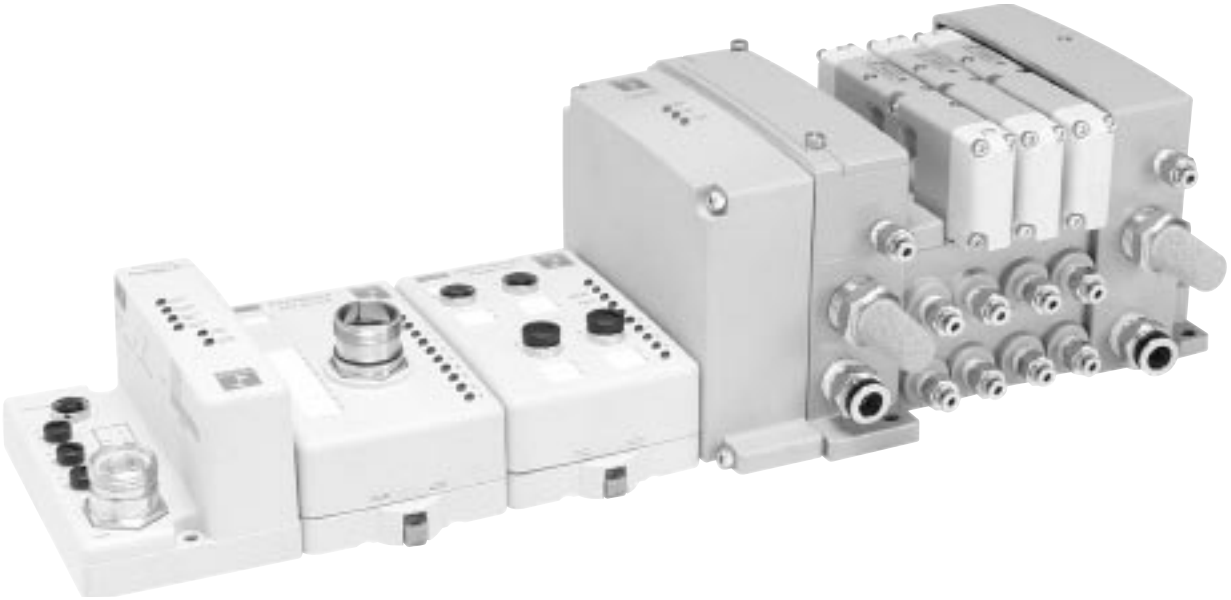


SERIAL BUS DEVICENET™ ADAPTERS

RPSSCDM12A, RPSSCDM18PA

User Manual 601

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls (Form #A10325)* (available online at www.rosscontrols.com/rosslit.htm), describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of these differences, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will ROSS CONTROLS® be responsible or liable for indirect or consequential damages to persons or property resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, ROSS CONTROLS cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by ROSS CONTROLS with respect to use of information, circuits, equipment, or software described in this manual.

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

WARNING 	Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
IMPORTANT	Identifies information that is critical for successful application and understanding of the product.
ATTENTION 	Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you: • Identify a Hazard • Avoid a Hazard • Recognize the Consequence
SHOCK HAZARD 	Labels may be located on or inside the equipment to alert people that dangerous voltage may be present.
BURN HAZARD 	Labels may be located on or inside the equipment to alert people that surfaces may be dangerous temperatures.

ATTENTION

Environment and Enclosure

This equipment is intended for use in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating. This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance. This equipment is supplied as “enclosed” equipment. It should not require additional system enclosure when used in locations consistent with the enclosure type ratings stated in the Specifications section of this publication. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings, beyond what this product provides, that are required to comply with certain product safety certifications.

NOTE: See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosures. Also, see the appropriate sections in this publication, as well as the publication A10324 (“Industrial Automation Wiring and Grounding Guidelines”), for additional installation requirements pertaining to this equipment.

ATTENTION

Preventing Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wrist strap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- If available, use a static-safe workstation.
- When not in use, store the equipment in appropriate static-safe packaging.

Purpose of This Manual

This manual describes how to install, configure, and operate your Serial Bus DeviceNet™ Adapters, catalog numbers RPSSCDM12A and RPSSCDM18PA.

IMPORTANT

In this manual, we use Serial Bus DeviceNet adapters to refer to all the DeviceNet™ adapter modules (RPSSCDM12A and RPSSCDM18PA). We use the specific catalog number (e.g., RPSSCDM12A) to refer to a specific module.

In the rest of this manual (except Chapter 4), we refer to the Serial Bus I/O DeviceNet™ adapters as the adapters.

In Chapter 4, we refer to the Serial Bus I/O DeviceNet adapter as the scanner because the chapter describes how to configure the adapter on the subnet.

Who Should Use This Manual

You must be able to use RSNetWorx for DeviceNet™ software, or a similar configuration software, to configure your adapter.

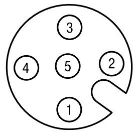
In this manual, we assume you know how to configure an adapter. If you do not, refer to your software user manuals, or online help, before attempting to use these adapters.

We also assume you are familiar with the Serial Bus I/O product line, including other serial bus interfaces, I/O modules, and power supplies. If you are not familiar with these components, you can read the Serial Bus I/O documents listed in the Related Products and Documentation section.

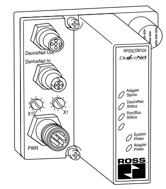
What the Manual Contains

This manual contains the following sections:

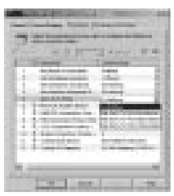
Chapter 1 - Install the Serial Bus DeviceNet Adapters
Description of how to install and wire the adapter



Chapter 2 - What Is the Serial Bus DeviceNet Adapter?
Overview of the adapter's features and functionality

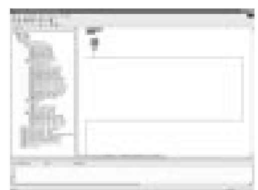


Chapter 3 - Use Auto Start Mode
Description of how to use the Auto Start Mode on your adapter to quickly get your system up and running

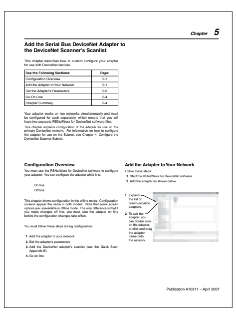


Or

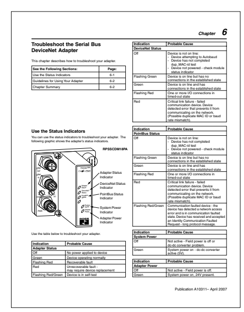
Chapter 4 - Configure the DeviceNet Scanner Subnet
Description of how to configure your adapter on the subnet



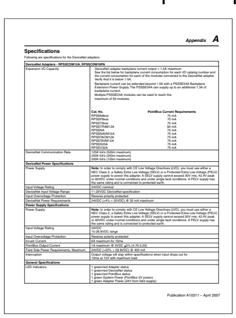
Chapter 5 - Add the Serial Bus DeviceNet Adapter to the DeviceNet Scanner's Scanlist
Description of how to configure the DeviceNet adapter and how to add it to the scanlist



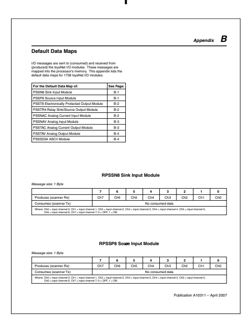
Chapter 6 - Troubleshoot the Serial Bus DeviceNet Adapter
Description of how to use the status indicators and how to troubleshoot your adapter



Appendix A - Specifications
Listing of the Serial Bus adapters' specifications



Appendix B - Default Data Maps
Listing of the default data maps for Serial Bus I/O modules



Related Terms

This manual uses the following terms:

Term	Definition
Adapter	The adapter interfaces between DeviceNet devices and Serial Bus I/O modules. Serial Bus I/O DeviceNet adapters include the RPSSCDM12A and RPSSCDM18PA.
Auto Catalog Replace	The Serial Bus I/O DeviceNet adapter supports the swapping of two identical modules connected to the adapter. That is, if a RPSSN8M8A is in slot 3 and another RPSSN8M8A is in slot 7, the two modules can be removed from the Serial Bus system and the slot 3 module placed into slot 7, and vice-versa. When Automatic Device Replacement (ADR) is active, the swapped modules will be reconfigured to match the previous module in their new slot. When ADR is not active, the configuration parameters will not be modified, the swapped modules must have identical configuration and values for their EDS file parameters.
Auto Device Replacement (ADR)	This refers to the ADR feature of a ControlLogix System on DeviceNet. With ADR active, any device on the DeviceNet link may be removed and replaced with an out-of-the-box checkmark compliant DeviceNet device. The ADR feature will result in downloading the values of the configuration parameters of the EDS file of the removed device to the new device.
Auto Start Mode	A feature that lets the Serial Bus I/O system get “up any of the EDS parameters for the PointBus™ or Serial Bus I/O modules. Using Auto Start Mode will result in a scan list within the adapter that stores the modules identity information.
Autobaud	A feature in devices (e.g., Serial Bus I/O modules) on the DeviceNet network that causes them to listen to communications on the network and set their own baudrate to match the network rate.
Backplane	The PointBus that consists of Serial Bus I/O modules connected to the Serial Bus DeviceNet adapter.
Baudrate	Rate of communications between devices on the DeviceNet network. Backplane baudrate is used for the RPSSCMD12A and RPSSCDM18PA.
Change of State (COS)	DeviceNet communications method in which the adapter sends data based on detection of any changed value within the input data. Data is independently received based on a change of state from the sender. Data in both directions can be acknowledged or unacknowledged depending on the run-time configuration of the system.
Commissioning	The period in time associated with post startup activities. Commissioning implies that the system has been validated and all configuration parameters are correct, all modules are in good operating condition, and the adapter scanlist is complete.
ControlFlash™	Utility software you can use to update the adapter’s firmware with the most current boot and application code.
Cyclic	DeviceNet communications method in which the adapter sends data cyclically based on a configured time value. Data is independently received cyclically from the sender. Data in both directions can be acknowledged or unacknowledged depending on the run time configuration of the system.
MACID	Media Access Control Identifier (DeviceNet network address).
Master	A DeviceNet network device (e.g., Rockwell Automation 1771-SDN) that initiates communication with DeviceNet slave devices (e.g., Serial Bus I/O modules) to retrieve data. The master only receives unprompted data when the slave is enabled for COS and there is a change in the device’s operating state.
Offline	State of the adapter when it is not powered or maintaining normal communication exchanges with other DeviceNet devices.
Online	State of the adapter when it is powered and maintaining normal communication exchanges with other DeviceNet devices.
PointBus	The Serial Bus I/O backplane PointBus maintains all DeviceNet network protocol, but also offers configuration capabilities.
Polled	DeviceNet communications method in which a module sends data in response to received data.
Primary Network	The primary DeviceNet network is defined as the DeviceNet link that provides the direct connection between the Serial Bus DeviceNet adapter and a DeviceNet scanner.
RSNetWorx for DeviceNet	Configuration software for the adapter and Subnet modules.
Scanlist	The list of Subnet modules connected to the adapter. When ADR is active, the scanlist stores the configured values of each of the Subnet modules’ configurable parameters. When ADR is not active, the scanlist stores only the module identity information.
Scanner	Operating state of the Serial Bus DeviceNet adapter when it retrieves I/O data from Subnet modules.
Slave	A DeviceNet network device that cannot initiate communication (except when configured with COS enabled) but responds to a DeviceNet master device.
Strobe	Adapter sends data in response to the strobe command. The single bit allocated to the adapter in the strobe message is not used. If the configured size of the input data (sent from the adapter) is greater than 8 bytes, the strobe connection establishment will fail. In this case, the input size must be reconfigured to 8 bytes or less.

Related Products and Documentation

The following table lists related Serial Bus I/O products and documentation:

Description	Model Number	Publication
Serial Bus 32 Point Valve Driver Installation Instructions	RPSSV32A	A10312
Serial Bus DeviceNet Adapters Installation Instructions	RPSSCDM12A, RPSSCDM18PA	A10313
Serial Bus PROFIBUS Adapter Installation Instructions	RPSSCPBA	A10314
Serial Bus ControlNet Adapter Installation Instructions	RPSSCCNA	A10315
Serial Bus EtherNet/IP Adapter Installation Instructions	RPSSCENA	A10316
Serial Bus I/O 24VDC Expansion Power Supply Installation Instructions	RPSSSE24A	A10317
Serial Bus 24VDC Input Modules Installation Instructions	RPSSN8, RPSSP8	A10318
Serial Bus 24VDC Output Modules Installation Instructions	RPSST8	A10319
Serial Bus Relay Output Modules Installation Instructions	RPSSTR4M12A	A10320
Serial Bus 24VDC Analog Input Modules Installation Instructions	RPSSNA	A10321
Serial Bus 24VDC Analog Output Modules Installation Instructions	RPSSTA	A10322
Serial Bus RS232 ASCII Module Installation Instructions	RPSSS23A	A10323
Industrial Automation Wiring and Grounding Installation Instructions	N/A	A10324
Safety Guidelines for the Application, Installation and Maintenance of Solid State Control	N/A	A10325

If you need more information on these products, contact your local distributor, integrator or sales office for assistance.

Guidelines for Using Your Adapter

Remember the following operational guidelines when using your Serial Bus DeviceNet adapter.

- Do not leave spaces in the I/O. Instead, install all Serial Bus I/O modules adjacent to each other.
- Populate every position on the mounting base.
- Serial Bus does not support removal and insertion under power (RIUP). When an I/O module is removed, the IP67 seal is broken and the backplane bus is interrupted.

Conventions Used In This Manual

The following conventions are used throughout this manual:

- Bullet lists (such as this one) provide information, not procedural steps
- Numbered lists provide sequential steps
- Text **written like this** identifies screen, menu, toolbar names, field names, buttons, and check boxes on screens
- A menu item in this format **File>Save** identifies the submenu item after the caret (>) that is accessed from the main menu (name before the caret)
- Pictures of symbols and/or screens represent the actual symbols you see or the screens you use

Chapter 1

Install the Serial Bus DeviceNet Adapters

Chapter 2

What Is the Serial Bus DeviceNet Adapter?

Chapter 3

Use Auto Start Mode

Install the Serial Bus DeviceNet Adapters

This chapter describes how to install and wire your adapter.

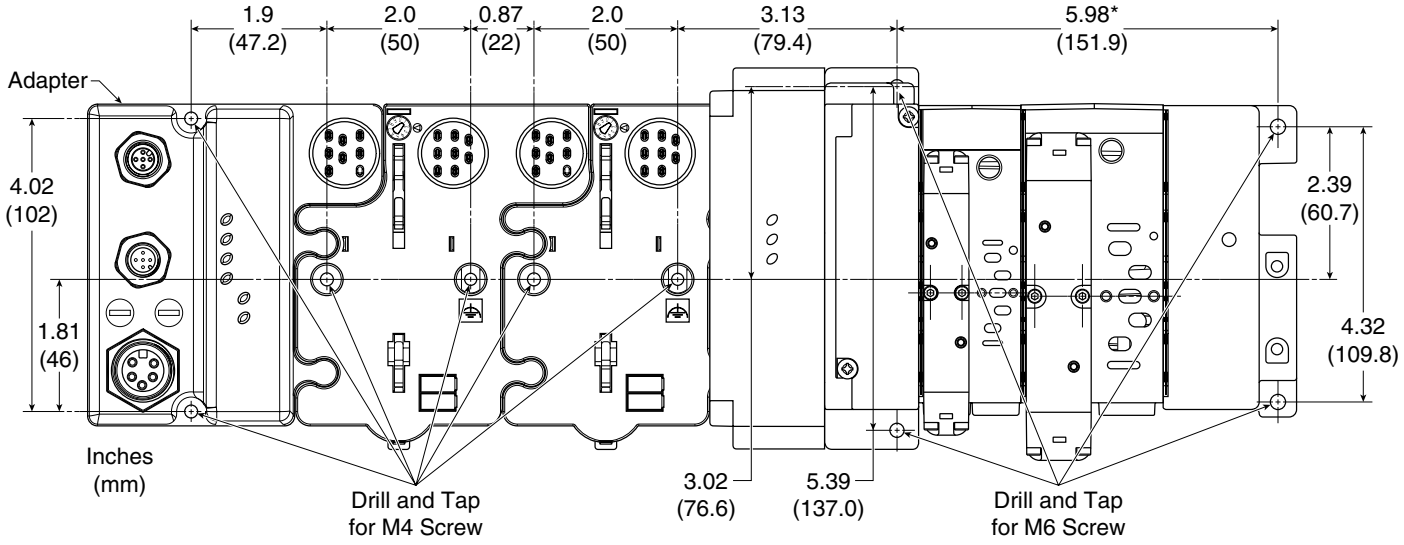
Mount the Adapter and I/O Base

To mount the Serial Bus adapter on a wall or panel, use the screw holes provided in the adapter.

A mounting illustration for the Serial Bus adapter with I/O bases is shown below.

Install the Mounting Base as Follows:

1. Lay out the required points as shown in the drilling dimension drawing.
2. Drill the necessary holes for #8 (M4) machine or self-tapping screws.
3. Mount the adapter and I/O bases using #8 (M4) screws.
4. Ground the system using the ground lug connection in the I/O base. (The ground lug connection is also a mounting hole.)



*Depending on the type and number of manifolds, this dimension may vary. Refer to Bulletin A10309 for additional information.

Set the Node Address

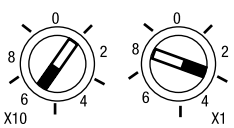
Valid node addresses are **00** through **63**.

Set the node address using either the rotary switches, RSNetWorx for DeviceNet™, DeviceNetManager™, or another software configuration tool. Setting the switches at any number from **64** through **99** lets the software have address control.

Each module is shipped with the switches set for node address **63**. Remove the caps on the front of the module to access the switches (refer to the X10 and X1 on the front of the module). The two switches are:

- X10 (most significant digit) – left side of module
- X1 (least significant digit) – right side of module

This example shows the node address set at 63.



To reset the node address, use a small blade screwdriver to rotate the switches. Line up the small notch on the switch with the number setting you wish to use and then cycle power.

The rotary switches are read periodically. If the switches have been changed since the last time they were read and they no longer match the on line address, a minor fault will occur, which is indicated by a flashing red Adapter Status LED. Settings of 64 through 99 cause the module to use the **last valid node address stored internally**. For example, the last setting internally was 40. If a change is made to 68, and then you power up, the address will default to 40.

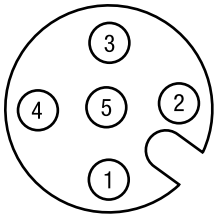
The module is equipped with AutoBaud detect. AutoBaud lets the module read the settings already in use on your DeviceNet network and automatically adjusts to follow those settings.

Wire the DeviceNet Adapters

Following are wiring instructions for the DeviceNet Adapters.

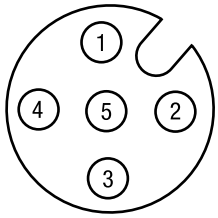
RPSSCDM12A

Male In Connector



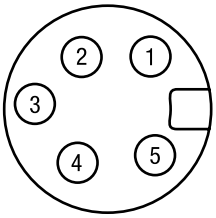
(view into connector)
Pin 1 - Drain
Pin 2 - +V
Pin 3 - -V
Pin 4 - CAN_High
Pin 5 - CAN_Low

Female Out Connector



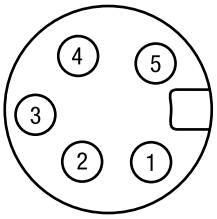
RPSSCDM18PA

Male In Connector



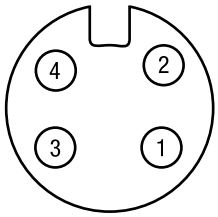
(view into connector)
Pin 1 - Drain
Pin 2 - +V
Pin 3 - -V
Pin 4 - CAN_High
Pin 5 - CAN_Low

Female Out Connector



DeviceNet Auxiliary Power

Male In Connector



(view into connector)
Pin 1 - User Power +
Pin 2 - Adapter Power +
Pin 3 - Adapter Power -
Pin 4 - User Power -

ATTENTION

Make sure all connectors and caps are securely tightened to properly seal the connections against leaks and maintain IP67 requirements.

Chapter Summary and What's Next

In this chapter, you learned how to install and wire your DeviceNet adapter. Move to Chapter 2 to learn about the Serial Bus DeviceNet adapters.

What Is the Serial Bus DeviceNet Adapter?

This chapter describes the Serial Bus I/O DeviceNet adapter, including descriptions of the adapter's features and functionality.

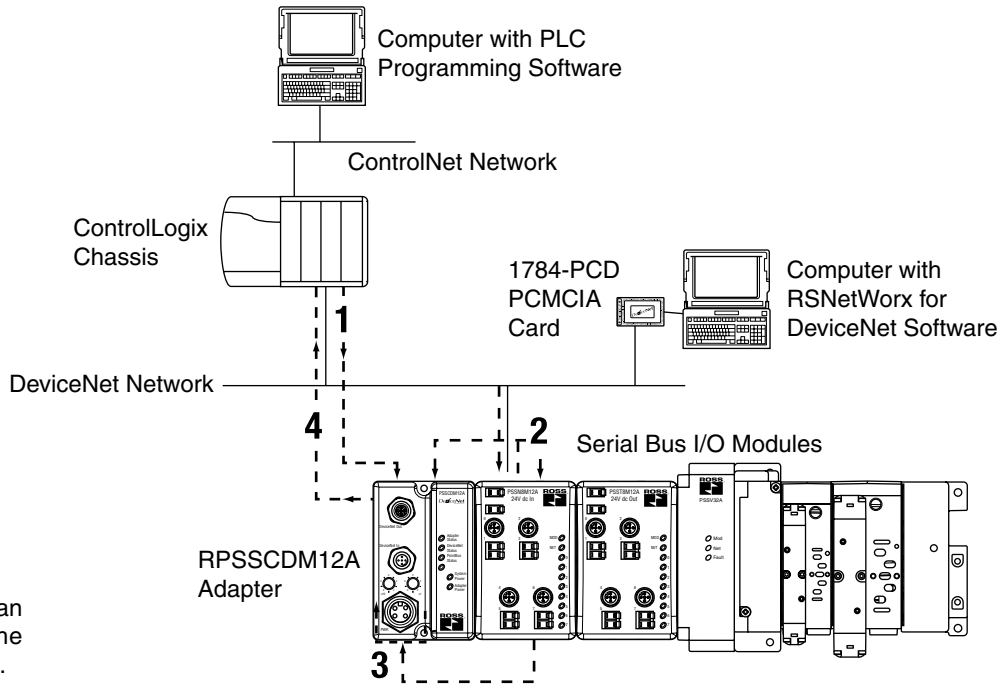
Use the Adapter

The adapter resides on the primary DeviceNet network and the Subnet simultaneously.

IMPORTANT

The PointBus maintains all DeviceNet network protocol, but also offers configuration capabilities.

The adapter interfaces between DeviceNet devices and Serial Bus I/O modules. The graphic below shows the adapter on the DeviceNet network and PointBus.



See page 2-8 for an explanation of the number sequence.

After you have installed your adapter into a Serial Bus I/O system, you must perform the following tasks:

1. Set Subnet/Backplane Baudrate
2. Set Subnet/Backplane I/O Module Addresses
3. Configure the Subnet I/O
4. Configure the Primary DeviceNet Network

The steps mentioned above are explained briefly here, and then in greater detail throughout this manual. You must complete the steps for the adapter to work with DeviceNet masters (e.g. Rockwell Automation 1756-DNB) on the primary network and Subnet modules.

1. Set Subnet/Backplane Baudrate

The adapter and Subnet/Backplane modules must use the same baudrate to communicate with each other. Use one or both of the following to set a Subnet/Backplane baudrate.

- Enable or disable the Backplane Autobaud feature for Serial Bus I/O modules. Serial Bus I/O modules have Autobaud enabled as the default - See page 2-5.
- Set the adapter baudrate for the Subnet. The default for the RPSSCDM12A and RPSSCDM18PA is 1Mbaud.

  You set the backplane baudrate for the RPSSCDM12A and RPSSCDM18PA.

2. Set Subnet/Backplane I/O Module Addresses

Once the adapter and Serial Bus I/O modules are communicating at the same rate on the backplane, you must make sure all modules use a valid MACID.

Set the Auto Address feature for Serial Bus I/O modules - See page 2-5.

3. Configure the Subnet I/O

In the first two steps, you set a consistent communication rate and made sure each module uses valid addresses for communication. Next you must configure the PointBus (e.g., set scan list).

You can configure the PointBus using one of two methods:

- Auto Start Mode (ASM) or
- Manually For more information on configuring the PointBus, see Chapter 3 for ASM or see Chapter 4 for manual configuration.

4. Configure the Primary DeviceNet Network

Finally, you must configure the adapter for communication with a master (e.g., Rockwell Automation 1756-DNB).

For more information on configuring the DeviceNet network, see Chapter 5, Add the Serial Bus DeviceNet Adapter to the DeviceNet Scanner's Scanlist.

You must understand all of the adapter's features to effectively use it in your Serial Bus I/O system. Keep these four steps in mind as you read this manual:

1. Set Subnet/Backplane Baudrate
2. Set Subnet/Backplane I/O Module Addresses
3. Configure the Subnet I/O
4. Configure the Primary DeviceNet Network

Remove and Reinsert Modules on the Backplane

Removal and Insertion Under Power (RIUP) is not recommended in a Serial Bus System because of the following reasons.

- Removing a module breaks the IP67 seal.
- Removing a module breaks the backplane bus. Modules to the right of the removed module will be 'lost' to the adapter. Also, the terminating resistor will be removed, causing system uncertainty.
- Inserting a module under power may cause the adjacent module to reset due to the addition of a large capacitive load on the power bus.

IMPORTANT

If the module is removed while it is under power, all the modules to the right of the removed module will disconnect from the PointBus and field power until the module is reinstalled.

If you must remove and reinsert modules, we recommend the following:

- Do not move I/O modules to different locations on the mounting base after they have been installed and configured.
- If adjacent modules (i.e., 2 or more) are removed from the backplane, replace all of them before attempting to operate the Serial Bus I/O system. Input data will hold last state until all previously removed modules are replaced.
  - If adjacent modules are removed and all but one is returned, the adapter cannot verify the location of the returned modules. For example, if modules are removed from nodes 3 and 4 and only the module from node 4 is returned, the adapter cannot verify the location. In this case, the adapter alerts you via a flashing red PointBus status LED that it cannot verify the presence of modules in the affected locations. I/O data will not be exchanged with this node until both modules have been reinserted.
  - If modules of **different types** are removed and returned to the wrong locations, the adapter identifies the returned modules and alerts you (via RSNetWorx for DeviceNet) that the error has occurred and must be corrected.
  - If modules of the **same type** are removed and returned to the wrong locations, the adapter identifies the returned modules, updates their MACIDs, and continues operation.

IMPORTANT

The removal and return scenario exists whether the system is under power or not. If the system is under power, the scenario arises immediately. If the system is not under power, the scenario arises in the next power cycle. Also, the example above shows removal of two adjacent modules. The scenario described exists anytime 2 or more adjacent modules are removed and all are not returned.

IMPORTANT

Care must be taken when replacing backplane I/O modules. Each I/O module stores its configuration parameters in internal non-volatile memory. You must either enable ADR for all modules or manually configure each module in a non-manufacturing environment when the module is being replaced or placed on the network for the first time. Failure to do so could result in inadvertent control attributed to different configuration settings.

Understand the DeviceNet Network and Subnet

DeviceNet Network

Your adapter serves as a slave to DeviceNet masters. The adapter receives data from, and returns data to, the master through the following I/O connections:

- Change of State (COS)
- Cyclic
- Polled
- Strobe

Backplane / Subnet Network

On the Backplane/Subnet, your adapter acts as a scanner and is the master of the Subnet modules. The adapter performs the following functions:

- Exchanges I/O data with devices on the Backplane/Subnet
- Collects I/O data from the Backplane/Subnet and sends it to devices on the DeviceNet network (e.g., scanners or controllers)
- Supplies power to the backplane I/O modules (See Appendix A for power supply rules regarding I/O modules power requirements.)

Data Collection

The adapter collects I/O data from up to 63 modules via the Backplane/Subnet. The I/O modules appear on the primary DeviceNet network as a single node, though, and require only one DeviceNet node address.

IMPORTANT

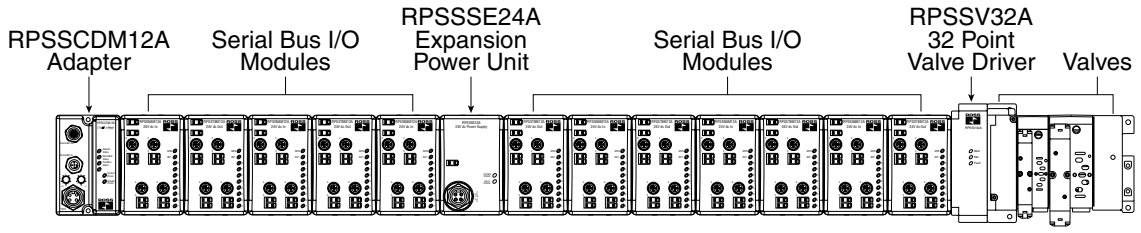
If Automatic Device Replacement (ADR) is enabled on the adapter, you can only connect up to 62 modules via the Subnet.

For more information on ADR, see page 2-6.

Module Power

The adapter supplies 5V logic power to Serial Bus I/O modules by converting 24VDC field power to PointBus 5V power.

You can connect up to 63 I/O modules to each adapter and you can power the backplane I/O modules from the adapter (with a maximum of 10A of field power). You may use the integrated, isolated 24VDC expansion power unit (RPSSSE24A) to power additional I/O modules, as shown below.



For more information on the RPSSSE24A expansion power unit, see the Serial Bus I/O 24VDC Expansion Power Supply Installation Instructions, publication A10317.

Adapter Features

Your adapter uses the following features on both the DeviceNet network and the PointBus:

- Self-Test
- Field Upgradable Firmware
- Fully Configurable Software
- Connections
- Baudrates

Self-Test

When power is applied to the adapter, the adapter performs a self-test. The adapter tests various internal and programmatic memories and checks the status indicators (LEDs).

Field Upgradable Firmware

You can update the adapter's firmware with the ControlFlash Utility software. This feature lets you always use the most current firmware.

Fully Software Configurable

The adapter is fully software configurable using RSNetWorx for DeviceNet. You must configure the adapter to be used with a DeviceNet master (e.g. 1756-DNB) and separately to be used with Subnet devices.

For more information on how to configure your adapter to use with a DeviceNet master, see Chapter 5, Add the Serial Bus DeviceNet Adapter to the DeviceNet Scanner's Scanlist.

For more information on how to configure your adapter to use with Subnet modules, see Chapter 4, Configure the DeviceNet Scanner Subnet.

Connections

Your adapter supports the following connections on both the primary DeviceNet network and Subnet:

- I/O connections:
  - Polled
  - Strobe
  - Cyclic
  - COS
- Explicit connections

You can use I/O mapping to determine the data contained in each connection.

The adapter supports Master/Slave connection types on the DeviceNet network. On the Subnet, the adapter functions as a scanner device, exchanging data with I/O modules.

Baudrates

Choose baudrates for the adapter in the RSNetWorx for DeviceNet software. The adapter supports these rates:

- 125Kbaud
- 250Kbaud
- 500Kbaud
- Autobaud – The adapter detects the primary DeviceNet network baudrate and automatically sets its own baudrate to match the network.
- For the RPSSCDM12A and RPSSCDM18PA, the PointBus can be configured to operate at 1Mbaud (1000Kbaud).

Auto Start Mode

Auto Start Mode lets you easily get your adapter installed and operating. In this mode, the adapter's configurable features operate as they were most recently configured. For example, if Autobaud on DeviceNet was enabled in the adapter's last configuration, it will be enabled when Auto Start Mode is used.

For a more detailed explanation of how to use Auto Start Mode, see Chapter 3.

Auto Catalog Replace

Auto Catalog Replace corrects errors that might occur when backplane modules of the same type are removed and replaced in the wrong location. If modules of the same type are removed and returned to the wrong locations, the adapter identifies the returned modules, updates their MAC IDs, and continues operation.

IMPORTANT

If modules of different types are removed and returned to the wrong locations, the adapter identifies the returned modules and alerts you (via RSNetWorx for DeviceNet, the Node Status Table, and the Faulted Node Table) that the error has occurred and must be corrected.

Backplane (RPSSCDM12A and RPSSCDM18PA) Baudrate

EDS parameter Backplane Baudrate is accessible from the primary DeviceNet and sets a specific baudrate for all backplane I/O modules.

Set this parameter in RSNetWorx for DeviceNet to one of the following baudrates:

- 125 Kbaud
- 250 Kbaud
- 500 Kbaud
- 1 Mbaud (available for both Serial Bus DeviceNet adapters)

When you download this parameter, the adapter sends a command to reset all present I/O modules on the backplane to the new baudrate. If additional modules are connected to the adapter, you must download the Backplane/Subnet Baudrate to make sure the new modules use the same rate as the others.

The baudrate may not take effect until power is recycled or the I/O modules are reset.

IMPORTANT

Changes to the Backplane Baudrate parameter only take effect if they are downloaded on an individual basis. (For example, if you change the Backplane Baudrate and download the changes with additional changes to other features, the Backplane Baudrate remains at the previous setting.)

Also, this parameter should be set to 'Do Nothing' when you download all parameters, or when Automatic Device Replacement is enabled for the adapter.

If you want to set an I/O module to use a specific baudrate (i.e., 125, 250, 500), you must first disable Backplane Autobaud for that module.

Backplane Baudrate performs the following functions:

- Sets the adapter's Subnet baudrate
- Sends a message to all connected backplane I/O modules. If an I/O module is set to autobaud, it receives the message, but ignores the new baudrate.

Backplane Autobaud

The adapter itself never autobauds on the Subnet. Backplane Autobaud automatically enables or disables Autobaud for all I/O modules currently attached to the backplane. The adapter does not set a specific rate though (as with Backplane Baudrate).

If you enable Backplane Autobaud in the adapter or the EDS parameter access that you set from the primary DeviceNet, the adapter only enables the Autobaud in all backplane I/O modules. When the modules listen to communications on the DeviceNet network, they detect the rate of communication and automatically set their own baudrates to match the network rate.

The module does not automatically detect the backplane baudrate until power is cycled or the module is reset.

TIP

Autobaud, when enabled, is useful if you swap Serial Bus I/O modules between networks that are operating at different baudrates.

Enable Backplane Baudrate in RSNetWorx for DeviceNet.

IMPORTANT

Changes to the Backplane Autobaud parameter only take effect if they are downloaded on an individual basis. (For example, if you enable the Backplane Autobaud setting and download the change with additional changes to other features, the Backplane Baudrate remains disabled.)

This parameter should be set to 'Do Nothing' when you download all parameters, or when Automatic Device Replacement is enabled for the adapter.

If you want to set an I/O module to use a specific baudrate (i.e., 125, 250, 500), you must first disable Autobaud for that module.

Auto Address

The EDS parameter Auto Address is available from the primary DeviceNet and lets the user sequentially order the node addresses of backplane I/O modules. This parameter is not a mode, but occurs on a single occurrence only. The node address selected is assigned to the module closest to the adapter. The next closest module is assigned the next numerically higher value. The numbering pattern continues for all connected backplane I/O modules.

Enable this parameter in the RSNetWorx for DeviceNet software.

IMPORTANT

Changes to the Auto Address parameter only take effect if they are downloaded on an individual basis. (For example, if you enable the Auto Address and download the changes with additional changes to other features, the node addresses of the I/O modules remains disabled.)

This parameter should be set to 'Do Nothing' when you download all parameters, or when Automatic Device Replacement is enabled for the adapter.

Physical List Acquire Status

The adapter maintains a physical list that indicates the order of the node addresses of all Serial Bus I/O modules present on the backplane. Physical List Acquire Status shows the status of this physical list acquire process.

The adapter requires that each backplane I/O module has a MACID greater than that of its neighbor to its immediate left. The list is created when power is applied to the adapter and each time a module is inserted on the backplane.

The valid values are:

- Idle
- Busy
- Auto Start Mode

Cycling Node Status

Using the Cycling Node Status parameter, you can easily determine the status of any Serial Bus I/O modules with which the adapter is experiencing problems. A corresponding text string appears, including the MAC ID, and a description of the status code reported in the Node Status Table. For more information on the Node Status Table, see page 2-11.

For the connection sizes mentioned below, the I/O connection sizes on DeviceNet are dependent on the scanlist configuration on the backplane.

Poll/COS Connection Consume Size

Poll/COS Connection Consume Size shows the size (number of data bytes) consumed by the poll/COS (Instance 2) I/O connection on the primary DeviceNet.

Poll Connection Produce Size

Poll Connection Produce Size shows the size (number of data bytes) produced by the polled (Instance 2) I/O connection on the primary DeviceNet.

COS/Cyclic Connection Produce Size

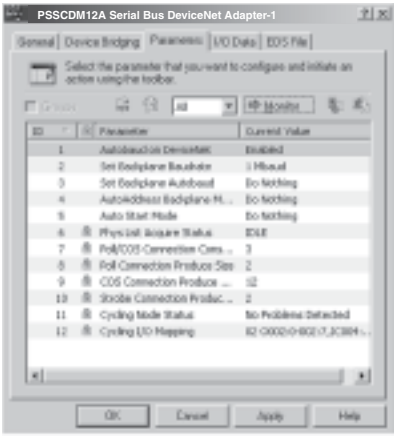
COS Produce Size shows the size (number of data bytes) produced by the Change of State I/O connection on the primary DeviceNet.

Strobe Connection Produce Size

The Strobe Produce Size shows the size (number of data bytes) produced by the Strobe I/O connection on the primary DeviceNet.

Cycling I/O Mapping

Cycling I/O Mapping is an EDS parameter, accessible from the primary DeviceNet, that shows you how data is mapped in the adapter's scanlist. The data, as shown below, is listed in order of active modules in the scanlist.



The data format is NN OBBB:b-BBB:b,IDBBB:b-BBB:b, where:

- NN = node number
- O or I = data type (output or input)
- BBB = byte number
- b = bit number
- D = DeviceNet connection (C [COS/cyclic], S [strobe], or P [poll])

IMPORTANT

If an I/O module's data has multiple mappings, you must use RSNetWorx for DeviceNet to browse to the backplane to view the mappings.

Automatic Device Replacement

With Automatic Device Replacement (ADR), the adapter automatically configures a new replacement module.

IMPORTANT

The replacement module must match the original module (i.e., same vendor I.D., device type, product code, major and minor revision) for ADR to work. The parameters that must match are those selected in the electronic keying portion of the scanlist. You determine the level of electronic keying.

The backplane configuration parameters (e.g., Auto Address) should be set to 'Do Nothing'.

The adapter is capable of holding approximately 64K of configuration data for Serial Bus I/O modules connected to it. The adapter sends configuration data to an I/O module each time connections are created with that module (i.e., power cycle or module insertion to backplane).

You can exchange an old module for a new one if the following conditions are met:

- ADR is enabled in the adapter.
- The new module matches the old one (i.e., electronic keying).
- The new module is inserted in the proper location (only for modules using the backplane).

If the conditions listed above are met, the new module's MACID is changed to the appropriate value, if necessary, and the configuration information is subsequently downloaded to the module.

Physical Ordering

When power is applied, or when an I/O module is inserted, the adapter detects the backplane I/O modules' order, based on MACID. With Physical Ordering, the adapter detects if any Serial Bus I/O modules connected to it are out of order. If this condition is detected, the adapter changes the MACIDs of any new modules.

IMPORTANT

If any backplane I/O modules are missing when power is applied, none of the backplane modules enter run mode.

The adapter's MACID is always 0 on Subnet. The MACIDs of each attached backplane I/O module must be sequentially ordered (i.e., each module's MACID is greater than the left adjacent module).

Interscan Delay (ISD)

Interscan Delay is the time delay between consecutive I/O scans of polled devices. The default setting is 10ms. The ISD=4ms for Auto Start Mode. You can change this parameter in the **Module** window of the scanner in the RSNetWorx for DeviceNet software.

The scanner uses this period of time to perform non-time-critical communications on the DeviceNet network, such as communicating with RSNetWorx for DeviceNet software. Setting this parameter to a very 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 very large value reduces the freshness of the I/O data being collected by the scanner and is not advisable.

Foreground to Background Poll Ratio

Foreground to Background Poll Ratio is the ratio of foreground to background polls. You can set this parameter in the **Module** window of the scanner in RSNetWorx for DeviceNet software.

Devices can be polled on every I/O scan (foreground), or they can be polled less frequently (background). Whether a particular device will be polled in the foreground or in the background is determined by its **Poll Rate** parameter on the **Edit I/O Parameters** dialog box, which is accessed from the **Scanlist** property page.

The poll ratio sets the frequency of poll I/O messages to a device in relation to the number of I/O scans. For example, if the poll ratio is set to 5, the scanner will poll the selected devices once every six I/O scans. We recommend that you use a poll ratio of 1.

Expected Packet Rate

Expected Packet Rate is the rate at which the packets will be expected to be received by the scanner. You set this parameter in the **Module** window (from the **Advanced** button) of the scanner in RSNetWorx for DeviceNet software.

IMPORTANT

We recommend that you do **not** change the Expected Packet Rate unless you are instructed to do so by a Rockwell Automation technical support representative.

Transmit Retries

Transmit Retries are the maximum number of times that the scanner will attempt to send an I/O message to a device before it times out and generates an error message. You set this parameter in the **Module** window (from the **Advanced** button) of the scanner in RSNetWorx for DeviceNet software.

IMPORTANT

We recommend that you do **not** change the Transmit Retries unless you are instructed to do so by a Rockwell Automation technical support representative.

Communicate Through the Adapter

As described previously in this manual, the adapter resides on the DeviceNet network and the PointBus simultaneously. The adapter's functions are as follows:

- DeviceNet – adapter serves as a slave device that exchanges I/O data with another DeviceNet scanner device (e.g., 1771-SDN) via DeviceNet messages
- PointBus – adapter serves as master for up to 63 I/O modules, using DeviceNet messages to consume from or produce data to each module.

IMPORTANT

If Automatic Device Replacement (ADR) is enabled on the adapter, you can only connect up to 62 modules via the PointBus.

For more information on ADR, see page 2-6.

Map the Data

Your adapter must store data temporarily before transferring it between devices. You must map data to your adapter's memory before transferring it.

For a detailed description of the mapping process, see page 2-9.

Overview of the Communication Process

In a typical configuration, the adapter acts as an interface between a DeviceNet scanner (e.g., Rockwell Automation 1756-DNB) and Serial Bus I/O modules. The following example graphic shows information transferred from a 1756-DNB to Serial Bus I/O modules.

IMPORTANT

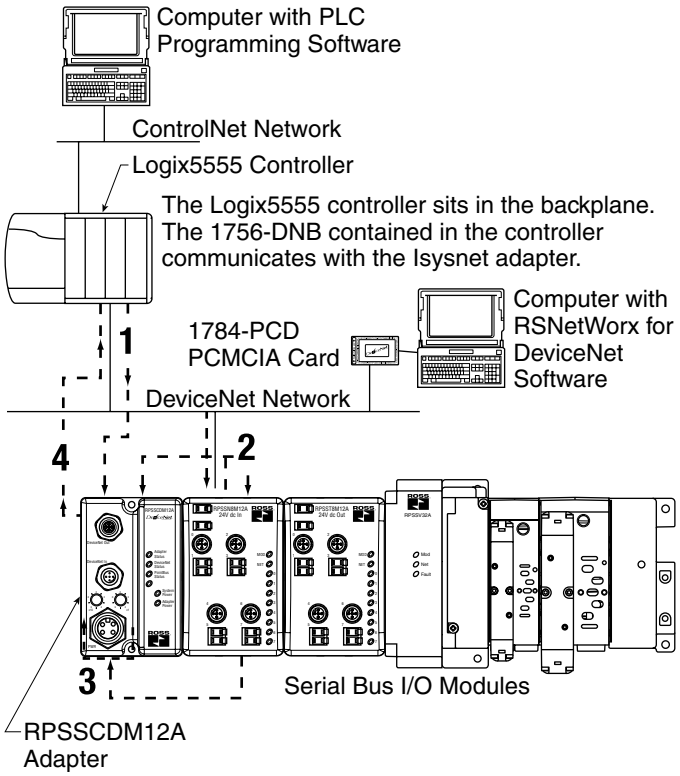
Although information is exchanged between the Logix5555 and 1756-DNB, this diagram (nor this chapter) is not designed to explain such an exchange.

Four data transfers are shown in the diagram, including:

1. Scanner to adapter
2. Adapter to I/O modules
3. I/O modules to adapter
4. Adapter to scanner

Because the adapter simultaneously resides on the DeviceNet network and on PointBus, it serves as a slave to the processor (i.e., steps 1 and 4) and a master to the I/O modules (i.e., steps 2 and 3).

The four data transfers are not necessarily sequential. Transfers 2 and 3 typically occur more frequently than transfers 1 and 4.



The computers and PCMCIA card shown in the diagram are required to configure the processor, adapter, and I/O modules.

Although the PCMCIA card is used in this example, you can use other communications cards, such as PCID and KFD cards.

Key Points About Scanner to Adapter Transfer (**Step 1**)

1. Scanner initiates transfer
2. Scanner uses DeviceNet I/O messaging to write data to adapter. Data may contain:
   - device output data
   - configuration data

Key Points About Adapter to Output Module Transfer (**Step 2)**

1. Adapter initiates transfer
2. Adapter produces data for I/O module to consume. Data may contain:
   - device output data
   - configuration data

Key Points About Input Module to Adapter Transfer (**Step 3**)

Adapter consumes data I/O module has produced. Data may contain:

- device input data
- status data

Key Points About Adapter to Scanner Transfer (**Step 4**)

SDN consumes I/O data produced by adapter. Data may contain:

- device input data
- status data

Image Table Mapping

Your adapter receives data from:

•master devices (e.g., scanners) - output data is then passed to Serial Bus I/O modules

•input modules - input data is passed to the scanner

The adapter must map the data it receives to its internal memory before passing it to the appropriate device. The I/O map for a module is divided into:

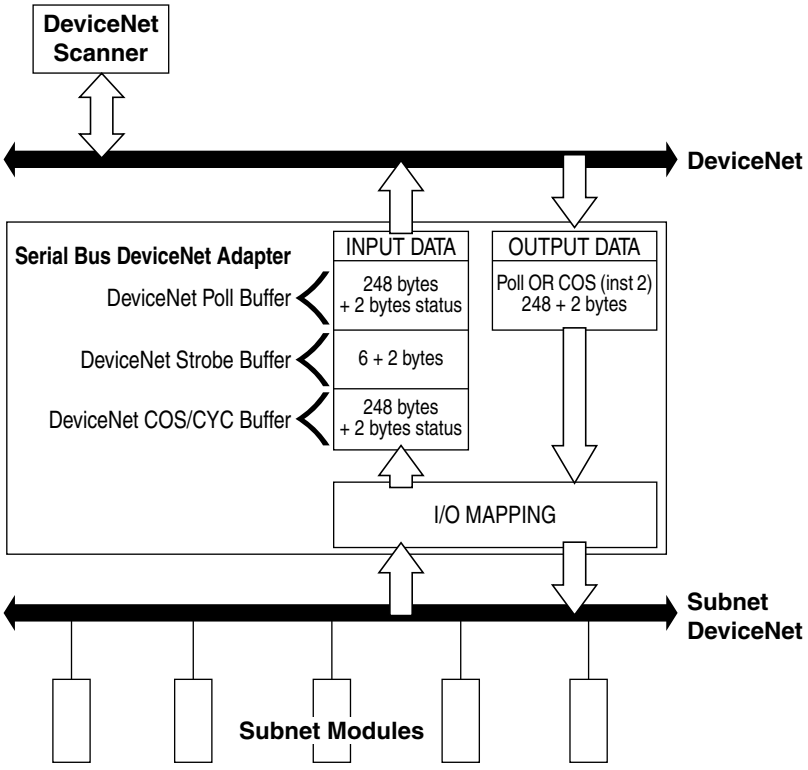
•read bytes - input and status bytes

•write bytes - output and configuration bytes

The data is mapped by 3 buffers for input data (each representing an I/O connection on the primary DeviceNet) and 1 buffer for output data (representing data sent for Poll or COS connections on the primary DeviceNet).

The number of read bytes or write bytes can be 2 or more. The length of each I/O module's read bytes and write bytes vary in size depending on module complexity. Each I/O module supports at least 1 input byte or 1 output byte. Status and configuration are optional, depending on the module.

The following graphic shows how the adapter maps information.



See the I/O Status Word Bit Definitions table for definitions of the first 2 bytes of each I/O message produced by the adapter on DeviceNet.

I/O Status Word Bit Definitions

Byte	Bit	Operating Mode	Operating Mode Description
0	0	0 = Run mode 1 = Idle mode	**Run** - The adapter maps output data to each module on PointBus. **Idle** - Output data with zero length is sent to I/O modules. **Device Failure** - One or more of the devices in the scanlist has failed to communicate with the adapter. **Communications Failure** - The adapter has entered the BUSOFF state on the Subnet. Another Subnet device is configured with the wrong baud rate. **Duplicate Node Address Failure** - There is another node with the same address (0) as the scanner on the Subnet and the adapter has failed its Dup_MAC_ID test.
0	1	1 = Device failure (at least one device failed)	
0	2	1 = Communication failure	
0	3	1 = Duplicate node address failure	
0	4	Reserved	
0	5	Reserved	
0	6	Reserved	
0	7	Reserved	
1	0	Reserved	
1	1	Reserved	
1	2	Reserved	
1	3	Reserved	
1	4	Reserved	
1	5	Reserved	
1	6	Reserved	
1	7	Reserved	

The first 2 bytes of output data on the DeviceNet network that are sent to the adapter are reserved as a command word. No bits have been defined.

Communicate With I/O Modules

The adapter module supports multiple communication choices. These choices all use the default I/O structure previously described. The adapter's master (e.g., 1756-DNB) makes the actual communication choice. The choices are:

- Polled – Adapter sends data in response to received data.
- Strobe – Adapter sends data in response to the strobe command. The single bit allocated to the adapter in the strobe message is not used. If the configured size of the input data (sent from the adapter) is greater than 8 bytes, the strobe connection establishment will fail. In this case, the input size must be reconfigured to 8 bytes or less (only 6 bytes are I/O data because the first 2 bytes are the status word).
- Change of State – Adapter sends data based on detection of any changed value within the input data. Data is independently received based on change of state from the sender. Data in both directions can be acknowledged or unacknowledged depending on the run time configuration of the system.
- Cyclic – Adapter sends data cyclically based on a configured time value. Data is independently received cyclically from the sender. Data in both directions can be acknowledged or unacknowledged depending on the run time configuration of the system.

The adapter uses these messages to solicit data from or deliver data to each device. Data received from the devices (i.e., input data) is organized by the adapter and retransmitted to the master. Data received from the master (i.e., output data) is organized in the adapter and sent on to the I/O modules.

Use Diagnostic Tables

The adapter maintains three diagnostic tables to manage the flow of data between a processor and a network's devices. You can access the table over DeviceNet through the Scan Config Object (Class Code 0x90), Instance 1, via the following read-only attributes:

- Faulted Node Table (Attribute 0xA) - In this 8-byte table, each bit represents a node on the backplane. For example, bit 0 in byte 0 represents MACID 0 (the adapter), while bit 0 in byte 1 represents MACID 8 and so on. If a bit is set, a corresponding non-zero status value can be read from the Node State Table described below.
- Idle Node Table (Attribute 0xB) - In this 8-byte table, each bit also represents a node on the backplane, as with the Faulted Node Table. If a bit is set in the Idle Node Table, the corresponding node is in the scanlist and currently in idle mode.
- Node Status Table (Attribute 0xC) - This 64 byte table contains a status code for each possible MACID on the backplane. Non-zero values are accompanied with the respective bit in the Faulted Node Table being set.

See the table Node Status Table Numeric Code Definitions for an explanation of the text messages associated with the Node Status Table.

Node Status Table Numeric Code Definitions

Numeric Code:	Text Message:	Definition:	Take this action:
70	DupMAC Failure	Adapter failed Duplicate Node Address check.	An I/O module has a MACID of zero. Change the module's address.
71	Scanner Cfg Error	Illegal data in the scan list table.	Reconfigure the scan list table and remove any illegal data.
72	Comm Failure	Slave device stopped communicating.	Inspect the I/O modules and verify connections.
73	Wrong Device Type	Device's identity information does not match electronic key in scan list table entry.	Verify that the correct device is at this node number. Make sure that the device matches the desired electronic key (vendor, product code, product type).
74	Port Overrun Error	Data overrun on port detected.	Modify your configuration and check for invalid data. Check network communication traffic.
75	Network Failure	Communication has ceased on the backplane.	Inspect the I/O modules and verify connections.
76	No Msg for Scanner	No direct network traffic for scanner detected.	No action. The scanner hears other network communication.
77	Wrong Data Size	Data size expected by the device does not match scan list entry.	Reconfigure your module for correct transmit and receive data sizes.
78	No Such Device	Slave device in scan list table does not exist.	Add the device to the network, or delete scan list entry for that device.
79	Transmit Failure	Adapter has failed to transmit a message.	Make sure that other modules exist on the backplane.
80	In Idle Mode	Adapter is in IDLE mode.	No action necessary. If you want the adapter to run, put it in RUN mode.

Node Status Table Numeric Code Definitions

Numeric Code:	Text Message:	Definition:	Take this action:
82	Fragmentation Error	Error detected in sequence of fragmented I/O messages from device.	Check scan list table entry for slave device to make sure that input and output data lengths are correct. Check slave device configuration.
83	Slave Init Error	Slave device is returning error responses when scanner attempts to communicate with it.	Check accuracy of scan list table entry. Check slave device configuration. Slave device might be in another master's scan list. Reboot slave device.
84	Not Yet Initialized	Adapter is initializing the DeviceNet channel.	No action.
85	Rcv Buffer Overflow	Data size is larger than 255 bytes.	Configure the device for a smaller data size.
86	Device Went Idle	Device is producing zero length data (idle state) while channel is in Run Mode.	Check device configuration and slave node status.
89	ADR Failed	Failure occurred when downloading ADR data to the I/O module.	Reconfigure the ADR download data for the I/O module.
91	Port Bus Off	Bus-off condition detected on communications port. Scanner is detecting communications errors.	Check DeviceNet connections and physical media integrity. Check system for failed slave devices or other possible sources of network interference.
92	Port Power Off	No network power detected on communications port.	Provide network power. Make sure that scanner drop cable is providing network power to adapter communications port.

A user program can monitor the Device Failure Bit in the I/O message(s) received from the adapter. When it has determined the bit set, you can read the Faulted Node Table and Node Status Table, using the Explicit Message Program Control Feature of the scanner device, to determine the module experiencing problems and the nature of those problems.

Chapter Summary and What's Next

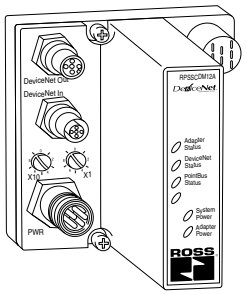
In this chapter you learned about the Serial Bus DeviceNet adapters. Move to Chapter 3 to learn about using Auto Start Mode.

Use Auto Start Mode

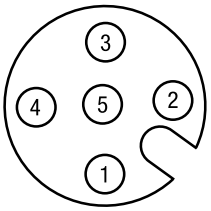
This chapter describes how to use the Auto Start Mode with your Serial Bus I/O DeviceNet adapters.

This chapter assumes you already have a Serial Bus system mounted. There are five simple steps to the Auto Start Mode:

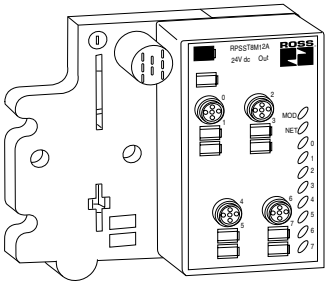
1. Install the I/O Module



2. Wire the DeviceNet Adapters



3. Install the I/O Module



4. Use RSNetWorx for DeviceNet

5. Begin Auto Start Mode

Why Use Auto Start Mode?

Auto Start Mode offers you a quick and easy method of getting your Serial Bus I/O system 'up and running'. If your Serial Bus I/O application can use default configuration, you should use Auto Start Mode to easily begin operations.

Once your adapter is:

- Installed
- Connected to the system's I/O modules
- Online (in RSNetWorx for DeviceNet)

you only need to choose the Auto Start Mode option in the adapter's **Parameters** window in the RSNetWorx for DeviceNet software and the adapter begins working with a default configuration.

IMPORTANT

Although Auto Start Mode allows your adapter to operate with a default configuration, you can write a custom configuration after operation has begun.

For more information on how to write custom configuration for your adapter on DeviceNet, see Chapter 5, Add the Serial Bus DeviceNet Adapter to the DeviceNet Scanner's Scanlist.

What Does Auto Start Mode Do?

When using Auto Start Mode, the adapter:

1. Sets all modules on the backplane to Auto Baud
2. Reads the Subnet module's identity information
3. Sets backplane modules' addresses sequentially
4. Generates a scanlist for the Subnet
5. Maps I/O data, based on byte, word, double-word, or fixed boundaries

When this sequence of events is completed, the Serial Bus I/O modules connected to the adapter are ready to accept connections from a scanner.

How Is I/O Data Mapped Using Auto Start Mode?

In Auto Start Mode, you can map I/O data in the adapter's memory in one of the following ways:

- Byte Boundaries
- Word Boundaries
- Double Word Boundaries
- Fixed Boundaries

Byte Boundaries

Each node's I/O data is mapped in the adapter's memory at the next available byte. This option works best in applications that use Allen-Bradley PLCs and SLCs.

Word Boundaries

Each node's I/O data is mapped in the adapter's memory at the next available word. This option works best in applications that use Allen-Bradley PLCs and SLCs.

Double Word Boundaries

Each node's I/O data is mapped in the adapter's memory at the next available double word. This option works best in applications that use Allen-Bradley Logix products.

Fixed Boundaries

The map to the fixed location is based on the node address. Mapping size ranges from 1 to 32 and is set using an EDS parameter. The mapping for a node with address 1 begins on byte 2. The formula for mapping is: 2+((N-1)(mapsize)), where N = node address.

Keep the following in mind when using fixed boundaries:

- You specify fixed map size using EDS parameters
- Data is mapped after status/channel words in I/O image, beginning with byte 2
- No data area is reserved for MACID 0 (the adapter)

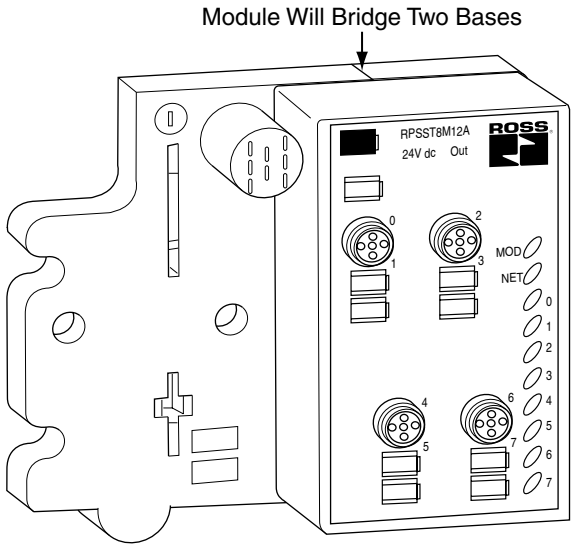
Requirement To Using Auto Start Mode

Your Serial Bus DeviceNet adapter must be free of I/O connections on DeviceNet when you use Auto Start Mode. If you attempt to use Auto Start Mode after another scanner device has established I/O connections with the adapter, your attempt to use Auto Start Mode will be rejected. When the adapter is configuring itself in Auto Start Mode, no other device can establish I/O connections to the adapter.

Install the I/O Module

To install the module:

1. Using a bladed screwdriver, rotate the keyswitch on the mounting base clockwise until the correct number for the I/O module aligns with the notch in the base. (See the individual Serial Bus I/O module installation instructions for this number.)
2. Position the module vertically above the mounting base. The module will bridge two bases.



3. Push the module down until it engages the latching mechanism. You will hear a clicking sound when the module is properly engaged.

   The locking mechanism will lock the module to the base.

Remove the Module From the Mounting Base

To remove the module from the mounting base:

1. Put a flat blade screwdriver into the slot of the orange latching mechanism.
2. Push the screwdriver toward the I/O module to disengage the latch. The module will lift up off the base.
3. Pull the module off of the base.

For more information on installing and wiring the multiple Serial Bus I/O modules, see the installation instructions for each catalog number.

Use RSNetWorx for DeviceNet

You must use the RSNetWorx for DeviceNet software to configure your adapter.

Follow the steps below to use Auto Start Mode.

1. Go online in the software.

IMPORTANT

Auto Start Mode is only available when RSNetWorx for DeviceNet is online.

A. Click on the Network pull-down menu.

B. Choose Online.

2. Once you are online, browse for the primary network (e.g., You can use Single Pass Browse).

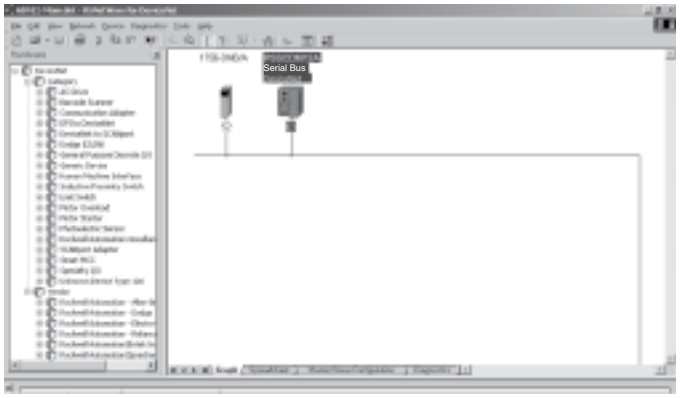
A. Click on the Network pull-down menu.

B. Choose a Browse type.

3. Click **OK** to synchronize your offline and online configuration.

The adapter appears on the screen.

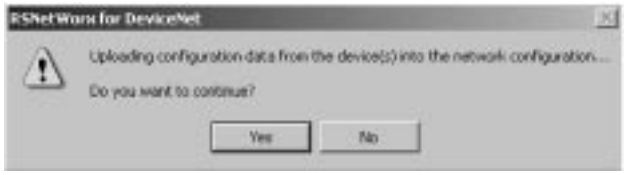
4. Double click on the adapter icon.



You can either:

- Upload configuration from the device to update the software
- Download configuration from the software to the device

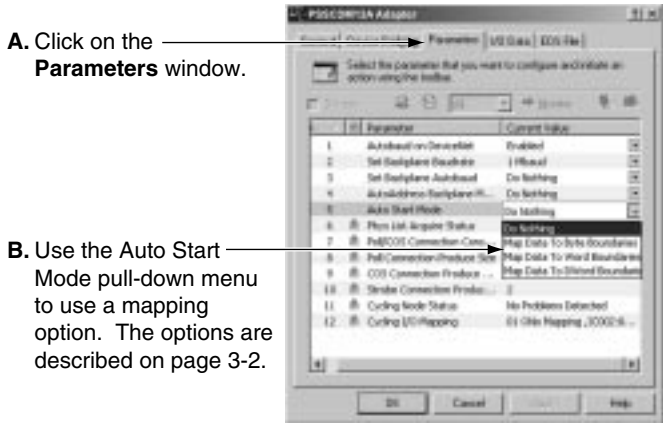
5. Click **Yes** to upload configuration from the device.



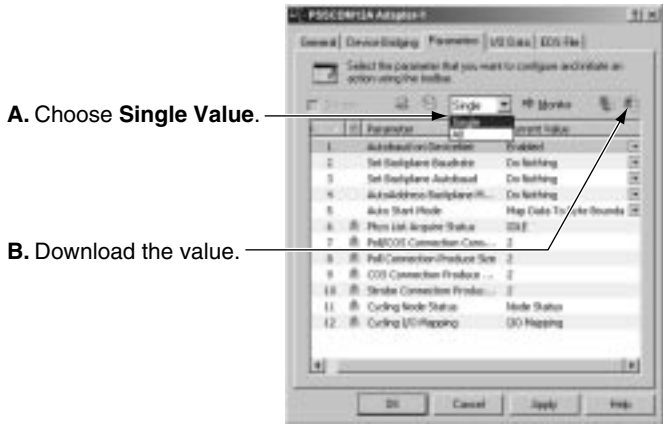
Begin Auto Start Mode

After you upload the configuration from the device to the software, begin Auto Start Mode (ASM).

1. Double click on the adapter icon to open the adapter properties window.
2. Click on the **Parameters** tab.
3. Click on the right side of the Auto Start Mode line so that a menu appears.



4. Download the Auto Start Mode value. Make sure you only download this single value, as shown below.



After 30-40 seconds, the adapter begins operations and uses the configuration most recently applied. During the Auto Start Mode process, the **Physical List Acquire Status** field displays the words: **Auto Start Mode**, but after the download is complete the field displays the word **Idle**.

- Check for solid red indicators on all modules
- Verify that all non-backplane modules have the proper baudrate (or have autobaud enabled)
- Check that MACIDs are set to proper values
- Check scanlist

  – browse to Subnet and view scanlist, or look at mapping text

  – Make sure the scanlist was saved (if not, investigate why?)

After ASM has completed (that is, **Physical List Acquire Status** field is **Idle**), verify that the operation was successful and that each I/O module was added to the adapter's scanlist. The PointBus Status LED should be solid green. This indicates only that the adapter is able to establish I/O connections with each module in its scanlist, not that each module on the Subnet was successfully added to its scanlist.

To verify the presence of each module in the adapter's scanlist, perform one of the following checks:

- Each I/O module's NET LED should be solid green. If the device has neither LED, use one of the following methods.
  – By browsing to the Subnet and uploading the adapter's scanlist using RSNetWorx for DeviceNet and verifying that the device is found in the scanlist.
  – By repeatedly uploading the EDS parameter **Cycling I/O Mapping** to verify that a mapping for the concerned module exists. See page 2-6 for more information about this parameter.

  If one of the following is observed, it is likely that one of the Subnet modules has been addressed incorrectly or is configured to communicate at the wrong baud rate.
- The adapter's PointBus Status LED is solid or blinking red
- An I/O module's NET LED is solid red
- It appears that the adapter has not saved a scanlist

Use the following procedures to attempt to remedy a problem:

- Verify that each backplane module is configured to autobaud. The adapter's EDS parameter **Set Backplane Autobaud** can be used to set each module's autobaud parameter. It is necessary to cycle a module's power before the autobaud parameter change takes effect. In rare situations, it may be necessary to download the parameter and cycle power several times before each backplane module's autobaud parameter has been changed.

Note that if the adapter is configured to autobaud on the primary DeviceNet network, network traffic on the primary network is required before the backplane modules will attempt to communicate. For this reason, it is sometimes helpful to have RSLinx continuously browsing the primary network while attempting the ASM process and verification.

When it is believed that each non-backplane module is correctly configured and that each backplane module is able to communicate on the Subnet, the ASM process can be attempted again.

After successfully configuring your adapter with the Auto Start Mode feature, the adapter must still be added to the primary DeviceNet network scanner's scanlist. See Chapter 5 for more information.

Use Custom Configuration

The Auto Start Mode is recommended to quickly and easily get your Serial Bus I/O system 'up and running'. But this mode does not prevent you from changing the adapter's default configuration after system operation has begun.

For more information on how to write custom configuration for your adapter on DeviceNet, see Chapter 4, Configure the DeviceNet Scanner Subnet and Chapter 5, Add the Serial Bus DeviceNet Adapter to the DeviceNet Scanner's Scanlist.

IMPORTANT

The adapter's ADR configuration for the Subnet modules is reset when you run Auto Start Mode.

Chapter Summary and What's Next

Auto Start Mode was discussed in this chapter. Move on to Chapter 4, Configure the DeviceNet Scanner Subnet or to Chapter 5, Add the Serial Bus DeviceNet Adapter to the DeviceNet Scanner's Scanlist.

Configure the DeviceNet Scanner Subnet

This chapter describes how to custom configure your scanner for use with Serial Bus I/O modules.

Your adapter works on two networks simultaneously and must be configured for each separately. This chapter explains configuration of the scanner for use with Serial Bus I/O modules.

For information on how to configure the adapter for use on the DeviceNet Network, see Chapter 5, Adding the DeviceNet Adapters to the DeviceNet Scanner's Scanlist.

Configuration Overview

You must use the RSNetWorx for DeviceNet software to configure your scanner. You can configure the scanner while it is:

- On Line
- Off Line

This chapter shows configuration in the offline mode. Configuration screens appear the same in both modes. Note that some screen options are unavailable in offline mode. The only difference is that if you make changes off line, you must take the scanner on line before the configuration changes take effect.

IMPORTANT

Throughout most of this manual, we refer to the Serial Bus I/O DeviceNet adapter as the adapter. The adapter also communicates with Subnet modules as a scanner. In this chapter only, the adapter is referred to as a scanner.

You must follow these steps during configuration:

1. Add the scanner to your network

2. Add I/O modules to your network

3. Set the scanner's parameters

4. Go on line

Add the Scanner To Your Network

Follow these steps:

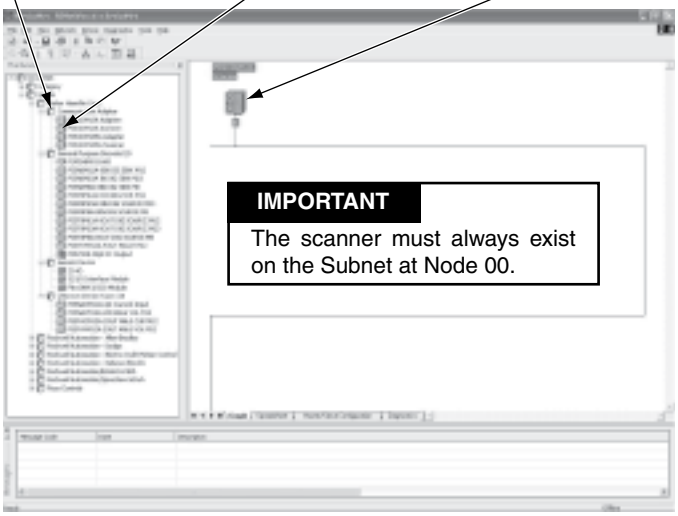
1. Start RSNetWorx for DeviceNet.

2. Add the scanner as shown below.

1. Expand the list of Communication Adapters.

2. Select the PSSCDM12A IsysNet Scanner.

3. The scanner appears on the network.



Add I/O Modules To Your Network

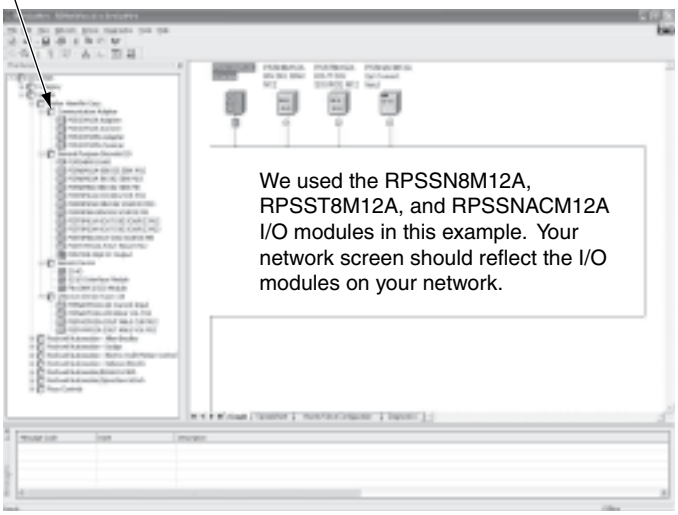
After you add the scanner, you must add the modules connected to the scanner on the Subnet. In the offline mode, I/O modules must be added individually. Follow these steps:

1. Add modules as shown below.

1. Expand Vendor → Parker Hannifin Corp. to display the list of I/O modules.

2. Double Click the I/O module you want to add to the network.

TIP: You can also click and drag the module name onto the network.



Set the Scanner's Parameters

After adding the scanner to the network, you must configure it for use with I/O modules.

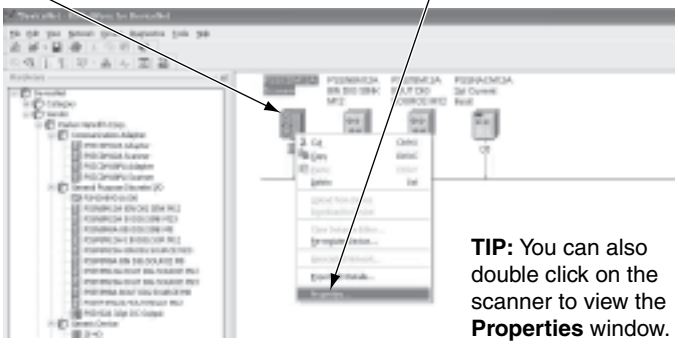
IMPORTANT

This chapter shows configuration in the off line mode. Changes set in this mode do not take effect until the scanner goes on line. For more information on how to go on line, see page 4-6.

1. Configure the scanner as shown below.

1. Right click on the scanner.

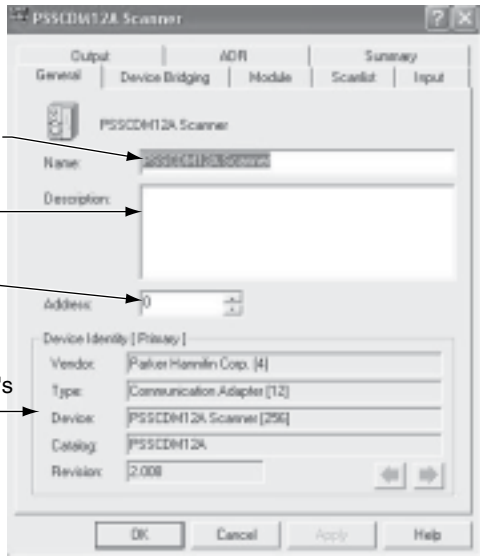
2. Click on **Properties...** to configure your scanner.



TIP: You can also double click on the scanner to view the **Properties** window.

A window will open with a series of tabs along the top. Each tab opens to a window that provides options to write configuration for your scanner. These windows are shown on the following pages.

General window



Type the scanner's name here.

Type a description here (optional).

The scanner's address must = 0.

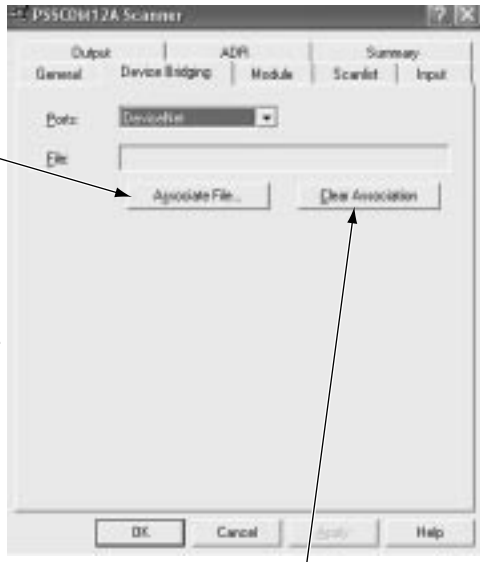
This window also shows the scanner's device identity. These fields are read only.

Click **OK** to accept the Parameters.

IMPORTANT

Configuration changes made in offline mode do not take effect until the scanner goes on line. For more information on how the scanner goes on line, see page 4-6.

Device Bridging window



Use **Associate File** to associate this configuration file with the configuration file that configures the same Isysnet DeviceNet scanner (called adapter on the primary network) for communication with a master device on the primary DeviceNet network.

For more information on the need to maintain two configuration files in the same adapter and the simultaneous presence of the adapter on two networks (i.e., DeviceNet as a slave and PointBus as a master), see page 4-1.

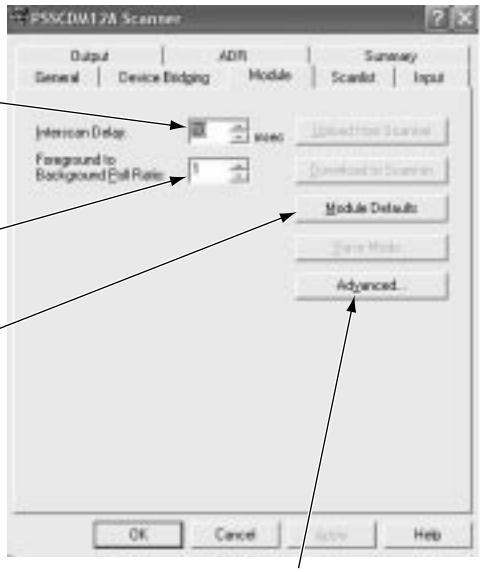
Use **Clear Association** to remove previously established configuration file associations that no longer apply to your scanner.

Module window

Set the **Interscan Delay** here.

Set the **Foreground to Background Poll Ratio** here.

Click here to reset the **Interscan Delay** and **Foreground to Background Poll Ratio** back to the module default values.



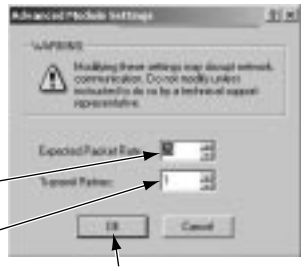
Click **Advanced** to change the advanced module settings, as shown in the following window.

Advanced window accessed from **Module** window

We recommend you **DO NOT** change module settings unless advised to do so by a Rockwell Automation support representative.

Set the **Expected Packet Rate** here.

Set the number of **Transmit Retries** here.



Click **OK** to accept new settings.

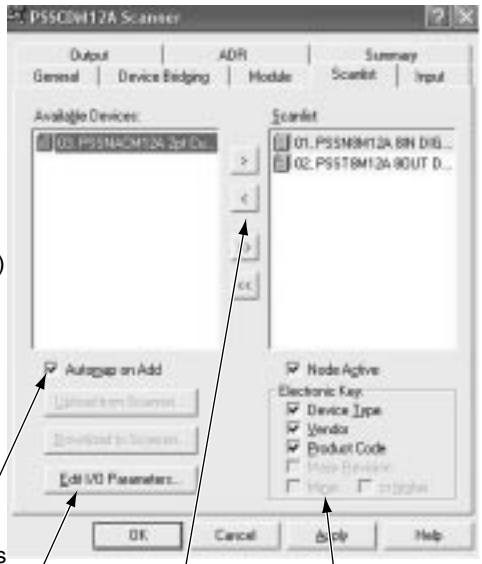
Scanlist window

Add and remove I/O modules to and from the scanlist on this screen.

To set any of the parameters on this screen, (e.g., **Node Active**) for a specific module, first add the module to the scanlist and then highlight the module to make specific changes.

Click **Automap on Add** so a checkmark appears to automap I/O data when adding modules.

Click **Edit I/O Parameters** to edit the module's I/O parameters, as shown below.



Add modules to, or remove modules from, the scanlist.

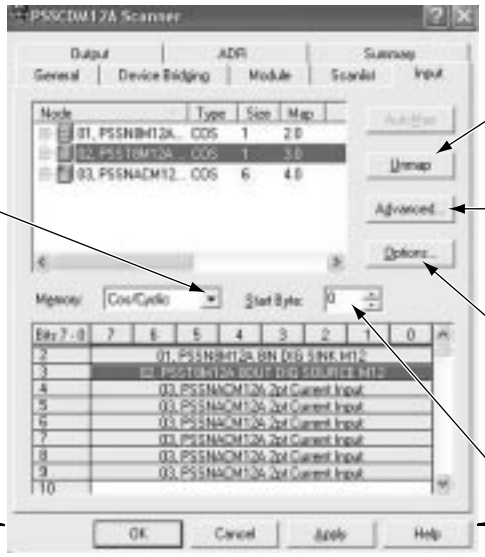
Choose **Electronic Key** parameters for each module.

Edit I/O Parameters window accessed from **Scanlist** window

Click on the appropriate I/O data transmission method (e.g., Polled) and make other appropriate I/O parameter changes on this screen.

Click **OK** when finished.

Input window



Use this pull-down menu to choose a **Memory** type.

The memory type corresponds to an I/O connections on DeviceNet.

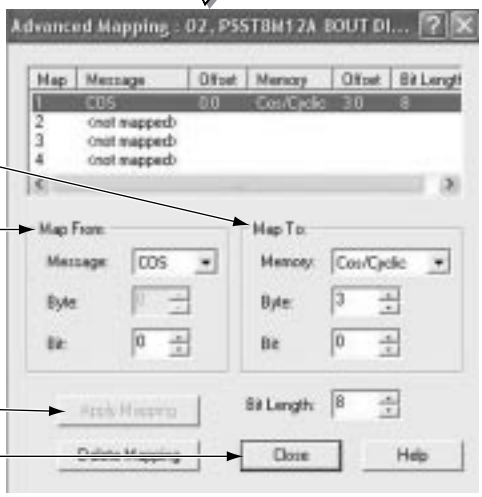
Highlight a module and click **Unmap** to unmap it.

Click **Advanced** to edit the advanced mapping parameters, as shown below.

Click **Options** to edit the automap options, as shown below.

Set the starting byte for I/O mapping.

Advanced Mapping window accessed from **Input** window

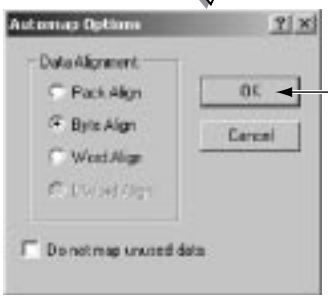


Set **Map To** parameters here.

Set **Map From** parameters here.

Click **Apply Mapping** to apply changes and leave screen open.

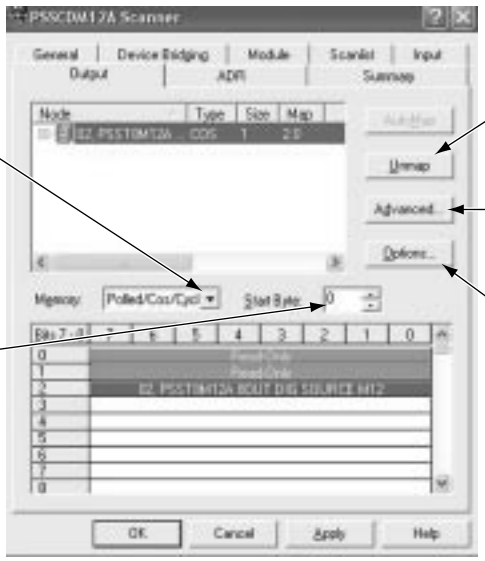
Click **Close** when finished.



Automap Options window accessed from **Input** window

Choose a **Data Alignment** and click **OK**.

Output window



Use this pull-down menu to choose a memory type. This corresponds to I/O on the primary DeviceNet.

Set the starting byte for I/O mapping here.

The bytes mapped last will determine sizes on the primary DeviceNet.

Highlight a module and click **Unmap** to unmap it.

Click **Advanced** to edit the advanced mapping parameters.

Click **Options** to edit the automap options.

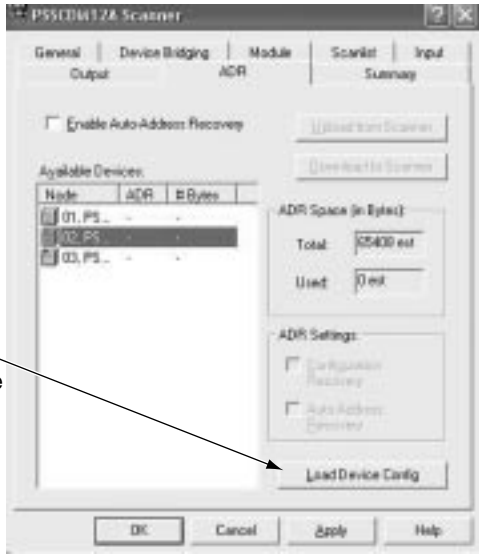
Note that the **Advanced Mapping** and **Options** windows are the same for output modules as those shown for input modules. See above for an explanation of these windows.

Following are the remaining configuration windows.

ADR window

Use this screen to choose Automatic Device Replacement options.

You must have loaded each device into RSNetWorx for DeviceNet before you can **Load Device Config** using this button.



Summary window

IMPORTANT

You cannot change any configuration parameters on this screen. It is for information purposes only. These buttons do not apply for this window, but are here to maintain consistency among the windows.

This completes the configuration options. Your scanner must go on line for configuration changes to take effect.

Go On Line

After you set configuration parameters, your scanner must go on line to accept the configuration changes. Follow these steps:

1. Use the Network pulldown to go on line.

1. Click on Network.

2. Click on Online.

The software prompts you to save your configuration changes.

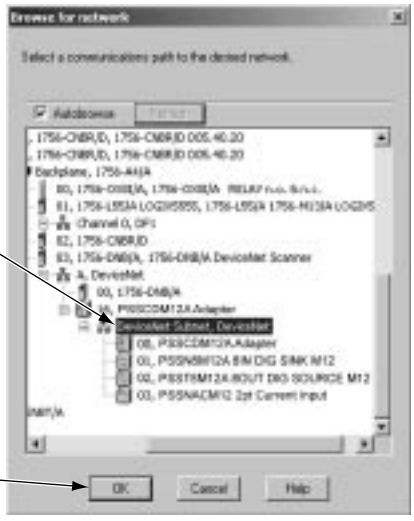
Click **Yes**.

2. Choose your scanner's network and apply the changes, as shown below.

Select the DeviceNet network subnetwork.

This selection accesses the PointBus to configure the adapter on the DeviceNet network.

Click **OK** to apply the data to your scanner.



Chapter Summary and What's Next

In this chapter, you learned how to configure the scanner. Move to Chapter 5 to learn how to add the Serial Bus DeviceNet adapter to the DeviceNet scanner's scanlist.

Add the Serial Bus DeviceNet Adapter to the DeviceNet Scanners Scanlist

This chapter describes how to custom configure your adapter for use with DeviceNet devices.

Your adapter works on two networks simultaneously and must be configured for each separately, which means that you will have two separate RSNetWorx for DeviceNet software files.

This chapter explains configuration of the adapter for use on the primary DeviceNet network. For information on how to configure the adapter for use on the Subnet, see Chapter 4, Configure the DeviceNet Scanner Subnet.

Configuration Overview

You must use the RSNetWorx for DeviceNet software to configure your adapter. You can configure the adapter while it is:

- On line
- Off line

This chapter shows configuration in the offline mode. Configuration screens appear the same in both modes. Note that some screen options are unavailable in offline mode. The only difference is that if you make changes off line, you must take the adapter on line before the configuration changes take effect.

You must follow these steps during configuration:

1. Add the adapter to your network
2. Set the adapter's parameters
3. Add the DeviceNet adapter's scanlist (see the Quick Start, Appendix B)
4. Go on line

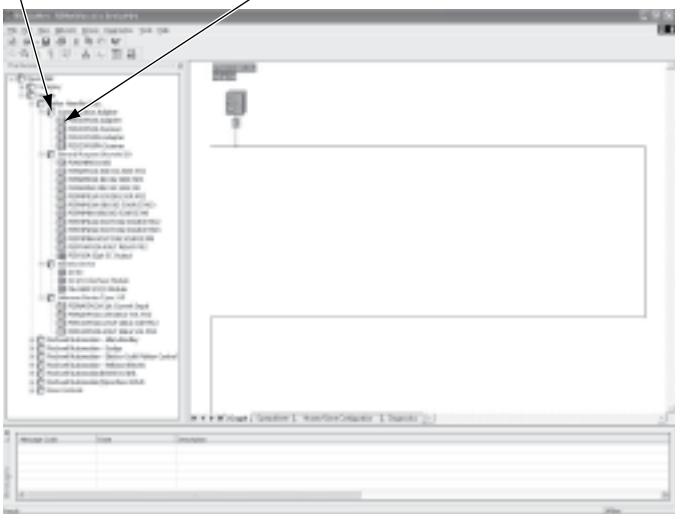
Add the Adapter to Your Network

Follow these steps:

1. Start the RSNetWorx for DeviceNet software.
2. Add the adapter as shown below.

1. Expand the list of Communication Adapters.

2. To add the adapter, you can double click on the adapter, or click and drag the adapter name onto the network.



Set the Adapter's Parameters

After adding the adapter to the network, you must configure it for use with master DeviceNet devices.

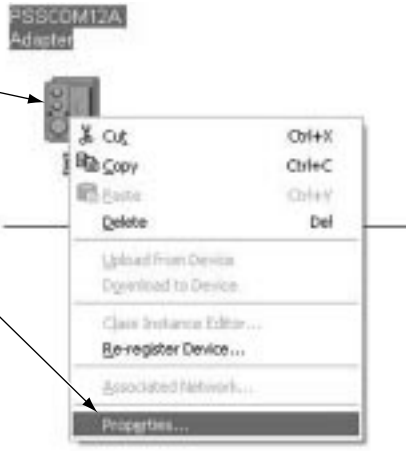
IMPORTANT

This chapter shows configuration in the offline mode. Changes set in this mode do not take effect immediately. For configuration changes to take place, you must:

- go on line with your adapter
- download the new configuration to your adapter

For more information on how to go on line, see page 5-4.

1. Configure the adapter as shown below.



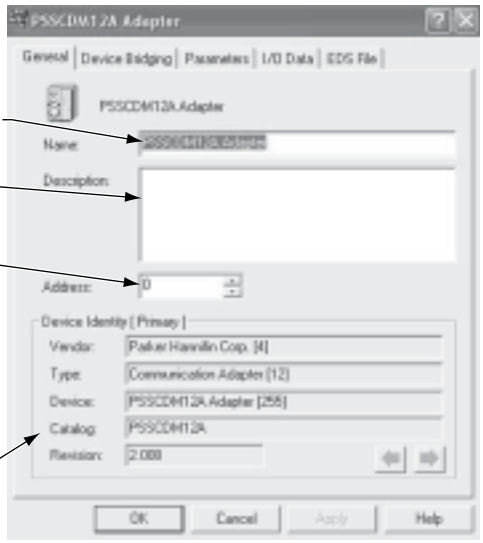
1. Right-click on the adapter.

2. Click on **Properties** to configure your adapter.

TIP
You can also double-click on the adapter to view the **Properties** menus.

You see a window with a series of tabs. Each tab opens to a window that provides options to write configuration for your adapter. The tabs are shown on the following pages.

General window



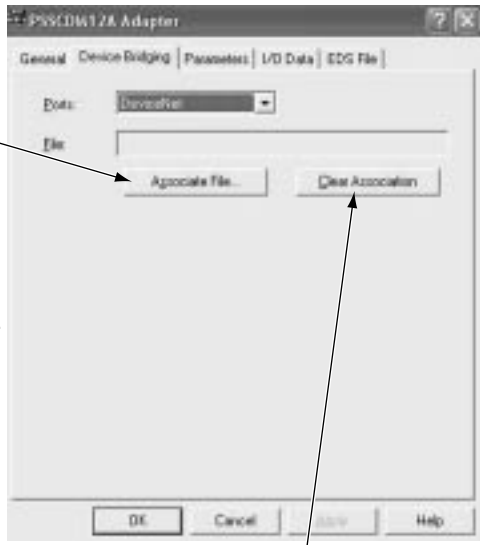
Type the scanner's name here.

Type a description here (optional).

Set the desired address. This address corresponds to the address switch on the adapter.

This screen shows the adapter's device identity. These fields are read only.

Device Bridging window



Use **Associate File** to associate this configuration file with the configuration file that configures the same Isysnet DeviceNet scanner for communication with IsysNet I/O modules.

For more information on the need to maintain two configuration files in the same adapter and the simultaneous presence of the adapter on two networks (i.e., DeviceNet as a slave and Subnet as a master), see page 5-1.

Use **Clear Association** to remove previously established configuration file associations that no longer apply to your adapter.

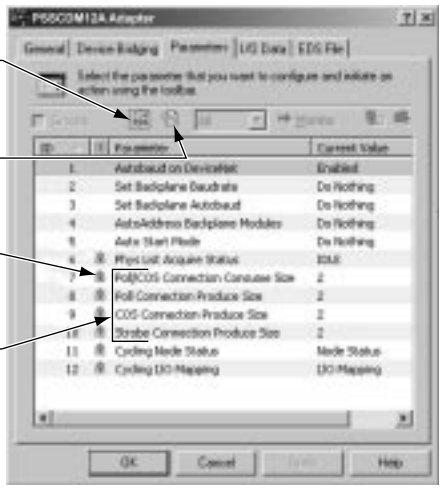
Parameters window

Restore all parameter default values.

For a description of a specific parameter, highlight the parameter below and click here.

Any parameter with a lock shown before it cannot be changed.

The values correspond to the I/O connection sizes from the **I/O Data** window. They can be uploaded from an adapter with a downloaded scanlist.



IMPORTANT

The following configuration parameters:

- **Auto Start Mode**
- **Set Backplane Baudrate**
- **Set Backplane Autobaud**
- **AutoAddress Backplane Modules**

should only be used when on line and should be set to **Do Nothing** when **Download All Parameters** is selected or when saving to a scanner's ADR data.

The following screens show how to change the other parameters.

AutoAddress

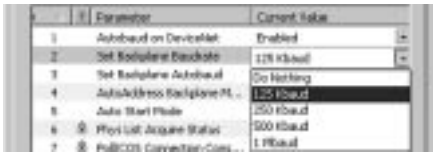
Enable or disable autoaddress.

Backplane Autobaud

Configure backplane modules to autobaud.

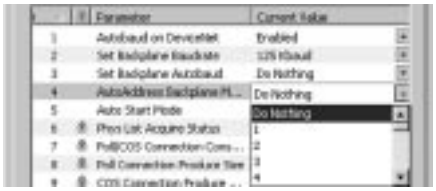
Auto Start Mode

Backplane Baudrate



Set the backplane baudrate.

AutoAddress Backplane Modules



Choose the autoaddress.

The following screens show the remaining configuration windows.

I/O Data window

Connection sizes appear only when the Subnet network file has been associated in the **Device Bridging** window.

These values correspond to the 4 parameters (**Poll/ COS Connection Consume Size**, **Poll Connection Produce Size**, **COS Connection Produce Size**, **Strobe Connection Produce Size**) found in the device's **Parameters** window.

EDS File window

Click here to view the EDS file. An example of the EDS file is shown below.

The window below shows an example EDS file.

```
$ Revision History
$ 1.1 08NOVD4 Fixed associated port designator
$ 1.0 28JUN04 original

[File]
        DescText = "PSSCDM12A Adapter";
        CreateDate = 06-28-2004;
        CreateTime = 15:00:00;
        ModDate = 11-08-2004;
        ModTime = 11:00:00;
        Revision = 1.1;
        HomeURL = "http://www.rosscontrols.com";

[Device]
        VendCode = 4;
        VendName = "Ross Controls";
        ProdType = 12;
        ProdTypeStr = "Communications Adapter";
        ProdCode= 255;
        MajRev = 2;
        MinRev = 8;
        ProdName = "PSSCDM12A Adapter";
        Catalog = "PSSCDM12A";
        Icon = "1738ADN12.ico";

[Device classification]
        Class1 = DeviceNet;

[Port]
    Port1 =     DeviceNet,              $ Port type
                "DeviceNet",            $ Port name
```

This completes the configuration options. Your adapter must go on line for the configuration to take effect.

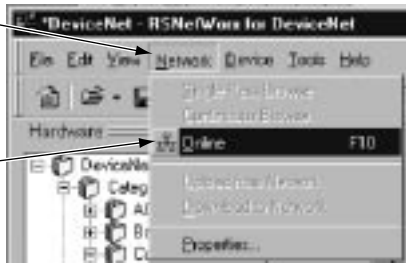
Go On Line

Follow these steps for the adapter to go on line:

1. Use the **Network** pulldown.

1. Click on Network.

2. Click on Online.



The software prompts you to save your configuration changes.

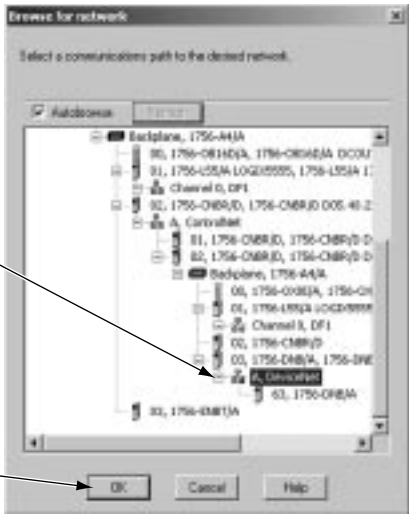
Click **Yes**.

2. Choose your adapter's network as shown below.

Select the DeviceNet network.

This selection accesses the PointBus to configure the adapter on the DeviceNet network.

Click **OK** to apply the data to your adapter.



To learn how to add the Serial Bus DeviceNet adapter to the scanner's scanlist, refer to the Quick Start section, Appendix B.

Chapter Summary and What's Next

In this chapter, you learned how to configure the adapter.

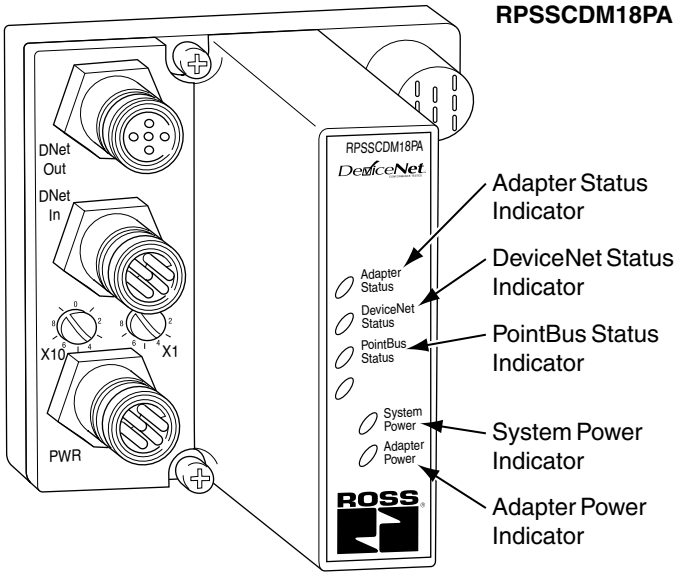
Troubleshoot the Serial Bus DeviceNet Adapter

This chapter describes how to troubleshoot your adapter.

Use the Status Indicators

You can use the status indicators to troubleshoot your adapter. The following graphic shows the adapter's status indicators.

RPSSCDM18PA



Use the table below to troubleshoot your adapter.

Indication	Probable Cause
Adapter Status	
Off	No power applied to device
Green	Device operating normally
Flashing Red	Recoverable fault
Red	Unrecoverable fault - may require device replacement
Flashing Red/Green	Device is in self-test

Indication	Probable Cause
DeviceNet Status	
Off	Device is not on line: - Device attempting to Autobaud - Device has not completed dup_MAC-id test - Device not powered - check module status indicator
Flashing Green	Device is on line but has no connections in the established state
Green	Device is on line and has connections in the established state
Flashing Red	One or more I/O connections in timed-out state
Red	Critical link failure - failed communication device. Device detected error that prevents it from communicating on the network. (Possible duplicate MAC ID or baud rate mismatch).

Indication	Probable Cause
PointBus Status	
Off	Device is not on line: - Device has not completed dup_MAC-id test - Device not powered - check module status indicator
Flashing Green	Device is on line but has no connections in the established state
Green	Device is on line and has connections in the established state
Flashing Red	One or more I/O connections in timed-out state
Red	Critical link failure - failed communication device. Device detected error that prevents it from communicating on the network. (Possible duplicate MAC ID or baud rate mismatch).
Flashing Red/Green	Communication faulted device - the device has detected a network access error and is in communication faulted state. Device has received and accepted an Identity Communication Faulted Request - long protocol message.

Indication	Probable Cause
System Power	
Off	Not active - Field power is off or dc-dc converter problem.
Green	System power on - dc-dc converter active (5V).

Indication	Probable Cause
Adapter Power	
Off	Not active - Field power is off.
Green	System power on, 24V present.

Guidelines for Using Your Adapter

Remember the following operational guidelines when using your Serial Bus DeviceNet adapter.

- Do not leave spaces in the I/O. Instead, install all Serial Bus I/O modules adjacent to each other.
- Populate every position on the mounting base.
- Do not add new I/O modules to the end of the Serial Bus I/O system while the system is under power.
- Use labels with the I/O modules.
- Do not move I/O modules to different locations on the mounting base after they have been installed and configured.
- If adjacent modules (i.e., 2 or more) are removed, replace all of them to operate the Serial Bus I/O system. Input data will hold last state until all previously removed modules are replaced.

Chapter Summary

In this chapter you learned how to troubleshoot your adapter.

Specifications

Following are specifications for the DeviceNet adapters.

DeviceNet Adapters - RPSSCDM12A, RPSSCDM18PA	
Expansion I/O Capacity	• DeviceNet adapter backplane current output = 1.0A maximum. See the list below for backplane current consumption for each I/O catalog number and the current consumption for each of the modules connected to the DeviceNet adapter. Verify that it is below 1.0A. • Backplane current can be extended beyond 1.0A with a RPSSSE24A Backplane Extension Power Supply. The RPSSSE24A can supply up to an additional 1.3A of backplane current. • Multiple RPSSSE24A modules can be used to reach the maximum of 63 modules. **Cat. No.** — **PointBus Current Requirements** RPSSN8xxx — 75 mA RPSSP8xxx — 75 mA RPSST8xxx — 75 mA RPSSTR4M12A — 90 mA RPSSNACM12A — 75 mA RPSSNAVM12A — 75 mA RPSSTACM12A — 75 mA RPSSTAVM12A — 75 mA RPSSS23A — 75 mA RPSSV32A — 75 mA
DeviceNet Communication Rate	125K bit/s (500m maximum) 250K bit/s (250m maximum) 500K bit/s (100m maximum)
DeviceNet Power Specifications	
Power Supply	**Note:** In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60VDC under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.
Input Voltage Rating	24VDC nominal
DeviceNet Input Voltage Range	11-25VDC DeviceNet specification
Input Overvoltage Protection	Reverse polarity protected
DeviceNet Power Requirements	24VDC (+4% = 25VDC) @ 30 mA maximum
Power Supply Specifications	
Power Supply	**Note:** In order to comply with CE Low Voltage Directives (LVD), you must use either a NEC Class 2, a Safety Extra Low Voltage (SELV) or a Protected Extra Low Voltage (PELV) power supply to power this adapter. A SELV supply cannot exceed 30V rms, 42.4V peak or 60VDC under normal conditions and under single fault conditions. A PELV supply has the same rating and is connected to protected earth.
Input Voltage Rating	24VDC 10-28.8VDC range
Input Overvoltage Protection	Reverse polarity protected
Inrush Current	6A maximum for 10ms
PointBus Output Current	1A maximum @ 5VDC $\pm$5% (4.75-5.25)
Field Side Power Requirements, Maximum	24VDC (+20% = 28.8VDC) @ 400 mA
Interruption	Output voltage will stay within specifications when input drops out for 10ms at 10V with maximum load
General Specifications	
LED Indicators	1 green/red Adapter status 1 green/red DeviceNet status 1 green/red PointBus status 1 green System Power (PointBus 5V power) 1 green Adapter Power (24V from field supply)

General Specifications (continued)	
Power Consumption, Maximum	8.1W @ 28.8VDC
Power Dissipation, Maximum	2.8W @ 28.8VDC
Thermal Dissipation, Maximum	9.5 BTU/hr. @ 28.8VDC
Isolation Voltage (continuous-voltage withstand rating)	50V rms Tested at 1250VAC rms for 60s
Field Power Bus Nominal Voltage Supply Voltage Supply Current	 24VDC 10-28.8VDC range 10A maximum
Dimensions Inches (Millimeters)	4.41H x 2.83W x 2.56D (112H x 72W x 65D)
Operating Temperature	IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): 20 to 60°C (68 to 140°F)
Storage Temperature	IEC 60068-2-1 (Test Ab, Un-packaged Non-operating Cold), IEC 60068-2-2 (Test Bb, Un-packaged Non-operating Dry Heat), -40 to 85°C (-40 to 185°F)
Relative Humidity	IEC 60068-2-30 (Test Db, Un-packaged Non-operating Damp Heat): 5-95% non-condensing
Shock	IEC60068-2-27 (Test Ea, Unpackaged Shock): Operating 30g Non-operating 50g
Vibration	IEC60068-2-6 (Test Fc, Operating): 5g @ 10-500Hz
ESD Immunity	IEC 61000-4-2: 6kV contact discharges 8kV air discharges
Radiated RF Immunity	IEC 61000-4-3: 10V/m with 1kHz sine-wave 80%AM from 30MHz to 2000MHz 10V/m with 200Hz 50% Pulse 100%AM at 900Mhz 10V/m with 200Hz 50% Pulse 100%AM at 1890Mhz
EFT/B Immunity	IEC 61000-4-4: ±4kV at 5kHz on power ports ±3kV at 5kHz on signal ports
Surge Transient Immunity	IEC 61000-4-5: ±1kV line-line(DM) and ±2kV line-earth(CM) on power ports ±2kV line-earth(CM) on shielded ports
Conducted RF Immunity	IEC 61000-4-6: 10Vrms with 1kHz sine-wave 80%AM from 150kHz to 80MHz
Emissions	CSPR 11: Group 1, Class A
Enclosure Type Rating	Meets IP65/66/67 (when marked)
Mounting Base Screw Torque	#8 screw, 7.5 in. lbs. in Aluminum, 16 in. lbs. in Steel
Wiring Category[1]	1 - on power ports 1 - on communications ports
Weight Imperial (Metric)	0.80 lb. (0.36 kg)
Certifications: (when product is marked)	c-UL-us UL Listed Industrial Control Equipment, certified for US and Canada CE European Union 89/336/EEC EMC Directive, compliant with: EN 61000-6-4; Industrial Emissions EN 50082-2; Industrial Immunity EN 61326; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity C-Tick Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions ODVA ODVA conformance tested to DeviceNet specifications

1. Use this Conductor Category information for planning conductor routing. Refer to Publication A10324, “Industrial Automation Wiring and Grounding Guidelines”.

Default Data Maps

I/O messages are sent to (consumed) and received from (produced) the Serial Bus I/O modules. These messages are mapped into the processor's memory. This appendix lists the default data maps for 1738 Serial Bus I/O modules.

RPSSN8 Sink Input Module

Message size: 1 Byte

	7	6	5	4	3	2	1	0
Produces (scanner Rx)	Ch7	Ch6	Ch5	Ch4	Ch3	Ch2	Ch1	Ch0
Consumes (scanner Tx)	No consumed data							
Where: Ch0 = input channel 0, Ch1 = input channel 1, Ch2 = input channel 2, Ch3 = input channel 3, Ch4 = input channel 4, Ch5 = input channel 5, Ch6 = input channel 6, Ch7 = input channel 7; 0 = OFF, 1 = ON								

RPSSP8 Source Input Module

Message size: 1 Byte

	7	6	5	4	3	2	1	0
Produces (scanner Rx)	Ch7	Ch6	Ch5	Ch4	Ch3	Ch2	Ch1	Ch0
Consumes (scanner Tx)	No consumed data							
Where: Ch0 = input channel 0, Ch1 = input channel 1, Ch2 = input channel 2, Ch3 = input channel 3, Ch4 = input channel 4, Ch5 = input channel 5, Ch6 = input channel 6, Ch7 = input channel 7; 0 = OFF, 1 = ON								

RPSST8 Electronically Protected Output Module

Message size: 1 Byte

	7	6	5	4	3	2	1	0	
Produces (scanner Rx)	Ch7	Ch6	Ch5	Ch4	Ch3	Ch2	Ch1	Ch0	Channel Status
Where: Ch0 = output channel 0, Ch1 = output channel 1, Ch2 = output channel 2, Ch3 = output channel 3, Ch4 = output channel 4, Ch5 = output channel 5, Ch6 = output channel 6, Ch7 = output channel 7; 0 = no error, 1 = error									

Message size: 1 Byte

	7	6	5	4	3	2	1	0	
Consumes (scanner Tx)	Ch7	Ch6	Ch5	Ch4	Ch3	Ch2	Ch1	Ch0	Channel State
Where: Ch0 = output channel 0, Ch1 = output channel 1, Ch2 = output channel 2, Ch3 = output channel 3, Ch4 = output channel 4, Ch5 = output channel 5, Ch6 = output channel 6, Ch7 = output channel 7; 0 = OFF, 1 = ON									

RPSSTR4 Relay Sink / Source Output Module

Message size: 1 Byte

	7	6	5	4	3	2	1	0	
Consumes (scanner Tx)	Not Used				Ch3	Ch2	Ch1	Ch0	Channel State
Where: Ch0 = output channel 0, Ch1 = output channel 1, Ch2 = output channel 2, Ch3 = output channel 3; 0 = OFF, 1 = ON									

RPSSNAC Analog Current Input Module

Message size: 6 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Produces (scanner Rx)	Input Channel 0 High Byte								Input Channel 0 Low Byte							
	Input Channel 1 High Byte								Input Channel 1 Low Byte							
	Status Byte for Channel 1								Status Byte for Channel 0							
	OR	UR	HHA	LLA	HA	LA	CM	CF	OR	UR	HHA	LLA	HA	LA	CM	CF
Consumes (scanner Tx)	No consumed data															

Where: CF = Channel Fault status; 0 = no error, 1 = fault
CM = Calibration Mode; 0 = normal, 1 = calibration mode
LA = Low Alarm, 0 = no error, 1 = fault
HA = High Alarm; 0 = no error, 1 = fault
LLA = Low/Low Alarm; 0 = no error, 1 = fault
HHA = High/High Alarm; 0 = no error, 1 = fault
UR = Underrange; 0 = no error, 1 = fault
OR = Overrange; 0 = no error, 1 = fault

RPSSNAV Analog Voltage Input Module

Message size: 6 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Produces (scanner Rx)	Input Channel 0 - High Byte								Input Channel 0 - Low Byte							
	Input Channel 1 - High Byte								Input Channel 1 - Low Byte							
	Status Byte for Channel 1								Status Byte for Channel 0							
	OR	UR	HHA	LLA	HA	LA	CM	CF	OR	UR	HHA	LLA	HA	LA	CM	CF
Consumes (scanner Tx)	No consumed data															

Where: CF = Channel Fault status; 0 = no error, 1 = fault
CM = Calibration Mode; 0 = normal, 1 = calibration mode
LA = Low Alarm, 0 = no error, 1 = fault
HA = High Alarm; 0 = no error, 1 = fault
LLA = Low/Low Alarm; 0 = no error, 1 = fault
HHA = High/High Alarm; 0 = no error, 1 = fault
UR = Underrange; 0 = no error, 1 = fault
OR = Overrange; 0 = no error, 1 = fault

RPSSTAC Analog Current Output Module

Message size: 4 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Consumes (Tx)	Output Channel 0 High Byte								Output Channel 0 Low Byte							
	Output Channel 1 High Byte								Output Channel 1 Low Byte							

Message size: 2 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Produces (Rx)	High Byte - Channel 1 Status								Low Byte - Channel 0 Status							
	Not Used				HCA	LCA	CM	CF	Not Used				HCA	LCA	CM	CF

Where: CF = Channel Fault status; 0 = no error, 1 = fault
CM = Calibration Mode; 0 = normal, 1 = calibration mode
LCA = Low Clamp Alarm, 0 = no error, 1 = fault
HCA = High Clamp Alarm; 0 = no error, 1 = fault

RPSSTAV Analog Voltage Output Module

Message size: 2 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Produces (Rx)	Channel 1 Status - High Byte								Channel 0 Status - Low Byte							
	Not Used				HCA	LCA	CM	ST	Not Used				HCA	LCA	CM	ST

Where: ST = Channel Fault status; 0 = no error, 1 = fault
CM = Calibration Mode; 0 = normal, 1 = calibration mode
LCA = Low Clamp Alarm, 0 = no error, 1 = fault
HCA = High Clamp Alarm; 0 = no error, 1 = fault

RPSSS23A ASCII Module

Default Receive Data Assembly Format (Default Mode)

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5-23	Byte 24
Rx Transaction ID Byte	Status Byte	Reserved	Length	ASCII Data	<CR> (Terminator)

Default Transmit Data Assembly Format (Default Mode)

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5-23	Byte 24
Reserved	TX Transaction ID Byte	Reserved	Length	ASCII Data	<CR> (Terminator)

RPSSV32A 32 Point Valve Driver Module

Message Size: 1 Byte

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Produce 0	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Produce 1	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8
Produce 2	Output 23	Output 22	Output 21	Output 20	Output 19	Output 18	Output 17	Output 16
Produce 3	Output 31	Output 30	Output 29	Output 28	Output 27	Output 26	Output 25	Output 24
Produce 4	Fault 28-31	Fault 24-27	Fault 20-23	Fault 16-19	Fault 12-15	Fault 8-11	Fault 4-7	Fault 0-3
Consume 0	Output 7	Output 6	Output 5	Output 4	Output 3	Output 2	Output 1	Output 0
Consume 1	Output 15	Output 14	Output 13	Output 12	Output 11	Output 10	Output 9	Output 8
Consume 2	Output 23	Output 22	Output 21	Output 20	Output 19	Output 18	Output 17	Output 16
Consume 3	Output 31	Output 30	Output 29	Output 28	Output 27	Output 26	Output 25	Output 24

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