



Allen-Bradley

PLC-5 DeviceNet Scanner Module

1771-SDN

DeviceNet[®]

User Manual

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.

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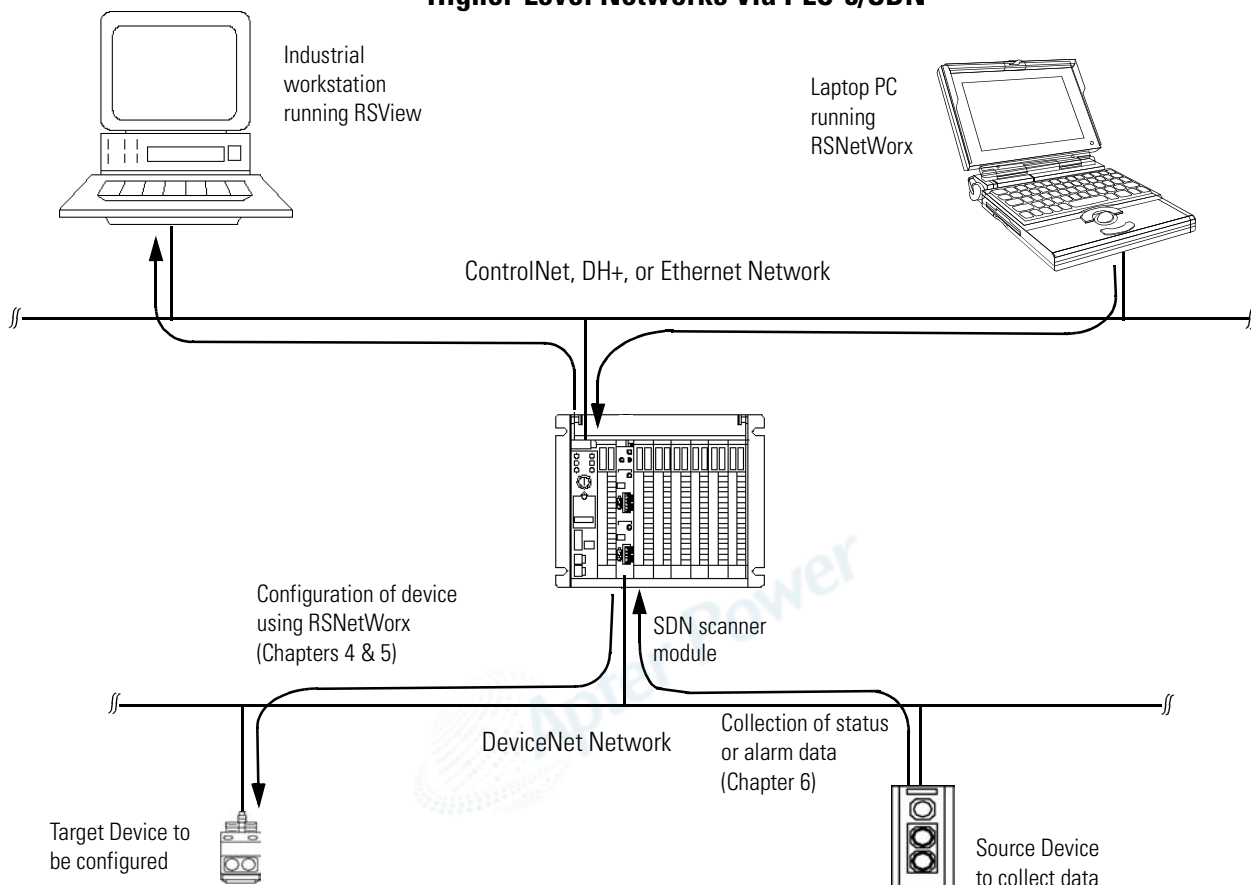
What You Need to Know

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

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

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



Address Density and Discrete I/O

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

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

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



= bits reserved for 1771-SDN and processor communication

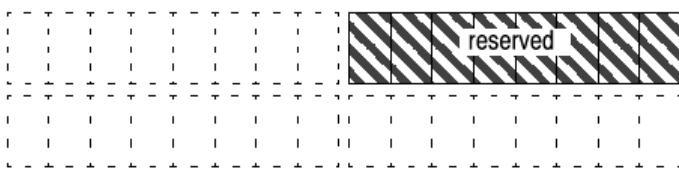


= bits available for discrete data transfer

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

0 bits for discrete data transfer

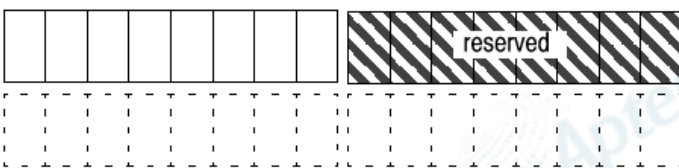
2-slot addressing



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

8 bits for discrete data transfer

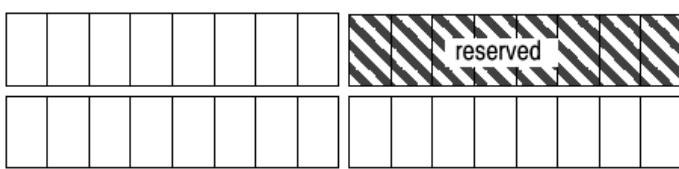
1-slot addressing



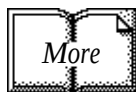
In 1-slot addressing mode, there are 16 bits: eight bits for scanner/processor communication, and eight bits for discrete data transfer.

24 bits for discrete data transfer

1/2-slot addressing



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



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

Communicating with Your Devices

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.

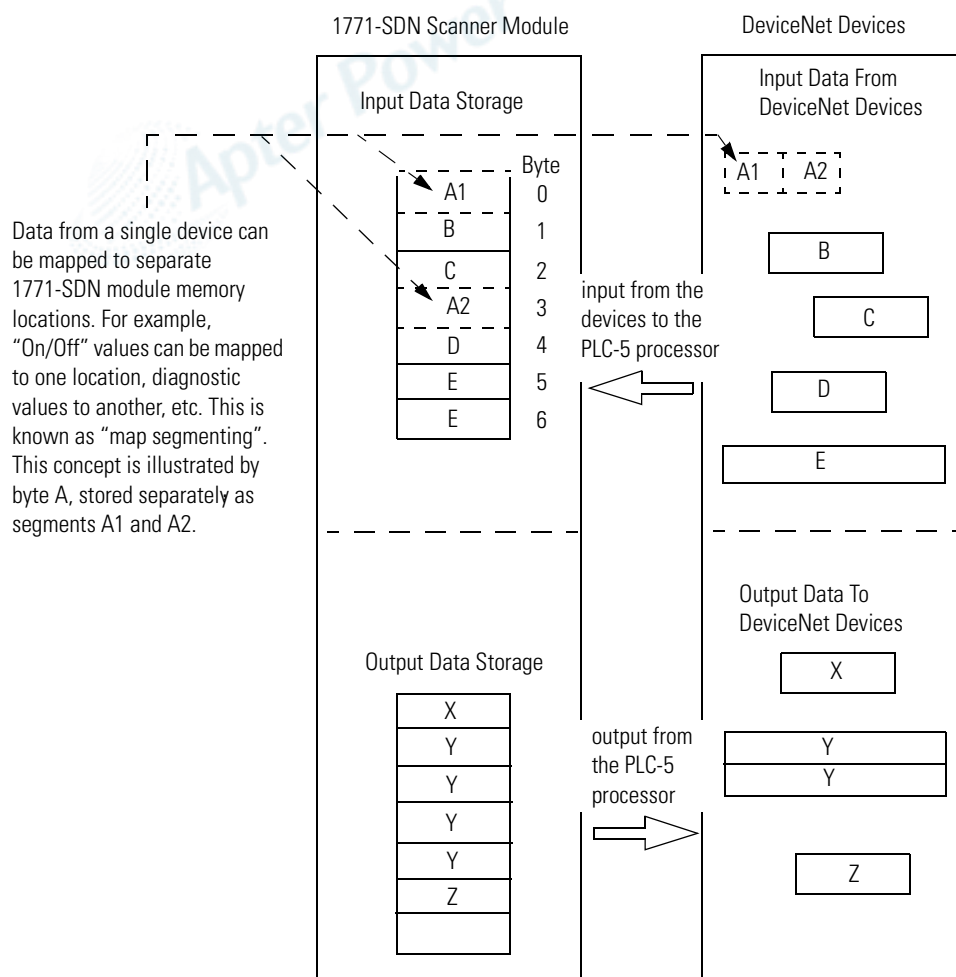
A cyclic message is sent only at a user-configurable rate, such as every 10 ms.

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.

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.



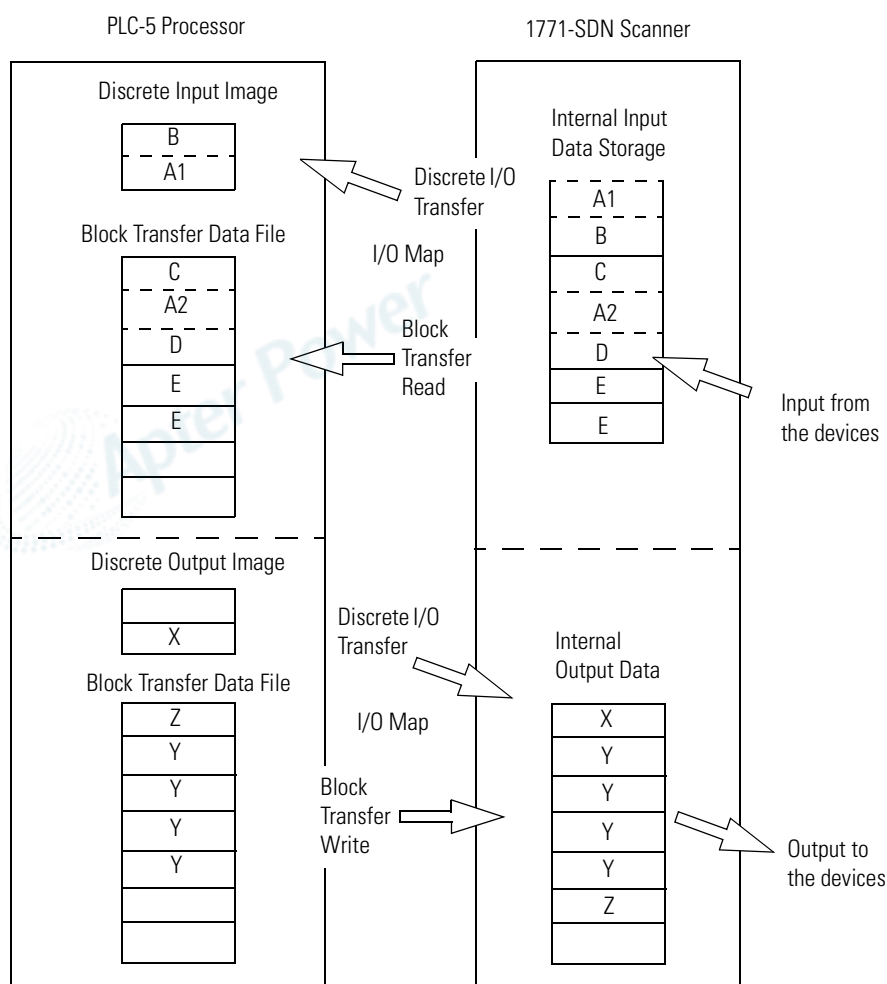
Communicating with Your PLC-5 Processor

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

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

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

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.

TIP

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

RSNetWorx Software as a Configuration Tool

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

TIP

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

Troubleshooting

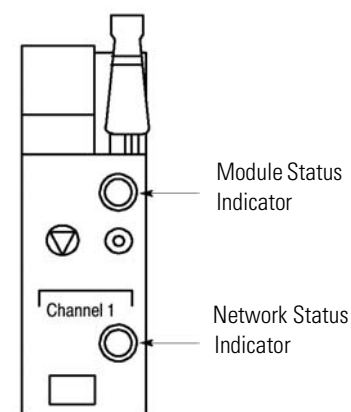
What This Chapter Contains

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

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Module Status Indicator	7-1
Network Status Indicator	7-2
Node/Error Code Indicator	7-2

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.