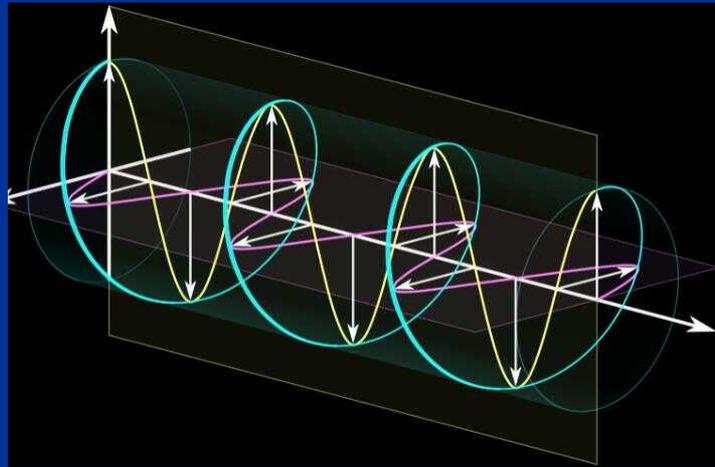




10 GHz Polarizer

The Alternative to circular Polarization



Agenda



- Introduction
- EME, Tropo, RS – why a Polarizer?
- Circular Polarization vs. Linear Polarization
- Objective
- Practical realization of the 10 GHz Polarizer
- Second attempt: advise by 88 yrs old microwave professional
- Polarizer unit for an offset dish
- StepMotor, control and display
- Conclusion: There is a better solution!
- Split RX-TX feedline!
- References
- Questions and remarks

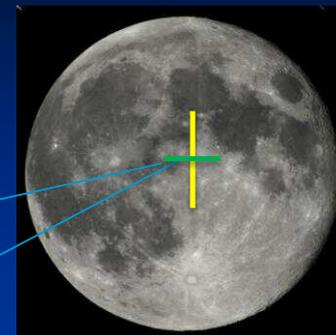
Introduction



- Depending of the geographical position on earth, the echo off the moon varies
- In the 23cm band circular pol has proven to be ideal
- @EME Conference 2002 in Prague we decided to go circular on 3cm
- Meanwhile, most EME stn on 3cm are using linear pol – WHY?
- Some twist the RX/TX front-end unit including the antenna
- My TX/RX unit is 20 Kg and therefore too bulky to sit in the focus of the offset dish



EME, Tropo, RS – Why a Polarizer?



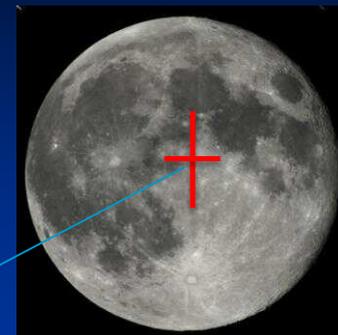
EME in NA: **HORIZONTAL** Polarization

Difference of geographical longitude equals the difference of the pol angle in degrees

EME in Europe: **VERTIKAL** Polarization



EME, Tropo, RS – Why a Polarizer?



*Tropo, RS in Europa **HORIZONTAL** Polarization*

If the same antenna is to be used for EME and Tropo the Polarization needs to be controlled

Polarization for Tropo activities



More than half of my tropo contacts are based on one or more reflections

Beacons HB9BBD
Rigi Scheidegg (1'674m)





Polarization for Tropo activities

The direct «view» of my antenna



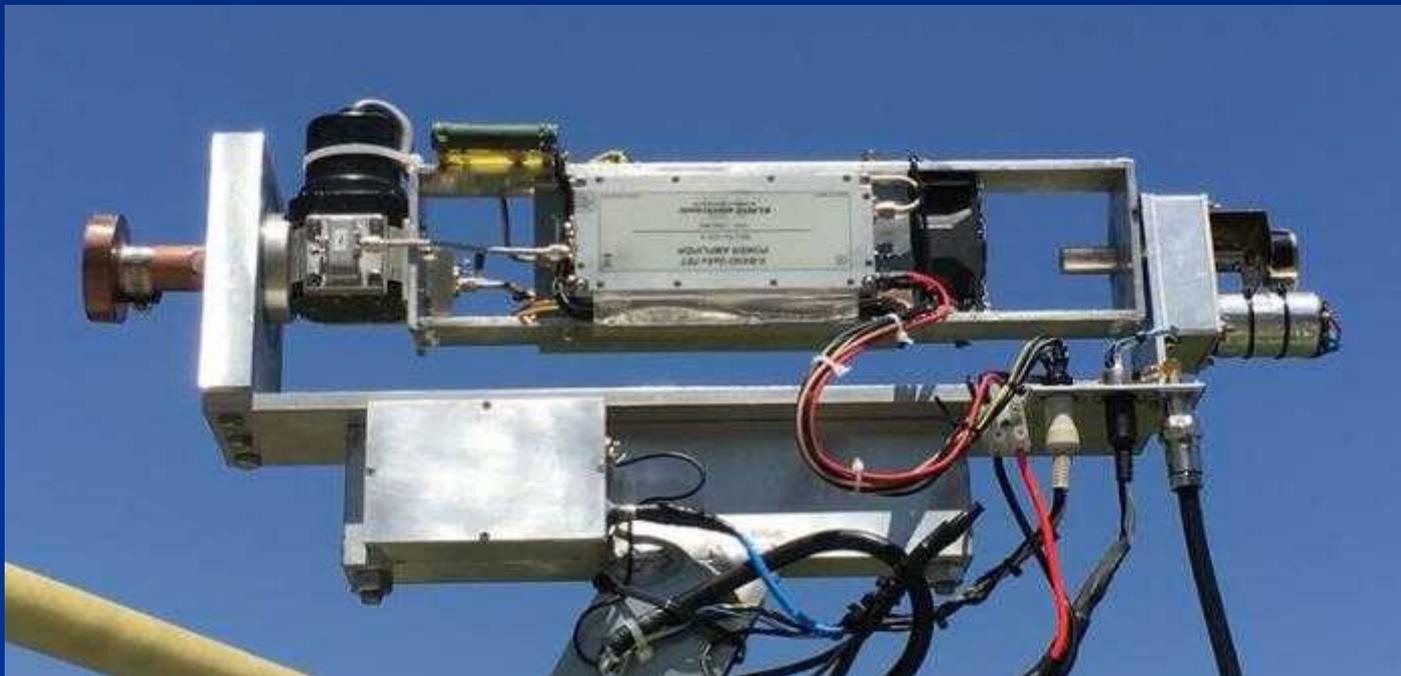


Polarization for Tropo contacts

- More than 50% of my tropo QSOs depend on reflections
- Up to 2020 I was circular, as agreed in Prague 2002
- Some signals perform more than one reflection and thus, may vary from the original Polarization
- These effects would basically favour circular Polarization



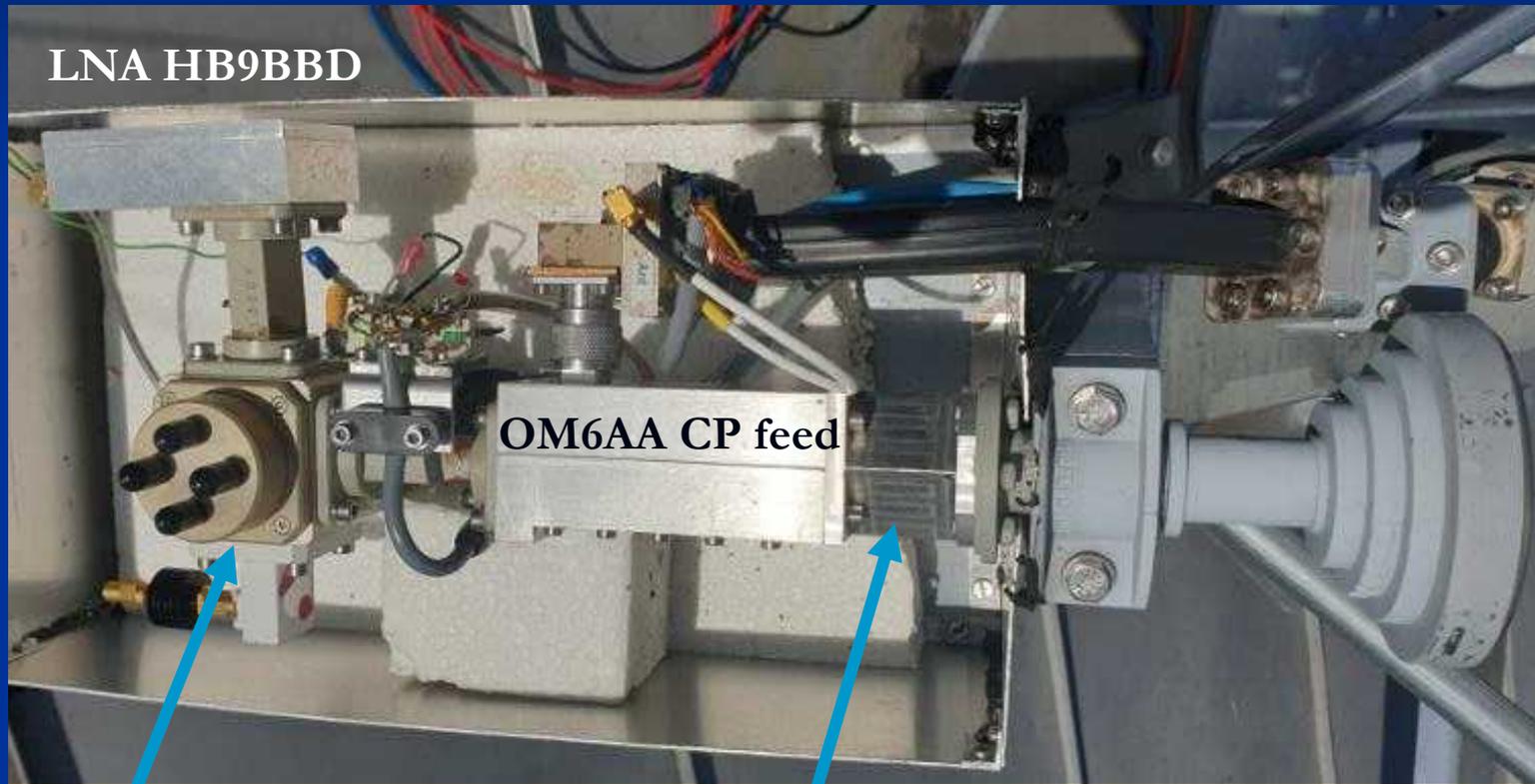
Example: PY2BS 10 GHz EME TX/RX



Linear Polarization, mechanically turned all TX/RX unit



Example: (looking back) HB9BBD Circular Polarization



LNA HB9BBD

OM6AA CP feed

Transformer Septum square-round

WR-75 Switch



Circular vs. Linear Polarization

@EME Conference 2016 in Venice Charlie Suckling, G3WDG shared his findings with us

Empirical tests by Charlie with OK1KIR, LX1DB and HB9Q lead to these conclusions:

1. CP – CP is worse than LP – LP (Circularity is not perfect, losses in septum)

2. CP – LP generates loss of approx. 2,xx dB

3. LP – LP is best, provided mechanically adapted to received pol

Source:

XVII International EME Conference – Venice 2016 Conference Proceedings 97 G3WDG - Experiences with Circular Polarisation on 10GHz Charlie Suckling (e-mail: charlie@sucklingfamily.free-online.co.uk)

Objective

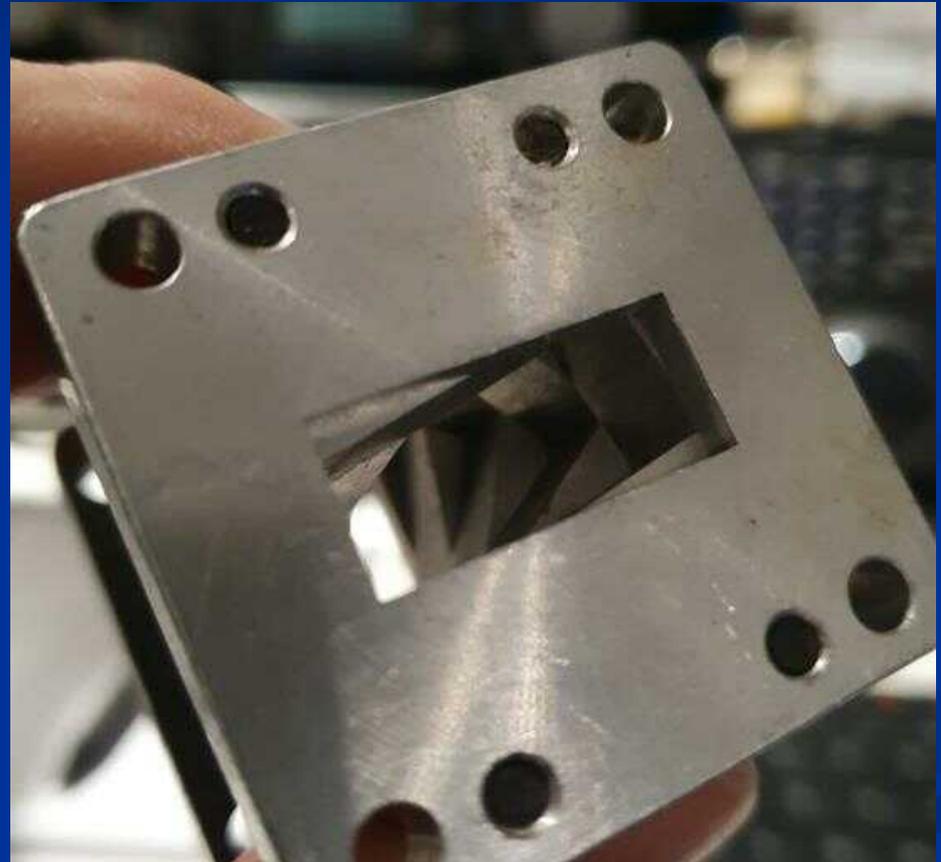


- Linear polarized feed
- Mechanically rotatable
- Display of Polarization @Operator's desk in degrees
- Losses by Polarizer unit below 0.2dB

Practical realization of the 10 GHz Polarizer



(Commercial product)
90 degrees (fixed)





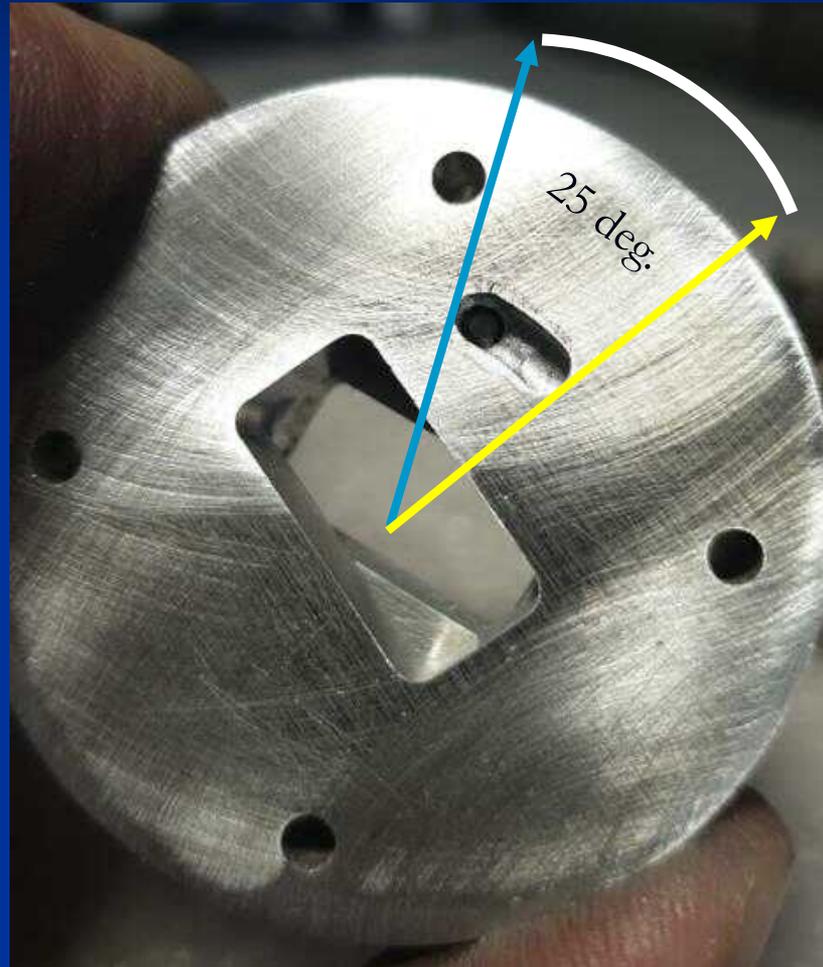
Practical realization of the 10 GHz Polarizer

WR-75 quarter wave segment,
8mm Aluminum
($\Lambda/4$ square WG and air
dielectric)

5 rotatable segments 25 deg. ea.

Variable from 0 – 90 degrees

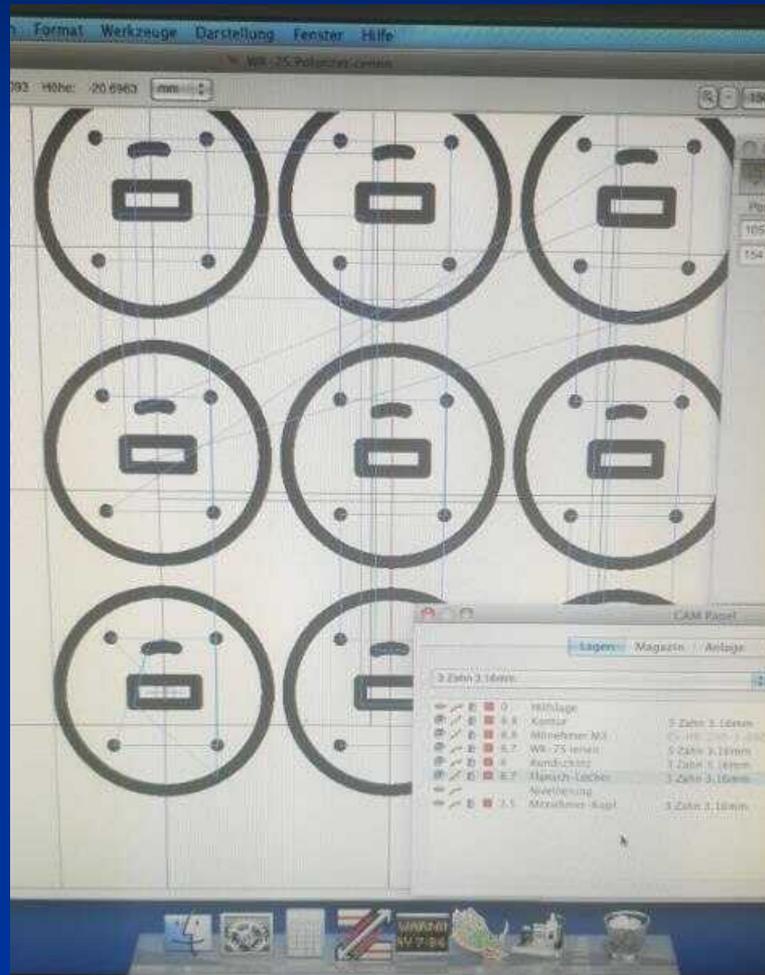
(Idea by commercial manufacturers
and in DUBUS by Jose, EA3HMJ)





Practical realization of the 10 GHz Polarizer

Production of
WG slices on a CNC
machine Cam100
(made by VHF,
Germany)



Practical realization of the 10 GHz Polarizer



Aluminum to
aluminum is not ideal
because of too much
adhesion



Aluminum slices turn easily in copper

