HiDes DVB-T Transmitter (sometimes called a modulator) Model HV-310E and HV-320E (www.hides.com.tw)

Here are some set up and usage tips for the HIDes DVB-T transmitters when used with the W0ATN repeater. Provided here only to supplement each transmitter's Quick Start Guide (QSG) document.

Configuration for each transmitter is the same with just a couple of exceptions. The earlier HV-310E transmitter has a "Low" - "High" power switch and a 9-pin sub female D connector while the HV-320E does not have the switch and replaces the D connector with a smaller 3 pin male shrouded header. Both connectors perform the same function connecting the receiver to the PC for configuring the transmitter transmission parameters using the AVsender program. Damage to the HV-310E transmitter may result if the RF output power is "switched" between settings when the transmitter is on. RF Power out can be toggled off and on using the receiver's remote control "Off" icon button. This same button will also cause the receiver to change resolution if it is in IR range. Turn off the receiver's DC power to avoid affecting it's configuration. The two channel +/- buttons on the front panel held down together for at least 3 seconds will cause a reset.

After set up is complete and tested with the repeater, save the configuration to a PC file. AVSender can "Reboot" the transmitter and reset all parameters back to default (including back to the commercial out-of-band channel 21). If a Reset is needed, replace RF amplifier connection with a dummy load until the parameters are set again. AVSender does not have to be restarted if left open when the transmitter's DC power is turned off and on.

Transmitter configuration using the AVSenderUARTGUI.exe

Program Spec Version 2.05

1 - HV310E switch must be in the down "Low" position when driving an external 10w Class A amplifier from Darko, OE7DBH or Jim's KH6HTV 10w amplifier.

2 - HiDes ships a UART serial to USB Prolific converter with each transmitter. It is needed to configure the transmitter. If ever lost, the converter can be found on eBay but the 3 pin female single row connector on 100" centers must be added for the HV320E.

3 - Install a 70cm antenna (mag vertical OK) or a dummy load on the SMA antenna connector.

4 - Connect the serial to USB converter cable to the transmitter and any available USB connector on the PC.

5 - Turn on the transmitter and wait until the LED changes from Red to Green before executing AVSenderUARTGUI.exe (just one file - no files will be extracted loaded). The transmitters will run warm. Avoid stacking any other equipment on or around the transmitter including a HiDes receiver. Only later manufactured HV320E has a small 5 volt cooling fan. The remote control's icon "Off" button is a valid command with different results for both the transmitter and receiver. Warning.. "other equipment remotes" may share some of the same commands with the receiver and transmitter so be careful.

6 - Click on "Auto Connect."   This will search for and connect a com port assigned by the USB converter. A successful connection will show the com port number, baud rate and allow user input to the GUI form.

     A - Click on "Get all Config" to load the fields with default data loaded from the transmitter's memory.

     B - Click on "Set All Confg"   Form is now ready to manually enter config info in steps below or load a previously saved configuration .xml file using the Get config from file.

     C - When a Tab's data is changed, save it using the "Set TransConfig" button. Rarely, a "time out error" may be encountered before the data is "set." Just ignore this and click on a different tab to fix it. Data entered should not be lost. Verify transmitter is on and USB connection is good if error persists.   D - Upon completion, click on "Set all Config." This will ensure all data has been accepted and saved.

7 - Initially, only the first 3 of the 11 tabs across the top of the AVSender GUI form will need user input. Like the receiver, there is no real time clock. This configuration program is used across many different modulators/transmitters for both ham radio and commercial equipment so many of the TAB configurations will not apply (grayed out) for the HV310/320.

8 - Make these changes in the following order:

9 - Tab Media Config

Video Input port = HDMI (default) - Cable connection between the transmitter and camera, PC, media player, etc.

Video Input Mode = Auto (default) - Ports are scanned for connectivity. Later, if analog NTSC (CVBS) input is also connected, it will be found and used first. Other ports can be connected at the same time (if the physical constraints of the HV-310E's connectors are overcome). When a video signal is dropped momentarily on either port, the transmitter will scan for the next port. The transmitter provides an analog to digital conversion for NTSC cameras. No video cable connection to a camera or other media device is required for this set up. A "Warning" screen indicating loss of video will be transmitted if no video is available. A warning will be displayed of an invalid resolution is being used.

Video Encoding Type = H264 This is the most efficient video compression available.

Video Encoding Resolution = 1920x1080 HD resolution for the best picture.

Video Encoding Width <1920> and Height <1080> will be detected and shown here for HD. No user input.

Data Rate Control Type = CBR Continuous Bit Rate has shown to work best with the repeater.

Auto Bit Rate = Disable since CBR is being used.

Max Bit Rate (kbps) = 5500 Provides full motion for video at 1920 x 1080 resolution. Must be less than the Modulation Rate or an error will occur.

Average Bit Rate (kbps) = 8000 (default) Does not apply with CBR Data Rate Control.

Video Aspect Ratio: 16:9 (default) Use for HD and 4:3 for analog/NTSC

Video Encoding GOP Length = 30 Lower number reduces latency at the expense of quality. 30 is an acceptable tradeoff. 60 is max. (component of MPEG compression)

Encoding B Frame Number = 0 (default) (B frames between Intra and predicted frames - part of MPEG compression)

Video Encoding Frame Rate (fps) 29.57 Some TV sets may not work well with 30fps but OK at 29.57 fps.

Quantization value, Buffer value, TS Buffer all = 0 (default)

Line in Mode = Stereo Only applicable with analog/NTSC (CVBS) input (Line in does not work with HDMI's embedded audio)

Line in Gain - 0 (default) Analog only

Audio Encoding Type = MPEG2 (default)

Audio Encoding Bit Rate Kbps = 96 Any audio bit rate (except 0)will work, however 96Kbps for the repeater appears to have the least dropouts.

Audio Source = Embedded Audio An external HDMI audio "extractor" hardware may be used if a PC display does not have sound support.

AAC Channel = Stereo (default) Advanced Audio Coding

Fast Playback = 4% (helps to reduce sound latency and improving lip sync)

HDMI HDCP = Off (default) Turns off check for Highbandwidth Digital Content (HDCP) otherwise some video may not be displayed due to license issues

10 - Tab Transmission Config (Transmission Signaling Parameters - TSP)

Channel# (0 for manual entry config) = 0 The current channel number will be shown here if other than 0 or when the User Channel Table is used.*

Channel Table = User defined - Edit as required. Refer to the QSG for detailed instructions. (add Repeater input/output frequencies here)

Bandwidth MHz = 4 This BW must be used for compatibility with the repeater's receiver.

Frequency KHz = 440000   Input frequency of the repeater

Constellation = 16QAM Modulation - Minimum rate modulation required for full motion HD in 4MHz BW. QPSK can be used with less FEC but cannot support full motion 1080p resolution in 4MHz BW.   Maximum Bit Rate should be set between 3000 and3500 k/bps. This works fine for "shack video" and is a few dB more robust than QAM16. It will not play smooth HD video from all sources because of its higher modulation rate requirement. The repeater will decode QPSK OK but not repeat it in QPSK because the TX output is set to 16QAM.

FFT = 8K (Transmission Mode) Number of modulated carriers including Tx signaling TPS and pilot carriers. 8K has better resilience to reflections caused by multipath. The actual effective number of carriers for 8K is 1705 and 6817 for 2K. DVB-T does not utilize the full BW with useful data. Some of the outside carriers are set to zero which helps avoid interfering with adjacent channels/frequencies.

Code Rate = 1/2 Forward Error Correction - 100 percent redundant data is added (1 real bit and 1 redundant bit) to the content bit stream prior to being transmitted. An attempt is made to reduce all errors at the input of the repeater's receiver caused by current intermittent interference. Once this interference is identified and hopefully removed, the modulated data rate may then be increased to meet HIDes's modulation and max bit rate recommended difference. The repeater modulation rate is set higher and exceeds the recommended difference.

Guard Interval = 1/32 Provides signal correlation plus suppresses echoes with minimum impact on the modulation rate. 1/32 provides sufficient echo suppression within the repeater and user's geographical area. Later, this may be increased (for more signal correlation) to 1/16 if the FEC is increased to 3/4.

RF Attenuator/Gain(dB) = -5 A starting value. Attenuation will depend on power input for the external amplifier. 0 is default. "Adjust" carefully. Don't exceed +6dB and avoid greater than -15dB. Important to note a Reset or firmware update will change this electrical attenuator to its default 0.

Modulation Data Rate (Mbps) = 5.90 Calculated by AVSender. Data Rate is dependent on BW, Code rate and Guard Interval data. No user input.

Chip ID = 9507 (default)   9507 is the Integrated Technology Express (ITE) company's DVB-T transmission (modulator/transmitter) chip

PCR Restamp Mode = Disable   Program Clock Reference (not needed to achieve additional receiver sync at the program level)

RF Disable = RF On (default) Off will remove the transmitter's output.

* Follow the Quick Start Guide for editing "User Channel Table" and adding repeater input and output frequencies so they be changed using remote or front panel switches on HV-320E. HV-310E works with remote's Ch+CH- buttons only.

11. TAB TS Info

Make only these changes: (leave all others as default)

Service Name = <Your Callsign> This will meet the FCC ID station requirements. ID is sent continuously and displayed in the lower left hand corner of the receiver's display. (10 characters max) Note the call sign of the repeater will be seen on its output frequency 426000. The repeater user's callsign will be shown on the repeater's receiver 440000 frequency when the OSD overlay is on.

PTS PCR Latency(ms) = 330   Program Time Stamp Program Clock Reference (should be default, but dependent on AVSender version it may not be) This is not a critical value unless it is made too small (<100 in attempt to reduce more latency).

Video PID(hex) = 641 Elementary Stream Program Identifier sent by the transmitter to ID the video for receiver decoding.

Audio PID(hex) = 642 Elementary Stream Program Identifier sent by the transmitter to ID the audio for receiver decoding.

If the PIDs are incorrect, then no picture or sound will be received. When the receiver scans for TSP parameters it looks for these hex IDs. The IDs will be shown in the screens for the manual input scans. .TS recordings must contain this ID also.

12. Tab Raw Data - For Firmware version update Only

As described in the QSG, the individual "I" and "Q" calibration data for the ITE transmission chip (9507) must be saved to a file on the PC -before- performing the update. This data must be saved in two files.   Follow these and the QSG instructions carefully when performing a firmware update.

A - These are small around 1k .BIN binary files and the default file name should be DCTable.bin and OFSTable.bin   Use the "GET" command to retrieve them from the electrically erasable programmable read only memory (EEPROM).

B - After the upgrade, check for them using this same command. If available, just quit. No further action required. If data is not available, then use the Get command and upload them. Normally, these files are not affected after an update and no action will be required.

Every attempt has been made to ensue this current configuration information is good. Changes due to new repeater hardware and/or an updated configuration will be made from time to time. Check back here later for a new documentation release.

Comments and suggestions are always welcome.

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