

Progress Towards 47 GHz EME

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Gunter VE7CLD, AI W5LUA
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Progress Towards 47 GHz EME

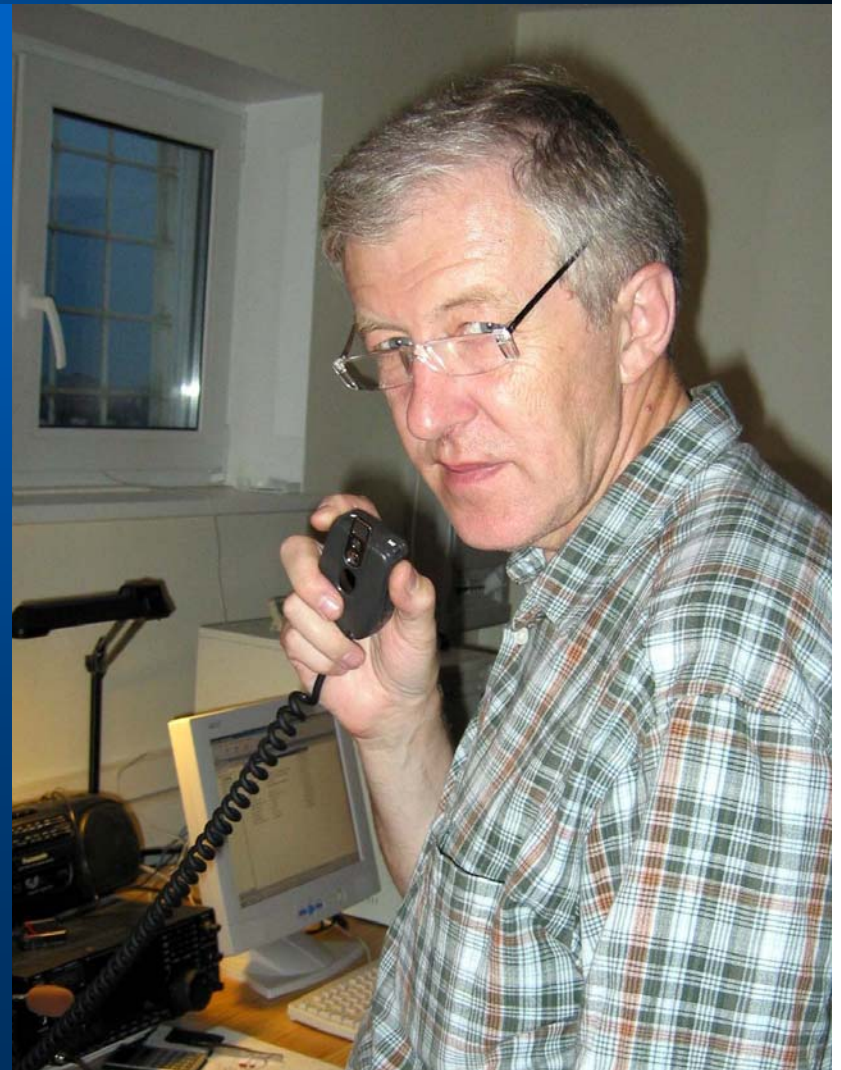
- Operating Results
- Dishes Used
- Preamplifier Requirements
- TWT Power Amplifiers
- Feed Systems

First 47 GHz EME Echoes

- RW3BP on July 24, 2004
- “Outstanding Accomplishment !”
- >100 Watts Output, 2.4 m Offset Dish,
~ 50 MW ERP!
- ~4 dB NF “HB” Preamplifier,
~10 dB Sun, 1 dB Moon Noise
- Copied By AD6FP, VE4MA, VE7CLD, W5LUA



2.4 Meter Offset Fed Dish at RW3BP



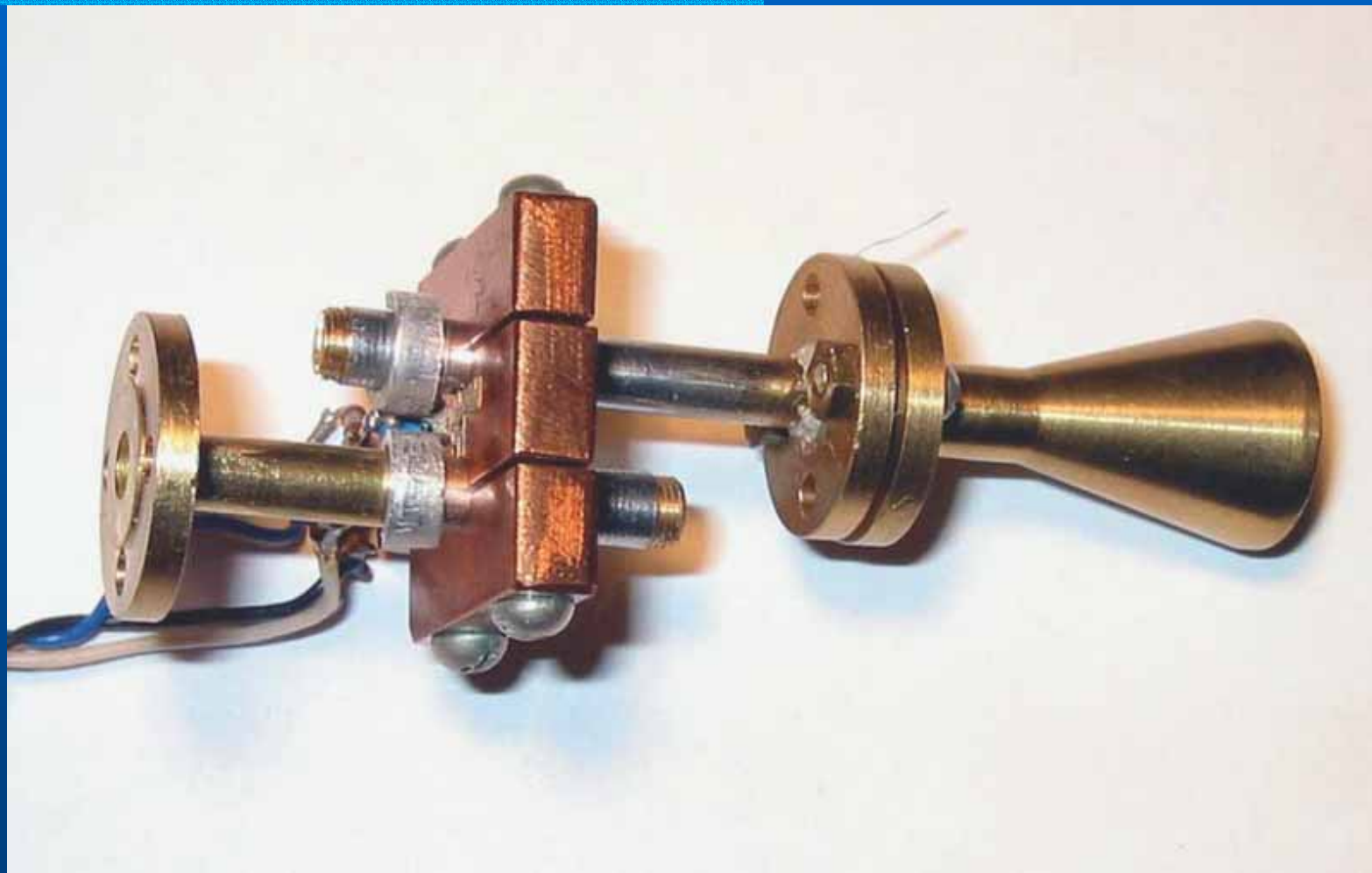
2.4 Meter Offset Fed Dish at RW3BP



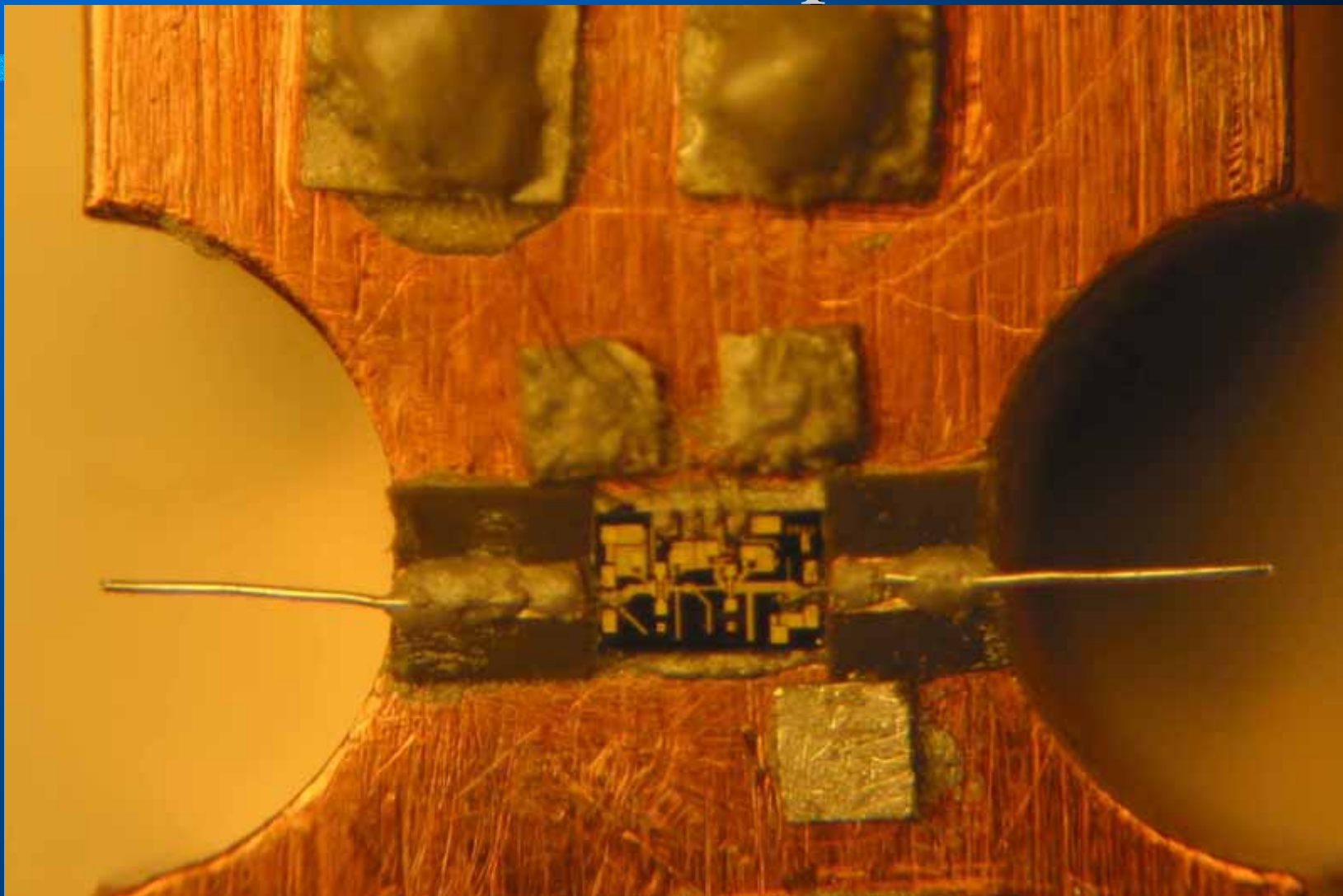
RW3BP 47 GHz EME Transverter at Feedhorn



RW3BP 47 GHz EME HB Preamplifier



RW3BP 47 GHz EME HB Preamplifier



The Moon at 47 GHz

- Rough surface of moon produces very rough sounding note – like aurora
- Spreading can be several hundred Hz making the use of very narrow bandwidth IF filters impossible
- Doppler shift upwards of +120 kHz on rising moon and –120kHz on setting moon
- Antenna beamwidths less than half the 0.5° subtended angle of the moon

Additional 47 GHz Tests

- Gary AD6FP Operational
- ~30 W output Hughes 8901 TWT
- 1.8 m Offset Dish (~57 dB Gain)
- ~ 4 DB NF Preamps
- Tested for Possible QSO at “Low Power”
- NO Signals heard
- Predictions Said “More System Gain Needed” (NF or Ant Gain, TX Power)

AD6FP 47 GHz 1.8 Meter Dish



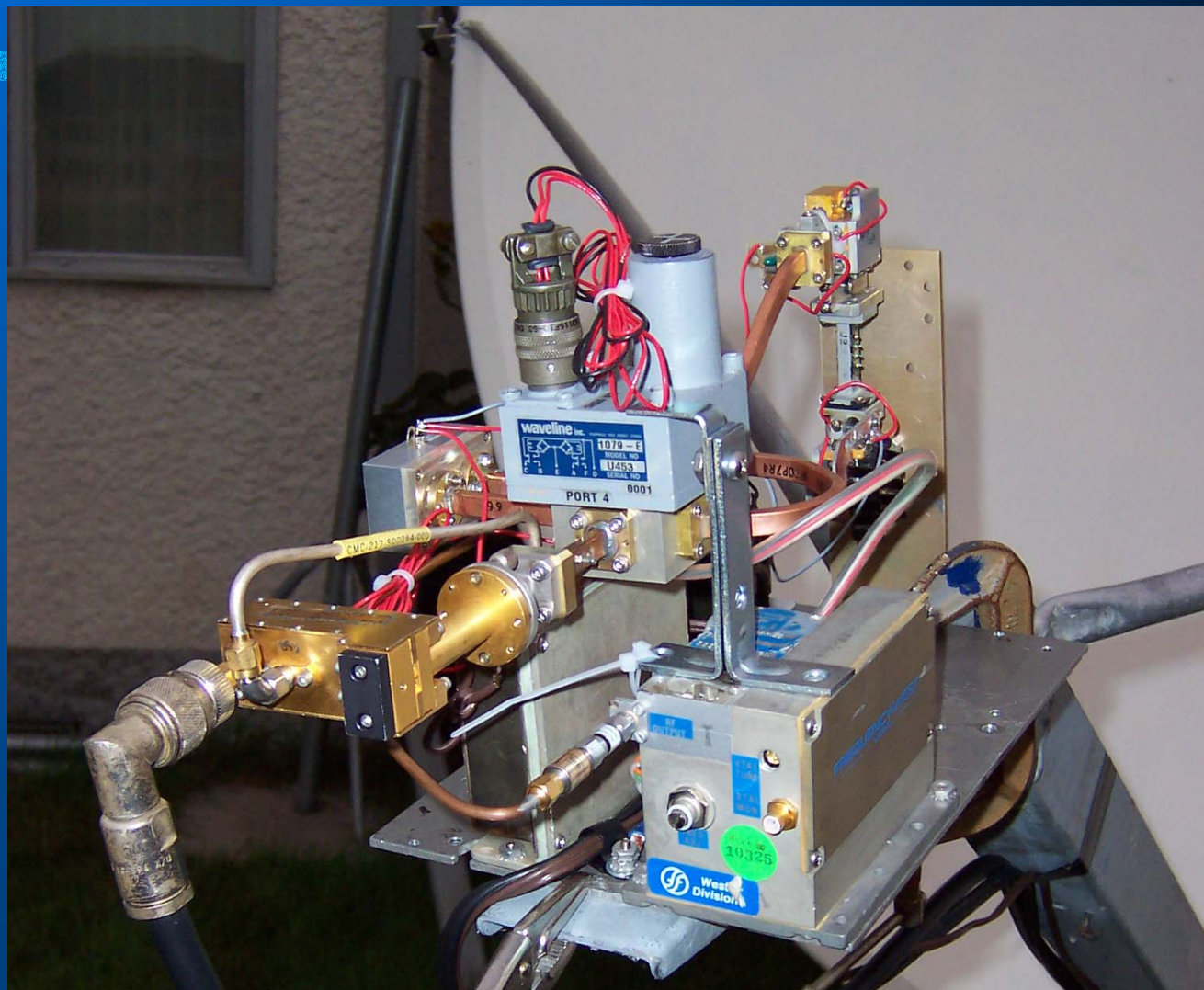
Atmospheric Effects at 47 GHz

- Unlike 24 GHz, 47 GHz is not significantly affected by Humidity
- Thick cloud cover has little effect
- Working through rain is certainly a test of your equipment capabilities
- Best conditions occur ?????...at Lowest Moon noise?

2.4m Dish at VE4MA



2.4m Dish at VE4MA



2.4 Meter Dish at W5LUA



2.4 Meter Dish at W5LUA



The 24 GHz Station at VE7CLD

- Andrews 4.5 Meter Prime Focus Dish
- DB6NT Preamp at Feed ~ 5dB NF
- ~ 0.25 dB Moon Noise

The Dish at VE7CLD



Hughes 32 Watt TWT for 45 GHz



Varian 13 kV Power Supply Mods



The First 47 GHz EME QSO?

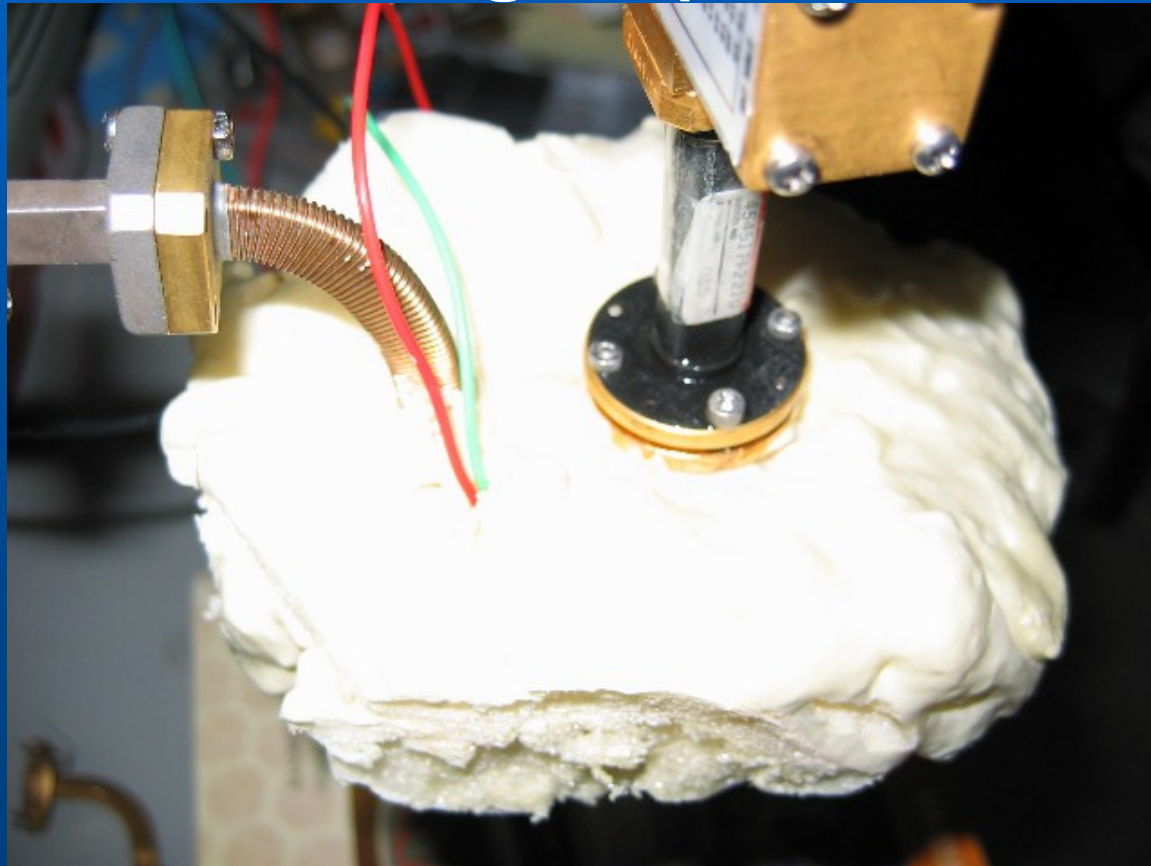
- More System Gain is Required
- More TX Power/ Ant Gain Not Practical
- Better NF Available Thru Cooling!
- Tests By Gary AD6FP with Liquid N2

Better RX Performance With LN2?



Better RX Performance With Liquid Nitrogen Cooling?

- 1.5 NF @ 77 deg K (4 dB @ 290 K)



The First 47 GHz EME QSO ?

- Within a year ???
- 30 Watts is Available...need more
- 4 dB noise figure is available....need better
- Good 2.4m Dish (Performance is a concern)
- Stations working toward 47 GHz EME QSOs
AD6FP, RW3BP, VE4MA & W5LUA
- Lots of Work Still Required !

Progress Towards 47 GHz EME

Questions?