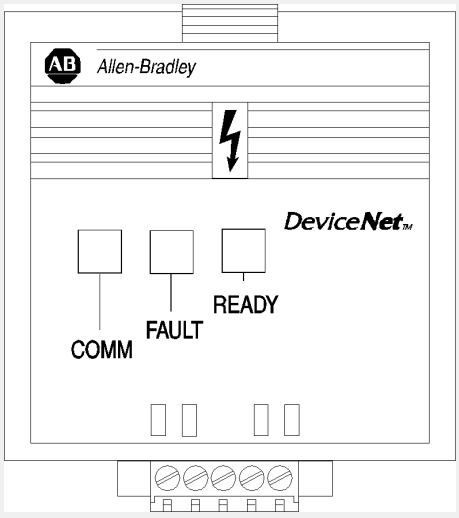
Allen-Bradley

Bulletin 160

DeviceNet™ Communication Module

User Manual

FRN 1.xx – 2.xx



Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Rockwell Automation does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Rockwell Automation publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Rockwell Automation office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.

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

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

Attention statements help you to:

- Identify a hazard.
- Avoid the hazard.
- Recognize the consequences.

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

Summary of Changes

This release of the *Bulletin 160 DeviceNet Communication Module User Manual* contains the software enhancements of Firmware Version 2.xx and contains new and updated information to the manual. The new and updated information is summarized on the following page.

Bulletin 160-DN1 version 2.xx Software Enhancements

New features and enhancements in Firmware Revision 2.xx include:

Configuration Assemblies
Four configuration assemblies for downloading parameters allow all parameters or blocks of parameters to be downloaded at once, reducing setup and programming time.

Change of State/Cyclic I/O Messaging
Allows device to initiate I/O message, reducing network traffic.

Off-line Node Recovery
Allows “off-line” change of node address over the network to devices with duplicate node addresses.

Configuration Consistency Checksum
Used to verify the parameters are unchanged since last configuration.

Additional I/O Assemblies
Similar to other Allen-Bradley drive products to reduce setup time and ensure consistency.

Added Second Identity Object
An instance of the Identity Object describes the attributes associated with the 160-DN1 module.

Idle Mode Parameter
Defines the actions of the drive when the PLC in placed in program mode.

Local Return Parameter
Sets which input mode the drive will use when transitioning from network control to local control.

160-DN1 Software Version Parameter
Displays the software version of the 160-DN1 module.

New and Revised Chapters for this Manual

Quick Start for Experienced Users	Chapter 2
DeviceNet Parameter Descriptions	Chapter 5
Using the 160-DN1 with a DeviceNet Scanner	Chapter 6
ODVA Parameter Descriptions	Appendix C

Summary of Enhancements to User Manual

Refer to the following references in this manual:

Reference Manuals Section	P-2
Quick Start for Experienced Users	2-2
CE Compliance Data	3-2
Setting Baud Rate	3-5
DeviceNet Parameter Descriptions	Chapter 5
160-DN1 EDS Files	5-1 to 5-3
I/O Assemblies Similar to Other Allen-Bradley Drive Products	5-6, B-19, B-21, B-22
Idle Mode Parameter	5-7
Local Return Parameter	5-7
160-DN1 Software Version Parameter	5-7
Using the 160-DN1 with DeviceNet Scanner	Chapter 6
Example Ladder Program for I/O Messaging	6-16
Example Ladder Program for Explicit Messaging	6-20
Troubleshooting Moved to Chapter 7	Chapter 7
Fault Codes	7-3 to 7-5
Electrical Specifications	A-1
DeviceNet Class, Instance and Attributes	Appendix B
Change of State/Cyclic I/O Messaging	B-1
Off-line Node Recovery	B-1
Configuration Consistency Checksum	B-3
Second Identity Object	B-4
Four Configuration Assemblies For Downloading Parameters	B-17, B-23 to B-26
ODVA Interface Parameter Descriptions	Appendix C

Table of Contents

Using This Manual — **Preface**

Manual Objectives P-1
Who Should Use This Manual? P-1
Vocabulary P-1
Conventions P-1
Firmware Version P-1
Reference Manuals P-2
Safety Precautions P-3
DeviceNet Compatibility P-4

Product Overview — **Chapter 1**

Module Description 1-1
LEDs and DeviceNet Connection 1-1
DIP Switches 1-2

Quick Start for Experienced Users — **Chapter 2**

Objective of This Chapter 2-1
Required Tools and Equipment 2-1
Procedures 2-2

Installation and Wiring — **Chapter 3**

EMC Directive 89/336/EEC Compliance 3-2
Low Voltage Directive 73/23/EEC Compliance 3-2
Removing Program Keypad Module or Ready/Fault Panel 3-3
Understanding Module Configuration Switches 3-3
Setting the DeviceNet Node Address 3-4
Setting the Baud Rate 3-5
  Cable Lengths and Baud Rates 3-5
Installing the Communication Module 3-6
Wiring the DeviceNet Connector 3-7
Connecting the DeviceNet Drop Line to the Module 3-8
Removing Communication Module From a Drive 3-8

Modes of Operation — **Chapter 4**

Powering Up the Drive 4-1
Modes of Operation 4-1
  Power-up Reset Mode 4-1
  Run Mode 4-2
  Error Mode 4-2

DeviceNet Parameter Descriptions — **Chapter 5**

DeviceNet Parameters . . . 5-1
Electronic Data Sheet . . . 5-1
Parameters and EDS File . . . 5-1
Interface Select Parameter . . . 5-2
Bulletin 160 SSC Interface . . . 5-2
ODVA Drive Profile Interface . . . 5-2
Product Codes and EDS Files . . . 5-3
Bulletin 160 SSC Interface Parameters . . . 5-4
Interface Select Parameter . . . 5-4
DeviceNet Parameters . . . 5-4
Drive Display Parameters (Read Only) . . . 5-8
Drive Program Parameters . . . 5-9

Using 160-DN1 with DeviceNet Scanner — **Chapter 6**

Needed Tools . . . 6-2
Example Network . . . 6-2
Set Device MAC ID's . . . 6-2
Installing the EDS Files . . . 6-3
Invoke Manager Software and "Go Online" . . . 6-3
Perform Network Who . . . 6-4
Invoke 160 Configuration Screen . . . 6-4
Pick Input and Output Assemblies for the Bulletin 160 . . . 6-5
Enable Network Control . . . 6-7
Configure the 160 to Accept Speed Commands From the Network . . . 6-8
Invoke Scanner Configuration Screens . . . 6-9
Set Up the Scan List . . . 6-9
Map Each Device in the Scan List . . . 6-12
Program the Ladder . . . 6-15
Explicit Messaging . . . 6-17
  How it Works . . . 6-17
How to Format the Explicit Message Transaction Block . . . 6-17
Programming the SLC to Run Explicit Messaging . . . 6-18
  1. Entering Data into the Program . . . 6-18
  2. Running the Program . . . 6-18
  3. Receiving Data From the Program . . . 6-18
  Data Format for a Read and Write of a Parameter . . . 6-19

Troubleshooting — **Chapter 7**

Understanding the COMM LED . . . 7-2
Understanding the FAULT LED . . . 7-3

Specifications **Appendix A**
Electrical A-1
Environmental A-1
Communications A-1
Mechanical A-1

DeviceNet Information **Appendix B**
DeviceNet Message Types B-1
Object Classes B-2
Class Code 0x01 — Identity Object B-3
Class Code 0x03 — DeviceNet Object B-5
Class Code 0x05 — Connection Object B-6
Class Code 0x28 — Motor Data Object B-9
Class Code 0x29 — Control Supervisor Object B-10
State Transition Diagram B-11
Run/Stop Event Matrix B-12
Class Code 0x2A — AC Drive Object B-13
Class Code 0xB3 — 160 Parameter Table Object B-14
Class Code 0xB4 — DN Interface Object B-17
Class Code 0x04 — Assembly Objects B-18
Instance Data Format B-19
Output Assemblies B-19
Input Assemblies B-21
Configuration Assembly Data Formats B-24

ODVA Interface Parameter Descriptions **Appendix C**
The ODVA Interface C-1
ODVA Drive Profile Interface C-1
ODVA Drive Profile Interface Parameters C-1

Index

Using This Manual

Manual Objectives

The purpose of this manual is to provide you with the necessary information to apply the Bulletin 160 SSC™ DeviceNet™ Communication Module. Described in this manual are methods for installing, configuring, and troubleshooting the Bulletin 160 SSC DeviceNet Communication Module.

For information on specific features of the Bulletin 160 SSC drive, refer to the *Bulletin 160 SSC User Manual*.

Important: Read this manual in its entirety before installing, operating, servicing, or initializing the Bulletin 160 DeviceNet Communication Module.

Who Should Use This Manual?

This manual is intended for qualified personnel. To make efficient use of the Communication Module, you must be able to program and operate serial communications devices, as well as have an understanding of the parameter settings and functions of the Bulletin 160 SSC drive.

You should understand DeviceNet network operations, including how slave devices operate on the network and communicate with a DeviceNet master.

Vocabulary

In this manual we refer to the:

- Bulletin 160 SSC DeviceNet Communication Module as Communication Module and Module.
- Bulletin 160 SSC Variable Frequency AC Drive as the Drive.

Conventions

Parameter numbers and names are shown in bold typeface and follow the format PXX - [*] where P denotes parameter, XX denotes the two digit parameter number, and * represents the parameter name. For example, **P01 - [Output Frequency]**.

Firmware Version

The convention for identifying firmware releases is as follows:

FRN	=	Firmware Release Number
2	=	Firmware (whole) Number
(.)	=	Decimal point separator
x	=	Place holder representing minor updates
x	=	Place holder representing bug fixes

Places to the right of the decimal do not affect content of this manual.

Reference Manuals

For Bulletin 160 SSC Information:

- *Bulletin 160 SSC User Manual Series A* Publication 0160-5.0
- *Bulletin 160 SSC User Manual Series B* Publication 0160-5.9

For the DeviceNet Manager Software:

- *DeviceNet Manager Software User Manual* Publication 1787-6.5.3

For SLC 500 and 1747-SDN information:

- *DeviceNet Scanner Module Installation Instructions* Publication 1747-5.8
- *DeviceNet Scanner Module Configuration Manual* Publication 1747-6.5.2

For PLC5 and 1771-SDN information:

- *DeviceNet Scanner Module Installation Instructions* Publication 1771-5.14
- *DeviceNet Scanner Module Configuration Manual* Publication 1771-6.5.118

For DeviceNet cables and components:

- *DeviceNet Product Overview* Publication DN-2.5

To install and implement a DeviceNet network:

- *DeviceNet Cable System Planning and Installation Manual* Publication 1485-6.7.1

Important: Read the *DeviceNet Cable System Planning and Installation Manual* Publication 1485-6.7.1 in its entirety before planning and installing a DeviceNet system. If the network is not installed according to this document, unexpected operation and intermittent failures can occur.

If this manual is not available, please contact either the local Allen-Bradley Distributor or Sales Office and request a copy. Copies may also be ordered from the Automation Bookstore. The Automation Bookstore can be contacted, via the Internet, from the Allen-Bradley Home Page at “www.ab.com.”

Manual Organization

Chapter	Title	Contents
	Preface	Manual objectives, audience, vocabulary, manual conventions and organization, safety precautions, and DeviceNet compatibility.
1	Product Overview	Module description, LEDs, DIP switches, and DeviceNet compatibility.
2	Quick Start for Experienced Users	Communication Module features, configuration, and diagnostics.
3	Installation and Wiring	Installation, switch configuration, cabling, and removal.
4	Modes of Operation	Power-up and modes of operation.
5	DeviceNet Parameter Descriptions	EDS file parameters, ODVA drive profile interface, product codes.
6	Using 160-DN1 with DeviceNet Scanner	Mac IDs, Manager software, configuration, input/output assemblies, network control, scan list, ladder program, explicit messaging.
7	Troubleshooting	LED indications and fault descriptions.
Appendix A	Specifications	Environmental, electrical, and communication specifications.
Appendix B	DeviceNet Information	DeviceNet message types and object classes.
Appendix C	ODVA Interface Descriptions	EDS file information and interfaces.

Safety Precautions

ATTENTION: Only personnel familiar with DeviceNet devices, Bulletin 160 SSC drives, and associated machinery should plan or implement the installation, start-up, configuration and subsequent maintenance of the Communication Module. Failure to comply may result in personal injury and/or equipment damage.

ATTENTION: This module contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing, or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference Allen-Bradley Publication 8000-4.5.2, *Guarding Against Electrostatic Damage* or any other applicable ESD protection handbook.

Safety Precautions (Continued)

ATTENTION: The drive contains high voltage capacitors which take time to discharge after removal of mains supply. Before installing or removing the DeviceNet Communication Module, ensure isolation of mains supply from line inputs [L1, L2, L3 (R, S, T)]. Wait one minute for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death.

ATTENTION: When a system is configured for the first time, the motor must be disconnected from the machine or process during initial system testing. Hazard of injury or equipment damage may occur due to unintended or incorrect machine motion.

DeviceNet Compatibility

The 160-DN1 Communication Module is intended for use only with Bulletin 160 SSC devices. When properly connected, the Communication Module communicates via the DeviceNet Protocol. The Communication Module/Bulletin 160 SSC combination comprise a Group 2 Slave Only device. This device supports DeviceNet slave Polled, Change of State/Cyclic messaging, and DeviceNet slave Explicit messaging.

Product Overview

This chapter contains the following information:

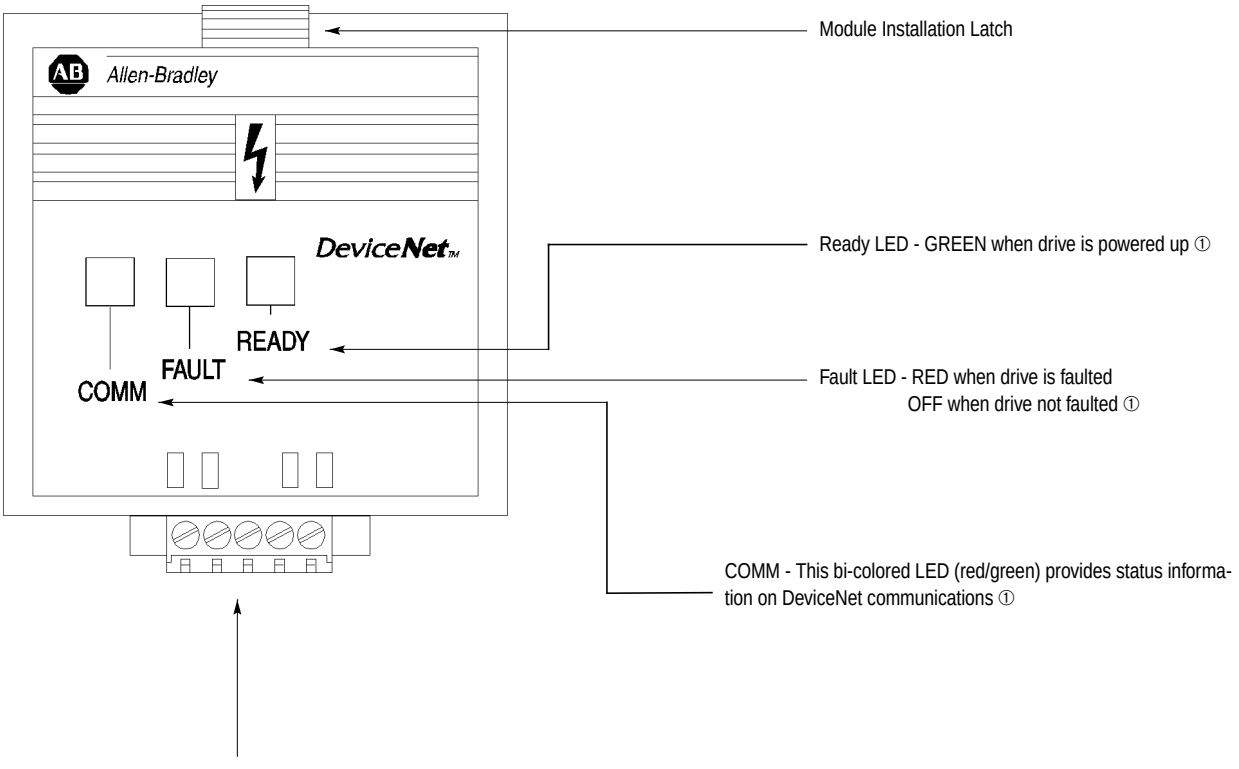
- The physical layout of the module.
- Location of configuration switches.
- DeviceNet overview and components.

Module Description

The Bulletin 160 SSC DeviceNet Communication Module is an optional interface device designed to provide a direct, digital link between DeviceNet devices and the Bulletin 160 SSC drive. The module connects to the Bulletin 160 SSC through the expansion/keypad port on the front of the drive.

LEDs and DeviceNet Connection

Figure 1.1
Module Front View

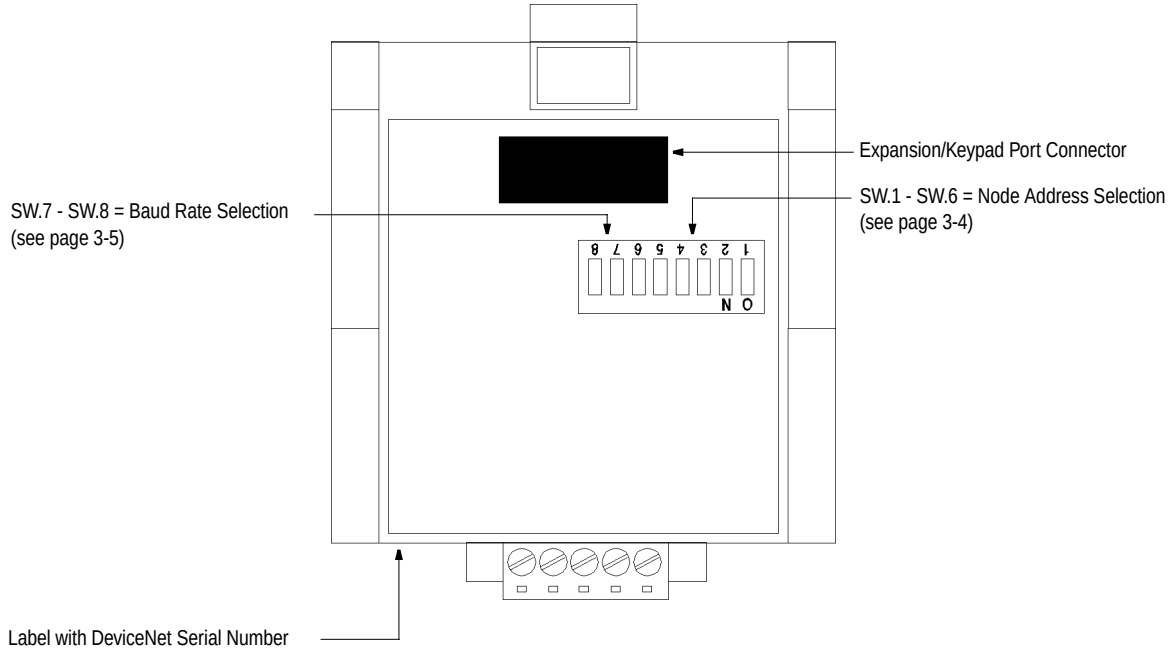


① See Chapter 4, *Modes of Operation*, and Chapter 7, *Troubleshooting*, for detailed operation.

DIP Switches

Figure 1.2
Module Rear View

The Communication Module has one eight position DIP switch for setting the DeviceNet Node Address and Baud Rate. DIP switches are located on the rear of the module and are only accessible when the module is removed from the Bulletin 160 SSC drive.



Quick Start for Experienced Users

Objective of This Chapter

This chapter can help you start using the Bulletin 160 DeviceNet Communication module. If you have installed or configured a DeviceNet network previously and are familiar with Rockwell Automation DeviceNet modules and drives, this information can help reduce the time of installation. If you are uncertain, use the full installation/configuring information beginning in Chapter 3.

We base the procedures here on the assumption that you understand DeviceNet concepts and know how to program the Bulletin 160 SSC drive. In addition, you should understand electronic process control and be able to interpret the ladder logic instructions required to generate the electronic signals that control your application.

Because it is a *start-up guide for experienced users*, this chapter *does not* contain detailed explanations about the procedures listed. It does, however, reference other chapters in this book where you can get more information.

If you have any questions or are unfamiliar with the terms used or concepts presented in the procedural steps, *always read the referenced chapters* and other recommended documentation before trying to apply the information.

This chapter contains the following information:

- What tools and equipment you need.
- When to address, configure and program the module.
- How to install and wire the Communication Module.
- System power-up procedures.

Required Tools and Equipment

Have the following tools and equipment ready:

- Small blade screwdriver.
- DeviceNet configuration software or hardware device.

Procedures

1.	**Review Attention statements in the Preface.**	
2.	**Check the contents of shipping box.**	

Unpack the shipping box making sure that the contents include:

- Bulletin 160 DeviceNet module (Catalog Number 160-DN1).
- 10 point DeviceNet Plug.
- *Bulletin 160 DeviceNet Communication Module User Manual.*

If the contents are incomplete, call your local Allen-Bradley representative for assistance.

3.	**Ensure that the drive is correctly installed and wired. (Stop Input (TB3-7, TB3-8) must be jumpered together to start drive.)**	**Publication 160-SSC User Manual**
4.	**Ensure that the DeviceNet master and network are installed and functioning in accordance with DeviceNet standards.**	**DeviceNet Cable System Planning and Installation Manual** (Pub. 1485-6.7.1)
5.	**Remove Program Keypad Module or Ready/Fault Indicating Panel from the drive.**	**Chapter 3** (Installation)
6.	**Set the DeviceNet Module's node address and baud rate.**	**Chapter 3** (Installation)

Set the DIP Switches at the back of the module. Switches 1 through 6 control node address and switches 7 and 8 control baud rate.

7.	**Install the DeviceNet module on the drive.**	**Chapter 3** (Installation)
8	**Wire the DeviceNet connector and plug it into the drive.**	**Chapter 3** (Installation)
9.	**Load the Electronic Data Sheet (EDS) file.**	**Chapter 6** (Using 160-DN1 with DeviceNet Scanner, page 6-3)

Load the EDS file (Catalog # 160-EDS) in accordance with the DeviceNet software or hardware configurator that you are using to configure the Communication Module (see *Chapter 5* for EDS file descriptions).

DeviceNet Software or Hardware Configurator Manual

10.	**Power up the drive and the network.**	**Chapter 3** (Installation)

Important: When power-up occurs, the COMM (communication status) LED flashes green for 1/4 second, red for 1/4 second, and then goes blank while the Communication Module finishes its initialization. If the COMM LED goes red, there is a problem.

Chapter 4 (Modes of Operation)
Chapter 7 (Troubleshooting)

11.	**Configure the Bulletin 160 SSC drive for DeviceNet so the drive can accept speed reference and control logic via the network.**	**Chapter 6** (Using 160-DN1 with DeviceNet Scanner, page 6-3 to 6-8)

Use configuration software such as DeviceNet Manager or hardware such as DeviceView Hand Held DeviceNet Configurator.

12.	**Configure the DeviceNet Scanner to recognize Bulletin 160 SSC drive.**	**Chapter 6** (Using 160-DN1 with DeviceNet Scanner, page 6-9 to 6-15)

Use DeviceNet Manager to configure the DeviceNet Scanner's "Scan List" to recognize the Bulletin 160 SSC drive.

Installation and Wiring

This chapter contains information necessary to:

- Meet the requirements of the EMC and Low Voltage directives for CE compliance.
- Remove a preinstalled Program Keypad Module or Ready/Fault Indicating Panel.
- Configure the Communication Module.
- Install the DeviceNet Communication Module.
- Wire the DeviceNet communication cables.
- Remove the DeviceNet Communication Module from the drive.

Read this chapter completely before you attempt to install or configure your Communication Module. Before you apply power, review the Attention statements on page P-3 and P-4 in the Preface and ensure that all connections are secure and that all selections are correct.

ATTENTION: When you make changes to the switch settings, use a pointed instrument such as a ball point pen. Do not use a pencil because damage may occur.

ATTENTION: Unpredictable operation may occur if you fail to check connections and DIP switch settings for compatibility with your application. Unpredictable operation may result in personal injury, death, and equipment damage.

EMC Directive 89/336/EEC Compliance

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

- The essential requirements for a conforming EMC installation for the Bulletin 160 SSC are employed. Refer to the *Bulletin 160 SSC User Manual*.
- The DeviceNet cable shield shall be connected to the SSC's protective earth terminal, PE, with a low impedance connection.
- A clamp-on ferrite cable clamp (see Figure 3.6) shall be installed on the DeviceNet communication cable within 10 cm (4 in.) of the SSC. When multiple SSC's are contained in one control cabinet, it is sufficient to install one clamp-on ferrite cable clamp where the DeviceNet communication cable enters the control cabinet.

Low Voltage Directive 73/23/EEC Compliance

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

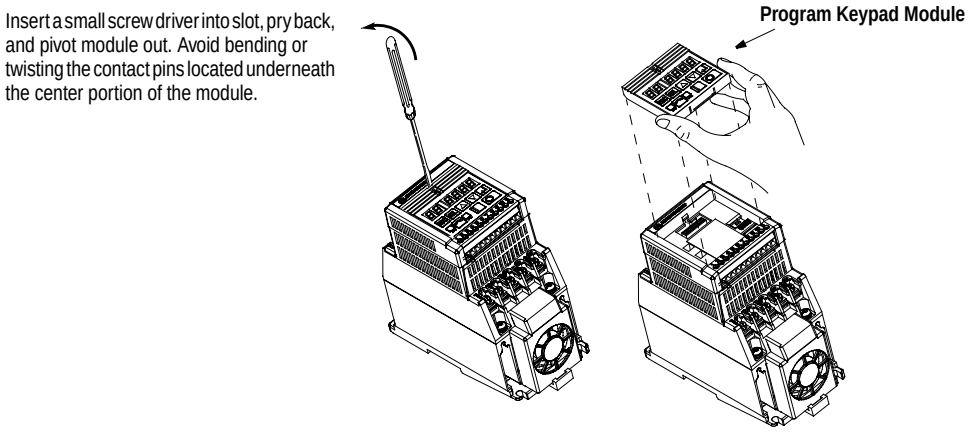
- The essential requirements for a conforming Low Voltage Directive installation for the Bulletin 160 SSC are employed. Refer to the *Bulletin 160 SSC User Manual*.
- Review "Safety Precautions" on page P-3 and P-4 in the Preface, and other ATTENTION statements throughout this manual prior to installation of the module.

Removing Program Keypad Module or Ready/Fault Panel

Before installing the Communication Module, it may be necessary to remove a previously installed Program Keypad Module or Ready/Fault panel.

ATTENTION: The drive contains high voltage capacitors which take time to discharge after removal of mains supply. Before installing or removing the DeviceNet Communication Module, ensure isolation of mains supply from line inputs [L1, L2, L3 (R, S, T)]. Wait one minute for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death.

Figure 3.1
Removing Program Keypad Module



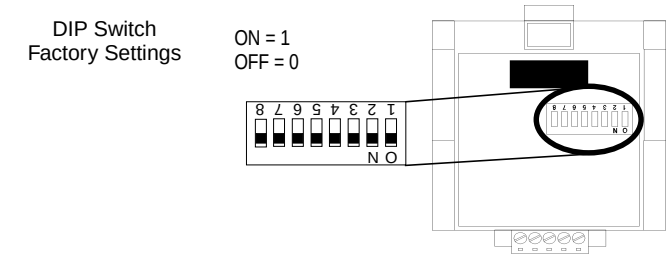
Understanding Module Configuration Switches

The DeviceNet Communication module's DIP switch settings determine:

- DeviceNet node address.
- DeviceNet baud rate.

The location of the DIP switch and the factory defaults are shown below.

Figure 3.2
DIP Switches on Rear of Module

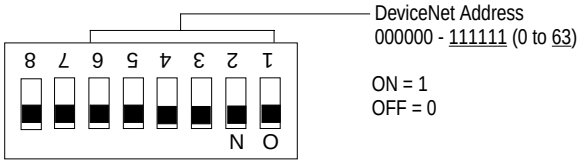


Important: When setting the Communication Module's *addressing* DIP Switches, you must ensure that each serial device on the network has a unique address. Also, all devices connected to the network must be set at the same baud rate.

Setting the DeviceNet Node Address

DIP switches 6 through 1 set the module's node address using binary addressing. The factory default setting is DeviceNet address 63.

Figure 3.3
Setting the Node Address



Follow these steps to set the DeviceNet node address:

1. Refer to the table below for the switch settings of a specific address.
2. Using your finger or a pointed object, slide switches 6 through 1 to the appropriate ON/OFF positions.

Important: When switches 7 and 8 are ON, the DeviceNet address is set to the value in parameter **P18 - [Nonvolatile MAC ID]**.

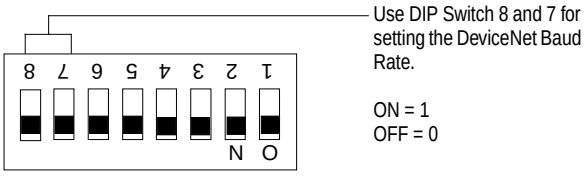
Table 1: Switch Settings for DeviceNet Node Addressing

DeviceNet Address	Switch Settings 6 <---- 1	DeviceNet Address	Switch Settings 6 <---- 1	DeviceNet Address	Switch Settings 6 <---- 1	DeviceNet Address	Switch Settings 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

Setting the Baud Rate

Dip switches 7 and 8 set the baud rate at which the Communication Module communicates on the network. The factory default setting for baud rate is 125K BPS.

Figure 3.4
Setting the Baud Rate



Follow these steps to set the DeviceNet Baud Rate:

1. Refer to Table 2 for the switch setting of a specific Baud Rate.
2. Slide switches 7 and 8 to the appropriate positions using your finger or a pointed object.

Important: When switches 7 and 8 are ON, the DeviceNet Baud Rate is set to the value in parameter **P19 - [Nonvolatile Baud].**

Table 2: Switch Settings for DeviceNet Module Baud Rate

Baud Rate	Switch Setting 8	Switch Setting 7
125 kBPS	0	0
250 kBPS	0	1
500 kBPS	1	0
Set by DeviceNet Parameter 19	1	1

Cable Lengths and Baud Rates

The baud rate determines the maximum length of the DeviceNet cable. Refer to Table 3 to determine cable lengths and baud rates.

Table 3: Baud Rate vs. Cable Length

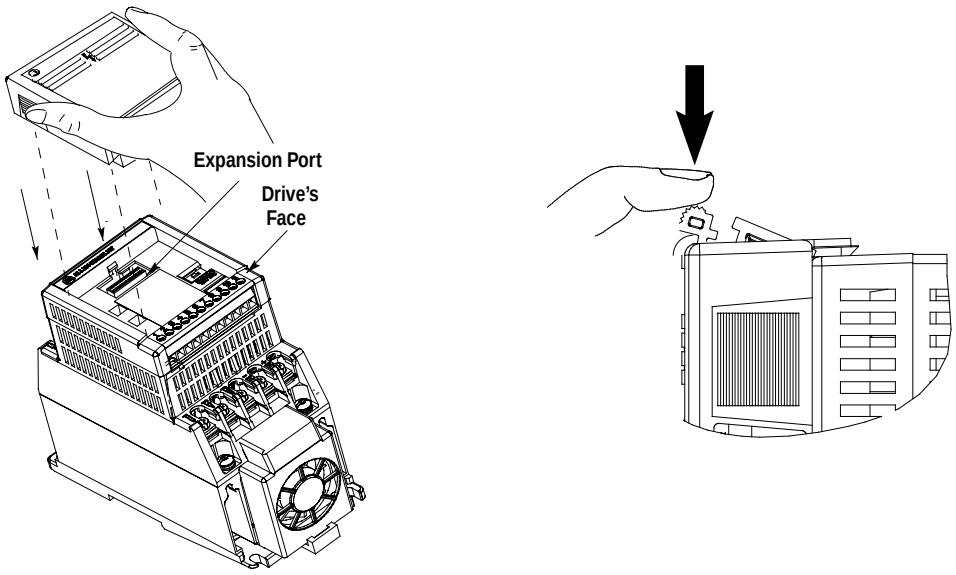
Baud Rate	Maximum Cable Length (Trunk Line)
125 kBPS	500 meters (1640 feet)
250 kBPS	250 meters (820 feet)
500 kBPS	100 meters (328 feet)

Installing the Communication Module

After setting the DIP switches, secure the Communication Module to the drive by following these steps:

1. Insert the module, ensuring that the pins on the back of the module line up with the drive's expansion port.
2. Press down on the module until it is fully seated. The module is fully seated when its sides are resting on the drive's face.
3. Press down on the latch until it snaps into place.

Figure 3.5
Installing the Communication Module



Wiring the DeviceNet Connector

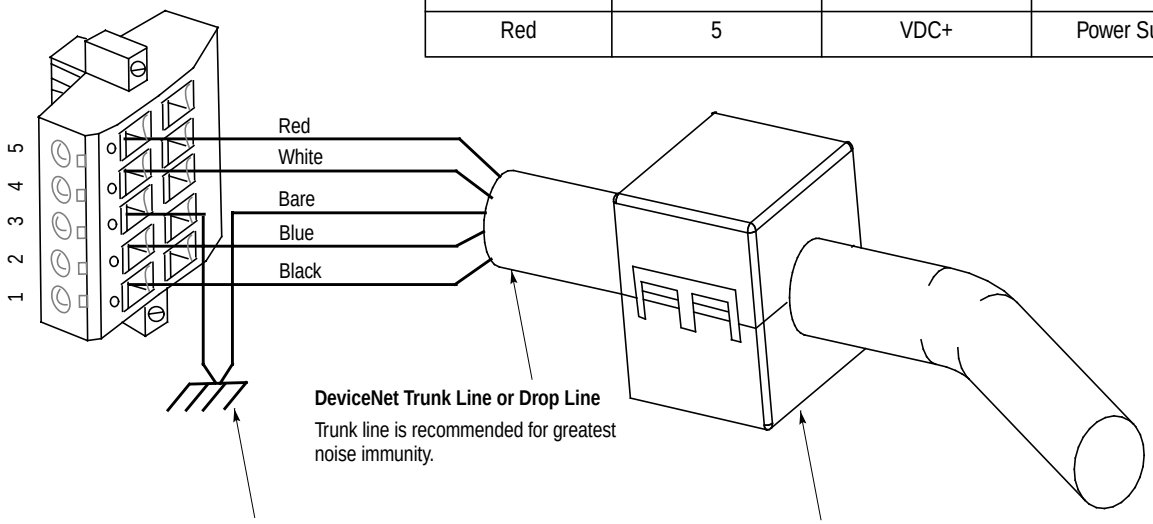
Follow these recommendations for communications wiring:

- See *DeviceNet Cable System* for planning and installation of Device Net networks.
- Keep communication wiring away from high noise sources such as motor cables.
- To increase noise immunity:
  - Use trunk line in place of drop line.
  - Use a ferrite cable clamp around the communication line. See Figure 3.6.
  - Ground the cable shield as shown in Figure 3.6.

Figure 3.6
Wiring the DeviceNet Connector

The Communication Module receives power and communications through the DeviceNet connector. DeviceNet cable wires connect to the DeviceNet plug terminal block as shown in the following table.

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



Connecting the DeviceNet Drop Line to the Module

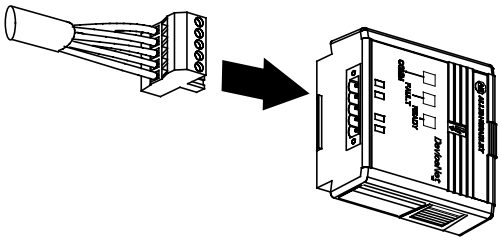
Follow these steps to connect your module DeviceNet drop line:

1. Turn off the network power supply.

ATTENTION: Do not wire the Communication Module with the network power supply on. Wiring the module with the network power supply on may short your network or disrupt communication.

2. Ensure that the terminal block is correctly wired. (See Figure 3-6 in previous section).
3. Locate the DeviceNet connector on the bottom of the module.
4. Insert the plug into the DeviceNet connector.

Figure 3.7
Installing the Drop Line

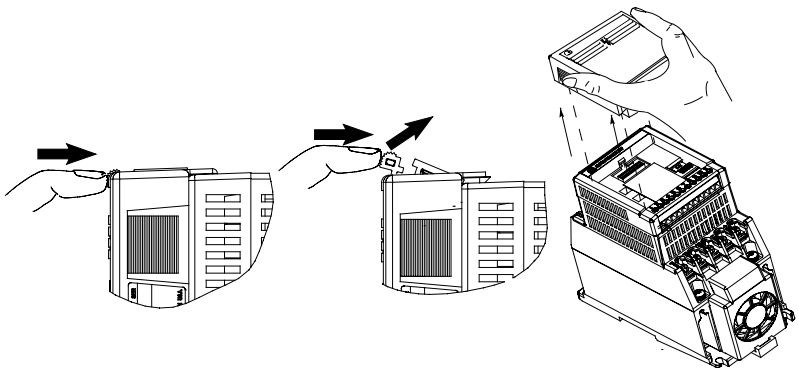


Removing Communication Module From a Drive

If you need to reconfigure the Communication Module DIP switches, you must remove the Communication Module from the drive.

1. Unplug the DeviceNet connector from the Communication Module.
2. Press in on the module's latch and then push away and up.
3. Grasp the module and pull straight up. Avoid bending or twisting the contact pins located underneath the center portion of the module.

Figure 3.8
Removing the Communication Module



Modes of Operation

This chapter contains the following information:

- Powering up the drive with the DeviceNet module installed.
- The module's modes of operation.

Refer to the Attention statements on page P-3 and P-4 in the Preface.

Powering Up the Drive

After you have installed the Communication Module, apply power to the drive and to the Network. The COMM LED should flash green or turn solid green. If it does not, refer to *Chapter 7, Troubleshooting*.

Modes of Operation

The Communication Module has three modes of operation:

- Power-up reset mode.
- Run mode.
- Error mode.

Power-up Reset Mode

During power-up or reset, the COMM LED is off.

The Communication Module follows this sequence of operation:

1. When power-up occurs, the COMM LED flashes green for 1/4 second, red for 1/4 second, and then goes blank while the Communication Module finishes its initialization.
2. Performs power-up initialization.
3. Reads and stores the DIP switch settings.
4. Performs a duplicate node address check to verify that another node is not assigned the same DeviceNet address as the Communication Module.

If the power-up or reset is successful, the Communication Module enters the run mode and the LED flashes green or turns solid green.

Modes of Operation (Continued)

Power-up Reset Mode (Continued)

If the power up or reset sequence fails, the COMM LED will go to solid red and the module will enter the Error Mode. See the Error Mode description in this section.

Table 4: COMM LED State During Power-up Reset Mode

COMM LED State	Description
Flashes Green 1/4 second, Red 1/4 second, then goes blank	Occurs when power is applied to module.
Blank	Power-up initialization is taking place.
Solid Red	Indicates failed initialization or duplicate node address.
Solid Green	DeviceNet module is in the Run mode.

Run Mode

After a successful power-up or reset, the Communication Module enters the run mode and operates as a slave device to a master device. In run mode, the Communication Module:

- Accepts messages from the master on the DeviceNet network.
- Monitors DeviceNet incoming power.

If an error is detected, the module enters error mode. See the Error Mode description below.

Error Mode

If the Communication Module detects an error, the COMM LED is affected. Errors are critical or noncritical, and are summarized below

Table 5: COMM LED State During Error Mode

Error Type	Description	COMM LED State
Critical (Not Recoverable)	Power-up initialization failure.	Solid Red
	Duplicate node address detected.	
	Incorrect baud rate.	
Non-Critical (Recoverable)	I/O connection timed out.	Flashing Red
Non-Critical (Recoverable)	DeviceNet power lost.	Off

See the troubleshooting chart in *Chapter 7* for details on how to recover from an error.

DeviceNet Parameter Descriptions

This chapter contains the following information:

- Description of DeviceNet Parameters.
- Definition of EDS files.
- Interface Select Parameter.
- *Bulletin 160 SSC Interface* and ODVA Interface.
- Brief description of Bulletin 160 parameters.

Important: This chapter describes the parameter set for a Series B Bulletin 160. If using a Series A Bulletin 160, then not all the parameters listed in this manual may apply to that device. When using a Series A Bulletin 160, please refer to the *Bulletin 160 SSC User Manual* (Publication 0160-5.0).

DeviceNet Parameters

The communication module contains a set of parameters that are used to define how the module will interact with the Bulletin 160 SSC and with the DeviceNet network. These parameters may be used to set the module's address, baud rate, or I/O data format. Parameters may also be read to attain status from the module.

Electronic Data Sheet

Electronic Data Sheet (EDS) files are specially formatted ASCII files that provide all of the information necessary for a configuration tool such as the DeviceNet Manager (Cat. No. 1787-MGR), to access and alter the parameters of a device. The EDS file contains information on the number of parameters in a device and how those parameters are grouped together. Information about each parameter is contained in this file such as parameter min, max, and default values, parameter data format and scaling, and the parameter name and units.

Parameters and EDS File

An EDS file is used to define all the parameters in the Bulletin 160 and in the communication module. This EDS file is used to create a public interface to the drive via DeviceNet. Configuration tools such as the DeviceNet Manager use EDS files to present parameters to the user. Through the DeviceNet Manager, operators can perform configuration functions on the 160 SSC drive via DeviceNet by changing the values associated with individual parameters. EDS files for the Bulletin 160 are available on disk (Catalog 160-EDS).

Parameters and EDS File (Continued)

Parameter values may be read or written via DeviceNet. *Writing* a value to a parameter may configure drive operations such as the acceleration or deceleration rates. Writing a value to a parameter may also configure DeviceNet operations such as which input or output assemblies are to be used for polled I/O communications with a master. *Reading* a parameter's value gives you status information.

Interface Select Parameter

There are two different EDS files for each Bulletin 160. Each EDS file has the Bulletin 160 parameters and DeviceNet parameters grouped differently. When using a configuration tool, such as the DeviceNet Manager, these EDS files will present different interfaces to the user. A special parameter named *Interface Select* allows the user to switch between these two interfaces. When **P15 - [Interface Select]** has a value of 0, the *Bulletin 160 SSC Interface* is used and when the value is set to a 1 the *ODVA Drive Profile Interface* is used.

Bulletin 160 SSC Interface

When **P15 - [Interface Select]** has a value of 0, the *Bulletin 160 SSC Interface* is selected. This interface (parameter set) contains all of the parameters described in the *Bulletin 160 SSC User Manual*, plus a few extra parameters to configure the operation of the Communication Module on the DeviceNet network.

ODVA Drive Profile Interface

When **P15 - [Interface Select]** has a value of 1, the *ODVA Drive Profile Interface* is selected. This interface contains standard parameters that are defined in the ODVA (Open DeviceNet Vendors Association) Drive Profile, plus some extra parameters to configure the operation of the Communication Module on the DeviceNet network. The interface also has parameters to configure some features of the 160 SSC drive that are not included in the ODVA Drive Profile. This interface differs from the *Bulletin 160 SSC Interface* in many aspects. For example, speeds are defined in RPM rather than Hz and the parameter numbers have different meaning than the parameters defined in the *Bulletin 160 SSC User Manual*. This interface is included to give the Bulletin 160 SSC drive true interoperability with other DeviceNet equipped drives that adhere to the ODVA Drive Profile. See *Appendix C* for the parameter set for the ODVA interface.

Product Codes and EDS Files

Bulletin 160 SSC drives are available in Analog Signal Follower and Preset Speed models. Each model supports a slightly different set of parameters (in general the Preset Speed model contains extra parameters for setting up preset speeds). Therefore each drive model uses an EDS file specific to that model. Configuration tools such as DeviceNet Manager use “product codes” to identify which EDS file to use for a given drive model. Table 6 and Table 7 summarize the various product codes. Note that each product code is based on the drive model, type of parameter interface to be used and the firmware version of the drive.

Table 6: EDS Files for Bulletin 160 using a 160 DN-1 version 2.00 or later

Product Code	Drive Model	Parameter Interface	EDS File Name
132	Analog Signal Follower	*Bulletin 160 SSC Interface*	2.typ/132.cod/XX.eds
133	Analog Signal Follower	ODVA Drive Profile Interface	2.typ/133.cod/XX.eds
134	Preset Speed	*Bulletin 160 SSC Interface*	2.typ/134.cod/XX.eds
135	Preset Speed	ODVA Drive Profile Interface	2.typ/135.cod/XX.eds

Table 7: EDS Files for Bulletin 160 using a 160 DN-1 version 1.2

Product Code	Drive Model	Parameter Interface	EDS File Name
1	Analog Signal Follower	*Bulletin 160 SSC Interface*	2.typ/1.cod/XX.eds
2	Analog Signal Follower	ODVA Drive Profile Interface	2.typ/2.cod/XX.eds
3	Preset Speed	*Bulletin 160 SSC Interface*	2.typ/3.cod/XX.eds
4	Preset Speed	ODVA Drive Profile Interface	2.typ/4.cod/XX.eds

Important: XX.eds = the major firmware revision number of the Bulletin 160.

Examples:
4.eds refers to Bulletin 160 with firmware version 4.04 or 4.07
5.eds refers to Bulletin 160 with firmware version 5.00 to 5.99
6.eds refers to Bulletin 160 with firmware version 6.00 or later

It is important that the correct EDS file for both the drive and the DeviceNet option be selected. If an incorrect one is chosen, the configuration tool may be unable to set up the drive.

Bulletin 160 SSC Interface Parameters

When **P15-[Interface Select]** is set to 0, the *Bulletin 160 SSC Interface* is selected. When this interface is selected, parameters are grouped together logically. The following sections provide information about the *Bulletin 160 SSC Interface* parameter groups:

- Interface Select Parameter.
- DeviceNet Parameters.
- Drive Display Parameters.
- Drive Program Parameters.

The following tables summarize the *Bulletin 160 SSC Interface*. For more detailed information on the Display Group and Program Group parameters, refer to the *Bulletin 160 SSC User Manual*.

Important: The following sections contain references to object mapping. This information is needed when using Explicit Messaging. Refer to *Chapter 6*, page 17, for more information.

Interface Select Parameter

The DeviceNet module contains the parameter used to select either the *Bulletin 160 SSC Interface* or the ODVA Drive Profile interface.

Parameter Number	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Factory Default
15	**[Interface Select]** This read/write parameter selects the current parameter set or interface for the Communication Module. 0 = *Bulletin 160 SSC Interface* 1 = ODVA Drive Profile	0xB4-1-2	0 to 1	0

DeviceNet Parameters

See next page.

DeviceNet Parameters

Use the following parameters to configure and monitor the DeviceNet Network Interface. These parameters are unique to drives equipped with the DeviceNet Communication Module.

Parameter Number	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Factory Default
16	**[Switches MAC ID]** This read only parameter reflects the state of the Node Address DIP switches. This address may not be the current address of the module if the Baud Rate DIP switches are set to 3. In this case **P18 - [Nonvolatile MAC ID]** is used.	0xB4-1-3	0 to 63	63
17	**[Switches Baud]** This read only parameter reflects the state of the Baud Rate DIP switches. A value of 3 means that the actual baud rate used by this module is given in the value of **P19 - [Nonvolatile Baud Rate]**. 0 = 125K BPS 1 = 250K BPS 2 = 500K BPS 3 = Use nonvolatile parameters for Address and Baud.	0xB4-1-4	0 to 3	0
18	**[Nonvolatile MAC ID]** This read/write parameter allows you to program the Node Address of the module independent of the DIP switch settings. To use this feature, set the baud rate DIP switches (7 and 8) to ON before power-up. Changing this parameter does not change the actual node address until power is cycled.	0xB4-1-5	0 to 63	63
19	**[Nonvolatile Baud]** This read/write parameter allows you to set the baud rate of the module without having to set DIP switches. To use this feature, set the baud rate switches (7 and 8) to ON before power up. Changing this parameter does not change the actual data rate until power is cycled. 0 = 125k BPS 1 = 250k BPS 2 = 500k BPS	0xB4-1-6	0 to 2	0
20	**[Bus Off Error]** This read/write parameter determines how the Communication Module processes 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.	0x03-1-3	0 to 1	0
21	**[Bus Off Count]** This read/write parameter counts the number of times the CAN chip went to the *bus off* state. This counter stops counting when the count reaches 255. Any write to this parameter will reset the counter to 0.	0x03-1-4	0 to 255	0

DeviceNet Parameters (Continued)

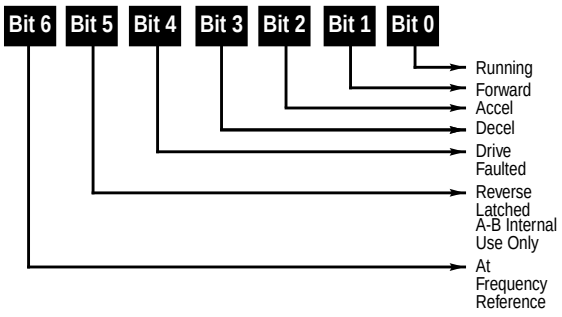
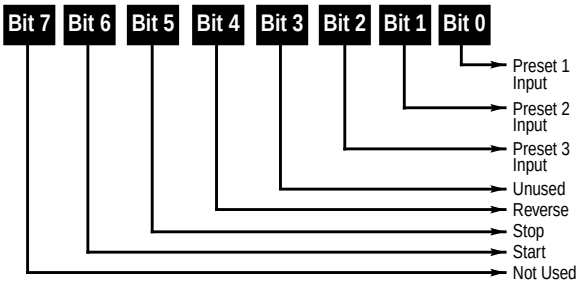
Parameter Number	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Factory Default
22	**[Output Assembly]** This read/write parameter sets the output assembly instance that is to be used for *polled* messaging with the master. The output assembly defines the data format that the drive receives from the master. The name (output assembly) is somewhat misleading in that this parameter determines the format of data being sent to the drive 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 1 = Basic Contactor Output 2 = Two Command Contactor Output 3 = Basic Overload Output 4 = Basic Motor Control Output 5 = 2 Command Motor Control 20 = Basic Speed Control 21 = Extended Speed Control 100 = Speed Control in Hz 101 = Preset Control (for Preset Speed units only) 103 = Allen-Bradley Drive Assembly (version 2.00 or later) **Important:** See *Appendix B,* pages B-19 to B-20 for the formats of the output assembly.	0x29-1-100	0 to 103	20
23	**[Input Assembly]** This read/write parameter sets the input assembly instance that is to be 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. The name (input assembly) is somewhat misleading in that 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 50 = Basic Overload Input 51 = Extended Overload Input 52 = Basic Motor Control Input 53 = Extended Motor Control Input 54 = Extended Motor Control 2 70 = Basic Speed Control Input 71 = Extended Speed Control Input 102 = Custom Parameter Based Assembly 104 = Allen-Bradley Drive Assembly (version 2.00 or later) 105 = Allen-Bradley Drive Assembly with Parameters (version 2.00 or later) **Important:** See *Appendix B*, pages B-21 to B-23 for the formats of the input assembly.	0x29-1-101	0 to 105	70
24	**[Assembly Word 0 Parameter]** This read/write parameter is used when **P23 - [Input Assembly]** is set to 102 Custom Parameter Based Assembly. It defines the first word in an assembly built from Bulletin 160 parameters. A 0 value defines the end of the assembly. For more information, see *Appendix B*, page B-22.	0xB4-1-7	0 to 88 (0 to 9 for version 1.2)	9
25	**[Assembly Word 1 Parameter]** This read/write parameter is used when **P23 - [Input Assembly]** is set to 102 Custom Parameter Based Assembly. It defines the second word in an assembly built from Bulletin 160 parameters. A 0 value defines the end of the assembly. For more information, see *Appendix B*, page B-22.	0xB4-1-8	0 to 88 (0 to 9 for version 1.2)	0

DeviceNet Parameters (Continued)

Parameter Number	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Factory Default
26	**[Assembly Word 2 Parameter]** This read/write parameter is used when **P23 - [Input Assembly]** is set to 102, Custom Parameter Based Assembly or 105, Allen-Bradley Drive Assembly with Parameters. It defines the third word in an assembly built from Bulletin 160 parameters. A 0 value defines the end of the assembly. For more information, see *Appendix B*, pages B-22 and B-22.	0xB4-1-9	0 to 88 (0 to 9 for version 1.2)	0
27	**[Assembly Word 3 Parameter]** This read/write parameter is used when **P23 - [Input Assembly]** is set to 102, Custom Parameter Based Assembly or 105, Allen-Bradley Drive Assembly with Parameters. It defines the fourth word in an assembly built from Bulletin 160 parameters. A 0 value defines the end of the assembly. For more information, see *Appendix B*, pages B-22 and B-22.	0xB4-1-10	0 to 88 (0 to 9 for version 1.2)	0
28	**[DN Fault Mode]** This read/write parameter is used to determine the drive's behavior when a communication fault such as loss of DeviceNet power occurs. The following behavior choices are used: 0 = Fault the drive and issue a stop command 1 = Ignore the communication fault  **ATTENTION:** Ignoring communication faults may result in equipment damage, personal injury, or death. Ensure that you understand how ignoring a communication fault affects the operation of your system.	0x29-1-16	0 to 1	0
77	**[Motor Base Speed]** This read/write parameter is set to the motor's rated nameplate speed in RPM.	0x28-1-15	200 to 32000	1800 RPM
85	**[DNet Idle Mode]** This Parameter, available with version 2.00 or later, controls the action of the drive when the SDN Scanner is in Idle Mode. 0 = Stop if Idle Mode (default) 1 = Hold last state if Idle Mode	0xB4-1-11	0 to 1	0
86	**[DNet Software Version]** This parameter, available with version 2.00 or later, indicates the software version of the DeviceNet option. The number is in the form of xx.yy where xx indicates the major revision level and yy indicates the minor revision level. This parameter is read only.	0xB4-1-12	0.00 to 10.00	2.00
87	**[Change of State Mask]** This parameter, available with version 2.00 or later, is 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.	0xB4-1-13	0 to 0xFFFF	0xFFFF
88	**[Local Return Mode]** This parameter, available with version 2.00 or later, sets the input mode the drive will use when transitioning from network to local control. This is only used with input mode 2. Available values are 0, 1, 3, 4, and 5.	0xB4-1-14	0 to 5	0

Drive Display Parameters (Read Only)

Below is a brief description of the *Bulletin 160 SSC Interface* Display Group parameters. Refer to the *Bulletin 160 SSC User Manual* for more detailed information on these parameters.

Parameter Number	Parameter Name	Object Mapping (Class-Instance-Attribute)	Description	Units
01	**[Output Frequency]**	0xB3-1-1	Frequency at TB2 terminals T1, T2, T3.	0.1 Hz
02	**[Output Voltage]**	0xB3-1-2	Voltage at TB2 terminals T1, T2, T3.	1 Volt
03	**[Output Current]**	0xB3-1-3	Current at TB2 terminals T1, T2, T3.	0.01 Amperes
04	**[Output Power]**	0xB3-1-4	Power at TB2 terminals T1, T2, T3.	0.01 kW
05	**[Bus Voltage]**	0xB3-1-5	DC Bus voltage level.	1 Volt
06	**[Frequency Command]**	0xB3-1-6	Commanded Frequency.	0.1 Hz
07	**[Last Fault]**	0xB3-1-7	Coded last fault number.	Numeric Value
08	**[Heatsink Temp]**	0xB3-1-8	Temperature of the drive heatsink.	1 degree C
09	**[Drive Status]**	0xB3-1-9	Status of drive in binary coded format. **Important:** Parameter 9 shown below *does not* match what is published in the Bulletin 160 SSC User Manual. The DeviceNet binary code for Parameter 9 is: 	Binary Number
10	**[Drive Type]**	0xB3-1-10	Used by Allen-Bradley field service personnel.	Numeric Value
11	**[Control Version]**	0xB3-1-11	Version of drive firmware used.	Numeric Value
12	**[Input Status]** ①	0xB3-1-12	Open (0) Closed (1) state of Drive's discrete inputs. **Important:** Parameter 12 shown below *does not* match what is published in the Bulletin 160 SSC User Manual. The DeviceNet binary code for Parameter 12 is: 	Binary Number
13	**[Power Factor Angle]**	0xB3-1-13	Angle (electrical degrees) between V and I.	0.1 degree C
14	**[Memory Probe]**	0xB3-1-14	Used by Allen-Bradley service personnel.	Numeric Value
29	**[Analog Input]** ②	0xB3-1-16	The analog input as a percent of full scale.	0.1%

① For preset speed model, this parameter contains the data from parameter 15 in the SSC drive due to conflicting parameter numbers with DeviceNet specific parameters.

② This parameter is parameter 16 in the SSC drive but is renumbered due to conflicting parameter numbers with DeviceNet specific parameters.

This parameter applies only to the Analog Signal Follower model.

This parameter applies only to the Preset Speed model.

Drive Program Parameters

Below is a brief description of the *Bulletin 160 SSC Interface* Program Group parameters. Refer to the *Bulletin 160 SSC User Manual* for more detailed information on these parameters.

Parameter Number	Parameter Name	Object Mapping (Class-Instance-Attribute)	Description	Units
30	**[Accel Time 1]**	0xB3-1-30	Time to ramp from 0 Hz to maximum frequency.	0.1 Seconds
31	**[Decel Time 1]**	0xB3-1-31	Time to ramp from maximum frequency to 0 Hz.	0.1 Seconds
32	**[Minimum Frequency]**	0xB3-1-32	Lowest continuous output frequency.	1 Hz
33	**[Maximum Frequency]**	0xB3-1-33	Highest continuous output frequency.	1 Hz
34	**[Stop Mode Select]**	0xB3-1-34	Determines stop mode used.  **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.	Numeric Value
35	**[Base Frequency]**	0xB3-1-35	Set to motor's nameplate frequency.	1 Hz
36	**[Base Voltage]**	0xB3-1-36	Set to motor's nameplate voltage.	1 Volt
37	**[Max Voltage]**	0xB3-1-37	Highest voltage the drive will output.	1 Volt
38	**[Boost Select]**	0xB3-1-38	Sets the volts/Hz relationship.	Numeric Value
39	**[Skip Frequency]**	0xB3-1-39	Frequency at which drive will not run continuously.	1 Hz
40	**[Skip Frequency Band]**	0xB3-1-40	Used with **P39 - [Skip Frequency]** to create skip band.	1 Hz
41	**[Overload Select]**	0xB3-1-41	Selects derating factor for motor overload.	Numeric Value
42	**[Overload Current]**	0xB3-1-42	Set to motor nameplate full load amperes.	0.01 Amperes
43	**[Current Limit]**	0xB3-1-43	Max output current allowed before limiting.	% I rating
44	**[DC Hold Time]**	0xB3-1-44	DC Injection Braking duration.	0.1 Seconds
45	**[DC Hold Voltage]**	0xB3-1-45	Voltage level for DC Injection Braking.	1 Volt
46	**[Input Mode]**	0xB3-1-46	Type of START, STOP, REV, commands.  **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.	Numeric Value
47	**[Output Configure]**	0xB3-1-47	Configures TB3 output relay functionality.	Numeric Value
48	**[Output Threshold]**	0xB3-1-48	Used in conjunction with **P47 - [Output Configure]**.	Numeric Value
49	**[PWM Frequency]**	0xB3-1-49	Carrier frequency for PWM output waveform.	0.1 kHz
50	**[Restart Tries]**	0xB3-1-50	Times drive will attempt to reset a fault.	Numeric Value
51	**[Restart Time]**	0xB3-1-51	Time between restart attempts.	0.1 Seconds
52	**[DB Enable]**	0xB3-1-52	Enables/disables dynamic braking.	Numeric Value
53	**[S-Curve]**	0xB3-1-53	Enables a fixed shape S-curve.	Numeric Value

Drive Program Parameters (Continued)

Parameter Number	Parameter Name	Object Mapping (Class-Instance-Attribute)	Description	Units
54	**[Clear Fault]**	0xB3-1-54	Setting to 1 performs a fault reset.	Numeric Value
55	**[Memory Probe Address]**	0xB3-1-55	Used by Allen-Bradley service personnel.	Numeric Value
56	**[Reset Defaults]**	0xB3-1-56	Sets all parameters to their factory default.	Numeric Value
57	**[Program Lock]**	0xB3-1-57	Locks all program group parameters.	Numeric Value
58	**[Internal Frequency]**	0xB3-1-58	Digital frequency setpoint.	0.1 Hz
59	**[Frequency Select]**	0xB3-1-59	Selects source of Frequency command.	Numeric Value
60	**[Zero Offset]**	0xB3-1-60	Add or subtracts an offset to the analog input.	Numeric Value
60	**[DN Preset Cmd]**	0xB3-1-92	Network preset command.	Numeric Value
61	**[Preset Frequency 0]**	0xB3-1-61	Sets command frequency when selected.	0.1 Hz
62	**[Preset Frequency 1]**	0xB3-1-62	Sets command frequency when selected.	0.1 Hz
63	**[Preset Frequency 2]**	0xB3-1-63	Sets command frequency when selected.	0.1 Hz
64	**[Preset Frequency 3]**	0xB3-1-64	Sets command frequency when selected.	0.1 Hz
65	**[Preset Frequency 4]**	0xB3-1-65	Sets command frequency when selected.	0.1 Hz
66	**[Preset Frequency 5]**	0xB3-1-66	Sets command frequency when selected.	0.1 Hz
67	**[Preset Frequency 6]**	0xB3-1-67	Sets command frequency when selected.	0.1 Hz
68	**[Preset Frequency 7]**	0xB3-1-68	Sets command frequency when selected.	0.1 Hz
69	**[Accel Time 2]**	0xB3-1-69	Sets second acceleration rate.	0.1 Seconds
70	**[Decel Time 2]**	0xB3-1-70	Sets second deceleration rate.	0.1 Seconds
71	**[IR Compensation]**	0xB3-1-71	Adds a voltage to the output based on the torque current.	1%
72	**[Slip Compensation]**	0xB3-1-72	Compensates for the inherent slip of the motor.	0.1 Hz
73	**[Reverse Disable]**	0xB3-1-73	Setting to 1 disables the reverse.	Numeric Value
74	**[Analog Select]**	0xB3-1-74	Selects between unipolar and bipolar analog input.	Numeric Value
75	**[Analog Input Minimum]**	0xB3-1-75	Sets the percent of the analog input used to represent **P32 - [Minimum Frequency]**.	0.1%
76	**[Analog Input Maximum]**	0xB3-1-76	Sets the percent of the analog input used to represent **P33 - [Maximum Frequency]**.	0.1%
78	**[Compensation]**	0xB3-1-78	Some drive/motor combinations have inherent instabilities which are exhibited as non-sinusoidal motor currents. A setting of 1 will enable the compensation to correct this condition. A setting of 0 disables this function.	Numeric Value

This parameter applies only to the Analog Signal Follower model.

This parameter applies only to the Preset Speed model.

Using 160-DN1 with DeviceNet Scanner

The purpose of this chapter is to provide an overview of the steps necessary to use the Bulletin 160-DN1 with a DeviceNet Scanner. Scanners act as “Masters” on a DeviceNet Network for the IO communication with a Bulletin 160-DN1. Scanners send “IO” messages periodically to a Bulletin 160-DN1 at a set frequency, and the Bulletin 160-DN1 responds to these IO messages by sending status messages back to the Scanner. The scanner also allows a ladder logic program to configure and read parameters from the Bulletin 160 SSC through special encoded instructions called Explicit Messages.

This chapter contains the following information:

- How to setup the 160-DN1 on DeviceNet.
- How to setup the 1747-SDN to work with the 160-DN1.
- A sample ladder logic program to control the Bulletin 160 SSC using polled messaging.
- A description of Explicit Messaging.
- A sample ladder logic program to execute Explicit Messaging.

Before continuing this chapter, the user should have read the *DeviceNet Manager Software User Manual* and the *1747-SDN DeviceNet Scanner Module Installation Instructions Manual*. Understanding the concepts in these manuals will be important to completing this chapter.

The 1747-SDN Scanner for the SLC 500 is used in the examples in this manual, but the concepts demonstrated in the examples apply to the 1771-SDN Scanner for the PLC 5 as well.

Important: The examples in this chapter reflect the following configuration: a Bulletin 160 SSC, Series B, preset speed model, with **P15 - [Interface Select]** set to 0, *Bulletin 160 SSC Interface*, and DeviceNet Manager software version 3.001.

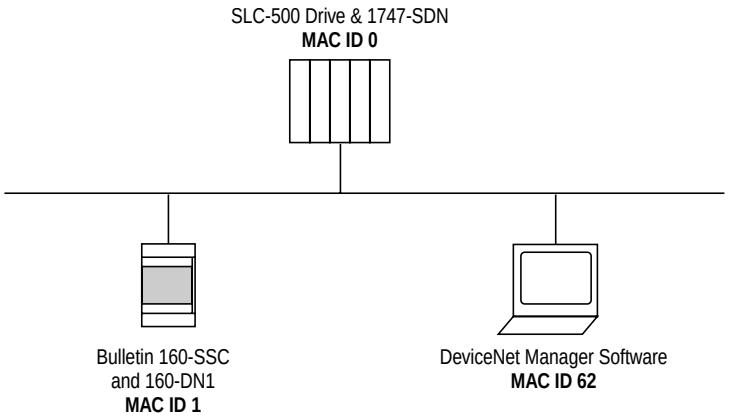
Needed Tools

The following tools will be needed to complete this chapter:

- Bulletin 160 SSC, Series B equipped with a DeviceNet Communication Module.
- SLC 500 processor with a 1747-SDN scanner.
- The DeviceNet Manager Software for Windows (Catalog 1787-MGR).
- EDS files for the Bulletin 160 (Catalog 160-EDS).

Example Network

This chapter will illustrate the steps needed to configure the following simple DeviceNet network.

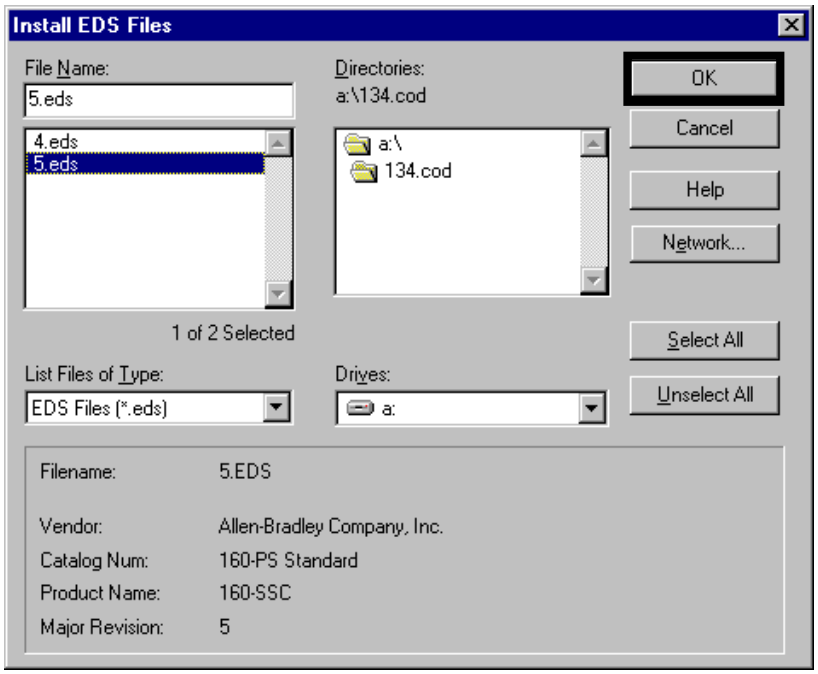


Set Device MAC ID's

Every device on a DeviceNet network must have a unique MAC ID between 0 and 63. Setting the MAC ID on the 1747-SDN is done via the network using the DeviceNet Manager Software. Setting the MAC ID for the 160-DN1 may be done via DIP switches or via the network using the DeviceNet Manager Software. For directions on setting the 160-DN1 MAC ID, refer to *Chapter 3*.

Installing the EDS Files

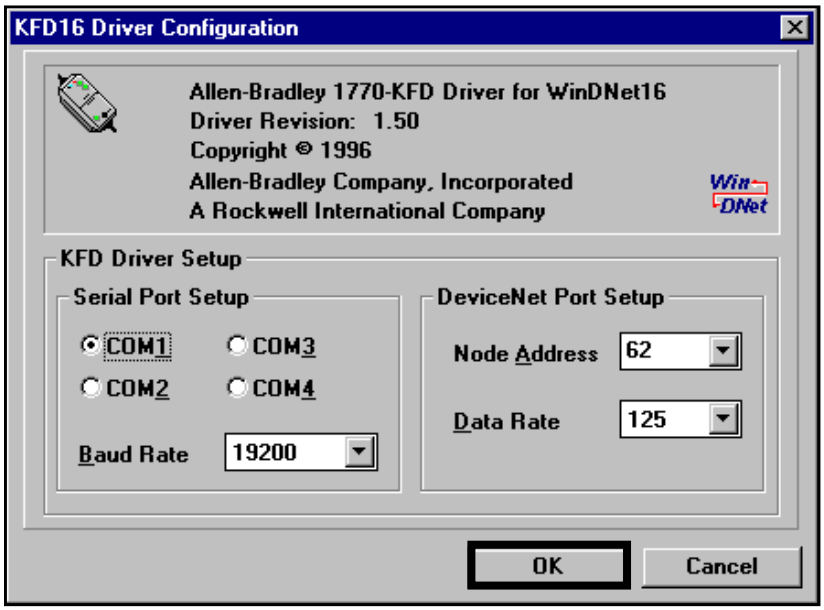
Upon invocation of the DeviceNet Manager Software, choose “Install EDS Files…” from the Utilities Menu. Select the EDS files needed to be installed from the Bulletin 160-EDS disk (see page 5-3 for details). The following screen will appear:



Press the “OK” button when the proper EDS file has been selected.

Invoke Manager Software and “Go Online”

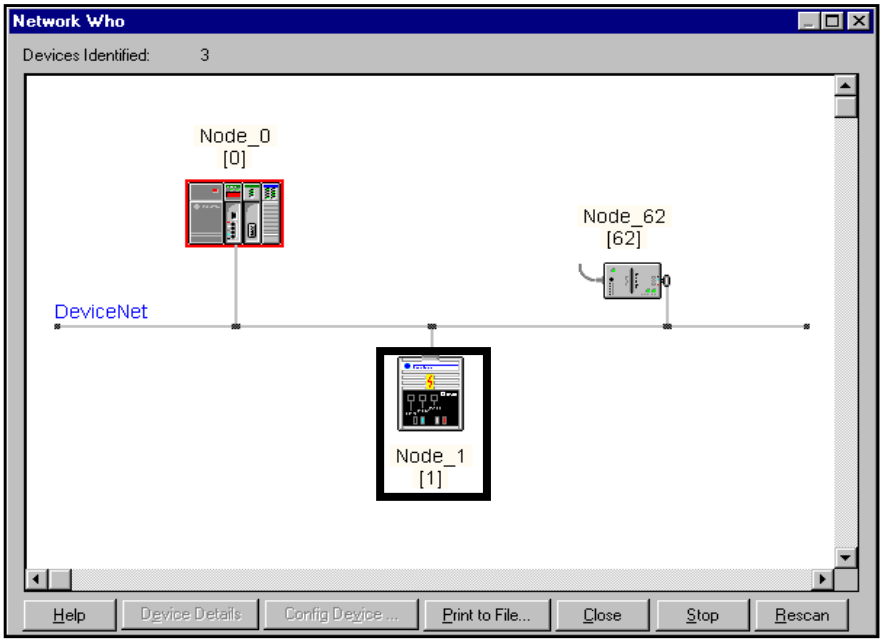
Choose “Set Up Online Connection” from the “Utilities” menu. The following screen appears:



Press the “OK” button to establish a connection to the network for the Manager Software.

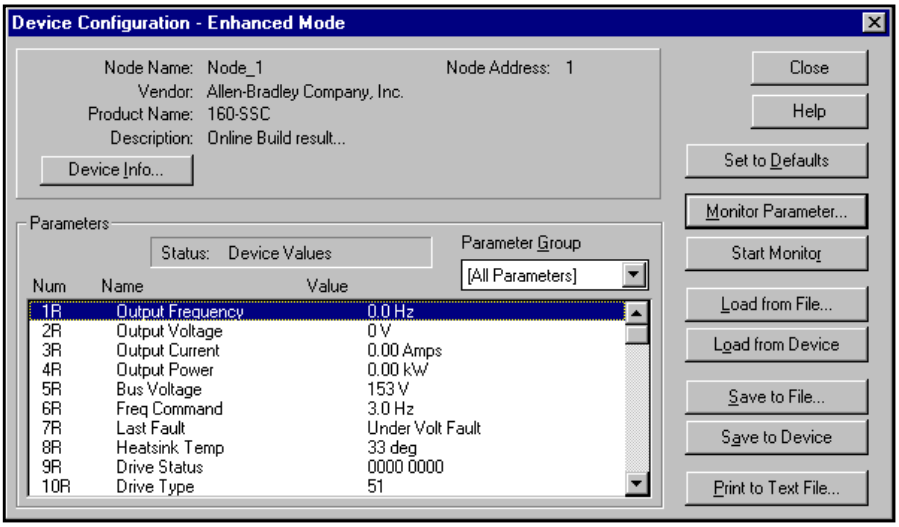
Perform Network Who

Choose “Network Who” from the who menu. The following screen will appear:



Invoke 160 Configuration Screen

Choose the Bulletin 160 by double clicking on the Bulletin 160 Image. This will invoke the 160 configuration screen and allow you to change setup parameters in the drive. The following screen will appear:



Pick Input and Output Assemblies for the Bulletin 160

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 Bulletin 160 uses Assembly Objects to send data to and from a Scanner over an IO connection. The terms "Input" and "Output" are defined from the scanner's point of view. Bulletin 160 Output Assemblies are defined as the information that is "output" by the scanner and consumed by the Bulletin 160. Input Assemblies are the status information that is consumed by the scanner or are the scanner's "input."

The Bulletin 160 allows the user to choose between various Input and Output Assemblies, thereby choosing the data format of the messages that are passed back and forth between the 160 and the scanner on the IO connection. The Assemblies that are supported are numbered and are part of a DeviceNet defined "Motor Control Hierarchy." This allows drives to directly replace motor starters or contactors on a network without the need to reprogram the scanner. Information on the data format of all Bulletin 160 Assemblies is given in *Appendix B*, page B-18 to B-23.

DeviceNet parameters **P22 - [Output Assembly]** and **P23 - [Input Assembly]** must be programmed with the proper output or input assembly. Refer to page 5-6 for possible selections.

The choice of which Input and Output Assembly to use should be based on what sort of information is appropriate in a particular system. See *Appendix B* for a description of the various Input and Output assemblies. In the example system, we will use Output Assembly 21 and Input Assembly 71. The data formats for these Assemblies are given below:

Table 8: Assembly 21 Data Format (Reversing Speed Control Output Assembly)

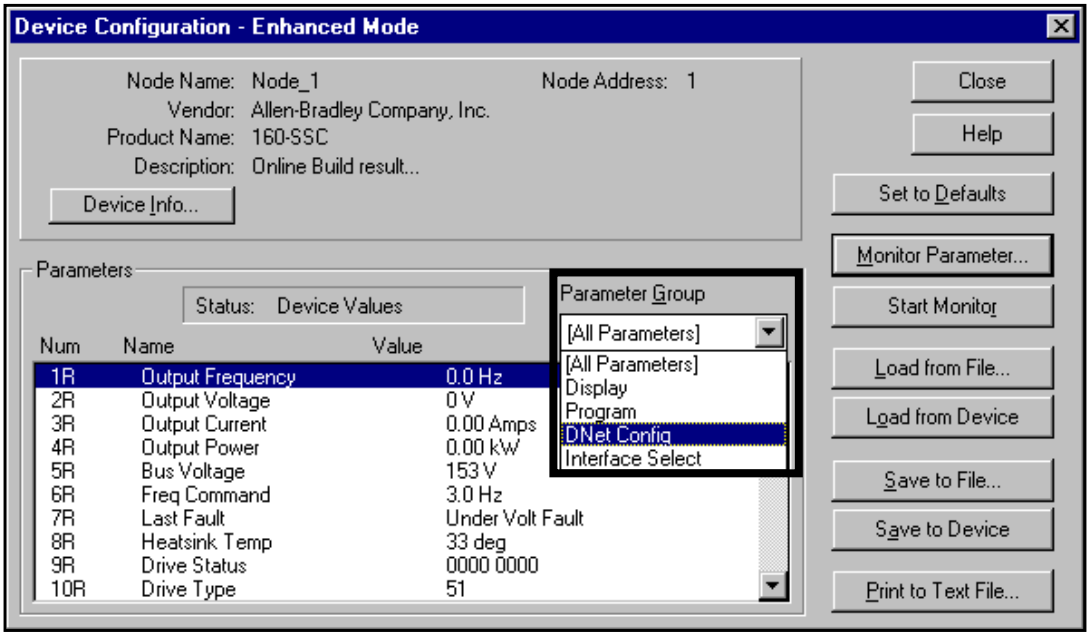
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		NetRef	Net Control			Fault Reset	RunRev	RunFwd
1								
2	Speed Reference RPM (Low Byte)							
3	Speed Reference RPM (High Byte)							

Table 9: Assembly 71 Data Format (Extended Speed Control Input Assembly)

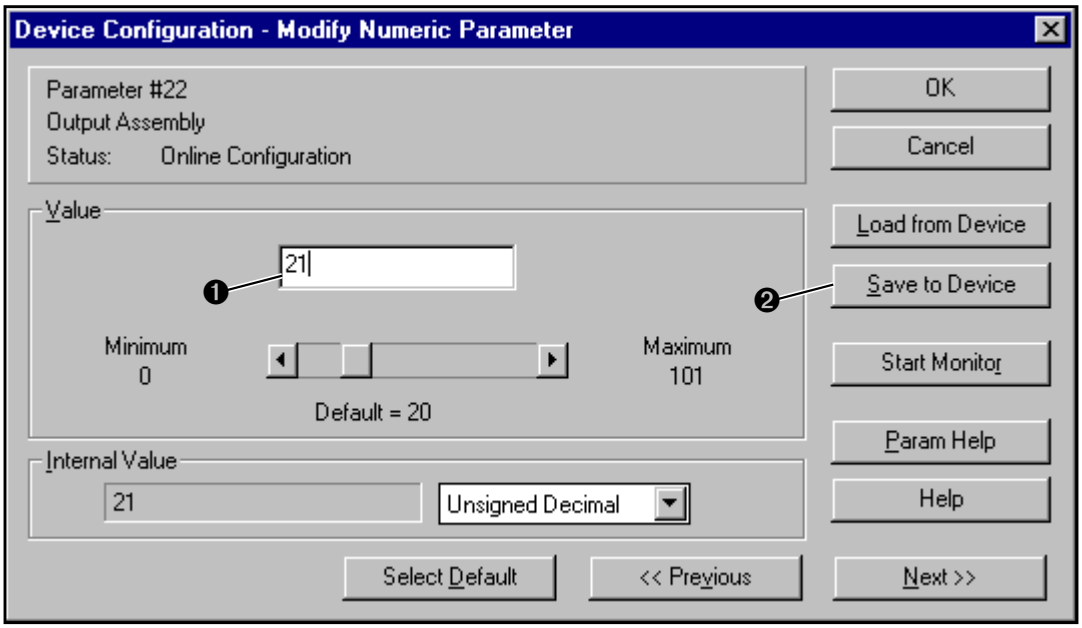
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	At Speed	Ref-From Net	Ctrl-From Net	Ready	Running Reverse	Running Forward		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

Pick Input and Output Assemblies for the Bulletin 160 (Continued)

To choose these Assemblies, first select the "DNet Config" parameter group as shown below:



To change the Output Assembly, double click on the "Output Assembly" parameter. The following screen appears:

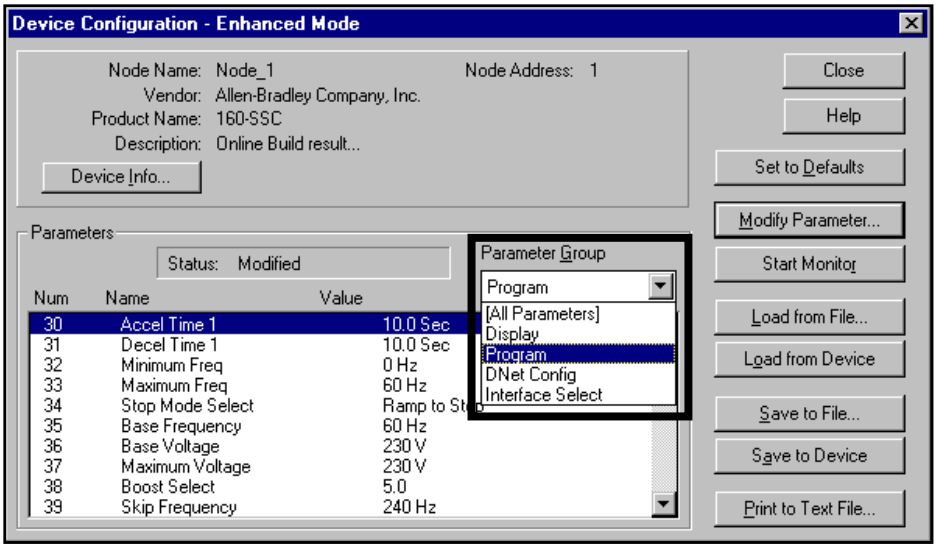


Enter Assembly Number 21 and click on the "Save to Device" button.

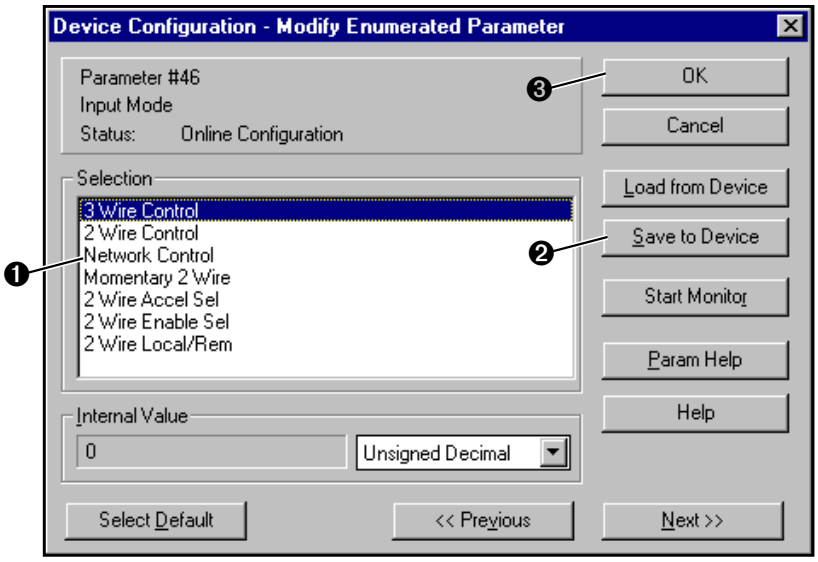
Repeat the above steps for the Input Assembly except set the value to "71."

Enable Network Control

The Bulletin 160 must be configured to accept commands from the network. This is done by configuring the “Input Mode” parameter. To do this, select the “Program” parameter group as shown below:



Double click on the “Input Mode” parameter (number 46). The following screen appears:

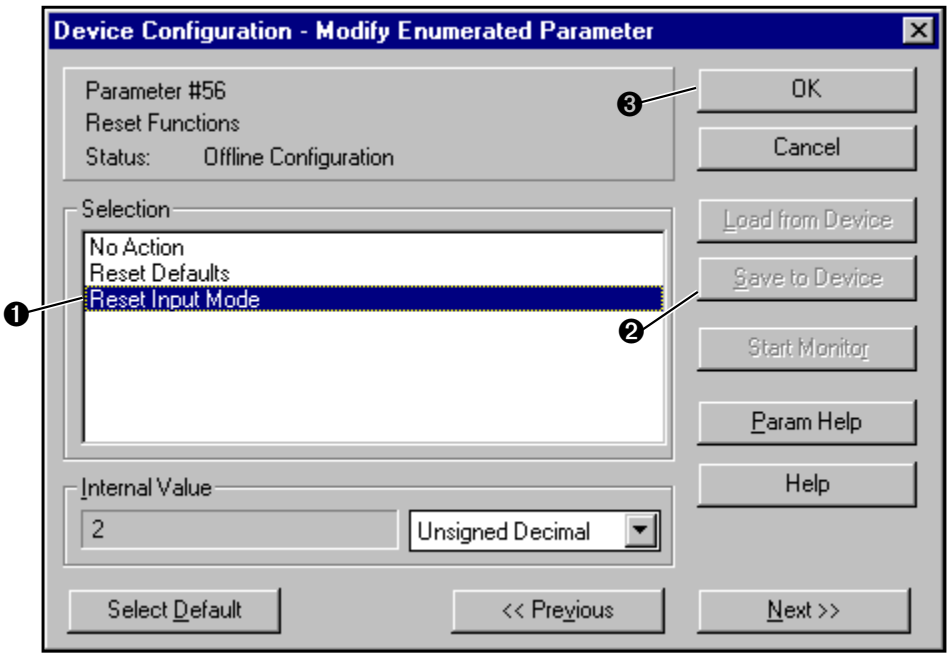


Select “Network Control” and click the “Save to Device” button. When the save is done, close the window by pressing the “OK” button.

ATTENTION: Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.

Enable Network Control (Continued)

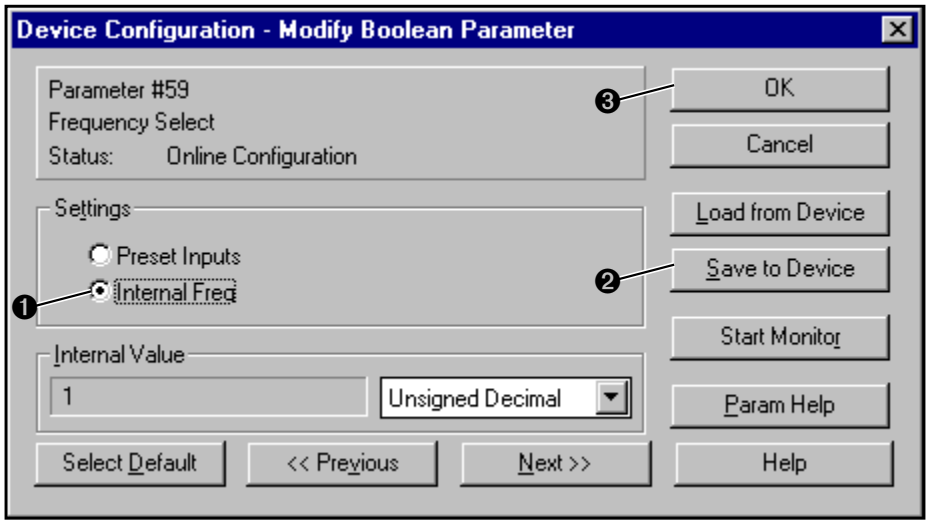
For the new input mode to take effect, **P56 - [Reset Functions]** must be modified. Double click on the "reset functions" parameter **P56 - [Reset Functions]**. The following screen appears:



Select "Reset Input Mode" and click the "Save to Device" button. When the save is done, close the window by pressing the "OK" button.

Configure the 160 to Accept Speed Commands From the Network

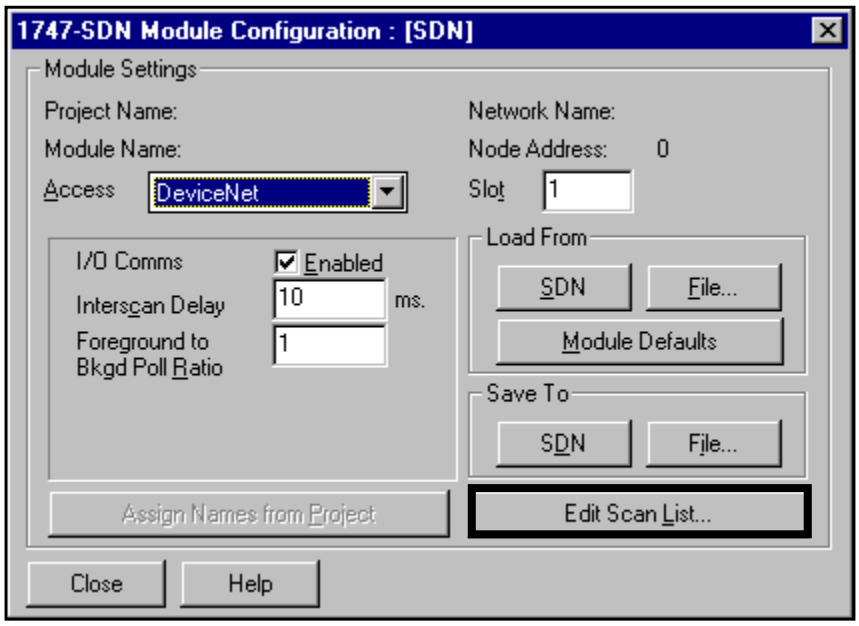
The Bulletin 160 must be configured to accept its speed commands from the network. This is done by changing the "Frequency Select" parameter. Double click on the **P59 - [Frequency Select]** parameter. The following screen appears:



Select "Internal Freq" and click the "Save to Device" button. When the save is done, close the window by pressing the "OK" button.

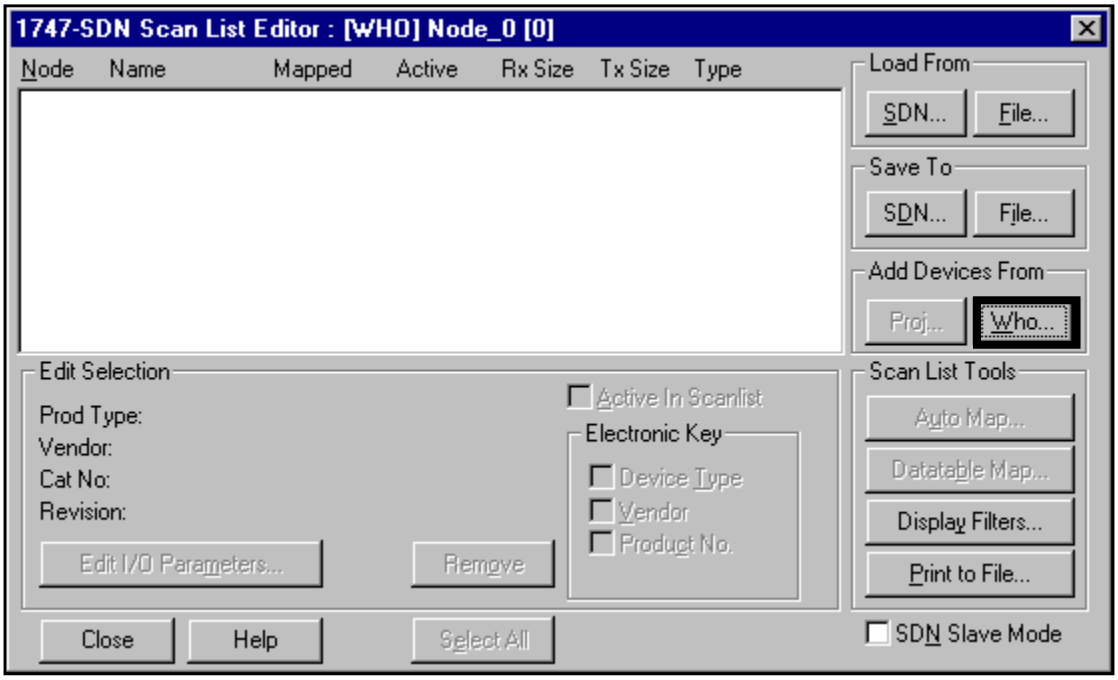
Invoke Scanner Configuration Screens

Double Click on the 1747-SDN Scanner in the “Network Who” screen to configure the SDN Scanner. The following Scanner configuration screen appears:



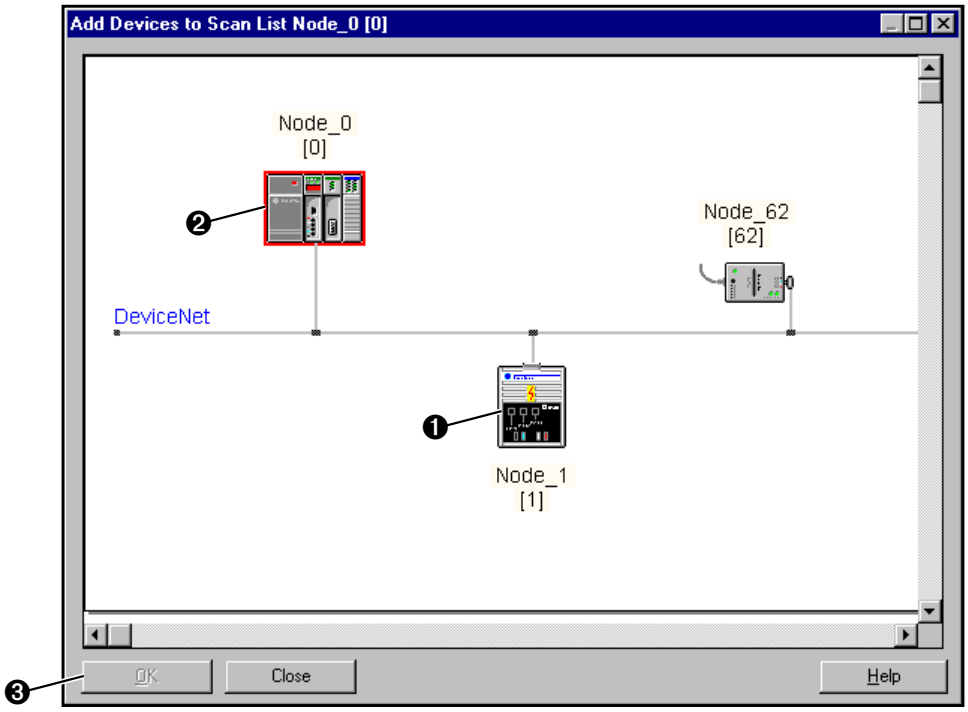
Set Up the Scan List

Click on the “Edit Scan List...” button. The following screen appears:

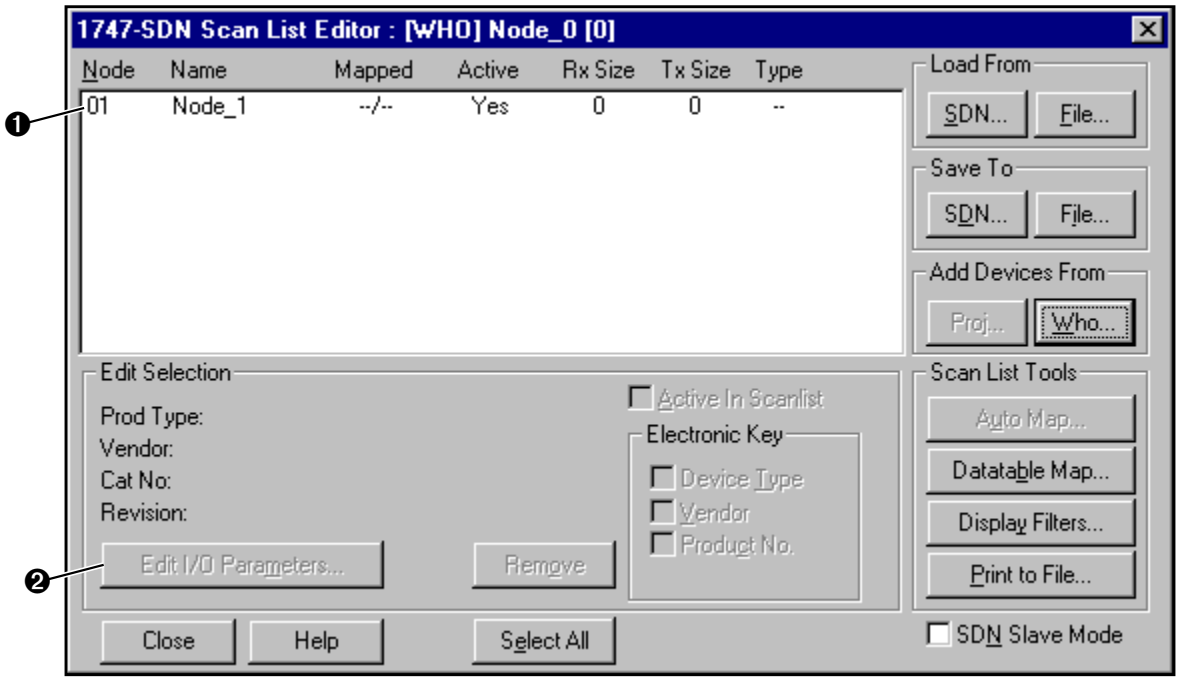


Set Up the Scan List (Continued)

To add the Bulletin 160 onto the 1747-SDN scan list, press the “Who” button in the “Add Devices From” box. The following screen will appear:

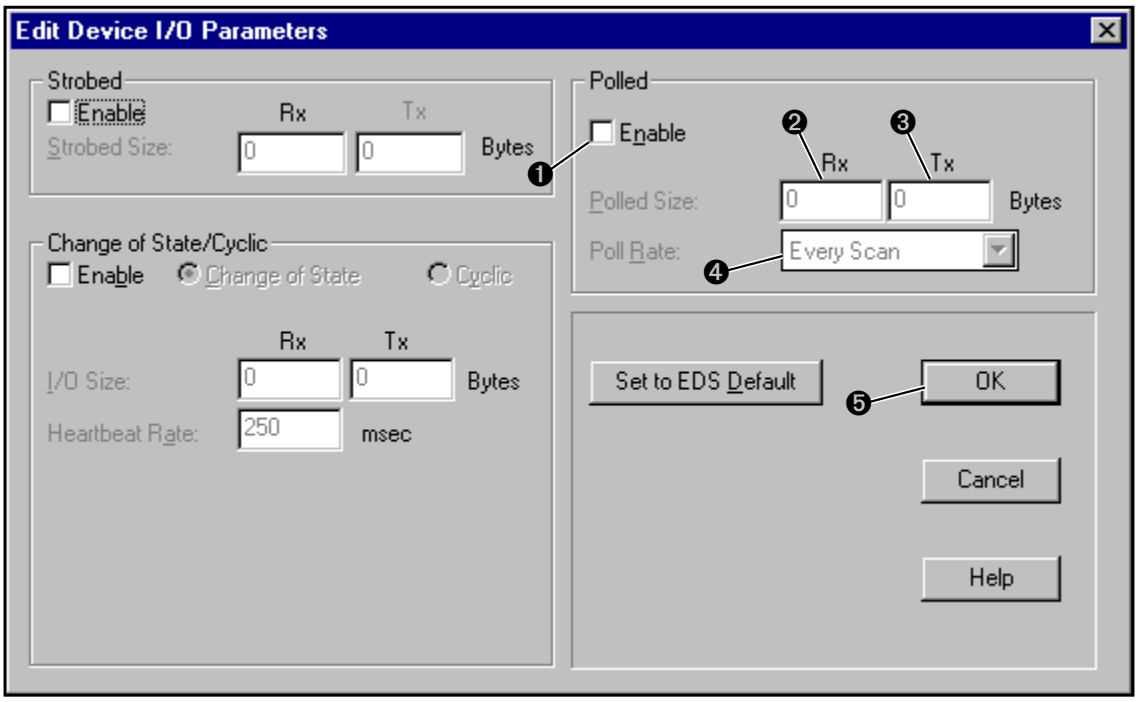


At this menu, simply click on the Bulletin 160 and drag it onto the 1747-SDN image. Press the “OK” button and the Bulletin 160 will appear in the 1747-SDN scan list:



Set Up the Scan List (Continued)

Edit the I/O data by either clicking Bulletin 160 in the scan list and clicking the "Edit I/O Parameters" check box or by double clicking on the Bulletin 160 in the scan list. The following screen appears:

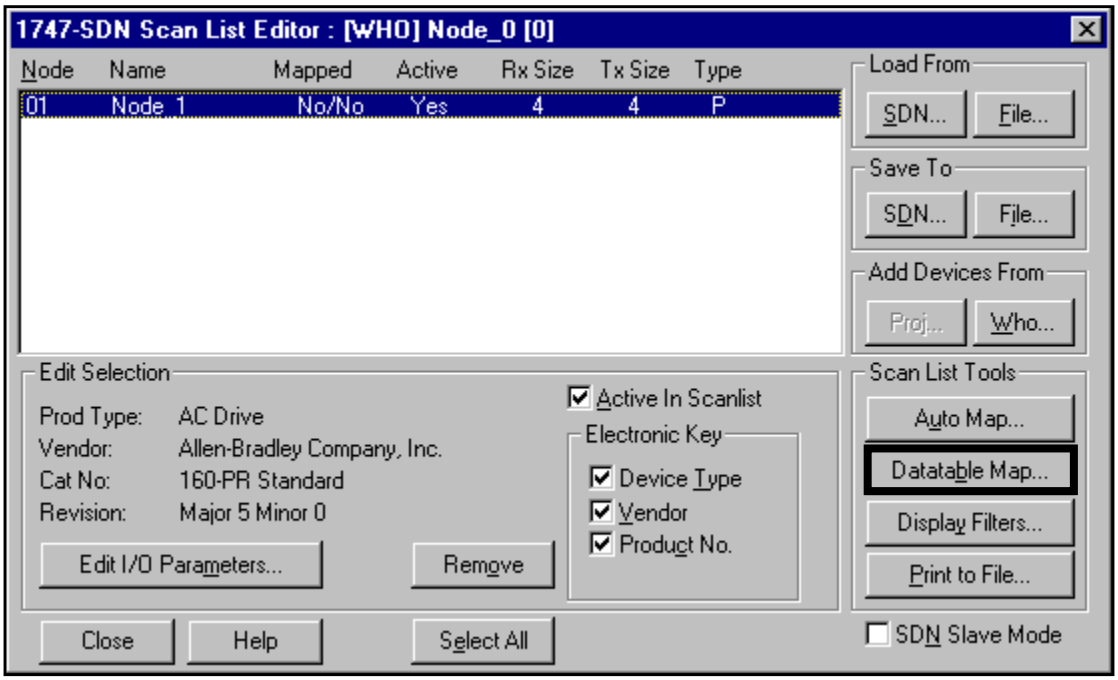


To set up a polled IO connection, choose the following, then click the OK button.

Polled:	Enabled
Poll Rx Size:	"4 Byte"
Poll Tx Size:	"4 Byte"
Poll Rate:	"Every Scan"

Set Up the Scan List (Continued)

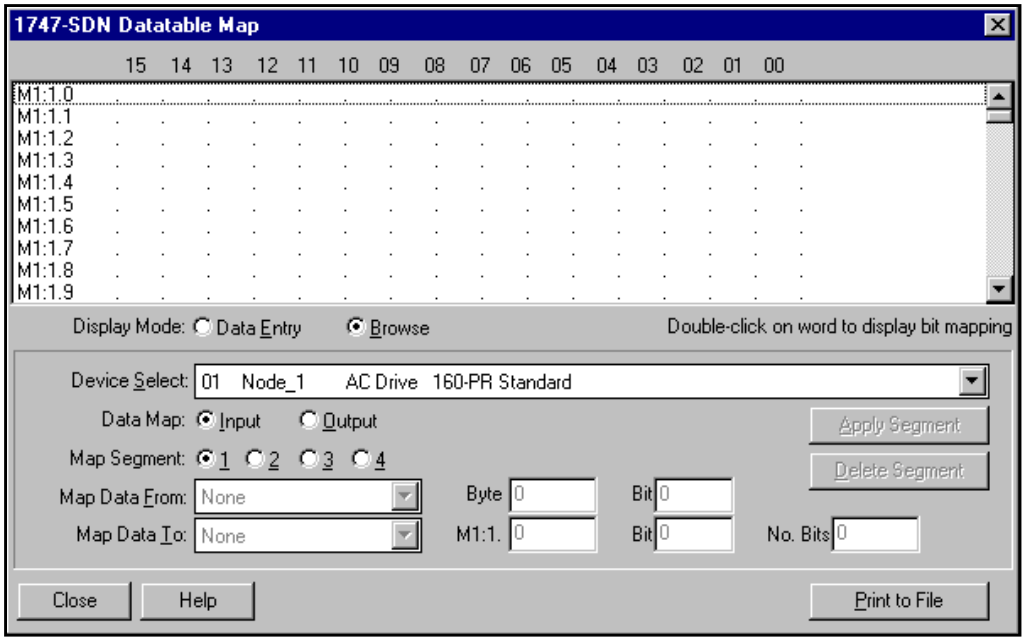
Now the scan list window should appear as follows:



Map Each Device in the Scan List

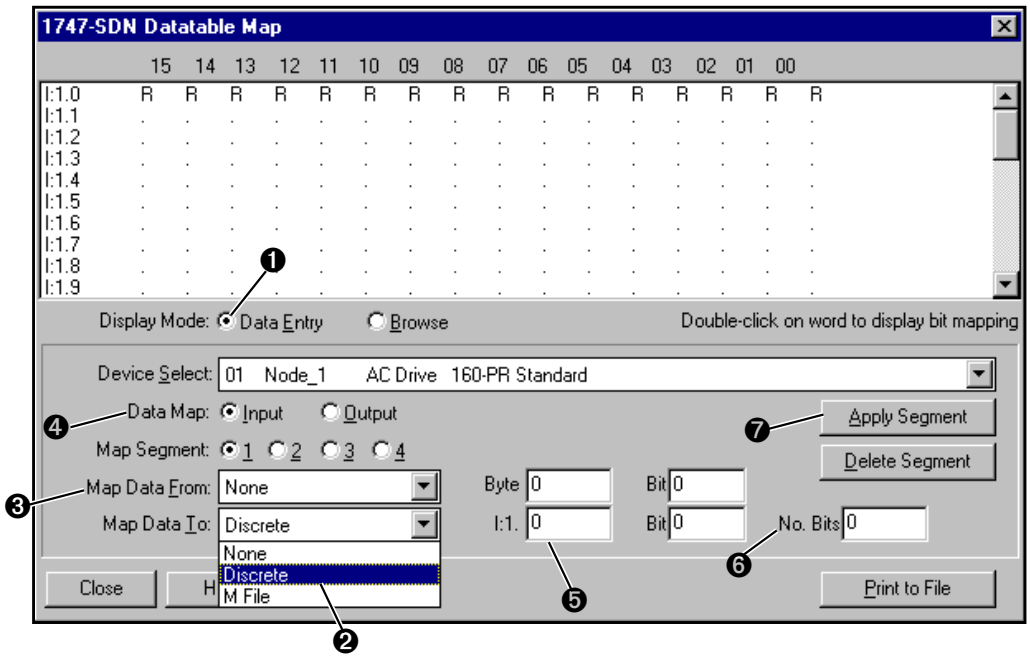
Data from IO messages may be mapped to the SLC's discrete I/O area or to an I/O area located in the "M0" and "M1" files. This mapping will determine where a ladder program can find the data that is passed over the network. We will use the discrete area in our example.

To map the data, click the "Datatable Map..." button under the Scan List Tools window. The following Datatable Map screen appears:

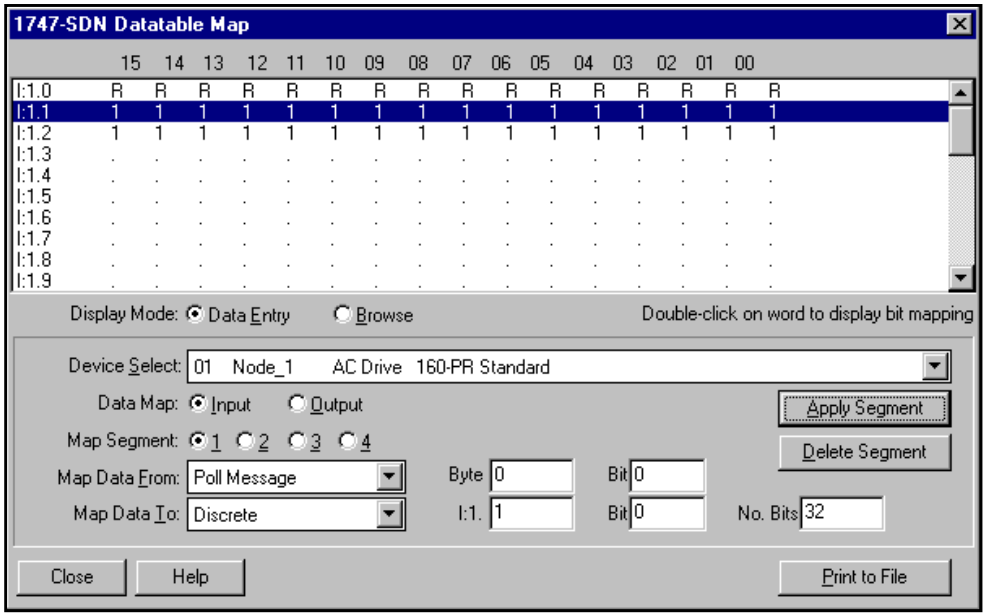


Map Each Device in the Scan List (Continued)

Select “Data Entry” for the display mode. Since we will be mapping to the discrete area, choose “Discrete” from the “Map Data To:” list box as shown below:

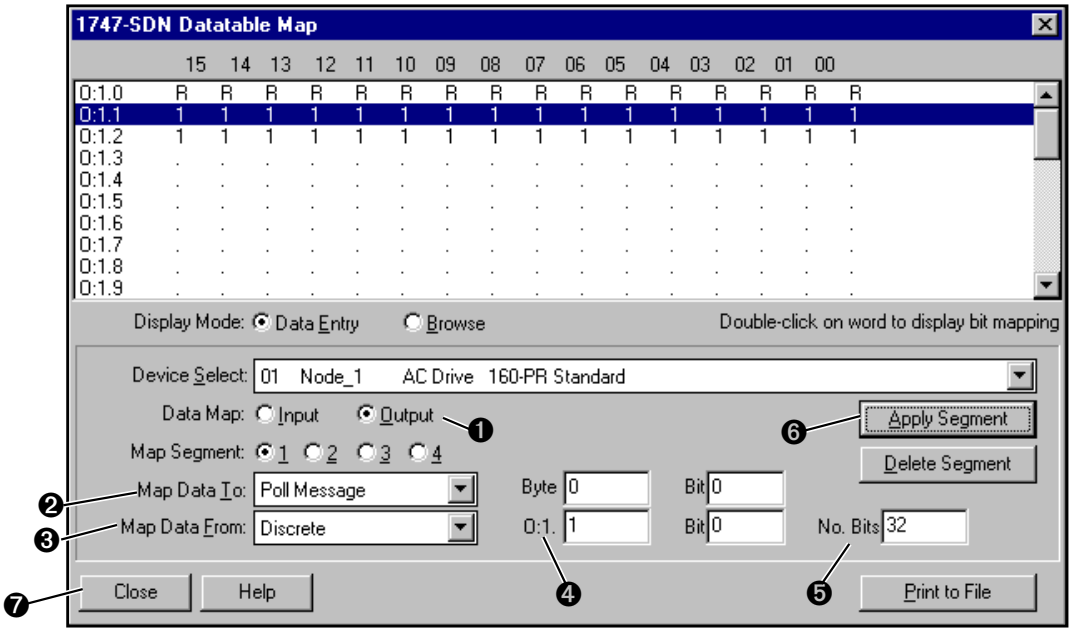


The Bulletin 160 will be mapped as a polled device to the discrete area. From the “Map Data From” box select the “Poll Message” choice. To map the input data, choose the “Input” button. For this example, map all 32 bits of the Bulletin 160 Input message to the first 32 bits in discrete input word I:1.1. In the “Map Data To:” section of the window choose I:1.1, Bit 0, 32 bits of data, then click the “Apply Segment” button. The Datatable map should appear as follows:

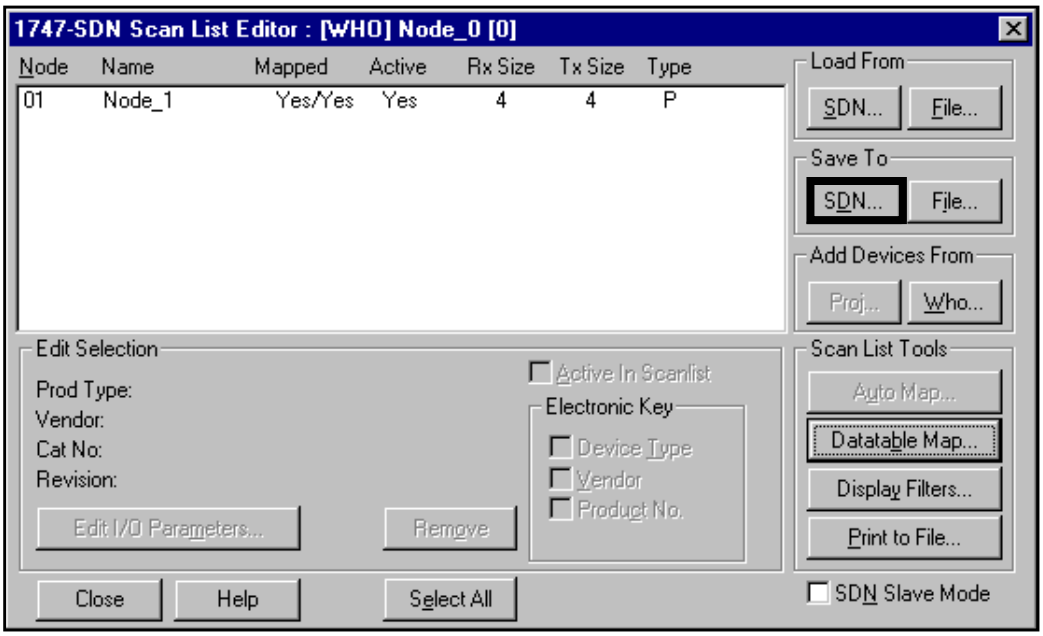


Map Each Device in the Scan List (Continued)

Next map 32 bits of the Bulletin 160 output message to O:1.1. First click the “Output” button in the Data Map section of the window. Then choose “Discrete” from the “Map Data From:” list. From the “Map Data To:” list choose “Poll message”. In the “Map Data To:” section of the window, choose O:1.1, Bit 0, 32 bits of data, then click the “Apply Segment” button. The Datatable map should appear as follows:

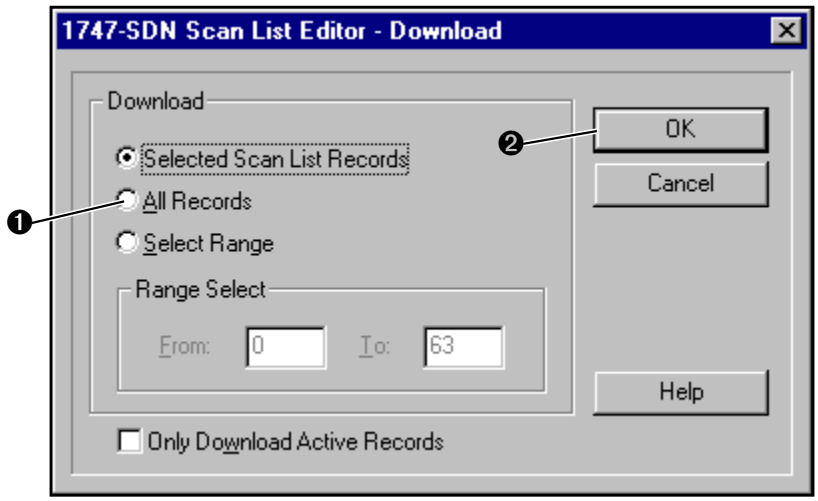


The datatable mapping is now complete. Click the “Close” button to return to the scan list window. It should appear as follows:

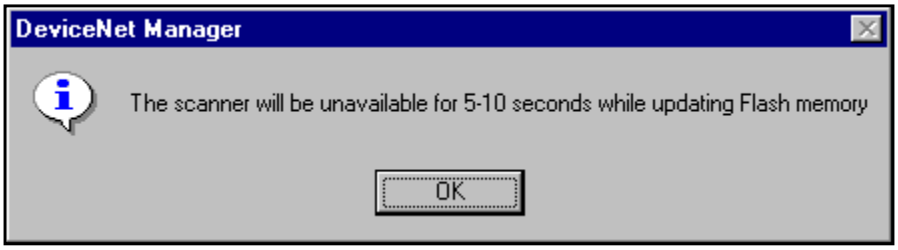


Map Each Device in the Scan List (Continued)

Finally, we must save the scan list and datatable map to the scanner. This is done by clicking the “Save To SDN...” button. The following window will appear:



Choose the “All Records” button, and click “OK”. When the scan list and datatable map have been loaded, you will be informed that the scanner will be unavailable for a brief period of time following the download as follows:



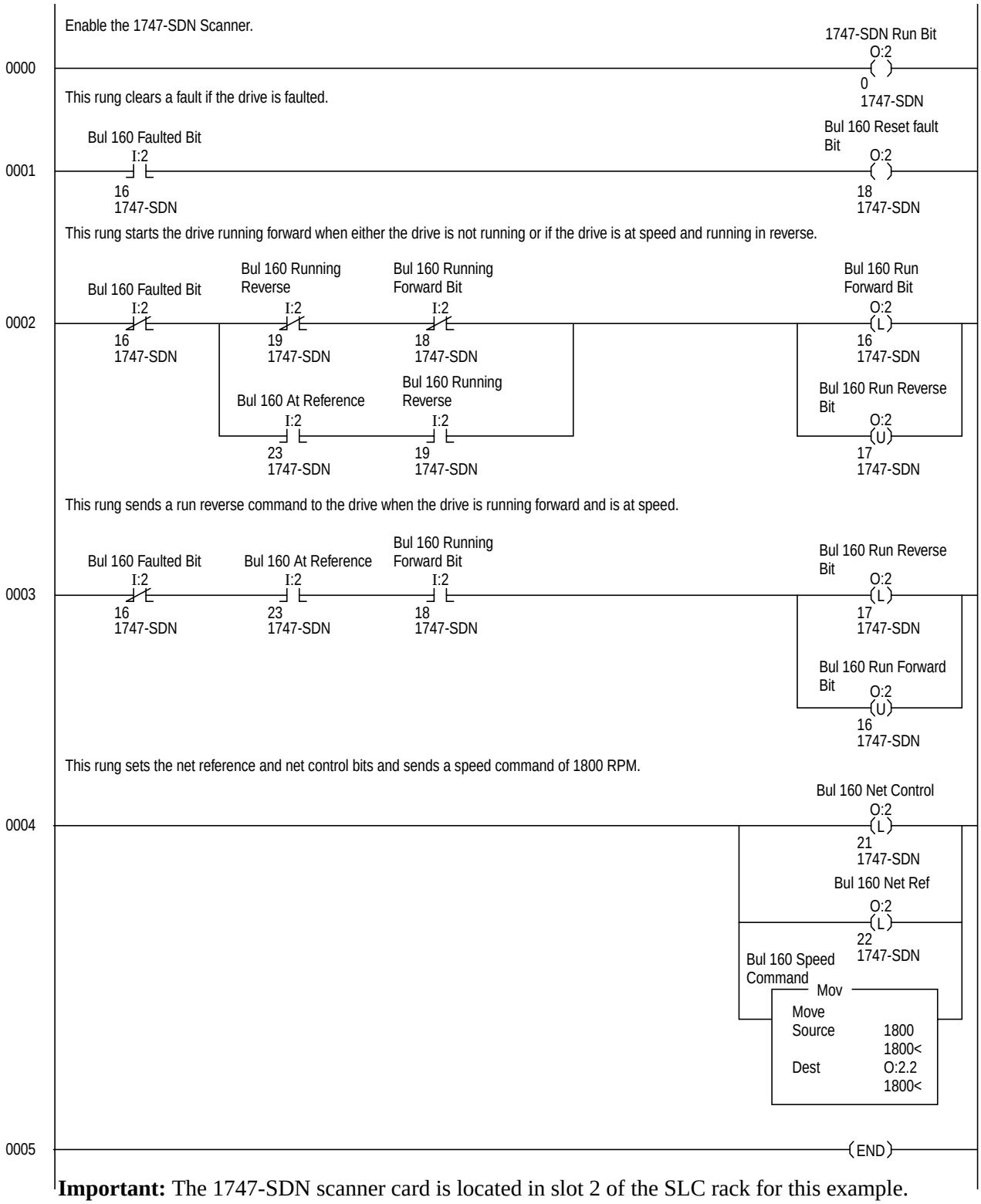
Program the Ladder

The example ladder program in Figure 6.1 on page 6-16 accomplishes Run Forward/Run Reverse control and speed command of the Bulletin 160.

This example SLC program will control the Bulletin 160 to run forward to 60Hz, once it reaches 60 Hz, the SLC will reverse the Bulletin 160 to 60Hz, once running in reverse at 60Hz the SLC will start this sequence over.

Program the Ladder (Continued)

Figure 6.1
Polled I/O Messaging



Important: The 1747-SDN scanner card is located in slot 2 of the SLC rack for this example.

Important: The Bulletin 160SSC drive Stop Input (TB3-7, TB3-8) must be jumpered together to start the drive.

Explicit Messaging

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

How it Works

There are five steps to the Explicit Messaging process. The following is a brief description of what happens during this process.

1. Format an M0 file transfer in the processor to send an Explicit Message Request to the scanner module (download).
2. The scanner module transmits the Explicit Message Request to the slave device over the DeviceNet network.
3. The slave device transmits the Explicit Message Response back to the scanner and is queued into a file transfer buffer.
4. The processor uses an M1 file transfer to retrieve the Explicit Message Response from the scanner's buffer (upload).
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.

It is important to note that there is a request message and a response message whether you are reading or writing a parameter.

How to Format the Explicit Message Transaction Block

There are ten 32-word transaction blocks within the scanner module reserved for Explicit Message Program Control. These transaction blocks accommodate both downloading of Explicit Message Requests and the uploading of Explicit Message Responses. The scanner module can accommodate one request or response for each transaction block. Each transaction block must be formatted as shown below.

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	

Programming the SLC to Run Explicit Messaging

The example ladder program (Figure 6.2, page 6-20) can be used to do explicit programing from the SLC 500. This ladder program will allow the SLC 500 to use Explicit Messaging to read and write parameters to a Bulletin 160 drive. There are three steps to executing this program:

1. Entering Data into the Program

The request information will be placed in the N10 file (refer to the table on page 6-19 for format). The first word in N10 will be the *TXID* and *command* information, which will both receive a value of one. The second word will be the *port* and *size* information. The *port* value will be zero when using a 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 *MAC ID* information. The *service* can 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 *MAC ID* will be the node address that was given to the slave device. Next the *class, instance*, and *attribute* for the parameter have to be entered. These values can be found in *Chapter 5*, *Appendix B* and *Appendix C*.

2. Running the Program

After formatting 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 this address back to zero when the Explicit Message is complete. After the program has been run, the results can be seen in the N11 address (refer to the table on page 6-19 for format). 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.

3. Receiving Data From the Program

The response data will be automatically put in the N11 file when the program has completed the explicit request. The SLC program should read/copy the data before performing another Explicit Message Request.

Programming the SLC to Run Explicit Messaging (Continued)

Data Format for a Read and Write of a Parameter

Request Data for Read of Parameter 30 (Accel Time)

N10 address

address	0	1	2	3	4	5	6	7	8	9
N10:0	0101	0006	0E01	00B3	0001	001E	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 30

N11 address

address	0	1	2	3	4	5	6	7	8	9
N11:0	0101	0002	8E01	00B3	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 30

N10 address

address	0	1	2	3	4	5	6	7	8	9
N10:0	0101	0008	1001	00B3	0001	001E	0001	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

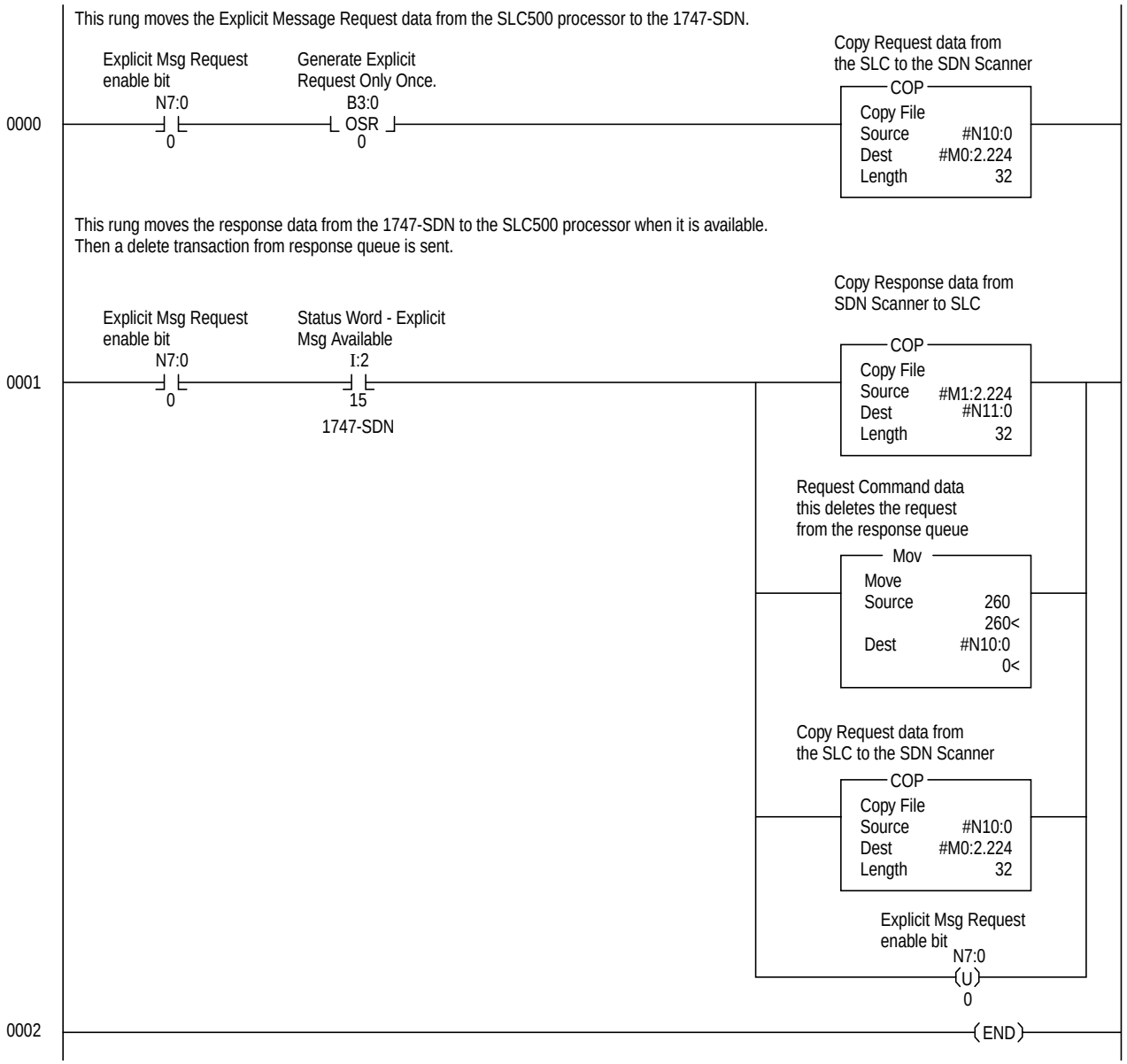
Response Data for Write to Parameter 30

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

Programming the SLC to Run Explicit Messaging (Continued)

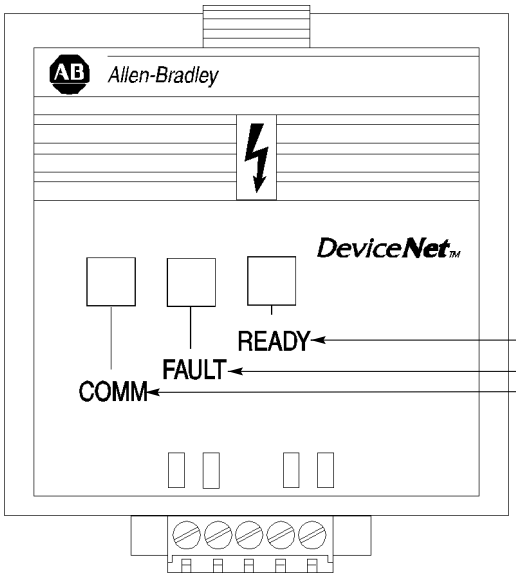
Figure 6.2
Explicit Messaging



Troubleshooting

The purpose of this chapter is to help you troubleshoot your DeviceNet Communication Module using the LEDs on the front of the device.

Figure 7.1
Module Front View



READY LED - Green when drive is powered up.

FAULT LED - Red when drive is faulted
Off when drive not faulted.

COMM LED - Bi-colored LED (red/green) provides status information on DeviceNet communications. The table below summarizes the operation of the LED.

Important: When power-up occurs, the communication status LED (COMM), flashes green for 1/4 second, red for 1/4 second, and then goes blank while the Communication Module finishes its initialization.

COMM LED		Description
Color	**State**	
None		No DeviceNet power or initializing.
Red	Solid	Unrecoverable fault.
Red	Flashing	I/O connection has timed out.
Green	Solid	Normal operating state. Device is allocated to a master.
Green	Flashing	Device is on-line but not allocated to a master.

ATTENTION: Servicing energized industrial control equipment can be hazardous. Electrical shock, burns, or unintentional actuation of controlled industrial equipment may cause death or serious injury. Follow the safety-related practices of NPFA 70E, *Electrical Safety for Employee Workplaces*, when working on or near energized equipment. Do not work alone on energized equipment.

ATTENTION: Do not attempt to defeat or override fault circuits. The cause of a fault indication must be determined and corrected before attempting operation. Failure to correct a drive or system malfunction may result in personal injury and/or equipment damage due to uncontrolled machine system operation.

Understanding the COMM LED

The COMM LED provides status information on Communication Module operations. The table below shows how to use the LED to detect and correct common operation problems.

Important: When power up occurs, the COMM LED flashes green for 1/4 second, red for 1/4 second and then goes blank while the Communication Module finishes its initialization.

Table 1: Understanding the COMM LED

Color	State	What It Means:	What To Do:
None		The Communication module 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 powerup/reset. Internal fault exists.	Cycle power to the drive and network. If the fault still exists, return the Communication Module for repair.
Red	Solid	Duplicate DeviceNet node address. Two nodes cannot have the same address.	Reset DIP switches 1 through 6 using a valid address and reset device. OR If DIP switches 7 and 8 are both set to ON, change the value of **P18 - [Nonvolatile MAC]** to a valid address and reset device.
Red	Solid	Invalid data rate.	Reset DIP switches 7 and 8 to a valid data rate and reset device. OR If DIP switches 7 and 8 are both set to ON, change value of **P19 - [Nonvolatile Baud]** to a valid baud rate and reset device.
Red	Flashing	I/O connection timed out.	Reset DeviceNet master device.
Green	Solid	Normal operating state and device is allocated to a master.	No action required.
Green	Flashing	Device is on-line but not allocated to a master.	Check DeviceNet master for correct Communication Module configuration information (node address, input assembly, and output assembly).

Understanding the FAULT LED

When the FAULT LED is Red, a drive fault is present. The Communication Module uses two sets of fault codes depending on the setting of **P15 - [Interface Select]**.

When **P15 - [Interface Select]** is set to a 0, *the Bulletin 160 SSC interface*, **P7 - [Last Fault]** uses the fault codes in Table 2.

When **P15 - [Interface Select] is set to a 1,** *ODVA Drive Profile Interface,* **P12 - [Last Fault]** uses the fault codes in Table 3.

Table 2: *Bulletin 160 SSC Interface* Fault Codes

Fault Code	Fault Indication	Description	Corrective Action
0	No Fault	The drive is currently not faulted.	No action required.
3	Power Loss	DC Bus voltage remains below 85% nominal on power up for longer than 5 seconds.	Monitor incoming AC line for low voltage or line power interruption.
4	Under Voltage	DC Bus voltage fell below the minimum value while the motor was running.	Monitor incoming AC line for low voltage or line power interruption.
5	Over Voltage	DC Bus maximum voltage exceeded.	Bus overvoltage caused by motor regeneration. Extend the decel time, or install dynamic brake option or external capacitor module.
6	Motor Stalled	Motor has stalled. Motor load is excessive.	Longer accel time or reduced load required.
7	Motor Overload	Internal electronic overload trip. Excessive motor load exists.	Reduce motor load.
8	Over Temperature	Excessive heat detected.	Clear blocked or dirty heat sink fins. Check ambient temperature. Check for blocked or non-operating fan.
12	Over Current	Overcurrent detected in hardware trip circuit.	Check short circuit at the drive output or excessive load conditions at the motor.
22	Drive Reset	Stop input not present.	Check stop input at TB3 terminal 8.
32	EEPROM Fault	EEPROM has invalid data.	Reset EEPROM using **P56 - [Reset Defaults]**.
33	Max Retries Fault	Drive did not reset fault within the max retries specified.	Repair system fault.
38	Phase U	Phase to ground fault detected between drive and motor phase U.	Check wiring between drive and motor. Check motor for grounded phase.
39	Phase V	Phase to ground fault detected between drive and motor phase V.	Check wiring between drive and motor. Check motor for grounded phase.
40	Phase W	Phase to ground fault detected between drive and motor phase W.	Check wiring between drive and motor. Check motor for grounded phase.
41	UV Short	Excessive current has been detected between these two drive output terminals.	Check the motor and external wiring to the drive output terminals for a shorted condition.
42	UW Short	Excessive current has been detected between these two drive output terminals.	Check the motor and external wiring to the drive output terminals for a shorted condition.
43	VW Short	Excessive current has been detected between these two drive output terminals.	Check the motor and external wiring to the drive output terminals for a shorted condition.
48	Reprogramming Fault	Occurs when reset defaults is performed.	Clear fault.

Understanding the FAULT LED (Continued)

Table 2: *Bulletin 160 SSC Interface* Fault Codes (Continued)

Fault Code	Fault Indication	Description	Corrective Action
50	No DeviceNet Power	24 volt network power is not detected.	Check DeviceNet connector at Communication Module. Also, check network's power supply.
51	DeviceNet Module EEPROM Fault	DeviceNet Module EEPROM has invalid data.	Reset to factory defaults **P56 - [Reset Defaults]**.
52	DeviceNet Lost I/O Connection	Polled I/O connection timed out.	Check DeviceNet Master for correct operation (i.e., powered up, scanner online, etc.).
53	DeviceNet Unrecoverable Fault	No communication is occurring. Fault occurs when duplicate node address exists or wrong baud rate is set.	Check DIP switch settings for proper baud rate and node address.
54	DeviceNet Transmit Fault	A transmit timeout occurred.	Power drive off and then cycle power on.

Table 3: ODVA Drive Profile Fault Codes

Fault Code (hex)	Fault Indication	Description	Corrective Action
1100	Max Retries Fault	Drive failed to reset fault within the max retries specified.	Repair system fault.
2213	Power Test	Fault detected during initial start sequence.	Check drive wiring. Check motor wiring. Reset drive to factory defaults.
2220	Over Current	Overcurrent detected in hardware trip circuit.	Check short circuit at the drive output or excessive load conditions at the motor.
2331	Phase U	Phase to ground fault detected between drive and motor phase U.	Check wiring between drive and motor. Check motor for grounded phase.
2332	Phase V	Phase to ground fault detected between drive and motor phase V.	Check wiring between drive and motor. Check motor for grounded phase.
2333	Phase W	Phase to ground fault detected between drive and motor phase W.	Check wiring between drive and motor. Check motor for grounded phase.
2341	UV Short	Excessive current has been detected between these two drive output terminals.	Check the motor and external wiring to the drive output terminals for a shorted condition.
2342	UW Short	Excessive current has been detected between these two drive output terminals.	Check the motor and external wiring to the drive output terminals for a shorted condition.
2343	VW Short	Excessive current has been detected between these two drive output terminals.	Check the motor and external wiring to the drive output terminals for a shorted condition.
3120	Power Loss	DC Bus voltage remains below 85% nominal on power up for longer than 5 seconds.	Monitor incoming AC line for low voltage or line power interruption.
3210	Over Voltage	DC Bus maximum voltage exceeded.	Bus overvoltage caused by motor regeneration. Extend the decel time, or install dynamic brake option or external capacitor module.
3220	Under Voltage	DC Bus voltage fell below the minimum value while the motor was running.	Monitor incoming AC line for low voltage or line power interruption.

Understanding the FAULT LED (Continued)

Table 3: ODVA Drive Profile Fault Codes (Continued)

Fault Code	Fault Indication	Description	Corrective Action
4310	Over Temperature	Excessive heat detected.	Clear blocked or dirty heat sink fins. Check ambient temperature. Check for blocked or non-operating fan.
5300	Drive Reset	Stop input not present.	Check stop input at TB3 terminal 8.
6310	EEPROM Fault	EEPROM has invalid data.	Reset EEPROM.
6311	DeviceNet Module EEPROM Fault	DevicNet Module EEPROM has invalid data.	Reset to factory defaults using **P56 - [Reset Defaults]**.
7121	Motor Stalled	Motor has stalled. Motor load is excessive.	Longer accel time or reduced load required.
7122	Motor Overload	Internal electronic overload trip. Excessive motor load exists.	Reduce motor load.
7421	Reprogramming Fault	Occurs when drive parameters are reset to defaults.	Clear fault.
7500	No DeviceNet Power	24 volt network power is not detected.	Check DeviceNet connector at Communication Module. Also, check network's power supply.
7501	DeviceNet Lost I/O Connection	Polled I/O connection timed out.	Check DeviceNet Master for correct operation (i.e., powered up, scanner online, etc.).
7502	DeviceNet Unrecoverable Fault	No communication is occurring. Fault occurs when duplicate node address exists or wrong baud rate is set.	Check DIP switch settings for proper baud rate and node address.
7503	DeviceNet Transmit Fault	A transmit timeout occurred.	Power drive off, and then cycle power on.
7504	DN Forced Fault	DeviceNet module forced a fault.	Clear fault.

Specifications

Electrical

Network Supply Voltage	11 to 25 VDC
Network Input Current	40 mA maximum
Power Consumption	1 Watt maximum

Environmental

Ambient Temperature Operating Storage	 0 to 50° C (32 to 122° F) -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

DeviceNet Baud Rates Distance maximum	 125, 250, 500 k BPS 500 m (1640 ft.) @ 125 k BPS 200 m (820 ft.) @ 250 k BPS 100 m (328 ft.) @ 500 k BPS

Mechanical

Dimensions in Millimeters (inches) Height Width Depth ①	 67.54 (2.68) 70.0 (2.76) 45.36 (1.79)

① When installed on the 160 SSC drive, the communication module adds approximately 21.40 mm (0.85 in.) to the overall depth.

DeviceNet Information

The DeviceNet communication module allows a Bulletin 160 SSC drive to operate as a slave device on a DeviceNet network. The communication module supports Explicit Messages and Polled or Change of State/Cyclic I/O Messages of the predefined master/slave connection set. It *does not* support the Explicit Unconnected Message Manager (UCMM).

This appendix defines the DeviceNet Message Types, object classes, class services, and attributes that are supported by the Communication Module.

DeviceNet Message Types

As a group 2 slave device, the Communication Module supports the following message types.

CAN Identifier Field	Group 2 Message Type
10xxxxxx111	Duplicate MAC ID Check Messages
10xxxxxx110	Unconnected Explicit Request Messages
10xxxxxx101	Master I/O Poll Command Messages
10xxxxxx100	Master Explicit Request Messages
10xxxxxx011	Slave Explicit Response Messages
01101xxxxxx	Slave's I/O Change of State or Cyclic Message (available with Communication Module version 2.00 and later)
10xxxxxx010	Master's Change of State or Cyclic Acknowledge Message (available with Communication Module version 2.00 and later)
01111xxxxxx	Slave Poll Response Messages

xxxxxx = Communication Module Node Address

CAN Identifier Field	Group 4 Message Types①
11111101100	Communication Faulted Response Message (available with Communication Module version 2.00 and later)
11111101101	Communication Faulted Request Message (available with Communication Module version 2.00 and later)

① Dip switches 7 and 8 must be set to "ON" position to enable Group 4 messaging (see pages 3-4 and 3-5).

Object Classes

The Communication Module supports the following object classes.

Class	Object	Class	Object
0x01	Identity	0x29	Control Supervisor
0x03	DeviceNet	0x2A	AC Drive
0x04	Assembly	0xB3	160 Parameter Table
0x05	Connection	0xB4	DeviceNet Interface
0x28	Motor Data		

Class Code 0x01 — Identity Object

Class Attributes

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	Revision	UINT	1
2	Get	Max 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	UINT	1
2	Get	Product Type	UINT	2
3	Get	Product Code	UINT	1 to 4, 132 to 135 (Refer to tables on page 5-3 for product codes.)
4	Get	Revision Major Revision Minor Revision	Structure of: USINT USINT	 X ① X ①
5	Get	Status	WORD	0 = Not owned 1 = Owned by master
6	Get	Serial Number	UDINT	unique number
7	Get	Product Name String Length ASCII String	Structure of: USINT STRING	 12 “Bulletin 160”
9	Get	Configuration Consistency (available with Communication Module version 2.00 and later)	UINT	Checksum

① E.g., firmware revision 5.01 would have a major revision of “5” and a minor revision of “1”.

Class Code 0x01— Identity Object (Continued)

Instance 2 Attributes: DeviceNet Instance
(available with Communication Module version 2.00 and later)

Attribute ID	Access ID	Name	Data Type	Value
1	Get	Vendor	UINT	1
2	Get	Product Type	UINT	105 = Subassembly
3	Get	Product Code	UINT	1
4	Get	Revision Major Minor	Structure of USINT USINT	 2 0
5	Get	Status	WORD	0 = Not Owned 1 = Owned by Master
6	Get	Serial Number	UDINT	Unique 32 bit number
7	Get	Product Name String Length ASCII String	Structure of USINT STRING	 16 “Bulletin 160 DN1”

Common Services

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

Class Code 0x03 — DeviceNet Object

Class Attributes: None Supported	**Number of Instances:** 1

Instance 1 Attributes:

Attribute ID	Access Rule	Name	Data Type	Value
1	Get/Set	Node Address	USINT	0 to 63
2	Get/Set	Data Rate	USINT	0 to 2
3	Get/Set	BOI	BOOL	0 = Hold in error state on BOI error 1 = Reset CAN chip on BOI error
4	Get/Set	Bus-off Counter	USINT	0 to 255
5	Get	Allocation Info Allocation Choice Master Node Addr	Structure of: BYTE USINT	Allocation_byte① 0 to 63 = Address 255 = Unallocated
8	Get	MAC ID switch value	USINT	0 to 63
9	Get	Baud Rate switch val	USINT	0 to 3

① Allocation_byte
Bit 0 Explicit Messaging
Bit 1 Polled I/O
Bit 4 Change of state
Bit 5 Cyclic

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

Class Code 0x05 — Connection Object

Class Attributes: None Supported	**Number of Instances:** 3

Instance 1 Attributes: Explicit Message Instance

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0 = Nonexistant 1 = Configuring 3 = Established 4 = Timed out 5 = Deferred delete (available with Communication Module version 2.00 and later)
2	Get	Instance Type	USINT	0 = Explicit Message
3	Get	Transport Class Trigger	USINT	0x83
4	Get	Produced Connection ID	USINT	10xxxxxx100 xxxxxx = Node address
5	Get	Consumed Connection ID	USINT	10xxxxxx100 xxxxxx = Node address
6	Get	Initial Comm. Characteristics	USINT	0x22
7	Get	Produced Connection Size	USINT	7
8	Get	Consumed Connection Size	USINT	7
9	Get/Set	Expected Packet Rate	UINT	Timer resolution of 10 msec.
12	Get/Set	Watchdog Action	USINT	1 = Auto delete 3 = Deferred delete (available with Communication Module version 2.00 and later)
13	Get	Produced Connection Path Length	USINT	0
14	Get	Produced Connection Path		Null (no data)
15	Get	Consumed Connection Path Length	USINT	0
16	Get	Consumed Connection Path		Null (no data)

Class Code 0x05 — Connection Object (Continued)

Instance 2: Attributes (Polled I/O Message Connection)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0 = Nonexistant 1 = Configuring 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	1 = I/O Message
3	Get	Transport Class Trigger	USINT	0x82
4	Get	Produced Connection ID	USINT	10xxxxxx100 xxxxxx = Node address
5	Get	Consumed Connection ID	USINT	10xxxxxx101 xxxxxx = Node address
6	Get	Initial Comm Characteristics	USINT	0x21
7	Get	Produced Connection Size	USINT	0 to 8
8	Get	Consumed Connection Size	USINT	0 to 4
9	Get/Set	Expected Packet Rate	USINT	Timer resolution of 10 msec.
12	Get/Set	Watchdog Action	USINT	0 = Transition to timed out 1 = Auto delete 2 = Auto reset
13	Get	Produced Connection Path Length	USINT	3
14	Get/Set	Produced Connection Path		[63hex][hex string] where [hex string] is the input assembly number in hex
15	Get	Consumed Connection Path Length	USINT	3
16	Get/Set	Consumed Connection Path		[63hex][hex string] where [hex string] is the output assembly number in hex

Class Code 0x05 — Connection Object (Continued)

Instance 4 Attributes: Change of State/Cyclic Instance
(Available with Communication Module version 2.00 and later)

Attribute ID	Access Rule	Name	Data Type	Value
1	Get	State	USINT	0 = Nonexistant 1 = Configuring 3 = Established 4 = Timed out
2	Get	Instance Type	USINT	1 = I/O Message
3	Get	Transport Class Trigger	USINT	0x82
4	Get	Produced Connection ID	USINT	10xxxxxx100 xxxxxx = Node address
5	Get	Consumed Connection ID	USINT	10xxxxxx101 xxxxxx = Node address
6	Get	Initial Comm Characteristics	USINT	0x21
7	Get	Produced Connection Size	USINT	0 to 8
8	Get	Consumed Connection Size	USINT	0 to 4
9	Get/Set	Expected Packet Rate	UINT	timer resolution of 10 msec.
12	Get/Set	Watchdog Action	USINT	0 = transition to timed out 1 = auto delete 2 = auto reset
13	Get	Produced Connection Path Length	USINT	3
14	Get/Set	Produced Connection Path		[63hex][hex string] where [hex string] is the input assembly number in hex
15	Get	Consumed Connection Path Length	USINT	3
16	Get/Set	Consumed Connection Path		[63hex][hex string] where [hex string] is the output assembly number in hex
17	Get/Set	Production Inhibit Time	UINT	0

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

Class Code 0x28 — Motor Data Object

Class Attributes: None Supported	**Number of Instances:** 1

Instance 1 Attributes

Attribute ID	Access Rule	Name	Data Type	Min/Max	Units	Default	Description
6	Get/Set	Rated Current	UINT	0 to 100.00	0.01 Amps	Drive Rating	Rated Stator Current (from motor nameplate).
7	Get/Set	Rated Voltage	UINT	110 to 460	1 Volt	Drive Rating	Rated Base Voltage (from motor nameplate).
9	Get/Set	RatedFreq	UINT	10 to 240	1 Hz	60 Hz	Rated Electrical Frequency (from motor nameplate).
15	Get/Set	BaseSpeed	UINT	200 to 32000	1 RPM	1800 RPM	Nominal Speed at Rated Frequency (from motor nameplate).

Common Services

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

Class Code 0x29 — Control Supervisor Object

Class Attributes: None Supported	**Number of Instances:** 1

Instance 1 Attributes:

Attribute ID	Access Rule	Name	Data Type	Min/Max	Default	Description
3	Get/Set	RunFwd	BOOL	0 to 1	0	See page B-12.
4	Get/Set	RunRev	BOOL	0 to 1	0	See page B-12.
5	Get/Set	NetCtrl	BOOL	0 to 1	0	See page B-12.
6	Get	State	USINT	0 to 7		1 = Start-up. 3 = Ready. 4 = Enabled. 5 = Stopping. 7 = Faulted. (See Figure B.1 on page B-11.)
7	Get	RunningFwd	BOOL	0 to 1	0	1 = (Enabled **and** RunFwd) **or** (Stopping **and** RunningFwd). 0 = Other State.
8	Get	RunningRev	BOOL	0 to 1	0	1 = (Enabled **and** RunRev) **or** (Stopping **and** RunningRev). 0 = Other State.
9	Get	Ready	BOOL	0 to 1		1 = Ready **or** Enabled **or** Stopping . 0 = Other State.
10	Get	Faulted	BOOL	0 to 1		1 = Fault Latched. 0 = No faults present.
12	Get/Set	FaultRst	BOOL	0 to 1	0	0 -> 1 = Fault Reset. 0 = No Action.
13	Get	FaultCode	UINT	0 to 7503hex	0	In **Faulted** state, FaultCode indicates the fault that caused the transition to **Faulted**. If not in **Faulted** state, FaultCode indicates the fault that caused the last transition to the **Faulted** state. Fault codes are listed in *Chapter 5*.
15	Get	CtrlFromNet	USINT	0 to 1	0	Status of Run/Stop control source 0 = Control is Local. 1 = Control is from the network.
16	Get/Set	DNFaultMode	USINT	0 to 1	0	
17	Get/Set	Force Fault/Trip	Boolean	0 to 1	0	0 to 1 transition forces fault.
100 ①②	Get/Set	OutputAssembly	USINT	0 to 103 (0 to 101 for version 1.2)	20	Output Assembly instance that is currently active.
101 ①②	Get/Set	InputAssembly	USINT	0 to 105 (0 to 102 for version 1.2)	70	Input Assembly instance that is currently active.
102 ①	Get/Set	DNPresetCmd	USINT	0 to 7	0	DeviceNet Preset command. (Preset Speed Units Only).

① Bulletin 160 specific instance attributes.

② Setting Attribute *ID 100* to *0* will cause the slave to expect no control information from the master. Likewise, setting Attribute *ID 101* to *0* will cause the master to expect no status information from the slave.

Class Code 0x29 — Control Supervisor Object (Continued)

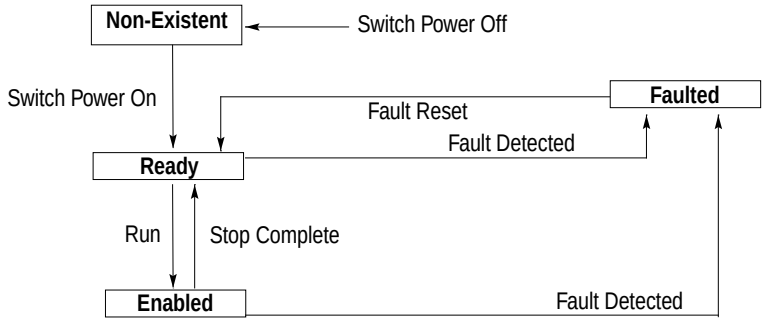
Common Services

Service Code	Implemented for:		Service Name
	Class	Instance	
0x0E	No	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 B.1
State Transition Diagram



Class Code 0x29 — Control Supervisor Object (Continued)

Run/Stop Event Matrix

Attribute 5, NetCtrl is used to request that Run/Stop events be controlled from the network. The following must occur before Run/Stop control is accomplished from the network:

- Attribute 15, CtrlFromNet is set to 1 by the device in response to a NetCtrl request.
- Power is cycled.

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: Local Stop commands from the TB3 terminal block on the drive override Run/Stop control through DeviceNet.

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.

Class Code 0x2A — AC Drive Object

Class Attributes: None Supported	Number of Instances: 1

Instance 1 Attributes:

Attribute ID	Access Rule	Name	Data Type	Min/Max	Units	Default	Description
3	Get	AtReference	BOOL	0 to 1		0	Set to 1 when SpeedActual is equal to SpeedRef.
4	Get/Set	NetRef	BOOL	0 to 1		0	1 = Drive uses SpeedRef (attribute 8) as its speed reference. 0 = Drive gets its speed reference from local terminal block 3.
6	Get	Drive Mode	USINT	1		1	1 = Open Loop Frequency control.
7	Get	SpeedActual	INT	0 to 32000	1 RPM	0	Actual speed command in RPM.
8	Get/Set	SpeedRef	INT	0 to 32000	1 RPM	1800 RPM	Network speed reference in RPM.
9	Get	CurrentActual	INT	0 to 32000	0.01 Amp		Actual motor phase current in amperes.
10	Get/Set	CurrentLimit	INT	0 to 32000	0.01 Amp	200% of rating	Motor phase current limit in amperes.
15	Get	PowerActual	INT	0 to 32000	1 Watt		Actual drive output power in Watts.
16	Get	InputVoltage	INT	0 to 460	1 Volt	230V or 460V	Input voltage rating.
17	Get	OutputVoltage	INT	0 to 460	1 Volt		Output voltage to the motor.
18	Get/Set	AccelTime	UINT	100 to 65500	1 mSec	10000	Time to accelerate from 0 to HighSpeed Limit.
19	Get/Set	DecelTime	UINT	100 to 65500	1 mSec	10000	Time to decelerate from HighSpeed Limit to 0.
20	Get/Set	LowSpeed Limit	UINT	0 to 32000	1 RPM	0 RPM	Minimum Speed Limit.
21	Get/Set	HighSpeed Limit	UINT	0 to 32000	1 RPM	1800 RPM	Maximum Speed Limit.
29	Get	RefFromNet	BOOL	0 to 1		0	Status of Network Speed Reference. 1 = Drive uses SpeedRef. 0 = Drive uses local ref.
Bulletin 160 SSC Specific Extensions	The AC Drive Object includes in its implementation a variable number of 160 SSC specific instance attributes. By adding the number *100* to any parameter number in the Bulletin 160 parameter table, the resulting number will be a 160 SSC specific instance attribute in the AC Drive Object. For example, in the 160 SSC drive, parameter 5 displays Bus Voltage. Therefore, attribute # 105 of the AC Drive Object returns Bus Voltage. This method of extending the AC Drive Object allows for an ODVA compliant implementation of the Drive Profile, and accommodates all Bulletin 160 SSC models (both analog and preset speed models). Refer to the *Bulletin 160 SSC User Manual, Chapter 5*.						

Common Services

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

Class Code 0xB3 — 160 Parameter Table Object

Class Attributes: None Supported	Number of Instances: 1

Instance 1 Attributes:

Attribute ID	Access Rule	Parameter Name	Data Type	Units	Description
This Bulletin 160 SSC specific object implements all of the parameters in the 160 SSC parameter table as instance attributes of the object. For example, attribute #1 corresponds to **P01 - [Output Frequency]**. This give you the ability to configure a drive via DeviceNet using attribute numbers that are published as parameter numbers in the *Bulletin 160 SSC User Manual*. **Important:** Attributes 9 and 12 shown below *do not* match what is published in the *Bulletin 160 SSC User Manual*.					
01	Get	**[Output Frequency]**	UINT	0.1 Hz	Frequency at TB2 terminals T1, T2, T3.
02	Get	**[Output Voltage]**	UINT	1 Volt	Voltage at TB2 terminals T1, T2, T3.
03	Get	**[Output Current]**	UINT	0.01 Amperes	Current at TB2 terminals T1, T2, T3.
04	Get	**[Output Power]**	UINT	0.01 kW	Power at TB2 terminals T1, T2, T3.
05	Get	**[Bus Voltage]**	UINT	1 Volt	DC Bus voltage level.
06	Get	**[Frequency Command]**	UINT	0.1 Hz	Commanded frequency.
07	Get	**[Last Fault]**	USINT	Numeric Value	Coded last fault number.
08	Get	**[Heatsink Temp]**	USINT	1 C	Temperature of the drive heatsink.
09	Get	**[Drive Status]**	USINT	Binary Number	Status of drive in binary coded format.
10	Get	**[Drive Type]**	UINT	Numeric Value	Used by Allen-Bradley field service personnel.
11	Get	**[Control version]**	UINT	Numeric Value	version of drive firmware used.
12	Get	**[Input Status]**	USINT	Binary Number	Open (0) Closed (1) state of drive's discrete inputs.
13	Get	**[Power Factor Angle]**	UINT	0.1	Angle (electrical degrees) between V and I.
14	Get	**[Memory Probe]**	UINT	Numeric Value	Used by Allen-Bradley service personnel.
16	Get	**[Analog Input]**	INT	0.1%	The analog input as a percent of full scale.
30	Get/Set	**[Accel Time 1]**	UINT	0.1 Seconds	Time to ramp from 0 Hz to maximum frequency.
31	Get/Set	**[Decel Time 1]**	UINT	0.1 Seconds	Time to ramp from maximum frequency to 0 Hz.
32	Get/Set	**[Minimum Frequency]**	USINT	1 Hz	Lowest continuous output frequency.
33	Get/Set	**[Maximum Frequency]**	USINT	1 Hz	Highest continuous output frequency.
34	Get/Set	**[Stop Mode Select]**	USINT	Numeric Value	Determines stop mode used.  **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.
35	Get/Set	**[Base Frequency]**	USINT	1 Hz	Set to motor's nameplate frequency.
36	Get/Set	**[Base Voltage]**	UINT	1 Volt	Set to motor's nameplate voltage.
37	Get/Set	**[Max Voltage]**	UINT	1 Volt	Highest voltage the drive will output.
38	Get/Set	**[Boost Select]**	USINT	Numeric Value	Sets the volts/Hz relationship.

Class Code 0xB3 — 160 Parameter Table Object (Continued)

Attribute ID	Access Rule	Parameter Name	Data Type	Units	Description
39	Get/Set	**[Skip Frequency]**	USINT	1 Hz	Frequency at which drive will not run continuously.
40	Get/Set	**[Skip Frequency Band]**	USINT	1 Hz	Used with **P39 - [Skip Frequency]** to create skip band.
41	Get/Set	**[Overload Select]**	USINT	Numeric Value	Selects derating factor for motor overload.
42	Get/Set	**[Overload Current]**	UINT	0.01 Amperes	Set to nameplate full load Amperes.
43	Get/Set	**[Current Limit]**	USINT	% I rating	Max output current allowed before limiting.
44	Get/Set	**[DC Hold Time]**	USINT	0.1 Seconds	DC Injection Braking duration.
45	Get/Set	**[DC Hold Voltage]**	USINT	1 Volt	Voltage level for DC Injection Braking.
46	Get/Set	**[Input Mode]**	USINT	Numeric Value	Type of START, STOP and REV commands.  **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.
47	Get/Set	**[Output Configure]**	USINT	Numeric Value	Configures TB3 output relay functionality.
48	Get/Set	**[Output Threshold]**	UINT	Numeric Value	Used in conjunction with **P47 - [Output Configure]**.
49	Get/Set	**[PWM Frequency]**	USINT	0.1 kHz	Carrier Frequency for PWM output waveform.
50	Get/Set	**[Restart Tries]**	USINT	Numeric Value	Times drive will attempt to reset a fault.
51	Get/Set	**[Restart Time]**	UINT	0.1 Seconds	Time between restart attempts.
52	Get/Set	**[DB Enable]**	USINT	Numeric Value	Enables/Disables dynamic braking.
53	Get/Set	**[S-Curve]**	USINT	Numeric Value	Enables a fixed shape S-curve.
54	Get/Set	**[Clear Fault]**	BOOL	Numeric Value	Setting to 1 performs a fault reset.
55	Get/Set	**[Memory Probe Address]**	UINT	Numeric Value	Used by Allen-Bradley service personnel.
56	Get/Set	**[Reset Defaults]**	USINT	Numeric Value	Sets all parameters to their factory default.
57	Get/Set	**[Program Lock]**	BOOL	Numeric Value	Locks all program group parameters.
58	Get/Set	**[Internal Frequency]**	UINT	0.1 Hz	Digital Frequency setpoint.
59	Get/Set	**[Frequency Select]**	BOOL	Numeric Value	Selects source of frequency command.
60	Get/Set	**[Zero Offset]**	INT	Numeric Value	Add or subtracts an offset to the analog input.
60	Get/Set	**[DN Preset Cmd]**	USINT	Numeric Value	Network preset command.
61	Get/Set	**[Preset Frequency 0]**	UINT	0.1 Hz	Sets command frequency when selected.
62	Get/Set	**[Preset Frequency 1]**	UINT	0.1 Hz	Sets command frequency when selected.
63	Get/Set	**[Preset Frequency 2]**	UINT	0.1 Hz	Sets command frequency when selected.

This parameter applies only to the Analog Signal Follower model.

This parameter applies only to the Preset Speed model.

Class Code 0xB3 — 160 Parameter Table Object (Continued)

Attribute ID	Access Rule	Parameter Name	Data Type	Units	Description
64	Get/Set	**[Preset Frequency 3]**	UINT	0.1 Hz	Sets command frequency when selected.
65	Get/Set	**[Preset Frequency 4]**	UINT	0.1 Hz	Sets command frequency when selected.
66	Get/Set	**[Preset Frequency 5]**	UINT	0.1 Hz	Sets command frequency when selected.
67	Get/Set	**[Preset Frequency 6]**	UINT	0.1 Hz	Sets command frequency when selected.
68	Get/Set	**[Preset Frequency 7]**	UINT	0.1 Hz	Sets command frequency when selected.
69	Get/Set	**[Accel Time 2]**	UINT	0.1 Seconds	Sets acceleration rate for presets 4 to 7.
70	Get/Set	**[Decel Time 2]**	UINT	0.1 Seconds	Sets deceleration rate for presets 4 to 7.
71	Get/Set	**[IR Compensation]**	USINT	1%	Adds a voltage to the output based on the torque current.
72	Get/Set	**[Slip Compensation]**	USINT	0.1 Hz	Compensates for the inherent slip of the motor.
73	Get/Set	**[Reverse Disable]**	BOOL	Numeric Value	Setting to 1 disables the reverse.
74	Get/Set	**[Analog Select]**	BOOL	Numeric Value	Selects between unipolar and bipolar analog input.
75	Get/Set	**[Analog Input Minimum]**	INT	0.1%	Sets the percent of the analog input used to represent **P32 - [Minimum Frequency]**.
76	Get/Set	**[Analog Input Maximum]**	INT	0.1%	Sets the percent of the analog input used to represent **P33 - [Maximum Frequency]**.
78	Get/Set	**[Compensation]**	BOOL	Numeric Value	Setting to 1 enables the compensation.

This parameter applies only to the Analog Signal Follower model.

This parameter applies only to the Preset Speed model.

Common Services

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

Class Code 0xB4 — DN Interface Object

Class Attributes: None Supported	**Number of Instances:** 1

Instance 1 Attributes:

Attribute ID	Access Rule	Name	Data Type	Min/Max	Default	Description
1	Get	Zero	USINT	0	0	Returns zero.
2	Get/Set	Interface Select	USINT	0 to 1	0	0 = *Bulletin 160 SSC Interface*. 1 = ODVA Drive Profile Interface.
3	Get	MAC ID Switches	USINT	0 to 63		Reflects the state of the MAC ID switches.
4	Get	Baud Switches	USINT	0 to 3		Reflects the state of the Baud Rate switches.
5	Get/Set	Nonvolatile MAC ID	USINT	0 to 63	63	Stored value of the MAC ID. This value is used when Baud Switches = 3.
6	Get/Set	Nonvolatile Baud	USINT	0 to 2	0	Stored value of Baud Rate. This value is used when Baud Switches = 3.
7①	Get/Set	Assembly Word 0 Param	USINT	0 to 88 (0 to 9 for version 1.2)	9	*Bulletin 160 SSC Interface* parameter number whose value is used as the first word in Input Assembly 102.
8①	Get/Set	Assembly Word 1 Param	USINT	0 to 88 (0 to 9 for version 1.2)	0	*Bulletin 160 SSC Interface* parameter number whose value is used as the second word in Input Assembly 102.
9①	Get/Set	Assembly Word 2 Param	USINT	0 to 88 (0 to 9 for version 1.2)	0	*Bulletin 160 SSC Interface* parameter number whose value is used as the third word in Input Assembly 102.
10①	Get/Set	Assembly Word 3 Param	USINT	0 to 88 (0 to 9 for version 1.2)	0	*Bulletin 160 SSC Interface* parameter number whose value is used as the fourth word in Input Assembly 102.
11	Get/Set	DN Idle Mode	Boolean	0 to 1	0	0 = Stop, 1 = Hold Last State. (Version 2.00 and later.)
12	Get	DN Software Version	Word	0.00 to 10.00	2.00	Indicates the software version of the DeviceNet option. (Version 2.00 and later.)
13	Get/Set	DN Change of State Mask	Word	0 to 0xFFFF	0xFFFF	A 16 bit mask used to enable automatic change of state messages. (Version 2.00 and later.)
14	Get/Set	Local Return Mode	Byte	0 to 5	0	Sets the input mode the drive will use when transitioning from network to local control. (version 2.00 and later.)

① If set to a "9" **P9 - [Drive Status]** (of the SSC Interface Profile) goes in the low byte of the assembly field and **P12 - [Input Status]** (of the SSC Interface Profile) goes in the high byte of assembly field.

Common Services

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

Class Code 0x04 — Assembly Objects

Class Attributes: None Supported	**Number of Instances:** 19

Instance 1 to 105 Attributes: I/O Instances
(Available with Communication Modules version 2.00 and later)

Attribute ID	Access Rule	Name	Data Type	Min/Max	Default	Description
3	Get	Data	See instance data format for individual I/O assemblies on page B-19 through page B-23.			

Instance 190 to 193 Attributes: Configuration Instances

Attribute ID	Access Rule	Name	Data Type	Min/Max	Default	Description
3	Get/Set	Data	See configuration assembly data formats for individual configuration assemblies on page B-24 through page B-29.			

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								
2①	Speed Reference RPM (Low Byte)							
3①	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								
2①	Speed Reference RPM (Low Byte)							
3①	Speed Reference RPM (High Byte)							

Instance 100 Data Format (Reversing Speed Control Output Assembly (Hz)
This output assembly type is only available for use when Parameter #15 (Interface Select) is set to "0=*Bulletin 160 SSC Interface*."

Byte	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0						Fault Reset	RunRev	RunFwd
1								
2①	Internal Frequency (0.1 Hz) (Low Byte)							
3①	Internal Frequency (0.1 Hz) (High Byte)							

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

Instance Data Format (Continued) Output Assemblies (Continued)

Instance 101 Data Format (Preset Control) (Preset Speed Units Only)①
This output assembly type is only available for use with Preset Speed Units.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Fault Reset	RunRev	RunFwd
1	DN Preset Cmd							
	(DN Preset Cmd contains these three bits)					Preset 2②	Preset 1②	Preset 0②

Instance 103 Allen-Bradley Drive Output Assembly (Available with Communication Module version 2.00 and later)
This output assembly mirrors the 1305/1336 IO format.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	N/A	N/A	Direction③	Direction③	Clear Faults	N/A	Start	Stop
1	N/A	Reference Select④	Reference Select④	Reference Select④	N/A	N/A	N/A	N/A
2	Scale Speed Reference (Low Byte)⑤							
3	Scale Speed Reference (High Byte)⑤							

① Net Ref has higher priority than Net Control. Therefore, if Net Ref is set, presets are ignored.

② For Preset Speed Units: Net Ref determines if speed reference comes from the network or preset speeds.

③ Direction

Bit 5	Bit 4	
0	0	No Command
0	1	Forward Command
1	0	Reverse Command
1	1	Hold Direction Cmd

④ Reference Select

Bit 14	Bit 13	Bit 12	
0	0	0	No Command Select
0	0	1	TB3 Control
0	1	0	Network Control
0	1	1	Preset 3
1	0	0	Preset 4
1	0	1	Preset 5
1	1	0	Preset 6
1	1	1	Preset 7

⑤ 0 = 0 Hz, 32767 = Maximum Frequency (Hz)

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

Data Component Name	Class		Instance	Attribute	
	Name	Number	Number	Name	Number
RunFwd	Supervisor	29hex	1	RunFwd	3
RunRev	Supervisor	29hex	1	RunRev	4
Fault Reset	Supervisor	29hex	1	FaultRst	11
NetCtrl	Supervisor	29hex	1	NetCtrl	5
DN Preset Cmd	Supervisor	29hex	1	DNPresetCmd	102
NetRef	AC Drive	2Ahex	1	NetRef	4
Speed Reference	AC Drive	2Ahex	1	SpeedRef	8
Internal Frequency	160 Param	B3	1	Internal Freq	58

Instance Data Format (Continued) 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	At Reference	RefFrom Net	CtrlFrom Net	Ready	Running Reverse	Running Forward		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

Instance Data Format (Continued) Input Assemblies (Continued)

Instance 102 Attributes (Custom Parameter Based Input Assembly)
160 SSC Display parameter values are used to form the Output_Data structure for this assembly. Parameters 24, 25, 26, or 27 contain numbers of the parameter values that form this assembly. A value of 0 in any of parameters 24 through 27 means end of assembly. For example, a value of 0 in parameter 25 means that the assembly will only be two bytes long, with parameter 24 containing the parameter number of the parameter whose value is placed in word 0 of the assembly.
Important: Setting Parameters 24, 25, 26, or 27 to a "9" causes the drive status to be mapped to the low byte and input status to be mapped to the high byte.

Word	Byte	
0	0	Value of parameter pointed to by Parameter Number 24 (Low Byte)
	1	Value of parameter pointed to by Parameter Number 24 (High Byte)
1	2	Value of parameter pointed to by Parameter Number 25 (Low Byte)
	3	Value of parameter pointed to by Parameter Number 25 (High Byte)
2	4	Value of parameter pointed to by Parameter Number 26 (Low Byte)
	5	Value of parameter pointed to by Parameter Number 26 (High Byte)
3	6	Value of parameter pointed to by Parameter Number 27 (Low Byte)
	7	Value of parameter pointed to by Parameter Number 27 (High Byte)

Instance 104: Allen-Bradley Input Assembly (Available with Communication Module version 2.00 and later)
This input assembly mirrors the Bulletin 1305 I/O Format.

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Fault	N/A	Decel	Accel	Rot Dir①	Cmd Dir①	Running	Enabled
1	Freq Source③	Freq Source③	Freq Source③	Freq Source③	Local②	Local②	Local②	At Speed
2	Actual Speed Scale 0-32767④							
3	Actual Speed Scale 0-32767④							

① 1 = forward, 0 = reverse

② Local

Bit 11	Bit 10	Bit 9	Definition
0	0	0	TB3 Control
0	0	1	Network Control

③ Frequency Source

Bit 15	Bit 14	Bit 13	Bit 12	Definition
0	0	0	0	Preset 0
0	0	0	1	Preset 1
0	0	1	0	Preset 2
0	0	1	1	Preset 3
0	1	0	0	Preset 4
0	1	0	1	Preset 5
0	1	1	0	Preset 6
0	1	1	1	Preset 7
1	0	0	0	TB3
1	0	0	1	Network
1	0	1	0	Not defined
1	1	1	1	Not defined

Instance Data Format (Continued) Input Assemblies (Continued)

Instance 105: Allen-Bradley Drive Input Assembly with Parameters (Available with Communication Module version 2.00 and later)
160 SSC parameter values are used to form the Output_Data structure for this assembly. Parameter 26 and 27 contain numbers of the display parameter values that form this assembly. A value of 0 in either parameter 26 or 27 means end of assembly. For example, a value of 0 in parameter 27 means that the assembly will only be six bytes long, with parameter 26 containing the parameter number of the parameter whose value is placed in word 3 of the assembly.

Word	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	0	Fault	N/A	Decel	Accel	Rot Dir①	Cmd Dir①	Running	Enabled
	1	Freq Source③	Freq Source③	Freq Source③	Freq Source③	Local②	Local②	Local②	At Speed
2	2	Actual Speed Scale 0-32767④							
	3	Actual Speed Scale 0-32767④							
3	4	Value of parameter pointed to by Parameter Number 26 (Low Byte)							
	5	Value of parameter pointed to by Parameter Number 26 (High Byte)							
4	6	Value of parameter pointed to by Parameter Number 27 (Low Byte)							
	7	Value of parameter pointed to by Parameter Number 27 (High Byte)							

① 1 = forward, 0 = reverse

② Local

Bit 11	Bit 10	Bit 9	Definition
0	0	0	TB3 Control
0	0	1	Network Control

③ Frequency Source

Bit 15	Bit 14	Bit 13	Bit 12	Definition
0	0	0	0	Preset 0
0	0	0	1	Preset 1
0	0	1	0	Preset 2
0	0	1	1	Preset 3
0	1	0	0	Preset 4
0	1	0	1	Preset 5
0	1	1	0	Preset 6
0	1	1	1	Preset 7
1	0	0	0	TB3
1	0	0	1	Network
1	0	1	0	Not defined
1	1	1	1	Not defined

④ 0 = 0 Hz, 32767 = Maximum Frequency

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	29hex	1	Faulted	9
Running 1 (Fwd)	Supervisor	29hex	1	RunningFwd	7
Running 2 (Rev)	Supervisor	29hex	1	RunningRev	8
Ready	Supervisor	29hex	1	Ready	9
CtrlFromNet	Supervisor	29hex	1	CtrlFromNet	15
CtrlFromNet	AC Drive	2Ahex	1	RefFromNet	29
At Reference	AC Drive	2Ahex	1	AtReference	3
Speed Actual	AC Drive	B3hex	1	SpeedActual	7

Configuration Assembly Data Formats

Instance 190 Data Format (Full Configuration Assembly – Series A – Signal Follower Model)							
Config Num.	**Parameter Number**	**Description**	**Size**	**Config Num.**	**Parameter Number**	**Description**	**Size**
1	**30**	Accel Time 1	2	23	**52**	DB enable	1
2	**31**	Decel Time 1	2	24	**53**	S-Curve	1
3	**32**	Minimum Frequency	1	25	**55**	Memory Probe Address	2
4	**33**	Maximum Frequency	2	26	**57**	Program Lock	1
5	**34**	Stop Mode Select ⚠	1	27	**58**	Internal Frequency	2
6	**35**	Base Frequency	1	28	**59**	Frequency Select	1
7	**36**	Base Voltage	2	29	**60**	Analog Scale Teach	1
8	**37**	Maximum Voltage	2	30	**15**	Interface Select	1
9	**38**	Boost Select	1	31	**77**	Motor Base RPM	2
10	**39**	Skip Frequency	2	32	**28**	DN Fault Mode ⚠	1
11	**40**	Skip Frequency Band	1	33	**22**	Output Assembly	1
12	**41**	Motor Overload Select	1	34	**23**	Input Assembly	1
13	**42**	Motor Overload Current	2	35	**18**	Nonvolatile MAC ID	1
14	**43**	Current Limit	1	36	**19**	Nonvolatile Baud	1
15	**44**	DC Hold Time	1	37	**24**	Assembly Word 0	1
16	**45**	DC Hold Voltage	1	38	**25**	Assembly Word 1	1
17	**46**	Input Mode ⚠	1	39	**26**	Assembly Word 2	1
18	**47**	Output Configuration	1	40	**27**	Assembly Word 3	1
19	**48**	Output Threshold	2	41	**85**	DNet Idle Mode	1
20	**49**	PWM frequency	1	42	**87**	Change of State Mask	2
21	**50**	Restart Tries	1	43	**88**	Local Return Mode	1
22	**51**	Restart Time	2	44	**20**	Bus Off Error	1

⚠ **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.

Configuration Assembly Data Formats (Continued)

Instance 190 Data Format (Full Configuration Assembly – Series A – Preset Speed Model)							
Config Num.	**Parameter Number**	**Description**	**Size**	**Config Num.**	**Parameter Number**	**Description**	**Size**
1	**30**	Accel Time 1	2	27	**61**	Preset Frequency 0	2
2	**31**	Decel Time 1	2	28	**62**	Preset Frequency 1	2
3	**32**	Minimum Frequency	1	29	**63**	Preset Frequency 2	2
4	**33**	Maximum Frequency	2	30	**64**	Preset Frequency 3	2
5	**34**	Stop Mode Select ⚠	1	31	**65**	Preset Frequency 4	2
6	**35**	Base Frequency	1	32	**66**	Preset Frequency 5	2
7	**36**	Base Voltage	2	33	**67**	Preset Frequency 6	2
8	**37**	Maximum Voltage	2	34	**68**	Preset Frequency 7	2
9	**38**	Boost Select	1	35	**69**	Accel Time 2	2
10	**39**	Skip Frequency	2	36	**70**	Decel Time 2	2
11	**40**	Skip Frequency Band	1	37	**15**	Interface Select	1
12	**41**	Motor Overload Select	1	38	**77**	Motor Base RPM	2
13	**42**	Motor Overload Current	2	39	**28**	DN Fault Mode ⚠	1
14	**43**	Current Limit	1	40	**22**	Output Assembly	1
15	**44**	DC Hold Time	1	41	**23**	Input Assembly	1
16	**45**	DC Hold Voltage	1	42	**18**	Nonvolatile MAC ID	1
17	**46**	Input Mode ⚠	1	43	**19**	Nonvolatile Baud	1
18	**47**	Output Configuration	1	44	**24**	Assembly Word 0	1
19	**48**	Output Threshold	2	45	**25**	Assembly Word 1	1
20	**49**	PWM frequency	1	46	**26**	Assembly Word 2	1
21	**50**	Restart Tries	1	47	**27**	Assembly Word 3	1
22	**51**	Restart Time	2	48	**85**	DNet Idle Mode	1
23	**52**	DB enable	1	50	**87**	Change of State Mask	2
24	**53**	S-Curve	1	51	**88**	Local Return Mode	1
25	**55**	Memory Probe Address	2	52	**20**	Bus Off Error	1
26	**57**	Program Lock	1				

⚠ **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.

Configuration Assembly Data Formats (Continued)

Instance 190 Data Format (Full Configuration Assembly – Series B - Signal Follower Model)							
Config Num.	**Parameter Number**	**Description**	**Size**	**Config Num.**	**Parameter Number**	**Description**	**Size**
1	**30**	Accel Time 1	2	27	**58**	Internal Frequency	2
2	**31**	Decel Time 1	2	28	**59**	Frequency Select	1
3	**32**	Minimum Frequency	1	29	**60**	Zero Offset	2
4	**33**	Maximum Frequency	2	30	**69**	Accel Time 2	2
5	**34**	Stop Mode Select ⚠	1	31	**70**	Decel Time 2	2
6	**35**	Base Frequency	1	32	**71**	IR Compensation	1
7	**36**	Base Voltage	2	33	**72**	Slip Compensation	1
8	**37**	Maximum Voltage	2	34	**73**	Reverse Disable	1
9	**38**	Boost Select	1	35	**74**	Analog Select	1
10	**39**	Skip Frequency	2	36	**75**	Analog Input Minimum	2
11	**40**	Skip Frequency Band	1	37	**76**	Analog Input Maximum	2
12	**41**	Motor Overload Select	1	38	**15**	Interface Select	1
13	**42**	Motor Overload Current	2	39	**77**	Motor Base RPM	2
14	**43**	Current Limit	1	40	**28**	DN Fault Mode ⚠	1
15	**44**	DC Hold Time	1	41	**22**	Output Assembly	1
16	**45**	DC Hold Voltage	1	42	**23**	Input Assembly	1
17	**46**	Input Mode ⚠	1	43	**18**	Nonvolatile MAC ID	1
18	**47**	Output Configuration	1	44	**19**	Nonvolatile Baud	1
19	**48**	Output Threshold	2	45	**24**	Assembly Word 0	1
20	**49**	PWM frequency	1	46	**25**	Assembly Word 1	1
21	**50**	Restart Tries	1	47	**26**	Assembly Word 2	1
22	**51**	Restart Time	2	48	**27**	Assembly Word 3	1
23	**52**	DB enable	1	49	**85**	DNet Idle Mode	1
24	**53**	S-Curve	1	50	**87**	Change of State Mask	2
25	**55**	Memory Probe Address	2	51	**88**	Local Return Mode	1
26	**57**	Program Lock	1	52	**20**	Bus Off Error	1

⚠ **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.

Configuration Assembly Data Formats (Continued)

Instance 190 Data Format (Full Configuration Assembly – Series B Preset Model)							
Config Num.	Parameter Number	Description	Size	Config Num.	Parameter Number	Description	Size
1	**30**	Accel Time 1	2	29	**61**	Preset Frequency 0	2
2	**31**	Decel Time 1	2	30	**62**	Preset Frequency 1	2
3	**32**	Minimum Frequency	1	31	**63**	Preset Frequency 2	2
4	**33**	Maximum Frequency	2	32	**64**	Preset Frequency 3	2
5	**34**	Stop Mode Select ⚠	1	33	**65**	Preset Frequency 4	2
6	**35**	Base Frequency	1	34	**66**	Preset Frequency 5	2
7	**36**	Base Voltage	2	35	**67**	Preset Frequency 6	2
8	**37**	Maximum Voltage	2	36	**68**	Preset Frequency 7	2
9	**38**	Boost Select	1	37	**69**	Accel Time 2	2
10	**39**	Skip Frequency	2	38	**70**	Decel Time 2	2
11	**40**	Skip Frequency Band	1	39	**71**	IR Compensation	1
12	**41**	Motor Overload Select	1	40	**72**	Slip Compensation	1
13	**42**	Motor Overload Current	2	41	**73**	Reverse Disable	1
14	**43**	Current Limit	1	42	**15**	Interface Select	1
15	**44**	DC Hold Time	1	43	**77**	Motor Base RPM	2
16	**45**	DC Hold Voltage	1	44	**28**	DN Fault Mode ⚠	1
17	**46**	Input Mode ⚠	1	45	**22**	Output Assembly	1
18	**47**	Output Configuration	1	46	**23**	Input Assembly	1
19	**48**	Output Threshold	2	47	**18**	Nonvolatile MAC ID	1
20	**49**	PWM frequency	1	48	**19**	Nonvolatile Baud	1
21	**50**	Restart Tries	1	50	**24**	Assembly Word 0	1
22	**51**	Restart Time	2	51	**25**	Assembly Word 1	1
23	**52**	DB enable	1	52	**26**	Assembly Word 2	1
24	**53**	S-Curve	1	53	**27**	Assembly Word 3	1
25	**55**	Memory Probe Address	2	54	**85**	DNet Idle Mode	1
26	**57**	Program Lock	1	55	**87**	Change of State Mask	2
27	**58**	Internal Frequency	2	56	**88**	Local Return Mode	1
28	**59**	Frequency Select	1	57	**20**	Bus Off Error	1

⚠ **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.

Configuration Assembly Data Formats (Continued)

Instance 191 Data Format (Fixed Configuration Assembly – All Preset Speed Models)							
Config Num.	**Parameter Number**	**Description**	**Size**	**Config Num.**	**Parameter Number**	**Description**	**Size**
1	**30**	Accel Time 1	2	18	**47**	Output Configuration	1
2	**31**	Decel Time 1	2	19	**48**	Output Threshold	2
3	**32**	Minimum Frequency	1	20	**49**	PWM frequency	1
4	**33**	Maximum Frequency	2	21	**50**	Restart Tries	1
5	**34**	Stop Mode Select ⚠	1	22	**51**	Restart Time	2
6	**35**	Base Frequency	2	23	**61**	Preset Frequency 0	2
7	**36**	Base Voltage	2	24	**62**	Preset Frequency 1	2
8	**37**	Maximum Voltage	2	25	**63**	Preset Frequency 2	2
9	**38**	Boost Select	1	26	**64**	Preset Frequency 3	2
10	**39**	Skip Frequency	2	27	**65**	Preset Frequency 4	2
11	**40**	Skip Frequency Band	1	28	**66**	Preset Frequency 5	2
12	**41**	Motor Overload Select	1	29	**67**	Preset Frequency 6	2
13	**42**	Motor Overload Current	2	30	**68**	Preset Frequency 7	2
14	**43**	Current Limit	1	31	**69**	Accel Time 2	2
15	**44**	DC Hold Time	1	32	**70**	Decel Time 2	2
16	**45**	DC Hold Voltage	1				
17	**46**	Input Mode ⚠	1				

Instance 192 Data Format (Fixed Configuration Assembly – All Signal Follower Models)							
Config Num.	**Parameter Number**	**Description**	**Size**	**Config Num.**	**Parameter Number**	**Description**	**Size**
1	**30**	Accel Time 1	2	13	**42**	Motor Overload Current	2
2	**31**	Decel Time 1	2	14	**43**	Current Limit	1
3	**32**	Minimum Frequency	1	15	**44**	DC Hold Time	1
4	**33**	Maximum Frequency	2	16	**45**	DC Hold Voltage	1
5	**34**	Stop Mode Select ⚠	1	17	**46**	Input Mode ⚠	1
6	**35**	Base Frequency	2	18	**47**	Output Configuration	1
7	**36**	Base Voltage	2	19	**48**	Output Threshold	2
8	**37**	Maximum Voltage	2	20	**49**	PWM frequency	1
9	**38**	Boost Select	1	21	**50**	Restart Tries	1
10	**39**	Skip Frequency	2	22	**51**	Restart Time	2
11	**40**	Skip Frequency Band	1	23	**53**	S-Curve	1
12	**41**	Motor Overload Select	1				

⚠ **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.

Configuration Assembly Data Formats (Continued)

Instance 193 Data Format (Fixed Configuration Assembly – DeviceNet Module)			
Config Num.	**Parameter Number**	**Description**	**Size**
1	**15**	Interface Select	1
2	**77**	Motor Base RPM	2
3	**28**	DN Fault Mode	1
4	**22**	Output Assembly	1
5	**23**	Input Assembly	1
6	**18**	Nonvolatile MAC ID	1
7	**19**	Nonvolatile Baud	1
8	**24**	Assembly Word 0	1
9	**25**	Assembly Word 1	1
10	**26**	Assembly Word 2	1
11	**27**	Assembly Word 3	1
12	**85**	DNet Idle Mode	1
13	**87**	Change of State Mask	2
14	**88**	Local Return Mode	1
15	**20**	Bus Off Error	1

Notes:

ODVA Interface Parameter Descriptions

The ODVA Interface

This appendix describes in detail the parameters that are defined in the ODVA Interface EDS files contained on the 160-EDS disk (Cat. No. 160-EDS).

Important: This document describes the parameter set for a Series B Bulletin 160. If using a Series A Bulletin 160, then not all the parameters listed in this manual may apply to that device. When using a Series A Bulletin 160 please refer to the *Bulletin 160 SSC User Manual* (publication 0160-5.0).

ODVA Drive Profile Interface

When **P15- [Interface Select]** has a value of 1, the *ODVA Drive Profile Interface* is selected. This interface contains standard parameters that are defined in the ODVA (Open DeviceNet Vendors Association) Drive Profile, plus some extra parameters to configure the operation of the Communication Module on the DeviceNet network, and to configure some features of the 160 SSC drive that are not included in the ODVA Drive Profile. This interface differs from the *Bulletin 160 SSC Interface* in many aspects. For example, speeds are defined in RPM rather than Hz. This interface is included to give the Bulletin 160 SSC drive true interoperability with other DeviceNet equipped drives that adhere to the ODVA Drive Profile.

ODVA Drive Profile Interface Parameters

When this interface is selected, parameters are logically grouped together as follows:

- Motor Group.
- Control Supervisor Group.
- Interface Select Group.
- AC Drive Group.
- AC Drive Extensions Group.
- DeviceNet Configuration Group.
- Preset Group (Preset Speed drives only).

The following table summarizes the ODVA Drive Profile parameter set.

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
01	Motor	**[Motor Rated Current]** This read/write parameter is set to the motor nameplate full load Amp rating (FLA). The drive uses this value as the motor overload setting.	0x28-1-6	0 to 24.00 Amperes	0.01 Amperes	Drive Rating
02	Motor	**[Motor Rated Volt]** This read/write parameter is set to the motor nameplate voltage. The drive uses this value in its volts/Hz calculations.	0x28-1-7	0 to 460 Volts	1 Volt	Drive Rating
03	Motor	**[Motor Rated Frequency]** This read/write parameter is set to the motor nameplate rated Frequency. This value is used by the drive in its volts/Hz calculations.	0x28-1-9	10 to 240 Hz	1 Hz	60 Hz
04	Motor	**[Motor Base Speed]** This read/write parameter is set to the motor's rated nameplate speed in RPM.	0x28-1-15	200 to 32,000 RPM	1 RPM	1800 RPM
05	Control Supervisor	**[Network Control]** This read/write parameter determines whether Run/Stop control is local (TB3) or from the network. 0 = Control from TB3. 1 = Network Control. **Important:** Power must be cycled for actual control to change sources, and actual control status is reflected in **P13 - [Control From Net]**.	0x29-1-5	0 to 1	Numeric Value	0
06	Control Supervisor	**[Drive State]** This read only parameter returns the status of the drive state. 1 = Startup. 3 = Ready. 4 = Enabled. 7 = Faulted.	0x29-1-6	1 to 7	Numeric Value	–
07	Control Supervisor	**[Running Fwd]** This read only parameter reflects the running forward state of the drive. 1 = Drive is running forward. 0 = Drive is not running forward.	0x29-1-7	0 to 1	Numeric Value	–
08	Control Supervisor	**[Running Rev]** This read only parameter reflects the running reverse state of the drive. 1 = Drive is running reverse. 0 = Drive is not running reverse.	0x29-1-8	0 to 1	Numeric Value	–

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
09	Control Supervisor	**[Ready]** This read only parameter reflects the ready state of the drive. 1 = Drive State is Ready or Enabled. 0 = Other State.	0x29-1-9	0 to 1	Numeric Value	–
10	Control Supervisor	**[Faulted]** This read only parameter reflects the faulted state of the drive. 1 = Fault Occurred (latched). 0 = No Faults Present.	0x29-1-10	0 to 1		–
11	Control Supervisor	**[Fault Reset]** This read/write parameter resets a fault. 0 -->1 = Fault Reset. 0 = No Action.	0x29-1-12	0 to 1		0
12	Control Supervisor	**[Fault Code]** This read only parameter indicates the first fault since the last fault reset. See *Chapter 7* for fault codes. **Important:** The fault codes returned in this parameter are different from the fault codes returned when the Bulletin 160 Interface is selected in **P15 - [Interface Select]**. When Bulletin 160 Interface is selected, fault codes are those published in the *Bulletin 160 SSC User Manual*. When ODVA Drive Profile Interface is selected, fault codes in *Chapter 7* are used.	0x29-1-13	0 to FFFF hex		0
13	Control Supervisor	**[Control From Net]** This read only parameter indicates the Run/Stop control source. 0 = Control is from TB3. 1 = Control is from Network.	0x29-1-15	0 to 1		
14	Control Supervisor	**[DN Fault Mode]** This read/write parameter determines the behavior of the drive when a DeviceNet error is detected. The following values are valid for this parameter. 0 = Fault and Stop. 1 = Ignore. **ATTENTION:** Ignoring communication faults may result in equipment damage, personal injury, or death. Ensure that you understand how ignoring a communication fault affects the operation of your system.	0x29-1-16	0 to 1		0
15	Interface Select	**[Interface Select]** This read/write parameter selects the current parameter set or Interface for the Communication Module. 0 = *Bulletin 160 SSC Interface.* 1 = ODVA Drive Profile Interface.	0xB4-1-2	0 to 1		0

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
16	AC Drive	[**At Reference]** This read only parameter is set to 1 if the drive is at its speed reference.	0x2A-1-3	0 to 1	Numeric Value	–
17	AC Drive	**[Network Reference]** This read/write parameter sets the type of speed reference that the drive uses. 0 = Reference is from TB3 (analog reference or preset reference). 1 = Reference is from DeviceNet.	0x2A-1-4	0 to 1	Numeric Value	
18	AC Drive	**[Drive Mode]** This read only parameter contains the drive operating mode.	0x2A-1-6	1	Numeric Value	1 = Open Loop Frequency Mode
19	AC Drive	**[Speed Actual]** This read only parameter contains the actual speed command value in RPM.	0x2A-1-7	0 to 32000	1 RPM	–
20	AC Drive	**[Speed Reference]** This read/write parameter sets the speed reference when **P17 - [Network Ref]** is set to 1.	0x2A-1-8	0 to 32000	1 RPM	1800 RPM
21	AC Drive	**[Current Actual]** This read only parameter contains the actual motor current.	0x2A-1-9	0% to 200% rated	0.01 Amperes	–
22	AC Drive	**[Current Limit]** This read/write parameter sets the current limit for the drive.	0x2A-1-10	0% to 190% rated	0.01 Amperes	150% rated
23	AC Drive	**[Power Actual]** This read/write parameter contains the actual power in Watts.	0x2A-1-15		1 Watt	–
24	AC Drive	**[Input Voltage]** This read only parameter contains the input voltage of the drive in volts.	0x2A-1-16	0 to 460	1 Volt	Drive Rated V
25	AC Drive	**[Output Voltage]** This read only parameter contains the output voltage of the drive in volts.	0x2A-1-17	0 to 460	1 Volt	–
26	AC Drive	**[Accel Time]** This read/write parameter sets the time for the drive to accelerate from 0. RPM to **P29 - [High Speed Limit]**.	0x2A-1-18	100 to 65500	1 ms	10000 ms
27	AC Drive	[**Decel Time]** This read/write parameter sets the time for the drive to decelerate from **P29 - [High Speed Limit]** to 0 RPM.	0x2A-1-19	100 to 65500	1 ms	10000 ms
28	AC Drive	**[Low Speed Limit]** This read/write parameter sets the lowest speed in RPM that the drive will output continuously.	0x2A-1-20	0 to 32000	1 RPM	0 RPM

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
29	AC Drive	**[High Speed Limit]** This read/write parameter sets the highest speed in RPM that the drive will output continuously.	0x2A-1-21	0 to 32000	1 RPM	1800 RPM
30	AC Drive Extension	**[Bus Voltage]** This read only parameter contains the DC Bus Voltage level.	0x2A-1-105	0 to 800	1 Volt	–
31	AC Drive Extension	**[Heatsink Temp]** This read only parameter contains the temperature of the drive heatsink.	0x2A-1-108	0 to 150	1° C	–
32	AC Drive Extension	**Drive Status** This read only parameter contains the drive status in binary coded format. bit 0 - Running. bit 1 - Forward. bit 2 - Accelerating. bit 3 - Decelerating. bit 4 - Faulted. bit 5 - Reverse latched. bit 6 - At Frequency.	0x2A-1-109	000000 to 111111	Binary Number	–
33	AC Drive Extension	**[Drive Type]** This read only parameter contains a coded drive rating used by Allen-Bradley service personnel.	0x2A-1-110	Numeric Value	Numeric Value	–
34	AC Drive Extension	**[Control Version]** This read only parameter contains the version of the drive firmware. Used by Allen-Bradley service personnel.	0x2A-1-111	Numeric Value	Numeric Value	Numeric Value
35	AC Drive Extension	**[Input Status]** This read only parameter contains the open (0) closed (1) state of the discrete inputs in binary coded format. bit 0 - Preset 1. bit 1 - Preset 2. bit 2 - Preset 3. bit 3 - Undefined. bit 4 - Reverse. bit 5 - Stop. bit 6 - Start. bit 7 - Undefined.	0x2A-1-112	000000 to 111111	Binary Number	–
36	AC Drive Extension	**[Power Factor Angle]** This read only parameter contains the angle in electrical degrees between motor voltage and motor current.	0x2A-1-113	0.00 to 90.00 degrees	0.01 degrees	–

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
37	AC Drive Extension	**[Stop Mode Select]** This read/write parameter determines the stopping mode used by the drive when a stop is initiated. 0 = Ramp to stop. 1 = Coast to stop. 2 = DC Injection Braking.  **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.	0x2A-1-114	0 to 2	Numeric Value	0
38	AC Drive Extension	**[Maximum Voltage]** This read/write parameter sets the highest voltage the drive will output. **Important:** Must be greater than or equal to **P2 - [Motor Rated Volt]**.	0x2A-1-137	20 to 460	1 Volt	460 or 230
39	AC Drive Extension	**[Boost Select]** This read/write parameter sets the boost voltage and redefines the Volts per Hz curve.	0x2A-1-138	0 to 12	Numeric Value	4
40	AC Drive Extension	**[Skip Frequency]** This read/write parameter works in conjunction with **P41 - [Skip Frequency Band]** to create a range of frequencies at which the drive will not operate continuously.	0x2A-1-139	0 to 240	1 Hz	240 Hz
41	AC Drive Extension	**[Skip Frequency Band]** This read/write parameter determines the band around **P40 - [Skip Frequency]**. The actual band width will be 2 times Skip Band RPM - 1/2 the band above and 1/2 the band below. A value of zero will disable the skip frequency.	0x2A-1-140	0 to 30	1 Hz	0 RPM
42	AC Drive Extension	**[Overload Select]** This read/write parameter selects the derating factor for the I2T overload function.	0x2A-1-141	0 to 2	Numeric Value	0
43	AC Drive Extension	**[DC Hold Time]** This read/write parameter defines the time that **P44 - [DC Hold Volts]** voltage will be applied to the motor when **P37 - [Stop Mode Select]** is set to either DC Brake or Ramp to Stop mode.	0x2A-1-144	0 to 15	1 Second	0 Seconds
44	AC Drive Extension	**[DC Hold Volts]** This read/write parameter sets the DC Voltage level applied to the motor during braking when **P77 - [Stop Mode Select]** is set to either DC Brake or Ramp to Stop mode.	0x2A-1-145	0 to 115	1 Volt	0 Volt

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
45	AC Drive Extension	**[Input Mode]** This read/write parameter configures the TB3 control inputs for either 3-wire or 2-wire run forward/run reverse control. It also enables/disables network control of the run forward/run reverse control. **Important:** Power must be cycled for the change to take effect. 0 = 3-wire control. 1 = 2-wire control. 2 = Network control. 3 = Momentary Run Forward/Run Reverse control.  **ATTENTION:** Changing this parameter value may cause unpredictable network conditions, resulting in equipment damage, personal injury, or death. Ensure that you understand how changing this parameter affects your application.	0x2A-1-146	0 to 3		0
46	AC Drive Extension	**[Output Mode]** This read/write parameter configures the TB3 relay output functionality. 0 = Drive Ready/Faulted. 1 = At Frequency. 2 = Drive Running. 3 = Reverse. 4 = Motor Overload. 5 = Ramp Regulated. 6 = Above Frequency. 7 = Above Current. 8 = Above DC Bus Voltage. 9 = Retries Exhausted.	0x2A-1-147	0 to 9	Numeric Value	0
47	AC Drive Extension	**[Output Threshold]** This read/write parameter determines the on/off point for the TB3 output relay when **P46 - [Output Mode]** is set to 6, 7, or 8.	0x2A-1-148	0 to 815	Numeric Value	0
48	AC Drive Extension	**[PWM Frequency]** This read/write parameter sets the carrier Frequency for the PWM output waveform. The chart below provides derating guidelines based on the PWM Frequency setting.	0x2A-1-149	2.0 to 8.0	0.1 kHz	4.0 kHz
49	AC Drive Extension	**[Restart Tries]** This read/write parameter sets the maximum number of times the drive will attempt to reset a fault and restart the drive.	0x2A-1-150	0 to 9	Numeric Value	0
50	AC Drive Extension	**[Restart Time]** This read/write parameter sets the time between restart attempts.	0x2A-1-151	0.5 to 300.0	0.1 Seconds	10.0 Seconds
51	AC Drive Extension	**[DB Enable]** This read/write parameter enables/disables dynamic braking. 0 = Disable. 1 = Enable. **Important:** This parameter can not be programmed while the drive is running.	0x2A-1-152	0 to 1	Numeric Value	0

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
52	AC Drive Extension	**[S-Curve]** This read/write parameter enables a fixed S-Curve acceleration/deceleration profile.	0x2A-1-153	0 to 10	Numeric Value	0
53	AC Drive Extension	**[Reset Defaults]** This read/write parameter causes all parameter values to be reset to their original factory defaults when set to a value of 1. When the default function is complete, this parameter will set itself back to 0. This parameter cannot be programmed while the motor is running. **Important:** A fault will occur and must be cleared by cycling the STOP input to the drive or cycling power.	0x2A-1-156	0 to 1	Numeric Value	0
54	AC Drive Extension	**[Program Lock]** This read/write parameter protects all parameters from being changed when it is set to 1.	0x2A-1-157	0 to 1	Numeric Value	0
55	DeviceNet Configuration	**[Switches MAC ID]** This read only parameter's value reflects the state of the Node Address DIP switches. This address may not be the current address of the module if the Baud Rate DIP switches are set to 3. In this case, **P57 - [Nonvolatile MAC ID]** is used.	0xB4-1-3	0 to 63	Numeric Value	63
56	DeviceNet Configuration	**[Switches Baud]** This read only parameter value reflects the state of the Baud Rate DIP switches. A value of 3 means that the actual baud rate used by this module is given in the value of parameter **P58 - [Nonvolatile Baud Rate]**. 0 = 125K BPS. 1 = 250K BPS. 2 = 500K BPS. 3 = Use nonvolatile parameters for Node Address and Baud Rate.	0xB4-1-4	0 to 3	Numeric Value	0
57	DeviceNet Configuration	**[Nonvolatile MAC]** This read/write parameter allows you to program the Node Address of the module, independent of the DIP switch settings. To use this feature, the baud rate switches (7 and 8) must be set to ON during power-up. Changing this parameter does not change the actual Node Address until power is cycled.	0xB4-1-5	0 to 63	Numeric Value	0
58	DeviceNet Configuration	**[Nonvolatile Baud]** This read/write parameter allows you to set the baud rate of the module without having to set DIP switches. To use this feature, the baud rate switches (7 and 8) must be set to ON during power up. Changing this parameter does not change the actual Baud Rate until power is cycled. 0 = 125k BPS. 1 = 250k BPS. 2 = 500k BPS.	0xB4-1-6	0 to 2	Numeric Value	0

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
59	DeviceNet Configuration	**[Bus Off Error]** This read/write parameter determines how the Communication Module processes a CAN Bus Off condition. This parameter is mapped to attribute 3 (BOI) of instance 1 of the DeviceNet Object. 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 is detected.	0x03-1-3	0 to 1	Numeric Value	0
60	DeviceNet Configuration	**[Bus Off Count]** This read/write parameter counts the number of times the CAN chip went to the bus off state. This counter stops counting when the count reaches 255. This parameter is mapped to attribute 4, instance 1 of the DeviceNet Object.	0x03-1-4	0 to 255	Numeric Value	0
61	DeviceNet Configuration	**[Output Assembly]** This read/write parameter sets the output assembly instance that is to be used for polled messaging with the master. The output assembly defines the data format that the drive receives from 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 (described fully in *Appendix B*) are valid for this parameter: 0 = No Data. 1 = Basic Contactor Output. 2 = Two Command Contactor Output. 3 = Basic Overload Output. 4 = Basic Motor Control Output. 5 = Reversing Motor Control. 20 = Basic Speed Control. 21 = Extended Speed Control. 101 = Preset Control (preset units only).	0x29-1-100	0 to 101	Numeric Value	20
62	DeviceNet Configuration	**[Input Assembly]** This read/write parameter sets the input assembly instance that is to be 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. It is named input assembly because the DeviceNet specification refers to all assemblies as they relate to the master. The following assembly instances (described fully in *Appendix B*) are valid for this parameter: 0 = No Data. 50 = Basic Overload Input. 51 = Extended Overload Input. 52 = Basic Motor Control Input. 53 = Extended Motor Control Input. 70 = Basic Speed Control Input. 71 = Extended Speed Control Input.	0x29-1-101	0 to 71	Numeric Value	70

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
63	Preset	**[DN Preset Cmd]** This read/write parameter acts as the network preset command.	0x2A-1-192	0 to 7	Numeric Value	0
64	Preset	**[Preset RPM 0]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-161	0 to 32000	1 RPM	90 RPM
65	Preset	**[Preset RPM 1]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-162	0 to 32000	1 RPM	600 RPM
66	Preset	[**Preset RPM 2]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-163	0 to 32000	1 RPM	900 RPM
67	Preset	**[Preset RPM 3]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-164	0 to 32000	1 RPM	1200 RPM
68	Preset	**[Preset RPM 4]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-165	0 to 32000	1 RPM	1350 RPM
69	Preset	**[Preset RPM 5]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-166	0 to 32000	1 RPM	1500 RPM
70	Preset	**[Preset RPM 6]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-167	0 to 32000	1 RPM	1650 RPM
71	Preset	**[Preset RPM 7]** This read/write parameter sets the speed that the drive outputs when selected.	0x2A-1-168	0 to 32000	1 RPM	1800 RPM
72	Preset	**[Accel Time 2]** This read/write parameter sets the acceleration time for parameters 68 to 71 (preset RPM 4-7).	0x2A-1-169	100 to 65500	1ms	20000 ms
72	AC Drive Extension	**[Accel Time 2]** This read/write parameter sets the acceleration time.	0xB3-1-69	0-60000	1 ms	20000 ms
73	Preset	**[Decel Time 2]** This read/write parameter sets the deceleration time for parameters 68 to 71 (preset RPM 4-7).	0x2A-1-170	100 to 65500	1ms	20000 ms
73	AC Drive Extension	**[Decel Time 2]** This read/write parameter sets the deceleration time.	0xB3-1-70	10 to 60000	1 ms	20000 ms

This parameter applies only to the Analog Signal Follower model.

This parameter applies only to the Preset Speed model.

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
74	AC Drive Extension	**[IR Compensation]** Adds a voltage to the output based on the torque current.	0x2A-1-171	0 to 150	1%	50%
75	AC Drive Extension	**[Slip Compensation]** Compensates for the inherent slip of the motor.	0x2A-1-172	0.0 to 5.0	0.1 Hz	2.0 Hz
76	AC Drive Extension	**[Reverse Disabled]** Setting the parameter to 1 disables reverse.	0x2A-1-173	0 to 1	Numeric Value	0
77	AC Drive Extension	**[Analog Select]** Selects between unipolar and bipolar analog input.	0x2A-1-174	0 to 1	Numeric Value	0
78	AC Drive Extension	**[Analog Input Min]** Sets the percent of analog input used to represent **P32 - [Minimum Frequency]**.	0x2A-1-175	0 to 150.0	0.1%	0
79	AC Drive Extension	**[Analog Input Max]** Sets the percent of analog input used to represent **P33 - [Maximum Frequency]**.	0x2A-1-176	0 to 150.0	0.1%	100.0%
80	AC Drive Extension	**[Zero Offset]** Used to add or subtract any system offset to the analog input.	0xB3-1-60	-50.0 to +50.0	0.1%	0%
81	AC Drive Extension	**[Analog Input]** The analog input as percent of full scale.	0xB3-1-16	-150.0 to +150.0	0.1%	–
82	AC Drive Extension	**[Compensation]** Some drive/motor combinations have inherent instabilities which are exhibited as non-sinusoidal motor currents. A setting of 1 will enable the compensation to correct this condition. A setting of 0 diables this function.	0xB3-1-78	0 to 1	Numeric Value	0
85	DeviceNet Configuration	**[DNet Idle Mode]** This Parameter, available with version 2.00 or later, controls the action of the drive when the SDN Scanner is in Idle Mode. 0 = Stop if Idle Mode (default) 1 = Hold last state if Idle Mode	0xB4-1-11	0 to 1	Numeric Value	0
86	DeviceNet Configuration	**[DNet Software Version]** This parameter, available with version 2.00 or later, indicates the software version of the DeviceNet option. The number is in the form of xx.yy where xx indicates the major revision level and yy indicates the minor revision level. This parameter is read only.	0xB4-1-12	0.00 to 10.00	Numeric Value	2.00

This parameter applies only to the Analog Signal Follower model.

This parameter applies only to the Preset Speed model.

ODVA Drive Profile Interface Parameters (Continued)

Parameter Number	Parameter Group	Name and Description	Object Mapping (Class-Instance-Attribute)	Min./Max. Range	Units	Factory Default
87	DeviceNet Configuration	**[Change of State Mask]** This parameter, available with version 2.00 or later, is 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.	0xB4-1-13	0 to 0xFFFF	Numeric Value	0xFFFF
88	DeviceNet Configuration	**[Local Return Mode]** This parameter, available with version 2.00 or later, sets the input mode the drive will use when transitioning from network to local control. This is only used with input mode 2. Available values are 0, 1, 3, 4, and 5.	0xB4-1-14	0 to 5	Numeric Value	0

C

COMM LED
- color 7-2
- description 7-2
- state 7-2
- troubleshooting 7-2

communication module
- installing 3-6, 3-8
- powerup 4-1
- removing 3-8

configuration
- switches 3-3

D

data rate
- factory default 3-5
- settings 3-5

DeviceNet wiring 1-1, 3-7

DIP switches
- 1 through 6 3-4
- 7 and 8 3-4
- baud rate 3-5
- data rate 3-5
- DeviceNet address 3-4
- node address 3-4

E

equipment needed 2-1

error
- description 4-2
- LED state 4-2
- type 4-2

error mode 4-2

F

factory default
- baud rate 3-5
- data rate 3-5

fault
- codes 7-4
- corrective action 7-4
- description 7-4

fault codes
- ODVA drive profile 7-4

G

getting started 2-1
- procedures 2-2

I

installation
- getting started 2-1

installing
- communication module 3-6, 3-8

installing module 3-1

L

LED
- COMM 1-1
- description 1-1, 3-7
- FAULT 1-1
- READY 1-1
- status 1-1, 3-7

M

modes of operation
- error mode 4-2
- Powerup Reset 4-1
- run mode 4-2

module
- installation 3-1

P

powerup 4-1

powerup mode 4-1

procedures
- quick start 2-1

Q

quick start
- for experienced users 2-1

R

removal
- communication module 3-8

removing keypad 3-1

removing Read/Fault panel 3-1

required tools and equipment 2-1

S

specifications
- communications A-1
- electrical A-1
- environmental A-1
- mechanical A-1

startup 2-1

start-up instructions 2-1

status LED 1-1, 3-7

switches
- configuration 3-3
- setting 3-3

T

tools needed 2-1

troubleshooting 7-1
- LEDs 7-1

U

understanding
- COMM LED 7-2
- FAULT LED 7-3

W

wiring
- DeviceNet connection 1-1, 3-7

Rockwell Automation

Allen-Bradley

Allen-Bradley, a Rockwell Automation Business, has been helping its customers improve productivity and quality for more than 90 years. We design, manufacture and support a broad range of automation products worldwide. They include logic processors, power and motion control devices, operator interfaces, sensors and a variety of software. Rockwell is one of the world's leading technology companies.

Worldwide representation.

Argentina • Australia • Austria • Bahrain • Belgium • Brazil • Bulgaria • Canada • Chile • China, PRC • Colombia • Costa Rica • Croatia • Cyprus • Czech Republic • Denmark • Ecuador • Egypt • El Salvador • Finland • France • Germany • Greece • Guatemala • Honduras • Hong Kong • Hungary • Iceland • India • Indonesia • Ireland • Israel • Italy • Jamaica • Japan • Jordan • Korea • Kuwait • Lebanon • Malaysia • Mexico • Netherlands • New Zealand • Norway • Pakistan • Peru • Philippines • Poland • Portugal • Puerto Rico • Qatar • Romania • Russia-CIS • Saudi Arabia • Singapore • Slovakia • Slovenia • South Africa, Republic • Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • United Arab Emirates • United Kingdom • United States • Uruguay • Venezuela • Yugoslavia

Allen-Bradley Headquarters, 1201 South Second Street, Milwaukee, WI 53204 USA, Tel: (1) 414 382-2000 Fax: (1) 414 382-4444

Publication 0160-5.5 – September 1997

PN 40055-164-02 (01)

Supersedes Publication 0160-5.5 – March 1996