

**RF HAMDESIGN 902 / 1296-1298 / 1700 / 2320 / 3400 MHz
Dual Mode Dish Feed**

Model: CIR-902 CIR-1296 / CIR-1700 / CIR-2320 / CIR-3400 (Septum)

Model Custom made: CIR-...../..... MHz

Circular polarization:

For HAM Radio Users:

EME the standard is to transmit in RHCP and receive in LHCP. RH=right hand; LH=left hand and refers to which direction the RF wave rotates. The easiest way to visualize it is by thinking of how a nut rotates on a bolt on RH thread vs LF thread. The reason two senses of CP are required is that CP is reversed upon reflection from the surface of the Moon.



Picture: 1296 MHz Septum Dish Feed

To generate a circular polarized signal there are two basic methods:

- 1) using a hybrid to feed two probes inside a horn at right angles to each other with RF phased by 90-degrees, or
- 2) using this septum feed horn which has a stepped center plate running down the middle of a section of waveguide (either square or cylindrical shape).

This plate is called the septum and it separates two probes inside the horn.

One is used for Rx and the other for Tx and the nature of the septum is that it produces circular polarization of both senses but opposite at each probe.

In this septum dish feed the two polarities are produced without need of external hybrids (which add loss) and fairly high isolation exists between Rx and tx (typically 24-dB).

This eliminates use of high power TR relays.

One needs typically 60-dB isolation (for power up to 1kW) so a fairly low-power relay can be used on the Rx port to add isolation (typically a mw sma relay). e.g. 1000w (+60 dBm) - 24-dB = +36 dBm (4w).

The relay must be able to handle 4w (easy) and have more than 36-dB isolation (also easy).

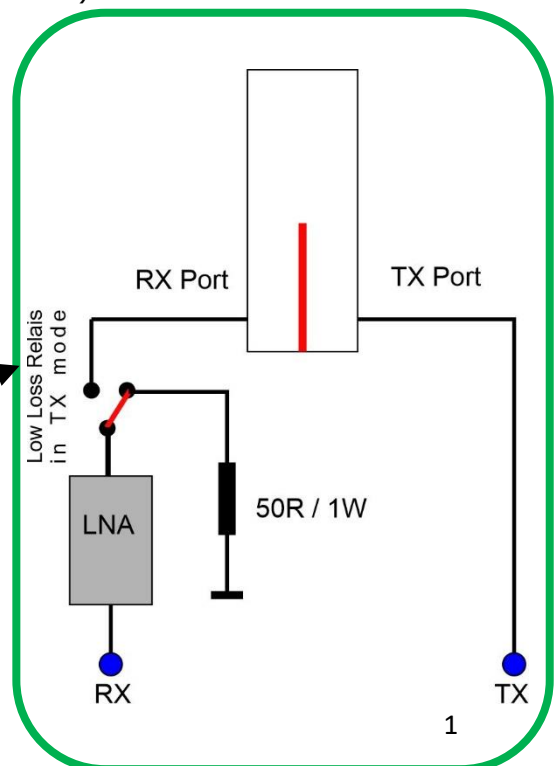
The relay needs very low insertion loss (not easy).

Refer to the drawing on this page.



2320 MHz Septum Dish Feed

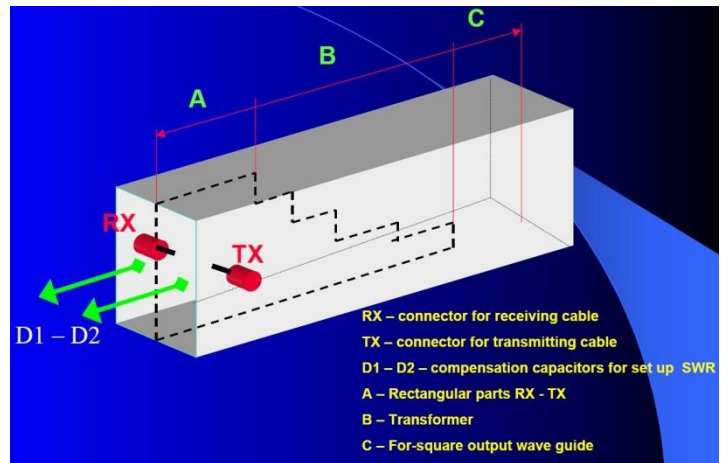
Picture right:
If this dish feed is used by separate RX and TX port, is advised to add a Low loss Coax relays which will prevent the LNA from damage during TX @ RX Port



How does a Dual Mode Circular Dish feed Work ?

The RX and TX ports are tuned to ordered frequency. it is recommended to fine tune the dish feed after you placed the feed in front of the dish, but if you prefer it can be done by use of a scalar network analyzer to setup the ports for minimum VSWR.

At the picture right you can see how the Dish feed is build and uses the inside parts of the wave guide.



Add a scalar ring ?

A scalar ring is really a choke ring and used to control RF fields at the mouth of the horn. It can be used on this septum feed. Typically, it is needed for dishes $f/d = 0.40 - 0.45$ ($f/d =$ focal distance/diameter and is a measure of how deep a dish is)

This means, when you ordered a RF HAMDESIGN Dish, you do NOT have to add a scalar ring.

Ready to use:

This Circular Dual Mode Dish feed is ready to use, it is tuned to the ordered frequency @ max return loss in free space (typical: >35dB 1296-1298MHz / >27dB 1700MHz / >30dB 2320MHz / 27dB 3400MHz). (Refer attached measurement report). The marked ports are based on the dish feed being placed in front of the dish.

Important note: Add a extra relay to the RX Port, when TX comes in, this relay must be switched to 50ohm ground.

General specifications Circular Septum Dish Feed

Description	CIR-902	CIR-1700	CIR-1296	CIR-2320	CIR-3400
Standard tuned to center frequency	902MHz	1700MHz	1296-1300MHz	2320MHz	3400MHz
Optional tuned to custom frequency possible	No	Yes	Yes	Yes	No
Return loss LHCP / RHCP port	>30dB	>20 dB	>30 dB	>20 dB	>20 dB
Isolation RX <> TX port	>22dB	>20 dB	>20 dB	>20 dB	>20 dB
Weight Circular dish feed	5.6 Kg	1,8 Kg	2.8 Kg	1.1 Kg	0,570 Kg
Dimensions Dish Feed (Length x Width x Height mm)	900x250x240	484x110x120	625x150x160	360x85x95	254x55x65
Weight Available dish feed bracket	2.1Kg	1.6 Kg	1.7 Kg	1.1 Kg	1.0Kg
Available dish feed bracket model	CLX-902	CLX-07	CLX-05	CLX-06	CLX-08
RF Power N-Connector / 7/16-DIN	1000W	750W	750W / 1500W	500W	500W
Connector RX / TX	N-Connector Female	N-Connector Female	N-Connector Female (option 7/16 DIN F)	N-Connector Female	N-Connector Female
Material used for Dish feed	Aluminum blank AW-5083 H111				
Tuned to users specifications in MHz	Yes				
Labeled ports	Yes				
Supplied incl Measurement plot	Yes				
Illumination angle for feed (-10dB)	~115 degrees				

Dish Feed Focus Point position: The phase center of the feed should be at the focal point of the dish. After that you can try tuning the feed for SWR if it's excessive. Very small changes in feed position may not have a huge effect on gain/efficiency because neither the phase center of the feed nor the position of best focus for the dish are mathematically small points and are a function of several factors including the wavelength. It is a good option to move the dish feed point a little bit (maybe wavelength/10 / steps) if that helps the SWR, but SWR isn't the parameter that tells you when you have best focus (max gain/efficiency).

So putting the phase center of the feed at the focal point of the dish is the first step. If you peak for example to sun noise or other signal source on Rx you should be very close to that position. Then tweak and see what effect the tweaks have on SWR/performance.

With the RF HAMDESIGN septum feed you can easily tune the Tx port for best SWR with the feed on the dish by use of the optional mounting bracket CLX-0X.



CIR-902 and CLX-902 bracket

Dish Feed Mounting Bracket CLX-0X:

RF HAMDESIGN can offer you a CNC Milled dish feed bracket for all RF HAMDESIGN Septum Dish feeds which can be used to mount the dish feed in front of the dish. When the dish feed is mounted in the bracket, you can slide easily the dish feed forwards / backwards to find the max gain / distance for your dish. (Picture below CLX-05 and CIR-1296)



Picture right:

3M0 RF HAMDESIGN Mesh DISH and CLX-05 Bracket placed on our Tri-Pod model STR-04

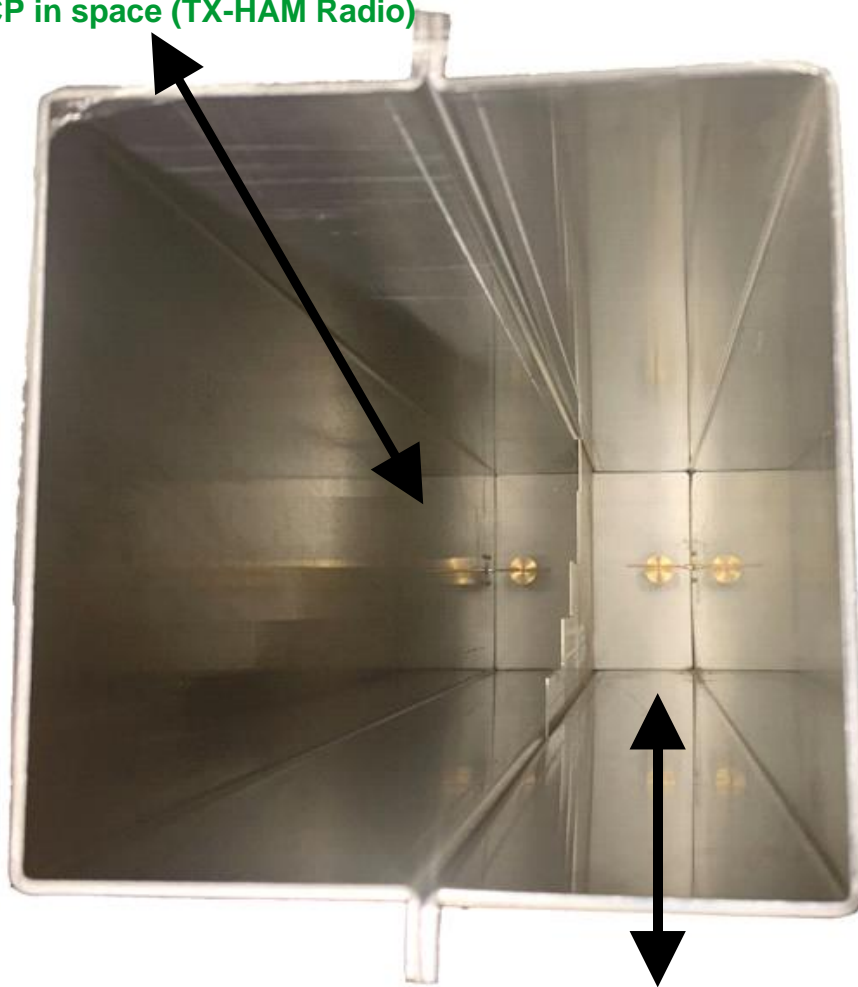


SEPTUM Dish Feed When placed IN FRONT OF A DISH

RHCP Port will be LHCP after mounted in front of dish / this means finally LHCP IN SPACE
LHCP port will be RHCP when mounted in front of dish / this means finally RHCP IN SPACE

LHCP PORT

Will be RHCP in space (TX-HAM Radio)



RHCP PORT

Will be LHCP in space (RX-HAM Radio)

HAM Radio users:

Circular polarization for EME user advice:

Rx LHCP in space / Tx: RHCP in space