# The Latest

# Antenna Switch

Up

Posted by AG6QV Frank
Tags:

For 2m and 70 cm bands I have horizontally polarized antennas for each band and a dual band vertical for operating on repeaters. There is also an external amplifier for each band. In order to utilize the vertical antenna I created a box that houses 3 coax relays. There is a relay for each band to switch between horizontal and vertical polarization and one relay that switches between the bands. Since this switching is done directly on the output of the radio, before the amplifiers and since the radio only transmits on one band at the time, the power handling for the relays can be limited to the power output of the radio (100W on 2m and 50W on 70cm). Standard coax relays can easily handle that amount of power.

With a 3D printed enclosure the box fits nicely on a shelf behind the radio. The image below shows the box and lid as they came out of the 3D printer.

The next image shows the components mounted inside the box. There are two RCA connectors used to control the switching of the relays (one for each band) and two LEDs to visually show which of the two bands are connected to the vertical antenna. When no LEDs are on both antennas will be connected to the horizontal beams.

The final image shows the box with the lid closed and ready to be connected to the radio, amplifiers and vertical antenna.

Controlling the relays is done through an Raspberry Pi application that also controls up to 6 HF/50MHz antennas. The logic ensures that only one HF antenna is selected at any given time and only 2m or 70cm can be connected to the vertical antenna at any given time.

**Link to this Post**

# Tunig of 10 GHz bandpass filter

Up

Posted by AG6QV Frank
Tags:

I've been building multiple pipe cap filters for 10 GHz and found that precision is key to make something that is easy to tune. I'm using M3 screws and nuts but even with one nut soldered to the top of the 1/2" pipe cap the thread is not stable enough to keep the screw from moving from side to side. W7GLF, Ray found a waveguide filter on eBay and I jumped on the listing and paid the $85 plus tax. Today I received the filter to be used in my new 10 GHz rig.

The filter was listed as "Harris Farinon WG Filter 10 GHZ XMT 801-112556" but there was no frequency labeled on the filter and since there are 5 cavities I did not want to start moving them around without a system in place to avoid getting it completely out of tune.

10 GHz bandpass filter

When I inserted the filter in the 10GHz radio there was no viewable output on the spectrum analyzer and my HP spectrum analyzer, that covers 10 GHz, does not have a tracking generator. My Regol analyzer has a tracking generator but that only covers up to 1.5 GHz. I do not have a good signal generator that covers the microwave bands so that was not an option either. The solution is to use the 10 GHz transverter. It uses a LO Frequency of 10.224 GHz and would normally ise an IF of 144 MHz. Instead of using an IF radio I used the tracking generator from the Regol spectrum analyzer. I started out with a bandwidth of 500 MHz and used to HP spectrum analyzer to determine the center frequency of the filter to be around 10.580 GHz. I then narrowed the bandwidth to about 20 MHz and moved the center frequency down 5MHz. I could then tune the filter to max signal through, then I

could move the center frequency another 5-10 MHz down as long as I able to see the signal I could tune the five cavities to maximum signal. By repeating these steps until the center frequency was close to the 10.368 GHz. Then I removed the tracking generator and replaced the IF signal with the 144 MHz radio and performed another tunig to maximum signal.

The image below shows the output of the mixer where the LO signal and the desired signal is shown.

Signal before filter

And the signal at the output of the filter looks like this:

Signal after filter

Note how the amplitude of the desired signal is the same level before and after the filter. This is an indication of a very small insertion loss. I'm quite happy about the performance. Tuning the filter to the correct frequency was much easier than anticipated. Having a VNA or an SA with tracking generator that covers the desired frequencies would make it even easier, especially to get the pass band to be in the right position. Since we normally only use about 2 MHz of bandwidth it is easy to check the filter response by moving the frequency of the IF radio to the band edges.

**Link to this Post**

# Microwave Contest May 2023

Up

Posted by AG6QV Frank
Tags:

The PNW Microwave group was out in the field, operating microwave equipment from 902MHz to 122GHz. This is a summary of the events. There are two contests today. The Microwave Spring from 8am to 2PM pacific time and the SBMS 2GHz & Up contest on both Saturday and Sunday. The day started with W7FY, John showing up at my QTH just after 8am. I was not quite ready and started out by making coffee and bringing out equipment. John traveled to a location 1.6 km south of my location to attempt 10 GHz and 122 GHz contacts. The 10 GHz contact was made quite easily with the short distance. The 122 GHz contact was not possible because of leaves on the trees in the path. A week ago the leaves was not as far along and it was possible to find a path trough the trees. John returned to my back yard and W7GLF, Ray showed up as well. WA4OSH, Konrad

was on his way to Vashon to attempt a repeat of the test we did last weekend. It was an easy contact so John and Ray wanted to test their rigs with horn antennas and was able to connect with Konrad without any problems. We also mad contact between the 3 of us in the back yard on both 10GHz and 122GHz. These contacts does not give any distance points but in the SBMS contest we each get 100 points for the fist contact with each station on each band :-)

WA4OSH mad his way back to the ferry terminal where we tried another contact on 10 GHz. As shown on the image below we did not have a clear line of sight:

Vashon Burien 10 GHz

I noticed the ferry was leaving the terminal so I asked Konrad to point his antenna in that direction and we were able to work each other with 59 signals in both directions. Ferry scatter is a thing. They do not move as fast as airplanes :-)

Konrad moved on to the Olympic peninsula where we made a final contact from Manchester to Burien ~16km distance. We are slowly increasing the distances while getting used to the new equipment and how to operate on the microwave bands. W7GLF, Ray had moved to the south beach to operate to lower frequency bands with bounces off of Mt. Rainer. I was listening from my shack on an indoor antenna and was able to hear Ray on the back of his beam. It was only 1.6 km away and I'm only running 10W on 1296 MHz but we gave it a try and was able to complete a QSO on SSB, using the home made ZigZag antenna shown below.

1296 MHz Zig Zag antenna

Finally I moved to the south beach where Ray was setting up his 10 GHz station. My station is very portable and after a few minutes I was ready to try a contact with KD7UO, Dale. He started out by sending CW beacon towards Mt. Rainer and I was able to find his signal and point my antenna towards maximum signal strength. We then switched to SSB and was able to hear each other with 55 signals in both directions. The mountain was not visible today, but 10GHz radio wave did not have any issues coming through.

10GHz contact via Mt. Rainer

**Link to this Post**

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