

# GREEN HERON ENGINEERING LLC

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## GREEN HERON EVERYWARE

## RX ANTENNA SWITCH

## RX8-2

## USER GUIDE

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## FCC Part 15

This product contains FCC ID: OUR-XBEE or OUR-XBEEPRO

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

## Industry Canada (IC)

Contains Model Xbee Radio, IC: 4214A-XBEE or Model Xbee-PRO Radio, IC: 4214A-XBEEPRO

## RADIO AND TELEVISION INTERFERENCE

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and the receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

You may also find helpful the following booklet, prepared by the FCC: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402.

Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission's rules.

## WARRANTY

This product is warranted to be free of defects in materials and workmanship for 1 year. We will repair or replace, at our option, any equipment proven to be defective within the warranty period. All warranty work is F.O.B. Webster, NY, USA. This warranty is exclusive of abuse, misuse, accidental damage, acts of God or consequential damages, etc. Green Heron Engineering LLC liability shall not exceed the original purchase price of the equipment.

## TRADEMARKS

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**We suggest that you look over this document carefully.**

**Section 1 is a brief overview of the RX8-2 and its features**

**Section 2 is the quick start setup procedure**

**Section 3 shows the RX 8-2 optional configurations**

**Section 4 is the hardware reference drawings**

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## **1.0 Overview**

The GHE RX8-2 is a high performance 8 antenna, 2 radio remote coax switch suitable for indoor or outdoor (semi-protected) mounting locations. The coax switch comes complete with built-in Green Heron Wireless remote module and built-in Bias 'T' for optional through-the-coax power supply. A packaged remote 8x2 RX antenna switch that requires ONLY the antenna coax to complete the installation. This unique product allows complete freedom from control cables and tethered control boxes and at no extra cost, provides remote internet access as well.

### **1.1 RX8-2 Features**

- 8 antenna ports, each selectable to one of two receivers. Each receive can select different, or the same antenna. It is also possible to cascade two or more RX8-2 together to obtain either more antenna positions, and/or more receivers (requires external antenna splitters)
- RX Only design, allow compact size, high quality relays, constant 75 Ohm termination of all antenna ports.
- Antenna isolation > 90 dB through 7 MHz - 80 dB through 30 MHz
- Built-in Green Heron Wireless Remote replaces control cable and tethered control boxes when used with a GH Base for complete wireless solution
  - Eliminates potential for conducting unwanted RF and lightning damage into the shack.
  - RPSMA connector for control GH Wireless control antenna (2.1dB ant included) or add your own long range, higher gain antenna.
  - Optional +12 power through the coax
  - Allows sharing of the remote coax switch among stations
  - Allows user custom on-screen controls using GH Everywhere software
  - Automatic selection based on radio's frequency when using compatible logging software
  - Allows remote access via internet, nothing else to buy. Ideal for remote stations
- Aluminum die-cast enclosure with lid gasket for indoor or outdoor installation. Outdoor must be protected from direct weather.
- High quality construction throughout, all stainless steel fasteners, high quality 'F' connectors.
- Capable of conventional wired control if desired.

## 1.2 Ordering Options

- Add: GH Wireless Base  
If you already are using a GH Wireless product and therefore, already have a GHE base, then you do not need to have another one to add the RX8-2 to your station.
- Add: MFJ 4116 DC injector for power through the coax (shack end)  
This inexpensive addition will save you from building your own injector for installations where it is inconvenient to supply +12V to the Select-8 separately.
- Add optional screw terminal connector for convenient wired control capability  
If you need a convenient way to attach a control cable for conventional wired control for your RX8-2, we can provide the screw terminal connectors. These connectors will eliminate the need to solder the control cable onto the main board.
- PCB only: Deletes the die-cast enclosure for your own packaging needs. Allows isolated or grounded antenna port shields.
- Antenna Port ground isolation kit. For use only with our enclosure, allow each antenna port to be isolated from ground (and each other) using fiber flat and shoulder washers. Requires customer to enlarge the holes for the 8 antenna ports.

## 2.0 Complete RX8-2 Installation

This quick start includes installing the RX8-2, a GH Base, and the GH Everyware Server software. If you already use GH Everyware for other station components then you already have a base and the software installed. You also know how to configure it all, so you may skip this section entirely and go directly to section 3.0 for configuration options specific to the GH Select-8.

### 2.1 Install the GH Everyware Base Unit

1. Connect the Base Unit into an available USB Port on a computer that will be running your Server. You may find that the required drivers are already loaded and nothing much will happen except you will get a new USB Serial Port show up in Device Manager. Make a note of the COM number that is assigned. If you are using an external USB hub, please ensure that you use the hub's additional power module. The Base unit will operate erratically with an un-powered USB hub.
2. If the drivers are not already loaded, you will get "New Hardware Found, USB UART" and New Hardware Wizard will appear on your screen. The exact procedure will vary for different versions of Windows, but in general, the sequence is the same. All versions of Windows contain the FTDI drivers that are needed, either within the original install, or from Windows Update. If for some reason, you can't locate the correct drivers on your system, they are provided in the .zip file download for the current GH Everyware release on our website. The drivers are in the folder named "CDM 2.04.06 WHQL".
3. Follow the directions and load both the "ftdibus" and following that, the "ftdiport" drivers.
4. After installation is complete, verify the COM port using Device Manager. Simply unplug and plug in the Base Unit while watching Device Manager COM ports to see what port is assigned. Note the COM Number.



**Note:** The COM port number will remain constant whenever you plug this specific Base Unit into any USB port on this computer.

## 2.2 Install the “GH Everyware Server” Software

### System Requirements:

- Windows XP SP2, Windows Vista, Windows 7/8/10
  - Windows .NET environment version 3.0 or higher
1. If the user has Administrator’s privileges, double-click the “GH Everyware Server.msi” installation file. If not, right-click the installation file and choose to run as Administrator.
  2. Follow the onscreen directions. In most cases the defaults will be sufficient.
  3. If you do not have a recent enough version of the Java Runtime Environment, the installer will prompt you to download it.

## 2.3 Configure your RX8-2.

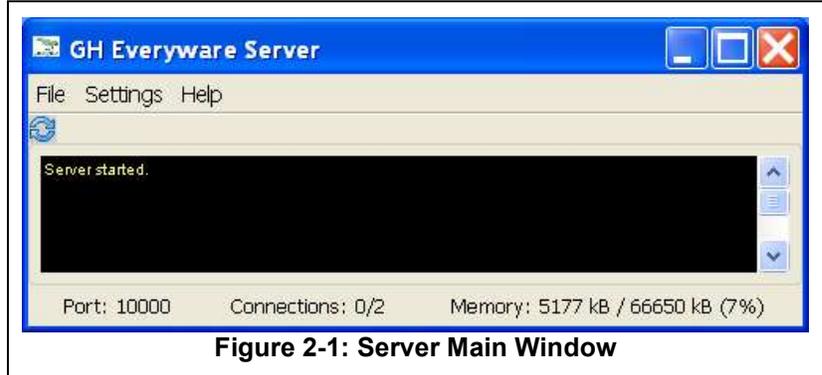
1. Your RX8-2 comes from the factory:
  - Remote Channel ‘C’, Address ‘1’
  - Jumper JP-1 Set for separate supplied 12V. (disable through the coax)
2. For initial testing, we will have the Base Unit, the Server Computer and RX8-2 Unit all within easy viewing and access. The easiest way to power the Select-8 for testing is to remove the cover screws (6), remove the cover and connect a source of +12 to the 12V input connector J1.
3. Optional – If you are going to be using your RX8-2 internal Bias ‘T’ that allows for ‘through-the-coax’ +12, then move the JP1 jumper to positions 2-3 and connect the shack end DC Injector with +12 source to the RX8-2 via a coax jumper connected to ‘RADIO B’ and power supply as shown in appendix A.

## 2.4 Create a WIO Profiles for your RX8-2

The WIO Profile defines the way Names, Switch positions and how the controls will be presented on your computer screen. For this Quick Start, we will use a sample profiles that you will download from the website. The file is named RX8\_2.xml and it is located in the GH Everyware Support tab on the website. Download this file and place in in your install directory for GHE Everyware Server(wioProfiles\). This WIO Profiles are examples of “Map Switch” selectors that would be suitable for an array of individual Beverage antennas. You may easily modify these profiles to change the “NAME” for your RX8-2, and all the position names for your switch as well. (The examples “Map Switch profile is also shown in appendix ‘B’”, and complete information on WIO Profiles is contained in the tutorial of the GH Everyware System Manual, Section 2.)

## 2.5 Configure GH Everyware Server

1. Start GH Everyware Server by double clicking on the Program Icon, or selecting from the Start Menu. "Server Started" will appear in the message window.



2. Select **Settings→Device Manager** from the menu bar. Create an entry on the first line to control the Radio 'A' side of your RX8-2:
  - Give it a name like "Beverage A"
  - Select the COM port that was assigned in paragraph 2.1
  - Select Device Type "GHE Base"
  - Select Subtype "GHE RX82 RADIO A" (Or whatever name you used to create your own WIO Profile)
  - Set WIO Addr to the 1 (or the actual address for the Select-8 if it was changed)
3. Click on the button labeled Disconnect to attempt Connect to your Device
  - If all is well, the button will change to Connect Status, your Wireless Base and Remote Units will light up their LED RSSI indicators (Signal Strength) indicating CONNECT to Server.
4. Repeat 2 and 3 using the name "Beverage B" and the device subtype of "GHE RX82 RADIO B".
  - If all is well, the button will change to Connect Status, your Wireless Base and Remote Units will light up their LED RSSI indicators (Signal Strength) indicating CONNECT to Server.
5. Close the Device Manager Window and select **Settings→Launch Local Controller**.

Your screen will now show the MAP displays for each radio's control for the example RX8-2 Switch. By clicking on the << or >> buttons, you can change the relay selection as desired. You can hear the relays changing as you do this.

Each direction and its name are separate selections from a typical 8 direction array of Beverages. This control can be modified to suit many different needs. Notice that the title bar of the control shows an RSSI value. This is the wireless device signal strength that the Remote Unit is reporting back as to how well it is receiving signal from the Base Unit.

## 2.6 Hotkey Shortcuts

Let's now add a HOTKEY to this control. A HOTKEY will allow you to change your remote switch without having to use the mouse to gain focus. You will assign keys on your keyboard that will (for this exercise) rotate your RX antenna directions around the compass display. Right click on the Switch Name portion ("Test Switch") and then left click on "Assign keystroke to cycle forward". Now tap F12. From now on, whenever this control is on-screen, pressing F12 will select the next position (down) on your Select-8 Switch. You may assign keys for forward and backwards as well as for each individual (or a single favorite selection, right click on the individual button to assign a HOTKEY for that button.

**Note:** Only numeric keypad, special application, function and combination keys using <Shift>, <Ctrl> and/or <Alt> are allowed to be assigned to these HOTKEY functions. You must make sure you don't assign something that will be needed by another program running at the same time on your computer.

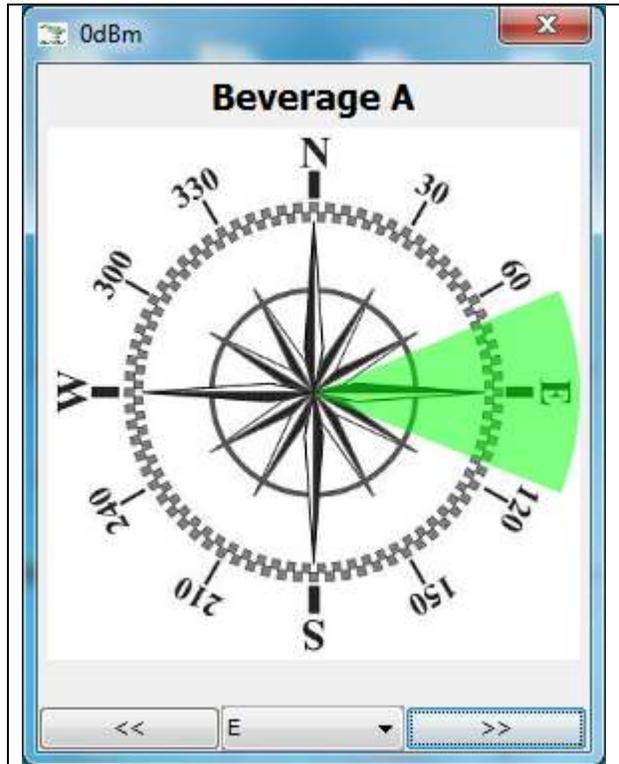


Figure 2-2: RX8-2 Map Display



## 3.0 GH RX8-2 Installation Options

### 3.1 + 12V Power Supply

Your RX8-2 requires 12V power for the relays and to power the built-in Wireless Remote. There are three ways to supply power to the unit.

1. If you have a convenient +12V source near the antenna switch, you should connect via the J1, +12 IN Phoenix (green) connector. Leave the JP1 jumper in the default 1-2 position. When powering through J1, reverse polarity protection and a self-resettable “Polyfuse” are in the +12V path.

**WARNING: We Strongly Recommend that your source of +12V is current limited to ~ 1A in order to protect from a short that could damage the RX8-2 PCB if enough current was available. DO NOT USE YOUR STATION 35A POWER SUPPLY WITHOUT AN ADDITIONAL FUSE ON THE LINE POWERING YOUR RX8-2!**

2. Power Over Coax POC - Move JP1 to the 2-3 position to enable the Power Over Coax (POC) operation. For POC, the RX8-2 includes a built-in bias ‘T’ that obtains the voltage from the feedline that is connected to the ‘Radio B’ connector and isolates the rest of your antenna system. You will need a DC injector at the other end of the feed-line to insert +12 at that end and to isolate the 12V from your station. We offer the MFJ 4116 as the shack end injector. You may use any DC injector that is capable of 500 ma and is compatible with the frequencies you are using with your RX8-2.
3. For test purposed when the cover is off, you may power the RX8-2 through the 2.1mm DC connector on the GH Wireless Remote board. A DC power cable is included for this purpose. This method is not recommended for full-time use as this connection bypasses the internal Polyfuse and reverse polarity protection circuits. BUT, this is a convenient connection point for use with a ‘wall wart’ power module for testing purposes.

### 3.2 (Optional) Wireless (WIO) Channel and Address

The GH RX8-2 is shipped on our default WIO Remote channel ‘C’ and Address ‘1’. If you also purchased a new Base unit with the Select-8, then it was shipped on channel ‘C’, and is correctly configured to connect without change. Should you already be using other GH Everywhere wireless units, then you may need to change the Channel and/or Address so as not to conflict with other GHE wireless controllers.. This is accomplished using the ‘Test and Configuration’ software and is described in the main GH Everywhere Manual, Section 5.1. Both of these items are always available on our website in the SUPPORT section.

**Note:** *The easiest way to reprogram the Channel/Address is to temporarily install the radio module into a GHE Base unit. The Base unit usb connection to pc and powers the unit through the usb. After changing to the new Channel/Address, return the radio module to the RX8-2.*

### **3.3 (Optional) Isolated Antenna Grounds**

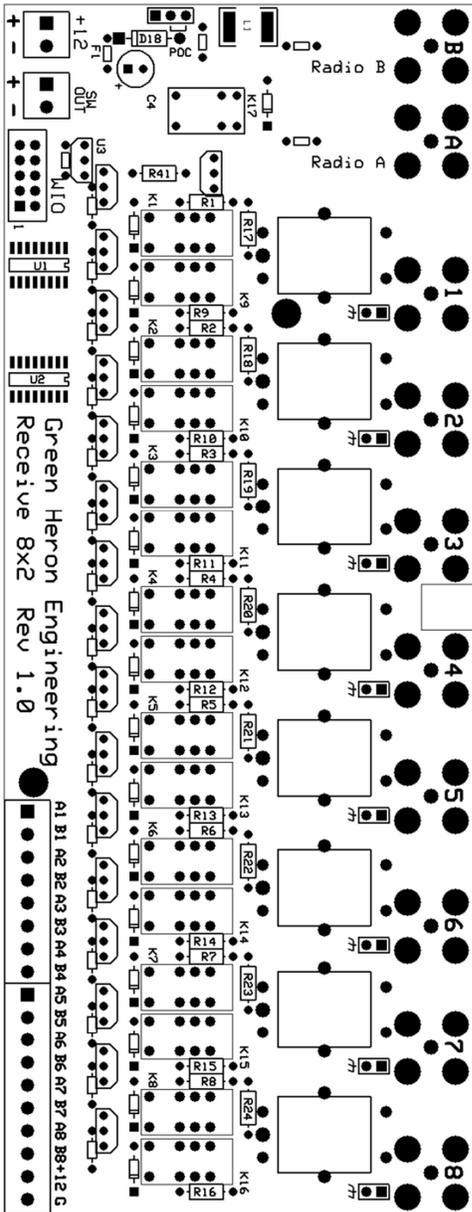
**BOARD ONLY** – If you are using the Board-Only version of the RX8-2, the connections of the antenna connector shields are determined by the mounting method and the PCB jumper holes located next to each of the ‘F’ antenna connectors. As delivered with no mounting and the jumper holes open, the shields on the 8 antenna connectors are each isolated from ground and from each other. If you wish to ground them to the board plane, then you may install wires into each set of jumper holes as provided. Also, note that if you use a conductive panel or enclosure (like we provide with our die-cast aluminum enclosure, this would physically connect all the antenna ‘F’ connector shields together and to the enclosure ground.

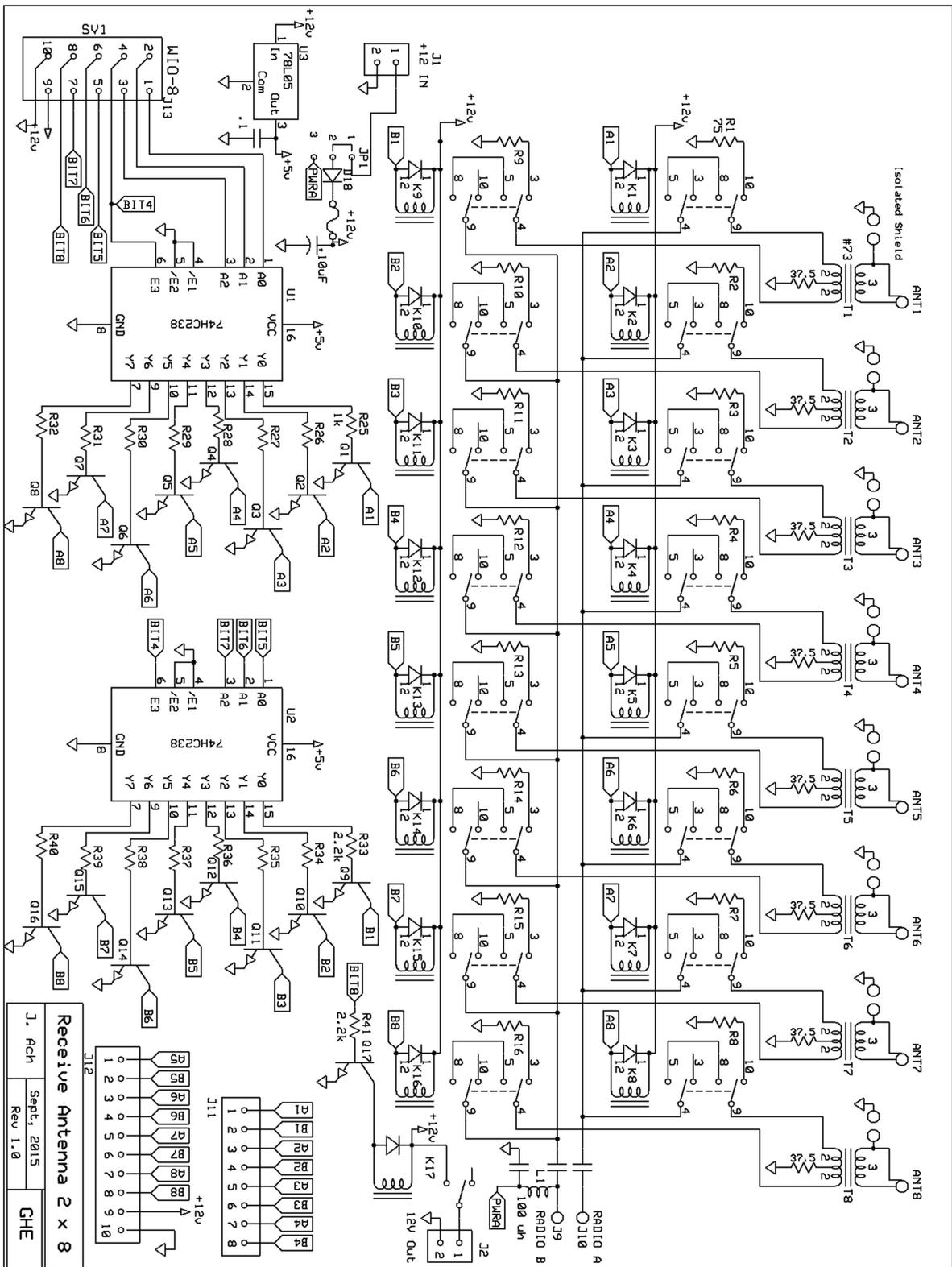
**GH RX8-2 ENCLOSURE** – If you are using the enclosure, the antenna ground isolation jumpers do not affect the grounding of the shields as the enclosure itself provides the ground connection to each ‘F’ connector. Should you wish to isolate, or leave the isolation to the state of the jumper holes as in the Board-Only scenario, then you remove the PCB, drill out or ream each antenna ‘F’ connector to 0.001” with a suitable tool, and reinstall the board using fiber flat and shoulder washers to provide enclosure isolation.

# Section 4

## 4.0 Hardware Reference

### 4.1 RX8-2 Drawings





## APPENDIX A – +12 THROUGH-THE-COAX

### CAUTION:

When you utilize Power through-the-coax (POC) option, you must be certain that you don't:

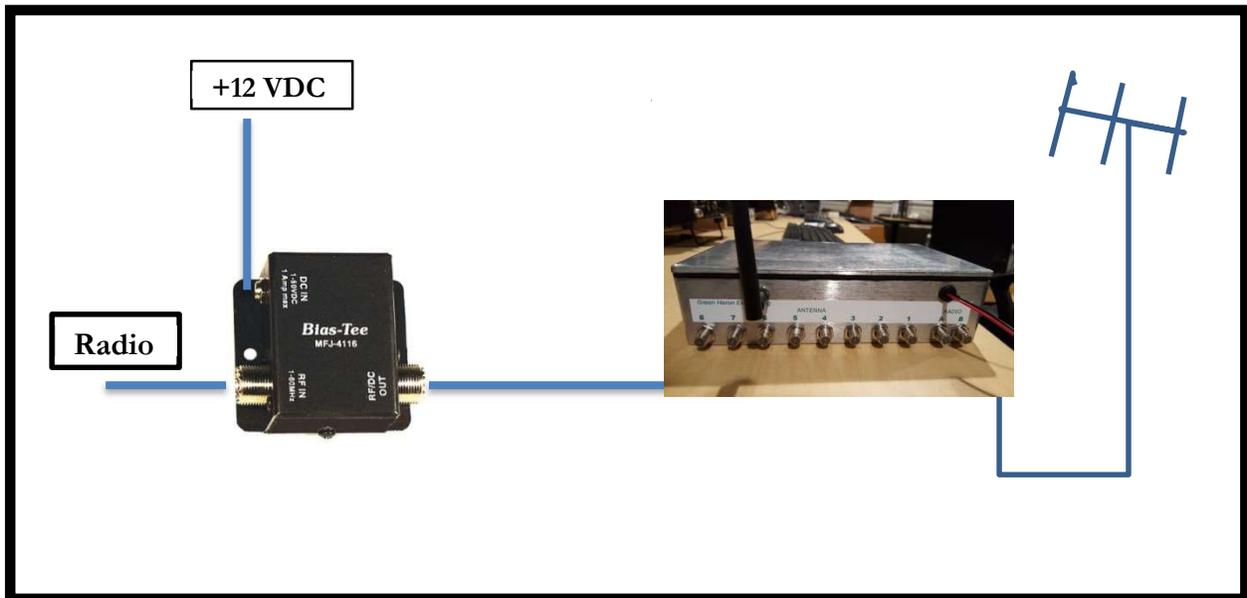
1. Get +12 applied directly to a radio where it might damage the radio. Some radios have low current DC chokes or other ESD protection devices to ground on the antenna inputs, and these could be damaged by the direct application of +12VDC.
2. Have the +12 connect into an antenna or other device that is DC grounded. This would short out the +12 so that our Select-8 would get none.

As an added precaution, you should limit the current that can be supplied by the 12V DC injection delivery scheme, and the RX8-2 JP1 jumper is shipped from the factory with POC (Power over coax) NOT USED. Do not jumper JP1 unless you are going to use POC and have the proper DC injector inserted into the POC feed-line with nothing but coax or DC pass components in place between the injector and the Select-8. Make sure you install the injector the correct way so that +12 is properly isolated from your radio equipment.

You should never connect a source of +12 that is capable of more than 1A. You may use a commercial DC Injector (we can supply the MFJ 4116).

Included here is a diagram of the components when POC is implemented.

NOTE: The POC power is applied to the "Radio B" connector only!



# APPENDIX B – WIO PROFILES

This appendix describes the switching logic that must be applied using the WIO Profiles for GH Everywhere Server. Also included are three example WIO Profiles you may use as a guide in order to implement on-screen controls that best fit your specific application of the RX8-2 switch in your station.

## SWITCHING LOGIC –

Outputs 1, 2 and 3 are used to select which antenna is connected to the 'A' Radio side. (BCD)

Output 4 is used to enable the RX8-2. This bit allows an "OFF" position to be defined.

Outputs 5, 6 and 7 are used to select which antenna is connected to the 'B' Radio side. (BCD)

Output 8 is used to select the external 12V output for powering preamp, or other on demand device or relay.

In a real RX8-2 setup, you would use 2 or optionally 3 separate WIO Profiles in order to provide complete control from your operating position. You could create a WIO Profile for:

- The 'A' side antenna selection
- The 'B' side antenna selection
- Optional external +12 output.

NOTE: - If an external +12V is required or desired for specific antenna selections, then the 8<sup>th</sup> bit logic may be implemented directly into the 'A' or 'B' side selection profile as opposed to having a separate on/off control that is selectable independent of an antenna.

## Example WIO Profiles

We have three example profiles as shown in the Profile Editor. These examples are included in the WIO Profile Download from the website, OR you can just use the WIO Profile Editor and recreate them yourself. If you download or share profiles, you must place them in your WIO Profiles directory under your GH Everywhere Server install directory.

Go to Device Manager and select **Edit→Wio Profile Editor** and then either start entering your profile, OR use **File→Open** and open up desired RX82 profile from the list.

- N/C (no change) – The state of this bit is not changed for this position
- ON – This bit is on, or relay is picked
- OFF – This bit is off, or relay is dropped
- MOM – This is not used with the RX8-2

**Note:** *The N/C is used to allow more than 1 switching device to share a single Remote Unit using different bits or outputs. NOTE that with the GH RX-8, the use of the N/C is very important when defining both the 'A' and 'B' sides using the same GH Remote device.*

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