70cm Deep Dish Feed *(rev 02)*

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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 ring 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.

1 wavelength annular feeder.

The 1wavelength ring (patch) antenna is well known for being easy top feed and has broad E and H patterns. In its most common configuration it has a 1wl closed ring 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 0.5f/d dish would be well illuminated but a 0.3f/d dish would require a much broader feeder.

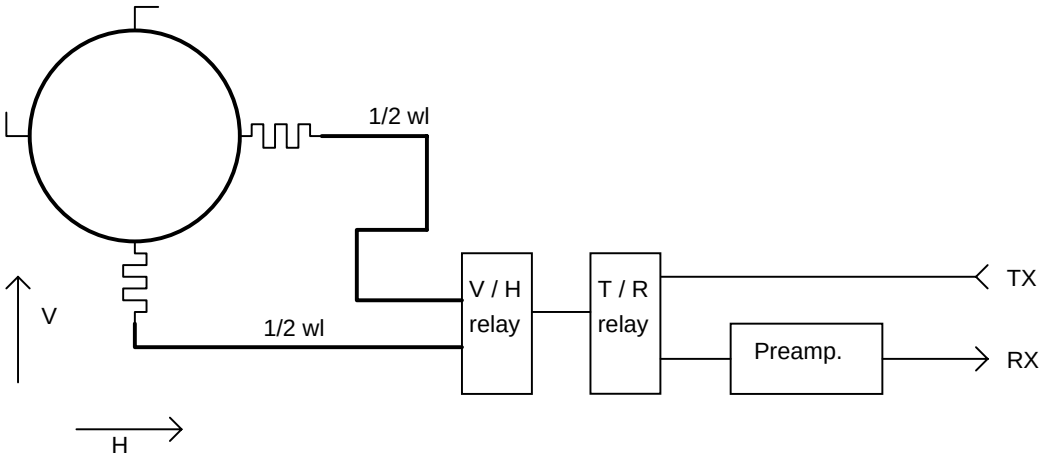
The distance form the ring to the back-plane is one of the key parameters to optimize the beam width, a smaller distance will widen the pattern while a greater distance will narrow the pattern. However an impedance close to 50Ohm is only found at about 1/8 to 1/10wl from the back plane.
Another interesting parameter that modify the radiation pattern is the size of the reflector. If we make it considerably small it will widens the patterns considerably. Diameters of 1wl or less will begin to produce wider patterns. For best performance while feeding low f/d dishes, a feed reflector of much less than 1wl in diameter were considered.

With the intention of making a deep dish feeder as simpler as possible and as less obstructive as possible both low ring height and small reflector were considered simultaneously resulting in a pattern wide enough for a 0.3 f/d dish this however being careful to avoid lowering much the impedance at feed point. A good compromise was found at 0.08 ring height with 0.6wl reflector while only requiring a small impedance matching (see diagram and picture for clarification).

The impedance matching consist of an inductor from the feed connector to the ring, 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.

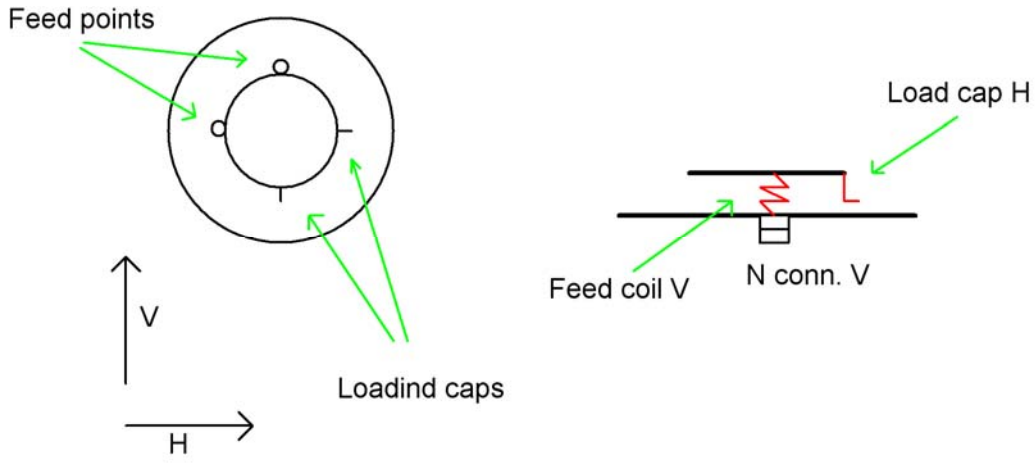
The simultaneous Vertical and Horizontal polarization were obtained by making the same connections and adjust points 90 degrees apart which should be a voltage null

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 should be measured from the end of the antenna connector to the end of the contact inside the relay).



Dimensions:

Ring diameter:	225 mm
Ring wire thickness:	4 mm
Ring height:	63mm
Reflector diameter:	430mm
Coil:	1.5 turn / 20mm length / 25mm diameter
Capacitive loading	45mm length (40mm vertical + 5mm bent).



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.