The Latest

Microwave Activity

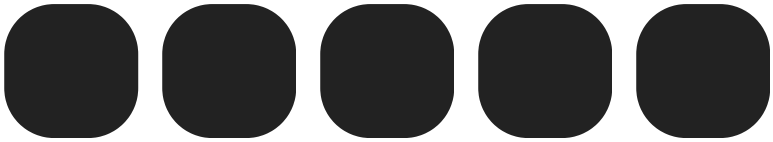
Up

Posted by AG6QV Frank
Tags: 10 GHz | PNW Microwave

The PNW-Microwave group took to the mountains this past Sunday to operate 10 and 24 GHz between USA (WA) and Canada (BC). I created a description of the event over on the groups web page.

Below is a list of the contacts I made.

Link to this Post



Interference from AM Station

Up

Posted by AG6QV Frank
Tags: HAM | HF

I have an AM station less than 5 miles from my location. During the daytime the transmitter is operation at 50 kW, which makes it almost impossible for me to heat anything on the HF bands, especially when using the long end-fed dipole. I have no problem receiving on the 23 foot vertical, bit the radiation pattern on that antenna is far from optimal. I have worked a few stations transmitting on the end-fed and listening on the vertical, but that is a bit tricky, especially on digital modes where there is little time between the RC and TX cycles.

So in order to get rid of the unwanted AM signal below 1.8 MHz I decided to build a high pass filter and insert it into the feed line close to the station. That way it will work on both of my HF/6m antennas, or any of the additional antennas I'll connect to the 6-way remote switch I have installed close to the feed point to avoid running to many coax cables.

In the past I have used the LC Filter design tools provides by Marki Microwave. After a bit of experimentation I ended up with an 11th order Chebyshev configuration with 6 capacitors and 5 inductors. The inductors was created by 13 and 15 turns on a T106-2 toroid and the capacitors are SMD 1206 100V MLCC. This should have no issue handling the 100W power I will be putting through the filter when transmitting.

1.8 MHz High pass filter

I created a PCB layout in KiCAD. It had been a couple of months since I used KiCAD so I started by updating to the latest version (9.0). If I ever get good at using this tool I hope to use it to design microwave boards in the future.

1.8 MHz High pass filter (KiCAD)

The PCB Layout is relatively simple and is almost identical to the schematic.

1.8 MHz High pass filter (PCB Layout)

The fabricated PCB arrived today from JCL PCB.

1.8 MHz High pass filter (PCB Layout)

And after a few minutes of soldering the board was assembled at placed in-line of the coax cable.

1.8 MHz High pass filter (PCB Layout)

It was now ready for the big test. To start with I recorded 10 seconds of audio without the filter in place. This was recorded on 30m (10 MHz) with the radio tued to the FT8 Frequency.

Then I installed the filter and recorded another 10 seconds of audio:

For some both of these files might sound like noise but for me there is a clear difference and the S9 noise is now gone and with this filter in place I'm now able to receive stations even with the AM station operating at 50 kW

just 5 miles from my QTH. Next project will be to find an enclosure or simply 3D print a small box for it.

Link to this Post

Grid Square Finder

Up

Posted by AG6QV Frank
Tags:

When operating microwave radios in the field it is common to exchange Maidenhead grid squares that allow us to calculate the distance between the two stations. The Maidenhead grid square is a system of letters and numbers corresponding to a specific location. The larges squares are identified with two letters from A-R. The squares are 20x10 degrees. Adding two numbers makes the grid size 2x1 degrees. It is common to use 4 characters for most contacts on FT8, but for microwave contacts both stations might be in the same 4 character grid so we add more characters to be more precise with the location.

Grid squares can be calculated from the coordinates provided by a GPS receiver, but doing the calculations in the field is not practical, and you might not know the exact location you will be operating from ahead of time so I created a small device using an Arduino Nano, a GPS module, a LCD display and a 3D printed box to bring with the radio. The system will show the 10 character grid square, number of satellites and alternating date and time (UTC).

I found a small GPS module on Amazon based on the GT-U7 chip. It came in a two pack.

I mounted the Arduino Nano on an expansion board that will allow for both 12V and USB power options. These came in a package of 4 or 6.

The enclosure was created with TinkerCadÆ

The Arduino code is a combination of functionality found on GitHub and will work with Arduino Nano, Uno, Pro Mini and many other versions. When testing the system it can take a while for the GPS unit to lock on to satellites, especially indoors. I have had the unit sitting in the window sill for a couple of days and it constantly see 5-9 satellites. It will be interesting to see how fast it can lock in the field.

A view inside the assembled unit:

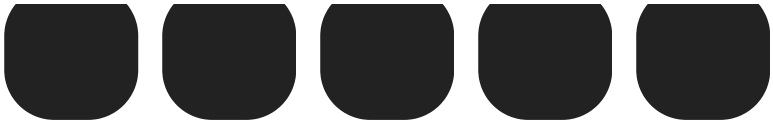
The GPS antenna is attached to the side of the box qith double sided tape.

And from the outside with power and GPS signal locked.

I added a button on the side to switch through 4, 6, 8 and 10 characters in the grid square. The code defaults to 8. The small size of the squares when 10 digits are shown makes it difficult to get a stable reading. Moving the box around will cause the last two characters to jump plus/minus on grid square in both directions, but with 10 characters each grid is about 20x20 meters.

The Arduino sketch can be downloaded here and the stl file for the box here.

Link to this Post



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April 2025

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