

Product Manual

ICC2-ATSC

HDTV Tuner/Controller

August 16, 2007

S12 Control Version 1.4
HD Processor Version 0.62



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Overview



The ICC2-ATSC HDTV Tuner is an integrated HDTV tuner/controller that networks HD display monitors and projectors in an iC-Net and SignStream display control system. As a universal TV tuner, the ICC2-ATSC can receive ATSC, NTSC, and clear QAM cable channels from an MATV antenna or CATV cable RF system.

The tuner displays broadcasts through simultaneous HDMI, RGB/Component, and NTSC composite video or connections. Full-time audio is available from digital 5.1/PCM/Variable PCM HDMI, optical, and coax ports, as well as variable-level analog stereo audio outputs.

- **Integrated Display Control** - Employs RS-232 control port for integrated display or video projector control, includes onboard database of display control command
- **Through-the-RF Coax Networking** - Communicates with SignStream servers, iC Commander software, Display Express Web software, and custom control systems
- **Universal Tuning** - Handles a mix of ATSC, clear QAM and NTSC channels, cable or off-air tuning
- **Pro Integration** - Features 2-way RS-232 control and feedback with simple ASCII commands, as well as discrete IR and wired IR - AMX and Crestron modules available
- **Fast Tuning** - Changes analog and digital channels instantly with improved RF reception
- **Total Video** - Simultaneous HDMI, RGB/Component, and composite video output (RGB and Component switchable)
- **Total Audio** - Simultaneous digital 5.1/PCM/Variable PCM HDMI, coax, and optical outputs, as well as variable-level analog stereo
- **HD Scaling** - Upscales NTSC broadcasts for HD output
- **Easy Set-up** - Front-panel programming supported by LCD display, on-screen menus using HD2-RC IR remote (included), and RS-232 control commands
- **Closed Captioning** - Displays analog and digital captioning text
- **On-Screen Menus** - Setup, Electronic Program Guide, Channel, Favorites, and Program Information menus
- **Compact Rack Mounting** - Mounts in 2RU single RK1-HD or dual RK2-HD 19" rack kits
- **Includes** - 12 VDC switching power supply
- **Options** - HD2-RC wireless remote, RK1-HD and RK2-HD rack kits, CC-232 or CC-COM RS-232 control cables, IR-RXC External IR Receiver
- **Green Machine** - Meets RoHS safety and California energy standards

Specifications

Physical

Size (HWD): 8.5" [216mm] wide x 2.43" [62mm] height (2RU) x 8.0" [203mm] deep

Weight: 2.25 lbs [1 kg]

Enclosure: Steel with black powder coat paint

Mounting: Rack mounting for one or two units side-by-side optional (RK1-HD, RK2-HD)

Front Panel



LEDs: DC Power (Green), RS-232 RX (Yellow), RS-232 TX (Red)

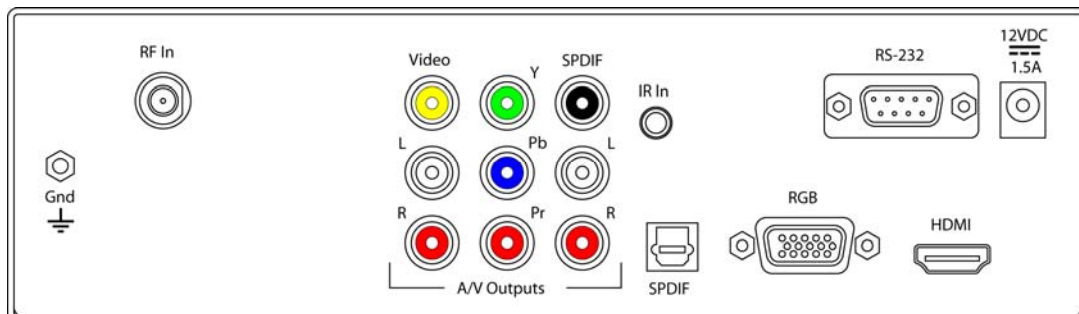
Control: Power, Volume Up/Down, Channel Up/Down

Display: Red LED Channel Display, dot separated major and minor channel numbers,

Air: Dot at end of display indicates Off-Air tuning

IR: IR sensor

Rear Panel



RF In: 'F', female, 75 ohm impedance, Off-air or cable

Video Output: Simultaneous HDMI, Component/RGB, NTSC video out

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 (1080i/720p/480p)

HDMI: HDMI receptacle, Type A, HD video and digital audio, version 1.2 (1080i/720p/480p)

Use PCM/PCM Variable mode if HDMI audio connection is used

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

Digital Audio SPDIF: Coax and Toslink optical output, 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

IR In: 3.5 mm stereo input for external IR sensor or wired IR (no carrier, discrete codes available)

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

1.3 A maximum, 11.5 to 15 VDC, 12 VDC typical

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 14-69 (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

Includes

Power Supply, 1.5A maximum, 12 VDC

Options

HD2-RC IR Tuner Remote, 4 AAA batteries (at least one per system for setup)

IR-RXC External IR Receiver

RK1-HD Single Rack Kit

RK2-HD Dual Rack Kit

CC-232 RS-232 Cable

Quick Setup Guide

Setup Step	Options	Notes
Front-Panel Programming Tuning Mode Baud Rate Unit # Zone # Panel Lock Power-Up Volume IR Receive Digital Audio HD Out HD Resolution	Hold and release Power and Volume Up buttons 0.0 = Cable* 1.6 = 9600 baud 2.1 = Unit 1 3.1 = Zone 1 (See IC-Net Zones) 4.0 = Unlocked 5.0 = Restore to previous level 15.9 = On 47.2 = PCM Variable 48.0 = RGB 49.0 = 1080i	Channel Up/Down = Mode Volume Up/Down = Options Default Settings, change if needed. See Front Panel for other setting options. Tip: Use Volume Down to access list in reverse for HD and Audio settings
On-Screen Menus Channels Time Audio Aspect Ratio	Use included HD2-RC Remote Menu/Channel/AutoScan* Signal Menu/Channel/Add-Delete Press List Menu/Setup/Time Menu/Setup/Audio/Digital Menu/Setup/Screen Format	<i>You can scan for Air and Cable View channel signal strength Add/Remove from Chan Up/Down Add to Favorite channel list</i> Fine Tune and Noise Reduction available for analog channels <i>Set DST and Time Zone</i> <i>AC-3 (5.1, PCM, PCM Variable) 4:3 or 16:9, zoom options (options vary when tuned to analog and digital channels)</i>

*You can initiate a channel scan without an IR remote (see next page for more options):

1. Put tuner into Front-panel programming mode (hold down Power, press Channel Up).
2. Go to Mode 0 and set Tuning Mode.
3. Go to Mode 6 using Volume Up button.
4. Press and hold Channel Up and Down, then press Power. This will exit programming mode and scan channels.

Front Panel Setup

To Enter a Front Panel Programming Mode:

1. Press **and hold** the Power button, then press the Volume Up button
2. Release all buttons, the ICC2-ATSC will now be in the front-panel programming mode. The Air LED will flash, indicating programming mode.
3. The first two digits show the mode, the second show the option.
4. Changes are saved in non-volatile memory as they are entered.
5. The Volume up/down buttons scroll through programming modes, forward and reverse.
6. The Channel up/down buttons scroll through possible options for each mode.

To Exit the Front Panel Mode

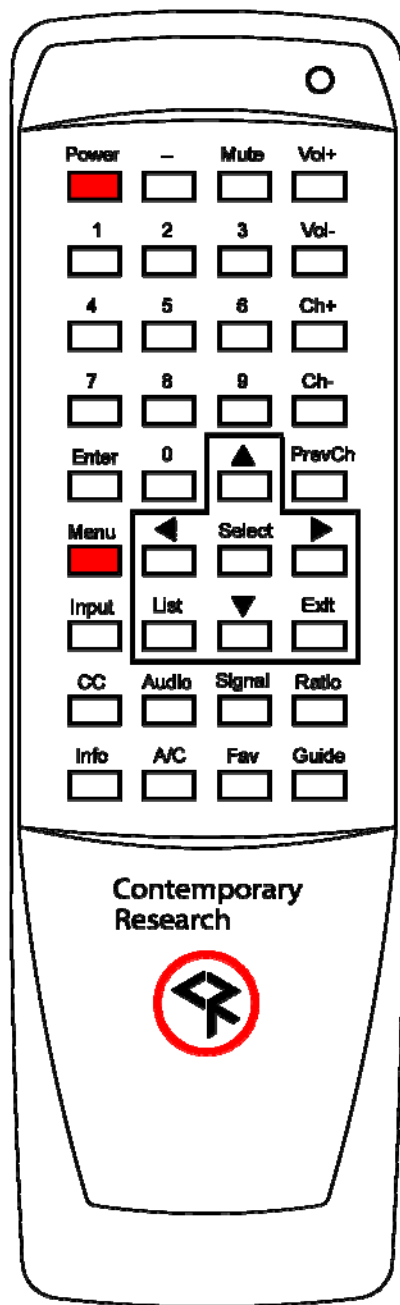
Push and release the Power button.

Mode	0-9	Parameters
RF Tune	0.0	0=CATV (Default) 1=Off-Air 2=IRC 3=HRC 4=Cable Auto
Baud Rate	1.1 1.2 1.3 1.4 1.5 1.6 1.7	300 600 1200 2400 4800 9600 19200
Unit Number	2.1	1-99
Zone Number	3.0	1-15
Panel Lockout	4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7	None Channel up/dwn Volume up/dwn Channel & Volume up/dwn Power Channel up/dwn & Power Volume up/dwn & Power All
Power-up Volume	5.0 5.X	Restore previous level (default) 1 – 63 sets volume level
Firmware Version	6.14	Ex: Version 1.4 - Press and hold Channel Up, then Power to restore tuner to default settings Press and hold Channel Up and Down, then Power to scan channels
Captions	10.0 10.1	Captioning off (default) Captioning on
Caption Mode	11.1 11.2 11.3 11.4 11.X	1=Caption 1 (default) 2=Caption 2 3=Caption 3 4=Caption 4 5-8= Text 1-4 (rarely used)
Video Detect	12.3	No AV mute (fixed)
AV Status	13.0	No AV status (default)
Label Mode	14.2	Numeric (fixed)
Digital Audio	47.0 47.1 47.2	0 = AC-3– 5.1 1 = PCM (set to this for audio through HDMI) 2= PCM Variable (default)
HD Output	48.0 48.2	RGB (Default) Component
HD Format	49.0 49.1 49.2 49.3	0=1080i (Default) 1=720p 2=480p 3=480i

Tip: The modes are arranged for fast access to common settings. Press Volume Up to set tune mode, unit, and Zone, then Volume Down to access the list in reverse to select HD and Audio options.

HD2-RC IR Remote

The HD2-RC IR Remote included with the ICC2-ATSC 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 ICC2-ATSC 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.

On-Screen Menus

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

Favorite Channels



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

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

Channel Add/Delete



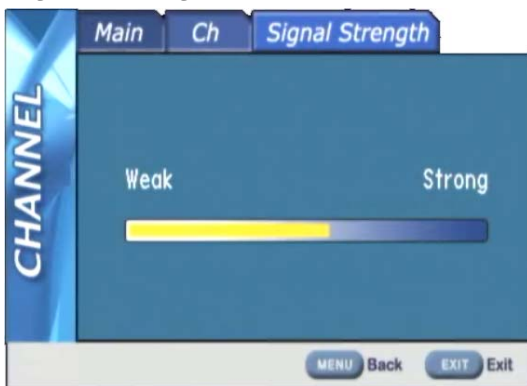
This menu can add or delete a channel accessed from Channel Up and Down.

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.



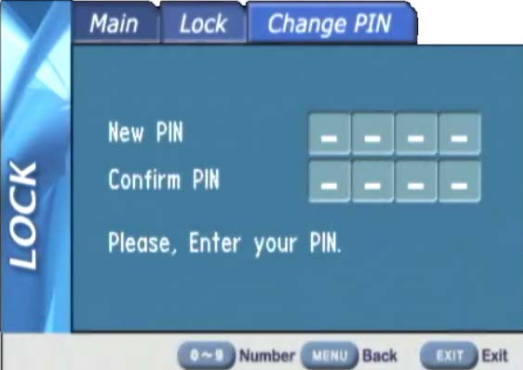
Note that HDTV channels are broadcast on UHF frequencies. The Add/Delete will show the name of the digital channel, as well as the actual UHF channel used for broadcasting.

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.

<p>Caption Menus</p> 	<p>This menu accesses captioning features:</p> <ul style="list-style-type: none"> • On/Off – turn captions on/off – <i>other options are not available if captions are off.</i> • Analog Mode - CC 1-4 and Text 1-4 • Digital Mode – Service 1-6 • Digital Font Options <ul style="list-style-type: none"> • 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 <p>Version displays current version of tuner firmware</p>
<p>V-Chip Settings Menus</p> 	<p>Manages access to programming for US and Canadian standards.</p> <p>The default PIN number for access is 0000 (four zeros).</p>
<p>Change PIN</p> 	<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
- **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 (5.1), PCM, or variable-level PCM. Set to PCM when using audio through the HDMI connection – most displays cannot decode AC-3 (5.1).
- **Auto Volume** – On or off

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

IC-Net Control Protocol

Overview

RS-232 control for up to 4000 TV Controllers is provided through an iC-series Head-End Network Controller. The ICE-HE Ethernet Head End and ICC-HE Head End manage iC-Net communication over RF Coax to ICC1 (1-way) and ICC2 (2-Way) TV Controllers.

Each TV Controller is assigned a unique device number from 1 to 4000 to which control commands are addressed. The devices are organized into 16 zones of 255 devices. All the devices in each zone will respond to a single "virtual device number" — one device number that represents all devices in each zone. There is also a global device number, 4095, that will command all devices in the system. This feature dramatically speeds up system operation and programming, because one command can affect an entire group of devices—or all. To take advantages of this feature, review the section **iC-Net SmartZones** in this manual.

In ABC-Net, we reserve the first group of devices, 1-255, for components operating on a connected control system. Zones 1-16 are used for CR TV Controllers, Video Display Controllers and Tuners. As it's unlikely any system will use all 4000 devices, this may be a good device standard for your system as well.

The Remote RS-232 port on the Head-End Network Controller can communicate from 1200 to 38.4K baud. The factory default setting is 19.2K baud, 8 data bits, No parity, and 1 stop bit.

Command String Structure

Characters in command strings are expressed in a combination of hex and ASCII characters. For clarity, the following protocol examples use the following conventions:

- Single-byte hex numbers are preceded by the '\$' symbol
- ASCII characters or strings are enclosed in single quotes
- Numbers not marked as hex or ASCII are a single decimal byte
- Parameters shown in < > brackets are single byte
- A series of multiple commands or parameters are set apart by [] brackets
- Commas separate the bytes, but are not part of the protocol
- Double quotes enclose the command string, but are not part of the protocol

Command format:

"\$A5,<dh>,<dl>,<ncb>,<cmd1>,<parameter> [<cmdN>]"

\$A5 Starts the command
<dh> The zone or high order byte of the device*
<dl> The unit or low order byte of the device (0 for global zone)
<ncb> The number of command bytes to follow
<cmd1> The first command byte
<parameter> Command parameters (not used by all commands)
[<cmdN>] Multiple commands can be concatenated, with byte count added to <ncb>

* *iC-Net devices are arranged with a zone mindset. For example, a command sent to Device 256, which triggers all the units in Zone 1, would be expressed as \$A5, 1, 0 (first zone, device zero). A command sent to 257 would be \$A5, 1, 1 (first zone, device 1 in the zone). See iC-Net SmartZones toward the end of this manual.*

IC-Net Commands

Control Commands

Command		Description
Power		
Power Off	P0	"\$A5,<dh>,<dl>,2,'P0' " (6 bytes)
Power On	P1	"\$A5,<dh>,<dl>,2,'P1' " (6 bytes)
Power Toggle	PT	"\$A5,<dh>,<dl>,2,'PT' " (6 bytes)
Volume	VL	"\$A5,<dh>,<dl>,3,'VL',<vol level>" (7 bytes) Sets TV volume level 0 = Mute 1 – 63 = Minimum level (1) to maximum volume (63)
RS-232 Control	T0	"\$A5,<dh>,<dl>,3,'T0'<type> " (7 bytes) – Sets RS-232 control codes
Tuning Format	S0=	"\$A5,<dh>,<dl>,3,'S0',<format>" (7 bytes) 0=CATV 1=Off-Air 2=IRC 3=HRC 4=Cable Auto
Tuning Style	H1=	NA
TC Response	H2=	NA – When the ICC2-ATSC receives an analog channel command, it will attempt to tune the digital equivalent first. If there is not a matching virtual channel, the unit will tune the analog channel.
Channel Up	TU	"\$A5,<dh>,<dl>,2,'TU' " (6 bytes) – Tunes to next channel up
Channel Dwn	TD	"\$A5,<dh>,<dl>,2,'TD' " (6 bytes) – Tunes to next channel down
Prev Channel	TP	"\$A5,<dh>,<dl>,2,'TP' " (6 bytes) – Tunes to previous channel
Tune Analog Channel	TC	"\$A5,<dh>,<dl>,3,'TC', <channel>" (7 bytes) – Tunes to a specific channel 2-127
Channel Scan	T^	"\$A5,<dh>,<dl>,2,'T^' " (6 bytes) – Initiates channel scan
Tune HD Channel	TH	"\$A5,<dh>,<dl>,5,'TH',<H1>,<Major>,<Minor>" (9 bytes) The tuner will ignore the first bit (H1), and tune the major (virtual) and minor channels. Values may be in hex or decimal. Ex: "\$A5,1,4,5,'TH',0,2,3" Device 260, virtual channel 2-3
Front panel Lock	S4=	0=None 1=Channel 2=Volume 3=Channel & Volume 4=Power 5=Channel & Power 6=Volume & Power 7=All
IR Receive	Q5=	0 - No IR reception 10 - Normal (Default)

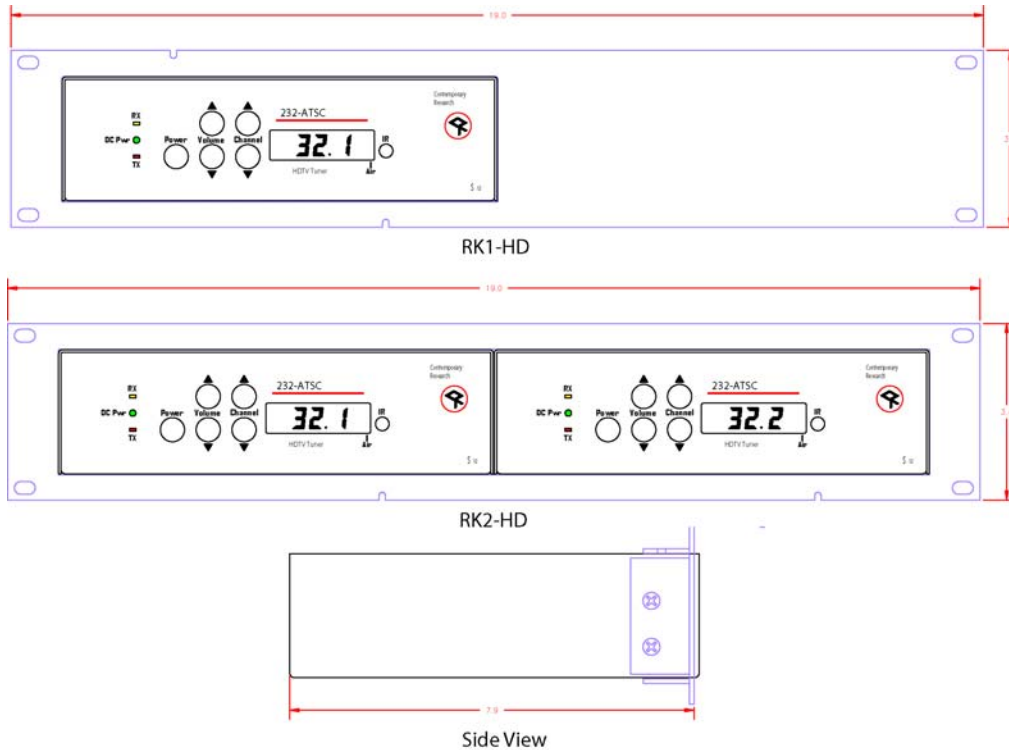
HD2-RC Remote Emulation

You can also emulate IR commands sent from the CR HD2-RC Wireless Remote. If you are using the numeric keys to select a channel, the user or program will need to follow the numeric command with an Enter.

KK=<key>	"\$A5,<dh>,<dl>,3,'KK',<control>" (7 bytes)	
	* = Reserved for future products/applications	
0=*		88=Favorite
1=*		95=List
2=*		96=Add/Delete Channel
3=*		98=Air/Cable
4=*		99=Dash -
5=*		100=Info
6=*		101=Prev Chan
7=*		105=Menu
8=*		106=Cur Rt
9=Power (tog)		107=Cur Lt
10=0		108=Cur Up
11=1		109=Cur Dn
12=2		110=Enter/Select
13=3		111=Exit
14=4		115=CC
15=5		141=Format 1080i
16=6		142=Format 720p
17=7		143=Format 480p
18=8		144=Format 480i
19=9		149=Output RGB
20=		151=Output YPbPr
21=Enter/Select		153=Air
22=Ch Up		154=Cable
23=Ch Dn		158=AC-3(5.1)
24=Vol Up		159=PCM
25=Vol Dn		160=PCM Variable
26=Vol Mute (tog)		161=16:9
27=Power On		162=4:3
28=Power Off		
29=Menu		
63=Guide		
80=Freeze		
81=Signal		
82=Ratio		
85=Audio		

Rack Mounting

Two options are available for rack-mounting tuners.



RK1-HD

- Insert ICC2-ATSC into RK1-HD frame.
- Use screws included with kit to attach tuner to the side flanges.

RK2-HD

- Use supplied screws to attach left tuner to left and top flanges
- Use supplied screws to attach right tuner to right and top flanges

iC-Net Zones, Units and Device Addresses

In the front-panel setup instructions, you set the Unit # (1-255), then the Zone # (1-15). This refers to the iC-Net address structure that includes device number 256 – 4095 that is divided up into 15 Zones.

To simplify controlling groups of devices, iC-Net is divided into 15 zones of 255 devices, called SmartZones. All the devices within each zone can be controlled simultaneously by sending a command to a single virtual device number.

For example, noting the zone chart below, if we send a Power On command to device #256, all iC-Net controllers in Zone 1 will turn off at the same time.

This is an immensely powerful feature, because most systems can only address one device at time. If you need to turn off all 50 TV in a zone, you would need to send 50 commands. In addition to the hassles of creating multiple commands, there would be a long delay between the first and last command. One command, instant response is easier.

The Zone number plus the Unit number equals the actual device address.

Zone	Device #	Unit	Total Device #
1	256	1-255	257-511
2	512	1-255	512-767
3	768	1-255	769-1023
4	1024	1-255	1025-1279
5	1280	1-255	1281-1535
6	1536	1-255	1537-1791
7	1792	1-255	1793-2047
8	2048	1-255	2049-2303
9	2304	1-255	2305-2559
10	2560	1-255	2561-2815
11	2816	1-255	2817-3071
12	3072	1-255	3073-3327
13	3328	1-255	3329-3583
14	3584	1-255	3585-3839
15	3840	1-255	3841-4000
All Zones	4095		

Tip: While many applications can use just the Zone number, it's a good practice to assign a unique Unit number to each controller in the zone. This allows the system software to address individual controllers if necessary.

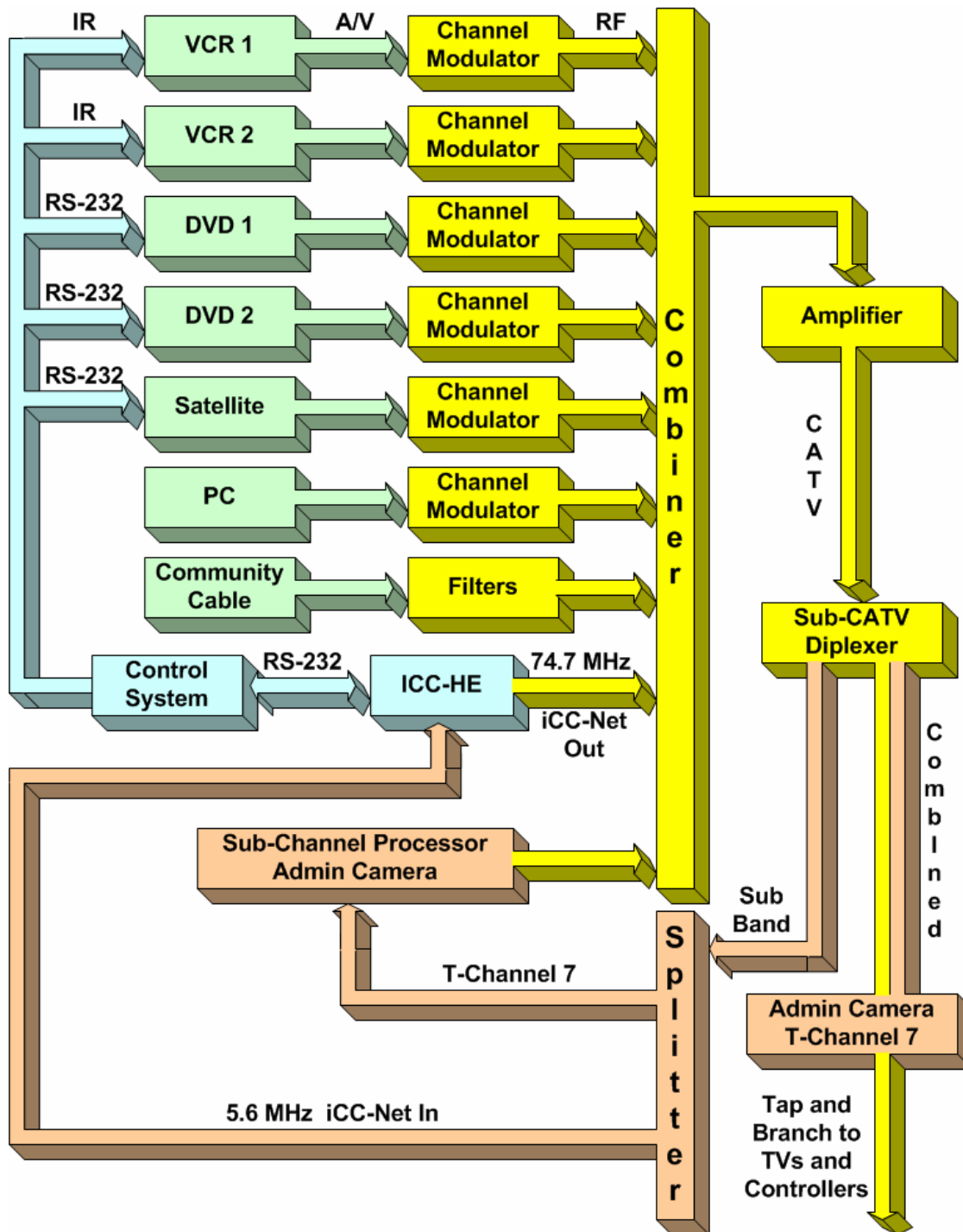
System Map

One of the key tasks for iC-Net integrators is to create a logical **System Map**, assigning device numbers to TV controllers so they fall into physical zones useful to the client. The device mapping could be sorted by type or location; whichever suits the application.

iC-Net Zone	Zone	Room	Unit	Device
1	W 1 st Floor			256
		W151	1	257
		W152	2	258
		W153	3	259
		W154	4	260
2	W 2 nd Floor			512
		W251	1	513
		W252	2	514
		W253	3	515
		W254	4	516
3	E 1 st Floor			768
		E151	1	769
		E152	2	770
		E153	3	771
		E154	4	772
4	E 2 nd Floor			1024
		E251	1	1025
		E252	2	1024
		E253	3	1025
		E254	4	1026
5	Cafes			1280
		G100	1	1281
		G150	2	1282
		G151	3	1283
6	Entrance			1536
		TV 1	1	1537
		TV 2	2	1538
7	Hallways			1792
		W1	1	1793
		W2	2	1794
		E1	3	1795
		E2	4	1796
8	Concession			2048
		Lower	1	2049
		Upper	2	2050
All Zones	All			4095

Typical RF and ICC-Net Signal Flow

The diagram below shows the structure of a typical Contemporary Research media retrieval system. One of the key aspects for iCC-Net communication is to provide a forward and return (sub-channel) path for data.



Safety Instructions

Read before operating equipment.

1. **Cleaning** - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
2. **Power Sources** - Use supplied or equivalent UL/CSA approved low voltage DC plug-in transformer.
3. **Outdoor Antenna Grounding** - If you connect an outside antenna or cable system to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
4. **Lightning** - Avoid installation or reconfiguration of wiring during lightning activity.

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

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

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

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

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

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

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

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