

3D Printed Feed Support for TVRO 18" Dish

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During the early days of the pandemic Paul Wade W1GHZ found a machine shop that wasn't very busy and proposed a bulk buy of his dual band feed horn (10GHz and 24 GHz - http://w1ghz.org/antbook/conf/dualband_feedhorn.pdf).

I had been using a homemade WR90 feedhorn and this looked like a much better unit and also gives me some room to grow on 24 GHz.

Photo 1 shows the horn as received. I had a couple of Dish Network offset feed dishes in the junk pile and decide to use one of these. Photo 3 shows the original Dish Network feed. To my eye it looked to be similar in size to the new horn. I assume the antenna designers knew a lot more than me about where to place the horn. So my plan was to position the dual band horn at the same spot. I measured the angle and distance to the surface of the dish. Photo 2 shows a red dot at the point the original feed was aiming.

I wanted my feed mount to be adjustable. The feed support is rectangular in cross section and is shown in Photo 4. I designed a sliding insert to go into the rectangular feed support. This is shown in photos 5 and 6. The insert has a slot in it that allows a ¼ inch bolt to pass thru the feed support and clamp into position when tightened. This allows me to move the feed position in and out. I then designed the horn mount. This can be seen in photos 7 and 8. Again I put some slots in this piece to allow movement up and down. The mount and the insert are connected together with a bent piece of aluminum.

These pieces were built using a 3D printer. The process starts with generating a 3D model. I use and Autodesk product called Fusion360. A student/hobbyist version of this is available for free download. If one is at all familiar with CAD work the learning curve is not too bad. Another program I know a lot of people use is OpenScad. I have not used it but it looks similar. Once the model is created another piece of software is used to convert to the code needed by the printer. I use a program called Simplify 3D which is not free but very flexible. One popular free program is Cura which I have used and it works fine.

You probably notice that both the sliding insert and the feed support have several extra holes in them. In the 3D printing process you select how solid you want the part. This is call infill percentage. One can print completely solid but this takes longer and uses more material. I

typically use a value of 40%. The first time I printed the insert it seemed very flimsy and spongy to the touch. The added holes are essentially solid post that go thru the part and make it very sturdy. I had to do several iterations on the insert to get the dimensions exactly where I wanted.

Photo 9 shows the complete assembly and also the plate under the dish feed support which contains the Power Amp, LNA and T/R switch. A short piece of .141 semirigid coax connects to the feed horn.

I have not yet done final optimization on the feed position. However I think I am pretty close. The antenna pattern seems what is to be expected and sensitivity seems very good. Have of rig up some sort of signal strength system since the S meter on the IF Radio (IC706) is nowhere accurate enough.

I would be happy to help anyone who would like to try building something like this. I can supply the design models and print files to anyone who would like them. Contact me at eswitzer2@cox.net

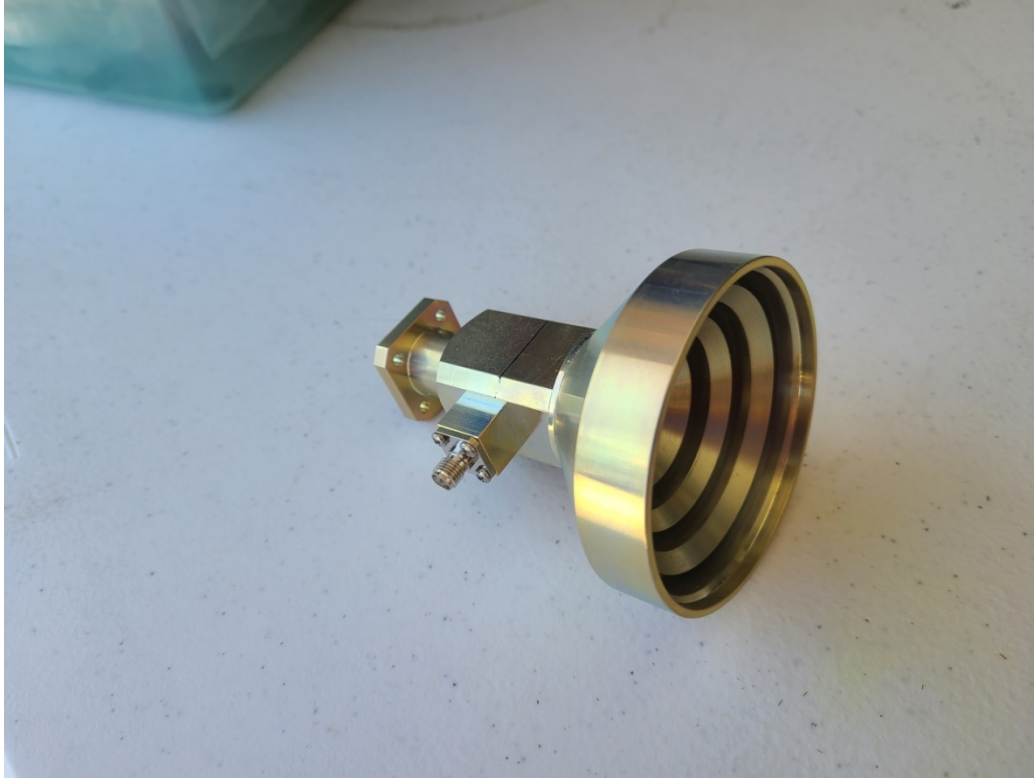


Photo 1 – Dual Band Feed Horn



Photo 2 – Red Dot - Aim Point on Dish Surface

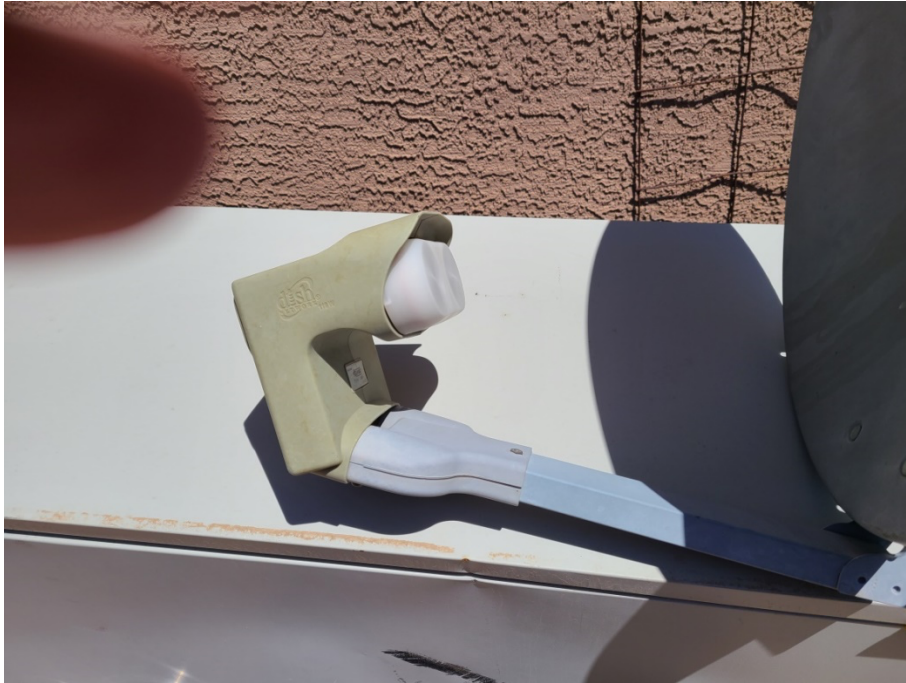


Photo 3 – Original Dish Network Feed

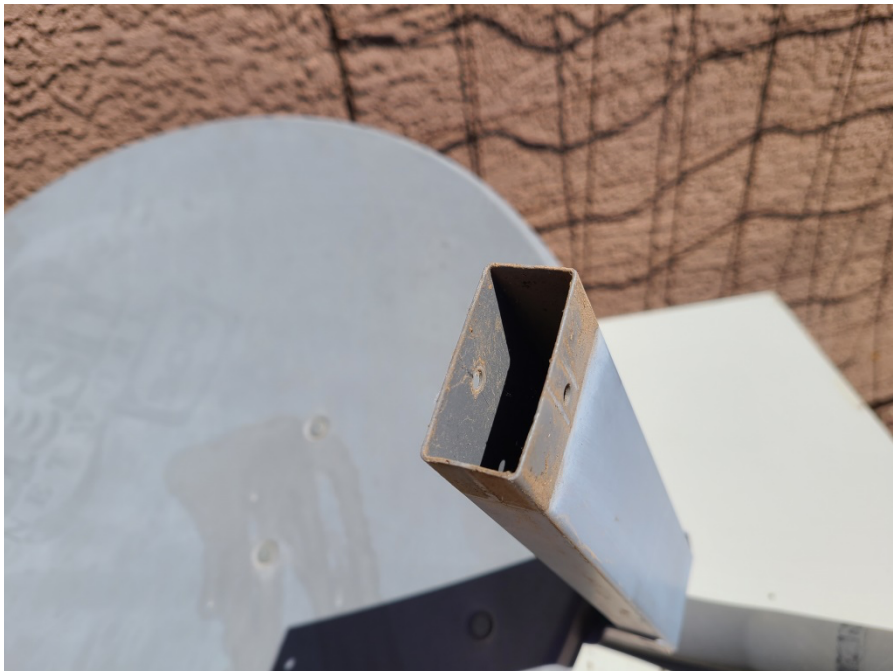


Photo 4 – Dish Network Rectangular Feed Support

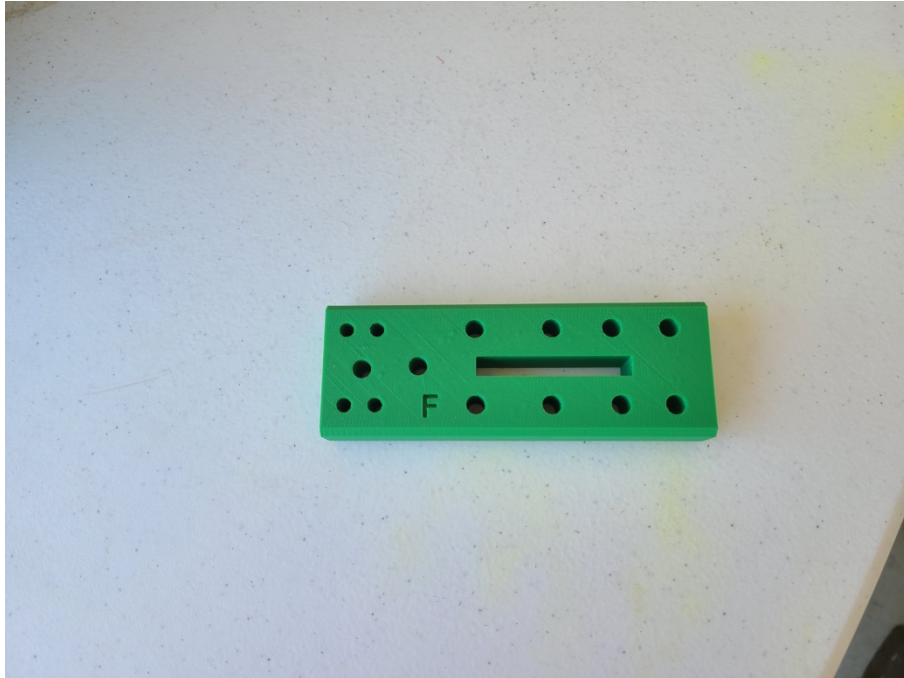


Photo 5 – Sliding Insert



Photo 6 – Insert Shown Sliding into In Feed Support



Photo 7 – Sliding Insert, Angle Bracket and Horn Mount



Photo 8 – Adjustment on Horn Mount



Photo 9 – Complete Mount