

Crestron **MP2/MP2E**
2-Series Media Processor

Operations Guide



CRESTRON

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2-Series Media Processor: MP2/MP2E

Introduction

Features and Functions

The Crestron[®] 2-Series Media Processors MP2/MP2E, cost-competitive options in the Crestron 2-Series line of integrated control systems, are designed for smaller home and commercial network systems. The MP2/MP2E combines 2-Series control processor capability with A/V switching, graphic and parametric equalizers.

Functional Summary

Media:

- [4 x 2] video switcher
 - Four composite video inputs
 - Two composite video outputs
- or [2 x 1] video switch – S-video
 - Two S-video inputs (Y/C)
 - One S-video output (Y/C)
- [7 x 1] stereo audio switch (Seven inputs, one output)
 - Two Balanced and Five unbalanced audio inputs
 - Built-in volume, mute, bass, treble, and balance controls
 - Built-in 6 band graphic and parametric equalizers

Control:

- 257 MIPS processor
- 36 MB of built-in memory (refer to page 14)
- Four IR/serial ports
- Two RS-232/422/485 communication ports
- Four relays
- Four input/output ports
- One IR receiver port
- One Cresnet port

LAN/WAN (MP2E Only):

- 10/100 Ethernet port
- Static IP addressing
- Built-in web server
- POP3 e-mail server send/receive e-mail (future application)
- Full compatibility with all Crestron e-Control[®] power applications

The MP2E provides connectivity for communication and control of Cresnet[®], IP and third party devices on the network. It provides LAN and Web access through its built-in 10/100 BaseT Ethernet port, which supports static IP addressing and full-duplex TCP/IP and UDP/IP protocols.

With speed, power, and extended memory, the 2-Series control systems are ideal for enhanced applications like media help desks, videoconferencing, distance learning, and entertainment facilities.

As with all of the Crestron 2-Series control processors, the 2-Series control engine is a solutions-driven control technology that is at the very heart of the MP2/MP2E products. The breakthrough 2-Series control engine is based on the 257 MIPS, 32-bit Motorola 5407 ColdFire[®] processor. The 2-Series operating system is vastly upgraded from the Crestron X-generation products, yet compatible with existing Crestron software and programming. A key feature is the new Crestron compiler, which allows any existing Crestron SIMPL Windows control program to be easily recompiled for the 2-Series. The real-time, preemptive multi-tasking/multi-threaded operating system offers a file system that supports long file names. The enhanced SIMPL+[®] instruction set is also fully compatible with existing Crestron SIMPL Windows and SIMPL+ programs.

Master Mode

In master mode, the MP2/MP2E is a standalone 2-Series control system that controls serial, Cresnet and Ethernet devices (MP2E only), while providing sophisticated A/V switching and processing capabilities.

Slave Mode

In Cresnet or Ethernet slave mode, the MP2/MP2E operates as part of a larger 2-series control system, where the programming resides in a separate 2-series processor that acts as the system master.

NOTE: The MP2/MP2E can only be a slave to a 2-Series control system.

Specifications

Specifications for the MP2/MP2E are given in the following table.

MP2/MP2E Specifications

SPECIFICATION	DETAILS
CPU	32-Bit Motorola 5407 ColdFire [®] Processor
Processor Speed	257 MIPS (Dhrystone 2.1 Benchmark)
Memory	36MB (4MB flash, 32MB SDRAM, 256KB NVRAM) ¹
Default Net ID	50 in Ethernet slave mode
Ports/Connectors ²	
NET	One – Cresnet 4-wire interface (Expandable via Cresnet Poll Accelerator)
COMPUTER	One – DB9F PC interface
INFRARED – Serial Output	Four – Simultaneous one-way IR or serial output
INFRARED – Serial Input	One – 3-Position connector for use with CNXRMIIRD IR Receiver
I/O	Four – Programmable digital/analog inputs & digital outputs
RELAY OUTPUT	Four – Normally open, isolated relays (MOV suppression)
LAN (MP2E only)	One – RJ-45 10/100 BaseT Ethernet port
COM (A & B)	Two – DB9 bidirectional serial ports (RS-232, RS-422, RS-485) All Cresnet Poll Accelerator ready (baud rate up to 115,200 bps)
24VDC	One – Male receptacle for external power pack (included) ³
MP2E Default Ethernet Ports	HTTP/Web – 80, CIP – 41794, CTP – 41795
Reset Buttons: HW-R	Initiates system hardware reset
SW-R	System restart with or without program

MP2/MP2E Specifications (Continued)

SPECIFICATION	DETAILS
Audio Switcher	Seven stereo inputs (two balanced, five unbalanced), One stereo output, (Balanced or unbalanced)
Volume Control:	-80 to +20 dB Balanced input and output
Bass/Treble Controls:	+/-15dB
Equalization (refer to the note following this table):	Choice of the following: 0 graphic equalizers and 6 parametric equalizers, or 3 graphic equalizers and 3 parametric equalizers, or 5 graphic equalizers and 1 parametric equalizer (firmware version 3.26 or higher required)
Input Compensation:	+/-15 dB per input channel
Frequency Response:	+0/-0.5 dB 20 Hz –20 kHz
THD and Noise:	<0.005% at 1kHz, 22 – 22 kHz, A-weighted, max I/O
S/N Ratio:	> 97 dB, 22 Hz–22 kHz, A-weighted
Common-Mode Rejection Ratio:	>85 dB, 20 Hz–20 kHz
Separation:	>100 dB at 1 kHz, 90 dB 20 Hz–20kHz
Crosstalk:	>90 dB 20 Hz–2 kHz
Input Impedance:	15 K Ω balanced, 10 K Ω unbalanced
Maximum Input Level:	4Vrms Balanced, 2 Vrms Unbalanced
Output Impedance:	200 Ω balanced, 100 Ω unbalanced
Maximum Output Level:	3.6 Vrms balanced, 1.8 Vrms unbalanced
Video Switcher	Four Composite Inputs, two composite outputs, or Two S-video inputs, one S-video output. 75 Ω terminated standard BNC connectors, 100 MHz minimum bandwidth.
Power Requirements	24 W (1Amp @ 24 VDC) Power supply PW-2410RU included ³ Cresnet Power Factor = 18 W
Network Power Fuse Rating	Internal self-resetting fuse ⁴
Environmental Temperature	41° to 113°F (5° to 45°C)
Environmental Humidity	10% to 90% RH (non-condensing)
Dimensions & Weight	Height: 1.7 in (4.32 cm) Width: 19.0 in (48.26 cm) – with ears 17.03 in (43.26 cm) – without ears Depth: 8.5 in (21.59 cm) Weight: 3.54 lb (1.59 kg)

1 For more information on system memory usage, refer to “Memory” on page 14.

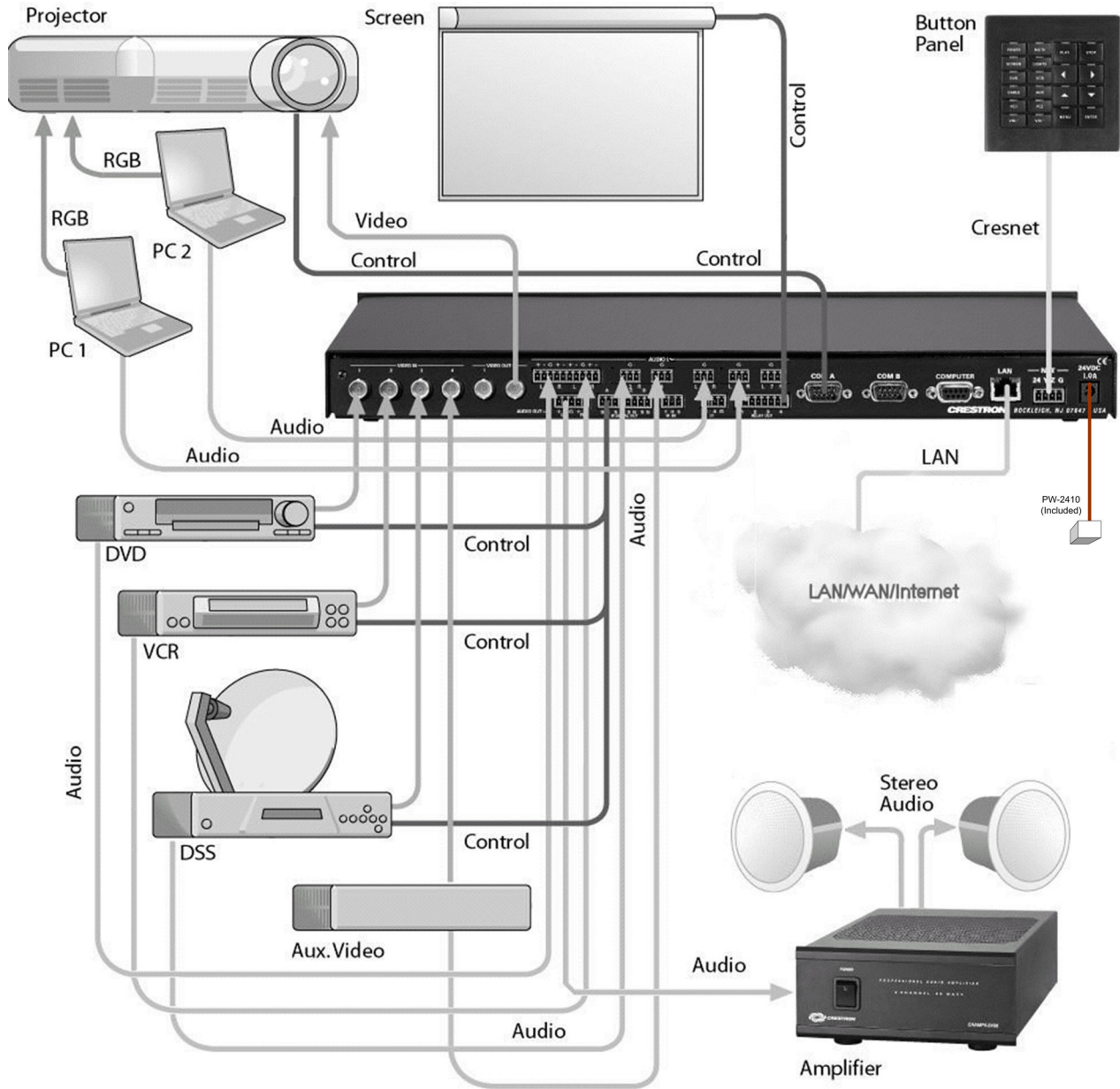
2 For more information on controls, ports, and indicators, refer to “Physical Description” on page 6.

3 For information on power source, refer to “Power Supply” on page 19.

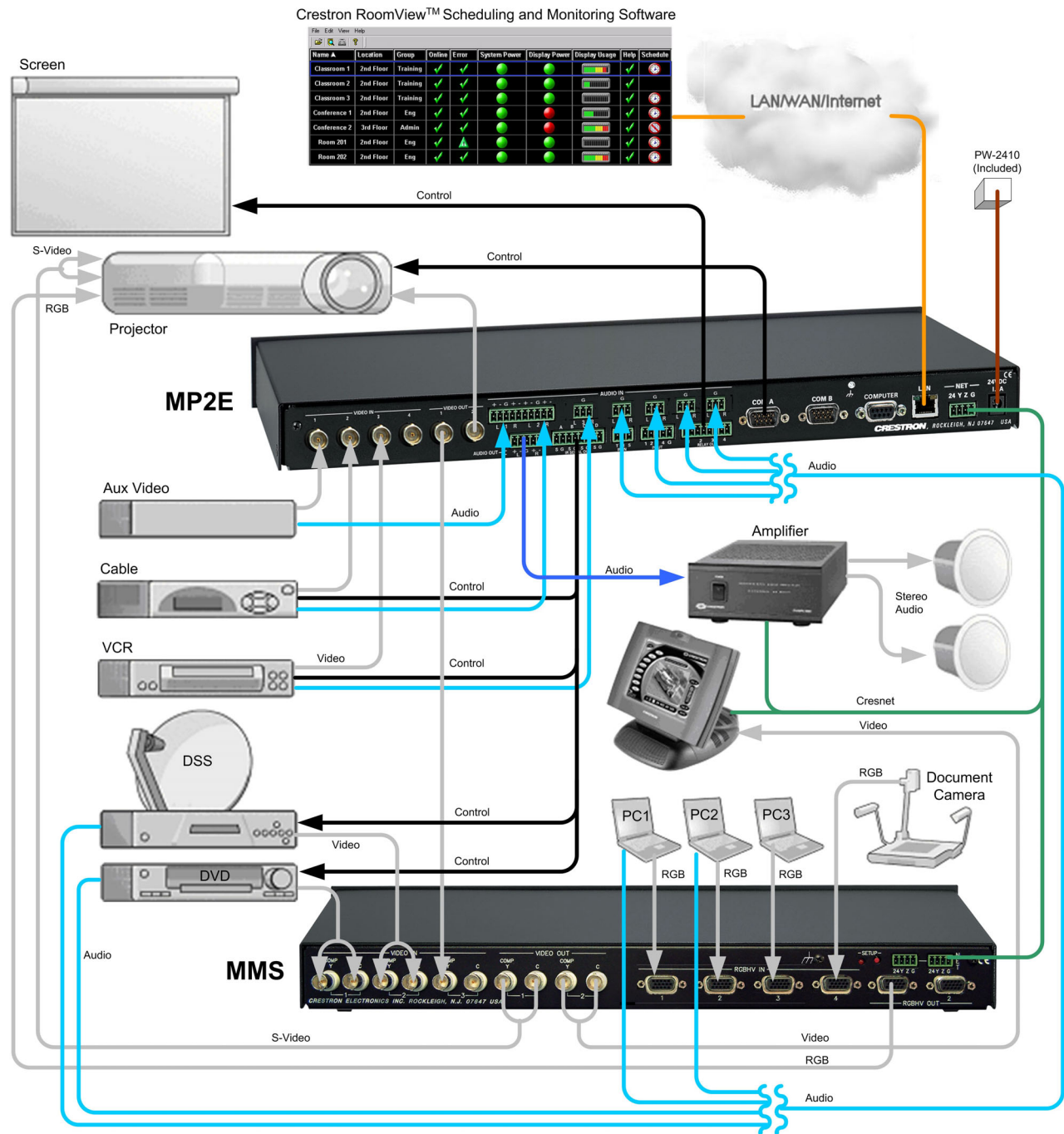
4 Heat-sensitive device—resets within approximately 30 seconds after overload condition is removed.

NOTE: Minimum operating firmware version 3.26 is required to operate the parametric equalizer feature.

Example of a Basic Room Master Mode Configuration with A/V Switching and Control



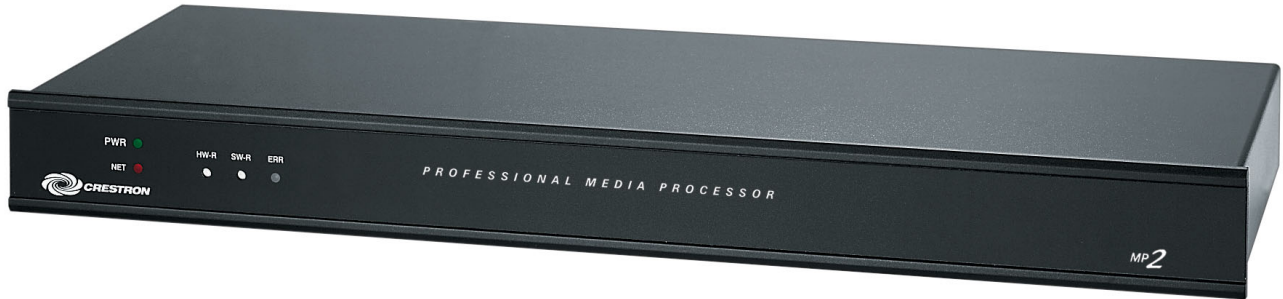
Example of a Basic Room Master Mode Configuration, with MMS Multimedia Switch



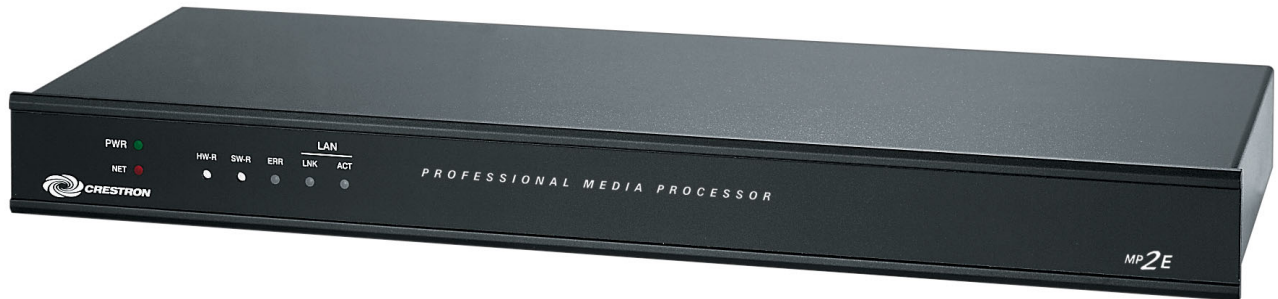
Physical Description

The MP2/MP2E integrated control system is housed in a black enclosure with labeling on the front and rear panels. The front panel includes standard LEDs and two reset buttons. All connections to the unit are made through the rear panel.

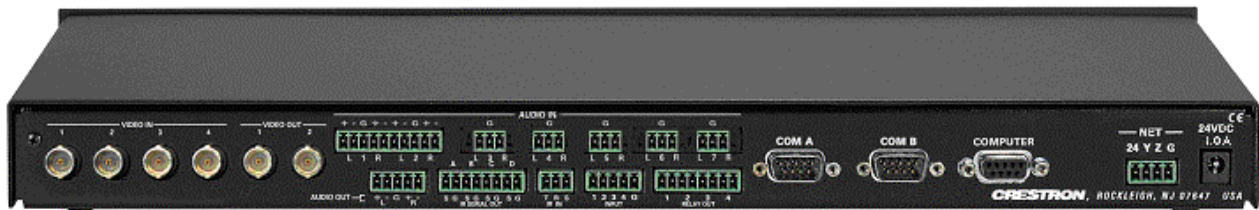
MP2 Front Panel



MP2E Front Panel



MP2 Rear Panel

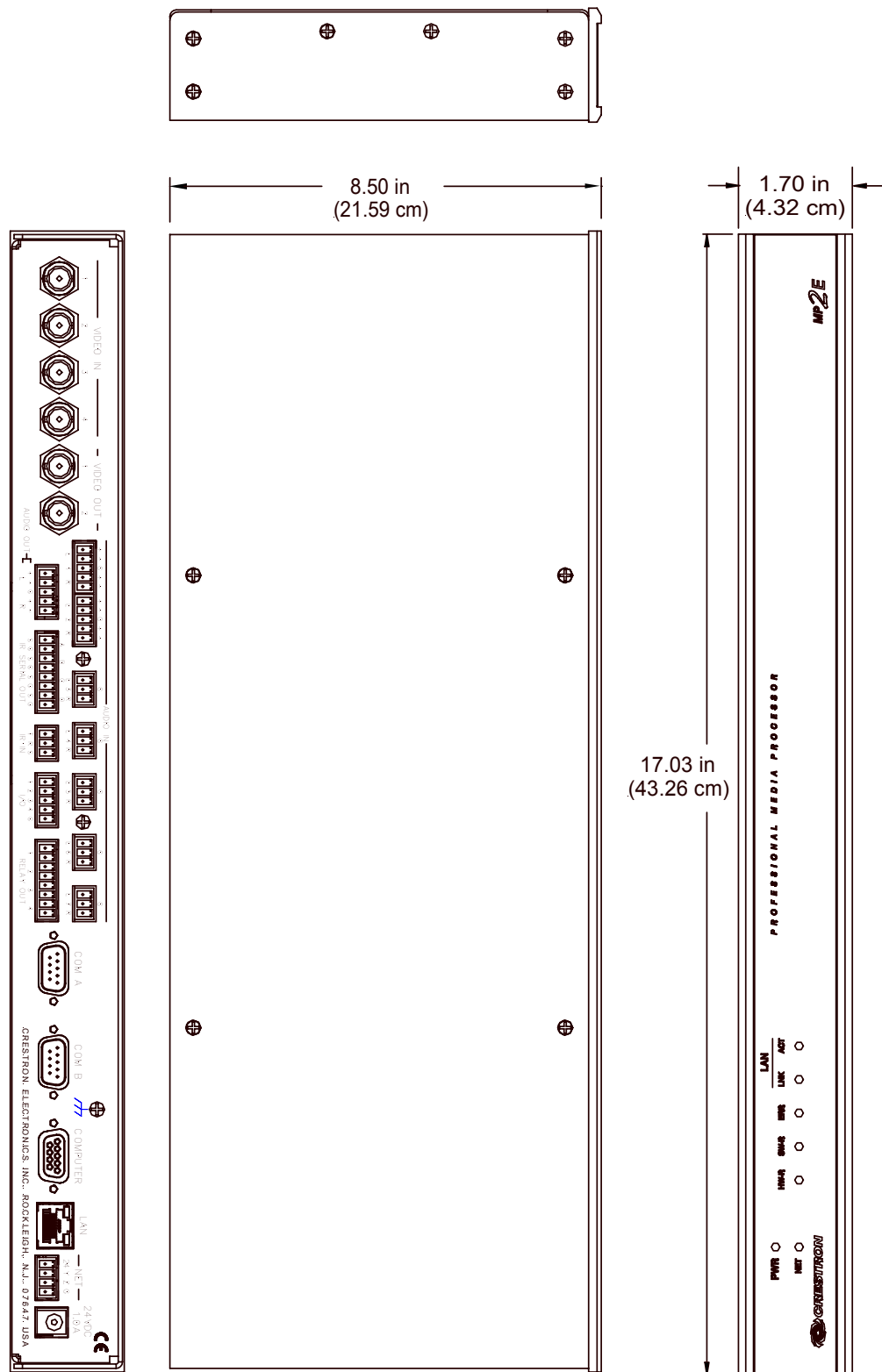


MP2E Rear Panel



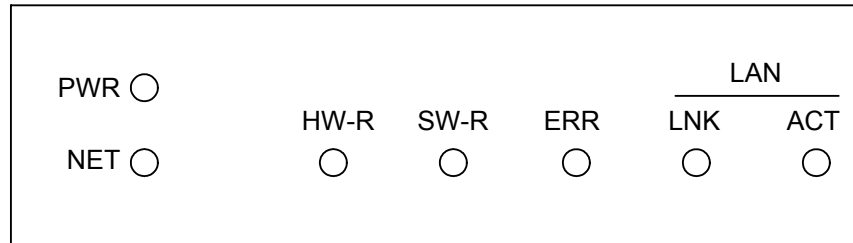
The dimensions shown in the following illustration apply to both units. The MP2E model is shown.

Physical Views of the MP2E



Controls and Indicators

The MP2/MP2E front panel indicators and controls are described as follows.



PWR (Power)

This green LED illuminates when the unit is connected to and receives 24 VDC power from an external power pack or the Cresnet NET connector (refer to page 19 for additional information).

NOTE: Do not apply power to both the 24 VDC external port and the Cresnet port at the same time.

NET

This yellow LED illuminates when the central processing unit is processing or communicating with Cresnet devices (i.e., button pressed at Cresnet panel or data received from Cresnet panel).

HW-R

Pressing this button initiates system hardware reset. (Same effect as disconnecting and reconnecting power.)

SW-R

Pressing this button in combination with the **HW-R** button performs a system restart without loading the program (refer to “Troubleshooting Communications” on page 22). Pressing it alone while the system is running restarts the program.

ERR

This LED illuminates when an error condition is detected. This may be the result of hardware or software failure, or a programming error. To determine the actual error condition, examine the message available through the Crestron Viewport command **Functions | 2-Series | Error Log**.

LNK (LAN) – (MP2E only)

This red LED illuminates when there is a connection to the rear panel LAN port.

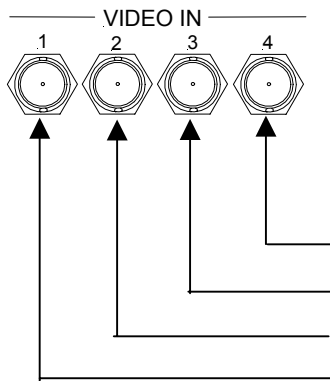
ACT (LAN) – (MP2E only)

This red LED illuminates when there is communication (activity) at the rear panel LAN port with an Ethernet network.

Ports

The MP2/MP2E rear panel ports are illustrated and described as follows.

NOTE: Interface connectors for the NET, Infrared-Serial, I/O, and Relay Output ports are provided with the unit.

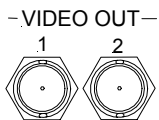


VIDEO IN

Four 75Ω video inputs are provided for four composite or two S-video inputs. A video sensor on each input reports to the CPU. S-video must use port 1 (luma) and 2 (chroma) for the first input, and port 3 (luma) and 4 (chroma) for the second input.

Example: Signal connections for S-video source 1 and 2.

- Chroma (C2) The color portion of the video signal source 2
- Luma (Y2) The brightness and contrast of the video signal source 2
- Chroma (C1) The color portion of the video signal source 1
- Luma (Y1) The brightness and contrast of the video signal source 1



VIDEO OUT

Two 75Ω video outputs are provided for two composite or one S-video output.

For S-video, use port 1 for luma (Y) and port 2 for chroma (C).

AUDIO IN



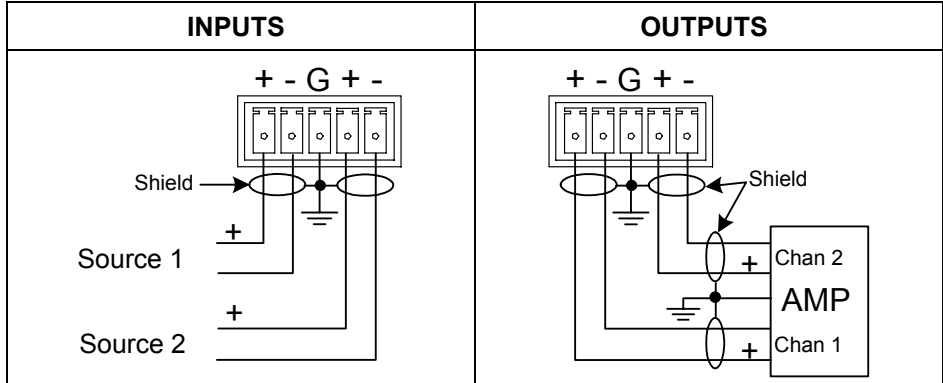
Two balanced inputs utilizing five-position mini-connectors and five unbalanced inputs utilizing three-position mini-connectors are provided for audio input. Balanced audio inputs use (+) and (-) inputs and a separate shield (ground). Unbalanced audio input uses L and R (+) inputs for left and right signal and connects (-) to ground connector (G) [max. 2Vrms].

NOTE: An unbalanced input may use a balanced or unbalanced output.
A balanced input may use a balanced or unbalanced output.

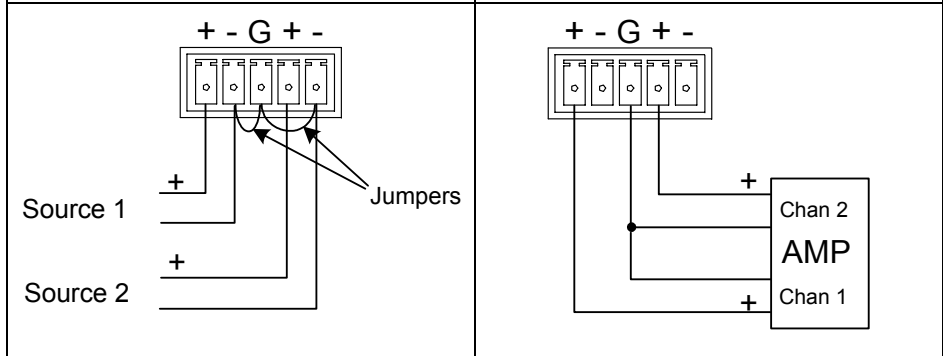
Balanced and Unbalanced Audio Connections on the Five Position Mini Connector

PIN #	SIGNAL NAME	BALANCED AUDIO INPUT	BALANCED AUDIO OUTPUT	UNBALANCED AUDIO INPUT	UNBALANCED AUDIO OUTPUT
1	+	Left +	Left +	Left In	Left Out
2	-	Left -	Left -	Left signal return, jumper to GND	OPEN
3	G	Shield/GND	Shield/GND	GND	Left & Right GND
4	+	Right +	Right +	Right In	Right Out
5	-	Right -	Right -	Right signal return, jumper to GND	OPEN

Balanced Audio Connections using a Five-Position Mini Connector



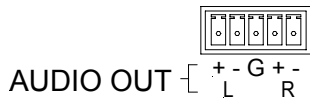
Unbalanced Audio Connections using a Five-Position Mini Connector



Unbalanced Audio Connections using a Three-Position Mini Connector

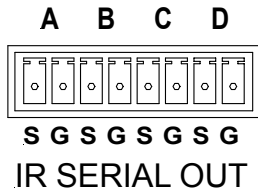


NOTE: Using the unbalanced configuration for the audio output reduces the total audio gain by 6 dB.



AUDIO OUT

One stereo balanced/unbalanced output is provided, utilizing a five-position mini-connector.

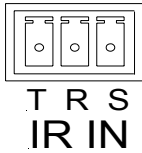


IR - SERIAL OUT

This connector provides four ports for IR level or serial interface. Each output is labeled S (signal) and G (ground). Infrared output is rated up to 1.2 MHz, at data rates up to 115K. Individual UART per port allow simultaneous firing of all ports. Serial protocols include one-way RS-232.

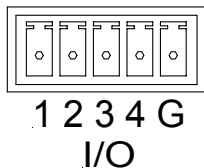
NOTE: Transmission levels on the infrared – serial output connectors are in the 0 to +5VDC range, which may not be compatible with all RS-232 devices.

NOTE: When configured for one-way RS-232 serial data, you cannot stack multiple RS-232 devices or combine/mix with IR devices on the same port.

**IR IN**

A 3-position mini-connector is provided for use with CNXRMIRD. It is used to receive standard RC5 infrared codes such as those transmitted by the Phillips® Pronto, and many universal remotes, as well as from certain devices manufactured by Sharp Electronics Corporation.

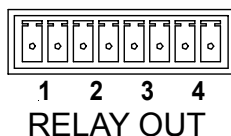
The RC5 code has a uniform duration of all bits. A transition in the middle of the time interval assigned to each bit encodes the logical value. A '0' is encoded by a high to low transition and a '1' by a low to high transition. This is also called a 'bi-phase' code.

**I/O**

This connector provides four software programmable analog and digital inputs as well as digital outputs. Digital outputs offer 250mA sync from maximum 24 VDC; catch diodes for use with "real world" loads. Digital inputs are rated 0 – 24 VDC, 20K ohms input impedance, logic threshold 1.25 VDC. Analog inputs are rated 0 – 10 VDC, protected to 24 VDC maximum, 20K ohms input impedance; pin-programmable 2K ohms pullup resistor to +5V.

NOTE: Digital outputs are TTL values and may not work with devices requiring a “dry” contact closure (e.g., low voltage motor controllers).

NOTE: Ports can be in or out, but not both. For additional information, refer to “Slot 3: C2I-MP2-I04” on page 31.

**RELAY OUT**

These connectors provide four normally open, isolated relay contact groups. Each relay contact closure is rated 1A, 30 VAC/DC; MOV (metal oxide varistor) arc suppression is provided across contacts for use with “real world” loads. For additional information, refer to “Slot 4: C2I-MP2-RY4” on page 34.

**COM (A & B)**

These two DB9 (male) software programmable, bi-directional serial ports are available for RS-232, RS-422, or RS-485 communication, with hardware and software handshaking. Speeds are rated up to 115,200 bps. Both ports are Cresnet Poll Accelerator ready. Only one is allowed on a system. The Cresnet Poll Accelerator effectively increases the Cresnet/network speed, and fan-out, by a factor of eight.

NOTE: The pinout of each 9-pin port is non-standard (refer to the table after these notes, titled "Non-Standard COM Pinout"); 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.

NOTE: Data Set Ready (DSR) and Data Terminal Ready (DTR) are not supported.

NOTE: 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 the table after this note, titled "COM Pinout to RS-485 Bus".

Non-Standard COM Pinout

PIN	DIRECTION	DESCRIPTION
1*	To MP2/MP2E	(RXD-) RS-422 Receive Data (Idles Low)
2	To MP2/MP2E	(RXD) RS-232 Received Data
3	From MP2/MP2E	(TXD) RS-232 Transmitted Data
4	From MP2/MP2E	(TXD+) RS-422 Transmit Data (Idles High)
5	Common	RS-232 and RS-422 Signal Common
6	To MP2/MP2E	(RXD+) RS-422 Receive Data (Idles High)
7	From MP2/MP2E	(RTS) RS-232 Request To Send
8	To MP2/MP2E	(CTS) RS-232 Clear To Send
9	From MP2/MP2E	(TXD-) RS-422 Transmit Data (Idles Low)

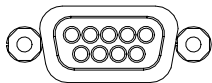
Where *= RS-422 transmit and receive are balanced signals requiring two lines plus a ground in each direction. RXD+ and TXD+ should idle High (going Low at the start of data transmission). RXD- and TXD- should idle Low (Going High at the start of data transmission). If necessary, RXD+/RXD- and TXD+/TXD-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

COM Pinout to RS-485 Bus

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

For additional information, refer to “Slot 6: C2I-MP2-COM2” on page 35.

COMPUTER



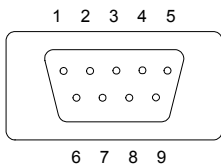
COMPUTER

This DB9F connector is used when programming the unit with a PC. The port is modem compatible. The modem and/or PC program cable are not included. Supports baud rate of up to 115 Kb. Use with a standard DB9 straight through cable.

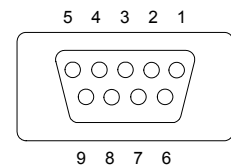
Standard DB9 Pin Assignments

PIN #	ABBREVIATION	DESCRIPTION
1	DCD	Data Carrier Detect
2	RD	Receive Data
3	TD	Transmit Data
4	DTR	Data Terminal Ready
5	SG	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	Ring	Ring Indicator

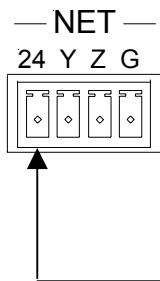
Male DB9 Connector



Female DB9 Connector



NOTE: DTR, pin 4 and DSR, pin 6 are not normally used.



NET

This connector is used for expansion to Cresnet peripherals. This connector can also serve as a 24 V power source to the network when MP2/MP2E unit power is supplied through the 24 VDC power supply connector by the external power pack, PW-2410RU; otherwise, power to the unit is supplied through this connector. There is a 24 W maximum load rating for the Cresnet power output. Refer to “Network Wiring” on page 17 for details.

NOTE: In larger system configurations that require more than the 24W load capacity supplied by Cresnet, disconnect the +24 VDC Cresnet wire from the MP2/MP2E and provide the +24 VDC power to the peripheral devices by an alternate source. Refer to page 19.



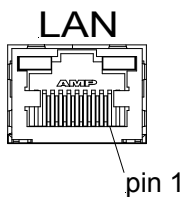
24VDC, 1.0A (Power Supply)

This male connector can be used to supply 24 VDC power to the MP2/MP2E from the external power pack, (model PW-2410RU included, refer to “Power Supply” on page 19). When power is supplied to the units through this connector, 24 VDC @ 1A is also available to other Cresnet system devices through the NET connector. This is typically done in small installations.

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

NOTE: When power is supplied through this connector, you must disconnect the +24 VDC input on the Cresnet connector.

NOTE: Use care in wiring installations to avoid applying 24 VDC power to Cresnet wiring from multiple sources.

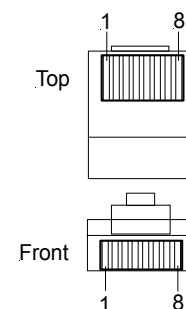


LAN (MP2E Only)

An 8-position RJ-45 port (labeled **LAN**) is accessible on the connector panel at the rear of the MP2E. The port is used for connection to the Ethernet, providing local area network or Web access (cable is not supplied). The port also contains two light-emitting diodes (LEDs). The green LED on the left side of the port is a link status LED and illuminates when the card is connected to a working network. The orange LED on the right-side flashes to indicate Ethernet activity. Refer to the following table for the Ethernet connector signals and use an appropriate cable (not supplied).

LAN Connector Specifications

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 pin7



NOTE: To determine which is pin 1 on the cable, hold the cable so that the end of the eight pin modular jack is facing away from you, with the clip down and copper side up. Pin 1 is on the far left.

Memory

The MP2/MP2E has 36MB of built-in memory (non-volatile and volatile). The total of 36MB is specified as follows: 4MB flash (non-volatile), 32MB SDRAM (volatile), and 256KB NVRAM (battery backed up). Flash memory contains the file system inside the 2-Series control engine. Non-volatile memory contains information that is retained after the loss of electrical power. Volatile memory is lost after a power failure. Refer to the following lists for a breakdown of memory usage for program-related information stored in the unit.

Flash

1. SIMPL Program
2. SIMPL+ Modules
3. Operating System (.cuz file)

The 4MB flash memory consists of approximately 1.5MB used for firmware, and approximately 2.5MB available for SIMPL, SIMPL+, and Web pages (MP2E only). The files that reside in flash conform to a flat directory structure. The following table presents the structure of the overall file system.

Flash File Structure

TOP LEVEL	SECONDARY LEVEL	DESCRIPTION
\		Root of the file system
	DISPLAY	Legacy directory used in Crestron Isys [®] panels to hold display lists
	SYS	Contains various system configuration files
	SETUP	Legacy directory used in Crestron Isys [®] panels to hold display lists
	HTML	Web pages
	SIMPL	Control system program files
	SPLUS	SIMPL+ module files
	USER	Used for user-defined files
	MAILBOX	Directory contains the user mailbox file
	\nvram	The mounting point for NVRAM disk files

Although the file system is case insensitive, the case is preserved to maintain file checksums.

Non-volatile (NVRAM)

1. SIMPL+ Variables (using "nonvolatile" qualifier or #DEFAULT_NONVOLATILE)
2. Signals explicitly written to NVRAM (by symbols such as Analog RAM, Analog RAM from database, Serial RAM, Serial RAM from database, Analog Non-volatile Ramp, Digital RAM, etc.)
3. Portions of the NVRAM may be set aside for implementing an "NVRAM Disk". This can be used to provide file system access from SIMPL+.

NOTE: If you extract NVRAM values to a file (**Viewport, File transfer | Save NVRAM to File**), to simplify restoring them in the event of file corruption or to distribute to identical control systems, remember that NVRAM values are position sensitive in the program. When saving the NVRAM is crucial to your application, it is recommended to place all symbols and/or modules that use NVRAM at the beginning of your program. When NVRAM (.nvr file) is re-installed, all the values should line up with the program. If the program is modified, and new logic that uses NVRAM is placed before any older symbols using NVRAM, the previously stored values will not line up and your presets will have to be re-entered.

NOTE: The new NVRAMDISK command (available in CUZ files later than 3.030), will fail unless it can determine the amount of NVRAM used by the program, to ensure that the NVRAM is not overwritten. Programs compiled in SIMPL Windows version 2.04.11 or later can provide this information. In the event of a failure of the NVRAMDISK command, ensure that your program has been recompiled in an appropriate version of SIMPL Windows and reloaded.

Volatile (DRAM)

1. Digital, analog and serial signal values
2. SIMPL+ Variables (Default if no options are specified, or if "volatile" qualifier is used, or #DEFAULT_VOLATILE is used)

NOTE: The DRAM memory runs all bit map files. To maximize loading speed of backgrounds, keep the total page size to a maximum of 32 MB.

NOTE: To reduce the size of bit maps, make them 16 bit rather than 24 or 32 bit. This will also reduce the load time of these files.

DRAM is used by the operating system for dynamic storage of variables, signals and other constructs used at runtime. The actual amount of DRAM used at any given time depends on the particular program that is running, i.e., usage is variable, or dynamic, during normal operation.

Industry Compliance

As of the date of manufacture, the MP2/MP2E have been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling (N11785).



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.

Setup

Rack Mounting

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:

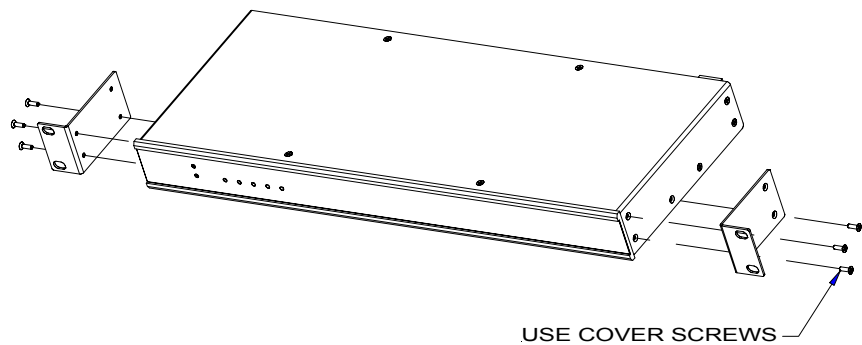
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

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).

Two “ears” are provided with the unit and must be installed so that it can be rack mounted. Refer to the following illustration and complete the following procedures to attach ears to the unit. The only tool required is a Phillips screwdriver.

Ear Attachment for Rack Mounting (MP2E shown in illustration)



1. Using a Phillips screwdriver, remove and retain the three side screws closest to the front panel.
2. Position a rack ear so that its mounting holes align with the vacated holes, and secure the ear to the unit with the three screws from step 1.
3. Repeat the procedure to attach the remaining ear to the opposite side.

Bussing Strip Installation

The 2-Series integrated control system is supplied with a brass bussing strip to facilitate commoning (linking) of multiple terminal block connections on the relay port. 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 on 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. Secure the wires connected to the terminal block with a tie wrap around the bussing strip to provide strain relief.

Network Wiring

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

CAUTION: Exceeding the power output (maximum 24W) of the MP2/MP2E can result in system shutdown or a blown fuse.

CAUTION: Possible equipment damage if miswired.

NOTE: When installing network wiring, refer to the latest revision of the wiring diagram(s) appropriate to your specific system configuration, available from the Downloads | Product Manuals | Wiring Diagrams section of the Crestron website (www.crestron.com).

NOTE: Do not power up system until all wiring is verified. Care should be taken to ensure data (Y, Z) and power (24, G) connections are not crossed.

NOTE: All network 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.

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

When calculating the wire gauge for a particular network run, the length of the run and the power factor of each network unit to be connected must be taken into consideration. If network units are to be daisy-chained on the run, the power factor of each network unit to be daisy-chained must be added together to determine the power factor of the entire chain. The length of the run in feet and the power factor

of the run should be used in the following resistance equation to calculate the value on the right side of the equation.

Resistance Equation

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

Where: R = Resistance (refer to table below). L = Length of run (or chain) in feet. PF = Power factor of entire run (or chain).

The required wire gauge should be chosen such that the resistance value is less than the value calculated in the resistance equation. Refer to the following table.

Wire Gauge Values

RESISTANCE	WIRE GAUGE
4	16
6	18
10	20
15	22
13	Doubled CAT 5
8.7	Tripled CAT 5

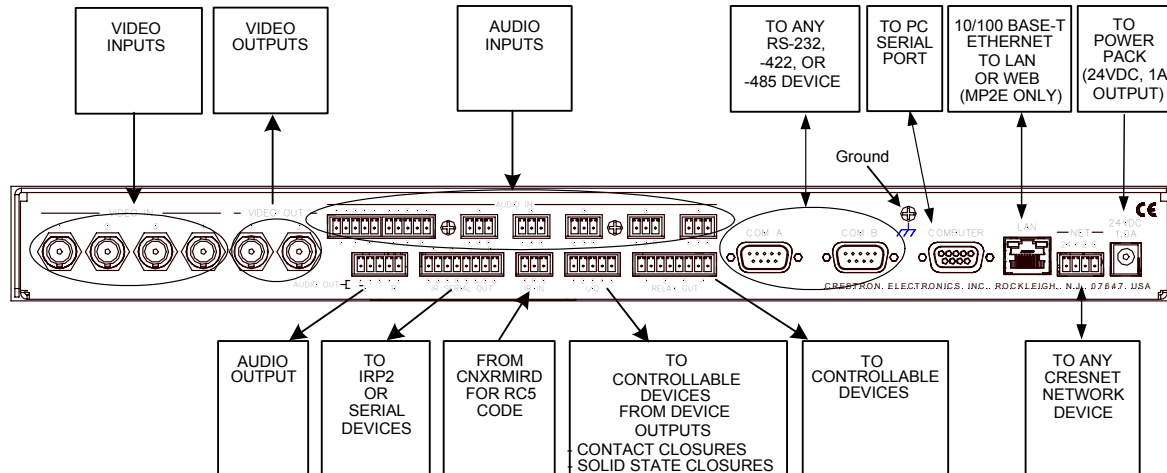
NOTE: When daisy-chaining Cresnet units, strip the ends of the wires carefully to avoid nicking the conductors. Twist together the ends of the wires that share a pin on the network connector, and tin the twisted connection. Apply solder only to the ends of the twisted wires. Avoid tinning too far up 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.

Hardware Hookup

Refer to the following hookup diagram and, aside from attaching power last, complete the connections in any order. Refer to "Network Wiring" on page 17 when making network connections.

NOTE: To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the table of leading 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. Contact with thermal insulating materials should be avoided on all sides of the unit.

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.

Hookup Connections for the MP2/MP2E

Power Supply

The MP2/MP2E can be powered through the NET network connector, or by an external power pack (PW-2410RU included) **but not by both methods**. Using the PW-2410RU, the MP2/MP2E may provide power to peripheral Cresnet devices (via the Cresnet connector) up to a total of 24W.

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

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

NOTE: Use care in wiring installations to avoid applying 24 VDC power to Cresnet wiring from an external 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.

NOTE: In larger system configurations that require more than the 24W supplied by Cresnet, disconnect the +24 VDC wire from the MP2/MP2E Cresnet connector and provide the +24 VDC power to the peripheral devices by an alternate Crestron power source.

NOTE: The MP2/MP2E is rated at 18 Watts. Six watts is available for Cresnet devices when using the supplied power supply (PW-2410RU).

Establishing Communication with the MP2/MP2E

Before uploading a program to the MP2/MP2E or performing diagnostic functions, you must connect the control system to the PC. The connection can be either serial or TCP/IP.

Serial Connection

Connect the COMPUTER port on the control system to one of the COM ports (usually COM 1) 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).

NOTE: The Viewport utility accomplishes multiple system tasks, primarily via an RS-232 or TCP/IP connection between the control system and a PC. It is used to observe system processes, upload new operating systems and firmware, change system and network parameters, and communicate with network device consoles and touchpanels, among many other tasks. Viewport can also function as a terminal emulator for generic file transfer. All of these functions are accessed through the commands and options in the Viewport menus. Therefore, for its effectiveness as a support and diagnostic tool, the Crestron Viewport may be preferred over development tools when uploading programs and projects.

Open the Crestron Viewport and click **Setup | Communication Settings** to display the “Port Settings” window. Then click **RS-232** as the connection type.

The PC communication settings specified here should match the protocol that the MP2/MP2E expects. The settings are as follows:

- Port = COM 1 through COM 8. Select the correct COM port on the PC.
- Baud rate = 115200 (You can set the PC and the control system to a different baud rate, by using the **Functions | Set Baud Rate** command.
- Parity = None.
- Number of data bits = 8.
- Number of stop bits = 1.
- Hardware handshaking (RTS/CTS) enabled.
- Software handshaking (XON/XOFF) not enabled.

“Port Settings” Window:

Default PC Settings for RS-232 Communication with the MP2/MP2E

To verify communication, click **Diagnostics | Establish Communications (Find Rack)**. This should display a window that gives the COM port and baud rate.

TCP/IP Connection (MP2E only)

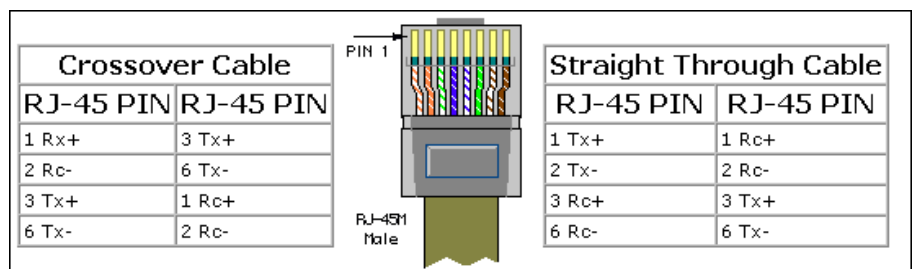
Before you can communicate with the MP2E over TCP/IP, you must use the RS-232 connection just described to configure the unit’s TCP/IP settings. Obtain the static address from the network administrator.

1. Open Viewport and click **Functions | Set Control System IP Information**.
2. Enter the IP address, IP mask and default router in the text fields. All of these terms are explained in detail in the Crestron e-Control Reference Guide (Doc. 6052). The latest version is available as a PDF on the Crestron website (www.crestron.com).
3. Click OK to set the new IP information.

Once you have assigned the IP settings, you can continue to communicate with the MP2E using the RS-232 connection, or you can establish a TCP/IP connection.

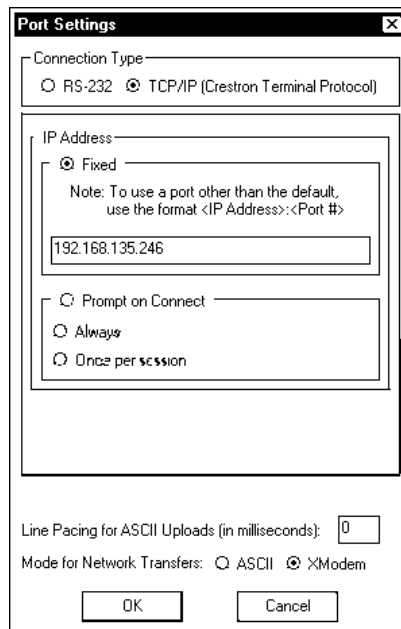
For TCP/IP, use CAT5 straight through cables with 8-pin RJ-45 connectors to connect the LAN port on the MP2E and the LAN port on the PC to the Ethernet hub. Alternatively, you can use a CAT5 crossover cable to connect the two LAN ports directly, without using a hub. The following figure illustrates pinouts for straight through and crossover RJ-45 cables. Pins 4, 5, 7, and 8 are not used.

RJ-45 Pinouts



Once the cable connections are made, open the Crestron Viewport and click **Setup | Communication Settings** on the menu to display the “Port Settings” window. Then click **TCP/IP** as the connection type. Enter the IP address of the MP2E.

“Port Settings” Window



To verify communication, click **Diagnostics | Establish Communications (Find Rack)**. This should display a window that gives the IP address and port number.

NOTE: To define the setup of DHCP-based Ethernet communication, refer to the Crestron e-Control Reference Guide (Doc. 6052).

NOTE: When using Viewport/Test Manager via the Ethernet, the default Crestron Terminal Port (CTP) is 41795.

NOTE: For laptops and other PCs without a built-in RS-232 port, Crestron recommends the use of PCMCIA cards, rather than USB-to-serial adapters. If a USB-to-serial adapter must be used, Crestron has tested the following devices with good results:

Belkin (large model) F5U103
I/O Gear GUC232A
Keyspan USA-19QW

Other models, even from the same manufacturer, may not yield the same results.

Troubleshooting Communications

Use the following checklist if communication cannot be established with the MP2/MP2E.

1. Verify that you are using the correct cables. As described previously, an RS-232 connection requires a straight-through serial cable. That is, pin 1 on one end is connected to pin 1 on the other end. Pin 2 connects to pin 2, etc. With a TCP/IP connection, you must use a CAT5 cable with 8-pin RJ-45 connectors.
2. With a serial connection, verify that the correct COM port on the PC has been selected. Some computers have more than one COM port; some may be internal (e.g., for a modem). Consult the manufacturer's documentation for further information about the COM ports on your PC.
3. Check the **ERR** LED indicator on the front panel of the MP2/MP2E. If this LED is illuminated, unplug the unit and reapply power after a few seconds. If the LED illuminates again, call Crestron customer service.
4. With a serial connection, reset the control system as follows:
 - a. Open Viewport and click **Setup | Communications Settings** to display the "Port Settings" window. Choose **RS-232** as the connection type.
 - b. Set the baud rate of the PC to **115200**.
 - c. Set the baud rate of the MP2/MP2E control system to 115200, as follows:
 - Press and release the **HW-R** button on the unit's front panel.
 - Press and hold the **SW-R** button for approximately three to five seconds. The Viewport console should display the following message:


Viewport Message

```
MP2E>
Control Console
Changing to default Comm Specs. 115200 N81 RTS/CTS
Switch to new settings...
Bypassing Program Load!!!
```


- Release the **SW-R** button.
- d. If communication still cannot be established:
 - Remove power from the control system.
 - Press and hold the **SW-R** button on the front panel of the MP2/MP2E.
 - Reapply power to the control system.
 - The Viewport console should display the message shown above.
 - Release the **SW-R** button.
- e. Select **Set Baud Rate** on the Viewport **Functions** menu (or press **F8**) and choose any baud rate from the drop-down list. This will attempt to establish a connection at the indicated baud rate. If the connection is successful, both the PC and the control system will be set to the new baud rate.
- f. Reinitialize the unit by recycling the power or pressing the **HW-R** button. If the connection is established, the Viewport console should display some text and the **MP2>** or **MP2E>** prompt.
- g. If communication still cannot be established, contact Crestron customer service.

Compiling and Uploading a Program to the Control System

After you have completed your SIMPL Windows program using an MP2 or MP2E, you must compile and upload the program to the control system.

To compile the program, simply click the **Convert/Compile** button  on the SIMPL Windows toolbar, or select **Project | Convert/Compile** (you can also press **F12**). A status bar indicates the progress of the compile operation. After the operation is complete, a window displays information about the program such as the number and type of signals, and memory usage.

The compiled program is stored as an SPZ file in the same directory as the source file. There are a number of ways to upload an SPZ file to the control system.

1. Immediately after compiling the program you have the option to transfer the file to the control system.
2. Alternatively, click the **Transfer** button  on the SIMPL Windows toolbar, or open Viewport and click **File Transfer | Send Program**.
3. Click **Browse**, locate the SPZ file and click **Open**. This displays the program's header information and enables one or both of the *What to Send* check boxes. If the program does not contain any SIMPL+ modules, only the *SIMPL Program* check box is enabled. If it does contain SIMPL+ modules, then the *SIMPL+ program(s)* check box is also enabled. Select one or both check boxes and then click **Send Program** to begin the transfer.

NOTE: Unlike X-Generation processors, the 2-Series processor does not require a permanent memory image. Also, the 2-Series adds the ability to automatically retrieve the current compiled program from the control system. Simply verify that the *Retrieve Current Program Before Overwriting* check box is selected.

You can also click **Report Program Information** or **F7** from **Diagnostics** in **Viewport** to display the header information of the currently loaded program. Program information is also displayed in the Viewport console whenever power is removed and re-applied to the MP2/MP2E.

“Send Program” Window

Uploading Web pages to the MP2E

The MP2E provides a built-in Web server for e-Control applications. The MP2E allots 2.5 MB of memory for “user files” such as Web pages, mailbox, and the compiled SPZ program file.

NOTE: The default HTTP/web host port is 80. The web port needs to “talk” to the Crestron port running with the program (CIP port 41794).

VisionTools Pro-e

In most cases, you create a VisionTools Pro-e browser project to generate the Web pages for uploading to the MP2E.

For e-Control projects:

When an e-Control browser project is created, VT Pro-e automatically creates a folder with the name of the project and a .web extension. This web project folder itself contains a Java subfolder, in addition to all the HTML files that are sent to the MP2E. In VT Pro-e, the target type is BROWSER.

For e-Control 2 projects:

When an e-Control 2 project is created, VT Pro-e automatically creates a folder with the name of the project and a .xweb extension. The web project folder contains all the necessary e-Control 2 files. In VT Pro-e, the target type is XPANEL.

In designing and creating a browser project, keep in mind that you must assign an IP ID to all the project pages and specify the IP address of the MP2E. (For further information on this procedure, refer to the VT Pro-e online help file.)

Viewport

To transfer the Web pages to the MP2E, use the **File Transfer | Send Web Pages** command.

The options are to send an entire project, only files that have changed, or a single HTML file. With the “Transfer Entire Project” option, click **OK** when reminded to select a default page, and then browse to the appropriate VT Pro-e .web project folder. Select the file that was designated as the “first” page of the project. This will be the default Web page that is displayed whenever the IP address of the control system is accessed by a Web browser. Click **Open**, and then **OK** to begin the transfer.

If any files in the VT Pro-e project change, the changed files can be transferred to the MP2E without resending the entire project by choosing the “Only Transfer Files that have Changed” option. Here again, browse to the .web project folder and select the default page. Click **Open**, and then **OK** to transfer the changed files.

Finally, selecting “Transfer Single File” can send a single HTML file. Browse to the file and click **Open**. Then specify the file’s relative path (from the root directory) and click **OK**.

SIMPL Windows

For each IP ID in the VT Pro-e browser project, there must be one corresponding e-Control PC Interface symbol defined in the SIMPL Windows program. The PC Interface symbol is one of the Ethernet Modules that can be dropped into the C2ENET-1 card slot.

As with all Ethernet devices, the PC Interface must receive an entry in the IP Table of the MP2E. Here the IP ID must match the IP ID that was assigned in VT Pro-e, while the IP address must be set to a loopback: 127.0.0.1, when hosting internal.

Uploading Touchpanel Projects via the MP2/MP2E

You can use the network connection to the MP2 or MP2E to upload VisionTools Pro-e projects to any Cresnet touchpanel. Compiled projects for TPS panels are contained in VTZ files; projects for all other touchpanels are contained in HEX files.

Before uploading, open Viewport and click **Diagnostics | Report Network Devices** to verify that the touchpanel is being detected by the control system. (As with any network device, touchpanels must be identified by unique hexadecimal network IDs. These IDs are set in the SIMPL Windows program.)

To upload a project:

1. From VT Pro-e: Click the **Project | Upload** button  on the toolbar, or click **File | Upload Project**.

From Viewport: Click **File Transfer | Send Touchpanel** or press **Alt+T**.

2. Select the network ID of the touchpanel, as set in SIMPL Windows, from the drop-down list.
3. Browse to the HEX or VTZ file to be uploaded. If the file is a HEX file, click **Open** to begin the transfer.

If the file is a VTZ file, choose the pages to send to the TPS panel. The choices are as follows:

- **All Files in Project:** sends the entire project.
- **Only Changed Files:** sends only the files that are different from those that are currently stored in the panel.

NOTE: Panels that are not present in the uploaded project are deleted.

- Additional choices include: **Do not send graphic files** and **Do not send sound files**. These are often very large files that need not be reloaded with every transfer.

Updating the Operating System

As with all 2-Series control systems, operating system files for the MP2 and MP2E have a .cuz extension. You can obtain .cuz updates (when available) from the Downloads | Software Updates section of the Crestron website. To download an update, click the .cuz file, choose the **Save to Disk** option, and then specify the directory where the update is stored.

NOTE: In some cases Microsoft's Internet Explorer may append a .zip extension to a downloaded .cuz file. For example, a file called "C2-1008.cuz" may appear as "C2-1008.cuz.zip." If this happens, rename the file, removing the .zip extension.

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).

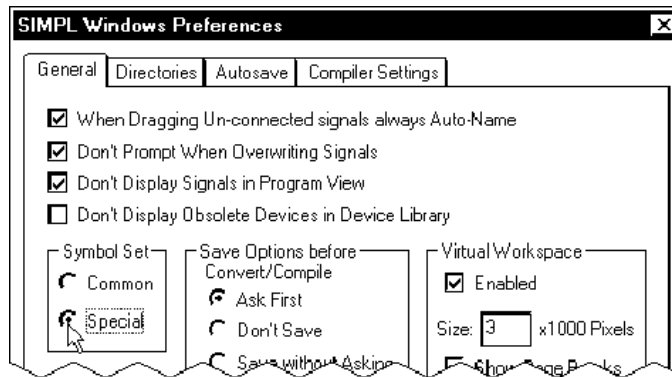
To upload the new .cuz to the control system:

1. Open Viewport and select **File | Update Control System**.
2. Browse to the .cuz file and click **Open** to start the transfer.
3. After the transfer is complete, the MP2/MP2E automatically reboots. To confirm the transfer, click **Diagnostics | Check Ops Version**. The Viewport console should display the new .cuz version number.

Advanced Console Commands

The SIMPL Windows online help file provides a full listing of console commands that are valid for 2-Series control systems. You can access the MP2/MP2E console in a variety of ways: via a serial connection (RS-232) with a PC, over Ethernet via the LAN port, or through Telnet, among many other methods. It is also possible to issue console commands through logic, by adding a Console symbol to the SIMPL Windows program.

The Console symbol is only visible in the *Symbol Library* when "Special" is selected as the Symbol Set. Click **Edit | Preferences**. In the *Symbol Set* area of the *General* tab, select **Special** as shown in the following graphic.

"SIMPL Windows Preferences" Window

Console commands are provided for advanced programmers. However, most functions and commands can be selected from the various Viewport menus.

NOTE: For more information on console commands, refer to the 2-Series Console Command Reference Guide (Doc. 6002). The latest version can be obtained from the Downloads | Product Manuals section of the Crestron website (www.crestron.com).

Switching Between Master and Slave

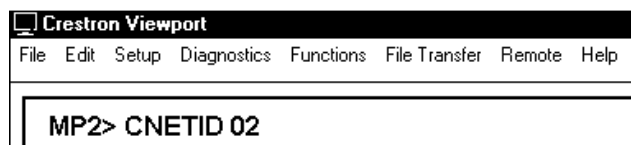
There are two modes of operation for the MP2/MP2E, master and slave. In the master mode, the MP2/MP2E is a standalone device. In the slave mode, the MP2/MP2E is a Cresnet or Ethernet device connected to a 2-Series control system.

In the slave mode, the MP2/MP2E operates in a similar manner to a standard Crestron Isys® touchpanel. Refer to the following to set the MP2/MP2E for master or slave operation.

Master Mode

In master mode, the MP2/MP2E is programmed to directly access and control its local hardware ports. The Cresnet ID, which determines the operating mode, is a two-digit hexadecimal number that can range from 02 to FE. To operate the MP2/MP2E as a master, the Cresnet ID must be set to 02.

From Viewport console, type: `CNETID 02` (02 is always the master).



Slave Mode

In slave mode, the MP2/MP2E operates as a 2-Series control system Cresnet or Ethernet device. For example, the MP2/MP2E can be part of a master control system that includes: audio and video switching, IR and relay control, and Ethernet, using touchpanels to operate the MP2/MP2E slave through the master 2-Series control system. To operate the MP2/MP2E as a slave, the Cresnet ID must be set to 03 or higher.

From the Viewport console, type: `CNETID XX` (Where "XX" is any valid Cresnet ID (any number from 03 to FE is designated as a slave mode)).

Refer to “Programming the MP2/MP2E as a Cresnet Slave Device” on page 47, and “Programming the MP2/MP2E as an Ethernet Slave Device” on page 49.

NOTE: The MP2/MP2E can only be controlled by a 2-Series control system.

NOTE: When in slave mode, the MP2/MP2E cannot address any Cresnet device on the operating network (only the controlled devices connected to the local ports of the slave). Only the master control system can address Cresnet devices.

NOTE: When operating in the slave mode, any program loaded in the MP2/MP2E will not run.

NOTE: When operating in the slave mode, The MP2/MP2E is controlled by the master control system only.

NOTE: When operating in the slave mode, Viewport functions (firmware upgrades, passthrough mode) can be used on the slave device.

For more information on slave mode operation, refer to the latest revision of 2-Series Master/Slave Modes Reference Guide (Doc. 6164).

Programming the MP2/MP2E

Crestron MP2 SystemBuilder and Crestron AppBuilder are easier to use for the beginning programmer, and much faster for all programmers. However, it does not allow the high degree of flexibility and control that SIMPL Windows does.

You can create a program that allows you to control the MP2/MP2E control system using the Crestron programming tools Crestron MP2 SystemBuilder™, Crestron Application Builder™ (AppBuilder) and SIMPL Windows. These tools are intended for users with different levels of programming knowledge. The flexibility of each tool is proportional to the degree of programming expertise (i.e., the more flexible, the more a programmer needs to know and account for). You can initiate programming using the easiest method, Crestron MP2 SystemBuilder, and customize in Crestron AppBuilder. You can then use the advanced techniques that are available from SIMPL Windows.

Following are the minimum software requirements for the PC:

- SIMPL Windows version 2.04.11, with Library Update 232 or later. (Also requires SIMPL+ Cross Compiler version 1.1).
- Crestron Database version 15.9.9 or later for use with SIMPL Windows.
- Crestron Viewport version 3.49 (standalone version).
- (Optional) VisionTools Pro-e software version 3.1.1.7 for designing touchpanel pages.
- (Optional) Crestron Application Builder version 1.2.3 software for automatic residential and commercial programming of the MP2/MP2E as a control system. Includes Crestron MP2 SystemBuilder version 1.2, for a rapid, automatic system design.
- (Optional) Crestron Application Builder Templates version 2.2.2.
- (Optional) DEAL for Windows IR learning software version 3.0.02.
- (Optional) Digital Audio Tools, version 1.02.05 for sophisticated audio equalization.

Programming with Crestron MP2 System Builder and AppBuilder

The MP2/MP2E can be optionally programmed with the Crestron MP2 System Builder or Crestron Application Builder software to automatically create residential, home theater and commercial audio/video programming.

MP2 System Builder

Simply input the required information and the MP2 System Builder produces a complete, sophisticated keypad system. The MP2 System Builder may be launched from Application Builder or as a stand-alone application. After completing these simple steps, the System Builder creates the control system logic, ready to upload to the MP2/MP2E.

- Define the display device
- Select the display options (Screen and Lift control)
- Select the audio/video sources
- Choose the video routing
- Select environmental devices (lights, window coverings)
- Select user interface (multimedia room and transport control)
- Choose button layout
- Choose power control method

After uploading the program to the control system and installing the hardware, you can reset the values for properties such as volume, balance, treble and bass. In addition, the MP2 System Builder can generate a system connection list. Additional functionality, components, and control refinements can be made in Application Builder or in SIMPL Windows.

Crestron Application Builder

The Crestron AppBuilder offers automatic programming for residential and commercial applications, including audio distribution, home theater, video conferencing, and lighting. The tool interface guides you through a few basic steps for designating rooms and specifying the control system, touchpanels, devices, and functionality. The Crestron AppBuilder then programs the system, including all touchpanel projects and control system logic.

The Crestron AppBuilder is fully integrated with the Crestron suite of software development tools, including SIMPL Windows, VisionTools® Pro-e (VT Pro-e), Crestron Database, User IR Database, and User Modules Directory. The Crestron AppBuilder accesses these tools behind the scenes, enabling you to easily create robust systems.

Programming with SIMPL Windows

NOTE: The following are acceptable file extensions for programs that include an MP2/MP2E, developed for specific control system types.

.smw	<i>projectname.smw</i>	(source file)
.spz	<i>Projectname.spz</i>	(compiled file for 2-Series)
.usp	<i>projectname.usp</i>	(source code module for SIMPL+)
.ush	<i>projectname.ush</i>	(compiled SIMPL+ file)
.umc	<i>projectname.umc</i>	(User Macro file)

.ir	<i>projectname.ir</i>	(IR code file)
.csz	<i>projectname.csz</i>	(firmware file)

SIMPL Windows is the Crestron graphical, Windows-based development tool for programming control systems. The SIMPL Windows interface provides two workspaces: the Configuration Manager, for configuring the control system, touchpanels, and controlled network devices; and Program Manager, for designing the logic and functionality of the control system.

In addition, you can use the powerful Crestron Viewport utility to perform multiple system tasks, such as uploading the program to the control system and performing diagnostic functions. Together with the Crestron Database, these tools provide you with the essential components you need to program the MP2/MP2E. Crestron software is available on CD-ROM, or can be downloaded from the Crestron website (www.crestron.com)—registration is required for downloading.

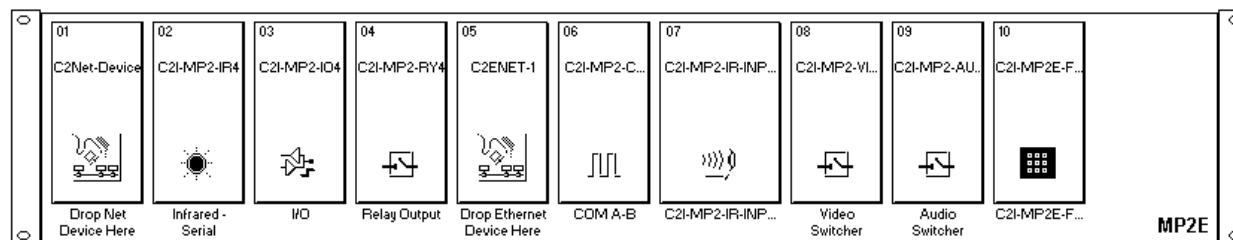
NOTE: Crestron software and any files on the website are for Authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).

NOTE: The information in this section assumes that the reader has knowledge of SIMPL Windows. If not, refer to the extensive help information provided with the software.

MP2/MP2E Device Library Symbols

In Configuration Manager, drag the MP2 or MP2E from the Control Systems folder of the *Device Library* to *System Views*. The MP2 and MP2E appear nearly identical, except that the MP2E provides an additional slot (number 5) for Ethernet devices, as shown in the following figure.

System View of MP2E



Slot 1: C2Net-Device

The C2Net-Device slot enables the MP2/MP2E to control up to 252 Cresnet devices. Each Cresnet device is assigned a unique identifier called a Net ID, which is a hexadecimal value ranging from 03 to FE.

To view the list of supported devices, expand the control system in the bottom pane of *System Views* and double-click the C2Net-Device slot, or right-click and select **Add Item** from the submenu. Supported devices include network control modules, lighting modules and a variety of Crestron wired touchpanels.

To add a device to the system expand the C2 Net-Device slot and double-click the desired Net ID, or right click and select **Add Item** from the submenu. Then select the device you want to add. Alternatively, you can drag the device from the Cresnet Control Modules folder onto the Net ID.

In Program Manager, the C2Net-Device symbol contains no signals; to program a controlled Cresnet device, expand C2Net-Device in *Program View*. Then drag the device to *Detail View*.

Slot 2: C2I-MP2-IR4

The MP2/MP2E provides four output IR ports (A through D) that enable serial communication in a variety of formats, including infrared and one-way RS-232. Of course, different devices may require additional receiving equipment, cables, adapters, etc.

NOTE: Ports A through D can be IR or RS-232 but not both.

NOTE: You cannot stack multiple RS-232 devices on a single port.

To add an IR device to the system, drag the device driver from the Crestron or User IR Database to a C2I-MP2-IR4 port.

To add an RS-232 device, drag the C2IR one-way serial driver from the Serial Drivers folder to a C2I-MP2-IR4 port. Alternatively, you can double-click a C2I-MP2-IR4 port and select the C2IR one-way serial driver (or right-click and select **Add Item** from the submenu).

Next, double-click the serial driver to specify the communication settings that are required by the device. These settings define the protocol that the controlled serial device expects, and include the speed of data transmission (baud rate), error checking (parity), and the number of data bits and stop bits. The exact protocol is described in the manufacturer's documentation.

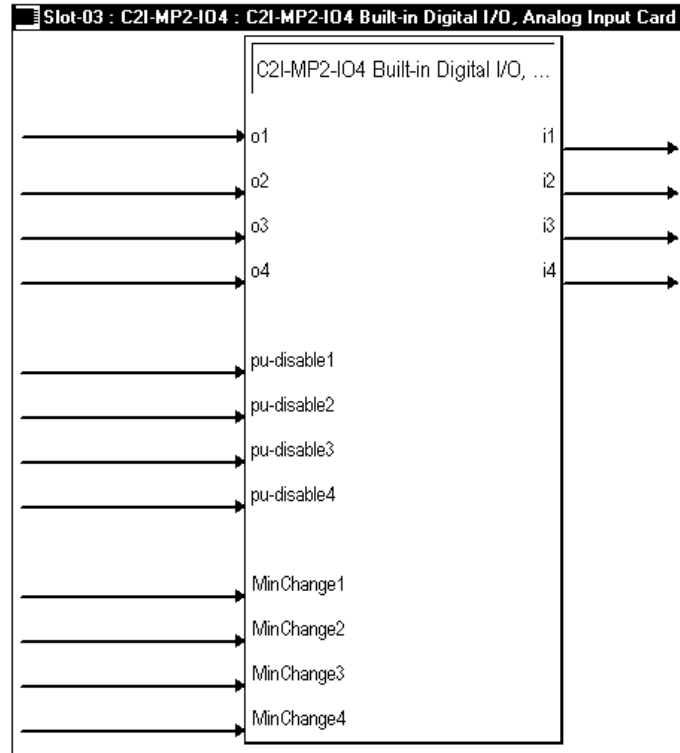
NOTE: The C2IR serial driver, being one way, does not provide hardware or software handshaking.

In Program Manager, the C2I-MP2-IR4 symbol contains no signals; to program an IR device or serial driver, expand the C2I-MP2-IR4 card by clicking the plus sign in *Program View*. Then drag the device or driver to *Detail View* (alternatively, double-click the device or driver).

Slot 3: C2I-MP2-IO4

The MP2/MP2E provides four I/O ports called Versiports, each of which can function as a digital input, a digital output, or an analog input. Each Versiport has a corresponding pullup resistor.

In Program Manager, drag C2I-MP2-IO4 from *Program View* to *Detail View*.

Detail View of the Built in Digital I/O, Analog Input Card Symbol

The symbol contains the following signals, arranged here according to mode:

Signals*Digital output mode*

- 4 digitals: <o1> through <o4>

Digital input mode

- 4 digitals: <i1> through <i4>

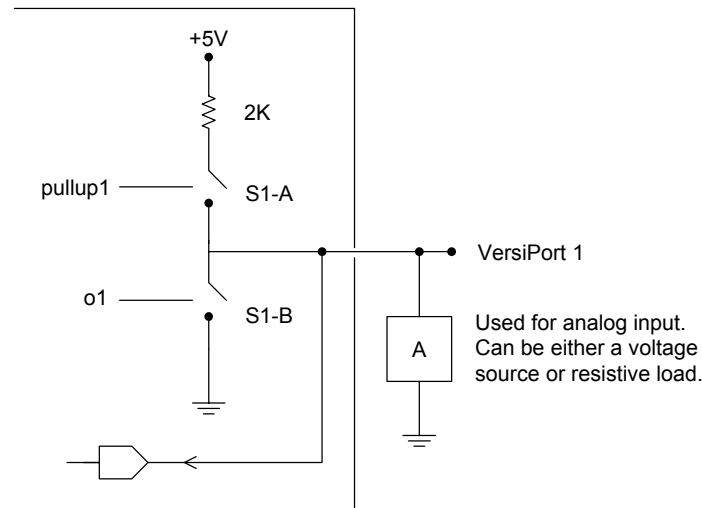
Analog input mode

- 4 analogs: <i1> through <i4>
- For each analog, one corresponding minimum change value: <MinChange1> through <MinChange4>

All Versiport modes

- For each Versiport, one corresponding pullup resistor: <pu-disable1> through <pu-disable4>

Defining a signal puts the signal into the corresponding mode. For example, defining the analog input <i1> configures that Versiport as an analog input. A Versiport can only operate in one mode. That is, if you define <o1> you should not also define <i1>.

Description*Internal configuration of a Versiport**Digital Output Mode*

When a Versiport is operating in digital output mode, the output pin is shorted to ground on the rising edge of the corresponding <o> signal (switch S1-B in the Versiport diagram is closed). When <o> goes low, the output pin is driven to a value of +5V (switch S1-B is open).

Driving the corresponding <pu-disable> signal high can modify this behavior. This is not recommended, though, since it causes the output pin to float when <o> goes low.

Example 1 (recommended):

The <pu-disable1> signal is driven low or left undefined. When <o1> goes low, Versiport 1 is at +5V. When <o1> goes high, Versiport 1 is shorted to ground.

Example 2 (not recommended):

The <pu-disable1> signal is driven high. When <o1> goes low, Versiport 1 is floating. When <o1> goes high, Versiport 1 is shorted to ground.

Digital Input Mode

When a Versiport is operating in digital input mode, the corresponding <i> signal goes high whenever the C2I-MP2-IO4 detects that the Versiport is shorted to ground (threshold < +2.5V).

NOTE: Here, as with digital output mode, the corresponding pullup resistor should be enabled. That is, <pu-disable> should be given the signal name 0 or left undefined; otherwise the input is always read as logic low.

Example 3:

When Versiport 3 is shorted to ground, <i3> goes high. When Versiport 3 is not shorted to ground, <i3> goes low (so long as <pu-disable> equals 0 or is undefined).

Analog Input Mode

In analog input mode, the Versiport is typically tied to a resistive load (such as a humidity sensor) or a voltage source (both can be represented by box "A" in the Versiport diagram).

When a resistive load is tied to a Versiport, the corresponding pullup resistor must be enabled (again, this means that `<pu-disable>` should be given the signal name 0 or left undefined). This creates a voltage divider and provides a varying voltage level, based on the current resistance of the sensor for the C2I-MP2-IO4 to read.

Example 4:

A resistive humidity sensor is tied to Versiport 1 (and `<pu-disable1>` is low or undefined). `<i1>` assumes the corresponding analog value.

When a voltage source is tied to a Versiport, the corresponding pullup resistor should be *disabled* (the only case where the default setting should be overridden). This allows the C2I-MP2-IO4 to read the value of the voltage source directly.

Example 5:

A voltage source is tied to Versiport 1 and `<pu-disable1>` is given the signal name 1. `<i1>` assumes the corresponding analog value (ranging from 0 to 65535, or 0 to +10V on the input pin).

The C2I-MP2-IO4 does not propagate all changes in the analog values of its Versiports, since this can lead to undesirable results if the input source is not clean or has jitter. Rather, the `<MinChange>` signals should be used to specify a "minimum change" value, such that the C2I-MP2-IO4 will not propagate the new value until it changes by `<MinChange>`. (The default minimum change value is 2048.)

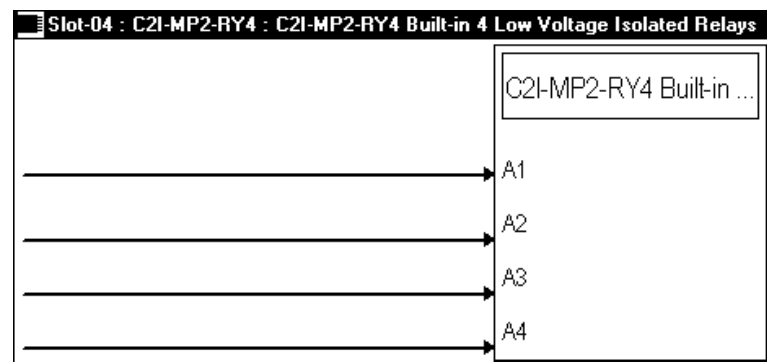
Example 6:

A voltage source is placed on Versiport 1 and `<MinChange1>` is set to 10 via an Analog Initialize symbol. The value of `<i1>` is not be propagated until it changes by at least 10. If the current value is 500, then a new value is not be reported until it changes to 510 or 490.

Slot 4: C2I-MP2-RY4

The C2I-MP2-RY4 provides four isolated relays for controlling low voltage contact closure devices such as drapes, screens and lifts.

In Program Manager, drag the C2I-MP2-IO4 from *Program View* to *Detail View*.

Detail View of the Built-in 4 Low Voltage Isolated Relays Symbol

The symbol contains the following signals:

Signals

- 4 relays: `<A1>` through `<A4>`

When a signal goes high, the corresponding relay closes for as long as the signal remains high. When the signal goes low, the relay opens. If a signal is undefined, the relay is open.

Slot 5: C2ENET-1 (MP2E Only)

The C2ENET-1 port enables the MP2E to control up to 252 Ethernet devices. Each Ethernet device is assigned a unique identifier called an IP ID, which is a hexadecimal value ranging from 03 to FE.

To view the list of supported devices, expand the control system in the bottom pane of *System Views* and double-click the C2ENET-1 slot. Supported devices include Ethernet control modules, PC and Web browser interfaces, and a variety of Crestron Ethernet touchpanels. To add a device to the system expand the C2ENET-1 slot and double-click the desired IP ID, or right-click and select **Add Item** from the submenu. Then select the device you want to add.

In Program Manager, the C2ENET-1 symbol contains no signals; to program a controlled Ethernet device, expand C2ENET-1 in *Program View*. Then drag the Ethernet device to *Detail View*. (Alternatively, you can double-click the Ethernet device.)

For further information about e-Control applications, including basic concepts and terminology, refer to the Crestron e-Control Reference Guide (Doc. 6052). The latest version is available in PDF format from the Downloads | Product Manuals section of the Crestron website (www.crestron.com).

Slot 6: C2I-MP2-COM2

The MP2/MP2E provides two serial COM ports (A and B) that enable RS-232, RS-422, and RS-485 communication.

Each port has a built-in serial driver with communication settings that must be specified in Configuration Manager: double-click a COM port to open the “Device Settings” window, and then click the *Serial Settings* tab. These settings define the protocol that a controlled serial device expects, and include the baud rate, parity, and the number of data bits and stop bits. In addition, a device might require hardware or software handshaking, which controls the flow of data between two devices. The exact protocol is described in the manufacturer's documentation.

The Crestron database includes numerous serial devices, with default logic and pre-configured communication settings, which are compatible with the ports on the COM card. Simply drag the serial device from the Crestron Database folder to one of the ports on the COM card and click **Yes** when prompted to replace the built-in serial driver for that port. In most cases, the default logic should be loaded as well.

In *Program Manager*, the C2I-MP2-COM2 symbol contains no signals; to program a serial driver, expand C2I-MP2-COM2 by clicking the plus sign in *Program View*. Then drag the desired serial driver to *Detail View*. (Alternatively, you can double click the driver.)

Slot 7: C2I-MP2-IR-INPUT

Refer to the latest version of the CNXRMIRD Infrared Detector Operations Guide (Doc. 8165) for RC5 code mapping. The MP2/MP2E provides 60 IR inputs (hex 01 through hex 3F).

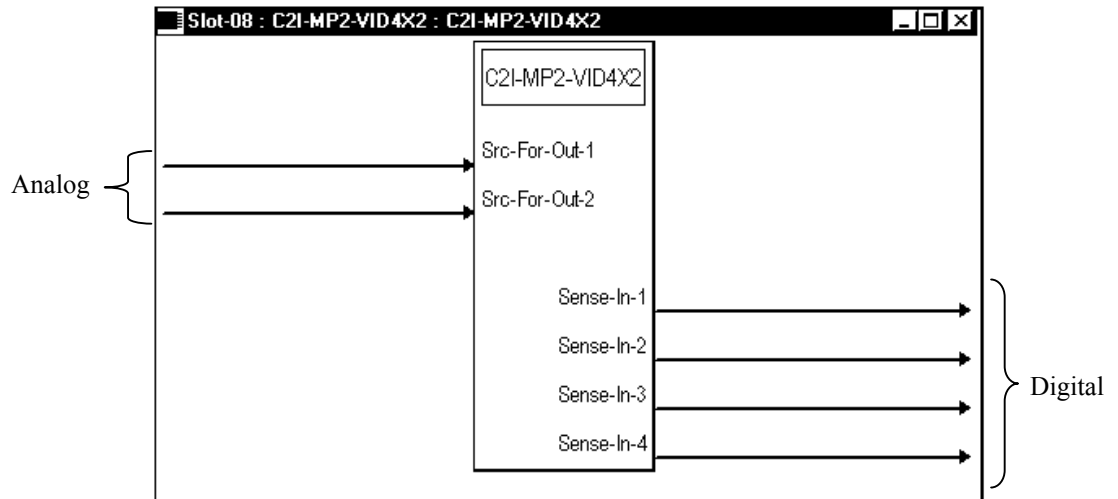
Used with CNXRMIRD to input RC5 compatible remote button presses.

Slot 8: C2I-MP2-VID4X2

The MP2/MP2E provides a 4x2 video switcher (four composite channels in or two S-video channels in, and two composite channels or one S-video channel out).

NOTE: Composite and S-video are mutually exclusive on the MP2/MP2E.

NOTE: Video switching and video muting are set via analog INIT using decimal format.

Detail View of the Video Switcher Symbol

When using with composite inputs, any one of the four video inputs can be switched to either one of the two video outputs.

<Src-For-Out-1> and <Src-For-Out-2> takes on the analog value 0-4 to switch the output to the selected input.

NOTE: The video board supports video mute on the start up *Src-For-Out 1 and 2*. Setting an analog value to zero *mutes* the video output (clears the video route).

<Sense-In-1>, <Sense-In-2>, <Sense-In-3>, and <Sense-In-4> are high if the input has detected video, low if no video is detected.

When functioning as a 2:1 S-video switch, the control inputs must be programmed to switch correctly (i.e., in1 > out1 & in2 > out2 *or* in3 > out1 & in4 > out2).

Slot 9: C2I-MP2-AUD7X1

The MP2/MP2E provides a 7x1 audio switcher (seven channels in, one channel out). The MP2/MP2E allows you to switch any of these seven audio inputs (CD, cassette, etc.) and provides a single output. That output is then subjected to the adjustments available in two sub-slots.

The first sub-slot provides the general audio controls: volume, balance, bass and treble.

The second sub-slot provides access to one of the three equalization modes:

- A five-band graphic equalizer and one parametric equalizer with variable filter properties.
- A three-band graphic equalizer and a three-band parametric equalizer.

- A full six band parametric equalizer.

All audio equalizers allow you to adjust and save trim presets and filter presets, and provide analog feedback for touchpanel indicators.

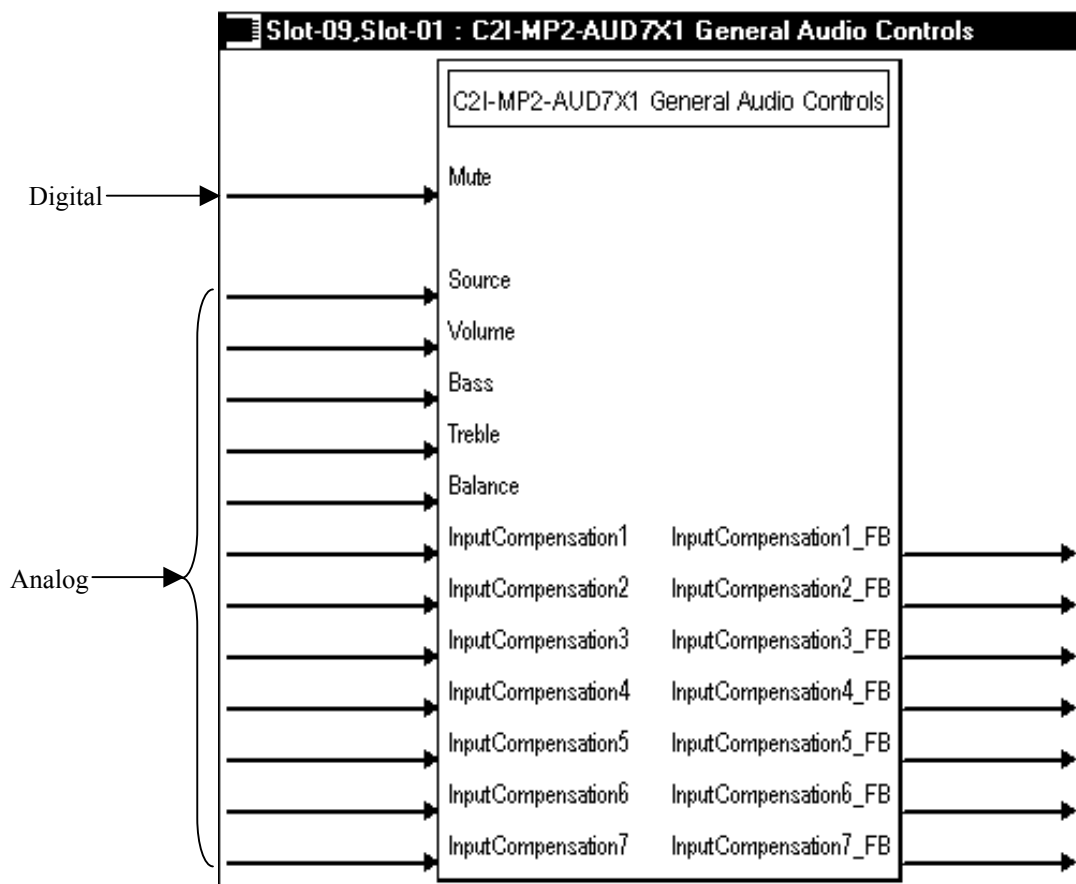
NOTE: The minimum operating firmware is version 3.26 to operate the parametric equalizer feature.

NOTE: If you have a version of SIMPL Windows that currently displays an empty Sub-Slot 2, you must swap the control system model out, and then back in (e.g., if you have an MP2, swap it for an MP2E then back to an MP2) to synchronize with the latest configuration files that contain the correct equalizer symbol.

General Audio Controls – Slot 9, SubSlot 1

Refer to the table that follows the symbol for join details.

General Audio Symbol



General Audio Symbol Join Definitions

Signal Type	Name	Value	Definition
Digital	Mute	1/0	High = Mute On Low = Mute Off
Analog	Source	0 to 7	Select source (0 = mute)
	Volume	0 to 100%	0% = Lowest 100% = Highest
	Bass	0 to 100%	50%=Flat
	Treble	0 to 100%	50%=Flat
	Balance	0 to 100%	0% = Full Left 50% = Equal Left and Right 100% = Full Right
	Input Compensation* (1 through 7)	0 to 100%	0% = -10dB, 100% = +10dB per input channel

*Various components (CD, cassette, etc.) connected to the MP2/MP2E will have different output levels. The **Input Compensation** setting allows an increase or decrease in level so that when switching between sources, the volume remains constant, and the user does not have to adjust the volume level.

Graphic/Parametric Equalizer – Slot 9, SubSlot 2

NOTE: Minimum operating firmware version 3.26 is required to operate the parametric equalizer feature.



The C2I-MP2-AUD7x1 Full Parametric Equalizer is built into the MP2 and MP2E control systems. The equalizer module provides both graphic and parametric equalization, programmable using Crestron's Digital Audio Tools software or SIMPL Windows. The Digital Audio Tools (DAT) software is free and available from the download section of the Crestron website (www.crestron.com).

Almost all users will use the Digital Audio Tools and not the SIMPL Windows symbol to adjust equalization. From the point of view of the symbol, everything is a parametric equalizer; graphic equalizers are just parametric equalizers with specific default frequencies, Q (bandwidth), and type. If you want to use a graphic equalizer, you **MUST** use Digital Audio Tools, because this is the only place where the default graphic equalizer frequencies are set up. The only possible exception is that programmers might want to set up sliders from the TrimBand gains to let the user modify slightly what the programmer has stored.

The MP2/MP2E adjustments in Digital Audio Tools contain five tabs:

- Master Volume tab – for adjusting the overall volume (+5 to -40 dB).
- Input Settings tab – for naming sources, setting up decoding, and adjusting input gain.
- Graphic EQ tab – for choosing the number of graphic equalizers, and provides access to the graphic equalizer sliders
- Parametric EQ tab – for making parametric equalization adjustments
- Communications tab – for setting up communications and adjusting the equalizer in real-time.

For additional details, refer to the Digital Audio Tools help file.

Available Filters

The MP2/MP2E provides six filters for the right channel and six for the left, with three modes of audio equalization (these modes are settable using Digital Audio Tools only):

- A five-band graphic equalizer and one-band parametric equalizer. If you are using a 5-band graphic equalizer, the first five filters are used to set up the default frequencies (60 Hz, 180 Hz, 540 Hz, 1620 Hz, and 4860 Hz) for the graphic equalizer, leaving one remaining parametric filter.
- A three-band graphic equalizer and three-band parametric equalizer. If you are using a 3-band graphic equalizer, the first three filters in both the left and right channel are used to set up the default frequencies (100 Hz, 600 Hz, and 3600 Hz) for the graphic equalizer, leaving three remaining parametric filters in case you want to notch out a 60 Hz hum or other resonant frequency.
- A full six-band parametric equalizer with six left and six right filters. You may use the equalizer as a full six-band parametric equalizer, however it is recommended that you have considerable experience with equalization techniques.

TrimBand

The TrimBand refers to a modification of the gain of these six filters, and is applied to the left and right channels equally.

There are ten trim presets. A trim preset is a set of all six TrimBands. (The TrimBands are not labeled with actual frequency values since they can be changed in the Digital Audio Tools or by setting the full parametric filters in the symbol.) Trim presets can be used to modify the soundfield for different kinds of music where you might want to emphasize the bass, or bring out a treble frequency.

Overall Presets

There are also five overall presets, where a preset is a set of 6 filters. A filter consists of the center frequency, Q, gain, and type for both the left and right channels.

For example: preset 1 includes filters 1 through 6, preset 2 also includes a different set of filters 1 through 6. If you set these filters through the SIMPL Windows symbol, the values specified by the Digital Audio Tools may be changed.

NOTE: The SIMPL Windows symbol will allow any valid value. Programming the parametric equalizer through SIMPL Windows may override the Digital Audio Tools settings. For example, if the 5-band graphic equalizer mode is specified in Digital Audio Tools and the SIMPL Windows program then changes one of the graphic filters, the system reverts to full parametric mode. SIMPL Windows permits any legal change without regard to the effect on the rest of the filters.

NOTE: The Mute On/Off button is the 'hot' button for muting the system when Real-Time mode is enabled in Digital Audio Tools. Once muted, you can only un-mute the system through the menu. This feature protects the speakers if, during Real Time mode, unreasonable values for filters and fields are entered in the program. You may also use F8 as a mute button and Shift+F8 to un-mute. An emergency MUTE button is also provided at the bottom of each screen. The MUTE button on the tool bar and the MUTE selection on the Tools Menu toggle MUTE on and off.

Programming in SIMPL Windows

You save and recall presets and trim presets separately, but what is in effect for the audio output is both the preset and the current trim feedback values.

TrimBand1 modifies the gain of filter 1, TrimBand2 modifies the gain of filter 2, etc. Setting the TrimBand value propagates immediately to the output.

If you do a recall of a TrimPreset#, the feedback values of the TrimBands will be different than the TrimBand input, and that is the only time they differ.

Signal Descriptions

The **<TrimBand>** inputs adjust the gains of the six filters; thus **<TrimBand1>** corresponds to filter #1, **<TrimBand2>** corresponds to filter #2, and so forth. The gains are adjustable within a range of -10dB to +10dB, and are applied to the left and right channels equally. All trim band values propagate immediately to the outputs.

Valid values for **<TrimBand>** range from -100 (-10dB) to +100 (+10dB). 2-Series symbols such as the Analog Scaler with I/O Limits and Analog Ramp (Bounds Limited) can handle range and sign mapping—refer to new scaling symbols on page 40.

A **<TrimBand>** value of 0 (0dB) means that the signal will pass unaffected. Values above and below 0 will boost or reduce the gain in increments of .1dB. That is, changing the analog value by one signifies a boost or attenuation of .1 decibels.

The MP2/MP2E provides 10 trim presets, where a trim preset is a set of all six **<TrimBand>** values.

On the rising edge of **<SaveTrimPreset>**, the six trim band values will be stored in the preset specified by **<TrimPreset#>**. Valid values for **<TrimPreset#>** range from 1 to 10.

On the rising edge of **<RecallTrimPreset>** the values stored in the indicated **<TrimPreset#>** will be recalled and propagated to the outputs. Here the **<TrimBand_F>** outputs may have different values than the **<TrimBand>** inputs (the only time these values will differ).

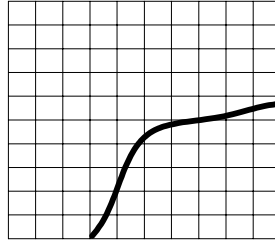
If **<RecallTrimPreset>** goes high and **<TrimPreset#>** is set to an invalid value (out of the 1 to 10 range) all trim settings will be cleared, and all signals will pass unaffected. This is the same as recalling a trim preset in which every trim band value is set to 0.

A rising edge of **<Clear Trims>** will set all trim band values to 0.

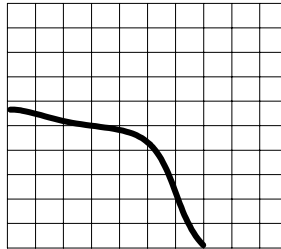
In addition to the 10 trim presets, the MP2/MP2E provides five overall presets, where a preset is a set of six filters. A filter consists of the type, center frequency, gain, and the ratio of the center frequency (equally spaced into octaves) divided by the bandwidth (also called Q) for both the left and right channels.

The **<FilterType>** inputs set the type of filter or equalization. Valid values are as follows:

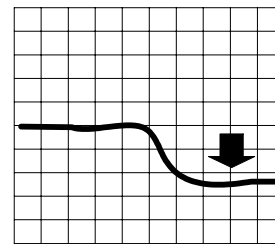
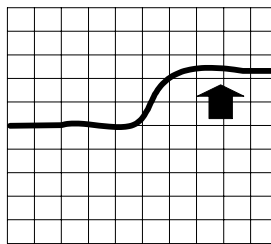
- 0 = Off (no parametric equalization)
- 1 = On (enables frequency, gain, and bandwidth (Q) filters)
- 2 = High Pass (Disables gain and Q, and filters out all audio below the **<FilterFreq>** levels). A high-pass filter circuit passes all signals that have a frequency higher than the specified frequency, while attenuating all frequencies lower than its specified frequency.

High Pass Filter

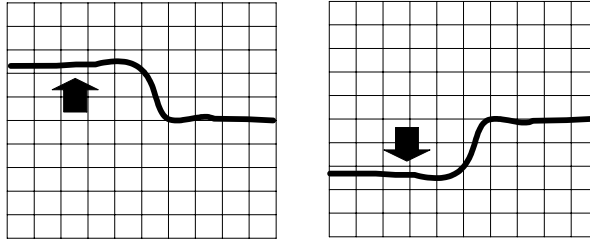
3 = Low Pass (Disables gain and Q, and filters out all audio above <FilterFreq> levels). A low-pass filter passes all frequencies below the specified frequency, while attenuating all frequencies above this specified frequency.

Low Pass Filter

4 = Treble Shelf (Uniformly boosts or attenuates all frequencies above the <FilterFreq> levels, without affecting the frequencies below. The amount of modification is given by <FilterGain>). A Treble Shelf filter boosts or attenuates all frequencies above the specified frequency in a uniform manner while not affecting the low frequencies below the specified frequency. For example: Because bass frequencies have longer wavelengths, small speakers may sound distorted when trying to reproduce these frequencies. The Treble Shelf filter can increase the proportion of treble to bass, enabling the smaller speakers to produce a clearer sound.

Treble Shelf Filters

5 = Bass Shelf (Uniformly boosts or attenuates all frequencies below the <FilterFreq> levels without affecting the frequencies above. The amount of modification is given by <FilterGain>). A Bass Shelf filter uniformly boosts or attenuates frequencies below the specified frequency while not affecting high frequencies above the specified frequency. For example: To increase the gain of bass frequencies applied to a subwoofer, you can set the bass shelf filter to uniformly increase the amplitude of all bass frequencies. The Bass Shelf filter can also be used to uniformly decrease the bass frequencies to eliminate a booming bass sound.

Bass Shelf Filters

NOTE: Various combinations of these filters may be used to equalize the soundfield in order to produce a flat response, and reproduce the sound as the recording engineer originally intended.

The **<FilterFreq>** inputs select the center frequency. Valid values range from 5 (5Hz) to 24000 (24kHz).

The **<FilterGain>** inputs boost or reduce the center frequency, or with shelving filters, all frequencies above or below the center frequency. Valid values range from -360 (-36dB) to +240 (+24dB).

A **<FilterGain>** setting of 0 (0dB) means that the signal will pass unaffected. Values above and below 0 will boost or reduce the frequency in increments of .1dB. That is, changing the filter gain value by 1 signifies a boost or attenuation of .1 decibels.

The **<FilterQ>** inputs set the width of the band of frequencies that will be boosted or reduced; that is, it affects the amount of frequencies around the center frequency that will have a similar amount of boost or reduction. Q is a ratio of the center frequency (equally spaced into octaves) divided by the bandwidth. Valid values range from 0.02 to 2.0 octaves. Smaller Q values represent a narrow band of boost or attenuation, while larger values represent a wider band of boost or attenuation.

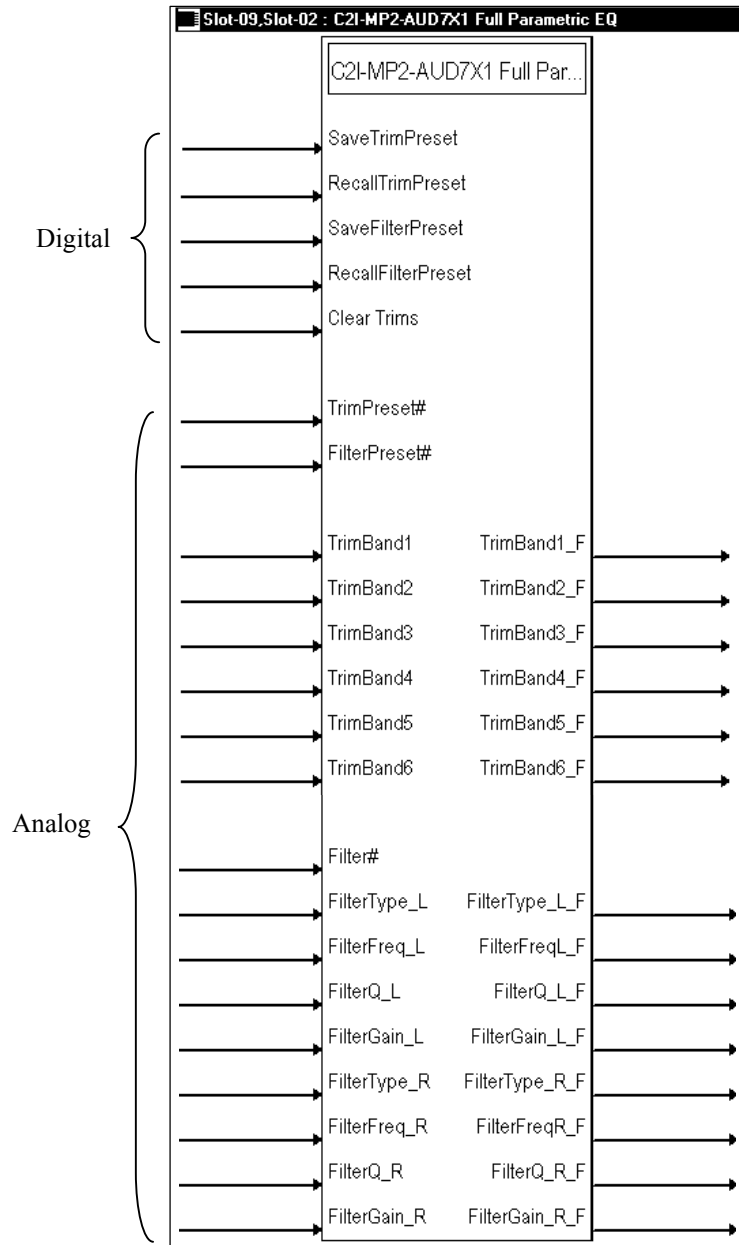
On the rising edge of **<SaveFilterPreset>** the current filter values for the indicated **<Filter#>** will be stored in the preset specified by **<Preset#>**. Valid values for **<Preset#>** range from 1 to 5; valid values for **<Filter#>** range from 1 to 6.

The outputs **<FilterType_L_F>** through **<FilterGain_R_F>** report the current filter settings.

A rising edge of **<RecallFilterPreset>** will recall the type, gain, frequency and Q of the specified **<Preset#>** and **<Filter#>**.

Refer to the tables that follow the symbol for join details.

Full Parametric Equalizer Symbol



Graphic/Parametric Equalizer Symbol Input Signals – Digital

SIGNAL TYPE	NAME	VALUE	DEFINITION
Digital	SaveTrimPreset	1/0	Saves the current trim values on the given TrimPreset# on the rising edge of the signal. TrimPreset# range is 1 - 10.
	RecallTrimPreset	1/0	Recalls the current trim values on TrimPreset 1 -10 from the given TrimPreset# on the rising edge of the signal.
	SaveFilterPreset	1/0	Saves the current filter values into the given FilterPreset# on the rising edge of the signal.
	RecallFilterPreset	1/0	Recalls the current filter values from the given FilterPreset# on the rising edge of the signal.
	ClearTrims	1/0	Clears all of the trim values (sets to 0 dB). Does not save the presets.

Graphic/Parametric Equalizer Symbol Input Signals – Analog

SIGNAL TYPE	NAME	VALUE	DEFINITION
Analog	TrimPreset#	1 to 10	10 user definable trim presets, each includes TrimBand 1-6
	FilterPreset#	1 to 5	5 user definable filter presets, each of which includes 6 filters
	TrimBand(1-6)	-100 to 100	-10 dB to +10 dB Each analog increment of 1 = 0.1 dB.
	Filter#	1 to 6	Select filter 1-6, per each channel.
	FilterType_(L or R)*	0 to 5	0=off, 1=EQ, 2=High Pass, 3=Low Pass, 4=Treble Shelf, 5=Bass Shelf
	FilterFreq_(L or R)	5 to 24000	5 Hz to 24 kHz. Each analog increment of 1 = 1 Hz
	FilterQ_(L or R)	20 to 2000	0.02 to 2.0 octaves Each analog increment of 1 = 0.001 octaves
	FilterGain_(L or R)	-360 to 240	-36 dB to +24 dB. Each analog increment of 1 = 0.1 dB

*NOTE: Refer to the Surround Sound Help File or the Surround Sound Primer (Doc. 6122) for additional information about filter types.

Graphic/Parametric Equalizer Symbol Output Signals – Analog

SIGNAL TYPE	NAME	VALUE	DEFINITION
Analog	TrimBand(1-6)_F	-100 to 100	-10 dB to +10 dB Each analog increment of 1 = 0.1 dB.
	FilterType_(L or R)_F	0 to 5	0=off, 1=EQ, 2=High Pass, 3=Low Pass, 4=Treble Shelf, 5=Bass Shelf
	FilterFreq_(L or R)_F	5 to 24000	5 Hz to 24 kHz, each analog increment of 1 = 1 Hz
	FilterQ_(L or R)_F	20 to 2000	0.02-2.0 octaves, each analog increment of 1 = 0.001 octaves
	FilterGain_(L or R)_F	-360 to 240	-36 dB to +24 dB, each analog increment of 1 = 0.1 dB

Slot 10: G2I-MP2-FRONT PANEL

The Slot 10 MP2/MP2E front panel symbol represents internal hardware and is not user programmable (not supported in this device).

New Symbols

The following new symbols have been created to facilitate programming for audio devices:

- Analog Ramp (Bounds Limited) – Many of the values that the MP2 permits are limited to a specific range, such as a gain restriction of -36dB to +24dB. The parameters for this symbol would be a lower limit of 360d, and an upper limit of 240d. These values are multiplied by 10, as the MP2 expects the gain in units of 0.1 dB. The Analog Ramp (Bounds Limited) symbol generates an analog output that changes linearly whenever the <up> or <down> inputs are high. The <ramp_time> parameter specifies the number of seconds that it takes to ramp the output from <LowerLimit> to <UpperLimit> (or vice-versa). At startup, <aout> goes to <MuteLevel>.
- Analog Scalar with I/O Limits – Useful for scaling an analog that goes from one value to another, to a different range (linearly). The "format" is 0d (input is treated as an unsigned value). The Analog Scalar with I/O Limits symbol takes an input that falls between <InputStart> and <InputEnd> and linearly scales it so that it falls between <OutputStart> and <OutputEnd>.
- Log/Antilog with Limits – For example, applying an Analog Ramp (0d to 65535d) yields a logarithmically varying output between the lower and the upper limits that are specified. In the MP2, for example, the lower limit is 5d and the upper limit is 24000d. (5Hz and 24KHz).
- Analog Increment – Allows you to go from one value to another, in specified increments. Also permits a "speed up" of the ramping by specifying a hold time at which the analog starts to increment at a given rate. If, for example, you wanted to ramp the gain in steps of 0.5dB, and have it repeat every 0.1s after holding the button for 1s, you can use one of these symbols with the following parameters: HoldTime = 1s, RepeatTime = 0.1s, Increment = 5d (in units of 0.1dB), LowerLimit = -360d, UpperLimit = 240d, MuteLevel = -360d.
- Analog Scalar with Overflow Handling – The Analog Scalar with Overflow Handling symbol scales the range of values for its analog input signal to the range defined by the and <offset> parameters.
- Analog Scalar without Zero Pass – The Analog Scalar without Zero Pass symbol operates identically to the Analog Scalar symbol, except that it has no "zero pass" feature. That is, when the input is at 0%, the output remains equal to <offset> and does not mute.

Refer to the SIMPL Windows Help file for additional details.

Example Program

NOTE: Before attempting to program the equalizer in SIMPL Windows, please study the sample program. There are some subtleties that must be carefully handled. You must use a Crestron supplied module with the MP2 equalization symbol if you intend to BOTH change parametric values from the control system AND to recall presets from the device. Download the sample program.

An example program is available from the Crestron FTP site:
<ftp://ftp.crestron.com/Examples/mp2-eg.smw>

Converting Programs and Modules Created for other Systems

A useful feature of SIMPL Windows is that you can convert a program created for another type of control system, simply by changing the target to an MP2/MP2E.

To do this you first open the program, and then replace the existing control system with the MP2/MP2E. That is, drag the MP2/MP2E from the Control Systems folder onto the existing control system in *System Views*, and click **Yes** when prompted to confirm the replacement.

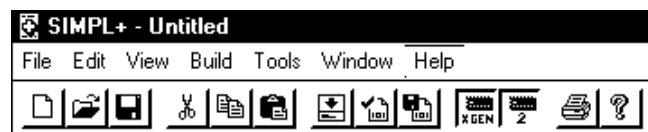
If the program contains SIMPL+ or User modules, the conversion might generate error messages. This is because modules and programs often contain symbols with “ambiguous” signals. For example, the inputs of the Serial to Analog symbol can be defined as either analog or serial. Although X-Generation processors support ambiguous signals, the 2-Series processor requires all signal types to be strictly defined.

If the program you want to convert contains SIMPL+ or User modules, Crestron recommends that you first convert each module before converting the larger program. In this way, the compiler can resolve any ambiguous signals in the modules and minimize errors when the larger program is converted.

Converting SIMPL+ Modules

1. Open the SIMPL+ module you want to convert.
2. Choose the 2-Series processor as the target by clicking the toolbar button, as shown in the following illustration.

SIMPL+ Toolbar



NOTE: Note that you can select both X and 2-Series as the targets, so that the module works for both types of control systems. However, you are limited to SIMPL+ keywords and functions that are supported on both systems. If you do not choose a target, then the module may or may not work, depending on the constructs that are used.

3. Save and compile the module by clicking the **Save and Compile** toolbar button; alternatively, click **Save and Compile** on the **Build** menu (or press **F12**).

Converting User Modules

1. Open the User module you want to convert.
2. Click **Project | Edit Program Header**.
3. Click **2-Series** in the *Target Control System Classes* list box.

You can select other types of control systems as well, but then you are limited to symbols that are supported by all of these platforms. The module may still work on unselected control systems so long as unsupported symbols are not used. Selecting a control system means that you are *requiring* the module to work there.

“Module Header Information” Window

Module Header Information

Module Hint:

Dealer Name

Programmer System Number

Program Created: Unknown
 Program Last Modified: Unknown

Compiler Version

OPS Version

Module Characteristics

Symbol Tree Category

- Lighting
- Media Resource
- Memory
- Miscellaneous

Target Control System Classes

- No Selection
- SmartTouch
- Cresnet II
- XGeneration

(hold down <CTL> key for multiple selections)

Module Help

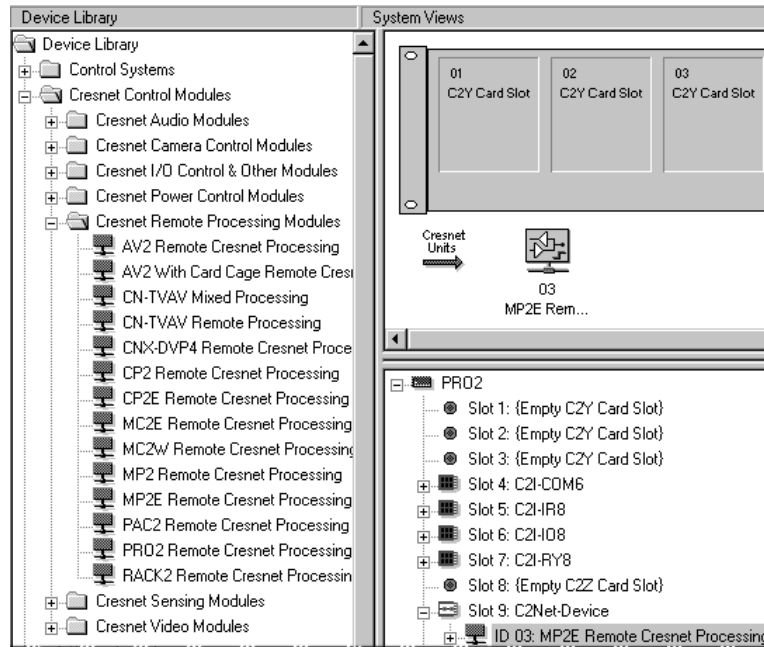
After you convert each module in a program, you can convert the program as described previously: drag the MP2/MP2E onto the existing control system in System Views and click Yes to confirm the replacement.

For further information about compile-time errors and detailed explanations about working with modules, refer to the SIMPL Windows online help file.

Programming the MP2/MP2E as a Cresnet Slave Device

To incorporate the MP2/MP2E as a Cresnet system slave, locate the MP2 or MP2E Remote Cresnet Processing symbol in the Device library and drag it to the C2NET-Device slot of the master device. In this example, we are using a PRO2 as the master. The PRO2 system view shows the MP2E as a slave device in slot 9 with a Net ID of 03 (assuming that no other C2NET devices are present as shown in the following illustration). The MP2/MP2E must have a Net ID of 03 or higher to be a slave device.

C2NET-Device

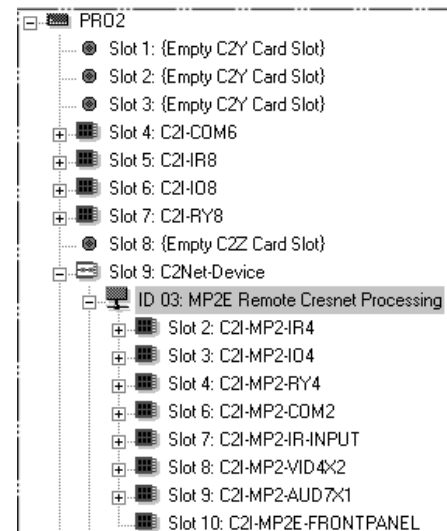


NOTE: The first Cresnet device placed in a system (as in the example shown here) takes a NET ID of 03. As additional symbols are added, they take the next available ID number.

NOTE: Slave devices do not have networks.

Expand the device to view the available slots in the MP2/MP2E remote processing symbol. The following diagram shows the available slots of an MP2E operating in slave mode.

Device Detail

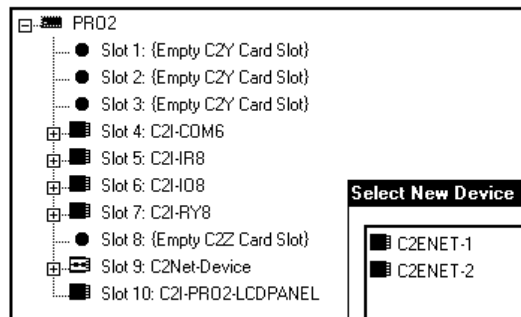


NOTE: Slot1: C2NET-Device is never available on a control system operating in slave mode. All other slots may be configured as described in this manual with the exception of slot 5; slave devices do not control networks.

NOTE: Each port on the master and slave system that requires configuration must be individually configured. In the example above, a COM port on Slot 6 of the slave system must be configured separately from any COM port on Slot 4 of the master system.

Programming the MP2/MP2E as an Ethernet Slave Device

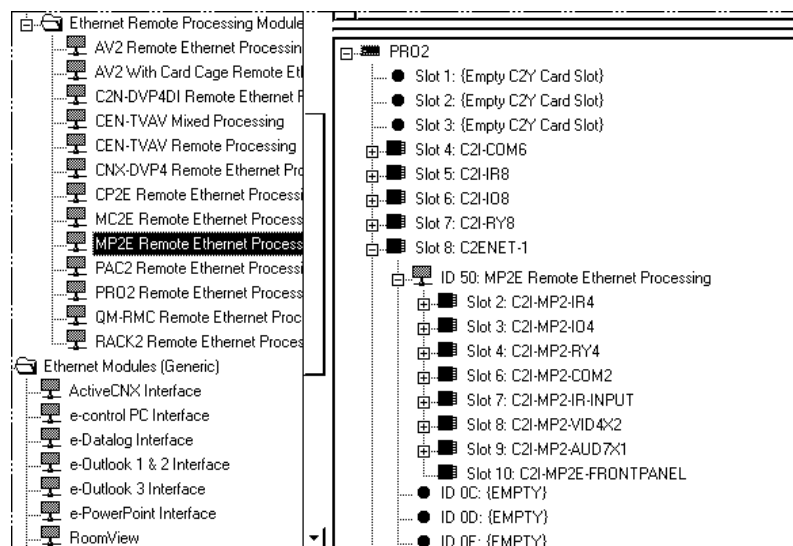
Continuing with our PRO2 example, add an Ethernet card to the Z-Bus by right-clicking slot 8. Select “Add item to C2Z Card Slot” and add a C2ENET-1 or C2ENET-2.



Locate the MP2E Remote Ethernet Processing symbol in the Device library and drag it to the C2ENET-Device slot of the master device.

The PRO2 system view shows the MP2E as a slave device in slot 8 with a Net ID of 50 (assuming that no other C2NET devices are present as shown in the following illustration). The Net ID for the MP2E must be 03 or higher to be a slave device.

C2NET-Device



NOTE: The first Ethernet device in a system is preset with a NET ID of 50 when its symbol is added to the C2ENET-Device slot. Additional devices are assigned different NET ID numbers, as they are needed.

NOTE: Slot1: C2NET-Device is never available on a control system operating in slave mode. All other slots may be configured as described in this manual with the exception of slot 5; slave devices do not have networks.

NOTE: Each port on the master and slave system that requires configuration must be individually configured. In the example above, a COM port on Slot 6 of the slave system must be configured separately from any COM port on Slot 4 of the master system.

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.

MP2/MP2E Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Unexpected response from control system.	Network devices are not communicating to the control system.	From the Viewport, poll the network (F4) to verify communication. Verify power distribution.
PWR LED does not illuminate.	Control system is not receiving power.	If power is supplied through an external adaptor, verify that the DC output plug is properly attached to the control system and that the adaptor is securely plugged into an outlet.
		If power is supplied through Cresnet cabling, ensure that the cable is securely plugged into the NET connector.
ERR LED illuminates.	Hardware or software failure, hardware incompatibility with software definitions, or programming error.	Verify that the hardware configuration matches software configuration. Poll the network (F4) from the Viewport; check error log for SIMPL, SIMPL+ program reload errors.
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 processor (refer to "Troubleshooting Communications" on page 22).
System does not function.	Various.	Refer to the "System Monitor" procedure following this table.
	Incorrect power supply.	Use a Crestron power supply. Verify 24 VDC.
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 miswired.	Verify that serial cable is wired correctly for RS-232, 422, or 485.

System Monitor

The System Monitor allows you to reload firmware into the MP2/MP2E in the event that you cannot load the firmware in the normal mode.

Perform the following procedure to correct the “System does not function” trouble situation (in reference to Corrective Action).

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

1. Connect DB9 straight-through RS-232 cable between the PC and MP2/MP2E. Refer to “Hardware Hookup” on page 18 for pin-out information.
2. Open Viewport and select **Setup | Communication Settings** to open the “Port settings” window.
3. In the window, select **RS-232** (Connection Type), **57600** (Baud Rate), **N** (Parity), **8** (Data Bits), **1** (Stop Bits), **RTS/CTS On**, **XON/XOFF Off**, and click **OK**.
4. Power down the MP2/MP2E.
5. While powering up the MP2/MP2E, press and hold **ATL+K** on the keyboard until the following text (or similar) appears in Viewport.

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

NOTE: After this, you can increase the baud rate to 115200 (for faster communication) by pressing **F8** on the keyboard and then selecting 115200 from the “Set Baud Rate” window.

6. At the Viewport prompt, type: **erase** and press **Enter**. The following text appears in Viewport.


```
CS>erase
->25%->50%->75%->100%
Done
CS>
```
7. Press **ALT+O** (not zero) on the keyboard. The “Open” window appears. Click: File Transfer | Update Control System.
8. Find and select the correct firmware file (.CUZ) and click **Open**.
9. Once “Completed Successfully” appears in Viewport, type **quit** at the Viewport prompt and press **Enter**.

Network Analyzer

To assist with troubleshooting, this unit contains the Crestron 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 SIMPL Windows 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 MP2/MP2E. Under normal conditions, it lasts for approximately 10 years. In the event that the clock

fails, only an authorized technician should replace it. Refer to the following caution statement.

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.

Passthrough Mode

Passthrough mode enables Viewport access to any serially controlled device on the network. That is, it allows direct communication between the PC and a network device (effectively "passing through" the MP2 or MP2E). While Passthrough mode is running, the program currently in memory is suspended and will not execute. When Passthrough mode is exited, the program resumes operation. The TX and RX LEDs for the given port illuminate when in Passthrough mode.

NOTE: Passthrough Mode (PTM) is available even when the MP2/MP2E is configured as an Ethernet or Cresnet slave.

Entering Passthrough mode for one of the internal COM ports reinitializes it, which clears the data for that port.

To establish communication, click **Functions | Enter Passthrough Mode**. Then select the connection type that exists between the MP2/MP2E and the device. The choices are Slot (for devices connected to the control system via one of the card slots on the back panel), Cresnet, or Ethernet. If the connection is through a card slot then select the slot number from the **Slot** drop-down list. For Cresnet, select the Cresnet ID of the device; for Ethernet, select the IP ID.

NOTE: The IP ID and associated IP address of the Ethernet device must be listed in the IP Table.

Specify the port (Port A through Port F) that the device is connected to, if applicable.

Next, specify the serial protocol that the device expects. The parameters include the baud rate, parity, the number of data bits and stop bits, the protocol (RS-232, RS-422 or RS-485), and the settings for software or hardware handshaking. This information is provided by the manufacturer's documentation.

"Passthrough Mode" Window

The PC is now communicating directly with the device.

To exit Passthrough mode, choose <CTRL> +C, or set a timeout. A system reboot also exits the Passthrough mode.

Further Inquiries

If after reviewing this Operations Guide, you cannot locate specific information or have questions, please take advantage of the Crestron award winning customer service team by calling:

- In the US and Canada, call the Crestron corporate headquarters at 1-888-CRESTRON [1-888-273-7876].
- In Europe, call Crestron International at +32-15-50-99-50.
- In Asia, call Crestron Asia at +852-2341-2016.
- In Latin America, call Crestron Latin America at +5255-5093-2160.
- In Australia and New Zealand, call Crestron Pacific at +613-9480-2999.

Firmware Upgrades

To take advantage of all the MP2/MP2E features, it is important that the unit contains the latest firmware available. Therefore, please check the Crestron website (http://www.crestron.com/downloads/software_updates.asp) for the latest version of firmware. Not every product has a firmware upgrade, but as Crestron improves functions, adds new features, and extends the capabilities of its products, firmware upgrades are posted. If you have questions regarding upgrade procedures, contact Crestron customer service.

Future Updates

As Crestron improves functions, adds new features, and extends the capabilities of the MP2/MP2E, 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 (www.crestron.com) periodically for manual update availability and its subjective value. Updates are available from the Downloads | Product Manuals section and are identified as an “Addendum” in the Download column.

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1. No merchandise may be returned for credit, exchange, or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address.
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, Cresskill, 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.

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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.

CRESTRON shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed.

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Operations Guide – DOC. 6175
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