

Simple 10 GHz Transmitters and Receivers

With thanks to G3PHO and G8AGN

What's Different ?

144 MHz

10 GHz

Tx output

1 - 100 W

1 - 50 mW (wideband)

5 μ W - 10 W (narrowband)

Bandwidth

2.5 - 12.5 kHz

50 - 250 kHz (wideband)

Antenna Gain

0 - 20 dB

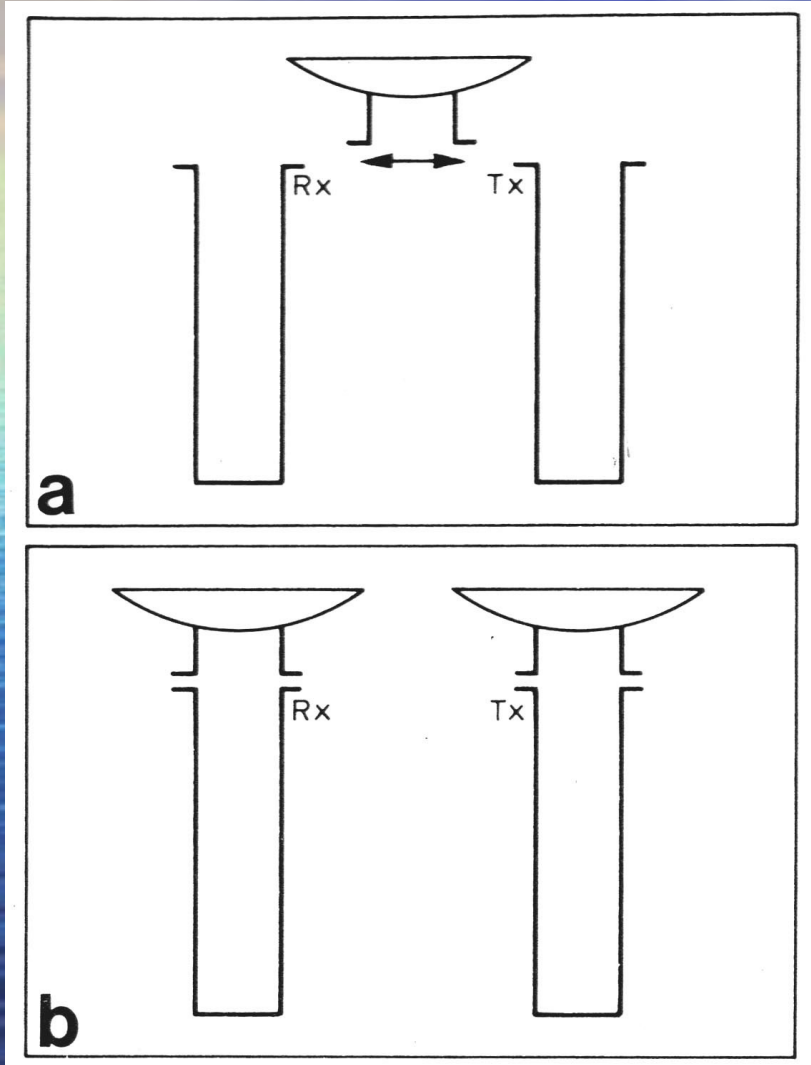
6 - 50 dB

Antenna Beamwidth

360 - 15 deg

180 - 1 deg

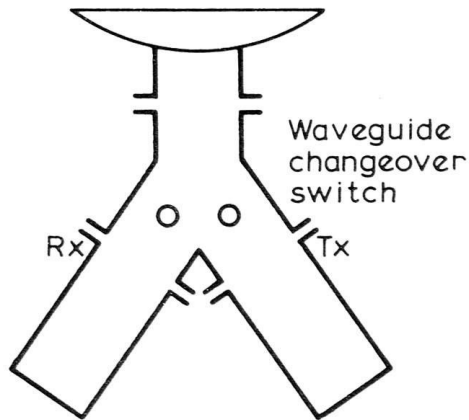
Transceiver arrangements - 1



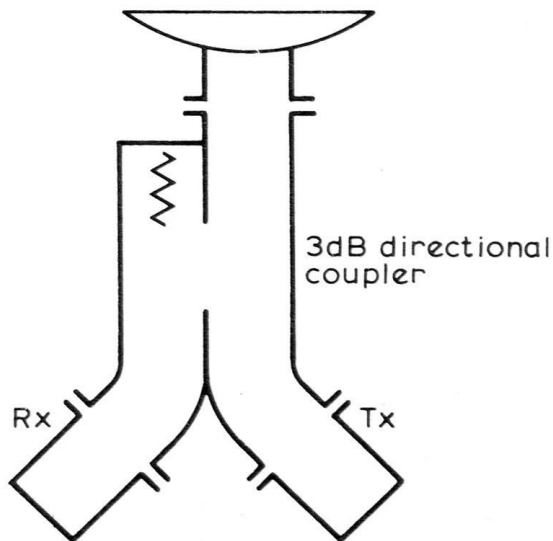
Swap antenna between
Tx and Rx

Separate antennas
for Tx and Rx

Transceiver arrangements - 2

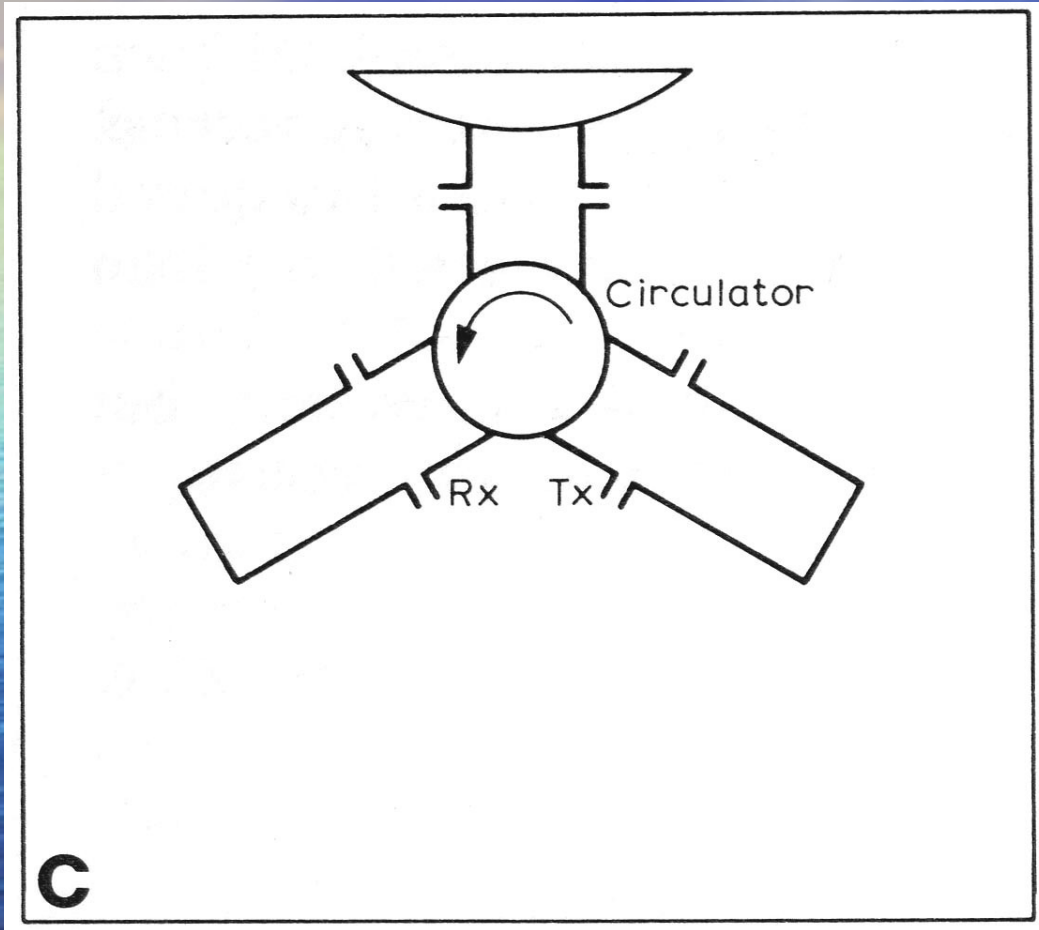


One antenna with
change-over switch



One antenna with
3 dB power splitter

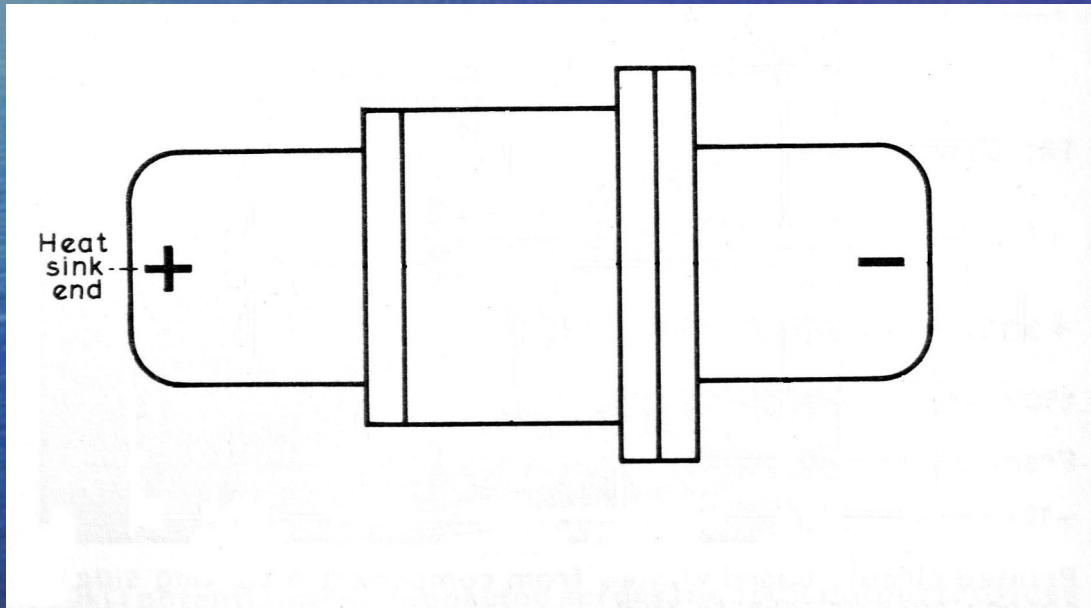
Transceiver arrangements - 3



One antenna with
circulator

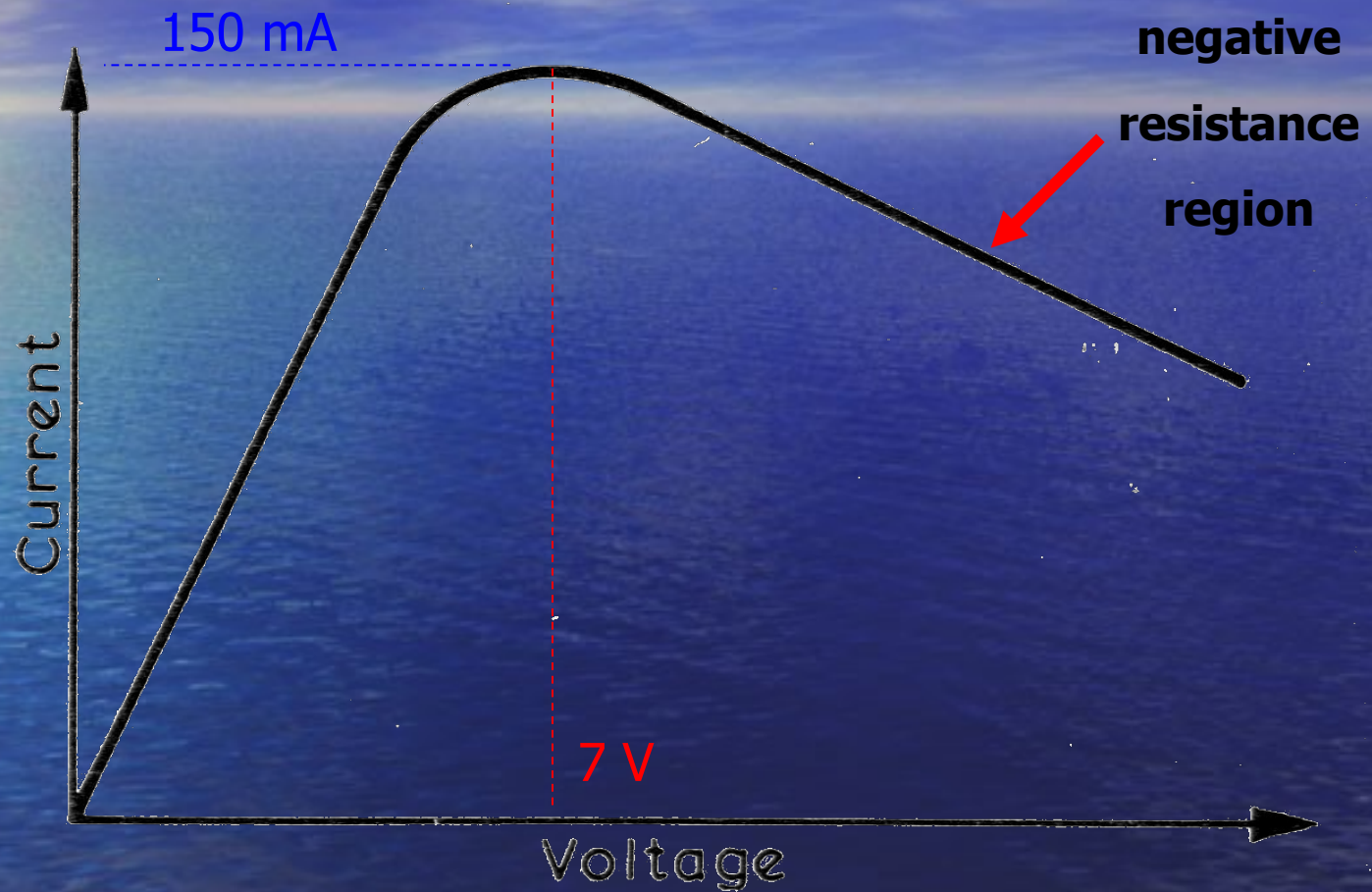
The Gunn Diode

An easy way to generate 10 GHz microwaves



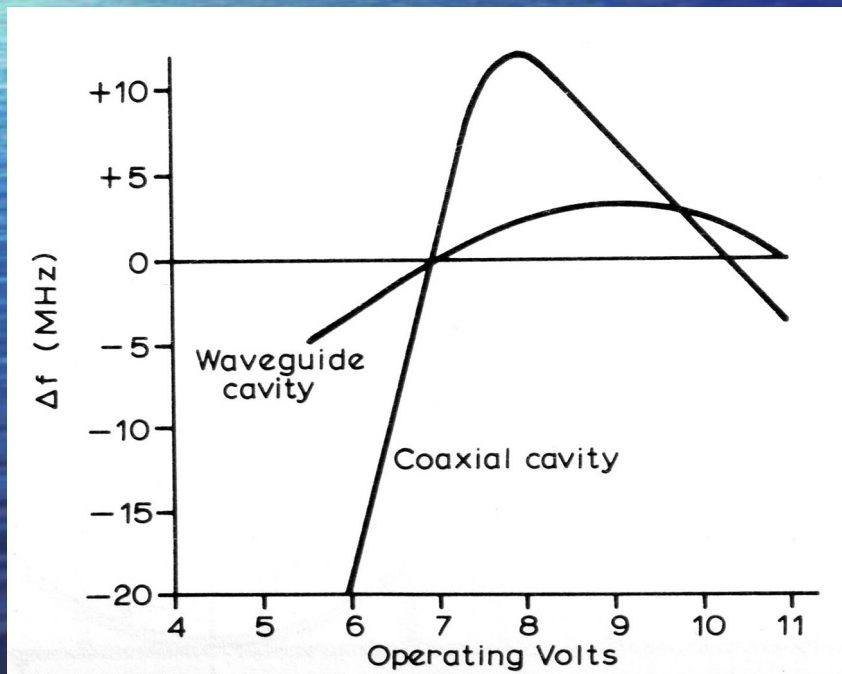
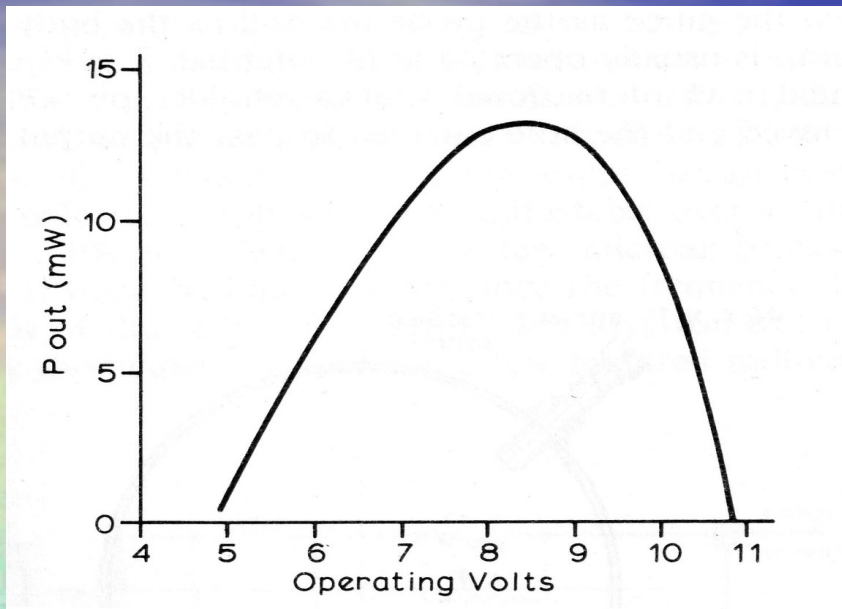
Note the polarity !

Gunn Diode Characteristics



Gunn Diode oscillator

Power Output vs Bias Voltage

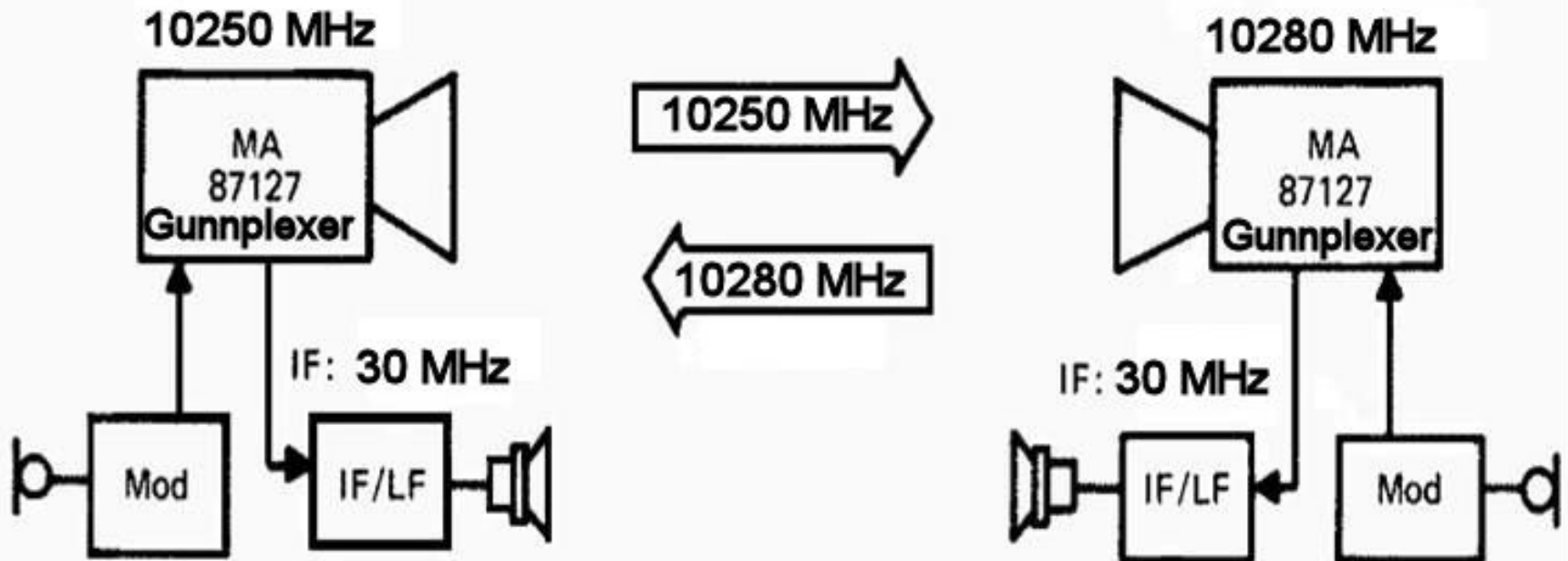


Frequency vs Bias Voltage

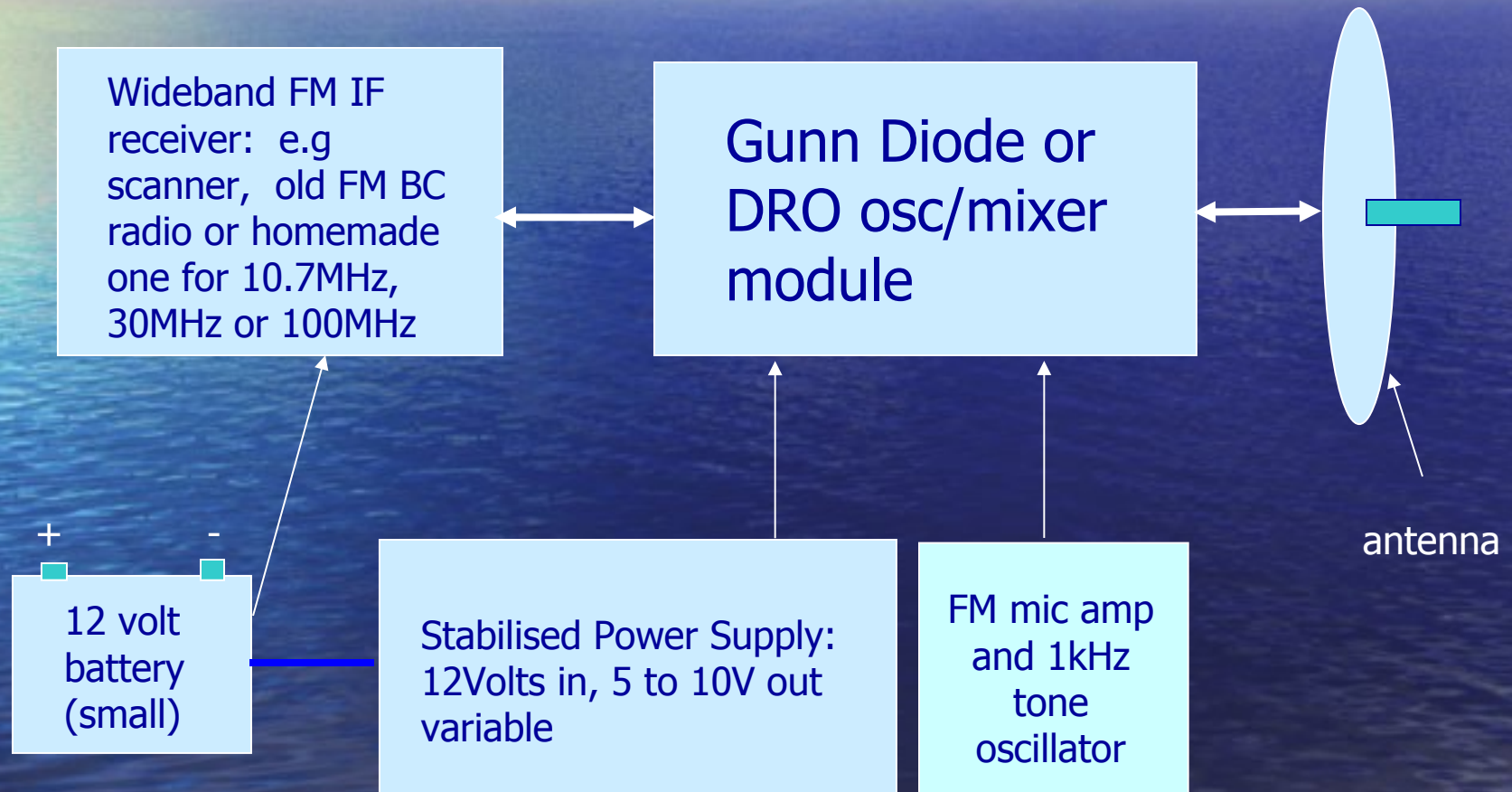
What is “simple” 10GHz wideband gear?

- It's easy to make but you need to know how to solder!
- It all runs off a small 12 volt battery
- It's low power output (5 to 10 milliwatts)
- You won't work very far (up to 200 km) so you need to work in pairs with a pal.
- It's an excellent, fun and cheap way to “wet your feet” in microwaves
- Here 's a simple system in detail

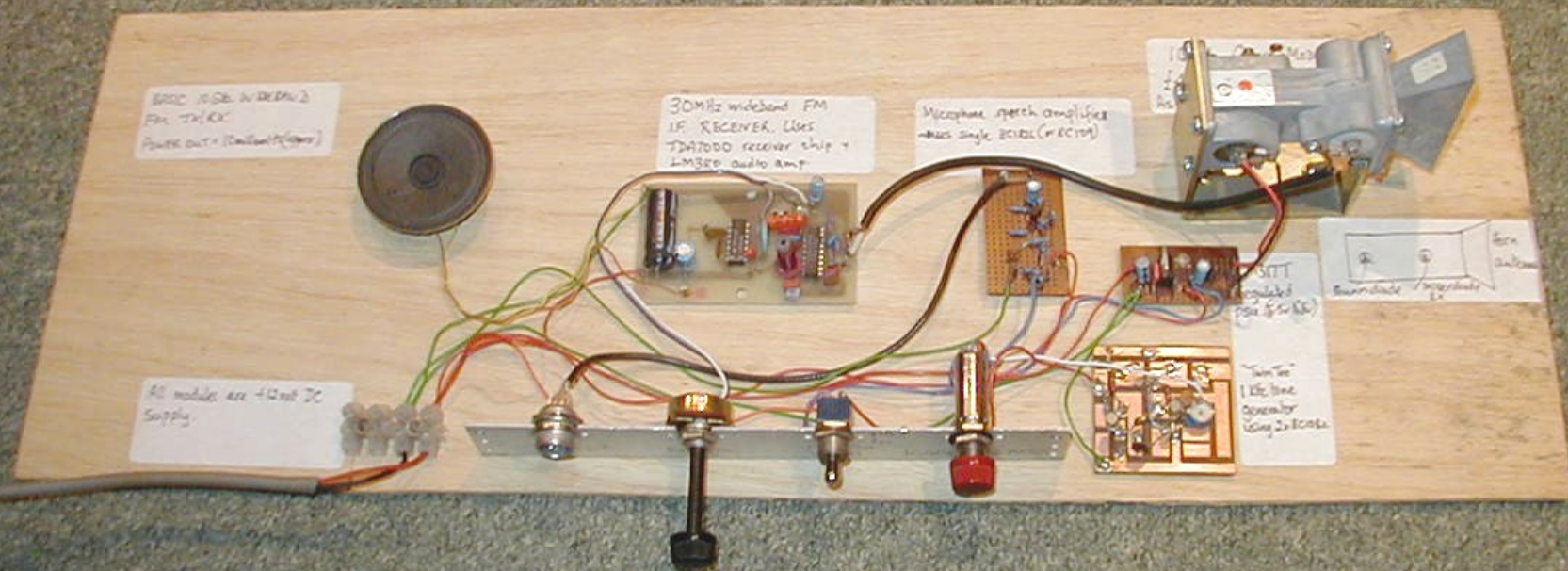
Full Duplex ... like a telephone!



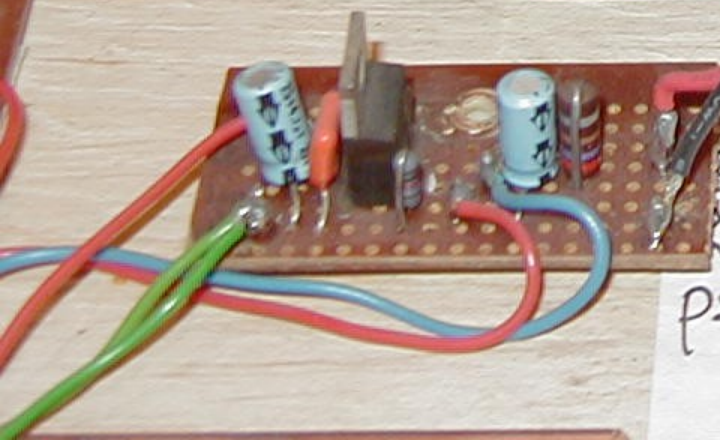
A simple microwave wideband FM system



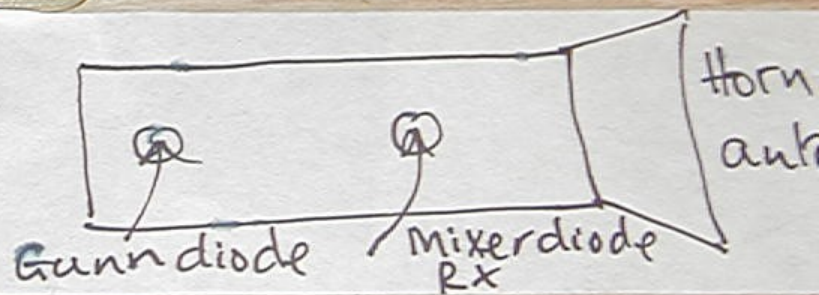
A "Breadboard" Wideband FM Transceiver for 10GHz



ch amplifier
(or BC109)



LM317T
regulated
psu. (6.5v to 8v)



Backplate

**Gunn diode:
+ supply**

mixer diode o/p

Iris

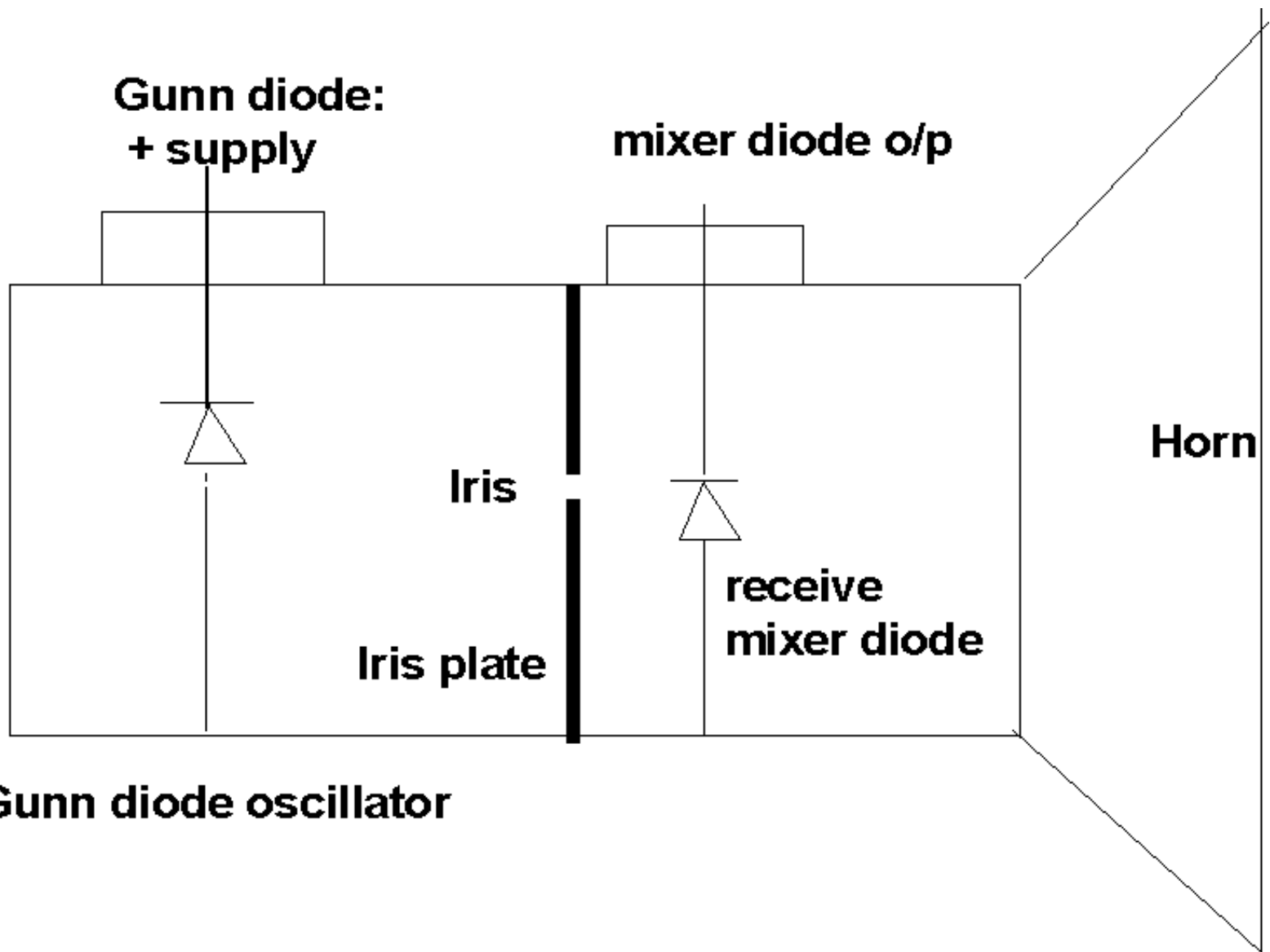
Iris plate

**receive
mixer diode**

Horn

Gunn diode oscillator

**INTERNAL CONSTRUCTION OF THE SOLFAN MODULE
~ AN EXAMPLE OF AN INLINE TRANCEIVER**



Gunnplexer



THE SATELLITE LNB ... AN ALTERNATIVE TO THE GUNN DIODE MODULE

Old Sat TV LNBS and dishes are worth getting for use at 10GHz.
Modification as discussed by Peter, G3PYB.



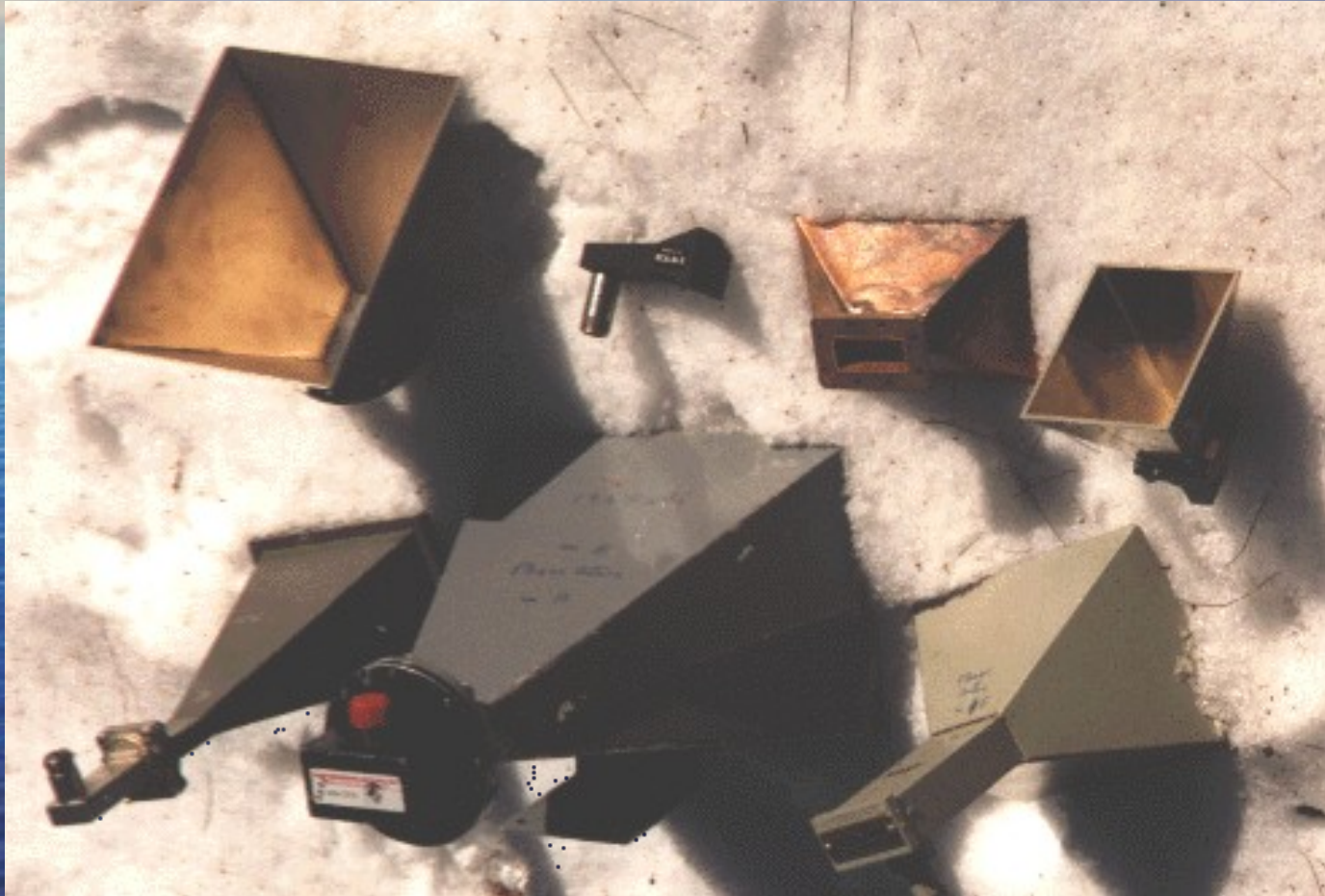
Horn Antennas

- Funnel – round or rectangular
- Easy to build, always works
- Gain  Aperture size
- Wide flare reduces gain, so large horns are very long
- High Gain = lots of metal
- Good for moderate gain (15-20 dBi)
 - *EASIER TO AIM*

Horn Antennas

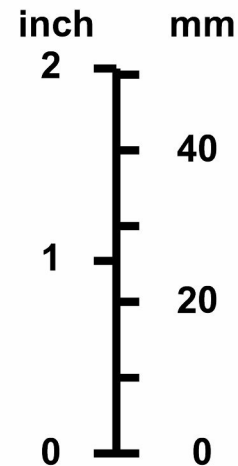
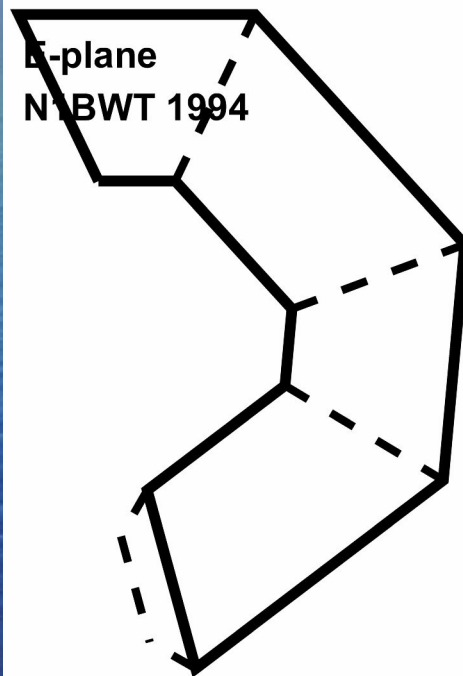


Rectangular Horns



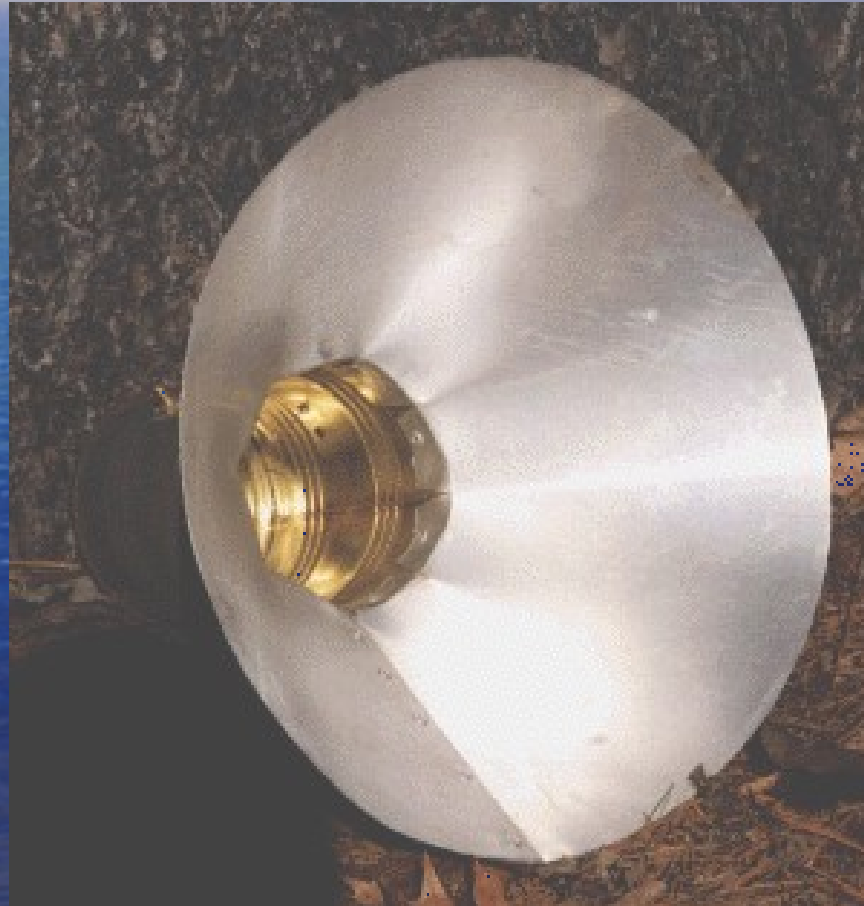
Rectangular Horn Template

Template for 11.49 dBi horn for 10368 MHz



Feedhorn Template for RCA DSS Offset Dish
(WR-90 Waveguide)

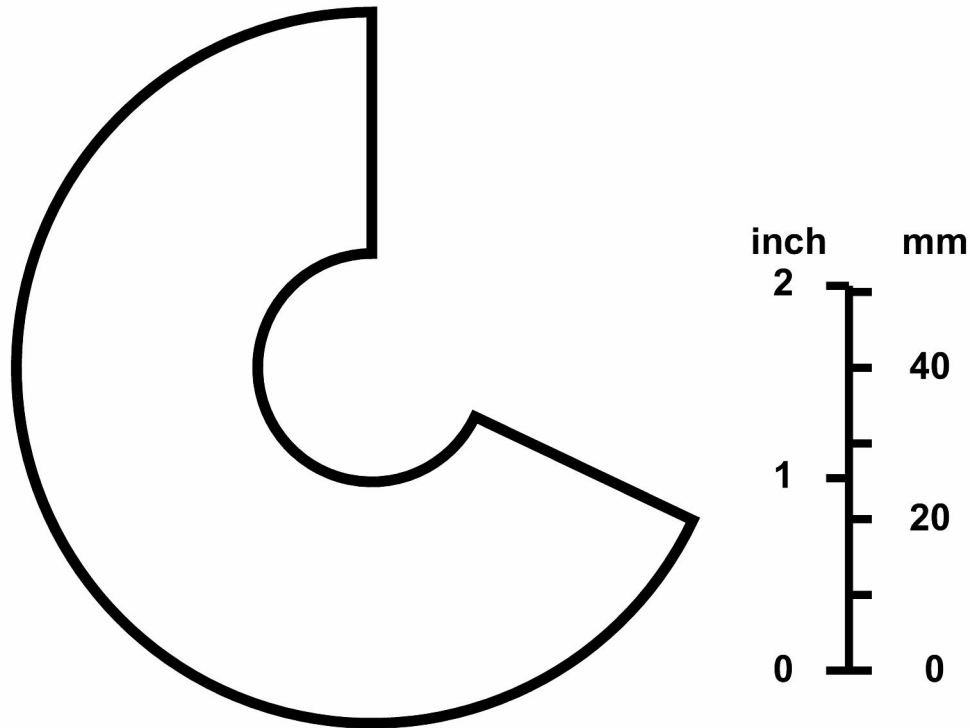
Conical Horn



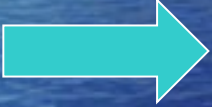
Conical Horn Template

Figure 2-6. Template for 14 dBi conical horn for 10368 MHz

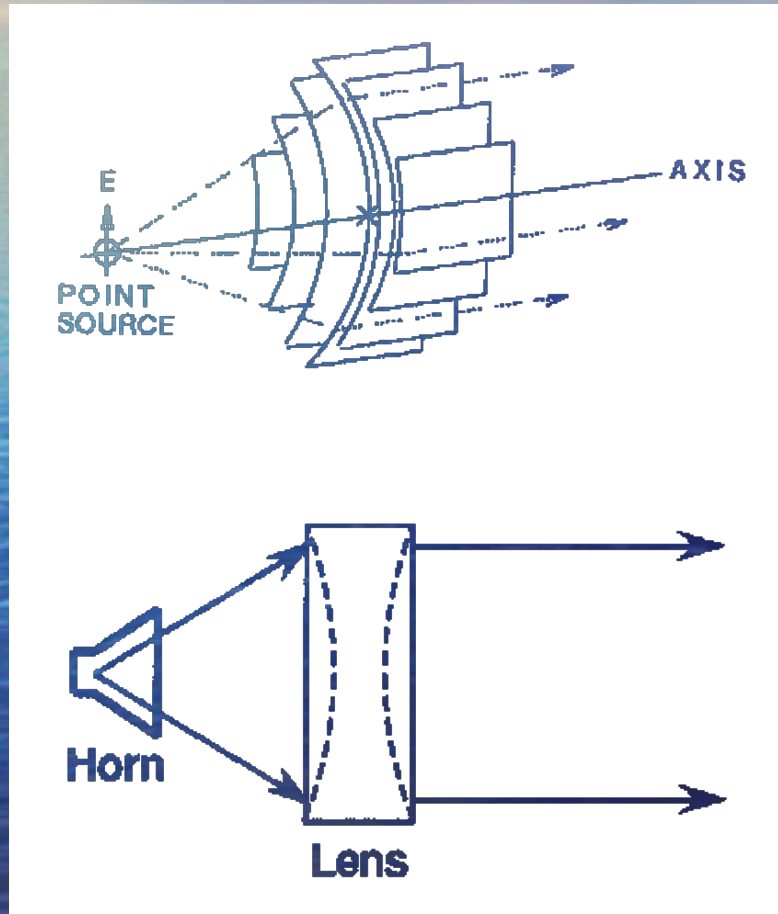
N1BWT 1998



Lens Antenna

- Lens focuses energy into tighter beam
- Lens can be dielectric (plastic, wax) or artificial dielectric (metal strips)
- Gain  Aperture size
- Lens in front of horn can be very long

Metal-Plate Lens Antenna



Lens amplifies Horn



Microwave Bees invade Vermont



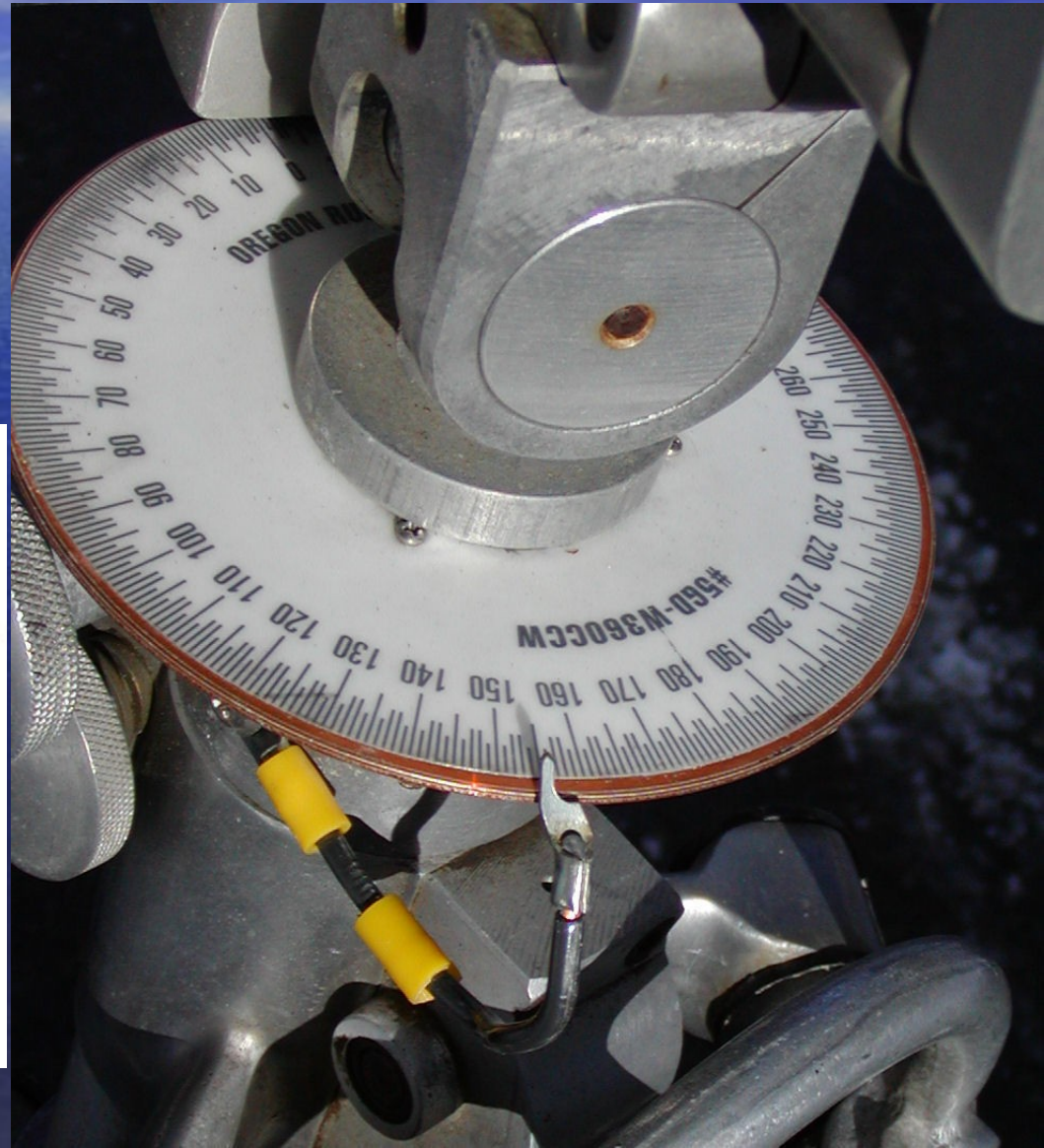
A robust tripod is essential for a dish antenna.

Note the battery anchoring the centerpost – helps in wind.

Once set up, the dish can be quickly set to any bearing with a 1 degree accuracy ... essential for dishes at 10GHz.



And aim the antenna accurately



QST

March 1980 \$5.00

devoted entirely to Amateur Radio

Microwaves
and Mountaintopping:
A Perfect Match



K1LPS
Larry got
many of
us
started





QST

devoted entirely to

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January 1997

Official Journal of
The American Radio
Relay League

QST
reviews:

Kenwood TS-570D MF/HF transceiver
SCS PTC-II multimode controller with PACTOR-II

- Build inexpensive 6- and 2-meter receive converters
- Add new life to old radios
- Get ready for Phase 3D

**New Ham
Companion:**

9 pages of
practical
information
for all hams

**September
VHF QSO
Party Results!**

Making a contact

FT817



**Low power
back-packable
2m ssb talkback
transceivers**

FT-290
2m ALL MODE TRANSCEIVER



IC202S



Hints for a successful contact

Barry G8AGN

The Essentials

Talkback liaison link between the two stations

144.260MHz, then QSY,

or mobile phone

Where are you ? (6-digit Grid Square)

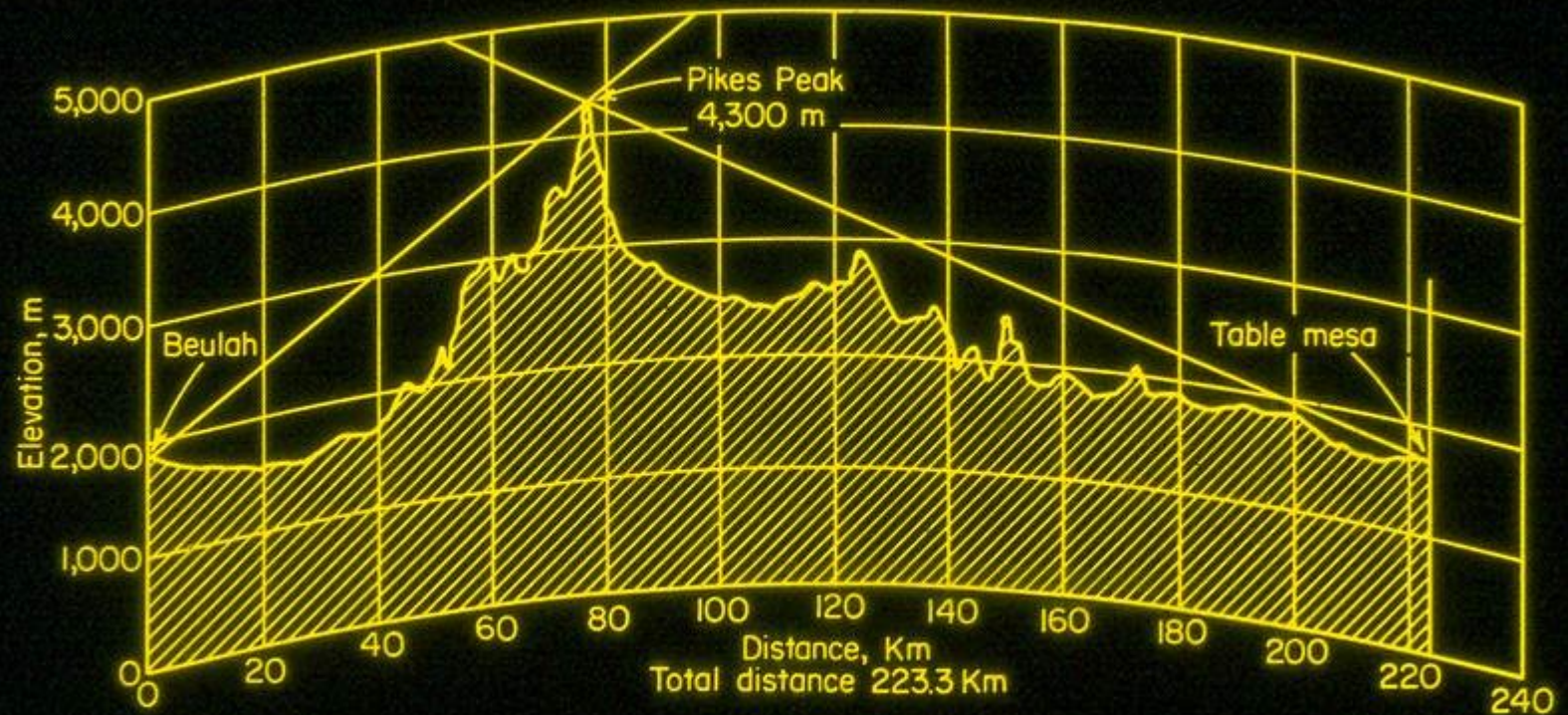
Where is the other station ? (6-digit Grid Square)

This enables you to work out the antenna pointing angles and the distance between stations

What frequency is the other station on ?

For duplex operation, Tx and Rx will be set on frequencies separated by the Rx IF

Microwave path profile



A photograph of a sunset over the ocean. The sun is a bright yellow-orange circle on the horizon, with a gradient of colors from orange to blue in the sky. The foreground shows dark, silhouetted rocks and some sparse vegetation.

The End

or is it the beginning?