# ZvBox® 170
## Configuration Manual





Configuring ZvBoxes can be as simple as changing the RF channel used for broadcast, or as powerful as associating audio ports with video ports and controlling how video gets processed and broadcast. This manual explains how to do it all.

If you run into any problems, please refer to the Zv Support page at www.zeevee.com, where you will find answers to frequently asked questions and helpful tips from ZeeVee experts. If you still cannot find the answers you need, our technical support hotline at 877-5ZEEVEE (877-593-3833) is here to help.

# Contents

# Configuring ZvBox® 170

In most cases, the ZvBox® 170 can be configured using the front panel buttons. Configuration is simple, and usually just involves setting the RF channel on which the ZvBox® will broadcast. Settings are stored in ZvBox® and not lost on power-down.

Component video sources connected to the ZvBox® 170 should be set for 720p output, and VGA sources should be set for 1280 x 720 output. If ZvBox® 170 receives a 1080 signal, it will display a warning message and the picture will appear at a very low frame rate.

**Important Note:** Many additional configuration settings can be accessed by connecting a PC to the ZvBox® (via USB), and running either ZvConfig or ZvCli configuration software. You can download either on the ZeeVee web site. The same USB connection can also be used to update the unit's firmware.

## Quick-start

Following are instructions on how to perform the most common setting adjustment (setting the RF channel the ZvBox® will use for broadcast) using the front panel controls.

**ZvBox® 170 Front Panel**



| Item | Description | Function |
|------|-------------|----------|
| 1 | Status Display | High-visibility character display for setting and displaying configuration including channel, power, and label configuration; input selection; video output parameters; scanning/system status. |
| 2 | Next Button | For scrolling between functions. |
| 3 | +/- Buttons | For scrolling between options within a function. |
| 4 | OK Button | For selecting functions and options. |

Note – make sure the HDTV connected to the ZvBox® is set to Cable mode, vs. Antenna or Over-the-air mode. ZvBox® broadcasts using QAM – the same standard used by cable companies.

1. Press the **Next** button until **SET CHANNEL** appears in the display
2. Press the **+** or **–** key until **7** appears
3. Press the **OK** button

That's it! Your ZvBox® should now be broadcasting on RF channel 7, and can be tuned in at your HDTV by entering 7.1. Note – sometimes a channel scan is required at the HDTV before the new channel is recognized. The rest of this manual will help you understand how to make other settings or get helpful information that may be useful in different scenarios.

**For more advanced configuration of the ZvBox® 170, see the remainder of this guide.**

# Compensating for cropped video from VGA sources

Most Digital Televisions crop off some portion of the picture at the outside edges; the phenomenon is known as overscan. For example, even if they receive an image that's *exactly* 1280x720 pixels, TVs may crop off up to 15% of the image before displaying it! Some TVs allow you to control this (look for setting like "Unscaled" or "Native" in the Picture menu settings). Most do not let you override it.

Component Video sources aren't terribly affected; they've always been designed to be displayed on TVs that might crop off a portion of the picture. Content is specially designed to keep important information inside of a 'safe area'. There is no need (and no ability) to adjust the source to better fit the TV– you'll simply see a little more picture on one TV vs. another.

VGA sources are quite a different matter. These are usually computer images that have important information at the edges of the screen:
- Windows has a Start button and the task bar right on the edge.
- Apple has a dock on the edge.
- Digital signage applications typically put a text crawl on the edge.

Any cropping of the image may cause important information to be lost. ZeeVee has developed a patent-pending mechanism to help compensate for this behavior. By changing the information presented to the computer via EDID on the VGA connection, we can give the computer an alternate "underscan" resolution that's a little smaller than the default. Although ZvBox® ships with a default underscan resolution, we also allow you to optimize the settings to match the exact behavior of your TV.

Here are the steps involved:

1. Broadcast a VGA source to your HDTV(s). Note which TV crops off the most.
2. Press the **Next** button until the display reads "**SET VIDEO-SOURCE**"
3. Press the **+** or **-** button until "**Test-Image-1**" appears on-screen, then press **OK**
4. On the TV that crops the most, note the largest resolution that is visible. It will look like this:
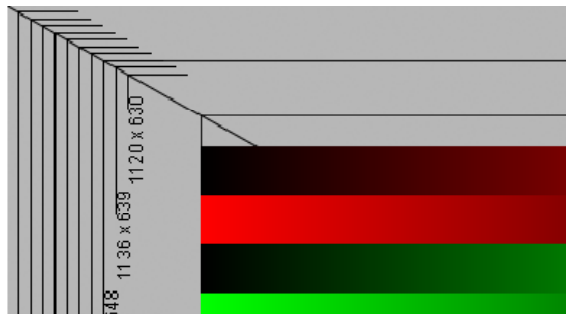


5. Press the **Next** button until the **SET VGA-RES** command appears in the window.
6. Press **+** or **–** buttons to select a resolution that is closest to, but not larger than, the one you saw on the HDTV (that will ensure that the entire picture fits on-screen).
7. Press OK to apply that resolution.
8. Unplug the VGA cable from your computer, wait a few seconds, and reconnect it. There should now be a new resolution available in your computer's "display properties" that matches your setting. Select it. Your VGA source's picture should now perfectly fit on your HDTV.

## ZvBox® 170 Front Panel Dashboard

In normal operation the display panel on the ZvBox® 170 is in "Dashboard" mode, giving you at-a-glance information about the operation of the ZvBox, as follows:

1 – HDTV channel #
2 – Short Channel Name
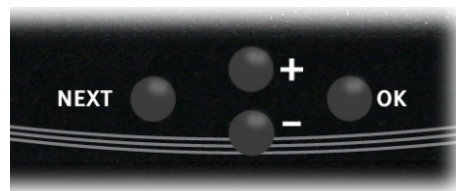3 – Input Video Source
4 – Output resolution

In addition, status messages may scroll across the bottom line of the display in lieu of the 'Input Video Source' and 'Output Resolution' indicators. These status messages are as follows:

| Status message | Notes |
|---|---|
| RF power off | Turn RF power on to begin broadcasting |
| Scanning cable | ZvBox is scanning cabling for open and occupied RF channels. Wait for completion. |
| VGA: no video input **or** Component: no video | No video input is detected at designated connector- check source connection |
| VGA: resolution unsupported **or** Component: resolution unsupported | Input video resolution not supported by ZvBox. Change to supported resolution. |
| VGA: 1080 unsupported **or** Component: 1080 unsupported – | Input video resolution of 1920x1080 unsupported; message appears at HDTVs as well. Change to supported resolution. |
| Temperature critical **or** Temperature warning | ZvBox is in danger of overheating; make sure all air inlets and outlets are clear, and that nothing is stacked on top of ZvBox |
| DSP error, reboot | The digital signal processor (DSP) is not functioning correctly.  Try rebooting the unit, or call technical support. |

## ZvBox® 170 Front Panel Setup

The front panel buttons operate as follows:

- **Next** scrolls through available settings
- **+** and **–** buttons scroll through possible values for a setting and multiple status lines
- **OK** saves the selected value

## Basic Menu

| Settings | Possible Values |
|---|---|
| **SET CHANNEL**<br>*Sets RF broadcast channel to X and HDTV channel to X.1* | 2-135 |
| **SET CHANNEL-NAME**<br>*Sets channel name displayed on-screen* | Any name, 7 characters or fewer |
| **SET VIDEO-SOURCE**<br>• *Select* Test Image 1 *before setting "VGA-RES" parameter* | Component<br>VGA<br>Test-image-1<br>Test-image-2<br>None |
| **SET AUDIO-SOURCE**<br>*Sets audio source for current video source. If video source not VGA or Component, sets both.* | Dig-optical<br>Dig-coax<br>USB<br>None |
| **SET LANG/IDIOMA**<br>*Sets the language that is used at the Front Panel Display.* | English<br>Español |
| **SHOW STATUS**<br>*Note: Scrolling through the SHOW STATUS section does not allow you to change settings- it simply gives you information about the operating status of your ZvBox 170* | Transmit (whether transmitting)<br>V-in (Video input resolution)<br>V-out (Video output resolution)<br>A-in (Audio input type)<br>A-out (Audio output type)<br>SN (Serial number)<br>HW Rev (Hardware version)<br>SW (Software version)<br>Temp (Temperature)<br>Up (Indicates continuous run time)<br>CC (Closed caption status) |
| **ADVANCED MENU** | Enter the advanced menu |
| **LOCK FRONT PANEL** | Lock<br>**Note:** To unlock front panel, press all four front-panel buttons simultaneously (Next, + , -, OK) |

## Advanced Menu

| Settings | Possible Values |
|---|---|
| **SET DATA-RATE** *Helps increase or decrease picture detail. Some HDTVs can't handle High setting without picture breakup.* | Low Normal High |
| **SET RF-POWER** *Sets broadcast power* | 0ff 5 dBmV 10 dBmV 15 dBmV 20 dBmV 25 dBmV |
| **SET CABLE-PLAN** *If sharing coax cabling with cable company feed, set to same cable plan as cable co.; normally Standard* | Standard HRC IRC |
| **SET WATERMARK** *Enables/disables on-screen Zv watermark* | On Off |
| **SET VGA-RES** *Used to shrink 1280 x 720 VGA source picture to better fit an HDTV screen* | Various from 1120x630 to 1264x711 |
| **START CABLE-SCAN** *Scans the cabling to see which channels are currently unoccupied on the coax system.* | Start |
| **SHOW SCAN RESULT** *Displays unoccupied channels on coax cabling which can be used to broadcast the Zv channel* | *Note: RF channel scan results are displayed; information includes channel plan, open and occupied channels* |
| **RESET DEFAULTS** *Restores ZvBox® to factory defaults* | |

## RF, Cable, and Broadcast Commands

These commands are used for settings related to the local cable plant, and how ZvBox® will broadcast.

### Set Channel

The ZvBox® 170 is frequency agile, so it's possible to use any RF channel for broadcast

**Syntax**
**SET CHANNEL** <2..135> **factory default**: **2**
Sets the RF channel frequency used for broadcast, as well as the HD-TV channel used to tune the channel at the TV. The exact frequency follows standard channel placement, and is also a function of the cable channel plan (Standard, HRC, IRC). ZvBox® creates a well-formed cable channel, and may be placed next to existing channels without concern.

### Set Channel Name

The ZvBox® channel name appears on HDTV screens when tuned in. Technically there are three names that could appear: the short channel name, long channel name, and EIT (or program) name. The name may be customized- 7 characters spaces are available. If customized, all three possible names are changed to the new customized name.

**Syntax**
**SET CHANNEL NAME**<A....Z> **factory default**: **MYTV-HD**
Sets the name that will appear on HDTVs when the ZvBox channel is tuned in. When the name is customized, all three channel names adopt the customized name.

### Set RF Output Power

Sets the power level that ZvBox® will use when broadcasting.

**Syntax**
**SET RF-POWER** {Off | 5dBmV | 10dBmV | 15dBmV | 20dBmV | **25dBmV**}
The ZvBox® has a maximum output power of +25 dBmV, matching the highest power levels typically entering a home from providers such as FIOS and Comcast. When using a ZvBox® to add a channel to an existing lineup, it is important to match the power of existing channels, otherwise adjacent lower-powered channels can be difficult to tune with some televisions. There are five power levels available, each dropping the output power approximately 5 dBmV, plus 'off'.

### Set the Cable Plan

ZvBox®'s built-in spectrum analyzer can identify the cable plan (channel alignment) the cable company is using for its channel lineup; options are Standard, HRC, and IRC. Once the cable plan is detected, the ZvBox® can be set to use the same plan. Matching the ZvBox to the cable company cable plan allows the HDTVs to tune both the Zv channel and the cable company channels reliably.

**Syntax**
**SET CABLE PLAN** {**standard** |HRC | IRC}
You can set the cable plan (Standard, HRC or IRC) to be used. For best results during the scan, connect ZvBox® to the cable plant using the same coax cabling connection that you would use to connect an HDTV.


**Cable Scan**

ZvBox® products contain a very powerful feature to aid the installer– a built-in cable spectrum analyzer. When asked, ZvBox® will stop transmitting, analyze every RF channel on the cable and report the result. The report shows if a channel is open or occupied, and if occupied, if the channel is Analog or Digital.

**Syntax**
**START CABLE-SCAN**
RF frequencies on the coax cabling are scanned from lowest number to highest. The scan cannot be interrupted once started.

**Example: (some results omitted to save space)**
**START CABLE-SCAN**
**Determining cable plan**
**RF 2: Open**
**RF 3: Digital**
**RF 4: Analog**
**…**
**RF 135: Open**
**SCAN COMPLETED - Hit NEXT**


**Show Last Cable Scan Results**

ZvBox® remembers the results of the last cable scan performed. This command shows the results.  The first line shows the cable-plan type that was determined (standard, HRC, or IRC).

**Syntax**
**SHOW SCAN RESULTS**

**Example:**
**SHOW SCAN RESULTS**
**Hit +- to scroll**
**Cable-plan STD**
**Open 2 3 4 5 6 7**
**Open 8 9 10 11**
**…**
**Digital 12 13 14 15**
**…**
**Analog 16 17 18 19**

## Audio Input Command

These commands are used to associate an audio input to the currently selected video input. It is allowable to use the same audio input for both video inputs, though that may not make the most sense.

### Associate Audio Input for VGA and Component Inputs

**Syntax**
**SET AUDIO-SOURCE** {Dig-optical | **Dig-coax** | USB | None}

This command sets the audio input that is associated with the currently selected video input.  If the video input is neither VGA nor Component, then the selected audio source is associated with both VGA *and* Component inputs.

The Dig- optical input is a TOSLINK connection that delivers digital audio. The Dig- coax input carries the same information in a different physical form. Note that DTS encoding is not supported.

If USB is selected, the USB port will present itself as a standard USB audio device to whatever device it is connected. No special software is required to use this connection.

If None is selected, no audio will be passed with the video stream

## Video Input Commands

These commands are used to select which video source to broadcast, and set some parameters for how to process that video.

### Select Active Video Source

Selects the video input that will be encoded and broadcast. Audio will be processed based on the audio port associated with the selected video input.

**Syntax**
**SET VIDEO-SOURCE** {**Component** | VGA | Test-image-1 | Test-image-2 | None}
**factory default**: **component**

If idle-screen is selected ('None'), the animated Zv logo is played. If a test image is selected, a fixed test image is displayed. These are designed to help you calibrate your HDTVs- test images are broadcast in 720p.

 On very rare occasions, the audio and video processing may need to be restarted. To do so, change the video-source to 'None' and then back to the previous setting.

Note that video-source can be selected via the IR control port on the rear panel of the ZvBox® 170.

**Select Underscan Resolutions to Present in VGA EDID**

When ZvBox® 170 is connected to a computer via the VGA connector, ZvBox® presents to the computer's graphics card a set of resolutions that are supported by ZvBox®, including the 1280 x 720 resolution used by HDTVs. These resolutions are presented in a structure called EDID (Extended Display Identification Data). If ZvBox® is broadcasting a full 1280 x 720 resolution to an HDTV that "overscans" (crops off the edges of the picture), important information may be lost, e.g. a PC taskbar or a scrolling ticker at the bottom of the screen. In that case it's possible to choose a ZvBox®-supported "underscan" resolution at the PC, generating a slightly smaller picture that will remain within the viewable area of the HDTV screen.

The following command allows you to set an underscan resolution for 720, which will be communicated to your PC via EDID. Once an underscan resolution has been selected, you may set your PC's output resolution to that resolution.

Note: each TV will perform a different amount of overscan, so keep this in mind when selecting an underscan resolution. It can be useful to have the ZvBox® output test-image-1 (i.e. "set video-source test-image 1") when determining the correct underscan resolution.

**Syntax**
**SET VGA-RES**     {1264x711 | 1248x702 | 1232x693 | 1216x684 | 1200x675 |
                    1184x666 | 1168x657 | 1152x648 | 1136x639 | 1120x630}


## MPEG2 Encoding Control

This group of commands can be used to fine-tune the characteristics of the MPEG2 encoder. The factory defaults have been set to values that produce the best picture, while also maximizing the chance that all HDTVs will correctly display the encoded video. We have found that some HDTVs are sensitive to certain things like total bit-rate or number of bits of DC coefficients. The picture may sometimes break up, or in some cases not display at all!

Experimenting with these settings can improve the quality of the encoded video, but we strongly advise you to test any changes on **\*each type of HDTV\*** that may receive the signal.


**Set Encoding Bit Rate**

A digital cable (QAM) RF channel allows for a data rate up to 38.78 Mbps. Usually, that stream is divided into multiple digital channels, each having a lower effective data rate. Since ZvBox® is placing a single digital channel in the stream, it can send more data during complex scenes, up to the 38.78 Mbps limit.

This can result in significant improvements in video quality for certain very complex scenes. However, some HDTVs will experience some picture breakup if the data rate ever exceeds 19.4 Mbps for a single digital channel. We have observed that this is true of some Sharp HDTVs, and may be true of others.

"Normal" will keep the encoder's output data rate to 19.4 Mbps. High will allow the encoder to operate up to 38.78 Mbps. At this time, Low and Normal have the same effect.

**Syntax**
**SET DATA-RATE** {low |normal | **high**} **factory default**: **high**

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**Visual Watermark**

ZvBox® overlays a Zv logo in the lower right corner of the broadcast stream. The logo has a 'heartbeat', slowly appearing and disappearing. This is used to identify a ZvBox® as being the source of video. This visual mark can be disabled, however, every encoded video stream also has an embedded digital watermark containing information about the ZvBox® and system that created it, that cannot be removed. This is added to help trace the source of potentially pirated video, and does not affect visual quality in any way.

**Syntax**

**SET WATERMARK** {off | **on** } **factory default**: **on**


## Miscellaneous Commands

**Reset to Factory Defaults**

This command resets all settings to their original factory defaults. It is especially useful when some prior configuration change causes the system to malfunction. Defaults are listed in this document in the command summary, and with each command description. The unit will reboot after it has reset to factory defaults.

Note that when configuring ZvBox® via ZvCli (with a PC via the USB connection), you can use the 'script' command to save the configuration to a file before setting to factory defaults, and also to restore the configuration from that file.

**Syntax**

**RESET DEFAULTS**

**Front Panel Lockout**

To prevent accidental changes to ZvBox® settings, the front panel buttons can be locked.

**Syntax**

**LOCK FRONT PANEL**

Note: The panel can be *unlocked* by simultaneously pressing all four buttons: **Next, +, -, and OK**.

**Set Language**

The ZvBox® 170 supports both English and Spanish languages at the Front Panel Display.

**Syntax**

**SET LANG/IDIOMA {English | Español}** **factory default**: **English**

Sets the language that is displayed on the Front Panel Display.

**Show Operating Status**

The system and operating status for ZvBox® can be reviewed using the Show Status display, which is useful for optimization and troubleshooting purposes. This display is only for review; actual configuration setting changes must be done in the Basic or Advanced menus.

**Syntax**

**SHOW STATUS**

# Show Status Display Description

| Display Lines | Descriptions of Possible Status Readouts |
|---|---|
| **Hit + - to scroll** | Operating instructions |
| **Transmitting** | Transmitting status:<br>• Transmitting = broadcasting normally<br>• RF-power off = RF output power has been turned off<br>• Scanning cable = Currently scanning for open and occupied channels<br>• Channel conflict = Set to broadcast on an occupied RF channel |
| **V-in** | Video input:<br>• Not cfg = No video source detected<br>• Test-image 1 = showing internally generated test image 1<br>• Test-image 2 = showing internally generated test image 2<br>• 1280 x 720 *(or other resolution)* = resolution of input source<br>• Undetected = no incoming video detected<br>• Unsupported = unsupported video resolution from input source |
| **V-out** | Video output:<br>• Power off = RF output is turned off<br>• 720p *(or other resolution)* = video resolution currently output from ZvBox |
| **A-in** | Audio input:<br>• Not cfg = No audio source detected (or no video source detected)<br>• PCM = audio source is USB, and/or audio input is PCM<br>• Undetected = no audio source detected<br>• AC3 = audio input is AC3 format<br>• DTS = audio input is DTS format, this is not supported<br>• Unknown = unknown audio format |
| **A-out** | Audio output:<br>• Power off = RF output is turned off<br>• AC3 = an audio source is detected, ZvBox is outputting AC3 audio<br>• No output = either no input detected, or unknown audio format from input source |
| **SN** | Shows serial number of ZvBox |
| **HW** | Shows hardware version of ZvBox |
| **SW** | Shows firmware version of ZvBox |
| **Temp** | Temperature status:<br>• Okay = normal operating temperature<br>• Warning = Hotter than normal operating temperature<br>• Critical = Unit about to shut down automatically |
| **Up** | Uptime = shows how long ZvBox has been running since power on or reboot |
| **CC** | Closed captioning adaptor status:<br>• Connected = ZVCC closed captioning adapter connected<br>• Not connected = no ZVCC closed captioning adapter connected |

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