70cm Deep Dish Feed

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Deep dishes are gaining a bad reputation on 70cm for being difficult to feed efficiently. On higher bands the scalar feeders (à la VE4MA) provide a good feeding method, but at 70cm their size make them too obstructive and very inconvenient to mount at the focal point. Also the well known EIA dipoles will under-illuminate deep dishes rendering a 6m dish with 0.3f/d nearly useless.
In this short article I present a 1wl loop feeder with reduced distance to the back-plane that gets a diagram wide enough for a 0.3f/d dish with a minimum antenna blockage.

1wavelegnth loop feeder.

The 1wavelength loop antenna is well known for its broad and quite similar E and H patterns. Its most common configuration has a 1wl closed loop at about 1/8 to 1/10wl distance from a reflecting plane which is usually bigger than 1wl in diameter. With this typical design a 0.4f/d dish could be well illuminated but a 0.3f/d dish would require a broader feeder.

The distance form the loop to the back-plane is one of the key parameters to optimize the beam width, a smaller distance will widen the pattern while a greater distance will narrow the pattern (within the 1/8 to 1/20wl range).
However an impedance close to 50Ohm is only found at about 1/10wl from the back plane.
Another interesting parameter that modify also the pattern is the size of the reflector if we make it considerably small. Diameters of 1wl or less will begin to produce wider patterns.

With the intention of making a deep dish feeder as simpler and as less obstructive as possible the two effects were combined together in order to widen the pattern enough for a 0.3 f/d dish without lowering too much the impedance at feed point. A good compromise was found requiring only a small impedance matching (see diagram and picture for clarification).

The impedance matching consist of an inductor from the feed connector to the loop, and a small adjustable wire at the opposite position. The inductor is a 1.5 turns of 3mm thick wire with 20mm diameter and 20mm length. The end capacitor is a 50mm length 3mm thick wire in which the last 15mm are bent for optimizing the impedance match.

The simultaneous Vertical and Horizontal polarization were obtained by making the same connections and adjust points 90 degrees apart which should be a voltage null point. However the switching between Vertical and Horizontal need to be done with

some care as in practice the connection at 90degrees will distort the pattern a bit and also changes the input impedance of the other polarity. This problem can be solved by using 1/2wl lines from the coaxial switch to the antenna feed point, this technique will place a virtual open circuit at the coaxial connection for the arm that is not selected by the relay (when making this cables, don't forget to count also the length inside antenna and relay connectors, length must be measured from the end of the antenna connector to the end of the contact inside the relay).

Thanks to Peter (EA6ADW) to bring my attention to this kind o feed, and to Jan(DL9KR) for reporting in dB's over a lot of test QSO's.

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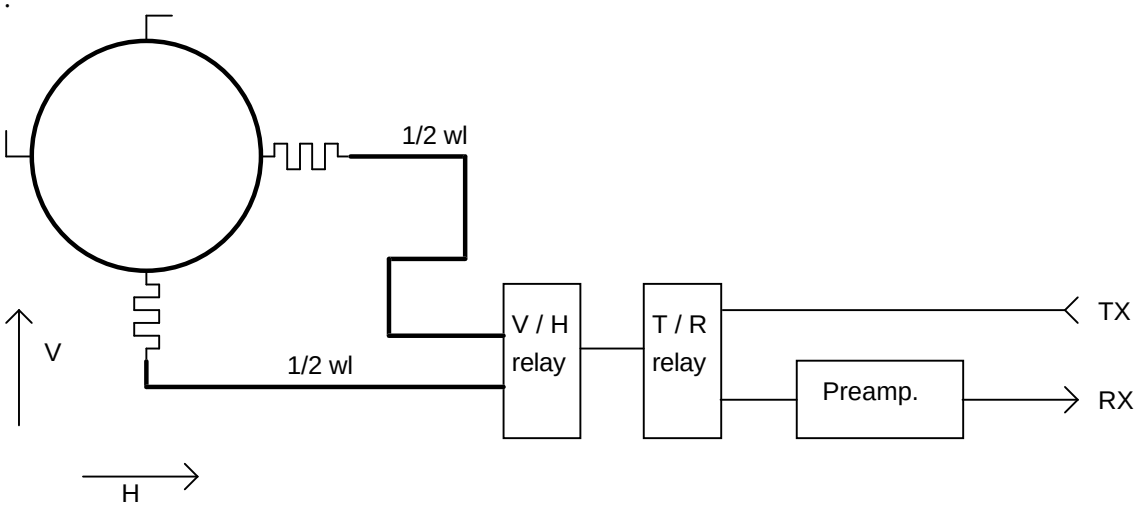

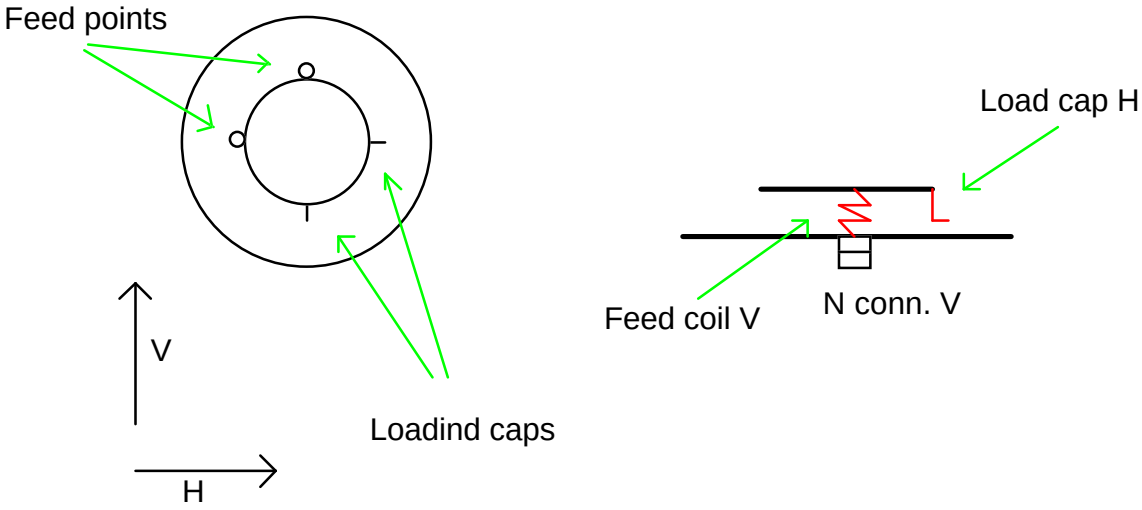

reflector 1wl diameter

loop 1wl perimeter

loop high 0.08wl above reflector