Crestron **PAC2M**
Professional Automation Mini Computer
Operations Guide

CRESTRON®

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Contents

Professional Automation Mini Computer: PAC2M

Introduction

Features and Functions

- A compact, low-cost alternative to the PAC2
- Provides information from the controls located in the living environment to the control modules located in the Crestron® Automation Enclosure
- Enables control of lighting as well as other systems, such as HVAC
- 66 MIPS 2-Series engine
- 40 MB of Internal Memory*
- MMC memory expansion card slot (card not supplied)
- Built-in Cresnet® distribution and hub/repeater
- Built-in 10/100 Ethernet with SSL encryption
- Crestron e-Control®2 enabled
- SNMP and RoomView® support
- Four relay and four digital input control ports
- Occupies a single module space in any CAEN or CAENIB enclosure
- Surface-mountable without an enclosure
- Configurable via Crestron D3 Pro™ software
- USB console port
- Supports SIMPL Windows and SIMPL+®
- Requires external power supply (sold separately)

*   For more information on internal memory, refer to "2-Series Memory & Directory Structure" in the latest version of the Crestron 2-Series Control Systems Reference Guide (Doc. 6256), which is available from the Crestron website (http://www.crestron.com/manuals).

Professional Automation Mini Control System

The PAC2M is a compact, low-cost alternative to the PAC2 designed for small lighting and automation applications. At half the size of a PAC2, the PAC2M is perfect for apartments and smaller homes as well as individual meeting rooms and lecture halls.

2-Series Engine

Built upon Crestron's reliable 2-Series control engine, the PAC2M is extensively programmable using Crestron's suite of powerful development software and vast database of drivers and software modules. The PAC2M works seamlessly with Crestron's entire line of lighting dimmers and shade controls, keypads and touchpanels, thermostats, wireless gateways, control cards and expansion modules. At the heart of the PAC2M is the powerful 32-bit Freescale ColdFire® processor. Crestron's exclusive enhanced real-time operating system makes the PAC2M one of the fastest, most reliable control systems available.

Whole House Integration

The PAC2M provides for the integration of non-Crestron devices and subsystems through a host of control interfaces. Four isolated relays and four digital input ports are built in to accommodate motion sensors, contactors, door strikes and other low-voltage controls. Additional relays, I/O ports, serial COM ports, DTMF interfaces and shade controllers can be added using Crestron expansion modules at any location throughout a residence or commercial facility.

Modular Enclosure Installation

The PAC2M is designed to install in a CAEN or CAENIB automation enclosure and provide a direct bus to a cabinet full of CLX-(or CLXI-)Series lighting control modules. It is also suitable for surface mount installation without an enclosure where allowed. Every Crestron lighting system is completely modular and scalable, allowing virtually unlimited configuration and expansion flexibility.

Cresnet® Distribution

Cresnet is the communications backbone for many Crestron lighting modules, wall box dimmers, thermostats, keypads and many other devices. This flexible 4-wire bus streamlines the wiring of a complete Crestron lighting system. The PAC2M provides connectivity for numerous Cresnet devices on multiple homeruns via eight separate Cresnet ports. Its built-in Cresnet hub provides two isolated segments, each supporting 3000 feet of cabling and approximately 25 Cresnet devices. The Cresnet ports are arranged into two separate power groups providing a clean, flexible 24 Volt DC power distribution solution. An external power supply is required (sold separately).

Ethernet and e-Control®2

Built-in 10/100 Ethernet facilitates secure high-speed network connectivity, enabling extensive capabilities for remote system maintenance and control and providing an interface to other Crestron control systems. Native features include a built-in email client to report system troubles and other functions to the homeowner or service company via instant email notification. An onboard Web server provides the foundation for Crestron's exclusive e-Control 2 Xpanel technology, providing secure IP-based remote control using any Windows® computer or CD/PocketPC™ PDA device.

RoomView® and SNMP

For large facilities utilizing multiple PAC2Ms and other control systems, Crestron's exclusive RoomView Help Desk software delivers a comprehensive solution for remote monitoring and asset management. Also, built-in SNMP support enables similar capability using third-part network management software, allowing full control and monitoring from the IT Help Desk or NOC in a format that is familiar to IT personnel.

Override

An override input is provided to allow an external contact closure to bypass the PAC2M and activate a preset override state in each connected lighting module.

Memory Expansion

A memory card slot allows for easy expansion of the PAC2M's internal memory using any MMC-compatible memory card up to 1 GB. (Memory card not included.)

D3 Pro™ Software

Crestron D3 Pro software eliminates the need for custom programming, providing a complete design, development and documentation solution for the lighting professional.

SSL

All Ethernet-enabled 2-Series control systems support SSL (Secure Sockets Layer), the industry standard for protecting sensitive network communications.

Specifications

Specifications for the PAC2M are listed in the following table.

PAC2M Specifications

SPECIFICATION	DETAILS
Processor	
CPU	32-bit Freescale Coldfire® Microprocessor
Processing Speed	66 MIPS (Dhrystone 2.1 benchmark)
Memory	
SDRAM	32 MB
NVRAM	256 kB
Flash	8 MB
Memory Card*	expandable up to 1 GB using MMC compatible card (not included)
Operating System	Real-time preemptive multi-threaded/multitasking kernel; FAT32 file system with long names*; supports SIMPL Windows and SIMPL+®
Ethernet	10/100BaseT, auto-negotiating, full/half duplex, static IP or DHCP/DNS, SSL, TCP/IP, UDP/IP, CIP, SMTP, SNMP, built-in Web server and e-mail client; supports Crestron e-Control®2 XPanel and RoomView® applications
Power Requirements	5 Watts (0.21 Amps) @ 24 Volts DC (PW-2420RU power supply sold separately)
Available Cresnet Power	45 Watts using PW-2420RU (sold separately)
Environmental	
Temperature	41º to 113ºF (5º to 45ºC)
Humidity	10% to 90% RH (non-condensing)
Enclosure	Black and gray metal, surface mount box with (2) integral mounting flanges; Occupies one module space in a single-width CAEN or CAENIB enclosure or one left side module space in a double-width CAEN or CAENIB enclosure
Dimensions	
Height	7.72 in (19.59 cm)
Width	7.05 in (17.89 cm)
Depth	1.71 in (4.33 cm)
Weight	2.14 lbs (0.97 kg)
Available Accessories	
CAEN	Automation enclosures
CAENIB	Automation enclosures
CLX-PWS75	75 Watt Cresnet Power Supply Module
PW-2420RU	50 Watt Power Pack

*   Memory cards of less than 512 MB should be formatted using the FAT16 file system. (FAT32 will not be supported for memory cards of less than 512 MB capacity.)
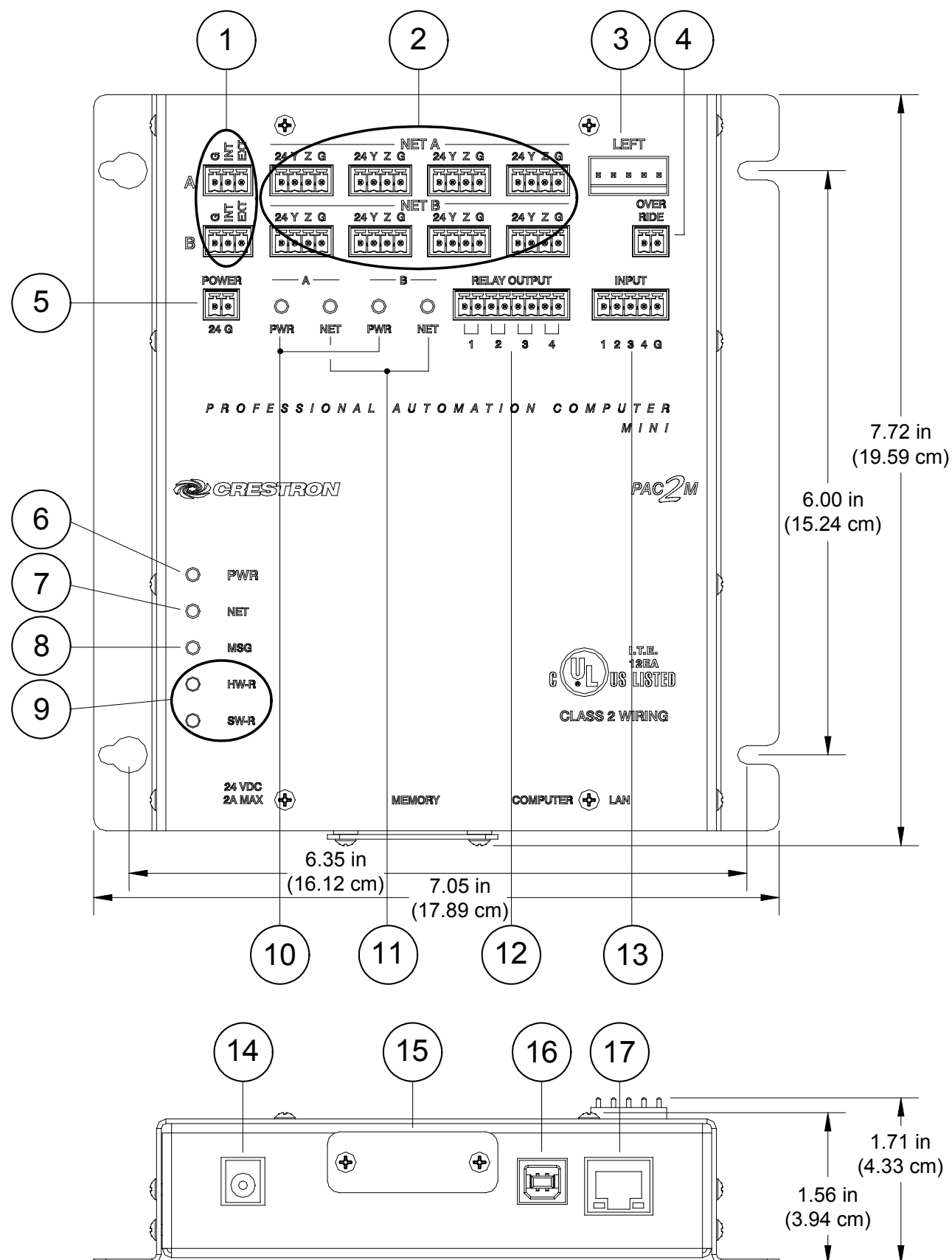
Physical Description

This section provides information on the connections, controls and indicators available on your PAC2M.

PAC2M Physical View (Head On)
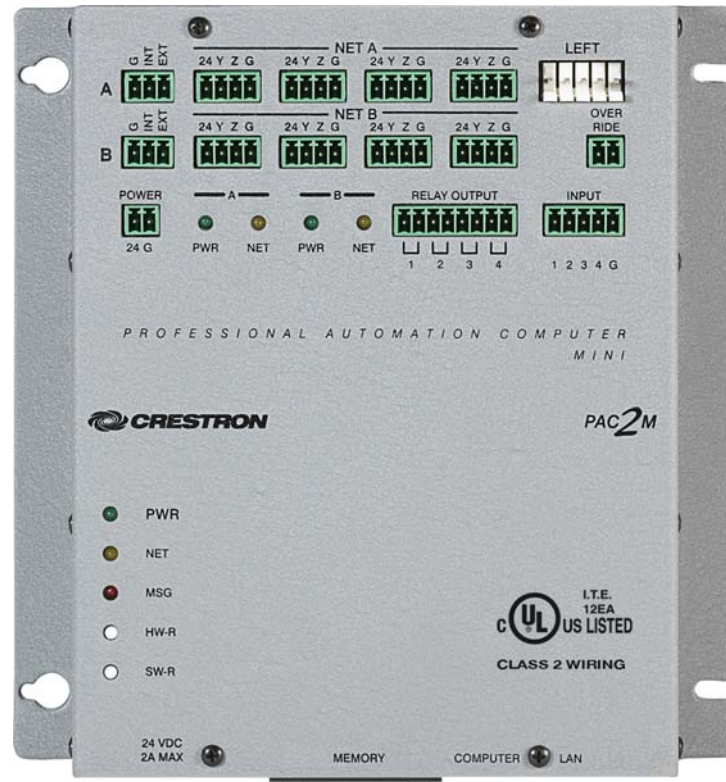
PAC2M Physical View (Angled)
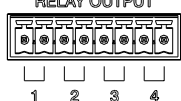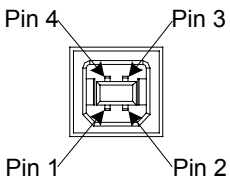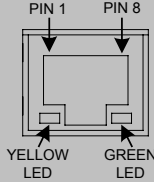
PAC2M Overall Dimensions

Connectors, Controls & Indicators

#	CONNECTORS*, CONTROLS & INDICATORS	DESCRIPTION
1	G/INT/EXT (A – B)	(2) 3-pin 3.5 mm detachable terminal blocks; Cresnet power selection connectors for each segment; Connect to external Cresnet power supply or to "internal" power source via jumpers, to power Cresnet devices connected to the NET ports; Maximum load per segment using external supply: 75 Watts (3.125 Amps @ 24 Volts DC); Maximum total load using "internal" source: 45 Watts (1.88 Amps @ 24 Volts DC).
2	NET (A – B)	(8) 4-pin 3.5 mm detachable terminal blocks comprising (4) Cresnet ports (paralleled) per each of (2) segments; Four-position terminal block connector for data and power. Connects to Cresnet control network. Pin 1 (24) Power; Pin 2 (Y) Data; Pin 3 (Z) Data; Pin 4 (G) Ground
3	LEFT	(1) 5-pin 0.156 inch header; Module interconnect port, connects to CLX-(or CLXI-)Series lighting control modules using interconnect cables provided.
4	OVERRIDE	(1) 2-pin 3.5 mm detachable terminal block; Input from external contact closure to trigger preset override state in CLX-(or CLXI-)Series modules connected to the module interconnect port; Maximum input: 10 mA @ 5 Volts.
5	POWER	(1) 2-pin 3.5 mm detachable terminal block; 24 Volt DC power input, 2 amp maximum; Paralleled with 24 VDC input; Powers processor and provides "internal" power source to power modules and Cresnet devices.
6	PWR LED	Indicates power supplied to unit via 24 VDC or POWER input.
7	NET LED	Indicates communication with Cresnet system.
8	MSG LED	Illuminates when a message is detected. To decipher content, examine the message through the Crestron Toolbox™.
9	RESET BUTTONS	HW-R – Initiates system hardware reset. SW-R – Pressing this in combination with HW-R button performs a system restart without loading the program. Pressing it alone momentarily while the system is running restarts the program.

Connectors, Controls & Indicators (Continued)

#	CONNECTORS*, CONTROLS & INDICATORS	DESCRIPTION
10	PWR LEDs (A – B)	Indicates 24 Volts DC power present at the respective segment (A and/or B).
11	NET LEDs (A – B)	Indicates communication with Cresnet system by the respective segment (A and/or B).
12	RELAY OUTPUT (1 – 4)	(1) 8-pin 3.5 mm detachable terminal block comprising (4) normally open, isolated relays; Rated 1 Amp, 30 Volts AC/DC; MOV arc suppression across contacts.
13	INPUT (1 – 4)	(1) 5-pin 3.5 mm detachable terminal block comprising (4) digital inputs; Rated for 0-24 Volts DC, referenced to GND; Input impedance: 2.2 kΩ pulled up to 5 Volts DC; Logic threshold: 2.5 Volts DC nominal.
14	24 VDC	(1) 2 mm barrel DC power jack; 24 Volt DC power input, 2 amp maximum; Paralleled with POWER input; Powers processor and provides "internal" power source to power modules and Cresnet devices.
15	MEMORY	(1) MMC compatible card slot; Accepts multimedia memory card (not included) up to 1 GB.
16	COMPUTER	(1) USB Type B female USB 1.1 computer console port (cable included).
17	LAN	(1) 8-wire RJ-45 with two LED indicators; 10BaseT/100BaseTX Ethernet port; Green LED indicates link status; Yellow LED indicates Ethernet activity.

Connector 16 – COMPUTER

PIN	DESCRIPTION
1	+5 VDC
2	Data -
3	Data +
4	Ground

Connector 17 – LAN

PIN	SIGNAL	PIN	SIGNAL
1	TX +	5	N/C
2	TX -	6	RC -
3	RC+	7	N/C
4	N/C	8	N/C

*   Interface connectors for **G/INT/EXT**, **NET**, **LEFT**, **OVERRIDE**, **POWER**, **RELAY OUTPUT** and **INPUT** ports are provided with the unit.

Industry Compliance

This product is Listed to applicable UL Standards and requirements by Underwriters Laboratories Inc.

(E174344)

As of the date of manufacture, the PAC2M has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling.

NOTE: This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

▪　　　Reorient or relocate the receiving antenna.

▪　　　Increase the separation between the equipment and receiver.

▪　　　Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

▪　　　Consult the dealer or an experienced radio/TV technician for help.

Setup

Network Wiring

When wiring the network, consider the following:

- Use Crestron Certified Wire.

- Use Crestron power supplies for Crestron equipment.

- Provide sufficient power to the system.

    CAUTION: Insufficient power can lead to unpredictable results or damage to the equipment. Please use the Crestron Power Calculator to help calculate how much power is needed for the system (http://www.crestron.com/calculators).

- For larger networks, use a Cresnet Hub/Repeater (CNXHUB) to maintain signal quality.

For more details, refer to "Check Network Wiring" on page 21.

Ethernet

The PAC2M also uses high-speed Ethernet for communications between the device and a control system, computer, digital media server and other IP-based devices.

For information on connecting Ethernet devices in a Crestron system, refer to the latest version of the Crestron e-Control® Reference Guide (Doc. 6052), which is available for download from the Crestron website.

Mounting the PAC2M in the Crestron Automation Enclosure

This section covers both CAEN and CAENIB automation enclosures, for simplicity, hereinafter referred to as CAEN.

CAUTION: The CAEN houses equipment that needs to be air-cooled. Therefore mount in a well-ventilated area. The ambient temperature range must be 32°F to 104°F (0°C to 40°C). The relative humidity must range from 10% to 90% (non-condensing). Furthermore, allow adequate clearance in front of the vented cover for servicing and ventilation.

NOTE: The CAEN is intended for indoor use only.

NOTE: Reliable earth grounding of equipment mounted in a CAEN should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

NOTE: To ensure access to the connectors and memory card slot at the bottom of the PAC2M, mount the PAC2M so that all CLX-(or CLXI-)Series modules are above it within the CAEN.

The PAC2M has two flanges that allow the unit to be mounted in a CAEN. Refer to the latest revision of the CAEN – Automation Enclosures Installation Guide (Doc.

5940) and CAENIB – Automation Enclosures Installation Guide (Doc. 6562) for more information on the CAEN and CAENIB. The following procedure assumes installation in a double-wide CAEN. Complete the procedure below to attach the PAC2M to the CAEN. A #2 Phillips screwdriver is required.

1. Using a #2 Phillips screwdriver attach the four supplied self-tapping pan Phillips screws (8B x ¼" length) by screwing them in partially, to allow room to mount the PAC2M (refer to illustration that follows).

2. Mount the PAC2M on the CAEN (where you attached the screws), slide the unit to the right to ensure the screws fully engage the slots in the flanges and tighten the screws.

NOTE: For a single-wide CAEN, attach screws on right (screw them in partially), mount the PAC2M where you attached screws, attach screws on left and fully tighten all screws.

Mounting the PAC2M in the CAEN
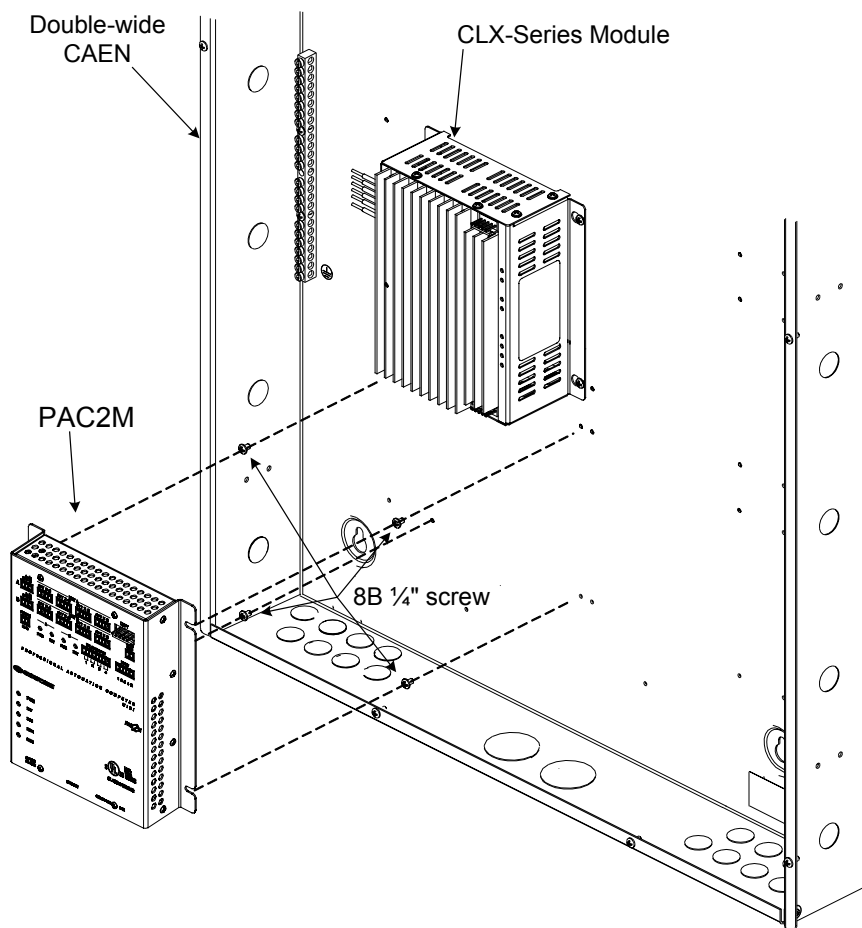
Power Supply

The PAC2M can be powered through the 2-pin **PWR** connector or by an external power pack (such as the PW-2420RU) but not by both. Using the PW-2420RU, the PAC2M may provide power to peripheral Cresnet devices (via the

built-in Cresnet Hub/Repeater) up to a total of 45 Watts. If additional power is needed, Crestron recommends its CNPWS-75 (75 watt) External Power Supply.

Installation

Ventilation

The PAC2M should be used in a well-ventilated area. The venting holes should not be obstructed under any circumstances. If the PAC2M is hot to the touch, consider using forced air ventilation and/or incrementing the spacing between units.

To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the table of specifications. Consideration must be given if installed in a closed or multi-unit rack assembly since the operating ambient temperature of the rack environment may be greater than the room ambient temperature. Contact with thermal insulating materials should be avoided on all sides of the unit.

Bussing Strip Installation

The PAC2M is supplied with a brass bussing strip to facilitate commoning (linking) of multiple terminal block connections. The bussing strip is constructed with four terminal block positions and may be trimmed to size for various applications or different devices.

1. To utilize the bussing strip, determine the number of relays to be commoned for the equipment being installed. If less than four, the strip can be trimmed to size with a pair of scissors or wire snips.

2. Loosen the terminal block screws and insert the first leg of the bussing strip into the first common position of the terminal block. The strip engages the other common positions automatically.

3. Remove approximately 1/8" of the jacket from the common wire and insert the conductor into one of the terminal block common positions. Tighten the terminal block screws to lock the wire and bussing strip into place. Insulate the strip by folding a piece of ¾" wide vinyl electrical tape (such as Scotch 33+) over the spine and as much of the individual legs as possible. Excess tape at each end of the strip should be pressed closed, then trimmed to within approximately 1/16" of the end of the strip.

4. When wiring the remaining conductors, remove approximately 1/8" of the jacket and insert the wires into the proper terminal block positions. To prevent the possibility of electrical shorts, it is essential that these conductors do not touch any uninsulated portion of the bussing strip.

5. Securing a tie wrap around the bussing strip is a useful way to provide strain relief for the wires connected to the terminal block.

Hardware Hookup

Make the necessary connections as called out in the illustration on the next page. Refer to "Network Wiring" on page 10 before attaching the 4-position terminal block connector. Apply power after all connections have been made.

When making connections to the PAC2M, be sure to use Crestron power supplies for Crestron equipment.

Hardware Connections for the PAC2M

POWER: 24 VDC INPUT, PARALLELED WITH 24 VDC JACK	G/INT/EXT: 24 VDC TO HUB FROM INTERNAL OR EXTERNAL POWER	CRESNET: TO ANY CRESNET NETWORK DEVICE	LEFT: TO CLX-(or CLXI-) SERIES LIGHTING CONTROL MODULE	OVERRIDE: FROM EXTERNAL CONTACT CLOSURE

NET A

NET B

A

B

POWER   — A —   — B —   RELAY OUTPUT   INPUT

24 G   PWR   NET   PWR   NET   1 2 3 4   1 2 3 4 G

P R O F E S S I O N A L   A U T O M A T I O N   C O M P U T E R
M I N I

CRESTRON   PAC2M

○ PWR

○ NET

○ MSG

○ HW-R

○ SW-R

I.T.E.
12EA
US LISTED

CLASS 2 WIRING

24 VDC
2A MAX   MEMORY   COMPUTER   LAN

RELAY OUTPUT (1 - 4): TO CONTROLLABLE DEVICES	INPUT (1 - 4): FROM DEVICE OUTPUTS -CONTACT CLOSURES -RELAY CLOSURES

24 VDC 2A MAX: AC POWER PACK (24 VDC, 2A)	MEMORY: FOR OPTIONAL MMC COMPATIBLE MEMORY CARD	COMPUTER: TO USB PORT ON PC	LAN: 10/100 BASE-T ETHERNET TO LAN OR WEB

Programming Software

Have a question or comment about Crestron software?

Answers to frequently asked questions (FAQs) can be viewed in the Online Help section of the Crestron website. To post a question or view questions you have submitted to Crestron's True Blue Support, log in at http://support.crestron.com. First-time users will need to establish a user account.

Earliest Version Software Requirements for the PC

NOTE: Crestron recommends that you use the latest software to take advantage of the most recently released features. The latest software is available from the Crestron website.

NOTE: Crestron software and any files on the website are for authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).

Crestron has developed an assortment of Windows®-based software tools to develop a Cresnet system. You can create a program to control the PAC2M control system using the Crestron programming tools D3 Pro™ or SIMPL Windows. Customers whose focus is on lighting systems may prefer to use the D3 Pro software since it is designed especially for creating lighting and environmental system control applications. Customers already familiar with SIMPL Windows who are including a lighting system as part of an overall control system project may prefer to continue using SIMPL Windows. The following are the minimum recommended software versions for the PC:

Software

TASK	REQUIRED SOFTWARE VERSION
Program control system to operate PAC2M.	SIMPL Windows version 2.07.36 or later with SIMPL+ Cross Compiler version 1.1 or later and Library update 404 or later; Also requires Crestron Database version 18.2.0 or later.
Upload program and firmware.	Crestron Toolbox 1.02.38 or later.
Software for lighting and environmental controls (optional)	Crestron D3 Pro™ version 2.2.12 or later
Program with simple wizards (optional but recommended).	Crestron SystemBuilder™ version 2.0.6 or later. Refer to software release notes or Crestron website for other required Crestron software packages.

Programming with D3 Pro

Crestron's D3 Pro lighting software provides all the tools necessary to create a complete Crestron lighting system for residential applications. The lighting system includes the control system logic program, touchpanel projects and keypad programming, documentation and real-time lighting adjustment capabilities.

As with all Crestron software, D3 Pro provides extensive right-click and drag-and-drop functionality in addition to convenient keyboard shortcuts for frequently used functions and commands.

Programming is organized into six system **Views** of the lighting system, each providing a moveable toolbox of devices such as interfaces, fixtures and control modules. You can add a device to your system simply by selecting it from one of the toolboxes and dragging it to a room. The available toolboxes differ depending on the View but all Views include a "General" toolbox that allows you to add areas and rooms at any time.

Programming with Crestron SystemBuilder

Crestron SystemBuilder is the easiest method of programming but does not offer as much flexibility as SIMPL Windows. For additional details, download SystemBuilder from the Crestron website and examine the extensive help file.

Programming with SIMPL Windows

NOTE: While SIMPL Windows can be used to program the PAC2M, it is recommended to use D3 Pro or SystemBuilder for configuring a system.

SIMPL Windows is Crestron's premier software for programming Crestron control systems. It is organized into two separate but equally important "Managers".

Configuration Manager

Configuration Manager is the view where programmers "build" a Crestron control system by selecting hardware from the *Device Library*.

- To incorporate the PAC2M into the system, drag the PAC2M from the Control Systems folder of the *Device Library* and drop it in the *System Views*.

Locating the PAC2M in the Device Library
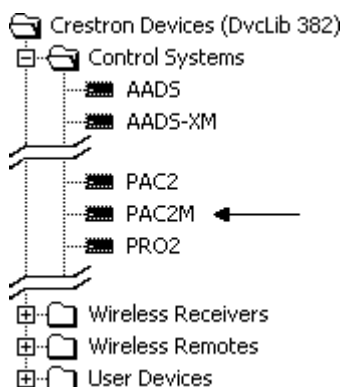
Programming Manager

Programming Manager is the view where programmers "program" a Crestron control system by assigning signals to symbols.

The symbol can be viewed by double clicking on the icon or dragging it into *Detail View*. Each signal in the symbol is described in the SIMPL Windows help file (**F1**).

Example Program

An example program for the PAC2M is available from the Crestron website (http://www.crestron.com/exampleprograms).

Uploading and Upgrading

Crestron recommends using the latest programming software and that each device contains the latest firmware to take advantage of the most recently released features. However, before attempting to upload or upgrade it is necessary to establish communication. Once communication has been established, files (for example, programs or firmware) can be transferred to the control system (and/or device). Finally, program checks can be performed (such as changing the device ID or creating an IP table) to ensure proper functioning.

While the next section provides an overview for communication, refer to "Establishing Communications with the Control System" in the Crestron 2-Series Control Systems Reference Guide (Doc. 6256) for connection details. If communications cannot be established, refer to "Troubleshooting Communications" in the same guide.
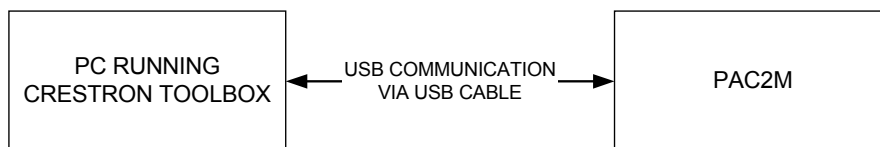
Establishing Communication

Use Crestron Toolbox for communicating with the PAC2M; refer to the Crestron Toolbox help file for details. There are two methods of communication.

USB Communication

NOTE: Required for initial setup of Ethernet parameters.

USB Communication

PC RUNNING CRESTRON TOOLBOX ◄── USB COMMUNICATION VIA USB CABLE ──► PAC2M

- The **COMPUTER** port on the PAC2M connects to the USB port on the PC via the included Type-A to Type B USB cable.

- Use the Address Book in Crestron Toolbox to create an entry using the expected communication protocol (USB). When multiple USB devices are connected, identify the PAC2M by entering "PAC2M" in the "Model" textbox, the unit's serial number in the "Serial" textbox or the unit's hostname in the "Hostname" textbox. The hostname can be founding the "System Info" window in the section marked "Ethernet" however, communications must be established in order to see this information in the "System Info" window.

- Display the PAC2M's "System Info" window (click the ▮ icon). Communications are confirmed when the device information is displayed.

TCP/IP Communication

Ethernet Communication

PC RUNNING CRESTRON TOOLBOX ◄── ETHERNET ──► PAC2M
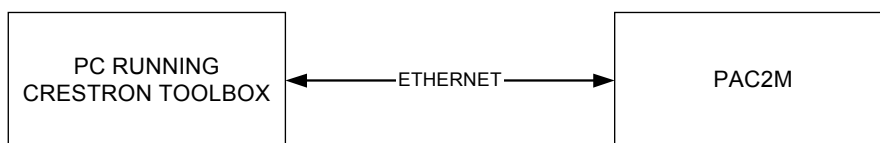
- Establish USB communication between PAC2M and PC.

- Enter the IP address, IP mask and default router of the PAC2M via the Crestron Toolbox (**Functions | Ethernet Addressing**); otherwise enable DHCP.

- Confirm Ethernet connections between PAC2M and PC. If connecting through a hub or router, use CAT5 straight through cables with 8-pin RJ-45 connectors. Alternatively, use a CAT5 crossover cable to connect the two **LAN** ports directly without using a hub or router.

- Use the Address Book in the Crestron Toolbox to create an entry for the PAC2M with the PAC2M's TCP/IP communication parameters.

- Display the "System Info" window (click the icon) and select the PAC2M entry. Communications are confirmed when the device information is displayed.

- Use the Crestron Toolbox to create the PAC2M IP table.

  ⇒ Select **Functions | IP Table Setup**.

  ⇒ Either add, modify, or delete entries in the IP table. The PAC2M can have only one IP table entry.

  ⇒ A defined IP table can be saved to a file or sent to the device.

Programs and Firmware

Program or firmware files may be distributed from programmers to installers or from Crestron to dealers. Firmware upgrades are available from the Crestron website as new features are developed after product releases. One has the option to upload programs via the programming software or to upload and upgrade via the Crestron Toolbox. For details on uploading and upgrading, refer to the SIMPL Windows help file or the Crestron Toolbox help file.

SIMPL Windows

If a SIMPL Windows program is provided, it can be uploaded to the control system using SIMPL Windows or Crestron Toolbox.

Firmware

Check the Crestron website to find the latest firmware. (New users may be required to register to obtain access to certain areas of the site, including the FTP site.)

Upgrade PAC2M firmware via Crestron Toolbox.

- Establish communication with the PAC2M and display the "System Info" window.

- Select **Functions | Firmware…** to upgrade the PAC2M firmware.

Program Checks

Actions that can be performed on the PAC2M vary depending on whether it is connected via Cresnet or Ethernet.

Cresnet Connections

For Cresnet connections, using Crestron Toolbox, display the network device tree (**Tools | Network Device Tree**) to show all network devices connected to the control system. Right-click on the PAC2M to display actions that can be performed on the PAC2M.

Ethernet Connections

For Ethernet connections, display the "System Info window (click the icon) and select the **Functions** menu to display actions that can be performed on the PAC2M.

Problem Solving

Troubleshooting

The following table provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

PAC2M Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Unexpected response from control system.	Network devices are not communicating with the control system.	Use Crestron Toolbox to poll the network. Verify network connection to the device.
PWR LED does not illuminate.	Control system is not receiving power.	If power is supplied through an AC adapter, verify the DC output plug is properly attached to the control system and that the adapter is securely plugged into an outlet. If power is supplied through Cresnet cabling, ensure the cable is securely plugged into the **NET** connector.
MSG LED illuminates.	Hardware or software failure, hardware incompatibility with software definitions or programming error.	Verify that hardware configuration matches software configuration. Use Crestron Toolbox to display the error log. Refer to "Error Message Definitions" in the latest version of the Crestron 2-Series Control Systems Reference Guide (Doc. 6256) for more details.
System locks up.	Various.	Press and release front panel **HW-R** button, then press and hold **SW-R** button to bypass program and communicate directly with the processor. (Refer to "Troubleshooting Communications" in the Crestron 2-Series Control Systems Reference Guide (Doc. 6256) for more details.
Cresnet device does not respond.	Device not wired correctly.	Verify Cresnet wiring.
	Improper NET ID used.	Verify that device ID matches NET ID in the program.
A/V system device does not respond.	Device is not receiving sufficient power.	User the Crestron Power Calculator to help calculate how much power is needed for the system.

NOTE: If communication cannot be established or the control system is locked-up, refer to "Troubleshooting Communications" in the Crestron 2-Series Control Systems Reference Guide (Doc. 6256).

NOTE: *Passthrough Mode* enables Viewport access to any serial controlled device on the network. This aids in troubleshooting by allowing direct communication between the PC and a network device (effectively "passing through" the PAC2M). For information pertaining to Passthrough Mode, refer to "Passthrough Mode" in the Crestron 2-Series Control Systems Reference Guide (Doc. 6256).

System Monitor

The System Monitor allows you to reload firmware into the PAC2M in the event that you cannot load the firmware in the normal mode.

If the system does not function, perform the following procedure:

1. Disconnect all Crestron USB devices from the PC.

2. On the PAC2M, press and release the **HW-R** button. The **MSG** LED will start blinking rapidly four times per second. This rapid blink will last five seconds.

3. During the rapid blink of the **MSG** LED, press and release the **SW-R** button. This will put the PAC2M into "Wait" mode for the next five seconds. During this mode the **MSG** LED will blink slowly, once per second.

4. During "Wait" mode, press and release the **SW-R** button again. The PAC2M will now enter the "Wait Acknowledge" mode for the next five seconds. During this mode the **MSG** LED will blink rapidly four times per second.

5. During "Wait Acknowledge" mode, press and release the **SW-R** button a third time. The PAC2M will enter "Monitor" mode. Once the PAC2M is in "Monitor" mode, the **NET** LED will light up to indicate "Monitor" mode. At the same time, the **MSG** LED will blink rapidly four times per second.

6. Once the PAC2M is in "Monitor" mode, connect to the PC using a USB cable.

NOTE: If at any point in the above sequence, one of the timer periods expires without the **SW-R** button being pressed, the unit will boot normally, first running the firmware, then loading the application.

NOTE: If your PC does not have the USB driver installed, after connecting the PAC2M to the PC using the USB cable, you will see a dialog box on your PC screen asking you to install the USB driver. For instructions on how to install the USB driver, refer to the Crestron Toolbox help file.

7. Open Toolbox and start the Text Console (click the icon). Then, click on the Address Book icon in the lower left corner of the window to open the "Address Book" window.

8. In the "Address Book" window, click the "Add Entry" button and give the new entry a name (e.g. "System Monitor").

9. Click the arrow next to the "Device Type" drop down list. A "Warning" window will open to inform you that this is an advanced feature. Click **OK**,

then select "2-Series Control System Monitor" from the drop down list. Make sure to choose **USB** as the "Connection Type", then click **OK**. The following text will appear in the bottom right corner of the "Text Console" window:

```
usb;device 2SeriesCtrlSystemMonitor
```

The following text will appear in Toolbox:

```
MONITOR>
```

10. At the Toolbox prompt, type **erase** and press **Enter**. The following text will appear in Toolbox:

```
Erasing

->25%->50%->75%->100%

Done
```

11. Press **Alt+O** (not zero) on the keyboard to open the "Firmware" window, then click **Browse**.

12. Find and select the correct firmware file (.CUZ or .zip) and click **Open**.

13. In the "Firmware" window, click **Send**. You will see a "Confirmation" window asking if you've selected the right file. Click **OK** and you will see the "File Transfer" window.

14. When file transfer is completed, you will see a window asking you to re-connect. Click **OK**, then close the "Firmware" window and re-connect using the normal Address Book entry.

Network Analysis

To assist with troubleshooting, you can use Crestron's C2N-ANLZ Cresnet Analyzer (sold separately) to monitor the integrity of the Cresnet network for wiring faults and marginal system performance or other network errors. For more information on how to use the C2N-ANLZ, refer to the C2N-ANLZ Operations Guide (Doc. 6473).

Battery Replacement

A Lithium battery is used to power the system clock within the PAC2M. Under normal conditions, it will last for approximately 10 years. In the event that the clock fails, only an authorized technician should replace it. Refer to caution statement below.

CAUTION: Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.

Check Network Wiring

Use the Right Wire

In order to ensure optimum performance over the full range of your installation topology, Crestron Certified Wire and only Crestron Certified Wire may be used. Failure to do so may incur additional charges if support is required to identify performance deficiencies because of using improper wire.

Calculate Power

CAUTION: Use only Crestron power supplies for Crestron equipment. Failure to do so could cause equipment damage or void the Crestron warranty.

CAUTION: Provide sufficient power to the system. Insufficient power can lead to unpredictable results or damage to the equipment. Please use the Crestron Power Calculator to help calculate how much power is needed for the system (http://www.crestron.com/calculators).

When calculating the length of wire for a particular Cresnet run, the wire gauge and the Cresnet power usage of each network unit to be connected must be taken into consideration. Use Crestron Certified Wire only. If Cresnet units are to be daisy-chained on the run, the Cresnet power usage of each network unit to be daisy-chained must be added together to determine the Cresnet power usage of the entire chain. If the unit is home-run from a Crestron system power supply network port, the Cresnet power usage of that unit is the Cresnet power usage of the entire run. The wire gauge and the Cresnet power usage of the run should be used in the following equation to calculate the cable length value on the equation's left side.

Cable Length Equation

$$L < \frac{40,000}{R \times P}$$

Where: L = Length of run (or chain) in feet
    R = 6 Ohms (Crestron Certified Wire: 18 AWG (0.75 MM^2))
        or 1.6 Ohms (Cresnet HP: 12 AWG (4 MM^2))
    P = Cresnet power usage of entire run (or chain)

Make sure the cable length value is less than the value calculated on the right side of the equation. For example, a Cresnet run using 18 AWG Crestron Certified Wire and drawing 20 watts should not have a length of run more than 333 feet. If Cresnet HP is used for the same run, its length could extend to 1250 feet.

NOTE: All Crestron certified Cresnet wiring must consist of two twisted pairs. One twisted pair is the +24V conductor and the GND conductor and the other twisted pair is the Y conductor and the Z conductor.

Strip and Tin Wire

When daisy-chaining Cresnet units, strip the ends of the wires carefully to avoid nicking the conductors. Twist together the ends of the wires that share a pin on the network connector and tin the twisted connection. Apply solder only to the ends of the twisted wires. Avoid tinning too far up the wires or the end becomes brittle. Insert the tinned connection into the Cresnet connector and tighten the retaining screw. Repeat the procedure for the other three conductors.

Add Hubs

For larger networks (i.e., greater than 28 network devices), it may become necessary to add a Cresnet Hub/Repeater (CNXHUB) to maintain signal quality throughout the network. Also, for networks with lengthy cable runs it may be necessary to add a Hub/Repeater after only 20 devices.

Reference Documents

The latest version of all documents mentioned within the guide can be obtained from the Crestron website (http://www.crestron.com/manuals). This link will provide a list of product manuals arranged in alphabetical order by model number.

List of Related Reference

DOCUMENT TITLE
2-Series Control Systems Reference Guide
C2N-ANLZ Cresnet Analyzer
CAEN Crestron Automation Enclosures
CAENIB Crestron Automation Enclosures
Crestron e-Control Reference Guide

Further Inquiries

If you cannot locate specific information or have questions after reviewing this guide, please take advantage of Crestron's award winning customer service team by calling the Crestron corporate headquarters at 1-888-CRESTRON [1-888-273-7876]. For assistance in your local time zone, refer to the Crestron website (http://www.crestron.com/offices) for a listing of Crestron worldwide offices.

You can also log onto the online help section of the Crestron website (http://www.crestron.com/onlinehelp) to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

Future Updates

As Crestron improves functions, adds new features and extends the capabilities of the PAC2M, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website periodically for manual update availability and its relevance. Updates are identified as an "Addendum" in the Download column.

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3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

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