

24 GHz LP horn feed for a primary focus dish with f/D abt. 0.4 by OK1KIR

The horn feed is made from a piece of copper WG R220 (WR42).

The fabrication requires special supplemental tool. It is a solid steel pyramid with the proper slope shapes according to the feed design; the length of it should be on each side at least by half inch longer than the wanted internal dimensions of the feed – see pictures 1 & 2.

Each wall of that tool should have smooth plain and sharp edges and needs to be perpendicular each other.

The production process requires a small hammer and a suitable hammer anvil or a heavy thick steel plate with smooth surface.

The process itself consists of repeating the slight hammering the tool inside the copper WG and simultaneously carefully hammering each of the four WG sides to broaden symmetrically, the internal profile while pressing the tool inside of WG and WG walls towards the anvil to maintain all four internal surfaces of the feed as smooth as possible.

At least two or better three times during the manufacturing it is necessary to anneal the WG copper (heat the piece to some 500...600 deg of C and immediately cool down in cold water) to retain its softness. Take care to prevent unwanted shaping (damage) of the rest of WG.

When the shape looks finished just cut it carefully in steps to get to the wanted mouth dimensions.

Take special care to have the mouth plane perpendicular to the feed axis!

On the other side of the feed just solder up the WG flange to get the feed completed.

Be careful to maintain the internal feed surfaces clean and smooth to minimize the attenuation.

Any WG between the feed and the LNA WG input must be as short as possible.

Already a short piece of say 20cm of copper WG represents insertion loss close to 0.2dB. It will degrade by the same amount the inherent NF of LNA!

WG switch and WG input of LNA is a MUST!

Forget any SMA on the RX input in front of LNA!

Be careful when using single WG switch! WG switch attenuation can be as low as 20dB or even less when moving from RX to TX position and vice-versa! Be sure to prevent any parasitic oscillation of TWT or SSPA to reach LNA input when WG switch moves. Be aware of the fact that WG switch removes proper load from the TWT or SSPA output when it starts to move!

It is easy to remove in advance all voltages from SSPA, but TWT may require doubling the WG switch with proper sequential timing!



Fig.1 Semi-finished copper horn from Cu WG R220 (WR42) with horn steel gusset when hammered in



Fig.2 Semi-finished copper horn from Cu WG R220 (WR42) with horn steel gusset excluded outside

OK1KIR 24 GHz feed for the original TRX design:



