Allen-Bradley

PLC-5 DeviceNet Scanner Module

1771-SDN

DeviceNet

User Manual

Rockwell Automation

Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of these products 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. In no event will Rockwell Automation be responsible or liable for indirect or consequential damage resulting from the use or application of these products.

Any illustrations, charts, sample programs, and layout examples shown in this publication 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.

Allen-Bradley™ publication SGI-1.1, *Safety Guidelines for the Application, Installation and Maintenance of Solid-State Control* (available from your local Allen-Bradley 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 publication, notes may be used to make you aware of safety considerations. The following annotations and their accompanying statements help you to identify a potential hazard, avoid a potential hazard, and recognize the consequences of a potential hazard:

WARNING	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
ATTENTION	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Rockwell Automation Support

Before you contact Rockwell Automation for technical assistance, we suggest you please review the troubleshooting information contained in this publication first.

If the problem persists, call your local Rockwell Automation representative or contact Rockwell Automation in one of the following ways:

Phone	United States/Canada	1.440.646.5800
	Outside United States/Canada	You can access the phone number for your country via the Internet: 1. Go to http://www.ab.com 2. Click on *Product Support* (http://support.automation.rockwell.com) 3. Under *Support Centers*, click on *Contact Information*
Internet	⇒	1. Go to http://www.ab.com 2. Click on *Product Support* 3. Click on *Online Manuals*

Your Questions or Comments on this Manual

If you find a problem with or have a comment on this manual, please notify us of it on the enclosed How Are We Doing form.

Notes

About This User Manual

Introduction

This user manual is designed to provide you enough information to get a small example application up and running. Use this manual if you are knowledgeable about DeviceNet™ and PLC-5® products, but may not have used the products in conjunction with each other. The information provided is a base; modify or expand the examples to suit your particular needs.

The manual contains instructions on configuring a DeviceNet network using RSLinx and RSNetWorx for DeviceNet software. It also describes how to use the PLC-5 pass-through feature to communicate with the DeviceNet network for adjustment and tuning of network devices via other networks, including:

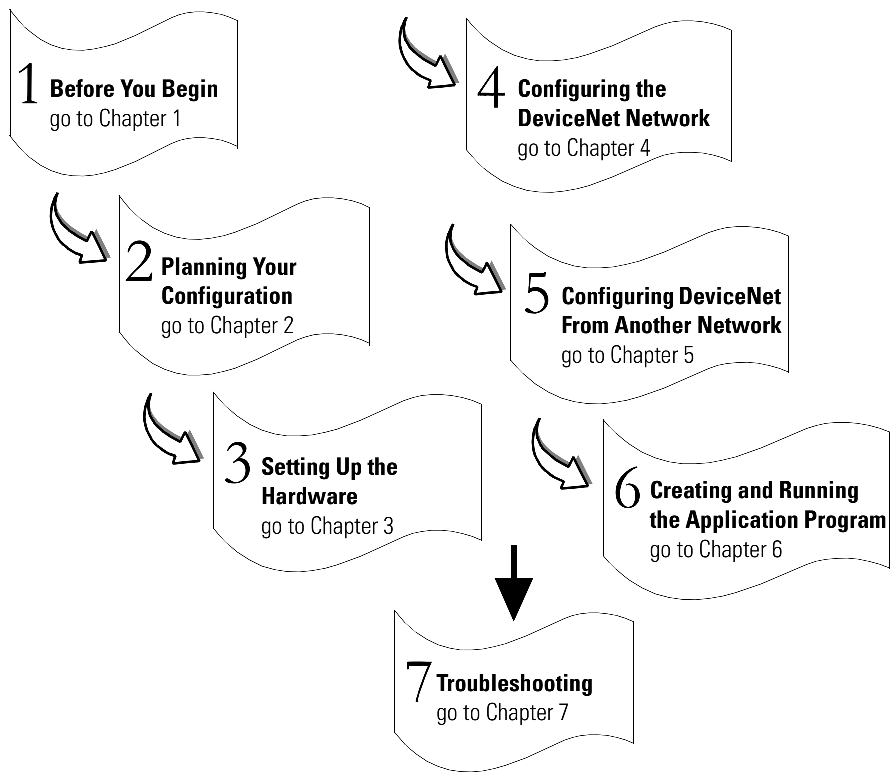
- ControlNet
- Ethernet
- Data Highway Plus (DH+)

The example application demonstrates how to perform control on DeviceNet using a PLC-5 processor and the 1771-SDN module. You use RSLogix 5 programming software to create a ladder logic program to control a photoeye and a RediSTATION™.

IMPORTANT This User manual should be used in conjunction with the 1771-SDN DeviceNet Scanner Module Installation Instructions, publication 1771-IN014. The Installation Instructions contain important information on configuring your scanner.

Contents

This user manual contains the following chapters:



Audience

This manual is intended for control engineers and technicians who are installing, programming, and maintaining a control system that includes a PLC-5 processor communicating on a DeviceNet network through a 1771-SDN module.

We assume that you:

- are developing a DeviceNet network using a PLC-5 processor in conjunction with the 1771–SDN scanner module
- know each of your device's I/O parameters and requirements
- understand PLC-5 processor programming and operation
- are experienced with the Microsoft® Windows™ environment
- are familiar with RSNetWorx for DeviceNet software

The Example Application

This manual describes how to set up an example application. The manual provides examples of each step of the setup, with references to other manuals for more details.

System Components

We used the following devices and software for the example application. For your own application, substitute your own devices to fit your needs. The recommended configurations in this user manual will help you set up the test system and get it working. Your eventual configuration will depend on your application.

Note: If you use different software or fimware versions of these products some of your screens may appear slightly different from those shown in the example.

	Product Name	Catalog Number	Series	Revision
Qty	**Hardware**			
1	PLC-5C processor[1]	1785-L20C15, -L40C15, -L80C15	-	-
1	1771 Universal I/O chassis	1771-A1B, -A2B, -A3B, -A3B1, -A4B	C	-
1	DeviceNet Scanner module	1771-SDN	C	-
1	Ethernet Interface module[2]	1785-ENET	-	-
1	DeviceNet Quad-Tap	1492-DN3TW	-	-
1	RediSTATION operator interface module	2705-TxDN1x42x-xxxx	-	-
1	Series 9000 Photoeye	42GNP-9000 or equivalent		
1	DeviceNet RS-232 interface module	1770-KFD	-	-
1	RS-232 cables	1787-RSCABL/A (PC to 1770-KFD)	-	-
-	DeviceNet dropline or trunkline cables, as needed	1787-PCABL, -TCABL, -MCABL	-	-
1	24V Power Supply	Regulated 24VDC, 8A	-	-
1	PC	IBM-compatible with Microsoft Windows		
	Software			
	RSLogix 5	9324-RL5300xxx	-	5.50
	RSNetWorx for DeviceNet	9357-DNETL3	-	4.01
	RSLinx	9355-WABxxx	-	2.40

(1) The minimum requirement for the processor is that it support block transfer instructions.
A ControlNet version of the Processor is required if interfacing the DeviceNet network and a ControlNet network (see chapters 5 and 6).

(2) Required if interfacing the DeviceNet network and an Ethernet network. See chapters 5 and 6.

Common Techniques Used in This Manual

The following conventions are used throughout this manual:

- Bulleted lists provide information, not procedural steps.
- Numbered lists provide sequential steps.
- Information in **bold** contained within text identifies menu windows, or screen options, screen names and areas of the screen, such as dialog boxes, status bars, radio buttons and parameters.

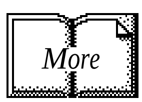
TIP

This symbol identifies helpful tips.

This is a definition box. When a word is bold within the text of a paragraph, a definition box will appear in the left margin to further define the text.

A **definition box** defines terms that may be unfamiliar to you.

Screen captures are pictures of the software's actual screens. The names of screen buttons and fields are often in bold in the text of a procedure. Pictures of keys represent the actual keys you press.



The "MORE" icon is placed beside any paragraph that references sources of additional information outside of this document.

Where to Find More Information

Refer to the following publications as needed for additional help when setting up and using your DeviceNet network:

For information about	See this publication	Publication Number
the 1771-SDN DeviceNet scanner	1771-SDN Scanner Module Installation Instructions	1771-IN014
the PLC-5 processor	ControlNet PLC-5 Programmable Controllers User Manual Phase 1.5	1785-UM022B-EN-P
	PLC-5 Instruction Set Reference Manual	1785-6.1
	1785-PLC-5 Programmable Controllers Quick Reference	1785-7.1
the1785-ENET Ethernet interface module	PLC-5 Ethernet Interface Module User Manual	1785-6.5.19
the 1771 I/O chassis	Universal I/O Chassis	1771-2.210
the 1770-KFD communication module	DeviceNet RS-232 Interface Module Installation Instructions	1770-5.6
a 1784-PCD communication card	NetLinx DeviceNet Communication Card Installation Instructions	1784-5.29
a 1784-PCID or 1784-PCIDS card	DeviceNet PCI Communication Interface Card Installation	1784-5.31
the RediSTATION	RediSTATION Operator Interface User Manual	2705-UM001EN-P
the 9000 Series photoeye	{refer to the information that came with your photoeye}	n/a
DeviceNet	DeviceNet System Overview	DN-2.5
	DeviceNet Design Selection Guide	DNET-SG001A-EN-P
connecting the DeviceNet network	DeviceNet Cable Planning and Installation Manual	DN-6.7.2
RSLinx software	RSLinx Lite User's Guide	9399-WAB32LUG
RSLogix 5 software	Getting Results With RSLogix 5	9399-RL53GR
RSNetWorx for DeviceNet software	DeviceNet Demo CD	DNET-DM001B-EN-C
terms and definitions	Allen-Bradley Industrial Automation Glossary	AG-7.1

TIP

The above are available online from the Automation Bookstore:

http://www.theautomationbookstore.com.

TIP

For more information about Rockwell Software products, visit the Rockwell Software internet site:

http://www.software.rockwell.com.

Terminology

This term	Means
ADR	Auto Device Replacement. The scanner module automates the replacement of a failed device on the network, returning it to the prior level of operation without having to use a software tool.
Bridge	The scanner module's support of explicit message transfer.
Change of State	A type of I/O data communication. The scanner module can send and receive data with slave devices that have the change of state feature. Data is sent whenever a data change occurs. Data is updated at the rate of the heartbeat.
Communication Module	The 1771-SDN scanner module or the 1770-KFD module.
Configuration Recovery	A feature of ADR that causes the replacement device's configuration to be made identical to the original device.
Cyclic	A type of I/O data communication. The scanner module can send and receive data with slave devices that have the cyclic feature. Data is only sent at a user-configurable rate.
EDS	Electronic Data Sheet. A vendor-supplied template that specifies how information is displayed as well as what is an appropriate entry (value).
Explicit Messaging	A type of messaging used for lower priority tasks, such as configuration and data monitoring.
Heartbeat Rate	Devices that are configured for change of state data can also send a "heartbeat" signal to indicate proper operation.
Host Platform	The computer that hosts the 1771-SDN scanner module.
I/O	An abbreviation for "input and output".
Implicit Messaging	The type of messaging used for high priority I/O control data; e.g., change of state, cyclic, polled, or strobed.
Input Data	Data produced by a DeviceNet device and collected by the scanner module for a host platform to read.
MAC ID	The network address of a DeviceNet node.
Network	The DeviceNet network or the RSNetWorx for DeviceNet software representation of the network.
Node	Hardware that is assigned a single address on the network (also referred to as device).
Node Recovery	A feature of ADR that causes the node number of the replacement device to be automatically changed to the node number of the original device.
Offline	When the PC communication scanner is not communicating on the network.
Online	When the PC communication scanner is configured and enabled to communicate on the network.
Output Data	Data produced by a host platform that is written to the scanner module's memory. This data is sent by the scanner module to DeviceNet devices.
PC	Abbreviation for an IBM® compatible personal-computer.
Pass-Through	This feature allows communication with the DeviceNet network from another network.
Polled	A type of input/output-data communication. A polled message solicits a response from a single, specified device on the network (a point-to-point transfer of data).
Record	The node address and channel-specific memory assigned in the scanner module's non-volatile storage for a node in the scanlist.
Rx	An abbreviation for "receive".

Scanlist	The list of devices (nodes) with which the scanner is configured to exchange I/O data.
Scanner	The function of the 1771-SDN scanner module to support the exchange of I/O with slave modules.
Shared Inputs	This enables multiple scanner modules to acquire inputs from a specific input device without using separate connections.
Slave Mode	The scanner module is in slave mode when it is placed in another scanner module’s scanlist as a slave device.
Strobed	A type of I/O data communication. A strobed message solicits a response from each strobed device (a multicast transfer). It is a 64-bit message that contains one bit for each device on the network.
Tx	An abbreviation for “transmit”.
Quick Connect	This feature enables the scanner module to connect to slave devices in less than one second.

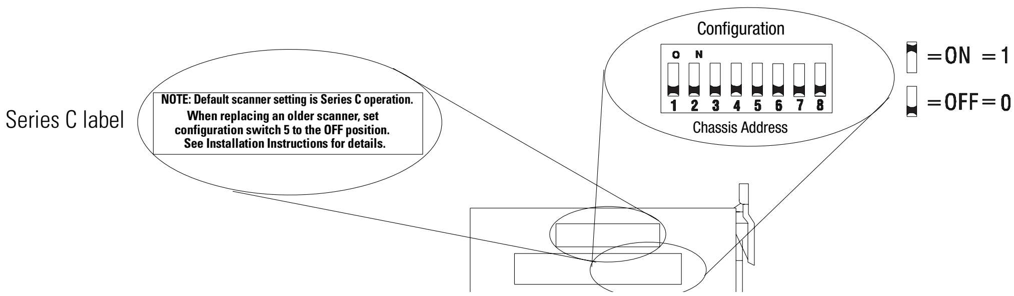
Notes

Summary of Changes

The information below summarizes the changes to the PLC-5 DeviceNet Scanner Module and this user manual.

Module Compatibility and Maintenance Requirements

The 1771-SDN/C DeviceNet Scanner Module is fully compatible with the Series A and Series B versions. You can use the Series C version as a spare or replacement module with one requirement: **you must change the position of Switch 5 to the off or "0" position in the Configuration switchbank as shown below:**



Electronic Data Sheet Requirement

To use the new features of this release, the scanner module requires the latest EDS file for RSNetWorx for DeviceNet™ software. If the software displays the device as an "unknown device", you must download the current EDS file. Get the latest EDS file online at:

http://www.ab.com/networks/eds

Once you are at this location:

1. Click on `DeviceNet`
2. Enter the catalog number: `1771-SDN`
3. Enter Major Revision: `6`
4. Click on `Search`

For more information, contact Rockwell Automation Technical Support at 440.646.5800 (or on the web at http://support.rockwellautomation.com).

Software Requirement

To use the new features of the 1771-SDN/C module, you must use RSNetWorx for DeviceNet, ver. 3.11 (or later as specified below) as your configuration tool.

Module Enhancements and Features

Updated DeviceNet Master Library

Electronic Keying - added to include Major and Minor revision checking.

Shared Inputs - this enables multiple scanner modules to acquire inputs from a specific input device without using separate connections.

Auto Device Replacement (ADR) - consists of Node Recovery and Configuration Recovery:

- **Node Recovery -** this feature causes the node number of the replacement device to be automatically changed to the node number of the original device. The replacement device's node number must be writable over the DeviceNet network and must initially be set to 63.
- **Configuration Recovery -** this feature causes the replacement device's configuration to be made identical to the original device. The replacement device's configuration must be writable over the DeviceNet network. Configuration Recovery files are stored in the master scanner that is communicating with the original device through RSNetWorx for DeviceNet.

Quick Connect - (requires RSNetWorx for DeviceNet 4.0 or later) this feature enables the scanner module to connect to slave devices in less than one second (previously up to 10 seconds). Slave devices must also have Quick Connect functionality.

Slave Mode (requires RSNetWorx for DeviceNet 4.0 or later)

Slave mode allows processor-to-processor communication and enables the scanner to perform as a slave device to another master on the network.

When the scanner module is in slave mode, it exchanges data with only one master. You control what information is exchanged through scan list configuration and associated mapping functions of RSNetWorx for DeviceNet software.

This feature has the following variations:

When the scanner module is in:	It:
Null mode	Contains an empty or disabled scan list (default)
Master mode	Serves as a master to on or more slaves but is not simultaneously serving as a slave to another master
Slave mode	Serves as a slave to another master
Dual mode	Serves as both a master to one or more slaves and as a slave to another master simultaneously

Before You Begin

What This Chapter Contains

This chapter provides an overview of communication between a PLC-5 processor and DeviceNet devices via a 1771-SDN module. The data tables and the RSNetWorx for DeviceNet screens and windows used to configure the data tables are also described.

The following table identifies what this chapter contains and where to find specific information.

What You Need to Know

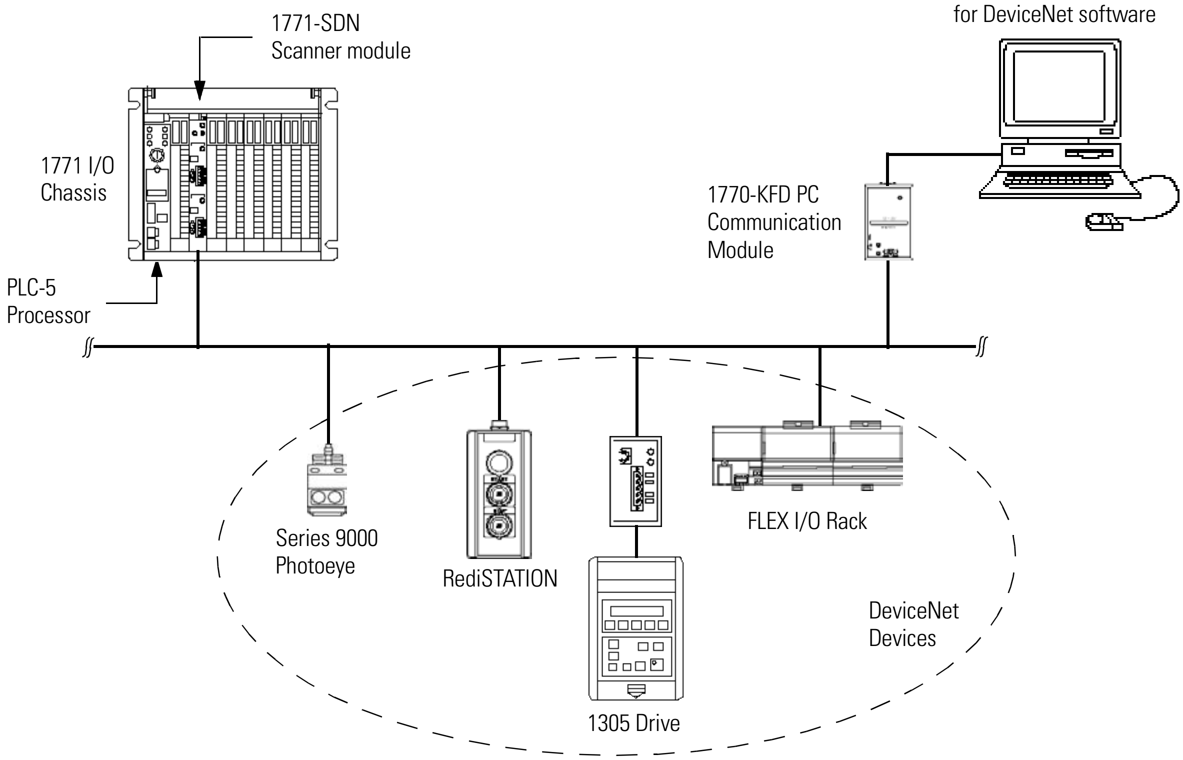
Before configuring your 1771-SDN scanner module, you must understand:

- the data exchange between the PLC -5 processor and DeviceNet devices through the 1771-SDN module
- user-configurable 1771-SDN module data tables
- the role of RSNetWorx for DeviceNet software

What Your 1771-SDN Module Does

In a typical configuration, the 1771-SDN module acts as an interface between DeviceNet devices and the PLC-5 processor.

DeviceNet Network



The 1771-SDN module communicates with DeviceNet devices over the network to:

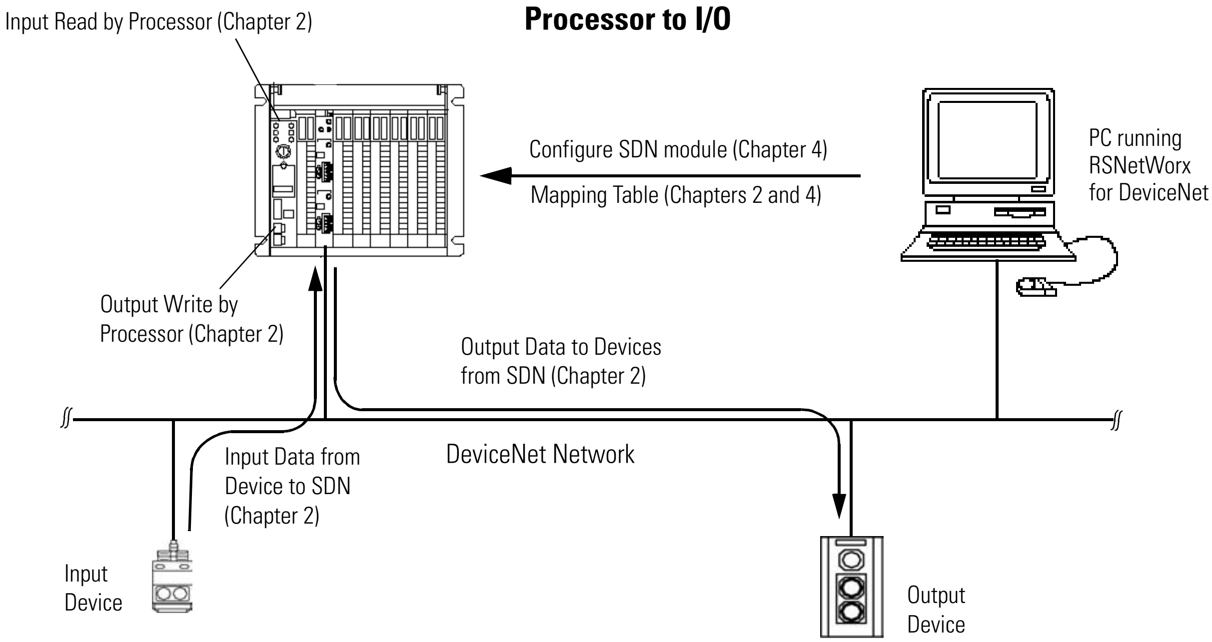
- respond as a slave
- read inputs from a device
- write outputs to a device
- download configuration data
- monitor a device's operational status

The 1771-SDN module communicates with the processor in the form of Block Transfers (BT) and/or Discrete I/O (DIO). Information exchanged includes:

- device I/O data
- status information
- configuration data

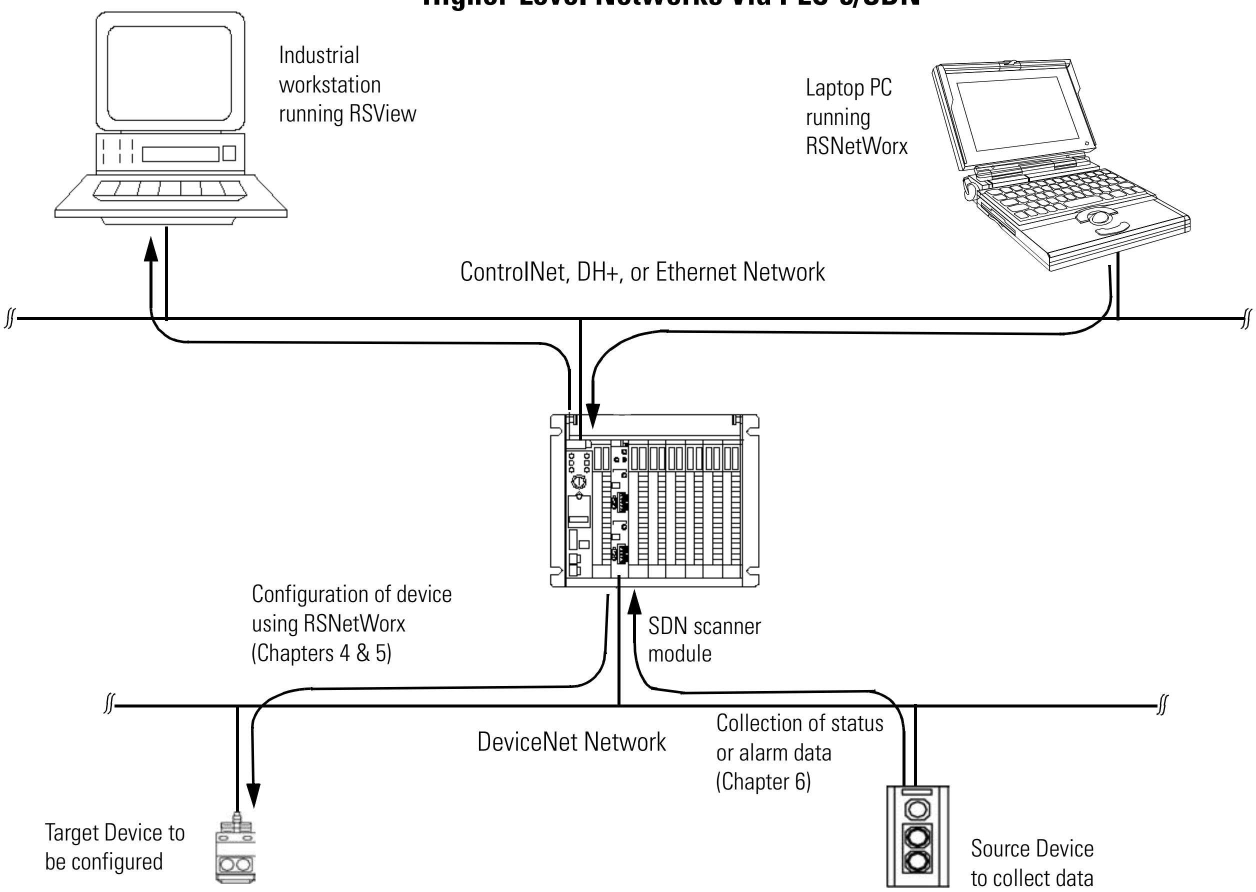
A processor to I/O DeviceNet configuration is shown in the following figure. See the referenced chapters for more information.

Processor to I/O



The 1771-SDN scanner module can also be used to bridge a DeviceNet network with another network.

Configuring Devices and Data Collection on Higher-Level Networks Via PLC-5/SDN

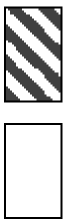


Address Density and Discrete I/O

You can use three addressing methods with your 1771-SDN scanner module. The number of discrete I/O bits you have available for data transfer is affected by the addressing mode selected.

Addressing Mode	Discrete Inputs	Discrete Outputs
2-slot	0 bits	0 bits
1-slot	8 bits	8 bits
1/2-slot	24 bits	24 bits

The concept described below applies to both input and output data tables. For example, when using your 1771-SDN in 1-slot addressing mode, you have eight bits of discrete input *and* eight bits of output available.

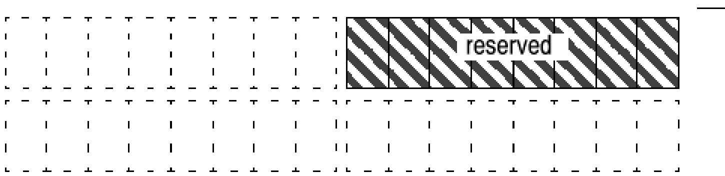


= bits reserved for 1771-SDN and processor communication

= bits available for discrete data transfer

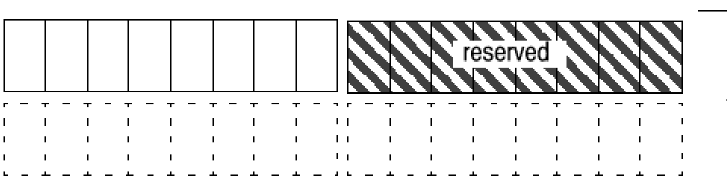
In the scanner's input and output data tables, there is one byte of memory that is reserved for communication between the processor and the scanner. Processor-specific responses from the scanner are read by the processor in this byte of the input data table. Scanner-specific instructions are written to this byte of the output data table.

0 bits for discrete data transfer **2-slot addressing**



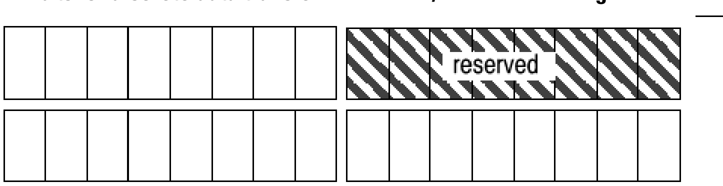
In 2-slot addressing mode, the only memory that would have been available for discrete data transfer (8 bits) is taken up by scanner/processor communication.

8 bits for discrete data transfer **1-slot addressing**

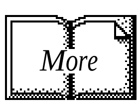


In 1-slot addressing mode, there are 16 bits: eight bits for scanner/processor communication, and eight bits for discrete data transfer.

24 bits for discrete data transfer **1/2-slot addressing**



In 1/2-slot addressing mode, there are 32 bits: eight bits used for scanner/processor communication, and 24 bits for discrete data transfer.



The address density is set via dip switches on the 1771-SDN module and 1771 chassis. For more information about setting your module's address density with switches, refer to the 1771-SDN Scanner Module Installation Instructions, publication 1771-IN014. For more information about 1771-module addressing, refer to chapter 3 and to your PLC programmable controller system-level installation manual and design manual.

Communicating with Your Devices

The 1771-SDN module communicates with a device via **strobe, poll, change of state,** and/or **cyclic** messages. It uses these messages to solicit data from or deliver data to each device. Data received from the devices, or input data, is organized by the 1771-SDN module and made available to the processor. Data received from your PLC-5 processor, or output data, is organized in the 1771-SDN module and sent on to your devices.

> A strobe message is a multicast transfer of data (which is 64 bits in length) sent by the 1771-SDN module that solicits a response from each strobed slave device. There is one bit for each of the possible 64 node addresses. The devices respond with their data, which can be as much as 8 bytes.

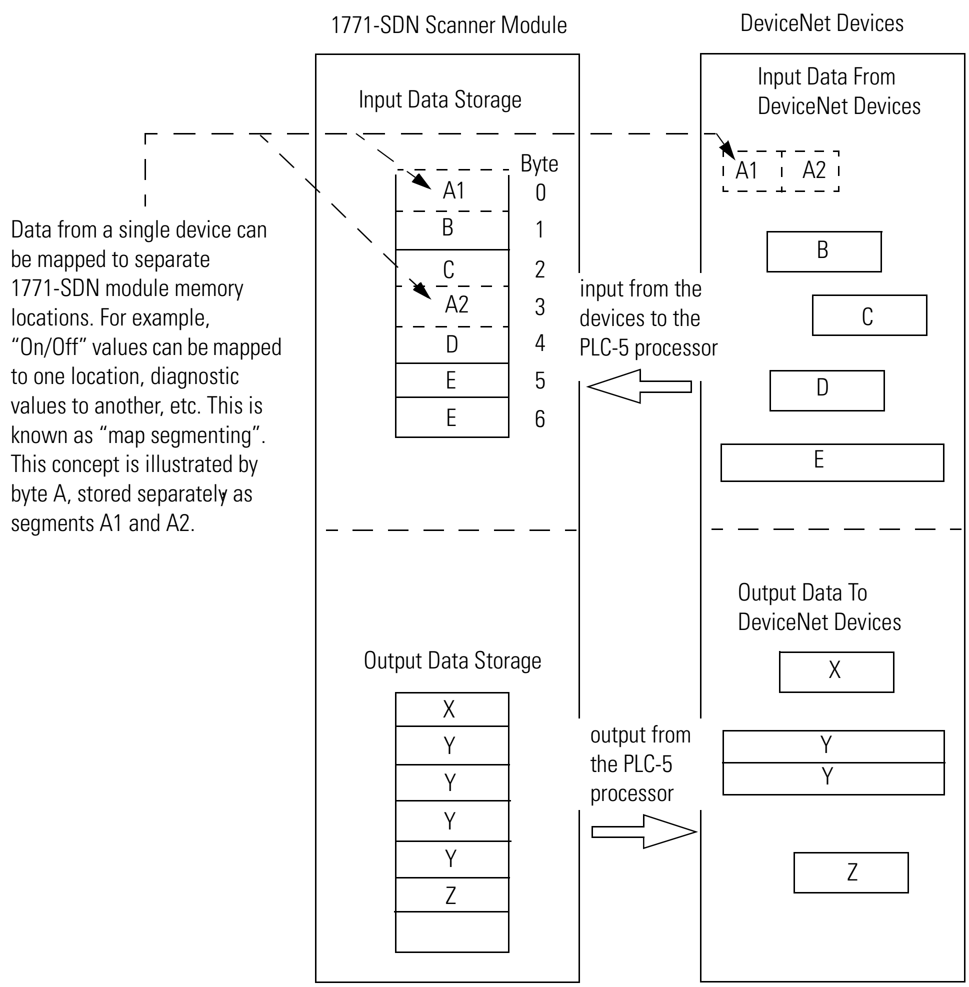
> A poll message is a point-to-point transfer of data (0-255 bytes) sent by the 1771-SDN module that solicits a response from a single device. The device responds with its input data (0-255 bytes).

> A change of state message is a transfer of data sent whenever a data change occurs. A user-configurable heartbeat rate can also be set to allow devices to indicate proper operation during intervals between data changes. This does not solicit response data, but may receive an acknowledge message.

> A cyclic message is sent only at a user-configurable rate, such as every 10 ms.

IMPORTANT Throughout this document, *input* and *output* are defined from the PLC-5 processor's point of view. Output is data sent from the PLC-5 processor *to* a device. Input is data collected by the PLC-5 processor *from* a device.

All data sent and received on a DeviceNet network is in byte lengths. A device may, for example, produce only two bits of input information. Nevertheless, since the minimum data size on a DeviceNet network is one byte, two bits of information are included in the byte of data produced by the device. In this example (only two bits of input information), the upper six bits are insignificant.



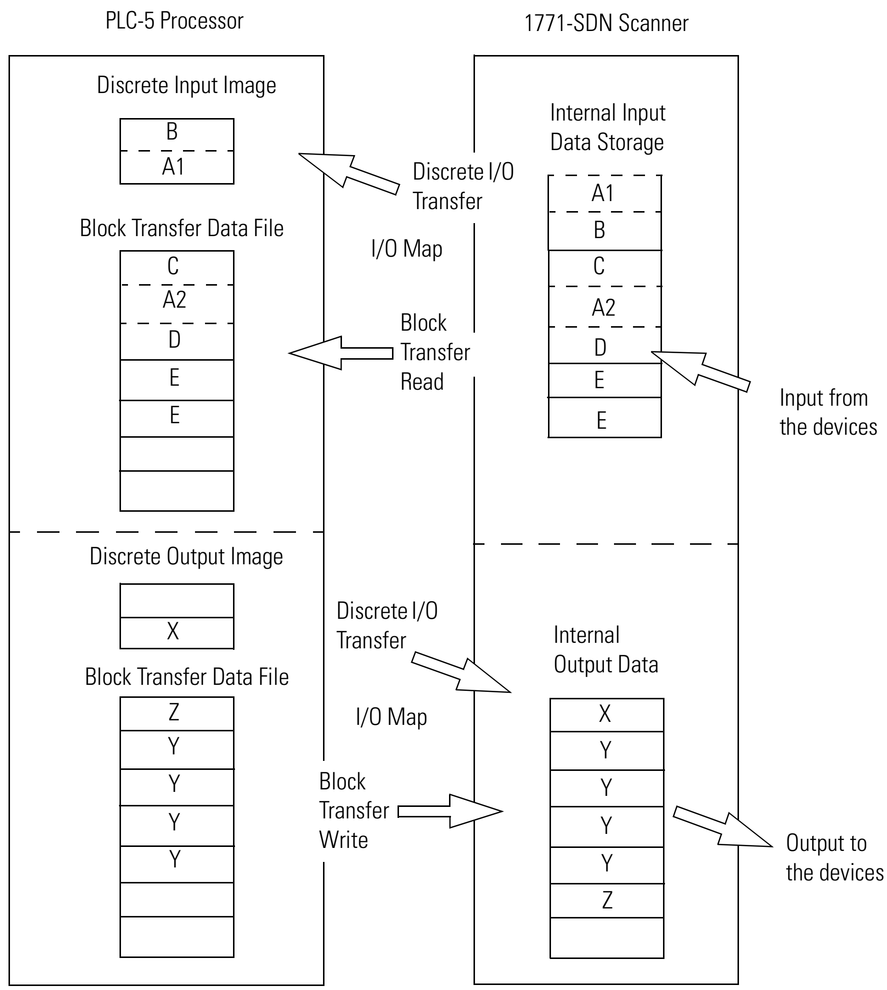
Communicating with Your PLC-5 Processor

A block transfer read (BTR) is a block transfer of data from the 1771-SDN module to the PLC processor. The processor is *reading* the data collected by the 1771-SDN module (i.e., DeviceNet input data).

A block transfer write (BTW) is a block transfer of data from the PLC processor to the 1771-SDN module. The processor is *writing* the data to the 1771-SDN's memory (i.e., DeviceNet output data).

Your processor communicates with the 1771-SDN scanner module via **block transfer reads, block transfer writes**, and **DIO** transfers. Input data, gathered from the network's devices, is organized within the 1771-SDN and made available for the processor to "read".

The 1771-SDN module does not send data to your processor. Data transferred between the module and the processor must be initiated by the processor. Output data is sent, or "written", to the scanner by your processor. This data is organized in the 1771-SDN module, which in turn passes the data on to your scanned devices via strobe, poll, change of state, or cyclic messages.



What 1771-SDN Module Data Tables Are and What They Do

To manage the flow of data between your processor and the network devices, the 1771-SDN module uses the following data tables.

- 1771-SDN Module Configuration Table
- Scanlist Table
- Device Input Data Table
- Device Output Data Table
- Device Idle Table
- Device Failure Table

You can configure two of these data tables through RSNetWorx software. These two tables are stored in the 1771-SDN module's non-volatile memory and used to construct all other data tables:

- Scanner Configuration Table (SCT)
- Scanlist Table (SLT)

The Scanner Configuration Table (SCT)

The SCT controls basic information your 1771-SDN module needs to function on your DeviceNet network. It tells your 1771-SDN module:

- if it can transmit and receive input and output data
- how long it waits after each scan before it scans the devices again
- when to send out its poll messages

The Scanlist Table (SLT)

The SLT supports I/O updating for each of your devices on the network. It also makes it possible for your 1771-SDN module to make device data available to your processor. The SLT tells your 1771-SDN module:

- which device node addresses to scan
- how to scan each device (strobe, poll, change of state, cyclic or any valid combination)
- how often to scan your devices

- exactly where in each device's total data to find the desired data
- the size of the input data/output data
- exactly where to map the input or output data for your processor to read or write

User Configured Tables	Data In This Table	RSNetWorx Configuration Screen
SCT	• basic operation • module parameters • interscan delay • background poll ratio	1771-SDN Module Configuration
SLT	• device-specific identification data	Scanlist Editor (SLE)
	• data transfer method • transmit/receive data size	Edit Device I/O Parameters
	• input and output data source and destination locations	These values can be configured automatically through the AutoMap function or manually through the Data Table Map.

Interscan delay is the time between I/O scans (polled and strobed). It is the time the 1771-SDN module will wait between the last poll message request and the start of the next scan cycle. The scanner module also uses this time to perform non-time-critical communications on the DevceNet network, such as communicating with RSNetWorx for DeviceNet software.

Background poll ratio sets the frequency of poll messages to a device in relation to the number of I/O scans. For example, if the ratio is set at 10, that device will be polled once every 10 scans.

TIP

Use caution when changing the interscan delay time from its default value. Setting this parameter to a low value increases the latency for non-time-critical scanner operations including the time required to respond to RSLinx software and configuration functions. Setting this parameter to a high value reduces the freshness of the I/O data being collected by the scanner.

RSNetWorx Software as a Configuration Tool

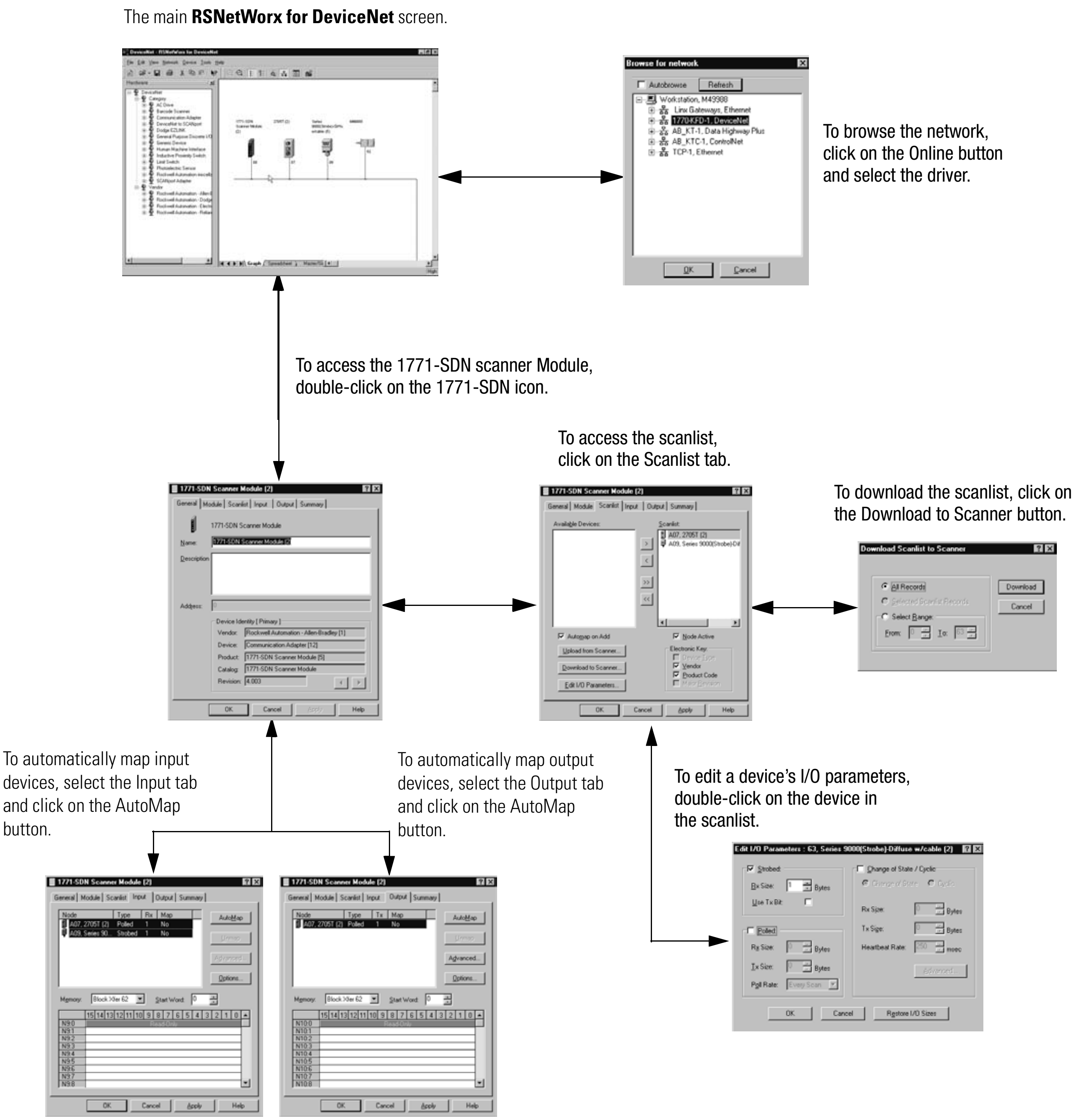
RSNetWorx for DeviceNet software is used to configure the 1771-SDN module's data tables. This software tool connects to the 1771-SDN module over the DeviceNet network via a PC RS–232 interface (1770–KFD module), or PC Card (1784-PCD, -PCID, or PCIDS).

TIP

RSNetWorx for DeviceNet software can also communicate with the 1771-SDN module via a ControlNet, Ethernet, or Data Highway Plus network. See chapter 5.

The configuration screen map below shows the RSNetWorx for DeviceNet screens used to configure the 1771-SDN module and the navigation paths between them. The use of these screens is described in Chapter 4.

RSNetWorx for DeviceNet Configuration Screen Map



What's Next?

The remaining sections of this manual provide the following information:

- Chapter 2 covers the configuration process planning stage through a data mapping example.
- Chapter 3 describes the hardware setup for the example application.
- Chapter 4 covers configuration of the DeviceNet network using RSNetWorx for DeviceNet software.
- Chapter 5 describes how to communicate with a DeviceNet network from another network.
- Chapter 6 describes how to create, download, and run the example application program.
- Chapter 7 covers the diagnostics provided for troubleshooting the 1771-SDN module.

Notes

Planning Your Configuration and Data Mapping Your Devices

This chapter introduces questions you should ask before configuring your 1771-SDN Scanner. In addition, it presents an example DeviceNet network and I/O data mapping scheme for a photoeye and a RediSTATION operator interface module. The following table identifies what this chapter covers and where to find specific information.

What You Need to Know

To map data via your 1771-SDN Scanner module, you must understand:

- your network requirements
- how input data is mapped
- how output data is mapped

Beginning the Process

Planning before configuring your 1771-SDN module helps make sure that you can:

- use your memory and bandwidth efficiently
- cater to device-specific needs and requirements
- give priority to critical I/O transfers
- leave room for expansion

A very important question to answer is "what is on your network?" You should be familiar with each device's:

- communication requirements
- I/O importance and size
- frequency of message delivery

You should also ask "how might this network appear in the future?" At this point in your planning, it is advantageous for you to have some idea of how the network could be expanded. I/O data mapping can be performed automatically by the RSNetWorx software. But when mapping your I/O, you also have the opportunity to allot room for future I/O. This can save time and effort in the future.

For example, RSNetWorx will automatically map the devices as efficiently as possible, but the result is that multiple devices may share the same word location in memory. However, you can also have the system map the devices such that no two devices share the same memory location by selecting the "Dword align" option when performing automapping. You can manually map the devices if you need to assign them to specific memory locations.

For details refer to the Help screens provided by the RSNetWorx for DeviceNet software. Additional support can be found at the Rockwell Software website: http://www.software.rockwell.com.

The Example Network

The following example illustrates a data mapping plan for a DeviceNet network. Note that even if the mapping is performed automatically by the RSNetWorx software, you must know where the devices are mapped in order to use them in your network.

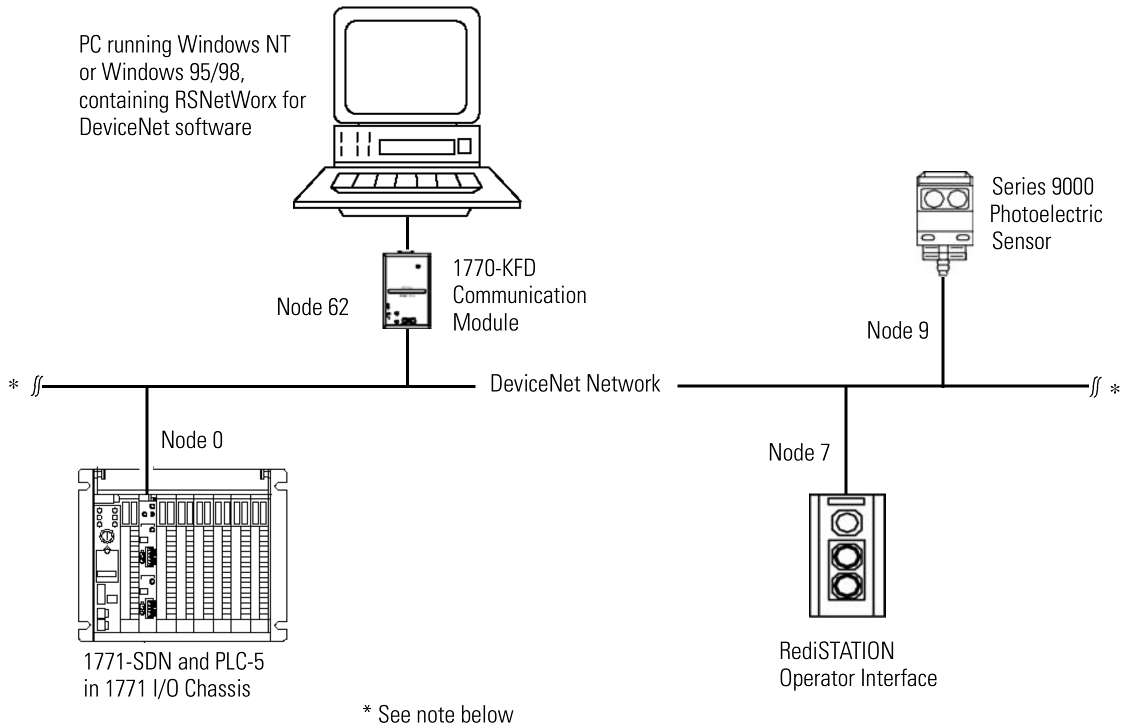
Example Network Devices

This example network has the following devices:

- a PC running RSNetWorx for DeviceNet software
- a 1771-SDN Scanner module interfacing a PLC-5 processor with DeviceNet
- a Series 9000 photoelectric sensor (strobed)
- a RediSTATION operator interface (polled)

IMPORTANT In the following example, output is data sent *to* a device from a controller. Input is data collected *from* a device by a controller.

The system you will set up is shown below:



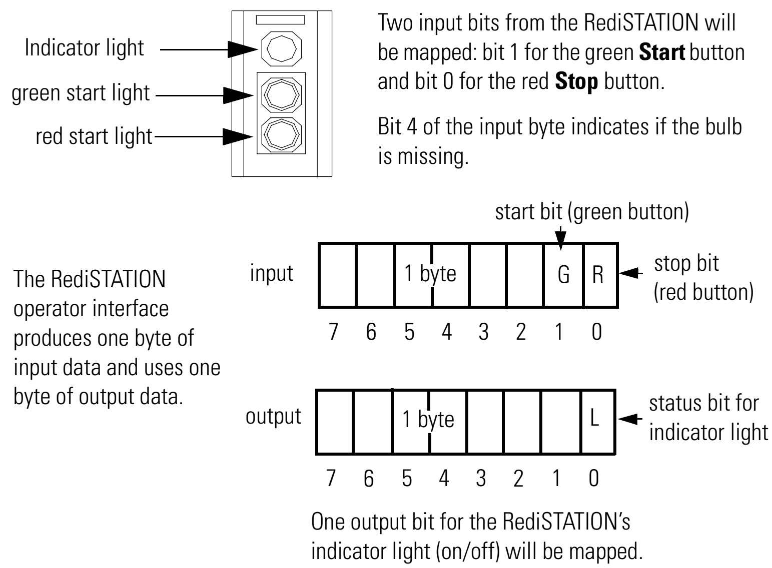
IMPORTANT Each end of the DeviceNet trunk cable must be properly terminated with a resistor. Refer to the DeviceNet Cable Planning and Installation Manual, publication DN-6.7.2 for detailed information.

RediSTATION Operator Interface Data Mapping

The RediSTATION has both inputs and outputs that must be mapped. The input byte is mapped to the 1771-SDN module's block transfer read data table and then to the PLC-5 processor's input data file. The output byte is mapped to the 1771-SDN module's block transfer write data table and then to the PLC-5 processor's output data file.

The mapping procedure, using RSNetWorx for DeviceNet software, is described on pages 4-14 to 4-17.

RediSTATION operator interface

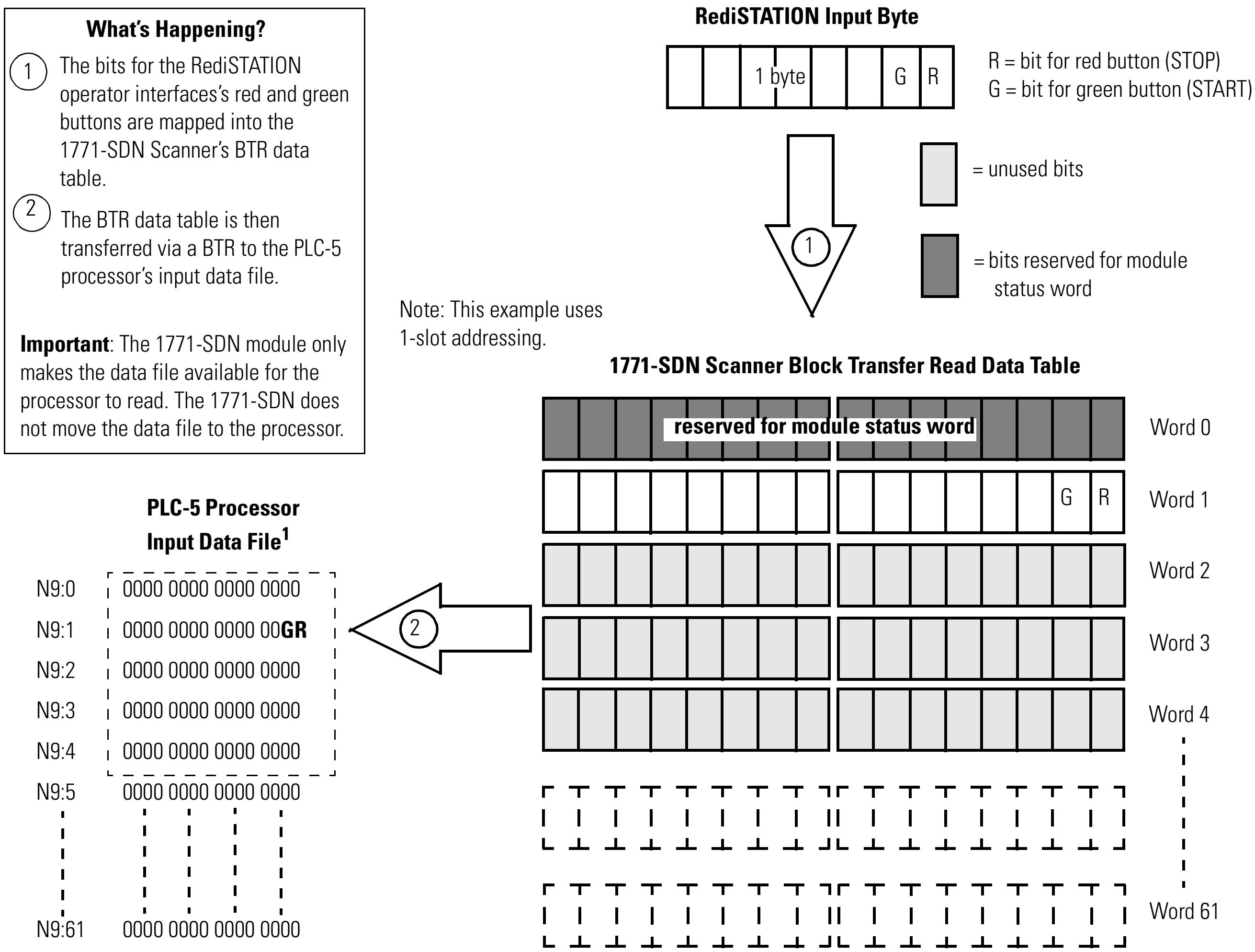


In the RediSTATION's bits for the red and green buttons and the indicator light status bit:

- 1 = ON
- 0 = OFF

Mapping RediSTATION Input Data for a Block Transfer Read

The RediSTATION operator interface's input byte is mapped to the scanner's block transfer read data table through a 62 word BTR. In this example, we use data file N9:0.



[1] This mapping is based upon the example in chapter 4. The mapping for your system may be different.

Example: The green START button from the RediSTATION appears in the PLC-5 processor's input file at address N9:1/1.

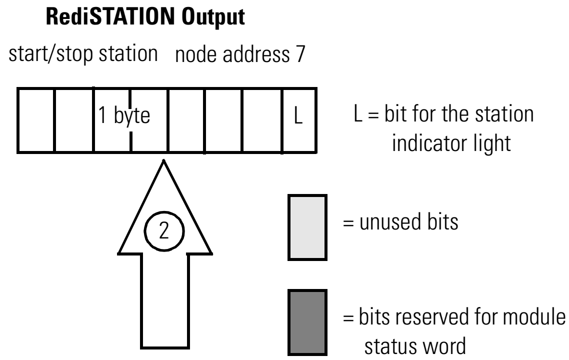
The red STOP button from the RediSTATION appears in the PLC-5 processor's input file at address N9:1/0.

Mapping RediSTATION Output Data for a Block Transfer Write

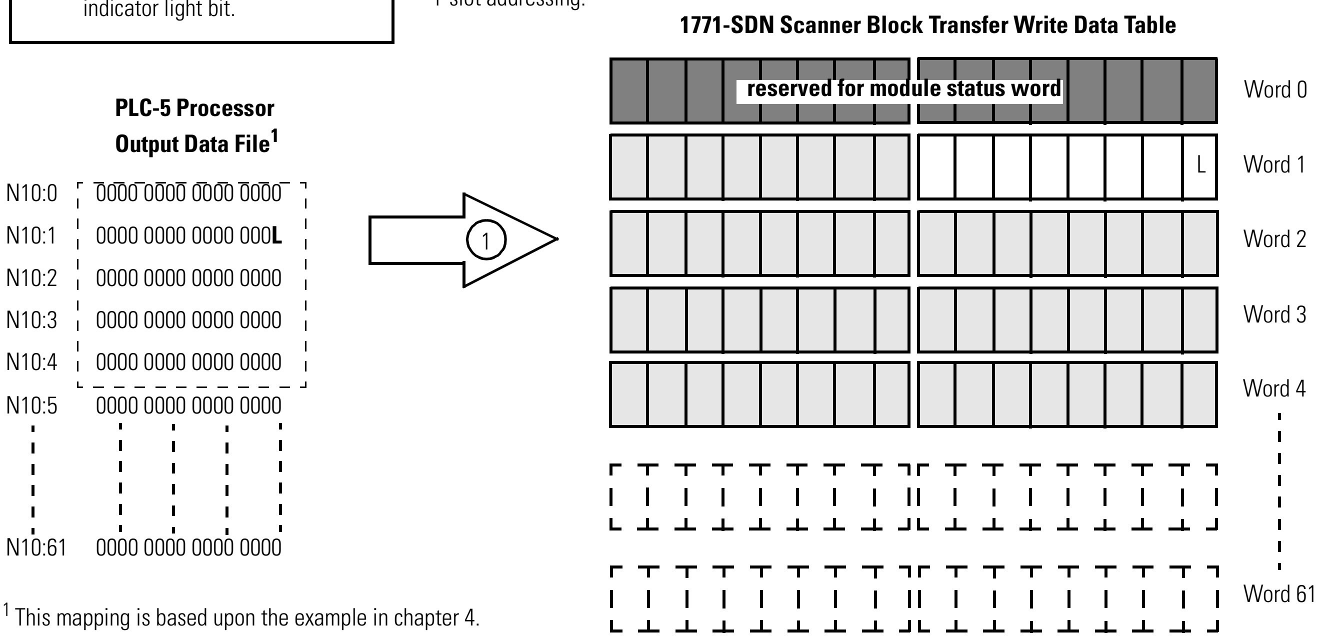
The RediSTATION operator interface's output byte is mapped to the 1771-SDN module's block transfer write data table. Within the output byte is bit 0 for the indicator light. The PLC-5's output data file is transferred by the processor application to turn the light on or off. In this example, we use N10 for the output data file.

What's Happening?

1. The PLC-5 processor's output data file containing the indicator light bit for the RediSTATION is transferred via a BTW to the 1771-SDN Scanner's BTW data table.
2. The BTW data table is then sent to the RediSTATION via a polled message from which the RediSTATION receives its indicator light bit.



Note: This example uses 1-slot addressing.



[1] This mapping is based upon the example in chapter 4. The actual mapping for your system may be different.

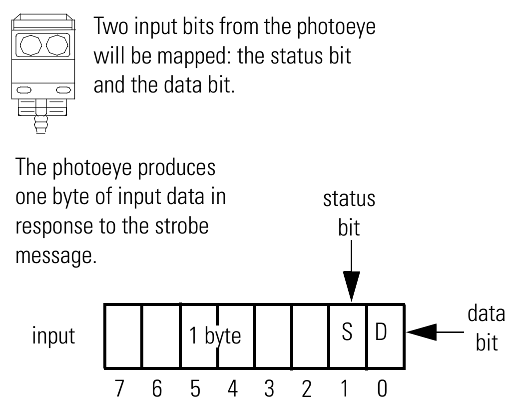
Example: The RediSTATION's indicator light (L) is taken from N10:1/0 in the PLC-5 processor's output data file.

Photoeye Input Data Mapping

The photoelectric sensor (photoeye) inputs are mapped to the 1771-SDN module's block transfer read data table and then to the PLC-5 processor's input data file. The procedure for doing this using RSNetWorx for DeviceNet software is described on pages 4-14 to 4-17.

The photoeye has no outputs to map.

Series 9000 Photoeye



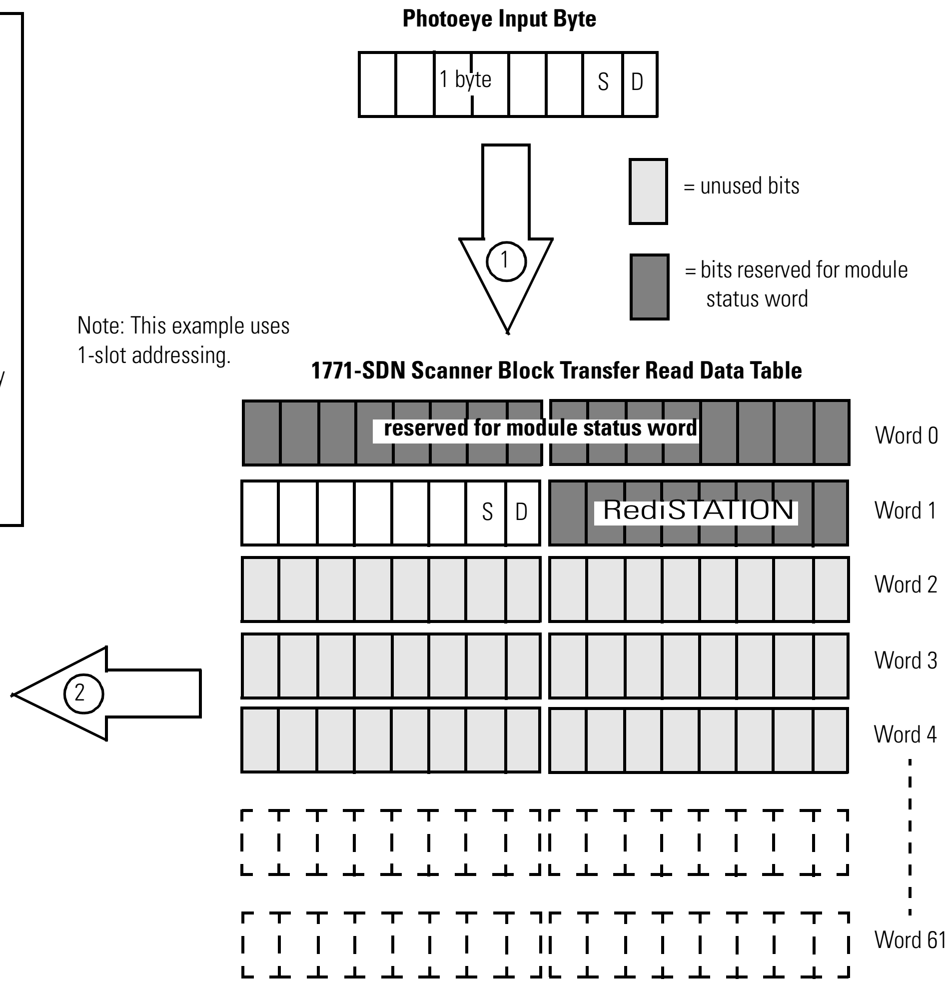
Mapping Photoeye Input Data for a Block Transfer Read

The photoeye's input byte is mapped to the scanner's block transfer read data table through a 62 word BTR. In this example, we use data file N9.

What's Happening?

1. The status and data bits from the photoeye are mapped into the 1771-SDN Scanner's BTR data table.
2. The BTR data table is then transferred via a BTR to the PLC-5 processor's input data file.

Important: The 1771-SDN module only makes the data available for the processor to read. The 1771-SDN module does not move the data to the processor.



PLC-5 Processor Input Data File[1]

N9:0	0000 0000 0000 0000
N9:1	0000 00**SD** 0000 0000
N9:2	0000 0000 0000 0000
N9:3	0000 0000 0000 0000
N9:4	0000 0000 0000 0000
N9:5	0000 0000 0000 0000
N9:61	0000 0000 0000 0000

[1] This mapping is based upon the example in chapter 4. The actual mapping for your system may be different.

Example: The Status bit from the photoeye appears in the PLC-5 processor's integer file at address N9:1/9.
The Data bit from the photoeye appears in the PLC-5 processor's integer file at address N9:1/8.

What's Next?

Chapter 3 describes how to set up the system hardware for the example application.

Notes

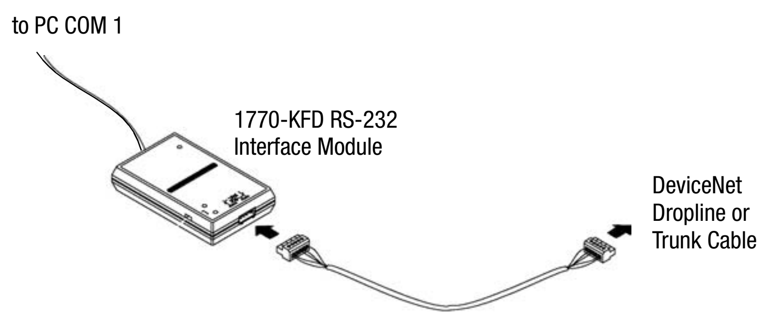
Hardware Setup

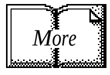
What This Chapter Contains

This chapter describes how to set up the hardware for the example application. The following table describes what this chapter contains and where to find specific information.

Installing the 1770-KFD Interface Module

Connect the RS-232 connector on the 1770-KFD interface module to one of the serial ports on your PC workstation (e.g., COM1). Connect the DeviceNet connector on the 1770-KFD module to a DeviceNet drop or trunk cable. You can make this connection in several ways; for example, using a DeviceNet Quad Tap (#1492-DN3TW), as shown on page 3-13.



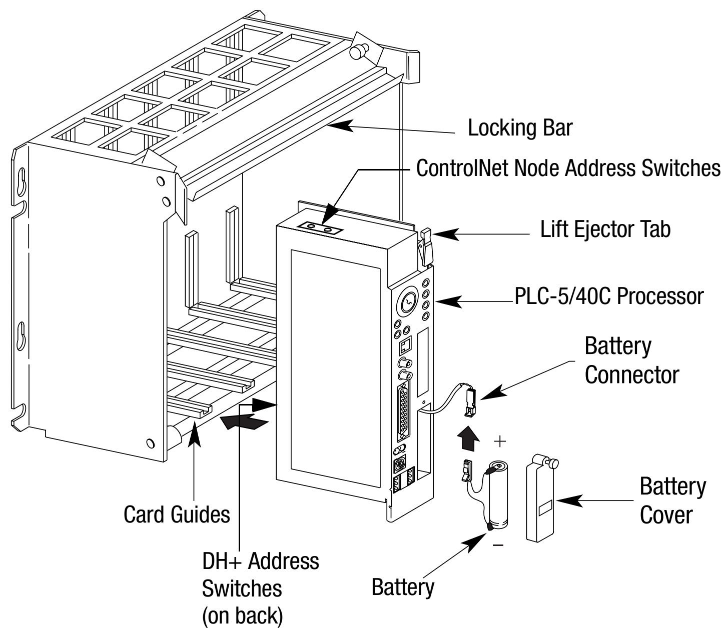


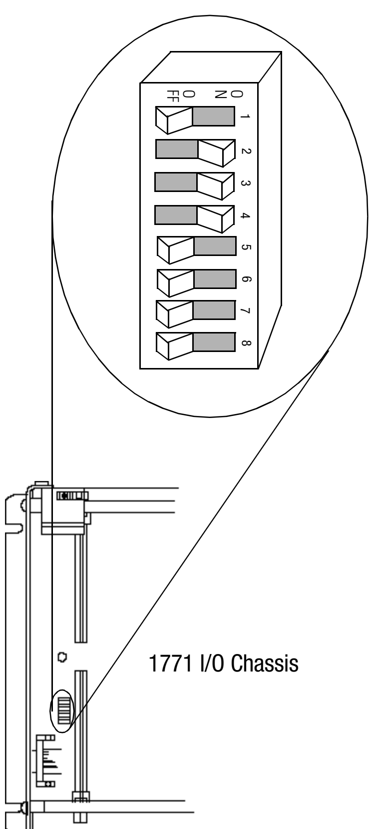
For detailed directions on how to install the 1770-KFD interface module, see the DeviceNet RS-232 Interface Module Installation Instructions, publication 1770-5.6.

Installing the PLC-5 Processor

Refer to the following figure while installing your PLC-5 processor. For additional installation requirements and detailed directions, refer to the document that shipped with your PLC-5 programmable controller.

PLC-5C Processor and 1771 I/O Chassis

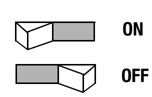




Setting the I/O Chassis Backplane Switches

Set the backplane switches in the 1771 I/O chassis for 1-slot addressing for the example application. To do this, put switch 4 in the OFF position and switch 5 in the ON position.

Switches		Addressing
4	5	
OFF	OFF	2 - slot
OFF	ON	1 - slot
ON	OFF	1/2 - slot
ON	ON	Not Allowed



For information on setting the other backplane switches for your system, refer to the ControlNet PLC-5 Programmable Controllers User Manual Phase 1.5, publication 1785-UM022B-EN-P.

Going Online to the PLC-5 Processor

You cannot go online to the PLC-5 processor over DeviceNet. In order to download and run the example application program in chapter 6 you must use the processor's RS-232 connector, or download and run the program via another network.

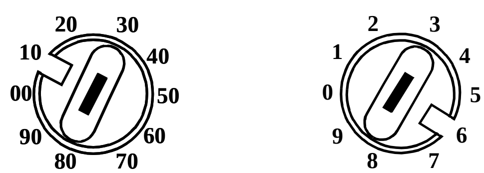
Chapter 6 provides examples of downloading and running the application program via ControlNet, Ethernet, and Data Highway Plus networks. Chapter 5 provides examples of configuring the DeviceNet network over these networks.

To go online to the PLC-5 processor via ControlNet:

1. Set the PLC-5C ControlNet node address using the two 10-digit rotary switches on top of the PLC-5C module.

For the example application we used node address 16.

ControlNet PLC-5C processor's NET address = 16



2. Connect the PLC-5C's ControlNet port to the ControlNet network.

More

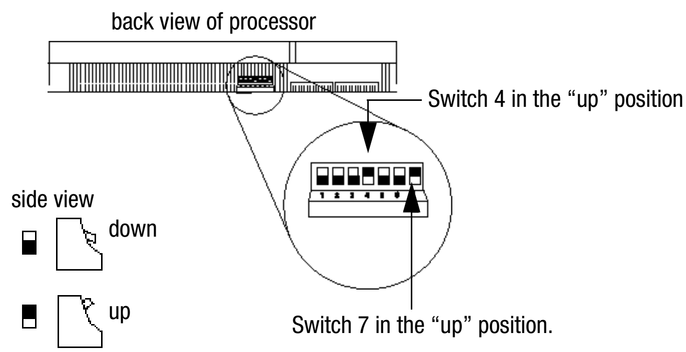
See Appendix B for information on installing and configuring the ControlNet driver. See the ControlNet 1.5 PLC-5 Programmable Controller User Manual, publication 1785-UM022B-EN-P, for further information.

To go online to the PLC-5 processor via Data Highway Plus:

1. Define the DH+ station address of channel 1A by setting switch assembly SW-1 on the back of the processor. For the example application we used address 1. (Set switch 4 in the up position, and switches 1, 2, 3, 5, and 6 in the down position.)

TIP

See the information on the side of the processor if you want to use another address.

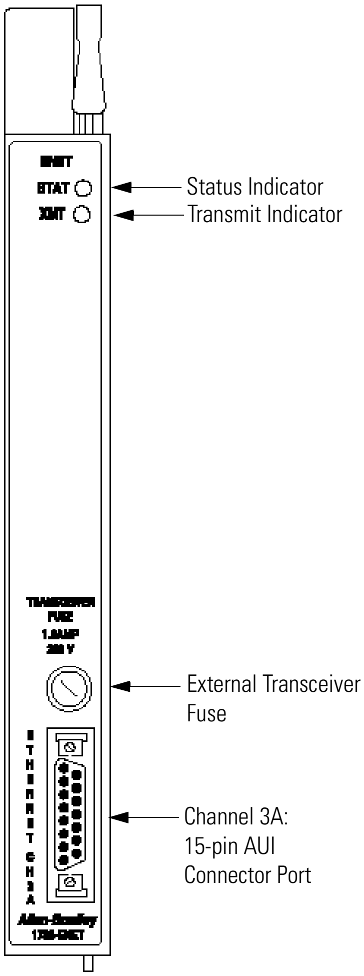


2. Set the baud rate to 57.6 Kbaud by placing switch 7 in the up position.

More

See Appendix C for information on installing and configuring the Data Highway Plus driver.

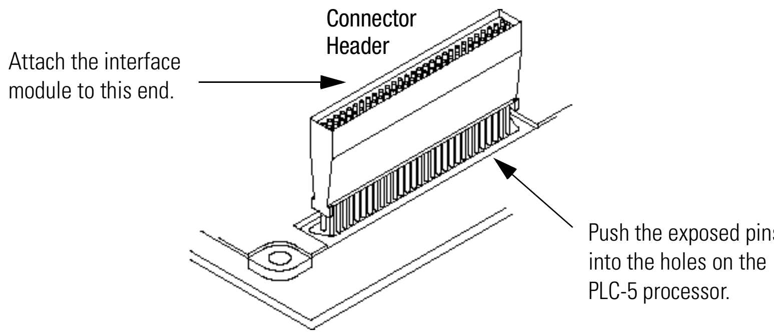
Installing the 1785-ENET Ethernet Module



To go online to the PLC-5 processor via Ethernet, you must install a 1785-ENET module in the 1771 I/O chassis.

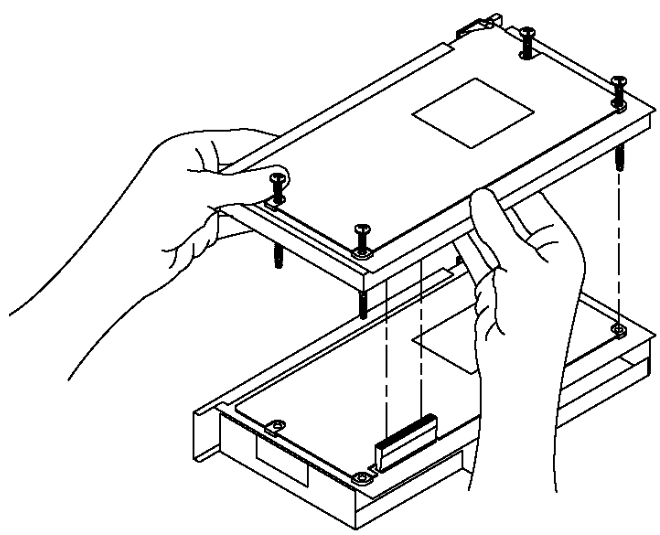
The Ethernet module is shipped with a 58-pin connector header that attaches to the PLC-5 processor.

1. Attach the connector header to the PLC-5 processor.



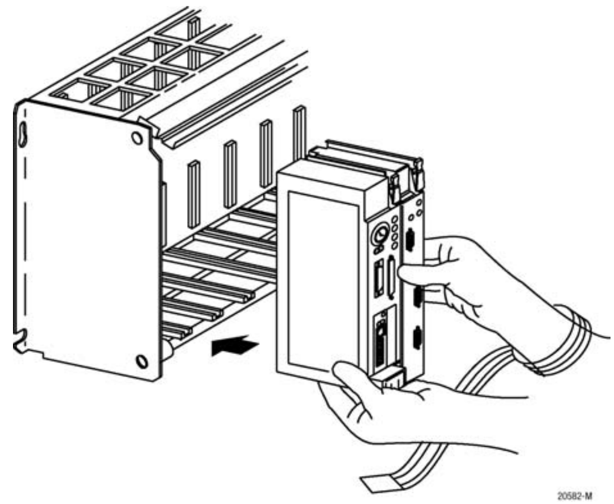
IMPORTANT	Make sure you carefully align the pins and holes before you press the connector header into the processor. If you improperly align them, you will bend the connector header pins when you press them together. Do not use excessive force on the connector header when seating it into the processor. You do not need to key the connector.

2. Use the captive screws to connect the interface module to the processor.



3. Insert the interface module/processor combination in the left-most slot of the 1771 I/O chassis.

Be sure power to the 1771 I/O chassis is OFF.



4. Assign an IP address to the interface module.

5. Configure channel 3A for Ethernet communication.

   You can configure the communication channel using BOOTP software or your PLC-5 programming software. See Appendix A for information on configuring the communication channel using **RSLogix 5** programming software.

TIP Rockwell Automation offers a BOOTP tool on http://www.ab.com

More For additional installation requirements and detailed directions, refer to the document that shipped with your 1785-ENET Ethernet module.

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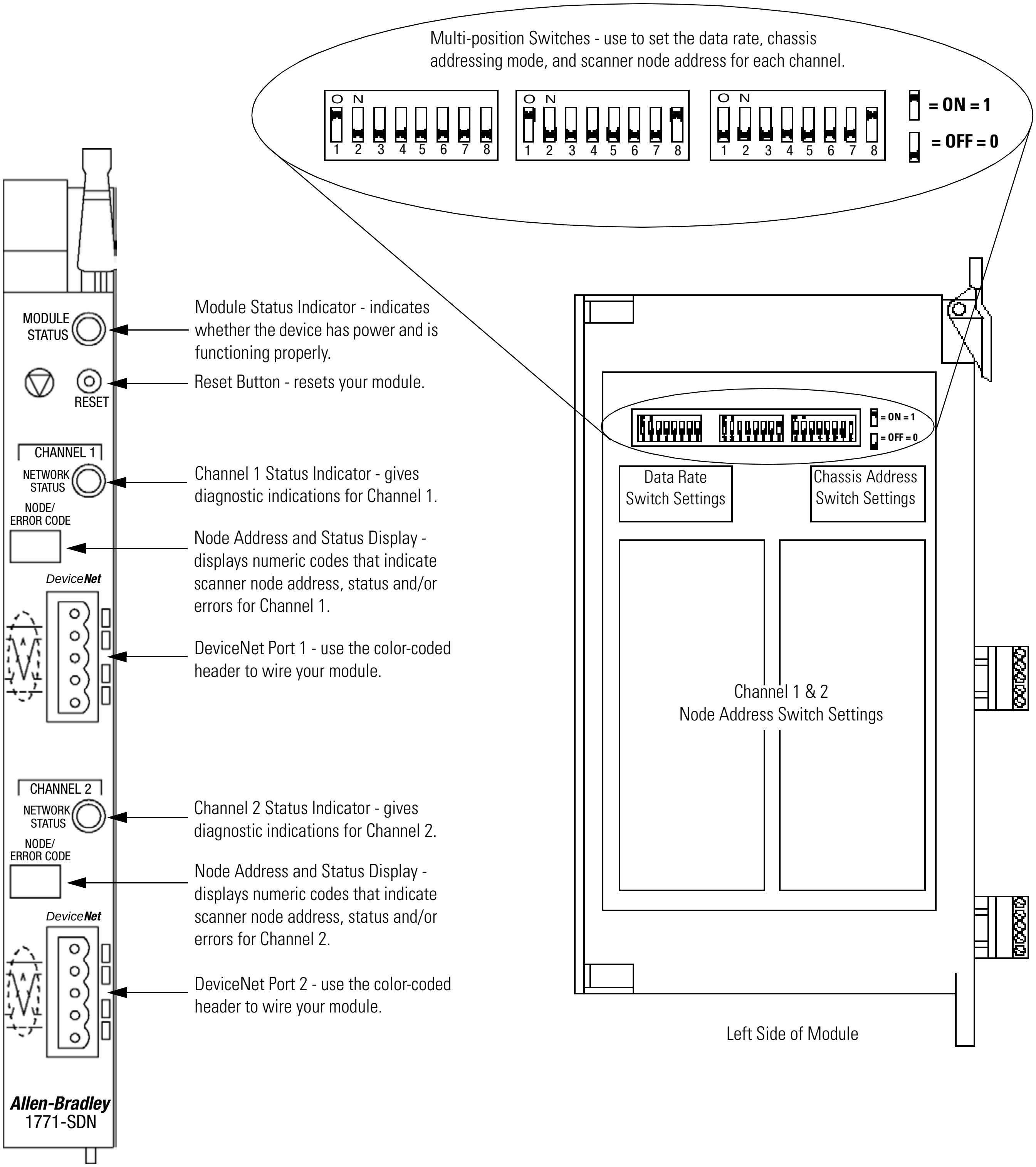
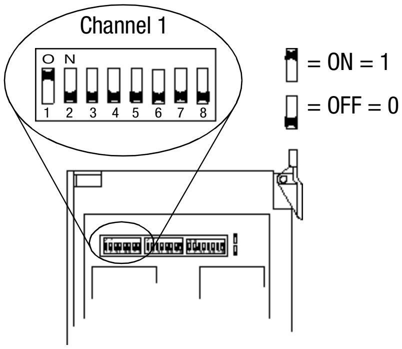
Installing the 1771-SDN Scanner Module

Refer to the following figure as you install the 1771-SDN scanner module. For additional installation requirements and detailed directions, refer to publication 1771-IN014.


Multi-position Switches - use to set the data rate, chassis addressing mode, and scanner node address for each channel.
O N
1 2 3 4 5 6 7 8
= ON = 1
= OFF = 0
MODULE STATUS
RESET
CHANNEL 1
NETWORK STATUS
NODE/ ERROR CODE
DeviceNet
CHANNEL 2
NETWORK STATUS
NODE/ ERROR CODE
DeviceNet
Allen-Bradley
1771-SDN
Module Status Indicator - indicates whether the device has power and is functioning properly.
Reset Button - resets your module.
Channel 1 Status Indicator - gives diagnostic indications for Channel 1.
Node Address and Status Display - displays numeric codes that indicate scanner node address, status and/or errors for Channel 1.
DeviceNet Port 1 - use the color-coded header to wire your module.
Channel 2 Status Indicator - gives diagnostic indications for Channel 2.
Node Address and Status Display - displays numeric codes that indicate scanner node address, status and/or errors for Channel 2.
DeviceNet Port 2 - use the color-coded header to wire your module.
Data Rate Switch Settings
Chassis Address Switch Settings
Channel 1 & 2
Node Address Switch Settings
Left Side of Module

Setting the Channel 1 Data Rate and Node Address Switches

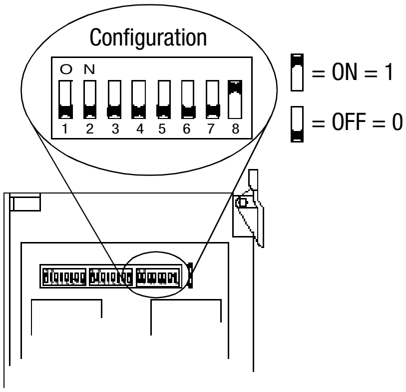


1. Locate the switchbank labeled “Channel 1” on the left side of the module.
2. Set the DeviceNet Data Rate for Channel 1 to 500K baud for the example application by setting switch 1 to an ON (“1”) position and switch 2 to an OFF (“0”) position.
3. Set the DeviceNet node address for Channel 1 to node 0 for the example application by setting switches 3 through 8 to the OFF (“0”) position.

TIP Refer to the table on the left side of the module to set the channel to a different node address. The address range is 0 to 63.

IMPORTANT The node address setting must not conflict with the node address of any other device on the network. Note that channel 2 is not used for the example application.

Setting the I/O Chassis Addressing Node Switches



Set the I/O chassis addressing mode to 1-slot for the example application.

1. Locate the switchbank labeled “Configuration” on the left side of the module.
2. Set switch 7 to an OFF (“0”) position and switch 8 to an ON (“1”) position.

IMPORTANT Make sure switches 1 through 6 in the Configuration switchbank always remain in the OFF (“0”) position.

IMPORTANT The chassis addressing mode setting for the 1771 I/O chassis (page 3-2) must match the I/O chassis address setting of the scanner. If the switches do not match, data will be lost in the data transfer between the PLC-5 processor and the scanner module.

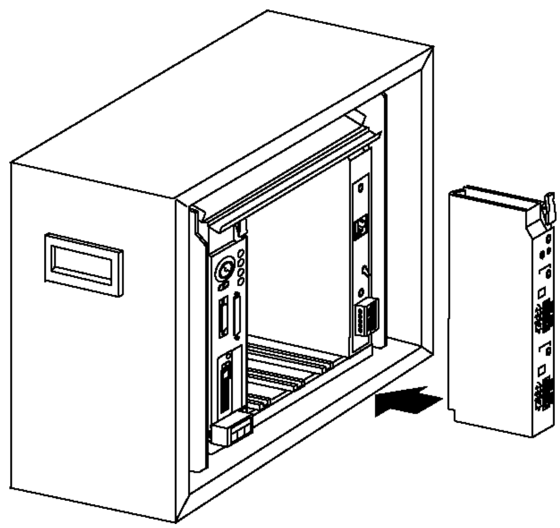
Installing the Scanner Module in the Chassis

ATTENTION

Do not install the 1771-SDN Scanner Module with the chassis power supply on. Turn off the chassis power supply. You will disrupt backplane communication and may damage your module.

1. Select a slot for the 1771-SDN module in the chassis. You may use any slot except the leftmost slot, which is reserved for the PLC-5 processor. For the example application, we installed the scanner in slot 1.

2. Insert the 1771-SDN Scanner module into the slot.



   Apply firm, even pressure to seat the module in the I/O chassis backplane connectors.

More

For additional installation requirements and detailed directions, refer to the document that shipped with your 1771-SDN scanner module.

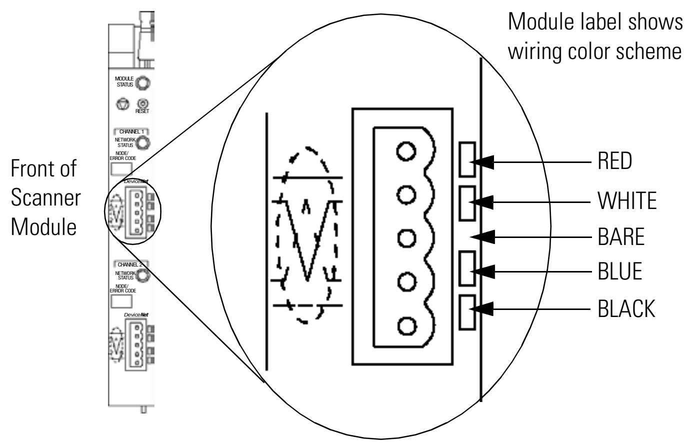
Connecting the Scanner to the DeviceNet Network

ATTENTION

Do not wire your module with power applied to your network. You may short circuit your network or disrupt communication.

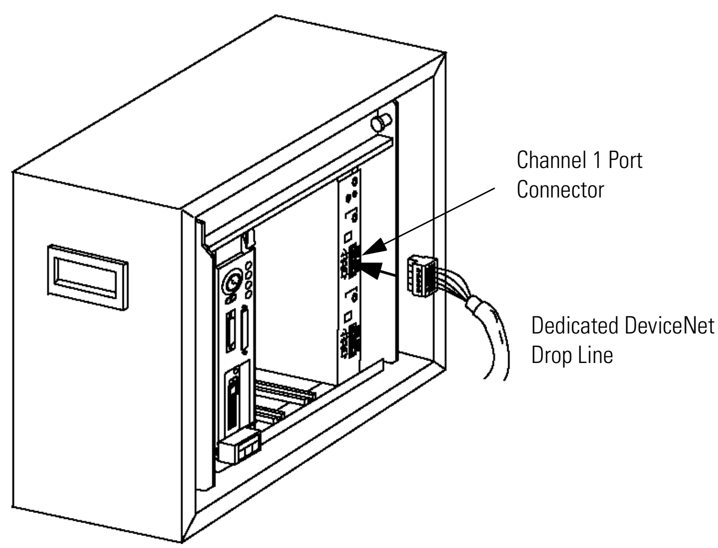
To connect to the DeviceNet network:

1. Connect the DeviceNet drop line to the linear plug provided with the scanner. Match the wire insulation colors to the colors shown on the label.



2. Locate the DeviceNet port connector for Channel 1 on the front of the module.

3. Insert the linear plug into the five-pin header for Channel 1.



Installing the RediSTATION Operator Interface

Begin installing the RediSTATION by removing the six screws fastening the cover and setting the DIP switches inside as follows:

Set this position	To this value:		
1	1	On	
2	1	On	
3	1	On	(node
4	0	Off	address[1])
5	0	Off	
6	0	Off	
7	0	Off	(data
8	1	On	rate[2])
9	0	Off	
10	0	Off	

[1]The DeviceNet address is 000111 (node 7).
[2]The data rate is 10 (500k bps).
The output fault rate is 0 (outputs turned off).
The output flash rate is 0 (outputs tuned off).

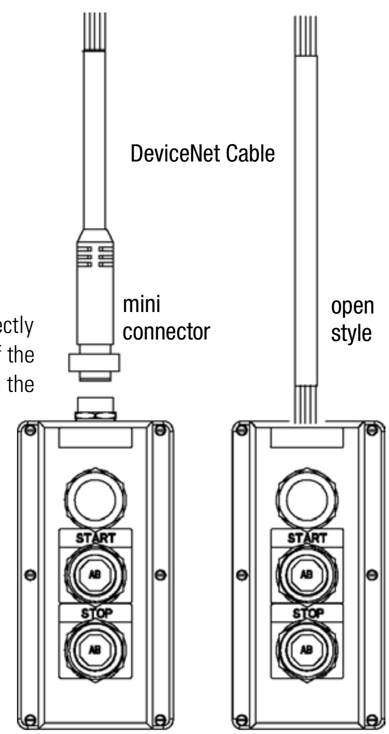
More

See Chapter 2 of the RediSTATION Operator Interface User Manual, publication 2705-UM001A-EN-P, for complete information about setting the DIP switches to configure the node address, data rate, output flash rate, and output fault state.

Refer to the following illustration as you connect the RediSTATION to the network.

TIP You do not need to disconnect incoming power from the DeviceNet network before connecting the RediSTATION.

The DeviceNet cable connects directly to the mini connector on the top of the RediSTATION enclosure or through the conduit opening (open style).

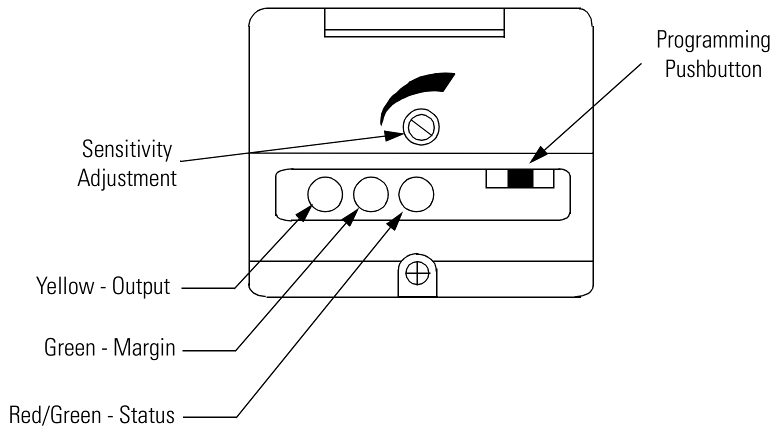


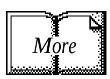
Installing the Series 9000 Photoeye

Connect the photoeye to the network and configure the photoeye as follows:

- Node Address: 9
- Operating Mode: Light Operate (default)
- Baud Rate: 500 kb

Top View of Series 9000 Photoeye



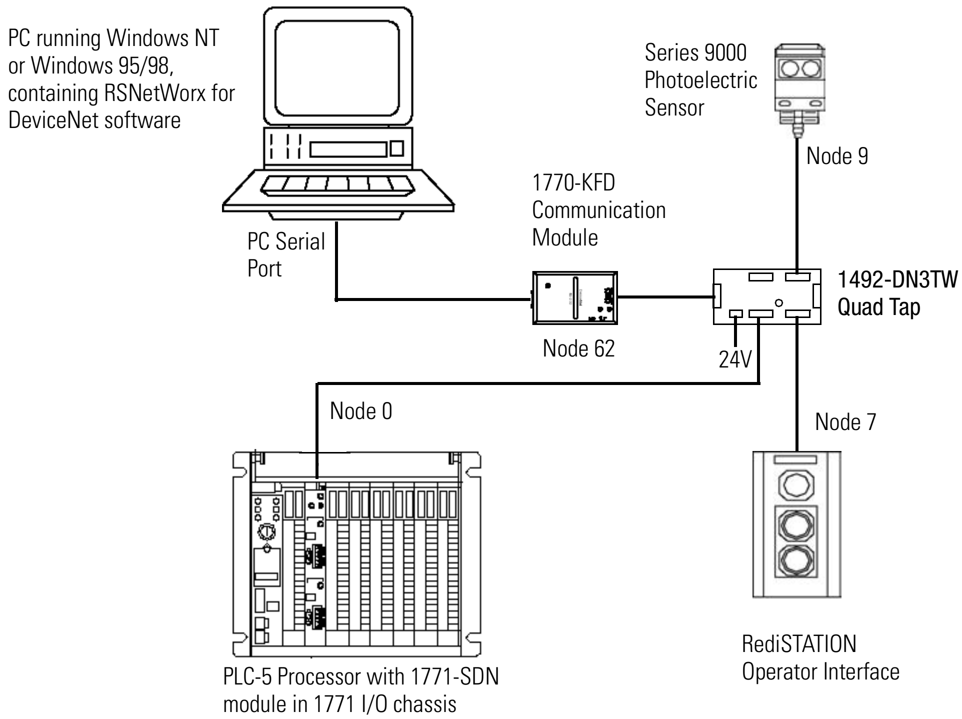


For detailed directions, see the instructions that came with your photoeye.

For a detailed example of node commissioning using RSNetWorx, refer to page 4-7 of this manual.

How Your Example System Will Look

When you have finished installing all the devices, your example system should look similar to the one shown below:



IMPORTANT Make sure **each end** of your DeviceNet trunk cable is properly terminated with a resistor. Refer to the DeviceNet Cable Planning and Installation Manual, publication DN-6.7.2 for detailed information.

What's Next?

The next step is to configure the 1771-SDN module and perform I/O data mapping using RSNetWorx for DeviceNet software.

Notes

Configuring the DeviceNet Network

What This Chapter Contains

This chapter describes how to configure the DeviceNet network using RSLinx and RSNetWorx for DeviceNet software. The following table describes what this chapter contains and where to find specific information.

Installing the Software

Install the **RSLinx** and **RSNetWorx** software.

1. Insert the CD in the CD-ROM drive.

   Note: The CD-ROM supports Windows Autorun. Once inserted into the CD-ROM drive, if you have Autorun configured, the installation will automatically start at the first setup screen.

   If Autorun is not configured for your CD-ROM drive, go to step 2.

2. From the **Start** menu, choose Run.

   You will see the Run pop-up window.

3. Type **d:/setup** (if it doesn't appear automatically), where **d:** is your CD-ROM driver letter.

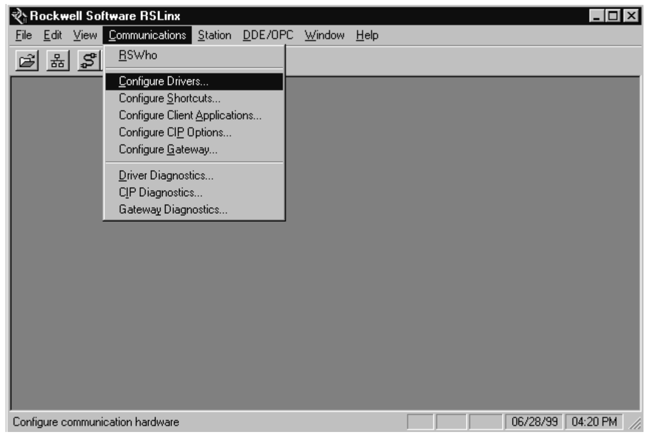
4. Click on **OK**.

   You see the progress bar, followed by the welcome screen.

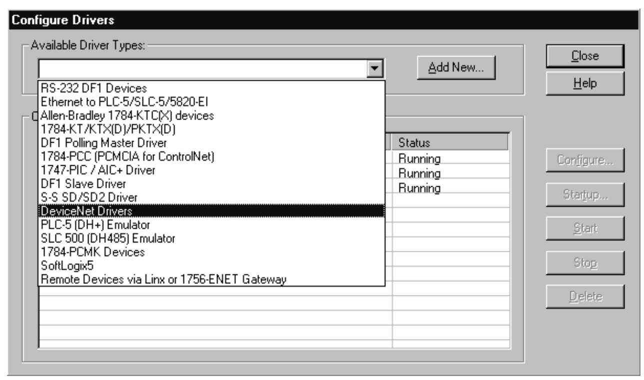
Using RSLinx to Configure the DeviceNet Driver

After you install the software, you use RSLinx to configure your DeviceNet driver and RSNetWorx for DeviceNet to configure the network.

1. Start the **RSLinx** software.

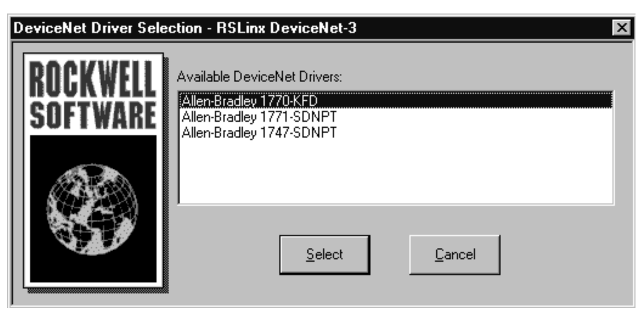


2. From the **Communications** menu, select **Configure Drivers**. The **Configure Drivers** window will appear.



3. From the list of **Available Drivers**, select **DeviceNet Drivers** and click on **Add/New**.

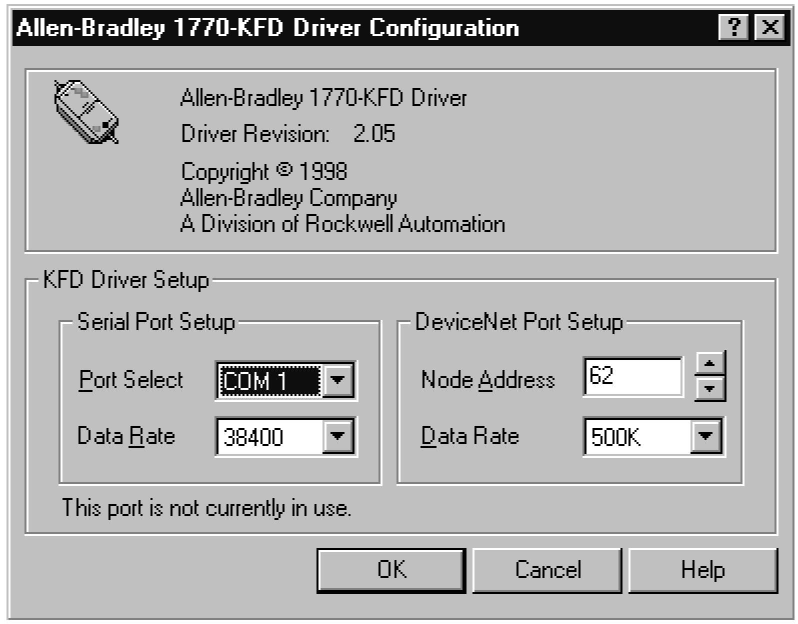
   You will see the following list of drivers:



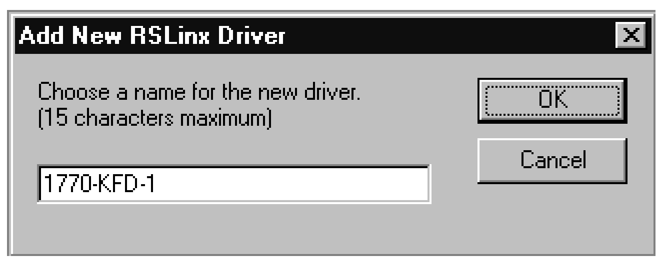
4. Select the **Allen-Bradley 1770-KFD** driver.

The **Allen-Bradley 1770-KFD Driver Configuration** window will appear.

Your driver setup will vary according to your system setup (COM port, Data Rate, Node Address). Choose the appropriate settings for your system. We set the DeviceNet Port Setup Data Rate to 500K for the example application.



5. Configure the driver using the example above as a guide and click on **OK**. The software will take a few seconds to configure the driver. When it is done the following prompt will appear:



6. Select the default driver name **1770-KFD-1** and click on **OK.**

7. **Close** RSLinx.

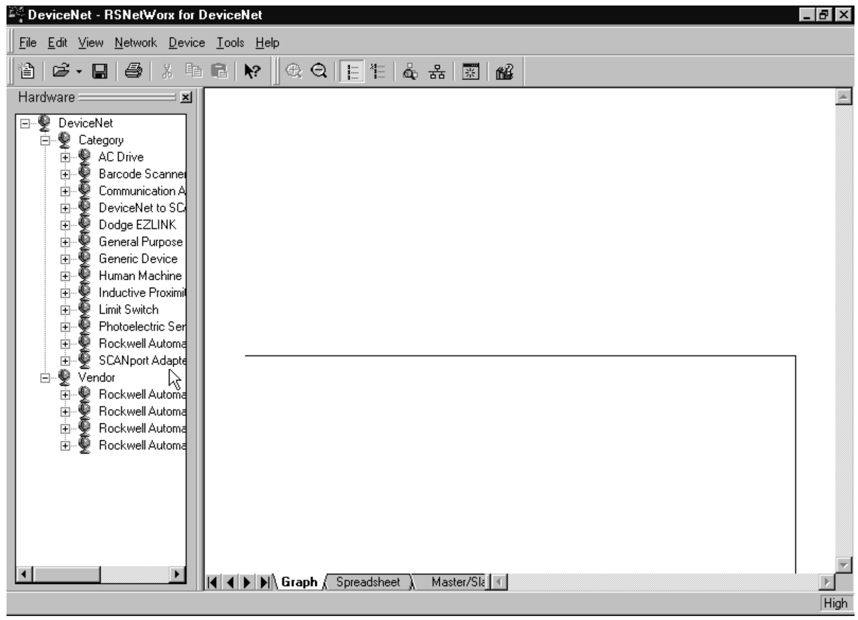
You will use the driver you just configured to browse and configure the network with RSNetWorx for DeviceNet.

Using RSNetWorx for DeviceNet to Configure the Scanlist

Setting Up an Online Connection

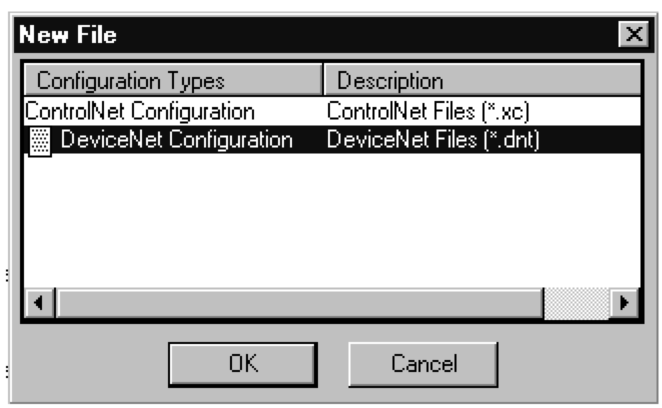
Follow the procedure below to set up an online connection to the DeviceNet network using the 1770-KFD driver.

1. Start **RSNetWorx**.

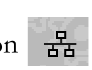


2. From the **File** menu, select **New**.

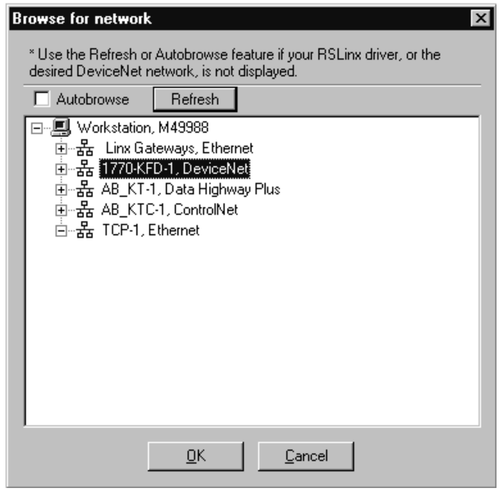
   If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



3. Highlight **DeviceNet Configuration** and click on **OK**.

4. Click on the **Online** button  on the toolbar.

The **Browse for network** window will appear. You will see the drivers you have configured on your system.

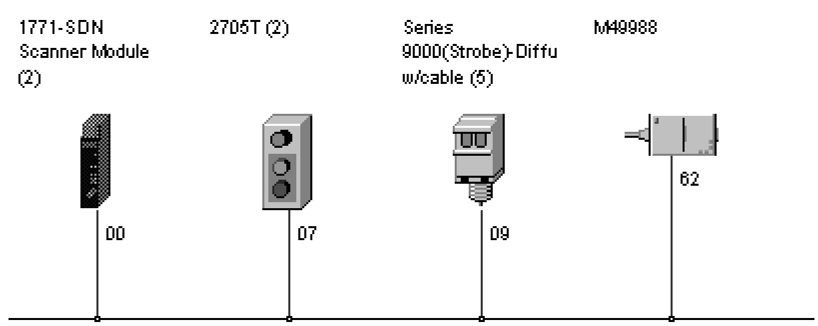


5. Select the **1770-KFD-1, DeviceNet** driver and click on **OK**.

You will be prompted to upload or download devices before going online.

6. Click on **OK** to go online and upload the network.

RSNetWorx for DeviceNet will begin browsing for network devices. When the software is finished browsing, the network displayed on your screen should look similar to the one shown below.



TIP

RSNetWorx for DeviceNet performs a one-shot browse when you go online or choose the browse feature. The software will poll for devices once and display the results. If a node which was online later goes offline, there will be no "live" indication in RSNetWorx. You must manually perform a browse to detect the missing node.

To perform the browse, press the  button.

Setting the 1771-SDN Node Address

Once the devices are uploaded, their node addresses appear to the right of their icons. For the example application, the 1771-SDN scanner module should have a node address of "0" (or "00"). If you need to change a module's node address, use the following procedure.

TIP

You can use this procedure to change the node address of other devices on the network (e.g., the Photoeye). You can also change the network data rate (baud rate) of some devices. Power must be cycled for baud rate changes to take effect.

If "00" appears to the right of the 1771-SDN icon and you do not need to change the node address or baud rate of any device, skip the remainder of this section and go to "Configuring the I/O Devices" on page 4-9.

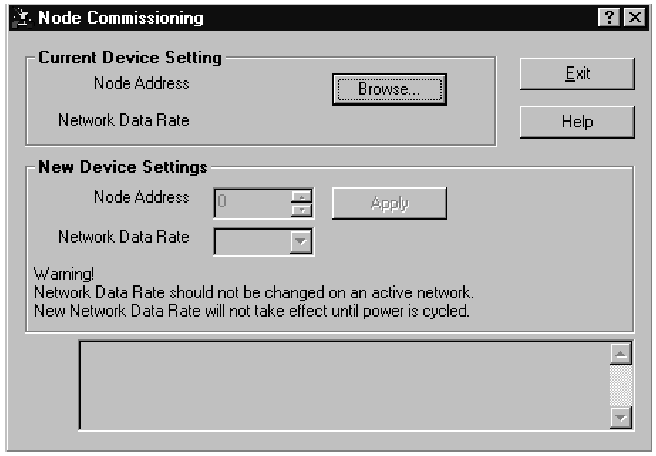
IMPORTANT

The network must not be active when performing node commissioning on the 1771-SDN module. Make sure the processor is in Program mode.

(Note that this applies only to the 1771-SDN. You may commission other devices with the processor in Run mode.)

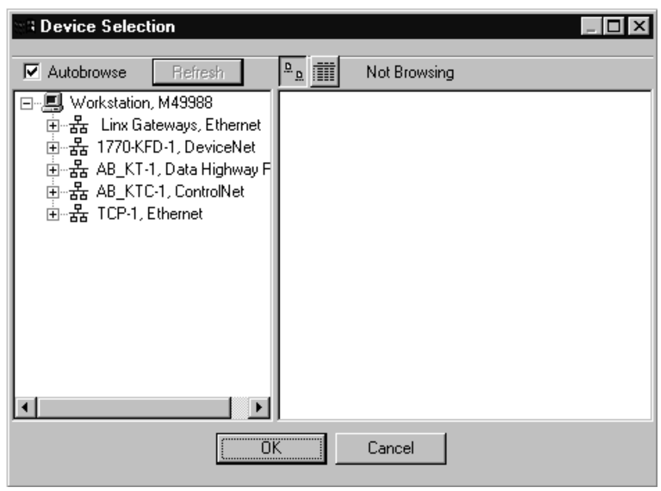
To change the node address of a device perform the following steps:

1. From the **Tools** menu select **Node Commissioning**.



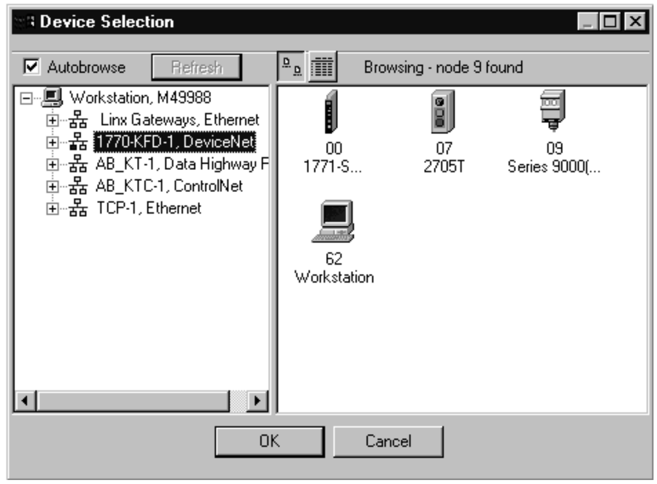
2. Click on the **Browse** button.

   You will see the **Device Selection** window.



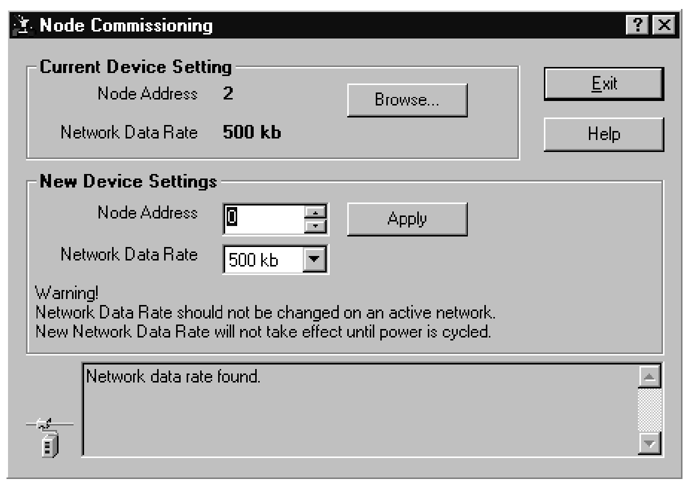
3. Select the **1770-KFD-1** driver.

The devices on the network will appear in the right panel.



4. Select the device from the right panel and click on **OK**.

   You will see the **Node Commissioning** window with the current settings for the device. Your window will look similar to the one shown below.



5. In the **New Device Settings: Node Address** box, enter the new node address (e.g., a **0** as shown above).

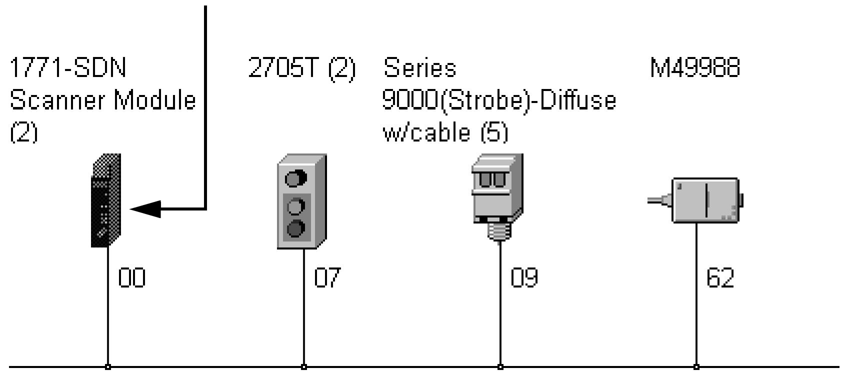
6. Click on **Apply**.

7. Click on **Exit** to close the window.

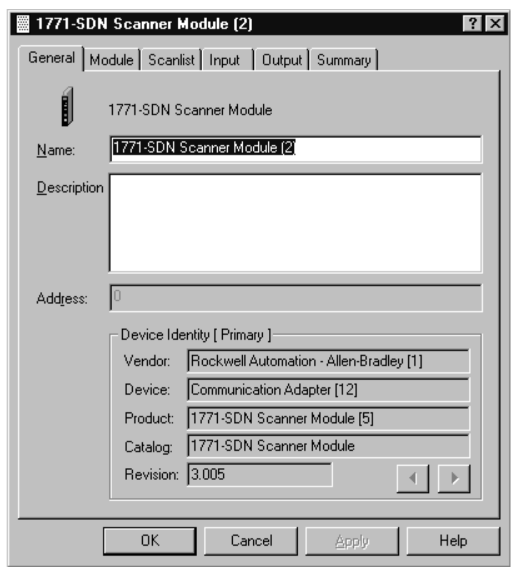
Configuring the I/O Devices

Next you must add the RediSTATION and the photoeye to the 1771-SDN's scanlist, configure and/or verify their parameters, and map them to the PLC-5 processor's memory.

1. Double-click on the **1771-SDN** module icon.

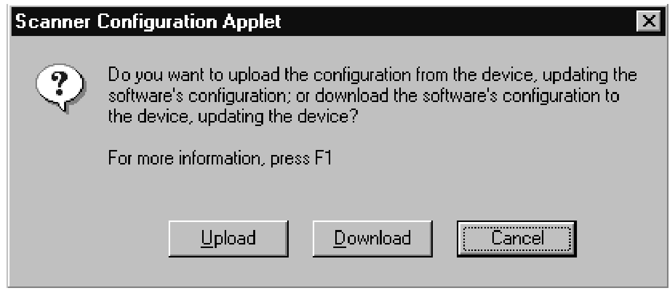


The following window will appear:



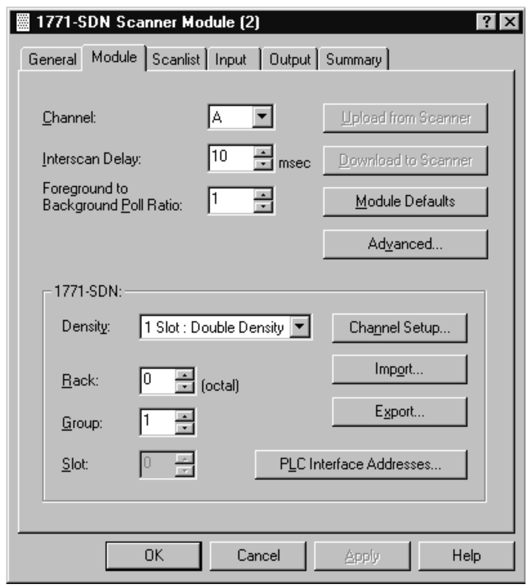
2. Select the **Module** tab.

You will be prompted to upload or download the configuration.



3. Click on **Upload**.

   After uploading the **Module** page will appear:



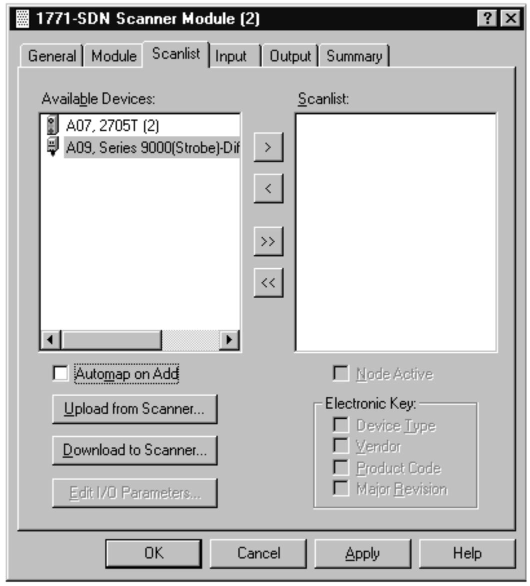
4. Make sure the 1771-SDN module's **Rack** and **Group** numbers are correct. We used Rack 0, Group 1 for the example application.

TIP

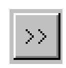
We used the Module Defaults for the other settings. For an explanation of the other settings (Import and Export, PLC Interface Address, etc.) click on the **Help** button.

5. Select the **Scanlist** tab.

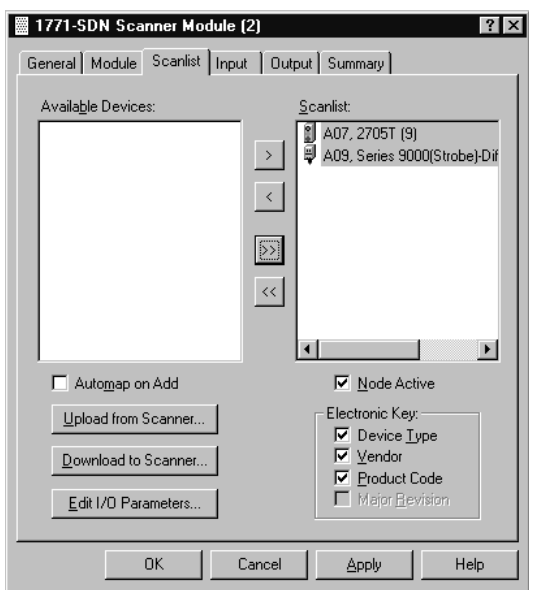
The **Scanlist** page will appear with the RediSTATION and the photoeye in the list of **Available Devices**.



6. For this example, uncheck the **Automap on Add** box, as shown above. You will do this mapping later.

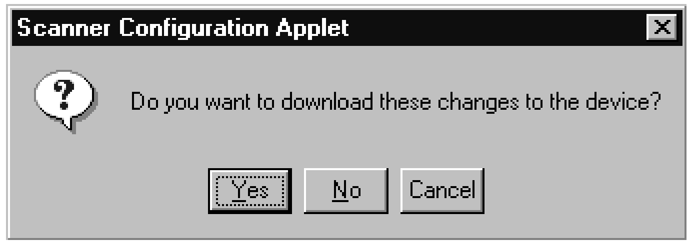
7. Click on the double arrow  button to add the photoeye and RediSTATION to the Scanlist.

   The photoeye and the RediSTATION will appear in the Scanlist in the right panel.



8. Click on **OK**.

You will be prompted to download the changes to the device (i.e., the scanner).

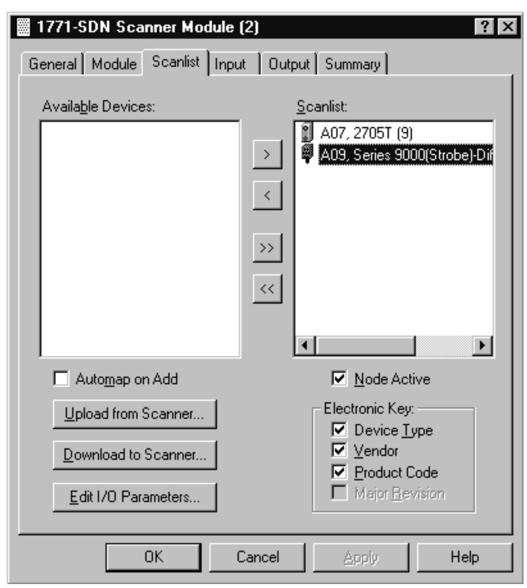


9. Click on **Yes**.

IMPORTANT The PLC-5 processor can be in either Program or Run mode to download the scanlist to the 1771-SDN module. However, if the PLC-5 is in Run mode, the scanner module must be in Idle mode. To put the scanner module into Idle mode, refer to Appendix E, Programming the PLC-5 Processor.

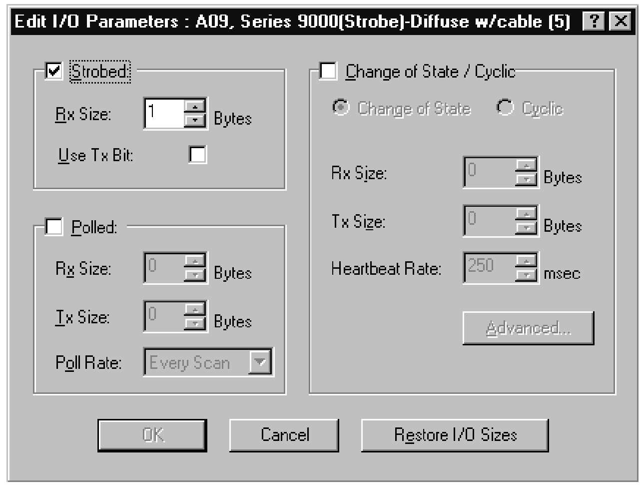
Verifying the Photoeye Configuration

1. Double-click on the **1771-SDN** module icon and again select the **Scanlist** tab.



2. Double-click on the photoeye in the Scanlist.

The **Edit I/O Parameters** window will appear for the photoeye.



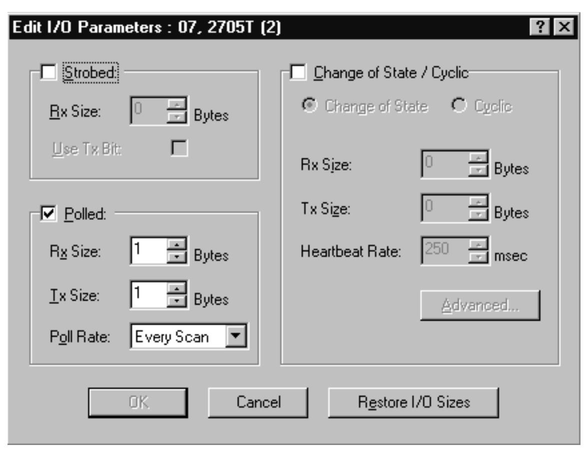
The I/O parameters define the configuration for the device in terms of how much and what data the device will exchange with the 1771-SDN module. By default, the photoeye will send 1 byte when it receives a strobe request. Recall from chapter 3 that the output of the photoeye will be returned in bit 0 of that byte.

3. Verify that the photoeye parameters are set as shown above. Make any changes as necessary and click on **OK**.

4. Close the **Edit I/O Parameters** window for the photoeye.

Verifying the RediSTATION Configuration

1. Double-click on the **RediSTATION** in the Scanlist window. The **Edit I/O Parameters** window will appear for the RediSTATION.



2. Make sure that the **Polled** box is checked and that the **Rx Size** and **Tx Size** are each 1 byte.

3. Click on **OK** if you made any changes and close the **Edit I/O Parameters** window for the RediSTATION.

4. Click on **OK** again. You will be prompted to download the changes to the 1771-SDN module.

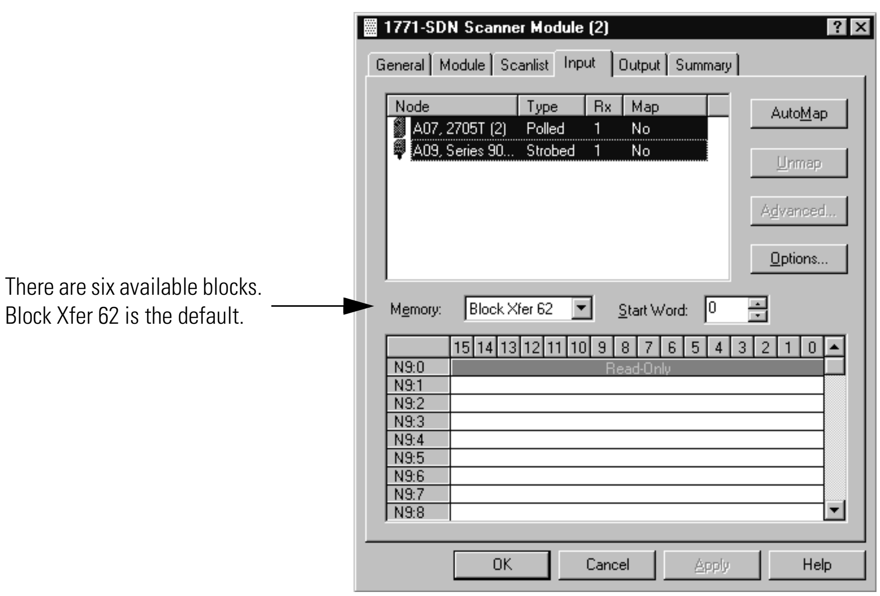
5. Click on **Yes** to download the new configuration.

AutoMapping the Devices into the Scanlist

Follow the procedure below to automatically map the photoeye and RediSTATION to the PLC-5 processor.

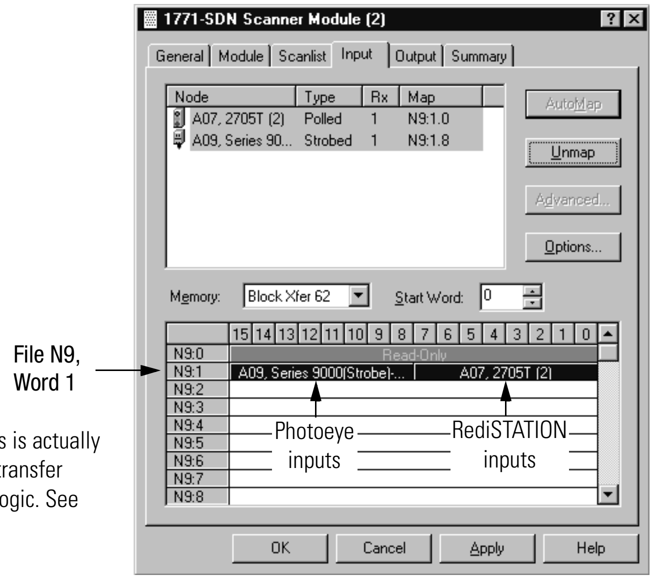
TIP If you want to know how to map the devices manually, click on the **Help** button at the bottom of the screen and select "Map device input data manually". RSNetWorx for DeviceNet **Help** also presents detailed information on "Advanced Mapping".

1. Double-click on the **1771-SDN** module icon and select the **Input** tab. You will see the following window.



2. Highlight the RediSTATION and the photoeye as shown above and click on the **AutoMap** button.

   The resulting device mapping will appear in the lower panel of the window:



Note: The source address is actually determined by the block transfer instruction in the ladder logic. See chapter 6.

In this example, the input byte from the RediSTATION will appear in the PLC-5 processor in file N9, word 1, as bits 0-7. Recall from chapter 2 that the START button is bit 1 and the STOP button is bit 0. Therefore, the addresses for the RediSTATION inputs are:

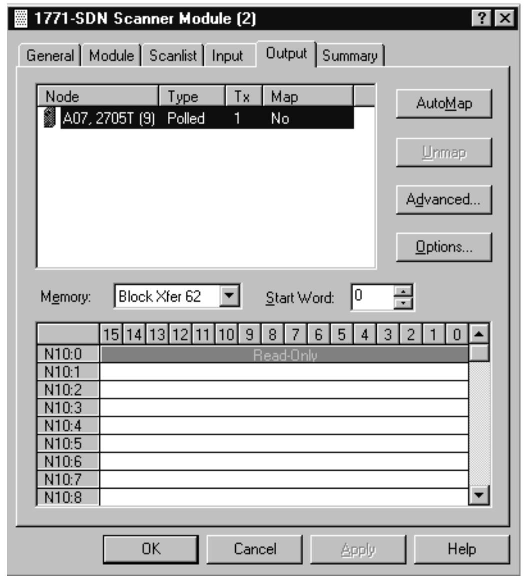
START N9:1.1
STOP N9:1.0

The input byte from the photoeye will appear in the PLC-5 processor in file N9, word 1, as bits 8-15. Recall from chapter 3 that the input bit is bit 0. Therefore, the address of the photoeye input bit is:

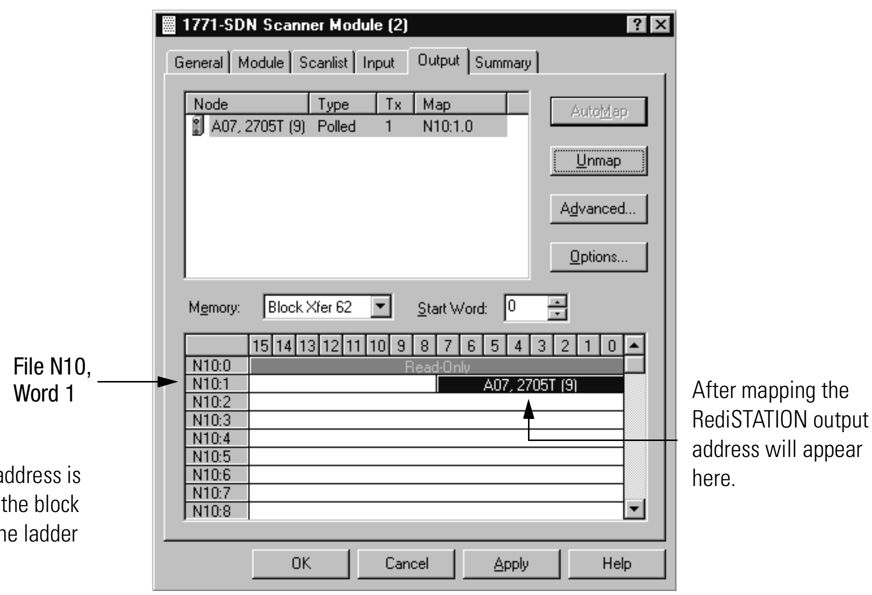
N9:1.8

3. **Note the addresses assigned to the START and STOP buttons and the photoeye in your system.** You will enter these addresses in the example ladder program.

4. Select the **Output** tab.



Highlight the RediSTATION as shown above and click on the **AutoMap** button. The mapping of the RediSTATION will appear in the lower panel.



Note: The destination address is actually determined by the block transfer instruction in the ladder logic. See chapter 6.

In this example, the output to the RediSTATION appears in the PLC-5 processor in file N10, word 1, as the lower byte (bits 0-7). Recall from chapter 3 that the indicator light is output bit 0. Therefore, the address for the RediSTATION's indicator light is:

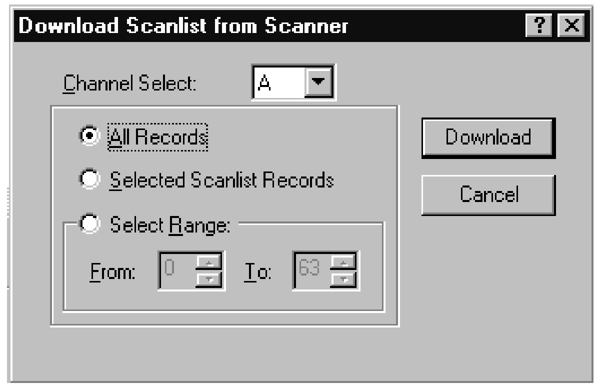
N10:1.0

5. **Note the address assigned to this output in your system.** You will enter this address in the example ladder logic program.

Download the Configuration to the Scanner

1. Click on the **Scanlist** tab and then on the **Download to Scanner** button.

   You will see this window:



2. Select Channel **A** (default).

   Note: Both channels will download.

3. Select **All Records**.

4. Click on the **Download** button to download the configuration to the 1771-SDN scanner module.

5. Click on the **OK** button to complete the DeviceNet scanner configuration.

6. Select the **Save as** option from the File menu, and save the DeviceNet configuration, using an appropriate name, e.g., **1771-SDN.dnt.**

7. **Close** the RSNetWorx for DeviceNet software.

What's Next?

The next chapter describes how to configure the DeviceNet network remotely from other networks: Ethernet, ControlNet, and Data Highway Plus.

Notes

Chapter 5

Communicating with DeviceNet from Another Network

What This Chapter Contains

This chapter describes how to communicate with the DeviceNet network from another network, using the PLC-5 “pass-through” feature. This feature can be used to adjust and fine tune the nodes on your network. Examples are provided for communicating from a ControlNet network, an Ethernet network, and a Data Highway Plus network.

ATTENTION

The pass-through feature is not intended to replace a 1770-KFD, PCD, PCID, or PCIDS connection to the network:

- Pass-through is intended only for fine tuning and adjustment of your network devices. Do not attempt to configure your entire network using a pass-through driver, or a time-out may occur.
- The pass-through method is not suitable for real time monitoring of your network devices.

IMPORTANT

To use the pass-through feature you must have the following versions of the RSLinx software and 1771-SDN module firmware:

Component	Software/Firmware Version
RSLinx software	2.10 or higher
1771-SDN module	4.003 or higher

You must have previously set up the network you will use to communicate with the DeviceNet network and have installed and configured the appropriate drivers and interface hardware. The 1771 I/O chassis used for these examples was set up with the following hardware mapping:

Module	Rack	Group	Slot	IP Address
PLC-5C/1785-ENET	0	0	0	192.168.1.1
1771-SDN	0	1	0	n/a

The following table describes what this chapter contains and where to find specific information.

Where to Find More Information

Refer to the following publications for information on configuring other networks:

For information about:	See this publication:	Publication number:
the ControlNet PLC-5 processor	ControlNet PLC-5 Programmable Controllers User Manual	1785-UM022B-EN-P
the Ethernet interface module	PLC-5 Ethernet Interface Module User Manual	1785-6.5.19
TCP/IP protocol and networking in general	Comer, Douglas E., *Internetworking with TCP-IP, Volume 1: Protocols and Architecture*, 2nd ed. Englewood Cliffs, N.J.:Prentice-Hall, 1995. ISBN 0-13-216987-8.	n/a
	Tannebaum, Andrew S. *Computer Networks*, 2nd ed. Englewood Cliffs, N.J.: Prentice-Hall, 1989. ISBN 0-13-162959-*X*.	n/a

Communicating with DeviceNet from a ControlNet Network

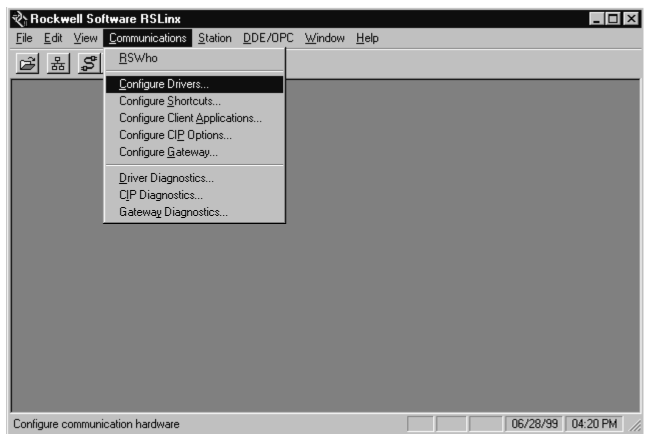
Before performing this example the ControlNet network must be configured and running. A ControlNet processor (PLC-5C) is required. In this example the PLC-5C processor is configured as ControlNet node 16. Use your own ControlNet PLC-5C processor's configuration when performing this example.

Configuring the DeviceNet Pass-Through Driver

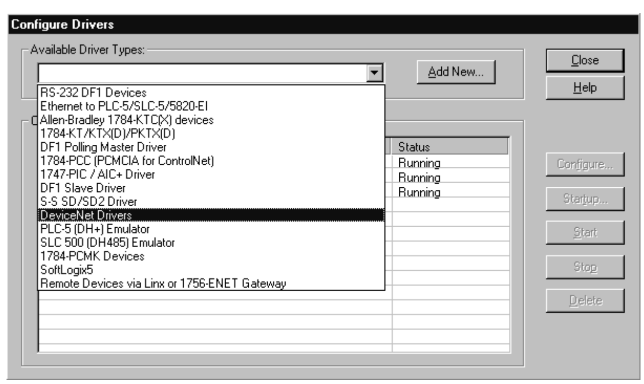
Before you can communicate with the 1771-SDN module via the ControlNet network, you must first configure the DeviceNet pass-through driver (1771-SDNPT) with a ControlNet port. RSLinx, version 2.10 or higher, is required.

To configure the ControlNet pass-through driver perform the following steps:

1. Start **RSLinx**.

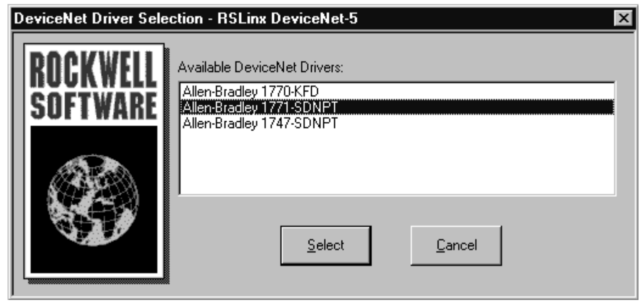


2. From the **Communications** menu, select **Configure Drivers**.

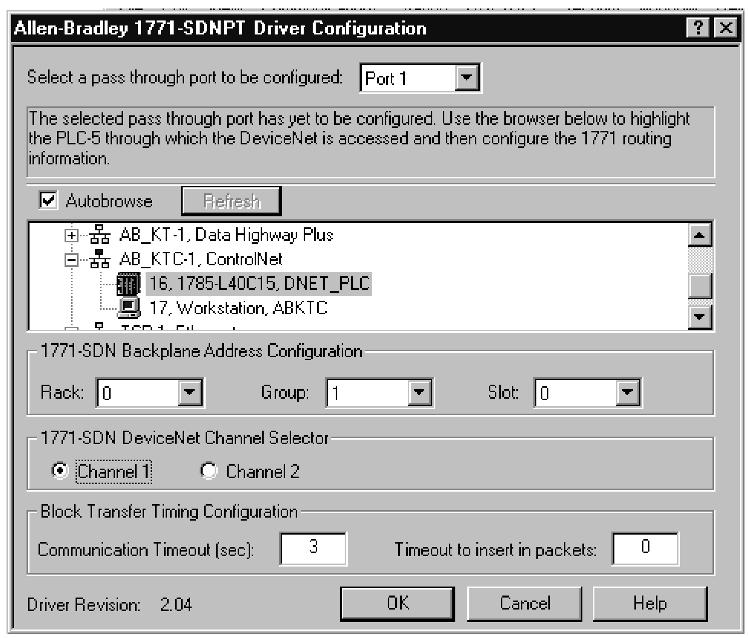


3. From the list of **Available Driver Types** select **DeviceNet Drivers** and click on **Add/New**.

You will see the following list of drivers.



4. Select the **Allen-Bradley 1771-SDNPT** driver. The **Driver Configuration** window will appear.



5. Select a pass-through port to be configured from the pull-down list, e.g., **Port 1**.

IMPORTANT You must configure each port for each DeviceNet channel on the scanner module. If there are more than two scanner modules (four DeviceNet channels) on your system, you will need more than one driver configured for connection to the PLC-5.

6. Expand your installed ControlNet driver (**AB_KTC-1** in the example) and highlight your PLC-5C processor.

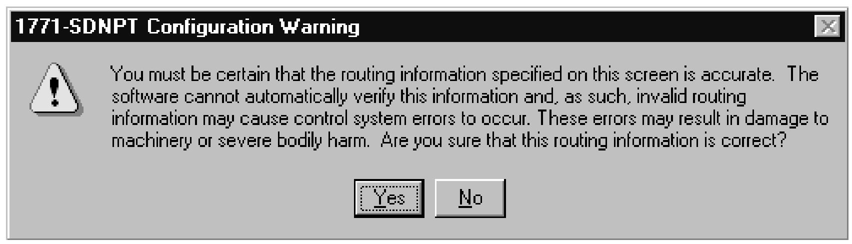
7. Select the **1771-SDN Backplane Address Configuration**. We used the following configuration for the example application.

Rack	0
Group	1
Slot	0

8. Select the DeviceNet Channel (**Channel 1** for the example application).

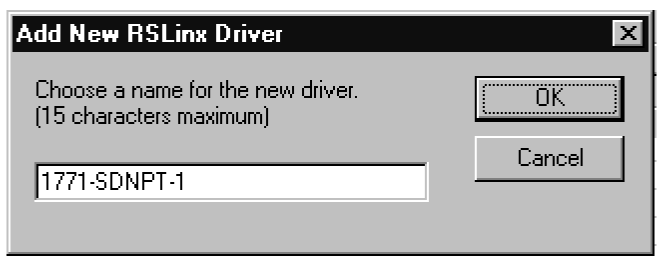
9. Click on **OK**.

   You will see the following warning:



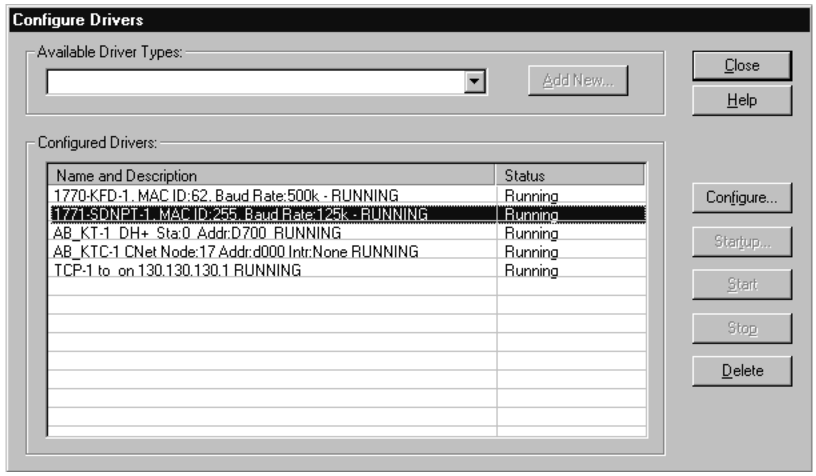
10. Verify that the routing information is accurate and click on the **Yes** button.

    You will be prompted to choose a name for the driver.



11. Enter an appropriate driver name (e.g., **1771-SDNPT-1**) and click on the **OK** button.

The new driver will be added to the **Configured Drivers** in RSLinx. (Your list will contain the drivers you have configured.)



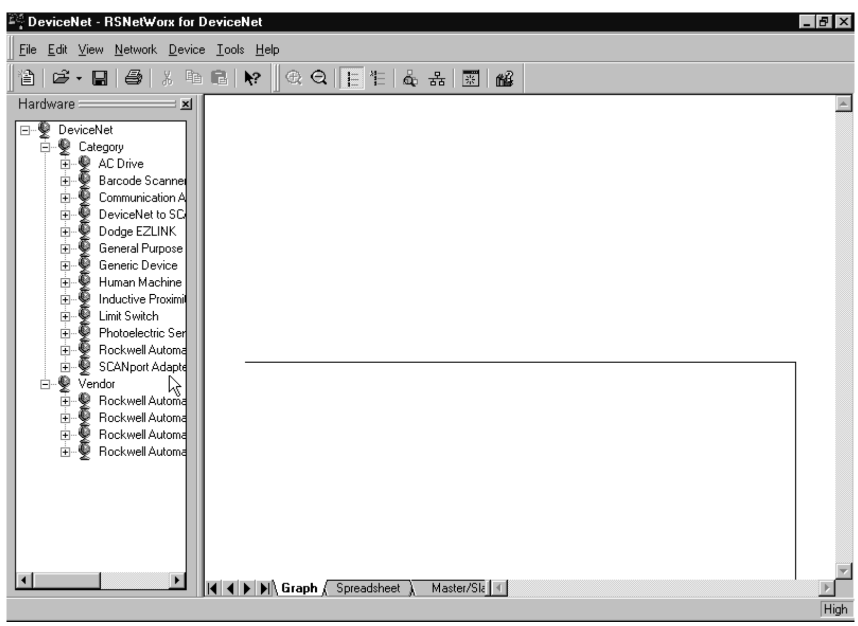
12. Close or **Minimize** RSLinx.

Communicating with the DeviceNet Network

Once you have the ControlNet pass-through driver configured, you can use RSNetWorx for DeviceNet to communicate with the DeviceNet network via the ControlNet network.

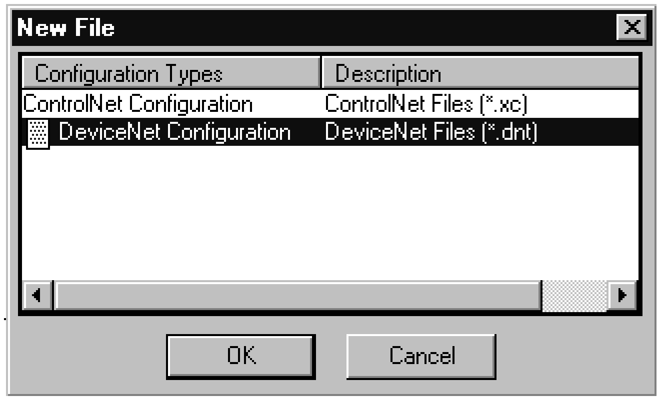
Perform the following steps:

1. Start **RSNetWorx**.

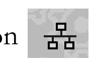


2. From the **File** menu, select **New**.

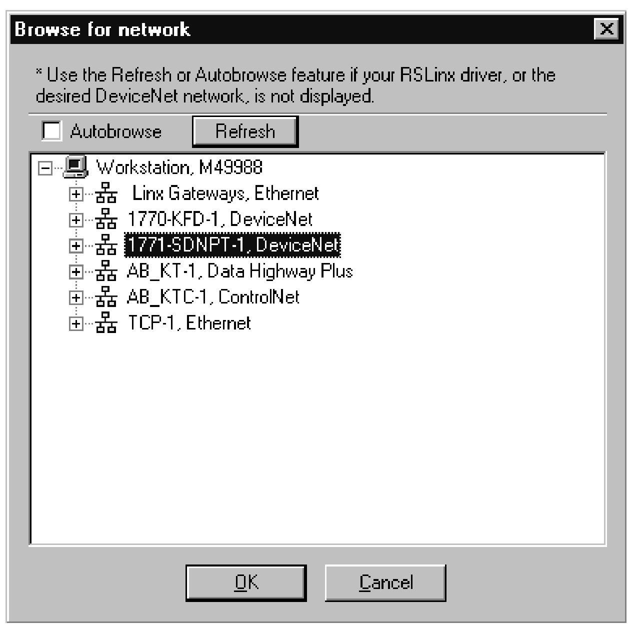
If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



3. Select **DeviceNet Configuration** and click on **OK**.

4. Click on the **Online** button  on the toolbar.

The **Browse for network** window will appear. You will see the drivers you have configured on your system.



5. Highlight your DeviceNet pass-through driver (**1771-SDNPT-1** above) and click on **OK**.

You will receive the following prompt:

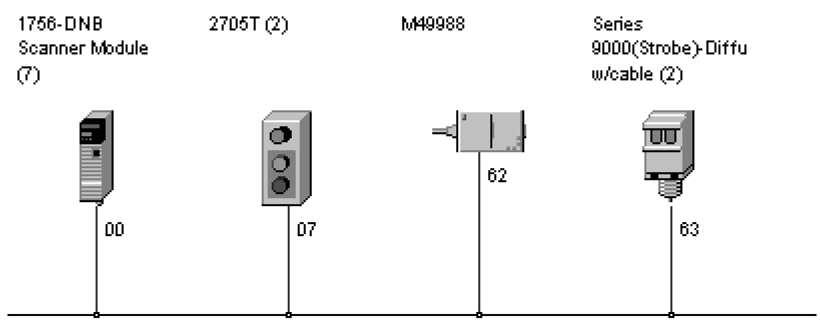
6. Click on **OK** to upload the devices. RSNetWorx for DeviceNet will begin browsing for network devices.

ATTENTION

Performing a pass-through browse via the ControlNet network will take longer than browsing using the 1770-KFD DeviceNet driver as described in chapter 4.

Note that due to the time required, the pass-through method is not suitable for configuring a network nor for real time monitoring of your network devices.

When RSNetWorx for DeviceNet is finished browsing, the network displayed on your screen should look similar to the one shown below.



You are now communicating with the DeviceNet network via the ControlNet network. See pages 4-6 to 4-17 of this manual for examples of how to use RSNetWorx for DeviceNet to adjust network parameters.

Communicating with DeviceNet from an Ethernet Network

Before performing this example the Ethernet network must be configured and running. A 1785-ENET module must be installed on the PLC-5 processor and connected to the network.

See the PLC-5 Ethernet Interface Module User Manual (publication 1785-6.5.19) for more information.

Establishing Ethernet pass-through communications involves four main steps:

1. You use RSLinx to configure the Ethernet to PLC-5 driver. This procedure is described on pages 5-9 to 5-11.

2. You configure the 1785-ENET module's communications channel and download the configuration to the PLC-5 processor. This can be done using RSLogix 5 software when you create the example ladder program. The Ethernet channel configuration is described in Appendix A.

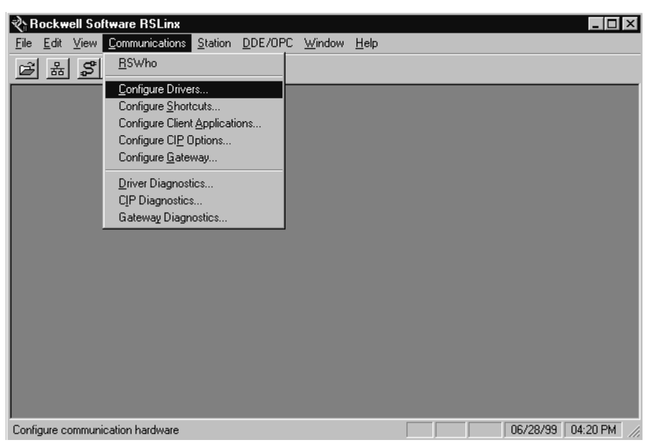
3. You use RSLinx to configure the DeviceNet pass-through driver to communicate with the 1771-SDN module via the Ethernet network. This procedure is described on pages 5-12 to 5-15.

4. You use the pass-through driver with RSNetWorx for DeviceNet software to adjust and tune your DeviceNet network. This procedure is described on pages 5-15 to 5-17.

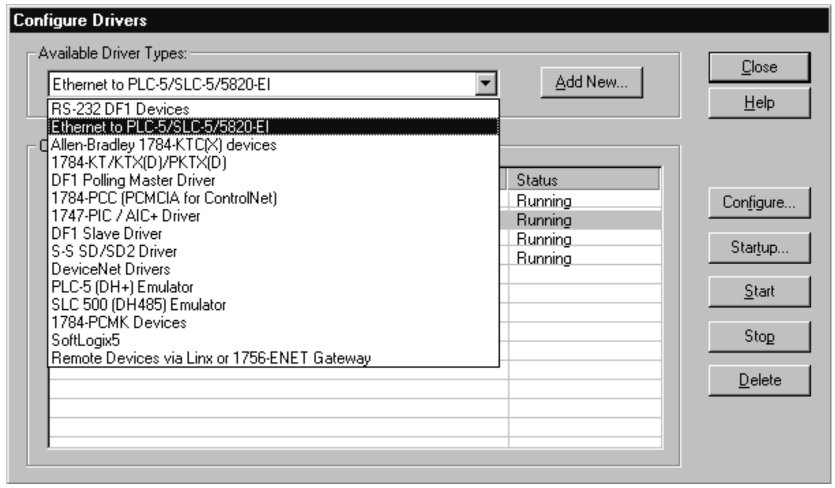
Configuring the Ethernet to PLC-5 Communications Driver

To communicate with your PLC-5 processor over an Ethernet network you must configure the Ethernet to PLC-5 driver. Perform the following steps to configure the driver using RSLinx software.

1. Start **RSLinx**.

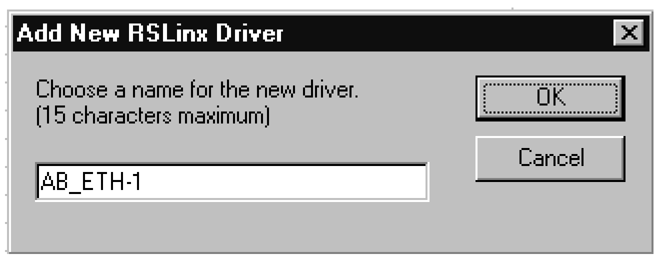


2. From the **Communications** menu, select **Configure Drivers**.



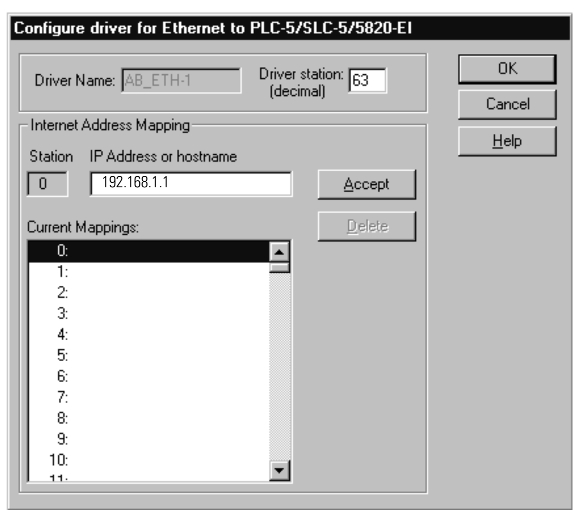
3. From the list of **Available Driver Types**, select the **Ethernet to PLC-5/SLC-5/5820-EI** driver and click on **Add New**.

You will be prompted to choose a name for the new driver.



4. Enter an appropriate driver name (e.g., **AB_ETH-1**) and click on the **OK** button.

The **Configure driver for Ethernet to PLC-5/SLC-5/5820-EI** window will open.

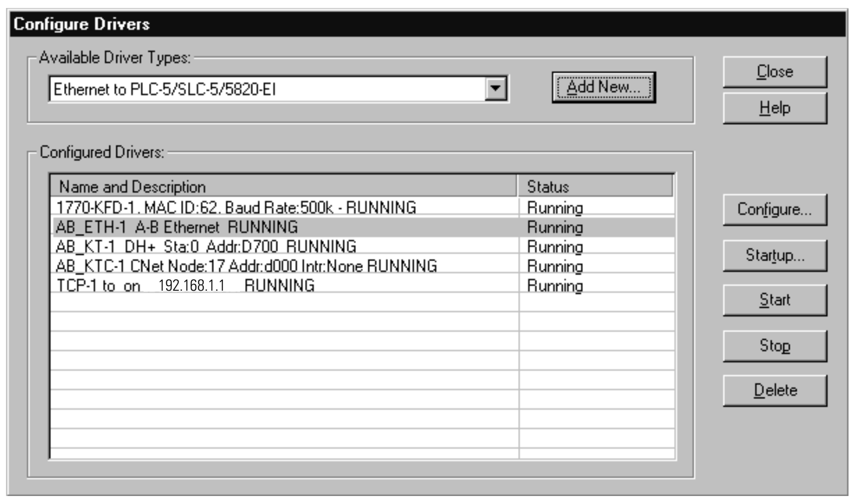


5. In the **IP address or hostname** field, enter the IP address of the PLC-5 processor (**192.168.1.1** in this example).

IMPORTANT You must configure the PLC-5's communications using BOOTP software or your PLC-5 programming software (e.g., RSLogix 5) before you will be able to communicate with the PLC-5 using this Ethernet address. See Appendix A for information on configuring the PLC-5's communications using RSLogix 5.

6. Click on the **Accept** button. Then click on **OK**.

The new driver will be added to the list of Configured Drivers in RSLinx. (Your list will contain the drivers you have configured.)

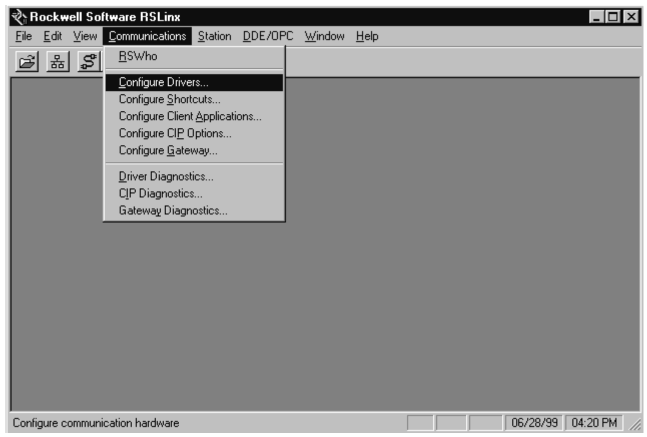


Configuring the DeviceNet Pass-Through Driver

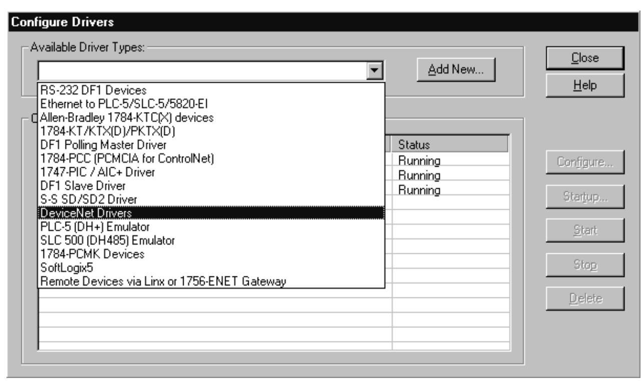
Before you can communicate with the 1771-SDN module via the Ethernet network, you must configure the DeviceNet pass-through driver (1771-SDNPT). RSLinx, version 2.10 or higher, is required.

Connect your 1785-ENET module to your Ethernet network. Then perform the following steps.

1. Start **RSLinx**.

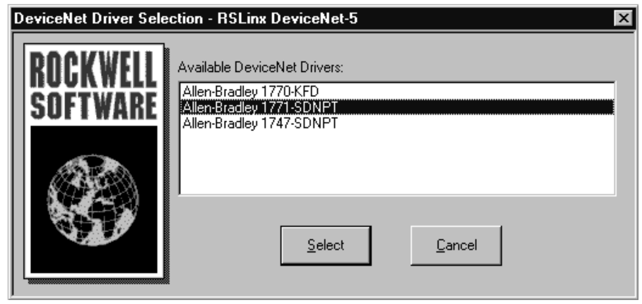


2. From the **Communications** menu, select **Configure Drivers**.



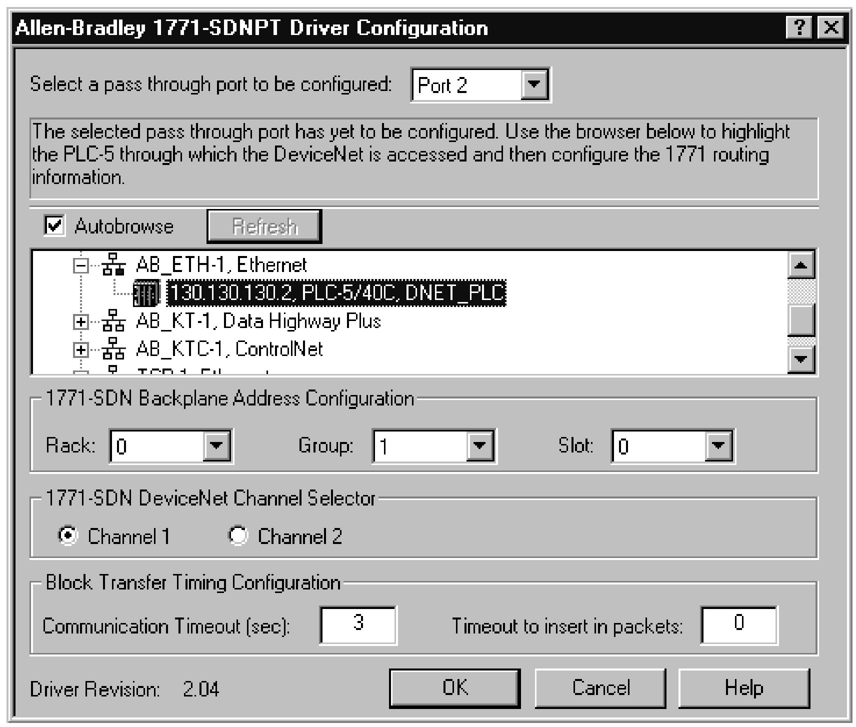
3. From the list of **Available Driver Types** select **DeviceNet Drivers** and click on **Add/New**.

You will see the following list of drivers.



4. Select the **Allen-Bradley 1771-SDNPT** driver.

   The **Allen-Bradley 1771-SDNPT Driver Configuration** window will open.



5. Select a pass-through port to be configured from the pull-down list, e.g., **Port 2**.

6. Expand your Ethernet driver (**AB_ETH-1**) and highlight your PLC-5 processor.

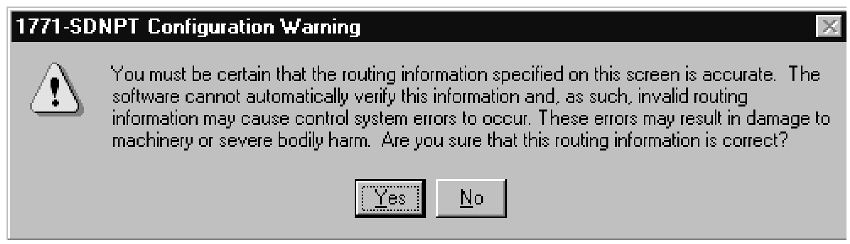
7. Select the **1771-SDN Backplane Address Configuration**. We used the following configuration for the example application.

Rack	0
Group	1
Slot	0

8. Select the DeviceNet channel (**Channel 1** for the example application).

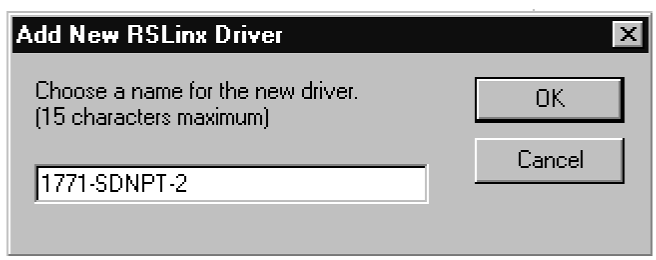
9. Click on **OK**.

   You will see the following warning:



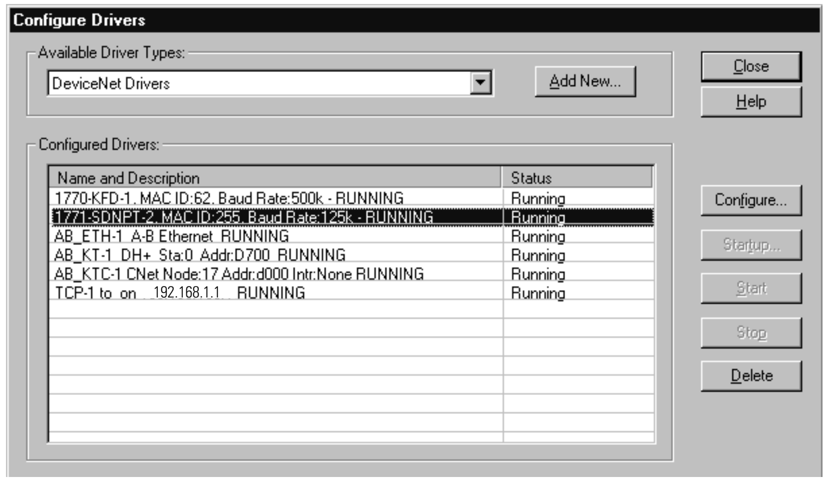
10. Verify that the routing information is accurate and click on the **Yes** button.

    You will be prompted to enter a name for the driver.



11. Enter an appropriate driver name (e.g., **1771-SDNPT-2**) and click on the **OK** button.

The new driver will be added to the list of **Configured Drivers** in RSLinx. (Your list will contain the drivers you have configured.)



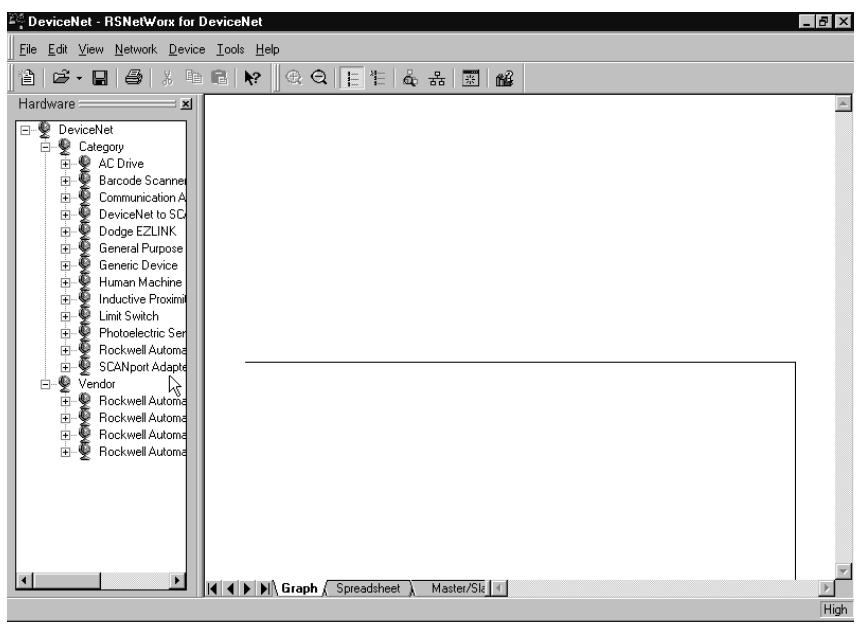
12. Close or **Minimize** RSLinx.

Communicating with the DeviceNet Network

Once you have the Ethernet pass-through driver configured, you can use RSNetWorx for DeviceNet to communicate with the DeviceNet network via the Ethernet network.

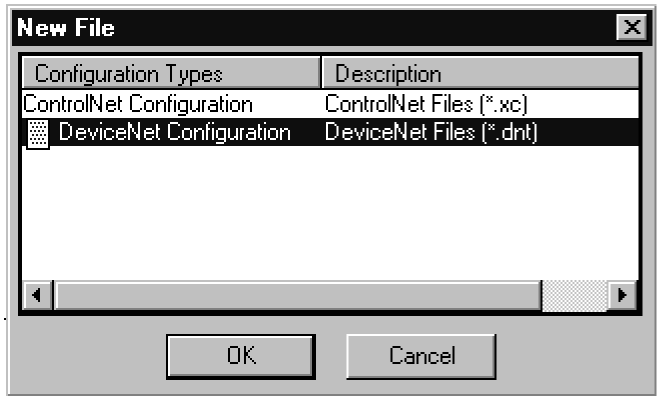
Perform the following steps:

1. Start **RSNetWorx**.

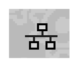


2. From the **File** menu, select **New**.

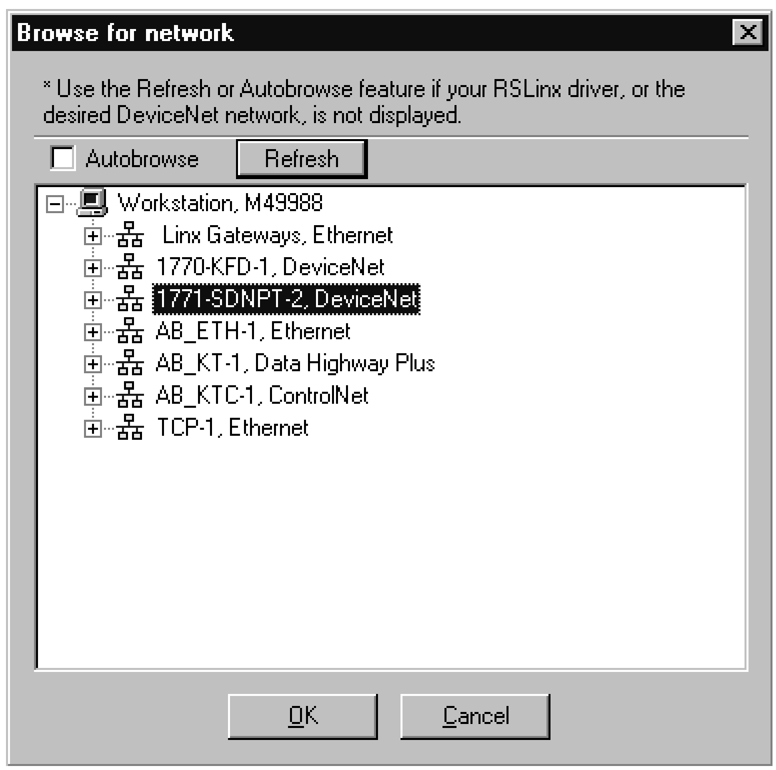
   If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



3. Select **DeviceNet Configuration** and click on **OK**.

4. Click on the **Online** button  on the toolbar.

   The **Browse for network** window will appear. You will see the drivers you have configured on your system.



5. Highlight the **1771-SDNPT-2, DeviceNet** driver and click on **OK**.

You will receive the following prompt:

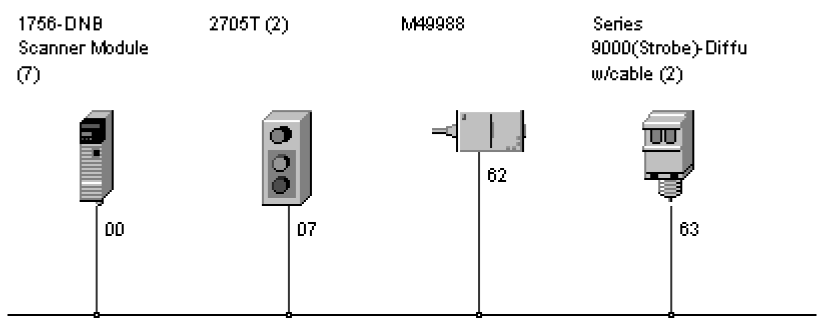
6. Click on **OK** to upload the devices. RSNetWorx for DeviceNet will begin browsing for network devices.

ATTENTION

Performing a pass-through browse via the Ethernet network will take longer than browsing using the 1770-KFD DeviceNet driver as described in chapter 4.

Note that due to the time required, the pass-through method is not suitable for configuring a network nor for real time monitoring of your network devices.

When RSNetWorx for DeviceNet is finished browsing, the network displayed on your screen should look similar to the one shown below.



You are now communicating with the DeviceNet network via the Ethernet network. See pages 4-6 to 4-17 of this manual for examples of how to use RSNetWorx for DeviceNet to adjust network parameters.

Communicating with DeviceNet from a DH+ Network

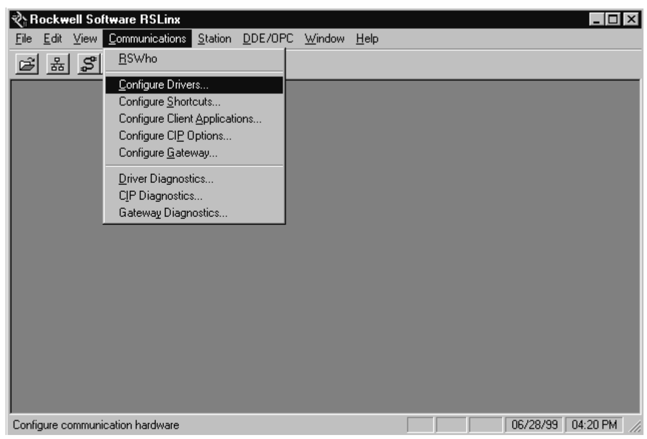
Before performing this example the DH+ network must be configured and running. In this example, the PLC-5 processor's DH+ channel A is configured as node 1. Use your own DH+ configuration when performing this example.

Configuring the DeviceNet Pass-Through Driver

Before you can communicate with the 1771-SDN module via a DH+ network, you must first configure the DeviceNet pass-through driver (1771-SDNPT) with a DH+ port. RSLinx, version 2.10 or higher, is required.

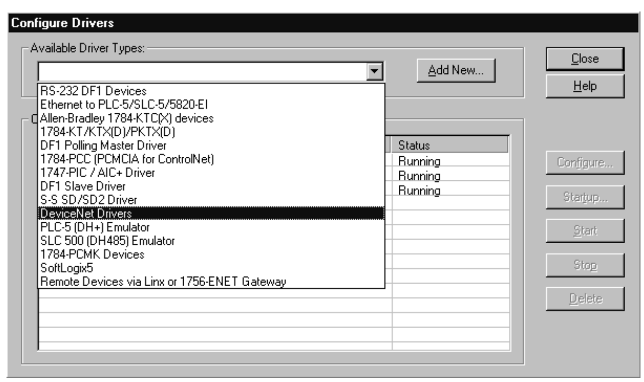
Perform the following steps.

1. Start **RSLinx**.



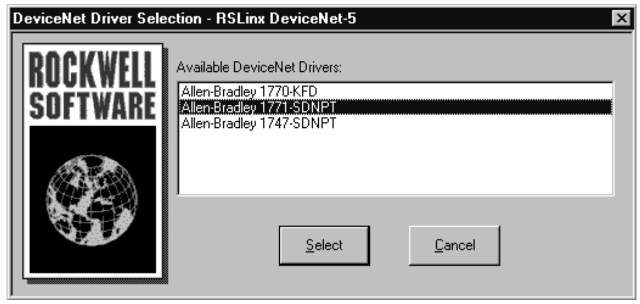
2. From the **Communications** menu, select **Configure Drivers**.

   The **Configure Drivers** window will appear.



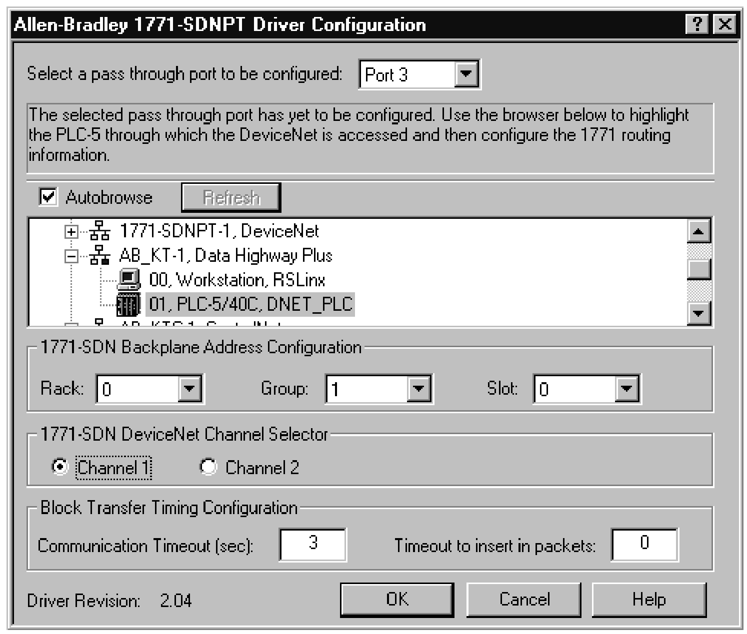
3. Select **DeviceNet Drivers** from the **Available Driver Types** pull-down list and click on **Add/New**.

You will see the following list of drivers.



4. Select the **Allen-Bradley 1771-SDNPT** driver.

   The **Driver Configuration** window will appear.



5. Select a pass-through port to be configured from the pull-down list, e.g., **Port 3**.

6. Expand your DH+ driver (**AB_KT-1** above) and highlight the PLC-5 processor.

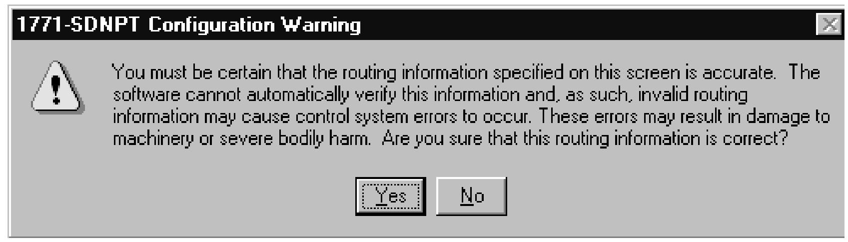
7. Select the **1771-SDN Backplane Address Configuration**. We used the following configuration for the example application.

Rack	0
Group	1
Slot	0

8. Select the DeviceNet Channel (**Channel 1** for the example application).

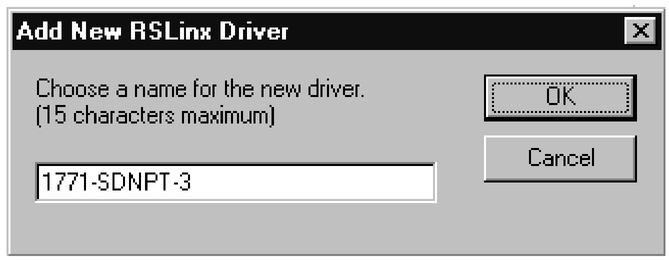
9. Click on **OK**.

   You will see the following warning:



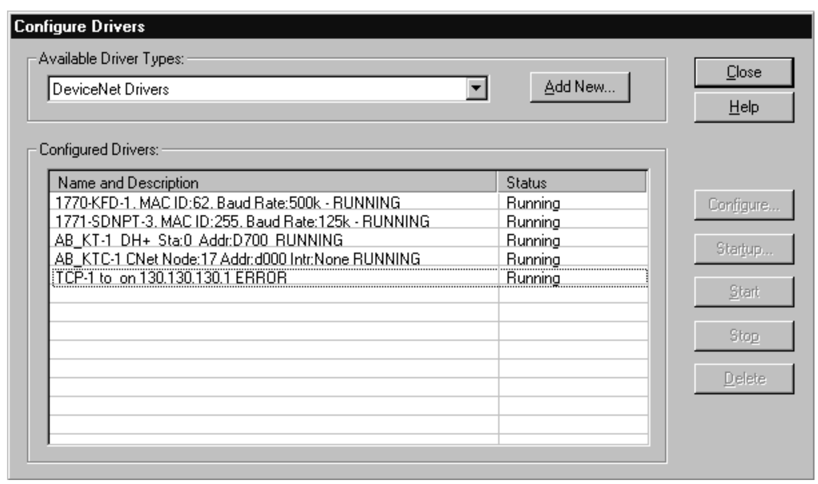
10. Verify that the routing information is accurate and click on the **Yes** button.

    You will be prompted to enter a name for the driver.



11. Enter an appropriate driver name (e.g., **1771-SDNPT-3**) and click on the **OK** button.

    The new driver will be added to the **Configured Drivers** in RSLinx. (Your list will contain the drivers you have configured.)



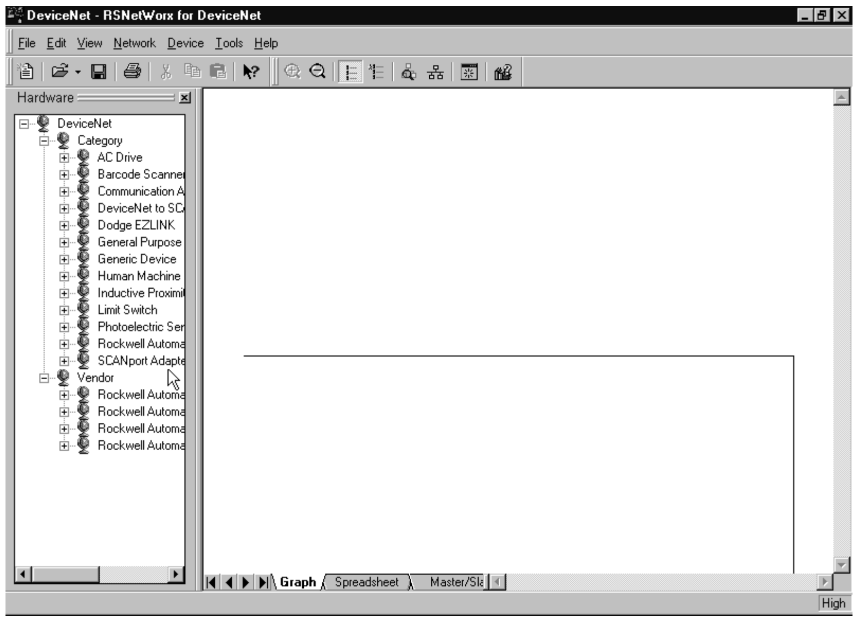
12. **Close** or **Minimize** RSLinx.

Communicating with the DeviceNet Network

Once you have the DH+ pass-through driver configured, you can use RSNetWorx for DeviceNet to communicate with the DeviceNet network via the DH+ network.

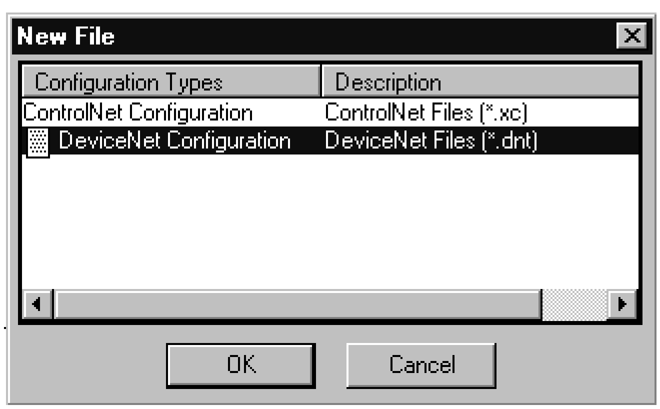
Perform the following steps:

1. Start **RSNetWorx**.

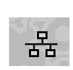


2. From the **File** menu, select **New**.

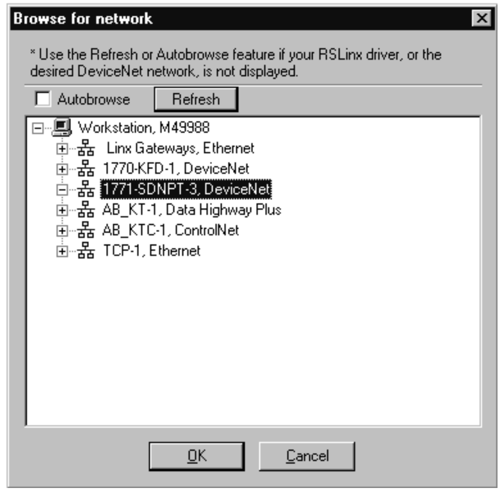
   If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



3. Select **DeviceNet Configuration** and click on **OK**.

4. Click on the **Online** button  on the toolbar.

The **Browse for network** window will appear. You will see the drivers you have configured on your system.



5. Highlight the **1771-SDNPT-3** driver and click on **OK**.

   You will receive the following prompt:

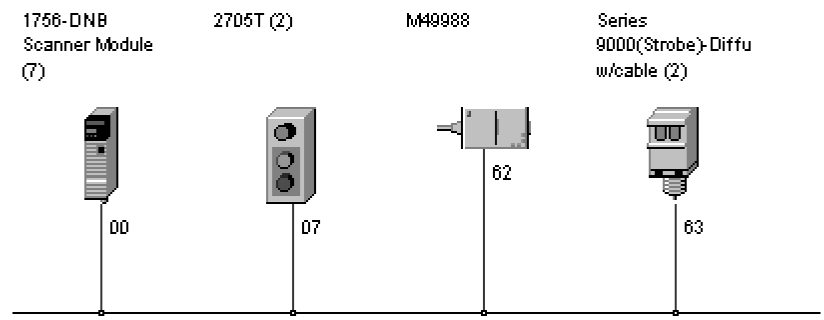
6. Click on **OK** to upload the devices. RSNetWorx for DeviceNet will begin browsing for network devices.

ATTENTION

Performing a pass-through browse via the DH+ network will take longer than browsing using the 1770-KFD DeviceNet driver as described in chapter 4.

Note that due to the time required, the pass-through method is not suitable for configuring a network nor for real time monitoring of your network devices.

When RSNetWorx for DeviceNet is finished browsing, the network displayed on your screen should look similar to the one shown below.



You are now online to the DeviceNet network via the Data Highway Plus network. See pages 4-6 to 4-17 of this manual for examples of how to use RSNetWorx for DeviceNet to adjust network parameters.

What's Next?

The next chapter describes how to create and run the example application program to test the DeviceNet Network.

Notes

Creating and Running the Example Application Program

What This Chapter Contains

This chapter describes the procedure to create, download, and run an example ladder logic program to test the DeviceNet network. When the program is put into Run mode, pressing the START button on the network's RediSTATION will cause the red indicator light to come on and stay on until the STOP button is pressed. Passing an object in front of the photoeye will increment a counter.

This chapter provides examples of downloading and running the program over ControlNet, Ethernet, and Data Highway Plus networks. You cannot directly communicate with the PLC-5 processor over the DeviceNet network.

The 1771 I/O chassis used for these examples was set up with the following hardware:

Module	Rack	Group	Slot	IP Address
PLC-5/1785-ENET	0	0	0	192.168.1.1
1771-SDN	0	1	0	n/a

The following table describes what this chapter contains and where to find specific information.

More

For more information, see Getting Results With RSLogix 5, Rockwell Software publication 9399-RL53GR.

Installing the Software

Install the **RSLogix 5** software.

1. Insert the CD in the CD-ROM drive.

   Note: The CD-ROM supports Windows Autorun. Once inserted into the CD-ROM drive, if you have Autorun configured, the installation will automatically start at the first setup screen.

   If Autorun is not configured for your CD-ROM drive, go to step 2.

2. From the **Start** menu, choose Run.

   You will see the Run pop-up window.

3. Type **d:/setup** (if it doesn't appear automatically), where **d:** is your CD-ROM driver letter.

4. Click on **OK**.

   You see the progress bar, followed by the welcome screen.

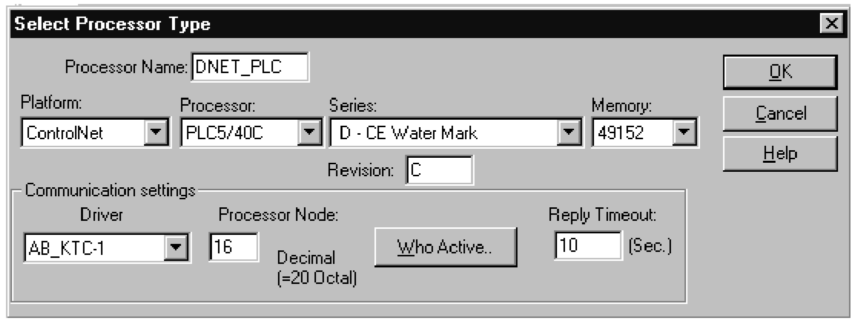
Creating the Example Application Program

Perform the following steps to create the example application program.

1. Start **RSLogix 5**.

2. From the **File** menu select **New**.

The **Select Processor Type** window will open.



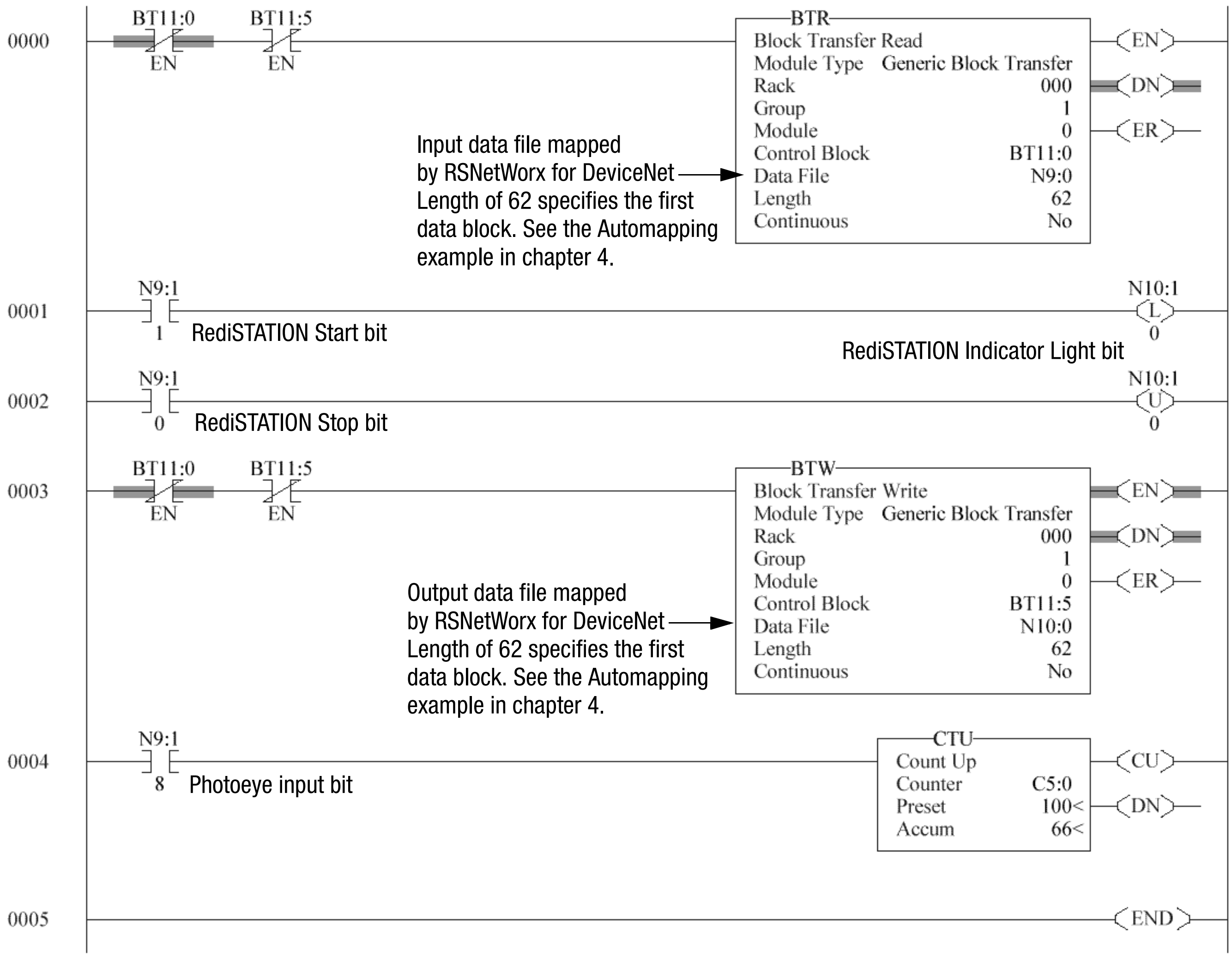
3. Enter the following information and click on **OK**.

In this field	Select or Enter
Processor Name	DNET_PLC
Platform	ControlNet
Processor	(Select your processor type)
Series	(Select your processor's series)
Revision	(Enter revision letter)
Driver	(Select a Driver)[1]
Processor Node	(Enter the Processor Node)[1]

(1) You can use the **Who Active** button to select your communications driver. This is described in the "Downloading" sections of this chapter.

TIP Ignore any prompts or warnings you receive about specifying ControlNet project files. That is not necessary for this example.

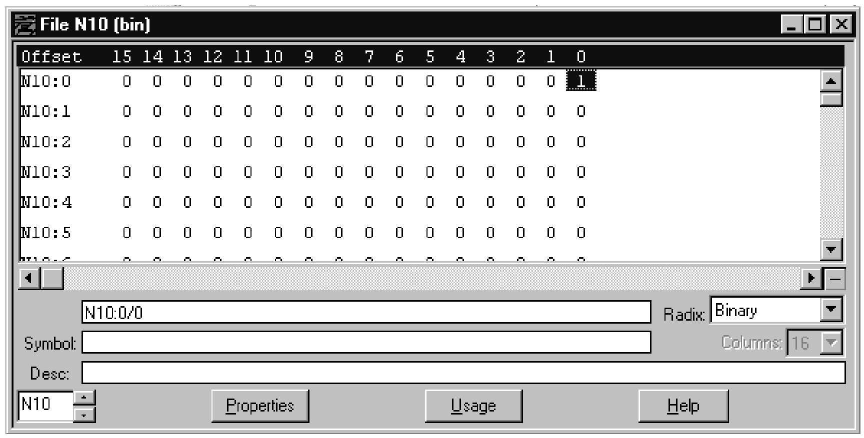
4. Enter the following ladder program.



5. Save the program using an appropriate name, e.g., “DNET_PLC”.

IMPORTANT The first word of the BTW downloaded from the PLC-5 to block 62 is reserved as the scanner module command register. You must set bit 0 of the command register to “1” to place the scanner’s DeviceNet Channel 1 in run mode. You can do this by double-clicking on file N10 in the project window and manually setting N10:0, bit 0 to “1” as shown below.

Note: Set bit 2 to place Channel 2 in run mode.



More: See the 1771-SDN DeviceNet Scanner Module Installation Instructions (publication 1771-IN014) for more information on using the scanner module command register.

Downloading and Running the Program

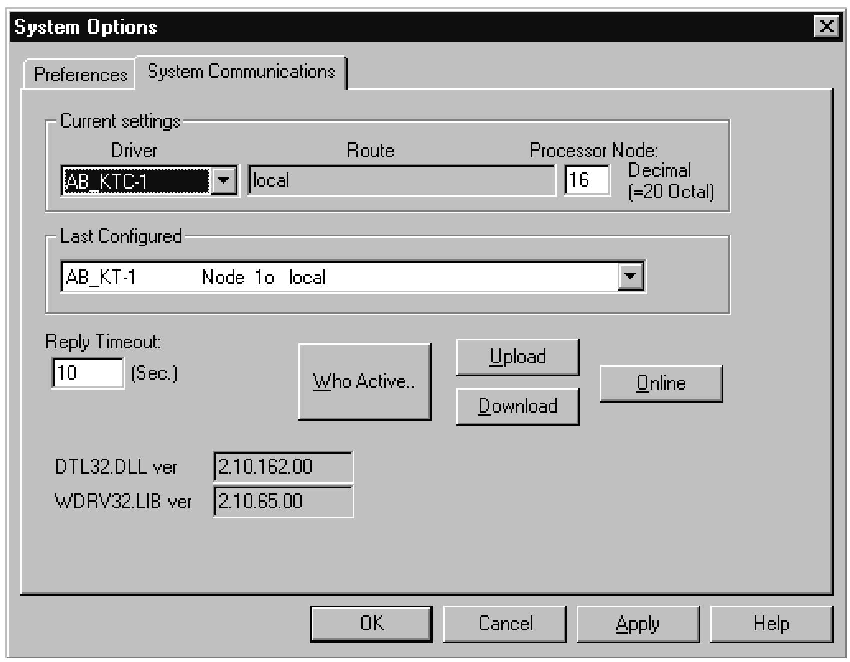
The remaining sections of this chapter provide examples of downloading and running the program via the following networks:

- ControlNet (page 6-6)
- Ethernet (page 6-9)
- Data Highway Plus (page 6-12)

Downloading and Running the Program via a ControlNet Network

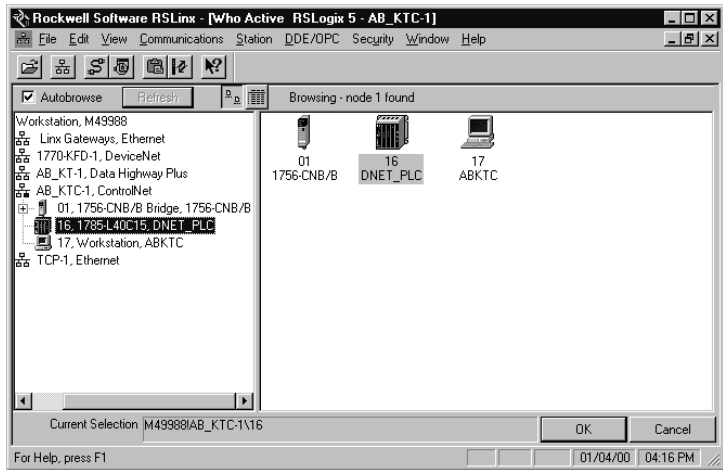
Follow the procedure below to download and run the example program via a ControlNet network.

1. Click on the RSLogix 5 **Comms** menu and select **System Communications**.



2. Click on the **Who Active** button.

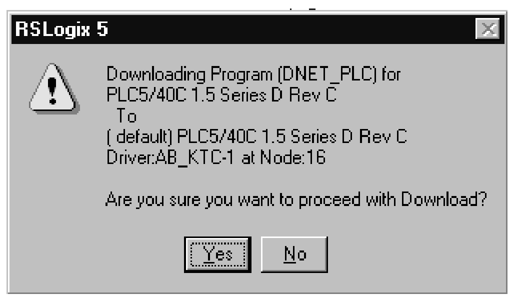
RSLinx will open. You will see a window similar to the one below, displaying your system's driver configuration.



3. Expand the tree under your ControlNet driver and highlight the PLC-5 processor as shown above. Click on **OK**.

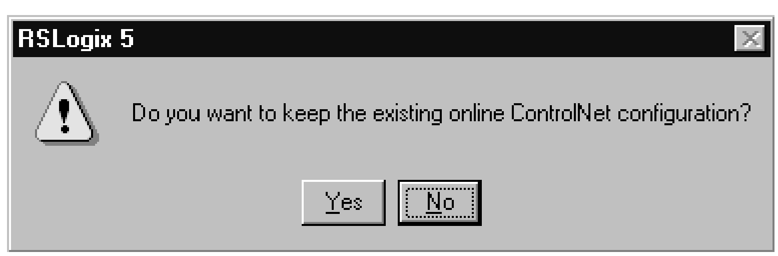
4. Click on the **Download** button.

   You will be asked if you want to proceed with the Download. You will see a message similar to the one below.



5. Click on **Yes** to download the program.

   You may be prompted to keep the existing online ControlNet configuration.



6. Click on **Yes**. The program will be downloaded to the processor.

Testing the Example Program

1. After the download is complete, go **online** and put the PLC-5 processor in **Run** mode.

2. Press and release the **START** button on the RediSTATION. The red light should turn on. On your screen, you should see rung 1 in your ladder program being energized as you press the button.

3. Pass your hand back and forth over the photoeye several times. On your screen you should see the counter incrementing.

4. Press and release the **STOP** button on the RediSTATION. The red light should turn off. On your screen, you should see rung 2 in your ladder program being energized as you press the button.

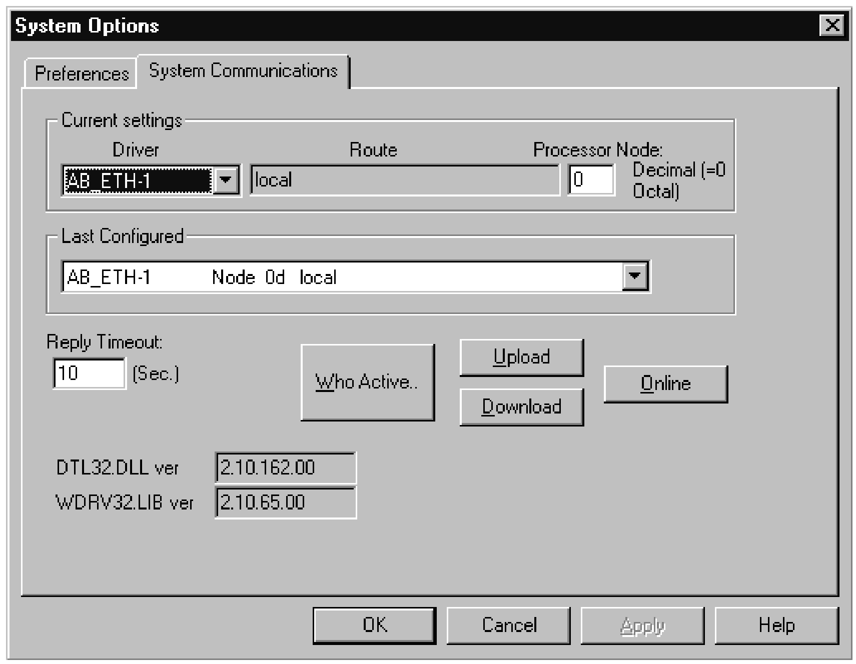
This completes the ControlNet example.

Downloading and Running the Program via an Ethernet Network

IMPORTANT The Ethernet configuration must be downloaded to the PLC-5 processor before performing this example. See Appendix A.

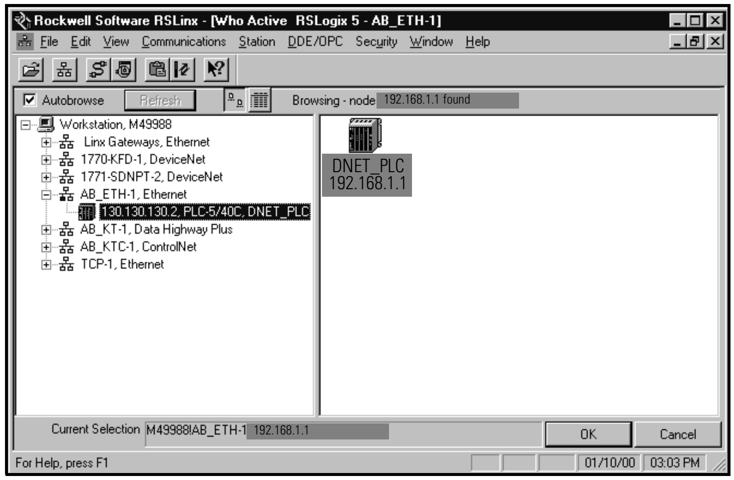
Follow the procedure below to download and run the example program via an Ethernet network.

1. Click on the RSLogix 5 **Comms** menu and select **System Communications**.



2. Click on the **Who Active** button.

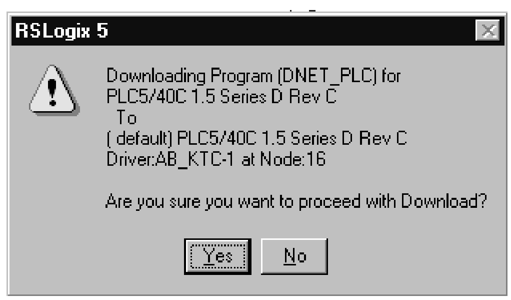
RSLinx will open. You will see a window similar to the one below, displaying your system's driver configuration.



3. Expand the tree under your Ethernet driver and highlight the PLC-5 processor as shown above. Click on **OK**.

4. Click on the **Download** button.

   You will be asked if you want to proceed with the Download. You will see a message similar to the one below.



5. Click on **Yes** to download the program.

   You may be prompted to keep the existing online ControlNet configuration.

6. Click on **Yes**. The program will be downloaded to the processor.

Testing the Example Program

1. After the download is complete, go **online** and put the PLC-5 processor in **Run** mode.

2. Press and release the **START** button on the RediSTATION. The red light should turn on. On your screen, you should see rung 1 in your ladder program being energized as you press the button.

3. Pass your hand back and forth over the photoeye several times. On your screen you should see the counter incrementing.

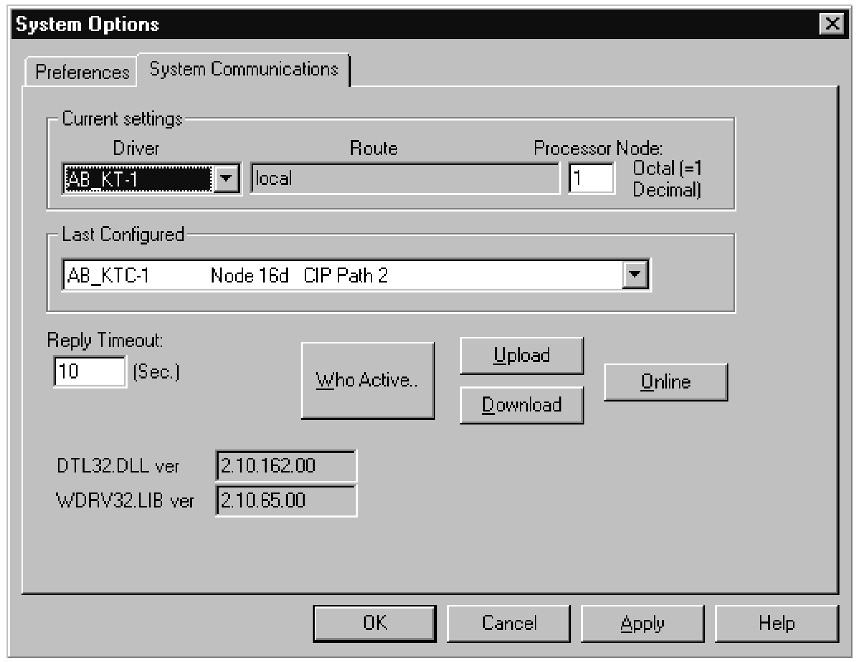
4. Press and release the **STOP** button on the RediSTATION. The red light should turn off. On your screen, you should see rung 2 in your ladder program being energized as you press the button.

This completes the Ethernet example.

Downloading and Running the Program via a DH+ Network

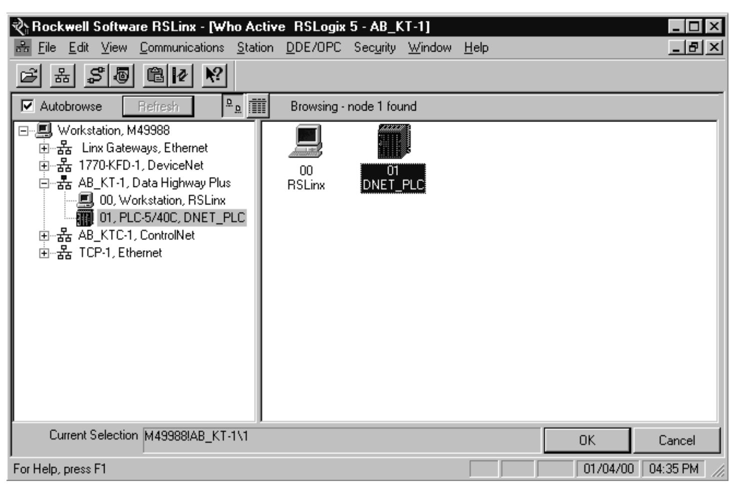
Follow the procedure below to download and run the example program via a DH+ network.

1. Click on the RSLogix 5 **Comms** menu and select **System Communications**.



2. Click on the **Who Active** button.

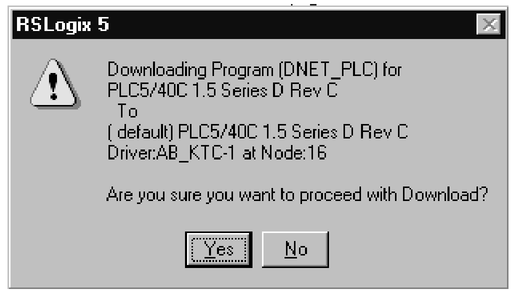
   RSLinx will open. You will see a window similar to the one below, displaying your system's driver configuration.



3. Expand the tree under your DH+ driver and highlight the PLC-5 processor as shown above. Click on **OK**.

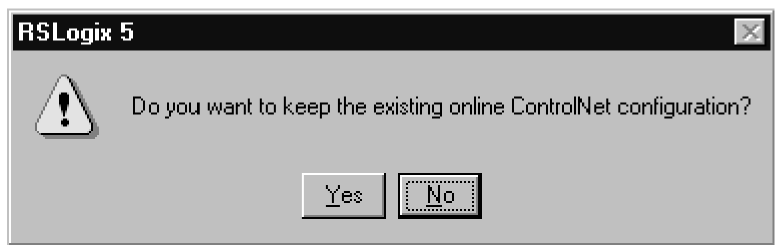
4. Click on the **Download** button.

   You will be asked if you want to proceed with the Download. You will see a message similar to the one below.



5. Click on **Yes** to download the program.

   You may be prompted to keep the existing online ControlNet configuration.



6. Click on **Yes**. The program will be downloaded to the processor.

Testing the Example Program

1. After the download is complete, go **online** and put the PLC-5 processor in **Run** mode.

2. Press and release the **START** button on the RediSTATION. The red light should turn on. On your screen, you should see rung 1 in your ladder program being energized as you press the button.

3. Pass your hand back and forth over the photoeye several times. On your screen you should see the counter incrementing.

4. Press and release the **STOP** button on the RediSTATION. The red light should turn off. On your screen, you should see rung 2 in your ladder program being energized as you press the button.

This completes the Data Highway Plus example.

What's Next?

This concludes the example applications. The following chapter describes how the diagnostic indicators on the 1771-SDN module can be used for troubleshooting.

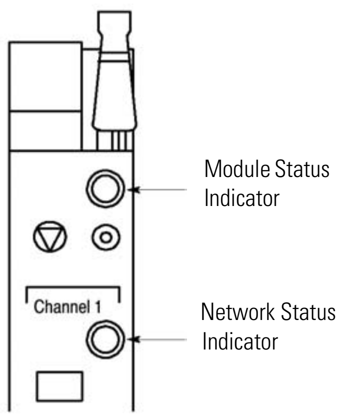
Troubleshooting

What This Chapter Contains

This chapter describes the diagnostics provided by the LED diagnostic indicators on the 1771-SDN module's front panel.

Module Status Indicator

The bicolor (green/red) Module Status LED indicates whether the 1771-SDN module has power and is functioning properly.



Top Part of Module

Module Status Indicator

If the indicator is	Then	Take this action
Off	There is no power applied to the module.	Verify power connections and apply power.
Green	The module is operating normally.	No action required.
Flashing Green	The module is not configured.	Configure the module.
Flashing Red	There is an invalid configuration.	Verify DIP switch settings. Check configuration setup.
Red	The module has an unrecoverable fault.	Replace the module.

Network Status Indicator

Each of the channels (1 and 2) on the 1771-SDN Scanner module has a bicolor (green/red) network status indicator that provides troubleshooting information about the channel's communication links.

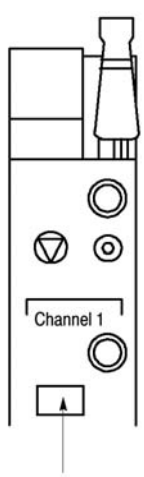
Network Status Indicator

If the indicator is	Then	Which indicates	Take this action
Off	The device has no power or the channel is disabled for communication due to a bus off condition, loss of network power, or it has been intentionally disabled.	The channel is disabled for DeviceNet communication.	Power-up the module, provide network power to the channel, and be sure the channel is enabled in both the module configuration table and the module command word.
Green	Normal operation.	All slave devices in the scanlist table are communicating normally with the module.	None.
Flashing Green	The two-digit numeric display for the channel indicates an error code that provides more information about the condition of the channel.	The channel is enabled but no communication is occurring.	Configure the scanlist table for the channel to add devices.
Flashing Red	The two-digit numeric display for the channel displays an error code that provides more information about the condition of the channel.	At least one of the slave devices in the module's scanlist table has failed to communicate with the module. The network has faulted.	Examine the failed device and the scanlist table for accuracy.
Red	The communications channel has failed. The two digit numeric display for the channel displays an error code that provides more information about the condition of the channel.	The module may be defective.	Reset the module. If failures continue, replace module.

Node/Error Code Indicator

Each channel also has a Node/Error Code indicator that displays numeric codes providing diagnostic information. The display flashes at approximately one second intervals, depending on network traffic. The following table summarizes the meanings of the numeric codes.

Top of Module



Node/Error Code Indicator

Numeric Display Code Summary

Numeric Code	Description	Take this action
0 - 63	Normal operation. The numeric code is the 1771-SDN's node address on the DeviceNet network.	None.
70	Module failed Duplicate Node Address check.	Change the module node address to another available one. The node address you selected is already in use on that channel.
71	Illegal data in scanlist table (node number alternately flashes).	Reconfigure the scanlist table and remove any illegal data.
72	Slave device stopped communicating (node number alternately flashes).	Inspect the field devices and verify connections.

Numeric Display Code Summary

Numeric Code	Description	Take this action
73	Device's identity information does not match electronic key in scanlist table entry (node number alternately flashes).	Verify that the correct device is at this node number. Make sure that the device at the flashing node address matches the desired electronic key (vendor, product code, product type).
74	Data overrun on port detected.	Modify your configuration and check for invalid data. Check network communication traffic.
75	No scanlist is active in the module.	Enter a scanlist.
76	No direct network traffic for module detected.	None. The module hears other network communication.
77	Data size expected by the device does not match scanlist entry (node number alternately flashes).	Reconfigure your module for the correct transmit and receive data size.
78	Slave device in scanlist table does not exist (node number alternately flashes).	Add the device to the network, or delete the scanlist entry for that device.
79	Module has failed to transmit a message.	Make sure that your module is connected to a valid network. Check for disconnected cables. Verify baud rate.
80	Module is in IDLE mode.	Put PLC-5 in RUN mode. Enable RUN bit in module command register.
81	Module is in FAULT mode.	Check ladder program for cause of fault bits.
82	Error detected in sequence of fragmented I/O messages from device (node number alternately flashes).	Check scanlist table entry for slave device to make sure that input and output data lengths are correct. Check slave device configuration.
83	Slave device is returning error responses when module attempts to communicate with it (node number alternately flashes).	Check accuracy of scanlist table entry. Check slave device configuration. Slave device may be in another master’s scanlist. Reboot slave device.
84	Module is initializing the DeviceNet channel.	None. This code clears itself once module attempts to initialize all slave devices on the channel.
85	Data size was incorrect for this device at runtime.	• Slave device is transmitting incorrect length data. • Verifiy device is not configured for variable poll connection data • Try replacing the device
86	Device is producing zero length data (idle state) while channel is in Run Mode.	Check device configuration and slave node status.
87	The primary owner has not allocated the slave.	Put the primary owner on line.
88	This is not an error. At power-up and reset, the module displays all 14 segments of the node address and status display LEDs.	None.

Numeric Display Code Summary

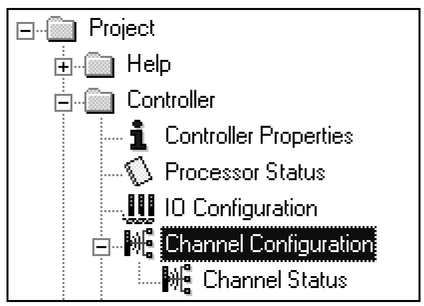
Numeric Code	Description	Take this action
89	Slave device initialization using Auto Device Replacement parameters failed.	• Put the slave device into configurable mode. • Check the slave's EDS file to see if the slave is configured offline. • Check to see if the slave device has been replaced with an incompatible device.
90	User has disabled communication port.	Reconfigure your module. Check the disable bit in the Module Command Register.
91	Bus-off condition detected on comm port. Module is detecting communication errors.	Check DeviceNet connections and physical media integrity. Check system for failed slave devices or other possible sources of network interference.
92	No network power detected on comm port.	Provide network power. Make sure that module drop cable is providing network power to module comm port.
95	Application FLASH update in progress.	None. Do not disconnect the module while application FLASH is in progress. You will lose any existing data in the module's memory.
97	Module halted by user command.	Check ladder program for cause of fault bits.
98	Unrecoverable firmware failure.	Service or replace your module.
99	Unrecoverable hardware failure.	Service or replace your module.

1785-ENET Module Channel Configuration

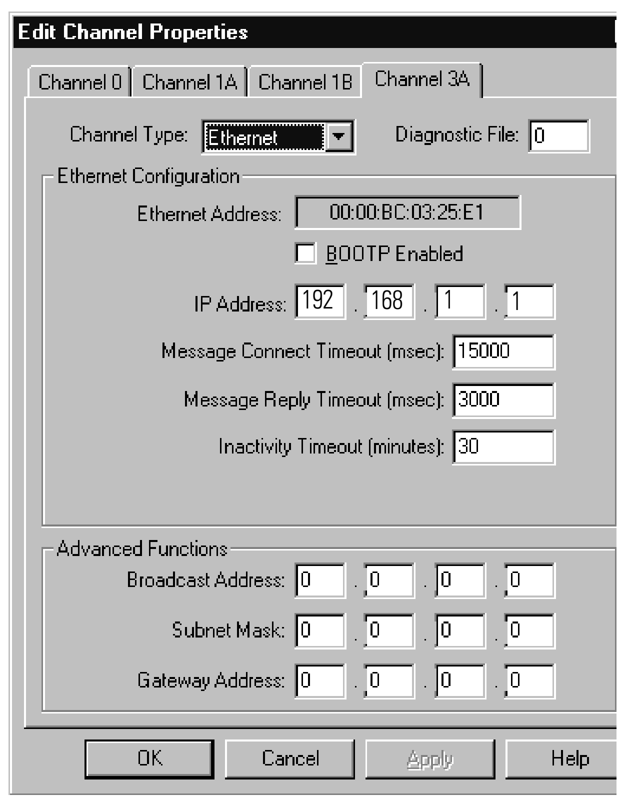
Configuring the Communications Channel

Before you can communicate with the PLC-5 processor over an Ethernet network, you must configure the 1785-ENET module's Ethernet communications channel and download the configuration to the PLC-5 processor. The following example describes how to do this using RSLogix 5 software.

1. Select **Channel Configuration** under the Controller folder in the Project window.



The **Edit Channel Properties** window will open.



2. Select the **Channel 3A** tab.

3. Select **Ethernet** as the **Channel Type**.

4. Uncheck the **BOOTP Enabled** box to disable BOOTP.

5. Enter the **IP Address** you want to assign to the PLC-5 processor (e.g., 192.168.1.1).

6. **Download** the configuration to the processor, using a communications driver that was previously configured, (e.g, ControlNet or DH+). See chapter 6 for examples of downloading to the PLC-5 using these drivers.

Installing and Configuring the ControlNet Communications Driver

The examples using ControlNet in this manual were performed with a 1784-KTCX15 communication interface card installed in the personal computer that was used as a programming terminal. This appendix describes how to install and configure the 1784-KTCX15 card.

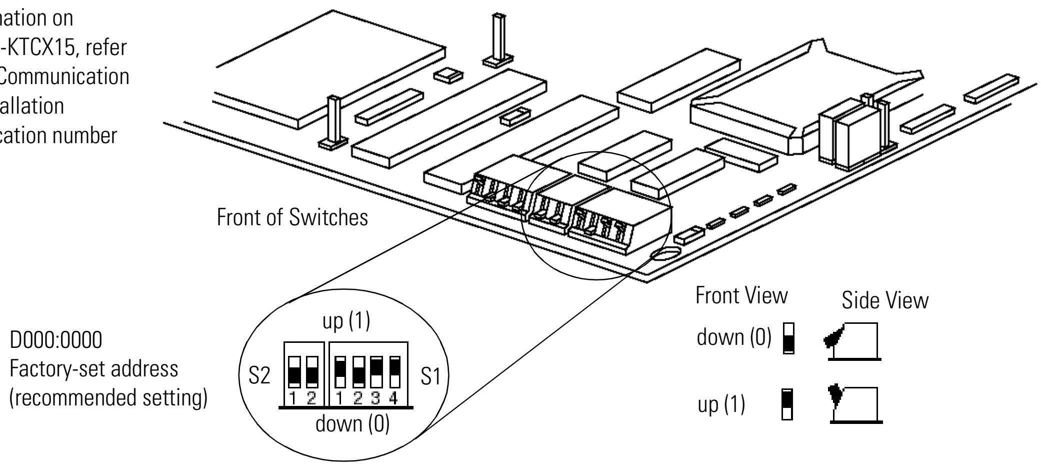
Installing the 1784-KTCX15 Communication Interface Card

More

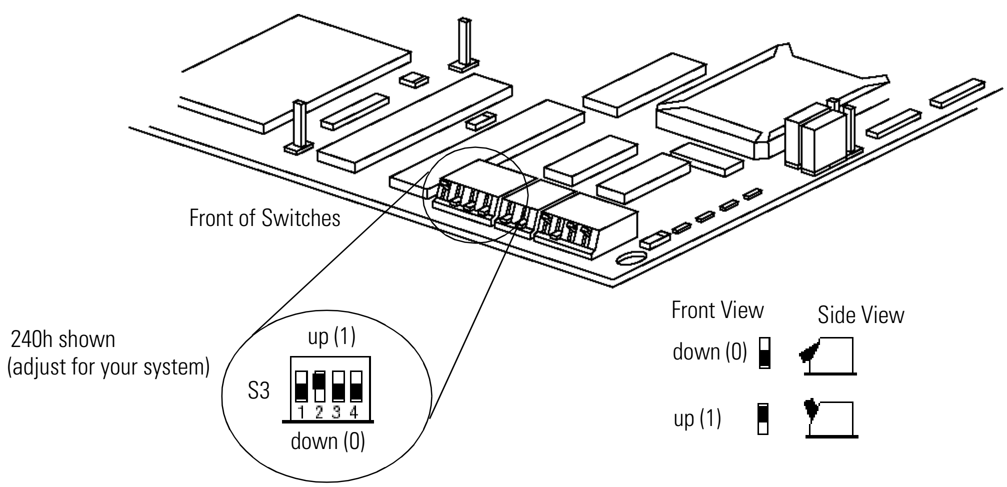
For detailed information on installing the 1784-KTCX15, refer to the ControlNet Communication Interface Card Installation Instructions, publication number 1784-5.33.

Perform the following steps to install the 1784-KTCX15 card in your personal computer.

1. Set the card's base memory address location on switches S1 and S2.



2. Set the card's base I/O space address location on switch S3.



These settings depend on the devices installed on your computer. We used the following addresses:

Base I/O Space Address	240
Base Memory Address	D000:000 (factory default)

When deciding which addresses to use, remember that each card in your computer must have a unique base memory address and a unique base I/O space memory address. If another card in the host computer is using one or both of the selected addresses, you must change the card's switch settings to an available address.

TIP

Consult with your IT/PC support group to find out if it is necessary to change any of your computer's memory address or IRQ settings.

3. Insert the card in a vacant 16- or 32-bit ISA/EISA expansion slot.

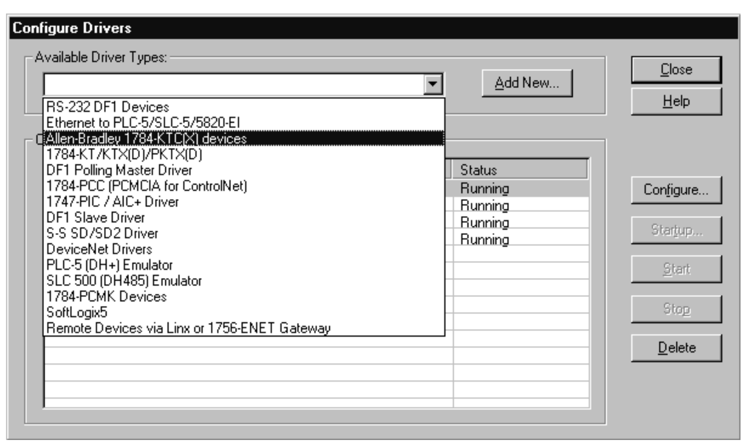
Configuring the 1784-KTCX15 Communications Driver

After installing the card in the computer, you must run **RSLinx** to configure the driver.

1. Start **RSLinx**.

2. Select **Configure Drivers** from the **Communications** menu.

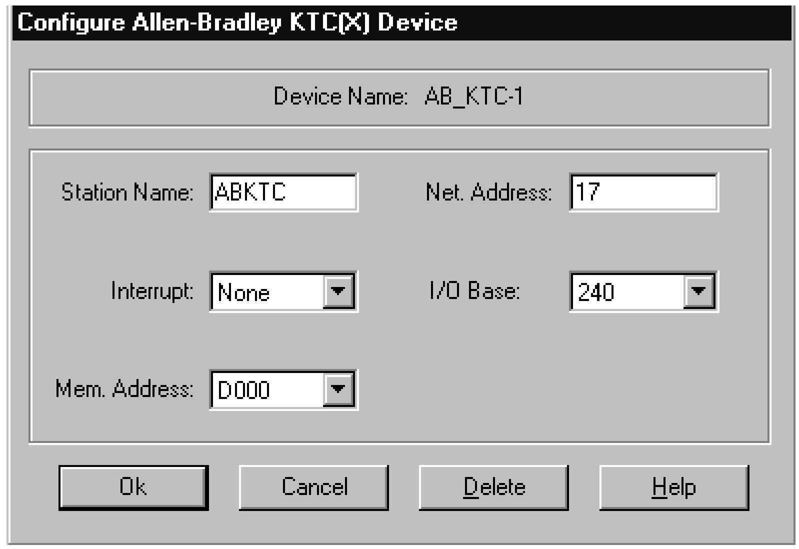
   The following window will appear:



3. Select the **Allen-Bradley 1784-KT/KTC(X) device** from the pull-down list and click on **Add/New**.

4. When prompted for a name for the new driver, select the default name assigned by the system, i.e., **AB_KTC-1**.

   The **Configure Device** window will appear:



5. Enter the following configuration:

Station Name	ABKTC
Net. Address	17(1)
Interrupt	None
I/O Base	240(2)
Mem. Address	D000(2)

(1) This is an unscheduled device. For maximum efficiency, set its address higher than the highest scheduled address on your network.

(2) Modify as necessary for your system.

6. Click on **OK** to save your settings.

7. **Close** RSLinx.

Notes

Installing and Configuring the DH+ Communications Driver

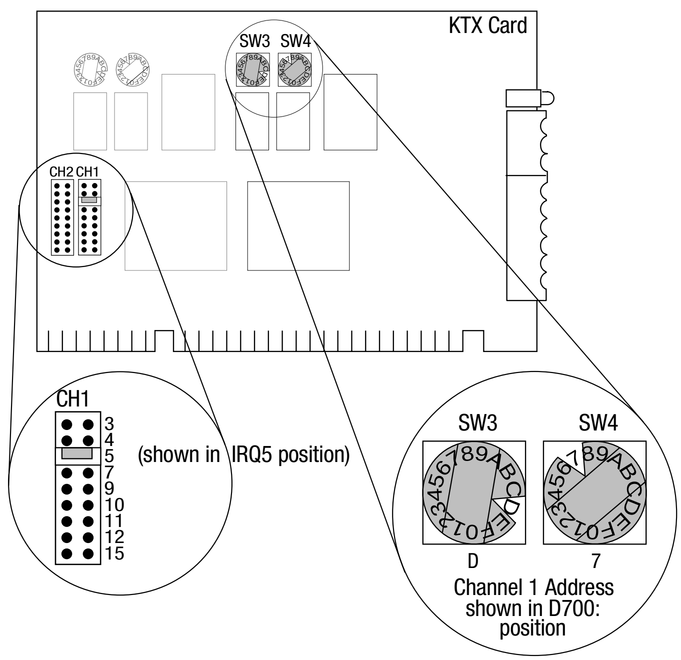
The examples using Data Highway Plus (DH+) in this manual were performed with a 1784-KTX communication interface card installed in the personal computer that was used as the programming terminal. This appendix describes how to install and configure the 1784-KTX card.

Installing the 1784-KTX Communication Interface Card

More

For more information, see the KTX Communication Interface Card User Manual, publication number 1784-6.5.22.

Perform the following steps to install the 1784-KTX card in your personal computer. Refer to the following figure.



1. Set the interrupt jumpers on the communication card (IRQ5 in this example).

2. Set the switches on the card (D700 in this example).

3. Insert the communication interface card into a vacant 16-bit ISA or EISA expansion slot and tighten the screw to secure the card.

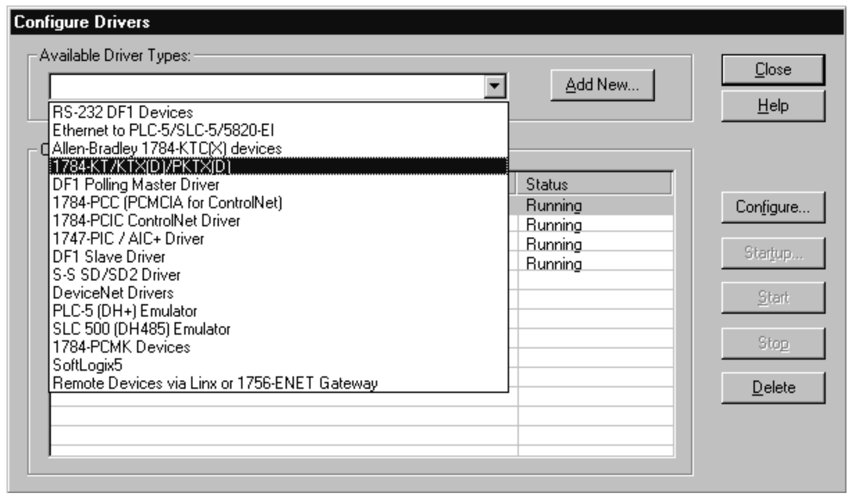
Configuring the 1784-KTX Communications Driver

After installing the card in the computer, you must run **RSLinx** to configure the communications driver.

1. Start the **RSLinx** software.

2. From the **Communications** menu select **Configure Drivers**.

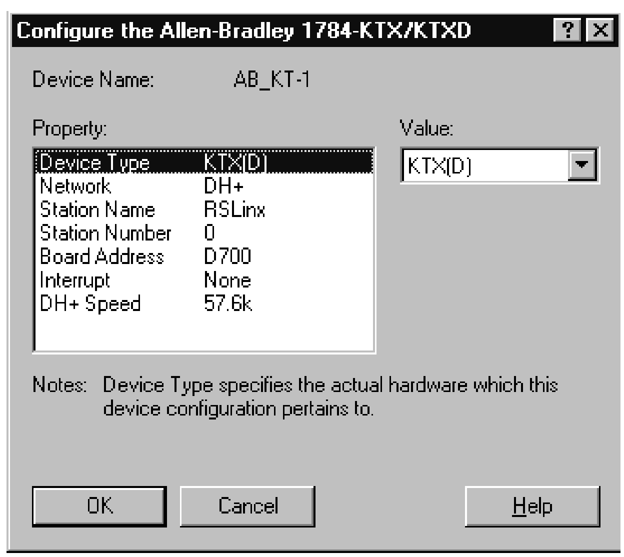
   The **Configure Drivers** window will appear:



3. From the list of **Available Drivers**, select the **1784-KT/KTX(D)/PKTX(D)** driver from the pull-down list and click on **Add/New**.

4. When prompted for a name for the new driver, select the default name assigned by the system, **AB_KT-1**.

   The device's configuration window will open:



5. Enter the following configuration:

Device Type	KTX(D)
Network	DH+
Station Name	RSLinx
Station Number	0
Board Address	D700
Interrupt[1]	None
DH+ Speed	57.6K

[1] Must match switch settings on card

6. Click on **OK** to save your settings.

7. **Close** RSLinx.

Notes

Appendix D

Data Map Example

This appendix describes a basic mapping example that connects two DeviceNet networks (channels A and B of the 1771-SDN scanner) to 62 simple sensor-type devices. Each device sends one data byte that contains one data bit and one status bit.

These are given in response to a strobe message. With channel A only, the scanner maps this data to the discrete I/O table if it is available; otherwise, the data is mapped to block transfer locations.

More

See the 1771-SDN DeviceNet Scanner Installation Instructions (pub. no. 1771-IN014) for details on using block transfer read and write operations to communicate between your PLC-5 processor and 1771-SDN scanner.

Example Input Mapping Scheme

This example's input mapping scheme is a simplified and fixed map of discrete input data and status bits for DeviceNet devices. It is mapped to discrete inputs and the device input data table. An example for each slot-addressing mode is given.

Example Characteristics

- strobe is used to query DeviceNet devices
- poll is disabled
- Devicenet A and B ports are connected to separate networks
- the input data bit is fixed and occupies the lowest-order bit in the lowest-order byte of the strobe (bit #0)
- one bit of status data is accepted from each node responding to the strobe
- the status data bit is fixed and occupies the next lowest-order bit in the next lowest-order byte (after the input data bit) of the strobe (i.e., bit #1)
- input and status data bits accepted from each node are mapped to discrete inputs and the device input data table of the scanner
- input and status data bits accepted from each node are fixed and predefined

Example Framework

Based on the backplane addressing mode and the scanner's block transfer support, the following number of discrete inputs are supported.

Addressing Mode	Discrete Inputs
2-slot	0
1-slot	8
1/2-slot	24

This example adheres to the following structure:

- only one master scanner can own a device; there may, however, be multiple masters on a network
- interface nodes (KFDs, PCDs, etc.) should be assigned node numbers 62, 61, 60, etc.
- node number 63 should always be left available to add a new default device
- address 0 is normally used for the scanner. Scanners in multi-scanner networks are numbered 0, 1, 2, etc.
- the first word in the device input data table contains the module command word (this is applicable under any mapping scheme)
- input data and status bits received from nodes 1-62 on channel A are mapped to both the discrete inputs and the device input data table
- no discrete inputs are used for channel B
- the device input data table is segmented

  –one word for the module status word

  –four words each for channel A and B devices' input data bits

  –four words each for channel A and B devices' status data bits

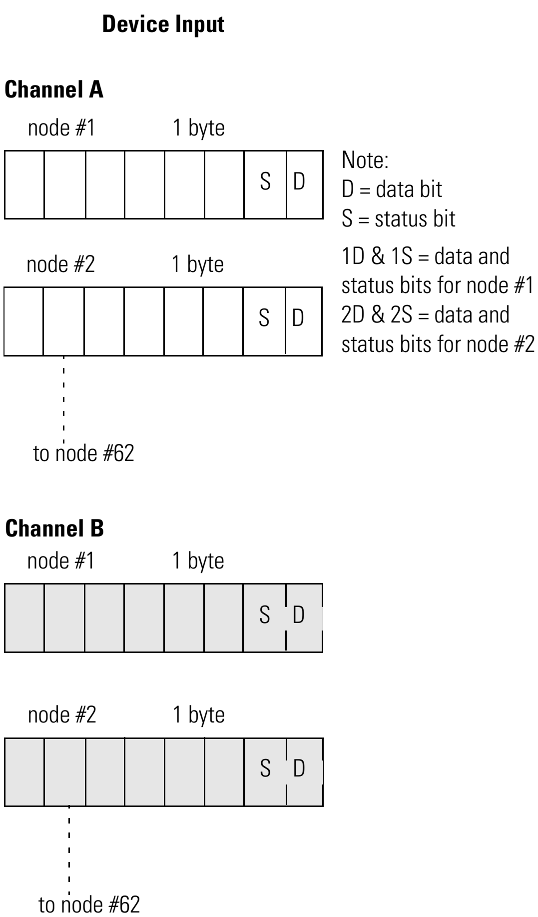
Input Data Table Formats

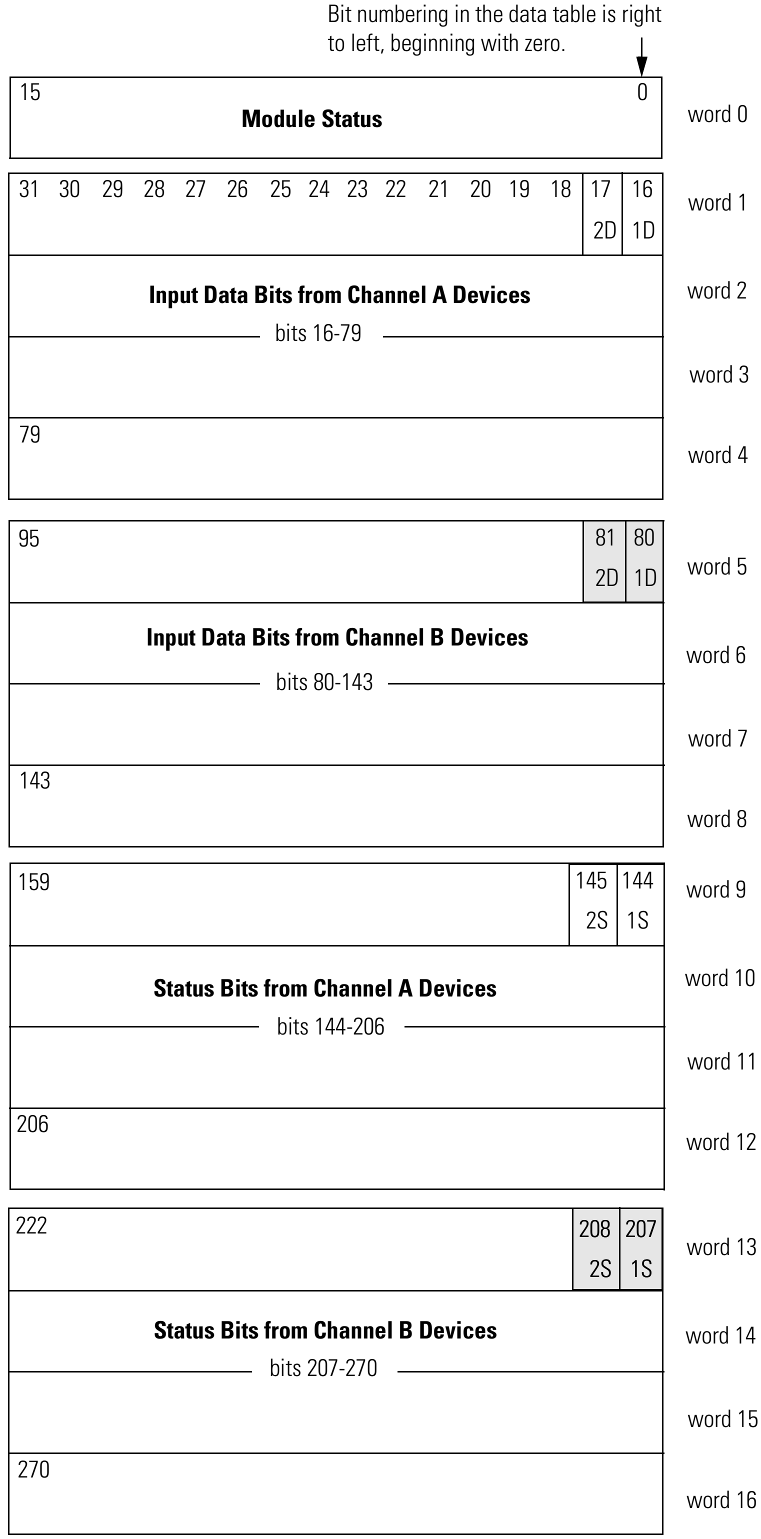
The manner in which bits are mapped to the input data table depends on the address density used. The following example is a 2-slot configuration. Note that discrete mapping is not possible in 2-slot mode.

Note: 1 word = 2 bytes
1 byte = 8 bits

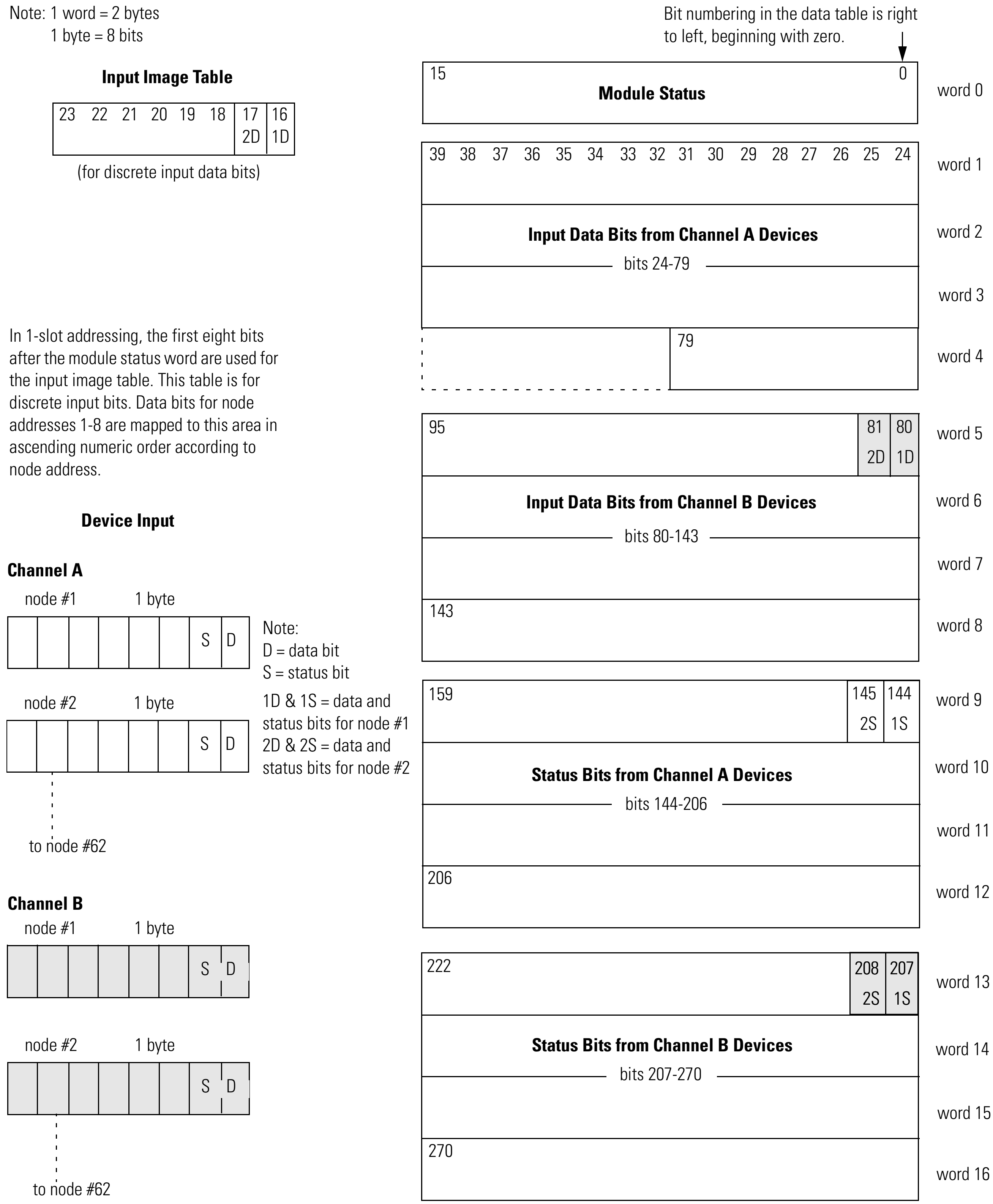
Each device's status and data bits are mapped into the device input data table. Data bits from devices on channel A are mapped into the first four words after the module status word in ascending, numeric order according to the device's node address. For example, node #1 is mapped then node #2, #3, #4, and so on.

Input data bits from channel B as well as status bits from channels A and B are mapped into similar four-word groups. These bits are also ordered by node address in ascending numeric order.

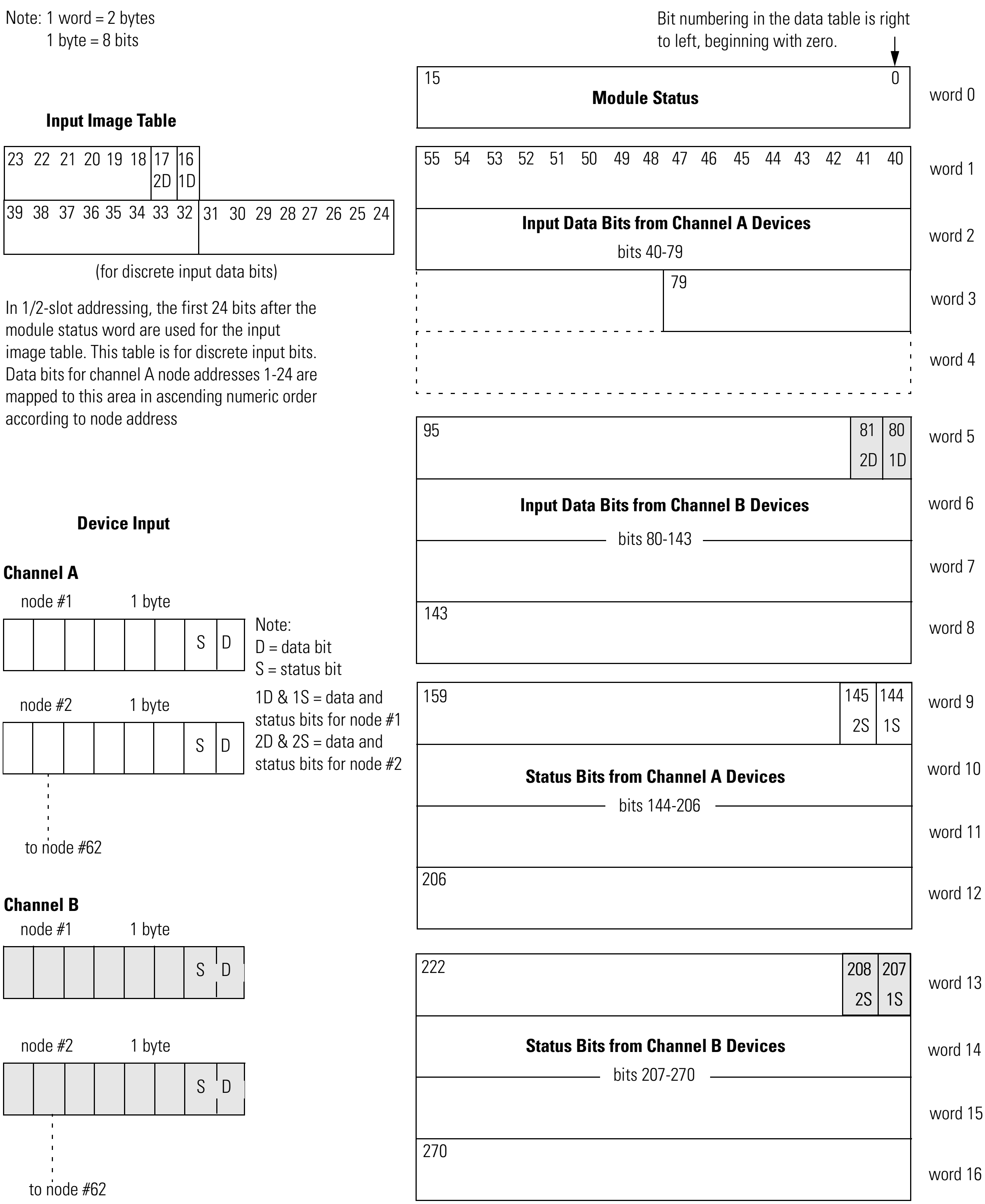




In 1-slot addressing mode eight bits are available for discrete input mapping, as shown below.



In 1/2-slot addressing 24 bits are available for discrete input mapping, as shown below.



Example Output Mapping Scheme

This example's output mapping scheme is a simplified and fixed map of the discrete outputs and data from the device output data table to DeviceNet devices.

Devices present in the default database are strobed only; therefore, the output data map bits are mapped into each network's strobe message. If the discrete table is available, it serves as a source for the strobe bits; otherwise, the source is found in block transfer locations.

Example Characteristics

- strobe is used to send output to the DeviceNet devices
- poll is disabled
- DeviceNet A and B ports are connected to separate networks
- one output data bit each is sent to nodes 1-62 on channel A
- the output data bits are embedded in the 8 byte (64 bit) data portion of the DeviceNet strobe message
- the output bit string source within the strobe message is divided across the discrete outputs (if any) assigned to the scanner and the device output data table

Example Framework

Based on the backplane addressing mode and the scanner's block transfer support, the following number of discrete outputs are supported:

Addressing Mode	Discrete Outputs
2-slot	0
1-slot	8
1/2-slot	24

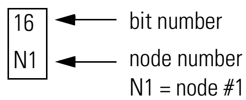
This example adheres to the following structure:

- when a 1771-SDN scanner is running this configuration, there cannot be any other 1771-SDN scanner on that network
- DeviceNet devices may reside only at nodes 1-62
- address 0 must be used for the scanner
- the first word in the device output data table contains the module command word (this is applicable under any mapping scheme)
- output bits intended for nodes 1-62 on channel A are mapped to both the discrete outputs and the device output data table
- no discrete outputs are used for channel B

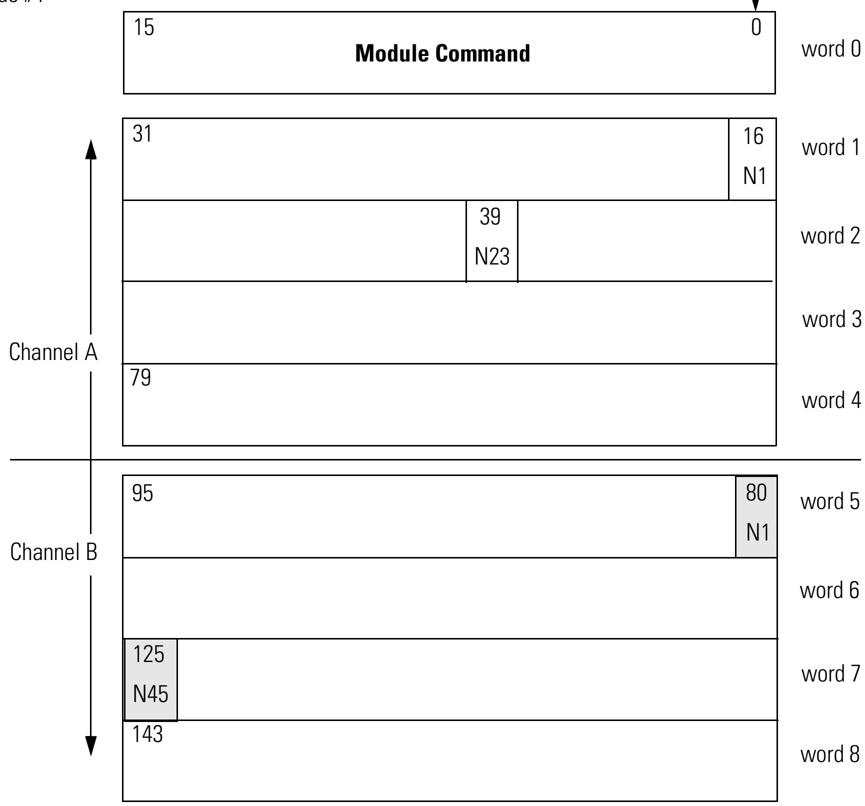
Output Data Table Formats

The following illustrates an output data mapping scheme example for a scanner in 2-slot addressing mode.

Note: 1 word = 2 bytes
1 byte = 8 bits



Bit numbering in the data table is right to left, beginning with zero.



In 2-slot addressing mode, the output bits for channel A and channel B devices are written to the scanner's output data table. The bits are stored in ascending numeric order, according to node address. The mapping begins with channel A devices at bit 16 of the table.

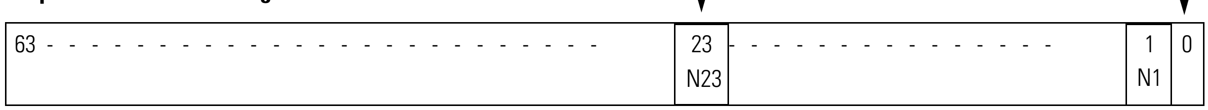
There are 64 possible node addresses per network. Channel A devices fill the first four words (after the module status word). Channel B devices fill the last four words of the table.

The scanner takes the output bits from its output data table and organizes them into a strobe message. The strobe message contains one bit for each node address, 0-63. In default mode, the scanner is node 63; therefore, this bit is empty. The scanner sends a separate strobe message to each network, via channel A and channel B.

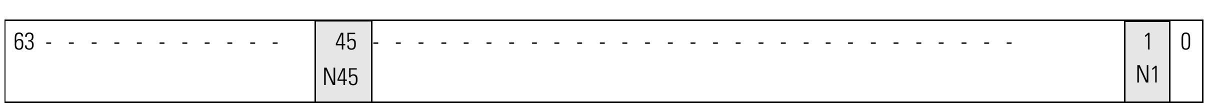
Each node's output bit is mapped to a bit number in the strobe message that directly corresponds to that particular node's MAC ID. For example, the output bit for node #23 is mapped to strobe bit #23.

Bit numbering in the data table is right to left, beginning with zero.

Output Data Strobe Message channel A

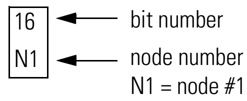


Output Data Strobe Message channel B

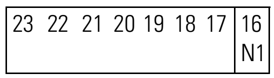


The following is an output data mapping scheme example for a scanner in 1-slot addressing mode.

Note: 1 word = 2 bytes
1 byte = 8 bits



Output Image Table

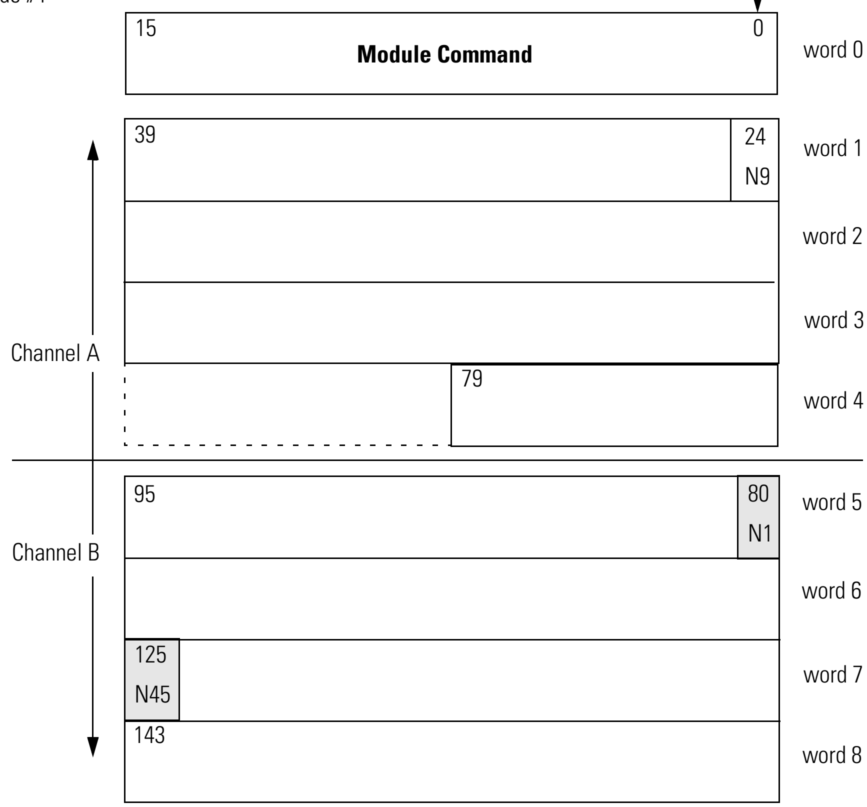


(for discrete output data bits)

In 1-slot addressing mode, eight bits of the output data table are used for the output image table. The image table is for discrete output bits. In the default mode, the processor writes the output bits of the first eight nodes to the output image table via DIO. The output bits from the remaining nodes are written to the output data table.

Note that the output image table begins with bit #16, where the output bit for node #1 (MAC ID 1) is written. The output data table now begins with bit #40, where the output bit for node #25 (MAC ID 25) is written.

Bit numbering in the data table is right to left, beginning with zero.

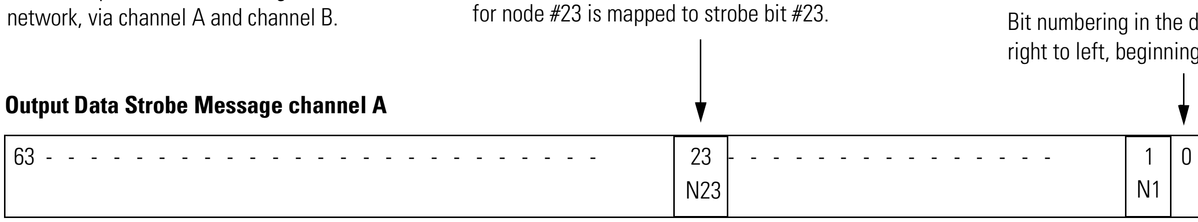


The scanner takes the output bits from its output data table and organizes them into a strobe message. The strobe message contains one bit for each node address, 0-63. In default mode, the scanner is node 0; therefore, this bit is empty. The scanner sends a separate strobe message to each network, via channel A and channel B.

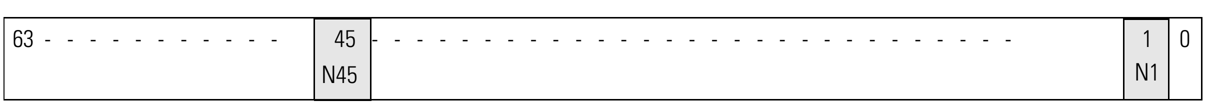
Each node's output bit is mapped to a bit number in the strobe message that directly corresponds to that particular node's MAC ID. For example, the output bit for node #23 is mapped to strobe bit #23.

Bit numbering in the data table is right to left, beginning with zero.

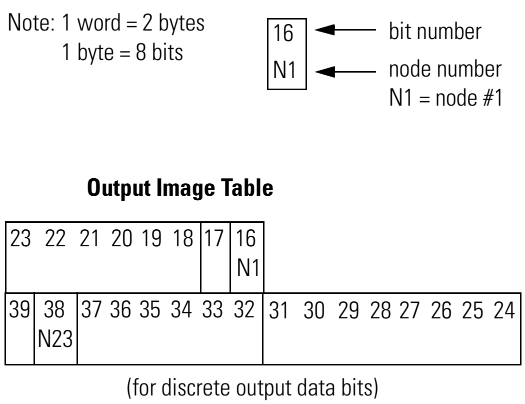
Output Data Strobe Message channel A

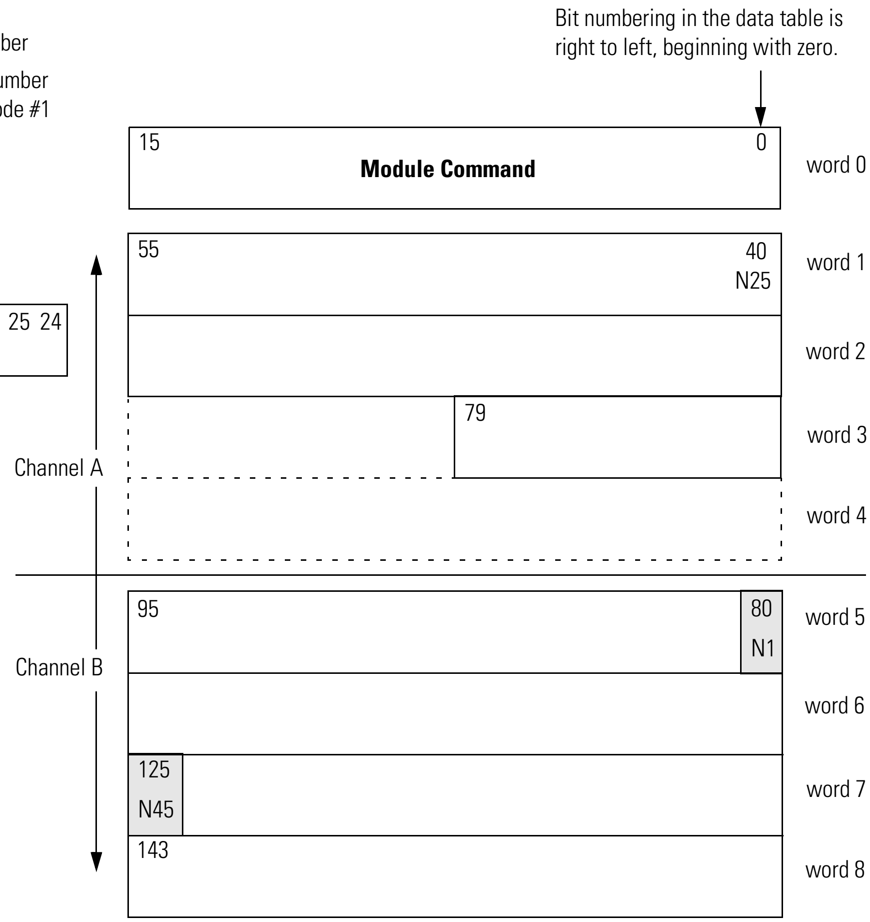


Output Data Strobe Message channel B



The following is an output data mapping scheme example for a scanner in 1/2-slot addressing mode.





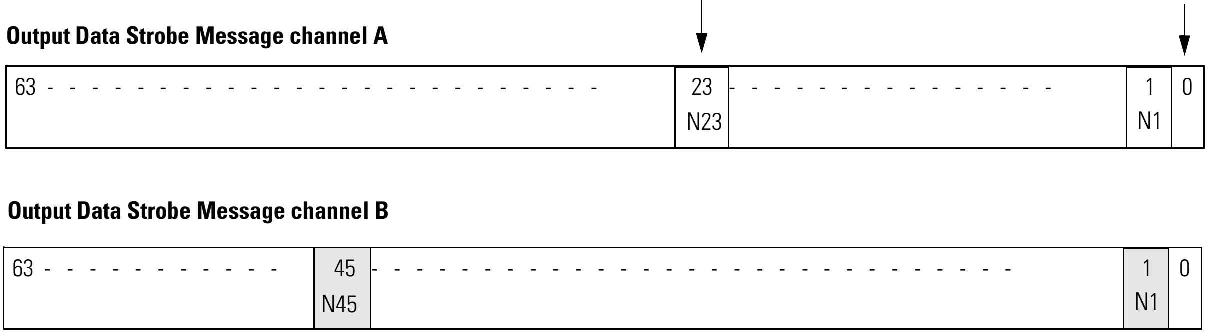
In 1/2-slot addressing mode, 24 bits of the output data table are used for the output image table. The image table is for discrete output bits. In the default mode, the processor writes the output bits of the first 24 nodes to the output image table via DIO. The output bits from the remaining nodes are written to the output data table.

Note that the output image table begins with bit #16, where the output bit for node #1 (MAC ID 1) is written. The output data table now begins with bit #40, where the output bit for node #25 (MAC ID 25) is written.

The scanner takes the output bits from its output data table and organizes them into a strobe message. The strobe message contains one bit for each node address, 0-63. In default mode, the scanner is node 0; therefore, this bit is empty. The scanner sends a separate strobe message to each network, via channel A and channel B.

Each node's output bit is mapped to a bit number in the strobe message that directly corresponds to that particular node's MAC ID. For example, the output bit for node #23 is mapped to strobe bit #23.

Bit numbering in the data table is right to left, beginning with zero.



Notes

Programming the PLC-5 Processor

Program the PLC-5 Processor

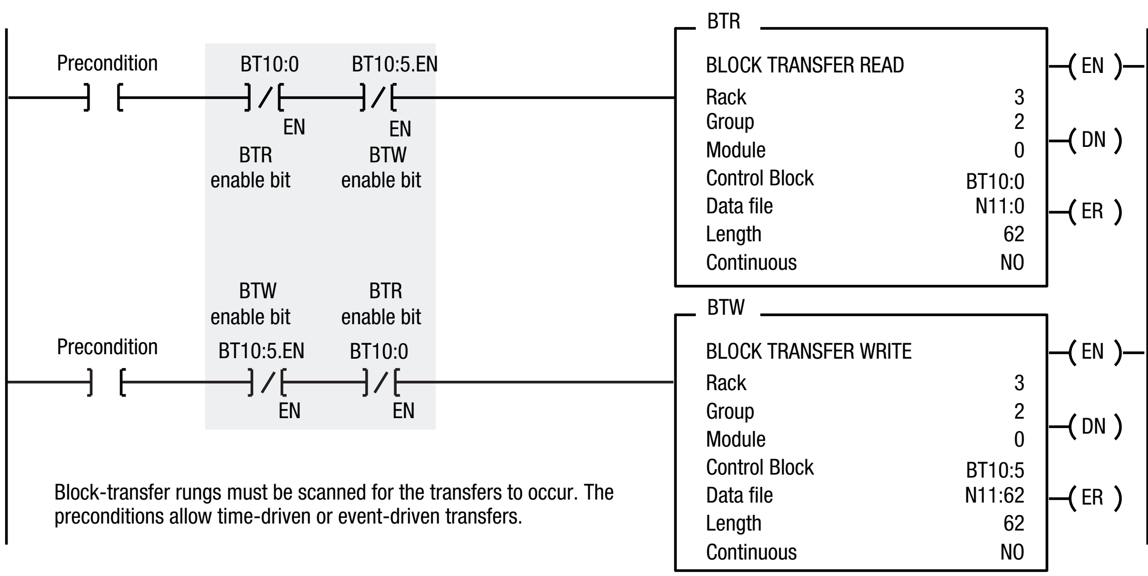
You must program your PLC-5 processor so it communicates with the 1771-SDN Scanner Module. Communication is possible when you program your processor through multiple block transfer instructions. The scanner uses the size of the block transfer to map the block transfer data words into the scanner's internal data table. The scanner module accepts blocks of different sizes and knows that each block has a different meaning.

PLC-5 block transfer instructions use one integer file in the data table section for module location and other data to execute the instruction. This is the control block file. The block transfer data file stores data that you want to transfer **to** your module (when programming a block transfer write (BTW)) or **from** your module (when programming a block transfer read (BTR)). The address of the block transfer data file is stored in the control block file.

You must select a separate data file for each of the block transfer instructions. **You must also use separate 5-word block transfer control files for each of the block transfer instructions when an integer file is used.** This is not necessary when a control block file is a BT data type.

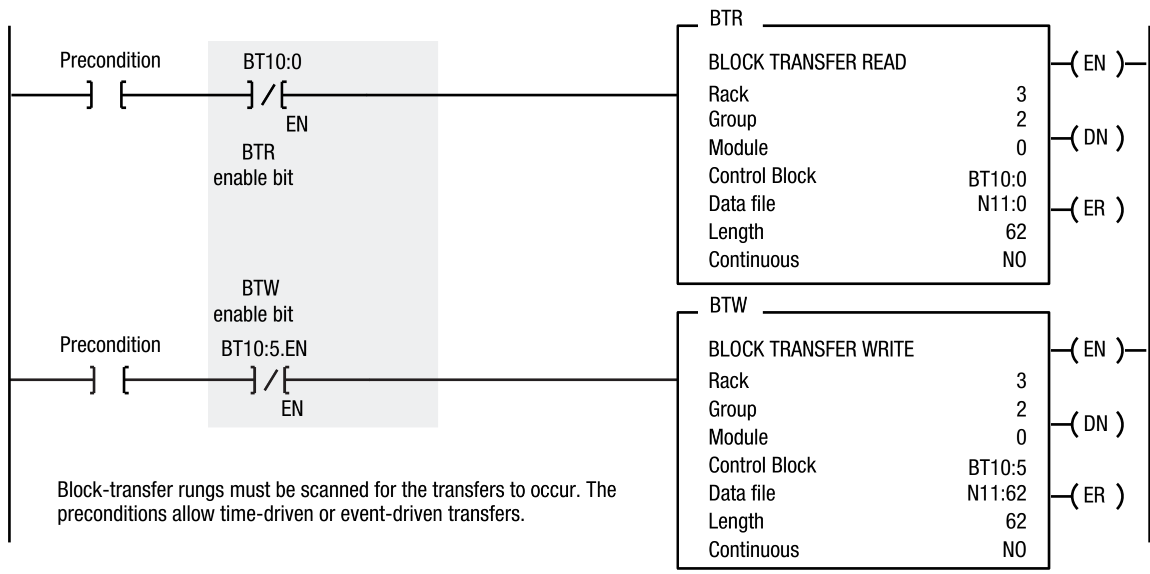
To make sure the instruction is reset after the block transfer completes and recycles, you must use enable bits as the conditions on each rung with the PLC-5. The following figure shows a PLC-5 sample program.

IMPORTANT	The module does not support continuous mode block transfer. Set **Continuous** to **NO** for each BTW or BTR.



Note: Precondition is optional

When using rungs like those in the preceding figure, the processor alternates between the BTR and the BTW, waiting to request the next block transfer until the previous block transfer is completed. When only one block transfer is active at a time, it is considered a single-threaded block transfer. Single-threaded block transfers operate in an orderly sequence of read and write, however, they tend to be slower than the asynchronous method, shown below:



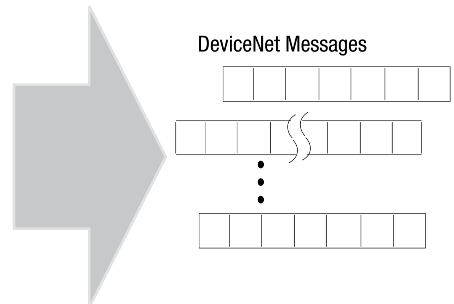
As soon as an asynchronous block transfer completes, it is requested again, independent of other block transfers going to the same module. If you have programmed many block transfers to the same logical rack (especially a remote rack), you will fill the processor's queue. In this situation, the asynchronous method can result in irregular timing between successive executions of the same block transfer.

For more information on programming and block transfers, refer to your PLC-5 Programming Software Instruction Set Reference Manual, publication 1785-6.1.

Using BTW to Send Outputs to the Scanner

The PLC-5 downloads output data to the scanner using block transfer write instructions over the 1771 backplane. The scanner module can update a maximum of 357 output words by internally linking together six different sized block transfers as shown in the following table.

Block Transfer Size	Accessed Scanner Output Block	Scanner Output Data Table
62 words	Block 62	Word 0 – Module Command Register Word
		Words 1–61
61 words	Block 61	Words 62–122
60 words	Block 60	Words 123–182
59 words	Block 59	Words 183–241
58 words	Block 58	Words 242–299
57 words	Block 57	Words 300–356
1-50 words	Block 1-50	Words 0-49



Each individual block transfer is independent, but always updates the same output bytes in the scanner's memory table. Of the scanner output words 0 through 61, the word 0 is reserved for the Module Command Register. Block transfer sizes 1 through 50 update scanner output words 0 through 49, thus reducing the required BTW time when 50 or fewer output words are needed. Sizes 51 thru 56 are illegal and size 64 is used for Explicit Message Program Control. For more details on Explicit Message Program Control, refer to page 26.

If the scanner receives a BTW of 62 words, then it knows that it contains the first block of the table. A BTW of 61 words, if necessary, contains the second block of the table and so on for 60, 59, 58 and 57 words.

You determine the data that is exchanged with a given node on channel 1 or 2 by creating custom configurations using RSNetworx software version 2.22 or later. Refer to your RSNetworx documentation or online help and your 1771-SDN Scanner Configuration Manual (publication number 1771-6.5.132) for more information on custom configurations.

Module Command Register

The first word of the BTW downloaded from the PLC-5 to block 62 is reserved as the module command register. The register is downloaded with every 1 through 50 and 62 word block transfer write. This modifies the scanner's operation.

To execute a command, you set the appropriate bits in the module command word, then perform a block transfer write to the first block (the 62 word block) of the scanner output table. When the scanner receives the command it immediately executes it. You latch bits 0 through 5 in your program to maintain the scanner's desired state.

The following table outlines the module command register's bit numbers and descriptions.

<table>
<tr><th colspan="5">Module Command Register - Word 0, Block 62</th></tr>
<tr><th rowspan="2">Bit Number</th><th colspan="2">Bits</th><th rowspan="2">Operating Mode</th><th rowspan="2">Operating Mode Description</th></tr>
<tr><th>01</th><th>00</th></tr>
<tr><td rowspan="4">00 – 01</td><td>0</td><td>0</td><td>DeviceNet Channel 1 in idle mode</td><td rowspan="19">Idle
The scanner does not map output data to the devices, but keeps network connections to devices open so device failures can be detected. Input data is returned from devices, and mapped into the scanner input table and the discrete inputs. Outputs on the network are not under program control and will be in their configured 'idle state.' The scanner must be put into this mode to perform configuration of the scanner database tables.

Run
The scanner module maps output data from its scanner output table and discrete outputs to each device on the network. Inputs are received and mapped into the scanner input table and discrete inputs. Outputs on the network are under program control.
Placing the PLC-5 into PROG or REM_PROG mode places the scanner into idle mode regardless of the state of the bits in the module command register. Placing the PLC-5 into RUN or REM_RUN mode causes the state of the bits in the module command register to determine the scanner state.

Fault Network
The scanner stops communicating with devices on the network. No outputs or inputs are mapped. Outputs on the network are not under program control. If the scanner was in run, devices will go to their configured 'fault state.'

Enable
The DeviceNet channel is enabled for communication. This is the normal operating state of the channel.

Disable
The DeviceNet channel is disabled for communication. No communication may occur over this channel. Outputs on the network are not under program control. If the scanner was in run, devices will go to their configured 'fault state.' Numeric error code 90 will occur when channel is disabled.

Scanner Active
This is the normal operating mode of the scanner.

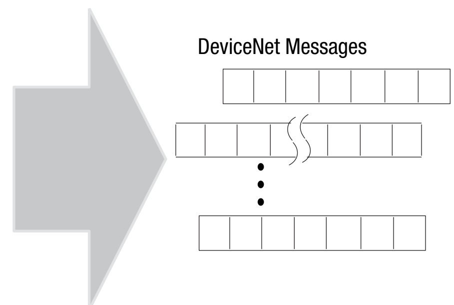
Scanner Halt
All scanner operations stop when this command is issued. No communications occur over either DeviceNet port. No block transfer or discrete I/O mapping occurs. Outputs on the network are not under program control. If the scanner was in run, devices will go to their configured 'fault state.' Numeric error code 97 will occur - you must reset the scanner or cycle power to the scanner to recover from this state.

Scanner Reboot
This command causes the scanner to reset as though the reset button had been pressed. When this command is issued, all scanner communication stops for the duration of the scanner's initialization sequence. Outputs on the network are no longer under program control. If the scanner was in run, devices will go to their configured 'fault state.'</td></tr>
<tr><td>0</td><td>1</td><td>DeviceNet Channel 1 in run mode</td></tr>
<tr><td>1</td><td>0</td><td>DeviceNet Channel 1 in fault mode</td></tr>
<tr><td>1</td><td>1</td><td>Reserved</td></tr>
<tr><td rowspan="4">02 - 03</td><td>0</td><td>0</td><td>DeviceNet Channel 2 in idle mode</td></tr>
<tr><td>0</td><td>1</td><td>DeviceNet Channel 2 in run mode</td></tr>
<tr><td>1</td><td>0</td><td>DeviceNet Channel 2 in fault mode</td></tr>
<tr><td>1</td><td>1</td><td>Reserved</td></tr>
<tr><td rowspan="2">04</td><td></td><td>0</td><td>Enable DeviceNet Channel 1</td></tr>
<tr><td></td><td>1</td><td>Disable DeviceNet Channel 1</td></tr>
<tr><td rowspan="2">05</td><td></td><td>0</td><td>Enable DeviceNet Channel 2</td></tr>
<tr><td></td><td>1</td><td>Disable DeviceNet Channel 2</td></tr>
<tr><td rowspan="2">06</td><td></td><td>0</td><td>Scanner run</td></tr>
<tr><td></td><td>1</td><td>Scanner halt</td></tr>
<tr><td rowspan="2">07</td><td></td><td>0</td><td>Scanner Active</td></tr>
<tr><td></td><td>1</td><td>Scanner reboot</td></tr>
<tr><td>08 – 15</td><td></td><td>0</td><td>Reserved for future use</td></tr>
</table>

Use BTR to Upload Input Data from the Scanner

The PLC-5 uploads input data from the scanner using block transfer read instructions over the 1771 backplane. The scanner interprets BTRs of length 1 through 50 and 62 words as being from the first block of the scanner input table. The scanner module can update a maximum of 357 input words by internally linking together six different sized block transfers. See the table below.

Block Transfer Size	Accessed Scanner Input Block	Scanner Input Data Table
62 words	Block 62	Word 0 – Module Status Register Word
		Words 1–61
61 words	Block 61	Words 62–122
60 words	Block 60	Words 123–182
59 words	Block 59	Words 183–241
58 words	Block 58	Words 242–299
57 words	Block 57	Words 300–356
52 words	Block 52	Device Failure Table
51 words	Block 51	Device Active Table
1-50 words	Block 1-50	Words 0–49



Each individual block transfer is independent, but always retrieves the same input bytes from the scanner's input data table. The types of information that a PLC-5 program will upload from the scanner via the BTR are the:

- Device Input Data Table (6 blocks, 62 through 57 words)
- Device Failure Table (1 block, 52 words)
- Device Active Table (1 block, 51 words)

When the scanner receives a BTR, it automatically knows which block of data is desired by the size specified.

You may upload portions of the scanner input table rather than the entire table, to support higher-speed operations. The scanner will interpret any BTR of length 1 through 50 with the words 0 thru 49 of block 62 of the scanner input table. BTRs of sizes 57 through 61 represent full blocks of the table. A BTR of 52 words contains the Device Failure Table. Sizes 53 through 56 are reserved. Size 64 is used for Explicit Message Program Control. For more details on Explicit Message Program Control, refer to page 26.

To reduce block transfer time and increase system performance, use only the words you need.

Use the RSNetWorx for DeviceNet software to map data from a DeviceNet node into the scanner input table. Data from a DeviceNet node can be split and put into as many as four different locations in the scanner input table.

Module Status Register

In the Module Status Register (word 0, block 62), bits 0 through 5 indicate to the PLC-5 the current state of the scanner module. When a Module Command Register command is sent to the scanner module, the respective bits are set in the Module Status Register when the command executes. Depending on network load, the scanner may take several moments to detect network status changes. The bits latch on in the "on" state until the command clears.

Bits 6 and 7 indicate that you should read the device failure table for more specific information about which devices failed. Bits 8 and 9 indicate that you should read the device autoverify table to determine which device has incorrect device keying or a misconfigured data size in the scanner configuration tables. Use the DeviceNetManager software to correct this error.

You can use bits 6 and 7 of the Module Status Register to enable the scanner module's Module Command Register to react to certain conditions. An example reaction to a condition is to keep the communication ports in the "idle" mode until the bits clear. When the bits clear, this indicates that all devices on the networks are operational. When the devices are operational, you can put the ports in the "run" mode, so that output data goes to the devices.

If a device failure is detected, you can put the communication into the "idle" mode, so that all devices would go into their idle state. You may tie these inputs to the Module Command Register, so that you may use them to adjust the operating mode of the scanner when devices fail or go online at startup.

You can also modify your control logic to run differently to compensate for the loss of communication with a certain node. An alarm message to alert an operator of the problem is also possible.

The following table lists Module Status Register bit numbers and their descriptions.

<table>
<tr><th colspan="5">Module Status Register - Word 0, Block 62</th></tr>
<tr><th rowspan="2">Bit Number</th><th colspan="2">Bits</th><th rowspan="2">Operating Mode</th><th rowspan="2">Operating Mode Description</th></tr>
<tr><th>01</th><th>00</th></tr>
<tr><td rowspan="4">00 - 01</td><td>0</td><td>0</td><td>DeviceNet Channel 1 in idle mode</td><td rowspan="32">Idle
The scanner does not map output data to the devices, but keeps network connections to devices open so device failures can be detected. Input data is returned from devices, and mapped into the scanner input table and the discrete inputs. Outputs on the network are not under program control and will be in their configured ‘safe state.’ The scanner must be in this mode to perform configuration of the scanner database tables.
Run
The scanner module maps output data from its scanner output table and discrete outputs to each device on the network. Inputs are received and mapped into the scanner input table and discrete inputs. Outputs on the network are under program control.
Placing the PLC-5 into the PROG or REM_PROG mode places the scanner into IDLE MODE regardless of the state of the bits in the module command register. Placing the PLC-5 into RUN or REM_RUN mode causes the state of the bits in the module command register to determine the scanner state.
Fault
The scanner has stopped communicating with devices on the network. No outputs or inputs are mapped. Outputs on the network are not under program control. If the scanner was in run, devices will go to their fault state.
Device Failure
One or more of the devices in the scanner’s scan list has failed to communicate with the scanner.
Autoverify Failure
One or more of the devices in the scanner’s scan list is returning an incorrect number of bytes of data in response to a strobe/poll, according to the information stored in the scanner’s scan list.
Communications Failure
There is no communication on the port.
Duplicate Node Address Failure
There is another node with the same address on the network.
Scanner Configuration Missing or Corrupted
Either the I/O chassis addressing mode is set to an illegal position or, the chassis addressing mode switch does not match the value stored in the scanner’s scan list.
Client/server transaction response queued
The client/server response is loaded and available with a 64-word Block Transfer Read.</td></tr>
<tr><td>0</td><td>1</td><td>DeviceNet Channel 1 in run mode</td></tr>
<tr><td>1</td><td>0</td><td>DeviceNet Channel 1 in fault mode</td></tr>
<tr><td>1</td><td>1</td><td>Reserved</td></tr>
<tr><td rowspan="4">02 - 03</td><td>0</td><td>0</td><td>DeviceNet Channel 2 in idle mode</td></tr>
<tr><td>0</td><td>1</td><td>DeviceNet Channel 2 in run mode</td></tr>
<tr><td>1</td><td>0</td><td>DeviceNet Channel 2 in fault mode</td></tr>
<tr><td>1</td><td>1</td><td>Reserved</td></tr>
<tr><td rowspan="2">04</td><td></td><td>0</td><td>Enable DeviceNet Channel 1</td></tr>
<tr><td></td><td>1</td><td>Disable DeviceNet Channel 1</td></tr>
<tr><td rowspan="2">05</td><td></td><td>0</td><td>Enable DeviceNet Channel 2</td></tr>
<tr><td></td><td>1</td><td>Disable DeviceNet Channel 2</td></tr>
<tr><td rowspan="2">06</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 1 device failure detected</td></tr>
<tr><td rowspan="2">07</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 2 device failure detected</td></tr>
<tr><td rowspan="2">08</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 1 autoverify failure detected</td></tr>
<tr><td rowspan="2">09</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 2 autoverify failure detected</td></tr>
<tr><td rowspan="2">10</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 1 communications failure detected</td></tr>
<tr><td rowspan="2">11</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 2 communications failure detected</td></tr>
<tr><td rowspan="2">12</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 1 duplicate node address failure</td></tr>
<tr><td rowspan="2">13</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>DeviceNet Channel 2 duplicate node address failure</td></tr>
<tr><td rowspan="2">14</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>Scanner configuration missing or corrupted</td></tr>
<tr><td rowspan="2">15</td><td></td><td>0</td><td>No failures detected</td></tr>
<tr><td></td><td>1</td><td>Client/server transaction response queued</td></tr>
</table>

Numerics

A

B

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D

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PLC-5 DeviceNet Scanner Module

User Manual