

Crestron **MC2E**
2-Series Compact Control System
with Ethernet

Operations Guide



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2-Series Compact Control System with Ethernet: MC2E

Introduction

Features and Functions

- 2-Series engine
- Dual bus architecture
- 32-bit Freescale Coldfire® processor
- 36 MB of Internal Memory*
- Cresnet® port – master/slave selectable
- 10/100 Ethernet with SSL encryption
- Crestron e-Control®2 enabled
- RoomView® enabled
- Two Com ports (RS-232/422/485)
- Four IR/serial ports
- Four Versiport I/O ports
- Four low-voltage relay ports
- IR wireless compatible using CNXRMIRD (not included)
- Static and dynamic IP addressing
- Built-in web server
- POP3 email server for sending email
- External power supply included
- Single-space EIA rack-mountable

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

2-Series Engine

At the heart of the MC2E is the powerful 32-bit Freescale ColdFire® processor. Crestron's exclusive enhanced real-time operating system makes the MC2E the fastest, most reliable control system available.

Cresnet®

Cresnet is the communications backbone for many Crestron touchpanels, keypads, lighting controls and other devices. The Cresnet bus is a simple, yet flexible 4-wire network that provides rock-solid bidirectional communication for numerous Cresnet devices.

Cresnet Slave Mode

Selectable Cresnet Slave Mode enables the MC2E to be configured as a Cresnet slave device, effectively transforming it into a Cresnet expansion module. Such flexibility can offer a cost-effective solution for system expansion, providing a host of additional control ports in a single module.

Ethernet

Crestron pioneered the IP-based control system to harness the vast possibilities of Ethernet and the Internet for remote control, monitoring, programming and diagnostics. The MC2E is designed to deliver the world's most advanced IP control solution with full-duplex 10/100 Ethernet, built-in Web server and email client and support for both static and dynamic IP addressing.

Crestron e-Control® 2

Crestron's award-winning e-Control 2 XPanel solutions offer the most flexible range of IP control possibilities available. Using a Windows® computer or CE/PocketPC™ PDA device, e-Control 2 provides an amazing control GUI that looks and behaves just like a Crestron Isys® touchpanel.

Crestron RoomView®

Every Ethernet-enabled 2-Series control system works directly with Crestron's exclusive RoomView Help Desk software for the industry's most comprehensive facility-wide asset management solution.

SNMP

Built-in SNMP support enables network management of Crestron control systems using third-party SNMP software. As an alternative or supplement to RoomView, SNMP allows full control and monitoring from the IT Help Desk or NOC in a format that is familiar to IT personnel.

SSL

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

IR Wireless Option

When equipped with an optional CNXRMIRD IR receiver, the MC2E provides a low-cost wireless control solution using any of Crestron's IR wireless touchpanels or a third-party universal IR remote.

Specifications

Specifications for the MC2E are listed in the following table.

MC2E Specifications

SPECIFICATION	DETAILS
Processor CPU	32-bit Freescale Coldfire [®] Microprocessor
Memory SDRAM	32 MB
NVRAM	256 kB
Flash	4 MB
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	12 Watts (0.5 Amp) @ 24 Volts DC (PW-2410RU power supply included)
Available Cresnet Power	13 Watts using PW-2410RU (included) or 38 Watts using PW-2420RU (sold separately)
Cresnet Power Usage	12 Watts (0.5 Amp @ 24 Volts DC) with no power supply connected to the 24VDC connector
Environmental Temperature	41° to 113°F (5° to 45°C)
Humidity	10% to 90% RH (non-condensing)
Enclosure Chassis	Steel, black matte powder coat finish
Faceplate	Extruded aluminum, black matte powder coat finish with polycarbonate label overlay
Mounting	Freestanding or 1U 19 inch rack mountable (adhesive feet and rack ears included)
Dimensions Height	1.70 in (4.32 cm) without feet; 1.80 in (4.58 cm) with feet
Width	17.03 in (43.25 cm) without ears; 19.00 in (48.26 cm) with ears
Depth	8.50 in (21.59 cm)
Weight	4.3 lbs (2.0 kg)
Included Accessories PW-2410RU	25 Watt Regulated Universal Power Supply

(Continued on following page)

MC2E Specifications (Continued)

SPECIFICATION	DETAILS
Available Accessories	
PW-2420RU	50 Watt Regulated Universal Power Supply
C2N-HBLOCK	Cresnet Network Distribution Block
CNSP-XX	Custom Serial Interface Cable
IRP2	IR Probe
CNXRMIRD	IR Receiver

Physical Description

This section provides information on the connections, controls and indicators available on your MC2E.

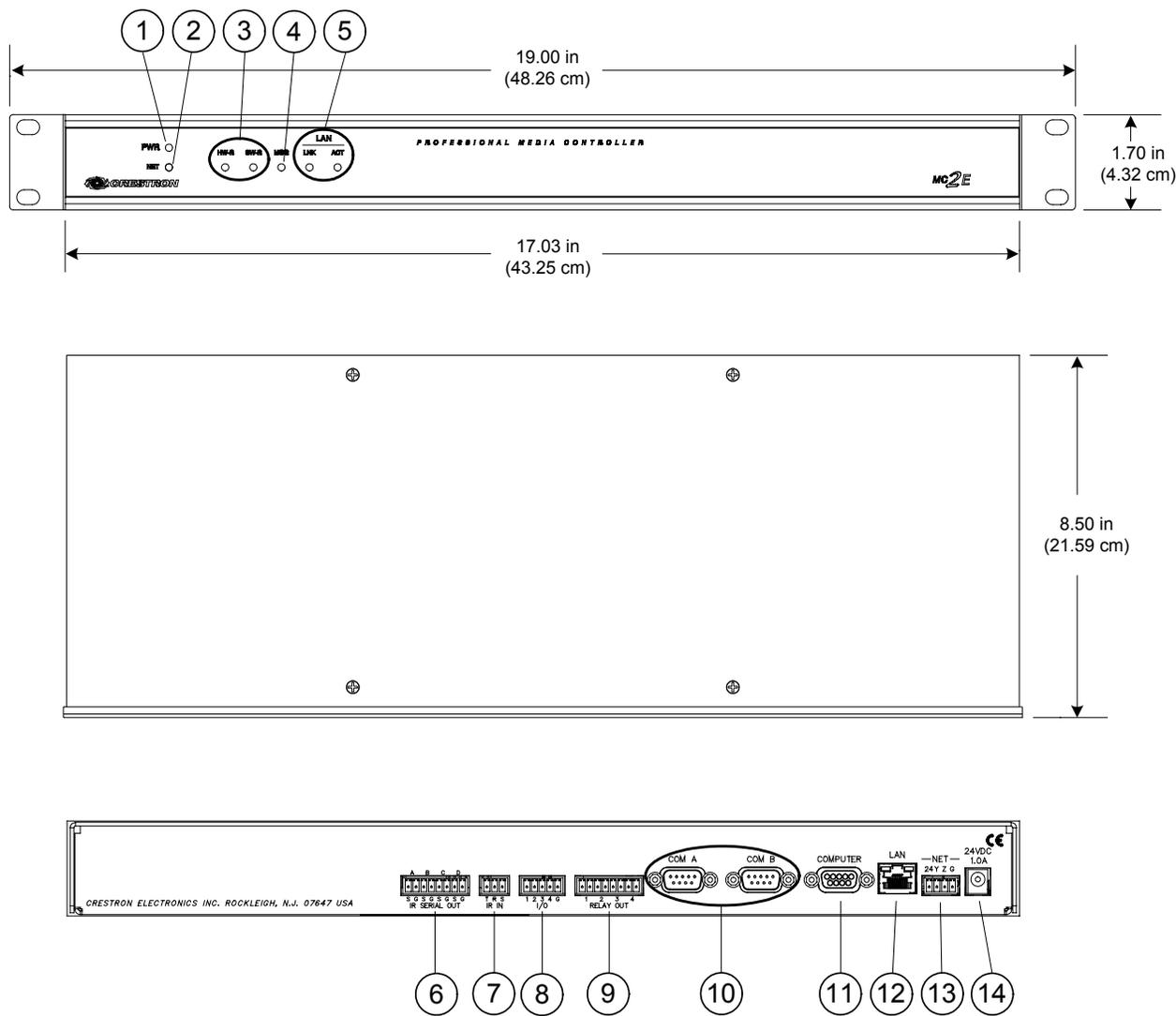
MC2E Physical View (Front)



MC2E Physical View (Rear)



MC2E Overall Dimensions

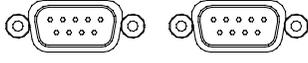


Connectors, Controls & Indicators

#	CONNECTORS ¹ , CONTROLS & INDICATORS	DESCRIPTION
1	PWR LED	Indicates 24 Volts DC power supplied from Cresnet control network or external power supply.
2	NET LED	Indicates communication with Cresnet System.
3	RESET BUTTONS	HW-R - Initiates system hardware reset. SR-R - Pressing this in combination with HW-R button performs a system restart without loading the program. Pressing it alone while the system is running restarts the program.
4	MSG LED ²	Illuminates when a message is present in the message log. To view the contents of the message log, use Crestron Toolbox™.
5	LAN LEDs	LNK – Indicates when there is a connection to the rear panel LAN port. ACT – Indicates communication (activity) at the rear panel LAN port.

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Connectors, Controls & Indicators (Continued)

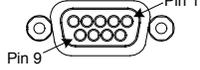
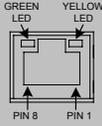
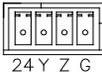
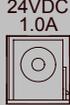
#	CONNECTORS ¹ , CONTROLS & INDICATORS	DESCRIPTION
6	INFRARED-SERIAL OUTPUT (A – D) ^{3,4}  IR SERIAL OUT	(4) 2-pin 3.5 mm detachable terminal blocks IR/Serial output ports; IR output up to 1.2 MHz; 1-way serial TTL/RS-232 (0-5 Volts) up to 115.2k baud; Individual signal generator per port, allowing simultaneous firing of all ports.
7	IR IN  IR IN	(1) 3-pin 3.5 mm detachable terminal block; For connection of the CNXRMIRD IR Receiver (sold separately); Allows IR wireless control from Crestron or third-party universal remotes using RC-5 IR commands.
8	I/O (1 – 4) ^{5,6}  I/O	(1) 5-pin 3.5 mm detachable terminal block comprising (4) digital input/output or analog input ports (referenced to GND); Digital Input: Rated for 0-24 Volts DC, input impedance 20 kΩ, logic threshold 1.24 Volts DC; Digital Output; 250 mA sync from maximum 24 Volts DC, catch diodes for use with “real world” loads; Analog Input: Rated for 0-10 Volts DC, protected to 24 Volts DC maximum, input impedance 20 kΩ; Programmable 5 Volts, 2 kΩ pull-up resistor per pin.
9	RELAY OUTPUT (1 – 4)  RELAY OUT	(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.
10	COM (A – B) ^{7,8,9} COM A COM B 	(2) DB9 male, bidirectional RS-232/422/485 ports; Up to 115.2k baud; Hardware and software handshaking support; All ports support C2N-NPA8 Network Poll Accelerator ¹⁰ .

PIN	DIRECTION	DESCRIPTION
1*	To MC2E	(RXD-) RS-422 Receive Data (Idles low)
2	To MC2E	(RXD) RS-232 Received Data
3	From MC2E	(TXD) RS-232 Transmitted Data
4	From MC2E	(TXD+) RS-422 Transmit Data (Idles high)
5	Common	RS-232 and RS-422 Signal Common
6	To MC2E	(RXD+) RS-422 Receive Data (Idles high)
7	From MC2E	(RTS) RS-232 Request to Send
8	To MC2E	(CTS) RS-232 Clear to Send
9	From MC2E	(TXD-) RS-422 Transmit Data (Idles low)

* RS-422 transmit and receive are balanced signals requiring two lines plus a ground in each direction. RXD+ and TXD+ should idle high (going low at start of data transmission). RXD- and TXD- should idle low (going high at start of data transmission). If necessary, RXD+/RXD- and TXD+/TXD- may be swapped to maintain correct signal levels.

(Continued on following page)

Connectors, Controls & Indicators (Continued)

#	CONNECTORS ¹ , CONTROLS & INDICATORS	DESCRIPTION																				
11	<p>COMPUTER COMPUTER</p> 	<p>(1) DB9 female, RS-232 computer console port. Connector is used when programming with a PC. The port is modem compatible (modem and PC cables not included). Supports baud rate of up to 115 kB. Use with standard DB9 straight through cable. Pins 1, 4, 6 and 9 are not connected.</p> <table border="1"> <thead> <tr> <th>PIN #</th> <th>ABBREVIATION</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>TXD</td> <td>Transmit Data</td> </tr> <tr> <td>3</td> <td>RXD</td> <td>Receive Data</td> </tr> <tr> <td>5</td> <td>SG</td> <td>Signal Ground</td> </tr> <tr> <td>7</td> <td>CTS</td> <td>Clear To Send</td> </tr> <tr> <td>8</td> <td>RTS</td> <td>Request To Send</td> </tr> </tbody> </table>	PIN #	ABBREVIATION	DESCRIPTION	2	TXD	Transmit Data	3	RXD	Receive Data	5	SG	Signal Ground	7	CTS	Clear To Send	8	RTS	Request To Send		
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12	<p>LAN</p> 	<p>(1) 8-wire RJ-45 with 2 LED indicators; 10/100BaseT Ethernet port; Green LED indicates link status Yellow LED indicates Ethernet activity.</p> <table border="1"> <thead> <tr> <th>TYPE</th> <th>PIN</th> <th>SIGNALS</th> </tr> </thead> <tbody> <tr> <td rowspan="8">8-Position RJ-45</td> <td>1</td> <td>TD+</td> </tr> <tr> <td>2</td> <td>TD-</td> </tr> <tr> <td>3</td> <td>RD+</td> </tr> <tr> <td>4</td> <td>Connected to pin 5</td> </tr> <tr> <td>5</td> <td>Connected to pin 4</td> </tr> <tr> <td>6</td> <td>RD-</td> </tr> <tr> <td>7</td> <td>Connected to pin 8</td> </tr> <tr> <td>8</td> <td>Connected to pin 7</td> </tr> </tbody> </table>	TYPE	PIN	SIGNALS	8-Position RJ-45	1	TD+	2	TD-	3	RD+	4	Connected to pin 5	5	Connected to pin 4	6	RD-	7	Connected to pin 8	8	Connected to pin 7
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13	<p>NET^{11, 12}</p> 	<p>Four-position terminal block connector for data and power. Connects to Cresnet control network.</p> <p>Pin 1 (24) Power Pin 2 (Y) Data Pin 3 (Z) Data Pin 4 (G) Ground</p> <p>Expandable via C2N-NPA8 Network Poll Accelerator¹⁰.</p>																				
14	<p>24 VDC^{11, 12, 13}</p> 	<p>(1) 2.1 mm barrel DC power jack, 24 Volt DC power input; (PW-2410RU power supply included); Passes through to NET port to power Cresnet devices.</p>																				

- Interface connectors for **IR-SERIAL OUT**, **IR IN**, **I/O**, **RELAY OUT** and **NET** ports are provided with the unit.
- This LED was labeled **ERR** on units manufactured prior to 2005. It is functionally the same; only the labeling has changed.
- Transmission levels on the infrared-serial output connectors are in the 0 to +5 VDC range, which may not be compatible with all RS-232 devices.
- A port can be used for either IR or RS-232 communications but not both.
- Digital outputs are TTL values and may not work with devices requiring a “dry” contact closure (e.g. low voltage motor controllers).
- Ports can be used for either input or output but not both.
- The pinout of each 9-pin port is non-standard; it contains RS-422 pins in addition to RS-232. This may result in a conflict with some equipment and therefore all nine pins should **not** be used. Only the required pins for each communication type should be connected. For RS-232 and -422, pins 2, 3, 5, 7 and 8 are wired straight through.
- Data Set Ready (DSR) and Data Terminal Ready (DTR) are not supported.

9. To support RS-485, tie pin 1 (RXD-) to pin 9 (TXD-) and pin 4 (TXD+) to pin 6 (RXD+) in the cable. (Refer to table at right.)

COM (DB9) CONNECTOR	RS-485 BUS
Tie Pins 1 & 9	-
Tie Pins 4 & 6	+
Pin 5	G

10. The Cresnet Poll Accelerator effectively increases the network speed, fan-out and device addresses by a factor of 8 for each Poll Accelerator added to the system.
11. The MC2E can be powered via the **24 VDC** jack or the **NET** port. Be sure to use a Crestron approved power supply as another may cause damage.
12. Use care in wiring installations to avoid applying 24 VDC to Cresnet wiring from an AC power pack as well as from a system device that contains its own power supply. Although this condition should not cause any damage, Crestron does not recommend it. In those network configurations that require more power than can be supplied by the primary power supply alone, disconnect the +24 VDC Cresnet wire from those devices that will be powered by an AC power pack.
13. An optional power pack (PW-2420RU) provides 38 watts to Cresnet devices when connected to the MC2E.

Industry Compliance

As of the date of manufacture, the MC2E 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.

Identity Code

Net ID

The Net ID of the MC2E has been factory set to **02**. This Net ID is defined as the “Master” control system. The Net IDs of multiple MC2E devices in the same system must be unique; this means there will be a master/slave relationship between units (only the Net ID of the master will be left at **02**). Net IDs are changed from a personal computer (PC) via the Crestron Toolbox™ (refer to “Establishing Communication” on page 15).

When setting the Net ID, consider the following:

- The Net ID of each unit must match an ID code specified in the SIMPL Windows program.
- Each network device must have a unique Net ID.

For more details, refer to the Crestron Toolbox help file.

IP ID

The IP ID is set within the MC2E’s table using Crestron Toolbox. For information on setting an IP table, refer to the Crestron Toolbox help file. The IP IDs of multiple MC2E devices in the same system must be unique.

When setting the IP ID, consider the following:

- The IP ID of each unit must match an IP ID specified in the SIMPL Windows program.
- Each device using IP to communicate with a control system must have a unique IP ID.

Installation

Ventilation

The MC2E should be used in a well-ventilated area. The venting holes should not be obstructed under any circumstances.

To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the table of specifications. Consider using forced air ventilation and/or incrementing the spacing between units to reduce overheating. 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.

Rack Mounting

The MC2E can be mounted in a rack or stacked with other equipment. Two “ears” are provided with the MC2E so that the unit can be rack mounted. These ears must be installed prior to mounting. Complete the following procedure to attach the ears to the unit. The only tool required is a #2 Phillips screwdriver.

WARNING: To prevent bodily injury when mounting or servicing this unit in a rack, take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

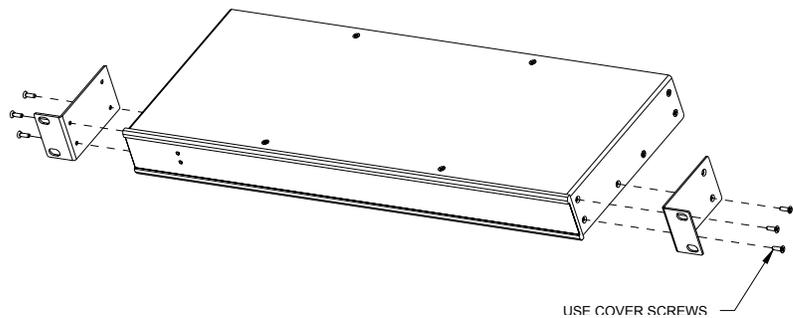
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

NOTE: If rack mounting is not required, rubber feet are provided for tabletop mounting or stacking. Apply the feet near the corner edges on the underside of the unit.

NOTE: Reliable earthing of rack-mounted equipment 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).

To install the ears:

1. There are screws that secure each side of the MC2E top cover. Using a #2 Phillips screwdriver, remove the three screws closest to the front panel from one side of the unit. Refer to the diagram following step 3 for a detailed view.
2. Position a rack ear so that its mounting holes align with the holes vacated by the screws in step 1.
3. Secure the ear to the unit with three screws from step 1, as shown in the diagram on the following page.

Ear Attachment for Rack Mounting (this image shows a 1RU device)

4. Repeat procedure (steps 1 through 3) to attach the remaining ear to the opposite side.

Bussing Strip Installation

The 2-Series compact control system is supplied with two brass bussing strips to facilitate commoning (linking) of multiple terminal block connections. The bussing strips are constructed with four terminal block positions and may be trimmed to size for various applications or different devices. One strip is supplied for the 8-position terminal block (four relays).

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 3/4" 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.

Stacking

Four "feet" are provided with the MC2E so that if the unit is not rack mounted, the rubber feet can provide stability when the unit is placed on a flat surface or stacked. These feet should be attached prior to the hookup procedure.

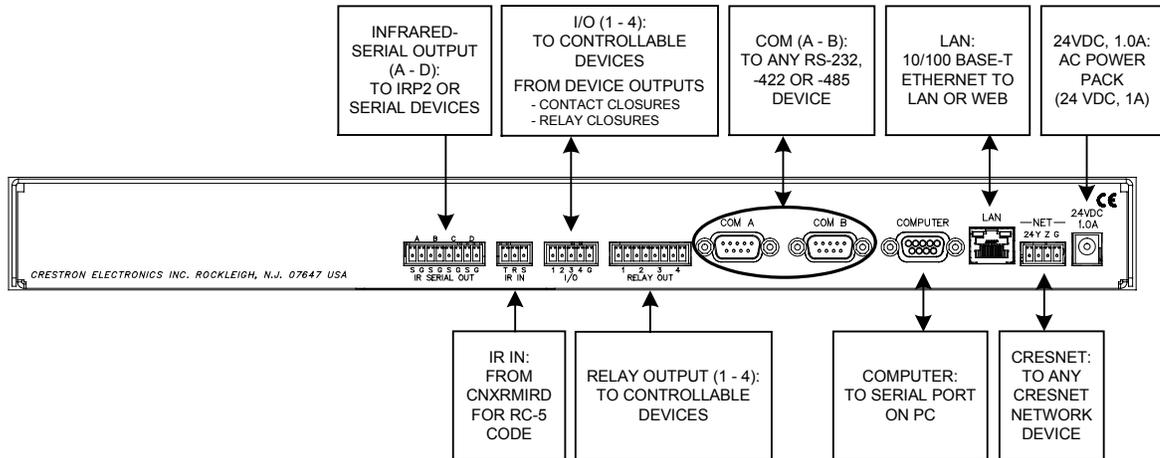
Hardware Hookup

Make the necessary connections as called out in the illustration that follows this paragraph. Refer to “Network Wiring” on page 9 before attaching the 4-position terminal block connector. Apply power after all connections have been made.

When making connections to the MC2E, consider the following:

- Use Crestron power supplies for Crestron equipment.
- The included cable cannot be extended.

Hardware Connections for the MC2E



NOTE: The maximum continuous current from equipment under any external load conditions shall not exceed a current limit that is suitable for the minimum wire gauge used in interconnecting cables. The ratings on the connecting unit's supply input should be considered to prevent overloading the wiring.

Power Supply

The unit can be powered through the **NET** connector, the included external power pack (PW-2410RU) or the optional power pack PW-2420RU. With the PW-2410RU, the MC2E can provide power to peripheral Cresnet devices (via the **NET** connector) up to a total of 13 watts. The PW-2420RU allows the MC2E to provide up to 38 watts to peripheral Cresnet devices (via the **NET** connector).

If additional power is needed, Crestron recommends the Crestron CNPWS-75 (75 watts) External Power Supply or equivalent.

CAUTION: When using the included power pack PW-2410RU, the MC2E's **NET** connector can supply 13 watts (maximum) to Cresnet devices. Do not connect devices that will exceed this rating as damage may occur to the power pack. To power additional devices from the MC2E's **NET** connector, use the optional power pack PW-2420RU that can supply up to 38 Watts from the **NET** connector to Cresnet devices.

NOTE: In larger system configurations that require more than the 24 VDC supplied by Cresnet, disconnect the +24 VDC wire from the MC2E Cresnet connector and provide the +24 VDC power to the peripheral devices by an alternate source.

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 MC2E 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 MC2E.	SIMPL Windows version 2.04.00 or later with SIMPL+ Cross Compiler version 1.1 or later and Library update 219 or later. Also requires Crestron Database version 15.8.5 or later.
Upload program and firmware.	Crestron Toolbox 1.05.02 or later.
Program with simple wizards for systems using a MC2E (optional but recommended).	Crestron SystemBuilder [™] version 2.0.6 or later (requires SIMPL Windows, VisionTools Pro-e, Crestron Database and Crestron Engraver). Refer to software release notes or Crestron website for other required Crestron software packages.
Software for lighting and environmental controls (optional)	Crestron D3 Pro [™] version 2.1.7 or later.
Manage MC2E systems within a facility (optional)	RoomView [®] Express.
IR learning software.	DEAL for Windows version 3.02 or later.

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 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 SIMPL Windows

NOTE: While SIMPL Windows can be used to program the MC2E, it is recommended to use SystemBuilder for configuring a system.

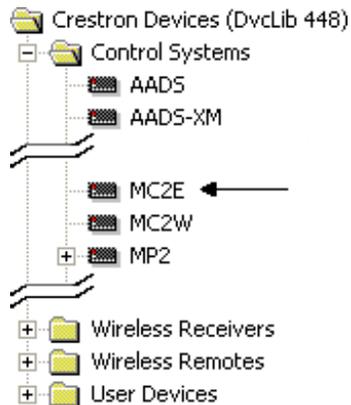
SIMPL Windows is Crestron's premier software for programming Crestron control systems. It is organized into two separate but equally important "Managers".

Configuration Manager

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

- To incorporate the MC2E into the system, drag the MC2E from the Control Systems folder of the *Device Library* and drop it in the *System Views*.

Locating the MC2E in the Device Library



Program Manager

Program 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).

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.

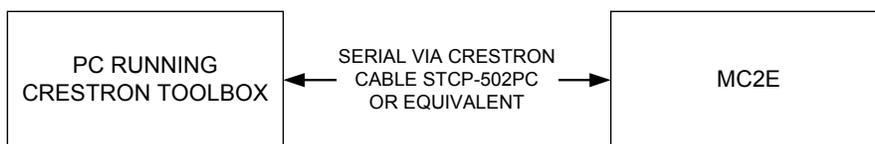
Establishing Communication

Use Crestron Toolbox for communicating with the MC2E; refer to the Crestron Toolbox help file for details. There are two methods of communication.

Direct Serial Communication

NOTE: Required for initial setup of Ethernet parameters.

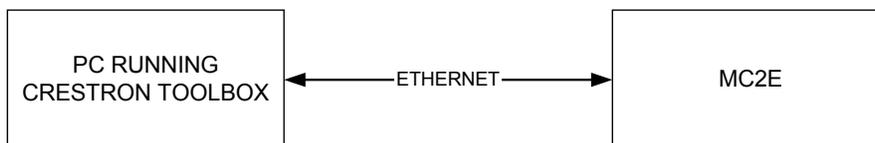
Direct Serial Communication



- The **COMPUTER** port on the MC2E connects to the serial port on the PC via a serial cable (Crestron STCP-502PC or equivalent).
- Use the Address Book in Crestron Toolbox to create an entry using the expected serial communication protocol (RS-232, auto-detect baud rate, no parity, 8 data bits, 1 stop bit, XON/XOFF disabled, RTS/CTS disabled).
- Display the MC2E’s “System Info” window (click the  icon); communications are confirmed when the device information is displayed.

TCP/IP Communication

Ethernet Communication



- Establish serial communication between MC2E and PC.
- Enter the IP address, IP mask and default router of the MC2E via the Crestron Toolbox (**Functions | Ethernet Addressing**); otherwise enable DHCP.

- Confirm Ethernet connections between MC2E 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 MC2E with the MC2E's TCP/IP communication parameters.
- Display the "System Info" window (click the  icon) and select the MC2E entry.
- Use the Crestron Toolbox to create the MC2E IP table.
 - ⇒ Select **Functions | IP Table Setup**.
 - ⇒ Either add, modify, or delete entries in the IP table. The MC2E can have only one IP table entry.
 - ⇒ A defined IP table can be saved to a file or sent to the device.
- When using the MC2E as a "slave", edit the "master" control system's IP table to include an entry for the MC2E. The entry should list the MC2E's IP ID (specified on the MC2E's IP table) and the internal gateway IP address 127.0.0.1.

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 MC2E firmware via Crestron Toolbox.

- Establish communication with the MC2E and display the "System Info" window.
- Select **Functions | Firmware...** to upgrade the MC2E firmware.

Operation

Crestron 2-Series Control Systems are the brain of a complete integrated audio/visual or automation solution, serving as the central processor and I/O interface. Every audio, video and environmental element of the home, boardroom, classroom or command center becomes integrated and accessible through the control system. No matter how complex or basic, Crestron control systems are entirely custom-programmable to attain the exact functionality required.

The MC2E is a low-cost 2-Series Ethernet control system ideally suited for any application requiring the powerful control engine and Ethernet connectivity of Crestron's larger control systems but with fewer control ports. The MC2E features two built-in COM ports, four IR/Serial ports, four I/O Versiports, four isolated relays and Ethernet for control of video projectors, plasma displays, switchers, DVD players, screens, lifts and much more. Additional control ports may be added using Cresnet expansion modules or by "slaving" additional control processors (MC2E or QM-RMC).

The MC2E employs the identical processing engine to that in Crestron's larger control systems and support Crestron's full range of touchpanels, keypads and Cresnet peripherals. It is ideal as the master control processor for a stand-alone boardroom or home theater system and serves equally well slaved to another 2-Series control processor to expand the number of control ports as part of a larger control system.

The MC2E's built-in high-speed Ethernet port and Web server provide full connectivity and e-Control 2 Xpanel support for extensive IP-based control capability, remote programming and diagnostics and seamless integration into very large control networks.

The MC2E requires 12 watts of power to operate. Therefore, if you use the included PW-2410RU power supply (rated at 25 watts), you will have 13 watts of power left over to run additional Cresnet devices. As long as the sum total of the devices on Cresnet does not exceed 13 watts, you will be fine. If the application requires more than 13 watts of network power, use a PW-2420RU or CNPWS-75 in place of the PW-2410RU.

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.

MC2E 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 System Reference Guide (Doc. 6256) for more details.
Compilation error RLCMCVT166 & RLCMCVT177.	Poor analog versus serial signal definition in the SIMPL Windows program.	Confirm properly defined signal definition in the program.
System locks up.	Various.	Press front panel SW-R and HW-R buttons at the same time to bypass program and communicate directly with the processor. (Refer to “Troubleshooting Communications” in the Crestron 2-Series Control System 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.

(Continued on following page)

MC2E Troubleshooting (Continued)

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
System does not function.	Various.	Refer to the "System Monitor" procedure following this table.
	Incorrect power supply.	Use a Crestron power supply.
A/V system device does not respond.	IRP2 or serial port not placed properly.	Verify placement of IRP2 (hold phosphor card under IRP2 while pressing button) and tighten serial cables.
	Used wrong IR/serial port.	Verify that proper IR or serial port is defined.
	Serial cable not wired correctly.	Verify that serial cable is wired correctly for RS-232, 422 or 485.
	Device is not receiving sufficient power.	Use 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 System Reference Guide (Doc. 6256).

NOTE: *Passthrough Mode* enables Toolbox 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 MC2E). For information pertaining to Passthrough Mode, refer to "Passthrough Mode" in the Crestron 2-Series Control System Reference Guide (Doc. 6256).

System Monitor

The System Monitor allows you to reload firmware into the MC2E in the event that you cannot load the firmware in the normal mode.

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

1. Connect the **COMPUTER** port on the MC2E to one of the COM ports (usually COM1) on the PC. Use a straight-through RS-232 cable with a DB9 male connector on one end and a DB9 female connector on the other. Most commercially available cables are acceptable; they should have at least five pins for transmit, receive, ground and hardware handshaking (pins 2, 3, 5, 7 and 8).
2. 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.
3. In the "Address Book" window, click the "Add Entry" button and give the new entry a name (e.g. "System Monitor").
4. 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 **Okay**, then select "2-Series Control System Monitor" from the drop down list and click **Okay**. When you are returned to the "Address Book" window, make sure to choose **RS-232** as the "Connection Type" and the correct Com port next to "Port".

5. Power down the MC2E.
6. While powering up the MC2E, press **Alt+K** then **Enter**, repeating **Alt+K** then **Enter** on the keyboard until the following text (or similar) appears in Toolbox.

```
System Monitor [v1.001 (0001)]  
12-19-01 16:25:23 32MB RAM, 4MB FLASH  
CS>
```

7. At the Toolbox prompt, type **erase** and press **Enter**. The following text appears in Toolbox.
CS>erase
->25%->50%->75%->100%
Done
CS>
8. Press **Alt+O** (not zero) on the keyboard to open the “Firmware” window, then click **Browse**.
9. Find and select the correct firmware file (.CUZ or .zip) and click **Open**.
10. In the “Firmware” window, click **Send**. You will see a “Confirmation” window asking if you have selected the right file. Click **Okay** and you will see the “File Transfer” window.
11. When file transfer is completed, you will see a window asking you to re-connect. Click **Okay**, then close the “Firmware” window and re-connect using the normal Address Book entry.

Network Analyzer

To assist with troubleshooting, the unit contains Crestron’s patent-pending network analyzer to continuously 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 network analyzer, refer to the Crestron Toolbox help file and use the index to search for “Network Analyzer”.

Battery Replacement

A Lithium battery is used to power the system clock within the MC2E. 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 MM²))
 or 1.6 Ohms (Cresnet HP: 12 AWG (4 MM²))
 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 Documents

DOCUMENT TITLE
2-Series Control Systems 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 MC2E, 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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2. Products may be returned for credit, exchange or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, 6 Volvo Drive, Rockleigh, N.J. or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee plus shipping costs on any products returned with an RMA.
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.

CRESTRON Limited Warranty

CRESTRON ELECTRONICS, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from CRESTRON, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touchscreen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

This warranty extends to products purchased directly from CRESTRON or an authorized CRESTRON dealer. Purchasers should inquire of the dealer regarding the nature and extent of the dealer's warranty, if any.

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