

New E band 3.7mm distance world record

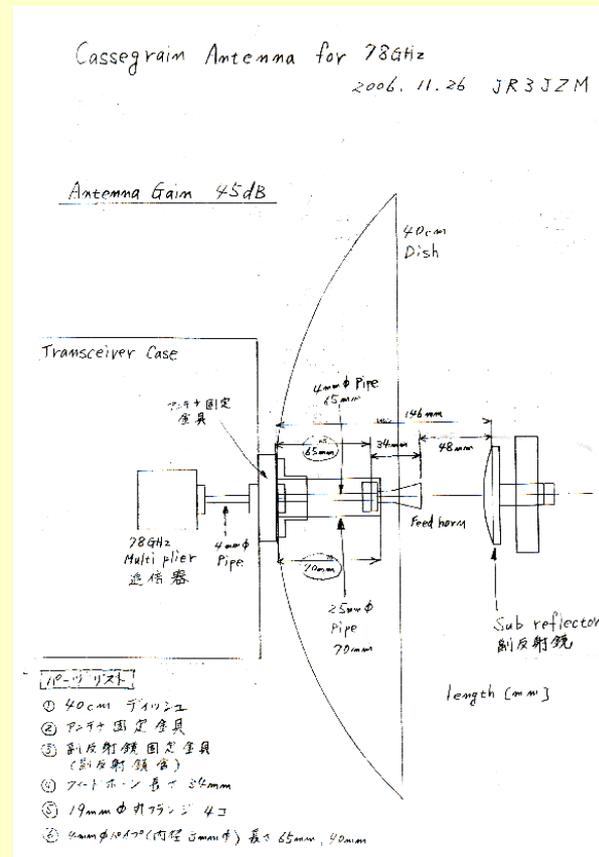
Bob Johnson KF6KVG

Goran Popovic AD6IW

2013

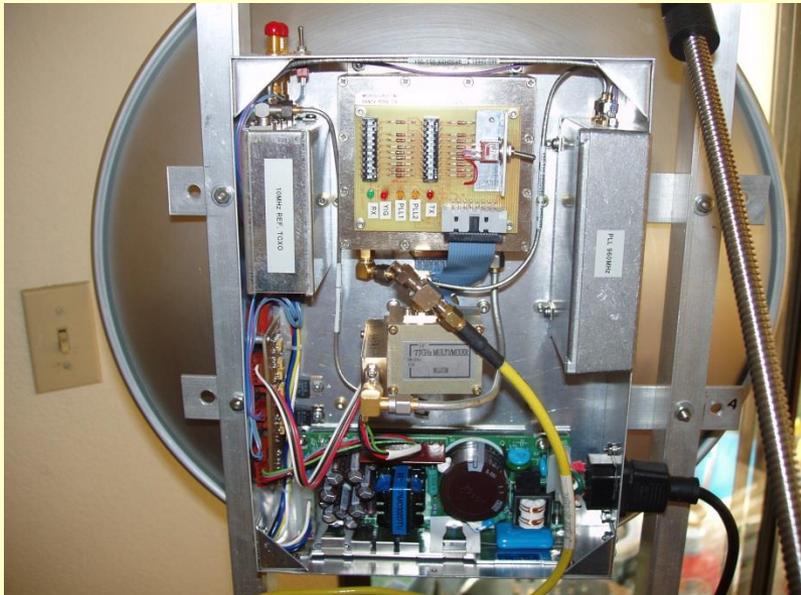
How I started...

- Feed, dish and mixer from Nori JR3JZM
- Tested on short distance with KF6KVG, AD6FP and K6GZA
- Test sites: Alviso, Canada collage, Mt Hamilton
- KF6KVG beacon at 79GHz - never heard with this radio



77-81 GHz AD6IW Transverter

- TX 3-4 mW
- RX NF, 12 - 15dB who knows ?
- CW and FM, YiG locked to 10MHz



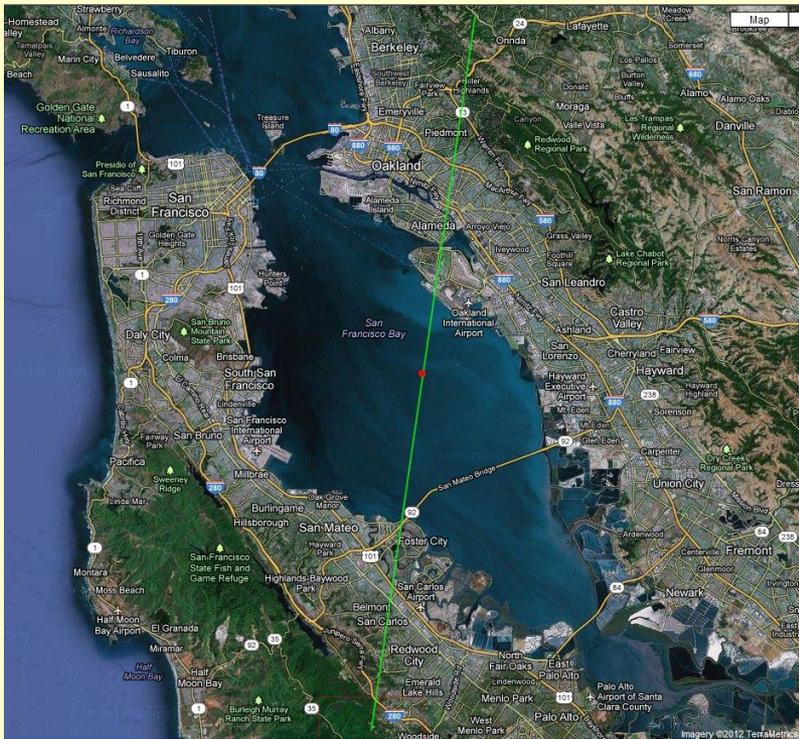
Early tests...

- Some improvements on both radios, more power but RX NF still high, low power..
- First 70km two way contact 10-15dB S/N



Canada collage to Grizzly peak, new test site 51.5Km

- S/N up to 30dB, easy 2 way QSO over Bay



Performance of the radio

- RX 12-15 dB NF
- TX 3-5 mW
- 0.4M Cass grain dish
- Programmable YIG oscillator, operating at
entire 77-81 GHz band,
CW and FM only

Goal distance

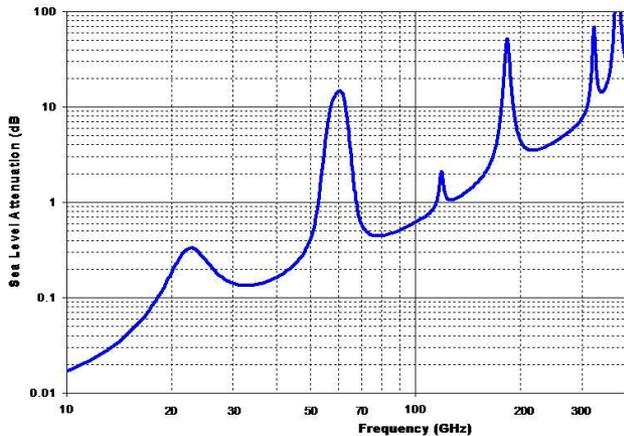
> 250km ?

No way, with existing
setup !

Need to improve my

Radio for min. 30dB.

Path loss calculations



Free space Path loss:
 $32.45 + 20\log(d) + 20\log(f)$
250km = 178.5dB

Atmospherics

absorption @ 45 deg.
0.38dB/Km = 95dB

Total path loss 273.5dB

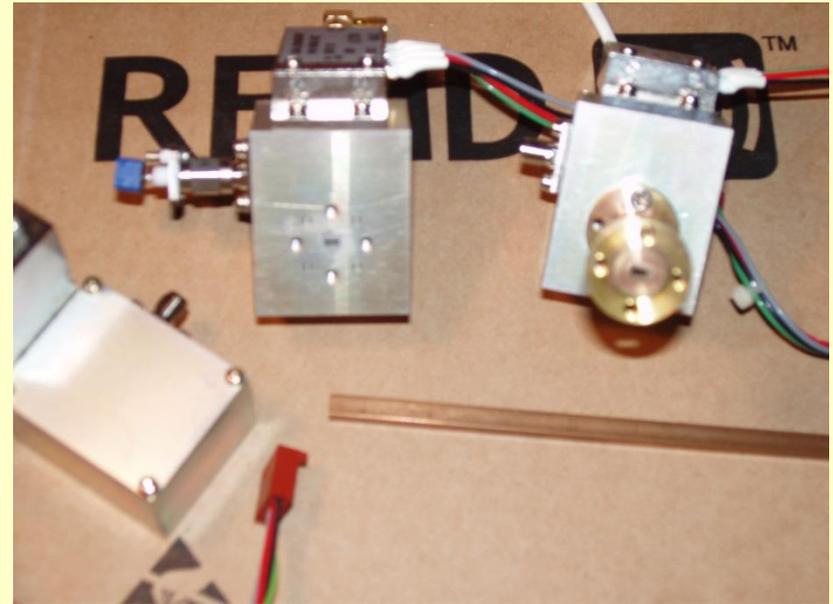
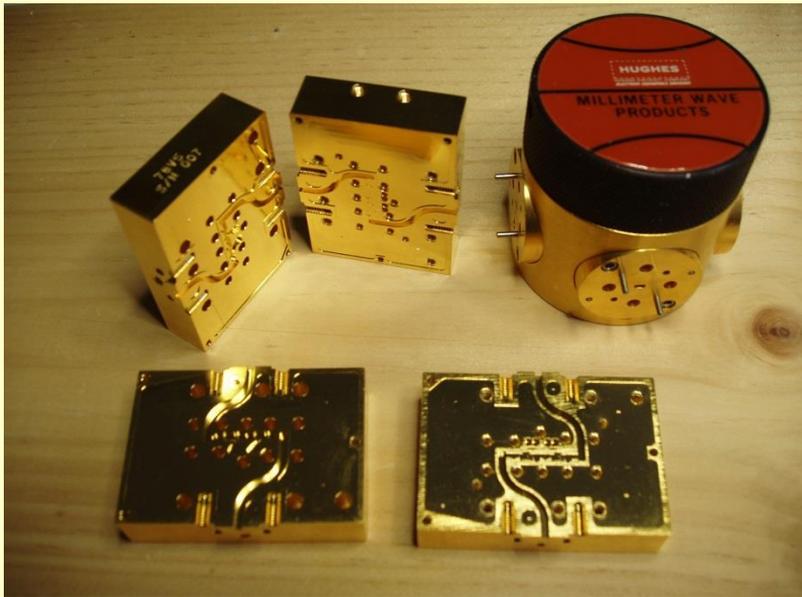
Same as 23cm EME !

In best case S/N would
be -29dB

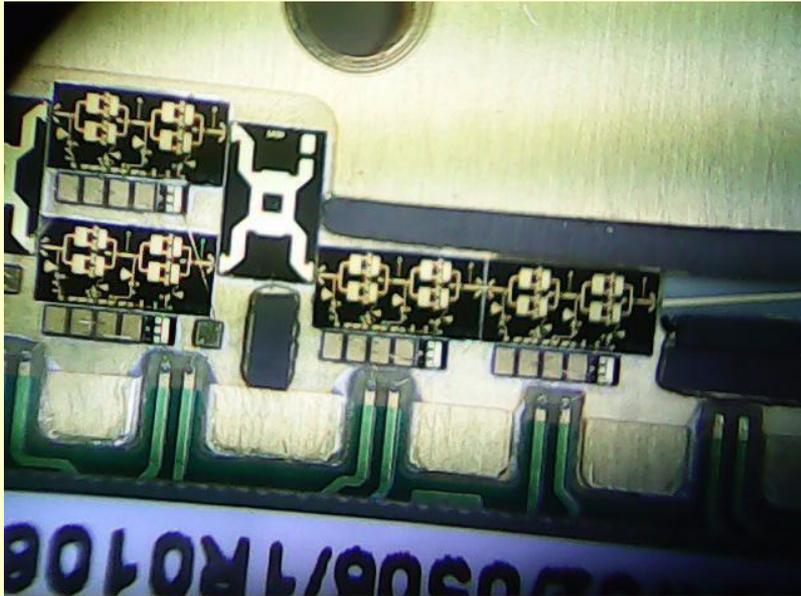
Time for new radio

New approach

- UMC LNA, WG Switch, diode mixer, Hittite and Triquint power amplifiers, wire bonding...



Some commercial parts



- Surplus high speed 71-81 GHz point to point links
Bob find nice surplus units, and modified them
Simple Mixer replaced with downconverter

KF6KVG



- High power 19dBm
- 5-6dB NF
- DRO very stable
- 1 ft dish
- More tests and large S/N improvements

AD6IW new radio-after a while



- High power 21 dBm
- 2 ft Dish 51 dB gain, 0.3 deg. Beam width
- 3dB of Sun Noise

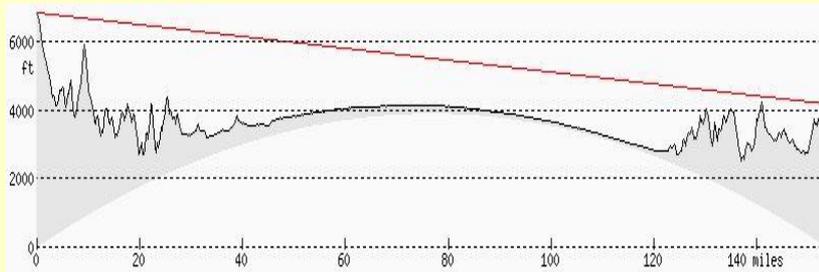


Sun Noise Measurements



- 3dB at 80843MHz
- SF at E band ?

Terrain profile for new record



- Waiting for low Dew point...
- Poor conditions during Summer
- Kings Canyon National Park to Mt. Hamilton
- 252km

Kings Canyon



Finally, we did it, at June 13th 2013



California Amateurs Claim New World Distance Record on 3.7 mm Band

Track amateur radio bands, GHz, GHz band, primary allocation, San Jose, strong signals

06/19/2013

Mountain-topping radio amateurs in California are claiming a new world distance record on the 77 to 81 GHz band — also known as “E band” — a band many hams likely are unaware of and whose future is unclear. The claimed record was set June 13 between Robert Johnson, KF6KVG, on a peak just east of San Jose and Goran Popovic, AD6W, in Kings Canyon National Park to the east-southeast.

“We achieved a distance of 252.49 km from Mt Hamilton (CM074) to Kings Canyon National Park (DM06ms).” Goran, AD6W, announced on the 50 MHz & Up Group reflector. “We made two-way contact on FM and SSB with strong signals at both ends.”

KF6KVG used a 1-foot dish, and AD6W a 2-foot dish. Both employed dielectric resonator oscillator-locked frequency control for extreme stability. The current E band record is 228 km, set in Germany between Philipp Prinz, DL2AM, and Alexander Wietzel, DL2GWZ.

According to ARRL CEO David Sumner, K1ZZ, this amateur band was first allocated internationally in 1979 as 75.5-81 GHz, with 75.5-76 GHz primary and the remainder secondary. When allocations below 76 GHz were realigned at WRC 2000, 75.5-76 GHz was deleted, 81-81.5 GHz was added as secondary, and the primary allocation was shifted to 77.5-78 GHz although only 77-81 GHz is available currently to amateurs in the US. Sumner says the band 77.5-78 GHz is under consideration at WRC 2015 for an allocation for automotive short-range radar, leaving the fate of the amateur primary allocation uncertain.

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Having Trouble?



How does it sound ?



- FM



- SSB



- SSB

AD6IW 2013