SNAP-LCM4
USER'S GUIDE

Form 1122-100622—June 2010

OPTO 22

43044 Business Park Drive • Temecula • CA 92590-3614
Phone: 800-321-OPTO (6786) or 951-695-3000
Fax: 800-832-OPTO (6786) or 951-695-2712
www.opto22.com

Product Support Services
800-TEK-OPTO (835-6786) or 951-695-3080
Fax: 951-695-3017
Email: support@opto22.com
Web: support.opto22.com

SNAP-LCM4 User's Guide
Form 1122-100622—June 2010

Copyright © 1998–2010 Opto 22.
All rights reserved.
Printed in the United States of America.

The information in this manual has been checked carefully and is believed to be accurate; however, Opto 22 assumes no responsibility for possible inaccuracies or omissions. Specifications are subject to change without notice.

Opto 22 warrants all of its products to be free from defects in material or workmanship for 30 months from the manufacturing date code. This warranty is limited to the original cost of the unit only and does not cover installation, labor, or any other contingent costs. Opto 22 I/O modules and solid-state relays with date codes of 1/96 or later are guaranteed for life. This lifetime warranty excludes reed relay, SNAP serial communication modules, SNAP PID modules, and modules that contain mechanical contacts or switches. Opto 22 does not warrant any product, components, or parts not manufactured by Opto 22; for these items, the warranty from the original manufacturer applies. These products include, but are not limited to, the OptoTerminal-G70, OptoTerminal-G75, and Sony Ericsson GT-48; see the product data sheet for specific warranty information. Refer to Opto 22 form number 1042 for complete warranty information.

Opto 22 FactoryFloor, Cyrano, Optomux, and Pamux are registered trademarks of Opto 22. Generation 4, ioControl, ioDisplay, ioManager, ioProject, ioUtilities, mistic, Nvio, Nvio.net Web Portal, OptoConnect, OptoControl, OptoDisplay, OptoENETSniff, OptoOPCServer, OptoScript, OptoServer, OptoTerminal, OptoUtilities, SNAP Ethernet I/O, SNAP I/O, SNAP OEM I/O, SNAP Simple I/O, SNAP Ultimate I/O, and SNAP Wireless LAN I/O are trademarks of Opto 22.

ActiveX, JScript, Microsoft, MS-DOS, VBScript, Visual Basic, Visual C++, and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries. Linux is a registered trademark of Linus Torvalds. Unicenter is a registered trademark of Computer Associates International, Inc. ARCNET is a registered trademark of Datapoint Corporation. Modbus is a registered trademark of Schneider Electric. Wiegand is a registered trademark of Sensor Engineering Corporation. Nokia, Nokia M2M Platform, Nokia M2M Gateway Software, and Nokia 31 GSM Connectivity Terminal are trademarks or registered trademarks of Nokia Corporation. Sony is a trademark of Sony Corporation. Ericsson is a trademark of Telefonaktiebolaget LM Ericsson.

All other brand or product names are trademarks or registered trademarks of their respective companies or organizations.

Table of Contents

Chapter 1: Introduction 1-1

What's In This Guide 1-2

For Help 1-2

SNAP-LCM4 Description 1-3

System Architecture 1-3

Ethernet Network 1-3

Serial Direct Connection 1-4

ARCNET Network 1-4

Remote Communication 1-4

LCM4 I/O Connection Options 1-5

Options 1-6

Interface Adapter Cards 1-6

Memory 1-6

Software 1-6

Chapter 2: Quick Start 2-1

What You Will Need 2-1

Instructions 2-2

Chapter 3: Jumpers and Communication 3-1

Setting Jumpers 3-1

Setting the Controller Address 3-2

Setting the Host Port 3-2

Setting the Host Port Baud Rate 3-3

Setting the Communication Mode 3-3

Setting the Boot Mode 3-3

AUTO and E/R Jumpers 3-3

X1 Jumper 3-4

Configuring Serial Ports 3-4

Removing the Serial Card 3-5

Configuring Port 0 3-5
COM0 RS-485 Configuration and Wiring 3-6
COM0 Modem Configuration and Wiring 3-7
Configuring Port 1 3-7
Configuring Ports 2 and 3 3-8
Pin Connections for COM2 and COM3 3-8
Setting the Mode for Port 2 3-9
Setting the Mode for Port 3 3-9
Connecting the Controller to Remote I/O 3-10
Downloading New Firmware 3-10

Chapter 4: Troubleshooting 4–1

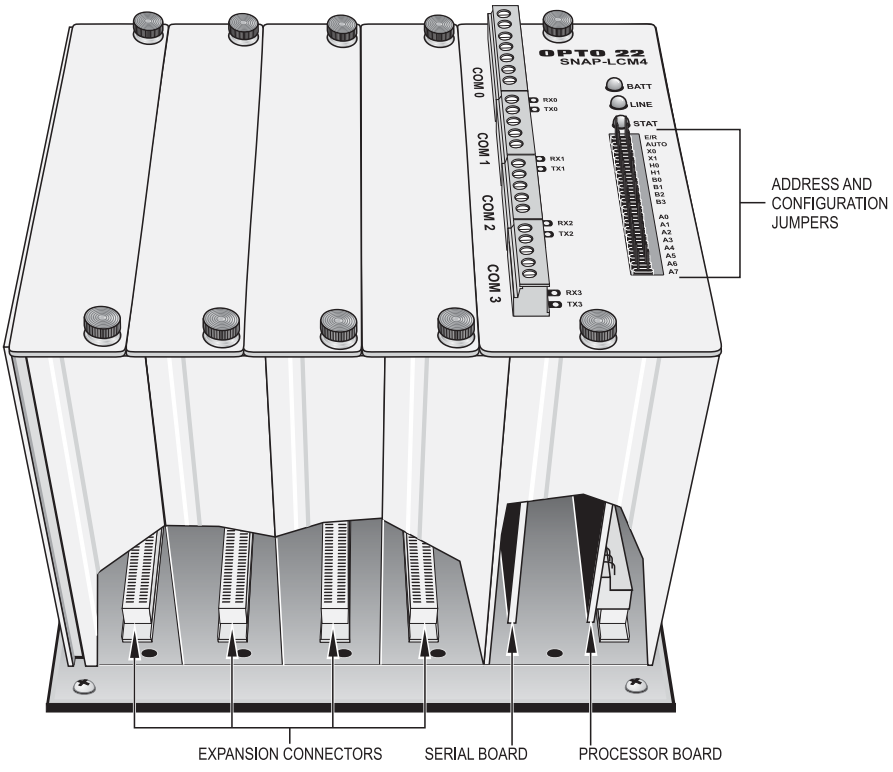
Appendix: Specifications A–1
LED Descriptions A-2
Dimensional Drawings and Mounting Diagrams A-3
DIN-Rail Mounting A-4
Cable Recommendations A-5
Ethernet A-5
Serial A-5
Power Supply Recommendations A-6
Third-Party Power Supply Vendors A-6

CHAPTER 1

Introduction

The SNAP-LCM4 is a powerful industrial controller that provides real-time control and communication to input/output (I/O) systems, serial devices, motion controllers, and networks.

The SNAP-LCM4 controller is designed for use with Opto 22's SNAP or Mistic remote I/O systems and Opto 22 FactoryFloor® software for industrial automation. The SNAP-LCM4 provides the flexibility of Ethernet, ARCNET, serial, or remote communication options.



What's In This Guide

This guide includes the following:

- **Chapter 1—Introduction** discusses applications, options, and software for the LCM4.
- **Chapter 2—Quick Start** shows how to install a generic SNAP-LCM4 controller using factory settings.
- **Chapter 3—Jumpers and Communication** gives detailed instructions for changing factory settings.
- **Chapter 4—Troubleshooting** helps solve problems you may encounter.
- **Appendix—Specifications** includes specifications and dimensional drawings, as well as DIN-rail mounting diagrams and information on cables and power supplies to use with the SNAP-LCM4.

For Help

If you have problems installing or using the SNAP-LCM4 controller and cannot find the help you need in this guide, contact Opto 22 Product Support.

Phone:	800-TEK-OPTO (835-6786) 951-695-3080 (Hours are Monday through Friday, 7 a.m. to 5 p.m. Pacific Time)
Fax:	951-695-3017
Email:	support@opto22.com
Opto 22 website:	www.opto22.com

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

When calling for technical support, be prepared to provide the following information about your system to the Product Support engineer:

- Software and version being used
- Controller firmware version
- PC configuration
- A complete description of your hardware and operating systems, including:
  - jumper configuration
  - accessories installed (such as expansion daughter cards)
  - type of power supply
  - types of I/O units installed
  - third-party devices installed (for example, barcode readers)

- Specific error messages seen.

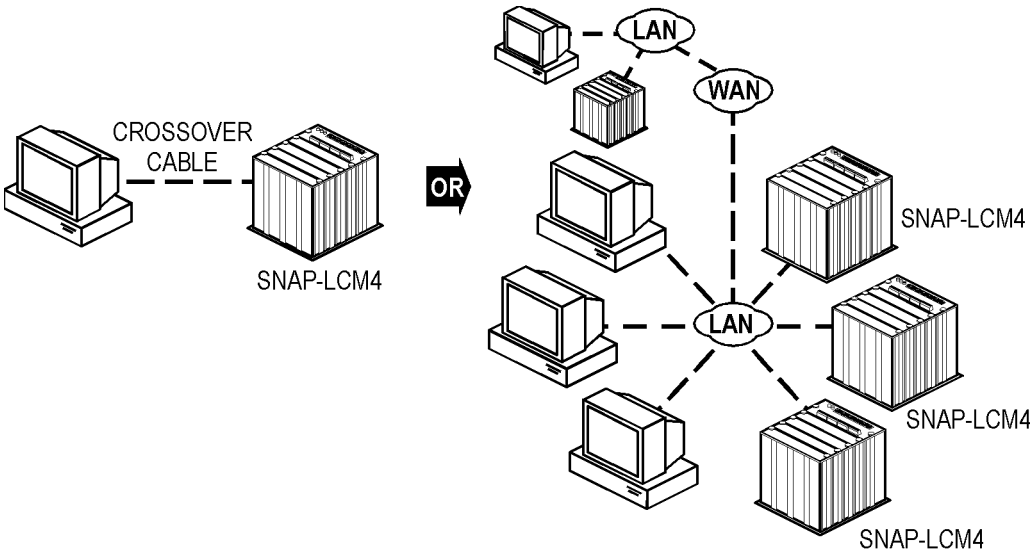
SNAP-LCM4 Description

System Architecture

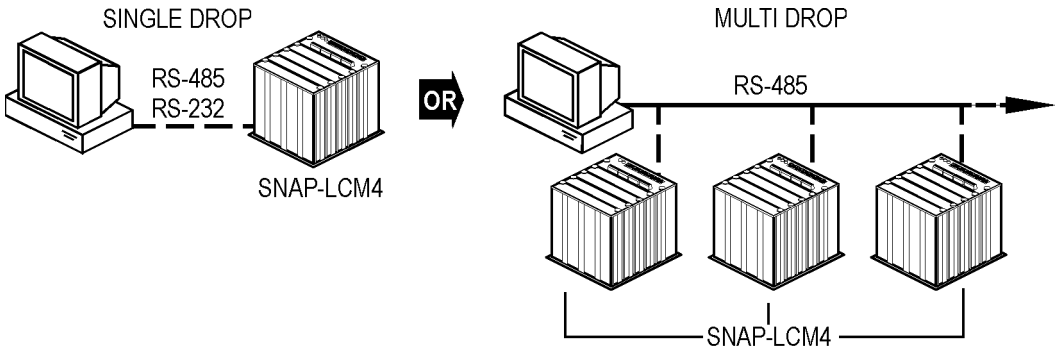
The SNAP-LCM4 is designed for easy configuration in a variety of communication scenarios, including Ethernet, serial, ARCNET, and remote connections. It can be integrated with Opto 22's digital and analog I/O systems as well as with other intelligent equipment devices, such as industrial PCs, M4RTUs, or other Opto 22 controllers.

The following diagrams show the versatility of communications using the SNAP-LCM4.

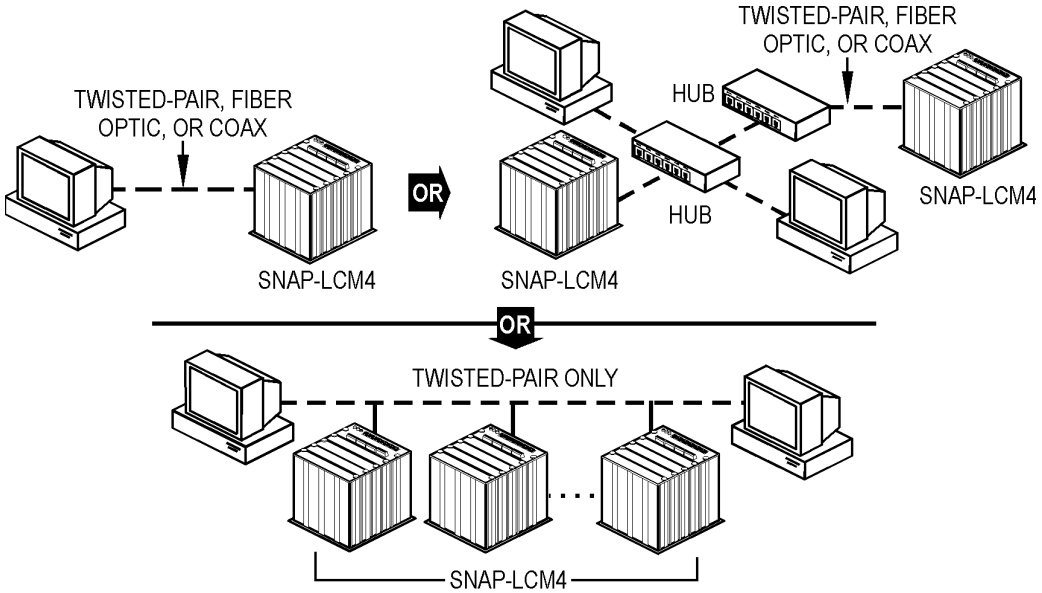
Ethernet Network



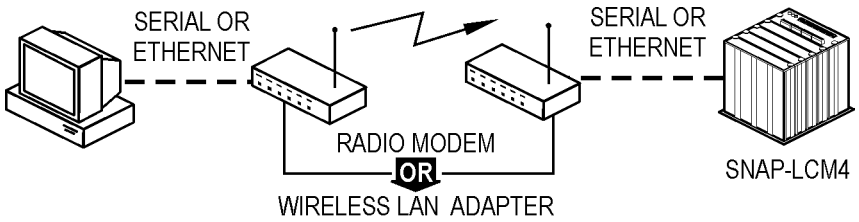
Serial Direct Connection



ARCNET Network

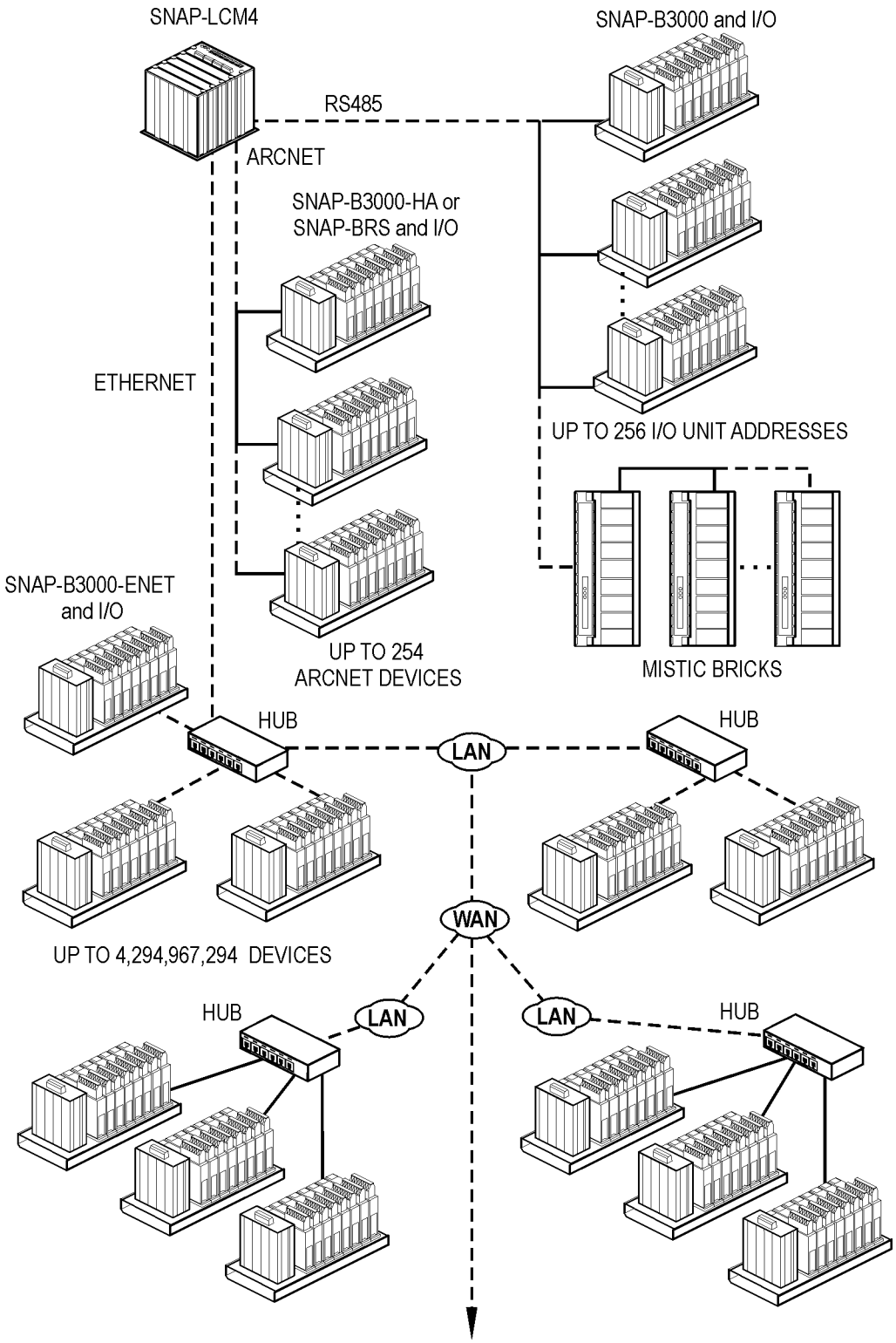


Remote Communication



Using these communication options, the LCM4 can connect to a variety of Opto 22 I/O, as the following diagram demonstrates:

LCM4 I/O Connection Options



Options

Interface Adapter Cards

The SNAP-LCM4 has four expansion slots that can accommodate the following communication interface cards. (For installation information, see the interface card documentation.)

Interface Adapter Card	Use	Current Draw
M4SARC	High-performance coaxial ARCNET	200 mA
M4DUALARC	Dual twisted-pair ARCNET (for HA brains)	150 mA
M4SARCF	Fiber optic ARCNET	250 mA
M4SARCFR	Fiber optic ARCNET with repeater	350 mA
M4SENET100	10/100 Mbps Ethernet* (Cat. 5 UTP)	1.00 A

*NOTE: Only one Ethernet card per controller is supported at this time. The Ethernet card currently accommodates 128 sessions, including FactoryFloor, Ethernet brains, and other Ethernet devices.

Memory

Memory (RAM and Flash EEPROM) is not expandable.

Software

The SNAP-LCM4 controller is designed to work with Opto 22's FactoryFloor software suite, which consists of four integrated components:

- OptoControl™, a graphical, flowchart-based development environment for machine control and process applications, which can run on a real-time industrial controller such as the SNAP-LCM4 or in a pure Microsoft® Windows NT® environment
- OptoDisplay™, an intuitive, shared database, human-machine interface (HMI) and trending package
- OptoServer™, a robust, OPC-compliant data server that connects the controller network with the PC network
- OptoConnect™, a bi-directional link between the SNAP controller database and Microsoft's SQL Server® and Access® databases.

The SNAP-LCM4 controller is programmed using OptoControl on a PC workstation. OptoControl is easy to use and self-documenting. It uses a plain English command set and a long tagname database shared by all FactoryFloor components.

The SNAP-LCM4 also works with Opto 22's Classic 16-bit software: Cyrano, Mistic MMI, and Mistic Data Server (MDS).

CHAPTER 2

Quick Start

This section gives quick instructions for installing a generic SNAP-LCM4 controller using factory-default settings, which are shown on page 3-1. If you are not using the factory defaults, see the detailed instructions in the following sections:

For help with	See page
Setting jumpers:	3-1
• controller address	3-2
• host port	3-2
• host port baud rate	3-3
• boot mode	3-3
Opening the controller and configuring the serial ports	3-4
Connecting the controller to remote I/O	3-10

What You Will Need

- SNAP-LCM4 controller
- +5 VDC power supply
- PC with OptoControl and a free RS-232 serial port
- RS-232 cable
- multimeter
- small flathead screwdriver
- pair of wire strippers/cutters.

Instructions

1. Unpack the controller. Check to make sure you have the following:
   - SNAP-LCM4 controller
   - jumpers
   - connectors
   - 3.6-V lithium backup battery
   - floppy disk containing firmware.

2. With the power supply off or unplugged, connect it to the controller.

   The SNAP-LCM4 controller requires only 5 VDC power, which can be supplied by the Opto 22 SNAP-PS5 or any 5 V power supply meeting SNAP-LCM4 power requirements.

   The controller does not have a power switch; to turn it off, switch off the power supply.

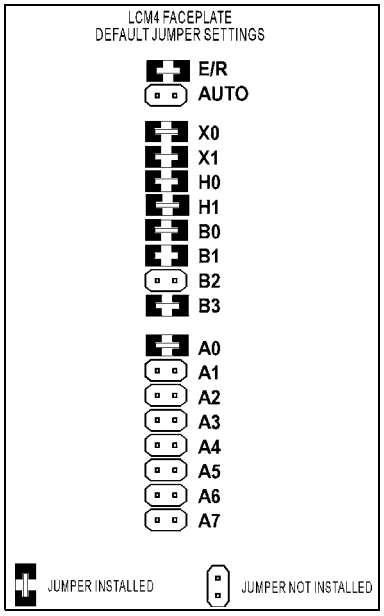
   CAUTION

   Reversing wire polarity may cause damage to your controller. This damage is not covered by Opto 22's warranty. If in doubt about which wire is which on your power supply, check with a meter.

   a. With the power supply off or unplugged, connect the +5 V lead from the power supply (normally red) to the +5V terminal on the SNAP-LCM4 backplane.
   b. Connect the COM wire from the power supply (normally black) to the GND terminal on the SNAP-LCM4 backplane. Optionally, you can connect the earth ground terminal to panel ground.

3. If necessary, change the configuration jumpers.

   Default jumper settings are as follows:



Default Jumper Settings

EEPROM/RAM:	Run from RAM
Autoboot:	Disabled
Communication:	Binary
BootLoader:	Boot to kernel
Host port:	COM 0
Baud rate:	38.4 K
Address:	1

If you are not using factory defaults, see Chapter 3 to change the jumpers.

4. If necessary, install optional adapter cards.

   See the data sheet for the adapter card for complete installation instructions.

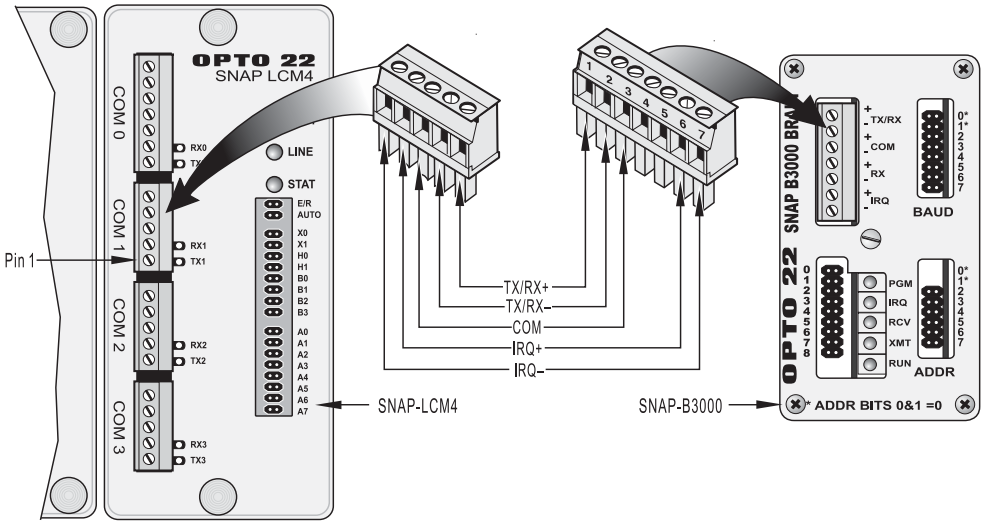
5. Mount the SNAP-LCM4.

   The SNAP-LCM4 controller can be panel-mounted or mounted on a DIN rail. DIN-rail mounting requires a DIN clip package, part number SNAP-LCM4DIN (not included). For dimensional drawings, see page A-3.

   - For panel mounting, use two screws on each side of the SNAP-LCM4 controller to mount it to a panel.
   - For DIN-rail mounting, see instructions on page A-4.

6. Connect the SNAP-LCM4 controller to Opto 22 I/O units.

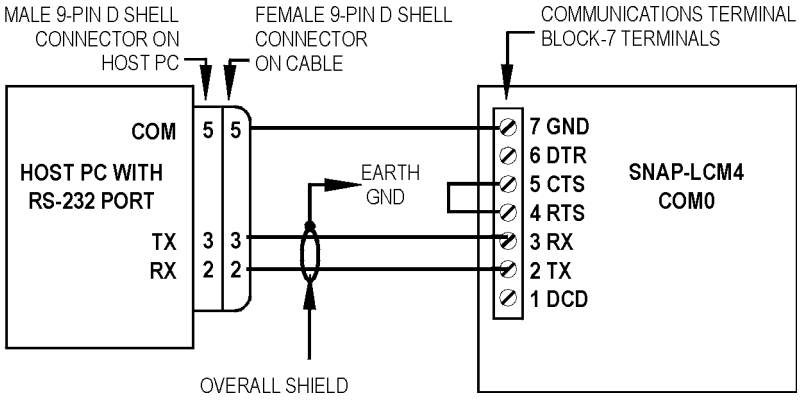
   Use the built-in COM1 port to communicate with Opto 22 digital or analog (or both) I/O. Set up the I/O unit as shown in its installation guide. The diagram below illustrates connection with a B3000 brain board:



7. Connect the SNAP-LCM4 controller to a personal computer (PC).

   You can start with a pre-wired RS-232 cable that you don't mind cutting, or you can make your own cable. Cut off the end of the cable that DOES NOT plug into the computer and wire the cable as shown in the diagram on the following page.

Important: If RTS and CTS are not used, be sure to connect RTS to CTS on the SNAP-LCM4 as shown below.



8. Configure the controller using OptoControl.

In order to be useful with a SNAP-LCM4 controller, a PC must have at least one element of Opto 22's FactoryFloor software suite installed: OptoControl, OptoDisplay, OptoServer, or OptoTerm. This guide assumes that you will configure the controller using OptoControl. For instructions, see the *OptoControl User's Guide* (Opto 22 Form number 724).

Cycle power to the SNAP-LCM4 by flipping the power supply's power switch off, waiting 10 seconds, then turning it on again. Any change to configuration jumpers will only take place after power is cycled.

9. Verify communications by using the OptoTerm utility included with FactoryFloor.

a. Choose Start→Programs→Opto22→OptoUtilities→OptoTerm.

b. In the OptoTerm main window, double-click the controller's name in the list.

c. Look for a window displaying information about the controller.

d. If the window does not appear, make sure you cycled power to the controller after any change. If it still doesn't appear, check wiring connections and jumper settings.

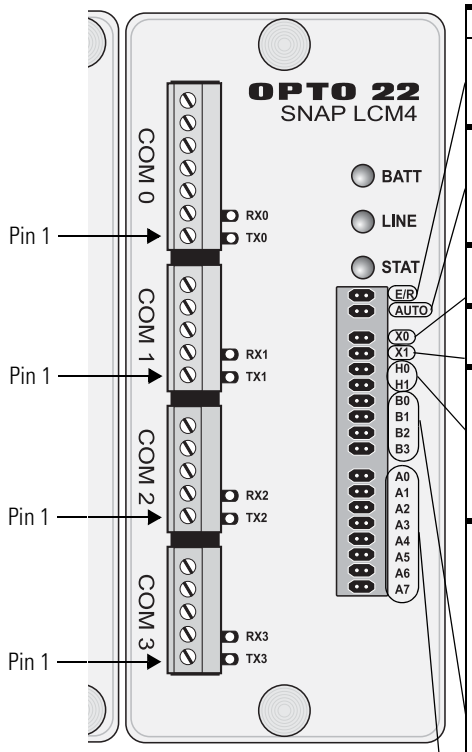
Your SNAP-LCM4 controller is now ready to run OptoControl strategies.

CHAPTER 3

Jumpers and Communication

Setting Jumpers

The following table summarizes faceplate jumper settings. Shaded entries show default settings.

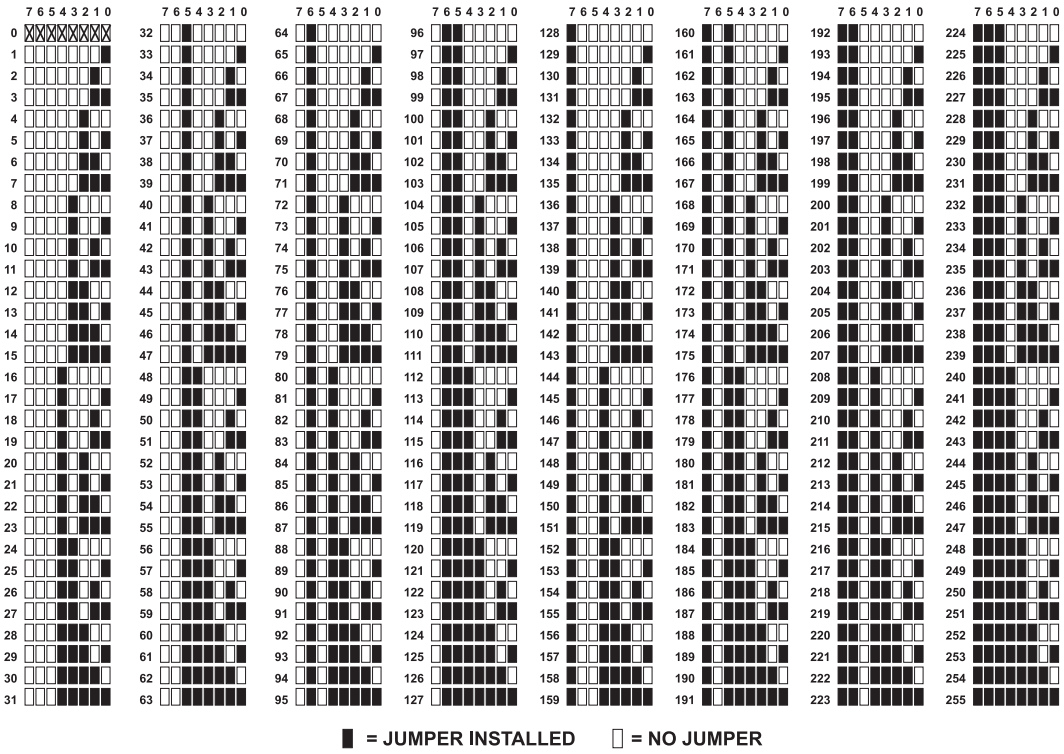


Jumper(s)	Description	Position				Setting
E/R	EEPROM/RAM	In				Run from RAM
		Out				Run from EEPROM
Auto	Autoboot	In				Autoboot enabled
		Out				Autoboot disabled
X0	Communication	In				Binary
		Out				ASCII
X1	Boot Loader	In				Boot to kernel
		Out				Boot to loader
H0, H1	Host Port	H0		H1		—
		In		In		COM0
		Out		In		COM1
		In		Out		ARCNET
		Out		Out		Ethernet
Baud 0–3	Baud Rate	B0	B1	B2	B3	—
		Out	In	In	In	115.2 KBd
		In	Out	In	In	76.8 KBd
		Out	Out	In	In	57.6 KBd
		In	In	Out	In	38.4 KBd
		Out	In	Out	In	19.2 KBd
		In	Out	Out	In	9600 Bd
		Out	Out	Out	In	4800 Bd
		In	In	In	Out	2400 Bd
		Out	In	In	Out	1200 Bd
		In	Out	In	Out	600 Bd
		Out	Out	In	Out	300 Bd
Address 0–7	Address Bits	Bit 0 In				1
		Bit 1 In				2
		Bit 2 In				4
		Bit 3 In				8
		Bit 4 In				16
		Bit 5 In				32
		Bit 6 In				64
		Bit 7 In				128

Setting the Controller Address

Each Opto 22 controller connected to a host computer must have a unique address between 1 and 255 (1 and FF hexadecimal). Zero is not a valid address. The following table shows possible addresses and their corresponding jumper settings. The factory default is 1. The most significant bit is 7 and the least significant bit is 0.

Address Jumpers



Setting the Host Port

The controller host port jumpers H0 and H1 determine which port the controller's default host task will be started on. Because the host task is required for communication to any of Opto 22's programming or interface software, the default host port must be set to the port attached to the host computer. The factory setting is COM0.

You can change the host port to COM1, as shown in the table at right. However, in general it should not be used this way with I/O, since COM1 was designed to communicate with I/O.

COM Port	H0	H1
COM0	In	In
COM1	Out	In
ARCNET	In	Out
Ethernet	Out	Out

Setting the Host Port Baud Rate

The factory setting for the host port baud rate is 38.4 KBd, but baud rates from 300 Bd to 115.2 KBd are selectable using jumpers B0 through B3. In general, it is best to choose the fastest baud rate the host computer and the controller will both support. Lower baud rates may be necessary for long cable runs, in high-noise environments, or for compatibility with modems or other data transmission equipment.

The table at right shows jumper settings for available baud rates. The shaded entry is the default setting.

Baud Rate	B0	B1	B2	B3
115.2 KBd	Out	In	In	In
76.8 KBd	In	Out	In	In
57.6 KBd	Out	Out	In	In
38.4 KBd	In	In	Out	In
19.2 KBd	Out	In	Out	In
9600 Bd	In	Out	Out	In
4800 Bd	Out	Out	Out	In
2400 Bd	In	In	In	Out
1200 Bd	Out	In	In	Out
600 Bd	In	Out	In	Out
300 Bd	Out	Out	In	Out

Setting the Communication Mode

You can select ASCII or binary communication mode using jumper X0. The factory default is binary, which is generally faster than ASCII. ASCII is typically used only for compatibility with modems or other data transmission equipment, or with host devices that for some reason cannot support binary mode.

Communication Mode	X0
Binary	In
ASCII	Out

Setting the Boot Mode

The boot mode jumpers determine how the controller acts when it is turned on. The AUTO, E/R, and X1 jumpers set the boot mode.

AUTO and E/R Jumpers

The AUTO jumper determines whether the controller automatically starts running your strategy (autoboot) or waits until instructed to do so by the host computer. The E/R jumper determines whether the strategy is executed from battery-backed RAM or from Flash ROM. The factory settings are non-autoboot and execute from RAM.

There is no operational difference between execution from battery-backed RAM or ROM, except that the SNAP-LCM4 has significantly more space available in RAM for program storage. The drawback to execution from RAM is that the program is lost when the backup battery dies. (Battery life typically exceeds three years.)

Before the controller will execute a program from ROM, you must have stored the program in Flash ROM by selecting that download function in OptoControl. In general, it is best to wait until program development is complete to use the autoboot feature or store the program in Flash ROM.

X1 Jumper

Under normal conditions, you can update the controller firmware with the X1 jumper in the default position (boot to kernel).

If the firmware in the controller has somehow been corrupted, however, and the controller cannot execute its full kernel properly, remove this jumper. Removing the X1 jumper sets the controller to "boot to loader" mode, preparing it to receive the firmware download from the loader.

The table at right shows Auto, E/R, and X1 jumper settings. Default settings are shaded.

Boot Mode	Auto	E/R	X1
Autoboot enabled	In		
Autoboot disabled	Out		
Run from RAM		In	
Run from EEPROM		Out	
Boot to kernel			In
Boot to loader			Out

Configuring Serial Ports

The SNAP-LCM4 comes with four serial ports:

- COM0 is selectable as RS-232, RS-485 half-duplex (2-wire), or RS-485 full duplex (4-wire). The default mode is RS-232 for connection to a PC. In RS-232 mode, COM0 also supports RTS and DTR/DCD flow control for use with modems.
- COM1 is an Opto 22 remote I/O port (half-duplex RS-485 only).
- COM2 and COM3 are both configurable either as RS-232 or as half- or full-duplex RS-485. The default mode is RS-232. In RS-232 mode, COM2 and COM3 support RTS flow control only. Interrupt (IRQ) functionality is available in RS-485 2-wire mode only.

Since most systems use the default modes, it's not normally necessary to configure serial ports. However, if you need to change the serial port configuration, you must open the controller and set configuration jumpers on the serial card inside. See page 5 for instructions.

In addition, all COM ports communicate using the following defaults:

Baud rate = 115,200

Parity = None

Data Bits = 8

Stop bit = 1

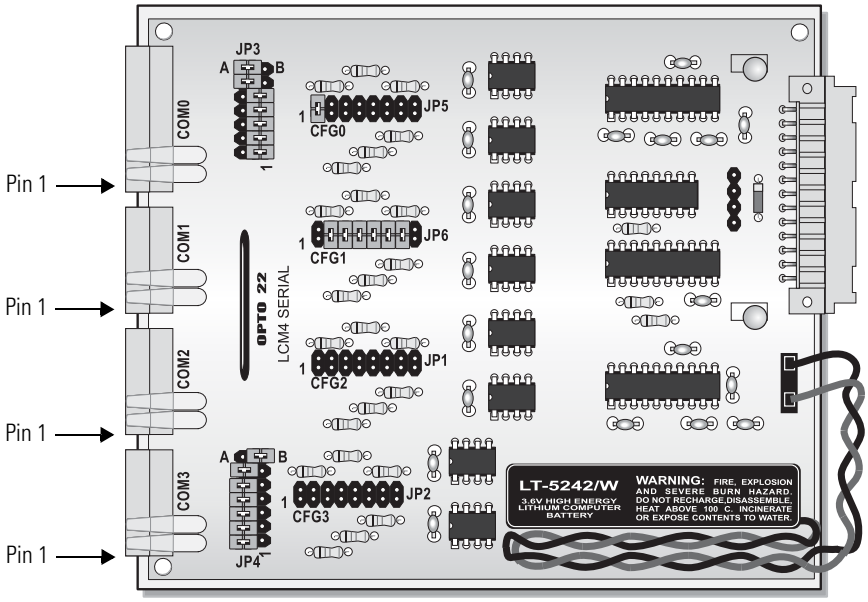
CTS = Disabled

If you need to change these defaults, use the OptoControl command Configure Port. See the *OptoControl Command Reference* (Opto 22 form #725) for details on using the command.

Removing the Serial Card

Remove the faceplate thumbscrews and the faceplate. Carefully pull straight up on the serial card (the one with the port connectors) to remove it.

The internal jumpers are shown in the diagram on the following page.

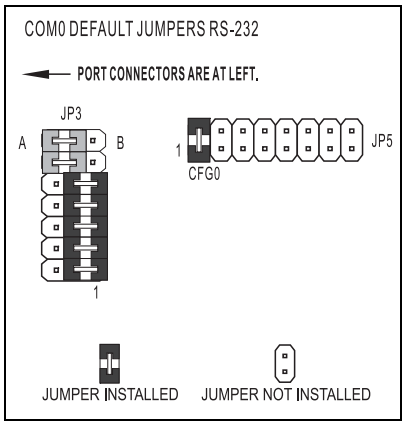


To change the serial port configuration, set jumpers on the serial card for each port as illustrated in the following sections.

Configuring Port 0

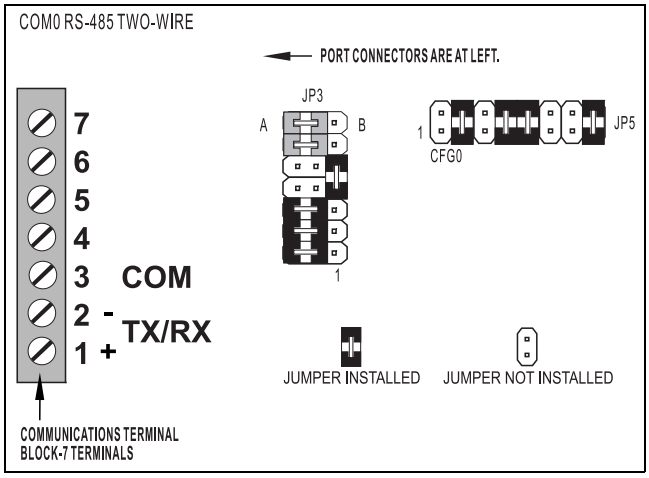
The default mode for COM0 is RS-232, and the wiring diagram is shown on page 2-4. Jumper groups JP3 and CFG0 control COM0. Default jumper settings are shown in the diagram at right. Note that only some of the jumpers in JP3 control COM0; the jumpers shown grayed out are included for reference only.

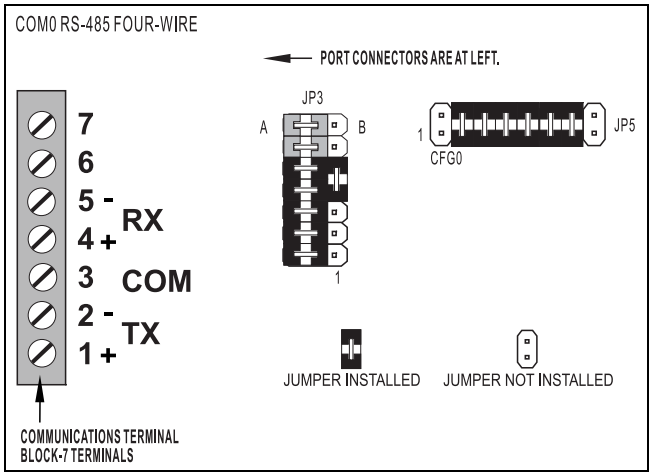
COM0 can also be configured for RS-485 two- or four-wire or for use with a modem. Note that IRQ settings for COM0 cannot be configured.



COM0 RS-485 Configuration and Wiring

The following diagrams illustrate jumper settings and wiring for RS-485 two-wire and RS-485 four-wire. Again, the grayed-out jumpers are shown for reference only.



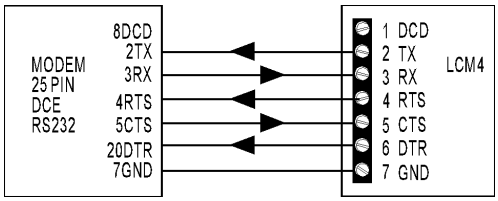


COM0 Modem Configuration and Wiring

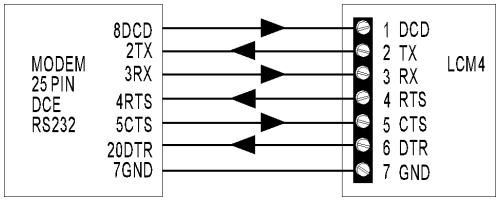
In RS-232 mode, COM0 also supports RTS and DTR/DCD flow control for use with modems, either with or without a carrier detect. Check your modem documentation for additional wiring information, possible jumper configuration, and initialization setup. You may also want to read Opto 22's communication application notes, available on the Opto 22 Web site or through our Bulletin Board Service. See page 1-2 for details.

The following diagrams illustrate wiring for modems. Use the COM0 default jumper settings for modems (shown in the diagram on page 3-5).

Wiring to a Modem without Carrier Detect



Wiring to a Modem with Carrier Detect

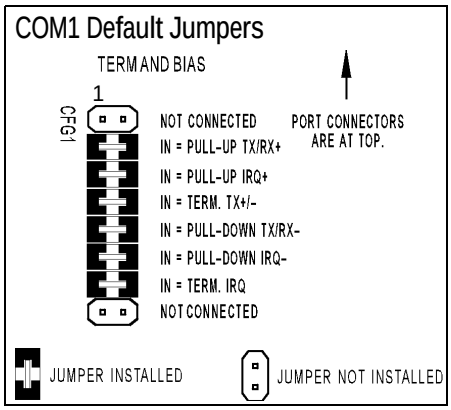


Configuring Port 1

COM1 comes from the factory set up for communicating with Opto 22 remote I/O. COM1 is a two-wire RS-485 port only. It will not typically require configuration unless you are using it with devices that are not Opto 22 remote I/O.

CFG1 jumpers control COM1. Default jumper settings are shown in the diagram at right.

Pin connections are shown in the following table:

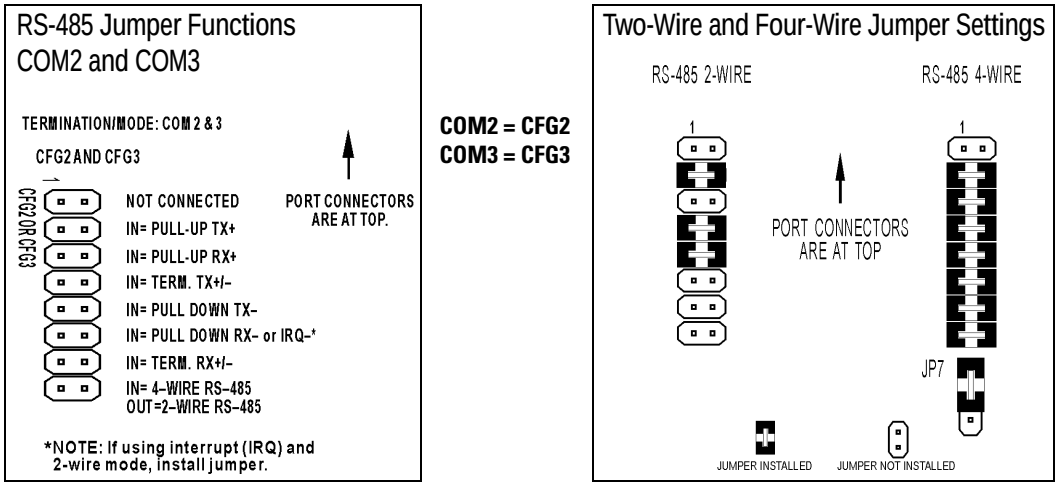


Pin	RS-485 2-wire
1	TX/RX +
2	TX/RX -
3	COM
4	IRQ +
5	IRQ -

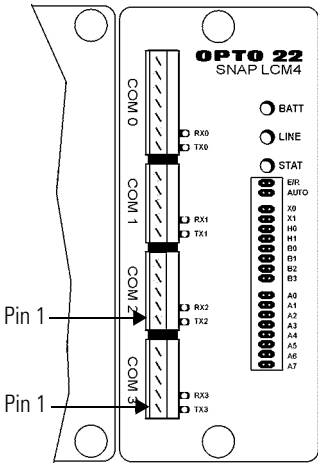
Configuring Ports 2 and 3

The default for COM2 and COM3 is RS-232, but these ports can also be configured as RS-485 two-wire or four-wire. See page 3-9 for jumper settings to configure RS-232 or RS-485 mode.

Jumper functions and two-wire and four-wire jumper settings are shown below. Use CFG2 jumpers for COM2 and CFG3 jumpers for COM3.



Pin Connections for COM2 and COM3



Pin	RS-232	RS-485 2-wire	RS-485 4-wire
1	TX	TX/RX +	TX +
2	RX	TX/RX -	TX -
3	COM	COM	COM
4	RTS	IRQ +*	RX +
5	CTS	IRQ -*	RX -

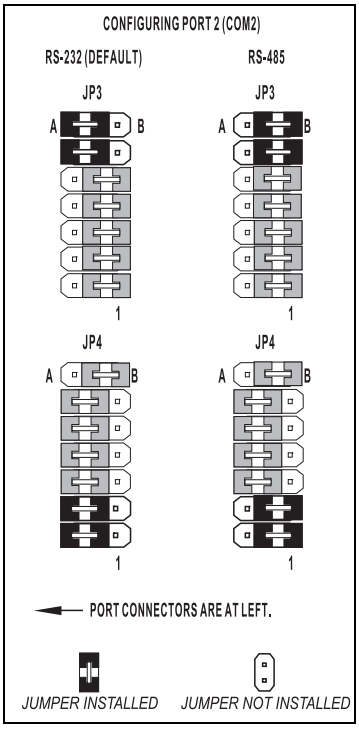
TX = Transmit
RX = Receive
COM = Common Ground
RTS = Request to Send
CTS = Clear to Send
IRQ = Interrupt

*NOTE: For 2-wire, use pins 4 and 5 only if you are using an interrupt (IRQ). The IRQ function is supported in 2-wire mode only. Use pins 4 and 5 for the IRQ wires.

Setting the Mode for Port 2

As shown in the diagram at right, jumper groups JP3 and JP4 control the mode for COM2. Only some of the jumpers in each group control COM2, however. The grayed-out jumpers are included for reference only.

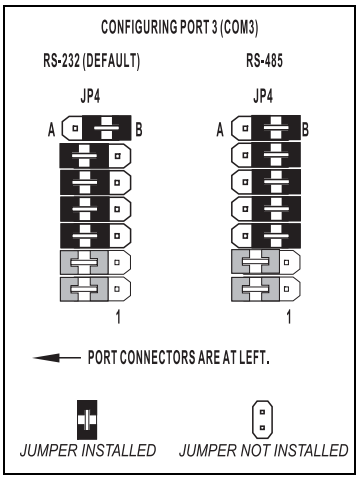
NOTE: RS mode may be shown incorrectly on the board itself. Follow the diagram to set the RS mode.



Setting the Mode for Port 3

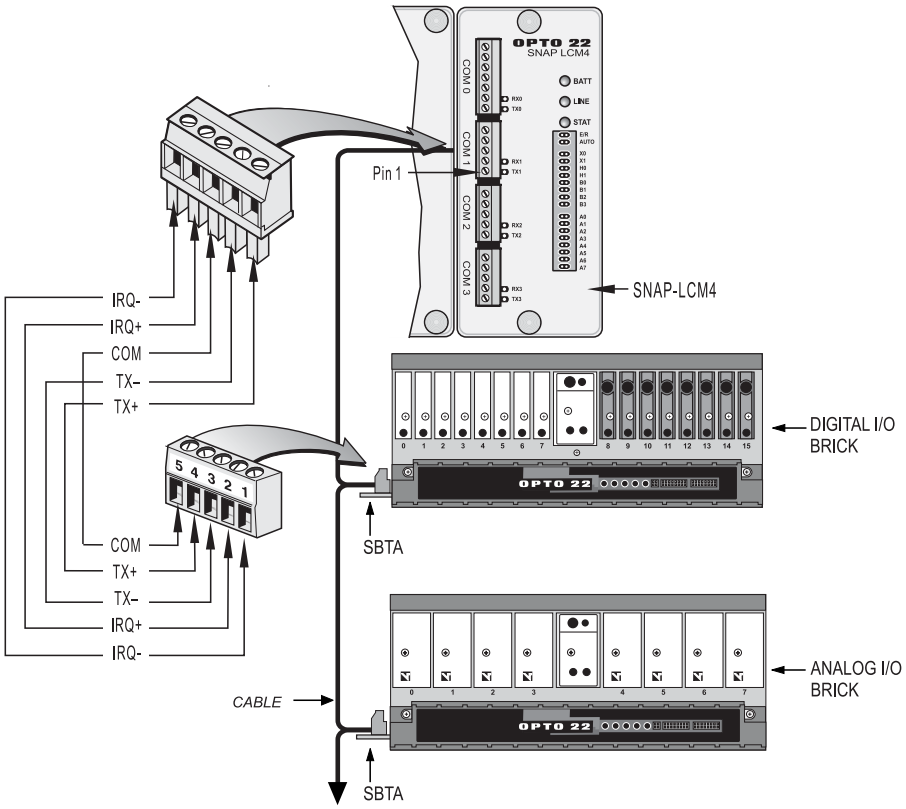
For COM3, jumper group JP4 controls the mode for COM3. The jumper settings are shown in the diagram at right. Only some of the these jumpers control COM3, however; grayed-out jumpers are included for reference only.

NOTE: RS mode may be shown incorrectly on the board itself. Follow the diagram to set the RS mode.



Connecting the Controller to Remote I/O

Connections from a SNAP-LCM4 controller to a SNAP brain are shown on page 2-3. If you are connecting the controller to Mistic I/O, follow the diagram below:



Downloading New Firmware

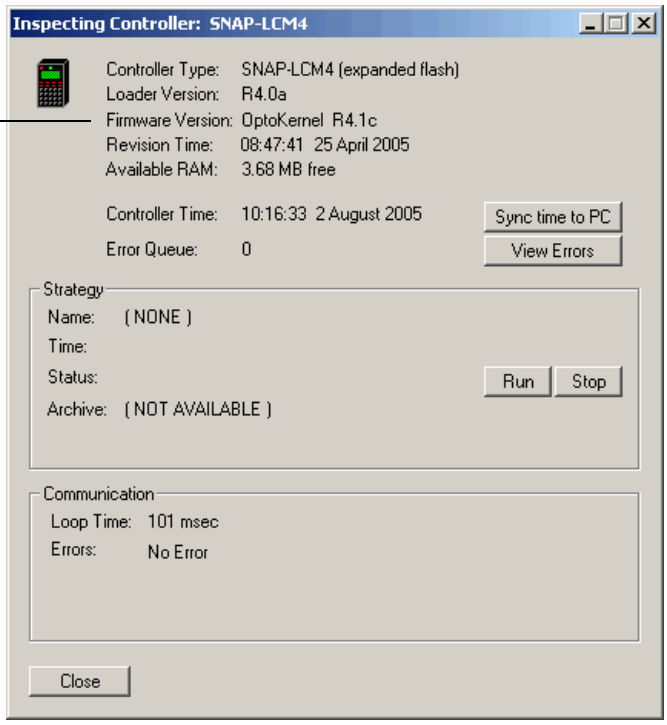
Occasionally you may need to download new firmware to the SNAP-LCM4 controller. To find out what firmware release your controller has and update it if necessary, follow these steps:

1. Connect the PC running FactoryFloor to the controller.
   - For a serial connection, COM 0 is usually used.
   - If the controller has an ARCNET card, you can use ARCNET.
   - If the controller has an M4SENET-100 card, you can use Ethernet if you have all of the following:
     - R4.0a or higher loader in the LCM4
     - R4.1a or higher firmware in the LCM4
     - OptoTerm version R4.1a or newer
2. Choose Start→Programs→Opto 22→OptoUtilities→OptoTerm.

3. In the OptoTerm main window, double-click the name of the controller. (If the controller is not listed, add it, following directions in the *OptoControl User's Guide*.)

   In the Inspect Controller dialog box, look for the firmware version in the upper-right corner.

Controller firmware version



4. If you need to download new firmware, close the Inspect Controller dialog box. In the main OptoTerm window, right-click the controller name and from the pop-up menu choose Download→Controller Kernel (or in older versions of OptoTerm, use Download Flash Files).

5. In the Open dialog box, locate your OptoKernel directory (C:\Opto22\OptoKrnl, by default). Click Files of Type and choose the name of your controller from the list. When the correct firmware file for your controller appears, double-click the file name.

   If you do not have the correct firmware, contact Opto 22 Product Support. (See page 2.)

6. When the full path to the correct file appears in the Download File dialog box, click OK.

   The firmware download begins, and a dialog box shows its progress.

7. When the download has finished, exit OptoTerm.

CHAPTER 4

Troubleshooting

If you encounter a problem while installing or using the SNAP-LCM4 controller, check this section for suggestions. See "For Help" on page 1-2 if you need to contact Opto 22 Product Support.

If you see this	It means	Try this
LINE LED is off.	No power.	Check wiring.
LINE LED is red or Controller resets.	Power may be out of specification.	Check the power supply. A minimum of 5.0 VDC power is required. The allowed deviation for any amount of time, no matter how short, is +/– 0.10 VDC.
STAT LED is off.	Controller has an internal problem.	Call Opto 22 Product Support.
STAT LED blinks red.	Firmware problem.	Remove jumper X1 and cycle power to the controller. If the STAT LED is solid, download new firmware. If the STAT LED still blinks, call Opto 22 Product Support.
BATT LED is red.	Backup battery is low.	Replace the backup battery.
RX LED is stuck on.	Wiring polarity problem.	If you're using two-wire mode, try swapping the TX+ and TX- wires. If you're using four-wire mode, try swapping the RX+ and RX- wires.
Controller cannot transmit to PC.	Configuration jumpers were changed without cycling power.	Cycle power and retry transmission. If using RS-232 port on SNAP-LCM4, make sure pin 4 (RTS) and pin 5 (CTS) are jumpered.
No communication to host PC and no TX/RX LEDs.	Communication problems.	Check the PC serial port.
No communication to host PC. RX LED is on, but TX LED is off.	Communication problems.	Check controller address, baud rate, and ASCII/binary settings. See "Setting Jumpers" on page 3-1.
No communication to host PC. Both TX and RX LEDs are on.	Communication problems.	Try a slower baud rate.

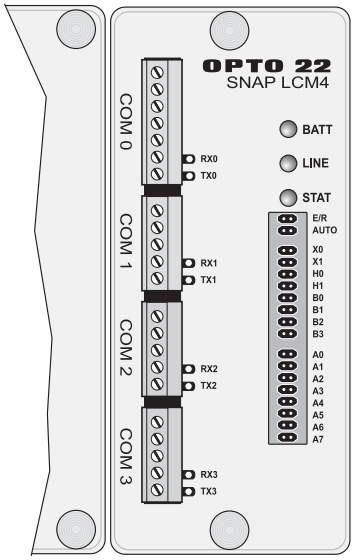
If you see this	It means	Try this
No communication to I/O. TX LED is off while trying to communicate.	Communication problems.	Check that I/O port software is configured for correct port. If RX LEDs on I/O are off while trying to communicate, check wire for loose connections, shorts, or breakage. If RX LEDs on I/O are on, check I/O address, baud rate, and protocol settings in software. Also check voltage at I/O units to make sure the power supply voltage is within specs.
Digital output is not working.	1. Bad module fuse. 2. Wrong module type or incorrect wiring.	1. Replace fuse. 2. Make sure module is 5V logic. Match the output module with the load.
Digital input is not working.	1. Input device is not working properly. 2. Wrong module type. 3. Voltage on input is not compatible with module voltage range. 4. I/O or brain may be bad.	1. Check input device wiring and power source. Rewire, replace, or fix power source as needed. 2. Make sure module is 5V logic. 3. Change voltage to match module, or change module to match field voltage. 4. See brain manual.
Analog output is not working.	1. Output is wired incorrectly. 2. Device is not properly matched to module type. 3. I/O or brain may be bad.	1. Check wiring to output device. 2. Change voltage to match module or module to match voltage. 3. Measure output with a multimeter.
Analog input is not working.	1. Voltage input device is wired incorrectly. 2. Thermocouple has a break. 3. RTD has open or incorrect wiring. 4. I/O or brain may be bad.	1. Check device and wiring. Connect voltage source or current source, depending on input type, and use multimeter to see whether input is functioning. 2. For a thermocouple, check for continuity across test points next to module. 3. For an RTD input, check resistance across test points next to module. 4. Contact Opto 22 Product Support if you find the following: –If value in software does not change with input when testing input voltage or current with multimeter –If thermocouple has continuity across test points –If resistance across test points is about 100 ohms for RTD input.

Appendix: Specifications

Specification Table

CPU	IEEE floating-point math co-processor
Memory: RAM Flash EEPROM	 4 MB with battery backup (user programs and data), not expandable 2 MB (controller firmware and user programs), not expandable
RAM/clock battery	3.6-volt lithium, non-rechargeable
Communication, base unit	Three RS-232 or RS-485 ports, one dedicated RS-485 remote I/O port with interrupt capability
Real-time clock	Clock/calendar, Epson 64613 with battery backup, Y2K compliant
Power requirements	5VDC ±0.1 VDC at 1 Amp (maximum) without expansion cards
Typical operating temperature	0 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Humidity	5% to 95% relative humidity, non-condensing
Software	FactoryFloor (OptoControl, OptoDisplay, OptoServer, and OptoConnect) and Classic software (Cyrano, Mistic MMI, and MDS)
Hard system monitors (including watchdog timer and voltage monitor)	Detect main power supply operation and proper microprocessor operation
Soft system monitors	Program/data corruption Host and I/O communication

LED Descriptions



The SNAP-LCM4 includes the following LEDs:

BATT—The BATT LED is normally green. If it is red, the backup battery is low and should be replaced.

LINE—The LINE LED is normally green. If it is off, the controller is not receiving power. If the LED is red, power is outside specifications.

STAT—The STAT LED is normally green. If it blinks red or is off, see Chapter 4—Troubleshooting.

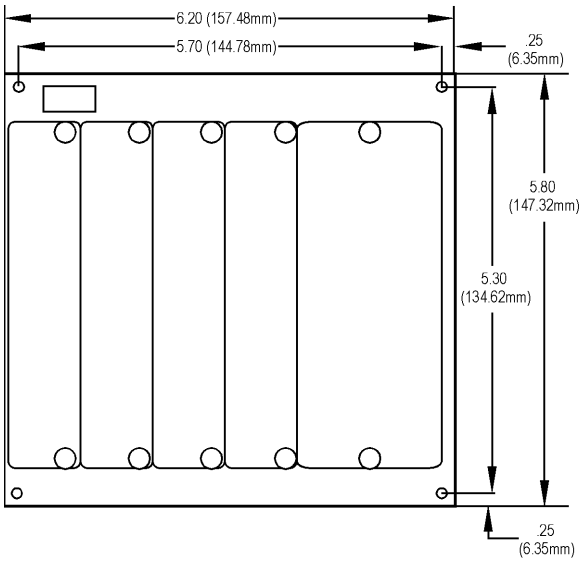
TX — Each communication port has a TX LED, which is on whenever the controller is actively transmitting data through that port.

RX — Each communication port also has an RX LED. It is on whenever the controller is actively receiving data through that port.

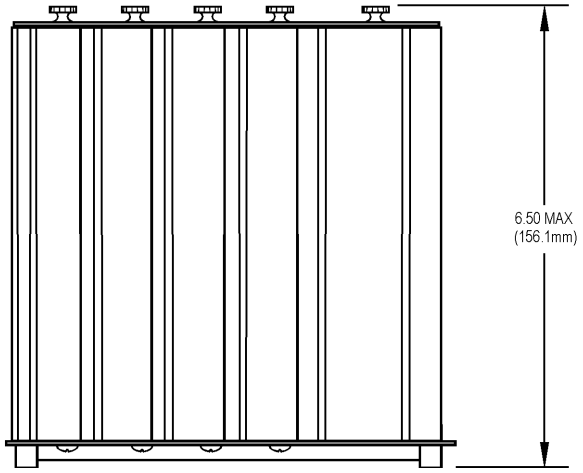
Dimensional Drawings and Mounting Diagrams

The following diagrams show dimensions for the SNAP-LCM4:

Top View



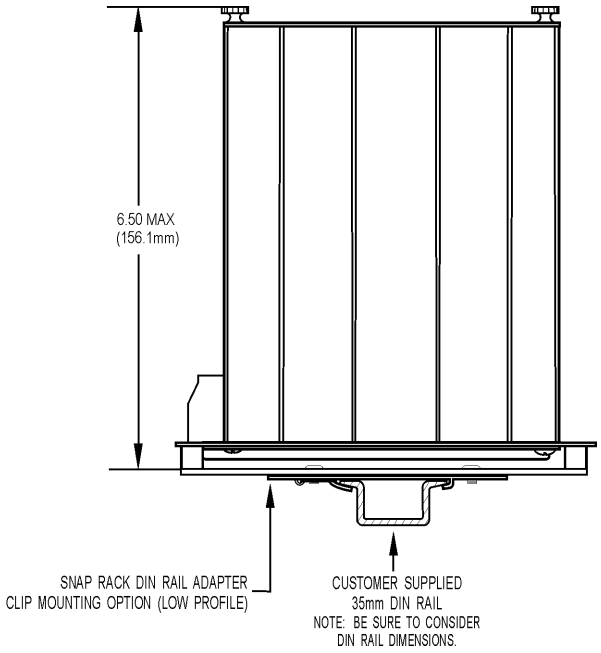
Side A View



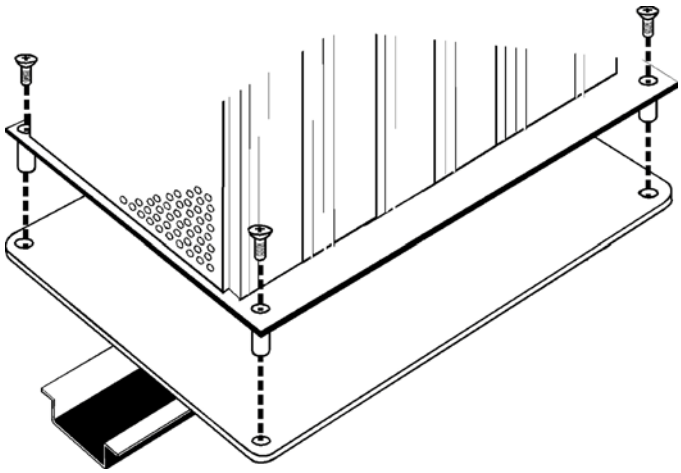
DIN-Rail Mounting

The SNAP-LCM4 can be panel-mounted or mounted on a DIN rail that you supply. DIN-rail mounting requires a DIN clip package, part number SNAP-LCM4DIN (not included). The following diagram shows a side view of the SNAP-LCM4 as mounted on a DIN rail:

Side B View



1. Use two screws on each side of the SNAP-LCM4 to attach the controller to the DIN clip:



2. Snap both clips to the DIN rail.

Cable Recommendations

Ethernet

For Ethernet communications, use Category 5 UTP (unshielded twisted pair) cable.

Serial

For serial communications, Opto 22 recommends the following cables for use with the SNAP-LCM4. Although you can use other cables, keep in mind that low capacitance (less than 15pF/ft.) is important for high-speed digital communication links. The cables listed below are all 24-gauge, 7x32 stranded, with 100-ohm nominal impedance and a capacitance of 12.5 pF/ft.

It is recommended that you choose a cable with one more pair of wires than your application requires. Use one of the extra wires, rather than the shield, for the common.

Two-Pair:

- Belden P/N 8102 (with overall shield)
- Belden P/N 9729 (individually shielded)
- Belden P/N 8162 (individually shielded with overall shield)
- Manhattan P/N M3475 (individually shielded with overall shield)
- Manhattan P/N M39249 (individually shielded with overall shield)

Three-Pair:

- Belden P/N 8103 (with overall shield)
- Belden P/N 9730 (individually shielded)
- Belden P/N 8163 (individually shielded with overall shield)
- Manhattan P/N M4376 (individually shielded with overall shield)
- Manhattan P/N M39250 (individually shielded with overall shield)

Four-Pair:

- Belden P/N 8104 (with overall shield)
- Belden P/N 9728 (individually shielded)
- Belden P/N 8164 (individually shielded with overall shield)
- Manhattan P/N M3477 (individually shielded with overall shield)
- Manhattan P/N M39251 (individually shielded with overall shield)

Power Supply Recommendations

The power supply used for the SNAP-LCM4 controller should **not** be used to supply any other equipment. Field devices must **not** be supplied by the same power supply used for the controller, as the optical isolation of the I/O modules would be bypassed and voltage fluctuations to the controller might cause controller resets.

Opto 22 recommends that the SNAP-LCM4 be powered with an Opto 22 SNAP-PS5 or SNAP-PS5-24 power supply. The controller requires only 5 VDC. The total amount of current required depends upon the expansion cards installed (see the table on page 1-6); the controller itself requires 1.0 amp.

Third-Party Power Supply Vendors

If you are not using an Opto 22 power supply, use only good quality power supplies that offer tight voltage regulation. Opto 22 recommends a linear supply with adequate current ratings for the load. The following vendors carry suitable third-party power supplies:

ELPAC Electronics Inc.
1562 Reynolds Avenue
Irvine, CA 92614
Phone: 949-476-6070
Fax: 949-476-6080
E-mail: sales@elpac.com
Web site: www.elpac.com

Lambda Electronics
515 Broadhollow Road
Melville, NY 11747
Phone: 800-LAMBDA-4
Web site: www.lambdapower.com

Power-One
740 Calle Plano
Camarillo, CA 93012-8583
Phone: 805-987-8741
Web site: www.power-one.com

SOLA
199 Scott Swamp Road
Farmington, CT 06034
Phone: 800-377-4384
Web site: www.sola-hevi-duty.com