Product Manual

232-ATSC 4

HDTV Tuner
June 16, 2016

S37 V2.15
HD V6.24
# Table of Contents

Installation ......................................................................................................................... 4
  Quick Front-panel Setup ................................................................................................. 4
  Channel Tuning – On-Screen menus ............................................................................... 5
  IR Menu Control ............................................................................................................... 5

Front Panel Setup ............................................................................................................ 6
  Setup Menus .................................................................................................................... 6
  Front-Panel Button Sequences ....................................................................................... 7

Web Pages ......................................................................................................................... 8

HD2-RC IR Remote ............................................................................................................ 9

Firmware Updates ............................................................................................................ 12

On-Screen Menus ............................................................................................................ 13
  Main Menu ..................................................................................................................... 13
  Channel Menus ............................................................................................................... 13
  Caption Menus ............................................................................................................... 14
  V-Chip Settings Menus ................................................................................................... 14
  Setup Menus ................................................................................................................... 15

RS-232/Telnet/UDP Control Protocol ............................................................................. 17

Control Commands ....................................................................................................... 18
  Terminal Communication Commands .......................................................................... 20
  HD2-RC Remote Emulation ........................................................................................... 20

Response Strings ............................................................................................................. 21
  Response Strings .......................................................................................................... 21

RS-232 Cable Connections .............................................................................................. 22

Specifications .................................................................................................................... 23
  Physical .......................................................................................................................... 23
  Front Panel .................................................................................................................... 23
  Back Panel ..................................................................................................................... 23
  Tuning ............................................................................................................................. 24
  Captioning ...................................................................................................................... 24
  Includes .......................................................................................................................... 24
  Options .......................................................................................................................... 24
  Firmware ........................................................................................................................ 24
  Trademarks .................................................................................................................... 24

Rack Mounting .................................................................................................................. 25
  RK2EZ Dual Rack Kit with Tie Bar Mounting ................................................................. 25
  RK1 Single Unit Rack Mount ......................................................................................... 25

Limited Warranty and Disclaimer .................................................................................... 25

Safety Instructions ............................................................................................................ 26
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
- 1080p set to 60Hz for more universal applications, 1080i and 720p can be set to 60 or 59.94
- 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
- New – Consumer or Pro settings for digital audio
- 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
- Update firmware via front-panel USB port (S37) and memory stick (HD firmware)
- 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.
- New! 2-way UDP control, password protection for Web pages, native resolution mode
Installation

There are 3 ways you can change the settings:

- **Front Panel.** Press the SETUP button use the Up/Down buttons to move through menus, Left/Right to change settings, then press SELECT to store the changes at each step.
  - Press SETUP to access the front-panel menus
  - Use the Up and Down arrows to step through each menu
  - Use the Left and Right arrows to choose and option
  - Click Select to save the change for each menu

- **IR.** Use the included IR remote to turn on/off, scan for channels and access on-screen menus. All the IR functions can be accessed from the front-panel buttons

- **Ethernet.** Access the onboard Web pages. Helpful for remote access when system is fully integrated with site Ethernet.

The front panel LCD shows the current channel and name, if the HD analog output is set to RGBHV or YPbPr, resolution of the channel, and if it's on Air or Cable.

### Quick Front-panel Setup

<table>
<thead>
<tr>
<th><strong>RGB or Component out</strong></th>
<th>Click the <strong>SETUP</strong> button, use <strong>Up</strong> or <strong>Down</strong> to HD Output menu, use <strong>Left</strong> or <strong>Right</strong> keys to choose input, press <strong>SELECT</strong> to choose. HDMI is always active.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HD Resolution</strong></td>
<td>Go to the next menu down, and cycle through the list of resolutions. Press <strong>SELECT</strong> to choose. Note that our <strong>Component port supports 1080p</strong> — we’ve found a number of TVs that support that resolution.</td>
</tr>
<tr>
<td><strong>Air or Cable Tuning</strong></td>
<td>Go to the next menu and select CATV, Air, IRC, HRC, or CATV Auto. Press <strong>SELECT</strong> 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.</td>
</tr>
</tbody>
</table>
| **Select Scan Mode**     | Page down a number of menus to the **Scan Mode** menu. The **Left** or **Right** 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 **Channel Scan**, just press **SELECT** 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

IR Menu Control
Use the IR remote’s red Menu button or click the blue front-panel Menu button to access on-screen menus.

<table>
<thead>
<tr>
<th>Scan Channels</th>
<th>Press the Blue MENU 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 SELECT when tuning analog to skip to analog and skip to a digital channel scan.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio</td>
<td>Press Blue MENU button, Setup, Digital Output, then Dolby, PCM or PCM Variable. If you get a “motorboat” sound for digital sound, switch to PCM.</td>
</tr>
<tr>
<td>Screen</td>
<td>Press Blue MENU 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 RATIO button on your remote.</td>
</tr>
</tbody>
</table>
# Front Panel Setup

## 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.

<table>
<thead>
<tr>
<th>Menu</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Firmware</strong></td>
<td>232-ATSC 4 VX.XX&lt;br&gt;<strong>To update the firmware</strong>, 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. <strong>Press Left</strong> to return to normal operation.&lt;br&gt;Also, when this menu is displayed, you can click the <strong>Right</strong> to view Bootloader version, HD version, and DC voltage.</td>
</tr>
<tr>
<td><strong>HD Output</strong></td>
<td>RGBHV&lt;br&gt;YPbPr (Default)</td>
</tr>
<tr>
<td><strong>HD Resolution</strong></td>
<td>1080p&lt;br&gt;1080i (Default)&lt;br&gt;720p&lt;br&gt;480p&lt;br&gt;480i&lt;br&gt;Auto – outputs native resolution of program</td>
</tr>
<tr>
<td><strong>Tune Mode</strong></td>
<td>CATV (Default) - Switches tuner to Cable, sets Scan mode (See mode 6)&lt;br&gt;Off-Air - Switches tuner to Air, sets for Off-Air channel scan&lt;br&gt;IRC - Switches tuner to Cable, sets Scan mode&lt;br&gt;HRC - Switches tuner to Cable, sets Scan mode&lt;br&gt;Cable Auto - Switches tuner to Cable, sets Scan mode</td>
</tr>
<tr>
<td><strong>Digital Audio</strong></td>
<td>AC.3– Dolby 5.1&lt;br&gt;PCM (use this or Variable for audio through HDMI)&lt;br&gt;PCM Variable (Default)</td>
</tr>
<tr>
<td><strong>Refresh Rate</strong></td>
<td>1080p is now set to 60Hz&lt;br&gt;1080i and 720p can be set to 60 or 59.94 Hz</td>
</tr>
<tr>
<td><strong>Baud Rate</strong></td>
<td>300&lt;br&gt;600&lt;br&gt;1200&lt;br&gt;2400&lt;br&gt;4800&lt;br&gt;9600 (default)&lt;br&gt;19200</td>
</tr>
<tr>
<td><strong>Unit Number</strong></td>
<td>1-9, default is 1</td>
</tr>
<tr>
<td><strong>Panel Lockout</strong></td>
<td>None, Ch+Menu, Vol+Menu, Ch+Vol+Menu, Power, Setup, Menu, All, Setup+Menu, Pwr+Setup+Menu</td>
</tr>
<tr>
<td><strong>Backlight</strong></td>
<td>Display brightness 1-10</td>
</tr>
<tr>
<td><strong>LCD Contrast</strong></td>
<td>Contrast 1-9</td>
</tr>
<tr>
<td><strong>IR Receive</strong></td>
<td>IR On, IR Off</td>
</tr>
<tr>
<td><strong>Captions</strong></td>
<td>On, Off (default)</td>
</tr>
<tr>
<td><strong>Caption Mode</strong></td>
<td>CC1, CC2, CC3, CC4&lt;br&gt;Text 1, Text1, Text3, Text4 (Text options rarely used)</td>
</tr>
<tr>
<td><strong>Digital Captions</strong></td>
<td>Service 1-6, Default is 1</td>
</tr>
<tr>
<td><strong>Scan Mode</strong></td>
<td>Sets how the tuner will scan the channels&lt;br&gt;<strong>Analog+Digital</strong> (standard full scan)&lt;br&gt;<strong>Digital – Delete Analog</strong> (scan for digital, delete any analog channels)&lt;br&gt;<strong>Digital – Keep Analog</strong> (scan for digital, but keep all analog channels)&lt;br&gt;<strong>Analog – Delete Digital</strong> (scan for analog, delete any digital channels)&lt;br&gt;<strong>Analog – Keep Digital</strong> (scan for analog, but keep all digital channels)</td>
</tr>
<tr>
<td><strong>Channel Scan</strong></td>
<td>Press <strong>Select</strong>&lt;br&gt;Starts the scan, follows the Tune Mode selection&lt;br&gt;Starts with analog channels, then digital. You can press <strong>Select</strong> to skip analog.</td>
</tr>
<tr>
<td><strong>Overscan</strong></td>
<td>Selects % overscan for all channels&lt;br&gt;0-9</td>
</tr>
</tbody>
</table>
**Menus** | **IP Configuration**
--- | ---
Typical operation:  
- Press Setup to edit value, characters will flash  
- Use direction keys to change  
- Press Setup to save  
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  
- DHCP will select new address  
- IP Address will show change when you select DHCP  
- If you go back to Static, the address you defined in that mode will be set  
MAC/SN | Shows network MAC address  
Ex: 00:14:C8:09:13:BF  
First 3 bytes is the CR MAC address, 02 designates 232-ATSC 4, and the last two are the serial #.

**Menus** | **General**
--- | ---
Clear | Clears network password (set Web page password from Settings page)  
HDMI-DVI | Selects Auto, HDMI or DVI mode – reboot tuner after changing setting  
HDMI Audio | Turns HDMI audio on or off (On is default)  
Digital Audio | Consumer (default) or Pro for digital audio

**Front-Panel Button Sequences**
- Pressing **Up** and **Down** keys toggles air/cable tuning  
- Pressing **Left** and **Right** keys toggles mute on/off  
- If the **Setup** key is locked out, pressing **Setup** and the **Right** key will unlock setup until the tuner resets, and turns 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  
- Remove power, hold **Up** and **Down** together, repower, then release to force S37 firmware load
Web Pages

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.

The Web password is set on the Settings page. To change the password, the user will need to know the current password.
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 a download.

**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.

Pressing Select and 4 together outputs 38 KHz IR, Select and 9 outputs 57 KHz IR, useful when there is IR interference.
Troubleshooting

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. Try 1080p, 720p, or 480i9

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

If the unit is new, open the lid and check if a ribbon cable came loose in shipping. For existing tuners, the problem is typically a failed component in the internal power distribution circuit. Send in for service.
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 1080p, 720p and 1080i, or down to 480P or 480i for old DVI sets.

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: Issue with DVI Conversion

- Set HDMI mode to DVI compatibility via front panel or RS-232 command

Composite Video

Symptom: Composite video output 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 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 KHz). 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 38 KHz 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.
Firmware Updates

- On the tuner, select Setup/Firmware to view current S37 and HD Load firmware – click the Right arrow twice to view the HD Load version
- Download the firmware from the 232-ATSC 4 Product page
  - Browse to www.crwww.com
  - Select Products, then choose the 232-ATSC 4
  - Select the Downloads tab and download the latest firmware pack
  - Extract the ZIP folder, usually on your Desktop or in the Downloads folder
- Install the S37 firmware first, then update HD Load

System Firmware over Front-Panel USB

The system firmware (S37) is a simple, fast update. It’s a small file and doesn’t take too long to update.

Connect USB cable as shown above

In the 232-ATSC 4 /ATSC-SDI 4, you won’t need an RS-232 port. Just copy or drag the S37 Update file to a pop-up file window, just as if the tuner was a memory stick.

- Connect your PC to the front panel USB port of the 232-ATSC 4.
- Copy the S37 file in the Firmware Pack folder
- 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. Some PCs are set to not automatically open the folder – you may need to look for the folder in Windows Explorer.
- Paste or drag the S37 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

USB Memory Stick for HD Firmware

- Copy the file HD4_V6xx.rom or HD4SDIV3.xx to the root of a memory stick. Make sure that it is the only *.rom file on the stick.
- Memory formatted as FAT, FAT16, or FAT32, not NTFS
- Place USB memory stick in the back USB port of the 232-ATSC 4 /ATSC-SDI 4
- Power on tuner.
- Press Setup, and then select the Firmware menu. Press the right arrow twice to display the current HD Version. Press both SETUP and POWER buttons at the same time. The update takes about one minute.

**Updating the HD firmware resets the HDCP mode in the 232-ATSC 4 tuner.** To change the HDCP mode, hold the white Select button and click the Down arrow. Repeat if needed.
## On-Screen Menus

<table>
<thead>
<tr>
<th>Main Menu</th>
<th>Selects sub-menus.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Arrow keys highlight option</td>
</tr>
<tr>
<td></td>
<td>• Select (or Enter) chooses option</td>
</tr>
<tr>
<td></td>
<td>• Menu steps back or exits menus</td>
</tr>
<tr>
<td></td>
<td>• Exit exits all menus</td>
</tr>
<tr>
<td></td>
<td>• Some options are only available if you are currently tuned to an analog or digital channel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channel Menus</th>
<th>Sub-Menu for Channels offers options for:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Channel Auto-Scan</td>
</tr>
<tr>
<td></td>
<td>• Favorite Channel Selection</td>
</tr>
<tr>
<td></td>
<td>• Add/Delete Channels</td>
</tr>
<tr>
<td></td>
<td>• Fine Tune (If tuned to an analog channel)</td>
</tr>
<tr>
<td></td>
<td>• Signal Strength Meter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auto-Scan</th>
<th>Starts scan of analog and digital channels for:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Air – looks for NTSC and ATSC channels</td>
</tr>
<tr>
<td></td>
<td>• Cable Auto – looks for analog and digital QAM cable channels, as well as all frequency plans</td>
</tr>
<tr>
<td></td>
<td>• Cable STD - standard cable spacing</td>
</tr>
<tr>
<td></td>
<td>• Cable HRC – HRC cable spacing</td>
</tr>
<tr>
<td></td>
<td>• Cable IRC – IRC cable spacing</td>
</tr>
</tbody>
</table>

**Tip:**

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.

<table>
<thead>
<tr>
<th>Favorite Channels</th>
<th>Menu is also displayed from the List command, selects channels advanced by the FAV favorite channel command.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use the Up, Down arrows to move through the list, press Select to add a channel to Favorites.</td>
</tr>
</tbody>
</table>
### 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.

### Caption Menus

This menu accesses captioning features:

- **On/Off** – turn captions on/off – other options are not available if captions are off.
- **Analog Mode** - CC 1-4 and Text 1-4
- **Digital Mode** – Service 1-6
- **Digital Font Options**
  - **Size** – Standard (15 pixels), Large (21 pixels), or Small (11 pixels)
  - **Style** – 1-6
  - **Color** – 8 shade of background, foreground and edge colors
  - **Opacity** – foreground and background
  - **Edge** – 6 style options

Version displays current version of tuner firmware

### V-Chip Settings Menus

Manages access to programming for US and Canadian standards.

The default PIN number for access is **0000** (four zeros).
Change PIN
Enter and confirm new PIN for access.

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
Selects:
- **Info**
- **Guide**
RS-232/Telnet/UDP Control Protocol

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 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 4 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.

The same commands can be sent over IP Telnet (up to two sessions) and via UDP to the tuner’s IP to port 31931 (fixed) with status feedback on port 31932. Port 31932 is disabled by default, send “>UO” command (UF turns UDP off). See our Support Blog How to Test 232-ATSC 4/ATSC+1 UDP Control to learn more about UDP control.

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.
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

<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Front Panel</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| S4=  | 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 |
| Q5=  | Set IR Receive mode | 0 - No IR reception 9 - CR 9 (Default) |
| KK=105 | Menu | Opens on-screen menus |
| KK=106 | Right | Left |
| KK=107 | Left | Down |
| KK=108 | Up | Up |
| KK=109 | Down | Down |
| KK=110 | Enter | Enter |
| KK=111 | Exit | Exits menus |
| KK=95 | List | Displays on-screen list to select favorite channels |
| P1   | Power On | On |
| P0   | Power Off | Standby, mutes audio and video |
| PT   | Power Off/On | Power toggle |
| **Tuning** |
| TC=  | 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.  
**Examples:**  
>`TC=28:1`, `TC=28-1` Selects channel 28-1  
>`TC=32` Selects 32-1, 32:0 if no digital |
| TU   | Tune channel up | Selects next higher channel in channel list  
**Example:** `>3TU` Bumps Unit#3 tuned channel up |
| TD   | Tune channel down | Selects next lower channel in channel list |
| TP   | Previous channel | Selects previously viewed channel |
| T^   | Start Channel Scan | Initiates new channel scan for analog and digital channels, scan operation set by D0 and S0. |
| S0=  | 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 |
| D0=  | 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. |
| XD=  | Channel delete | XD=<major>,<minor> removes channel from channel list.  
**Example:** `>XD=0,0` removes current channel |
| XA=  | Channel add | XA=<major>,<minor>,<physical> adds channel  
**Example:** `>XA=38,1,0` Physical channel will be same as major |
<p>| NC=  | Channel name status | &gt;NC returns channel name, up to 7 characters |
| NP=  | Program name status | &gt;NP returns program name, up to 30 characters, 15 more if there are non-ascii characters, such as Á |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Function</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>KK=149</td>
<td>RGB Out</td>
<td>Selects RGB output and colorspace</td>
</tr>
<tr>
<td>KK=151</td>
<td>YPbPr Out</td>
<td>Selects Component (YPbPr) output and colorspace</td>
</tr>
</tbody>
</table>
| D4= | Overscan (0-9)% | Removes upper scan lines that may appear in RGB output, affects all outputs, 0% is default setting.  
*Example:* ‘>D4=3’ Overscan by 3% (typical solution) |
| KK=82 | Ratio | Steps through aspect ratios, options depend on channel and output types |
| KK=81 | Signal | Displays signal Strength |
| KK=100 | Info | Launches on-screen information window |
| KK=63 | Guide | Displays Electronic Program Guide |
| KK=115 | CC – Closed captions | Steps through captioning options |
| Q0= | Caption Mode Off (0-2) | Sets captioning mode  
0=Captioning off (default)  
1=Captioning on  
Example: ‘>Q0=0’ or ‘>Q00’ |
| Q1= | Analog Captioning Type (1-8) | Turns on captioning type  
1=Caption 1  
2=Caption 2  
4=Caption 4  
5-8= Text 1-4 (rarely used)  
3=Caption 3 |
| Q7= | Digital Caption Service | Set to 1-6 (1 is default) |
| Audio | | |
| VU | Ramp volume up | Starts volume ramping up |
| VD | Ramp volume down | Starts volume ramping down |
| VH | Sets volume level 0-100 | Volume level, scaled in 100 steps |
| VL | Sets volume level 0-63 | Volume level, scaled in 63 steps, as other 232 tuners |
| VX | Volume Mute off | Restores audio volume to previous level |
| VM | Volume Mute on | Turns off audio outputs  
*MExample:* ‘>VM’  
Mutes audio outputs |
| VV | Stop volume ramp | Stops volume ramping |
| VT | Toggle Volume Mute | Alternates audio mute on and off |
| DL= | Set Power-Up volume | Not supported |
| KK=85 | Audio Mode | Step through audio mode options for mono, stereo, SAP |
| Status Request | | |
| SQ | Request Q Mode status | Unit sends “Q” Mode status string |
| SS | Request Front Panel status | Unit sends “S” Front Panel status string |
| ST | Request Channel status | Unit sends “T” Channel/Source status string  
*Example:* ‘>ST’  
Returns Channel/Source status response string |
| SV | Request AV status | Unit sends “V” Audio status string |
| IP Setup | | |
| IP= | 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):  
$\text{MAC}=0014C8090001  
\text{IP}=192.168.001.231  
\text{IG}=000.000.000.000  
\text{IM}=255.255.255.000  
\text{IY}=1  
\text{IP}=\text{xxx.xxx.xxx.xxx} \text{ Defines IP address, then sends status}  
(0.0.0.0 = DHCP) |
| IG= | IP Gateway | IG Returns current MAC address and IP information  
\text{IG}=\text{xxx.xxx.xxx.xxx} \text{ Defines IP gateway, then sends status} |
| IM= | IP Subnet Mask | IM Returns current MAC address and IP information  
\text{IM}=\text{xxx.xxx.xxx.xxx} \text{ Defines IP subnet mask, then sends status} |
| IY= | IP Mode | IY Returns current mode  
IY=1 Static (default)  
IY=2 DHCP |
| IX= | Telnet Port | IX Returns current Telnet port (00023 default)  
\text{IX}=\text{xxxxxx} \text{ Defines Telnet port} |
| U_ | UDP Reply Port 31932 | UO Turns UDP Reply port on  
UF Turns UDP Reply port off |
### Code  Function  Operation

| NW=  | Tuner Name  | Sets name of tuner on Web page  
|      |             | Set name: >NW=Tuner 1  
|      |             | Get name: >nm  
|      |             | Reply: <1NMTuner1  
| NM=  | LCD Backlight  | 0-9  
| M0=  | LCD Contrast  | 0-8  
| R_   | Refresh Rate  | R6 = 59.94 Hz  
|      |              | RM= 60 Hz  
| DH=  | HDMI Audio Mute  | Turns HDMI audio on or off  
|      |              | 1=Audio mute on 0=Audio mute off (default)  
| DI=  | HDMI Mode  | 0=Auto (default), 1=HDMI, 2=DVI  

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

| EF   | Echo Off  | Characters received will not be re-transmitted (power up default).  
| EN   | Echo On  | Characters received will be re-transmitted.  
| ID   | Product ID  | Returns the product model number and firmware version.  
| Z!   | 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.

| KK=<key>  | 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 On  | 24=Vol Up  | 25=Vol On  | 26=Vol Mute (toggle)  | 27=Power On  | 28=Power Off  | 29=Menu  | 30=Guide  | 32=Freeze  | 31=Signal  | 32=Ratio  | 35=Audio  | 36=Reserved for future products/applications  | May need Enter for channel entry  | 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  | 145=Format 1080p  | 146=Format Auto  | 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

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):

<table>
<thead>
<tr>
<th>Start</th>
<th>#</th>
<th>CMD</th>
<th>Power</th>
<th>Major Channel</th>
<th>Video Mute</th>
<th>Input</th>
<th>RF</th>
<th>Received Resolution</th>
<th>Minor Channel</th>
<th>NA</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td></td>
<td></td>
<td>U=On</td>
<td>3 digits</td>
<td>Unmuted</td>
<td>0=RF</td>
<td>A=Air</td>
<td>0=1080i 1=720p 2=480p 3=480i N=No Sig</td>
<td>3 digits</td>
<td></td>
<td>0=None</td>
</tr>
<tr>
<td></td>
<td>&lt;</td>
<td>1</td>
<td>T</td>
<td>U 032</td>
<td>U 0</td>
<td>A</td>
<td>0</td>
<td>002 x</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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):

<table>
<thead>
<tr>
<th>Start</th>
<th>Unit</th>
<th>CMD</th>
<th>Power</th>
<th>Volume 1</th>
<th>Volume Mute</th>
<th>Stereo</th>
<th>Volume 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>1</td>
<td>V</td>
<td>U</td>
<td>63</td>
<td>U</td>
<td>x</td>
<td>100</td>
</tr>
</tbody>
</table>

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):

<table>
<thead>
<tr>
<th>Start</th>
<th>Unit</th>
<th>CMD</th>
<th>Audio</th>
<th>Tune Mode</th>
<th>Lockout</th>
<th>Bass</th>
<th>Treble</th>
<th>Output</th>
<th>Output Resolution</th>
<th>Output Setting</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>1</td>
<td>S</td>
<td>x</td>
<td>1</td>
<td>0</td>
<td>08</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>xxxx</td>
</tr>
</tbody>
</table>

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

Q Mode Response String (Q):

<table>
<thead>
<tr>
<th>Start</th>
<th>Unit</th>
<th>CMD</th>
<th>Q0</th>
<th>Q1 Type</th>
<th>Q2</th>
<th>Q3 Type</th>
<th>Q4</th>
<th>Q5 IR</th>
<th>Q6 Digital CC</th>
<th>Q7</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-9</td>
<td>1</td>
<td>Q</td>
<td>1</td>
<td>CC Type 1-8</td>
<td>Video Detect (fixed)</td>
<td>AV Detect (fixed)</td>
<td>Label (fixed)</td>
<td>IR 9=Normal</td>
<td>1 digit</td>
<td>Digital CC 1-6</td>
<td>2 digits</td>
</tr>
<tr>
<td></td>
<td>&lt;</td>
<td></td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>9</td>
<td>0</td>
<td>1</td>
<td>xx</td>
</tr>
</tbody>
</table>

Contemporary Research 21 232-ATSC 4 HDTV Tuner
RS-232 Cable Connections

Single Tuner

Contact closures on Pins 4 and 9 can be used with GND for channel up/down control. Using a fully wired null model cable will not trigger the closure functions.

Multiple Tuners

The easy way is to use an inexpensive IP switch to a control system to connect all the tuners; then use the control system’s Telnet control setting for the RS-232 commands. No need for Unit numbers, just different URL addresses.

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.
Specifications

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 for Web pages, Telnet and UDP control
Service: Female USB-A port for memory stick HD processor updates
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 (1080p/1080i/720p/480p/480i)
   RGB Out: RGBHV DB-15 female (1080p/1080i/720p/480p/480i, 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, Consumer or Pro for digital outputs
      Digital Audio SPDIF: Coax and optical output, Dolby 5.1 AC3/PCM/Variable PCM 44 KHz/44.1 KHz
      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.

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.

Manufactured under license from Dolby Laboratories, Dolby and the double-D symbol are trademarks of Laboratories
Rack Mounting

Two options are available for rack-mounting ATSC Tuners, 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 ¼” (black) countersunk screws.

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.
Safety Instructions

Read before operating equipment.

- Cleaning - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
- Power Sources - Use supplied or equivalent UL/CSA approved low voltage DC plug-in transformer.
- 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.
- 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.

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