Product Manual

232-MCT

Mono Caption Tuner
Ver.5.2 March 7, 2013

Contemporary Research

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Overview

The Contemporary Research 232-MCT is an economical RS-232/IR controlled video tuner featuring mono audio, 125-channel access in CATV, HRC, or IRC modes, closed captioning and intelligent control. Fully programmable, the unit can restore all settings on power-up from non-volatile memory. A list of accessible channels, called channel rings, can be stored in memory, used for convenient channel up/down control and to control direct access to unlisted channels. Switchable inputs for NTSC video and mono audio are included for display of PC graphics, a character generator information channel, camera or other A/V sources.

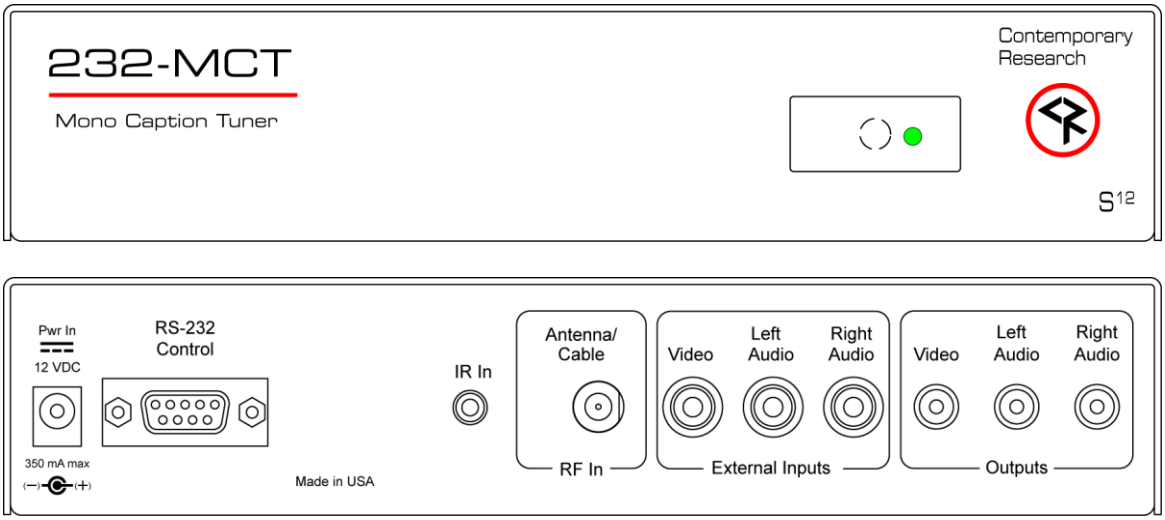
An onboard character generator displays on-screen text for closed captioning, channel names, and text from a custom control system. Full setup, control, and feedback is provided by RS-232. Up to nine 232-series tuners can be controlled from a single RS-232 port. In addition, remote tuning ring channel up and down operation can be accessed through contact closure inputs. Enjoy a full range of wireless control with the optional IC-RC IR Wireless Remote.

- Interacts with PCs and control systems via RS-232, using simple ASCII-format commands and feedback, up to 9 tuners can be linked to a single RS-232 control port; AMX, Crestron, or RTI modules available.
- Tunes 125 channels CATV, HRC, or IRC modes, using true synchronous video detection and intercarrier SAW filter – channel 126 selects the composite input.
- Stores programmable tuning ring in memory to control channel access
- Receives IR commands from front-panel sensor and wired IR input on the back, also responds to Sharp IR TV commands
- Accesses tuning ring channel up/down from contact closure inputs
- Displays closed-captioning text, on-screen channel names, and on-screen text from custom control systems
- Inserts blue screen video image when unit senses loss of video level
- Restores all operation status after loss of power from data stored in non-volatile memory
- Mutes both audio and video, variable volume control
- Switches between tuner and external A/V input (video and audio inputs, can convert stereo to mono)
- Mounts in 19" rack with optional RK1 or RK2 kit for dual side-by-side installation
- Setup available via RS-232 using free Tuner Helper software, a Terminal application, or by custom system programming
- Integrates with 232-AMP for educational applications, pole mount bracket available
- Firmware updateable via local PC over RS-232

Firmware Versions:

V5.1 Adds RS-232 command for setting Unit#, enables use of fully-wired RS-232 cables (ignores voltage on pins 4 and 9).
5.2 Makes sure CC text messages clear the screen after use

Specifications



Physical

Size:	8.5" [216mm] wide x 1.75" [38mm] height (1RU) x 6.0" [153mm] deep
Weight:	1.5 lbs [0.68kg]
Enclosure:	All aluminum with durable black powder coat paint
Mounting:	Rack mounting for one or two units side-by-side optional (RK1, RK2)

Front Panel

IR Sensor:	Receives 57 KHz IR commands, CR mode 9 or Sharp TV
Power LED:	Green LED behind IR window lights when power is on (AV unmuted)

Rear Panel

Power In:	2.1mm coaxial jack (inside center conductor positive), 350 mA maximum 10.5 to 14.5 VDC, 12 VDC typical (may be unregulated)
RS-232 Control:	DB-9 male connector
	User selectable 300 to 19,200 (9600 default) baud, 8 data bits, no parity, 1 stop bit
	Employs standard ASCII strings from any terminal program, PC, or control system
	Can accept non-standard RS-232, including 0 to +5 VDC operation
	Integrates with 232-AMP, daisy-chain RS-232, set tuner to Unit 2
Closures:	2 momentary closure inputs - Channel Up (Pin 4), Down (Pin 9), GND (Pin 5)
IR In:	3.5mm stereo jack for optional IR-RXC IR Receiver
	Sleeve= DC power+ from power jack input, limited to less than 100mA
	Ring=DC power– (GND)
	Tip= IR data signal
Antenna/Cable:	'F', female, 75 ohm impedance
AV Input:	1 RCA female NTSC composite, 2 RCA mono audio (mixes stereo input to mono)
Video Output:	RCA female, NTSC composite, 75 ohm impedance, 1V peak-to-peak typical
Audio Outputs:	2 RCA female, mono, unbalanced, 330 ohms impedance
	(they are marked Left/Right, but both provide the same mono output)
Response:	Total Harmonic Distortion (THD) 0.5%, 0.1% typical 20Hz to 20KHz
Level:	+8dBu, (2V RMS), 0 to -70 dB and mute, 64 steps

Internal Character Generator/Captioning

Characters:	ASCII
Format:	White text over video or white text with black background over video,
	Up to 32 characters, 13 lines
Function:	Closed captioning, channel labels, interactive menus, messages, and system feedback
Captioning:	Modes CC1-CC4, TT1-TT4, On/On with Mute/Off modes, CG text times out to show captioning

RF Tuner

Frequency Range:	NTSC television 55.25 to 801.25 MHz, 62.5KHZ fine tune resolution
Maximum Input:	Maximum Input: +20dBmV max, +10dBmV nominal*
Video Gain:	±5% maximum, 2% typical
Video Phase:	±3 degrees maximum, 2 degrees typical

Includes

12 VDC power supply, 500 mA min (North American shipments only)

Options

CC-232 RS-232 Control Cable (specify make and model)
RK1 Kit for mounting single unit in 19" rack, RK2 Kit for mounting two units side-by-side in 19" rack
IC-RC IR Wireless Remote
PMT-1 Pole Mount Bracket can mount tuner (and 232-AMP) to a video projector pole.

Troubleshooting

Symptom: Problems with Cable Channels

There are three types of cable channel systems, Cable, IRC, and HRC. While the Cable setting works for over 90% of installations, there are a few cable systems set for IRC and HRC channel frequencies. Here's how to tell which is which:

- **IRC**– Channels 5 and 6 are missing. Change to IRC and they will appear.
- **HRC** – None of the channels tune in, or they are noisy or lack audio. Change to HRC.

Symptom: Need to change Unit # of Tuner

See Page 9 for S2 RS-232 command.

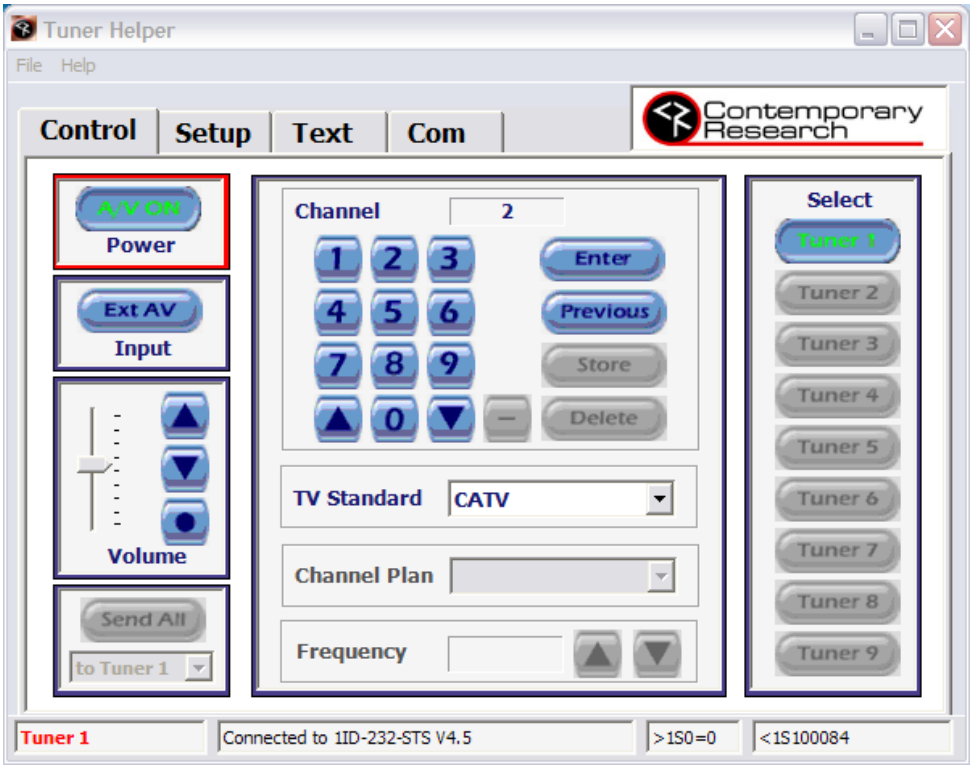
Symptom: How do I select the composite input?

Select Channel 126.

Tuner Setup

There are several ways you can set up the 232-MCT tuner via RS-232.

Tuner Helper



Download this easy-to-use free software tool (Version 3.2.0) from the bottom of the www.crwww.com home page, or the **Downloads** page. The three tabs you'll use are:

- **Control** – Acts a test control panel, sets up TV Standard and Volume.
- **Setup** – Channel ID text and define list of channels (tune ring)
- **Text** – sets closed captioning operation
- **COM** – defines RS-232 port or IP port for communication

All changes are live, so your changes are real-time. You can save your setup to a file, then use to clone identical tuners.

Terminal

It's also easy to use an RS-232 Terminal app for setup. The 232-MCT is shipped set to Standard Cable, and the internal channel list is set to 2-126. To limit the channels, use the TR command and enter a list of channels. If your PC is XP and you still have Hyper Terminal, you can enter the setup commands in a Notepad text file, then select the page from HyperTerminal to clone the tuner. Download the **HyperTune** file from Download for a manual and a sample text file. If you have Windows Vista or newer, search for Tera Term and download the application. It's a great Terminal application, and it also has a Send File option that can send the text file.

To quickly "clone" MCT Tuners:

- Create a text file with Notepad as shown below
- Add an Enter at the last line (commands need it to be sent)
- Save by job name
- Open Windows Terminal (or Tera Term for Win 7 users) set up for RS-232 control (COM port, 9600, 8 data bits, 1 stop, no handshake) and connect.
- Select the HyperTerm Transfer menu, select Send Text File, and choose the file you've just saved, or File/Send File in Tera Term

Sample file:

```
>S0=0 (Tune Mode Cable)
>TR=2,4,5,7-10,19,32,50 (Tune Ring Channels)
>Q4=3 (Onscreen Channel Display - Channel and Name)
>Q0=0 (Captioning off)
>TN=2,NBC (Channel name - up to 8 characters)
>TN=4,FOX
>TN=7,ABC
>TN=5,PBS
>TN=19,CW
>TN=32,KAZQ
>TN=50,WC
>P1 (Power On)
>TC=19 (Tune to Channel 19)
```

Overview

The 232-MCT full duplex RS232 scheme enables a system programmer to control all TV Tuner functions as well as monitor 3 groups of TV Tuner status. All commands are sent as ASCII strings. No delays between characters or commands are required, as data is interrupt driven and buffered.

The 3 status groups are: Channel/Source Select, Audio Levels/Mode and Front Panel. Each of the groups has one ASCII status response string containing all of the status data for that group. The current status string of a group is sent from the 232-MCT whenever a valid command for that group is received by the 232-MCT RS-232 port or front panel. A group's status may be requested at any time via the RS-232 port. Status of all 3 groups is sent at power up. The format of each group's status response string remains the same always.

Up to 9 232-MCTs may be cabled together and addressed for individual control from a single RS-232 port. Each 232-MCT is assigned a unique unit code (Front Panel Mode 2).

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.

All settings are saved to NVRAM in the 232-MCT.

General protocol specifications

Characters in command strings to the 232-MCT are common ASCII keyboard characters.

Command strings sent to the 232-MCT 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 232-MCT 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 0-9 when used in multiple tuner applications. To address all units, use a Unit # of 0 (Zero – versions 4.0 and above) Sending no unit number will default to 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.

Command and Status Response

Commands can be sent back to back at any time without any delay. To allow for rapid, multiple commands, status responses are intentionally delayed by about 125mS, sending the most current status in response to control commands or user actions.

RS-232 Commands

	Typical Setup Commands	
S0=	Set tune mode	0=CATV 1=Broadcast 2=HRC 3=IRC
S2=	Set Unit #	1-9
TR=	Set Tune Ring (TR) ***Example:*** '>2TR=2,4,7-10'	Limits access to specified channels, 120 chars max You can use dash for sequential channels, include 126 if you are using external AV inputs Stores unit #2 Tune Ring as 2,4,7,8,9,10
Q4=	Label Mode with Status (0-3)	Sets on-screen channel label mode. Same as TM, current mode reflected in status, setting TM will also change Q4. (Ver 3.1) 0=None 1=Alpha only 2=Numeric only (default) 3=Both alpha and numeric labels Channel labels are displayed overlaying the video in the top-left corner of the screen for about 10 seconds after each channel change. Tuner displays the channel number only.
Q0=	Caption Mode Off (0-2) Example: '>Q0=0' or '>Q00'	Sets captioning mode 0=Captioning off (default) 1=Captioning on 2=Captioning active when volume is muted Captioning off
	Tuning	
TR=	Set Tune Ring (TR) ***Example:*** '>2TR=2,4,7-10'	Limits access to specified channels, 120 chars max You can use dash for sequential channels, include 126 if you are using external AV inputs Stores unit#2 Tune Ring as 2,4,7,8,9,10
TT=	Select tuned channel (0-126) ***Example:*** '>TT=28'	0=video mute, 255=video unmute* 126=External AV Inputs Selects channel 28 only if 28 is present in current TR
TC=	Force tuned channel (0-126) ***Example:*** '>TC=39'	0=video mute, 255=video unmute* 126=External AV Inputs Selects channel 39 regardless of current TR
TP	Set to previous channel	Selects previous channel only if present in current TR
TU	Tune channel up ***Example:*** '>3TU'	Selects next higher channel in stored Tune Ring Bumps Unit#3 tuned channel up one from available Tune Ring
TD	Tune channel down	Selects next lower channel in stored Tune Ring
	Power and Mute AV	**Both activate the same function**
P0	Power Off	Same as XM
P1	Power On	Same as XX
PT	Power Toggle	Same as XT
XT	Toggle Mute A/V	Alternates Mute A/V on and off
XX	Mute A/V off	Turn A/V outputs on at previous level
XM	Mute A/V on Example: '>XM'	Mutes A/V outputs Mutes audio and video outputs

RS-232 Commands

	Volume and Audio	
VU	Ramp volume up	Starts volume ramping up
VD	Ramp volume down	Starts volume ramping down
VL	Ramps volume to level (0 – 63)	Sets volume to specific level
VX	Volume Mute off	Restores audio volume to previous level
VV	Stop volume ramp	Stops volume ramping
VT	Toggle Volume Mute	Alternates audio mute on and off
VM	Volume Mute on ***Example:*** '>VM'	Turns off audio outputs Mutes audio outputs
S5=	Power-up volume	0=restore to previous level (default) 1= Restore to full
S7=	Set audio mode	0=Mono/Mono (fixed)
	Status	
SQ	Request Q Mode status	Unit sends "Q" Mode status string
SS	Request Mode status	Unit sends "S" Mode status string
ST	Request Channel status ***Example:*** '>ST'	Unit sends "T" Channel/Source status string Returns Channel/Source status response string
SV	Request Audio status	Unit sends "V" Audio status string
Q	**Q-series Commands**	**Captioning, Text and Video**
Q0=	Caption Mode Off (0-2) Example: '>Q0=0' or '>Q00'	Sets captioning mode 0=Captioning off (default) 1=Captioning on 2=Captioning active when volume is muted Captioning off
Q1=	Captioning Type (1-8)	Turns on captioning type, no functionality in 232-STA 1=Caption 1 (default) 2=Caption 2 3=Caption 3 4=Caption 4 5-8= Text 1-4 (rarely used)
Q2=	Video Loss Detection (0-3)	Selects response when a loss of video signal is detected 0=Both audio and video muted (default-blue screen for video) 1=Audio mute only 2=Video muted, audio active 3=No AV mute Audio is always unmuted when external AV inputs are selected
Q4=	Label Mode with Status (0-3)	Sets on-screen channel label mode. Same as TM, current mode reflected in status, setting TM will also change Q4. (Ver 3.1) 0=None 1=Alpha only 2=Numeric only (default) 3=Both alpha and numeric labels Channel labels are displayed overlaying the video in the top-left corner of the screen for about 10 seconds after each channel change. Tuner displays the channel number only.

A carriage return is required at the end of each command and is assumed in all examples. The '=' sign for parameters may be omitted if desired, though it is helpful for clarity in checking programming.

Character Generator Commands

Before the introduction of the 232-STS, 232-MCT models offered an optional character generator, supporting an on-screen display that is 28 columns (characters) across by 11 rows (lines) down. An imaginary cursor represents the current screen write position. Writing text automatically increments the cursor to the next character space. The character text is always white.

TM=<label mode>	Sets on-screen channel label mode. 0=None 1=Alpha only 2=Numeric only 3=Both alpha and numeric labels Channel labels are displayed overlaying the video in the top-left corner of the screen for about 10 seconds after each channel change. ***Example:*** '>TM=2' Sets channel mode to display channel number only.
TN=<channel>,<alpha label>	Sets the alpha label for the specified channel. Alpha labels may be up to 8 characters and are displayed on screen when a channel changes, if alpha labels are enabled by the 'TM' command. ***Example:*** '>TN=8,ABC' Sets the alpha label for channel 8 to be 'ABC'.
TN=0,0	Clears (blanks) all stored alpha labels
TC	Displays the current channel label on screen for about 10 seconds
DG=<row>,<column>	Moves the cursor to the specified row and column position. If row is 0, then row will not be changed, and if column is 0, then column will not be changed.
E7=<column>	Moves cursor to specified column.
E8=<row>	Moves cursor to specified row.
EA	Clear on screen display. Also, moves cursor to column 1 and row 1.
EB	Moves cursor down to the first column of the next row (like a carriage return plus line feed).
DC	Clear on screen display from the cursor to the end of the screen. Cursor position does not change.
DB	Clear on screen display from the cursor to the end of the current line. Cursor position does not change.
E9=<num spaces>	Clears the specified number of spaces. Cursor position does not change
DM	Clears on-screen display. Also, moves cursor to column 1 and row 1, unblanks screen if it was blanked, and cancels an active 'KC' or 'KT' keypad command
DN<text>	Clears on screen display, then writes the specified text to the display starting at column 1 and row 1.
DW<text>	Writes the specified text to the display starting at current cursor position.
DQ=<time>	Sets screen timeout to specified time in seconds. If time is 0 or 255, any text on the screen will persist indefinitely, or until cleared.

Keypad Channel Command

If you're using an external control system, this command will emulate the pressing of numeric keypad buttons for channel selection, which means you won't need to use extra elements for capturing channel commands in your programming. The **KC** command will access any channel, **KT** will only access a channel stored in the Tune Ring.

KC=0	Emulates '0' key, accesses any channel.
KC=1	Emulates '1' key, accesses any channel.
KC=9	Emulates '9' key, accesses any channel.
KC	Emulate 'Enter' key, accesses any channel.
KT=9	Emulates '9' key, accesses channel if it exists in current Tune Ring.
KT	Emulate 'Enter' key, accesses channel if it exists in current Tune Ring.
KD	Clears or cancels any KC or KT channel entry

After 3 seconds, with no other key, the selected channel will be tuned to. Optionally, you can have an Enter key send the command KC or KT to select the channel immediately. Using the KD command can cancel a channel entry before the time delay or Enter executes the channel change.

IC-RC Remote Emulation

You can also emulate IR commands sent from the CR IC-RC Wireless Remote. If you are using the numeric keys to select a channel, the user or program will need to follow the numeric command with an Enter.

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KK=<key>	Emulates IC-RC remote key codes 0=Release Key 9=Power (toggling) 10= 0 (numeric keypad) 11=1 12=2 13=3 14=4 15=5 16=6 17=7 18=8 19=9 21=Enter 22=Channel up or + 23=Channel down or – 24=Volume up or + (use Release Key (0) to stop volume ramp) 25=Volume down or – (use Release Key (0) to stop volume ramp) 26=Volume mute 30=Switch to tuner AV (previous channel) if unit is currently set to External (ch 126) 31=Input (Toggling) switches between tuner and AV input

Tune Ring Commands and Replies

$R	Request Tune Ring	Asks for reply with list of channels in Tune Ring ***Example:*** '>$R' asks for list from Unit 1 ***Reply:***'<1$TR2-31,35,52,126'
$N=xxx	Request Label	Asks for reply with channel text assigned to specific channel ***Example:*** '>$N31' asks for label assigned to channel 31 ***Reply:*** '<1$TN038,ABC'

Terminal Communication Commands

EF	Echo Off	Characters received will not be re-transmitted (power up default)
EN	Echo On	Characters received will be re-transmitted. ***Example:*** '>EN' Characters received will be re-transmitted.
ID	Product ID	Returns the product model number and software version.
Z!	Zap	Reconfigures unit for all factory default settings.
Z]	Soft Zap	Emulates reboot after power restored

RS-232 Command Hints and Tips

Leading zeros may be included or omitted from command parameters.
Example: '>TC=009' Selects channel 9 as A/V output, same as '>TC=9'.

Multiple commands may be concatenated as single strings up to 120 ASCII characters long.
Example: '>XXTC=9' Selects Mute A/V off, channel 9.
Example: ' >S0=0S4=0' Selects CATV mode, no front panel lockout.

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 to the 232-MCT back-to-back for a full status update is allowed.
Example: '>STSVSS' Returns all 3 response strings back-to-back.

The carriage return line feed at the end of each 232-MCT response allows for easy monitoring of responses with an ASCII terminal program. You may use ASCII CR, Hex $0D, or keyboard 'Enter' in programming.

You don't have to use the '=' character between the command and parameter – the string works either way.

Response Strings

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

232-MCT status 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. Functions shown as N/A are not applicable; characters will appear in status strings as lower-case x.

Channel/Source Status Response String (T):

Start	Unit	CMD	Power	Channel	Video Mute	N/A
	1-9		U=On M=Off	Current Channel 3 digits	U=Unmuted M=Mute	2 digits
<	**1**	**T**	**U**	**008**	**U**	**xx**

Audio Status Response String (V):

Start	Unit	CMD	Power	Volume	Volume Mute	Stereo
	1-9		U=On M=Off	0-63 2 digits	U = Unmuted M =Mute	S=Stereo M=Mono
<	**1**	**V**	**U**	**63**	**U**	**M**

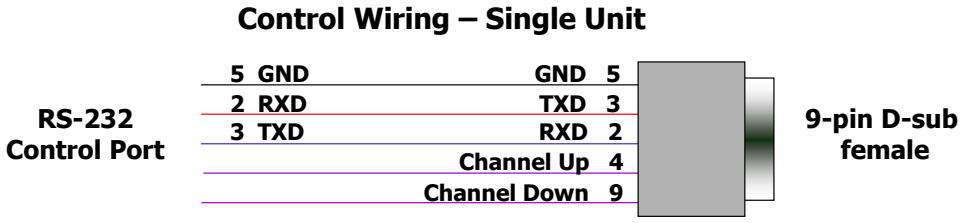
Front Panel Mode Status Response String (S):

Start	Unit	CMD	Audio Mode	Tune Mode	Lockout	Bass	Treble
	1-9		0=Mono/Mono	0-3	0-9	Fixed 0 dB 2 digits	Fixed 0 dB
<	**1**	**S**	**0**	**0**	**0**	**08**	**4**

Q Mode Response String (Q):

Start	Unit	CMD	Q0	Q1	Q2	Q3	Q4	N/A
	1-9		0-2	1-8	0=AV Muted 2=Video Muted	0-3	0-3	5 digits
<	**1**	**Q**	**2**	**1**	**0**	**0**	**x**	**xxxxx**

Single Tuner

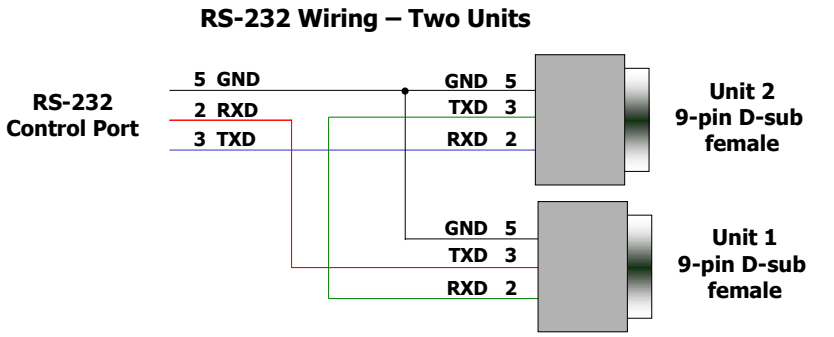


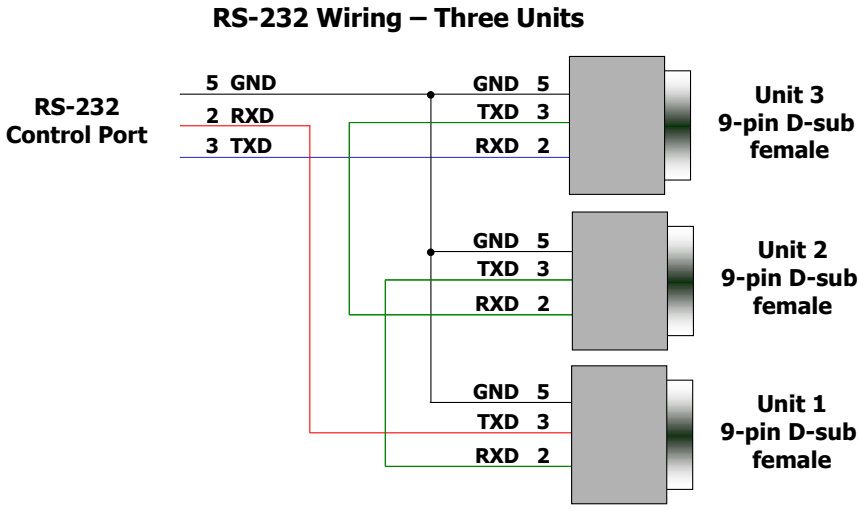
RS-232 wiring for control or programming should only use pins 2, 3, 5. Standard null modem cables such as the CC-COM cable that include all wires can be used for programming and control.

Multiple Tuners

Up to nine tuners 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 tuner from the same control port.

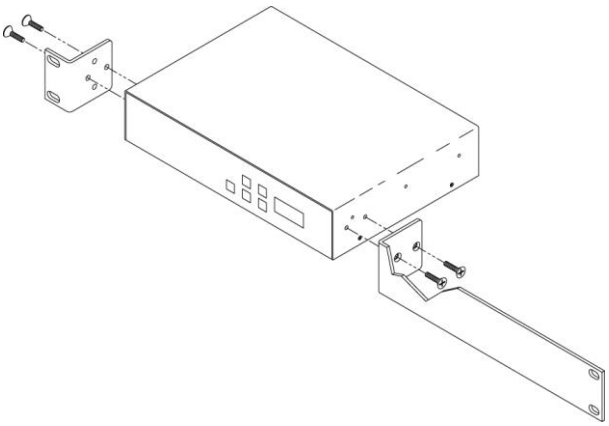
Set the first unit in the RS-232 chain to the highest Unit#, then wire in sequence to the last tuner in the chain. The reason for this is that CR tuners use an intelligent data bus - the highest number tuner receives all commands, and then passes on commands addressed to tuners with lower unit numbers. The next tuner in the chain does the same, and so on until the last unit.



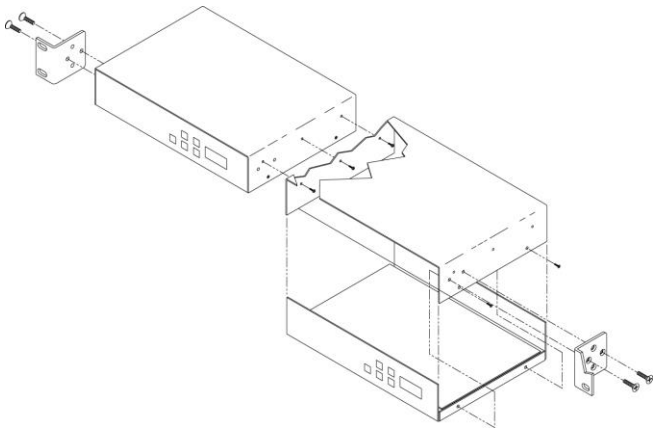


Rack Mounting

Two options are available for rack-mounting tuners.



RK1 Rack Mount



RK2 Rack Mount

RK1 Single Unit Rack Mount

Size Long Bracket:	9.5" [206mm] wide x 1.75" [38mm] height (1RU) x 1.75” [38mm] deep
Size Short Bracket:	1.0" [22mm] wide x 1.75" [38mm] height (1RU) x 1.75” [38mm] deep
Weight:	3.25 oz [0.148kg]
Enclosure:	All aluminum with durable black powder coat paint
Hardware:	Qty 4 CS, Phillip, Flathead, 82deg, Black, 8-32 x .25”

Attach the long and short rack ears to the side and towards the front of the unit with the four (4) supplied 8-32 by ¼” (black) countersunk screws.

RK2 Side-by-Side Rack Kit

1. Remove top cover of the first unit by removing the ten (10) black screws.
2. Attach cover of first unit to the side of the second with three (3) supplied 4-40 by 1/4" (silver colored) panhead screws and split lock washers. Note that only one side of the second unit has the (3) built in nuts to accept the screws above.
3. Reinstall the bottom/chassis of the first unit underneath its cover and attach with just eight (8) of the screws removed in step 1.
4. Attach short rack ears to the side and towards the front of each unit with the four (4) supplied 8-32 by 1/4" (black) countersunk screws.

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

Warranty: Three (3) year limited warranty on all parts and labor for Contemporary Research manufactured products from the day of purchase by authorized dealer. Manufactured products are warranted against defects in materials and workmanship. If Contemporary Research receives notice of such defects during the warranty period, Contemporary Research will repair or replace, at its option, products that prove to be defective.

Exclusions: The above warranty shall not apply to defects resulting from improper or inadequate maintenance by the customer, customers applied software or interfacing, unauthorized modifications or misuse, mishandling, operation outside the normal environmental specifications for the product, use of the incorrect, modified or extended power supply, or improper site operation and maintenance. *Please note Contemporary Research SSV-DX Display Express PC product carries a six month limited warranty.*