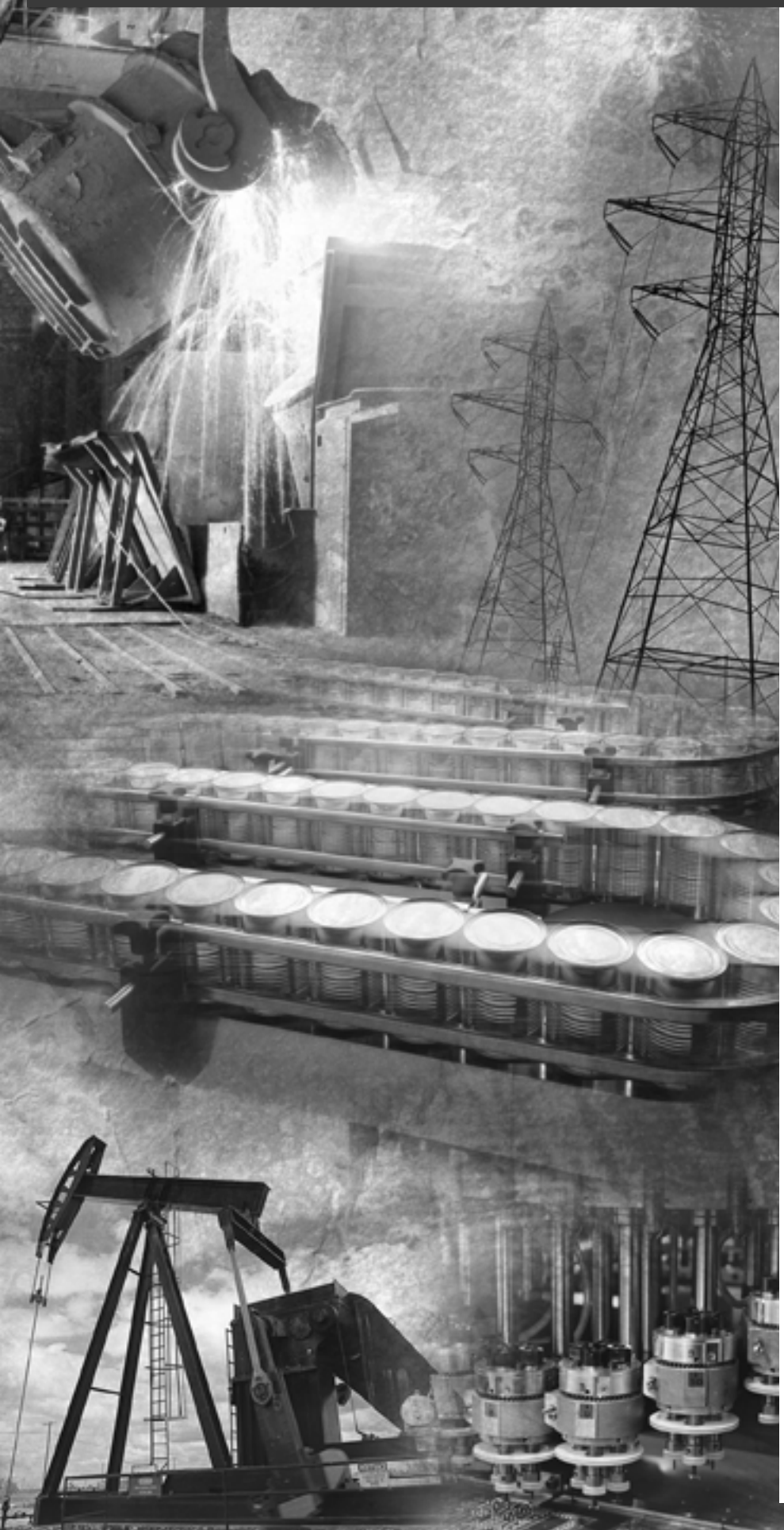


Allen-Bradley

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 this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley 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 manual we use notes to make you aware of safety considerations:

ATTENTION

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

Attention statements help you to:

- identify a hazard
- avoid a hazard
- recognize the consequences

IMPORTANT

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

European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 50082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests. For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the Allen-Bradley publication Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

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. 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:

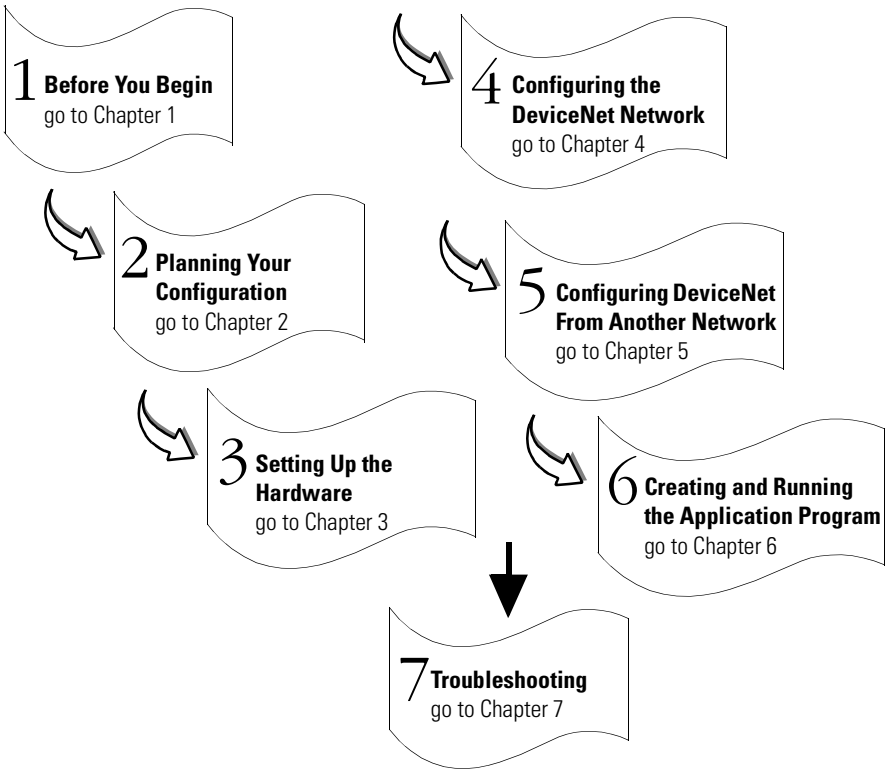
- ControlNet
- Ethernet
- Data Highway Plus (DH+)

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 1771-5.14. 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	B	-
1	DeviceNet Scanner module	1771-SDN/B	B	-
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 Windows 95/98, NT 4.0		
	Software			
	RSLogix 5	9324-RL5300xxx	-	3.22
	RSNetWorx for DeviceNet	9357-DNETL3	-	2.11
	RSLinx	9355-WABxxx	-	2.10

(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:

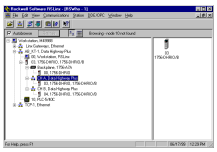
- Bulleted lists provide information, not procedural steps.
- Numbered lists provide sequential steps.
- Information in **bold** contained within text identifies menu windows, or screen options, screen names and areas of the screen, such as dialog boxes, status bars, radio buttons and parameters.

TIP

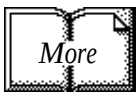
This symbol identifies helpful tips.

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.

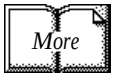


Screen captures are pictures of the software's actual screens. The names of screen buttons and fields are often in bold in the text of a procedure. Pictures of keys represent the actual keys you press.



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	1771-5.14
the PLC-5 processor	ControlNet PLC-5 Programmable Controllers User Manual Phase 1.5	1785-6.5.22
	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	2705-804
the 9000 Series photoeye	{refer to the information that came with your photoeye}	n/a
DeviceNet	DeviceNet System Overview	DN-2.5
	DeviceNet Design Manual (online)	DNET-AT-001A-EN
connecting the DeviceNet network	DeviceNet Cable Planning and Installation Manual	DN-6.7.2
	DeviceNet Cable Planning and Installation Release Note 1	DN-6.7.2-RN1
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	9398-DNETDEMO
terms and definitions	Allen-Bradley Industrial Automation Glossary	AG-7.1

TIP

Many of 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
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.
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).
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.
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.
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".

Rockwell Automation Support

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Contact your local Rockwell Automation representative for:

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- product technical training
- warranty support
- support service agreements

Technical Product Assistance

If you need to contact Rockwell Automation for technical assistance, call your local Rockwell Automation representative, or call Rockwell directly at: 1 440 646-6800.

For presales support, call 1 440 646-3NET.

You can obtain technical assistance online from the following Rockwell Automation WEB sites:

- www.ab.com/mem/technotes/kbhome.html (knowledge base)
- www.ab.com/networks/eds (electronic data sheets)

Your Questions or Comments about This Manual

If you find a problem with this manual, please notify us of it on the enclosed Publication Problem Report (at the back of this manual).

If you have any suggestions about how we can make this manual more useful to you, please contact us at the following address:

Rockwell Automation, Allen-Bradley Company, Inc.
Control and Information Group
Technical Communication
1 Allen-Bradley Drive
Mayfield Heights, OH 44124-6118

Chapter 1

Before You Begin

Chapter 2

Planning Your Configuration and Data Mapping Your Devices

Chapter 3

Hardware Setup

Chapter 4

Configuring the DeviceNet Network

Chapter 5

Communicating with DeviceNet from Another Network

Chapter 6

Creating and Running the Example Application Program

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.

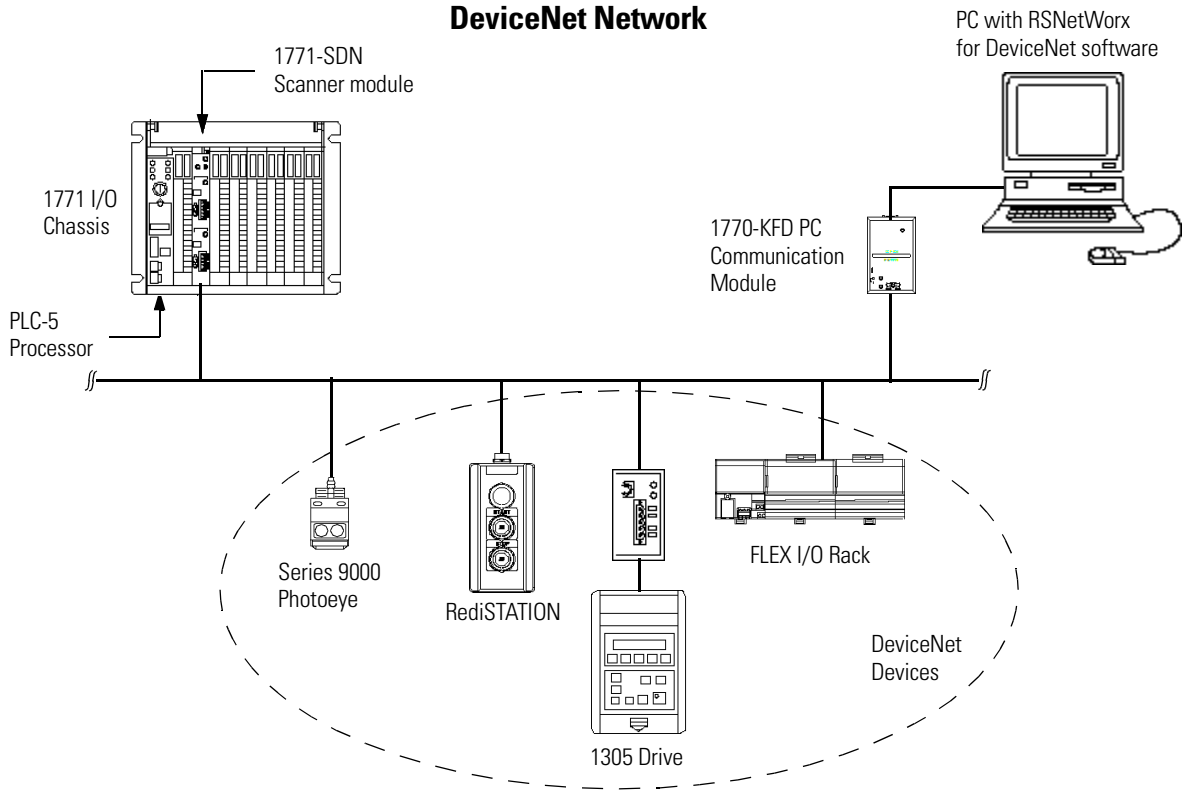
What You Need to Know

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.



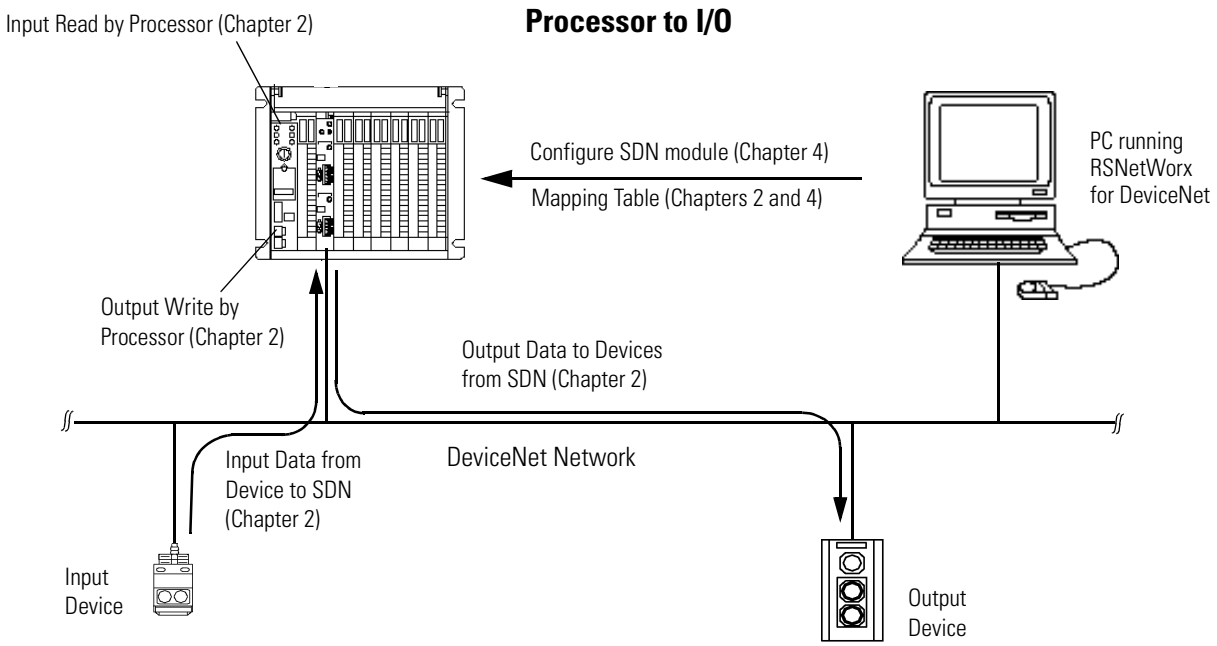
The 1771-SDN module communicates with DeviceNet devices over the network to:

- 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:

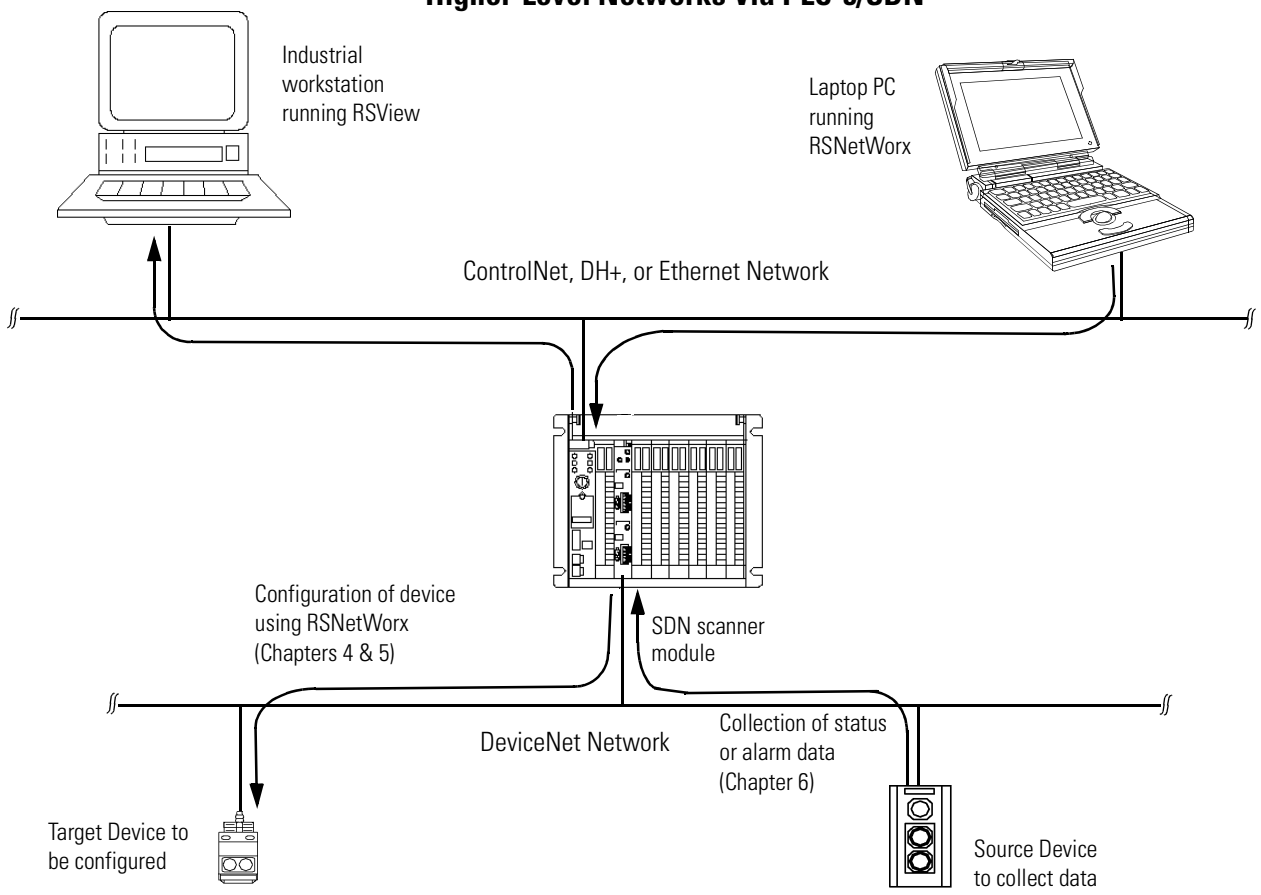
- device I/O data
- status information
- configuration data

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



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

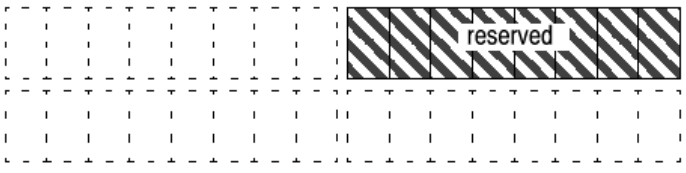
The concept described below applies to both input and output data tables. For example, when using your 1771-SDN in 1-slot addressing mode, you have eight bits of discrete input *and* eight bits of output available.

= bits reserved for 1771-SDN and processor communication

= bits available for discrete data transfer

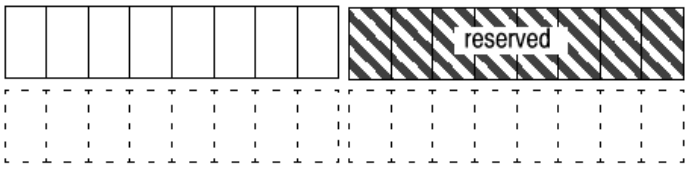
In the scanner's input and output data tables, there is one byte of memory that is reserved for communication between the processor and the scanner. Processor-specific responses from the scanner are read by the processor in this byte of the input data table. Scanner-specific instructions are written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

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



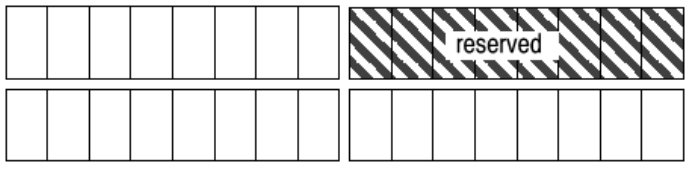
In 2-slot addressing mode, the only memory that would have been available for discrete data transfer (8 bits) is taken up by scanner/processor communication.

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

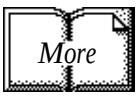


In 1-slot addressing mode, there are 16 bits: eight bits for scanner/processor communication, and eight bits for discrete data transfer.

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 1771-5.14. 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).

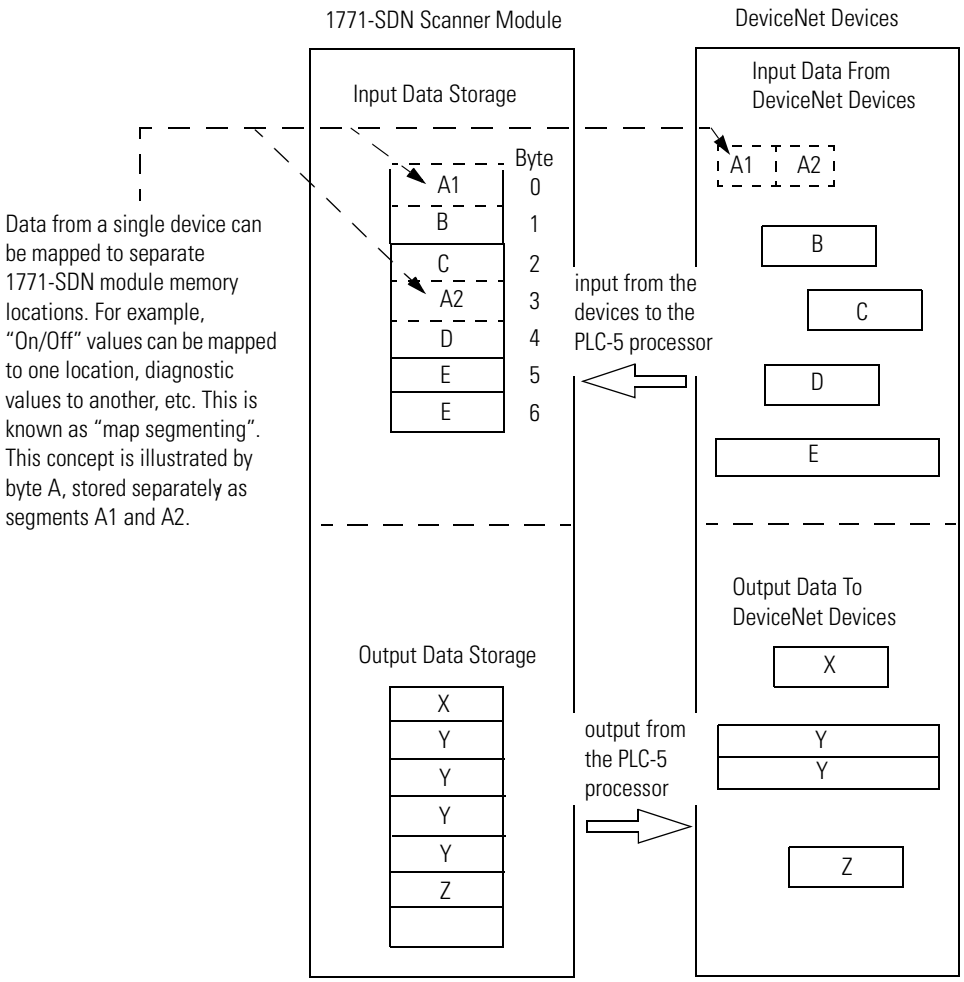
A change of state message is a transfer of data sent whenever a data change occurs. A user-configurable heartbeat rate can also be set to allow devices to indicate proper operation during intervals between data changes. This does not solicit response data, but may receive an acknowledge message.

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.



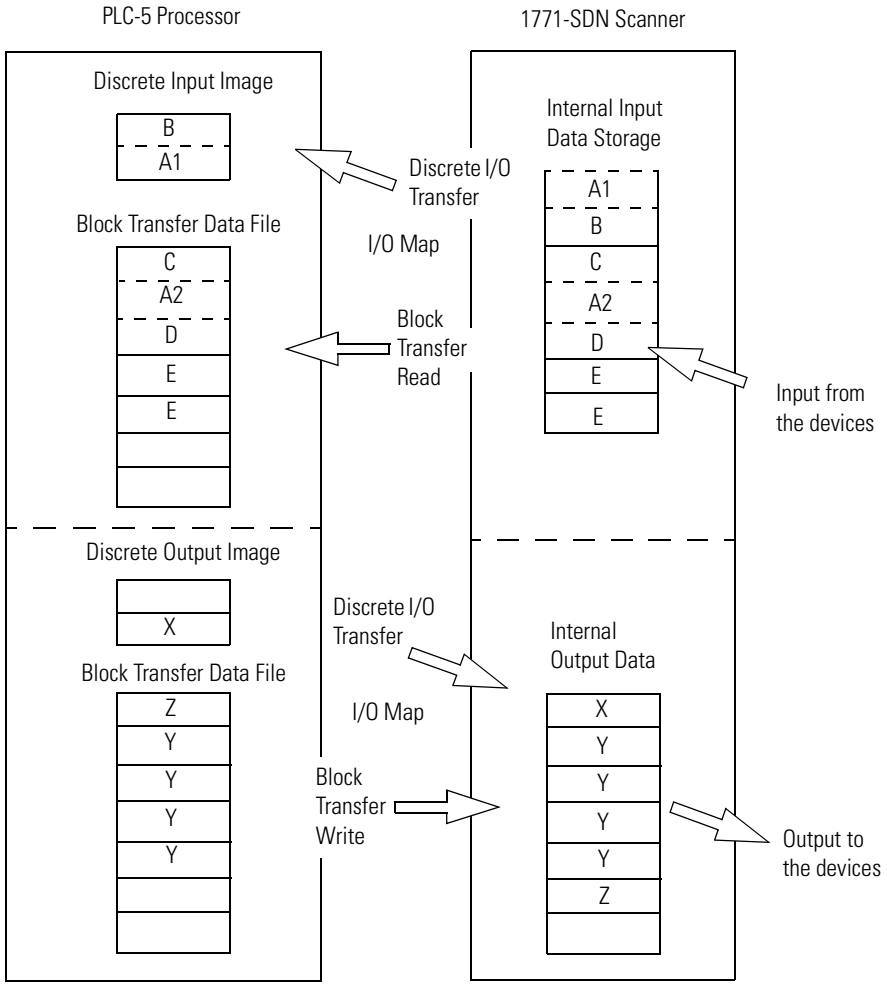
Communicating with Your PLC-5 Processor

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.

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.

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).

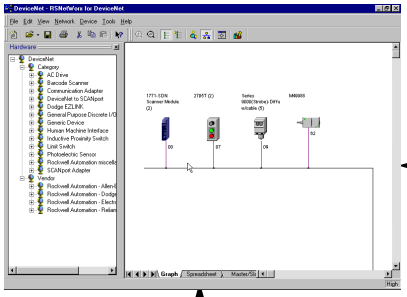
TIP

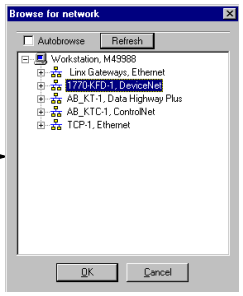
RSNetWorx for DeviceNet software can also communicate with the 1771-SDN module via a ControlNet, Ethernet, or Data Highway Plus network. See chapter 5.

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

The main **RSNetWorx for DeviceNet** screen.

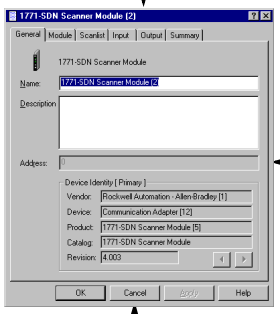


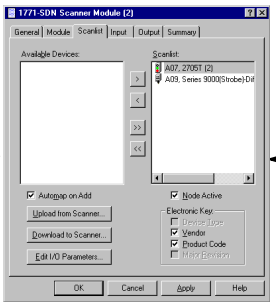


To browse the network, click on the Online button and select the driver.

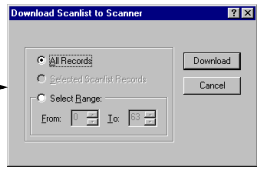
To access the 1771-SDN scanner Module, double-click on the 1771-SDN icon.

To access the scanlist, click on the Scanlist tab.





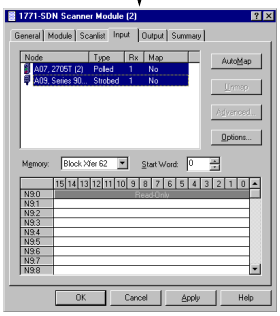
To download the scanlist, click on the Download to Scanner button.

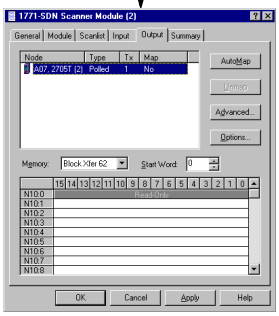


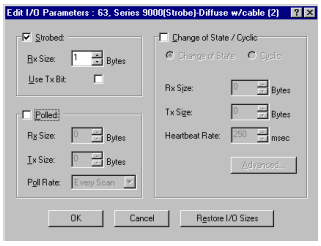
To automatically map input devices, select the Input tab and click on the AutoMap button.

To automatically map output devices, select the Output tab and click on the AutoMap button.

To edit a device's I/O parameters, double-click on the device in the scanlist.







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.

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.

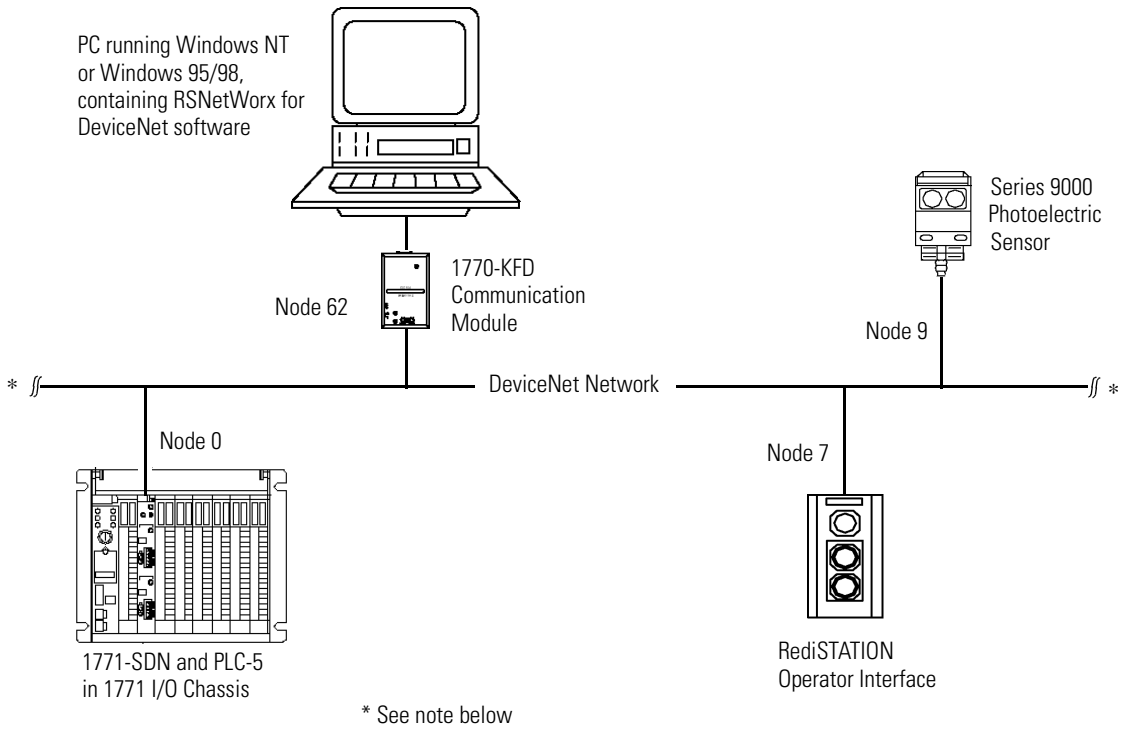
Example Network Devices

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:



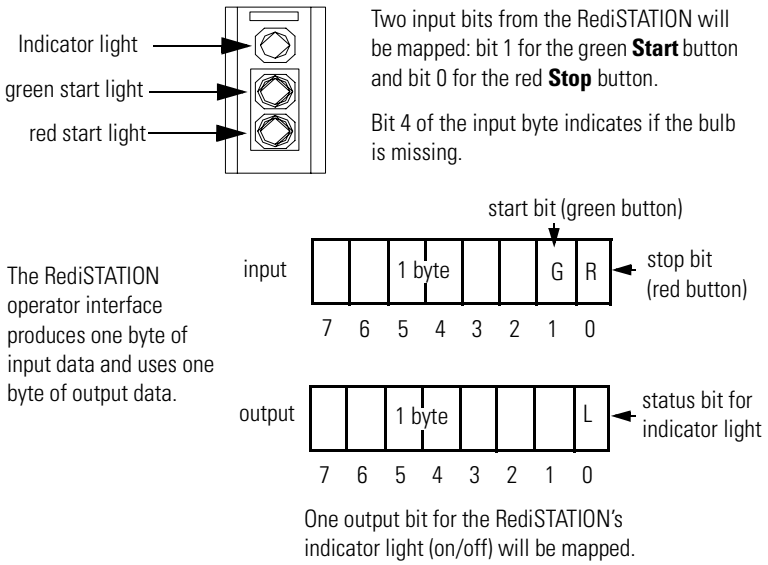
IMPORTANT Each end of the DeviceNet trunk cable must be properly terminated with a resistor. Refer to the DeviceNet Cable Planning and Installation Manual, publication DN-6.7.2 for detailed information.

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

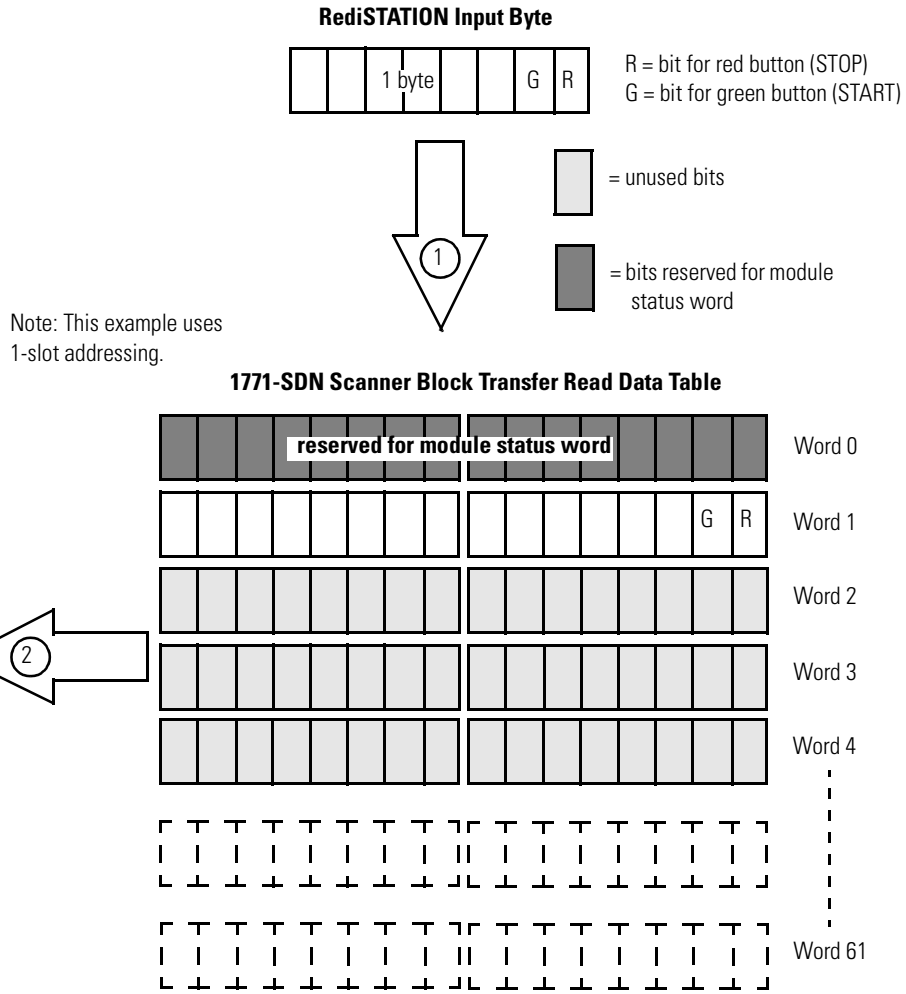
Mapping RediSTATION Input Data for a Block Transfer Read

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.

What's Happening?

1. The bits for the RediSTATION operator interfaces's red and green buttons 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 file available for the processor to read. The 1771-SDN does not move the data file to the processor.



[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

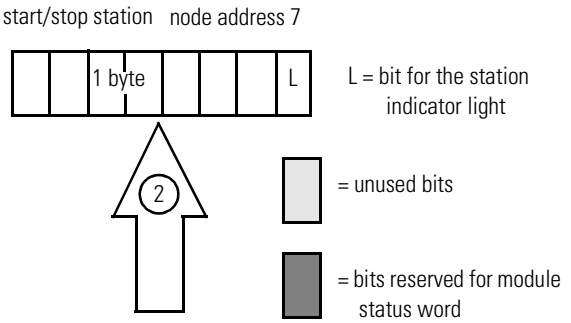
The RediSTATION operator interface's output byte is mapped to the 1771-SDN module's block transfer write data table. Within the output byte is bit 0 for the indicator light. The PLC-5's output data file is transferred by the processor application to turn the light on or off. In this example, we use N10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

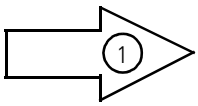
Note: This example uses 1-slot addressing.

RediSTATION Output

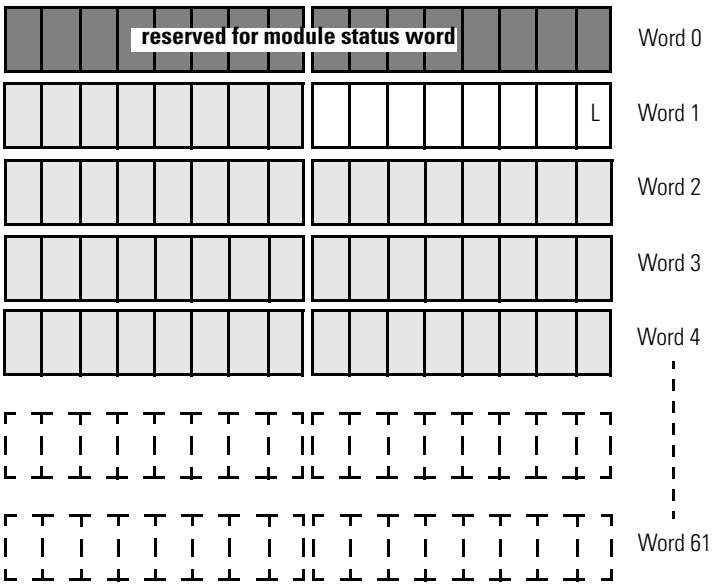


PLC-5 Processor Output Data File[1]

N10:0	0000 0000 0000 0000
N10:1	0000 0000 0000 000**L**
N10:2	0000 0000 0000 0000
N10:3	0000 0000 0000 0000
N10:4	0000 0000 0000 0000
N10:5	0000 0000 0000 0000
N10:61	0000 0000 0000 0000



1771-SDN Scanner Block Transfer Write Data Table



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

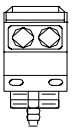
Example: The RediSTATION's indicator light (L) is taken from N10:1/0 in the PLC-5 processor's output data file.

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.

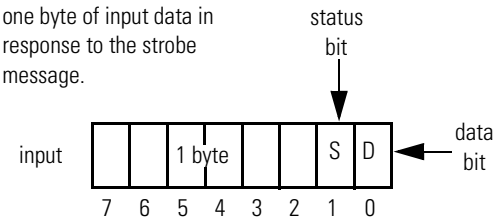
The photoeye has no outputs to map.

Series 9000 Photoeye



Two input bits from the photoeye will be mapped: the status bit and the data bit.

The photoeye produces one byte of input data in response to the strobe message.



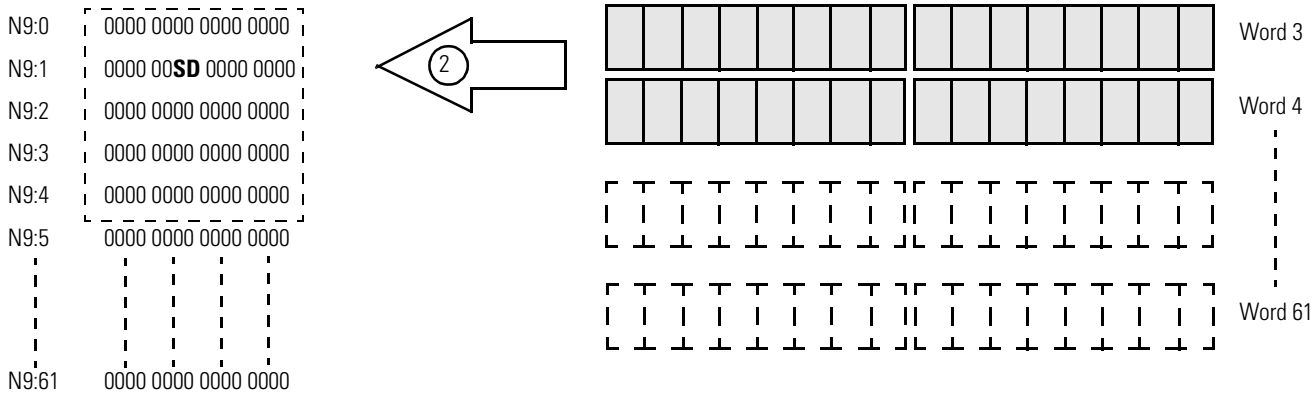
Mapping Photoeye Input Data for a Block Transfer Read

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.



[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.

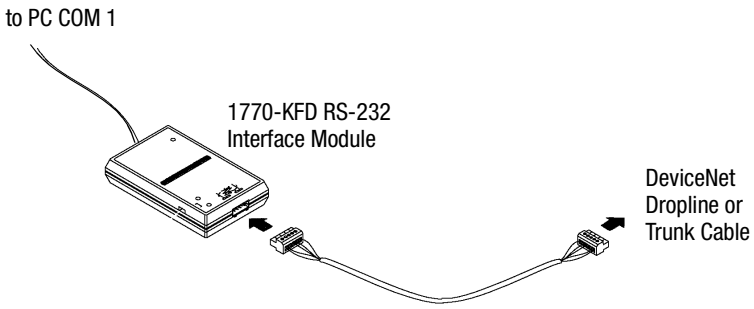
Hardware Setup

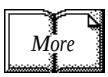
What This Chapter Contains

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.



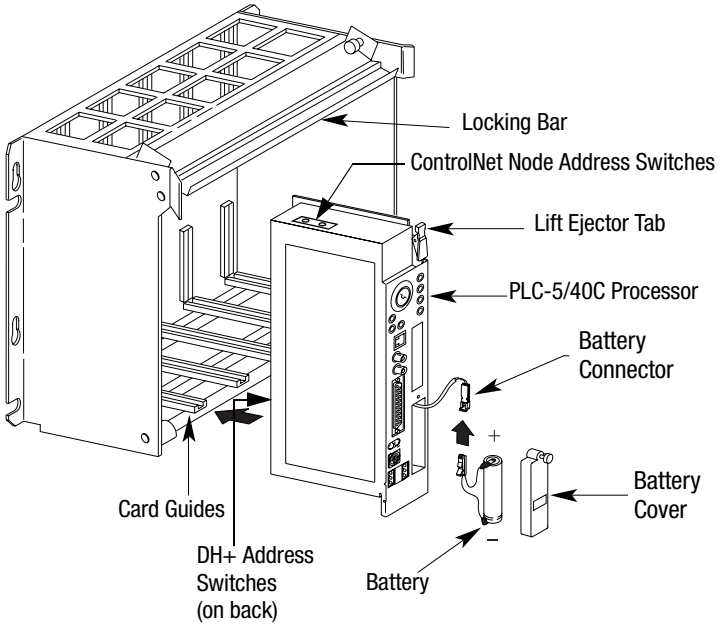


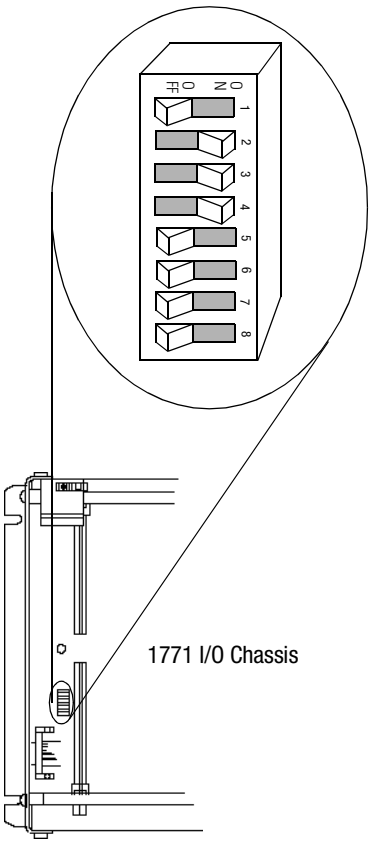
For detailed directions on how to install the 1770-KFD interface module, see the DeviceNet RS-232 Interface Module Installation Instructions, publication 1770-5.6.

Installing the PLC-5 Processor

Refer to the following figure while installing your PLC-5 processor.

PLC-5C Processor and 1771 I/O Chassis

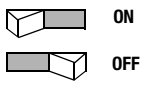


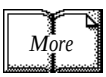


Setting the I/O Chassis Backplane Switches

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 1785-6.5.22.

Going Online to the PLC-5 Processor

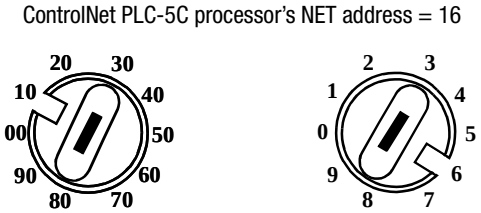
You cannot go online to the PLC-5 processor over DeviceNet. In order to download and run the example application program in chapter 6 you must use the processor's RS-232 connector, or download and run the program via another network.

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.

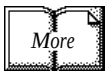
To go online to the PLC-5 processor via ControlNet:

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.



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

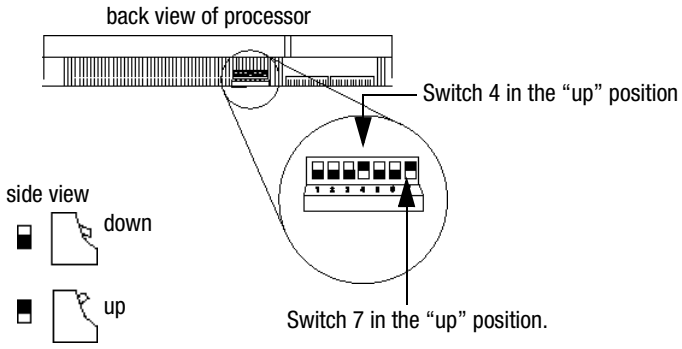


See Appendix B for information on installing and configuring the ControlNet driver. See the ControlNet 1.5 PLC-5 Programmable Controller User Manual, publication 1785-6.5.22, for further information.

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.)

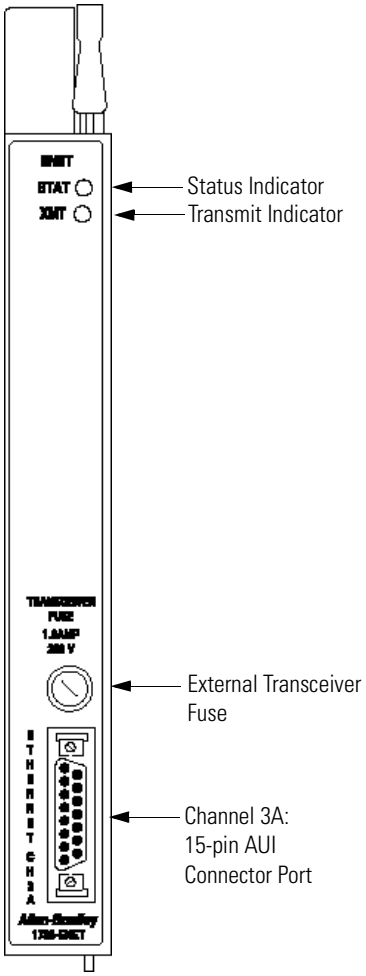
TIP See the information on the side of the processor if you want to use another address.



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.

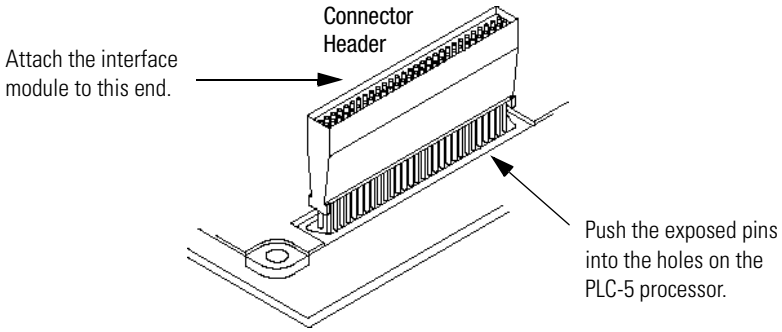
Installing the 1785-ENET Ethernet Module



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

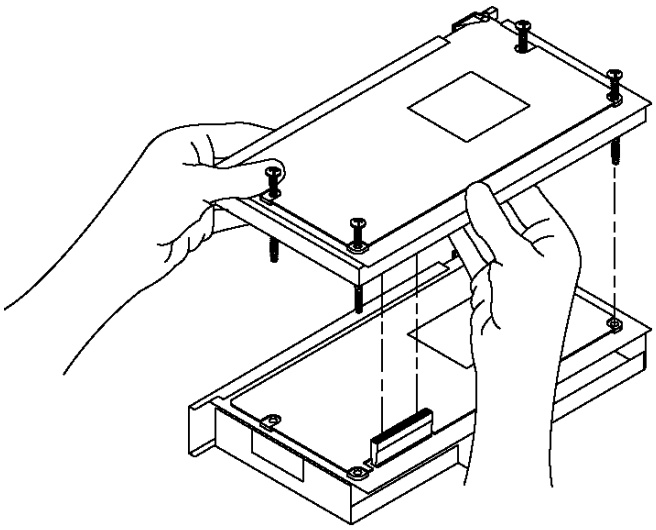
The Ethernet module is shipped with a 58-pin connector header that attaches to the PLC-5 processor.

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



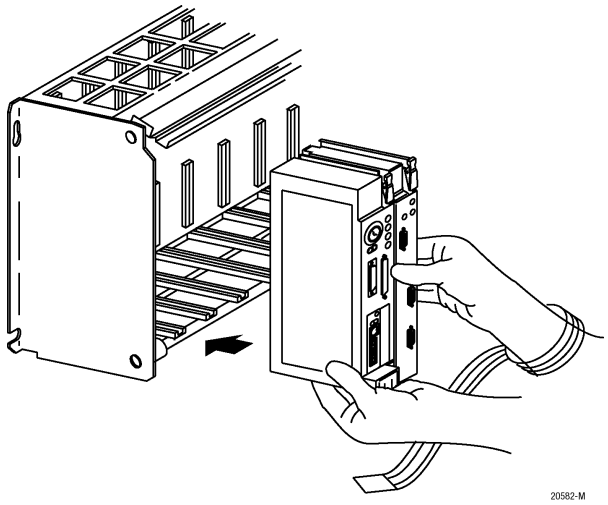
IMPORTANT Make sure you carefully align the pins and holes before you press the connector header into the processor. If you improperly align them, you will bend the connector header pins when you press them together. Do not use excessive force on the connector header when seating it into the processor.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

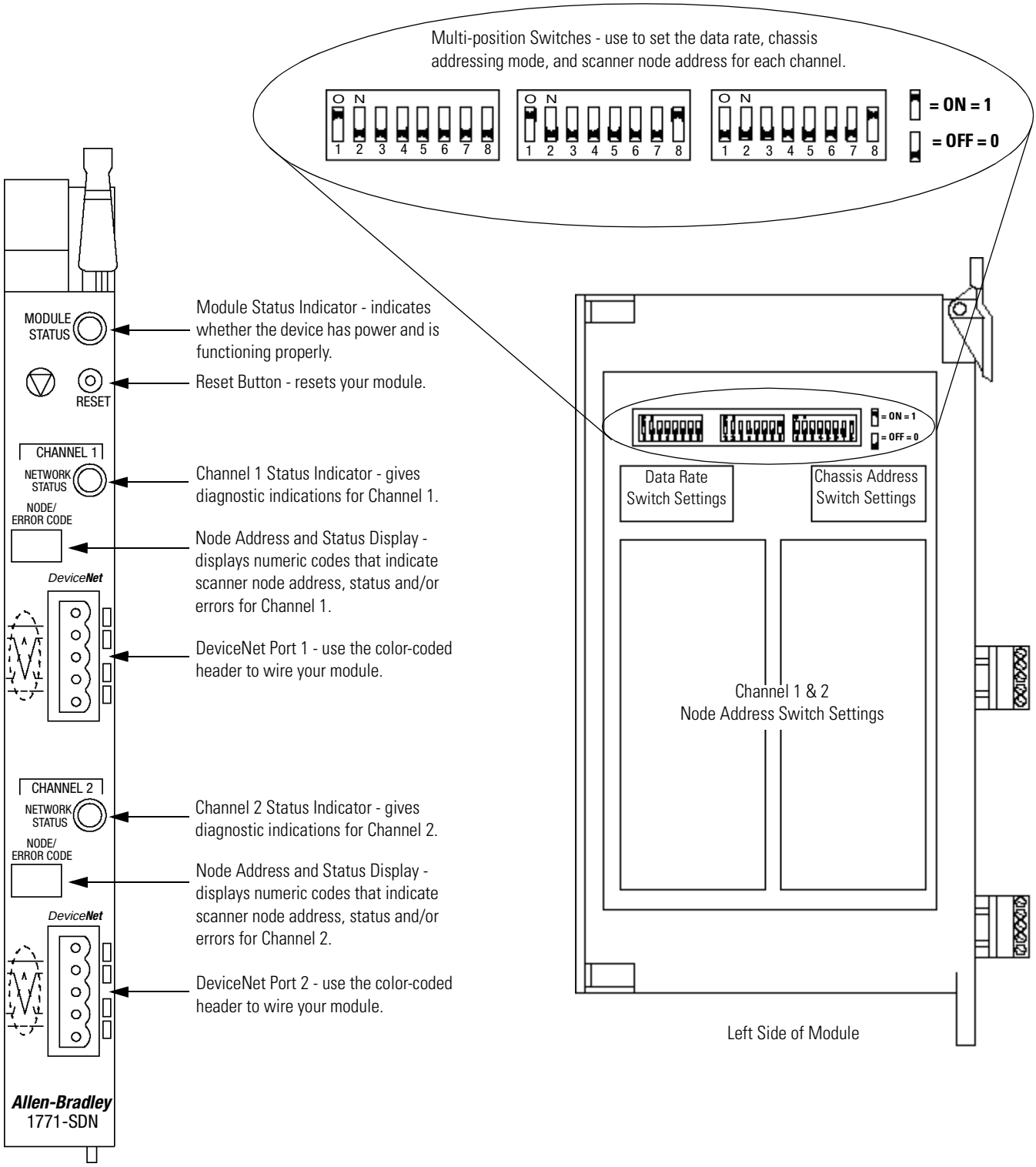
You can configure the communication channel using BOOTP software or your PLC-5 programming software. See Appendix A for information on configuring the communication channel using **RSLogix 5** programming software.

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

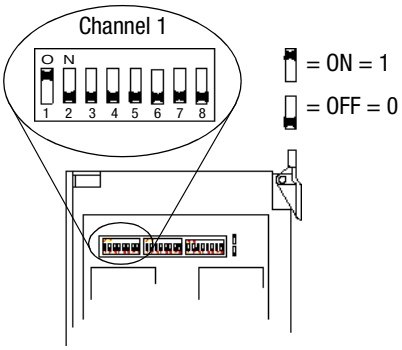
More For more information, see the PLC-5 Ethernet Interface Module User Manual, publication 1785-6.5.19.

Installing the 1771-SDN Scanner Module

Refer to the following figure as you install the 1771-SDN module.



Setting the Channel 1 Data Rate and Node Address Switches

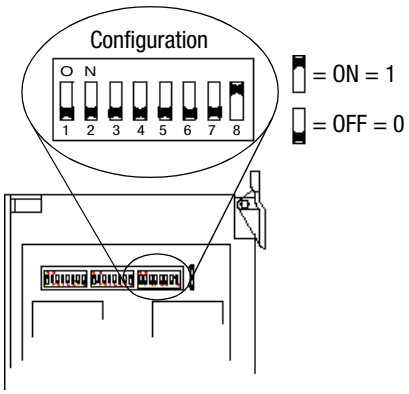


1. Locate the switchbank labeled "Channel 1" on the left side of the module.
2. Set the DeviceNet Data Rate for Channel 1 to 500K baud for the example application by setting switch 1 to an ON ("1") position and switch 2 to an OFF ("0") position.
3. Set the DeviceNet node address for Channel 1 to node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

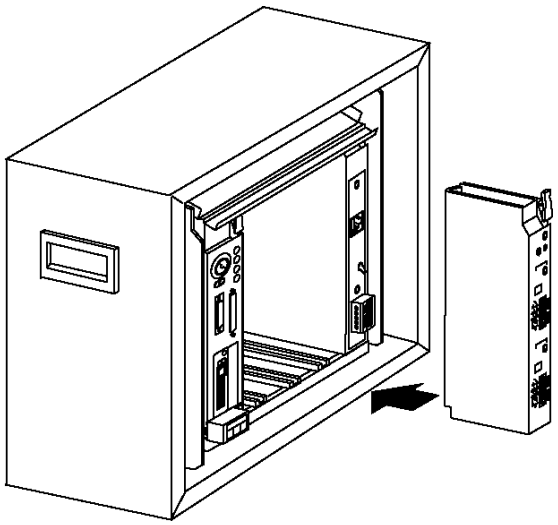
Installing the Scanner Module in the Chassis

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.

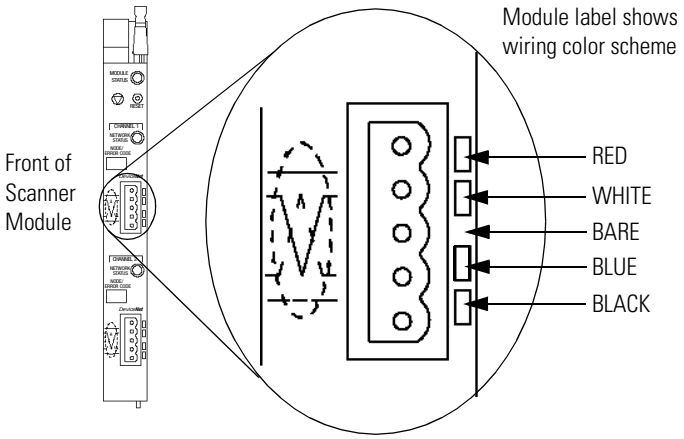
Connecting the Scanner to the DeviceNet Network

ATTENTION

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

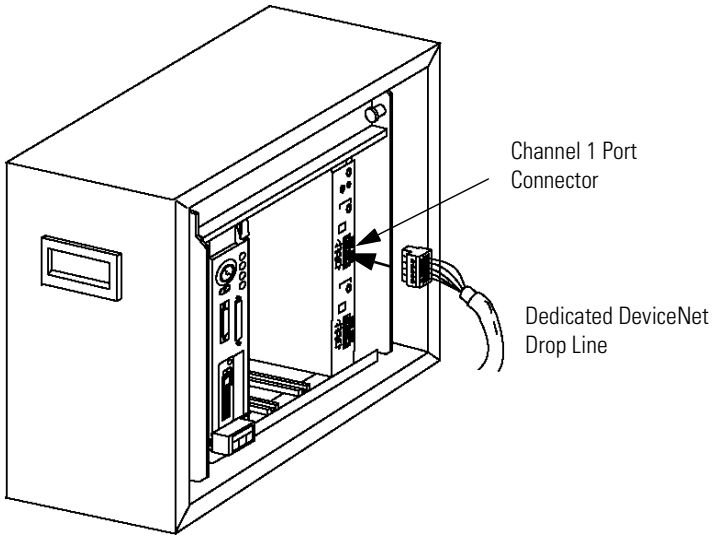
To connect to the DeviceNet network:

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.

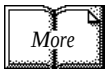


Installing the RediSTATION Operator Interface

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).

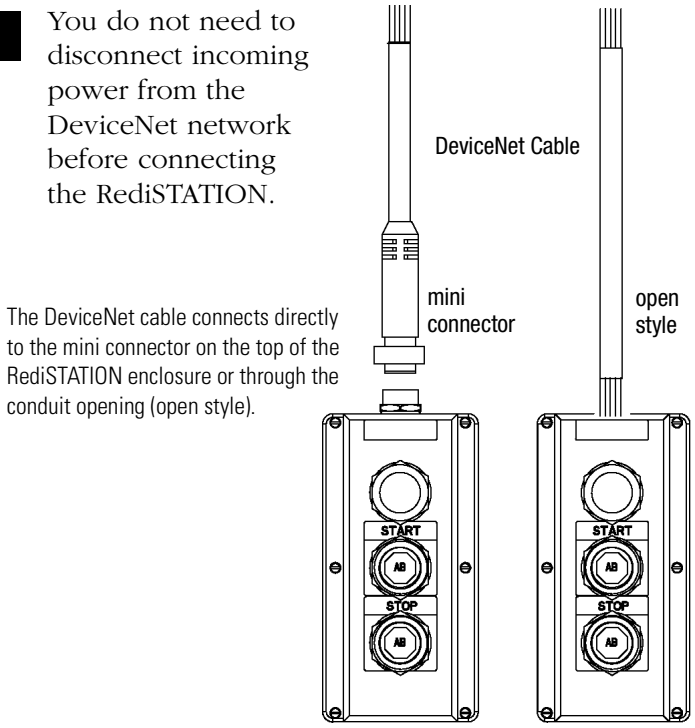


See Chapter 2 of the RediSTATION Operator Interface User Manual, publication 2705-804, for complete information about setting the DIP switches to configure the node address, data rate, output flash rate, and output fault state.

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.

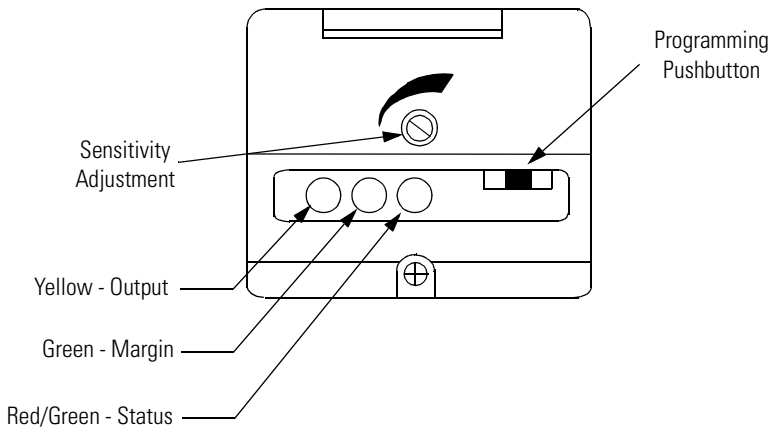


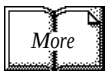
Installing the Series 9000 Photoeye

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

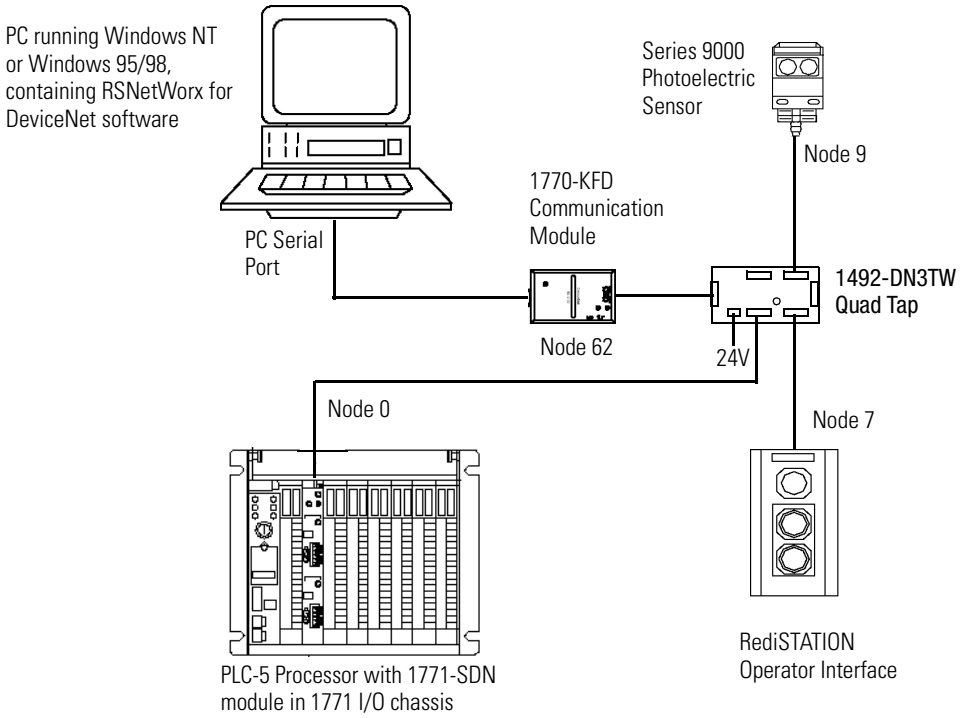




For detailed directions, see the instructions that came with your photoeye.

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.

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.

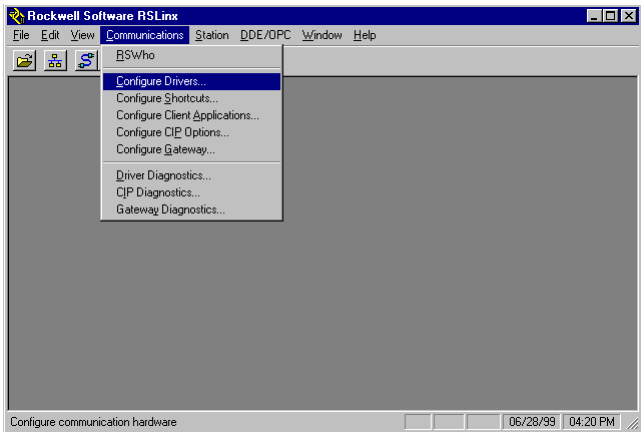
4. Click on **OK**.

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

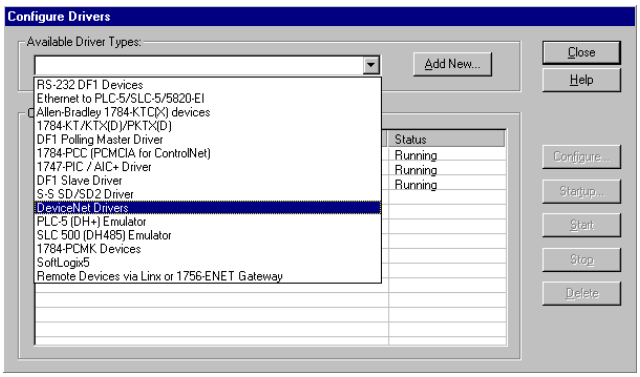
Using RSLinx to Configure the DeviceNet Driver

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.

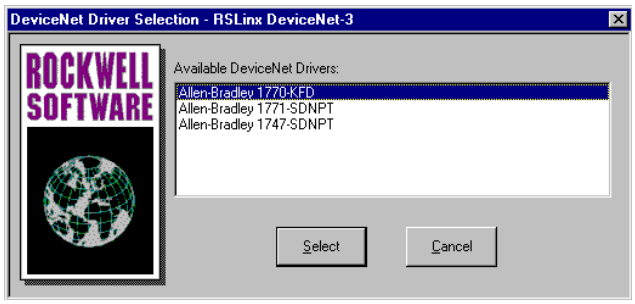


2. From the **Communications** menu, select **Configure Drivers**. The **Configure Drivers** window will appear.



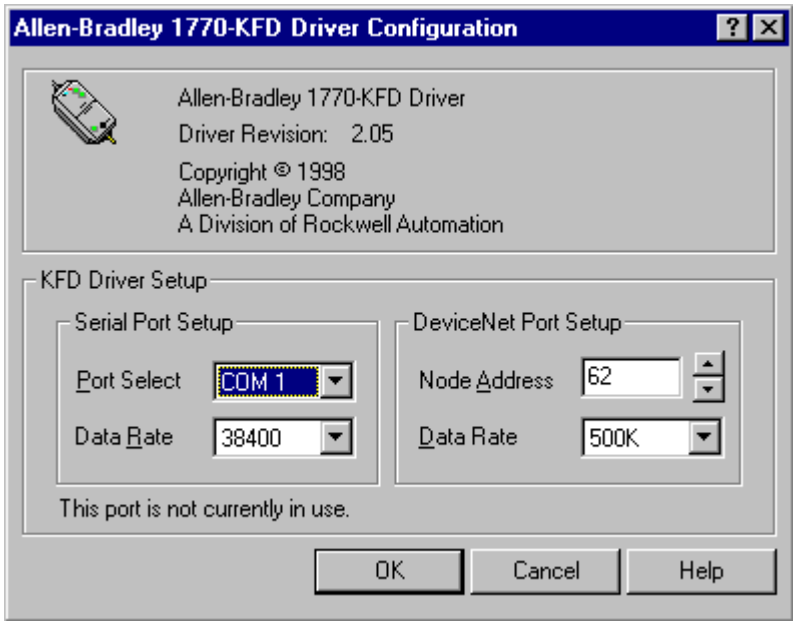
3. From the list of **Available Drivers**, select **DeviceNet Drivers** and click on **Add/New**.

   You will see the following list of drivers:



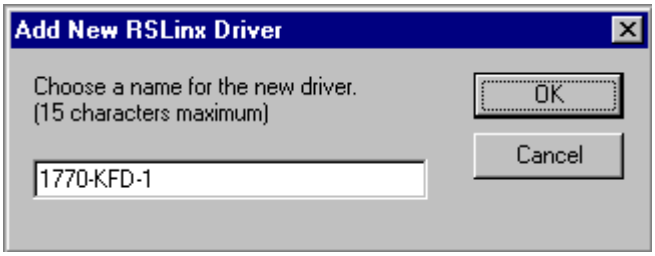
4. Select the **Allen-Bradley 1770-KFD** driver.

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.

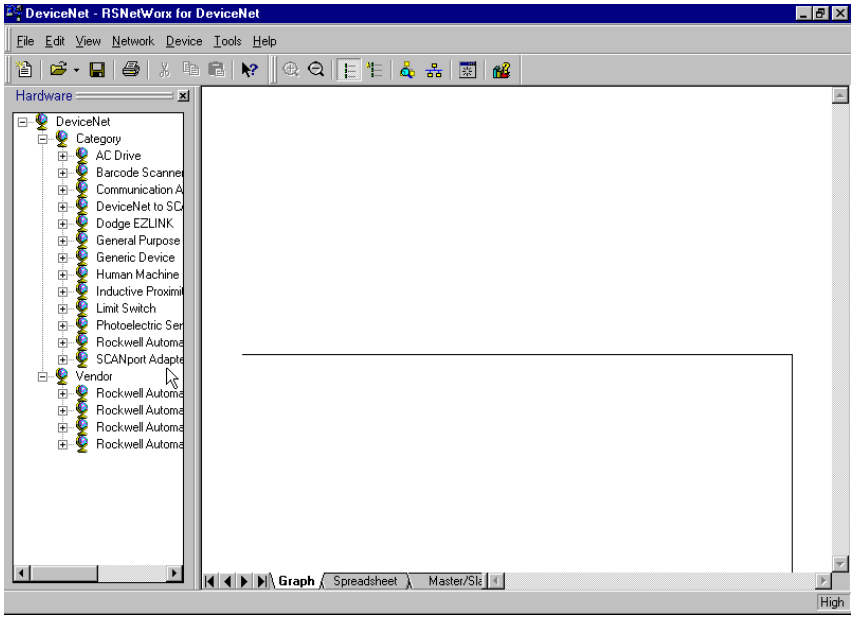
You will use the driver you just configured to browse and configure the network with RSNetWorx for DeviceNet.

Using RSNetWorx for DeviceNet to Configure the Scanlist

Setting Up an Online Connection

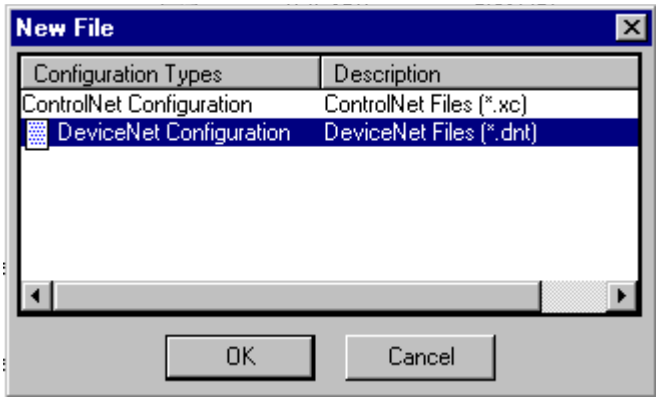
Follow the procedure below to set up an online connection to the DeviceNet network using the 1770-KFD driver.

1. Start **RSNetWorx**.



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

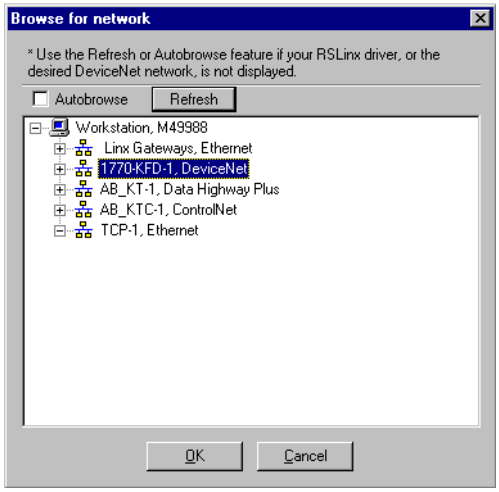
   If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



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.

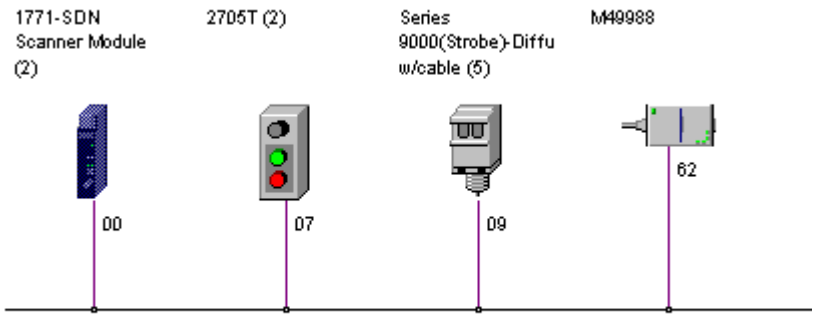


5. Select the **1770-KFD-1, DeviceNet** driver and click on **OK**.

   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.

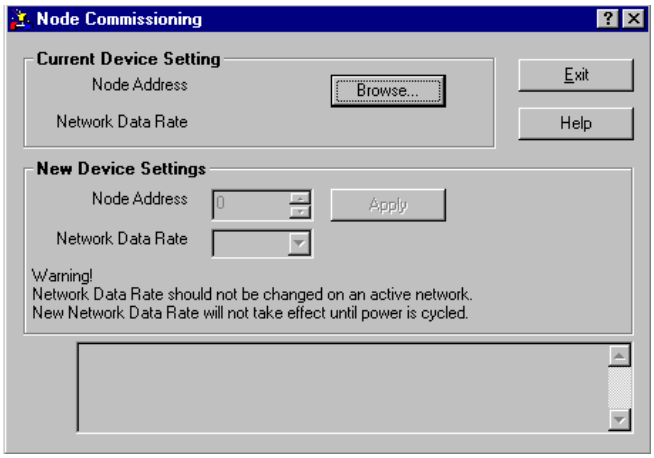
IMPORTANT

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.)

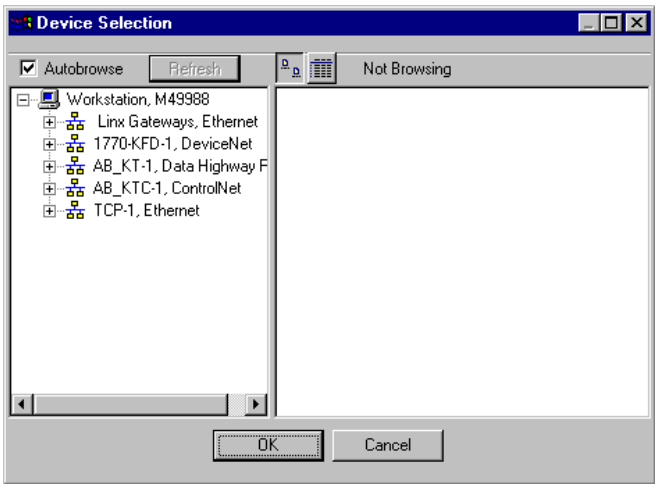
To change the node address of a device perform the following steps:

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



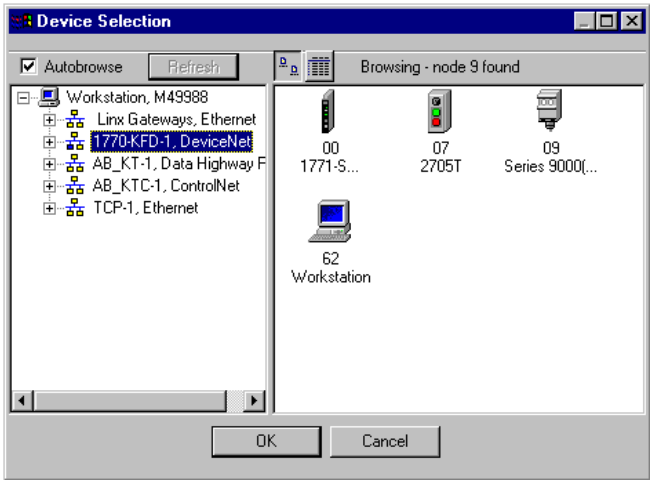
2. Click on the **Browse** button.

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



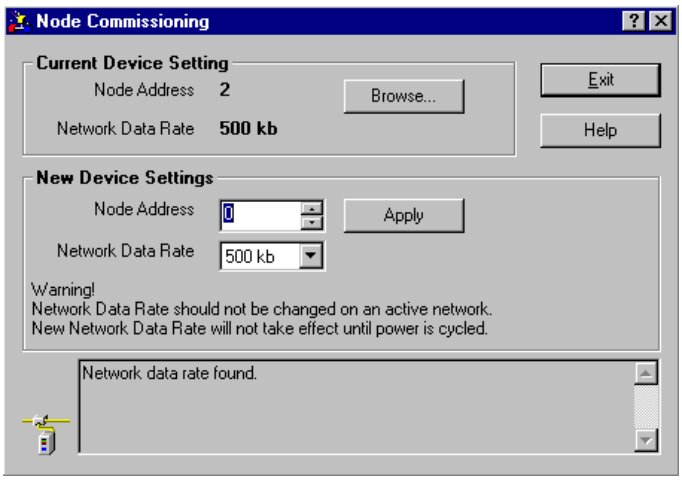
3. Select the **1770-KFD-1** driver.

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).

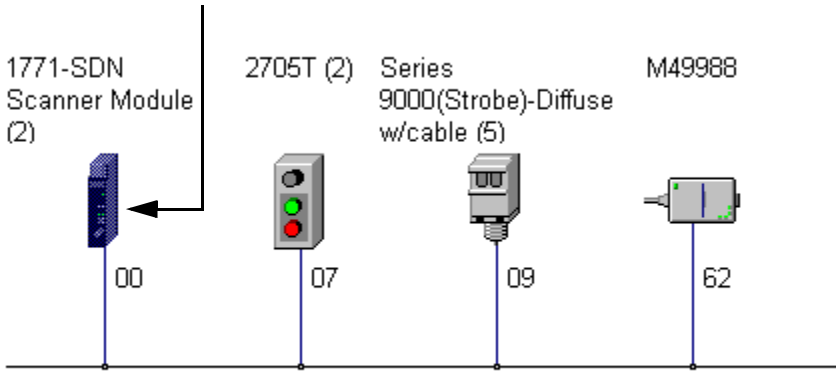
6. Click on **Apply**.

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

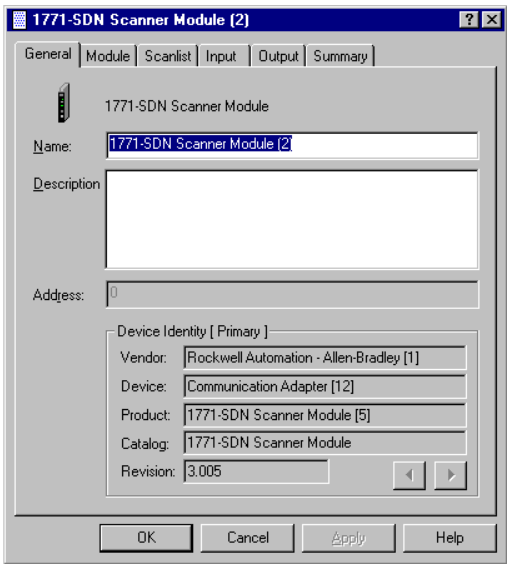
Configuring the I/O Devices

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.

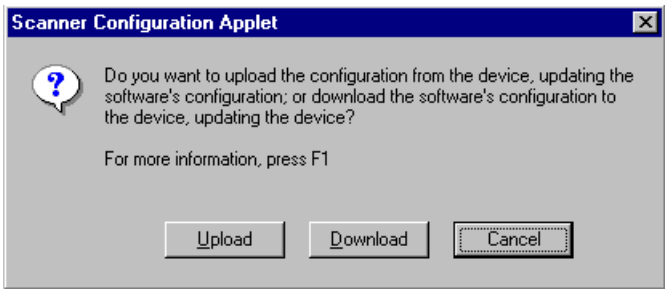


The following window will appear:



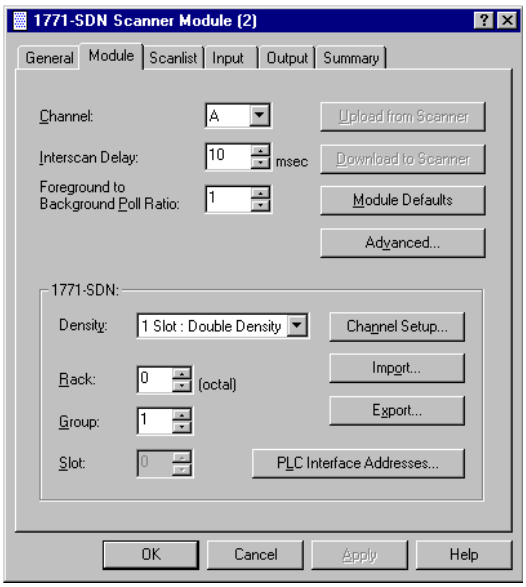
2. Select the **Module** tab.

You will be prompted to upload or download the configuration.



3. Click on **Upload**.

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



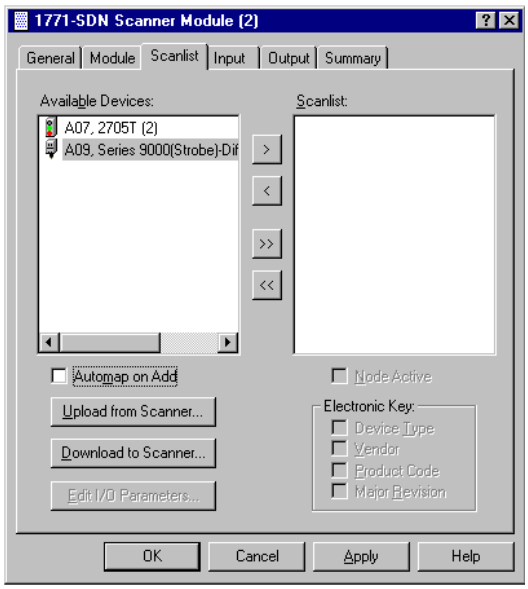
4. Make sure the 1771-SDN module's **Rack** and **Group** numbers are correct. We used Rack 0, Group 1 for the example application.

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.

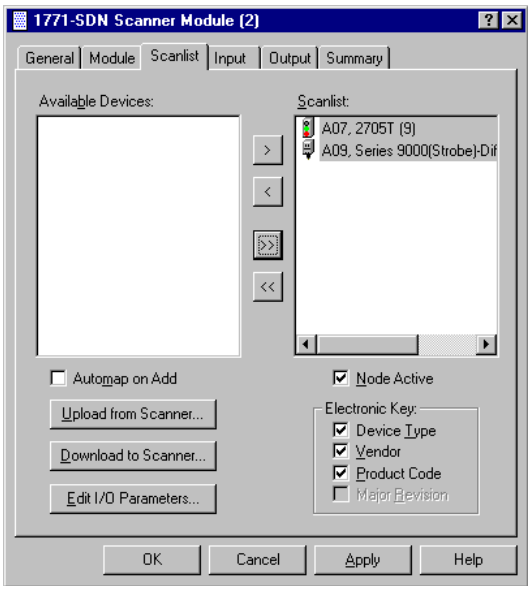
The **Scanlist** page will appear with the RediSTATION and the photoeye in the list of **Available Devices**.



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

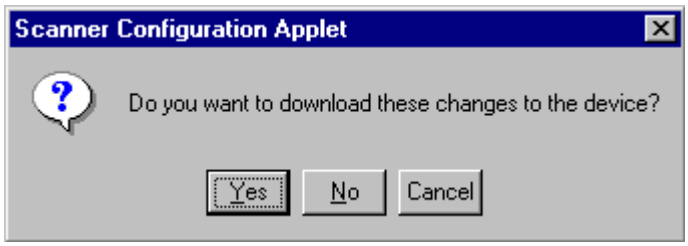
7. Click on the double arrow  button to add the photoeye and RediSTATION to the Scanlist.

   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).

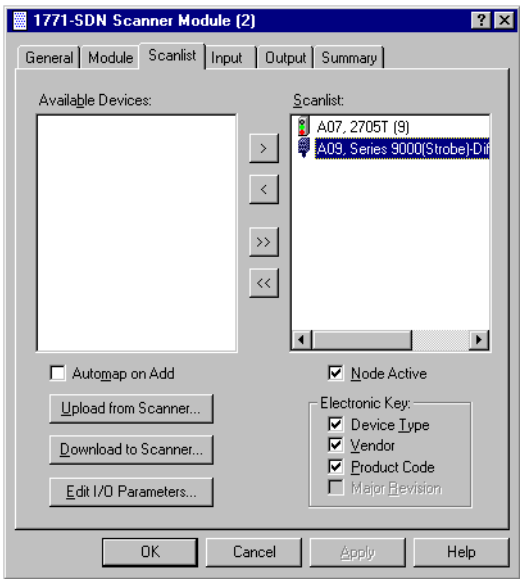


9. Click on **Yes**.

IMPORTANT The PLC-5 processor must be in Program mode to download the scanlist to the 1771-SDN module.

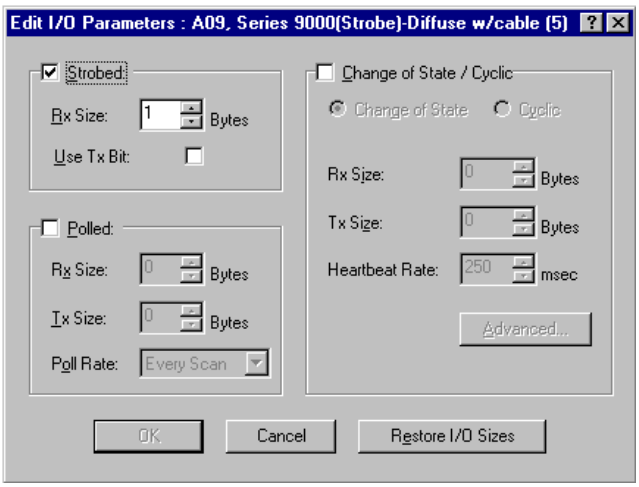
Verifying the Photoeye Configuration

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.



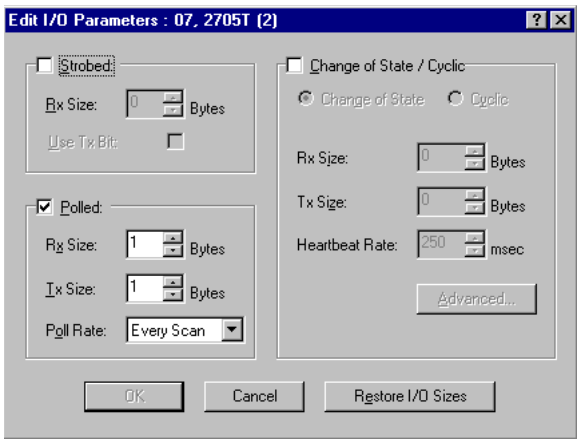
The I/O parameters define the configuration for the device in terms of how much and what data the device will exchange with the 1771-SDN module. By default, the photoeye will send 1 byte when it receives a strobe request. Recall from chapter 3 that the output of the photoeye will be returned in bit 0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

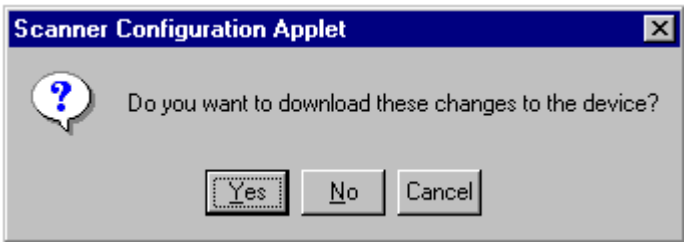
1. Double-click on the **RediSTATION** in the Scanlist window. The **Edit I/O Parameters** window will appear for the RediSTATION.



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

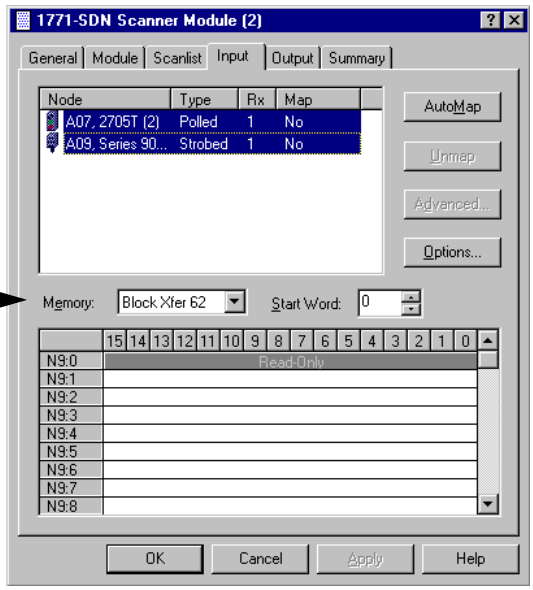
Follow the procedure below to automatically map the photoeye and RediSTATION to the PLC-5 processor.

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".

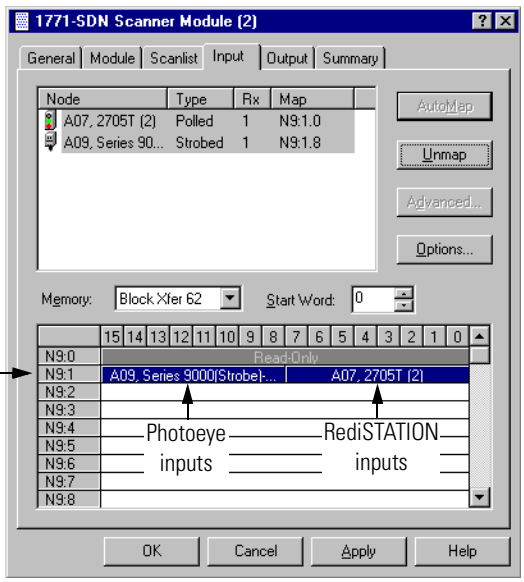
1. Double-click on the **1771-SDN** module icon and select the **Input** tab. You will see the following window.

There are six available blocks. Block Xfer 62 is the default.



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:



File N9, Word 1

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:

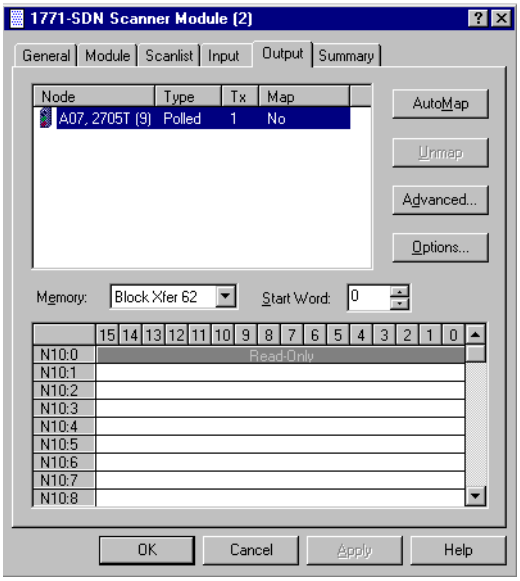
START N9:1.1
STOP N9:1.0

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:

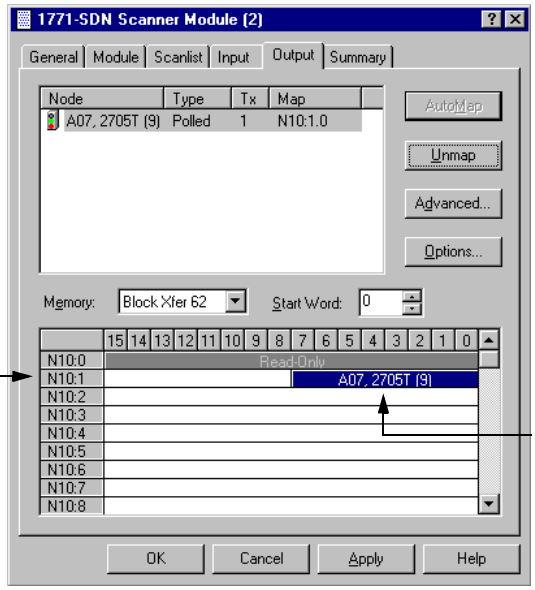
N9:1.8

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.



File N10, Word 1

After mapping the RediSTATION output address will appear here.

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:

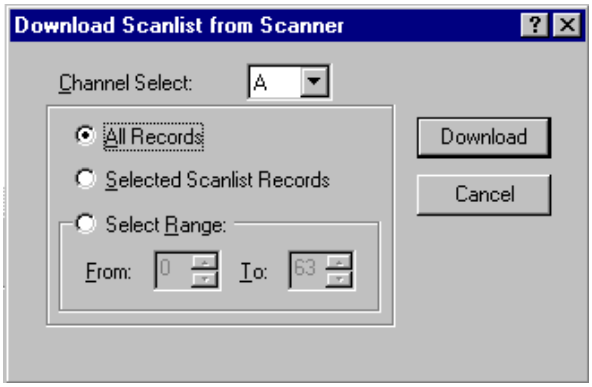
N10:1.0

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.

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:

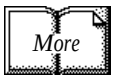
Component	Software/Firmware Version
RSLinx software	2.10 or higher
1771-SDN module	4.003 or higher

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	130.130.130.2
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	1785-6.5.22
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

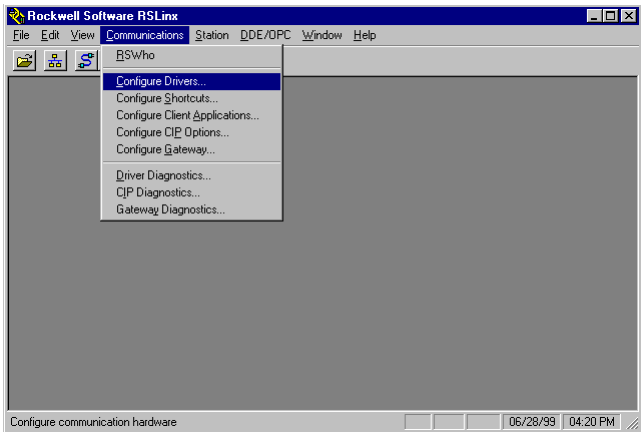
Before performing this example the ControlNet network must be configured and running. A ControlNet processor (PLC-5C) is required. In this example the PLC-5C processor is configured as ControlNet node 16. Use your own ControlNet PLC-5C processor's configuration when performing this example.

Configuring the DeviceNet Pass-Through Driver

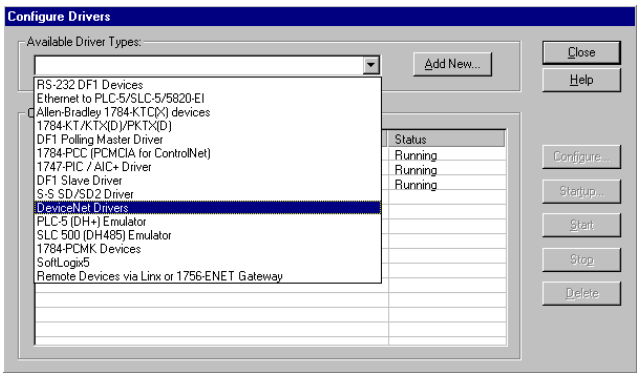
Before you can communicate with the 1771-SDN module via the ControlNet network, you must first configure the DeviceNet pass-through driver (1771-SDNPT) with a ControlNet port. RSLinx, version 2.10 or higher, is required.

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

1. Start **RSLinx**.

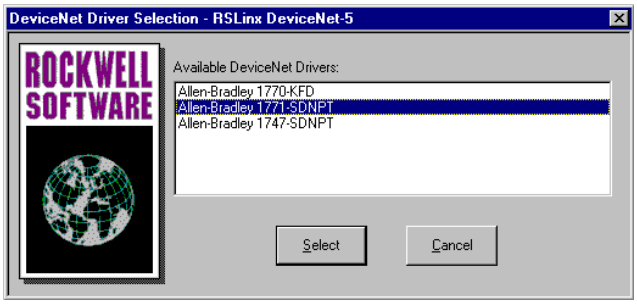


2. From the **Communications** menu, select **Configure Drivers**.

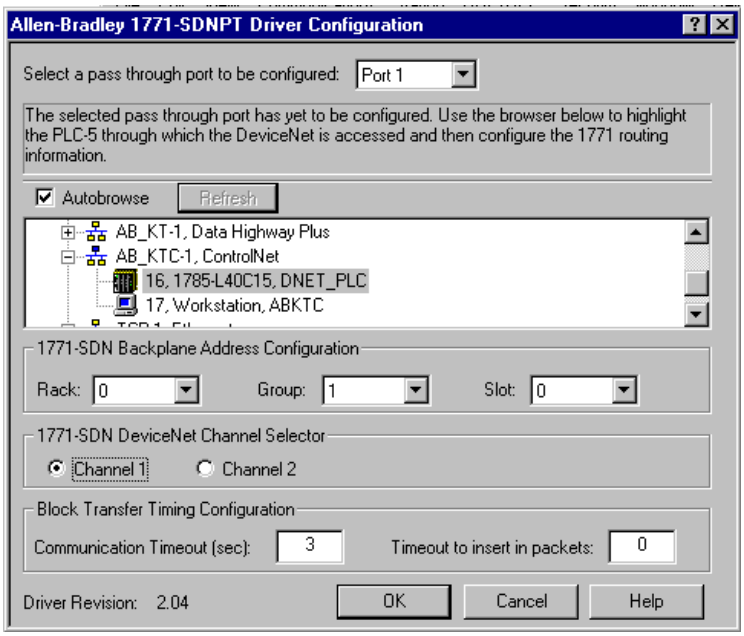


3. From the list of **Available Driver Types** select **DeviceNet Drivers** and click on **Add/New**.

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**.

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

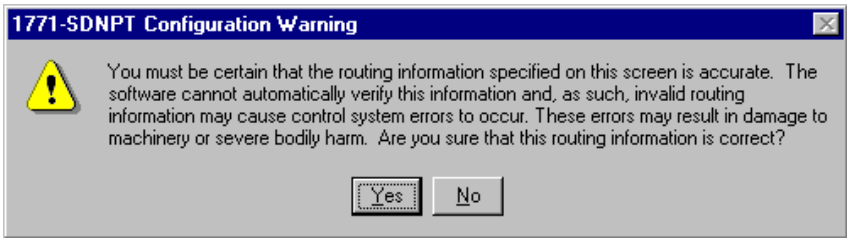
7. Select the **1771-SDN Backplane Address Configuration**. We used the following configuration for the example application.

Rack	0
Group	1
Slot	0

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

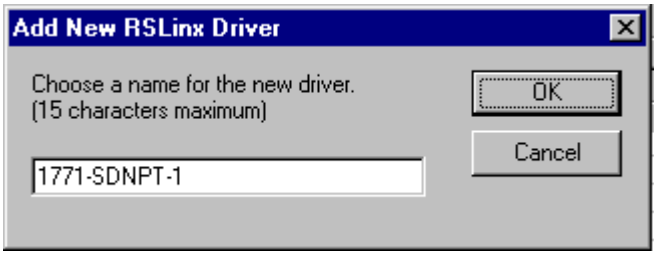
9. Click on **OK**.

You will see the following warning:



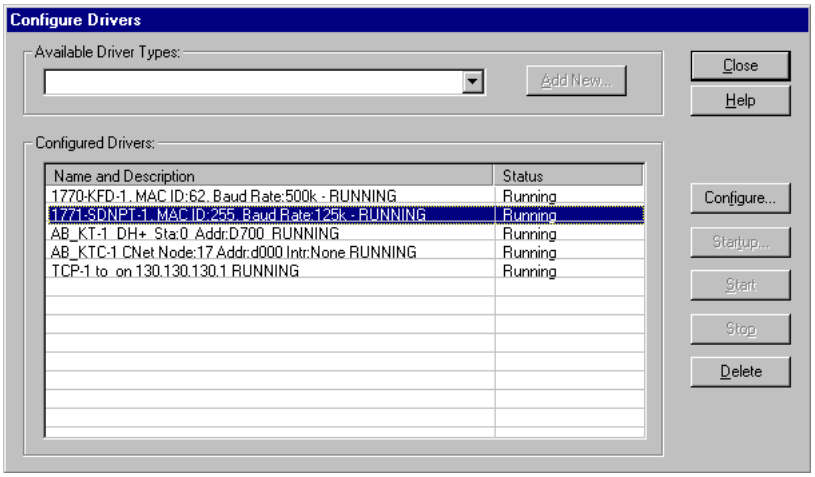
10. Verify that the routing information is accurate and click on the **Yes** button.

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.)



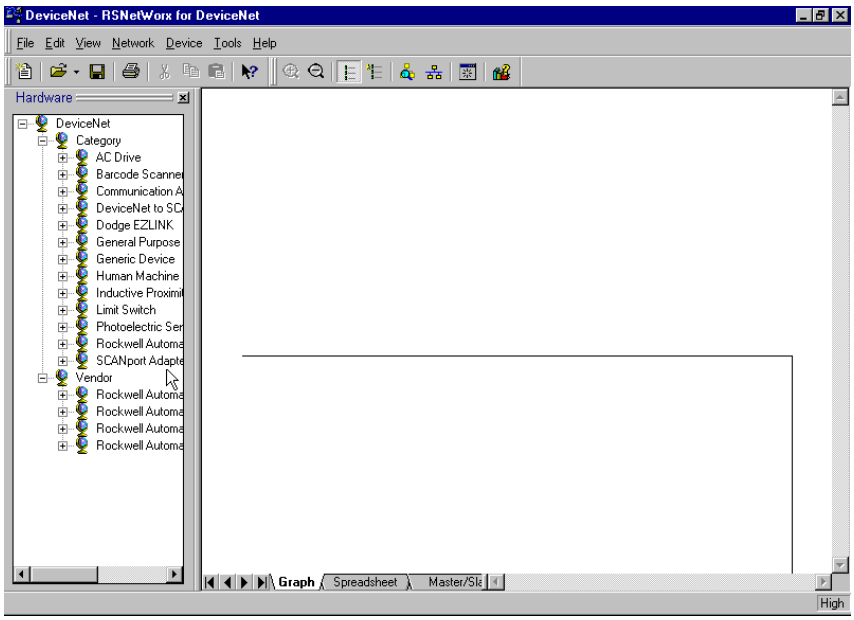
12. Close or **Minimize** RSLinx.

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.

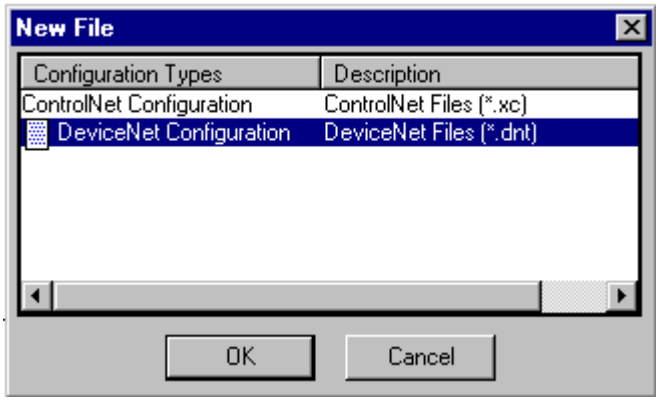
Perform the following steps:

1. Start **RSNetWorx**.



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

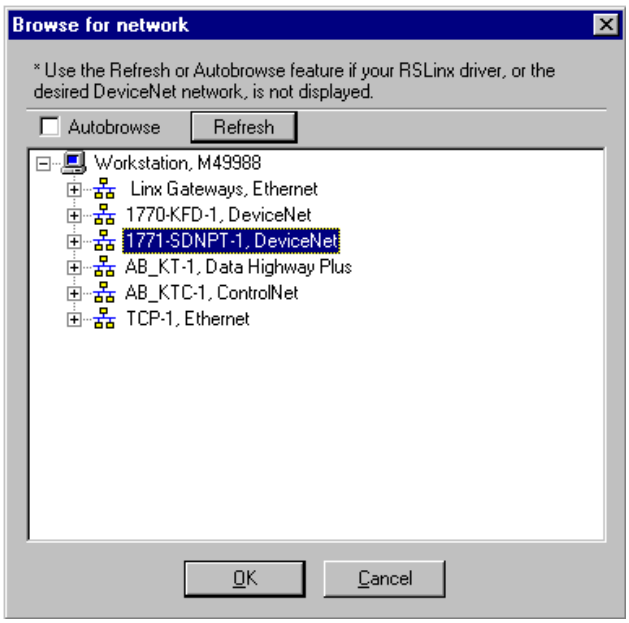
   If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



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:

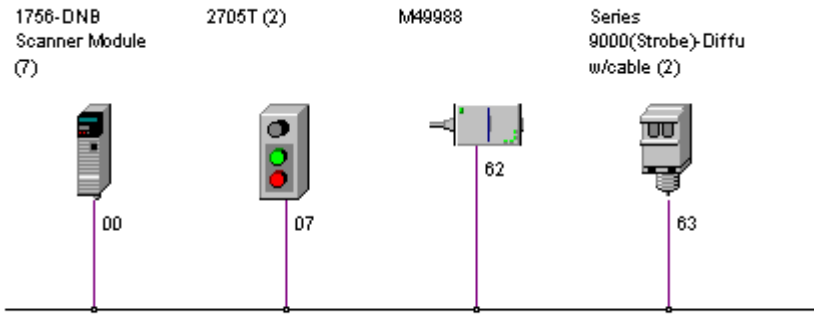
6. Click on **OK** to upload the devices. RSNetWorx for DeviceNet will begin browsing for network devices.

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.

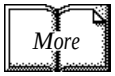
When RSNetWorx for DeviceNet is finished browsing, the network displayed on your screen should look similar to the one shown below.



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.

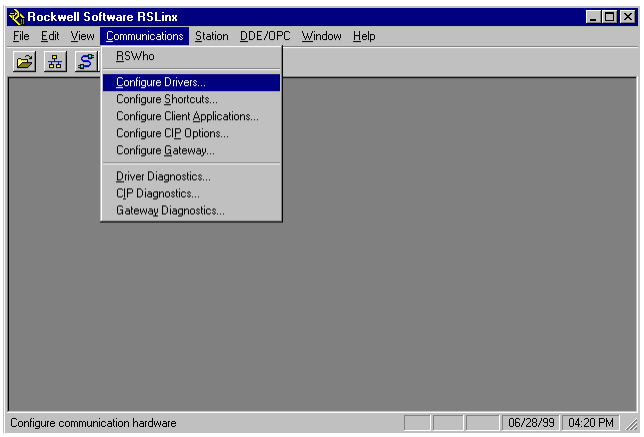
3. You use RSLinx to configure the DeviceNet pass-through driver to communicate with the 1771-SDN module via the Ethernet network. This procedure is described on pages 5-12 to 5-15.

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.

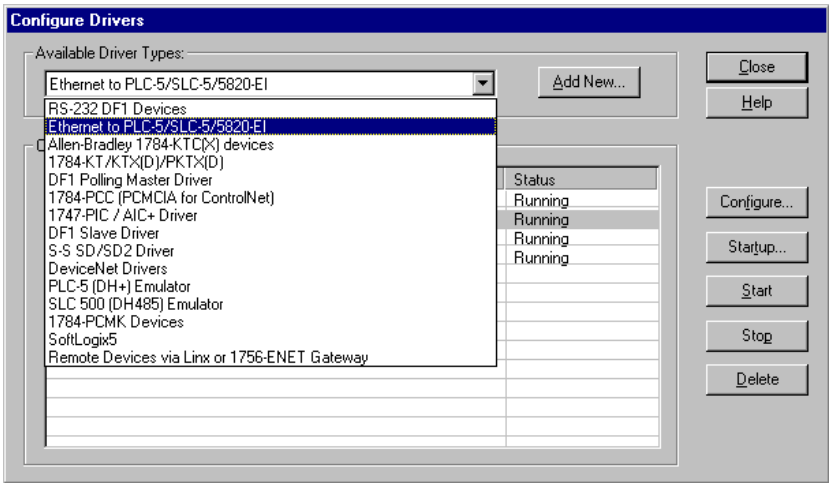
Configuring the Ethernet to PLC-5 Communications Driver

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**.

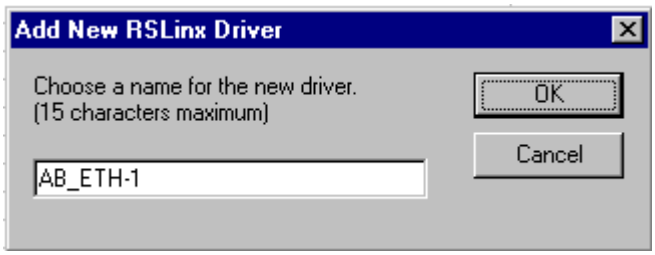


2. From the **Communications** menu, select **Configure Drivers**.



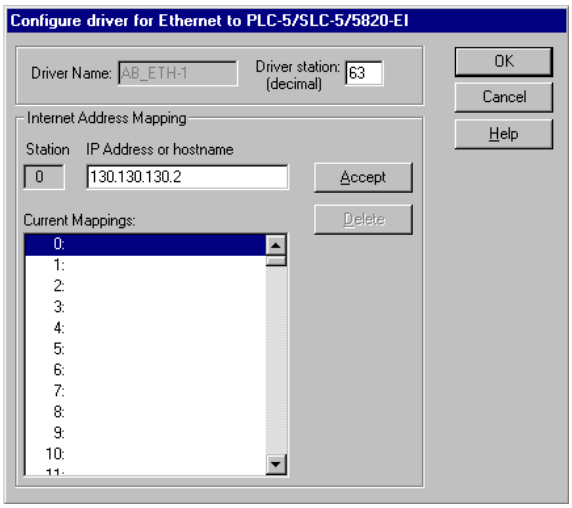
3. From the list of **Available Driver Types**, select the **Ethernet to PLC-5/SLC-5/5820-EI** driver and click on **Add New**.

   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.

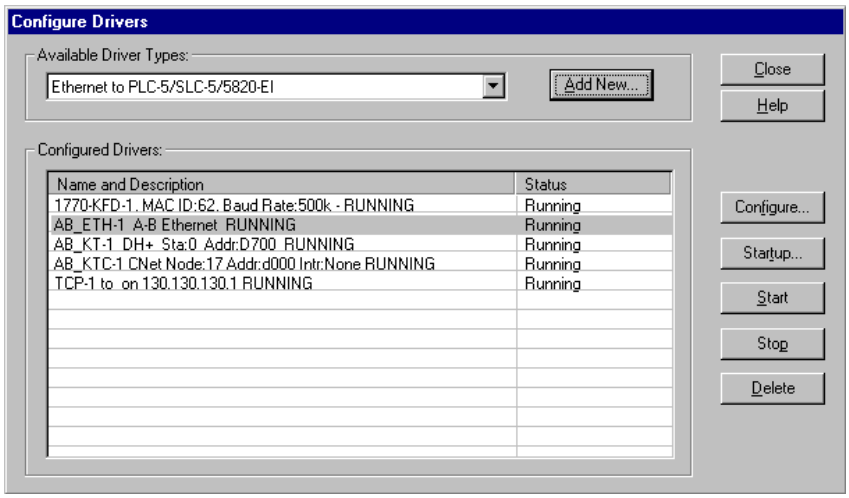


5. In the **IP address or hostname** field, enter the IP address of the PLC-5 processor (**130.130.130.2** in this example).

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.)

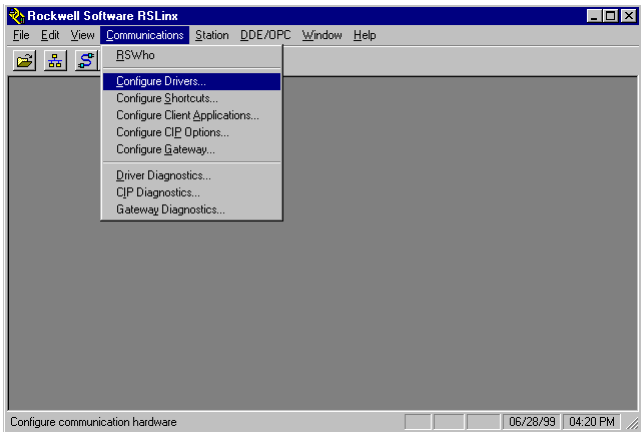


Configuring the DeviceNet Pass-Through Driver

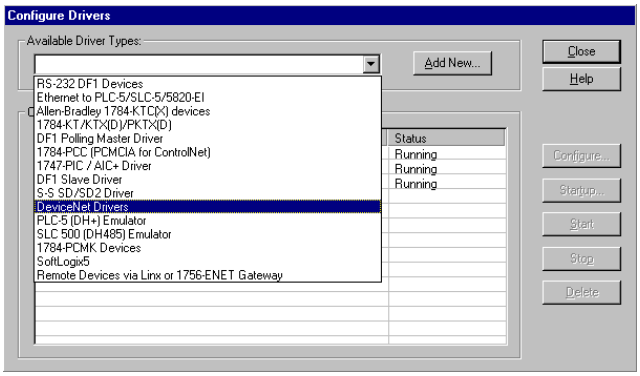
Before you can communicate with the 1771-SDN module via the Ethernet network, you must configure the DeviceNet pass-through driver (1771-SDNPT). RSLinx, version 2.10 or higher, is required.

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

1. Start **RSLinx**.

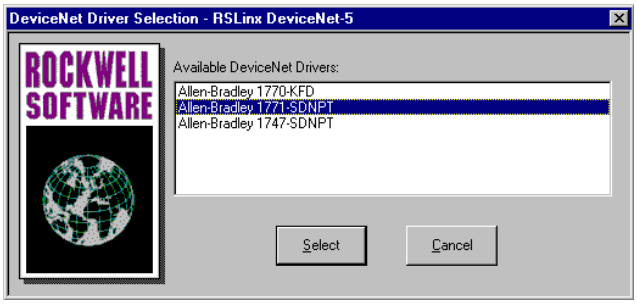


2. From the **Communications** menu, select **Configure Drivers**.



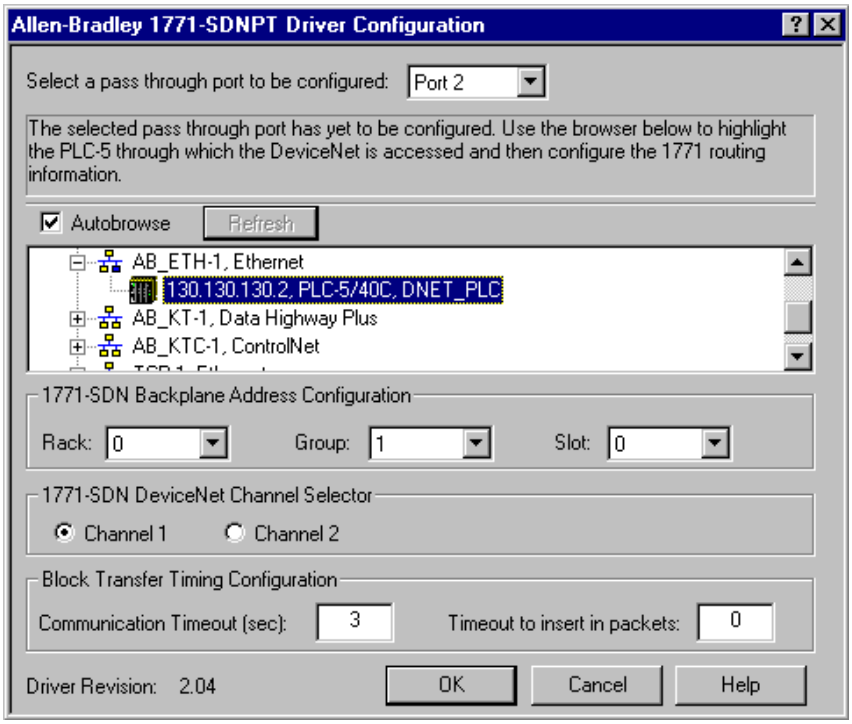
3. From the list of **Available Driver Types** select **DeviceNet Drivers** and click on **Add/New**.

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.

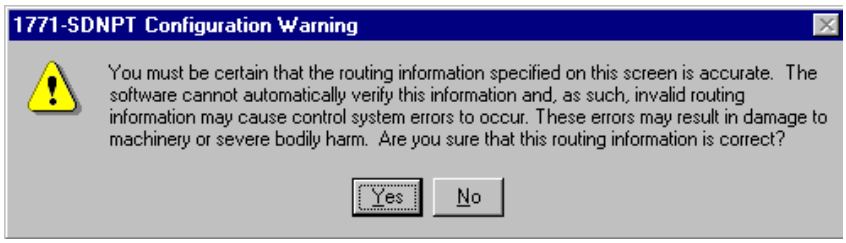
7. Select the **1771-SDN Backplane Address Configuration**. We used the following configuration for the example application.

Rack	0
Group	1
Slot	0

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

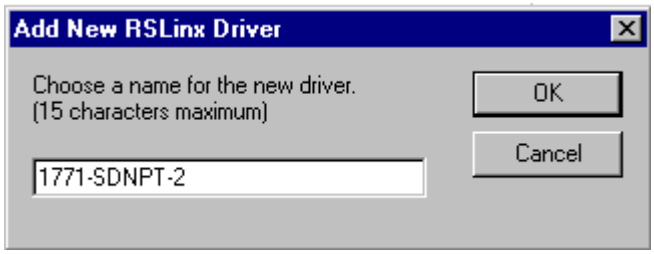
9. Click on **OK**.

   You will see the following warning:



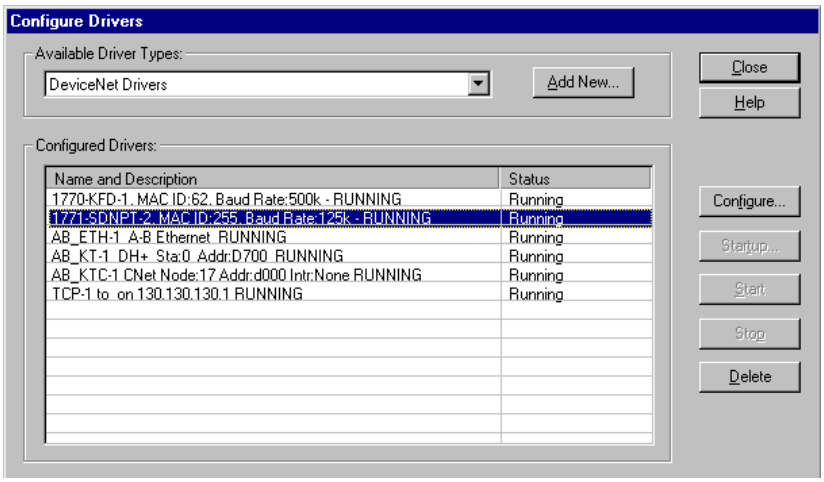
10. Verify that the routing information is accurate and click on the **Yes** button.

    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.)



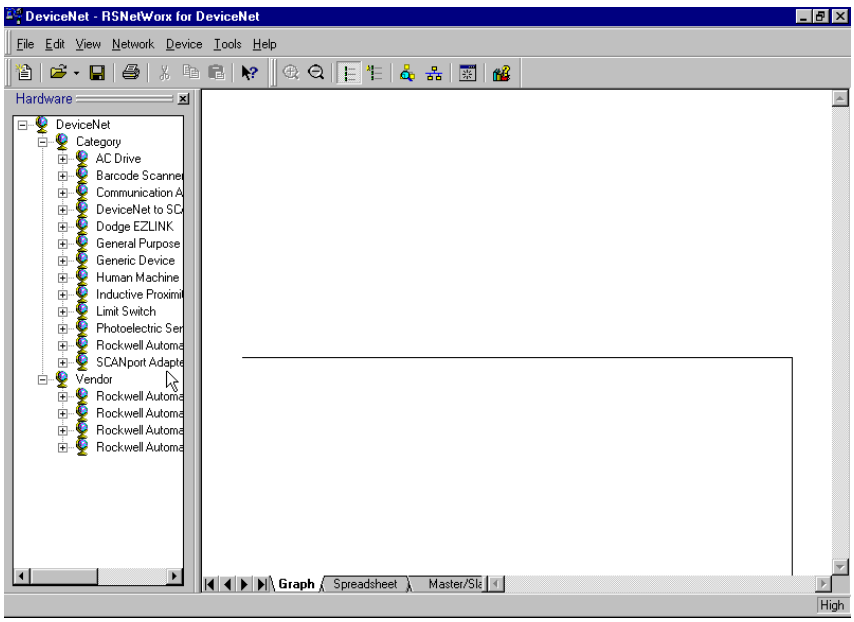
12. Close or **Minimize** RSLinx.

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.

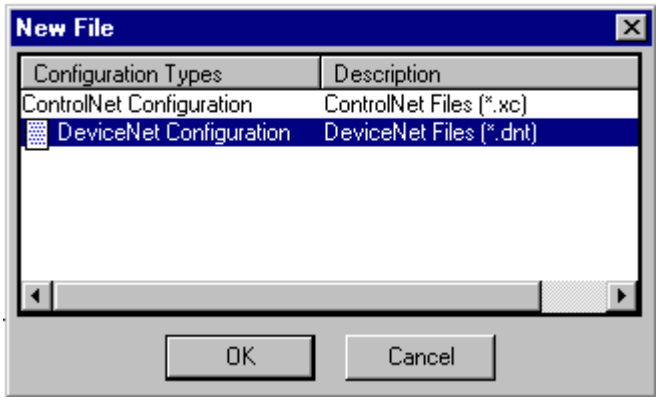
Perform the following steps:

1. Start **RSNetWorx**.



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

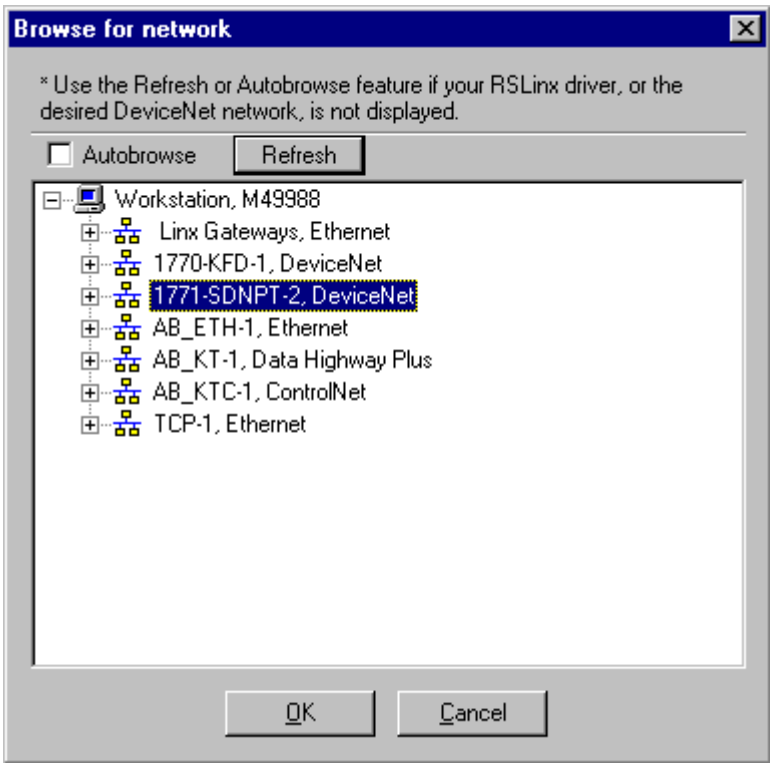
   If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



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:

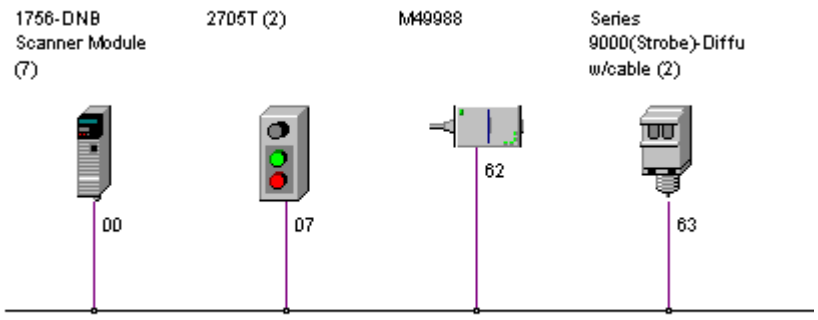
6. Click on **OK** to upload the devices. RSNetWorx for DeviceNet will begin browsing for network devices.

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

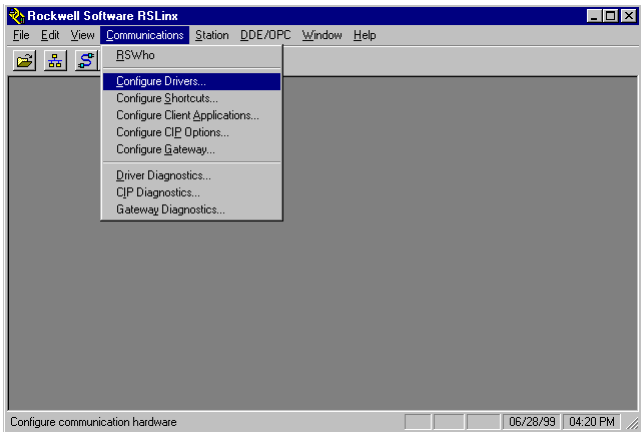
Before performing this example the DH+ network must be configured and running. In this example, the PLC-5 processor's DH+ channel A is configured as node 1. Use your own DH+ configuration when performing this example.

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.

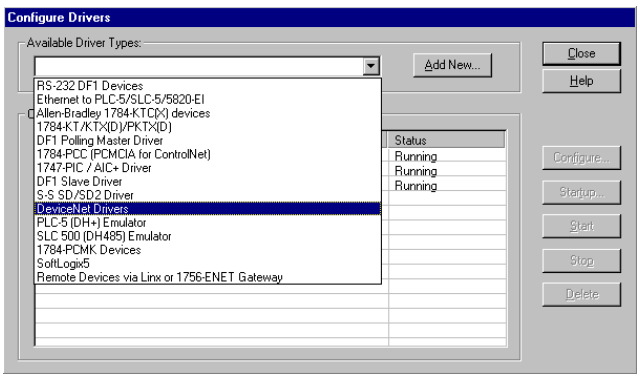
Perform the following steps.

1. Start **RSLinx**.



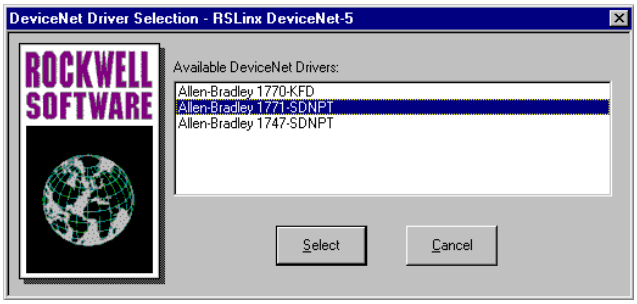
2. From the **Communications** menu, select **Configure Drivers**.

   The **Configure Drivers** window will appear.



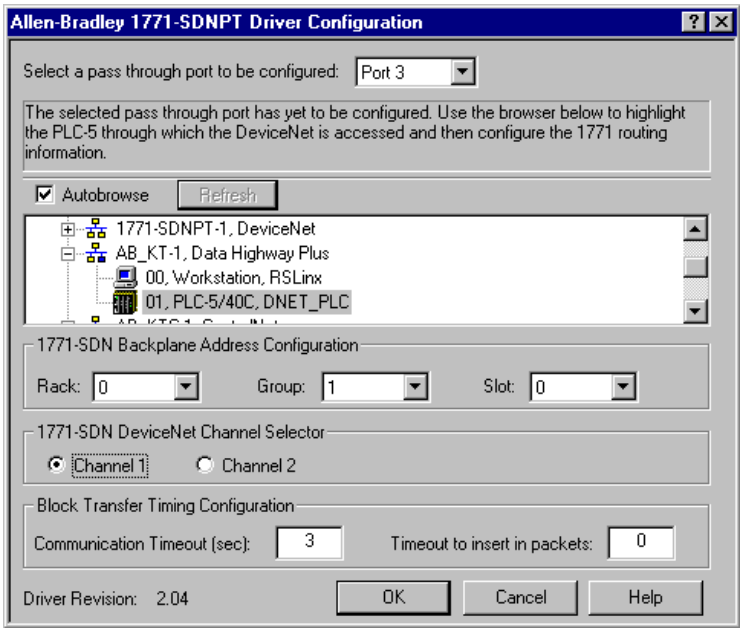
3. Select **DeviceNet Drivers** from the **Available Driver Types** pull-down list and click on **Add/New**.

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.

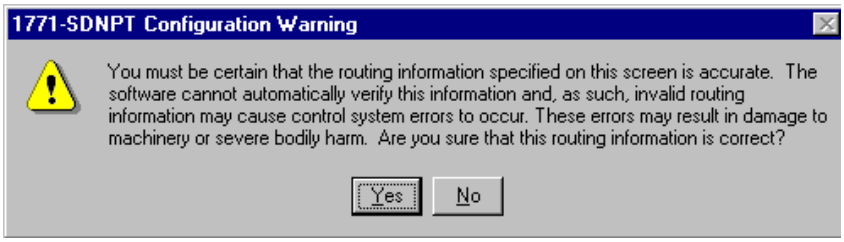
7. Select the **1771-SDN Backplane Address Configuration**. We used the following configuration for the example application.

Rack	0
Group	1
Slot	0

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

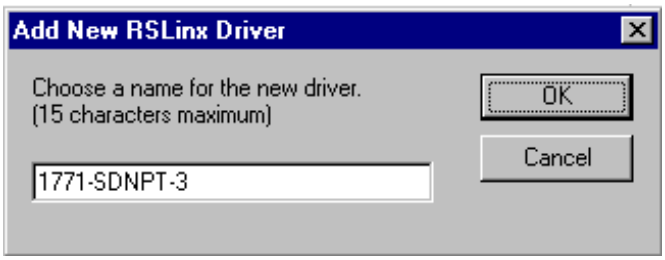
9. Click on **OK**.

   You will see the following warning:



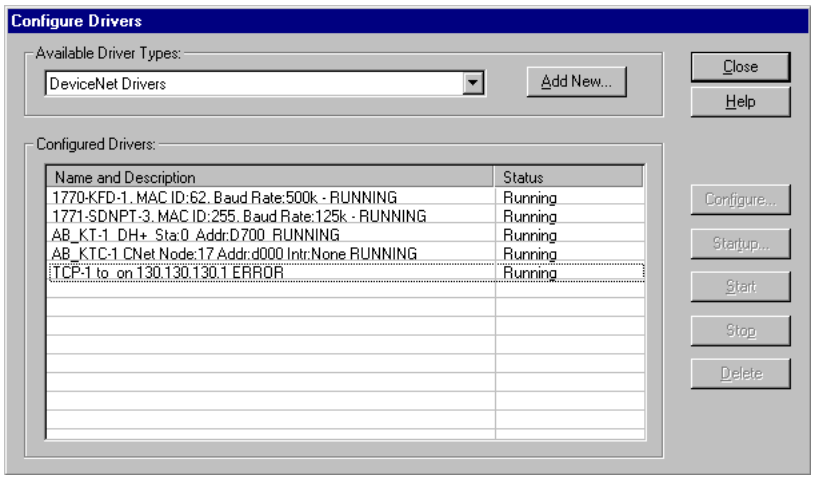
10. Verify that the routing information is accurate and click on the **Yes** button.

    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.)



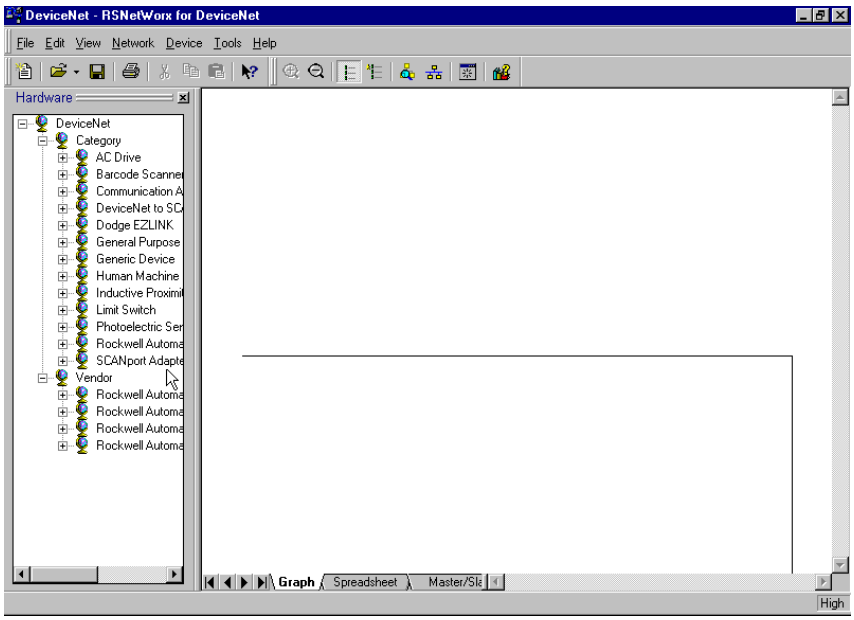
12. **Close** or **Minimize** RSLinx.

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.

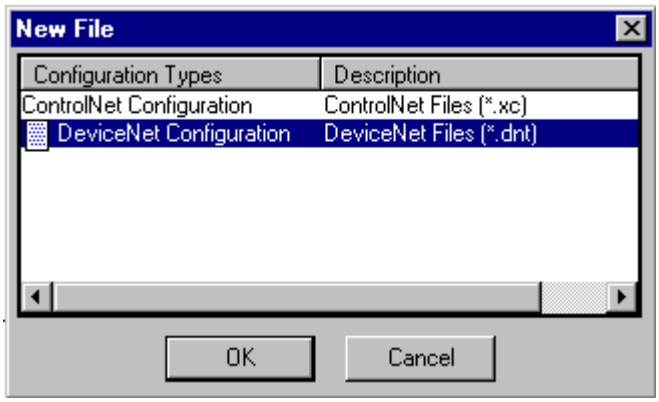
Perform the following steps:

1. Start **RSNetWorx**.



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

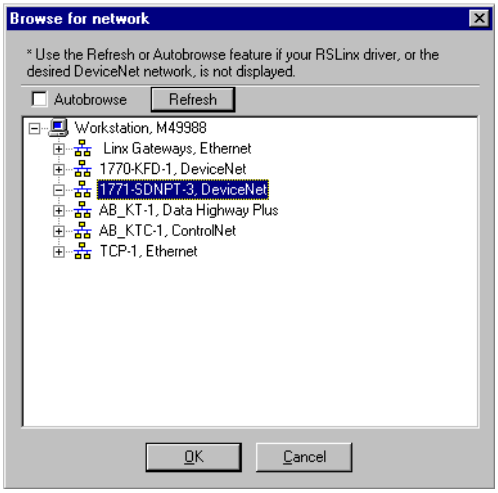
   If you have RSNetWorx for ControlNet installed on your computer you may see the following window. Otherwise, proceed to step 4.



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:

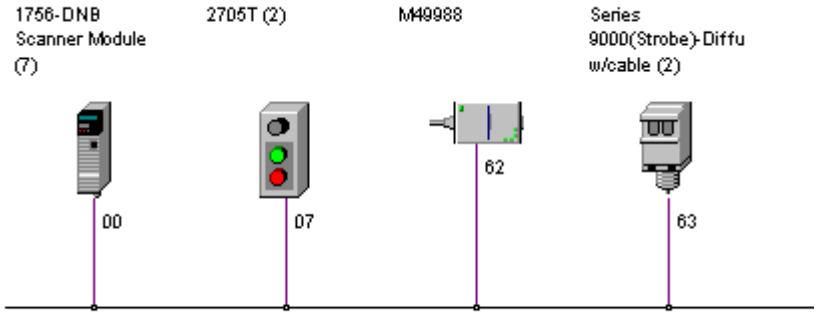
6. Click on **OK** to upload the devices. RSNetWorx for DeviceNet will begin browsing for network devices.

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.

Creating and Running the Example Application Program

What This Chapter Contains

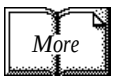
This chapter describes the procedure to create, download, and run an example ladder logic program to test the DeviceNet network. When the program is put into Run mode, pressing the START button on the network's RediSTATION will cause the red indicator light to come on and stay on until the STOP button 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	130.130.130.2
1771-SDN	0	1	0	n/a

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



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.

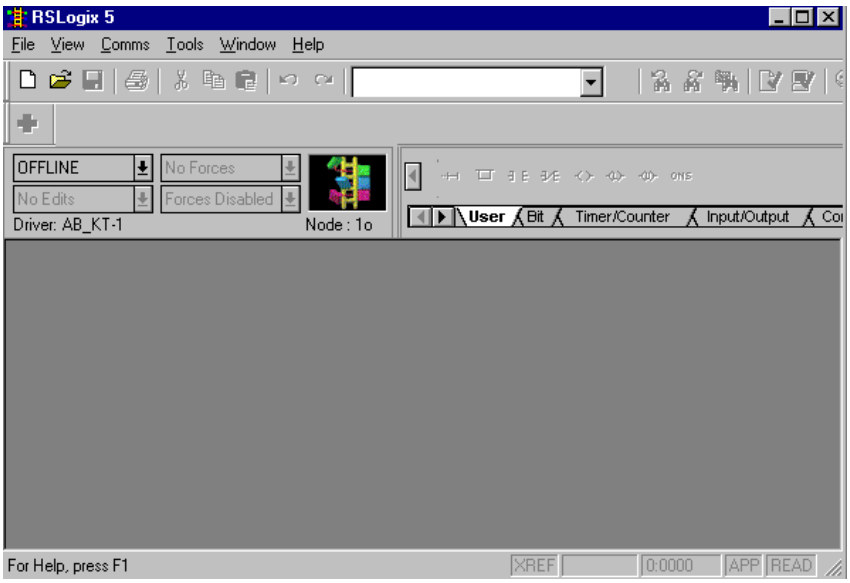
4. Click on **OK**.

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

Creating the Example Application Program

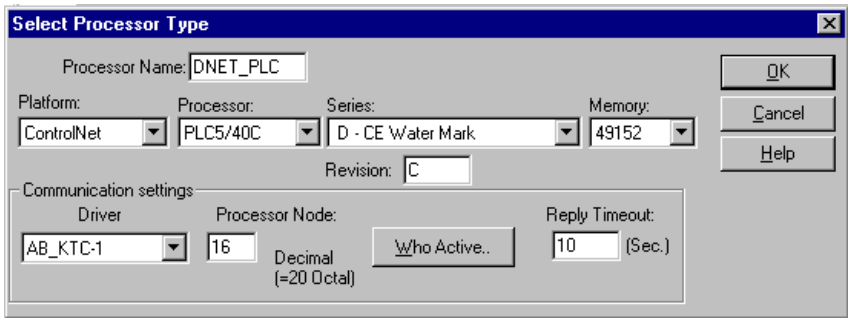
Perform the following steps to create the example application program.

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**.

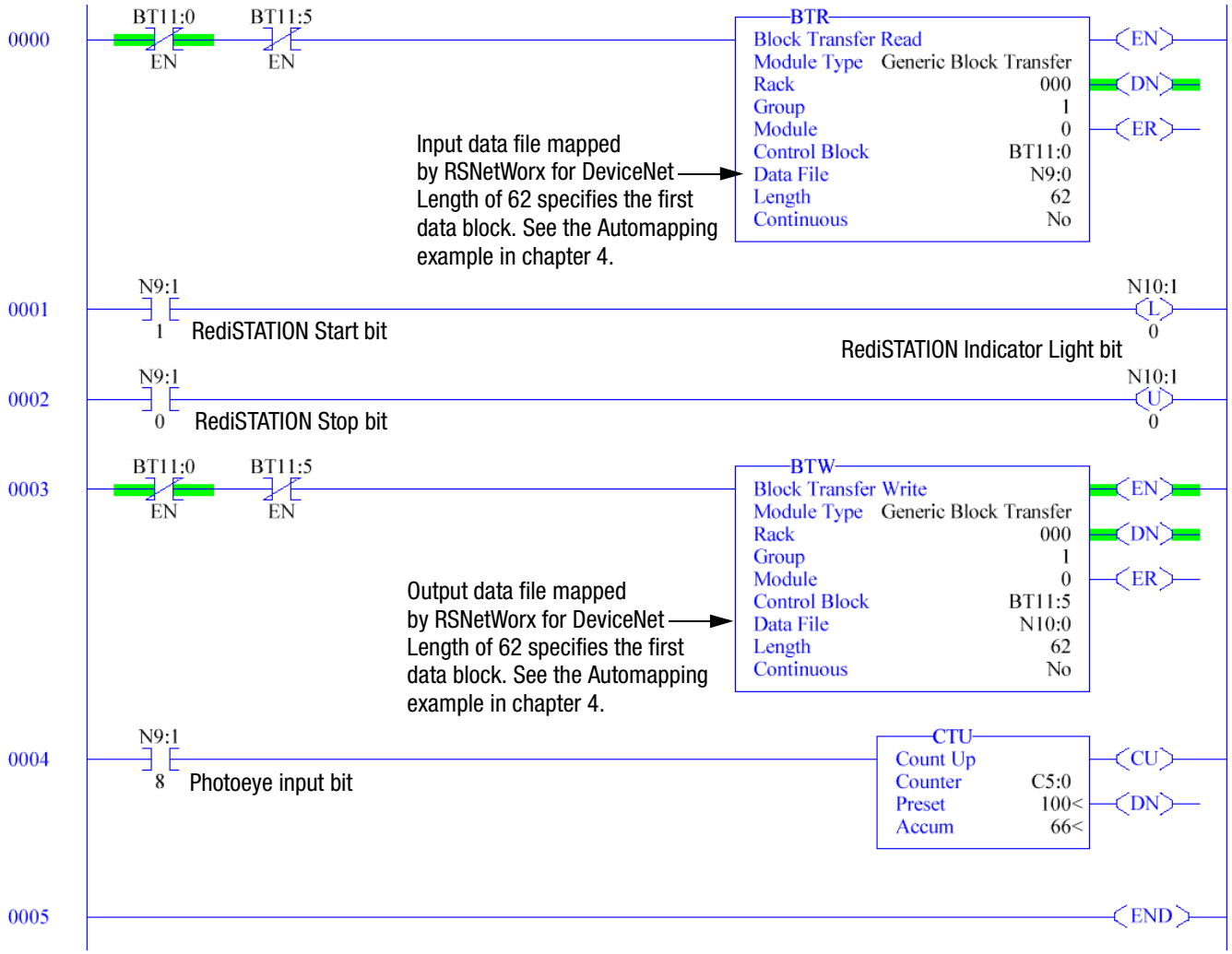
In this field	Select or Enter
Processor Name	DNET_PLC
Platform	ControlNet
Processor	(Select your processor type)
Series	(Select your processor's series)
Revision	(Enter revision letter)
Driver	(Select a Driver)(1)
Processor Node	(Enter the Processor Node)(1)

(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.

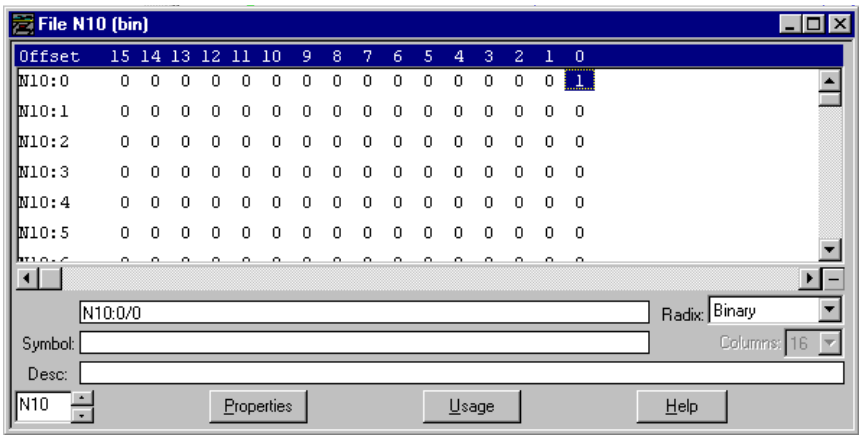


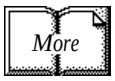
5. Save the program using an appropriate name, e.g., “DNET_PLC”.

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.





See the 1771-SDN DeviceNet Scanner Module Installation Instructions (publication 1771-5.14) for more information on using the scanner module command register.

Downloading and Running the Program

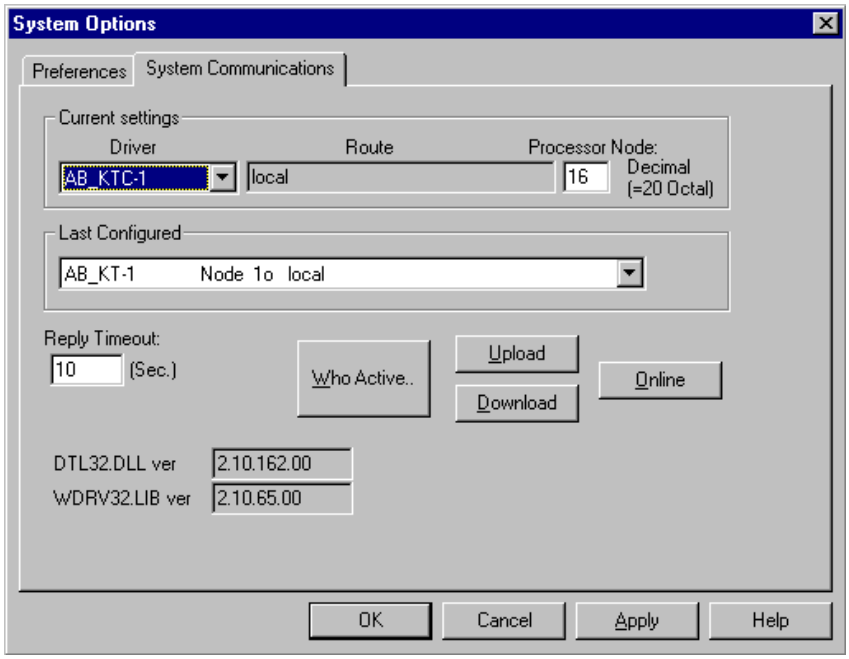
The remaining sections of this chapter provide examples of downloading and running the program via the following networks:

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

Downloading and Running the Program via a ControlNet Network

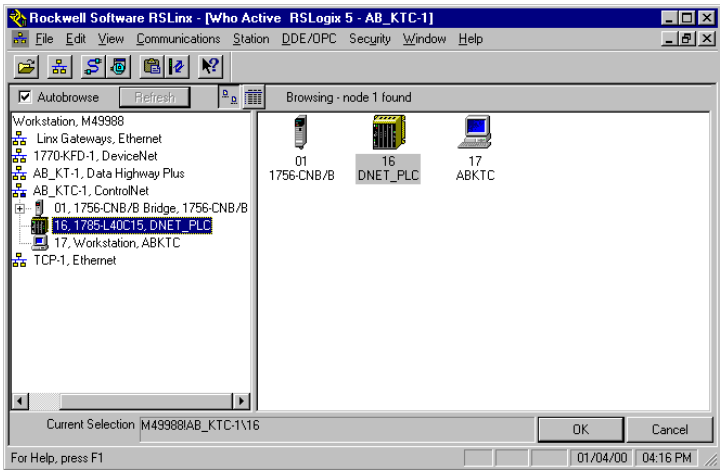
Follow the procedure below to download and run the example program via a ControlNet network.

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



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

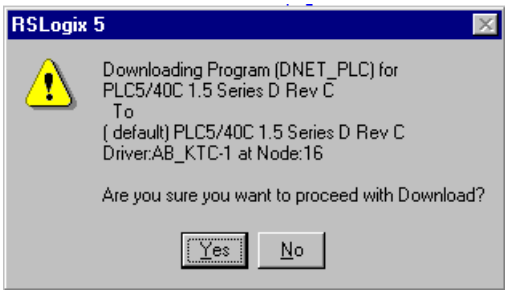
RSLinx will open. You will see a window similar to the one below, displaying your system's driver configuration.



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

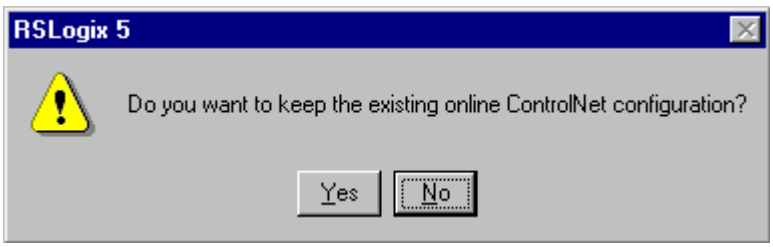
4. Click on the **Download** button.

   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.

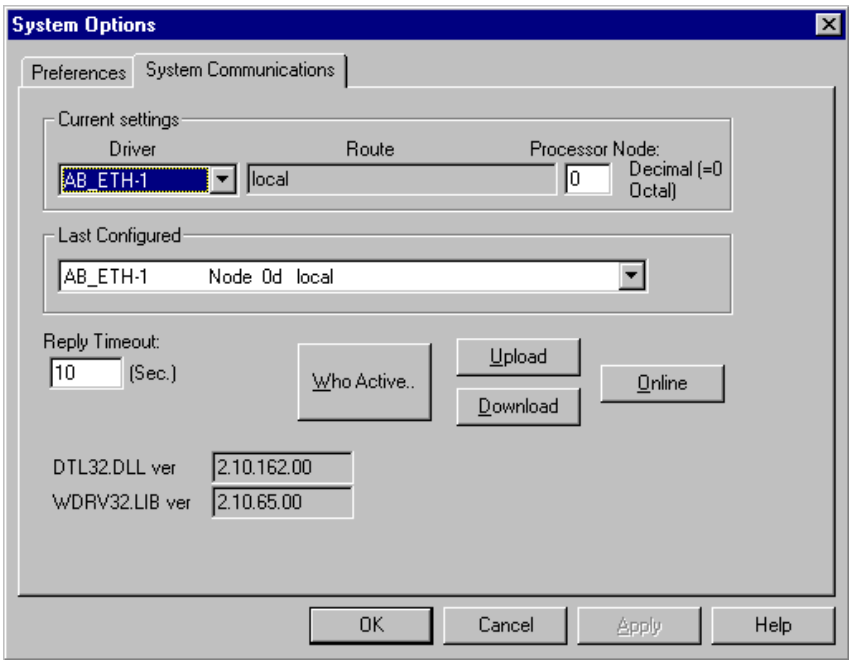
This completes the ControlNet example.

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.

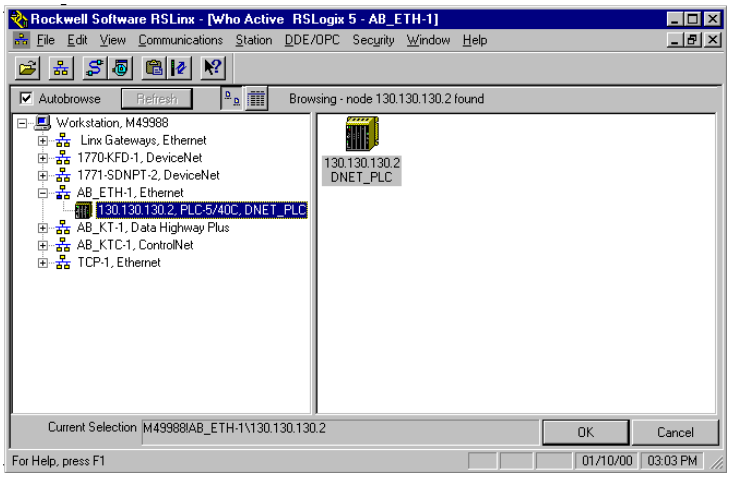
Follow the procedure below to download and run the example program via an Ethernet network.

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



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

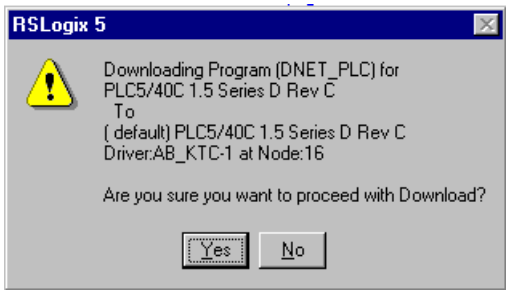
RSLinx will open. You will see a window similar to the one below, displaying your system's driver configuration.



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

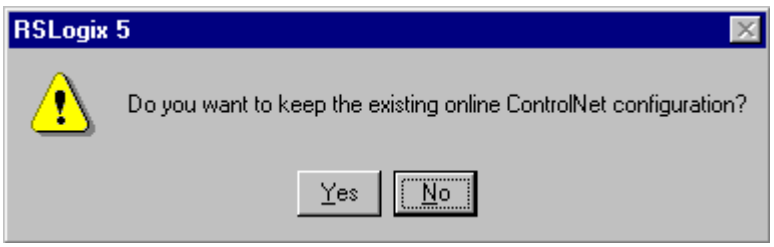
4. Click on the **Download** button.

   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.

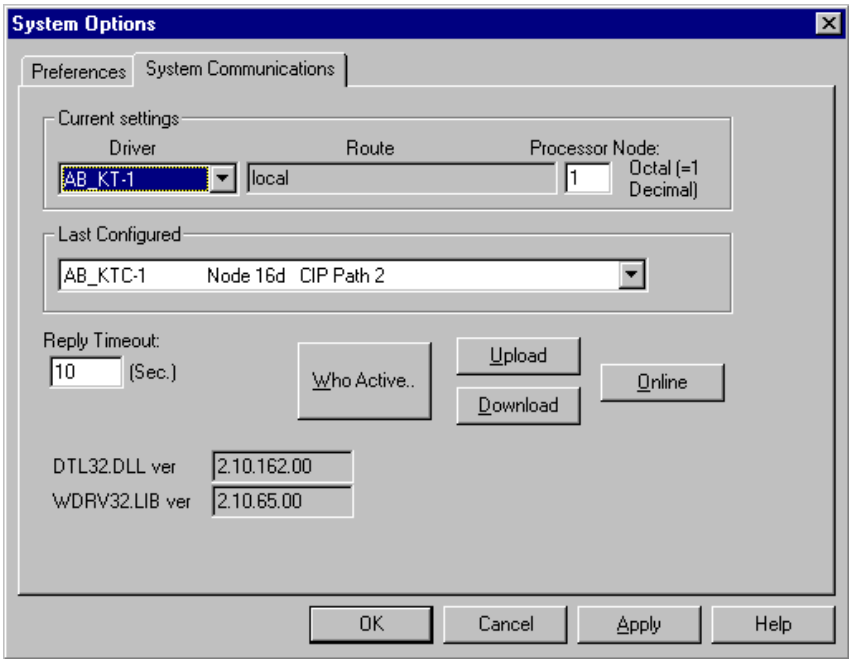
4. Press and release the **STOP** button on the RediSTATION. The red light should turn off. On your screen, you should see rung 2 in your ladder program being energized as you press the button.

This completes the Ethernet example.

Downloading and Running the Program via a DH+ Network

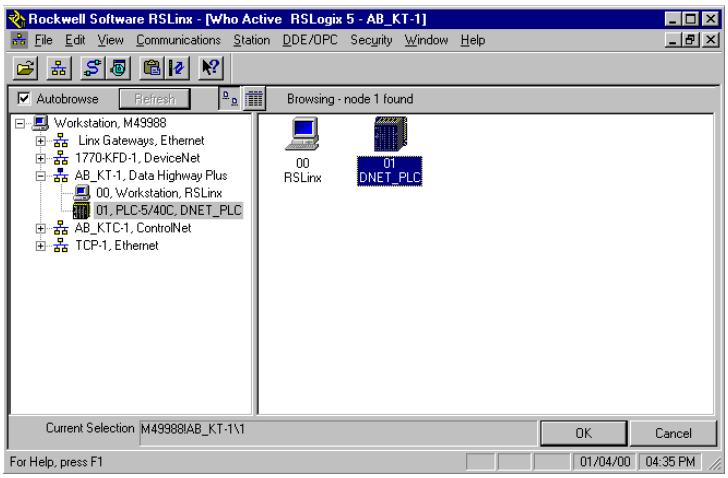
Follow the procedure below to download and run the example program via a DH+ network.

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



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

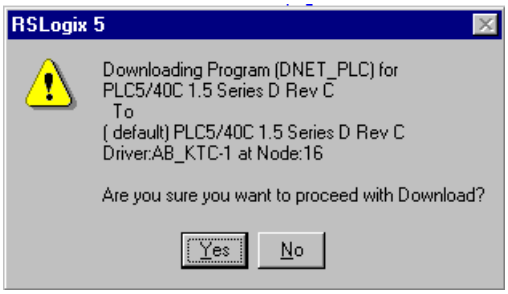
   RSLinx will open. You will see a window similar to the one below, displaying your system's driver configuration.



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

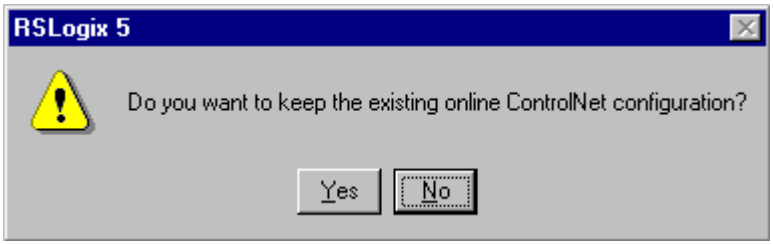
4. Click on the **Download** button.

   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.

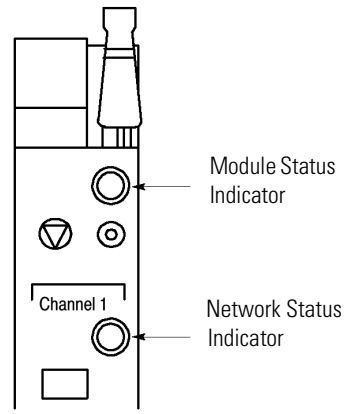
Troubleshooting

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

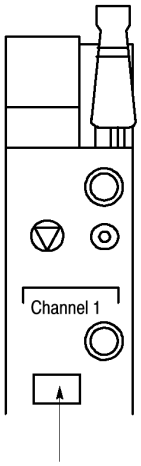
Each of the channels (1 and 2) on the 1771-SDN Scanner module has a bicolor (green/red) network status indicator that provides troubleshooting information about the channel's communication links.

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

Top of 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.

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 larger than 255 bytes (node number alternately flashes).	Configure the device for a smaller data size.
86	Device is producing zero length data (idle state) while channel is in Run Mode.	Check device configuration and slave node status.
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.
90	User has disabled communication port.	Reconfigure your module. Check the disable bit in the Module Command Register.

Numeric Display Code Summary

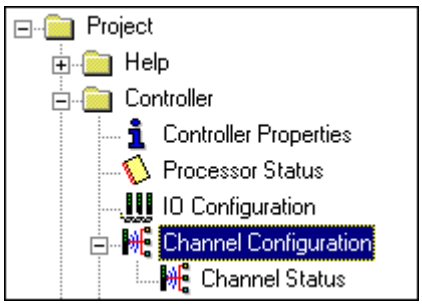
Numeric Code	Description	Take this action
91	Bus-off condition detected on comm port. Module is detecting communication errors.	Check DeviceNet connections and physical media integrity. Check system for failed slave devices or other possible sources of network interference.
92	No network power detected 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

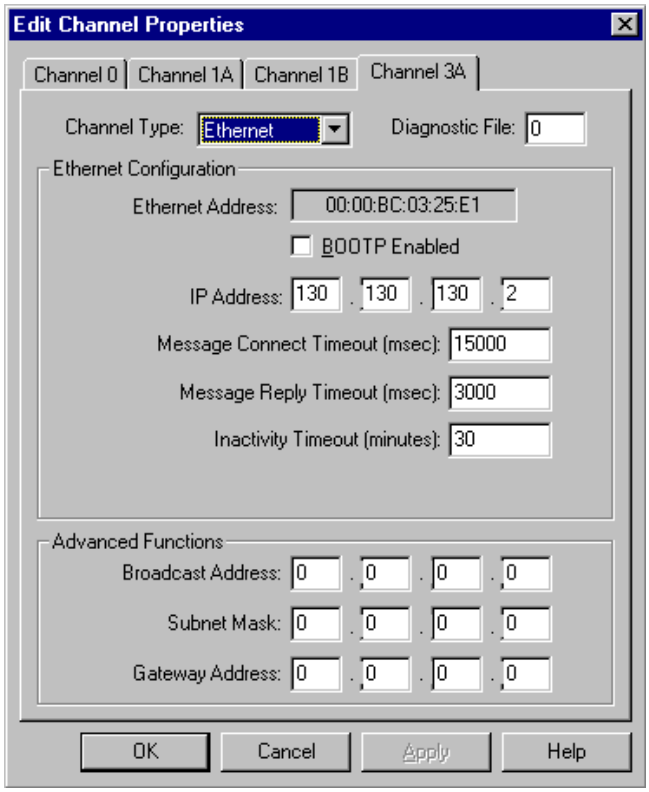
Configuring the Communications Channel

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., 130.130.130.2).

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

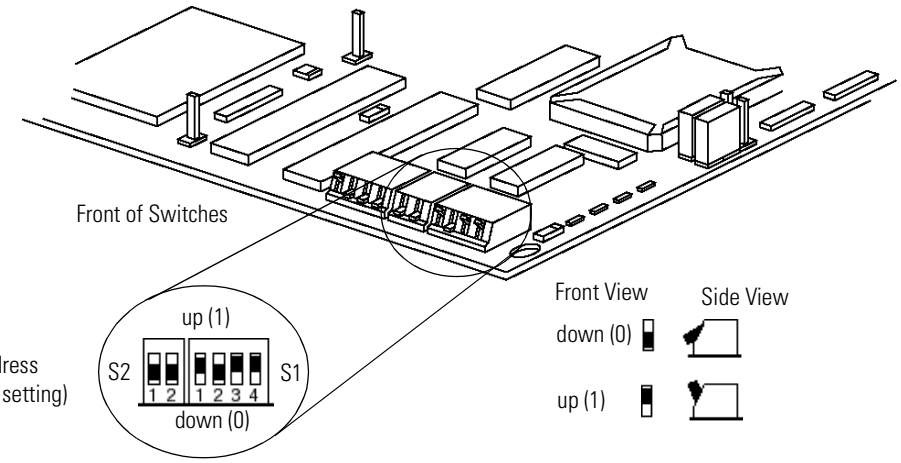
The examples using ControlNet in this manual were performed with a 1784-KTCX15 communication interface card installed in the personal computer that was used as a programming terminal. This appendix describes how to install and configure the 1784-KTCX15 card.

Installing the 1784-KTCX15 Communication Interface Card

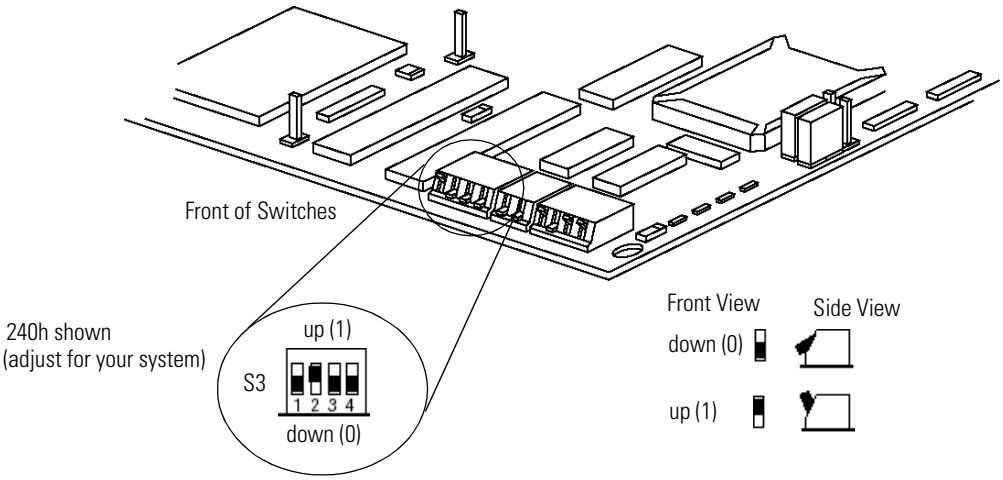
Perform the following steps to install the 1784-KTCX15 card in your personal computer.

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

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



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.

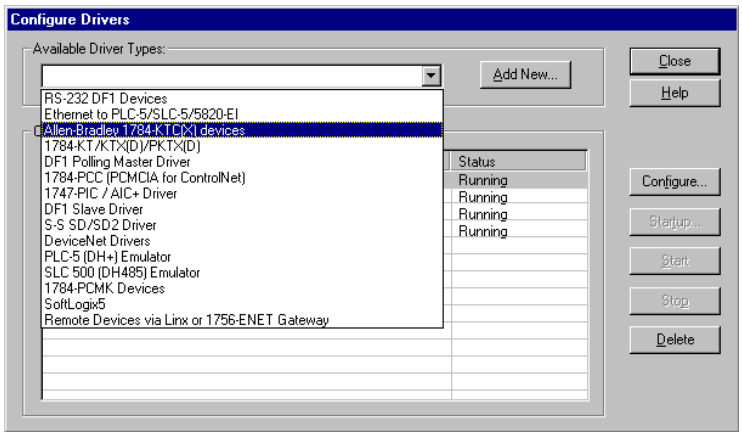
Configuring the 1784-KTCX15 Communications Driver

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.

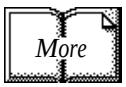
6. Click on **OK** to save your settings.

7. **Close** RSLinx.

Installing and Configuring the DH+ Communications Driver

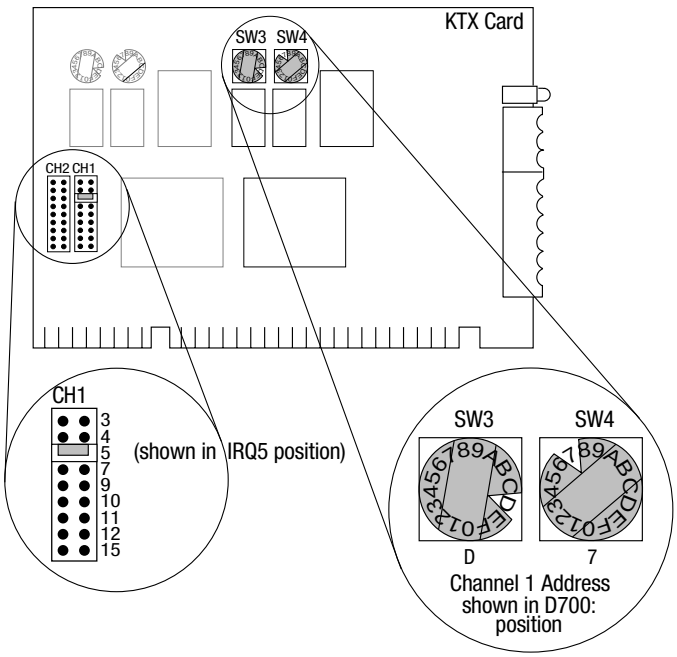
The examples using Data Highway Plus (DH+) in this manual were performed with a 1784-KTX communication interface card installed in the personal computer that was used as the programming terminal. This appendix describes how to install and configure the 1784-KTX card.

Installing the 1784-KTX Communication Interface Card



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.

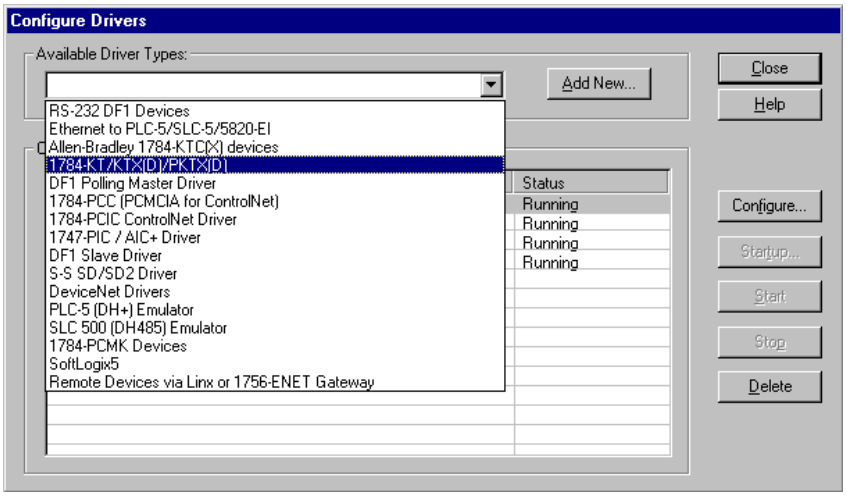
Configuring the 1784-KTX Communications Driver

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**.

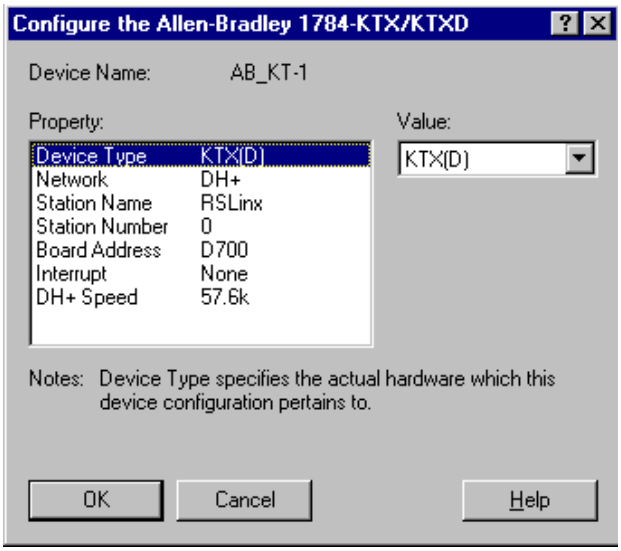
   The **Configure Drivers** window will appear:



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

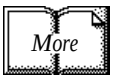
6. Click on **OK** to save your settings.

7. Close RSLinx.

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.



See the 1771-SDN DeviceNet Scanner Installation Instructions (pub. no. 1771-5.14) 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

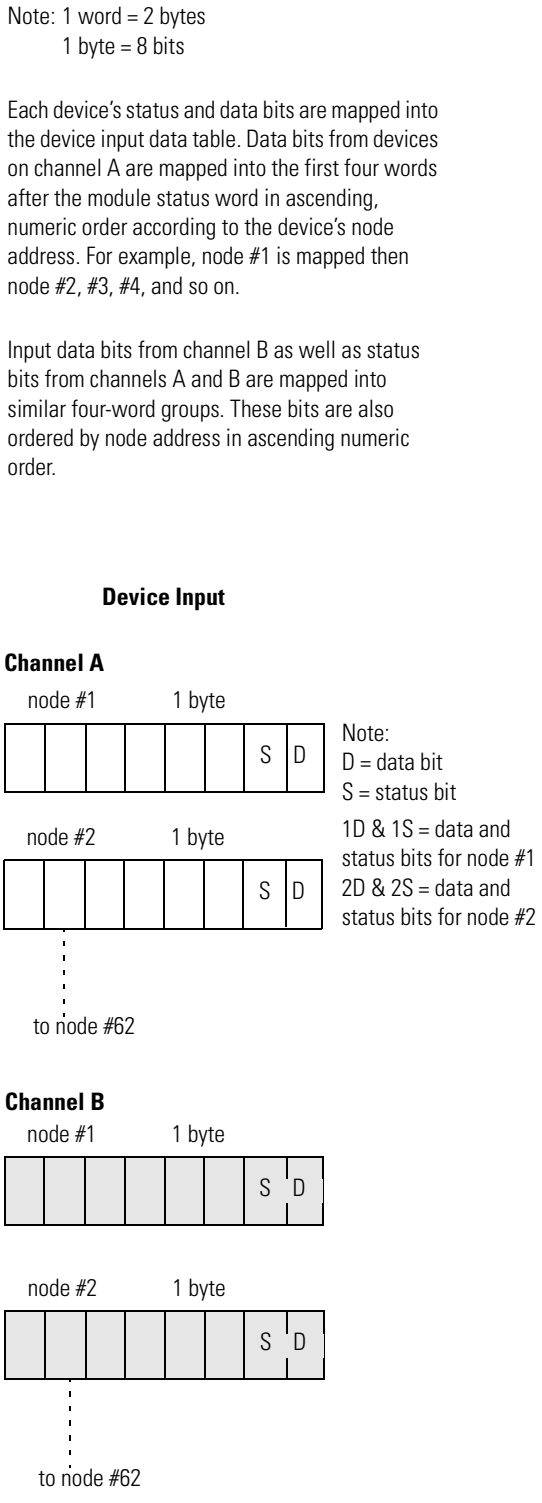
Input Data Table Formats

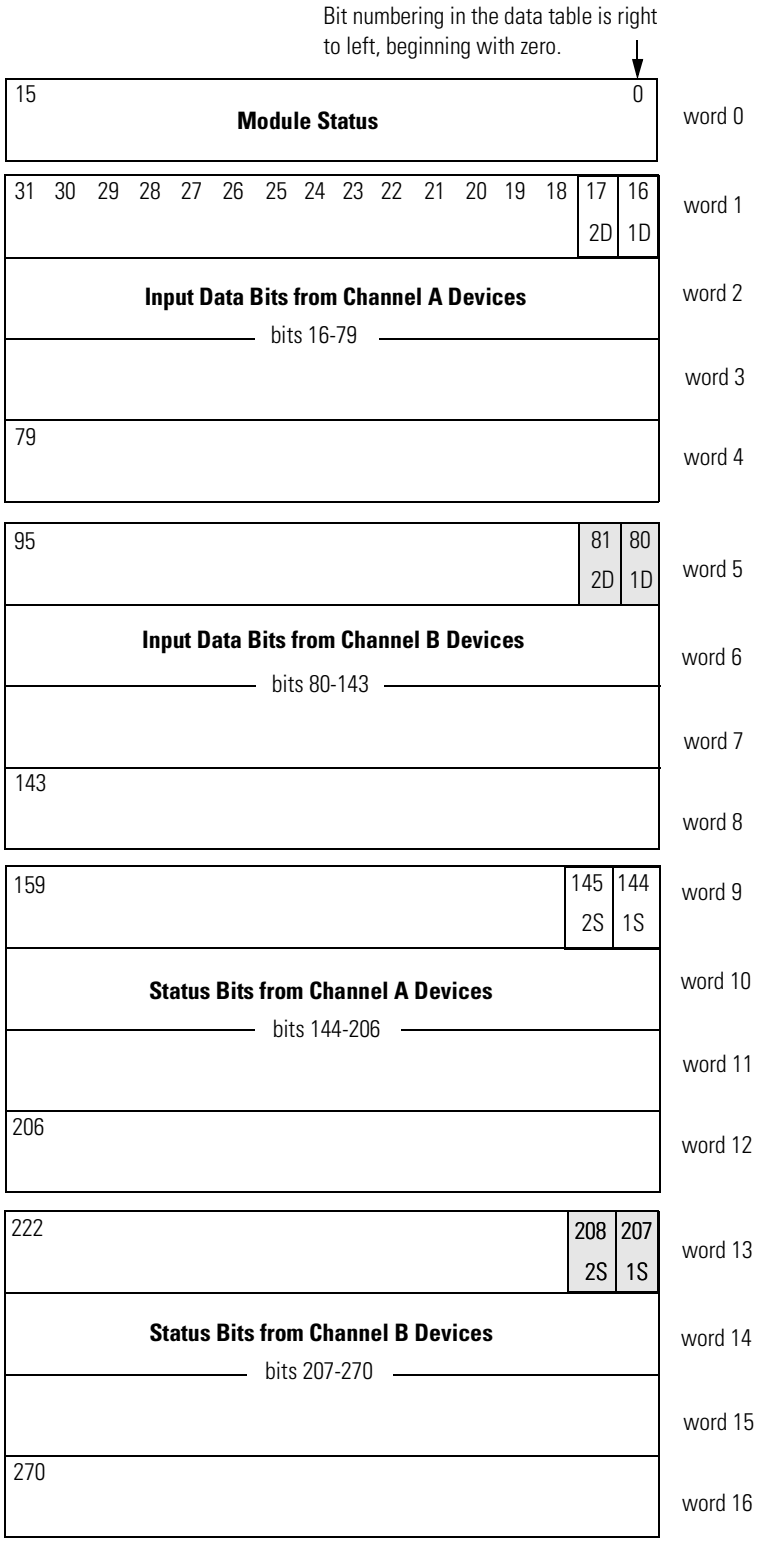
The manner in which bits are mapped to the input data table depends on the address density used. The following example is a 2-slot configuration. Note that discrete mapping is not possible in 2-slot mode.

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.

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

Input Image Table

23	22	21	20	19	18	17 2D	16 1D

(for discrete input data bits)

In 1-slot addressing, the first eight bits after the module status word are used for the input image table. This table is for discrete input bits. Data bits for node addresses 1-8 are mapped to this area in ascending numeric order according to node address.

Device Input

Channel A

node #1 1 byte

						S	D

node #2 1 byte

						S	D

to node #62

Note:
D = data bit
S = status bit

1D & 1S = data and status bits for node #1
2D & 2S = data and status bits for node #2

Channel B

node #1 1 byte

						S	D

node #2 1 byte

						S	D

to node #62

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

15 **Module Status** 0	word 0
39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24	word 1
Input Data Bits from Channel A Devices bits 24-79	word 2
	word 3
79	word 4
95 81 2D 80 1D	word 5
Input Data Bits from Channel B Devices bits 80-143	word 6
	word 7
143	word 8
159 145 2S 144 1S	word 9
Status Bits from Channel A Devices bits 144-206	word 10
	word 11
206	word 12
222 208 2S 207 1S	word 13
Status Bits from Channel B Devices bits 207-270	word 14
	word 15
270	word 16

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

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

Input Image Table

23	22	21	20	19	18	17 2D	16 1D
39	38	37	36	35	34	33	32

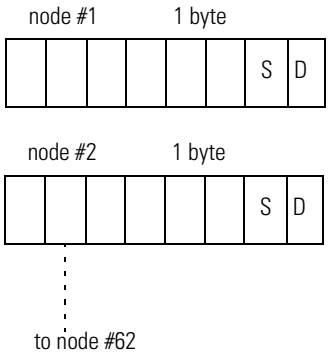
31	30	29	28	27	26	25	24

(for discrete input data bits)

In 1/2-slot addressing, the first 24 bits after the module status word are used for the input image table. This table is for discrete input bits. Data bits for channel A node addresses 1-24 are mapped to this area in ascending numeric order according to node address

Device Input

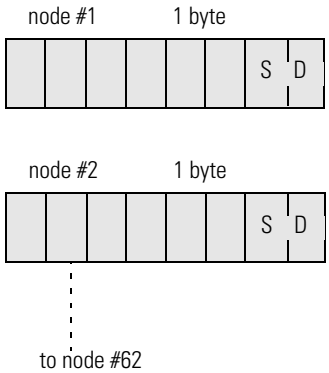
Channel A



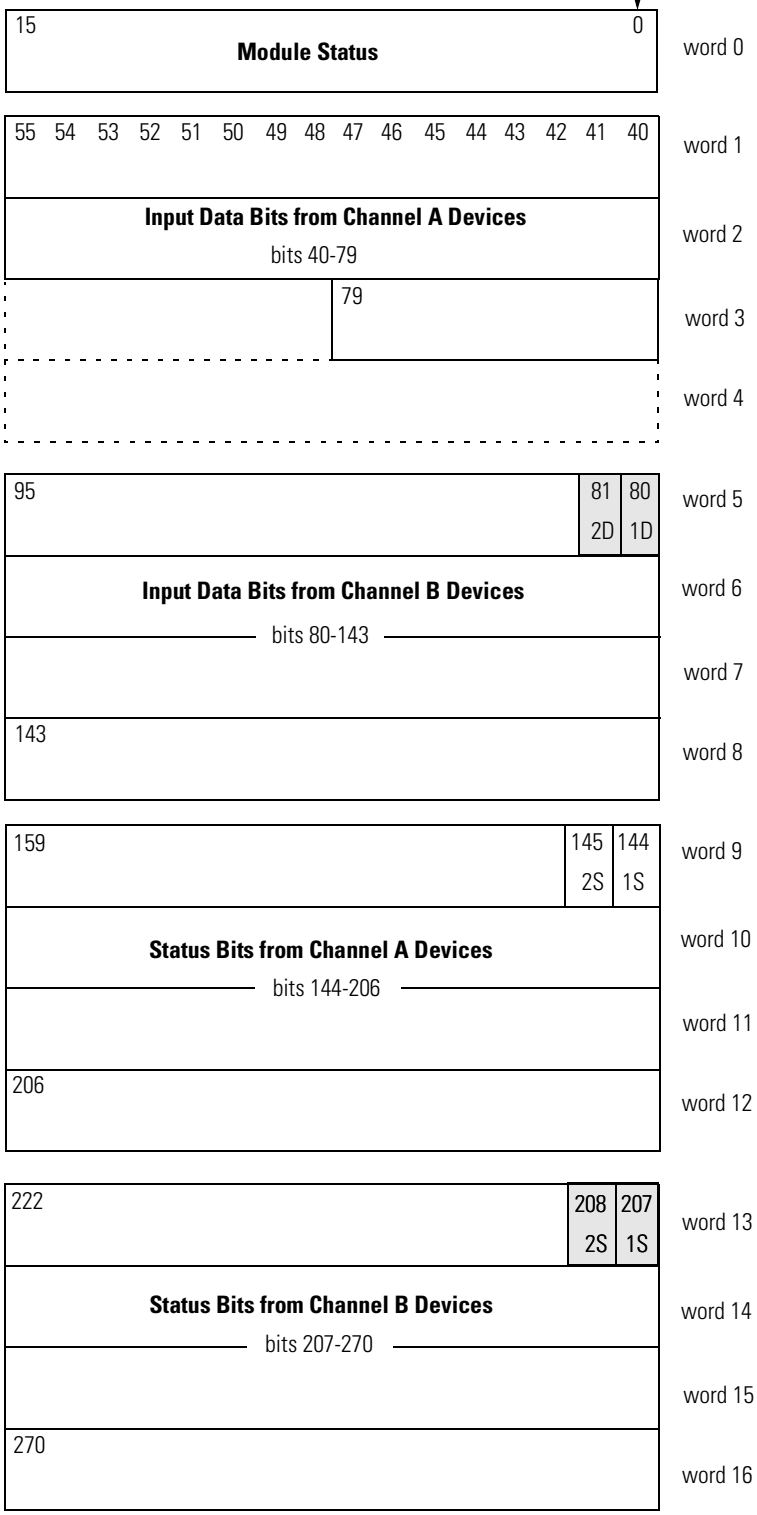
Note:
D = data bit
S = status bit

1D & 1S = data and status bits for node #1
2D & 2S = data and status bits for node #2

Channel B



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



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

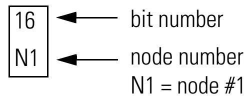
This example adheres to the following structure:

- 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

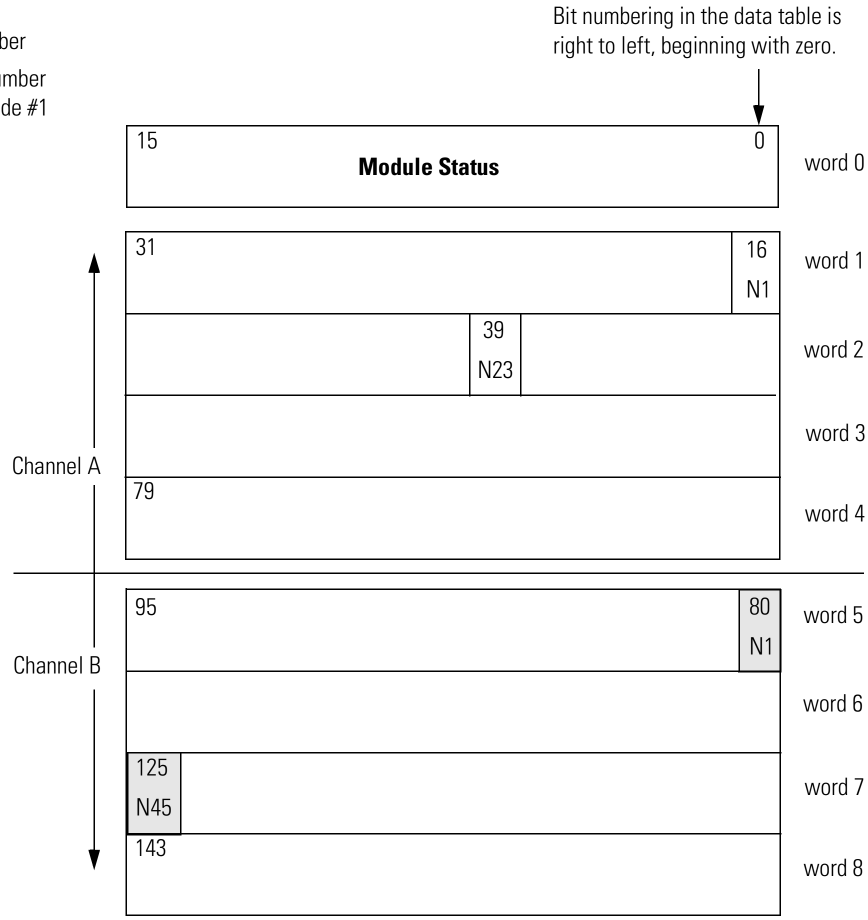
The following illustrates an output data mapping scheme example for a scanner in 2-slot addressing mode.

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



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.

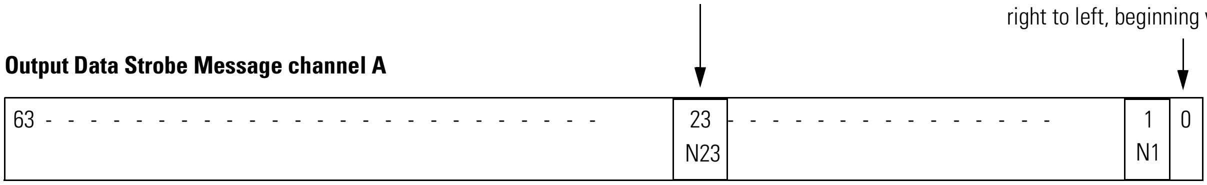


The scanner takes the output bits from its output data table and organizes them into a strobe message. The strobe message contains one bit for each node address, 0-63. In default mode, the scanner is node 63; therefore, this bit is empty. The scanner sends a separate strobe message to each network, via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

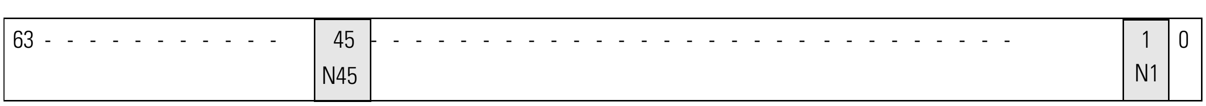
Each node's output bit is mapped to a bit number in the strobe message that directly corresponds to that particular node's MAC ID. For example, the output bit for node #23 is mapped to strobe bit #23.

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

Output Data Strobe Message channel A

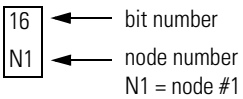


Output Data Strobe Message channel B

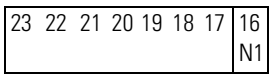


The following is an output data mapping scheme example for a scanner in 1-slot addressing mode.

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



Output Image Table

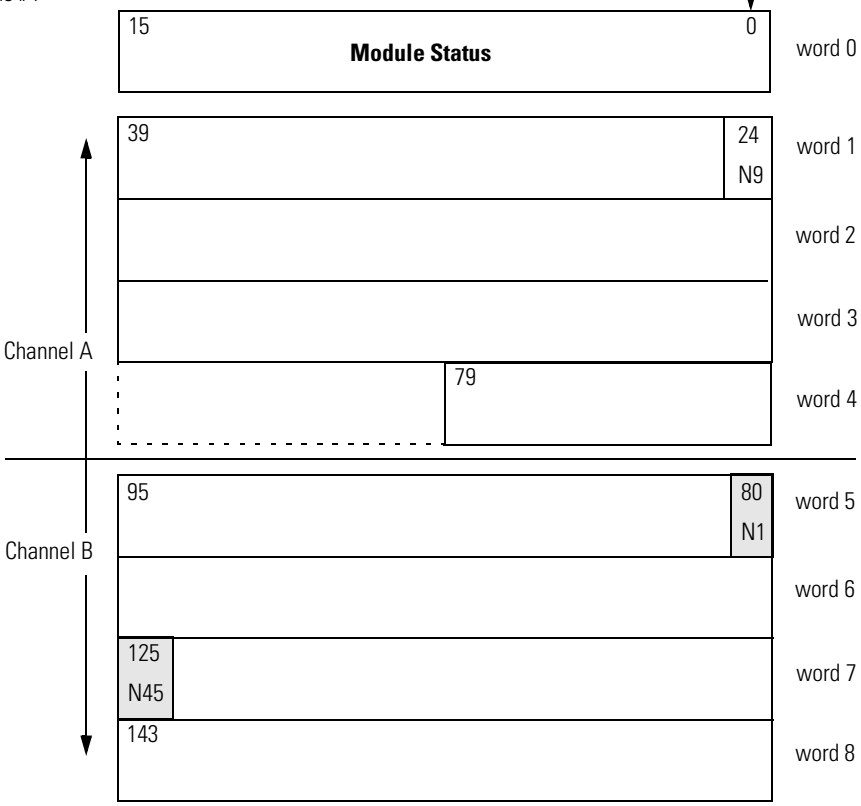


(for discrete output data bits)

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.

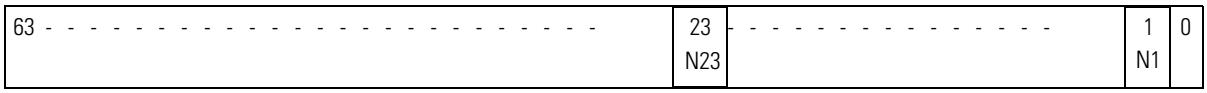


The scanner takes the output bits from its output data table and organizes them into a strobe message. The strobe message contains one bit for each node address, 0-63. In default mode, the scanner is node 0; therefore, this bit is empty. The scanner sends a separate strobe message to each network, via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

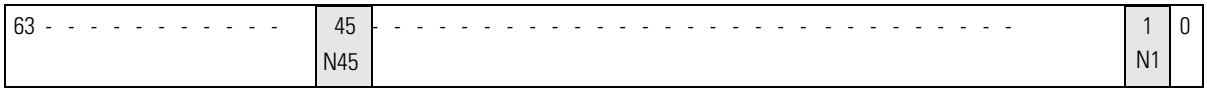
Each node's output bit is mapped to a bit number in the strobe message that directly corresponds to that particular node's MAC ID. For example, the output bit for node #23 is mapped to strobe bit #23.

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

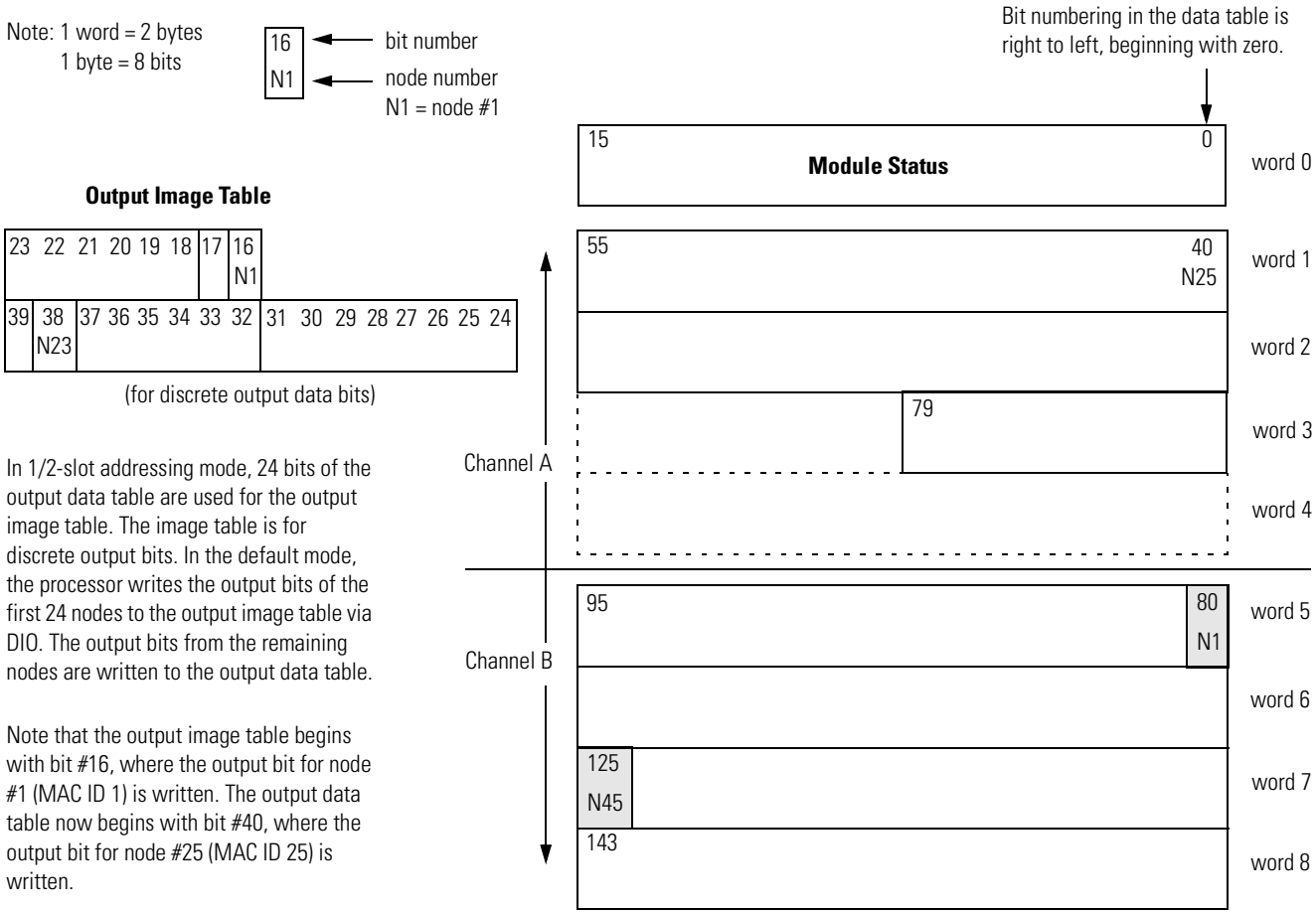
Output Data Strobe Message channel A



Output Data Strobe Message channel B



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

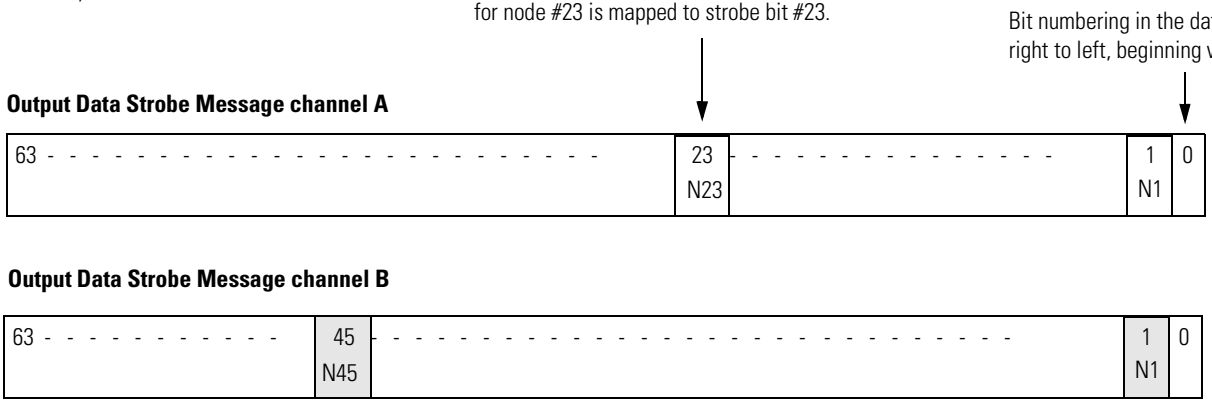


In 1/2-slot addressing mode, 24 bits of the output data table are used for the output image table. The image table is for discrete output bits. In the default mode, the processor writes the output bits of the first 24 nodes to the output image table via DIO. The output bits from the remaining nodes are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



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