600 (RPM)
104[1]	Get/Set	DNet Speed Ref Hz	UINT	0 to 120.0 (0.1 Hz)

[1] This attribute can be set only when the expected packet rate (EPR) for the explicit connection is non-zero and the VSM500 unit does not have an active I/O connection.

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x05	No	Yes	Reset
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

State Transition Diagram

The following State Transition Diagram provides a graphical description of the states and state transitions that are reflected in attribute #6.

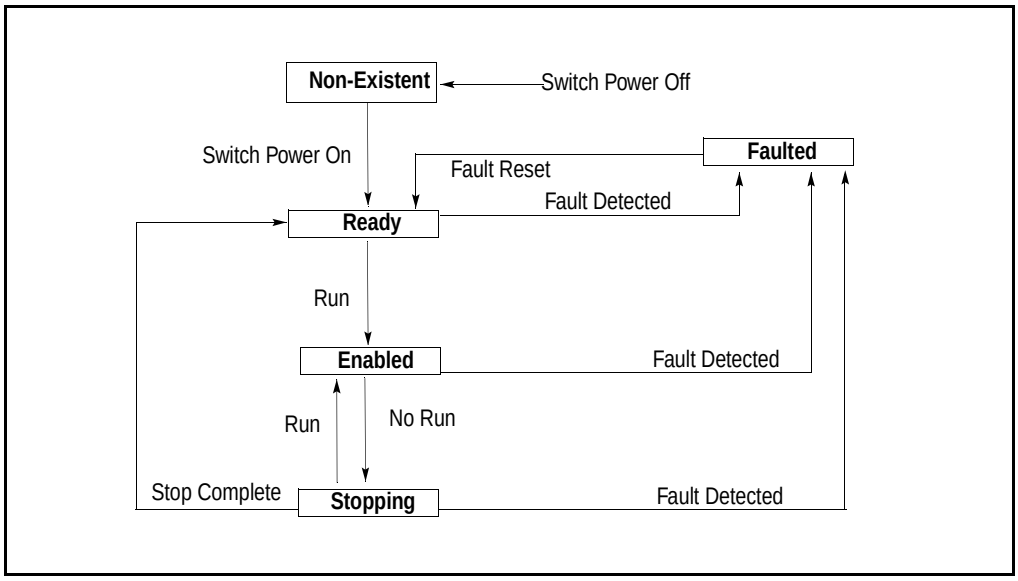


Figure C.1 – State Transition Diagram

Run/Stop Event Matrix

Attribute 5, NetCtrl, is used to request that Run/Stop events be controlled from the network. Before Run/Stop control is accomplished from the network, Attribute 15, CtrlFromNet must be set to 1 by the device in response to a NetCtrl request.

If attribute 15, CtrlFromNet is set to 1, the events Run and Stop are triggered by a combination of the RunFwd and RunRev attributes as shown in the following table.

RunFwd	RunRev	Trigger Event	Run Type
0	0	Stop	NA
0 -> 1	0	Run	RunFwd
0	0 -> 1	Run	RunRev
0 -> 1	0 -> 1	No Action	NA
1	1	No Action	NA
1->0	1	Run	RunRev
1	1->0	Run	RunFwd

Important: When attempting to use attribute 3 or 4 to start the drive, the Explicit Message connection (Class 5, instance 1) attribute 9, Expected Packet Rate must be set to greater than zero.

C.11 Class Code 0x2A – AC Drive Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	1
6	Get	Max ID Class	UINT	7
7	Get	Max ID Instance	UINT	29

Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Number of Attributes	USINT	20
2	Get	Attributes List	Array of USINT	1, 2, 3, 4, 6, 7, 8, 9, 10, 16, 17, 18, 19, 20, 21, 22, 23, 27, 28, 29
3	Get	At Reference	BOOL	0 = Drive not running at speed reference 1 = Drive running at speed reference
4	Get/Set	Net Ref	BOOL	0 = TB or keypad speed ref 1 = Network speed ref
6	Get	Drive Mode	USINT	1 = Open loop speed (frequency)
7	Get	Speed Actual	INT	0 to 3600 RPM
8	Get	Speed Ref	INT	0 to 3600 RPM
9	Get	Current Actual	INT	0.1 Amp[1]
10	Get	Current Limit	INT	0.1 Amp[1]
16	Get	Input Voltage	INT	Volts (input line voltage)[1]
17	Get	Output Voltage	INT	Volts[1]
18	Get/Set	Accel Time	UINT	500 to 45000[2]
19	Get/Set	Decel Time	UINT	500 to 45000[2]
20	Get/Set	Low Speed Limit	UINT	0 to 1800 RPM
21	Get/Set	High Speed Limit	UINT	1500 to 3600 RPM
22	Get	Speed Scale	SINT	0
23	Get	Current Scale	SINT	0
27	Get	Voltage Scale	SINT	0
28	Get	Time Scale	SINT	-1
29	Get	Ref From Net	BOOL	0 = TB or keypad speed ref 1 = Network speed ref

[1] Value varies based on drive rating and operating conditions.
[2] This value is converted to milliseconds using the following formula: value x 2 = milliseconds. For example, a value of 45000 equals 90.000 seconds.

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

C.12 Class Code 0x2B – Acknowledge Handler Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max Instance	UINT	1

Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get/Set	Acknowledge Timer	UINT	Timer resolution of 8 msec
2	Get	Retry Limit	USINT	1
3	Get	COS Producing Connection Instance	UINT	4

Common Services

Service Code	Implemented for		Service Name
	Class	Instance	
0x0E	Yes	Yes	Get_Attribute_Single
0x10	No	Yes	Set_Attribute_Single

APPENDIX D

Glossary

Assembly Objects: The DeviceNet Specification defines Assembly Objects as objects that “bind attributes of multiple objects to allow data to or from each object to be sent over a single connection.” The VSM500 unit with a DeviceNet option board uses assembly objects to transmit data to and from a scanner over a control I/O connection. The terms “input” and “output” are defined from the scanner’s point of view. Output assemblies are sent by the scanner and consumed by the unit. Input assemblies are sent by the unit and consumed by the scanner.

Bus Off: A bus off condition occurs when an abnormal rate of errors is detected on the Control Area Network (CAN) bus in a device. The bus-off device cannot receive or transmit messages on the network. This condition is often caused by corruption of the network data signals due to noise or data rate mismatch.

Change of State (COS) I/O Data Exchange: A device that is configured for change of state I/O data exchange transmits data only when its data has changed. This type of exchange can reduce network traffic and save resources since old data does not need to be transmitted or processed.

Classes: A device has many objects. Each type of object is grouped in a class that is identified with a unique ID number.

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

Cyclic I/O Data Exchange: A device configured for cyclic I/O data exchange transmits data at a user-configured rate. This type of exchange ensures that data is updated at an appropriate rate for the application, preserves bandwidth for rapidly-changing devices, and allows data to be sampled at precise intervals for better determinism.

Data Rate: The data rate, sometimes called baud rate, is the speed at which data is transferred on the DeviceNet network. The available data rates depend on the type of cable and total cable length used on the network**:**

Cable	Maximum Cable Length Based on Data Rate		
	125 K	250 K	500 K
Thick Trunk Line	500 m (1,640 ft.)	250 m (820 ft.)	100 m (328 ft.)
Thin Trunk Line	100 m (328 ft.)	100 m (328 ft.)	100 m (328 ft.)
Maximum Drop Length	6 m (20 ft.)	6 m (20 ft.)	6 m (20 ft.)
Cumulative Drop Length	156 m (512 ft.)	78 m (256 ft.)	39 m (128 ft.)

Each device on a DeviceNet network must be set for the same data rate. You can set the DeviceNet option board to 125K, 250K, or 500K. You can set it to Autobaud if another device on the network has set the data rate.

DeviceNet Network: A DeviceNet Network is a producer/consumer Control Area Network (CAN) that connects controllers (e.g., PLCs and SLCs) and devices (e.g., drives and motor starters). Both implicit (control I/O) and explicit (configuration) messages can be transmitted over the network. A DeviceNet network can support a maximum of 64 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 both the signal and power wires. Devices can be connected to the network with drop lines, in a daisy chain connection, or a combination of the two.

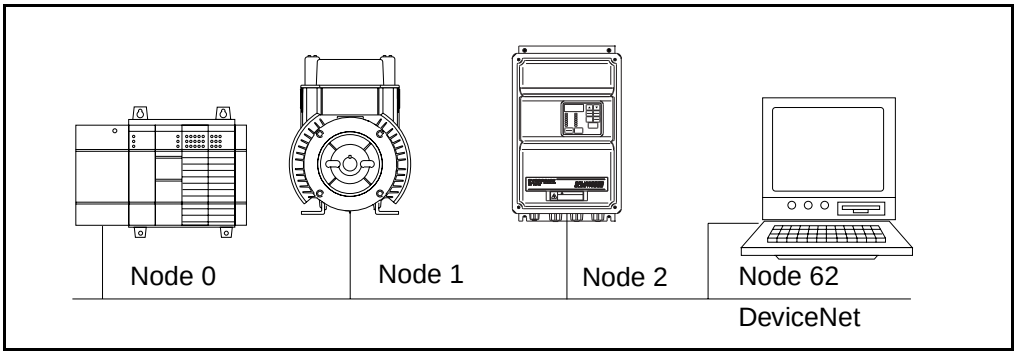


Figure D.1 – Example DeviceNet Network

Node	Description
0	SLC Scanner. PLC and SLC scanners connect controllers to the network.
1	VSM500 Integrated Drive/Motor with a DeviceNet option board.
2	GV3000 AC drive with a DeviceNet option board.. Many products (including sensors, push buttons, motor starters, simple operator interfaces, and drives) can be connected to a DeviceNet network.
62	Computer using a 1784-PCD adapter. A computer running software such as DeviceNet Manager can be used to configure the network and devices.

General information about DeviceNet and the DeviceNet specification are maintained by the Open DeviceNet Vendor's Association (ODVA) at **http://www.odva.org**.

DeviceNet Manager Software: DeviceNet Manager software is a tool for configuring and monitoring DeviceNet networks and connected devices. It is a 16-bit Windows application that runs on Windows™ 95, Windows 98, and Windows NT® (4.0 or greater).

DeviceNet Option Board: Devices such as drives, controllers, and computers usually require an option board to provide a communication interface between them and a network such as DeviceNet. A DeviceNet option board 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.

Option boards are sometimes also called adapters, cards, gateways, modules, or peripherals.

Electronic Data Sheet (EDS) Files: EDS files are simple text files that are used by network configuration tools, such as DeviceNet Manager and RSNetWorx for DeviceNet, to help you identify products such as VSM500 units and easily commission them on a network. EDS files describe a product device type, revision, and configurable parameters.

Explicit Messaging: Explicit messages are used to configure, monitor, and diagnose devices.

Fault Action: A fault action determines how the option and connected VSM500 unit act when there is a communications fault (e.g., a cable is disconnected).

Faulted Node Recovery: If you have software that supports this feature, you can change a configuration of a device that is faulted on the network. For example, if you add a device to a network and it does not have a unique address, it will fault. If it has faulted node recovery, you can change its node address so that it is no longer faulted.

Hold Last State: When communications are disrupted (e.g., a cable is disconnected), the DeviceNet option board and VSM500 unit can respond by holding last state. Hold last state results in the VSM500 unit receiving the last data received via the DeviceNet connection before the disruption. If the VSM500 unit was in RUN mode and using the reference from DeviceNet, it will continue to run at the same reference.

I/O Messaging: I/O messages are used to transmit time-critical I/O data that controls the drive. I/O messages are sometimes referred to as implicit messages. The I/O messages used for the VSM500 unit depend on the input and output assemblies that you are using.

Idle Action: An idle action determines how the option and connected VSM500 unit act when the processor is placed into an idle mode.

Logic Command/Status: The logic command/status is used to control and monitor the VSM500 unit (e.g., start, stop, direction). The definition and size of the logic command/status depends on which assemblies are being used.

Master/Slave Hierarchy: An VSM500 unit configured for a master-slave hierarchy exchanges data with the master device (scanner). Usually, a network has one scanner which is the master device, and all other devices are slave devices. A network can have multiple scanners. These networks are sometimes referred to as “multimaster hierarchies.” On such networks, each slave device must have a scanner specified as its master.

Node Address: A DeviceNet network can have as many as 64 devices connected to it. Each device on the network must have a unique node address between 0 and 63. However, some node addresses are reserved for special devices. For example, node number 0 is usually reserved for scanners. Node number 62 is usually reserved for a computer connected to the network. Node number 63 is always reserved for new devices.

Object: An object consists of the attributes (data), services (functions), and behavior (operations) that are bound together to support a functionality in a device.

Polled I/O Data Exchange: A device that is configured for polled I/O data exchange sends data immediately after it receives data. For example, an option receives a logic status command from the scanner and then sends the logic status of connected VSM500 unit.

Producer/Consumer Network: DeviceNet is a producer/consumer network. On producer/consumer networks, packets are identified by content rather than by an explicit destination. If a node needs the packet, it will accept the identifier and consume the packet. The source therefore sends a packet once and all the nodes consume the same packet if they need it. Data is therefore produced once, regardless of the number of consumers. Also, precise synchronization is possible because data arrives at each node at the same time

Reference/Feedback: The reference/feedback is used to send a reference (i.e., command speed) to the VSM500 unit and monitor its feedback (i.e. actual speed). The size and definition of the reference/feedback depend on the assemblies that you are using.

RSNetWorx for DeviceNet Software: RSNetWorx for DeviceNet software is tool for configuring and monitoring DeviceNet networks and connected devices. It is a 32-bit Windows application that runs on Windows 95, Windows 98, and Windows NT.

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

UCMM (UnConnected Message Manager): UCMM is the use of explicit messages that use the DeviceNet group 3 identifiers. They allow multiple devices to access the VSM500 unit and DeviceNet option board at the same time.

VSM500 Integrated/Drive Motor: The VSM500 Integrated Drive/Motor is an AC drive integrally mounted with an inverter duty motor. It consists of a drive section and a motor section. It may be connected to a DeviceNet network with a DeviceNet option board. In this manual, the VSM500 Integrated Drive/Motor is also referred to as “VSM500 unit,” “drive,” or “unit.”

Zero Data: When communications are disrupted (e.g., a cable is disconnected), the DeviceNet option board and VSM500 unit can respond with zero data. Zero data results in the VSM500 unit receiving zero as values for logic command and speed reference. This will stop the unit.

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