

# Product Manual



## 232-ATSC 4

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HDTV Tuner

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## Overview

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The new 232-ATSC 4 HDTV Tuner, our 4th-generation ATSC HDTV tuner, adds new capabilities to the industry-standard 232-ATSC series. New features include tuning MPEG-4 programs, up to 1080p output, and more efficient operation. The new tuner is fully compatible with control commands for previous models.

The integrator-friendly HDTV tuner is controllable with 2-way RS-232 and IP Telnet, as well as wireless and wired IR commands. An onboard Web page enables remote Web control. A new menu-driven display simplifies setup, and a front-panel USB port makes firmware updates a snap. The new compact enclosure allows mounting of two tuners in a single rack space.

A universal TV tuner, the 232-ATSC 4 can receive both analog and digital MPEG-2/MPEG-4 channels, in ATSC, NTSC, and clear QAM formats. Using an optional RF switcher, the tuner can switch between antenna and cable feeds.

- Tunes analog and digital channels in ATSC, NTSC, and clear QAM formats
- Accepts MPEG-4 TV channels, as well as standard MPEG-2
- Scales video output from 480p to 1080p
- Simulcasts from HDMI and composite video ports, as well as stereo, and digital coax and Toslink optical audio ports
- Switches to RGBHV or Component output from front-panel settings, Web page or control commands
- Dolby® 5.1 or PCM/Variable PCM digital audio formats for digital audio ports and HDMI
- Front-panel text and on-screen menus for tuner setup
- Web pages for remote setup and control
- Supports dual Air/Cable tuning with optional RF switch
- Analog and digital closed captioning
- Internal scaler displays channels at selected resolution
- Rack-mountable two across in 1RU
- Full ASCII 2-way RS-232/USB commands, AMX, Crestron, and RTI modules available, discrete IR commands
- RS-232 can be daisy-chained to control up to 9 tuners from a single RS-232 port, or control any number of tuners via IP
- Meets RoHS and California energy-saving standards
- Includes HD2-RC IR remote and 12 VDC power supply
- Options for single and dual rack mounts, external RF-AB RF switch, also we can provide a PS-6-4Y 6A power supply that can power groups of up to 4 tuners at time of order.

# Specifications

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## Physical

**Size (HWD):** 8.5" [216mm] wide x 1.75" [44mm] height (1RU) x 8.0" [203mm] deep

**Weight:** 2.25 lbs [1 kg]

**Enclosure:** Steel with black powder coat paint

**Mounting:** 1RU Rack mounting for one or two units side-by-side (RK1, RK2EZ)

**Cooling:** Not required for normal applications, where there many tuners in one rack, a rack fan is recommended to add air flow

## Front Panel



**Display:** Text Display, white text on blue LCD:

Top line indicates channel number

Lower line indicates if RGB or YPbPr output is active, resolution of current channel, and Air/Cable tuning

**IR:** IR sensor

**Control:** Power, Menu, Setup and Select buttons

Up and Down (Channel Up and Down) buttons

Left and Right (Volume Up and Down) buttons

**Mini USB Port:** for drag-and-drop firmware updates

## Back Panel



**Ethernet and Web page:** RJ-45 10/100 Ethernet connector

**Service:** Female USB-A port for memory stick HD processor updates (future)

**Air/Cable:** 'F', female, 75 ohm impedance

Supports dual Cable and Air tuning with optional RF-AB RF A-B Switch

**Video Output:** Simultaneous HDMI and NTSC video, switch between RGB and Component

**Video Out:** RCA composite video output, 1V p-p at 75 ohm impedance, 480i

**Component Out:** 3 RCA Y, Pr, Pb outputs (1080i/720p/480p/480i)

**RGB Out:** RGBHV DB-15 female (1080p/1080i/720p/480p, 59.95 Hz)

**HDMI:** HDMI receptacle, Type A, HD video and digital audio, version 1.3 (1080p/1080i/720p/480p)

Use PCM mode if HDMI audio connection is used to most displays (not all have Dolby)

**Audio Output:** Simultaneous HDMI, Coax, Optical, and Stereo

**Digital Audio SPDIF:** Coax and optical output, Dolby 5.1 AC3/PCM/Variable PCM

**Analog Audio Out:** Stereo RCA audio, Mono, Stereo, or SAP, variable level

**RS-232 Control:** DB-9 male, RS-232 data link to control system or PC, up to 9 tuners, 300-19,200 baud

(or use an Ethernet switch and control via IP Telnet)

**Air/Cable (A/C):** 3.5 mm output to operate the RF-AB RF A-B Switch

**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

**Power In:** 2.1mm coaxial jack (inside center conductor positive)

1.1 A maximum, 11 to 14 VDC, 12 VDC typical,

13.2W 45 BTU, 15.2 W 52 BTU including power supply

## Tuning

**Frequency Range:** ATSC and Clear QAM (cable) television 55.25 to 801.25 MHz

**TV System:** ATSC, NTSC, Cable, and Clear QAM (1080i/720p/480p/480i)

**Tuning:** Off-air 2-69 (NTSC and 8-VSB) and CATV 1-135 (Analog, 64QAM, 256QAM, 8-VSB)

**Aspect Ratio:** 4:3, 16:9 (Digital), 4:3, 16:9, Zoom (Analog channels)

**Captioning:** DTV and analog, set by program or customized for size, font and display attributes

**Lock:** Parental option for channels and/or rating

## Captioning

**On-Screen:** Displays on-screen analog and digital captioning on all video ports.

**Captioning Data:** HDMI, RGB, and Component ports don't have the ability to carry captioning data.

Captioning data from analog and digital channels will be expressed as Line 21 captioning on the composite video port.

## Includes

HD2-RC IR Tuner Remote, 4 AAA batteries

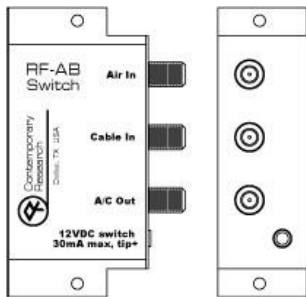
Power Supply, 1.5A maximum, 12 VDC

## Options

PS12-6Y 4A power supply with Y cable to drive up to 4 tuners (free at time of order)

RK1 Single Rack Kit, 1RU

RK2EZ Dual Rack Kit, 1RU



RF-AB RF A-B Switch, self-terminating, included 3,5mm cable connects to A/C DC output on tuner

IR-RXC External IR Receiver

CC-COM RS-232 Null Modem Cable

## Firmware

### Trademarks

- VGA and XGA are trademarks of International Business Machines
- SVGA is a trademark of the Video Electronics Standard Association
- HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC.



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## Quick Setup

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### Tuner Setup – Front-panel Quick Setup

RGB or Component out	Click the <b>SETUP</b> button, use <b>Up</b> or <b>Down</b> to HD Output menu, use <b>Left</b> or <b>Right</b> keys to choose input, press <b>SELECT</b> to choose.
HD Resolution	Go to the next menu down, and cycle through the list of resolutions. Press <b>SELECT</b> to choose.
Air or Cable Tuning	Go to the next menu and select CATV, Air, IRC, HRC, or CATV Auto. Press <b>SELECT</b> to choose. IRC has the same channel map as standard CATV, except for 5 and 6. The HRC channel map uses completely different frequencies than the others. CABLE AUTO looks at the first few channels to determine the right format. If there are no channels between 2 and 6, you may have to set the tuning mode manually.
Select Scan Mode	Page down a number of menus to the <b>Scan Mode</b> menu. The <b>Left</b> or <b>Right</b> keys will select several options Analog+Digital (standard full scan) Digital – Delete Analog (scan for digital, delete any analog channels) Digital – Keep Analog (scan for digital, but keep all analog channels) Analog – Delete Digital (scan for analog, delete any digital channels) Analog – Keep Digital (scan for analog, but keep all digital channels)  Once you do the next step, scan from the front-panel menu, the tuner will always scan this way from the panel or on-screen menu – until you change the mode later on.
Channel Scan	The next menu starts the <b>Channel Scan</b> , just press <b>SELECT</b> to start scanning. You can watch the scan progress from a pop-up window on the video outputs from the tuner. You can watch the scan process if the output of the tuner is fed to a display. A Cable analog/digital scan will take 7 minutes, only digital 6 minutes (the analog scan is faster).

### Channel Tuning – On-Screen menus

Scan Channels	Press Blue <b>MENU</b> button, Channel, Auto Scan, then scan mode - usually Cable Auto for cable, Air for off-air channels. The tuner will automatically delete encrypted Cable programs. Wait for the tuner to finish analog scanning, then it will re-scan channels for digital. Press <b>SELECT</b> when tuning analog to skip to scanning for only digital channels.
Audio	Press Blue <b>MENU</b> button, Setup, Digital Output, then Dolby, PCM or PCM Variable. If you get a "motorboat" sound for digital sound, switch to PCM.
Screen	Press Blue <b>MENU</b> button, Setup, Screen Format and select between 4:3, 16:9 and Zoom options. Stores two different options for digital and analog channels. Options vary in analog and digital, and the channel itself may restrict your options. You can also use the <b>RATIO</b> button on your remote.

## Front Panel Setup

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**IR Menu Control** – Click **Menu** button to access on-screen menus.

### Setup Menus

Press **Setup** to enter menus. Use **Up** and **Down** buttons to page through options, **Left** and **Right** buttons to change settings. Press **Select** to enter the setting.

Menu	Options
Firmware	232-ATSC 4 V5.0 To update the firmware, click Power and Setup while on this menu while connected via USB. That will open up a file folder. Copy the file to the tuner memory, the tuner installs the update itself. Press <b>Left</b> to return to normal operation.  Also, when this menu is displayed, you can click the <b>Right</b> to view Bootloader version, HD version, and DC voltage.
HD Output	RGBHV YPbPr (Default)
HD Resolution	1080p 1080i (Default) 720p 480p 480i
Tune Mode	CATV (Default) - Switches tuner to Cable, sets Scan mode (See mode 6) Off-Air - Switches tuner to Air, sets for Off-Air channel scan IRC - Switches tuner to Cable, sets Scan mode HRC - Switches tuner to Cable, sets Scan mode Cable Auto - Switches tuner to Cable, sets Scan mode
Digital Audio	AC-3- Dolby 5.1 PCM (use this or Variable for audio through HDMI) PCM Variable (Default)
Baud Rate	300 600 1200 2400 4800 9600 (default) 19200
Unit Number	1-9, default is 1
Panel Lockout	None, Ch+Menu, Vol+Menu, Ch+Vol+Menu, Power, Setup, Menu, All, Setup+Menu, Pwr+Setup+Menu
Backlight	Display brightness 1-10
LCD Contrast	Contrast 1-9
IR Receive	IR On, IR Off
Captions	On, Off (default)
Caption Mode	CC1, CC2, CC3, CC4 Text 1, Text1, Text3, Text4 (Text options rarely used)
Digital Captions	Service 1-6, Default is 1
Scan Mode	Sets how the tuner will scan the channels Analog+Digital (standard full scan) Digital – Delete Analog (scan for digital, delete any analog channels) Digital – Keep Analog (scan for digital, but keep all analog channels) Analog – Delete Digital (scan for analog, delete any digital channels) Analog – Keep Digital (scan for analog, but keep all digital channels)
Channel Scan	Press <b>Select</b> Starts the scan, follows the Tune Mode selection Starts with analog channels, then digital. You can press <b>Select</b> to skip analog.
Overscan	Selects % overscan for all channels 0-9
HD Load	Use Select to start HD processor update from Service USB port

Menus	IP Configuration
	Typical operation: <ul style="list-style-type: none"> <li>• Press Setup to edit value, characters will flash</li> <li>• Use direction keys to change</li> <li>• Press Setup to save</li> </ul>
IP Port	23 IP port for Telnet communication – Click or hold Up or Down to set.
Gateway	255.255.255.000 Quad address – Left/Right steps through each group, click Up or Down to step one at a time, hold down to move faster.
Subnet Mask	255.255.255.0 Subnet has a limited range of combinations, so this function is simplified Left/Right steps through each group, click Up or Down for options
IP Address	192.168.1.231 Left/Right steps through each group, click Up or Down to step one at a time, hold down to move faster.
IP Mode	Selects Static (default) or DHCP IP modes <ul style="list-style-type: none"> <li>• DHCP will select new address</li> <li>• IP Address will show change when you select DHCP</li> <li>• If you go back to Static, the address you defined in that mode will be set</li> </ul>
MAC/SN	Shows network MAC address  Ex: 00:14:C8:02:13:BF First 3 bytes is the CR MAC address, 02 designates 232-ATSC 4, and the last two are the serial #.

## Front-Panel Button Sequences

- Pressing **Up** and **Down** keys toggles air/cable tuning
- Pressing **Left** and **Right** keys toggles mute on/off
- While on **Setup: Firmware**, and when a USB cable is connected to a PC, clicking **Setup** and **Power** will start a firmware upload process, and a file window will open up on the PC desktop.
- After the firmware installs, pressing the **Left** key will exit the firmware mode
- If the **Setup** key is locked out, pressing **Setup** and the **Right** key will unlock setup until the tuner resets, and turn the tuner on if it is off (even if the Power button is locked)
- Press **Power** and **Up** together when at **Setup:Firmware** menu to reset to default settings



# Firmware Updates

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## System Firmware

The system firmware (S37) is the most common type of update. It's a small file and doesn't take too long to update.

In the 232-ATSC 4, you won't need an RS-232 port. Just download the .zip file from our website, open the ZIP folder, then copy or drag the file to a pop-up file window, just as if the tuner was a memory stick.

- Download the firmware from the 232-ATSC 4 Product page
  - Browse to [www.crwww.com](http://www.crwww.com)
  - Select **Products**, then choose the 232-ATSC 4
  - Select the **Downloads** tab and download the latest firmware
  - Open the ZIP folder
- Connect your PC to the USB port of the 232-ATSC 4.
- Select the red **Setup** button on the ATSC front panel, then go to the **Setup: Firmware** setting
- Click **Setup** and **Power** together – a file folder will open on your desktop and the front panel of the tuner will display **Firmware Loader**
- Copy and paste or drag the file into the folder
- The front panel will show **File Loading**, then **Copying Image**.
- When the process is complete, the display will change to **Firmware Loader**
- Press the **Left** to exit the mode, no need to exit **Setup** or reset power

**Alternate Update:** Older firmware may have a glitch in the start-up sequence and the tuner is locked to the **Power On** text. The alternate access is to unplug DC power, hold down the **Up** and **Down** buttons while you reconnect DC power. A file folder will open on your desktop and the front panel of the tuner will display **Firmware Loader**.

## HD Load Processor Firmware

This firmware process updates the HD processor in the 232-ATSC 4; it's a much larger file and uses a different set of steps for updating.

- Download the latest version of **HD Load (HD\_Vxxx)** from the website.
- Copy to memory stick
- Insert memory stick into Service USB port on the back panel
- Select the HD Load menu and press **Select** to start update

# Troubleshooting

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## TUNING CABLE CHANNELS

**Tip:** The 232-ATSC 4 will skip encrypted channels automatically when you activate a channel scan

**Tip:** You can skip scanning analog channels by pressing **Select** after you start the scan.

**Symptom: Channel ID is in XX-XX form, not cable box Guide form**

- Cable boxes translate the actual channel #s into a virtual Channel Guide, using channels 2 – 900, or more.
- The actual (physical) channels have IDs in XXX-XX form, just like off-air channels. Non-cable HDTV tuners like the ATSC or LCD TVs don't provide Guide features, so the channels will be displayed in their native, physical major-minor channel form.
- Some cable companies are using a useful format – the cable channels will have a single virtual channel that is the same as the Guide, and local TV channels may use the same virtual major-minor listing as the off-air channel.
- Some cable franchisees have a listing by physical channel, many do not. You can press the INFO button on the HD2-RC remote to view the channel name.

## COMPONENT OR RGB VIDEO

**Symptom: No Component or RGB Video**

The RGB and Component outputs are switchable, and the tuner ships set to RGB. Use Front Panel Menus to switch the HD analog video to Component or RGB.

Some monitors and TVs can't handle HD resolutions, only traditional VGA settings. Consult the display's manual – a listing of resolutions is usually towards the back of the manual. Usually, those sets can only display 480i.

If the display can't handle any setting, use HDMI or Component, or use a small scaler, such as the TV One C2-400, 1T-VS-624, or similar than can accept an HD RGB signal and convert to a PC resolution.

**Symptom: Scan or "fluttery" lines at top of video, usually on an analog channel**

Use the Overscan menu to crop the video a bit. What you're seeing is the data (captioning) portion of the video. Adding a bit more overscan will eliminate the lines at the top.

## POWER/ NO VIDEO or AUDIO

**Symptom: Tuner cycles power and LEDs**

Power supply is not providing enough amps of power (1 A or more). If you're replacing an old CR analog tuner, the old power supply is 500 mA, and will cause the "power cycle" effect. Use the power supply that came with the tuner, or call to order a new one. Voltage range should be 11-14 VDC.

**Symptom: Tuner appears to be on, channel display is lit, but unresponsive, no video/audio out**

- When the tuner turns on, it will display **Voltage Low** or **Voltage High** if there is power problem.
- Go to the **Setup: Firmware** menu and click the **Right** key to display the exact voltage.

**Symptom: Tuner stays locked at Power On text**

Reload the S37 firmware again (see **Alternate Update** note at the end of the **System Firmware** section on page 9). Call CR Support (888-972-2728) to get the right firmware version for your tuner.

## HDMI

### **Symptom: No Video or Signal**

- Most monitors accept HDMI in the RGB and Component color space, but there are exceptions. Try switching from RGB to Component.
- Switch between 720p and 1080i, or down to 480P or 480i for old DVI sets.
- If you're connecting via a Cat5 interface, HDMI receiver, or switcher, some delay the HDCP signal slightly out of range. Call CR Support on how to extend the delay on HDMI.

### **Symptom: No audio or fluttering sound in display speakers connected via HDMI**

Change ATSC digital audio to PCM or PCM variable (not all displays accept Dolby 5.1)

### **Symptom: Scan or "fluttery" lines at top of video, usually on an analog channel**

Use the Overscan menu to crop the video a bit. What you're seeing is the data (captioning) portion of the video. Adding a bit more overscan will eliminate the lines at the top.

## Composite Video

### **Symptom: Composite video out has small image in 16:9 setting, analog channels**

- For a 4:3 set, tune to an analog channel and press **RATIO** on the remote or **Setup: Screen Format** on onscreen menu to set to 16:9. Image will fill left to right, you'll always have a black band top and bottom.
- Set to 4:3 if you're only feeding video to 4:3 TVs.
- Set output ratio on a digital channel as well - this is a different setting than for analog channels.
- If the tuner is used for 16:9 displays and analog TVs, choose the best setting for the widescreen, and the NTSC will have to be a compromise. Most of the time, setting the RATIO while tuned to an analog channel and again for a digital channel will provide the best result.

## IR Control

### **Symptom: IR remote won't control tuner**

Hold down IR remote **Select**, press **9**, and release both. Front-panel setting should be **IR On**. In addition, check if the remote works when the lights are off. Some energy-saving fluorescent lights produce interference at our IR frequency (57 Hz). Try to cover the IR sensor so the lights don't affect operation, or add the IR-RXC External IR Sensor. It's easier to hide and tilt the sensor to help with reception, and you can try Select and 4 to use the lower IR frequency (the RXC has both types of sensors).

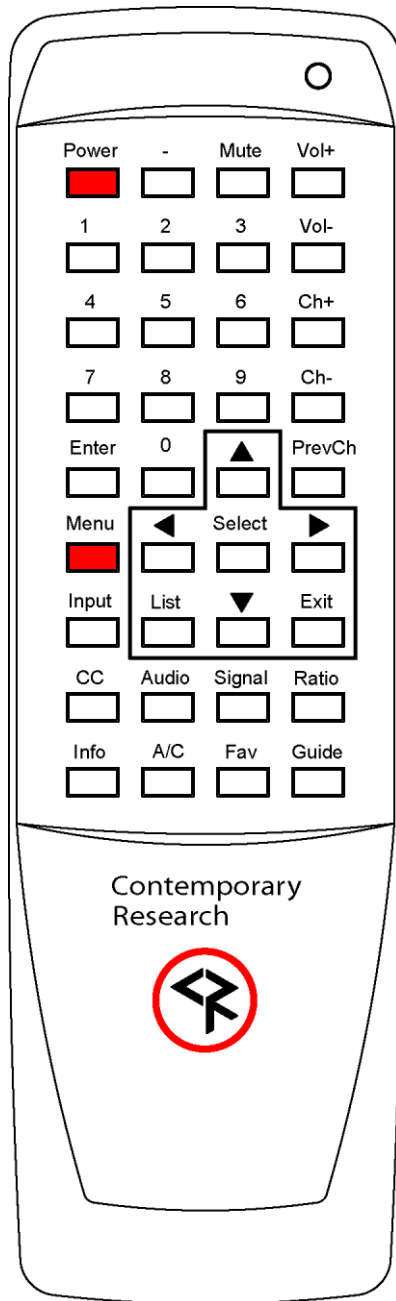
## Captioning on Video Outputs

### **Symptom: Video out does not include captioning data**

The 232-ATSC 4 provides on-screen captioning on all ports. No captioning **data** is carried on any HD port (HDMI, RGB, and Component standards do not support carrying captioning data). However, the composite video output does carry Line 21 captioning data when tuned to either an analog or digital channel.

## HD2-RC IR Remote

The HD2-RC IR Remote included with the 232-ATSC 4 can be used to setup the tuner and for daily operation. All of the functions on the remote have equivalent commands in RS-232, Ethernet, and Wired IR formats. In addition, the 232-ATSC 4 front panel buttons can perform Power, Channel, and Volume control.



### Power

Turns tuner on and off. Discrete on and off IR commands are available as well.

### Volume Control

Use the **Vol+**, **Vol-** and **Mute** buttons.

### Channel Selection

The key change in digital tuning is the need to add a dash (-) and number after the traditional channel number. Analog channels are accessed using XX-0, digital channels using XX-1 (or -2, -3, etc).

**Ch+**, **Ch-** and **PrevCh** can be used to access and recall channels.

### Menu Operation

Press Menu to access the on-screen menus.

- Use the directional **Arrows**, **Select** and **Exit** to navigate the menus.
- **List** displays the list of all channels, arrow keys add/remove channels, set Favorite Channel list
- **Exit** steps backwards out of menus
- **Enter** selects menu choice

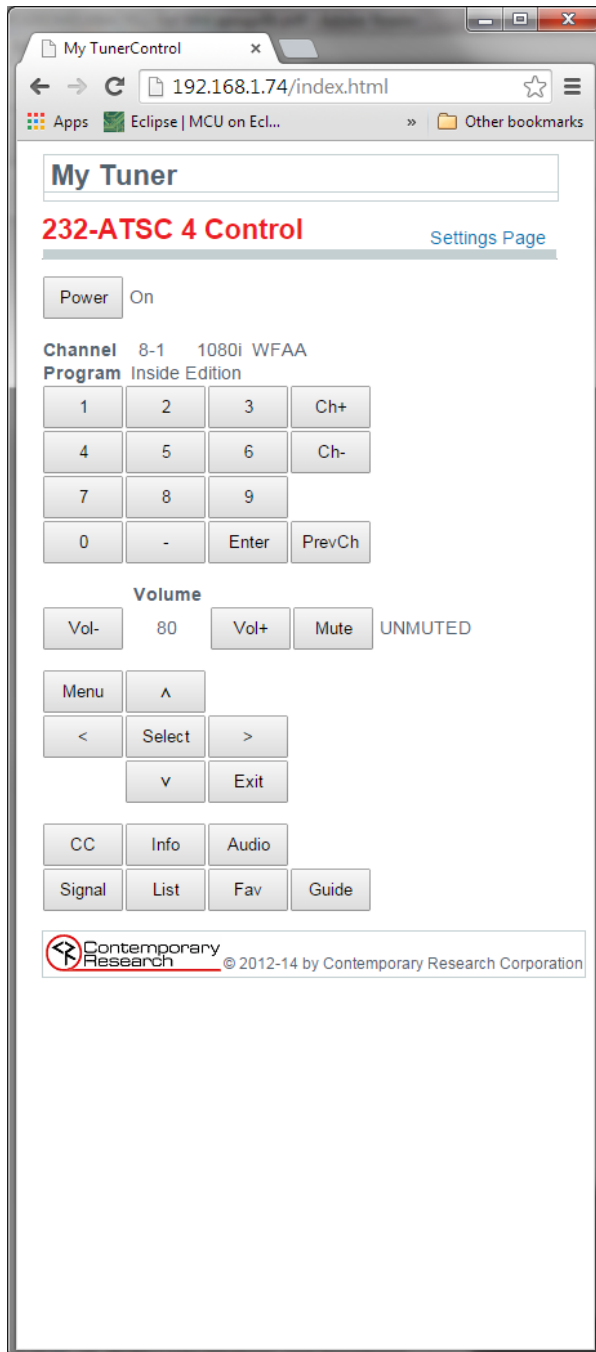
### Special Functions

- **CC** steps through available closed-captioning options
- **Audio** selects audio and SAP modes
- **Signal** displays channel signal level
- **Ratio** steps through aspect ratios, options depend on channel and output types
- **Info** launches on-screen information window
- **A/C** selects Air or Cable tuning
- **Fav** Displays list of favorite channels
- **Guide** displays on-screen Guide

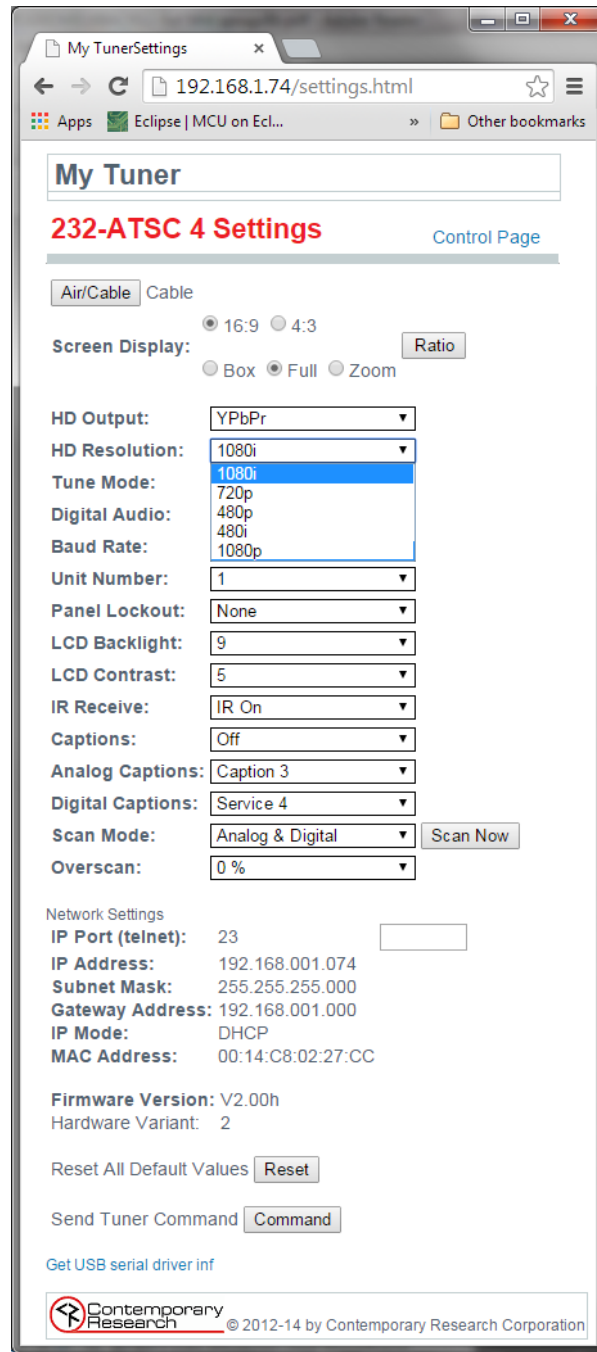
Features of many of the Special Function commands depend on whether the current channel is analog or digital.

Tip: The output rules behave differently for digital and analog channels. When you set up the tuner, use the **RATIO** button to set image output for a digital channel, then tune to an analog channel and set that to 16:9 or 4:3. The same rule applies to the Menu/Setup/Screen Format menus. Set for analog and digital.

# Web Pages






Control Page



Settings Page

The 232-ATSC 4 features Web pages accessible by any browser over IP. The Control page features a full array of control options with interactive status feedback, including the native resolution of the program and if no signal is present. The Settings page can change all aspects of tuner setup and operation. The name of the tuner can be changed by clicking on the name at the top of the page.

# On-Screen Menus

<p><b>Main Menu</b></p> 	<p>Selects sub-menus.</p> <ul style="list-style-type: none"> <li>• Arrow keys highlight option</li> <li>• Select (or Enter) chooses option</li> <li>• Menu steps back or exits menu</li> <li>• Exit exits all menus</li> <li>• Some options are only available if you are currently tuned to an analog or digital channel</li> </ul>
<p><b>Channel Menus</b></p> 	<p>Sub-Menu for Channels offers options for:</p> <ul style="list-style-type: none"> <li>• <b>Channel Auto-Scan</b></li> <li>• <b>Favorite Channel Selection</b></li> <li>• <b>Add/Delete Channels</b></li> <li>• <b>Fine Tune</b> (If tuned to an analog channel)</li> <li>• <b>Signal Strength Meter</b></li> </ul>
<p><b>Auto-Scan</b></p> 	<p>Starts scan of analog and digital channels for:</p> <ul style="list-style-type: none"> <li>• <b>Air</b> – looks for NTSC and ATSC channels</li> <li>• <b>Cable Auto</b> – looks for analog and digital QAM cable channels, as well as all frequency plans</li> <li>• <b>Cable STD</b> - standard cable spacing</li> <li>• <b>Cable HRC</b> – HRC cable spacing</li> <li>• <b>Cable IRC</b> – IRC cable spacing</li> </ul> <p><b>Tip:</b> Normally, use Auto. Most cable channels will be in standard frequencies. If all the channels tune in STD but channels 5 and 6, scan for IRC. If few channels can be found, scan for HRC.</p>

### Favorite Channels



Menu is also displayed from the List command, selects channels advanced by the FAV favorite channel command.

Use the Up, Down keys to move through the list, press Select to add a channel to Favorites.

### Channel Add/Delete



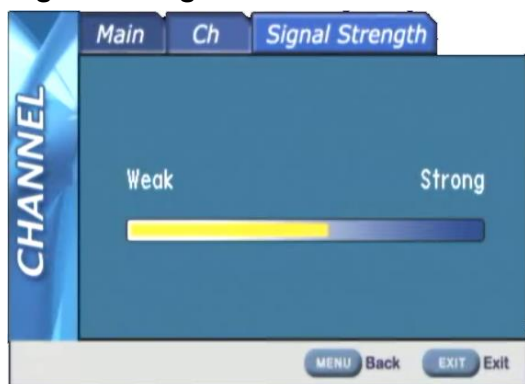
This menu can add or delete a channel accessed from Channel Up and Down.

You can tune to a channel you want to delete, then press Menu/Channel/Add-Delete. Press Select to delete the channel. You can also keep the page on screen as you step through channels, adding and deleting as desired. If the channel has a good signal, it will be displayed in the background.



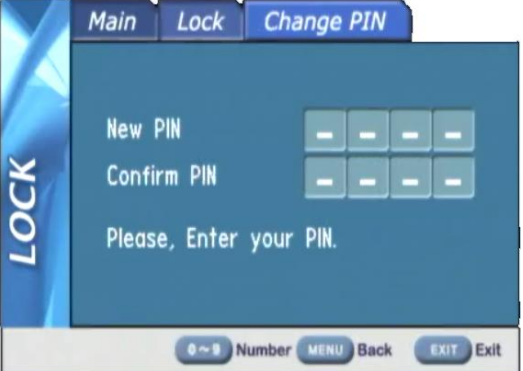
Note that HDTV channels are broadcast on UHF frequencies. The Add/Delete will show the name of the digital channel, as well as the actual UHF channel used for broadcasting.

You can delete one of a digital channel's sub-channels without affecting the others.

### Signal Strength



This page also displays from the Signal remote command. The graphic shows the current signal strength, and changes in real time. This allows you to monitor the strength of a channel as you adjust the antenna for best reception.

<h3>Caption Menus</h3> 	<p>This menu accesses captioning features:</p> <ul style="list-style-type: none"> <li>• <b>On/Off</b> – turn captions on/off – <i>other options are not available if captions are off.</i></li> <li>• <b>Analog Mode</b> - CC 1-4 and Text 1-4</li> <li>• <b>Digital Mode</b> – Service 1-6</li> <li>• <b>Digital Font Options</b> <ul style="list-style-type: none"> <li>• <b>Size</b> – Standard (15 pixels), Large (21 pixels), or Small (11 pixels)</li> <li>• <b>Style</b> – 1-6</li> <li>• <b>Color</b> – 8 shade of background, foreground and edge colors</li> <li>• <b>Opacity</b> – foreground and background</li> <li>• <b>Edge</b> – 6 style options</li> </ul> </li> </ul> <p>Version displays current version of tuner firmware</p>
<h3>V-Chip Settings Menus</h3> 	<p>Manages access to programming for US and Canadian standards.</p> <p>The default PIN number for access is <b>0000</b> (four zeros.</p>
<h3>Change PIN</h3> 	<p>Enter and confirm new PIN for access.</p>



### US Rating



Use arrows and Select functions to select level of Movie and TV rating allowed.

### Canada Rating



Use arrows and Select functions to select level of Movie and TV rating allowed.

### Setup Menus



This series of menus select the options for tuner operation:

- **Screen Format** – 16:9 or 4:3  
NOTE: Set when tuned to a digital channel, again when tuned to an analog channel – these are two different settings! You can use RATIO on the remote – does the same setting.
- **Time**
- **Sound Settings**
- **Video Noise Reduction** - On/Off (if tuned to analog)  
Set to On – helps to clean up analog channels
- **Menu Language** – English, Spanish, French

### Screen Format



Selects between 4:3 and 16:9 aspect ratios. The Ratio command can also adjust the settings.

- **4:3 Display** offers three options for 16:9 video: 16:9, 4:3 (stretched vertically), and Zoom (cropped sides)
- **16:9 Display** offers three options for 4:3 video: 4:3 (small centered), 16:9 (stretched horizontally), and Zoom (stretched vertically and horizontally) – or 4:3 and 16:9 if the video is 16:9

### Time



Sets time settings for:

- **Daylight Saving** – Select and choose on or off  
Note – The DST trigger comes from the broadcast stations, and may not be in sync with the new US standards. Use On/Off or time zone to offset time
- **Time Zone** – Select local time Zone

### Time Zone





Use left-right cursors to select the time zone, Select enters the current zone.

### Sound



Selects a variety of options, each is only active when you are currently tuned into an analog or digital channel:

- **Analog MTS** – Mono, Stereo, SAP (same as Audio)
- **Multi-Track** – English, French, Spanish
- **Digital Out** – AC-3 (Dolby 5.1), PCM, or variable-level PCM. Set to PCM when using audio through the HDMI connection – most displays cannot decode AC-3 (Dolby 5.1).
- **Auto Volume** – On or off

Pop-Up Menus	
<p><b>Info</b></p> 	<p>Activated from Info command.</p> <ul style="list-style-type: none"> <li>• <b>Channel</b> – Analog or digital, Mode, Name</li> <li>• <b>Time</b> – current time and date</li> <li>• <b>Program</b> – Times and name (if digital)</li> <li>• <b>Details</b> – Resolution, Audio Mode, Captions, Rating</li> </ul>
<p><b>Guide</b></p> 	<p>Shows the day's programming guide for current station. Use Up or Down arrows to move through Guide.</p>

# RS-232/Telnet Control Protocol

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## Overview

The 232-ATSC 4 full duplex RS-232/Telnet protocol enables a system programmer to control all TV Tuner functions as well as monitor 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. The Power button-function status from the 232-ATSC 4 front panel has been grouped with the Channel/Source for simplicity in the most common modes of operation. 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-ATSC+ whenever a valid command for that group is received by the 232-ATSC 4 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-ATSC 4 units may be cabled together and addressed for individual control from a single RS-232 port. Each 232-ATSC+ is assigned a unique unit code.

Communications parameters (Front Panel Mode 1) are 300 to 19200 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-ATSC 4.

The tuner will accept non-standard RS-232 control such as voltage that swings from 0 to +5 VDC, commonly found when IR ports are used to send RS-232 commands.

## General protocol specifications

Characters in command strings to the 232-ATSC 4 are common ASCII keyboard characters.

Command strings sent to the 232-ATSC 4 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-ATSC 4 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) 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.

## Control Commands

Code	Function	Operation
	<b>Front Panel</b>	
<b>S4=</b>	Set front panel lockout mode	0 =None                    6 = Menu 1 = Ch+Menu            7 = All 2 = Vol+Menu            8 = Setup+Menu 3 = Ch+Vol+Menu      9 = Pwr+Setup+Menu 4 = Power 5 = Setup – Press Select and Right key to unlock temporarily
<b>Q5=</b>	Set IR Receive mode	0 - No IR reception 9 - CR 9 (Default)
<b>KK=105</b>	Menu	Opens on-screen menus
<b>KK=106</b>	Right	Left
<b>KK=107</b>	Left	Down
<b>KK=108</b>	Up	Up
<b>KK=109</b>	Down	Down
<b>KK=110</b>	Enter	Enter
<b>KK=111</b>	Exit	Exits menus
<b>KK=95</b>	List	Displays on-screen list to select favorite channels
<b>P1</b>	Power On	On
<b>P0</b>	Power Off	Standby, mutes audio and video
<b>PT</b>	Power Off/On	Power toggle
<b>XX</b>	Power On	On (same as 232-series Mute Off)
<b>XM</b>	Power Off	Standby (same as 232-series Mute On)
<b>XT</b>	Power Off/On	Power toggle (same as 232-series Mute Toggle)
	<b>Tuning</b>	
<b>TC=</b>	Select channel	Tunes analog and digital channels, leading zeros OK, up to 4 characters for analog or single-unit digital channel, 3 characters for major and minor channels. <i>Examples:</i> '>TC=28:1', '>TC=28-1'    Selects channel 28-1 '>TC=32'            Selects 32-1, 32-0 if no digital
<b>TU</b>	Tune channel up <i>Example:</i> '>3TU'	Selects next higher channel in channel list Bumps Unit#3 tuned channel up
<b>TD</b>	Tune channel down	Selects next lower channel in channel list
<b>TP</b>	Previous channel	Selects previously viewed channel
<b>T^</b>	Start Channel Scan	Initiates new channel scan for analog and digital channels, scan operation set by D0 and S0.
<b>S0=</b>	Tuning Format	0=CATV (Default) - Switches to Cable, sets scan mode 1=Off-Air - Switches tuner to Air RF input and channels 2=IRC - Switches to Cable, sets scan mode 3=HRC - Switches to Cable, sets scan mode 4=Cable Auto - Switches to Cable, sets scan mode
<b>D0=</b>	Set Channel Scan Mode	Sets scan mode for digital and analog channels from the T^ or front panel scan command. 0= Scans for analog and digital channels scan (default) 1= Scans for digital only, deletes analog channels 2= Scans for digital only, keeps analog channels 3= Scans for analog only, deletes digital channels 4= Scans for analog only, keeps digital channels A scan must be triggered by T^ or front panel before the onscreen Menus will scan following D0 rules.
<b>XD=</b>	Channel delete	XD=<major>,<minor> removes channel from channel list. <i>Example:</i> '>XD=0,0' removes current channel
<b>XA=</b>	Channel add	XA=<major>,<minor>,<physical> adds channel <i>Example:</i> '>XA=38,1,0' Physical channel will be same as major
<b>NC=</b>	Channel name status	>NC returns channel name, up to 7 characters
<b>NP=</b>	Program name status	>NP returns program name, up to 30 characters, 15 more if there are non-ascii characters, such as ñ

Code	Function	Operation
	<b>Output</b>	
<b>KK=149</b>	RGB Out	Selects RGB output and colorspace
<b>KK=151</b>	YPbPr Out	Selects Component (YPbPr) output and colorspace
<b>D4=</b>	Overscan (0-9)%	Removes upper scan lines that may appear in RGB output, affects all outputs, 0% is default setting. <i>Example: '&gt;D4=3'</i> Overscan by 3% (typical solution)
<b>KK=82</b>	Ratio	Steps through aspect ratios, options depend on channel and output types
<b>KK=81</b>	Signal	Displays signal Strength
<b>KK=100</b>	Info	Launches on-screen information window
<b>KK=63</b>	Guide	Displays Electronic Program Guide
<b>KK=115</b>	CC - Closed captions	Steps through captioning options
<b>Q0=</b>	Caption Mode Off (0-2)  <i>Example: '&gt;Q0=0' or '&gt;Q00'</i>	Sets captioning mode 0=Captioning off (default) 1=Captioning on Captioning off
<b>Q1=</b>	Analog Captioning Type (1-8)	Turns on captioning type  1=Caption 1 1 (normal setting for most captioning) 2=Caption 2 3=Caption 3 4=Caption 4 5-8= Text 1-4 (rarely used)
<b>Q7=</b>	Digital Caption Service	Set to 1-6 (1 is default)
	<b>Audio</b>	
<b>VU</b>	Ramp volume up	Starts volume ramping up
<b>VD</b>	Ramp volume down	Starts volume ramping down
<b>VH</b>	Sets volume level 0-100	Volume level, scaled in 100 steps
<b>VL</b>	Sets volume level 0-63	Volume level, scaled in 63 steps, as other 232 tuners
<b>VX</b>	Volume Mute off	Restores audio volume to previous level
<b>VM</b>	Volume Mute on <i>Example: '&gt;VM'</i>	Turns off audio outputs Mutes audio outputs
<b>VV</b>	Stop volume ramp	Stops volume ramping
<b>VT</b>	Toggle Volume Mute	Alternates audio mute on and off
<b>DL=</b>	Set Power-Up volume	Not supported
<b>KK=85</b>	Audio Mode	Step through audio mode options for mono, stereo, SAP
	<b>Status Request</b>	
<b>SQ</b>	Request Q Mode status	Unit sends "Q" Mode status string
<b>SS</b>	Request Front Panel status	Unit sends "S" Front Panel status string
<b>ST</b>	Request Channel status <i>Example: '&gt;ST'</i>	Unit sends "T" Channel/Source status string Returns Channel/Source status response string
<b>SV</b>	Request AV status	Unit sends "V" Audio status string
	<b>IP Setup</b>	
<b>IP=</b>	IP Address	IP returns the current MAC address, current IP address, subnet mask, and gateway. Response example (S or D at end of IP signifies DHCP or Static address):  \$MAC=0014C8020001 / 1 \$IP=192.168.001.231S IG=000.000.000.000 IM=255.255.255.000 IY=1 IP=xxx.xxx.xxx.xxx Defines IP address, then sends status (0.0.0.0 = DHCP)
<b>IG=</b>	IP Gateway	IG Returns current MAC address and IP information IG=xxx.xxx.xxx.xxx Defines IP gateway, then sends status
<b>IM=</b>	IP Subnet Mask	IM Returns current MAC address and IP information IM=xxx.xxx.xxx.xxx Defines IP subnet mask, then sends status
<b>IY=</b>	IP Mode	IY Returns current mode IY=1 Static (default) IY=2 DHCP
<b>IX=</b>	Telnet Port	IX Returns current Telnet port (00023 default) IX=xxxxx Defines Telnet port

Code	Function	Operation
<b>NW=</b> <b>NM=</b>	Tuner Name	Sets name of tuner on Web page Set name: >NW=Tuner 1 Get name: >nm Reply: <1NMTuner1
<b>M0=</b>	LCD Backlight	0-9
<b>M8=</b>	LCD Contrast	0-8

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.

## Terminal Communication Commands

<b>EF</b>	Echo Off	Characters received will not be re-transmitted (power up default).
<b>EN</b>	Echo On	Characters received will be re-transmitted. <i>Example: '&gt;EN'</i> Characters received will be re-transmitted.
<b>ID</b>	Product ID	Returns the product model number and firmware version.
<b>Z!</b>	Zap	Reconfigures unit for all factory default settings.

## HD2-RC Remote Emulation

You can emulate IR commands sent from the CR HD2-RC Wireless Remote.

<b>KK=&lt;key&gt;</b>	* = Reserved for future products/applications	May need Enter for channel entry
	0=* 1=* 2=* 3=* 4=* 5=* 6=* 7=* 8=* 9=Power (toggle) 10=0 11=1 12=2 13=3 14=4 15=5 16=6 17=7 18=8 19=9 20= 21=Enter/Select 22=Ch Up 23=Ch Dn 24=Vol Up 25=Vol Dn 26=Vol Mute (tog) 27=Power On 28=Power Off 29=Menu 63=Guide 80=Freeze 81=Signal 82=Ratio 85=Audio	88=Favorite 95=List 96=Add/Delete Channel 98=Air/Cable 99=Dash - 100=Info 101=Prev Chan 105=Menu 106=Cur Right 107=Cur Left 108=Cur Up 109=Cur Down 110=Enter/Select 111=Exit 115=CC 141=Format 1080i 142=Format 720p 143=Format 480p 144=Format 480i 149=Output RGB 151=Output YPbPr 153=Air 154=Cable 155=16:9 Ratio Pillar Box 4:3 Ratio Letterbox 156=16:9 Ratio Full Wide 4:3 Ratio Full 157=16:9 Ratio V Zoom 4:3 Ratio H Zoom 158=AC-3(Dolby 5.1) 159=PCM 160=PCM Variable 161=Display 16:9 162=Display 4:3

# Response Strings

## Response Strings

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

232-ATSC+ 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 or available in the 232-ATSC 4; characters will appear in status strings as lower-case x.

### Channel/Source Status Response String (T):

Start	#	CMD	Power	Major Channel	Video Mute	Input	RF	Received Resolution	Minor Channel	NA	Function
	1-9		U=On M=Off	3 digits	Un-muted	0=RF	A=Air C=Cable	0=1080i 1=720p 2=480p 3=480i N=No Sig	3 digits		0=None
<	<b>1</b>	<b>T</b>	<b>U</b>	<b>032</b>	<b>U</b>	<b>0</b>	<b>A</b>	<b>0</b>	<b>002</b>	<b>x</b>	<b>0</b>

For compatibility with 232-series tuners, the 232-ATSC 4 channel status is split into Major Channel and Minor Channel sections. The Minor Channel will always be 000 for analog channels. The Minor Channel status will display "F00" if the Major channel is a special "one-part" digital channel. Also, as one-part channels can go higher than 999, the Minor status will tell you how many thousands (up to 63) you add to the Major number. So, channel 1032 would show 032 Major F01 Minor. Two-part channels are limited to 999-999.

### Audio Status Response String (V):

Start	Unit	CMD	Power	Volume 1	Volume Mute	Stereo	Volume 2
	1-9		U=On M=Off	0-63 Emulated level 2 digits	U=Unmuted M=Mute	N/A	0-100 Actual level 3 digits
<	<b>1</b>	<b>V</b>	<b>U</b>	<b>63</b>	<b>U</b>	<b>x</b>	<b>100</b>

Volume 1 emulates 232-series volume level for compatibility with existing applications. Volume 2 shows actual 232-ATSC 4 level, from 0-100 steps. Mute status will be sent if a user mutes volume from an IR remote.

### Front Panel Mode Status Response String (S):

Start	Unit	CMD	Audio	Tune Mode	Lockout	Bass	Treble	Output	Output Resolution	Output Setting	NA
	1-9		N/A	0=Cable 1=Air 2=IRC 3=HRC 3=Auto	0-7	Fixed 2 digits	Fixed	0=RGB 2=YpPr	0=1080i 1=720p 2=480p 3=480i	0=1080i 1=720p 2=480p 3=480i	4 digits
<	<b>1</b>	<b>S</b>	<b>x</b>	<b>1</b>	<b>0</b>	<b>08</b>	<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>xxxx</b>

Current Ratio is the actual output ratio; Ratio Mode is the selected mode (see chart on page 9)

### Q Mode Response String (Q):

Start	Unit	CMD	Q0	Q1	Q2	Q3	Q4	Q5	Q6	Q7	NA
	1-9		CC 0=Off 1=On	CC Type 1-8	Video Detect (fixed)	AV Detect (fixed)	Label (fixed)	IR 0=Off 9=Normal	1 digit	Digital CC 1-6	2 digits
<	<b>1</b>	<b>Q</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>9</b>	<b>0</b>	<b>1</b>	<b>xx</b>

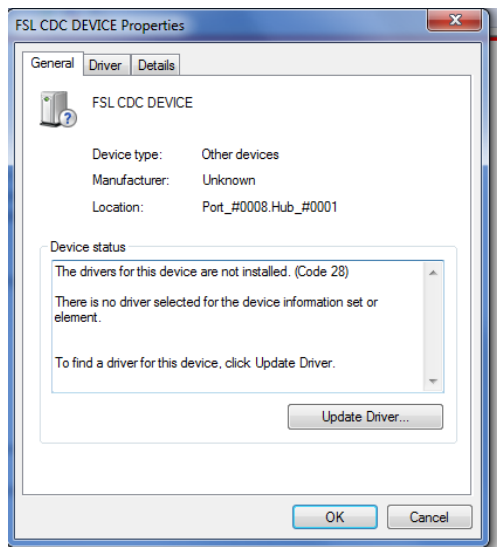


## Using USB as an RS-232 Port

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We are in the process of registering the USB driver for the 232-ATSC 4 HDTV tuner with Microsoft, which will simplify integrating the USB port with your Windows PC. In the interim, use the following steps to install the USB port. The instructions are for Windows 7, but the process is similar for XP.

- Download the USB driver and firmware from the 232-ATSC 4 Product page
  - Browse to [www.crwww.com](http://www.crwww.com)
  - Select **Products**, then choose the 232-ATSC 4
  - Select the **Downloads** tab and download the driver (CR USB\_Comm.inf)
  - Copy to your desktop or the Download folder many browsers use
- Plug a USB cable with micro USB connector between your PC and the USB port on the 232-ATSC 4
- The connection will be installed, but without the correct driver.
- Bring up the Control Panel, Select Hardware and Sound, then select the Device manager
- Double click the FSP CDC DEVICE icon (Should be highlighted with a question mark) to view the Properties

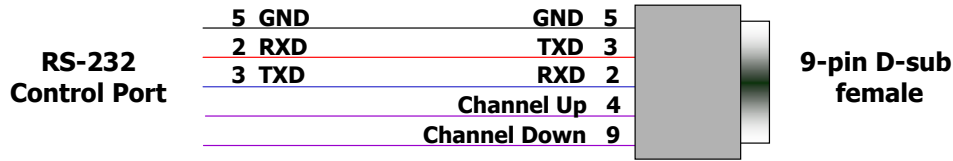


- Select **Update Driver**, then **Browse my computer for driver software**
- Select the folder on your desktop and click OK
- As the app is not yet registered, it will ask if you want to continue to install. Agree to continue and install the driver.
- This will install a COM port you can use for control or Terminal testing.

# RS-232 Cable Connections

## Single Tuner

### Control Wiring – Single Unit



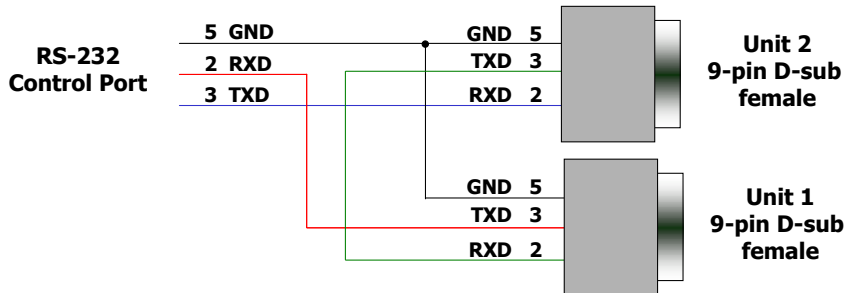
Contact closures on Pins 4 and 9 can be used with GND for channel up/down control.

## Multiple Tuners

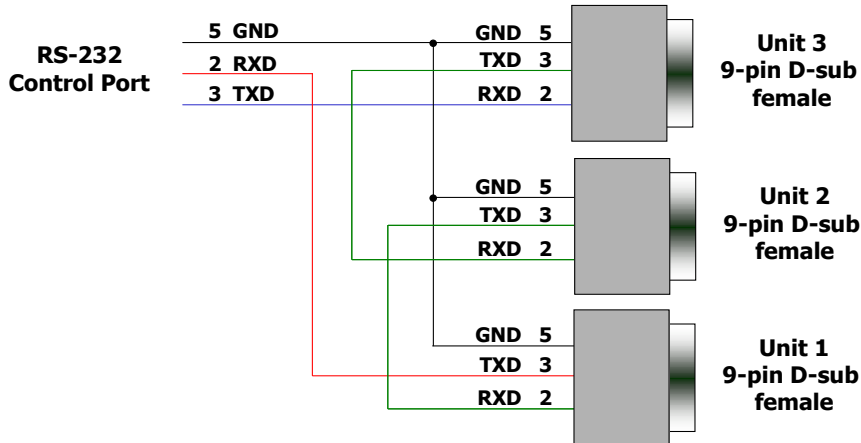
Up to nine tuners can be daisy-chained from one RS-232 control port. Remember that you will need to use the Unit# address in your programming when you control more than one tuner from the same control port.

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.

### RS-232 Wiring – Two Units



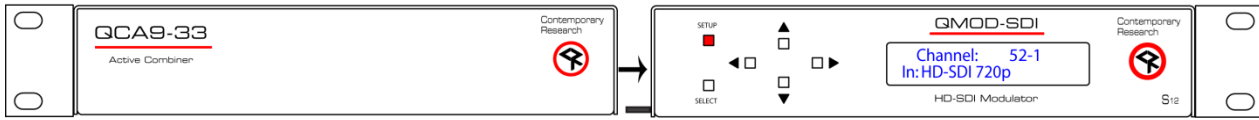
### RS-232 Wiring – Three Units



# Rack Mounting

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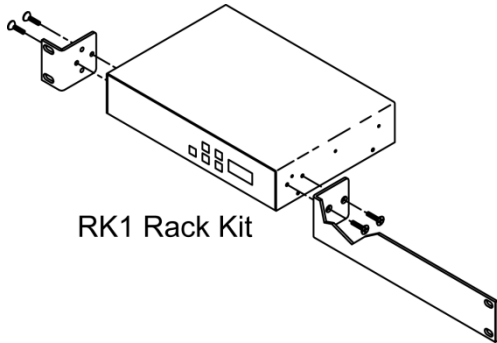
Two options are available for rack-mounting ATSC+1, QMOD and units with similar enclosures.



## RK2EZ Dual Rack Kit with Tie Bar Mounting

New ATSC+1, ATSC+SDI, QMOD and QCA enclosures have a slot in the bottom middle of the case. This will accept a tie bar that will lock the two enclosures together without taking the cases apart

1. Check that your enclosures have the tie bar slot.
2. Slide the included tie bar into the side of one unit and attach with the included screws.
3. Slide the other unit into the tie bar, and attach the screws
4. Add the rack mounts to the sides.



## RK1 Single Unit Rack Mount

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 1/4" (black) countersunk screws.

# Safety Instructions

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## 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.

**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.

5. **Overloading** - Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.
6. **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.
7. **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.
8. **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

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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.

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