

Crestron **AV2 & PRO2**
2-Series Integrated Dual Bus Control System
Operations Guide



CRESTRON

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



Crestron Electronics, Inc.
15 Volvo Drive
Rockleigh, NJ 07647
1-888-CRESTRON

Contents

| | |
|--|----------|
| Integrated Dual Bus Control System: PRO2 & AV2 | 1 |
| Description..... | 1 |
| Functional Description | 1 |
| Configuration Differences | 2 |
| Physical Description..... | 3 |
| 2 Series Ports..... | 4 |
| 2 Series Indicators | 6 |
| 2 Series Buttons..... | 7 |
| PRO2 LCD Display..... | 8 |
| Leading Specifications..... | 10 |
| Setup..... | 12 |
| Rack Mounting..... | 12 |
| Expandable Memory | 13 |
| Memory Card Installation | 13 |
| Memory Card Removal..... | 14 |
| Bussing Strip Installation | 14 |
| Network Wiring..... | 14 |
| Hardware Hookup | 16 |
| Programming the LCD Display (available on PRO2 only) | 17 |
| Front Panel Editor | 17 |
| Creating a Page with Front Panel Editor | 18 |
| Adding Top-Level Pages and Objects..... | 18 |
| Adding Lower-Level Pages and Objects..... | 18 |
| Front Panel Symbol..... | 20 |
| Object Types..... | 21 |
| Loading Crestron Control Software..... | 21 |
| Installing Crestron Development Tools..... | 21 |
| Memory..... | 22 |
| Non-volatile | 22 |
| Volatile..... | 23 |
| Initial Setup | 23 |
| Obtaining Communications..... | 25 |
| Troubleshooting Communications | 27 |
| Creating the System Program | 30 |
| Converting an Existing System Program..... | 33 |
| Loading the System Program | 34 |
| Testing the Program after Transfer..... | 35 |
| Loading Touchpanels | 36 |
| Updating the Control System | 36 |
| Acceptable Commands | 38 |
| Problem Solving | 40 |
| Possible Problems with the Control System..... | 40 |
| Troubleshooting the Control System..... | 40 |
| Network Analyzer | 40 |
| Battery Replacement | 40 |

Serial Communication Difficulties with Other Devices Connected to the Control System 41

- Passthrough Mode 41
- COM Analyzer 41

Further Inquiries 43

Future Updates 43

Software License Agreement 44

Return and Warranty Policies 46

- Merchandise Returns / Repair Service 46
- CRESTRON Limited Warranty 46

Appendix A: Command Details 47

Appendix B: File System 57

Integrated Dual Bus Control System: PRO2 & AV2

Description

NOTE: A summary of differences between the 2-Series and CNX generation control systems is provided in the SIMPL™ Windows® help file. Search for "What's new in the 2-Series".

Functional Description

The 2-Series Control Engine is a completely new solutions-driven control technology that is at the very heart of the new PRO2 and AV2 Integrated Control Systems. With speed, power, and massive memory, the 2-Series control systems are ideal for enhanced applications like media help desks, videoconferencing, distance learning, and entertainment facilities.

The breakthrough 2-Series control engine is based on the new 257 MIPS, 32-bit Motorola ColdFire® processor. Onboard 36MB memory is enhanced with a 4GB expansion slot that supports off-the-shelf Type II compact flash memory and the IBM Microdrive® hard disk drive, allowing on-board storage of program and touchpanel files, room and equipment profiles, upgrades, databases, and schedules.

Crestron's unique dual bus system, with its high-speed I/O bus architecture, provides blazing fast throughput, system wide. This dual bus architecture also permits upgrade to new, second generation, higher performance expansion cards, while still using existing cards and software programs. The 40Mb/s Y-BUS supports existing CNX control cards and serves as the pipeline for IR, serial communications, and relays. The 300Mb/s Z-BUS is designed for super high-speed control card applications such as 10/100 Ethernet, USB, USBII, FireWire, disk drive arrays and more.

The 2-Series also provides true secure network communications, which is required for today's corporate networks and the Internet. A Built-in Firewall delivers the ultimate in security, with Network Address Translator (NAT) and Router functions. The Dual Port 10/100 BaseT Ethernet card supports dynamic and static IP addressing and full duplex TCP/IP and UDP/IP. It offers a WAN port for Internet and corporate-wide communications and a LAN port for room use. The built-in Web Server uses memory storage on a compact flash card for remote access and control.

The 2-Series operating system is vastly upgraded, 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 FAT32 file system with long file names. The enhanced SIMPL+™ instruction set is also fully compatible with existing Crestron SIMPL Windows and SIMPL+ programs.

Configuration Differences

The PRO2 delivers speed, power, and massive memory. Expansion capabilities include one Z-BUS and three Y-BUS slots. High performance front panel diagnostics and monitoring make the PRO2 ideal for sophisticated control of even the most complex audio, video, lighting, security, and HVAC systems. The AV2 is the cost-competitive option in Crestron's 2-Series line of integrated dual bus control systems. Fully expandable with one Z-BUS and optional three Y-BUS slots, it is the budget-conscious choice for control. Refer to the table below for a concise list of configuration features.

2-Series Integrated Dual Bus Control System Configuration Differences

| FEATURES | | PRO2 | AV2 |
|--|-------|---|---|
| CPU | | 32-Bit Motorola ColdFire® Processor | |
| Processing Speed | | 257 MIPS (Dhrystone 2.1 Benchmark) | |
| Onboard Memory | | 36MB* | |
| Expandable Memory | | Compact Flash Slot (up to 4GB) accepts standard Type II Compact Flash or IBM Microdrive® | |
| High-Speed Dual Bus Architecture | Y-BUS | 3 Expansion Card Slots** | Optional 3 Expansion Card Slots** |
| | Z-BUS | 1 Expansion Card Slot*** 300 Mb/s Parallel Communications | |
| Ethernet (Optional Z-BUS cards) | | Dynamic/Static IP Addressing Full Duplex TCP/IP and UDP/IP Built-in Firewall for Ultimate Security (Dual Port only) Built-in Network Address Translator (Dual Port only) Built-in Router - Built-in Web Server (Dual Port only) | |
| IR/Serial Ports | | 8 Simultaneous Outputs | |
| I/O Versiports | | 8 | |
| Communication Ports | | 6 Bidirectional RS-232/422/485 Ports C-F Cresnet Accelerator Ready**** | |
| Computer Console | | 1 RS-232 (Front & Back Access) | |
| Cresnet Port | | 1 (Expandable via Cresnet Accelerator) | |
| Relays | | 8 Isolated with MOV Suppression | |
| Cresnet Expander Hub | | External Option | |
| LCD Display Screen | | Yes | No |
| Runs existing SIMPL and SIMPL+ programs | | Yes | |

* A total of 36MB is broken down as follows: 4MB flash, 32MB DRAM, and 256KB NVRAM.

** 40 Mb/s parallel communications and supports current and enhanced Crestron control cards.

*** Optional Z-BUS Cards: Single port 10/100 Ethernet, Dual Port WAN-LAN-10/100 Ethernet, or Dual Port WAN-LAN-10/100 Ethernet-USB

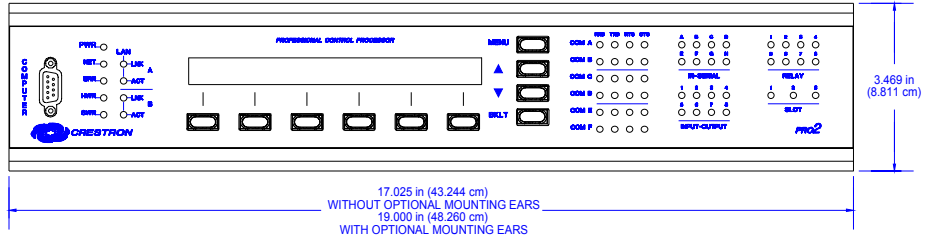
**** Cresnet Accelerator increases effective network speed, fan-out, and device addresses by a factor of 8 for each Poll Accelerator added to the system.

Physical Description

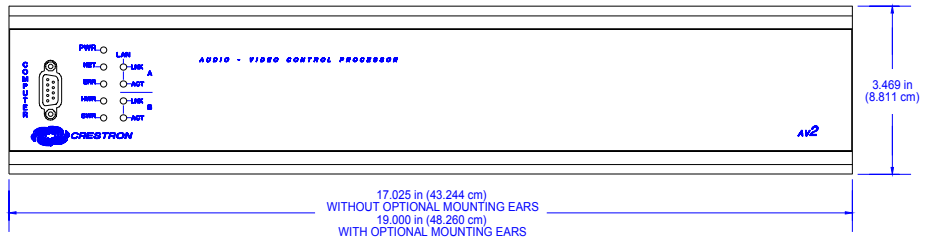
An asterisk (*) indicates that the feature is not standard on the AV2 configuration.

The 2-Series integrated control system is housed in a black enclosure with silk-screened labels on the front and rear panels. On the front panel there is a single RS-232 computer port, standard LEDs, two reset buttons, a reverse LCD display* with menu function and selection buttons, and an extended bank of LED indicators*. The front panel of the PRO2 and AV2 are shown below.

PRO2 Front Panel



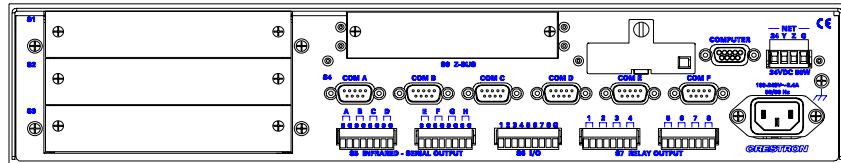
AV2 Front Panel



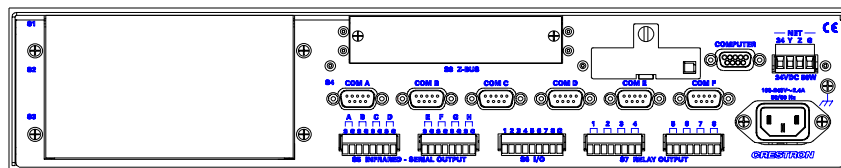
An asterisk (*) indicates that the feature is not standard (though may be optional) on the AV2 configuration.

A number of slots reside on the rear panel of the 2-Series: three open Y-BUS slots*, a Z-BUS slot, and a compact flash slot. Furthermore, as shown after this paragraph, there is a single RS-232 computer port, network connector, six COM ports, eight IR/serial ports, eight I/O ports, eight relay ports, and a 110-230 VAC male connector for power located on the rear panel.

PRO2 Rear Panel



AV2 Rear Panel



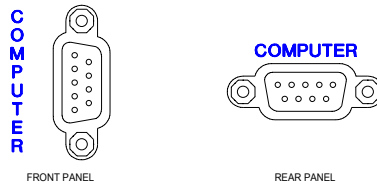
Rubber feet are supplied and can be attached to the base of the unit for stability and to prevent slippage when resting on a flat surface. The unit may also be rack mounted by attaching metal flanges, also known as ears (supplied), to each end.

2 Series Ports

A number of ports are provided on the front and rear panels of the 2 Series integrated control systems. Refer to the description of each below.

COMPUTER

Computer Connectors



These DB9F connectors (one on front panel and one on rear) are used when programming with a PC. Each port is modem compatible. The modem and/or PC program cable are not included.

NET

Cresnet 4-Wire Connector



A 4-wire network connector resides on the rear panel. This connector (typical Crestron network port labeled 24 Y Z G) is used for expansion to Cresnet and SmarTouch peripherals. Depending on the expansion slot load, there is a 50 W maximum load rating. Refer to "Network Wiring" on page 14 for details.

COM (A – F)

COM (A – F) Connectors



On the rear panel there are six software programmable bidirectional serial ports for RS-232, RS-422, or RS-485 communication with hardware and software handshaking. Speeds are rated up to 115,200 bps. Ports C, D, E, and F are Cresnet Accelerator ready. The Cresnet Accelerator effectively increases the network speed, fan-out, and device addresses by a factor of 8 for each Poll Accelerator added to the system.

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.

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 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) |

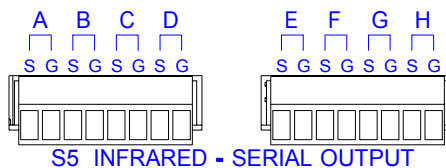
Where: *= RS-422 transmit and receive are balanced signals requiring two lines plus a ground in each direction. RXD+ and TXD+ should idle high (going low at start of data transmission). RXD- and TXD- should idle low (going high at start of data transmission). If necessary, RXD+/RXD- and TXD+/TXD- may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

COM Pinout to RS-485 Bus

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

INFRARED – SERIAL OUTPUT

Infrared – Serial Output Connectors

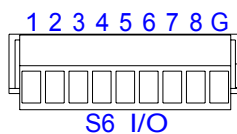


On the rear panel there are eight serial outputs for IR or serial interface. Each output is labeled S (signal) and G (ground). Infrared output is rated up to 1.2 MHz. Serial protocols include one-way RS-232.

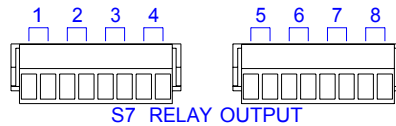
NOTE: RS-232 levels on the infrared – serial output connectors provide a 0 – 5V range, which may not be compatible with all devices.

I/O

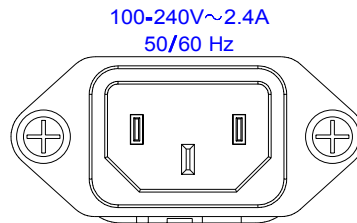
I/O Connector



On the rear panel there are eight 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.

RELAY OUTPUT*Relay Output Connectors*

On the rear panel there are eight normally open, isolated relays. Each relay is rated 1A, 30 VAC/DC; MOV arc suppression is provided across contacts for use with "real world" loads.

100 – 240V ~ 2.4A 50/60 Hz (Power Supply)*Universal Power Supply Connector*

On the rear panel there is an internal universal power supply connector. Use the supplied power cord to connect to an AC outlet.

2 Series Indicators

A number of indicators are provided on the front panel of the 2 Series integrated control systems. Refer to the description of each below.

PWR (Power)

This LED illuminates when the unit is connected to and receives power from an AC outlet.

NET

This 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).

ERR

This LED illuminates when an error condition is detected. This may be the result of hardware or software failure, missing/wrong card placed in a slot, or a programming error. To decipher content, examine the message available from the menu function buttons.

NOTE: The LAN LEDs are active only if a single port or dual port Ethernet card (which is field installed) occupies the Z-BUS slot.

LNK A, LNK B (LAN)

These LEDs illuminate when there are attachments to the respective port on the Ethernet card.

ACT A, ACT B (LAN)

These LEDs illuminate when there is communication (activity) at the respective port on the Ethernet card.

NOTE: The remaining LEDs mentioned after this note are available on the PRO2 configuration, but not available on the AV2 configuration.

RXD (COM A - F)

These LEDs illuminate during reception of data from serial devices attached to the respective COM ports.

TXD (COM A - F)

These LEDs illuminate during transmission of data to serial devices attached to the respective COM ports.

RTS (COM A - F)

These LEDs illuminate to reflect the state of the RTS pin on the respective COM port. An illuminated LED means that the RTS line is high. If no handshaking is specified, the RTS line will be high and therefore, 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.

CTS (COM A - F)

These LEDs illuminate to reflect the state of the CTS pin on the respective COM port. An illuminated LED means that 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 from the unit.

IR – SERIAL (A - H)

These LEDs illuminate during activity on the respective IR/SERIAL lines.

INPUT – OUTPUT (1 - 8)

These LEDs illuminate when the input voltage thresholds for the respective I/O ports are exceeded or when the output is active.

RELAY (1 - 8)

These LEDs illuminate when the respective relay is closed.

SLOT (1 - 3)

These LEDs illuminate when an expansion card is inserted into the respective slots. These LEDs extinguish momentarily when data is sent to the card or received from the card.

2 Series Buttons

Two buttons are provided on the front panel of the 2 Series integrated control systems. Refer to the description of each below.

HW-R

Depression of this button initiates physical reset of the system.

SW-R

Depression of this button in combination with the **HW-R** button performs a system restart without loading the program. Depressing it for approximately five seconds while the system is running restarts the program.

PRO2 LCD Display

The front panel of the PRO2 incorporates a reverse mode (yellow on black) LCD display, shown below. The screen contains two lines with 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 "Programming the LCD Display (available on PRO2 only)" on page 17.

*Main Menu
(Default LCD Display)*

LCD Display 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).



This button scrolls the listed information UP.



This button scrolls the listed information DOWN.

BKLT

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

Menu Function Buttons

PANEL

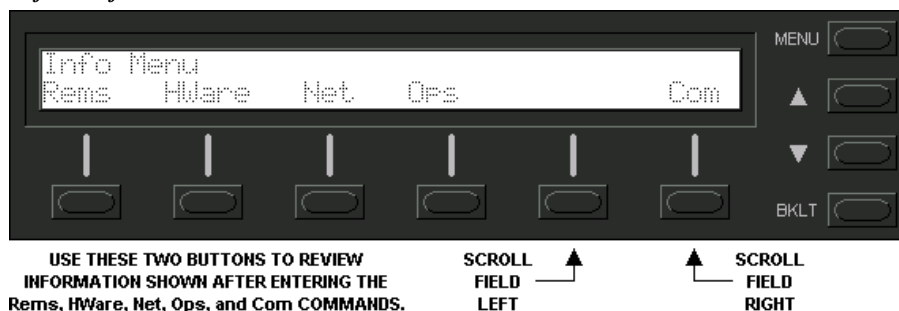
NOTE: If the unit does not have a loaded program with front panel screens defined, the PANEL menu function does not appear on the Main Menu.

This menu function button displays a programmable interface offering command text, indirect text, and hierarchical screen structure. The menu contents are subject to programming and an example of this display is provided in "Programming the LCD Display (available on PRO2 only)" on page 17.

INFO

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

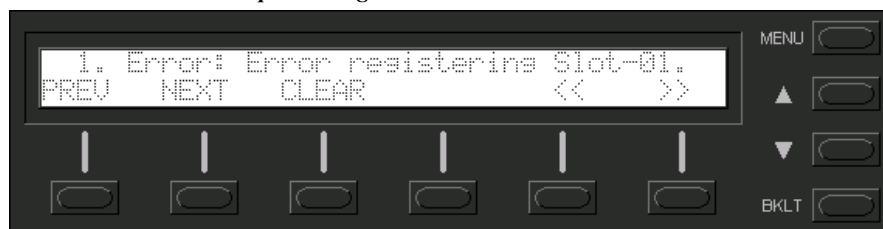
NOTE: The information within each of the commands displayed in the Info Menu may exceed the 40 characters permitted per line. If this occurs, use the two right-most menu function buttons to scroll left and right. Refer to the two arrows shown beneath the Info Menu illustrated after this note for location 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 top line of the LCD display 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 display 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 display. Use << and >> to scroll left and right, respectively. The **CLEAR** button can be used to empty the error log and extinguish the ERR 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 display 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. Use the Viewport (**Functions | Set Front Panel Password (CNX / 2-Series only)**) to assign a unique access code.

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 which is loaded into the 2-Series control system. This includes all devices connected via Cresnet (eg. ST-COM) and Ethernet (eg. CEN-COM) as well as the built-in card (slot 4) and cards inserted into the expansion slots (eg. CNXCOM-2 and C2COM-3). Serial transmission to IR ports can also be monitored. Refer to "COM Analyzer" on page 41 for details.

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

Leading Specifications

The tables after this paragraph provide a summary of leading specifications for the 2-Series integrated control systems.

Leading Specifications of the 2-Series Integrated Control System

| SPECIFICATION | DETAILS |
|--|---|
| Power Requirements | 100-240 VAC, 2.4 A, 50/60 Hz Internal Universal Power Supply |
| SIMPL™ Windows® | Version 2.00 or later ¹ |
| Crestron Database | Version 15.6.2 or later ¹ |
| 2-Series Control System Update File ² | Version 1.000.CUZ or later ³ |
| Reset Buttons | HWR (permits physical reset of system) & SWR (system restart with or without program) |
| LCD Display | (1) reverse mode (yellow on black) LCD back light; (2) lines, (40) characters per line. ⁴ |
| Network Power Fuse Rating | 4A, 250V (1 1/4" x 1/4" Slow Blow Fuse Series) |
| Environmental Temperature Range | 41° to 113°F (5° to 45°C) |
| Environmental Humidity | 10% to 90% RH (non-condensing) |
| Dimensions & Weight | Height: 3.47 in (8.81 cm) Width: 19.00 in (48.26 cm) - with ears 17.03 in (43.24 cm) - without ears Depth: 9.69 in (24.61 cm) Weight: 7.10 lb (3.22 kg) for AV2 with line cord 8.00 lb (3.62 kg) for PRO2 with line cord |

- 1 The latest software versions can be obtained from the What's New page (SIMPL Windows and Crestron Database sections) or Downloads page (SIMPLWIN and CRESDB Libraries) of the Crestron website (www.crestron.com). New users are required to register in order to obtain access to the FTP site.
- 2 Crestron 2-Series control systems include the AV2, AV2 with Card Cage, CP2, CP2E, PAC2, PAC2M, PRO2, and RACK2.
- 3 Filenames for 2-Series control system update files have a CUZ extension and can be obtained from the What's New page (Control Systems Update Files section) or Downloads page (OPSYS Library) of the Crestron website.
- 4 The LCD display is not available on the AV2.

Leading Specifications of the 2-Series Connectors

| CONNECTOR | DETAILS |
|--------------|---|
| NET | (1) 4-pin male connector for expansion to Cresnet or SmarTouch peripherals. 50 Watt maximum load depending on expansion slot load |
| RELAYS | (8) normally open, isolated relays; each relay is rated 1 A, 30 VAC/DC MOV arc suppression devices across contacts for use with "real world" loads |
| INPUT/OUTPUT | (8) programmable digital/analog inputs & digital outputs; digital outputs offer 250 mA sync from maximum 24 VDC; catch diodes for use with "real world" loads; digital inputs rated for 0-24 VDC, 20 K ohms input impedance, logic threshold 1.25 VDC; analog inputs rated 1-10 VDC, protected to 24 VDC maximum, 20 K ohms input impedance; programmable 2 K ohms pullup resistor (per pin, software reference to GND or closure to GND) |
| IR/SERIAL | (8) serial outputs or IR, RS-232, or serial interface; signal (S) and ground (G) pins, infrared output up to 1.2 MHz, serial protocols include RS-232 |
| COM | (6) bidirectional serial ports for RS-232, RS-422, or RS-485 communication with hardware and software handshaking; speeds up to 115,000 baud |
| COMPUTER | (2) 9-pin DB9 female connector for programming with a PC; modem compatible, null modem cable; not included |

Leading Specifications of the 2-Series Slots

| SLOT | DETAILS |
|--------|--|
| Memory | Compact flash slot (up to 4GB) accepts standard Type II Compact Flash or IBM Microdrive® |
| Y-BUS | (3) open "card cage" slots provides 40 Mb/s parallel communications and supports current and enhanced Crestron control cards ⁵ |
| Z-BUS | Single slot provides 300 Mb/s parallel communications and supports either the single port 10/100 Ethernet, dual port WAN-LAN-10/100 Ethernet, or dual port WAN-LAN-10/100 Ethernet-USB |

⁵ CAGE2, 3-card cage, installation required for AV2.

As of the date of manufacture, the unit has been tested and found to comply with specifications for CE marking.



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:

- The unit should be mounted at the bottom of the rack if it is the only unit in the rack.
 - 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 table-top 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).

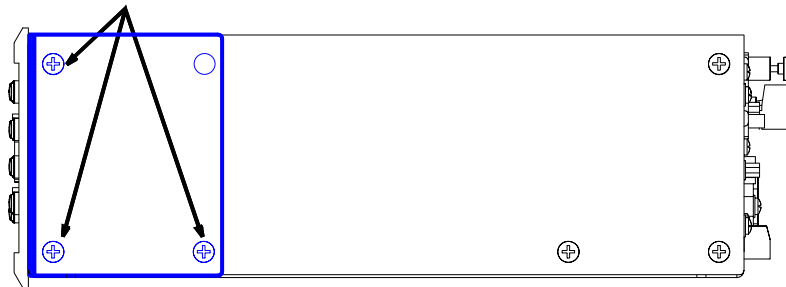
Two "ears" are provided with the 2-Series integrated dual bus control system so that the unit can be rack mounted. These ears must be installed prior to mounting.

Complete the procedure below to attach ears to the unit. The only tool required is a #2 Phillips screwdriver.

1. There are 12 screws (#6-32 x 0.375" LG) that secure the sides of the 2-Series control system top cover. Using a #2 Phillips screwdriver, remove the three screws closest to the front panel from one side of the unit.
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 illustration after this step.

Ear Attachment for Rack Mounting (PRO2 shown in illustration)

FASTEN WITH THE SAME (3) COVER SCREWS



RIGHT SIDE VIEW OF PRO2 WITH
OPTIONAL RACK MOUNTING EARS INSTALLED

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

Expandable Memory

The onboard 36MB memory of the 2-Series integrated dual bus control system is enhanced with a 4GB expansion slot that supports off-the-shelf Type II compact flash memory and the IBM Microdrive[®] hard drive. The slot is accessible on the rear panel of the unit. Complete the procedures in the following subsections to install and remove the memory cards. Power does not have to be disconnected to insert or remove memory. The memory supports FAT32 file structure.

Memory Card Installation

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 into the open slot.
4. Align and reposition cover over slot.
5. Tighten the screw.

Memory Card Removal

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.
6. Tighten the screw.

Bussing Strip Installation

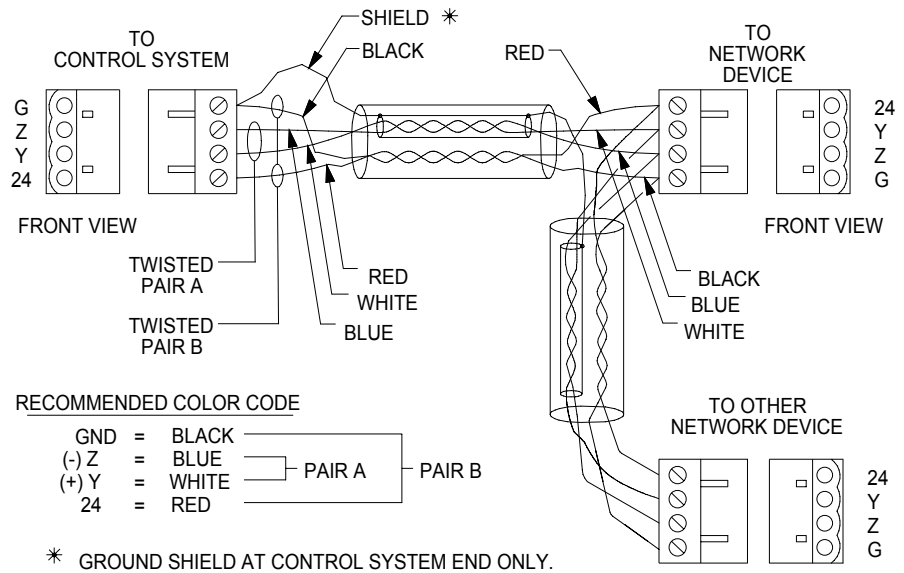
The 2-Series integrated dual bus control system is supplied with two brass bussing strips to facilitate commoning (linking) of multiple terminal block connections. The bussing strips are constructed with four terminal block position, and may be trimmed to size for various applications or different devices. 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 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. Securing a tie wrap around the bussing strip is a useful way to strain relieve the wires connected to the terminal block.

Network Wiring

The four-wire network cable is used to power Crestron devices. Before making any four-wire network connections, refer to the network interconnection after this paragraph and the cautions that follow.

Recommended Network Cable, Liberty Wire Reference: Cresnet



CAUTION: Possible equipment damage if miswired.

CAUTION: Exceeding the power output (maximum 50W) of the 2-Series integrated dual bus control system can result in system shutdown or a blown fuse.

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. Data "Y" was data "+". Data "Z" was data "-".

NOTE: The cable consists of 1-#18 AWG twisted pair, tinned copper 1-#22 AWG twisted pair with shield, tinned copper. There are six twists per foot per pair. The jacket is teal color and labeled "CRESNET" every two feet. Liberty Wire carries the cable (reference: CRESNET) and it is available in plenum or non-plenum versions.

NOTE: Each 2-Series integrated dual bus control system has one 4-pin network connector. Use the following Crestron products to interconnect to other devices within a network (some permit network testing):

- CNTBLOCK, Network Terminal Block
- CNHBLOCK, Multi-Type Network Distribution Block
- CNXHUB, Cresnet Hub/Repeater
- ST-CNB, SmarTouch/Cresnet Terminal Expander

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 table after this paragraph.

Wire Gauge Values

| RESISTANCE (R) | WIRE GAUGE |
|----------------|--------------|
| 4 | 16 |
| 6 | 18 |
| 10 | 20 |
| 15 | 22 |
| 13 | Doubled CAT5 |
| 8.7 | Tripled CAT5 |

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: When daisy chaining network units, always twist the ends of the incoming wire and outgoing wire which share a pin on the network connector. After twisting the ends, tin the twisted connection with solder. Apply solder only to the ends of the twisted wires. Avoid tinning too far up or the tinned end becomes brittle and breaks. After tinning the twisted ends, insert the tinned connection into the network connector and tighten the retaining screw. Repeat the procedure for the other three network conductors.

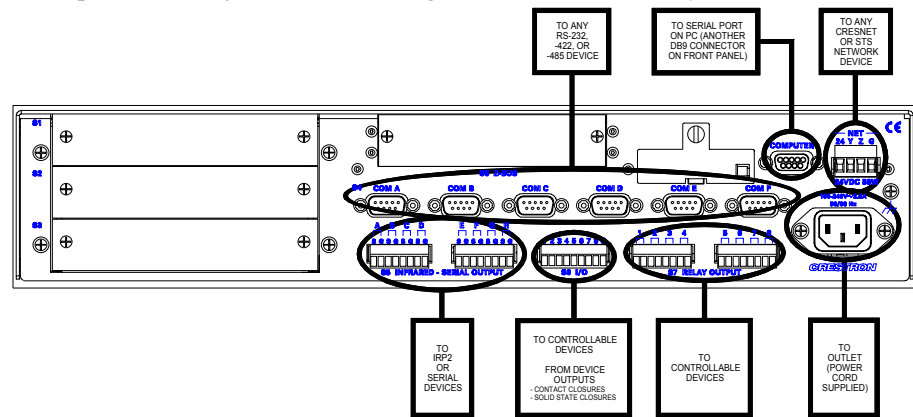
Hardware Hookup

Refer to the hookup diagram on the next page and aside from attaching power last, complete the connections in any order. Refer to "Network Wiring" on page 14 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.

NOTE: Since the plug on the power supply cord is used to disconnect power from the unit, the socket-outlet shall be installed near the equipment and shall be easily accessible.

Hookup Connections for the 2-Series Integrated Dual Bus Control System

Programming the LCD Display (available on PRO2 only)

NOTE: The following description assumes that the reader has some knowledge of SIMPL™ Windows®. If not, please refer to the extensive help information provided with the software.

SIMPL (Symbol Intensive Master Programming Language) is an easy-to-use programming language that is completely integrated and compatible with all Crestron system hardware. The objects that are used in SIMPL are called symbols. SIMPL Windows offers drag and drop functionality in a familiar Windows® environment.

SIMPL Windows is Crestron Electronics development environment for programming Crestron control systems. It provides a well-designed graphical environment with a number of workspaces (i.e., windows) in which a programmer can select, configure, program, test, and monitor a Crestron control system.

The PRO2 LCD display is preprogrammed with a certain level of diagnostic, testing, and network device information. Assuming the PRO2 is connected to a PC running SIMPL Windows, a LCD display programming utility (Front Panel Editor) can be accessed. This editor enables a programmer to program multi-level pages under the PANEL (left-most, function) button on the LCD display.

Front Panel Editor

The LCD display on a PRO2 has different pages that are defined by the programmer. Menu function buttons are assigned to different pages or objects. The LCD display has a 2x40 character display with six-programmable buttons.

In Front Panel Editor, pages are designed and added to the panel. An example of the default page is shown after this paragraph. Each front page is one display (2x40 characters) and can have as many objects as the physical size of the display allows (objects can not overlap). The top line of the panel is used for informative object displays, such as headings, indirect text, bar graphs, and time/date displays. The bottom line of the panel is for objects that are accessed by the six menu function buttons below the display. The buttons only access the page or object whose field is directly over the button. Objects added to the bottom line of the display can have page jumps or logic programming in SIMPL Windows that cause specific events to

occur. These objects are initiated by pressing the function button that is associated with it.

Default Front Panel Page



Creating a Page with Front Panel Editor

NOTE: The creation of a front panel page is discussed in this section. For more details, consult the SIMPL Windows help file. Search for Front Panel Editor.

Assume that a page, as shown after this paragraph, is required. The concept of such an application is that the user can then choose a given device and then, from a lower-level page, control one or more transport functions of the device.

Example of a Front Panel Page



Adding Top-Level Pages and Objects

Use SIMPL Windows and access the Front Panel Editor by selecting **Project | Edit Front Panel**. Click on the **Add** button and enter a new name for the new page. For this example, use “Menu1 – Choose Device” as the name.

Double click on the front panel (green display area) to open the “Edit Panel Object” window. This example requires that headings be added to the page, so choose **Text Object** from the *Object Type* area. In the *Inactive Text* field, enter “Choose device” and click **OK**. The object is displayed on the panel. Click on and drag the object to its desired location on the panel, top row.

Add additional objects (VCR, DVD, CD, Lights, and Volume) to the page by double clicking in the display area where the object is to appear. Repeat the procedure in the previous paragraph; place objects over the appropriate menu function button.

NOTE: Objects on a screen can be copied and pasted to facilitate ease of design (using SIMPL Windows v2.00 or later).

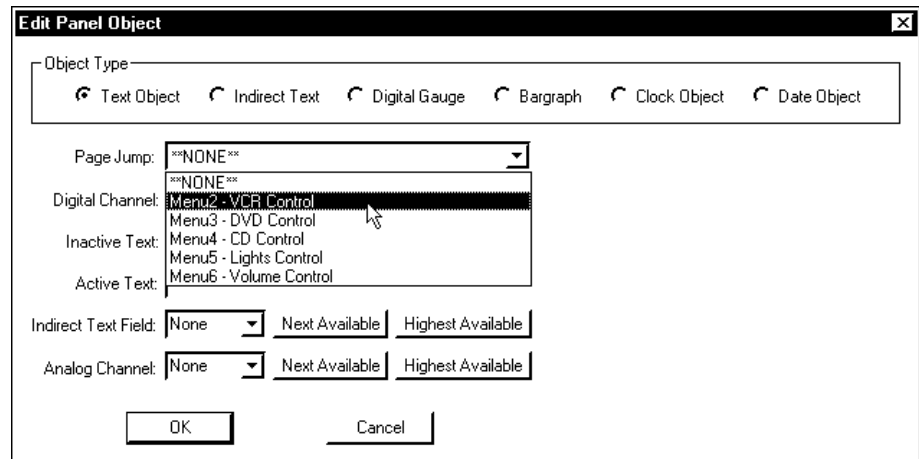
Adding Lower-Level Pages and Objects

Lower-level pages can be added for each of the objects on the bottom row of the page just created. For the purpose of this example, one lower-level page is added for

the *VCR* object. Simply click on the **Add** button and enter a new name for the new page. For this example, use “Menu2 – VCR Control” as the name.

Return to the “Menu1 – Choose Device” and double click on the *VCR* object. The “Edit Panel Object” window appears. From the *Page Jump* field, select “Menu2 – VCR Control”, as shown after this paragraph, and click **OK**. Select the *Simulate* check box to make the Front Panel Editor simulate an actual PRO2 front panel. Click on the *VCR* function button to enable the simulated page jump. The display clears, because “Menu2 – VCR Control” has been named, but no objects have been added yet.

Selecting a Page Jump from the "Edit Panel Object" Window



An example VCR Control page, as shown after this paragraph, has a text object that appears as a header on the top row of the display and objects that are control functions assigned to each function button. Objects in the bottom row are shown in the inactive state (none of the buttons are being pressed).

Example VCR Control Page



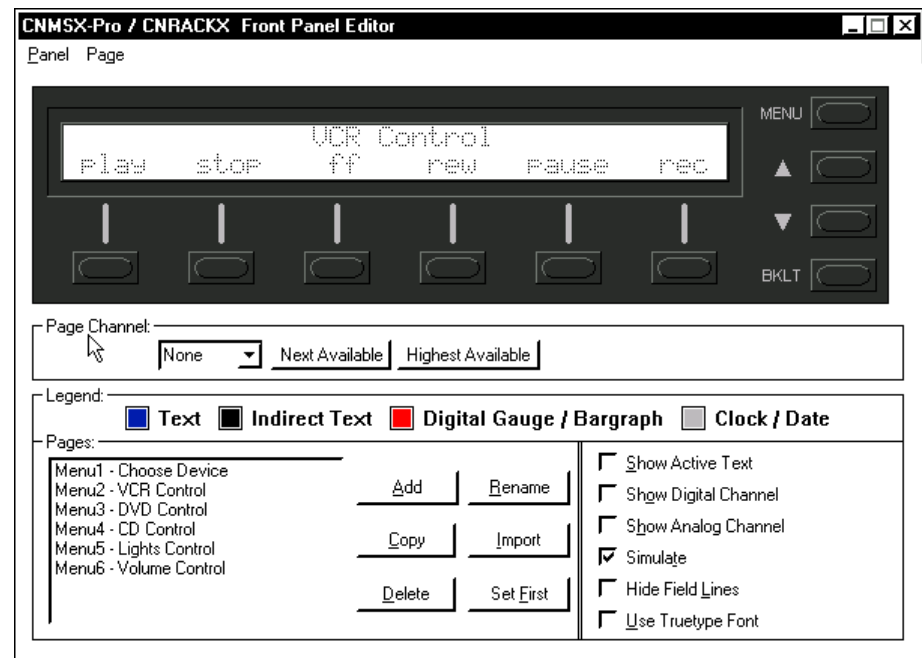
Use the “Edit Panel Object” window to add objects to this page. Double click on the first object (**play**). From the *Digital Channel* field in the “Edit Panel Object” window, scroll down to or enter “1”. In the *Active Text* field, enter “PLAY” as the button’s active text. Therefore, when the menu function button associated with digital channel 1 (the VCR button) is pressed, the active text is displayed as a visual cue that the button is pressed. Repeat the procedure for each of the other menu function buttons in the “Menu2 – VCR Control” page, except choose a unique *Digital Channel* and assign the proper control function for each button.

NOTE: Digital channels are also referred to as “join numbers”. Join numbers are numeric identifiers assigned to an object or button. It is necessary to identify objects so the input/output signals of the SIMPL program can be named and routed properly. Digital channels for an object on a page are assigned from the *Digital Channel* field on the “Edit Panel Object” window.

NOTE: Pages on the Front Panel Editor can be assigned a join number to facilitate controlled page jumps. Use the "CNMSX-Pro/CNRACKX Front Panel Editor" window, as shown after this note, to assign the join number. In the *Page Channel* area of this window, a specific number can be assigned or with the appropriate button assign the next or highest available.

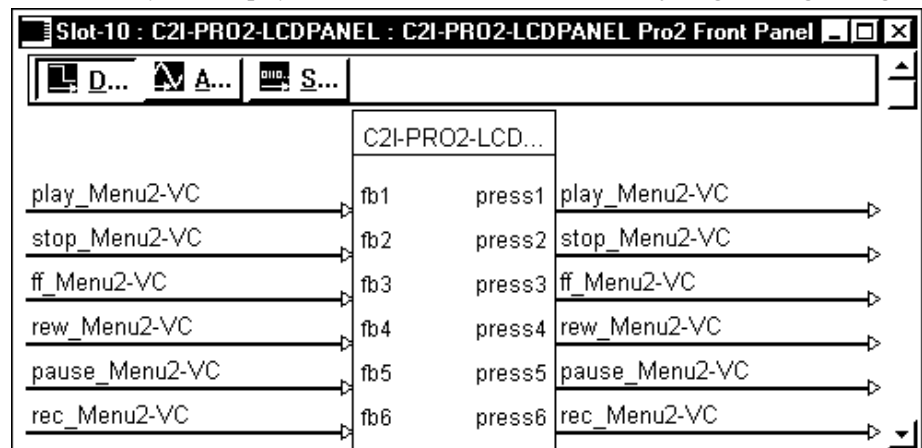
Asserting the digital signal for a particular page join number (fb*** on the SIMPL Window symbol) results in a jump to that page. When the system is on a page with a join number, the digital signal corresponding to that join number is asserted for as long as the system is on that page (press *** on the SIMPL Windows symbol). In this note, *** is used to denote a wildcard.

"CNMSX-Pro / CNRACKX Front Panel Editor" Window



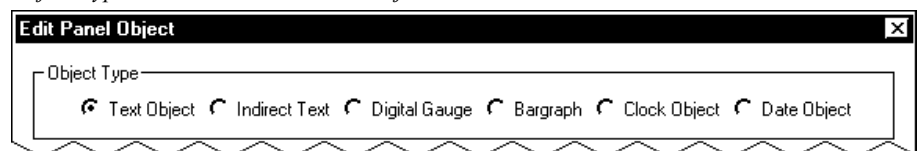
Front Panel Symbol

A powerful tool to assist programmers in naming and routing signals for the LCD display is the **Synchronize Signals** command. While the panel appears on the PC screen, select **Panel | Synchronize Signal Names** to automatically name all the input and output signals for the front panel in the SIMPL Windows program. To confirm the assignment and display the signal names, double click on *Slot-10 : C2I-PRO2-LCDPANEL Pro2 Front Panel* which is available from the Central Control Modules folder in the *Program View* of SIMPL Windows' Program Manager. The symbol appears in *Detail View*, as shown after this paragraph.

Front Panel Symbol Displayed in SIMPL Windows' Detail View of Programming Manager

Object Types

The sample discussed in the previous sections utilizes only one of the object types available from the “Edit Panel Object” dialog box, shown below. These object types are not new to Crestron programmers; the same types are available in VisionTools™ Pro-e.

Object Type Area in the “Edit Panel Object” Window

Loading Crestron Control Software

Crestron control software is available in an electronic form, via CD-ROM, email, or from the Crestron website (www.crestron.com). Regardless of how and from where the software is obtained, this section provides the necessary installation steps.

Before performing the following set of instructions, obtain a straight-through RS-232 cable that has a DB9 male connector on one end and a DB9 female connector on the other. Straight-through means that pin 1 on the male end goes to pin 1 on the female end, etc. The male end plugs into the port labeled COMPUTER on the 2-Series integrated dual bus control system. The female end plugs into a serial port on the PC. If the PC has a DB25 male connector, obtain a DB9 to DB25 adapter (the adapter has a DB9 male end and a DB25 female end).

Installing Crestron Development Tools

Crestron provides software tools for programming the 2-Series integrated dual bus control system. Even if only the control software is being loaded into the hardware and there are no plans to do any programming, some Crestron development software must be installed on the PC. Currently, Crestron programming is accomplished with the use of the following development tools listed in the table after this paragraph.

NOTE: If the intent is to load software developed by someone else, then install SIMPL Windows only. Install all three applications to program systems as well.

NOTE: The latest version of these applications is available from the Crestron website (www.crestron.com). Crestron ControlCD also carries a version (which may not be as current as the website version). To obtain a free copy of the CD-ROM, please call Crestron at 1-888-CRESTRON [1-888-273-7876]. Alternatively, complete a literature request from the Crestron website to obtain one.

NOTE: The minimum version of DEAL™ for Windows® is v2.07. The minimum versions required for the other software are listed in "Leading Specifications" on page 10.

Crestron Development Tools

| DEVELOPMENT TOOL | DESCRIPTION |
|--------------------|--|
| SIMPL™ Windows® | Used to program the main control processor. |
| VisionTools™ Pro-e | Used to design touchpanel layouts and to program SmarTouch Systems. |
| DEAL™ for Windows® | Used for learning (using the optional CNXLIR) and maintaining IR driver files. |

Before installing any tools, confirm that all applications such as Microsoft Office, etc. are closed. The website and CD provide instructions for installing the various development tools. When initiating a custom install from the CD, the user is presented with a list of the software programs, documentation, and other resources available on the CD-ROM. For each item, set or clear a checkbox to the left of the item to direct the installation program whether to install that component onto the hard drive. The size of the items installed determines how much hard disk space is required.

Each development tool contains a help file that can be opened from the Help pull-down menu. Refer to these files for additional information.

Memory

The 2-Series integrated dual bus control system has 36MB of built-in memory (non-volatile and volatile). A total of 36MB is broken down as follows: 4MB flash, 32MB DRAM, and 256KB NVRAM. Non-volatile memory contains information that is retained after loss of electrical power. Volatile memory is lost after a power failure. Refer to the lists below for a breakdown of memory for program-related information stored in the unit.

Non-volatile

1. SIMPL+ Modules
2. SIMPL+ Variables (using "nonvolatile" qualifier or #DEFAULT_NONVOLATILE)
3. SIMPL Program
4. Ops (CUZ file)
5. 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.)

Volatile

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

Initial Setup

NOTE: For the Ethernet IP setup of the 2-Series integrated dual bus control system with the optional Z-BUS expansion card, refer to the C2ENET-1 & C2ENET-2 Operations & Installation Guide (latest revision of Doc. 5962) for further information.

To avoid any procedural errors, follow the steps in the order provided.

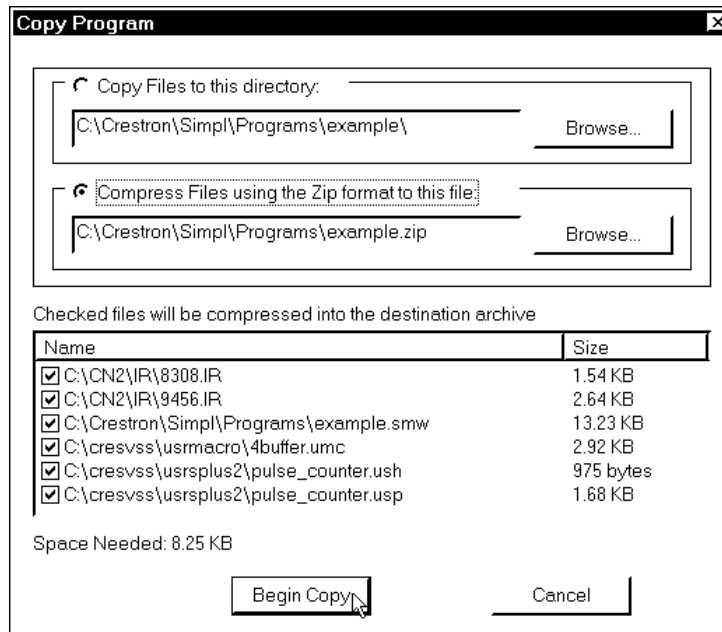
After installing the desired development tool, various job files may be obtained from Crestron or other sources. Using Windows Explorer, complete the following steps. These steps ensure that all job files reside on the hard drive (C:) in a directory named \CRESTRON\PROJECTS\MYJOB.

1. Navigate to the SIMPL directory on the hard drive. Assume that the default install directory is C:\CRESTRON.
2. Create a new folder for the project files. Although the folder where the files are placed is not critical, it is easier to manage projects if a logical structure is created. For example, create a new folder, called PROJECTS, underneath the CRESTRON directory. Create another folder, called MYJOB, under PROJECTS for the current job. The resulting pathname is C:\CRESTRON\PROJECTS\MYJOB.
3. Copy the supplied files into the folder created in the last step. The source of the file determines the procedure.

From an EXE file: If a job is downloaded from the Crestron website or is received via email, all files may have been compacted into a single, self-extracting archive. This archive has an EXE extension. First, copy the EXE file into the directory stated in step 1, then double click on the file name to begin decompressing the file. The program asks for a location for the extracted files. In this case, simply browse for the same directory where the archive was copied. (Once files are extracted, retain the original EXE file in case files need to be restored at any point.)

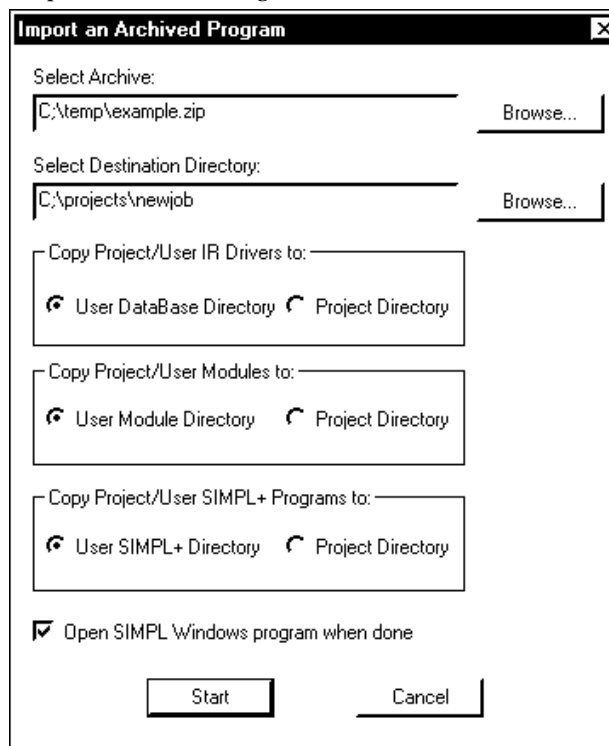
From a ZIP file: If the downloaded job is from the Crestron website or email, all files may have been compressed into a single archive file with a ZIP extension.

NOTE: The ZIP file was created with the Copy Program feature of SIMPL Windows, which provides the option to archive the project to a ZIP file. The command is initiated in SIMPL Windows via **File | Copy Program**. An example of the "Copy Program" window is shown after this note.

"Copy Program" Window

After **Begin Copy** is selected, the selected files will be archived to the example file C:\CRESTRON\SIMPL\PROGRAMS\EXAMPLE.ZIP.

For this ZIP file to be used by SIMPL Windows, select **File | Import Archived Program**. The "Import an Archived Program" Window similar to the one one after this paragraph appears.

"Import an Archived Program" Window

The job may be copied to any folder or directory, and the User IR, Module, and SIMPL+ files will be copied to the proper directories. Extract the files into the same directory where the archive was copied. Once files are extracted, retain the original ZIP file in case the files need to be restored at any point. The User IR, Module, and SIMPL+ modules will need to be copied to their proper directories manually.

Obtaining Communications

NOTE: If an optional Z-BUS expansion card is installed into the 2-Series integrated dual bus control system, communications can be obtained over TCP/IP. The Operations & Installation Guide for the card explains how to load the required IP Table that contains the addresses of the Ethernet devices and set up the control system for Ethernet communications. Refer to the C2ENET-1 & C2ENET-2 Operations & Installation Guide (latest revision of Doc. 5962) for further information.

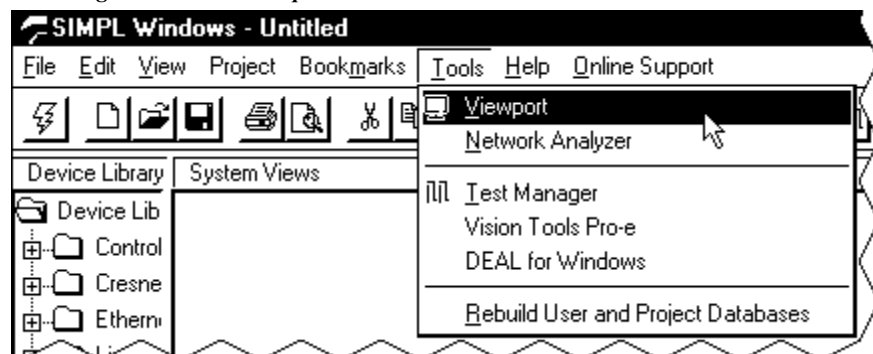
Before attempting to upload the program files into the 2-Series integrated dual bus control system, it is necessary to first establish communication between the unit and a PC. There are two ways of communicating with the control system, either via the COMPUTER port (RS-232 serial communications) or via Ethernet if the optional Z-BUS expansion card is installed. Prior to completing the following steps, be sure the communication cable is properly connected as described in "Loading Crestron Control Software" on page 21.

NOTE: Type of cable depends if communication is via RS-232 or Ethernet.

If RS-232, use a standard/straight through cable.
If Ethernet via hub, use straight RJ45 8-pin.
If Ethernet via PC direct, use X-over RJ45 8-pin.

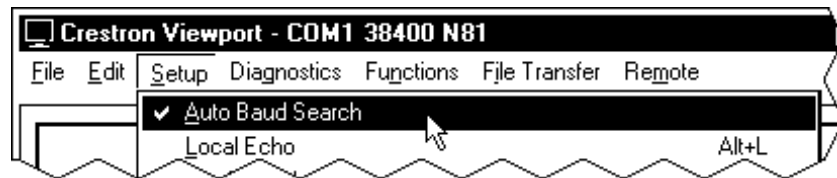
1. Make sure that no programs accessing the COM port of the PC are running.
2. Select **Start | Programs | Crestron | SIMPL Windows** to start SIMPL Windows.
3. SIMPL Windows responds with an opening splash screen and may display the "What do you want to do?" window. If so, close the window.
4. As illustrated after this step, select **Tools | Viewport** to open the Crestron Viewport.

Accessing the Crestron Viewport



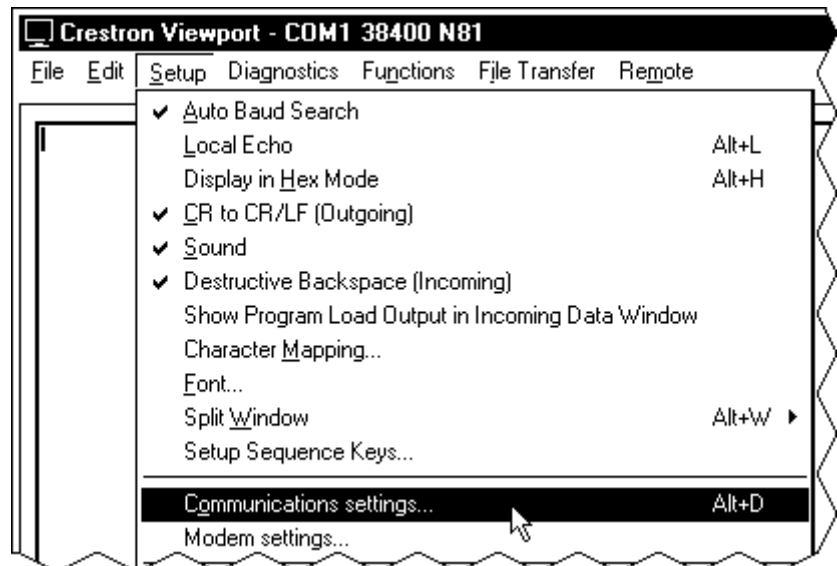
- From the **Setup** menu, verify that **Auto Baud Search** is checked; refer to illustration after this step.

Verifying Auto Baud Search



- While the Viewport is displayed, select **Setup | Communications settings** (alternatively, depress **Alt+D**) to open the "Port Settings" window. Refer to the illustration after this step.

Accessing the "Port Settings" Window



- Select the appropriate connection type (RS-232 for a PC connection through the COMPUTER port of the 2-Series integrated dual bus control system or TCP/IP through the Ethernet via optional Z-BUS). Verify that the proper COM port is selected and set the parity to **None**, the data bits to **Eight**, and the stop bits to **One**. Refer to the window shown after this step for the remaining settings. Click on the **OK** button to save the communication settings and close the window.

"Port Settings" Window

8. Select **Diagnostics | Check Operating System Version** (alternatively, depress the **F5** key) from the Viewport. The Viewport may display a window as it scans various baud rates. Eventually, a message should appear within the Viewport window showing a version number. Such a response indicates that communications have been established. If a "No Communications with Rack" error message appears, proceed to "Troubleshooting Communications" on page 27.

Troubleshooting Communications

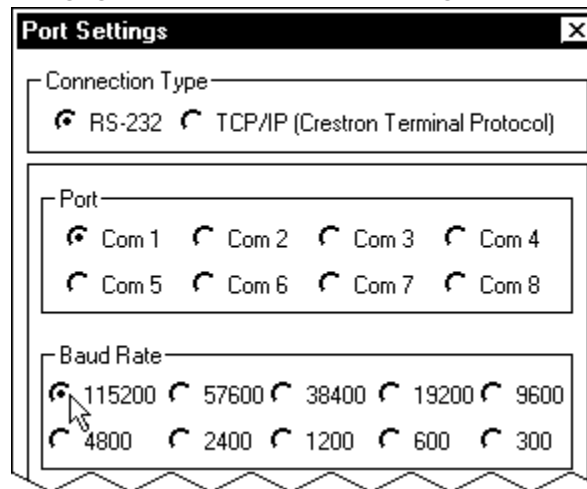
NOTE: This section covers troubleshooting communications of the 2-Series integrated dual bus control system via RS-232 to the COMPUTER port. For troubleshooting Ethernet communications of the unit with the optional Z-BUS expansion card, refer to the C2ENET-1 & C2ENET-2 Operations & Installation Guide (latest revision of Doc. 5962, respectively) for further information.

If communications with the 2-Series integrated dual bus control system was not established, follow the steps in this section to help remedy the problem. After performing each step, repeat step 7 in "Obtaining Communications" on page 25 again.

1. Try repeating step 7 from "Obtaining Communications" on page 25 to attempt to establish communications.

2. Verify that the cable being used is correct. It should be a straight-through cable. That is, pin 1 on one end is connected to pin 1 on the other end. Pin 2 connects to pin 2, etc. To work properly, pins 2, 3, and 5 must be connected. The handshaking pins (pins 7 and 8) are irrelevant.
3. Verify that the proper COM port on the PC has been selected. Some computers have more than one COM port; some of which may be internal (e.g., for a modem). If verification can not be made, consult the user's manual or contact the PC manufacturer.
4. Check the **ERR** LED on the front of the 2-Series integrated dual bus control system. If the LED is illuminated, unplug the unit and reapply power after a few seconds. If the LED illuminates again, call Crestron customer service. Refer to "Further Inquiries" on page 43.
5. If steps 1 through 4 have failed to result in communications, the last series of steps to perform is a reset on the control processor. Complete the following steps to do so.
 - 5a. While the Viewport is displayed, select **Setup | Communications Settings** (alternatively, depress **Alt+D**) to open the "Port Settings" window.
 - 5b. Set the baud rate to 115200, as shown below.

Changing the Baud Rate in the "Port Settings" Window



- 5c. Set the 2-Series integrated dual bus control system to 115200 baud with the following actions.
 - Depress and release the **HW-R** button on the front panel of the 2-Series integrated dual bus control system.
 - Depress and hold the **SW-R** button on the front panel of the 2-Series integrated dual bus control system for approximately five seconds.
 - Wait until a message similar to the one (after this step) appears in the Viewport.

Viewport Message

```
PR02 Control Console
Bypassing Program Load!!!
PR02 >|
```

NOTE: If a computer is not hooked up, wait approximately three to four seconds.

- Release the **SW-R** button.
- 5d. If the 2-Series integrated dual bus control system responds, proceed to step 5e. Otherwise, do the following.
- Remove power from the control system.
 - Depress and hold the **SW-R** button on the front panel of the 2-Series integrated dual bus control system.
 - Reapply power to the control system.
 - Wait until a message similar to the one below appears in the Viewport.

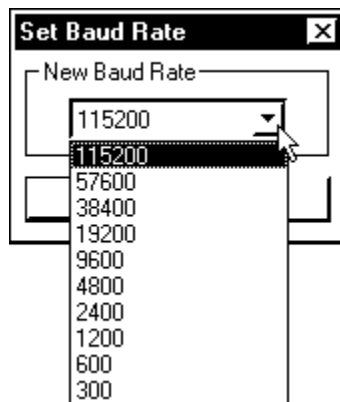
Viewport Message

```
PR02 Control Console
Bypassing Program Load!!!
PR02 >|
```

NOTE: If a computer is not hooked up, wait approximately three to four seconds.

NOTE: The message "Bypassing 000" indicates that the SIMPL Windows program loaded in the system is not running. However, it is stored and will execute during the next reset.

- Release the **SW-R** button.
- 5e. To confirm communication from the PC to the 2-Series integrated dual bus control system, select **Diagnostics | Check Operating System Version** (alternatively, depress the **F5** key) from the Viewport. After a few seconds, the Viewport responds by displaying the operating system version number that is loaded into the unit. If a message does not appear or if it is intelligible, verify that the Viewport is set to 115200 baud and repeat steps 5a through 5d.
- 5f. Select **Functions | Set Baud Rate** (alternatively, depress the **F8** key) from the Viewport to open the "Set Baud Rate" window. As shown after this step, scroll down to the desired baud rate at which communications should take place. This value is purely subjective.

"Set Baud Rate" Window

5g. Reinitialize the unit by recycling the power again or depress the **HW-R** button. The Viewport responds with some text and the **AV>** or **PRO>** prompt (depending on which unit is used).

NOTE: If after trying all these procedures, communication can not be established, contact Crestron customer service for assistance. Refer to "Further Inquiries" on page 43.

Creating the System Program

SIMPL (Symbol Intensive Master Programming Language) is an easy-to-use programming language that is completely integrated and compatible with all Crestron system hardware. The objects that are used in SIMPL are called symbols. SIMPL Windows offers drag and drop functionality in a familiar Windows® environment.

SIMPL Windows is Crestron's software for programming Crestron control systems. It provides a well-designed graphical environment with a number of workspaces (i.e., windows) in which a programmer can select, configure, program, test, and monitor a Crestron control system.

NOTE: Crestron 2-Series control systems require SIMPL Windows version 2.00 or later. The latest software versions can be obtained from the What's New page (SIMPL Windows section) or Downloads page (SIMPLWIN Library) of the Crestron website (www.crestron.com). New users are required to register in order to obtain access to the FTP site.

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

To create a program with an AV2 or PRO2 in the *Configuration Manager* of SIMPL Windows, refer to the table on the next page for initial configuration information.

NOTE: There is a **Slot 10: C2I-AV2-FRONT PANEL** shown in the *Configuration Manager* of SIMPL Windows. However, this slot represents non-programmable hardware and there is no reference in *Programming Manager*.

NOTE: Each item listed in the Device Library column (except Control Systems) is optional and applies to all control systems (unless indicated otherwise).

Configure AV2 and PRO2

| DEVICE LIBRARY | SYMBOL REQUIRED | DROP WHERE | ADDITIONAL SETUP |
|--|-----------------------------------|--|--|
| Control Systems | AV2 | System Views | Configure the built-in slots. |
| | AV2 With Card Cage | System Views | Configure the available and built-in slots. |
| | PRO2 | System Views | Configure the available and built-in slots. |
| Plug-in Control Cards [Cards (2-Series Y Bus) or Cards (CNX Series)]* | Depends upon system requirements. | Empty C2Y Card Slots (slots 1 through 3) | Depends upon the type of card dropped into the slot. Refer to the documentation supplied with the specific card for additional setup information. |
| Serial Drivers (General) | C2 COM Two-way serial driver | C2I-COM6 (Slot 4) | As devices are dropped onto slot 4, they are assigned to port A through port F, in sequence by default. COMMUNICATION PARAMETERS - In the System Tree, scroll down to Slot 4: C2I-COM6 within the control system and expand to display the individual ports. Single-click on the desired port, then right-mouse click and select Configure. Select the SERIAL SETTINGS tab to display a window that allows for the assignment of communication parameters. REASSIGN DEVICES TO A PORT (OPTIONAL) - In the System Tree, double-click on the device that needs to be reassigned to open the "Device Settings" window. Select the PORT ASSIGNMENT tab and scroll to the desired port address. (Alternatively, single-click then right mouse-click on device that needs to be reassigned. Select Configure to open "Device Settings" window.) |

* Only applies to AV2 With Card Cage and PRO2.

Configure AV2 and PRO2 (Continued)

| DEVICE LIBRARY | SYMBOL REQUIRED | DROP WHERE | ADDITIONAL SETUP |
|---------------------------------|---|------------------|---|
| Serial Drivers (General) | Desired IR devices (drivers are arranged by manufacturer or device) - or - C2IR One-way serial driver | C2I-IR8 (Slot 5) | As devices are dropped onto slot 5, they are assigned to port A through port H, in sequence by default. If more than eight devices are to be controlled via this port, the assignment sequence repeats. REASSIGN DEVICES TO A PORT (OPTIONAL) - Double-click on the device that needs to be reassigned to open the "Device Settings" window. Select the PORT ASSIGNMENT tab and scroll to the desired port address. (Alternatively, single-click then right mouse-click on device that needs to be reassigned. Select Configure to open "Device Settings" window.) As devices are dropped onto slot 5, they are assigned to port A through port H, in sequence by default. If more than 8 drivers are needed in the system, the sequence is repeated again, as needed. COMMUNICATION PARAMETERS - In the System Tree, scroll down to Slot 5: C2I-IR8 within the control system and expand to display the individual ports. Single-click on the desired port, then right-mouse click and select Configure. Select the SERIAL SETTINGS tab to display a window that allows for the assignment of communication parameters. REASSIGN DEVICES TO A PORT (OPTIONAL) - In the System Tree, double-click on the device that needs to be reassigned to open the "Device Settings" window. Select the PORT ASSIGNMENT tab and scroll to the desired port address. (Alternatively, single-click then right mouse-click on device that needs to be reassigned. Select Configure to open "Device Settings" window.) |
| Not applicable (N/A) | Built-in digital I/O port (Slot 6) | N/A | None required. |
| Not applicable (N/A) | Built-in relay output port (Slot 7) | N/A | None required. |

Configure AV2 and PRO2 (Continued)

| DEVICE LIBRARY | SYMBOL REQUIRED | DROP WHERE | ADDITIONAL SETUP |
|---|--|----------------------------------|---|
| Plug-in Control Cards [Cards (2-Series Z Bus) | C2ENET-1 or C2ENET-2 (card varies per custom system) | Empty C2Z-EN1 Card Slot (slot 8) | Adding a C2ENET card enables the slot to accept Ethernet devices. Refer to the documentation supplied with the specific C2ENET card for additional setup information. |
| OPEN | Depends upon system requirements. | C2Net-Device (Slot 9) | Depends upon the type of peripheral dropped into the slot. Refer to the documentation supplied with the specific peripheral for additional setup information. |
| Not applicable (N/A) | Built-in front panel (Slot 10) | N/A | None required; this slot represents non-programmable hardware and there is no reference in Programming Manager. |

Converting an Existing System Program

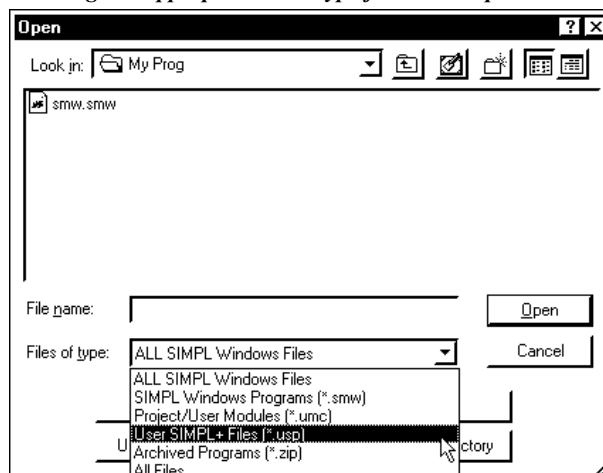
To convert an existing system program that is configured with a control system other than the AV2 or PRO2, one must verify that SIMPL Windows (v2.0 or later) is running and the Crestron database (v15.6.2 or later) is available. Complete the following steps to execute the conversion.

1. Use the correct version of SIMPL Windows and open the existing program.
2. In *Configuration Manager*, drag the desired 2-Series integrated dual bus control system from the Control Systems folder in the *Device Library* onto the existing control system in *System Views*.

NOTE: If the existing program makes use of a SIMPL+ module, continue with steps 3 and 4. Otherwise, proceed to step 5.

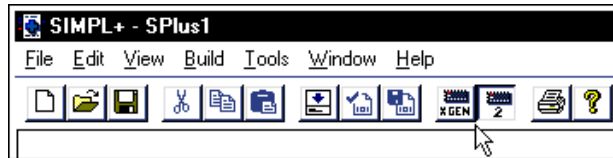
3. Open any SIMPL+ program by selecting **File | Open**. From the "Open" window select *User SIMPL+ Files (*.usp)* as the file type to help navigate to the proper file, as shown after this step.

Selecting the Appropriate File Type from the "Open" Window



4. Choose the correct target environment. The target environment is defined as the class of control system processor (either **X GEN** or **2** or both). Selection of target environment is made on the toolbar, as shown after this step.

Location of X GEN and 2 on the Toolbar



NOTE: Both target environments may be selected so that the same SIMPL+ module can be used in multiple SIMPL Windows programs, regardless of control system (CNX generation and 2-series) defined in the program. However, verify that all commands in the SIMPL+ module are acceptable with both control systems.

NOTE: Multiple copies of the same SIMPL+ module can exist in a SIMPL Windows program (v1.60 and later) and each is identified by a unique location-specific reference name. Each module copy (including the original) is referred to as an instance of the module. To provide a unique and traceable identity to each instance, a reference name can be assigned to the symbol. Simply enter the reference name into the parameter field at the bottom of each symbol in *Detail View*.

5. Select **Build | Save and Compile** (alternatively, depress **F12**) to recompile the SIMPL+ program.
6. If signal ambiguity exists, SIMPL Windows prompts the programmer to open each Crestron module (select Project/User Modules (*.umc) as the file type and recompile.
7. Return to SIMPL Windows and select **Project | Convert/Compile** (alternatively, depress **F12**) to recompile the SIMPL Windows program.

NOTE: SIMPL Windows (v2.00 and later) is sensitive to analog versus serial signal definition in a program. During the compilation, the software detects ill-defined signals and provides the programmer with errors. Compilation error RLCMCVT166 indicates signal ambiguity in the SIMPL program and RLCMCVT177 indicates signal ambiguity in a SIMPL+ module. It is better to discover and correct the problem during compilation rather than during run-time.

Loading the System Program

To load the system program into the 2-Series integrated dual bus control system, use the Crestron Viewport or the Transfer Program option in SIMPL Windows. For consistency, the steps that follow this paragraph use the Viewport. To upload a SPZ file into the control system, complete the following steps in the order provided.

1. Select **Tools | Viewport** to open the Crestron Viewport, if it is not already opened.
2. Select **File Transfer | Send Program** (alternatively, depress **Alt+P**) to open the “Cresnet Simpl Program” window.
3. Use the **Browse** button to locate the precise SPZ file.

- As shown after this step, click the **Send Program** button to initiate program upload to the control system. A "Transfer in Progress" window opens, but no response is required. If SIMPL+ files are present and the SIMPL+ Program(s) option is checked in the *What to Send* area of the window, the associated files are transferred after the program is transferred.

NOTE: Check the *Retrieve Program from Control System before overwriting* check box to save the file currently loaded into the control system

"Cresnet Simpl Program" Window

- If the "Failure" dialog box opens, repeat steps 3 and 4. If this does not remedy the problem, call Crestron customer service. Refer to "Further Inquiries" on page 43.

NOTE: Use of the **Make Permanent** button is not required for a 2-Series integrated dual bus control system since all transfers are permanently stored. To extract the existing program, confirm that the *Retrieve Program from the Control System before overwriting* check box is checked before sending the new program.

- After transferring the program file, click on the **Check Program** button to ensure that the file loaded properly. The information in the *Current Program* field of the "Cresnet Simpl Program" window should update and display the file currently loaded. If the information does not update, repeat steps 3 through 5. If this does not remedy the problem, call Crestron customer service. Refer to "Further Inquiries" on page 43.

Testing the Program after Transfer

Complete the following steps in the order provided to determine if the program transfer was a success.

- Select **Tools | Viewport** to open the Crestron Viewport.

2. Unplug the 2-Series integrated dual bus control system and leave it unplugged for about 10 seconds.
3. Plug the unit in and observe the statistics displayed within the Viewport. The program name uploaded into the system also appears.
4. Verify the displayed information against what was originally loaded in the previous section.

Loading Touchpanels

A VTZ file is the format associated with TPS touchpanel projects. All other touchpanels use the HEX format.

The 2-Series integrated dual bus control system may include one or more touchpanels. Each panel must be set to the proper network ID and loaded with a touchpanel *project* in order to work properly in conjunction with the system program loaded in "Loading the System Program" on page 34. For each panel in the system, a separate HEX or VTZ file describing the graphical elements of the panel is required. In some cases, where two or more panels are to be identical in usage, a single HEX or VTZ file may be used for multiple panels. To load a touchpanel project into the panel, use the Crestron Viewport or the "Upload Project" function in VisionTools™ Pro-e. For consistency, the steps that follow this paragraph use the Viewport. To upload a HEX or VTZ file into the touchpanel, complete the following steps in the order provided.

1. Verify that the touchpanel is connected to the 2-Series integrated dual bus control system via the appropriate network cable. Also, verify that the touchpanel is set to the proper network ID. (This info should be available in the system connection sheets or directly from the programmer.)
2. Select **Tools | Viewport** to open the Crestron Viewport, if it is not already opened.
3. Select **Diagnostics | Report Network Devices** (alternatively, depress **F4**) and verify that the touchpanel to be loaded reports back and is at the expected network ID.
4. Select **File Transfer | Send Touchpanel** (alternatively, depress **Alt+T**) and set the network ID to the ID of the touchpanel to be loaded.
5. Browse for the supplied HEX or VTZ file and click the **Open** button. The file is sent to the control system and then over the network to the touchpanel. Verify that the panel displays a message saying that the upload is in progress.

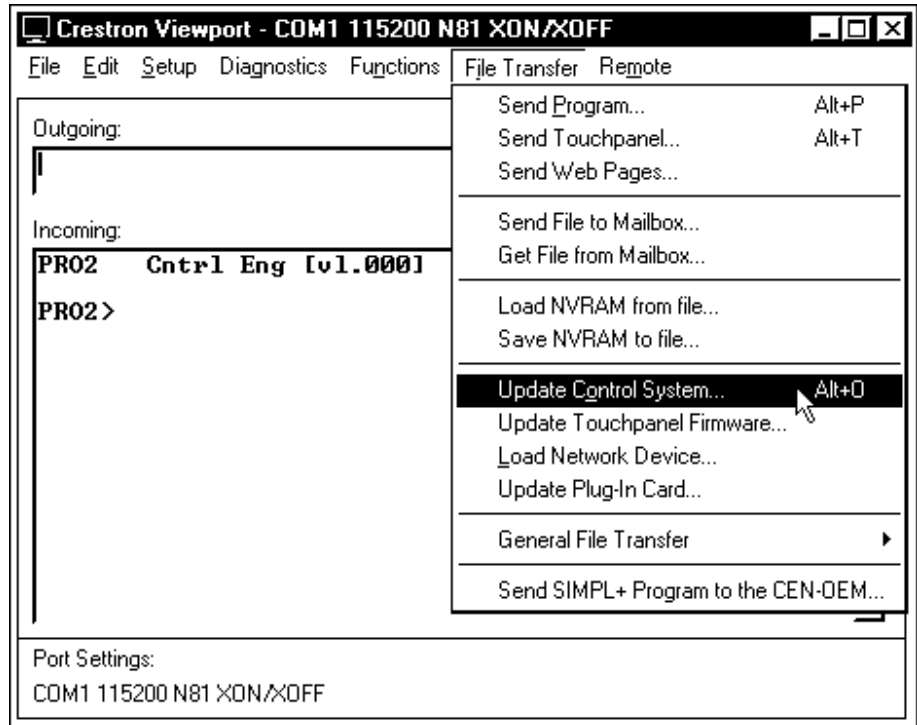
Updating the Control System

Each 2-Series integrated dual bus control system contains an operating system (also known as OPS) that from time-to-time must be updated. It is often necessary to update a control system if new features have been implemented (such as support for new hardware or new language constructs) or if bugs have been corrected. New updates are made available as a CUZ file (or Control System Update Package). The following procedure is recommended to load a new CUZ file into the 2-Series integrated dual bus control system:

NOTE: CUZ files only pertain to 2-Series control systems. CUZ files are not used for older models such as X generation control systems, the CNRACK, CNMS, CNLCOMP-232, or the ST-CP. Consult the appropriate documentation for each of these products to perform updates.

1. Establish communications with the 2-Series integrated dual bus control system by following the steps listed in "Obtaining Communications" on page 25.
2. From the Crestron Viewport, select **File Transfer | Update Control System** as shown below.

Accessing the "Update Control System" Window



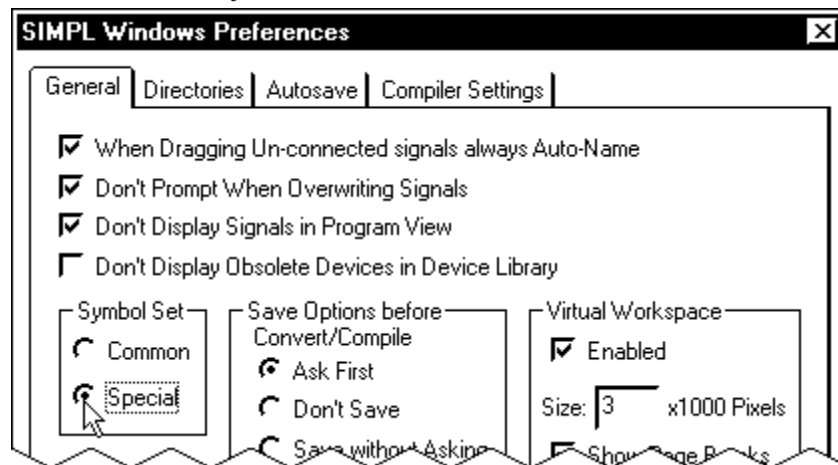
3. The "Open" window offers the option to enter or browse to the path name of a new update package. Only choose update packages with a CUZ extension.
4. After, locating the CUZ package, click **OK** in the "Open" window to initiate firmware download. Observe the "Transfer In progress" window on the PC.
5. When the transfer is 100% complete, the "Waiting for Control System to Reboot" message appears.
6. Upload the SIMPL program and SIMPL+ modules after the transfer is complete.

Acceptable Commands

The 2-Series integrated dual bus control system is capable of interpreting commands from various sources. Sources include serial communication (RS-232) with a PC via the **COMPUTER** port. Over Ethernet (via the installed Z-BUS card) the control system can receive commands by CTP (Crestron Terminal Protocol – reserved port number) or Telnet. It is also possible to incorporate a symbol (Console) into the loaded SIMPL Windows program that is capable of running console commands.

NOTE: The Console logic symbol only appears in the System Control folder in the *Symbol Library*, after enabling a special symbol set to be displayed. To enable this set, select **Edit | Preferences**, which opens the "SIMPL Windows Preferences" window. In the *Symbol Set* area of the *General* tab, select **Special** as shown in the illustration that follows this note.

"SIMPL Windows Preferences" Window



Commands can be categorized. It is possible to find the same command in more than one category. Categories include:

- Device – pertains to the unit itself.
- Ethernet – govern parameters that involve the installed Z-BUS card.
- File – influence the internal file system.
- Main – includes common use commands.
- System – sets system-wide parameters.

Commands are case insensitive and can be entered from the appropriate prompt (i.e., AV2, PRO2, etc.). Help on individual commands is available by typing the command followed by a "?" (i.e., ADDMASTER ?). The table on the next page lists acceptable commands alphabetically and provides a brief description. Additional information about each command is available from "Appendix A: Command Details" on page 47.

List of Acceptable Commands for the 2-Series Integrated Dual Bus Control System

| COMMAND | DESCRIPTION |
|---------------|--|
| ADDMASTER | Add an entry to IP table |
| AUTONEGOT | Set auto negotiation for Ethernet device |
| BROADCAST | Enable/disable the broadcasting of error messages |
| BYE | Close user session |
| CARDS | Display cards detected in system |
| CD | Change the file directory |
| CIPPORT | Specify the port for the CIP interface |
| CLEARERR | Clears the current error log |
| COMPACT | Remove invalid files from system |
| CNETID | Set the Cresnet ID of the panel |
| CTPPORT | Specify the port for the CTP console |
| DEFROUTER | Set default router |
| DELETE | Delete file(s) |
| DIR | Display files in directory |
| ECHO | Enable/disable character echoing |
| EEPROM | Displays the parameters stored in EEPROM |
| ERRLOG | Prints the current error log |
| ESTATUS | Displays the status and parameters for the Ethernet card |
| ETHERNET | Enable/disable Ethernet |
| ETHERTEST | Perform diagnostic test on the Ethernet card |
| FPPASSWORD | Set front panel password |
| FREE | Show available file space |
| HEAPFREE | Show available heap space |
| HELP | Display help screens |
| INFO | Print software capabilities |
| INITIALIZE | Clear file system |
| IPADDRESS | Set IP address |
| IPMASK | Set IP subnet mask |
| IPTABLE | Display IP table |
| MESSAGE | Display a message on front panel screen |
| PASSWORD | Set console password |
| PING | Perform IP ping test on remote node |
| RAMFREE | Show available file space in the ram file system |
| REBOOT | Perform system reboot |
| REMMASTER | Remove an entry from IP table |
| REPORTCRESNET | Show all devices on the main Cresnet leg |
| RESTORE | Restore factory defaults |
| RTSCTS | Set/clear hardware handshaking |
| SAVE | Save system parameters |
| SELFTEST | Initiate the self test procedure |
| SERIAL | Set serial communication parameters |
| SET SIGNAL | Set the state of a signal in the program |
| SHOWHW | Display hardware configuration |
| SYSTEM | Xmodem download new firmware |
| TIMEDATE | Set the time and date |
| TYPE | Display file contents |
| UPLOAD | Load file into cresnet device |
| VERSION | Print version to console |
| WEBSERVER | Enable/disable Webserver |
| WEBINIT | Initialize Webserver default file |
| WEBPORT | Specify the port for the Webserver |
| XGETFILE | Use Xmodem to retrieve file from panel |
| XONXOFF | Set/clear software handshaking |
| XPUTFILE | Use Xmodem to transfer file to ROM |

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

Troubleshooting the Control System

The table below and on the next page provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

2-Series Integrated Dual Bus Control System 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. |
| PWR LED does not illuminate. | Control system is not receiving power. | Verify that supplied power cord is properly attached to control system and the other end is securely plugged into an outlet. |
| ERR 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. If using AV, poll the network (F4) from the Viewport. |
| Compilation error RLCMCVT166 & RLCMCVT177. | Poor analog versus serial signal definition in the SIMPL Windows program. | Confirm properly 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"). |
| 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. |

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 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 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

Passthrough Mode

Passthrough mode is accessed from the Crestron Viewport by selecting **Functions|Enter Passthrough Mode (CNX / 2-Series only)**. The window, shown after this paragraph, is used to select the port configuration for passthrough mode.

Passthrough Mode Window

The screenshot shows a window titled "Passthrough Mode" with a close button (X) in the top right corner. The window contains a "Setup" section with the following fields:

- Type: Slot (dropdown menu)
- Slot: 4 (dropdown menu)
- Port: A (dropdown menu)
- Baud Rate: 9600 (dropdown menu)
- Parity: None (dropdown menu)
- Data Bits: 8 (dropdown menu)
- Stop Bits: 1 (dropdown menu)
- Protocol: RS-232 (dropdown menu)
- Handshaking: None (dropdown menu)

Below the "Setup" section, there is a text box with the instruction: "To Exit Passthrough Mode: Select 'Exit Passthrough Mode' from the 'Functions' menu". At the bottom of the window, there are two buttons: "OK" and "Cancel".

Passthrough mode allows data to pass from the COMPUTER port to the selected COM port on a Cresnet or Ethernet device (such as ST-COM or CEN-COM). 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.

Entering passthrough mode for one of the internal COM ports reinitializes it, which clears the data for that port. The COM analyzer also functions while the unit is in passthrough mode.

COM Analyzer

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 display 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 display 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 display 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 below. 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 display 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) in front on 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



Further Inquiries

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

- In the US and Canada, call Crestron's corporate headquarters at 1-888-CRESTRON [1-888-273-7876] or 1-201-767-3400.
- 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, call Crestron Pacific at +613-9480-2999.

For local support from exclusive Crestron factory-trained personnel in New Zealand call Amber Technologies at +649-410-8382.

Future Updates

As Crestron improves functions, adds new features, and extends the capabilities of the 2-Series integrated dual bus control system, 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.

The Downloads page of the Crestron website (www.crestron.com) directs the reader to the location and description of each update. Check the site periodically for update availability and its subjective value.

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Appendix A: Command Details

This appendix provides details about each of the acceptable commands that can be interpreted by the 2-Series Integrated Dual Bus Control System. Details include a description of the command, a list of help menus that contain the command, the proper syntax for entering the command, definitions of parameters that maybe included in the syntax, and a list of allowable sources for the command.

NOTE: The entire command name (i.e., ADDMaster) does not need to be entered in order to be recognized. The capitalized letters of the command name listed in the syntax (i.e., ADDM) are all that is required to interpret the command.

NOTE: Not all parameters listed in the syntax are necessary. Parameters that are contained within brackets "[...]" are optional. Furthermore (for the sake of the commands shown in this appendix), parameters in lower case represent a placeholder for some value or variable. Upper case parameters separated by a vertical mark "|" (i.e., ON | OFF) are mutually exclusive of each other. Enter only one of the available upper case parameters verbatim (interpretation is case insensitive). If the parameter is listed in lower and upper case, only the upper case portion of the parameter is necessary for interpretation.

ADDMASTER

Description: This command adds a CIP node to the panel's master list. A CIP node is completely specified by its CIP ID number and the IP addresses of each end. The new IP table is stored in permanent memory for retrieval. The panel should be rebooted to recognize the new node. Entering the command without a parameter displays the current setting.

Help Menu(s): Ethernet, Main

Syntax: ADDMaster cip_id ip_address [device_id]

Parameters: cip_id - the ID of the node in hexadecimal notation
ip_address - the Internet Protocol (IP) address of the remote node in dot decimal format (eg. 255.255.255.255)
device_id - optional ID used in join number remapping

Possible Source: RS-232, CTP, Telnet, User Program

AUTONEGOT

Description: This command sets the state of the autonegotiation process on the Ethernet device(s). Autonegotiation is the process of automatically determining the speed of the Ethernet network.

Help Menu(s): Ethernet

Syntax: AUTONEGOT [device_num (ON | 10MPS | 100MPS)]

Parameters: device_num - number of the Ethernet device to set (0 or 1)
ON - autonegotiation is on
10MPS - autonegotiation is OFF, use 10mps
100MPS - autonegotiation is OFF, use 100mps

Possible Source: RS-232, CTP, Telnet, User Program

BROADCAST

Description: This command enables/disables the broadcasting of error messages. The messages will be logged whether or not they are broadcast. Entering the command without a parameter displays the current state.

Help Menu(s): System

Syntax: BROADCAST [ON | OFF]

Parameters: ON - turns on broadcasting of error messages
OFF - turns off broadcasting of error messages

Possible Source: RS-232, CTP, Telnet, User Program

BYE

Description: This command cancels a connection over the Ethernet, whether to the Telnet or CTP ports. If password protection is enabled, the password has to be re-entered before connection is re-established.

Help Menu(s): System

Syntax: BYE

Parameters: none

Possible Source: CTP, Telnet

CARDS

Description: This command displays the cards in the system.

Help Menu(s): Main, System

Syntax: CARDS

Parameters: none

Possible Source: RS-232, CTP, Telnet, User Program

CD

Description: This command changes the current working file directory. Refer to "Appendix B: File System" for details.

Help Menu(s): File

Syntax: CD [directory]

Parameters: directory – ASCII string representing the desired directory

Possible Source: RS-232, CTP, Telnet, User Program

CIPPORT

Description: This command specifies the port number to be used for the CIP interface. It should only be used in the few cases where there is a conflict.

Help Menu(s): Ethernet

Syntax: CIPPORT [portnumber]

Parameters: portnumber - port number for CIP activity

Possible Source: RS-232, CTP, Telnet

CLEARERR

Description: This command clears the error log (for diagnostic purposes only).

Help Menu(s): System

Syntax: CLEARerr

Parameters: none

Possible Source: RS-232, CTP, Telnet, User Program

COMPACT

Description: This command reclaims flash file space by removing invalid (deleted) files from the system. The file system is compacted to remove the holes left by the invalid files. The rest of the flash file space is cleared to accept new files.

Help Menu(s): Files

Syntax: COMPACT

Parameters: none

Possible Source: RS-232, CTP, Telnet, User Program

CNETID

Description: This command sets the ID number of the system as a slave on the Cresnet network.

Help Menu(s): System

Syntax: CNETid id

Parameters: id - the ID of the panel in hexadecimal notation

Possible Source: RS-232, CTP, Telnet, User Program

CTPPORT

Description: This command specifies the port number to be used for the CTP console interface. It should only be used in the few cases where there is a conflict.

Help Menu(s): Ethernet

Syntax: CTPPORT [portnumber]

Parameters: portnumber - port number for CIP activity

Possible Source: RS-232, CTP, Telnet

DEFROUTER

Description: This command sets the IP address of the default router on the system. It is only necessary on networks without automatic routing. The value is stored in permanent memory and requires a reboot before it is recognized.

Help Menu(s): Ethernet

Syntax: DEFRouter device_num ip_address

Parameters: device_num - indicates device to be set (0 = LanA, 1 = LanB)

ip_address - the Internet Protocol (IP) address of the router node in dot decimal format (eg. 255.255.255.255)

Possible Source: RS-232, CTP, Telnet, User Program

DELETE

Description: This command deletes file(s) from the file system. Wildcards are accepted and can be in the form of (*file, *file*, and file*).

Help Menu(s): File

Syntax: DELEte filespec

Parameters: filespec - ASCII string contains the file name and/or wildcards

Possible Source: RS-232, CTP, Telnet, User Program

DIR

Description: This command lists information about file(s) from the file system. Wildcards are accepted and can be in the form of (*file, *file*, and file*). If no parameter is entered, all files are listed.

NOTE: Compact flash directories can only use the standard DOS file wildcards.

Help Menu(s): File

Syntax: DIR [filespec]

Parameters: filespec - ASCII string contains the file name and/or wildcards

Possible Source: RS-232, CTP, Telnet

ECHO

Description: This command enables/disables character echoing on the port. If no parameter is entered, the current state is displayed.

Help Menu(s): System

Syntax: ECHO [ON | OFF]

Parameters: ON - enables character echoing

OFF - disables character echoing

Possible Source: RS-232, CTP, Telnet

EEPROM

Description: This command displays the current parameters stored in EEPROM.

Help Menu(s): Device

Syntax: Eeprom

Parameters: none

Possible Source: RS-232, CTP, Telnet

ERRLOG

Description: This command prints a list of the most recent errors.

Help Menu(s): System

Syntax: ERRlog

Parameters: none

Possible Source: RS-232, CTP, Telnet

ESTATUS

Description: This command displays the status of the Ethernet link (Link on/off, link speed, full duplex on/off). Also it displays the settings for the Ethernet card.

Help Menu(s): Ethernet, System

Syntax: EStatus

Parameters: none

Possible Source: RS-232, CTP, Telnet

ETHERNET

Description: This command enables/disables the Ethernet card. A reboot is required before the command is effective.

Help Menu(s): Ethernet, System

Syntax: ETHERNET [ON | OFF]

Parameters: ON - enables the Ethernet card
OFF - disables the Ethernet card

Possible Source: RS-232, CTP, Telnet

ETHERTEST

Description: This command runs the various diagnostic tests for the Ethernet card.

Help Menu(s): Ethernet, System

Syntax: ETHERTEST [RESET | REGTEST | MEMTEST | LOOPBACK | MMUTEST | INTTEST | EETEST | FULL | EXTLOOP | REGMAP | SHOWTX | SHOWRX | EEDUMP]

Parameters: RESET - reset Ethernet chip
REGTEST - perform register test
MEMTEST - perform memory test
LOOPBACK - perform local loopback test
MMUTEST - perform memory management unit test
INTTEST - perform interrupt test
EETEST - perform EEPROM test
FULL - perform all the above tests
EXTLOOP - perform external loopback test
REGMAP - display all the registers
SHOWTX - display the last transmitted packet
SHOWRX - display the last received packet
EEDUMP - perform EEPROM test

Possible Source: RS-232

FPPASSWORD

Description: The front panel password is set with this command.

Help Menu(s): Main, System

Syntax: FPPASSWORD password

Parameters: password - four digit numerical string using digits 1 through 6.

Possible Source: RS-232, CTP, Telnet

FREE

Description: This command displays the space remaining in the file system.

Help Menu(s): File

Syntax: FREE

Parameters: none

Possible Source: RS-232, CTP, Telnet

HEAPFREE

Description: This command displays the space remaining in the memory heap.

Help Menu(s): File

Syntax: HEAPfree

Parameters: none

Possible Source: RS-232, CTP, Telnet

HELP

Description: This command lists the commands for the console grouped by function.

Help Menu(s): Main

Syntax: HELP [ALL | DEvice | ETHERnet | FILE | SYStem]

Parameters: ALL - shows all the commands for the touchpanel
DEvice - displays commands specific to a touchpanel device
ETHERnet - shows the commands for Ethernet control
FILE - displays the commands for the file system
SYStem - list of general system commands

Possible Source: RS-232, CTP, Telnet

INFO

Description: This command prints the various capabilities of the firmware.

Help Menu(s): Main, System

Syntax: INFO

Parameters: none

Possible Source: RS-232, CTP, Telnet

INITIALIZE

Description: This command erases the entire flash file system. Progress status messages appear until the command has completed.

Help Menu(s): File

Syntax: INITIALIZE

Parameters: none

Possible Source: RS-232, CTP, Telnet

IPADDRESS

Description: This command sets the IP address of the touch panel. The value is stored in permanent memory and requires a reboot before it is recognized.

Help Menu(s): Ethernet

Syntax: IPAddress device_num ip_address

Parameters: device_num - indicates device to be set (0 = LanA, 1 = LanB)
ip_address - the Internet Protocol (IP) address of the touchpanel in dot decimal format (eg. 255.255.255.255)

Possible Source: RS-232, CTP, Telnet

IPMASK

Description: This command sets the subnet mask for the local area network to which the panel is attached. The value is stored in permanent memory and requires a reboot before it is recognized.

Help Menu(s): Ethernet

Syntax: IPMASK device_num ip_mask

Parameters: device_num - indicates device to be set (0 = LanA, 1 = LanB)
ip_mask - the subnet mask of the LAN in dot decimal format (eg. 255.255.0.0). 0.0.0.0 is an invalid entry and will be rejected.

Possible Source: RS-232, CTP, Telnet

IPTABLE

Description: This command displays the current IP table for the CIP interface on the touchpanel.

Help Menu(s): Ethernet

Syntax: IPTable

Parameters: none

Possible Source: RS-232, CTP, Telnet

MESSAGE

Description: This command displays a message on the front panel screen. It will be used to display informational messages during downloads.

Help Menu(s): Device

Syntax: MESSAGE [message_string]

Parameters: message_string - ASCII string to display on panel screen
No parameter clears message from screen and restores display page.

Possible Source: RS-232, CTP, Telnet

PASSWORD

Description: This command is used to set the password for console connection over the Internet. The user is prompted for the password and once again to verify the password. The password feature can be disabled by simply depressing <RETURN> at each prompt. The RS-232 and Cresnet console connections do not have password protection, which allows the password to be changed if it is forgotten.

Help Menu(s): Main, System

Syntax: PASSWORD

Parameters: none, user is prompted for password

Possible Source: RS-232, CTP, Telnet

PING

Description: This command executes the standard ping test on a remote node.

Help Menu(s): Ethernet

Syntax: PING ip_address

Parameters: ip_address - the Internet Protocol (IP) address of the remote node in dot decimal format (eg. 255.255.255.255)

Possible Source: RS-232, CTP, Telnet

PROGRESET

Description: This command reloads and restarts the program.

Help Menu(s): System

Syntax: PROGReset

Parameters: none

Possible Source: RS-232, CTP, Telnet

RAMFREE

Description: This command displays the space remaining in the ram file system.

Help Menu(s): File

Syntax: RAMFree

Parameters: none

Possible Source: RS-232, CTP, Telnet

REBOOT

Description: This command causes the panel to execute a reboot sequence.

Help Menu(s): Main, System

Syntax: REBOOT

Parameters: none

Possible Source: RS-232, CTP, Telnet

REMASTER

Description: This command removes a CIP node from the panel's master list. A CIP node is completely specified by its CIP ID number and the IP addresses of each end. The new IP table is then stored in permanent memory for retrieval. The panel should be rebooted so that the old node will not be recognized.

Help Menu(s): Ethernet, Main

Syntax: REMMaster cip_id ip_address

Parameters: cip_id - the ID of the node in hexadecimal notation

ip_address - the Internet Protocol (IP) address of the remote node in dot decimal format (eg. 255.255.255.255)

Possible Source: RS-232, CTP, Telnet

REPORTCRESNET

Description: This command shows all devices on the main Cresnet leg.

Help Menu(s): System

Syntax: REPORTCRESNET

Parameters: none

Possible Source: RS-232, CTP, Telnet

RESTORE

Description: This command restores system setup parameters to the factory defaults.

Help Menu(s): System

Syntax: RESTORE

Parameters: none

Possible Source: RS-232, CTP, Telnet

RTSCTS

Description: This command enables/disables the hardware handshaking on the RS-232 port. If no parameter is entered, the current state is displayed.

Help Menu(s): System

Syntax: RTScts [ON | OFF]

Parameters: ON - enables the RTS/CTS handshaking
OFF - disables the RTS/CTS handshaking

Possible Source: RS-232, CTP, Telnet

SAVE

Description: This command forces a system parameter save to EEPROM.

Help Menu(s): Main, System

Syntax: SAVE

Parameters: none

Possible Source: RS-232, CTP, Telnet

SELFTEST

Description: This command executes the system self test procedure.

Help Menu(s): Device

Syntax: SELFTEST

Parameters: none

Possible Source: RS-232, CTP, Telnet

SERIAL

Description: This command sets the communication parameters for the **COMPUTER** port. New settings are effective immediately.

Help Menu(s): System

Syntax: SERIAL baud,parity,databits,stopbits

Parameters: baud - desired baud rate for the RS-232 port (110 through 115200)
parity - desired parity for the port ('N', 'E', 'O')
databits - desired number of data bits (7,8)
stopbits - desired number of stop bits (1,2)

Possible Source: RS-232, CTP, Telnet

SHOWHW

Description: This command displays the current hardware configuration as well as the current Internet settings.

Help Menu(s): Main, System

Syntax: SHOWHW

Parameters: none

Possible Source: RS-232, CTP, Telnet

SYSTEM

Description: This command initiates a firmware upgrade using Xmodem to transfer the new firmware to the panel. The user is prompted to start the Xmodem transfer (not allowed over a Telnet connection).

Help Menu(s): File, System

Syntax: SYSTEM

Parameters: none

Possible Source: RS-232, CTP

TIMEDATE

Description: This command sets the time and date of the control system real-time clock. If no parameter is entered, the current time/date is displayed.

Help Menu(s): Main, System

Syntax: TIMEdate [hh:mm:ss mm/dd/yyyy]

Parameters: hh:mm:ss - time in hours (use 24 hour), minutes, and seconds
mm/dd/yyyy - date in months (1 through 12), day (1 through 31), and year

Possible Source: RS-232, CTP, Telnet

TYPE

Description: This command displays the contents of a file (only works for files under 1024 bytes in size).

Help Menu(s): File

Syntax: TYPE filename

Parameters: filename - name of the file to be displayed

Possible Source: RS-232, CTP, Telnet

UPLOAD

Description: This command will load a file into a Cresnet touchpanel device.

Help Menu(s): System

Syntax: UPLOAD [DISPLAY | FIRMWARE] net_id

Parameters: DISPLAY - indicates that the file is a display list for a touchpanel
FIRMWARE - indicates that the file is a firmware upgrade
net_id - Cresnet ID of the touchpanel device (in hexadecimal)

Possible Source: RS-232, CTP, Telnet

VERSION

Description: This command displays firmware version information.

Help Menu(s): Main, System

Syntax: VERsion

Parameters: none

Possible Source: RS-232, CTP, Telnet

WEBSERVER

Description: This command enables/disables the webserver for the control system. System must be rebooted to take affect.

Help Menu(s): Ethernet, System

Syntax: WEBSERVer [ON | OFF]

Parameters: ON - enables webserver
OFF - disables webserver

Possible Source: RS-232, CTP, Telnet

WEBINIT

Description: This command sets the main page for the web pages. It looks for a special file, which contains the name of the default page.

Help Menu(s): Ethernet, System

Syntax: WEBINIT

Parameters: none

Possible Source: RS-232, CTP, Telnet

WEBPORT

Description: This command specifies the port number from which the web server listens. Changing the port (from the well know web server port 80) can protect the system from attacks.

Help Menu(s): Ethernet

Syntax: WEBPORT [portnumber]

Parameters: portnumber - port number for CIP activity

Possible Source: RS-232, CTP, Telnet

XGETFILE

Description: This command uses Xmodem to retrieve a file(s) from the panel. Wildcards are accepted and can be in the form of (*file, *file*, and file*).

Help Menu(s): File, Main

Syntax: XGETfile filespec

Parameters: filespec - ASCII string contains the file name and/or wildcards

Possible Source: RS-232, CTP

XONXOFF

Description: This command enables/disables the software handshaking on the RS-232 port. If no parameter is entered, the current state is displayed.

Help Menu(s): System

Syntax: XONxoff [ON | OFF]

Parameters: ON - enables the XON/XOFF handshaking
OFF - disables the XON/XOFF handshaking

Possible Source: RS-232, CTP, Telnet

XPUTFILE

Description: This command uses Xmodem to send a file to a touchpanel. All information is retrieved from the file.

Help Menu(s): File, Main

Syntax: XPUTfile

Parameters: none

Possible Source: RS-232, CTP

Appendix B: File System

The file system inside the 2-series control engine can be broken down into two parts. The first part resides on the on-board flash memory and the second resides on the external compact flash/microdrive card. This appendix briefly describes the structure of the file system.

The files that reside in the internal flash conform to a flat directory structure. The compact flash system contains a fully FAT32 compatible file system to allow the same compact flash card to be used in a Windows environment. The table, shown below, presents the structure of the overall file system.

| TOP LEVEL | SECONDARY LEVEL | DESCRIPTION |
|-----------|-----------------|---|
| \ | | Root of the file system |
| | DISPLAY | Legacy directory used in ISYS panels to hold display lists |
| | SYS | Contains various system configuration files |
| | SETUP | Legacy directory used in ISYS panels to hold setup files |
| | 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 |
| | CFx | The mounting point for the compact flash files, where x is the number of the compact flash slot (0 = on board slot, i.e., \CF0 refers to the on-board slot) |

Although the file system is case insensitive, the case is preserved to maintain file checksums. The compact flash directory only appears when the compact flash is inserted into the system. To reference files on the compact flash, prefix the “\CFx\” to any fully qualified path from the Windows environment. For example, if the file in Windows is “\MyDirectory\MySubdirectory\MyFile.ext”, the complete 2-series path for a file on the first Compact Flash slot (onboard) is:

“\CF0\MyDirectory\MySubdirectory\MyFile.ext”

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Crestron Electronics, Inc.
15 Volvo Drive Rockleigh, NJ 07647
Tel: 888.CRESTRON
Fax: 201.767.7576
www.crestron.com

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