SNAP SERIAL COMMUNICATION MODULE USER'S GUIDE

SNAP-SCM-232
SNAP-SCM-485-422
SNAP-SCM-W2
SNAP-SCM-PROFI
SNAP-SCM-CAN2B
SNAP-SCM-ST2

Form 1191-231226—December 2023

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Opto 22
Your Edge in Automation.

Table of Contents

1: Introduction

This user's guide includes the following serial communication modules, all designed for use with Opto 22's SNAP PAC System:

- SNAP-SCM-232
- SNAP-SCM-485-422
- SNAP-SCM-W2
- SNAP-SCM-PROFI
- SNAP-SCM-CAN2B
- SNAP-SCM-ST2

These modules conveniently provide serial data at a remote Ethernet location.

Port B

Port A

SNAP-SCM-232

Port B

Port A

SNAP-SCM-485-422

Port B

Port A
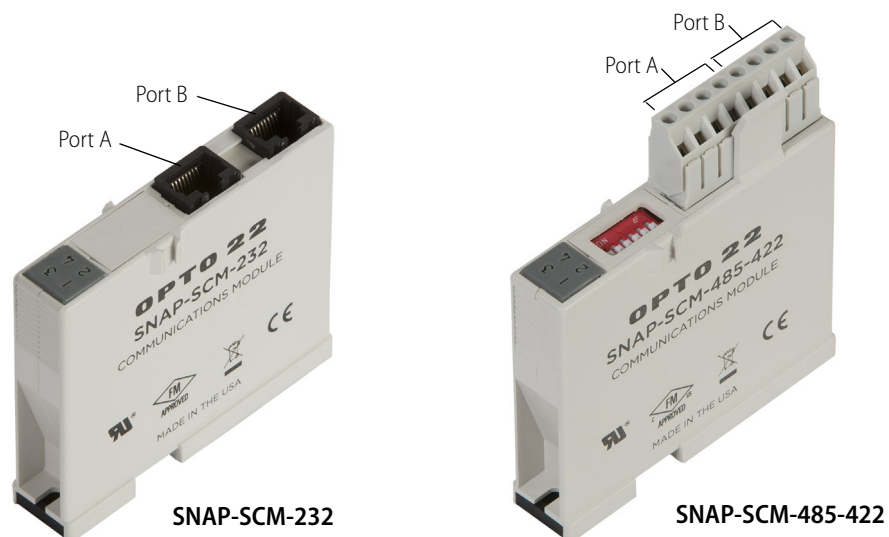
SNAP-SCM-W2

SNAP-SCM-PROFI

SNAP-SCM-CAN2B Module

Port B

Port A

SNAP-SCM-ST2

Many industrial applications require digital, analog, and serial data to provide a complete solution. Traditionally, either separate serial network cabling is required for the serial devices, or an expensive data processor or PC must be used just to interface with the serial devices.

The SNAP serial communication modules eliminate this problem by providing high-speed, isolated serial communications packaged in the compact SNAP module form. The SNAP-SCM-232, SNAP-SCM-485-422, SNAP-SCM-W2, and SNAP-SCM-ST2 modules provide two channels of serial data on each module (one channel for a 4-wire SNAP-SCM-485-422). The SNAP-SCM-PROFI and SNAP-SCM-CAN2B modules provide one channel per module.

Using the SNAP serial communication module as a converter, non-Ethernet devices can be connected to an Ethernet network and be available for control, monitoring, or data acquisition by any authorized PC or other device on the Ethernet network.

All SNAP serial communication modules snap into Opto 22 SNAP PAC mounting racks right beside SNAP I/O® digital and analog modules, to provide the mix of analog, digital, and serial channels you need at any location.

TYPICAL APPLICATIONS

Typical applications for the SNAP-SCM-232 and the SNAP-SCM-485-422 include interfacing with printers, scales, chart recorders, and barcode systems.

- The **SNAP-SCM-232** interfaces to auxiliary serial equipment via two RJ-45 plug-in data connectors, providing two RS-232 serial ports. This model also supports optional RTS/CTS flow control.

- The **SNAP-SCM-485-422** uses a simple screw-type connector for easy wiring of two 2-wire RS-485 ports or one 4-wire RS-485/422 port.

- The **SNAP-SCM-W2** is ideal for security applications. It complies with the Security Industry Association Access Control Standard Protocol for the 26-bit Wiegand® Reader Interface. The module receives incoming data from card readers, keypads, or other Wiegand devices.

- The **SNAP-SCM-PROFI** integrates a PROFIBUS DP® network into your system. It uses a built-in DB-9 connector to provide a standard electrical interface between Ethernet-based Opto 22 SNAP I/O systems and PROFIBUS DP networks. For information on how to integrate an Opto 22 controller with a PROFIBUS DP network, see form 1591, *PROFIBUS DP Master Technical Note*.

- The **SNAP-SCM-CAN2B** provides an interface to a Controller Area Network (CAN) that allows your SNAP PAC system to send data to and receive data from CAN devices. Once you install the module, integrate it with your system using the CAN Integration Kit, part number PAC-INT-CAN-RXTX, which is a free download from the Product section of our website, www.opto22.com.

- The **SNAP-SCM-ST2** provides pulse and direction signals for up to two stepper motors which can be controlled by a SNAP PAC controller running a PAC Control™ strategy.

WHAT'S IN THIS GUIDE?

This guide assumes that you have some familiarity with Ethernet networking and serial communication. If you are using a SNAP Wiegand module, you should be familiar with the Wiegand interface. If you are using a SNAP PROFIBUS DP module, you should understand the PROFIBUS DP protocol. If you are using a SNAP-SCM-CAN2B module, you should already understand how to use the CAN protocol. Commercial resources are available for learning about these subjects.

To learn more about the SNAP PAC System, visit the Opto 22 website at www.opto22.com.

This guide includes the following sections:

- Quick Start to get your serial module up and running quickly
- Instructions for changing communication parameters, configuring Wiegand and CAN2B modules, using ST2 commands, loading new firmware, building cables, and more
- Specifications, LEDs, and Module Switches

NOTE: This guide does not cover SNAP-SCM-MCH16 or SNAP-SCM-SSI modules. For the SNAP-SCM-MCH16, see form 1673, SNAP PAC Motion Control User's Guide. *For the SNAP-SCM-SSI, see form 1931,* SNAP SSI (Serial Synchronous Inferface) Module User's Guide.

FOR HELP

If you have problems installing or using SNAP serial communication modules and cannot find help in this guide or on our website, you can contact Opto 22 Product Support.

Phone: 800-TEK-OPTO (800-835-6786 toll-free in the U.S. and Canada)
951-695-3080
Monday through Friday,
7 a.m. to 5 p.m. Pacific Time

NOTE: Email messages and phone calls to Opto 22 Product Support are grouped together and answered in the order received.

Email: support@opto22.com

Opto 22 website: www.opto22.com

When calling for technical support, you can help us help you *faster* if you provide the following information to the Product Support engineer:

- A screen capture of the Help > About dialog box showing software product and version (available by clicking Help > About in the application's menu bar).
- Opto 22 hardware part numbers or models that you're working with.
- Firmware version:
    - For *groov* EPIC processors and *groov* RIO modules: available in *groov* Manage by clicking Info and Help > About.
    - For SNAP controllers and brains: available in PAC Manager by clicking Tools > Inspect.
- Specific error messages you received.
- Version of your computer's operating system.
- For PAC Control, PAC Display, OptoOPCServer, or PAC Manager, you may be requested to provide additional information, such as log or dump files. You can find these files in a support files sub-folder:
    a. On your Windows Desktop, double-click the PAC Project 10.4 folder.
    b. Double-click Support Files.
    c. Double-click on the appropriate shortcut to open the sub-folder containing the requested files.

    Note: *PAC Control, PAC Display, OptoOPCServer, and PAC Manager create appropriate sub-folders when they create diagnostic log or dump files. If they have not created these files, the sub-folder may not exist; in this case, the shortcut will not work.*

2: Quick Start

In this chapter:

CHECK PROCESSOR COMPATIBILITY

SNAP serial communication modules can be used with any of the following SNAP PAC rack-mounted controllers and brains:

SNAP-PAC-R1	SNAP-PAC-EB1 [Obsolete]
SNAP-PAC-R1-B	SNAP-PAC-EB1-FM [Obsolete]
SNAP-PAC-R1-FM [Obsolete]	SNAP-PAC-EB1-W [Obsolete]
SNAP-PAC-R1-W [Obsolete]	SNAP-PAC-EB2 [Obsolete]
SNAP-PAC-R2	SNAP-PAC-EB2-FM [Obsolete]
SNAP-PAC-R2-FM [Obsolete]	SNAP-PAC-EB2-W [Obsolete]
SNAP-PAC-R2-W [Obsolete]	

These modules cannot be used with SNAP PAC serial-based brains (SNAP-PAC-SB1 and SNAP-PAC-SB2). If you are using an older brain or rack-mounted controller, such as SNAP Ultimate or SNAP Ethernet, see Appendix B: Using SNAP Serial Modules with Legacy Hardware to determine compatibility.

INSTALL THE MODULE

SNAP serial communication modules can be installed in any position on an Opto 22 SNAP PAC mounting rack. Do not install more than eight serial communication modules of any type on the same rack.

NOTE: SNAP serial communication modules draw considerably more power than a standard SNAP analog or digital module. The rack can handle a maximum of eight serial modules, plus the processor and up to eight digital or analog modules. See serial module specifications on page 45. Make sure you have sufficient power for the processor and all modules on the rack.

1. Turn off power to the rack.

WARNING: Make sure power is off before continuing, or you will severely damage the module.

2. Remove the module from its packaging.

3. Position the module over the connector on the rack, aligning the small slot at the base of the module with the retention bar on the rack.
   If it is next to another module, make sure the male and female module keys are aligned, as shown at right.

4. Push straight down on the module to snap it into position.

5. Use two standard 4-40 x 1/4 truss-head Phillips holddown screws to secure both sides of each module.

If you need to remove the module, see .
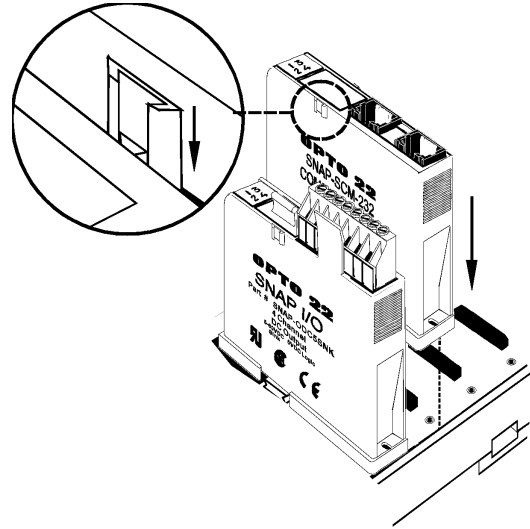
Bias and Termination (SNAP-SCM-485-422 and SNAP-SCM-PROFI Only)

If you are using the SNAP-SCM-485-422 or SNAP-SCM-PROFI, use the small switches on the top of the module to provide bias or termination on the RS-485/422 or PROFIBUS DP network as required. Bias and termination switches are shown in the diagrams at right.

Termination

If the port is physically the first or last device on the network, provide termination as follows:

SNAP-SCM-485-422—Move the Term switch to ON.

SNAP-SCM-PROFI—If you are using an official PROFIBUS cable, termination is provided in the cable; therefore, switch the termination to ON in the cable and move the Term switch to OFF in the SNAP-SCM-PROFI module.

Bias

Provide bias at one point on the network by moving both the Pull Up and Pull Down switches to ON.

SNAP-SCM-485-422

SNAP-SCM-PROFI
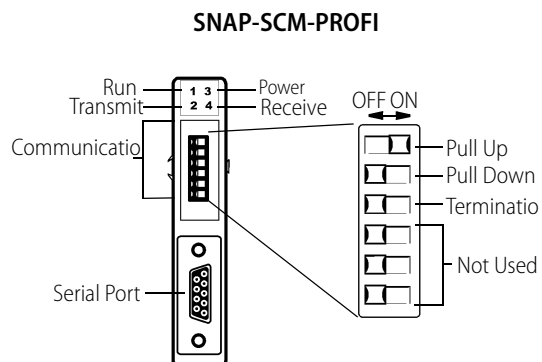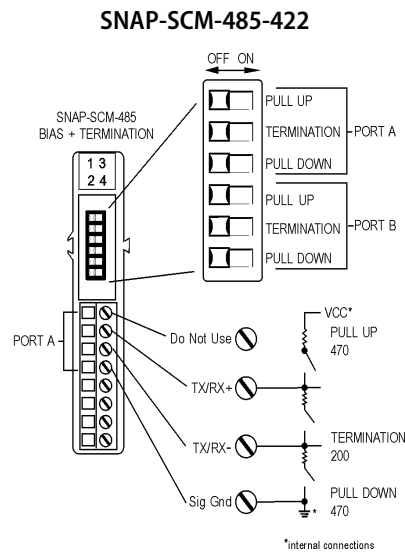
ATTACH SERIAL DEVICES

SNAP-SCM-232

If you have a SNAP-SCM-232, use the supplied cable and adapters to connect a serial device to each port on the module.

Pinouts for the RJ-45 connectors and DB-9 (male) adapters on the SNAP-SCM-232 are shown below.

RJ-45 Connectors

1	Not used
2	RX (receive data)
3	TX (transmit data)
4	RTS (request to send)
5	COM (signal common)
6	Not used
7	Not used
8	CTS (clear to send)

DB-9 (male) Adapters

1	Not used
2	RX (receive data)
3	TX (transmit data)
4	Not used
5	COM (signal common)
6	Not used
7	RTS (request to send)
8	CTS (clear to send)
9	Not used

NOTE: RTS/CTS is optional; to use this mode, see "Changing Parameters Using PAC Manager's Inspect Window" on page 18.

SNAP-SCM-232 and SNAP-SCM-485 LEDs

LEDs are the same for SNAP-SCM-232 and SNAP-SCM-485-422 modules. Transmit and receive LEDs are provided for each port as shown in the diagram at right.

If you are using the SNAP-SCM-485-422 in 4-wire mode, only LEDs 1 and 3 are used.

Since SNAP-SCM-W2 modules receive but do not transmit, LEDs 1 and 2 are not used. LEDs 3 and 4 function as shown in the diagram.

LED Indicators, SNAP-SCM-232 and SNAP-SCM-485-422 (top view)

(SNAP-SCM-232 shown as example)

SNAP-SCM-PROFI LEDs

LED	Indication
1	TEST
2	TRANSMIT
3	POWER
4	RECEIVE
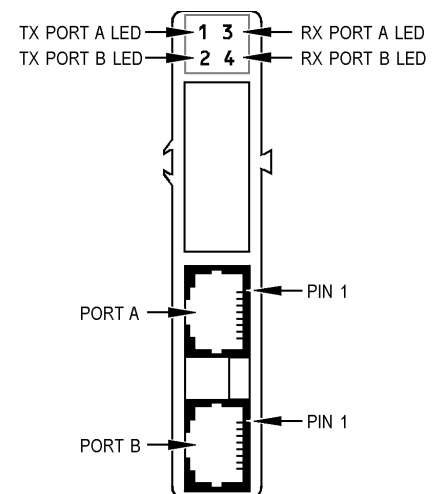
SNAP-SCM-485-422

If you have a SNAP-SCM-485-422, use the supplied terminal strip to connect serial devices to each port, as shown in the diagrams and tables below. Two-wire mode is the default; to use four-wire mode, see "Changing Parameters Using PAC Manager's Inspect Window" on page 18.

NOTE: Vcc on the SNAP-SCM-485-422 is 5 VDC and is supplied by the module itself. Do not use this voltage to power another device, as it can interfere with normal module operation.

Two-Wire Mode

SNAP-SCM-485-422 Top View
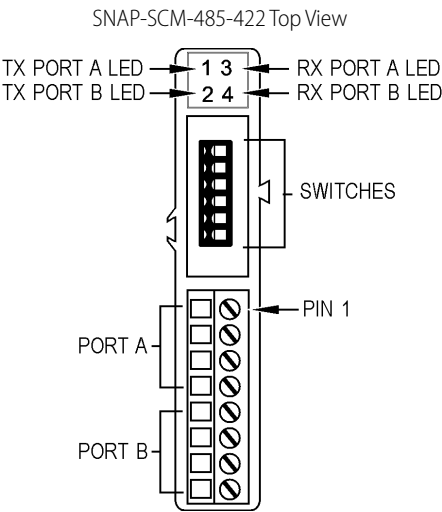
RS-485 Device   SNAP-SCM-485-422
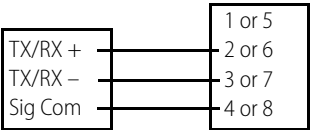
Pinouts for Two-Wire SNAP-SCM-485-422

Pin	Port	Description
1	A	Vcc
2	A	TX/RX +
3	A	TX/RX -
4	A	Sig Com
5	B	Vcc
6	B	TX/RX +
7	B	TX/RX -
8	B	Sig Com

Four-Wire Mode

Serial Device   SNAP-SCM-485-422
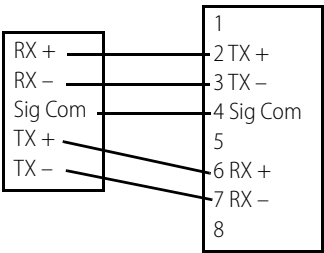
Pinouts for Four-Wire SNAP-SCM-485

Pin	Port	Description
1	A	Vcc
2	A	TX +
3	A	TX –
4	A	Sig Com
5	A	Vcc
6	A	RX +
7	A	RX –
8	A	Sig Com

SNAP-SCM-W2

If you have a SNAP-SCM-W2, use the supplied terminal strip to connect a Wiegand serial device to each port on the module, as shown in the diagram and table below.

IMPORTANT: Some devices such as card readers can use other protocols. Make certain that your device has been correctly configured to use the Wiegand protocol.

SNAP-SCM-W2 Top View
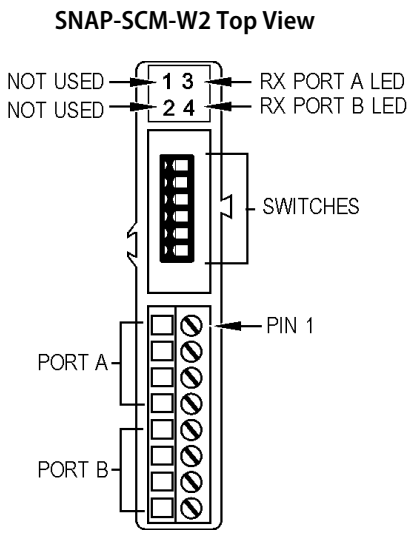
Pinouts for SNAP-SCM-W2

Pin	Port	Color	Description
1	A	Black	Common
2	A	White	Data One
3	A	Green	Data Zero
4	A	--	*Do not use*
5	B	Black	Common
6	B	White	Data One
7	B	Green	Data Zero
8	B	--	*Do not use*

SNAP-SCM-PROFI

Pinouts for the DB-9 connector on the SNAP-SCM-PROFI are shown in the diagram and table below. For information on how to set the communication switches, see .

SNAP-SCM-PROFI Top View
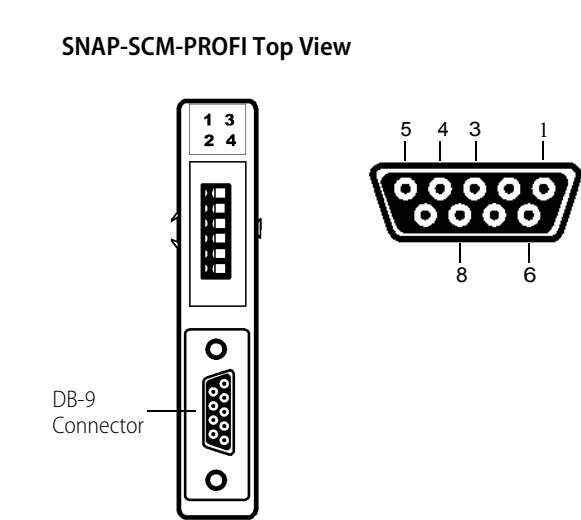
Pinouts for SNAP-SCM-PROFI

Pin	Description
1	Not used
2	Not used
3	RxD/TxD+
4	Enable
5	Dgnd
6	VP
7	Not used
8	RxD/TxD–
9	Not used

SNAP-SCM-CAN2B

Pins 1-4 are in parallel to pins 5-8. V+ is not used by the SNAP-SCM-CAN2B module.

SNAP-SCM-CAN2B Top View

Pinouts for SNAP-SCM-CAN2B

Pin	Use
1,5	V +
2,6	CAN +
3,7	CAN –
4,8	GND
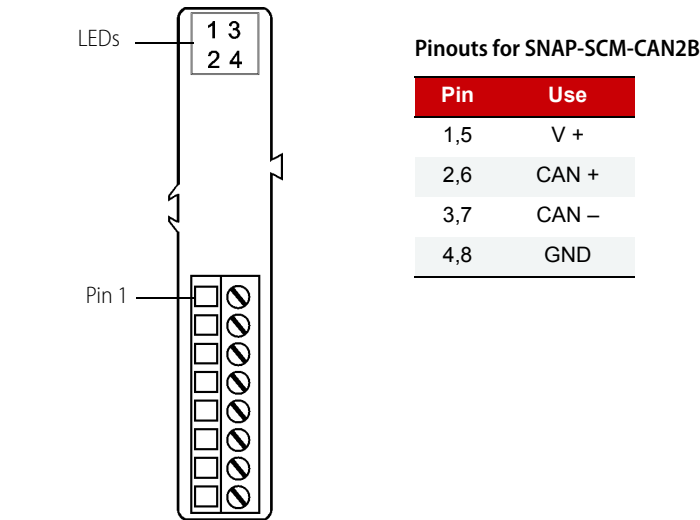
SNAP-SCM-ST2

Connect a stepper motor to each port on the module, as shown in the diagram and table below.

SNAP-SCM-ST2 Top View

Pin	Port	Use	Description
1		Pulse	Frequency output
2		Ground	Isolated from logic side
3	A	Direction	+5 VDC when asserted 0 VDC when deasserted
4		Ground	Isolated from logic side
5		Pulse	Frequency output
6		Ground	Isolated from logic side
7	B	Direction	+5 VDC when asserted 0 VDC when deasserted
8		Ground	Isolated from logic side
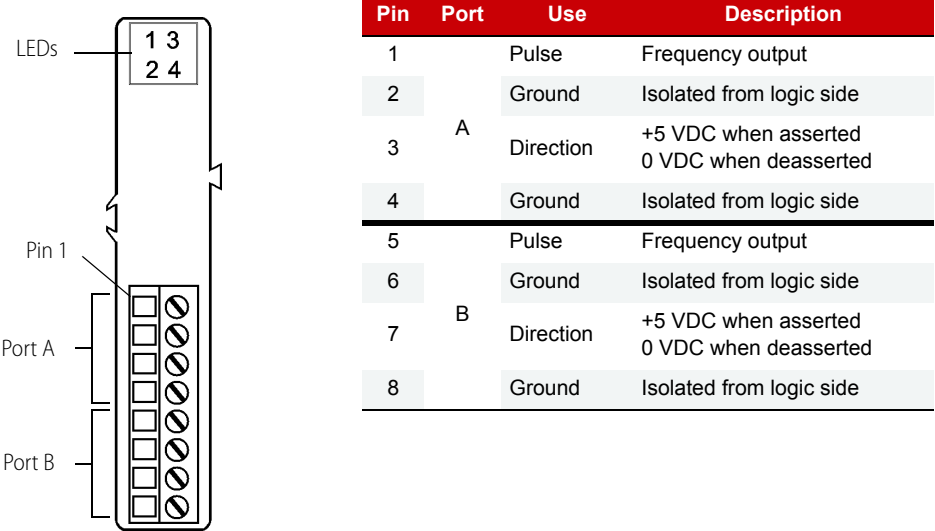
APPLY POWER TO THE RACK

Power can usually be supplied by an Opto 22 SNAP-PS5 power supply; however, check total power requirements for all modules and the processor.

When you apply power to the rack, the SNAP-SCM-232 and the SNAP-SCM-485-422 respond by blinking their TX LEDs (see diagram above for LED location). Additionally, on the SNAP-SCM-232 and SNAP-SCM-485-422, unless you have changed the default, a test message similar to the following is sent to the attached serial devices:

```
Opto 22 SNAP-SCM232, Ver 00.01.01.01, Module 7, Port 0, 9600,N,8,1
```

CONFIGURE THE MODULE

SNAP-SCM-232 and SNAP-SCM-485-422 Configuration

Default communication parameters for the SNAP-SCM-232 and SNAP-SCM-485-422 are as follows:
- 1 start bit
- 9600 baud
- No parity
- 8 data bits
- 1 stop bit
- SNAP-SCM-232: No flow control
- SNAP-SCM-485-422: Two-wire mode

If you plan to use the default parameters, configuration is already finished. If you need to change the communication parameters, see page 15.

SNAP-SCM-PROFI Configuration

Default communication parameters for the SNAP-SCM-PROFI module are as follows:
- 1 start bit
- 9600 baud
- Even parity
- 8 data bits
- 1 stop bit
- Send a test message when the module is turned on.

If you plan to use the default parameters, configuration is already finished. If you need to change the communication parameters, see page 20. Note that on the SNAP-SCM-PROFI module you can configure only the Baud Rate, Power-up Test Message, and EOM Character List.

SNAP-SCM-W2 Configuration

Use PAC Manager to configure SNAP-SCM-W2 serial modules, which involves telling the module what bit pattern you are using to transmit site and badge code data. For detailed configuration instructions see page 22.

SNAP-SCM-CAN2B Configuration

The SNAP-SCM-CAN2B module has the following default settings:
- IP Port Number: This number is different for each slot. See the port number table in "Establish an Ethernet Connection" on page 12. This is the Port A IP port number for the module's position on the rack.
- Baud Rate: 250000
- Data Masks and Filters: These are all set to 0.

If you plan to use the default parameters, configuration is already finished. To change parameters from the defaults, see "Configuring CAN Modules" on page 24.

SNAP-SCM-ST2 Configuration

Once you have established an Ethernet connection (see below) you are ready to use the ST2's output commands. For more information, see "Using the SNAP-SCM-ST2 Module Commands" on page 28. No other configuration is necessary.

ESTABLISH AN ETHERNET CONNECTION

An Ethernet connection in the software application is required in order to establish communication with the serial device that is attached to the SNAP serial communication module. In Opto 22's PAC Control, for example, you would do the following things:

*   Create a communication handle. See "Communication Handles for Serial Communication Modules" in chapter 10 of form 1700, *PAC Control User's Guide*.
*   Use the comm handle in the Open Outgoing Communication command, and follow that with the Communication Open? command. See form 1701, *PAC Control Command Reference*. In the legacy software OptoControl™, you would use the command Open Ethernet Session.

To establish an Ethernet connection, you need the IP address of the I/O unit. You also need the IP Port number of the module's serial port from the following table. Note that SNAP-SCM-PROFI and SNAP-SCM-CAN2B modules have only one port, port A.

(This table shows the default port numbers. You can change them if necessary using PAC Manager. See "Changing SNAP-SCM-232 and SNAP-SCM-485-422 Communication Parameters" on page 15 or "Configuring Wiegand Modules" on page 22.)

Module Position	Port	IP Port Number	Module Position	Port	IP Port Number
0	A	22500	8	A	22516
	B	22501		B	22517
1	A	22502	9	A	22518
	B	22503		B	22519
2	A	22504	10	A	22520
	B	22505		B	22521
3	A	22506	11	A	22522
	B	22507		B	22523
4	A	22508	12	A	22524
	B	22509		B	22525
5	A	22510	13	A	22526
	B	22511		B	22527
6	A	22512	14	A	22528
	B	22513		B	22529
7	A	22514	15	A	22530
	B	22515		B	22531

NOTE: If a connection is not established, the serial module buffers incoming characters and saves them until a connection is established. For REVISION A modules (those manufactured in June 2003 or after), the buffer holds 999 characters. For modules prior to REVISION A, the buffer holds 247 characters.

SEND AND RECEIVE DATA THROUGH THE MODULE

Once the Ethernet connection is established, you use a normal Ethernet *send* or *recv* to send or receive characters over the serial port. In PAC Control, for example, you would use commands such as Transmit String, Transmit Numeric Table, and Receive String Table.

3: Module Configuration

In this chapter:

CHANGING SNAP-SCM-232 AND SNAP-SCM-485-422 COMMUNICATION PARAMETERS

Communication parameters on the SNAP-SCM-232 and SNAP-SCM-485-422 serial modules can be changed using PAC Manager utility software. PAC Manager is available for free download from our website, www.opto22.com.

Default configuration parameters for the SNAP-SCM-232 and SNAP-SCM-485-422 are:

- 1 start bit (not configurable)
- 9600 baud
- No parity
- 8 data bits
- 1 stop bit
- Send a test message when the module is turned on.
- SNAP-SCM-232: No flow control
- SNAP-SCM-485-422: 2-wire mode

Changing Basic Parameters

You will need to have a PC with PAC Manager installed on the same Ethernet network as the I/O unit. You can change most default parameters in two ways:

- Using an I/O unit configuration file you already have—see steps below. (The *PAC Manager User's Guide* has more information about configuration files.)
- Using PAC Manager's Inspect window—see page 18.

Changing Parameters Using an I/O Unit Configuration File

All communication parameters for SNAP-SCM-232 and SNAP-SCM-485-422 modules *except* flow control and 2- or 4-wire mode can be changed in the I/O unit's configuration file using the following steps. For flow control and 2- or 4-wire mode, use the Inspect window (see page 18).

1. Start PAC Manager:

Click the Windows Search button and type PAC Manager 10.0.

2. In the PAC Manager main window, click the Open button or choose File > Open. Navigate to the location of the configuration file and double-click the filename.

3. In the configuration tree, right-click the name of the I/O unit the serial module is on. From the pop-up menu, choose Configure.
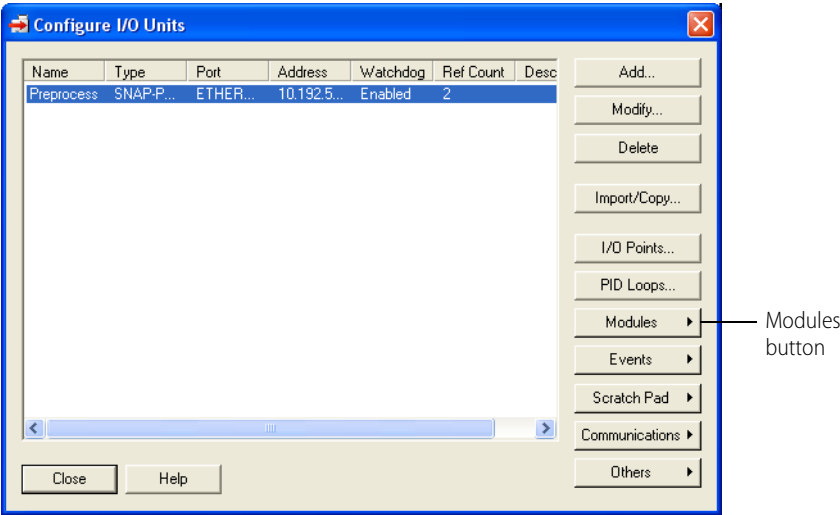
The Configure I/O Units dialog box opens.

4. Make sure the correct I/O unit is highlighted. Click the Modules button and choose Serial Modules from the pop-up menu.
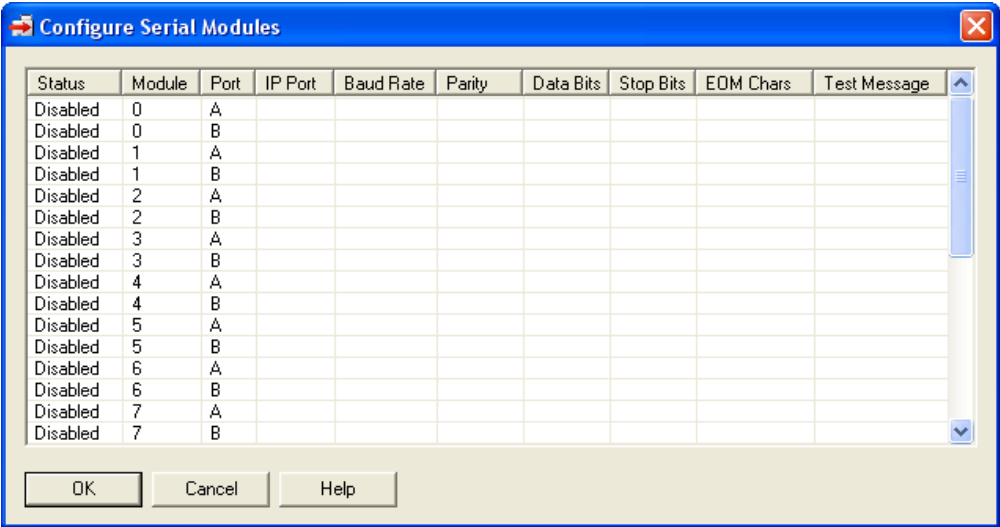
5. Click the status cell for the module number and port number whose parameters you want to change. From the pop-up menu, choose Enabled.

The Status changes to Enabled.

6. To change a communication parameter, click the cell you want to change within the highlighted line. Choose from the drop-down list, if there is one, or type the new value in the cell.

EOM Chars: The device can check any one of up to four characters as the end-of-message indicator. EOM checking occurs only when using the serial module port with serial events. Enter up to four characters in hex. Example: 0x0D0A0000 looks for a 13 (hex 0D) or a 10 (hex 0A).

NOTE: The start bit is not configurable. To set flow control and 2- or 4-wire mode, see the steps on page 18.

7. When you have finished changing parameters for serial modules, click OK. Then click Close.

8. With the configuration file open, choose Tools > Send Configuration to I/O Unit.
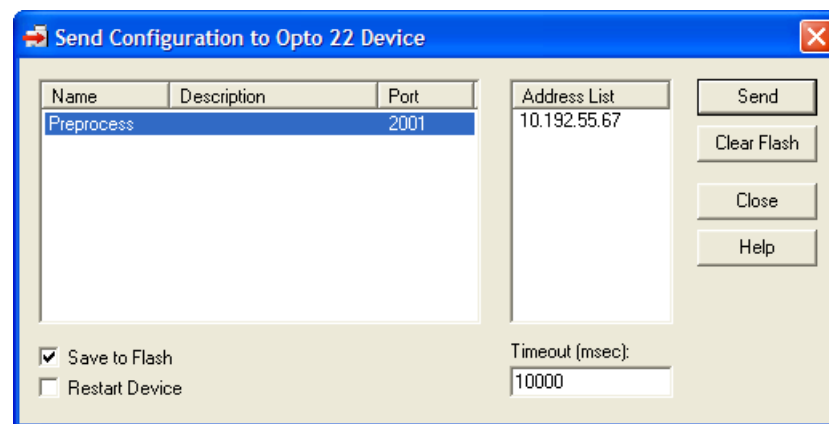
The Send Configuration dialog box appears:

The list on the left shows all the I/O units in this configuration file. When you click a unit, the Address List shows the IP addresses for all I/O units to receive the same configuration.

9. Highlight the I/O unit configuration(s) you want to send.

10. Highlight the IP addresses to receive the I/O unit configuration.

If you don't highlight any addresses, the configuration will be sent to the entire list.

NOTE: If you highlighted more than one unit configuration, each unit configuration will automatically be sent to all the IP addresses associated with it.

11. If necessary, change the Timeout field.

The timeout field shows how long, in milliseconds, PAC Manager will try to communicate with the I/O unit before returning a timeout error.

12. To save the configuration file to flash memory as well as to RAM, check Save to Flash. To also restart the unit, check Restart I/O Unit.

IMPORTANT: If you have changed an IP Port number, you must save the change to flash and restart the I/O unit.

13. Click Send.

The configuration data is sent to the I/O units whose IP addresses you chose.

Changing Parameters Using PAC Manager's Inspect Window

If you don't have an I/O unit configuration file, you can change communication parameters for SNAP-SCM-232 and SNAP-SCM-485-422 modules in PAC Manager's Inspect window.

You can also configure flow control on a SNAP-SCM-232 and 2- or 4-wire mode on a SNAP-SCM-485-422 using the Inspect window. (These configurations cannot be saved to a configuration file.)

The I/O unit that contains the serial module must be on the same network as your PC, and the configuration is sent directly to the I/O unit.

1. Start PAC Manager on a PC on the same Ethernet network as the I/O unit:

Click the Windows Search button and type PAC Manager 10.0.

2. In the PAC Manager main window, click the Inspect icon 🔍 or choose Tools > Inspect.
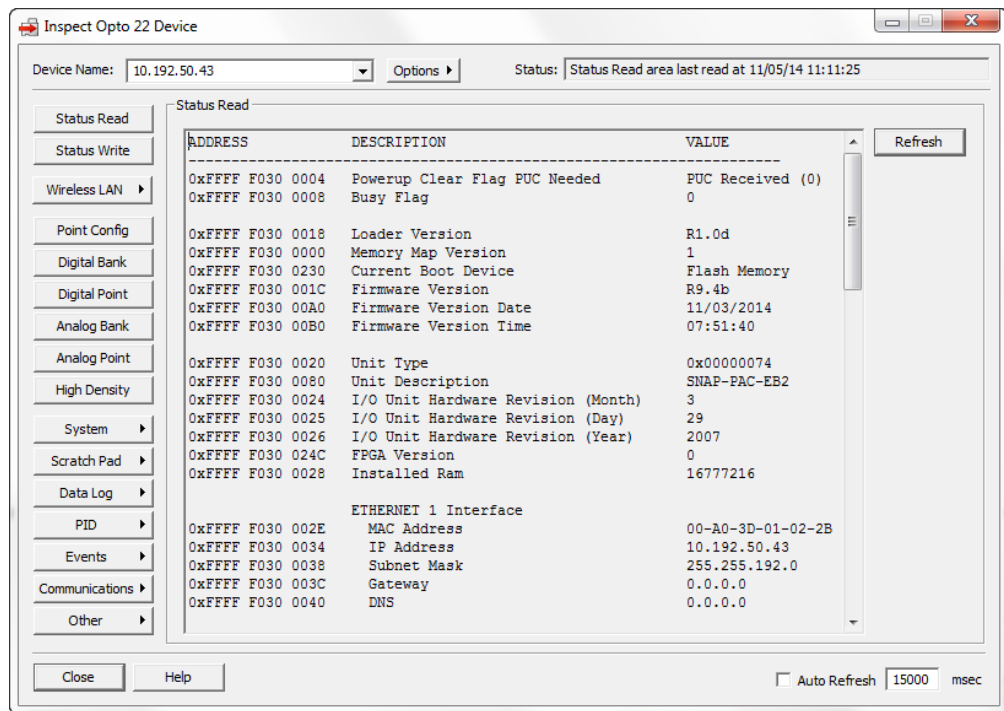
3. In the Device Name field, type the name or IP address of the I/O unit, or choose it from the drop-down list. Click the Communications button and choose Serial Modules from the menu.

Information from the I/O unit is displayed in the window:

4. Click the Serial Module Number drop-down list and choose the module's position number on the rack to see the module's communication parameters.

5. To change a parameter, click its value in the Value column and choose from the drop-down list or enter a new value.

   NOTE: This is the only way to change hardware flow control for a SNAP-SCM-232 or 2- or 4-wire mode for a SNAP-SCM-485-422. Parameters changed in this dialog box are not saved to a configuration file.

This example shows how to change Hardware Flow Control on a SNAP-SCM-232:

6. When you have finished changing parameters for this module, click Apply.

The configuration changes are sent to the I/O unit.

7. To make sure your changes remain after a power cycle, click the Status Write button in the upper left.

8. In the Operation section (see image below), highlight Store configuration to flash.
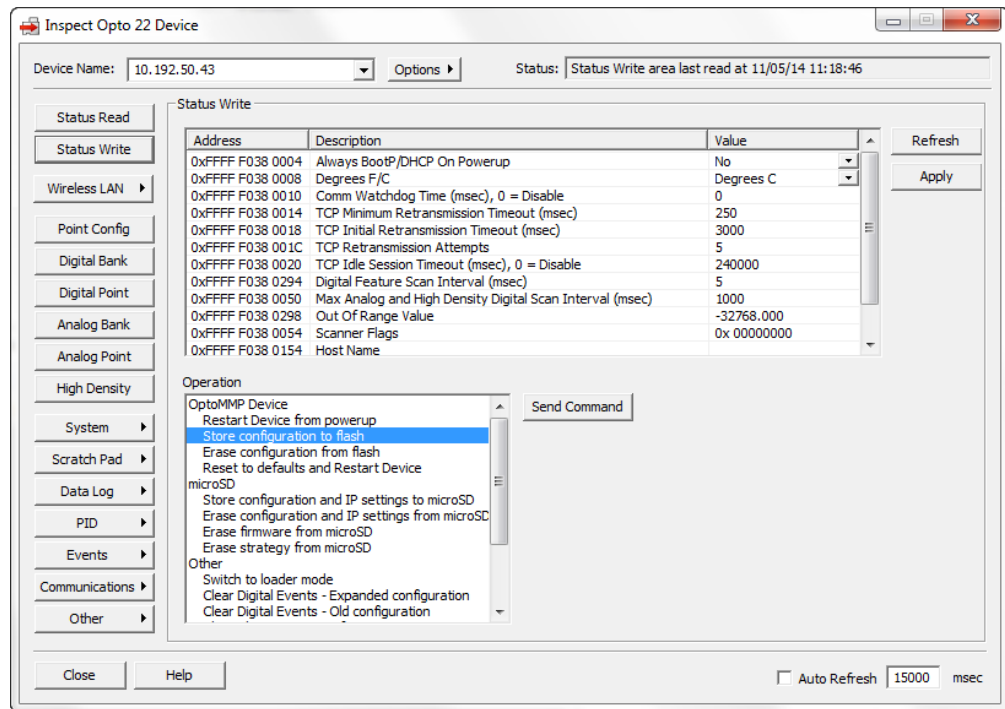
9. Click Send Command.

The configuration is stored to flash memory.

10. Highlight Restart Device from powerup and click Send Command again.

11. When the I/O unit has powered back up, inspect the settings and make sure they are correct.

CHANGING SNAP–SCM–PROFI COMMUNICATION PARAMETERS

Communication parameters on the SNAP-SCM-PROFI serial module can be changed using PAC Manager.

Default communication parameters for the SNAP-SCM-PROFI are:

- 1 start bit (not configurable)
- 9600 baud
- Even parity (not configurable)
- 8 data bits (not configurable)
- 1 stop bit (not configurable)
- Send a test message when the module is turned on.

To change parameters, you will need a PC on the same Ethernet network as the I/O unit.

NOTE: These steps describe how to change parameters using an I/O unit configuration file (see more information in the PAC Manager User's Guide). If you don't have a configuration file, you can change parameters in PAC Manager's Inspect window. Steps are similar to "Changing Parameters Using PAC Manager's Inspect Window" on page 18 **except** *choose Communications > Profibus Modules.*

1. Start PAC Manager:

Click the Windows Search button and type PAC Manager 10.0.

2. On your Windows 8.1 or Windows 10 desktop, double-click the PAC Project 9.5 folder, and then double-click the PAC Manager icon.

3. In the PAC Manager main window, click the Open button or choose File > Open. Navigate to the location of the configuration file and double-click the filename.

4. In the configuration tree, right-click the name of the I/O unit the SNAP-SCM-PROFI module is on. From the pop-up menu, choose Configure.

   The Configure I/O Units dialog box opens:
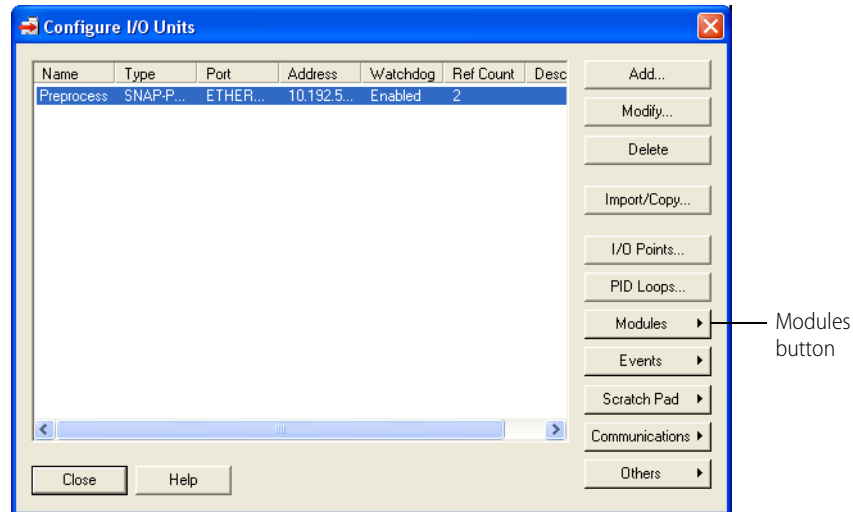
5. Make sure the correct I/O unit is highlighted. Click the Modules button and choose Profibus Modules from the pop-up menu.
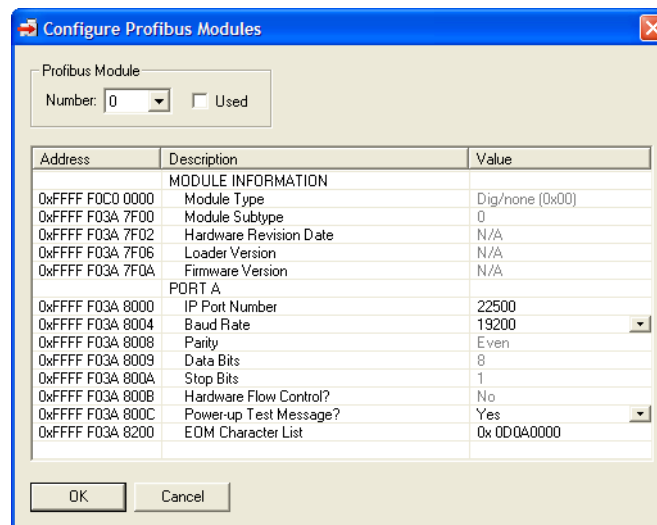
6. In the Number field, choose the Profibus module's position from the drop-down list.
   Click to put a check mark in the Used box.

7. To change a communication parameter, click the cell you want to change within the highlighted line. Choose from the drop-down list, if there is one, or type the new value in the cell.

   EOM Chars: The device can check any one of up to four characters as the end-of-message indicator. EOM checking occurs only when using the serial module port with serial events. Enter up to four characters in hex. Example: 0x0D0A0000 looks for a 13 (hex 0D) or a 10 (hex 0A).

   NOTE: You can configure only IP Port Number, Baud Rate, Power-up Test Message?, and EOM Character List. The other parameters are not configurable.

8. When you have finished changing parameters for the SNAP-SCM-PROFI module, click OK. Configure another module or click Close.

9. When you are ready to send all configuration data to the I/O unit, see "Sending Configuration Data to the I/O Unit" on page 27.

CONFIGURING WIEGAND MODULES

This section includes step-by-step instructions for telling a SNAP-SCM-W2 what bit pattern you are using to transmit site and badge code data.

Sample Strategy

If you are using the SNAP Wiegand module for card reader access to 16 or fewer doors by 4200 or fewer users, you can download and use the sample control strategy and utility software available on our website at www.opto22.com. (The sample strategy is an ioControl strategy but can be opened in PAC Control.) The strategy configures the modules, processes card reader data, and sends SNMP traps for security monitoring. The utility manages user names and entry permissions.

The sample strategy assumes a 37-bit code with the following format:

```
Bits-1234 5678 9012 3456 7890 1234 5678 9012 3456 7
Code-P000 0000 SSSS SSSS SBBB BBBB BBBB BBBB BBBB P

Key: P = parity bit
     0 = zero-filled
     S = Site code
     B = Badge code
```

Both samples include source code and can be used as is or modified to fit your application. See form 1366, *Door Access Manager Technical Note*, for more information.

If your situation does not match the sample strategy, you can follow the steps below to configure SNAP-SCM-W2 modules. For additional information on configuration, see form 1704, *PAC Manager User's Guide*, available from our website at www.opto22.com.

Configuring Your Own Modules

IMPORTANT: Some serial devices such as card readers can use other protocols. Make sure your device has been correctly configured to use the Wiegand protocol.

The SNAP-SCM-W2 conforms to the data transmission standards of the Wiegand 26-bit reader interface protocol. However, note the following:

• The first and last few bits of the transmission can optionally be parity bits, but due to the number of possible variations, no parity or CRC checking is done by the SNAP Wiegand module.

• The SNAP Wiegand module can accommodate transmissions from 26 bits to 64 bits. The site code always comes before the badge code and can be a maximum of 32 bits. The badge code immediately follows the site code (regardless of the length of the site code) and can also be a maximum of 32 bits. Parity bits at the beginning and end of the transmission, if used, reduce the total number of possible site and badge code bits.

To configure Wiegand modules, use PAC Manager on a PC on the same network as the I/O unit.

1. On the PC, choose Start > Programs > Opto 22 > PAC Project > PAC Manager.

2. In the PAC Manager main window, click the Open button or choose File > Open. Navigate to the location of the configuration file and double-click the filename.

3. In the configuration tree, right-click the name of the I/O unit the Wiegand module is on. From the pop-up menu, choose Configure.

The Configure I/O Units dialog box opens:
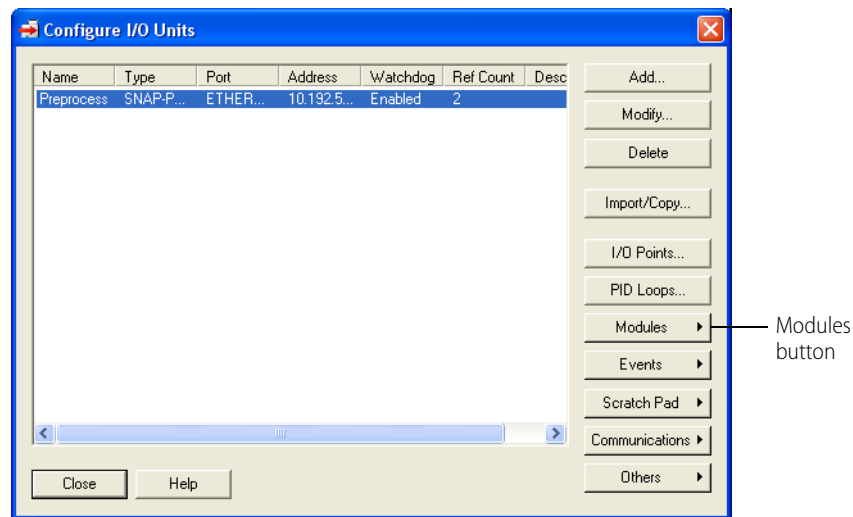
4. Make sure the correct I/O unit is highlighted. Click the Modules button and choose Wiegand Modules from the pop-up menu.
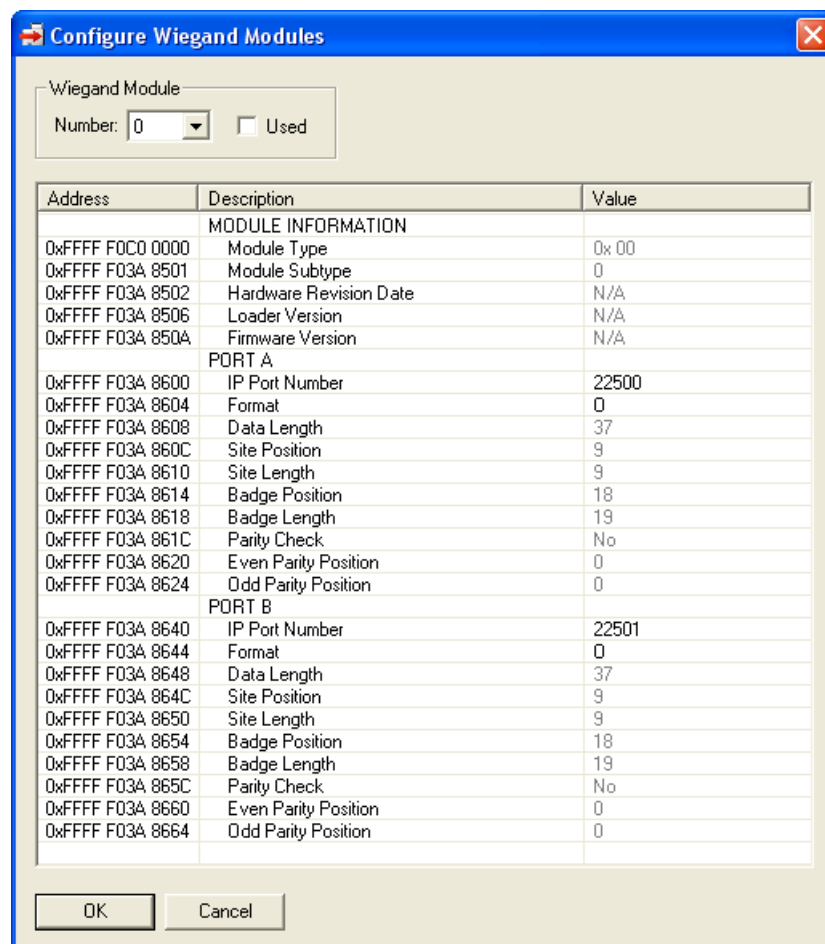
5. In the Number field, choose the Wiegand module's position from the drop-down list.
    Click to put a check mark in the Used box.
6. If you need to change port numbers, enter the new numbers for each port in the IP Port Number fields.
7. Click the Format/Value cell, and from the drop-down list, choose a standard data format (shown by its total data length) or choose C for custom.

    NOTE: O is the 37-bit Opto 22 format used in the sample control strategy.

8. Change the following fields if necessary to match your Wiegand hardware device:
    Data Length—total length of data in the transmission
    Site Position—first bit of the site code
    Site Length—length of the site code, in bits
    Badge Position—first bit of the badge code (should be the next bit after the site code)
    Badge Length—length of the badge code, in bits
9. When data for both ports is correct, repeat from step 5 for additional Wiegand modules.
10. When all Wiegand modules are configured, click OK. Close the Configure I/O units dialog box.
11. When you are ready to send all configuration data to the I/O unit, see "Sending Configuration Data to the I/O Unit" on page 27.

CONFIGURING CAN MODULES

Configuration for the SNAP-SCM-CAN2B module is normally done in a PAC Control strategy using the example subroutine from the CAN RX/TX Integration Kit for PAC Project, part number PAC-INT-CAN-RXTX, a free download available on our website, www.opto22.com. As described below, you can also use PAC Manager to change the IP Port Number, Baud Rate, Data Masks, or Filters for the SNAP-SCM-CAN2B serial module. However, the settings in your strategy will override the settings in PAC Manager for each module.

1. With the configuration file open, double-click the I/O Units folder.
    The Configure I/O Units dialog box opens.
2. Highlight the I/O unit the CAN module is on. Click the Modules button and choose CAN Modules from the pop-up menu.
    Information from the I/O unit is displayed in the window.
3. Click the CAN Module number dropdown list and choose the module's position number on the rack to see the module's communication parameters.
4. To change a parameter, click its value in the Value column.
    To change the Baud Rate on a SNAP-SCM-CAN2, choose from the drop-down list
    To change the Filter or Data Mask values, see the next section below.
5. When you have finished changing parameters for this module, click OK.
6. Repeat the previous step for additional CAN modules.
7. When all CAN modules are configured, click OK to close the dialog box and return to configuring I/O units.
8. When you're finished configuring I/O units, close the dialog box. Choose File > Save to save the configuration file.
9. When you are ready to send all configuration data to the I/O unit, see "Sending Configuration Data to the I/O Unit" on page 27.

SNAP-SCM-CAN2B Filters and Data Masks

The filters and data masks for each CAN2B module are normally configured in a PAC Control strategy using the sample subroutines provided in the CAN RX/TX Integration Kit for PAC Project, part number PAC-INT-CAN-RXTX. You can also use PAC Manager to configure these settings. However, the filter and data mask settings in your PAC Control strategy will override the settings in PAC Manager for each module.

In PAC Manager the Data Masks and Filters are all set to 0 by default, which means that all CAN packets will be received. If you want the SNAP-SCM-CAN2B module to provide filtering, then configure the Data Masks and Filters.

Always start with the highest priority mask and filter, Data Mask 0 and Filter 0. Mask 0 uses Filter 0 and Filter 1, in that order. Then Data Mask 1 uses Filters 2–5, in that order.

Masks and filters each consist of 32 bits; in PAC Manager these are entered in hex. The mask determines how broadly or narrowly the filter will be applied, that is, which bits of the CAN ID to pay attention to when deciding to accept or reject a CAN packet. The following table shows how the mask and filter work together.

Mask Bit	Filter Bit	CAN ID Bit	Accept/Reject
0	X*	X*	Accept
1	0	0	Accept
1	0	1	Reject
1	1	0	Reject
1	1	1	Accept
* X = Don't Care			

The configuration examples below show how to build the masks and filters.

SNAP-SCM-CAN2B Configuration Examples

These examples assume you are using module firmware 2.0b or higher.

Example 1

Suppose many CAN frames are placed on the bus at regular intervals (in no particular order). Some are standard CAN frames; others are extended CAN frames. You are interested in only one frame, an extended CAN frame with an Arbitration ID of: `0x14613A2C`

This is the only frame you want to capture. How do you configure the Mask and Filter fields to capture it?

Parameter	Value	Description
Mask 0	0x1FFFFFFF	A mask with all bits set means the module should consider each bit of the arbitration ID for acceptance. This makes the filter more stringent.
Filter 0	0x54613A2C	Since this is an extended CAN frame, you want the filter to apply to extended CAN frames received. So bitwise OR the Arbitration ID with the Extended ID Enable (EXIDE) flag. This flag tells the brain that the filter should apply to extended CAN frames. The value of this flag is 0x40000000.
Filter 1	0x0	Not used, since you are interested in only one CAN frame.
Mask 1	0x0	Not used
Filters 2 - 5	0x0	Not used

Here are representations of the 32-bit mask and the 32-bit filter for this example:

Mask 0

Bits:	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit values:	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mask in hex:	1				F				F				F				F				F				F				F			

Filter 0

For data in an extended frame, set the EXIDE flag, which is bit 30. The Arbitration ID of `0x14613A2C` becomes `0x54613A2C` when bit 30 is set:

	Not used	EXIDE flag	Not used	Arbitration ID																										
Bits:	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Bit values:	0	1	0	1	0	1	0	0	0	1	1	0	0	0	0	1	0	0	1	1	1	0	1	0	0	0	1	0	1	1	0	0
Filter in hex:	5				4				6				1				3				A				2				C			

Example 2

Building on Example 1, suppose now you decide that in addition to the extended CAN frame with Arbitration ID `0x14613A2C` you also want to capture a standard CAN frame with Arbitration ID `0x1EC`.

For this second frame you have two options:
- You could put the standard frame at Filter 1 so that both frames are using Mask 0.
- You could use a different mask, Mask 1, and use Filter 2.

In either case you need to map the 11-bit (standard) Arbitration ID to the 32-bit value the module is expecting. The module expects the 11-bit standard ID to be in bits 28–18 of the 32-bit filter. So, in terms of math: mask the desired 11-bit Arbitration ID with 0x7FF and then left-shift by 18 bits: `((11-bit Arbitration ID) & 0x7FF)<<18`

Using Mask 0. Mask 0 is already considering each bit in the Arbitration ID, and since we only want to look at these two CAN frames, we could use Filter 1.

| Parameter	Value	Description
Mask 0	0x1FFFFFFF	A mask with all bits set means the module should consider each bit of the arbitration ID for acceptance. This makes the filter more stringent.
Filter 0	0x54613A2C	Since this is an extended CAN frame, you want the filter to apply to extended CAN frames received. So bitwise OR the Arbitration ID with the EXIDE flag.
Filter 1	0x07B00000	Value of standard Arbitration ID filter after mapping it to its 32-bit value. Do not set the EXIDE flag. In this case the lower 18 bits (the extended arbitration bits) are excluded from the acceptance check, even though the mask would indicate otherwise, since this is a standard CAN frame filter.
Mask 1	0x0	Not used
Filters 2 - 5	0x0	Not used

Using Mask 1. If Mask 0 were less stringent (fewer set bits) so it would not cause acceptance of just the `0x1EC` Arbitration ID, then you could use the Mask 1 and Filter 2.

Parameter	Value	Description
Mask 0	0x1C63FFFF	A Mask with much less stringent acceptance criteria. The set mask bits are used in the comparison with the filter, while the cleared bits are "Don't Care."
Filter 0	0x54613A2C	Since this is an extended CAN frame, we want the filter to apply to extended CAN frames received. So bitwise OR the Arbitration value with the EXIDE flag. (Depending on the Arbitration IDs of other CAN frames on the bus, other extended CAN frames will also be accepted, for example 0x15613A2C, 0x16613A2C, 0x17613A2C, 0x14713A2C, and so on.)
Filter 1	0x0	Not used
Mask 1	0x1FFC0000	A mask stringent on the standard arbitration bits but allowing all the extended arbitration bits.
Filter 2	0x07B00000	Value of standard Arbitration ID filter after mapping it to its 32-bit value. Do not set the EXIDE flag. This filter captures only the 0x1EC standard CAN frame.
Filter 3 - 5	0x0	Not used

SENDING CONFIGURATION DATA TO THE I/O UNIT

When you are ready to send all module configuration data to the I/O unit, do the following steps:

1. With the configuration file open in PAC Manager, choose Tools > Send Configuration to I/O Unit.
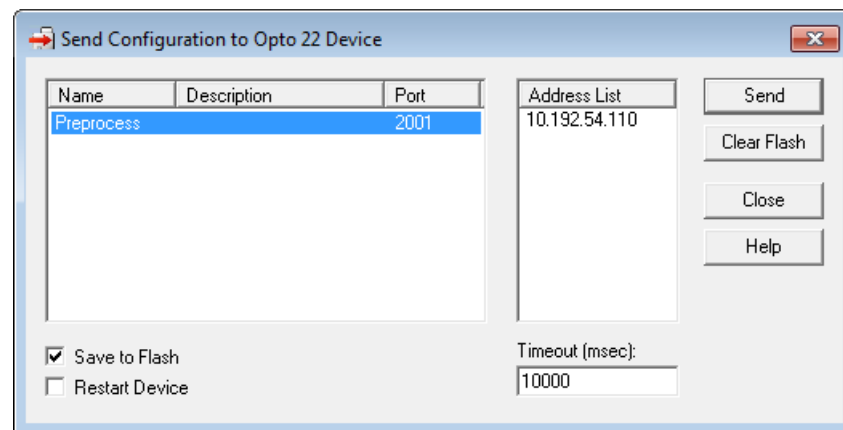
The Send Configuration dialog box appears.

The list on the left shows all the I/O units in this configuration file. When you click a unit, the Address List shows the IP addresses for all I/O units to receive the configuration.

2. Highlight the I/O unit configuration(s) you want to send.

3. Highlight the IP addresses to receive the I/O unit configuration.

If you don't highlight any addresses, the configuration will be sent to the entire list.

NOTE: If you highlighted more than one unit configuration, each unit configuration will automatically be sent to all the IP addresses associated with it.

4. If necessary, change the Timeout field.

The timeout field shows how long, in milliseconds, PAC Manager will try to communicate with the I/O unit before returning a timeout error.

5. In addition to downloading the configuration to RAM, if you also want the configuration to survive a power cycle, check Save to Flash.

6. To also restart the unit, check Restart I/O Unit.

IMPORTANT: If you have changed an IP Port number, you must save the change to flash and restart the I/O unit.

7. Click Send.

The configuration data is sent to the I/O units whose IP addresses you chose.

USING THE SNAP-SCM-ST2 MODULE COMMANDS

In order to use the commands for this module, first you need to establish an Ethernet connection in the software application that communicates with the serial device attached to the ST2 module. For instructions, first see "Establish an Ethernet Connection" on page 12.

The SNAP-SCM-ST2 module supports the following pulse output commands in PAC Control:

- **SetPulseFrequency** outputs a set frequency until instructed to do otherwise.
- **SetPulseSequence** ramps from one frequency to another.
- **ReadPulseFrequency** returns a string representing a channel's current frequency.

These commands are not part of the PAC Control command set. Rather, they are entered in a PAC Control strategy as parameters in a Transmit/Receive String command (or OptoScript TransmitReceiveString command).

The Transmit/Receive String command sends the pulse output command to the processor and then waits for a response. For more information on the Transmit/Receive String command, see form 1701, *PAC Control Command Reference*.

Command examples shown below are in OptoScript, but you can accomplish the same thing with the standard command. Syntax for the OptoScript TransmitReceiveString command is:
`TransmitReceiveString`(*String, Communication Handle, Put Result in*)

ReadPulseFrequency

NOTE: This command requires SNAP-SCM-ST2 module firmware version R1.0d or newer, which is available as a download file on the Opto 22 website. For installation instructions, see form 1704, PAC Manager User's Guide.

If successful, this command returns a string representing a channel's current frequency. If the command fails, it returns 00 (0x3030).

The command has no parameters.

The returned frequency always shows four decimal places, and the sign reflects the channel's current direction. The string is terminated with an end-of-message character.

Examples of returned strings:

- 5000.0000
- 12.3456
- 0.0000
- −1.4290

Example

This example places the current frequency for *comSCMStPort1* into the *chan1Frequency* string variable:

```
nStatus = TransmitReceiveString(">ReadPulseFrequency()", comScmStPort1, chan1Frequency);
```

SetPulseFrequency

Outputs a set frequency until instructed otherwise.

The Frequency parameter indicates in hertz (Hz) the desired output frequency.

If Frequency is positive, then the module will assert the Direction pin. If Frequency is negative, then it will deassert the Direction pin. See "SNAP-SCM-ST2" on page 10 for descriptions of the Direction output pins.

Example 1

This OptoScript example outputs 50 kHz, 50% duty cycle, direction pin asserted. The result is placed in sReturn[1].

```
nStatus = TransmitReceiveString(">SetPulseFrequency(50000)", comScmStPort1, sReturn);
```

NOTE: The > in the string is required to parse the serial data sent to the module.

Example 2

This example stops pulsing on the channel. The result is placed in sReturn[1].

```
nStatus = TransmitReceiveString(">SetPulseFrequency(0)", comScmStPort1, sReturn);
```

Example 3

This example outputs 30 kHz, 50% duty cycle, direction pin deasserted. The result is placed in sReturn[1].

```
nStatus = TransmitReceiveString(">SetPulseFrequency(-30000)", comScmStPort1, sReturn);
```

1 Return string. If the command succeeds, it returns a string equal to an ASCII value of 01 (3031 hex). If the command fails, it returns 00 (3030 hex). No change occurs if it fails. Strings are terminated with an End-Of-Message (EOM) character.
The default EOM character is a Carriage Return, 0x0D. To change it, write to memory map address 0xF03A8200 for Module 0 Channel 0, 0xF03A8210 for Module 0 Channel 1, 0xF03A8220 for Module 1 Channel 0, etc. Only the most significant byte is used, bits 24 through 31. Also change this byte with the Set End-Of-Message Terminator in PAC Control.

SetPulseSequence

Ramps from one frequency to another. Once the Stop Frequency is reached, it continues to output the Stop Frequency until told otherwise.

Parameter	Units	Description
Start Frequency[a,b]	Hz	The initial frequency. Must be nonzero.
Stop Frequency[a,b]	Hz	The frequency you want to ramp to. May be zero.
Delta Frequency[c]	Hz	Frequency increments/decrements for each Time Slice. Must be non-zero.
Time Slice[d]	ms	How often the Delta Frequency is applied to the current frequency. The maximum value is 42,949,672.

a. If the Start Frequency and Stop Frequency are positive, the module will assert the Direction pin during the pulse sequence. If the Start and Stop Frequency are negative, it will deassert the Direction pin.

b. Start Frequency and Stop Frequency cannot have opposite signs (for example, you cannot ramp from –1000 to 1000 Hz).

c. Frequency can only change as fast as one half the period. In other words, at least one pulse must be executed before changing the frequency.

Example: If the current frequency is 100 Hz, then the period is $1 \div 100$ Hz = 0.01 s = 10 ms.

The pulse width is equal to half the period (5 ms in this example). So the frequency stays at 100 Hz for 5 ms minimum before changing. If Time Slice is less than half the period, see note **d**.

d. If Time Slice is less than one half the period of the current frequency, then the Delta Frequency is boosted proportionately.

Example: Current frequency = 100 Hz, Time Slice = 1 ms, and Delta Frequency = 10 Hz.

You would expect the frequency to increase/decrease 10 Hz every 1 ms. But since the frequency can only change as fast as one half the period (see note **c**) it won't update for at least 5 ms. At this time it will temporarily boost the Delta Frequency 5x, or increase the current frequency from 100 Hz to 150 Hz to make up for the missed Time Slices.

Example 1

This example ramps from 1 kHz to 25 kHz, 50% duty cycle, in 100 Hz steps every 10 milliseconds. Direction pin is asserted. Result is placed in sReturn[1].

```
nStatus = TransmitReceiveString(">SetPulseSequence(1000, 25000, 100, 10)", comScmStPort1, sReturn);
```

Example 2

This example ramps from 1 kHz to 25 kHz, 50% duty cycle, in 100 Hz steps every 10 milliseconds. Direction pin is deasserted. The result is placed in sReturn[1].

```
nStatus = TransmitReceiveString(">SetPulseSequence(-1000, -25000, 100, 10)", comScmStPort1, sReturn);
```

Example 3

NOTE: If you use "current" as the Start Frequency parameter, the module ramps to the stop frequency from its current frequency.

This example ramps from the channel's current frequency to 25 kHz, 50% duty cycle, in 1 Hz steps every 1 ms. Direction pin is asserted. The result is placed in sReturn[1].

```
nStatus = TransmitReceiveString(">SetPulseSequence(current, 25000, 1, 1)", comScmStPort1, sReturn);
```

1 Return string. If the command succeeds, it returns a string equal to an ASCII value of 01 (3031 hex). If the command fails, it returns 00 (3030 hex). No change occurs if it fails. Strings are terminated with an End-Of-Message (EOM) character. The default EOM character is a Carriage Return, 0x0D. To change it, write to memory map address 0xF03A8200 for Module 0 Channel 0, 0xF03A8210 for Module 0 Channel 1, 0xF03A8220 for Module 1 Channel 0, etc. Only the most significant byte is used, bits 24 through 31. Also change this byte with the Set End-Of-Message Terminator in PAC Control.

CONFIGURING SERIAL EVENTS AND REACTIONS

Data transmitted through a serial module can be used in any of the ways supported by the processor's multiple methods of communication. If you are using PAC Control, use logic in the PAC Control strategy to read and write serial data. See form 1700, *PAC Control User's Guide*, for more information.

If you are not using PAC Control, you can use PAC Manager to trigger reactions in response to a specific string received through a serial module. The string transmitted through the module is the event; the reaction in response to that event may include sending an SNMP trap, sending an email message, or turning bits on or off in the processor's Scratch Pad. To configure events and reactions, see the chapter "Setting Up Events and Reactions" in form 1704, *PAC Manager User's Guide*.

4: Additional Tasks

In this chapter:

LOADING NEW FIRMWARE

All SNAP Ethernet-based processors and SNAP serial communication modules contain firmware. Each device is shipped from the factory with the latest firmware installed.

If you need to load new firmware, see the *PAC Manager User's Guide* (form 1704) for instructions.

REMOVING A SERIAL MODULE

To remove a serial module, use the SNAP module tool that came with the module.

1. Turn off power to the rack.

   WARNING: Make sure power is off before continuing, or you will severely damage the module.

2. Remove the hold-down screws.

3. Holding the SNAP module tool as shown in the illustration at right, insert it into the notch at the base of the module.

   NOTE: If you are facing the rack with the processor on the left side, the notch is on the back of the module.

4. Squeeze the module tool against the module to open the release latch, and pull straight up on the module to remove it.

SNAP MODULE TOOL

RETENTION BAR

MODULE RETAINING SCREW HOLE

MODULE RELEASE LATCH (RETAINING SCREW HOLE UNDER MODULE RELEASE LATCH)
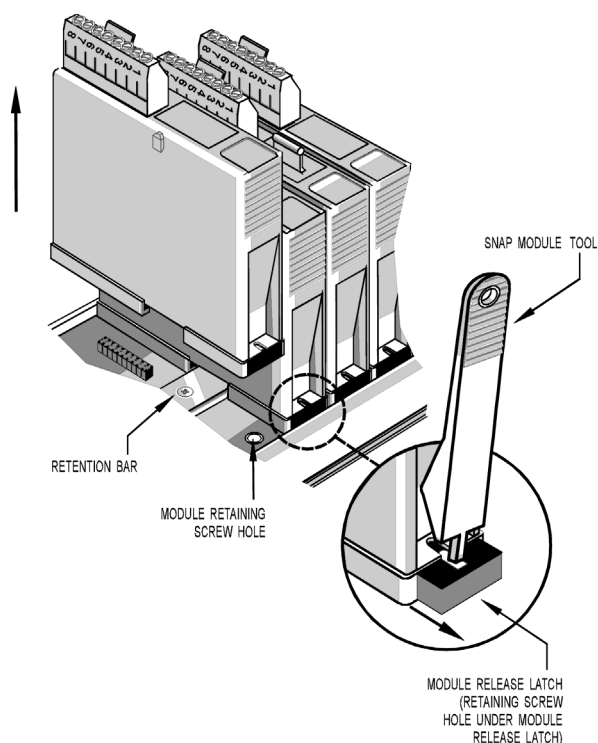
BUILDING A THREE-WIRE CABLE FOR SNAP-SCM-232

Two short, unshielded twisted-pair cables and two RJ45 to DB-9 (male) adapters are included with the SNAP-SCM-232 for easy connection to all types of RS-232 devices. If you need to build a three-wire cable to run from the PC to a serial module, use the table at right as a guide.

See the diagram on for pin locations.

RJ-45 pin number (on serial module)	Female DB-9 pin number (on PC)
2 (RX)	3 (TX)
3 (TX)	2 (RX)
5 (Sig Com)	5 (Sig Com)

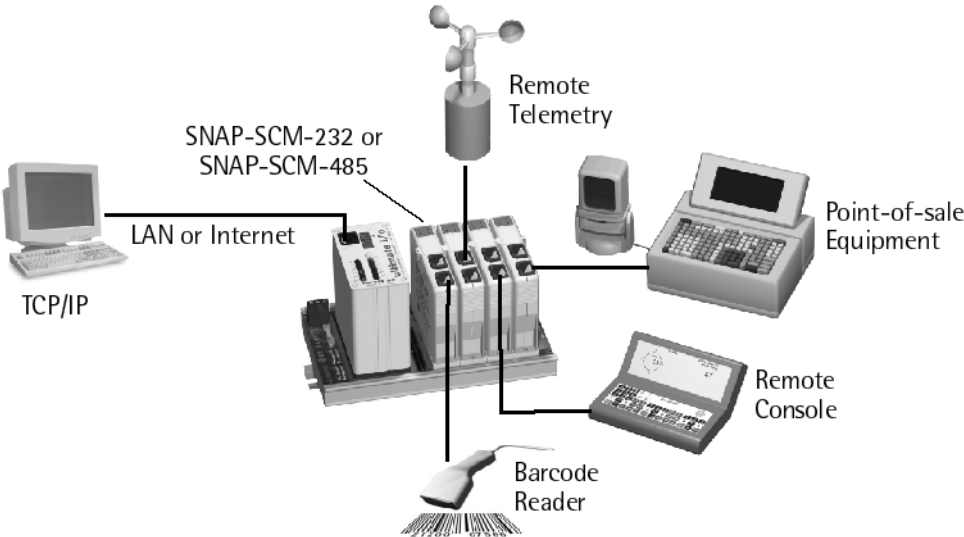# USING THE SNAP-SCM-232 OR SNAP-SCM-485-422 AS A WINDOWS COM PORT

For data collection from remote serial devices, where it is impossible or impractical to run serial cables, you can use a third-party software driver to redirect virtual Windows COM ports through the SNAP-SCM-232 or SNAP-SCM-485-422 module. In this way you can connect an existing Windows application that understands only serial communication to a remote SNAP Ethernet-based I/O unit attached to serial devices such as barcode readers, intelligent transducers, point-of-sale (POS) equipment, serial display devices, scanners, and weather monitoring equipment.

The COM port redirect expands the range of your serial application because it eliminates the necessity of a serial link between the PC and the serial device. The normal direct connection from the PC application to a serial device is shown in the following diagram:

Serial Cable 232/485 — Serial Device
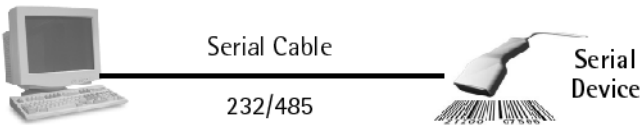
With redirection, the direct serial connection is not necessary. Serial devices can talk through a SNAP serial communication module to the PC application over a local area network or over the Internet using TCP/IP, as shown in the diagram below:

SNAP-SCM-232 or SNAP-SCM-485 — LAN or Internet — TCP/IP — Remote Telemetry — Point-of-sale Equipment — Remote Console — Barcode Reader

The third-party software driver you can use for redirection is a product of Tactical Software, LLC, and is available from their website at www.tacticalsoftware.com.

CAUTION: The serial port redirector captures Windows COM port data and routes it through a TCP/IP socket to the SNAP serial module. The overhead associated with redirection and network transport time may cause serial data to be intermittently transmitted. Data protocols relying on character timing transmission intervals are not recommended for redirection applications.

Also note that serial port handshaking signals, such as RTS and CTS, are not redirected. Some binary data protocols may not correctly function; check with the manufacturer.

Requirements

- Opto 22 SNAP Ethernet-based processor

  NOTE: A wireless SNAP Ethernet brain can be used, but you may find that bandwidth and response times are not sufficient for your application.

- Opto 22 SNAP-SCM-232 or SNAP-SCM-485-422 serial communication module(s), on a SNAP rack attached to the processor
- Tactical Software's Serial/IP™ COM port redirector (from www.tacticalsoftware.com)
- Opto 22 PAC Manager (available from our website at www.opto22.com.

Configuring SNAP Serial Modules

Following directions in "Changing SNAP-SCM-232 and SNAP-SCM-485-422 Communication Parameters" on page 15, use PAC Manager to change serial module configuration as follows:
- Set Baud, Parity, Data Bits, and Stop Bits as required by the serial device you are communicating with.
- Set the EOM Char List to zeroes to allow data to pass through.
- Set Power-Up Test Message to NO, so that unwanted characters will not be sent to the Windows COM port application.

Installing Software

Read and follow Tactical Software's Serial/IP documentation to install the Windows serial port redirector.

Configuring Redirected COM Ports

When you install the driver, the Select Ports dialog box appears:
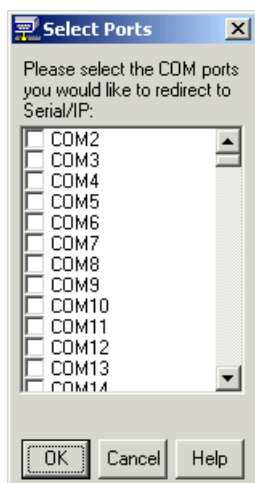
1. Check the box for each COM port you wish to redirect. Then click OK.
   The COM ports you checked appear in the Serial/IP dialog box:
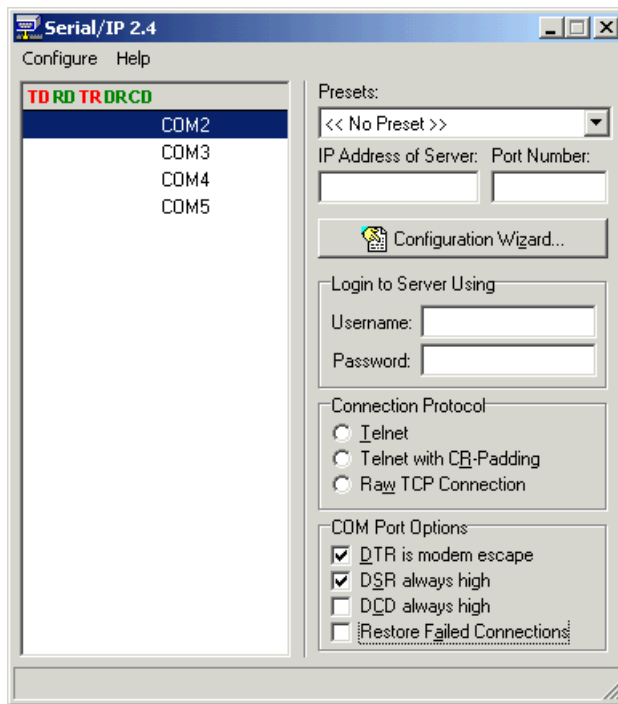
2. For each COM port, do the following:

   a. Click the COM port to highlight it.

   b. In the IP Address of Server field, enter the IP address of the SNAP Ethernet-based I/O unit this COM port will communicate with.

   c. In the Port Number field, enter the port number on the serial communication module where the device is connected (see the list of port numbers on page 12).

   d. In the Connection Protocol area, click Raw TCP Connection.

   e. Under COM Port Options, click Restore Failed Connections to make sure that the serial redirector will try to restore communication with the I/O unit if the I/O unit is reset or loses power. The DTR and DSR boxes can remain checked.

When you have finished, the dialog box will look something like this:

Configuration Wizard button
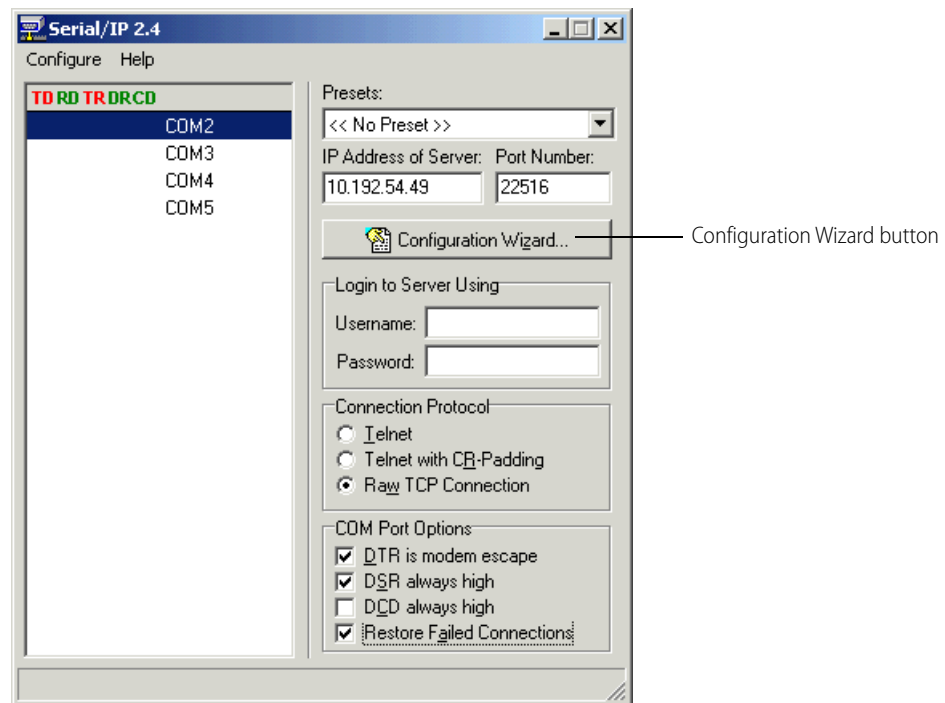
3. Click the Configuration Wizard button.
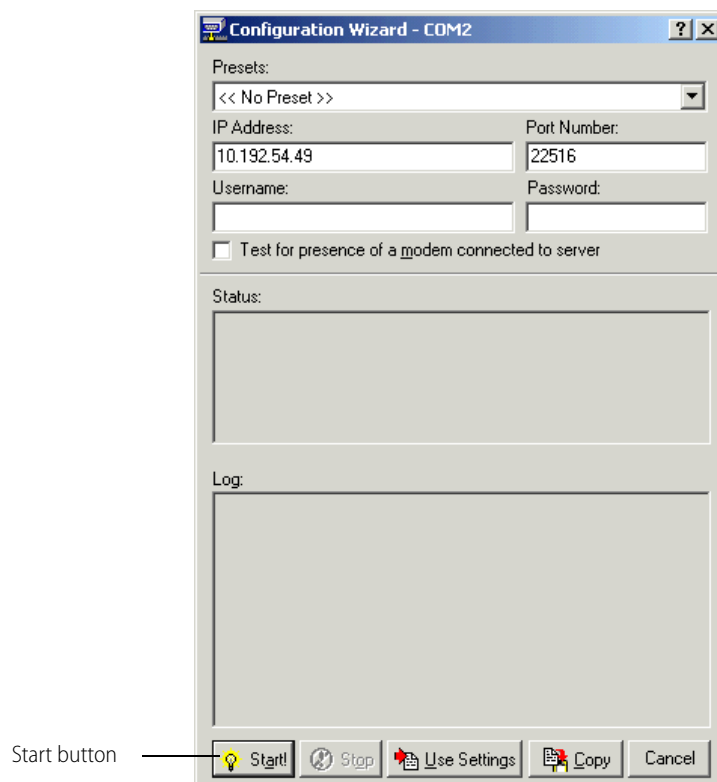
Start button

4. In the Configuration Wizard dialog box, press the Start button in the lower-left corner to test the connection.

Messages similar to the following appear in the Status and Log areas of the wizard:
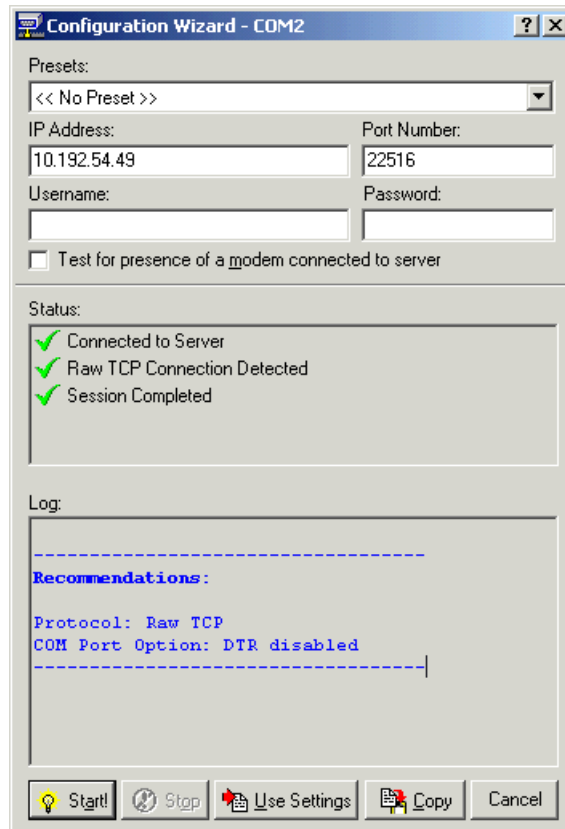
The driver is ready to use. You can close the window, as the driver runs in the background.

Consult Tactical Software's Serial/IP user's guide for additional information and troubleshooting.

A: Testing a SNAP-SCM-232 Ethernet Connection

If you are having trouble establishing an Ethernet connection or sending and receiving data to a SNAP-SCM-232, you may want to test the module without using an application such as PAC Control. The following steps use the Microsoft Windows® applications Telnet and HyperTerminal to talk to each other through the serial module.

1. Make sure you have not changed the serial module's default of sending a powerup test message. (See page 15.) Leave power to the SNAP Ethernet-based I/O unit turned off, so that HyperTerminal can capture the test message.

2. Plug the module's serial port into a PC serial port using a three-wire cable.

   If you need to build the cable, see page 34.

3. Start HyperTerminal (Start > Programs > Accessories > HyperTerminal) and open the serial port using the module's default settings: 9600 baud, no parity, 8 data bits, 1 stop bit, and no handshaking.

4. Turn on the I/O unit. Watch the TX LEDs on the serial module.

   The TX LEDs blink in the following pattern: three quick blinks to indicate power; then two blinks to indicate a connection to the processor; and finally a single blink to indicate transmittal of a test message like the following:

   ```
   Opto 22 SNAP-SCM232, Ver 00.01.01.01, Module 7, Port 0, 9600,N,8,1
   ```

   NOTE: The final single blink that indicates test message transmittal may be turned off. You can enable or disable it using the Configure Serial Module dialog box in PAC Manager.

5. From the Start menu, open a command prompt. Establish a Telnet connection to the port, using the IP address of the I/O unit and the IP port number of the serial port on the module.

   For example, type `Telnet 10.192.55.62 22500` to establish a connection to serial port 22500 (port 0 of the serial module in position zero) on an I/O unit with the IP address 10.192.55.62. See the table on page 12 for other port numbers.

6. Type anything in HyperTerminal.

   The characters should be transmitted through the serial port and appear on Telnet.

7. Type characters in Telnet.

   They are transmitted through the serial port and should appear on HyperTerminal.

If you continue to have trouble communicating with the module, contact Opto 22 Product Support. See page 3 for contact information.

B: Using SNAP Serial Modules with Legacy Hardware

In this appendix:

OVERVIEW

Some SNAP serial communication modules can also be used with the following legacy I/O processors on M-series or B-series mounting racks. Make certain you have the correct rack for the processor you are using (see the processor's user guide for information).

SNAP Ethernet:	SNAP-B3000-ENET
	SNAP-ENET-RTC
SNAP Simple:	SNAP-ENET-S64
SNAP Ultimate:	SNAP-UP1-ADS
	SNAP-UP1-M64

Minimum firmware for current and legacy processors is shown in the following table. Firmware must be the version shown or newer (higher) in order to work with the module described.

Module	Minimum Processor Firmware			
	SNAP PAC R SNAP PAC EB	SNAP Ethernet	SNAP Simple	SNAP Ultimate
SNAP-SCM-232 (No flow control)	All	R1.3h (1.3.2.7) with serial module firmware 1.1.2.5 or older R3.0a (3.0.2.0) with serial module firmware 1.1.2.B or newer	All	R1.0a (1.0.2.0)
SNAP-SCM-232 (With flow control)	All	R5.0a	All	R5.0a
SNAP-SCM-485 or SNAP-SCM-485-422 (2-wire RS-485)	All	R1.3h (1.3.2.7) with serial module firmware 1.1.2.5 or older R3.0a (3.0.2.0) with serial module firmware 1.1.2.B or newer	All	R1.0a (1.0.2.0)
SNAP-SCM-485-422 (4-wire RS-485/422)	All	R5.0a	All	R5.0a
SNAP-SCM-W2	All	R3.0k (3.0.2.10)	All	R1.0 (1.0.2.B)

Module	Minimum Processor Firmware			
	SNAP PAC R SNAP PAC EB	SNAP Ethernet	SNAP Simple	SNAP Ultimate
SNAP-SCM-PROFI	All	R6.1c	R6.1c	R6.1c
SNAP-SCM-CAN2B*	9.2a	Not supported		
SNAP-SCM-ST2	9.1a	Not supported		

* Module firmware R2.0b or higher required to transmit data on the CAN network.
Modules with lower module firmware can receive data only.

CHECKING THE FIRMWARE VERSION

If you need to check the processor's firmware version, follow these steps. You'll need to have PAC Manager installed on your computer. PAC Manager is available for free download from our website at www.opto22.com.

1. Start PAC Manager on a PC on the same Ethernet network as the processor:

Click the Windows Search button and type PAC Manager 10.0.
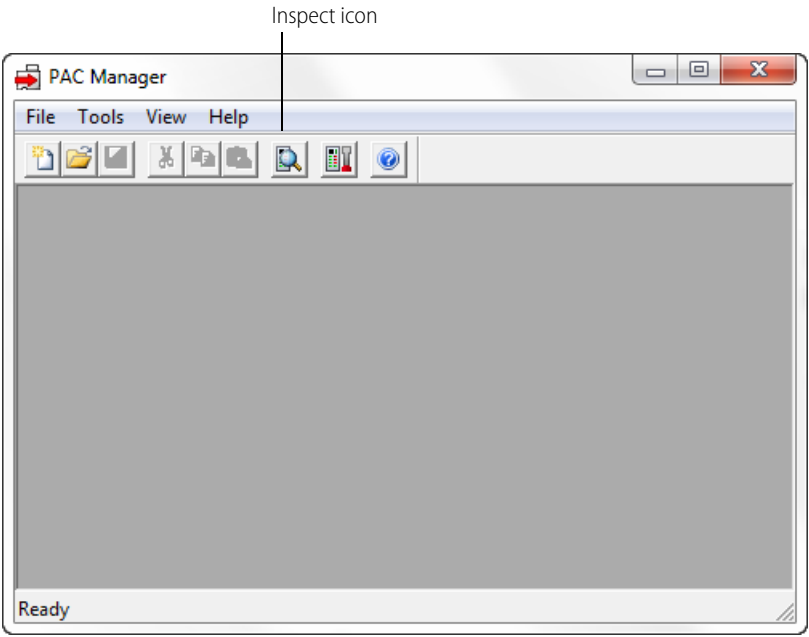
Inspect icon

2. In the PAC Manager main window, click the Inspect icon [icon] or choose Tools > Inspect.

3. In the Device Name field, type in the IP address of the I/O unit. Click the Status Read button at the top left side of the Inspect window.

The status information from the I/O unit is displayed in the window:
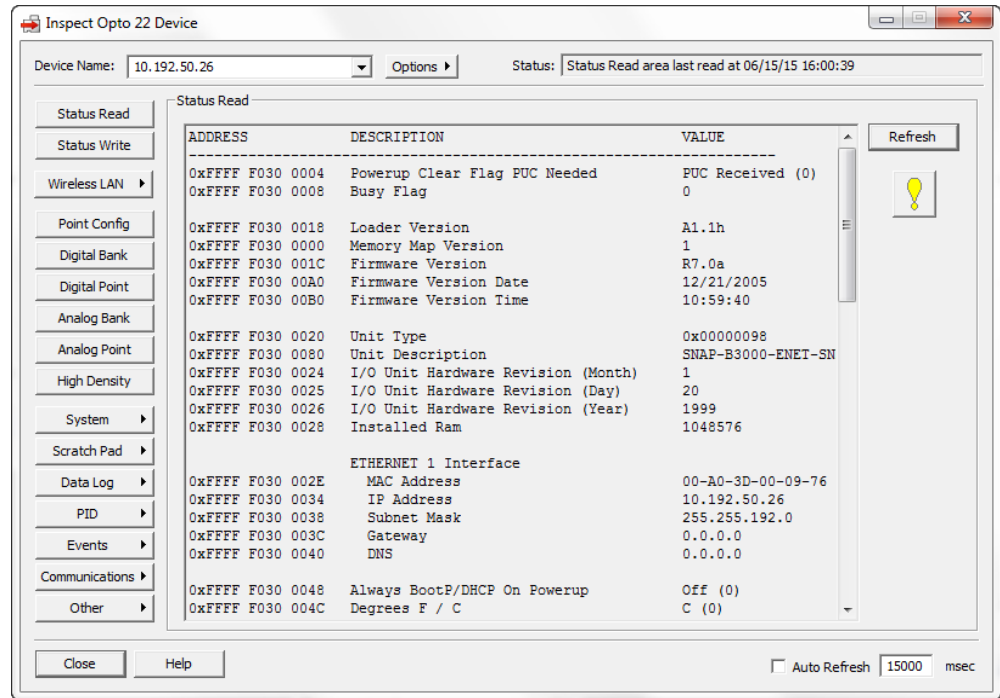
4. Find the value for Firmware revision (in the example above, R7.0a) and compare it to the required firmware version number in the table on . If the version number is older than the minimum processor firmware shown, follow instructions in the processor's user guide to download new firmware.

C: Specifications, LEDs, and Module Switches

In this appendix:

SPECIFICATIONS

SNAP-SCM-232 and SNAP-SCM-485-422 Specifications

Baud rates	300–115,200*
Channel-to-channel isolation	750 V$_{RMS}$
Logic supply voltage	5.0 VDC
Logic supply current	250 mA DC
Number of ports per module	2 (1 if SNAP-SCM-485-422 in 4-wire mode)
Max. number of modules per rack**	8
Maximum cable length, point-to-point (SNAP-SCM-232)	50 feet
Maximum cable length, multidrop (SNAP-SCM-485-422)	1,000 feet at 115,200 Kbd
Processor compatibility	SNAP PAC R-series controllers and SNAP PAC EB brains, both standard wired and Wired+Wireless models. Also SNAP-B3000-ENET, SNAP-ENET-RTC, SNAP-ENET-S64, SNAP-UP1-ADS, and SNAP-UP1-M64.
Operating temperature	-20 to 70 °C
Storage temperature	-30 to 85 °C
Torque, hold-down screws	Not to exceed 1 in-lb (0.11 N-m)
Torque, connector screws	5.22 in-lb (0.59 N-m)
Agency Approvals	UL, CE, RoHS, DFARS; UKCA ATEX (SNAP-SCM-485-422 only) NEBS (SNAP-SCM-232 only)
Warranty	30 months

* Module performance is limited by the number of serial modules on the SNAP rack. Each rack backplane provides approximately 2.5 Mbps of bandwidth.
** Maximum number of modules per rack assumes a 4A power supply (for example, SNAP-PS5).

SNAP-SCM-PROFI Specifications

Baud rates	9600 to 1.5 MBaud*
Channel-to-channel isolation	750 Vrms
Logic supply voltage	5.0 VDC
Logic supply current	250 mA
Number of ports per module	1
Maximum number of modules per rack*	8
Processor compatibility	SNAP PAC R-series controllers and SNAP PAC EB brains, both standard wired and Wired+Wireless models. Also SNAP-B3000-ENET, SNAP-ENET-RTC, SNAP-ENET-S64, SNAP-UP1-ADS, and SNAP-UP1-M64.
Processor firmware	Firmware 6.1c or newer required
Operating temperature Storage temperature	-20 to 70 °C -30 to 85 °C
Torque, hold-down screws	Not to exceed 1 in-lb (0.11 N-m)
Torque, connector screws	5.22 in-lb (0.59 N-m)
Agency Approvals	CE, RoHS, DFARS
Warranty	30 months

* Maximum number of modules per rack assumes a 4A power supply (for example, SNAP-PS5). Each rack backplane provides approximately 2.5 Mbps of bandwidth.
** With Opto 22 SNAP power supply and SNAP rack

SNAP-SCM-W2 Specifications

Channel-to-channel isolation	250 Vrms
Logic supply voltage	5.0 VDC (± 0.15)
Logic supply current	250 mA
Number of ports per module	2
Maximum number of modules per rack*	8
Maximum cable length	See table below
Processor compatibility	SNAP PAC R-series controllers and SNAP PAC EB brains, both standard wired and Wired+Wireless models. Also SNAP-B3000-ENET, SNAP-ENET-RTC, SNAP-ENET-S64, SNAP-UP1-ADS, and SNAP-UP1-M64.
Operating Temperature Storage Temperature	-20 to 70 °C operating -30 to 85 °C storage
Torque, hold-down screws	Not to exceed 1 in-lb (0.11 N-m)
Torque, connector screws	5.22 in-lb (0.59 N-m)
Agency Approvals	CE, RoHS, DFARS
Warranty	30 months

* With Opto 22 SNAP power supply and SNAP rack

SNAP-SCM-W2 Maximum Cable Lengths for Conductor Size

Cable Length	Conductor Size
Up to 200 ft. (60 m)	22 GA stranded or larger
Up to 300 ft. (90 m)	20 GA stranded or larger
Up to 500 ft. (150 m)	18 GA stranded or larger

SNAP-SCM-CAN2B Specifications

Baud rates	10–1000 Kbps*
Logic supply voltage	5.0 VDC
Logic supply current	250 mA DC
Number of ports per module	1
Max. number of modules per rack**	8
Processor compatibility	SNAP PAC R-series controllers and SNAP PAC EB brains, both standard wired and Wired+Wireless models, with firmware 9.2a or newer.
Operating temperature	-20 to 70 °C
Storage temperature	-30 to 85 °C
Torque, hold-down screws	Not to exceed 1 in-lb (0.11 N-m)
Torque, connector screws	5.22 in-lb (0.59 N-m)
Agency Approvals	UL, CE, RoHS, DFARS
Warranty	30 months from date of manufacture

* Module performance is limited by the number of serial modules on the SNAP rack. Each rack backplane provides approximately 2.5 Mbps of bandwidth.
** Maximum number of modules per rack assumes a 4A power supply (for example, SNAP-PS5).

SNAP-SCM-ST2 Specifications

Frequency Range	0.13–50,000 Hz
Pulse Width Range[1]	3.84 Sec to 10 µSec
Pulse Width Resolution	0–2 Hz, 2–30 Hz, 30–50,000 Hz
Output Frequency Accuracy	To calculate error (in Hz) for the desired frequency, use this equation and the resolution graphs on the next page: `Frequency Error (+/-) = Desired Frequency - (1 ÷ (Pulse Width Resolution + (1 ÷ Desired Frequency)))`
Output Format	CMOS/TTL Compatible
Logic Supply Voltage	5.0 VDC
Logic Supply Current	200 mA
Compatible I/O Processors	SNAP PAC R-series controllers and EB-series brains with R9.1a or newer firmware
Duty Cycle	Fixed at 50%
Number of Ports per Module	2
Operating Temperature Range	-20–60 °C
Storage Temperature Range	-30–85 °C
Torque, hold-down screws	Not to exceed 1 in-lb (0.11 N-m)
Torque, connector screws	5.22 in-lb (0.59 N-m)
Agency approvals	CE, RoHS, DFARS
Warranty	30 months from date of manufacture

[1]Pulse Width is equal to one-half the period.

SNAP-SCM-232 and SNAP-SCM-485 LEDs

LEDs are the same for SNAP-SCM-232 and SNAP-SCM-485-422 modules. Transmit and receive LEDs are provided for each port as shown in the diagram at right.

If you are using the SNAP-SCM-485-422 in 4-wire mode, only LEDs 1 and 3 are used.

Since SNAP-SCM-W2 modules receive but do not transmit, LEDs 1 and 2 are not used. LEDs 3 and 4 function as shown in the diagram.

LED Indicators, SNAP-SCM-232 and SNAP-SCM-485-422 (top view)
(SNAP-SCM-232 shown as example)

SNAP-SCM-PROFI LEDs

LED	Indication
1	TEST
2	TRANSMIT
3	POWER
4	RECEIVE

SNAP-SCM-CAN2B LEDs

LED	Type	Indicates
1	CAN Bus Activity	Communication activity with the CAN module. This LED illuminates while the module is being configured and when CAN data is received.
2	STATUS	2 blinks: SNAP-SCM-CAN2B firmware has started. 5 blinks: firmware error 8 blinks: CAN module error
3	POWER	Power is applied to the module.
4	ERROR	Error on the CAN bus. (For details, see next section.)

**Error LED Operation.** The #4 LED indicates an error on the CAN bus. Error codes include:

Error Codes	Description
0	Error—Active State. The SNAP-SCM-CAN2B has received less than 96 errors.
-1	Error—Active State. The SNAP-SCM-CAN2B has received 96 or more errors but less than 128 errors.
-2	Receiver Overflow. A CAN packet was dropped. This happens when the SNAP-SCM-CAN2B can't keep up with the traffic on the CAN bus. This means the internal buffer on the CAN2B module is full. This can happen if the strategy isn't reading the data fast enough, or too many serial modules are on the rack. To resolve it, you can: • Configure the Data Masks and Filters to receive fewer CAN packets. • Reduce the number of serial modules on the rack. • Increase how frequently the strategy reads the module.
-3	Error—Passive State. The SNAP-SCM-CAN2B has received 128 or more errors but less than 255 errors.

To clear the error, you can use PAC Manager or PAC Control to read the CAN module configuration from the memory map. (For the memory map addresses required to access the error codes, see form 1465, *OptoMMP Protocol Guide*, Appendix A: SNAP-SCM-CAN2B Serial Module Configuration-Read/Write.)

If your device has **SNAP-SCM-CAN2B Firmware R2.0b or higher**, the Error LED also illuminates when any bits are set in either the CAN bus error flags register or the CAN transport error flags register. For information on error flags, see form 2151, the *CAN RX/TX Integration Kit for PAC Project Technical Note*, "CAN Module Status Reply."
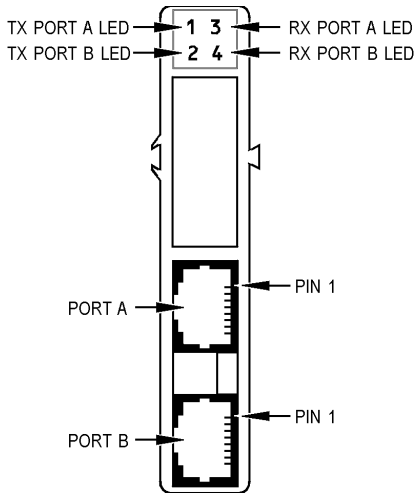
In addition to clearing the error by reading from the memory map, with firmware R2.0b, you can also clear the error by issuing an "S" command from the O22Can2BModuleCtrlStat subroutine (in the CAN Integration Kit for PAC Project). For more information, see form 2151, the CAN RX/TX Integration Kit for PAC Project Technical Note, "PAC Control Sample Subroutines."

SNAP-SCM-ST2 LEDs

LED	Description
1	Blinks when outputting pulses on channel 1
2	Positive/Negative direction indicator on channel 1
3	Blinks when outputting pulses on channel 2
4	Positive/Negative direction indicator on channel 2

MODULE SWITCHES

Module Switches—SNAP-SCM-PROFI

The SNAP-SCM-PROFI module is designed to work with either a standard PROFIBUS DP$^®$ cable or a custom-built PROFIBUS DP cable. The positions of the communication switches when used with a standard PROFIBUS cable are shown in the diagram at left.

If you are using a cable other than a standard PROFIBUS cable, set the switches as appropriate for the layout of your system.
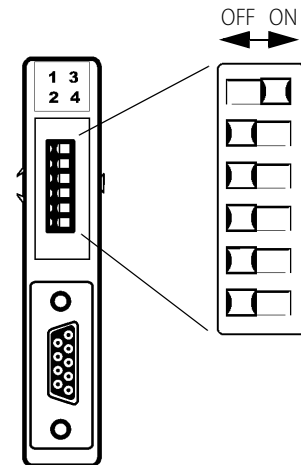
Module Switches—SNAP-SCM-W2

The switches on the top of the SNAP-SCM-W2 are set at the factory and should not be changed from their factory defaults. Factory default positions are shown in the diagram at left.