VE2DX Electronics Design Inc.

VE2DX Electronics Design Inc.
Band decoders FAMILY OF PRODUCTS.

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1.   Introduction

Congratulation on your purchase of the **VE2DX ELECTRONICS DESIGN INC. BAND DECODER.** This ESP32-based fully integrated platform designed by VE2DX Electronics Design Inc. is using our code to offer the user a flexible device ICOM, KENWOOD, YAESU, and XIEGU Radios, over direct connection, Bluetooth, USBoIP via WiFi and/or direct WiFi/LAN connection when available. It will work with radios on bands from 160m to 23cm and will be easily updated for band changes or new band arrival.

There are three variations of the **VE2DX Electronics Design Inc. Band decoders ©.**

- The **BD1-BT©** with **VE2DX TrueCIV© and TrueCAT© technology**, offering the user heavily RF filtered and Automatic signal leveling technology from **VE2DX Electronics Design Inc.** It is designed for a simple single radio station with only antenna switching output or Band Pass Filter switching.
- The **BD1-BTPlus©** with **VE2DX TrueCIV© and TrueCAT© technology**, offering the user heavily RF filtered and Automatic signal leveling technology from **VE2DX Electronics Design Inc.** It is designed for a more advanced station with both Antenna Switching and Band Pass Switching from a single radio.
- Finally STAR of the family the I**BD2-BT©** with **VE2DX TrueCIV© and TrueCAT© technology**, offering the user heavily RF filtered and Automatic signal leveling technology from **VE2DX Electronics Design Inc.** the I**BD2-BT©** is designed for a dual radio station it can be used for antenna switching or band pass filter switching and the radio types and manufacturer can be mismatched. And the I**BD2-BT©** also features **NEW VE2DX ELECTRONICS DESIGN INC. SDI© Technology (Software Defined Interlock)**, preventing a selected series of output from both accessing the same output, and alerting the operators of the problem.

The **VE2DX ELECTRONICS DESIGN INC. Band Decoders** family of products is a ESP32-S3 based design from **VE2DX ELECTRONICS DESIGN INC.** and code that will help you automate your station using remote antenna and/or band pass filter switching from the smaller stations to the largest of contest stations.

This manual will explain to the user the different features of the **VE2DX ELECTRONICS DESIGN INC. BAND DECODERS©**, How to install and configure the band decoders, how to operate them, and troubleshoot any problems.

2. Technical information

2.1.   Technical Specification

The **VE2DX Electronics Design Inc. Band decoders FAMILY OF PRODUCTS©** are based on our design ESP32-S3 platform.

Resources	Parameter
Processor	ESP32-S3-WROOM-U1
Flash Memory	Insert info here
Power Input	12V DC
USB	Type C, not used to POWER the device
WiFi	Integrated 802.11b/g/n HT40 Wi-Fi transceiver, baseband, stack and LWIP
Bluetooth	Integrated dual-mode Bluetooth (classic and BLE)
Antenna	2.4G Antenna
Operating Temperature	0°C to 60°C
Net weight	Insert info here
Product Size	80 x 100 x 34mm
Case Material	Extruded Aluminum

CAT/CI-V Signal Filtering and Leveling	Automatic using VE2DX TrueCAT and TrueCIV technology.
Interlock	IBD2-BT Only using VE2DX Software Define Interlock (SDI) Technology.

2.2. Technical Principals

The technical principals of the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** are fairly simple, offer the operator a simple easy to use interface to Band Decoder that can be put in an Automated mode. Thus, the operator once his VE**2DX ELECTRONICS DESIGN INC. Band Decoders** has been configured using a simple WiFi connected Web page, can use the Band Decoder manually with the rotary encoder or switch to automatic mode where the Band Decoder will be monitoring the radio frequency and change the output banded on the configuration. The output can be switched using Internal 12VDC, External Voltage or Ground.

There are three different models of **VE2DX ELECTRONICS DESIGN INC. Band Decoders**;

1- The BD1-BT; a single Radio simple Antenna **OR** Band Pass Filter Band Decoder that can be operated manually using the front panel rotary encoder or Automatically by monitoring the radio frequency using CAT or CI-V data.

2- The BD1-BTPlus, a single Radio simple combined Antenna **AND** Band Pass Filter Band Decoder, that can be operated manually using the front panel rotary encoder or Automatically by monitoring the radio frequency using CAT or CI-V data. The BD1-BTPlus as two outputs connectors, one for the Remote Antenna Switch and one for the Band Pass Filter Switch, these are configured separately to their specific needs.

3- The IBD2-BT, is our most advance model, it is a DUAL RADIO Remote Antenna OR Band Decoder Band Decoder, that can be operated manually or in automatic mode where both radios frequency will be monitored, and used to change automatically to the proper output for that band. Using **VE2DX ELECTRONICS DESIGN INC. Software Defined Interlock (SDI)** the Band Decoder will prevent the remote antenna switch or Band Pass Filter switch from selecting an output already being used by the other radio.

2.3. VE2DX Software Define Interlock technology SDI

Since the IBD2-BT supports two radios at the same time, it is possible that the operator selects the same output by error and damages the radios. To prevent this the **VE2DX Electronics Design Inc.** now offers our new **Software Define Interlock Technology (SDI),** it is a Software based interlock technology used to prevent both radios to use the same output on SO2R 2by switches, or used output for the same band of distinct antenna switches whatever there output.

SDI monitors both radios frequencies, if a radio is already using a band or SO2R output, SDI will prevent the band decoder from engaging the output requested, and an alarm with be shown and sounded (optional) to alert the operator that an urgent intervention is required.

SDI if made operational will be operational in both manual and automatic modes.

SDI can be turned OFF in the configuration.

In the examples on this page, the SDI is applied to BAND Selection independent of the specific Output assigned.

Bloc Diagram of SDI Principals

SDI with Radio1 using 20M and Radio2 not selected

Proper operations Radio1 20M Radio2 10M

SDI ERROR Radio1 was already on 20M, Radio2 tried to go to 20M, note that Remote Switch2 as NO output selected

Proper operations Radio1 20M Radio2 10M

SDI ERROR Radio2 was already on 10M, Radio1 tried to go to 10M, note that Remote Switch1 as NO output selected

In the examples on this page, the SDI is applied to an SO2R 2by remote antenna switch with a Tribander antenna on 20M/15M/10M on port 3.

Software Define Interlock
SDI Applied to SO2R 2by

Radio1 20M	CAT/CIV1 Activity 20M		Output Display1 Port 4	
	Radio1 CAT/CI-V 20M	Band Selection1 20M = Port 4	Output Driver1 Port 4	Remote Switch1 Port 4
	SDI set to SO2R 2by mode			
Radio2	Radio2 CAT/CIV	Band Selection2	Output Driver2	Remote Switch2
	CAT/CIV2 Activity		Output Display2	

Port 2 is 80M/40M Dipole
Port 4 is 20M/15M/10M Tribander Yagi

SDI with Radio1 using 20M and Radio2 not selected Output 4 on the SO2R Switch.

Software Define Interlock
SDI

Radio1 20M	CAT/CIV1 Activity 20M		Output Display1 Port 4	
	Radio1 CAT/CI-V 20M	Band Selection1 20M = Port 4	Output Driver1 Port 4	Remote Switch1 Port 4
	SDI set to SO2R 2by mode			
Radio2 80M	Radio2 CAT/CIV 80M	Band Selection2 80M = Port2	Output Driver2 Port 2	Remote Switch2 Port 2
	CAT/CIV2 Activity 80M		Output Display2 Port 2	

Port 2 is 80M/40M Dipole
Port 4 is 20M/15M/10M Tribander Yagi

Software Define Interlock
SDI

Radio1 20M	CAT/CIV1 Activity 20M		Output Display1 Port 4	
	Radio1 CAT/CI-V 20M	Band Selection1 20M = Port4	Output Driver1 Port 4	Remote Switch1 Port 4
	SDI set to SO2R 2by mode ERROR			
Radio2 15M	Radio2 CAT/CIV 15M	Band Selection2 15M = Port4	Output Driver2 ERROR	Remote Switch2 NO
	CAT/CIV2 Activity 15M		Output Display2 ERROR	

Port 2 is 80M/40M Dipole
Port 4 is 20M/15M/10M Tribander Yagi

Proper operations Radio1 20M (SO2R 4) Radio2 80M (SO2R 2)

SDI ERROR Radio1 was already on 20M, Radio2 tried to go to 15M,

Both were SO2R Output 4, note that Remote Switch2 as NO output selected

Software Define Interlock
SDI

Radio1 20M	CAT/CIV1 Activity 20M		Output Display1 Port 4	
	Radio1 CAT/CI-V 20M	Band Selection1 20M = Port 4	Output Driver1 Port 4	Remote Switch1 Port 4
	SDI set to SO2R 2by mode			
Radio2 80M	Radio2 CAT/CIV 80M	Band Selection2 80M = Port2	Output Driver2 Port 2	Remote Switch2 Port 2
	CAT/CIV2 Activity 80M		Output Display2 Port 2	

Port 2 is 80M/40M Dipole
Port 4 is 20M/15M/10M Tribander Yagi

Software Define Interlock
SDI

Radio1 40M	CAT/CIV1 Activity 40M		Output Driver1 ERROR	
	Radio1 CAT/CI-V 40M	Band Selection1 40M = Port2	Output Display1 ERROR	Remote Switch1 NO
	SDI set to SO2R 2by mode ERROR			
Radio2 80M	Radio2 CAT/CIV 80M	Band Selection2 80M = Port2	Output Display1 Port 2	Remote Switch1 Port 2
	CAT/CIV2 Activity 80M		Output Driver1 Port 2	

Port 2 is 80M/40M Dipole
Port 4 is 20M/15M/10M Tribander Yagi

Proper operations Radio1 20M Radio2 80M

SDI ERROR Radio2 was already on 80M, Radio1 tried to go to 40M,

Both were on SO2R Output 2, note that Remote Switch1 as NO output selected

2.4. VE2DX TrueTTL technology

VE2DX Electronics Design Inc. TrueTTL Technology is used in both the ICOM TrueCIV and CAT TrueCAT formats in the **VE2DX Electronics Design Inc. Band Decoders**.

The VE2DX TrueTTL technology is a combination of heavy RFI filtering on all signals, power and grounds coming into or out of the band decoders, and automatic TTL signal leveling to make certain all signals coming into or out of the **VE2DX Electronics Design Inc. Band Decoders** are always at maximum TTL levels so that the signal interference are eliminated and signal are always getting maximum performances.

2.5. VE2DX Blind Operator Assistance technology BOA

VE2DX Electronics Design Inc. is proud to introduce **VE2DX Blind Operator Assistance (BOA) technology** to our lineup of band decoders. This simple feature announces using sounding CW the changing status and alerts from the band decoder.

The BOA mode can be enabled in the Web based configuration of the band decoder or simply by hitting the rotary encoder twice.

The following are all possible **BOA** messages;

For the **VE2DX ELECTRONICS DESIGN INC. Band Decoders BD1-BT.**

- On power up the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** will send **VE2DX BD1 BOA ON**, to confirm the CW audio mode is enabled.

- To get manual **VE2DX ELECTRONICS DESIGN INC. Band Decoders** status, the operator can simply push twice on the Rotary encoder push button switch, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios R1OX (X=Output ID from 1 to 8, 0 for OFF).

- After manually or automatically switching to a different Output; R1OX where X will be replaced by the Output ID (1 to 8, 0 for OFF).
  If and error is encountered;

- AL0 for and unknown nature of the alarm.

- AL1 for a missing firmware password alarm.

For the **VE2DX ELECTRONICS DESIGN INC. Band Decoders Model BD1-BTPlus.**

- On power up the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** will send **VE2DX BD1Plus BOA ON**, to confirm the CW audio mode is enabled.

- To get manual **VE2DX ELECTRONICS DESIGN INC. Band Decoders** status, the operator can simply push twice on the Rotary encoder push button switch, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios AOX and 3 seconds delay and BOX (X=Output ID from 1 to 8, 0 for OFF). AOX is your Antenna output and BOX is your Band Pass Filter output.

- After manually or Automatically switching from Antenna Switching to or from Band Pass Filter Switching A or B.

- After manually or automatically switching to a different Output; AOX or BOX where X will be replaced by the Output ID (1 to 8, 0 for OFF).

If and error is encountered;

- AL0 for an unknown nature of the alarm.

- AL1 for a missing firmware password alarm.

For the **VE2DX ELECTRONICS DESIGN INC. Band Decoders IBD2-BT.**

- On power up the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** will send **VE2DX IBD2 BOA ON**, to confirm the CW audio mode is enabled.

- To get manual **VE2DX ELECTRONICS DESIGN INC. Band Decoders** status, the operator can simply push twice on the Rotary encoder push button switch, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios R1OX and 3 seconds delay and R2OX (X=Output ID from 1 to 8).

- After manually or Automatically switching from one Radio to the other; R1 or R2.

- After manually or automatically switching to a different Output; RXOX where X will be replaced by the Radio ID (1 or 2) in RX, and X will be replaced by the Output ID (1 to 8, 0 for OFF) in OX.

- If and error is encountered;

- AL0 for and unknown nature of the alarm.

- AL1 for a missing firmware password alarm.

- ALRXOXI would indicate that an alarm was encountered that caused Radio RX (X=Radio ID of 1 or 2) output OX (X=Output ID from 1 to 8). AL=Alarm, RX=Radio ID, OX=Output ID, and I=Interlock.

- 10 Sections after any ALARMS, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios R1OX a 3 seconds delay and then R2OX. The radio in error would then show as being Output 0 since the relay output would have been disabled, thus RXO0.

2.6. Relay Switching

The relay switching can be set to three different outputs type;

1. Internal 12V DC from the band decoder.
2. External DC power source using power applied to JXXX.
3. Or GND Switching.

The internal output drivers must be replaced to select Voltage based switch vs GND switching, by default the voltage based switching is installed in the band decoder. The GND based chips are supplied with the band decoder. Jumper JXXX must also be changed to match the driver chip being used.

To switch from Internal 12VDC to External Voltage, the external power source must be connected to JXXX in the back of the band decoder, also JXXX must be changed to match the power source selected.

If operating a high current 12V DC switch, it is recommended to operate in external DC power source and apply 12V DC to JXXX. The Internal 12V DC power is limited to a maximum of XXXA. The External Power source is limited to a maximum of XXXV at XXXA.

3. Operations

3.1   Buttons

The **VE2DX Electronics Design Inc. Band decoders** have a single push button that is part of the rotary encoder. The operations of the buttons are fairly simple;
- Single click to switch from Radio1 to Radio2 on IBD2-BT or switch from Antenna Switching to Band Pass Filter Switching on BD1-BTPlus, if they are in Manual mode.
- Holding the switch in for 1sec or more is used to switch from manual mode to automatic mode and back on all three models.
- Double Click, will generated audible CW of the **VE2DX Electronics Design Inc. Band decoders** status using **VE2DX Blind Operator Assistance (BOA) Technology**.

3.2   Rotary encoder

The **VE2DX Electronics Design Inc. Band decoders** have a rotary encoder used while in manual mode to selected the antenna or band pass filter that will be used. The operations of the buttons are fairly simple.
- Only operational while in manual mode.
- After selecting you antenna or band decoder by single clicking on the knob, simply turn the rotary encoder left or right to select the output to be made operational.

3.3   LEDs

The **VE2DX Electronics Design Inc. Band decoders** have multiple LEDs to show status of the Band Decoder;
- Power: Solid ON to indicate the Band Decoder is powered ON.
- Radio1: Flashing ON/OFF as data is received from Radio1.
- Automatic: Indicates that Band Decoder is in Automatic Band Decoding mode, meaning that if the outputs are set to a band, the Band Decoder will automatically switch to the proper output.
- A: Always ON, indicates that Radio1 is connected to Antenna Switch1.

On BD1-BTPlus Only
- Power: Solid ON to indicate the Band Decoder is powered ON.Radio1: Flashing ON/OFF as data is received from Radio1.
- Automatic: Indicates that Band Decoder is in Automatic Band Decoding mode, meaning that if the outputs are set to a band, the Band Decoder will automatically switch to the proper Antenna and Band Pass Filter output.
- A: Solid indicates that the Band Decoder is switching or has switched the Antenna Switch Output.
- B: Solid indicates that the Band Decoder is switching or has switched the Band Pass Filter Output.

On IBD2-BT Only

- **Power**: Solid ON to indicate the Band Decoder is powered ON.
- **Radio1**: Flashing ON/OFF as data is received from Radio1.
- **Radio2**: Flashing ON/OFF as data is received from Radio2.
- **Automatic**: Indicates that Band Decoder is in Automatic Band Decoding mode, meaning that if the outputs are set to a band, the Band Decoder will automatically switch to the proper output. This applies to both Radio1 and Radio2, the Band Decoder will select automatically the Radio Output based on the Radio Port receiving the Data.
- **SDI**: Solid ON indicates that **VE2DX Software Defined Interlock (SDI)** is turned on, this will disable the rotary encoder. **SDI** can be switched ON or OFF by pushing the rotary encoder knob.
- **R1**: Solid ON indicates that the Band Decoder is switching or has switched Radio1 Antenna Switch Output.
- **E1**: Flashing ON/OFF Indicates that **VE2DX Software Defined Interlock (SDI)** has detected that Radio1 has tried to select that same Band or Output (If in SO2R) already selected by Radio2, this caused the problem Output to be Flashing on Radio1.
- **R2**: Solid ON indicates that the Band Decoder is switching or has switched Radio2 Antenna Switch Output.
- **E2**: Flashing ON/OFF Indicates that **VE2DX Software Defined Interlock (SDI)** has detected that Radio2 has tried to select that same Band or Output (If in SO2R) already selected by Radio1, this caused the problem Output to be Flashing on Radio2.

3.4   Connectors

The **VE2DX Electronics Design Inc. Band decoders** has three variations of connector configurations;

3.4.1   BD1-BT

BD1-BT Band Decoder Rear View

	Switching output	EXT Voltage input
	1 2 3 4 5 6 7 8 9 10	V+ GND
Radio1 ⚪		12VDC ⚪
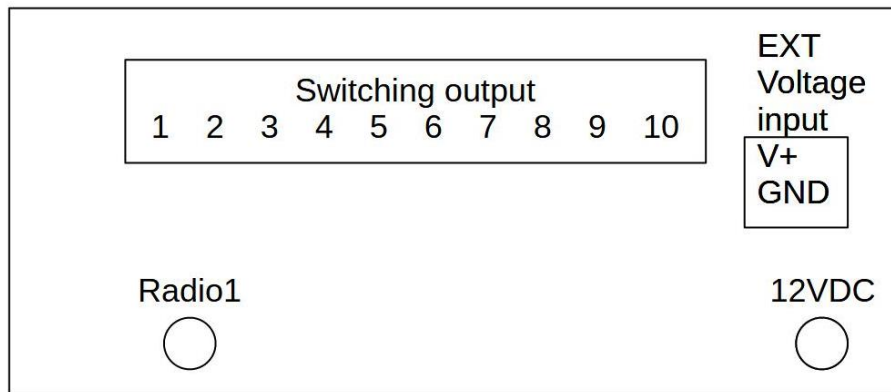
- Four connectors:

  ° 12VDC Power, 5mm/2.1mm barrel connector.

  ° Radio1 CAT/CI-V connector, a 3.5mm (1/8th) standard audio jack.

  ° External power, a 2 pins Phoenix style connector.

  ° Switching output for Radio1; a 10 pin Phoenix style connector.

3.4.2   BD1-BTPlus

BD1-BTPlus Band Decoder Rear View

Antenna Switching output 1 2 3 4 5 6 7 8 9 10	EXT Voltage input V+ GND
Band Pass Filter Switching output 1 2 3 4 5 6 7 8 9 10	
◯ Radio1	◯ 12VDC
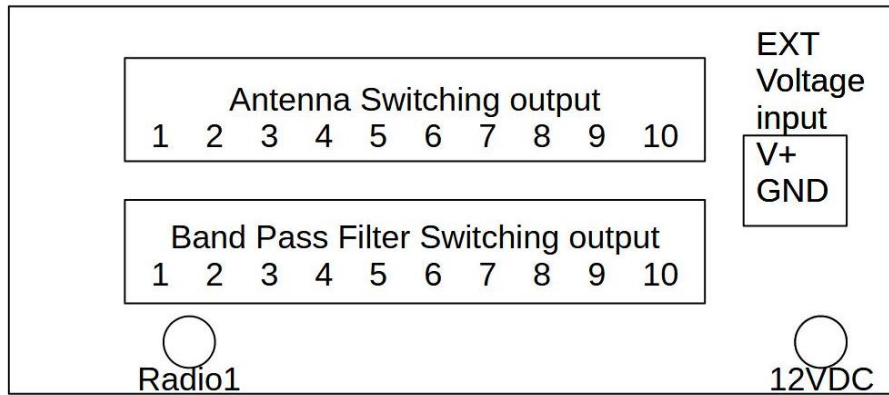
- Five connectors:

  ° 12VDC Power, 5mm/2.1mm barrel connector.

  ° Radio1 CAT/CI-V connector, a 3.5mm (1/8th) standard audio jack.

  ° External power, a 2 pins Phoenix style connector.

  ° Switching output for Antenna; a 10 pin Phoenix style connector.

  ° Switching output for Band Pass Filter; a 10 pin Phoenix style connector.

3.4.3   IBD1-BT

IBD2-BT Band Decoder Rear View

Radio1 Switching output 1 2 3 4 5 6 7 8 9 10	**EXT Voltage input** V+ GND
Radio2 Switching output 1 2 3 4 5 6 7 8 9 10	

Radio2 Radio1   12VDC
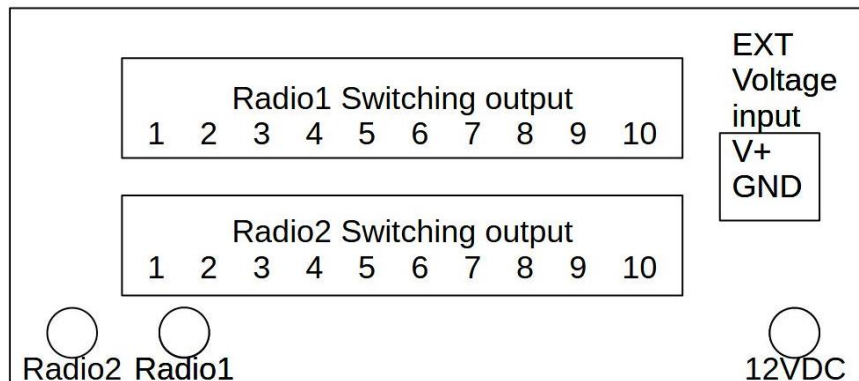
- Six connectors:

  ° 12VDC Power, 5mm/2.1mm barrel connector.

  ° Radio1 CAT/CI-V connector, a 3.5mm (1/8th) standard audio jack.

  ° Radio2 CAT/CI-V connector, a 3.5mm (1/8th) standard audio jack.

  ° External power, a 2 pins Phoenix style connector.

  ° Switching output for Radio1; a 10 pin Phoenix style connector.

  ° Switching output for Radio2; a 10 pin Phoenix style connector.

!!WARNING!!

If VE2DX Software Defined Interlock (SDI) has detected an error causing the INTERLOCK to prevent engaging the Output, the Radio with the error will NOT engage ANY relays and thus the Radio WILL NOT be connected to ANY antenna, Operator action will be needed immediately to prevent and equipment damage.

4 Installation

The installation process is fairly simple.

1. Apply 12VDC power to the Band Decoder.
2. Using a laptop, Tablet or cellphone connect to the VE2DXBandDec (SSID) private WiFi network. There is no Password required.
3. Open your Chrome (Recommended) Browser and enter in your browser the Band Decoders Default IP Address; 192.168.0.10.
4. See section 4.1 for the menu options.
5. Once your configuration is done, simply turn OFF your **VE2DX Electronics Design Inc. Band decoders.**
6. Plug in your radio(s) CAT or CI-V link if you are using a cabled connection.
7. Plug in your remote antenna switch and/or Band Pass Filter and remote external power if needed.
8. Set your radio(s) as required based on your configuration.
9. Refer to section XXXXX to change from DC switching to GND Switching.
10. If using external power to drive your remote antenna switch or Band pass filter switching.
11. Refer to section XXXXX to change from Internal DC switching or External DC Switching.
12. Apply 12VDC power to the Band Decoder.

5 Configuration

The configuration is done in two steps, Web based firmware configuration and Hardware configuration.

5.1 *Web Based Configuration menu*

Insert image of the menu

This Menu will be used to show you important information like model and serial number from you band decoder and help you configure different options in the **VE2DX Electronics Design Inc. Band decoders**.

A Serial number is required to get the **VE2DX Electronics Design Inc. Band decoders** working, your unit should already have you password preloaded during manufacturing, but it is possible that during firmware updates or after a hard factory default reset, that your password might be lost from the **VE2DX Electronics Design Inc. Band decoders** memory with other settings, you will find your password on a label located under you enclosure and a separate label shipped in the box.

The menu options will change according to your **VE2DX Electronics Design Inc. Band decoders models.**

5.1.1 Radio1 Manufacturer Selection

Application: All VE2DX Electronics Design Inc. Band decoders models.

This menu option is used to select if what Radio manufacturer you will be using and connect your Radio1 CAT/CI-V port of your VE2DX Electronics Design Inc. Band decoders. At this point four manufacturers are supported;

- ICOM, all radios since the IC-735 to newer radios.
- KENWOOD, all radios since the TS-450 to newer radios.
- Yaesu, All Radios Since FT817 to newer radios.
- XIEGU G90, G106, X5105, X6100, and X6200.

The radios can be connected to the **VE2DX Electronics Design Inc. Band decoders** via CAT TTL (K & Y), CI-V TTL (I & X), CAT RS232 (K & Y), USBoIP UDP (ALL if CAT or CI-V USB is supported), Bluetooth (ALL if CAT or CI-V Bluetooth is supported), CIVoIP (I if CIVoIP UDP is supported).

5.1.2   Radio2 Manufacturer Selection

Application: VE2DX IBD2-BT Band Decoder models.

If your **VE2DX Electronics Design Inc. Band decoders** is an IBD2-BT, then you will see a Radio2 Manufacturer Selection menu.

This menu option is used to select if what Radio manufacturer you will be using and connect your Radio2 CAT/CI-V port of your VE2DX Electronics Design Inc. Band decoders. At this point four manufacturers are supported;

- ICOM, all radios since the IC-735 to newer radios.
- KENWOOD, all radios since the TS-450 to newer radios.
- Yaesu, All Radios Since FT817 to newer radios.
- XIEGU G90, G106, X5105, X6100, and X6200.

The radios can be connected to the VE2DX Electronics Design Inc. Band decoders via CAT TTL (K & Y), CI-V TTL (I & X), CAT RS232 (K & Y), USBoIP UDP (ALL if CAT or CI-V USB is supported), CIVoIP (I if CIVoIP UDP is supported).

==Note: Only Radio1 supports Bluetooth connection, Radio2 can not be connected via Bluetooth.==

5.1.3   Radio1 Model Selection

Application: All VE2DX Electronics Design Inc. Band decoders models.

This menu option is used to select what model of radio you are using on Radio1 Port based of your manufacturer selection, that you will be using and connect to your **VE2DX Electronics Design Inc. Band decoders** Radio1 Port.

ICOM Radios, may be configured using generic **ICOM TRANCEIVE** mode, or default radio CI-V Address based on radio model.

ICOM Radios, connected via Bluetooth are **ALWAYS connected at a Speed of 9600bps**. Using generic **ICOM TRANCEIVE** mode, or default radio CI-V Address based on radio model.

KENWOOD Radios, as setup as radios groups, selection the group that include your **KENWOOD Radio**.

Yaesu Radios, as setup as radios groups, selection the group that include your **Yaesu Radio**.

Xiegu Radios, are **ALWAYS** configured as an **ICOM 7100, CI-V Address of 88, and Speed of 19.2Kbps**.

The pull down menu will offer you all the options based on your manufacturer selection, if a specific model can be selected it will show in this pull down list, if your radio model is not shown please contact VE2DX ELECTRONICS DESIGN INC. at info@ve2dx.com with your radios information.

5.1.4   Radio2 Model Selection

Application: VE2DX IBD2-BT Band Decoder models.

This menu option is used to select what model of radio you are using on Radio2 Port based of your manufacturer selection, that you will be using and connect to your **VE2DX Electronics Design Inc. Band decoders** Radio2 Port.

ICOM Radios, may be configured using generic **ICOM TRANCEIVE** mode, or default radio CI-V Address based on radio model.
KENWOOD Radios, as setup as radios groups, selection the group that include your **KENWOOD Radio.**
Yaesu Radios, as setup as radios groups, selection the group that include your **Yaesu Radio.**
Xiegu Radios, are **ALWAYS** configured as an **ICOM 7100, CI-V Address of 88, and Speed of 19.2Kbps.**

The pull down menu will offer you all the options based on your manufacturer selection, if a specific model can be selected it will show in this pull down list, if your radio model is not shown please contact VE2DX ELECTRONICS DESIGN INC. at info@ve2dx.com with your radios information.

Note: Only Radio1 supports Bluetooth connection, Radio2 can not be connected via Bluetooth.

IMPORTANT INFORMATION ABOUT USING ICOM TRANSCEIVE MODE:
ICOM TRANSCEIVE MODE if enabled on the radio is a great way for the radio to send frequency information to the **VE2DX Electronics Design inc. Band Decoders** under a generic CI-V address of 00. but this will also slow other CI-V OEM devices if they are not using transceive mode, since in transceive the radio generates high amount of data specially when changing the frequency using the VFO knob, this is known to cause high amount of collisions.. if this is your situation simply use "default radio CI-V address based on radio model." in this mode the **VE2DX Electronics Design Inc. Band decoders** will monitor the expect radio CI-V address and pull the radio frequency to switch band based on this information, obviously this assumes that the radio is being queried by an OEM CI-V device or application.

5.1.5   Radio1 Connection type

Application: All VE2DX Electronics Design Inc. Band decoders models.
This menu option is used to select how your radio is connected to your **VE2DX Electronics Design Inc. Band decoders** Radio1 Port. There are four different ways you can connect your Radio to your VE2DX Electronics Design Inc. Band decoders.

1. **Direct CAT or CI-V connection**, please see in the HARDWARE section ==XXXXX== and the JUMPER TABLES for proper hardware configuration based on you radio manufacturer. ==JXXX== will need to be moved according to your radio manufacturer.
2. **Bluetooth CAT or CI-V connection**, if supported by your radio, see **Bluetooth Operations** at section ==XXXXX== below, at this time only ICOM IC705, ID52, ID5100 support **Bluetooth operations.**
3. **USBoIP UDP via WiFi/LAN,** this option may be used to if your radio supports **CI-V or CAT via USB** and is **connected to a PC**. Using this option will require you to **connect the radio via USB to your PC**, **share your USB COM port** of the radio to both your application and a **third party COM port UDP server software**, and configure in the Band Decoder;

   - **Manufacturer.**
   - **Radio Model.**
   - **WiFi SSID.**
   - **WiFi Password.**
   - **Remote UDP address (PC Address)**
   - **Remote UDP Port (Can NOT be the same as Radio2)**

4. **CIVoIP using UDP via WiFi/LAN**, this option if supported on your **ICOM radio**, can be used to do a direct connection to you radio via a UDP link to your radio address. Using this option will require you to configure your **radio IP Address**, **UDP Port number**, **Radio ID**, **Radio Password**, and configure in the Band Decoder;

   - **Manufacturer.**
   - **Radio Model.**
   - **WiFi SSID.**
   - **WiFi Password.**
   - **Remote UDP address (PC Address)**
   - **Remote UDP Port (Can NOT be the same as Radio2)**
   - **Radio ID.**
   - **Radio Password.**

==**Note: Only one Radio 1 supports Bluetooth connection, Radio2 can not be connected via Bluetooth.**==
==**Note: The UDP port number can not be the same for Radio1 and Radio2.**==

5.1.6   Radio2 Connection type

Application: VE2DX IBD2-BT Band Decoder models Only.

This menu option is used to select how your radio is connected to your **VE2DX Electronics Design Inc. Band decoders** Radio2 Port. There are three different ways you can connect your Radio to your VE2DX Electronics Design Inc. Band decoders.

1. **Direct CAT or CI-V connection**, please see in the HARDWARE section XXXXX and the JUMPER TABLES for proper hardware configuration based on you radio manufacturer. JPX will need to be moved according to your radio manufacturer.
2. **USBoIP UDP via WiFi/LAN**, this option may be used to if your radio supports **CI-V or CAT via USB** and is **connected to a PC**. Using this option will require you to **connect the radio via USB to your PC, share your USB COM port** of the radio to both your application and a **third party COM port UDP server software**, and configure in the Band Decoder;

   - **Manufacturer.**
   - **Radio Model.**
   - **WiFi SSID.**
   - **WiFi Password.**
   - **Remote UDP address (PC Address)**
   - **Remote UDP Port (Can NOT be the same as Radio2)**

3. **CIVoIP using UDP via WiFi/LAN**, this option if supported on your **ICOM radio**, can be used to do a direct connection to you radio via a UDP link to your radio address. Using this option will require you to configure your **radio IP Address**, **UDP Port number**, **Radio ID**, **Radio Password**, and configure in the Band Decoder;

   - **Manufacturer.**
   - **Radio Model.**
   - **WiFi SSID.**
   - **WiFi Password.**
   - **Remote UDP address (PC Address)**
   - **Remote UDP Port (Can NOT be the same as Radio2)**
   - **Radio ID.**
   - **Radio Password.**

Note: Only Radio 1 supports Bluetooth connection, Radio2 can not be connected via Bluetooth.

Note: The UDP port number can not be the same for Radio1 and Radio2.

5.1.7 CI-V/CAT Speed

Application: All VE2DX Electronics Design Inc. Band decoders models.

This option is used to set the speed of the CI-V or CAT port.

5.1.8 WiFi SSID

Application: All VE2DX Electronics Design Inc. Band decoders models.

This menu option is used to configure the **WiFi SSID** of your network. This new configuration will be online ONLY after WiFi SSID, WiFi Password, WiFi IP Address, and WiFi IP Mask have been updated, and you select **APPLY WiFi Update**, confirm the information is correct twice, then the **VE2DX Electronics Design Inc. Band decoders** will then reboot and apply the changes.

5.1.9 WiFi SSID Password

Application: All VE2DX Electronics Design Inc. Band decoders models.

This menu option is used to configure the **WiFi SSID Password** of your network. This new configuration will be online ONLY after WiFi SSID, WiFi Password, WiFi IP Address, and WiFi IP Mask have been updated, and you select **APPLY WiFi Update**, confirm the information is correct twice, then the **VE2DX Electronics Design Inc. Band decoders** will then reboot and apply the changes.

5.1.10 WiFi SSID IP Address

Application: All VE2DX Electronics Design Inc. Band decoders models.

This menu option is used to configure the WiFi SSID Address on your network. This new configuration will be online ONLY after WiFi SSID, WiFi Password, WiFi IP Address, and WiFi IP Mask have be updated, and you select APPLY WiFi Update, confirm the information is correct twice, then the VE2DX Electronics Design Inc. Band decoders will then reboot and apply the changes.

==**Note: ALWAYS! Validate that the proposed IP Address is available on your network by doing a Ping of the proposed address on a PC, Tablet or Cell already using the same network.**==

5.1.11   WiFi IP Mask

Application: All VE2DX Electronics Design Inc. Band decoders models.

This menu option is used to configure the WiFi IP Mask on your network. This new configuration will go online ONLY after WiFi SSID, WiFi Password, WiFi IP Address, and WiFi IP Mask have be updated, and you select APPLY WiFi Update, confirm the information is correct twice, then the VE2DX Electronics Design Inc. Band decoders will then reboot and apply the changes.

5.1.12   UDP Remote IP

Application: All VE2DX Electronics Design Inc. Band decoders models.

When using the **VE2DX Electronics Design Inc. Band decoders**© in USBoIP or CIVoIP, you need to enter the target IP Address of the UDP device, this device is ided as the REMOTE. In this menu setting you will be entering the IP address of the Remote device. . Once you are done simply select the SAVE? or if you want to cancel select CANCEL?

5.1.13   UDP Remote Port

Application: All VE2DX Electronics Design Inc. Band decoders models.

When using the **VE2DX Electronics Design Inc. Band decoders**© in USBoIP or CIVoIP, you need to enter the target UDP device. In this menu setting you will be entering the UDP Port of the Remote device.. Once you are done simply select the SAVE? or if you want to cancel select CANCEL?

5.1.14   UDP Remote Device ID

Application: All VE2DX Electronics Design Inc. Band decoders models.

When using the **VE2DX Electronics Design Inc. Band decoders**© in CIVoIP, you need to enter the target UDP device Name, this device is ided as the REMOTE. In this menu setting you will be entering the Device ID of the Remote device.. Once you are done simply select the SAVE? or if you want to cancel select CANCEL?

5.1.15   UDP Remote Device Password

Application: All VE2DX Electronics Design Inc. Band decoders models.

When using the **VE2DX Electronics Design Inc. Band decoders**© in CIVoIP, you need to enter the target UDP device password. In this menu setting you will be entering the Password of the Remote device.. Once you are done simply select the SAVE? or if you want to cancel select CANCEL?

5.1.16   Apply WiFi Update Configuration on line

Application: All VE2DX Electronics Design Inc. Band decoders models.
This menu option is used put on line the **new WiFi configuration on your network**. This new configuration will go online ONLY after WiFi SSID, WiFi Password, WiFi IP Address, and WiFi IP Mask have been updated, and you select **APPLY WiFi Update**, confirm the information is correct twice, then the **VE2DX Electronics Design Inc. Band decoders** will then reboot and apply the changes.

Note: If the changes were WRONG, pushing on the Rotary Encoder during power up, will reset the WiFi configuration to the Factory Default configuration.

5.1.17   Remote Antenna Switch1 configuration

Application: All VE2DX Electronics Design Inc. Band decoders models.
This menu option is used to configure the Remote Antenna Switch1 Output to match the required band, this is done by matching each bands to the Remote Antenna Switch1 output, thus multiple bands can be configured to the same Remote Antenna Switch Output like in the case of a common HF tribander;

In this example assuming the Tribander is 20m, 15m and 10m,
then for each band the output of the Remote Antenna Switch is the same.

Only one output can be assigned to a band if running in automatic mode. If you have multiple antennas covering the same band, only one can be used at a time, only one can be configured in Automatic mode.
A maximum of 8 outputs can be configured. The others should stay unassigned and selected in manual mode.

The VE2DX Electronics Design Inc. Band Decoders can also be used to switch Band Pass Filters.

5.1.18   Remote Antenna Switch2 configuration

Application: VE2DX IBD2-BT and IB1-BTPlus Band Decoder models.

This menu option is used to configure the Remote Antenna Switch2 Output to match the required band, this is done by matching the each bands to the Remote Antenna Switch2 output, thus multiple bands can be configured to the same Remote Antenna Switch Output like in the case of a common HF tribander;

In this example assuming the Tribander is 20m, 15m and 10m,
then for each band the output of the Remote Antenna Switch is the same.

Only one output can be assigned to a band if running in automatic mode. If you have multiple antennas covering the same band, only one can be used at a time, only one can be configured in Automatic mode.
A maximum of 8 outputs can be configured. The others should stay unassigned and selected in manual mode.

The VE2DX Electronics Design Inc. Band Decoders can also be used to switch Band Pass Filters.

Note: Both antenna switches do not have to match.

5.1.19   Radio1/Remote Antenna Switch1 Automatic mode ON/OFF

Application: ALL VE2DX Electronics Design Inc. Band decoders models.

This menu option is used to turn ON or OFF on Radio1/Remote Antenna Switch1 the Automatic mode, if turn OFF then the user will have to change manually the VE2DX Electronics Design Inc. Band decoders Output for Radio1/Remote Antenna Switch 1.

5.1.20   Radio2/Remote Antenna Switch2 Automatic mode ON/OFF

Application: VE2DX IBD2-BT and BD1-BTPlus Band Decoder models.

This menu option is used to turn ON or OFF on Radio1/Remote Antenna Switch2 the Automatic mode, if turn OFF then the user will have to change manually the VE2DX Electronics Design Inc. Band decoders Output for Radio1/Remote Antenna Switch 2.

5.1.21   SDI (Software Define Interlock) ON/OFF

Application: VE2DX IBD2-BT Band Decoder models only.

This menu option is used to turn ON or OFF the **VE2DX ELECTRONICS DESIGN INC. SDI(c) (SOFTWARE DEFINE INTERLOCK) technology.**

SDI, is a new **VE2DX ELECTRONICS DESIGN INC. Technology** used to monitor in the IBD2-BT dual radio both radios to make certain any Remote Antenna Switch output used for the same band can not be enabled if that band is already in use by the other radio, it is applied as a first come first serve approach.

With SDI what ever the output used will not be enabled if the other radio already selected the same band. This is very important when using SO2R 2by remote antenna switches like the VE2DX 2X6 SO2R Remote antenna switch, but since it is band oriented it can also be applied to unmatched Remote Antenna Switches.

5.1.22   SDI (Software Define Interlock) Mode.

Application: VE2DX IBD2-BT Band Decoder models only.

This menu option is used to select the operating mode of the **VE2DX ELECTRONICS DESIGN INC. SDI(c) (SOFTWARE DEFINE INTERLOCK) technology.**

SDI, is a new **VE2DX ELECTRONICS DESIGN INC. Technology** used to monitor in the IBD2-BT dual radio both radios to make certain any Remote Antenna Switch output used for the same band can not be enabled if that band is already in used by the other radio, it is applied as a first come first serve approach.

In this option you are basically defining if the Remote Antenna Switches are an SO2R 2by or Mismatched.

Selecting **SO2R ENABLE** will disable the "**Remote Antenna Switch2 configuration.**" automatically set the bands setting used in Remote Antenna Switch1 Configuration to Remote antenna Switch2.

Selecting **SO2R DISABLE** will enable the "**Remote Antenna Switch2 configuration.**" thus the Remote antenna switch2 configuration might not match the Remote antenna Switch1 and band interlock may happen of unmatched antenna switch outputs.

==Note: Setting SDI MODE correctly is crucial to prevent damage to the radios when using SO2R 2by switches since both are both radios using are connected to the same antenna output and in a situation where multi-band antennas like Tri-Bander are used they would end up on the same output.==

5.1.23   Blind Operator Assistance (BOA)

Application: ALL VE2DX Band Decoder models.

VE2DX ELECTRONICS DESIGN INC. is proud to offer with our **VE2DX ELECTRONICS DESIGN INC. Band Decoders** a new feature to help Blind Ham Radio Operators called **VE2DX Blind Operator Assistance (BOA)**. When enabled this will sound CW to indicate status of the **VE2DX ELECTRONICS DESIGN INC. Band Decoder** following any changes done manually or automatically.

For the **VE2DX ELECTRONICS DESIGN INC. Band Decoders BD1-BT.**

- On power up the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** will send **VE2DX BD1 BOA ON**, to confirm the BOA mode is enabled.

- To get manual **VE2DX ELECTRONICS DESIGN INC. Band Decoders** status, the operator can simply push twice on the Rotary encoder push button switch, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios R1OX (X=Output ID from 1 to 8, 0 if no output is selected).

- After manually or automatically switching to a different Output; R1OX where X will is the Output ID (1 to 8, 0 for OFF) in OX.

If an error is encountered;

- AL0 for and unknown nature of the alarm.

- AL1 Lost of Serial Number Password alarm. (Refer to Section 8).

For the **VE2DX ELECTRONICS DESIGN INC. Band Decoders Model BD1-BTPlus.**

- On power up the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** will send **VE2DX BD1Plus BOA ON**, to confirm the BOA mode is enabled.

- To get manual **VE2DX ELECTRONICS DESIGN INC. Band Decoders** status, the operator can simply push twice on the Rotary encoder push button switch, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios AOX and 3 seconds delay and BOX (X=Output ID from 1 to 8, 0 if no output is selected).

- After manually or Automatically switching from Antenna Switching to Band Pass Filter Switching A or B.

- After manually or automatically switching to a different Output; AOX or BOX where X will be replaced by the Output ID (1 to 8, 0 for OFF).

If an error is encountered;

- AL0 for and unknown nature of the alarm.

- AL1 Lost of Serial Number Password alarm. (Refer to Section 8).

For the **VE2DX ELECTRONICS DESIGN INC. Band Decoders IBD2-BT.**

- On power up the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** will send **VE2DX IBD2 BOA ON**, to confirm the CW audio mode is enabled.

- To get manual **VE2DX ELECTRONICS DESIGN INC. Band Decoders** status, the operator can simply push twice on the Rotary encoder push button switch, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios R1OX and 3 seconds delay and R2OX (X=Output ID from 1 to 8, 0 if no output is selected).

- After manually or Automatically switching from one Radio to the other; R1 or R2.

- After manually or automatically switching to a different Output; RXOX where X will be replaced by the Radio ID (1 or 2) in RX, and X will be replaced by the Output ID (1 to 8, 0 for OFF) in OX.

If an error is encountered;

- AL0 unknown nature of the alarm.

- AL1 Lost of Serial Number Password alarm. (Refer to Section 8)

- ALRXOXI would indicate that an alarm was encountered that caused Radio RX (X=Radio ID of 1 or 2) output OX (X=Output ID from 1 to 8). AL=Alarm, RX=Radio ID, OX=Output ID, and I=Interlock.

- 10 Secondes after any ALARMS, the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** would then proceed to send the status of both radios R1OX a 3 seconds delay and then R2OX. The radio in error would then show as being Output 0 since the relay output would have been disabled, thus RXO0.

5.2   Configuration of USBoIP

To use CIVoIP, you must have your **VE2DX ICOM METER©** configured for your WIFI SSID, Password, REMOTE IP (IP address of the PC where the radio is plugged into via USB), and REMOTE PORT (Configure UDP port number into the PC where the radio is plugged into via USB).

- Next install a UDP Serial Port emulator in the PC like "COM Port Data Emulator", set up a UDP Server pointing to the COM port used by the radio CI-V USB port.
- Setup the
- Select in the **VE2DX ICOM METER©** configuration menu Radio Selection the Radio and mode showing USBoIP, if it is not in the list, the radio does not support CI-V on USB.
- Reboot the meter and **VE2DX ICOM METER©.**
- You are now connected.

5.3   Configuration of CIVoIP

This feature will be added soon.

6   CAT Protocols

6.1   ICOM CI-V.

ICOM Radios, CAT is known as CI-V, CI-V has been introduced with the ICOM IC-735 in the 1980's. It is a combination of three things, hardware standards based on TTL, CDMA communication protocol and Communication language.

ICOM Radios, in most cases come with an ICOM CI-V port identified as the REMOTE port, others like the IC-705 don't have ANY CI-V Remote ports in this case you need to connect to CI-V using Bluetooth, others support USB CI-V, and finally CIVoIP UDP link.

The CI-V communication language has evolved since the IC-735 from a very small command table oriented mostly to know you frequency and other very basic information, to a very advance command set in the newer IC-705, IC-905, IC7300, etc… to a VERY advance command set able to pull almost ANY information from the radio.

6.1.1   ICOM CI-V Remote Port

ICOM Radios, in most cases come with an ICOM CI-V port identified as the REMOTE port in the rear of the radio, in some cases like the ID-52, ID-5100 and IC-2730, this port requires a specially adapted cable to be used. Most ICOM radios since the IC-735 use the common ICOM REMOTE port which is a simple 3.5mm (1/8th) mono jack running standard 1 wire TTL signals.

These CI-V ports can be attached to multiple devices, but this should be done using a proper CI-V hub like the VE2DX CT17Bs family of products with proper RF filtering and Automatic Signal Leveling using technology link VE2DX Electronics Design Inc. TrueTTL/TrueCIV.

6.1.2   ICOM CI-V USBoIP UDP

ICOM Radios, with support of CI-V via USB can be linked to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** using a UDP link to a UDP Server port emulator and the sharing of the PC's COM port. It is important is such a situation to take into consideration the excessive amount of data coming from applications like HRD and NOT try to use Tranceive mode that may encounter high amount of collisions.

This is done through a WiFi connection of your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** to your network.

6.1.3   ICOM CI-V Bluetooth

Some **ICOM Radios**, like the IC-705 do not have any Cabled REMOTE ports, in this situation, this device MUST be linked to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** via a Bluetooth CI-V link or via a remote Hub with Bluetooth CI-V like the **VE2DX CT17B`s** that will give the radio 5 Cabled RFI filtered and Auto-leveled CI-V ports and can then be cabled to the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**.

6.1.4   ICOM CI-VoIP UDP

ICOM Radios CIVoIP, like the IC-705 and the IC-9700 can once connected to WiFi or LAN be linked to the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** via a UDP link. This will give direct connection from the radio to the band decoder using CI-V.

This is done through a WiFi connection of your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** to your network.

6.1.5   To link or Not to Link?

In some cases the REMOTE port can be linked or unlinked from USB CI-V, this feature can be important since some application can be very data intensive and may have positive or negative effect on the operations of your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**, if an application is already doing a lot of DATA request to the radio over you may want to use that to your advantage and NOT use Tranceive mode and instead use CI-V based operation that will monitor the ongoing exchange between you application and your radio, if your application is using USB CI-V then you must enable CI-V to be linked.

6.2   KENWOOD CAT

KENWOOD Radios, CAT has been introduced with some of the older KENWOOD radios via an interface called a FIF-232 in the late 1980`s.

Later models in the late 1990s were converted to RS232c port directly in the back of the KENWOOD radio.

6.2.1   KENWOOD CAT TTL Port

On older KENWOOD radios from the late 1980`s the Output was TTL with separate RX and TX signals, and using an external interface called the FIF-232 this signal would have been converted to RS232c to interface with a computer.

At this time the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** does not support these older radios.

6.2.2   KENWOOD RS-232c CAT Port

In the 1990`s KENWOOD converted there CAT interface to RS-232c directly in the back of the radio eliminating the need for the FIF-232 interface.

This CAT interface is supported by the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**, to interface these KENWOOD radios you will require the VE2DX RS232toTTL converter, this RS-232c to TTL converter plugs directly into the back of the KENWOOD radio in the CAT RS-232c port and at the other end of the converter a simple 3.5mm (1/8th) jack plugs into your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**, it is important to remind you that all **VE2DX ELECTRONICS DESIGN INC.** cables and converters with cables have RF chokes preinstalled to help filter out any RFIs.

6.2.3   KENWOOD USBoIP UDP

Some newer KENWOOD Radios, with support of CAT via USB can be linked to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** using a UDP link to a UDP Server port emulator and the sharing of the PC's COM port. It is important is such a situation to take into consideration the excessive amount of data coming from applications like HRD.

This is done through a WiFi connection of your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** to your network.

6.3   Yaesu CAT

Yaesu Radios, CAT was introduced with some of the older Yaesu radios via multiple variations of interfaces in the late 1980`s. They settled with DIN connectors in the late 1980`s.

Later models in the late 1990s were converted to TTL mini-DIN and later to RS232c port directly in the back of the Yaesu radio. Newer models saw the introduction of USB CAT interfacing and the return of TTL Mini-Din with the FT-710.

6.3.1   Yaesu CAT TTL Din Port and older Interfacing

Yaesu Radios, CAT was introduced with some of the older Yaesu radios via multiple variations of interfaces in the late 1980`s. They settled with DIN connectors in the late 1980`s.

At this time the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** does not support these older radios.

6.3.2   Yaesu TTL mini-Din 8Pins CAT Port

In the 1990`s Yaesu introduced with the FT-100 and FT-817 there TTL CAT interface based on a mini-Din 8Pin connector in the back of the radio. This deployment was expanded to the FT-857, FT-897 and then the FT-817ND followed with the FT-818.

This design was a multi function port, it could be used for CAT, TUNER and AMP interfacing, later models dropped this approach for CAT and it was kept in many variations for Tuner and Amp interfacing. Only later with the introduction of the FT-710 in mid 2020`s was this TTL port brought back in action. Even if the same mini-Din 8Pins port was still in used in other radios from 2005 till 2024, none supported CAT TTL until the FT-710.

To use to mini-Din CAT TTL port with the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** you must using a special VE2DX Yaesu TTL Cable, this specially made cable with RF Chokes for added RFI filtering is made with a mini-Din 8Pins connector at one end to plug in the back of your radio, and a 3.5mm (1/8th) plug at the other end to plug into your Radio1 or Radio2 port of your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** as per your configuration.

6.3.3   Yaesu USBoIP UDP

Some newer Yaesu Radios, with support of CAT via USB can be linked to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** using a UDP link to a UDP Server port emulator and the sharing of the PC's COM port. It is important is such a situation to take into consideration the excessive amount of data coming from applications like HRD.

This is done through a WiFi connection of your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** to your network.

7   How to connect your radio

7.1   ICOM

7.1.1   How to setup an IC-705 Bluetooth

The ICOM IC-705 is a bit different from other radios since it does not have a CI-V port, thus you need to use either Bluetooth, USBoIP via WiFi, or CIVoIP via WiFi. In this section we will explore how to configure the **VE2DX ELECTRONICS DESIGN INC. Band Decoders** with an ICOM IC-705 using Bluetooth.

1   Turn On the ICOM IC 705.

2   Hit Menu/Set/Bluetooth.

3   Verify that **Bluetooth** is on. If not turn it on.

4   Hit Pair/Connect.

△ **IMPORTANT** △

The ICOM IC-705 cannot have more than 5 Bluetooth devices configured, this includes BOTH data or audio devices if you already have 5 Bluetooth devices configured;
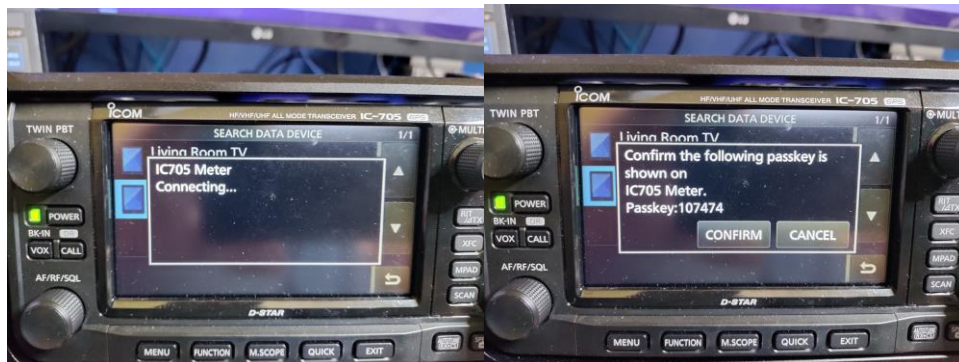
5   Hit Device Search

6   Hit Search Data Device

7 You will see a new device called **VE2DX Band Decoder** select the device, this may take up to 30s.

8 A prompt window will ask "**Connect**", hit **YES**

9 A prompt window will ask "**Confirm the following passkey is shown on VE2DX Band Decoder**" Don't worry about the **passkey** it may change from unit to unit, simply hit confirm.

10 Windows will then indicate "**Connecting**" followed by "**Connected**"

11 The display will then show your list of Bluetooth devices and the **VE2DX Band Decoder** will be shown with "**(Connect)**".

12 Your done Hit the **Menu** Bottom.

Your **VE2DX ELECTRONICS DESIGN INC. Band Decoders©** should now be getting DATA from the ICOM IC-705 the Radio1 LED should be flashing according to data being received.

7.1.2   Setting up a cabled ICOM Radio

To use your ICOM Radio CI-V port (REMOTE) with your **VE2DX Electronics Design Inc. Band Decoder©** the JPXXX or JPXXX must be set tho the I side, as per your configuration.

To connect by CI-V Cabled your ICOM radio, simply plug a 3.5mm (1/8th) mono cable with proper RF Chock into the ICOM REMOTE port in the back of the radio and into the Radio1 or Radio2 port of your **VE2DX Electronics Design Inc. Band Decoder©** as per your configuration. You can also use a properly RF Filtered with proper Automatic signal leveling CI-V hub like the VE2DX CT17B product family, again using properly RF Chocked cables.

Note: VE2DX products can handle stereo cables, but some OEM CI-V devices don't, please be careful about the use of Stereo cables with NON-VE2DX devices.

The Radio1 or Radio2 (according to your configuration) LED indicates that the **VE2DX Electronics Design Inc. Band Decoder©** is receiving data from the radio in question.

To test your radio connection;

- If configured with TRANCEIVE simply turn the VFO on your ICOM Radio.

- If not using TRANCEIVE mode make certain your application is operational and receiving data from the radio.

7.1.3   Setting up a USBoIP ICOM Radio

Some ICOM Radios, with support of CI-V via USB can be linked to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** using a UDP link to a UDP Server port emulator and the sharing of the PC's COM port. It is important is such a situation to take into consideration the excessive amount of data coming from applications like HRD and NOT try to use Tranceive mode that may encounter high amount of collisions.

In your **VE2DX Electronics Design Inc. Band Decoder©** and ICOM radio configuration you will need to also configure matching speed of the port. Some radios may have fix speed, then the **VE2DX Electronics Design Inc. Band Decoder©**.will have to match the ICOM Radio.

7.1.4   Setting up a CIVoIP ICOM Radio

Some ICOM Radios, with support of CI-V via CIVoIP using a UDP link can be connected to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** using a UDP link directly to the radio.

To do this multiple items must be configured in both your ICOM Radio and your **VE2DX Electronics Design Inc. Band Decoder©** please refer to section 6 for more information.

In your **VE2DX Electronics Design Inc. Band Decoder©** and ICOM radio configuration you will need to also configure matching speed of the port. Some radios may have fix speed, then the **VE2DX Electronics Design Inc. Band Decoder©**.will have to match the ICOM Radio.

7.2   KENWOOD

KENWOOD Radios, CAT is a simple RS232c physical connection in the back of more recent KENWOOD Radios since the TS-450, some newer KENWOOD radios also support USB CAT, the **VE2DX Electronics Design Inc. Band Decoder©** supports both mode of connecting KENWOOD CAT.

7.2.1   KENWOOD cabled CAT RS232c Port

To use your KENWOOD Radio CAT port with your **VE2DX Electronics Design Inc. Band Decoder©** the JPXXX or JPXXX must be set tho the K/Y side, as per your configuration.

To be used with the **VE2DX Electronics Design Inc. Band Decoder©** a RS232c to TTL converter with proper RF Chock must be used to convert your RS232c to CAT TTL. Simply plug the RS232c end of your converter to the CAT connector in the back of your KENWOOD radio, and plug your 3.5mm in the proper radio port in the back of the **VE2DX Electronics Design Inc. Band Decoder©**.

In your **VE2DX Electronics Design Inc. Band Decoder©** and KENWOOD radio configuration you will need to also configure matching speed of the port. Some radios may have fix speed, then the **VE2DX Electronics Design Inc. Band Decoder©**.will have to match the KENWOOD Radio.

7.2.2   KENWOOD cabled TTL CAT Port

We are looking into the possible support of older KENWOOD CAT interfaces, this is not implemented at this time.

7.2.3   KENWOOD using USBoIP

KENWOOD Radios, with support of CAT via USB can be linked to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** using a UDP link to a UDP Server port emulator and the sharing of the PC's COM port. It is important is such a situation to take into consideration the excessive amount of data coming from applications like HRD.

In your **VE2DX Electronics Design Inc. Band Decoder©** and KENWOOD radio configuration you will need to also configure matching speed of the port. Some radios may have fix speed, then the **VE2DX Electronics Design Inc. Band Decoder©**.will have to match the KENWOOD Radio.

7.3   Yaesu

YAESU Radios, CAT are simple TTL, RS232c, USB physical connection in the back of your Yaesu Radios since the FT-XXXXX, some newer Yaesu radios also support USB CAT, the **VE2DX Electronics Design Inc. Band Decoder©** supports both mode of connecting KENWOOD CAT.

7.3.1   YAESU cabled CAT RS232c Port

To use your KENWOOD Radio CAT port with your **VE2DX Electronics Design Inc. Band Decoder©** the JPXXX or JPXXX must be set tho the K/Y side, as per your configuration.

To be used with the **VE2DX Electronics Design Inc. Band Decoder©** a RS232c to TTL converter with proper RF Chock must be used to convert your RS232c to CAT TTL. Simply plug the RS232c end of your converter to the CAT connector in the back of your KENWOOD radio, and plug your 3.5mm in the proper radio port in the back of the **VE2DX Electronics Design Inc. Band Decoder©**.

In your **VE2DX Electronics Design Inc. Band Decoder©** and Yaesu radio configuration you will need to also configure matching speed of the port. Some radios may have fix speed, then the **VE2DX Electronics Design Inc. Band Decoder©**.will have to match the Yaesu Radio.

7.3.2   YAESU cabled CAT TTL Port

The YAESU FT-100. FT817, FT817ND, FT818, FT-857, FT-897 and FT-710 all support TTL CAT direct connection using a mini-Din 8 pin connector in the back of the radio.

To be used with the **VE2DX Electronics Design Inc. Band Decoder©** a mini-Din 8 Pin to 3.5mm (1/8th) mono jack with proper RF Chock must be used. Simply plug the Mini-Din 8Pin end of your cable to the CAT connector in the back of your Yaesu radio, and plug your 3.5mm (1/8) in the proper radio port in the back of the **VE2DX Electronics Design Inc. Band Decoder©**.

In your **VE2DX Electronics Design Inc. Band Decoder©** and Yaesu radio configuration you will need to also configure matching speed of the port. Some radios may have fix speed, then the **VE2DX Electronics Design Inc. Band Decoder©**.will have to match the Yaesu Radio.

7.3.3   YAESU USBoIP

YAESU Radios, with support of CAT via USB can be linked to your **VE2DX ELECTRONICS DESIGN INC. Band Decoders** using a UDP link to a UDP Server port emulator and the sharing of the PC's COM port. It is important is such a situation to take into consideration the excessive amount of data coming from applications like HRD.

In your **VE2DX Electronics Design Inc. Band Decoder©** and Yaesu radio configuration you will need to also configure matching speed of the CAT port. Some radios may have fix speed, then the **VE2DX Electronics Design Inc. Band Decoder©**.will have to match the Yaesu Radio.

8   Firmware updates

The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© firmware update process is very simple.

1- Go to https://ve2dx.com/support
2- In the FIRMWARE section.
3- Download the latest firmware for your device.
4- During download your Anti Virus may alert you to the possibility of a Virus, this does happen randomly, there are no viruses in our update software, disregard this warning.
5- Plug your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© USB cable into your PC.
6- Using DEVICE MANAGER locate the SERIAL PORT section and identify your COM PORT for your meter by simply disconnecting it from the PC and looking at the changes in the list.
7- Once the EXE file is downloaded, simply run it.
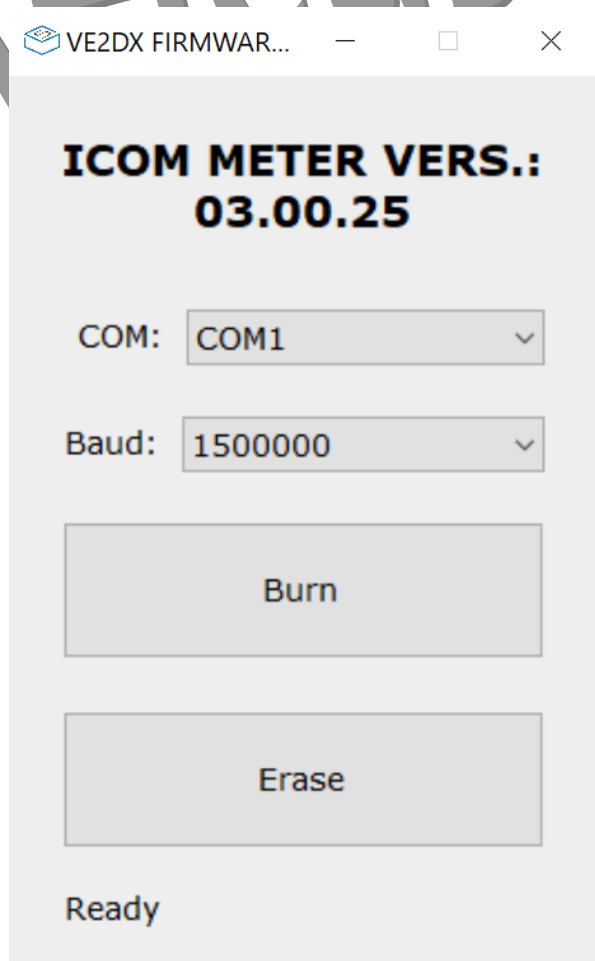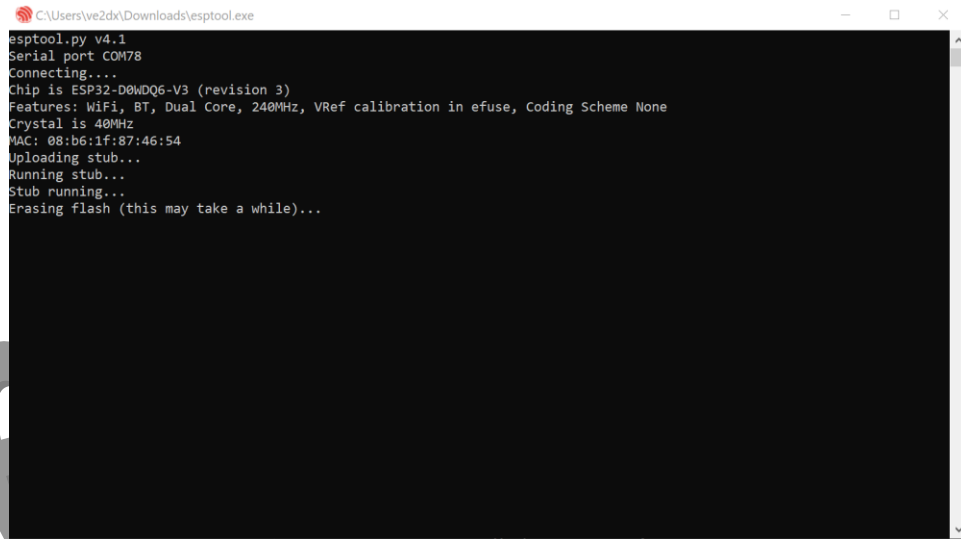
Change this image

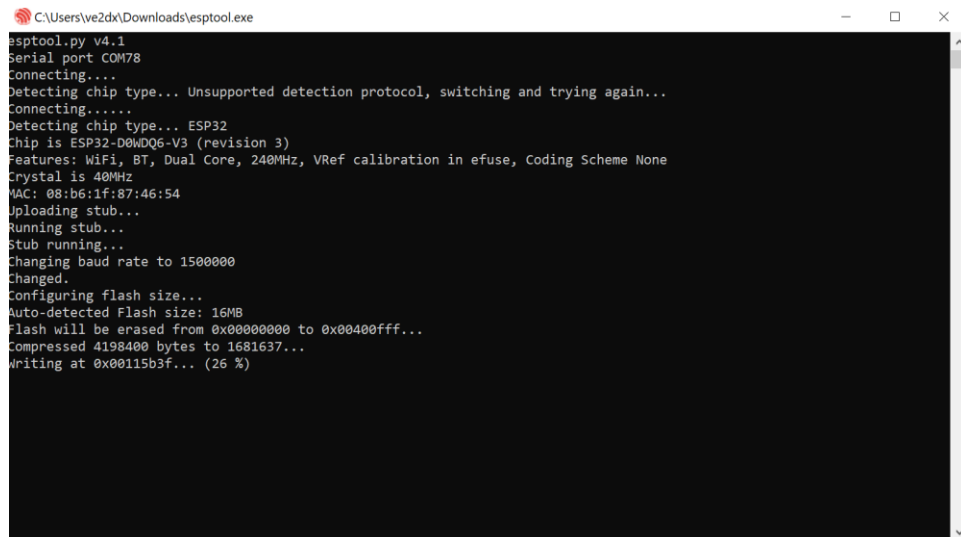8- Select your COM PORT (normally the last one in the list!)

9- If needed ERASE the old firmware.

(Look for a black window with process status.)

10- Press Burn.

(Look for a black window with process status.)

When done the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© will reboot.

On rare occasions you may be asked to reenter the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© password, this is shown when all sixteen OUTPUT LEDs are all flashing non-stop. If needed go to section 8 for information on how to enter your password.

9   Password configuration

The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© may request the Serial Number Password this is indicated by all sixteen Output LEDs flashing non stop. The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© will also be sending a BOA audio CW message every 60 secondes of AL1, this BOA is an indication that your firmware password has been cleared from memory.

If you get this error you will need to follow the following steps;

- Locate your serial number and password, they are located on a small white label under your device and a spare label that was located in your box.
- If you cannot locate your password, contact VE2DX Electronics Design Inc. At info@ve2dx.com send you serial number and proof of purchase, and we will send you your password.
- Open your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© web based configuration page.
- Instead of the usual configuration page you will get the following HTML page, showing your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© serial number and requesting your password.
- Once your password is entered your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© will reset.
- It is likely, since your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© has cleared the memory, that your configuration was lost, please refer to your CONFIGURATION REFERENCE FORM that was supplied with your **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© for your configuration.

10 Physical information

10.1 BD1-BT

10.1.1 Front

10.1.2 Rear

10.1.3 Inside

10.2 BD1-BTPlus

10.2.1 Front

10.2.2 Rear

10.2.3 Inside

10.3 IBD2-BT

10.3.1 Front

10.3.2 Rear

10.3.3 Inside

10.4 Enclosure Configuration

The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© enclosure can be physically configured in two different ways:

- It is shipped with the magnets and installation holes are under the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**©.
- the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© is designed so that the internal electronics can be removed, flipped and reinstalled so that the magnets and mounting holes are on top of the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**©.

11   Connections

11.1 BD1-BT

11.2 BD1-BTPlus

11.3 IBD2-BT

12   Troubleshooting

Troubleshooting the **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© is fairly simple. The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© will indicate using LEDs and sounded CW codes the issue encountered.

The following table will walk you through the process. If you do not resolve the issue following your inquiry in this table, please contact your reseller for support or directly VE2DX ELECTRONIC DESIGN INC. Via email at info@ve2dx.com or directly by phone at 450-689-4591.

Problem	Possible issue	Test Process and FRU replacement if required
The Band Decoder won't power up or reseting randomly.	Bad power source, Improperly seated DC cable. Ground loop from the Radio, Ground loop from the remote switching device, Bad Band Decoder.	Disconnect the Radio from the Band Decoder (Eliminate Ground loop). Disconnect the remote switch from the Band Decoder (Eliminate Ground loop). Disconnect the External Power from the Band Decoder (Eliminate Ground loop). Disconnect the USB cable from the Band Decoder. Try a different power source. Replace Band Decoder or the Main PCB.
The Band Decoder is resetting when radio is transmitting.	Possible ground loop between Radio and Band Decoder, switch or power supply. RFI via power, CAT/CI-V, Remote Switch. Bad Band Decoder.	Add RF Chokes to the cabling. Make certain your station, your radio and all equipment are properly grounded.
The Band Decoder not communicating with the radio	The radio is turned off. The radio is not connected to the Band Decoder. The radio manufacturer and/or model not matching the Band Decoder configuration. CAT/CI-V speed is not set properly. Configuration error (Meter, Radio, UDP, etc...) If Bluetooth: Radio is not paired	Power on the radio. Check configuration (Meter, Radio, UDP, WiFi, etc...) Check connections. If Bluetooth check that the radio is properly paired and connected to the Band Decoder.
The Band Decoder is very slow.	For ICOM; Make certain if using TRANSCEIVE that there is no other devices or application causing heavy data traffic. Update your firmware.	Turn OFF TRANSCEIVE in the radio configuration and change to NON-TRANCEIVE configuration. Verify the Band Decoder configuration.
Where are the updates?	NA	WWW.VE2DX.COM in the support

		section.
Do I have to pay for new features?	NA	No
Do you have a Yaesu version?	NA	Yes
What are TrueTTL, TrueCAT, and TrueCIV.	NA	Please look for my TrueTTL WhtePaper at WWW.VE2DX.COM in the support section.
Can I just download your firmware and use it?	NA	Our firmware will only work with our hardware.

13   Warranty

The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© is covered by a 1-year limited warranty on all hardware.

The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© is covered by lifetime updates at no cost.

The **VE2DX ELECTRONICS DESIGN INC. Band Decoders**© is covered by lifetime support at no cost.

At **VE2DX ELECTRONICS DESIGN INC.** We are proud to have a WAY TOO LARGE OPEN-DOOR policy, if you have a question, a new feature, or a project, that you would like to discuss with us, please give us a call at 450-689-4591 or drop us an email at info@ve2dx.com, we will discuss the idea or question with you with a smile 😋

If you are looking for an ELMER, please give us a call will be happy to try to help you.

PreRelease Daft

73 DE Richard VE2DX 😄