

Product Manual

AV6x4

Audio/Video Router, 6x4
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17630 Davenport Rd, Suite113
Dallas, TX 75252 USA

Tel: 972.931.2728
888.972.2728

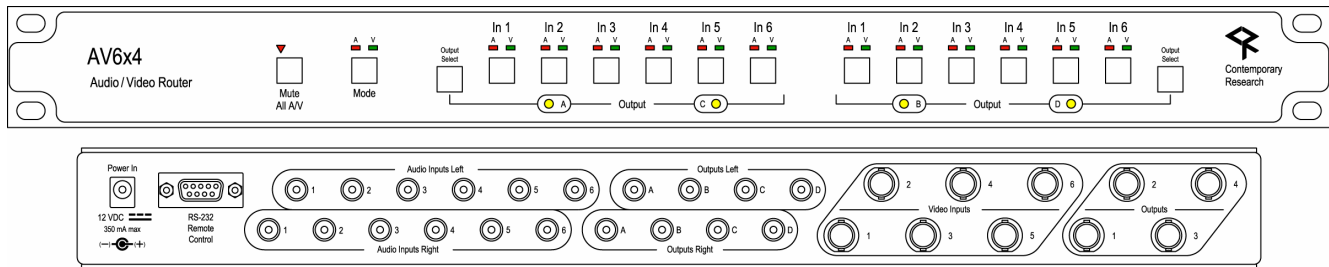
Fax: 972.931-2765

Web: www.crwww.com
www.contemporaryresearch.com

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Overview

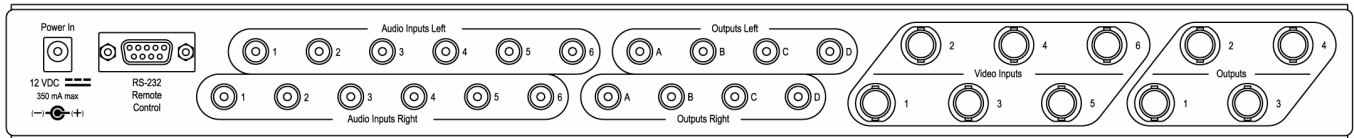


Contemporary Research presents the AV6x4, a flexible, controllable matrix switcher for routing six stereo A/V inputs to four stereo A/V outputs. Using the simplified front-panel controls, it's easy to switch VCRs, DVDs CDs, cameras and other sources to TVs, projectors, and plasma displays. Route and input to any combination of outputs, send both audio and video, or switch audio and video separately. Advanced capabilities are available from front-panel programming as well, including adjusting input levels, setting RS-232 baud rate and device number, and selectively enabling or disabling front-panel features.

The AV6x4 is a popular choice for conference rooms, home theaters, and classrooms because it is easily controllable by computer software and custom control systems. Up to three switchers, as well as CR stereo TV and FM tuners, can be controlled by a single RS-232 control port. Simple and logical, the AV6x4 ASCII protocol is easy to integrate for system control, setup, and feedback.

- Switches six A/V inputs to four outputs
 - BNC video inputs and outputs (composite NTSC, PAL, SECAM)
 - Vertical interval routing for clean glitch-free switching
 - Internal DIP switch provides 75 ohm input termination or Hi-Z video T-connection
 - Stereo gold RCA inputs and outputs
 - Audio-follow-video or breakaway audio and video switching
 - Adjustable sound levels help balance audio from input sources
 - Master Mute for all video and audio outputs
- Operates from RS-232 control port or front-panel control
 - Simple ASCII commands and feedback for computer or control system integration
 - Opto-isolated RS-232 port reduces interference and ground loops
 - Control up to three switchers or other CR RS-232 products from a single RS-232 control port
 - Programmable front-panel control enable/disable
- Simplified front-panel switching control
 - Select switching Mode (video, audio or both)
 - Select output A, B, C, or D, LEDs display current input for both audio and video
 - Press desired Input to execute switch, LEDs change to show new routing status
- Restores all operation status after loss of power from data stored in non-volatile memory
- Mounts on shelf or in 19" equipment rack

Specifications



Physical

Size: 19" [483mm] wide x 1.75" [38mm] height (1RU) x 9.25" [235mm] deep
Weight: 4.25lbs [1.47Kg]
Enclosure: All aluminum, including front extrusion, durable black powder coat paint

Front Panel

Mute All A/V: Toggling Mute for all audio and video, red LED lights when muted
Routing Mode: Cycling routing mode selection — red LED (Audio only), green LED (Video only), or both LEDs (A/V)
Routing Control: Select Mode
Select Output (A, B, C, or D), LEDs show the audio and video input routed to output
Selecting Input (1-6) initiates switch, LEDs reflect change

Rear Panel

Power In: 2.1mm coaxial jack (inside center conductor positive), 300 mA maximum
11.5 to 17 VDC, 12 VDC typical (may be unregulated)
RS-232 Connector: DB-9 male
Front panel set-up for 300 to 9600 baud. Always 8 data bits, No parity, 1 stop bit
Standard ASCII keyboard character strings available from any terminal program
Status update is sent after every front panel or RS-232 command
Audio Inputs: 6 stereo (dual channel) gold RCA female
Unbalanced line level, 20K ohms and buffered
Each input programmable from -9 to +9dB in 3dB steps
Maximum level, including any AV6x4 gain, +11 dBm (3.5V rms or 10V peak to peak)
Audio Outputs: 4 stereo (dual channel) Gold RCA female
Unbalanced line level, buffered, 100 ohms (up to +11dBm, 600 ohm load)
Frequency Response: 20Hz to 30KHz flat
Total Harmonic Distortion (THD): < 0.01%
Crosstalk: < -75dB @ 1KHz
Noise: < -75dB
Video Inputs: 6 BNC female
NTSC, PAL, or SECAM composite
2 V peak to peak maximum level
75 ohms Impedance (+/- 1%) or internal DIP switch selectable to HI-Z for looping
Video Outputs: 4 BNC female
Video op-amp with 75 ohm (+/- 1%) series termination
DC through 10 MHz response
Vertical interval Switching
Crosstalk: < -55dB @ 4.43 MHz (chroma)
Noise: < -70dB
Differential Gain: < 0.1%
Differential Phase: < 0.2°

Includes

19" mounting brackets
12 VDC Power Supply, 400 mA (Included for North American shipments only)

Options

CC-232 Cables for control, linking multiple units

Front Panel Programming

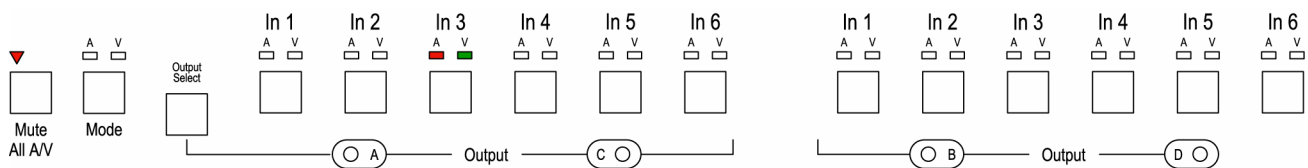
To Enter a Front Panel Programming Mode

1. Press and hold the **Mute A/V** button until the red LED light above is lit (indicating Mute On).
2. Press **Input 1-6** in the **Output A/C** section to select Programming Mode 1-6.
The Mode and Output A-D LEDs (yellow) will turn off when programming mode is selected.
3. Release **Mute A/V** button to enter selected front-panel programming mode.
4. The **A/C Input** and **B/D Input** LEDs will display the current setting for the mode
5. Use the **A/C Input** and **B/D Input** buttons to change parameters.
6. Changes are saved in non-volatile memory as they are entered.

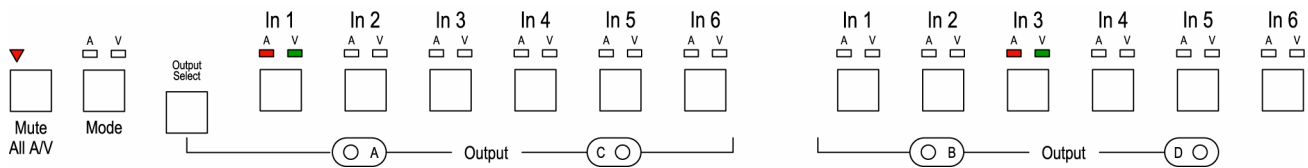
To Exit selected Front Panel Mode

Push and release the Mute All A/V button.

Example:



Set to Front-Panel Input Level Mode: Mute A/V held down, A/C Input 3 pressed, release Mute A/V



Set Input Level: Press A/C In 1 (Input 1) and B/D In 3 (Gain Level 3), then press Mute A/V to exit

Mode 1: Baud Rate select.

Selects baud rate for the RS-232 control port. Factory default is 9600 baud. Higher baud rates are recommended for quicker response time.

Mode 2: Unit Address select, Reset to Default Settings

Selects unit address used in RS-232 remote control protocol. Factory default is unit address 1 and should only be 2 or 3 if multiple units are RS-232 daisy chained.

If the Mode button is pressed and held while exiting this mode, the AV6x4 is reconfigured for all factory defaults.

Mode 3: Input Gain Adjust

Selects Input to adjust gain. See chart on next page for gain levels.

1. Press one of the **A/C Input** buttons (1-6) to select input to attenuate.
2. Press one of the **B/D Input** buttons (1-6) to select attenuation level
3. To select zero attenuation, press the **A/C Input** button again to clear all B/D Input LEDs (0 dB)

In this mode, audio from the selected input is routed to all outputs. To test levels during programming, send audio through the selected input, and meter from one of the outputs.

Mode 4: Front Panel Disable level.

Selects front panel buttons to be disabled. Different levels of lockout are possible. See chart on next page.

Mode 6: Special Test Mode (for factory testing)

Byte \$55 is constantly transmitted out from the RS-232 port.

Front Panel Programming Quick Reference

Mode	Function	A/C	Parameter	B/D	Parameter
1	Baud Rate	1	300		
		2	600		
		3	1200		
		4	2400		
		5	4800		
		6	9600 (default)		
2	Unit Number	1	Unit 1		
		2	Unit 2		
		3	Unit 3		
3	Input Level	1	Input 1	1	-9 dB
		2	Input 2	2	-6 dB
		3	Input 3	3	-3 dB
		4	Input 4	4	+3 dB
		5	Input 5	5	+6 dB
		6	Input 6	6	+9 dB
					All Off
4	Panel Lockout	1	All functions enabled	1	Mute All A/V, Mode
		2	Output Selects disabled	2	All functions disabled
		3	Mode disabled		
		4	Output Selects, Mode disabled		
		5	Mute All A/V disabled		
		6	Output Selects and Mute All A/V		
6	Test Mode		Send test string		

RS-232 Control Protocol

Overview

The AV6x4 full-duplex RS-232 scheme enables a system programmer to control all routing functions as well as monitor 3 groups of unit status. All commands are sent as ASCII strings. No delays between characters or commands are required, as data is interrupt driven and buffered.

There are three types of commands and responses—Crosspoint, Input Gain and Front Panel. Crosspoint commands route Input 1-6 audio and video to Outputs 1-4. Audio Gain commands adjust the audio gain of each input between -9 to +9 dB, allowing the user to balance levels for all inputs. Front Panel commands provide several front-panel mode and lockout functions. A corresponding Crosspoint, Input Gain or Front Panel ASCII response will be sent when a valid command has been received. In addition, all three status strings will be sent on power-up or by and RS-232 status request at any time.

Up to 3 AV6x4s, or a combination of three Contemporary 232-series components, may be cabled together and addressed for individual control from a single RS-232 port. Each unit is assigned a unique unit code (Front Panel Mode 2). All settings are saved to NVRAM.

Communications parameters (Front Panel Mode 1) are 300 to 9600 baud, 8 data bits, No parity, and 1 stop bit. Factory default is 9600 baud, Unit#1.

General protocol specifications

Characters in command strings to the AV6x4 are common ASCII keyboard characters.

Command strings sent to the AV6x4 begin with the ASCII > (greater than symbol) as an 'Attention' character and end with carriage return - ASCII CR, Hex \$0D, or keyboard Enter - as an 'End-of-command' character.

Responses from the AV6x4 begin with the ASCII < (less than symbol) as an 'Attention' character and end with a carriage return followed by line feed an ASCII LF or Hex \$0A as 'End-of-command' characters.

A carriage return is required at the end of each command and is assumed in all examples.

Command String Structure

[Attention] (Unit#) [Command] (Parameters) [Return]

Attention	Single character (>) starts the string
Unit#	The Unit# is expressed as an ASCII 1 2 or 3 when used in multi AV6x4 applications. It may be omitted for a default of Unit#1 for a single AV6x4 set as Unit#1.
Command	A two-character command
Parameters	Added attributes to some commands
Return	A carriage return ends the command string, you may use ASCII CR, Hex \$0D, or keyboard 'Enter' in programming. For simplicity, the programming examples in the manual will not show the 'CR' – so remember, you'll need to add it in your control code.

RS-232 Commands

Crosspoint Commands

A Crosspoint command sends inputs to outputs. The command structure is simple:

> [Unit] [Crosspoint (X, A, V)] [Input (0-6)] [Output (A-D)] [Input] [Output]...

More than one set of Input/Output points can follow the Crosspoint command. You don't have to include all Input/Output Crosspoints in the string, only the Crosspoints that need to be changed. A carriage return is required at the end of each command and is assumed in all examples.

Parameter	Character	Function
Crosspoint	X Audio-Follow Video A Audio Only V Video Only	Route the input's audio and video to the output Route the input's audio only to the specified output Route the input's video only to the specified output
Input	1-6 Input # 0 Blank	Specifies Input 1-6. When a zero (0) is used, the output will be blanked.
Output	A – D Outputs * All Outputs	Specifies output for Crosspoint Routes input to all outputs
Mute	M Mute On U Mute Off T Toggle Mute On/Off	Mutes all audio and video Unmutes all audio and video Toggles Mute on and off Mute command must follow Crosspoint character
Status	XS Request Crosspoint Status	AV6x4 returns Crosspoint status string
Examples	>2X1A2B3C4D	Unit 2 Audio-Follow Video Crosspoint In 1 to Out A, In 2 to Out B, In 3 to Out C, In 4 to Out D
	>2XU1A2B3C4D	Performs same routing as example above Unmutes all audio and video outputs, clears any front-panel muting
	>2U	Mutes all audio and video (I/O Crosspoints not required)
	>X0D	Mutes Unit 1 audio and video to Out D
	>V5*	Routes Input 5 video to all outputs
	>XS	Requests Crosspoint status for Unit 1

Multiple commands may be concatenated as single strings up to 120 ASCII characters long.

Example: >2X1A2BA3CM Combines Crosspoint and Audio routes, mutes all A/V

Mute A/V Off command is not required in any command; however it may be useful to send Mute A/V Off in case Mute A/V had been set On from the front panel.

Sending all 3 status request commands back-to-back for a full status update is allowed.

Example: >XSGSPS' Returns all 3 response strings back-to-back.

Audio Gain Commands

An Audio Gain command adjusts the attenuation or gain of each Input.

> [Unit] [Gain] [Input (1-6)] [Level (1-6)] [Input] [Level]...

More than one set of Input/Gain pairs can follow the Gain command. You don't have to include all Input/Gain pairs in the string, only the ones that need to be changed. A carriage return is required at the end of each command and is assumed in all examples.

Parameter	Character	Function
Gain	G Gain	Sets the selected input to the specified audio level
Input	1-6 Input # * All Inputs	Selects Input 1-6. Sets all inputs to specified gain
Level	0 1 2 3 4 5 6	Unity (0) gain - default -9 dB gain -6 dB gain -3 dB gain +3 dB gain +6 dB gain +9 dB gain
Status	GS Request Gain Status	AV6x4 returns Gain status string
Examples	>2G102030405060	Unit 2 Sets all Inputs to 0 Gain
	>G*0	Unit 1 Sets all Input to 0 Gain
	>G53	Lowers Input 5 gain to Level 3 (-3 dB)
	>3GS	Requests Gain status for Unit 3

Front Panel Commands

Front Panel Commands emulate the functions of front-panel operation and programming.

> [Unit] [Panel] [Mode] [Output A/C] [Output B/D] [Lockout]

All four parameters (Mode, Output A/C, Output B/D, Lockout) must be included in string. A carriage return is required at the end of each command and is assumed in all examples.

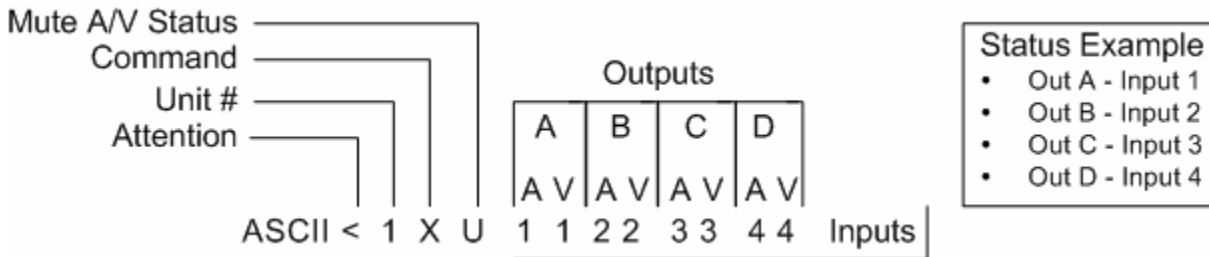
Parameter	Character	Function
Panel	P Front Panel Mode	Sets the command for front-panel functions
Mode	X Audio-Follow Video A Audio Only V Video Only T Toggle Mode	Route the input's audio and video to the output Route the input's audio only to the specified output Route the input's video only to the specified output Cycles Mode through the three routing options
Output A/C	A Output A mode C Output C mode T Toggle A/C	Selects Output A mode Selects Output C mode Toggles between A and C
Output B/D	B Output B mode D Output D mode T Toggle B/D	Selects Output B mode Selects Output D mode Toggles between B and D
Lockout	1 2 3 4 5 6 5 8	All functions enabled Output Selects disabled Mode disabled Output Selects and Mode disabled Mute All A/V disabled Output Selects and Mute All A/V disabled Mute All A/V, Mode disabled All functions disabled
No Change	=	Parameter unchanged
Status	PS Request Front Panel Status	Returns Front Panel Status string from AV6x4
Examples	>1PAAD1	Unit 1 Audio-only Crosspoint Output A selected Output D selected Level 1 lockout (all functions enables - default)
	>1PX===	Unit 1 Audio-Follow Video Crosspoint All other parameters unchanged
	>3PS	Requests Front Panel status for Unit 3

Response Strings

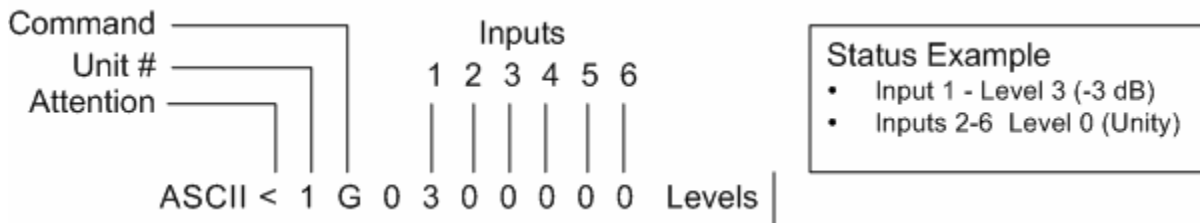
Typical: [Attention] [Unit#] [data ...data] [cr] [lf]

AV6x4status response strings contain ASCII characters similar to those used for the same functions in command strings. An ASCII 'carriage return' and 'line feed' follow each response string.

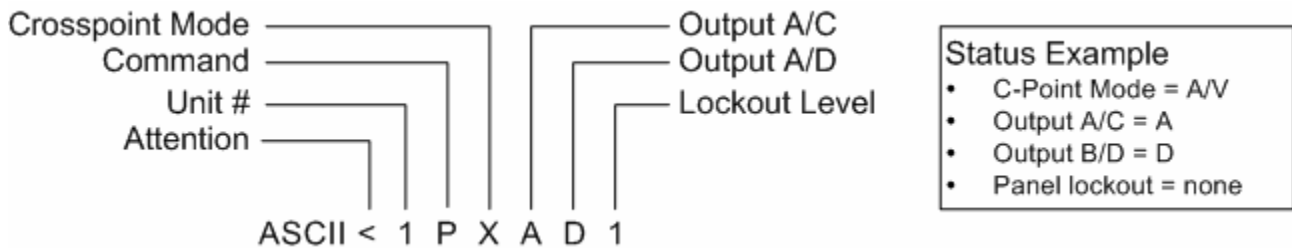
Crosspoint Status Response String



Audio Attenuation Response String



Front Panel Status Response String

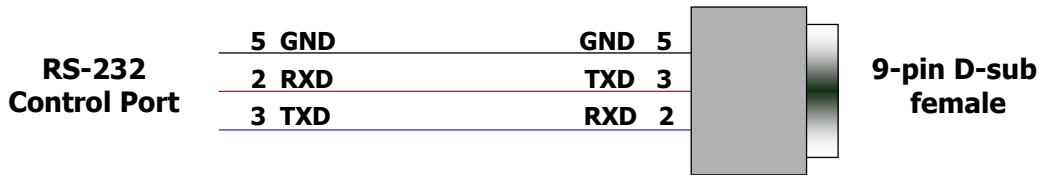


RS-232 Cable Connections

All drawings show pin numbers relative to a PC COM port or Axcnt3 DB-9 RS-232 control port. Pin-outs to other types of control ports may vary.

Single Unit

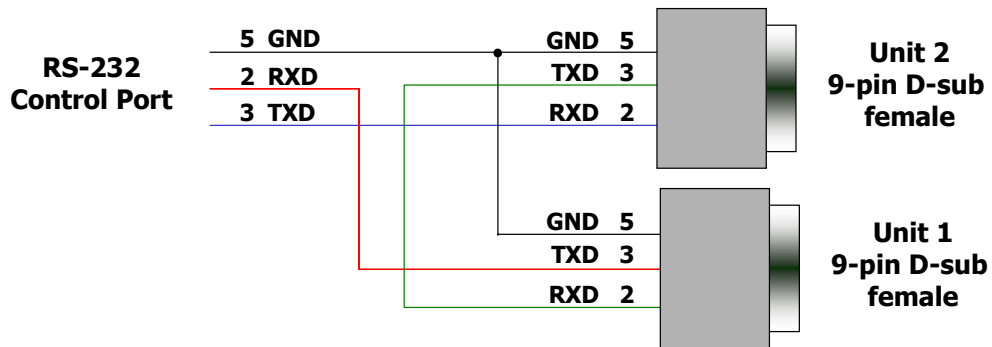
RS-232 Wiring – Single Unit



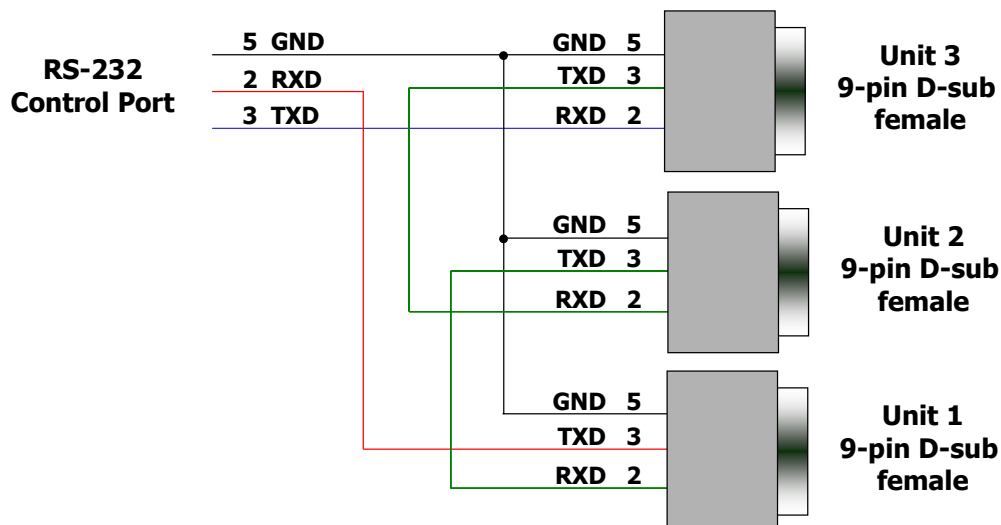
Multiple RS-232 Units

Up to three Contemporary Research 232-series components can be daisy-chained from one RS-232 control port. Remember that you will need to use the **Unit# address** in your programming when you control more than one AV6x4 from the same control port. You can also daisy-chain 232-series Video and FM tuners with one or two AV6x4 A/V Routers. In this application, set the Router to the lowest Unit#.

RS-232 Wiring – Two Units



RS-232 Wiring – Three Units



Safety Instructions

Read before operating equipment.

1. **Cleaning** - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
2. **Power Sources** - Use supplied or equivalent UL/CSA approved low voltage DC plug-in transformer.
3. **Outdoor Antenna Grounding** - If you connect an outside antenna or cable system to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
4. **Lightning** - Avoid installation or reconfiguration of wiring during lightning activity.
5. **Power Lines** - Do not locate an outside antenna system near overhead power lines or other electric light or power circuits or where it can fall into such power lines or circuits. When installing an outside antenna system, refrain from touching such power lines or circuits, as contact with them might be fatal.
6. **Overloading** - Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
7. **Object and Liquid Entry** - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts, resulting in a fire or electric shock. Never spill liquid of any kind on the product.
8. **Servicing** - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
9. **Damage Requiring Service** - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - When the power supply cord or plug is damaged.
 - If liquid spills or objects fall into the product.
 - If the product is exposed to rain or water.
 - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. An improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
 - If the video product is dropped or the cabinet is damaged.
 - When the video product exhibits a distinct change in performance, this indicates a need for service.

*** Note to CATV system installer:** This reminder is provided to call CATV system installer's attention to Article 820-40 of the National Electrical Code (Section 54 of Canadian Electrical Code, Part I), that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building as close to the point of cable entry as possible.

Limited Warranty and Disclaimer

Contemporary Research Corporation (CR) warrants this product to be free from defects in material and workmanship under normal use for a period of two years from the date of purchase from CR. Should such a defect occur CR will repair or replace, at their option, the defective product at no cost for parts or labor.

This warranty extends to product purchased directly from CR or an Authorized CR Dealer. Consumers should inquire from selling dealer as to the nature and extent of the dealer's warranty, if any.

All warranty claims must be shipped pre-paid to the factory. Call or fax to obtain a Return Material Authorization (RMA) number.

CR is not liable for any damages caused by any of its products or for the failure of any products to perform, including any lost profits, lost savings, incidental damages, or consequential damages. CR is not responsible for any claim made by a third party or made for you by a third party. This limitation of liability applies whether damages are sought, or a claim is made, under this warranty or as a tort claim (including negligence and strict product liability), a contract claim, or any other claim. This limitation of liability cannot be waived or amended by any person. This limitation of liability will be effective even if CR or an authorized representative of CR has been advised of the possibility of any such damages.

Some states do not allow a limitation of how long an implied warranty lasts. Some states do not allow the limitation or exclusion of incidental or consequential damages for consumer products. In such states, the limitation or exclusion of the Limited Warranty may not apply to you. This Limited Warranty gives you specific legal rights. You may also have other rights that may vary from state to state. You are advised to consult applicable state laws for a full determination of your rights.

Except as expressly set forth in this Limited Warranty, CR makes no other warranties, expressed or implied, including any implied warranties of merchantability or fitness for a particular purpose. CR expressly disclaims all warranties not stated in this Limited Warranty. Any implied warranties that may be imposed by law are limited to the terms of this Limited Warranty.