

Crestron **AV2 & PRO2**

2-Series Integrated Dual Bus Control System

Operations Guide



This document was prepared and written by the Technical Documentation department at:



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2-Series Integrated Dual Bus Control System: AV2 & PRO2

Introduction

Features and Functions

- 2-Series engine with Dual-bus architecture
- 36 MB of Internal Memory¹
- 4 GB Compact Flash memory card slot
- Cresnet[®] port – master/slave selectable
- 10/100 Ethernet capable with SSL encryption
- Crestron e-Control^{®2} and Crestron RoomView[®] enabled
- Built-in firewall, NAT and router
- Six Com ports, eight IR/serial ports, eight Versiport I/O ports, eight relay ports
- Three Y-Bus² / One Z-Bus control card expansion slots
- Internal power supply
- 2-Space EIA rack-mountable
- Front panel control with LCD display (PRO2 only)

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

2. Optional on AV2.

2-Series Engine

At the heart of the AV2 & PRO2 is the powerful 32-bit Freescale ColdFire[®] processor. Crestron's exclusive enhanced real-time operating system makes the AV2 & PRO2 the fastest, most reliable control systems available.

Dual Bus Architecture

The AV2's & PRO2's unique dual-bus architecture affords ultra fast communications. The 40 Mbps Y-Bus provides a high-speed backplane for IR, serial and other integrated control ports. Additional control ports and interfaces like MIDI and digital audio processing may be added by installing up to three Y-Bus control

cards (expansion cage option required for AV2). At a blazing 300 Mbps, the Z-Bus supports Fast Ethernet with future support for other emerging technologies.

Cresnet[®]

Cresnet is the communications backbone for many Crestron touchpanels, keypads, lighting controls and other devices. The Cresnet bus is a simple, yet flexible 4-wire network that provides rock-solid bidirectional communication and power for up to 252 Cresnet devices.

Cresnet Slave Mode

Selectable Cresnet Slave Mode enables the AV2 & PRO2 to be configured as Cresnet slave devices, effectively transforming them into Cresnet expansion modules. Such flexibility can offer a cost-effective solution for system expansion, providing a host of additional control ports in a single module.

Ethernet

Crestron pioneered the IP-based control system to harness the vast possibilities of Ethernet and the Internet for remote control, monitoring, programming and diagnostics. The AV2 & PRO2 are designed to deliver the world's most advanced IP control solutions. A choice of single or dual port Ethernet cards enables a full-duplex 10/100 Ethernet connection with built-in Web server and email client and support for both static and dynamic IP addressing.

Crestron e-Control[®] 2

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

Crestron RoomView[®]

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

SSL

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

NAT

The AV2's & PRO2's onboard NAT (Network Address Translator) acts as a firewall and router to facilitate the configuration of a private control LAN with a single-point connection to the client's LAN (Dual-port Ethernet card required).

Memory Expansion

A memory card slot accessible on the rear panel allows for easy expansion of the AV2's & PRO2's internal memory using any Type II Compact Flash memory card up to 4 GB. Note that compact flash memory supports FAT file structure.

Front Panel Control (PRO2 only)

The PRO2 includes a programmable front control panel with LCD display and control port status indicators. The PRO2's front panel serves as a ready user interface for system configuration and diagnostics and can also be custom programmed to enable menu-driven control capability.

Specifications

Specifications for the AV2 & PRO2 are listed in the following table.

AV2 & PRO2 Specifications

SPECIFICATION	DETAILS
Processor CPU Processing Speed	32-bit Freescale Coldfire [®] Microprocessor 257 MIPS (Dhrystone 2.1 benchmark)
Memory SDRAM NVRAM Flash Compact Flash	32 MB 256 kB 4 MB expandable up to 4 GB (not included)
Operating System	Real-time preemptive multi-threaded/multitasking kernel; FAT32 file system with long names; supports SIMPL Windows and SIMPL+ [®]
Ethernet With C2ENET-1 With C2ENET-2	10/100BaseT, auto-negotiating, full/half duplex, static IP or DHCP/DNS, SSL, TCP/IP, UDP/IP, CIP, SMTP, built-in Web server and e-mail client; supports Crestron e-Control [®] 2 Xpanel and RoomView [®] applications All above features plus: built-in firewall, router and network address translator (NAT)
Expansion Slots Y-Bus ¹ Z-Bus ²	(3) (AV2 requires CAGE2 accessory, sold separately); Accept all Y-Bus control cards (1) Accepts all Z-Bus control cards
Power Requirements Internal Universal Power Supply Available Cresnet Power	2.3 Amps, 100-250 Volts AC, 50/60 Hz 50 Watts (shared with control card expansion slots)
Network Power Fuse Rating	4A, 250V (1 1/4" x 1/4" Slow Blow Fuse Series) 50 watts (DC) available for Cresnet devices
Environmental Temperature Humidity	41° to 113°F (5° to 45°C) 10% to 90% RH (non-condensing)

(Continued on following page)

AV2 & PRO2 Specifications (Continued)

SPECIFICATION	DETAILS
Enclosure	Black metal, 2U 19" rack-mountable (rack ears included)
Dimensions	
Height	3.47 in (8.82 cm)
Width	19.00 in (48.26 cm) with ears; 17.03 in (43.25 cm) without ears
Depth	9.69 in (24.61 cm)
Weight	
AV2	7.1 lbs (3.22 kg) – with line cord
PRO2	8.0 lbs (3.63 kg) – with line cord
Available Accessories	
CAGE2 (AV2 only)	3-Card expansion cage
C2ENET-1	Single port Ethernet card
C2ENET-2	Dual port Ethernet card
C2COM-2	Dual COM port card ³
C2COM-3	Three COM port card ³
C2IR-8	8 IR/Serial output card ³
CNXIO-16	16 I/O Versiport card ³
CNXAO-8	8 Analog output card ³
CNXRY-8	8 Relay card ³
CNXRY-16	16 Relay card ³
CNXMIDI	MIDI Interface card ³
C2VEQ-4	4-Channel Volume/EQ and 4x4 matrix mixer card ³
CNXTA	Telephone interface and Voice/WAV sound card ³
C2N-HBLOCK	Cresnet Network Distribution Block
C2N-NPA8	Cresnet Network Poll Accelerator
C2N-SPWS300	300 Watt Cresnet Power Supply
CNSP-XX	Custom Serial Interface Cable
IRP2	IR Probe

1. 40 Mb/s parallel communications; Internal backplane for integrated control ports and Y-Bus expansion slots.

2. 300 Mb/s parallel communications; Backplane for Z-Bus expansion slots.

3. AV2 requires CAGE2 for card installation.

Physical Description

This section provides information on the connections, controls and indicators available on your AV2 & PRO2.

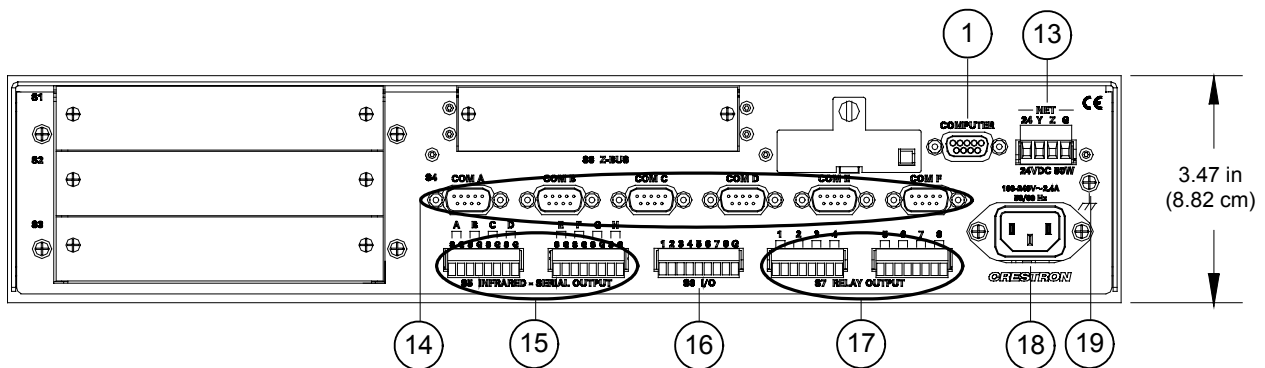
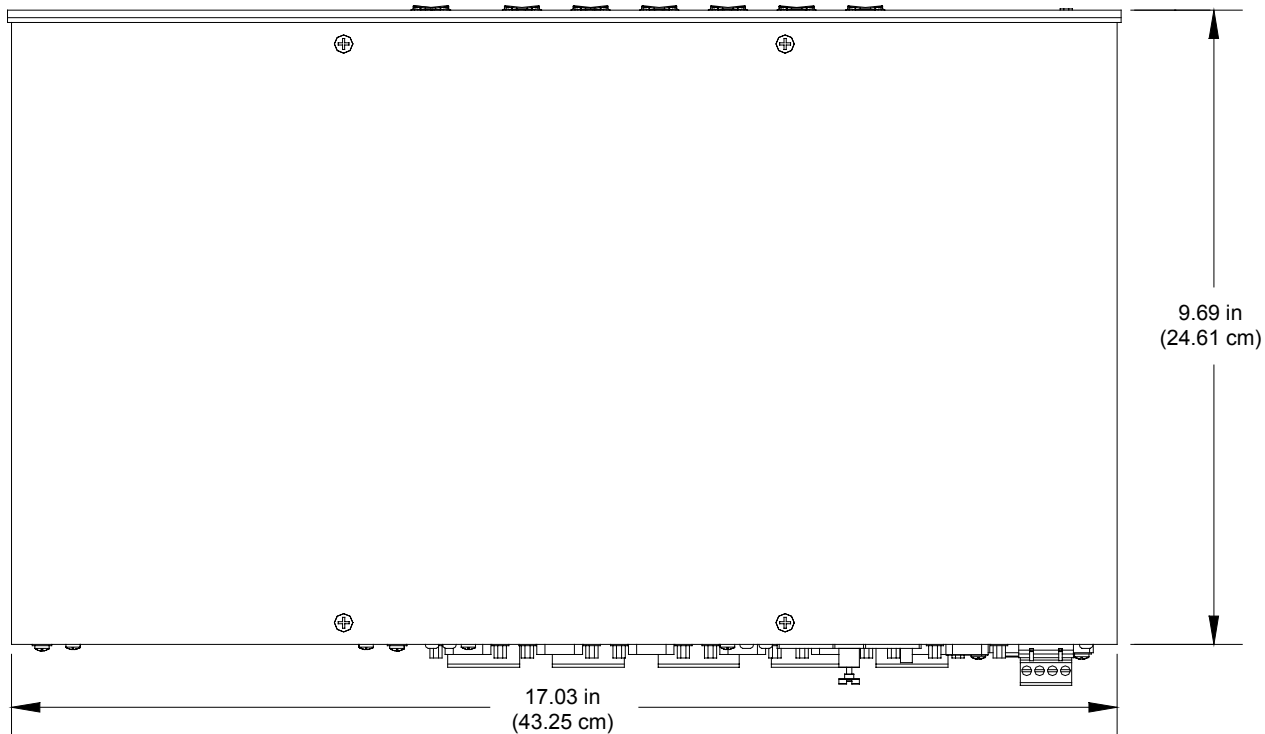
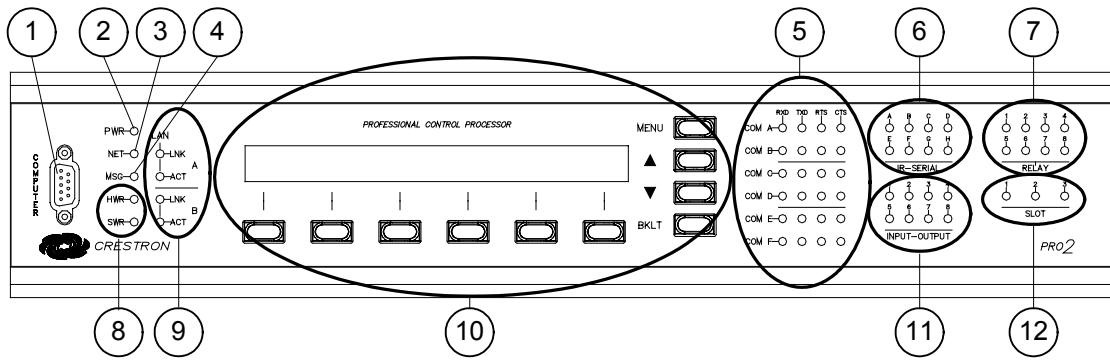
AV2 Physical View (shown with accessory cards installed in CAGE2; optional)



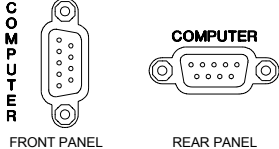
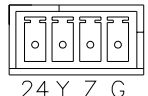
PRO2 Physical View (shown with accessory cards installed)



AV2 & PRO2 Overall Dimensions

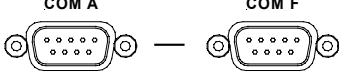

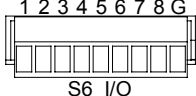
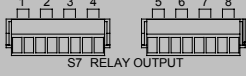
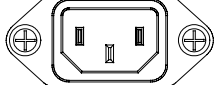



Connectors, Controls & Indicators

#	CONNECTORS ¹ , CONTROLS & INDICATORS	DESCRIPTION
1	<p>COMPUTER</p>  <p>FRONT PANEL REAR PANEL</p>	DB9F connectors (one on front panel and one on rear) are used when programming with a PC. Each port is modem compatible. (Modem and PC cables not included.)
2	PWR LED	Indicates 24 Volts DC power supplied from Cresnet control network.
3	NET LED	Indicates communication with Cresnet System.
4	MSG LED ²	Illuminates when a message is detected. To decipher content, examine the message available from the menu function buttons or through the Crestron Toolbox™.
5	COM (A – F) LEDS ³	<p>RXD - Illuminate during reception of data from serial devices attached to the respective COM ports.</p> <p>TXD – Illuminate during transmission of data to serial devices attached to the respective COM ports.</p> <p>RTS – Illuminate to reflect state of the RTS pin on the respective COM port. If no handshaking is specified, the RTS line will be high and the associated LED is also high. When RTS flow control is enabled, RTS indicates the unit is ready to receive data from serial devices attached to the respective COM ports.</p> <p>CTS – Illuminate to reflect state of the CTS pin on the respective COM port. An illuminated LED means the CTS line is high. When CTS flow control is enabled, CTS indicates the serial devices on the respective COM ports are ready to accept data.</p>
6	IR – SERIAL (A – H) LEDS ³	Indicate activity on the respective IR-SERIAL lines.
7	RELAY (1 – 8) LEDS ³	Indicate the respective relay is closed.
8	RESET BUTTONS	<p>HW-R - Initiates system hardware reset.</p> <p>SR-R - Pressing this in combination with HW-R button performs a system restart without loading the program. Pressing it alone momentarily while the system is running restarts the program.</p>
9	LAN (A – B) LEDS ⁴	<p>LNK – Indicate the Ethernet card has established a valid Ethernet connection.</p> <p>ACT – Indicate communication (activity) at the respective port on the Ethernet card.</p>
10	LCD SCREEN & MENU BUTTONS ³	Permits local control; refer to “Operation” on page 18 for details.
11	INPUT – OUTPUT (1 – 8) LEDS ³	Indicate when input voltage thresholds for the respective I/O ports are exceeded or when the output is active.
12	SLOT (1 – 3) LEDS ³	Indicate an expansion card is inserted into the respective slot. These LEDS turn off momentarily when data is sent to the card or received from the card.
13	<p>NET</p>  <p>24 Y Z G</p>	<p>Four-position terminal block connector for data and power. Connects to Cresnet control network.</p> <p>Pin 1 (24) Power</p> <p>Pin 2 (Y) Data</p> <p>Pin 3 (Z) Data</p> <p>Pin 4 (G) Ground</p>

(Continued on following page)

Connectors, Controls & Indicators (Continued)

#	CONNECTORS ¹ , CONTROLS & INDICATORS	DESCRIPTION																														
14	<p>COM (A – F)^{5,6,7}</p> 	<p>(6) DB9 male, bidirectional RS-232/422/485 ports. Up to 115.2k baud, hardware and software handshaking support. Ports C-F support C2N-NPA8 Network Poll Accelerator⁸.</p> <table border="1"> <thead> <tr> <th>PIN</th> <th>DIRECTION</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>1*</td> <td>To AV2 or PRO2</td> <td>(RXD-) RS-422 Receive Data (Idles low)</td> </tr> <tr> <td>2</td> <td>To AV2 or PRO2</td> <td>(RXD) RS-232 Received Data</td> </tr> <tr> <td>3</td> <td>From AV2 or PRO2</td> <td>(TXD) RS-232 Transmitted Data</td> </tr> <tr> <td>4</td> <td>From AV2 or PRO2</td> <td>(TXD+) RS-422 Transmit Data (Idles high)</td> </tr> <tr> <td>5</td> <td></td> <td>RS-232 and RS-422 Signal Common</td> </tr> <tr> <td>6</td> <td>To AV2 or PRO2</td> <td>(RXD+) RS-422 Receive Data (Idles high)</td> </tr> <tr> <td>7</td> <td>From AV2 or PRO2</td> <td>(RTS) RS-232 Request to Send</td> </tr> <tr> <td>8</td> <td>To AV2 or PRO2</td> <td>(CTS) RS-232 Clear to Send</td> </tr> <tr> <td>9</td> <td>From AV2 or PRO2</td> <td>(TXD-) RS-422 Transmit Data (Idles low)</td> </tr> </tbody> </table> <p>* RS-422 transmit and receive are balanced signals requiring two lines plus a ground in each direction. RXD+ and TXD+ should idle high (going low at start of data transmission). RXD- and TXD- should idle low (going high at start of data transmission). If necessary, RXD+/RXD- and TXD+/TXD- may be swapped to maintain correct signal levels.</p>	PIN	DIRECTION	DESCRIPTION	1*	To AV2 or PRO2	(RXD-) RS-422 Receive Data (Idles low)	2	To AV2 or PRO2	(RXD) RS-232 Received Data	3	From AV2 or PRO2	(TXD) RS-232 Transmitted Data	4	From AV2 or PRO2	(TXD+) RS-422 Transmit Data (Idles high)	5		RS-232 and RS-422 Signal Common	6	To AV2 or PRO2	(RXD+) RS-422 Receive Data (Idles high)	7	From AV2 or PRO2	(RTS) RS-232 Request to Send	8	To AV2 or PRO2	(CTS) RS-232 Clear to Send	9	From AV2 or PRO2	(TXD-) RS-422 Transmit Data (Idles low)
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15	<p>INFRARED - SERIAL OUTPUT (A – H)⁹</p> 	<p>(8) 2-pin 3.5 mm detachable terminal blocks IR/Serial output ports. IR output up to 1.2 MHz; 1-way serial TTL/RS-232 (0-5 Volts) up to 115.2k baud. Individual signal generator per port, allowing simultaneous firing of all ports.</p>																														
16	<p>I/O (1 – 8)¹⁰</p> 	<p>(1) 9-pin 3.5 mm detachable terminal block comprising (8) digital input/output or analog input ports (referenced to GND); Digital Input: Rated for 0-24 Volts DC, input impedance 20k ohms, logic threshold 1.24 Volts DC; Digital Output; 250 mA sync from maximum 24 Volts DC, catch diodes for use with “real world” loads; Analog Input: Rated for 0-10 Volts DC, protected to 24 Volts DC maximum, input impedance 20k ohms; Programmable 5 Volts, 2k ohms pull-up resistor per pin.</p>																														
17	<p>RELAY OUTPUT (1 – 8)</p> 	<p>(2) 8-pin 3.5 mm detachable terminal blocks comprising (8) normally open, isolated relays; Rated 1 Amp, 30 Volts AC/DC, MOV arc suppression across contacts.</p>																														
18	<p>100 – 240V ~2.4A 50/60 Hz (POWER SUPPLY)</p> 	<p>(1) IEC Socket, mates with removable power cord (included).</p>																														
19	<p>CHASSIS GROUND</p> 	<p>(1) 6-32 screw, chassis ground lug.</p>																														

- Interface connectors for NET, Infrared-Serial, I/O and Relay Output ports are provided with the unit.
- This LED was labeled “ERR” on units manufactured prior to 2005. It is functionally the same; only the labeling has changed.
- PRO2 only.
- LAN LEDs are active only if a single port or dual port Ethernet card (which is field installed) occupies the Z-Bus slot.

5. The pinout of each 9-pin port is non-standard; it contains RS-422 pins in addition to RS-232. This may result in a conflict with some equipment and therefore all nine pins should **not** be used. Only the required pins for each communication type should be connected. For RS-232 and -422, pins 2, 3, 5, 7 and 8 are wired straight through.
6. Data Set Ready (DSR) and Data Terminal Ready (DTR) are not supported.
7. To support RS-485, tie pin 1 (RXD-) to pin 9 (TXD-) and pin 4 (TXD+) to pin 6 (RXD+) in the cable.
(Refer to table at right.)

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

8. The Cresnet Poll Accelerator effectively increases the network speed, fan-out and device addresses by a factor of 8 for each Poll Accelerator added to the system.
9. Transmission levels on the infrared – serial output connectors are in the 0 to +5 VDC range, which may not be compatible with all RS-232 devices.
10. Digital outputs are TTL values and may not work with devices requiring a “dry” contact closure (e.g. low voltage motor controllers).

Industry Compliance

These products are Listed to applicable UL Standards and requirements by Underwriters Laboratories Inc.



As of the date of manufacture, the AV2 & PRO2 have been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling.



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

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Setup

Network Wiring

When wiring the network, consider the following:

- Use Crestron Certified Wire.
- Use Crestron power supplies for Crestron equipment.
- Provide sufficient power to the system.

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

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

For more details, refer to “Check Network Wiring” on page 26.

Identity Code

Net ID

The Net IDs of the AV2 & PRO2 have been factory set to **02**. This Net ID is defined as the “Master” control system. The Net IDs of multiple AV2 & PRO2 devices in the same system must be unique; this means there will be a master/slave relationship between units (only the Net ID of the master will be left at **02**). Net IDs are changed from a personal computer (PC) via the Crestron Toolbox™. When setting the Net ID, consider the following:

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

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

IP ID

The IP ID is set within the AV2’s or PRO2’s table using Crestron Toolbox. For information on setting an IP table, refer to the Crestron Toolbox help file.

The IP IDs of multiple AV2 & PRO2 devices in the same system must be unique. When setting the IP ID, consider the following:

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

Hardware Hookup

Ventilation

The AV2 & PRO2 should be used in a well-ventilated area. The venting holes should not be obstructed under any circumstances. If the AV2 or PRO2 is hot to the touch, consider using forced air ventilation and/or incrementing the spacing between units.

To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the table of specifications. Consideration must be given if installed in a closed or multi-unit rack assembly since the operating

ambient temperature of the rack environment may be greater than the room ambient temperature. Contact with thermal insulating materials should be avoided on all sides of the unit.

Rack Mounting

The AV2 & PRO2 can be mounted in a rack or stacked with other equipment. Two “ears” are provided with the AV2 & PRO2 so that the units can be rack mounted. These ears must be installed prior to mounting. Complete the following procedure to attach the ears to the unit. The only tool required is a #2 Phillips screwdriver.

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

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

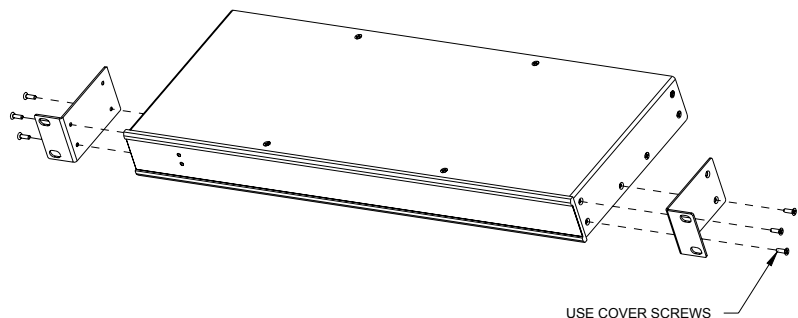
NOTE: If rack mounting is not required, rubber feet are provided for tabletop mounting or stacking. Apply the feet near the corner edges on the underside of the unit.

NOTE: Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit. (e.g., use of power strips).

To install the ears:

1. There are screws that secure each side of the AV2 & PRO2 top cover. Using a #2 Phillips screwdriver, remove the three screws closest to the front panel from one side of the unit. Refer to the diagram following step 3 for a detailed view.
2. Position a rack ear so that its mounting holes align with the holes vacated by the screws in step 1.
3. Secure the ear to the unit with three screws from step 1, as shown in the following diagram.

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



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

Bussing Strip Installation

The 2-Series integrated dual bus control system is supplied with two brass bussing strips to facilitate commoning (linking) of multiple terminal block connections. The

bussing strips are constructed with four terminal block positions and may be trimmed to size for various applications or different devices. One strip is supplied for each 8-position terminal block.

1. To utilize the bussing strip, determine the number of relays to be commoned for the equipment being installed. If less than four, the strip can be trimmed to size with a pair of scissors or wire snips.
2. Loosen the terminal block screws and insert the first leg of the bussing strip into the first common position of the terminal block. The strip engages the other common positions automatically.
3. Remove approximately 1/8" of the jacket from the common wire and insert the conductor into one of the terminal block common positions. Tighten the terminal block screws to lock the wire and bussing strip into place. Insulate the strip by folding a piece of 3/4" wide vinyl electrical tape (such as Scotch 33+) over the spine and as much of the individual legs as possible. Excess tape at each end of the strip should be pressed closed, then trimmed to within approximately 1/16" of the end of the strip.
4. When wiring the remaining conductors, remove approximately 1/8" of the jacket and insert the wires into the proper terminal block positions. To prevent the possibility of electrical shorts, it is essential that these conductors do not touch any uninsulated portion of the bussing strip.
5. Securing a tie wrap around the bussing strip is a useful way to provide strain relief for the wires connected to the terminal block.

Memory Card Installation

The onboard 36 MB memory of the 2-Series integrated dual bus control system is enhanced with a 4 GB expansion slot that supports off-the-shelf Type II compact flash memory and "microdrive" devices. The slot is accessible on the rear panel of the unit. Complete the following procedures to install the memory card. Power does not have to be disconnected to insert memory. Note that compact flash memory supports FAT file structure.

1. Loosen the screw that secures the memory slot cover located to the left of the **COMPUTER** port on the rear panel.
2. Pull on the screw to remove the screw and cover.
3. Observe handling precautions of the memory card manufacturer and insert card into the open slot.
4. Align and reposition cover over slot and tighten the screw.

Memory Card Removal

Complete the following procedures to remove the memory card. Power does not have to be disconnected to remove memory.

1. Loosen the screw that secures the memory slot cover located to the left of the **COMPUTER** port on the rear panel.
2. Pull on the screw to remove the screw and cover.
3. Press the eject button located on the extreme right of the slot.
4. Observe handling precautions of the memory card manufacturer and remove card from the slot.
5. Align and reposition cover over slot and tighten the screw.

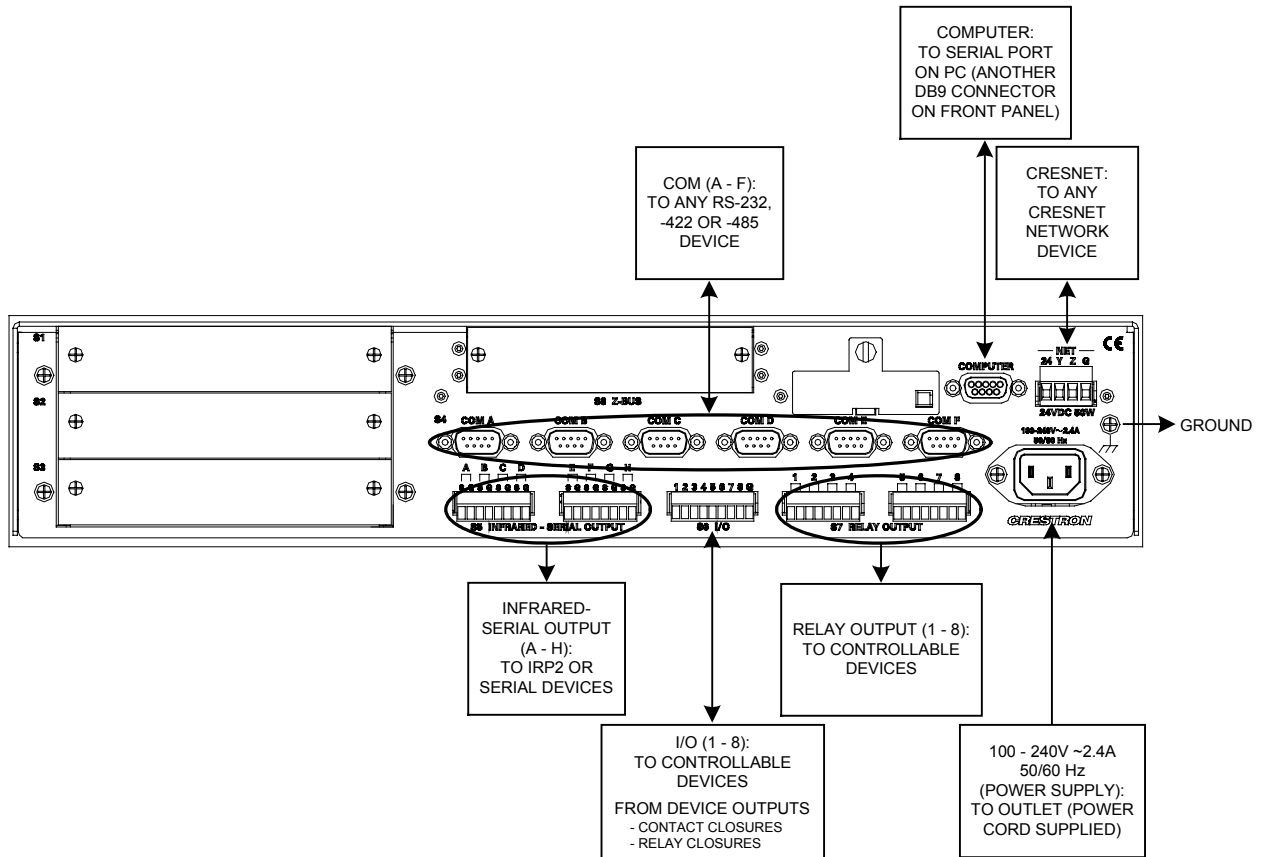
Connect the Device

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

When making connections to the AV2 & PRO2, consider the following:

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

Hardware Connections for the AV2 & PRO2



Programming Software

Have a question or comment about Crestron software?

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

Earliest Version Software Requirements for the PC

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

Crestron has developed an assortment of Windows®-based software tools to develop a Cresnet system. The following are the minimum recommended software versions for the PC:

Software

TASK	REQUIRED SOFTWARE VERSION
Program control system to operate AV2 & PRO2.	SIMPL Windows version 2.02.08 or later with SIMPL+ Cross Compiler version 1.1 or later and Library update 145 or later; Also requires Crestron Database version 15.6.2 or later.
Upload program and firmware.	Crestron Toolbox 1.01.06 or later.
Program with simple wizards (optional but recommended).	Crestron SystemBuilder™ version 2.0.6 or later. Refer to software release notes or Crestron website for other required Crestron software packages.

Programming with Crestron SystemBuilder

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

Programming with SIMPL Windows

NOTE: While SIMPL Windows can be used to program the AV2 & PRO2, it is recommended to use SystemBuilder for configuring a system.

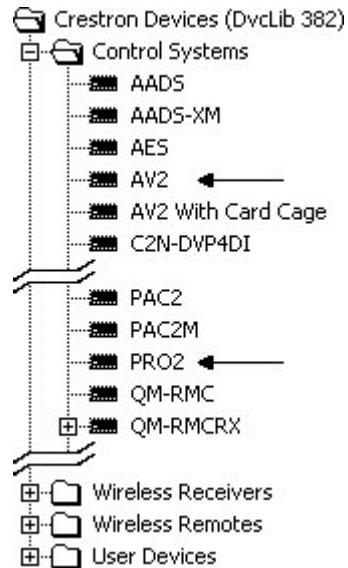
SIMPL Windows is Crestron's premier software for programming Crestron control systems. It is organized into two separate, but equally important "Managers".

Configuration Manager

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

- To incorporate the AV2 or PRO2 into the system, drag the AV2 or PRO2 from the Control Systems folder of the *Device Library* and drop it in the *System Views*.

Locating the AV2 & PRO2 in the Device Library



Programming Manager

Programming Manager is the view where programmers “program” a Crestron control system by assigning signals to symbols. The symbol can be viewed by double clicking on the icon or dragging it into *Detail View*. A description for each signal in the symbol is described in the SIMPL Windows help file (F1).

Example Program

An example program for the AV2 & PRO2 is available from the Crestron website (<http://www.crestron.com/exampleprograms>).

Uploading and Upgrading

Crestron recommends using the latest programming software and that each device contains the latest firmware to take advantage of the most recently released features. However, before attempting to upload or upgrade, it is necessary to establish communication.

While the next section provides an overview for communication, refer to “Establishing Communications with the Control System” in the Crestron 2-Series Control System Reference Guide (Doc. 6256) for serial and TCP/IP connection details. If communications cannot be established, refer to “Troubleshooting Communications” in the same guide.

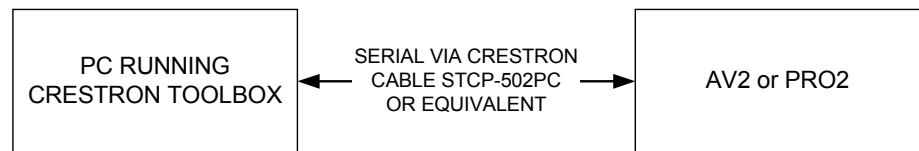
Establishing Communication


Use Crestron Toolbox for communicating with the AV2 & PRO2; refer to the Crestron Toolbox help file for details. There are two methods of communication.

Direct Serial Communication

NOTE: Required for initial setup of Ethernet parameters.

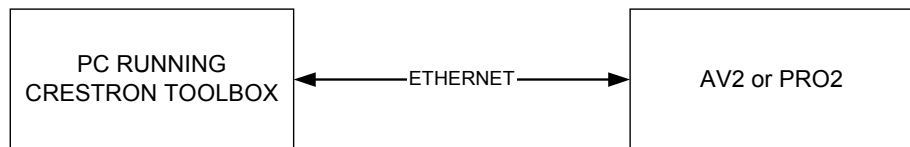
Direct Serial Communication




- The **COMPUTER** port on the AV2 & PRO2 connects to the serial port on the PC via a serial cable (Crestron STCP-502PC or equivalent).
- Use the Address Book in Crestron Toolbox to create an entry using the expected serial communication protocol (RS232, auto-detect baud rate, no parity, 8 data bits, 1 stop bit, XON/XOFF disabled, RTS/CTS enabled).
- Display the AV2's or PRO2's "System Info" window (click the  icon); communications are confirmed when the device information is displayed.

TCP/IP Communication

Ethernet Communication



- Establish direct serial communication between AV2 or PRO2 and PC.
- Enter the IP address, IP mask, and default router of the AV2 or PRO2 via the Crestron Toolbox (**Functions | Ethernet Addressing**); otherwise enable DHCP.
- Confirm Ethernet connections between AV2 or PRO2 and PC. If connecting through a hub or router, use CAT5 straight through cables with 8-pin RJ-45 connectors. Alternatively, use a CAT5 crossover cable to connect the two LAN ports directly, without using a hub or router.

- Use the Address Book in the Crestron Toolbox to create an entry for the AV2 or PRO2 with the AV2's or PRO2's TCP/IP communication parameters.
- Display the “System Info” window (click the  icon) and select the AV2 or PRO2 entry.
- Use the Crestron Toolbox to create the AV2 or PRO2 IP table.
 - ⇒ Select **Functions | IP Table Setup**.
 - ⇒ Either add, modify, or delete entries in the IP table. The AV2 or PRO2 can have only one IP table entry.
 - ⇒ A defined IP table can be saved to a file or sent to the device.
- When using the AV2 or PRO2 as a “slave”, edit the “master” control system's IP table to include an entry for the slave AV2 or PRO2. The entry should list the AV2 or PRO2's IP ID (specified on the AV2's or PRO2's IP table) and the internal gateway IP address 127.0.0.1.

Programs and Firmware

- Display the network device tree (**Tools | Network Device Tree**) to show all network devices connected to the control system. Right-click on the AV2 or PRO2 to display actions that can be performed on the AV2 or PRO2:
 - ⇒ Upgrade firmware
 - ⇒ Change Net ID
- Upload the SIMPL Windows file to the control system using SIMPL Windows or Crestron Toolbox.
- Upgrade AV2 & PRO2 firmware via Crestron Toolbox.
 - ⇒ Establish serial or TCP/IP communications with the AV2 or PRO2 and display the “System Info” window.
 - ⇒ Select **Functions | Firmware...** to upgrade the AV2 or PRO2 firmware.

For details on uploading and upgrading, refer to the SIMPL Windows help file or the Crestron Toolbox help file.

Operation

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

The AV2 is an economical version of the PRO2, providing all the features and performance of the PRO2 without the front panel LCD display and pushbuttons. The AV2 is perfect for medium to large-scale commercial and residential control applications.

The flagship PRO2 is designed for demanding medium to large-scale commercial and residential control applications. The PRO2 includes a programmable front panel with LCD display, four menu selection buttons, six user buttons and port status LEDs. The PRO2's front panel serves as a ready user interface for system configuration and diagnostics and can also be custom programmed to enable menu-driven end-user control capability. The front panel may be password-protected.

The front panel of the PRO2 incorporates a reverse mode (yellow on black) LCD screen shown below. The screen contains two lines with up to 40 characters per line; it is used to extend features and gain access to the system including the SIMPL program. To the right of the display are four menu selection buttons. These buttons permit the user to navigate through the menus and also to control the brightness of the display backlight. Below the display are six menu function buttons. These buttons offer extended features of the PRO2. For details, refer to the help file in the "Front Panel Editor" utility of SIMPL Windows.

*Main Menu
(Default LCD Display)*

LCD Screen with Menu Selection and Menu Function Buttons



Menu Selection Buttons

MENU

This menu selection button functions as a return and will eventually bring the screen display to the menu default state (Main Menu).



These buttons scroll the listed information UP and DOWN.

BKLT

This button adjusts the brightness of the LCD backlight and the front panel LEDs.

Menu Function Buttons

PANEL

NOTE: If the unit does not have a loaded program with front panel screens defined, the PANEL menu function does not appear on the Main Menu.

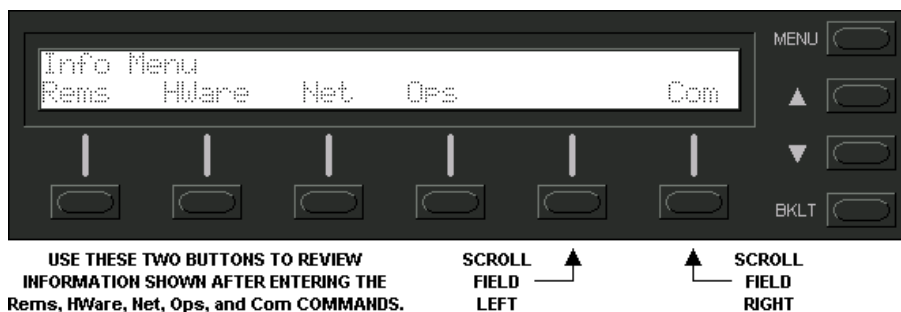
This menu function button displays a programmable interface offering command text, indirect text and hierarchical screen structure. For details, refer to the help file in the “Front Panel Editor” utility of SIMPL Windows.

INFO

This button displays the default Info Menu, shown after this paragraph. System information including the loaded SIMPL program version (Rems), hardware specs such as types of expansion cards installed in the card slots (HWare), the Cresnet devices detected (Net), the Ops version (Ops) and the communication settings (Com) is displayed.

NOTE: The information within each of the commands displayed in the Info Menu may exceed the 40 characters permitted per line. If this occurs, use the two right-most menu function buttons to scroll left and right. Refer to the two arrows shown beneath the Info Menu illustrated after this note for location and identification.

Default Info Menu



MSG

This button displays a list (error log) of the most recent errors. Error messages may be the result of hardware or software failure, hardware incompatibility with software definitions or a programming error. The following table lists and defines the four types of error messages that may appear:

Error Message Types

TYPE	DEFINITION
Notice	An event has occurred that is noteworthy, but will not affect program operation.
Warning	An event has occurred that could affect program operation but the program can still run normally.
Error	An event has occurred that indicates that the program is not operating as expected.
Fatal	An event has occurred that will prevent the program from running.

The top line of the LCD screen provides a single error message from the error log. In the sample shown below, the message indicates that the system expects a card to be inserted into slot 1. The bottom line of the LCD screen provides commands. The user can use **NEXT** or **PREV** to scroll through the entire error log. Some messages may

be too long to be displayed across the top line of the LCD screen; use << and >> to scroll left and right respectively or examine them through Crestron Toolbox. Users may wish to periodically save the error log to a file. This can be an invaluable aid in troubleshooting problems with the control system. Refer to the Crestron Toolbox help file for details.

The **CLEAR** button can be used to empty the error log and extinguish the **MSG** front panel LED. A security message prompts the user to confirm the command.


NOTE: The up and down menu selection buttons to the right of the LCD screen may be used in lieu of the **NEXT** and **PREV** menu function buttons.

MSG Submenu with Sample Message

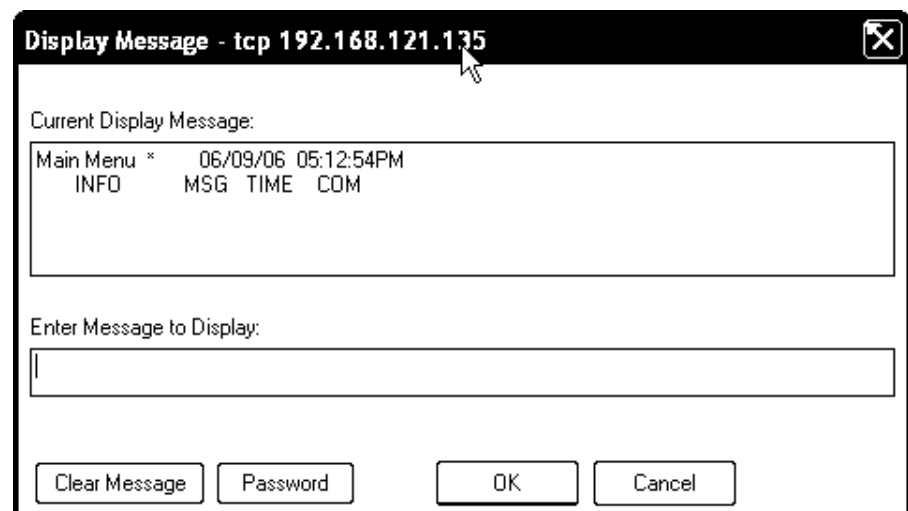


TIME

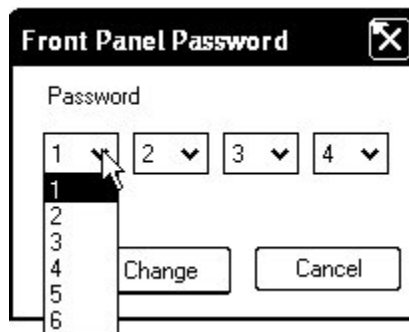
This menu can only be obtained by entering the correct access code. The default access code is 1234. To assign a unique access code, use the following procedures:

1. Establish communication with the control system (refer to “Establishing Communication” on page 16).
2. Launch the Crestron Toolbox and display the “System Info” window by selecting **Tools | System Info** (or by clicking the  icon).
3. Select **Functions | Display Message** to bring up the “Display Message” window.

“Display Message” Window



4. Click the “Password” button to open the “Front Panel Password” window.

“Front Panel Password” Window

NOTE: “Front Panel Password” window from Crestron Toolbox version 1.02.29 or later.

- To change the current password, use the drop down lists to select the four numbers for the new password, then click the **Change** button.

NOTE: New password must be four numbers (each in the range of 1-6).

The default Date/Time Menu, shown after this paragraph, permits alterations to the current system date and time shown on the top line. Select either Date or Time to open the respective submenu.

Default Date/Time Menu

The Date Set submenu, shown after this paragraph, permits alterations to the current system date shown on the top line. Use the Dn (down) and Up selection buttons for month, day and year decremental or incremental changes, respectively.

Date Set Submenu

The Time Set submenu, shown after this paragraph, permits alterations to the current system time, shown on the top line. Use the Dn (down) and Up selection buttons for hour and minute (Min) decremental or incremental changes, respectively. The AM/PM selection button toggles between AM and PM.

Time Set Submenu**COM**

This button allows the user to monitor the transmission and reception traffic on every COM-type device and card that is active in the SIMPL Windows program that is loaded into the 2-Series control system. This includes all devices connected via Cresnet (e.g. ST-COM) and Ethernet (e.g. MC2E or QM-RMC) as well as the built-in card (slot 4) and cards inserted into the expansion slots (e.g. C2COM-2 or C2COM-3). Serial transmission to IR ports can also be monitored. Refer to “Serial Communication Difficulties with Other Devices Connected to the Control System” on page 24 for details.

NOTE: Only COM-type devices and cards in the SIMPL Windows program that are active (not commented out) are monitored.

Problem Solving

Problems may occur with the 2-Series integrated dual bus control system itself or there may be serial communication difficulties with other devices connected to the control system. The next two sections address possible problem solving tools or procedures for each.

Possible Problems with the Control System

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

AV2 & PRO2 Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Unexpected response from control system.	Network devices are not communicating with the control system.	Use Crestron Toolbox to poll the network. Verify network connection to the device.
PWR LED does not illuminate.	Control system is not receiving power.	Use the provided Crestron power source. Verify connections.
MSG LED illuminates.	Hardware or software failure, hardware incompatibility with software definitions or programming error.	Verify that hardware configuration matches software configuration (i.e. card is in proper slot as defined by program). If using PRO2, depress MSG button on front panel for specific error. Use Crestron Toolbox to display the error log. Refer to "Error Message Definitions" in the latest version of the Crestron 2-Series Control System Reference Guide (Doc. 6256) for more details.
Compilation error RLCMCVT166 & RLCMCVT177.	Poor analog versus serial signal definition in the SIMPL Windows program.	Confirm properly defined signal definition in the program.
System locks up.	Various.	Hold down SW-R button on control system front panel to bypass program and communicate directly with processor. Refer to "Troubleshooting Communications" in the Crestron 2-Series Control System Reference Guide (Doc. 6256) for more details.
Cresnet device does not respond.	Device not wired correctly.	Verify Cresnet wiring.
	Improper NET ID used.	Verify that device ID matches NET ID in the program.

(Continued on following page)

AV2 & PRO2 Troubleshooting (Continued)

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
A/V system device does not respond.	IRP2 or serial port not placed properly.	Verify placement of IRP2 (hold phosphor card under IRP2 while pressing button) and tighten serial cables.
	Used wrong IR/serial port.	Verify that proper IR or serial port is defined.
	Serial cable not wired correctly.	Verify that serial cable is wired correctly for RS-232, 422, 485.
	Device is not receiving sufficient power.	Use the Crestron Power Calculator to help calculate how much power is needed for the system.

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

Network Analyzer

To assist with troubleshooting, the unit contains Crestron’s patent-pending network analyzer to continuously monitor the integrity of the Cresnet network for wiring faults and marginal system performance or other network errors. For more information on how to use the network analyzer, refer to the Crestron Toolbox help file and use the index to search for “Network Analyzer”.

Battery Replacement

A Lithium battery is used to power the system clock within the 2-Series integrated dual bus control system. Under normal conditions, it will last for approximately 10 years. In the event that the clock fails, only an authorized technician should replace it. Refer to caution statement below.

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

Serial Communication Difficulties with Other Devices Connected to the Control System

NOTE: The information below pertains to the COM Analyzer. The methods described apply to the PRO2 only. For the AV2, use Passthrough Mode. For information pertaining to Passthrough Mode, refer to “Passthrough Mode” in the Crestron 2-Series Control System Reference Guide (Doc. 6256)

NOTE: Only COM-type devices and cards in the SIMPL Windows program that are active (not commented out) are monitored.

Depressing the COM menu function button from the front panel Main Menu (default front panel page) displays a listing of all devices and cards that can be monitored. The listing follows the same order as the system tree in *Configuration Manager*. The

top line of the LCD screen provides the COM-type device or card and its port. In the sample shown below, the first active port in the system is the built-in card, port A. The bottom line of the LCD screen provides commands. The user can **SELECT** the COM port shown on the top line or use **NEXT** or **PREV** (appears after scrolling down from the top of the list) to scroll through the entire list of all devices and cards that can be monitored.

Sample of COM-Type Device or Card Listing



NOTE: The **PREV** command only appears after advancing past the first COM-type device or card in the list.

NOTE: The up and down menu selection buttons to the right of the LCD screen may be used in lieu of the **NEXT** and **PREV** menu function buttons.

The data transmitted and received when communicating with another device can be monitored in three formats. Depressing the **SELECT** menu function button displays the Format Type screen, shown after this paragraph. Select the **BIN**, **ASCII** or **HEX** menu function button to determine the appropriate format.

Select Format Type Screen



Once the **BIN**, **ASCII** or **HEX** menu function button is selected, the display provides the T/R Screen. The Data Menu in the CNX Series control system contained a **RESET** and **REFRESH** menu function button. These buttons are not necessary for the PRO2 because the data is always “live”. A buffer constantly records and recycles the data. The buffer is empty when the COM port is first selected and remains empty until data is transmitted or received.

When the port is active, data information races across the T/R Screen; a sample is shown after this paragraph. The transmission and reception traffic is displayed in alternating sequence to facilitate diagnostics. Depressing any of the six-menu function buttons “freezes” the data information. The up and down menu selection buttons to the right of the LCD screen may be used to advance or reverse the frozen data. Compare the data to expected manufacturer’s protocol for the communicating device.

NOTE: Data in the “freeze” state is denoted by a lower case letter (f) after the T and R in the T/R Screen.

NOTE: Any of the six-menu function buttons toggles the “freeze” state.

NOTE: The buffer recycles data even when in the “freeze” state. When the screen is unfrozen, the display jumps to the end of the buffer.

T/R Screen with Frozen Sample



Check Network Wiring

Use the Right Wire

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

Calculate Power

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

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

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

Cable Length Equation

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

Where: L = Length of run (or chain) in feet
 R = 6 Ohms (Crestron Certified Wire: 18 AWG (0.75 MM²))
 or 1.6 Ohms (Cresnet HP: 12 AWG (4 MM²))
 P = Cresnet power usage of entire run (or chain)

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

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

Strip and Tin Wire

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

Add Hubs

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

Reference Documents

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

List of Related Reference Documents

DOCUMENT TITLE
2-Series Control Systems Reference Guide

Further Inquiries

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

You can also log onto the online help section of the Crestron website to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

Future Updates

As Crestron improves functions, adds new features and extends the capabilities of the AV2 & PRO2, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

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

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Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange, or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact an authorized CRESTRON dealer. Only authorized CRESTRON dealers may 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, 6 Volvo Drive, Rockleigh, N.J. or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.
3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

CRESTRON Limited Warranty

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

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

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.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall CRESTRON be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. CRESTRON is not liable for any claim made by a third party or made by the purchaser for a third party.

CRESTRON shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

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