

### **3 Element General test Trouble shooting using Sound**

The SteppIR has some characteristics you can listen for to tell if it is operating properly.

1. Band noise - When the SteppIR is adjusting you will hear two things on your Radio. First when the indicator is flashing you will here a humming sound, this is caused by the drive circuits in the controller. Some Users do not hear this sound so it is not a sure fire test. Next as

the Antenna gets close to the right frequency you will hear the band noise come up considerably. If you select Retract elements in the setup menu the Back ground noise should go away completely.

2. Band Signals - The DRIVEN element needs to be close to the right length to hear a good signal. For this test start with all elements retracted. Enter the create modify mode on the controller and first verify there are no signals or back ground noise on the radio. Run out the two passive elements, say 400 inches for 20M and make sure the noise level does not come up then run out the driven element, the signals and noise should increase greatly.

3. Motor noise - When the SteppIR is adjusting you can listen to it by standing under it or putting your ear to the tower. There are three distinct noises it makes.

a. The first is a humming noise that sounds like a motor running when it is changing bands.

b. The second is a louder rattling sound that happens when the motors stall. The Calibrate mode in the Setup menu makes both of these noises, first the humming then the rattling and then the humming noise.

c. The third noise is the ramp up and down of the motor which is a ratcheting noise as the motor starts and stops.

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#### **4 element trouble shooting cable test:**

The control cable uses 4 wires per Motor (element) to control the antenna. Referring to the 25 pin connector that plugs into the controller, they are Pared using pins 1, 2 and pins 3, 4 for the first Motor with the pattern repeating for each motor (element). Skipping the last pin on the top row pin 13.

This test assumes that the antenna is connected to one end of the cable and the measurements are taken from the 25 pin connector that plugs into the controller.

To Ensure the 16 conductor cable is free of shorts and opens follow the instructions below.

First Ensure there is between 18 and 30 ohms (Depends on cable length) between the following pins:

1 and 2 Driven  
3 and 4  
5 and 6 Director 1, Closest to Driven  
7 and 8  
9 and 10 Reflector  
11 and 12  
14 and 15 Director 2, Way out there  
16 and 17

Next Ensure that there is No resistance (a Open) between the following pins:  
Connector Case and any Pin 1 through 12

2 and 3  
4 and 5  
6 and 7  
8 and 9  
10 and 11  
15 and 16

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### 3 Element SWR test - trouble shooting using SWR

High SWR can be caused by many different things, to list a few:

- Other Antennas
- Power lines
- Metal roofs
- Elevation off of ground
- Antenna problems

In our experience a SWR of less than or equal to 1.4:1 is normal. In most cases the lowest SWR will not be at the same frequency as the best performance. This because we have optimized the antenna for performance first and SWR second. In ideal conditions when we tested the antenna the worst SWR was 1.2:1. Though the impedance (SWR) of the antenna varies with height and location the performance should not.

To trouble shoot high SWR, greater than 1.4:1, the Create Modify mode can be used.

To do this use the HAM mode to select the segment (frequency and direction) to test. From the Setup menu enter the Create mode and record the lengths for the elements, note that the names "DIR" and "REF" follow the antenna physical position for the elements as described in the manual not the actual function for the given segment.

Adjust the reflector and Director so they are at least 1m (40 inches) shorter than the driven.

The SWR should be less than 4:1 in this configuration. Adjust the Driven element length to make sure it effects the SWR then set it back to the original length.

While watching the SWR increase the Director length, as the length gets close to the same length as the driven the SWR should start to go down then as the length gets longer than the driven it should go up again. Set the Director back to 1m (40 inches) shorter again.

Repeat the test for the Reflector.

When done exit the Setup mode without saving, the Antenna will return to it's original lengths when the HAM mode is selected.

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