# N2UO version of W2IMU horn using a septum polariser scaled to 5760 MHz.

Marc, N2UO, described at the 13th EME conference a dish feed- horn based on the dual mode design which originated with W2IMU. His paper is at

http://www.ok1dfc.com/EME/technic/septum/N2UO%20opt.pdf

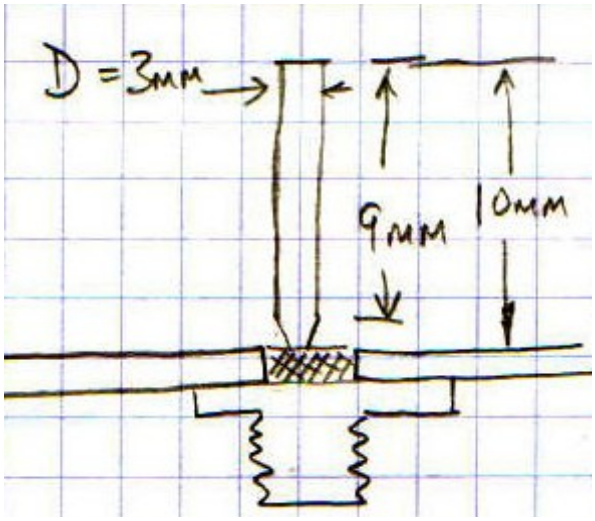
I took this design and scaled all the dimensions of Figure 4 by 1296/5760 = 0.225. Note that I did not exactly scale the septum thickness but the results do not seem to have been affected by this ( see later). The septum section internal diameter scaled to 41.3mm which is almost exactly 1.625". This is a copper tube size that can be found in the UK in model-making suppliers although it is quite expensive in small quantities. The wall thickness is 1.6mm. (1/16")

The horn section, flare and septum I made from 0.35mm thickness copper sheet. The horn section is made by cutting a strip of copper sheet with a small joggle or double bend with about a 5mm overlap. It is then formed into a tube by careful flexing on a round mandrel. A similar technique is used for the flare. I used very small screws, about 1.5mm diameter, to hold the overlaps together while soldering them. I made the "fingering" on the narrow end of the flare very small, about 3mm, and fitted them inside the guide, ensuring that they were tight against the wall. At the large diameter end of the flare I fitted the "fingering" on the outside. The detail of how to cut the "fingering" can be seen in Figure 17 of the original article by N2UO.

The three pieces, horn, flare and guide were then soldered together.I used a mandrel scheme using wood and metal and a length of threaded rod,very similar to Marc's arrangement, to keep the guide and the horn sections aligned while soldering. Finally the septum was soldered in.

I marked out the septum using a vernier caliper and on the long side of the septum I added 5mm so that the material outside the tube wall would be 5 -1.6 = 3.4mm. I carefully cut along this at each end for a distance of 3mm and then bent this tab at right angles, in opposite directions at each end, to hold the septum at the correct position and depth before soldering. For strength I added 3mm to the short side of the septum

The probe position was scaled by the same 0.225 factor and sited at 13.9mm from the back wall. The probe dimensions that I used with an SMA fitting are shown below.




This arrangement gave a return loss of 21dB which I improved to 27dB by turning down the lower 3mm to a diameter of 2.4mm.

The isolation measured 36dB and the circularity <0.5dB axial ratio on axis and about 0.5dB at 70 degrees off axis.

I fitted the horn to my HB 6m dish, which is 0.375 f/d ratio, but I only wanted to illuminate the centre 4.4m as that is the part covered by 6mm mesh, effectively 0.51 f/d. The rest of the dish has 12mm mesh which has only about 5dB attenuation at 6cm. As a result I gained 1.5dB in system sensitivity over my previous feed which was an RA3AQ septum feed with a wider pattern. My tx performance was also improved slightly.

The two lugs fixed to the side of the horn are for the connection of stabilisers to the dish feed supports to ensure that the feed points exactly to the dish centre. The back plate is made slightly larger than the guide diameter so that the back support tube, used to adjust position, can be fixed to it without needing screws inside the guide.

The completed horn is shown in the picture below.

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**The Completed 6cm Dual Mode Horn**