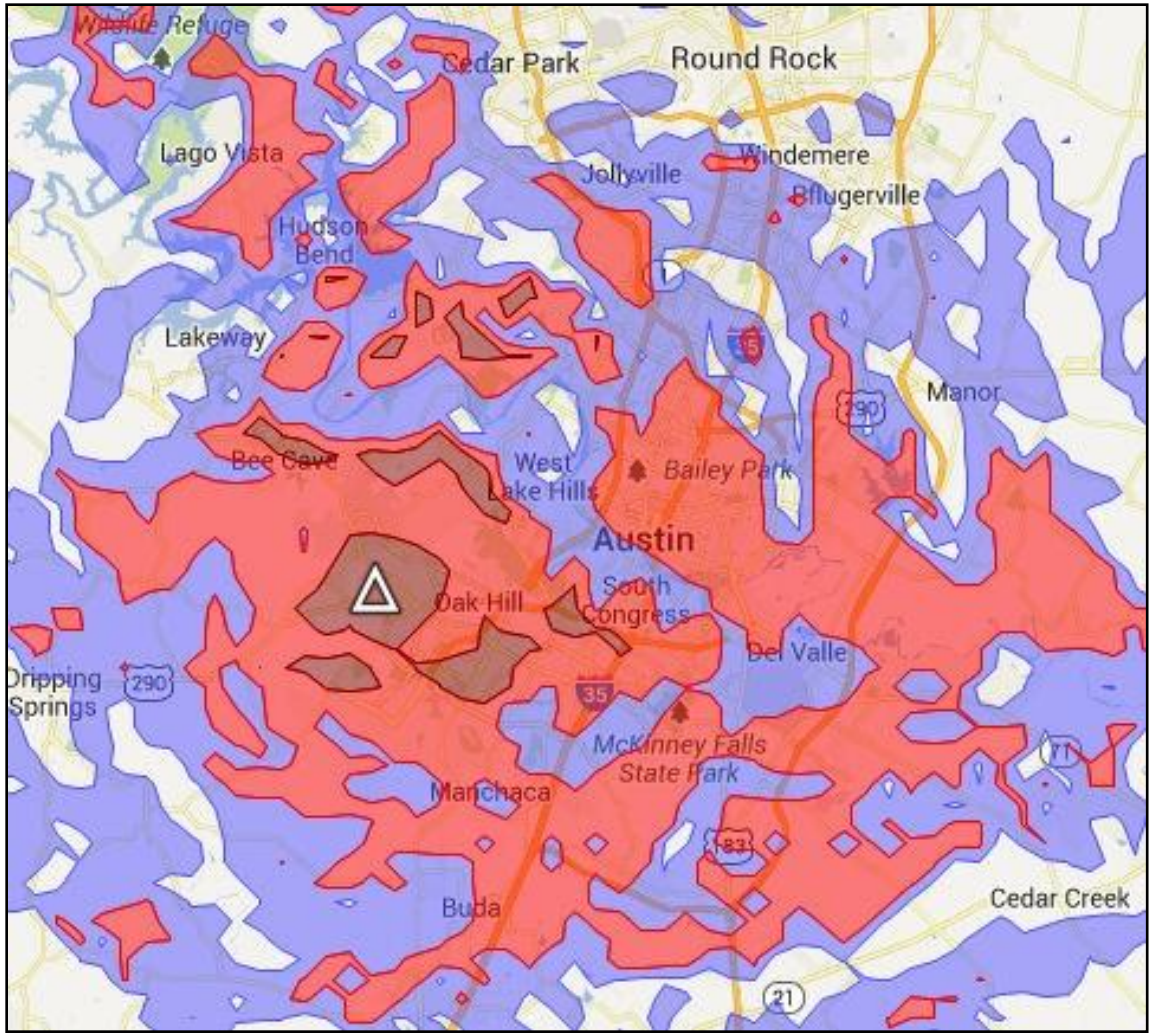
Stealth Antenna Farm

Preliminary Considerations

- Why stealth ? Restrictive neighborhood covenants !
- Attic performance factors
  - Location /ground elevation
  - Longley-Rice propagation plot for VHF/UHF/μWave
  - Attic size and height
  - Reflective clutter: furnace/AC/ducting
  - Roof insulation (reflective or not)
  - Feedline routing plan
- Improvements
  - Plywood flooring
  - 120 V AC power
  - Overhead lights
  - CAT-5 ?

440 MHz Longley-Rice Plot

- Analysis before I purchased my home
- Planned for repeaters and weak-signal operation



Keys to Performance

- HF
  - Balanced antennas: large loops or dipoles – eliminates problems with grounding/counterpoise
  - Lots of copper – I use copper tubing for my HF loop
  - A good balun with plenty of reserve power rating – I use a 10KW, 4:1
- VHF-UHF-μWave
  - Stacked beam antennas reduce boom length
  - Line loss management is key to performance at higher frequency bands
    - Remote LNA establishes system NF at antenna –
    - LNA preselector filter is a MUST below 440 MHz
    - Remote PA provides *'free'* boost to transmit power
    - CAT-5, IP control of remote power supplies for LNA/PA works well
  - Omni antennas are useful for local QSO's
- Filters are needed with co-located transmitters / repeaters
  - Receiver desense
  - Reverse IMD
- Crossband couplers reduce the number feedlines

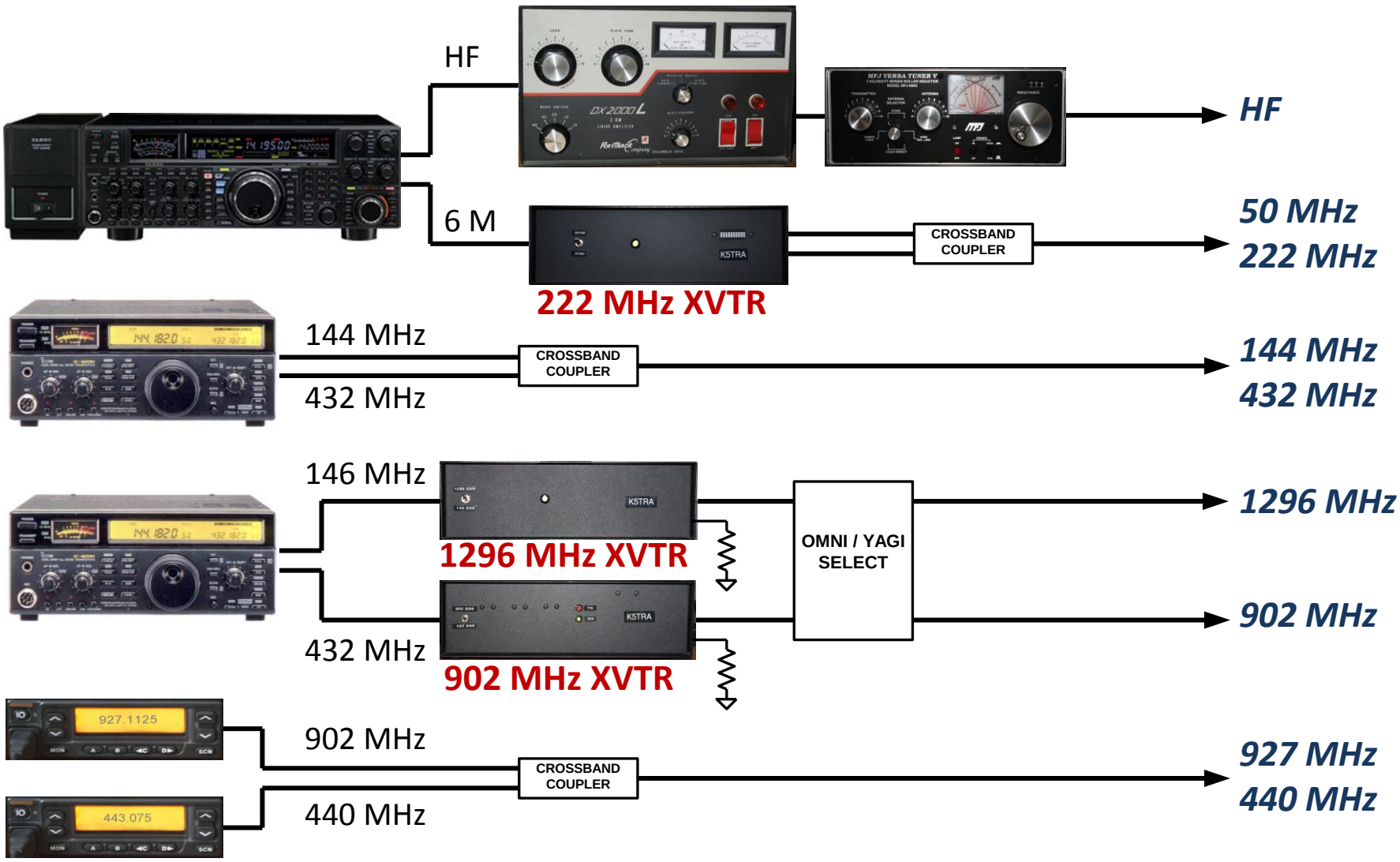
K5TRA Shack

HF, 50 and 222 MHz

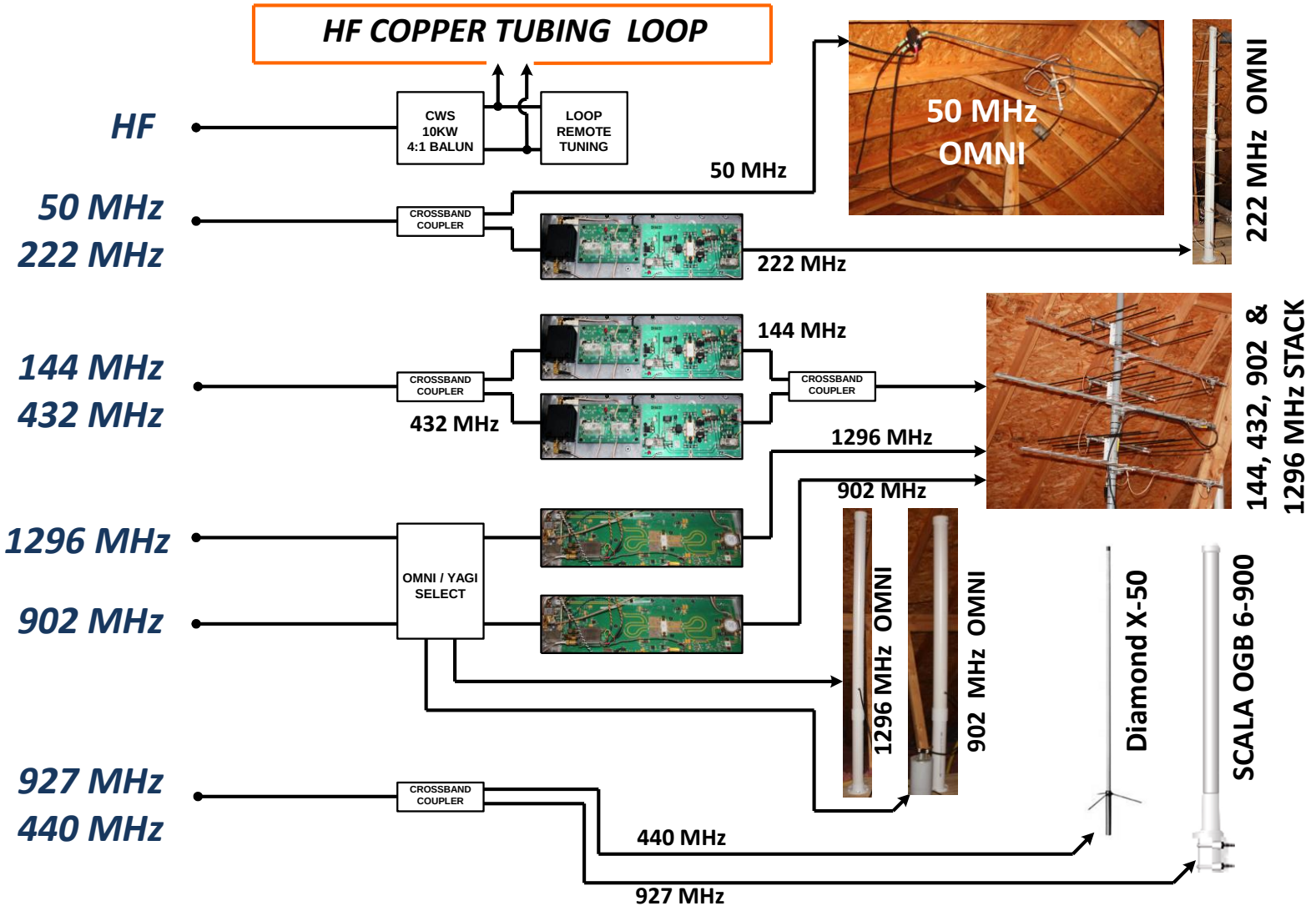
144, 432, 902 and 1296 MHz

Home Repeater

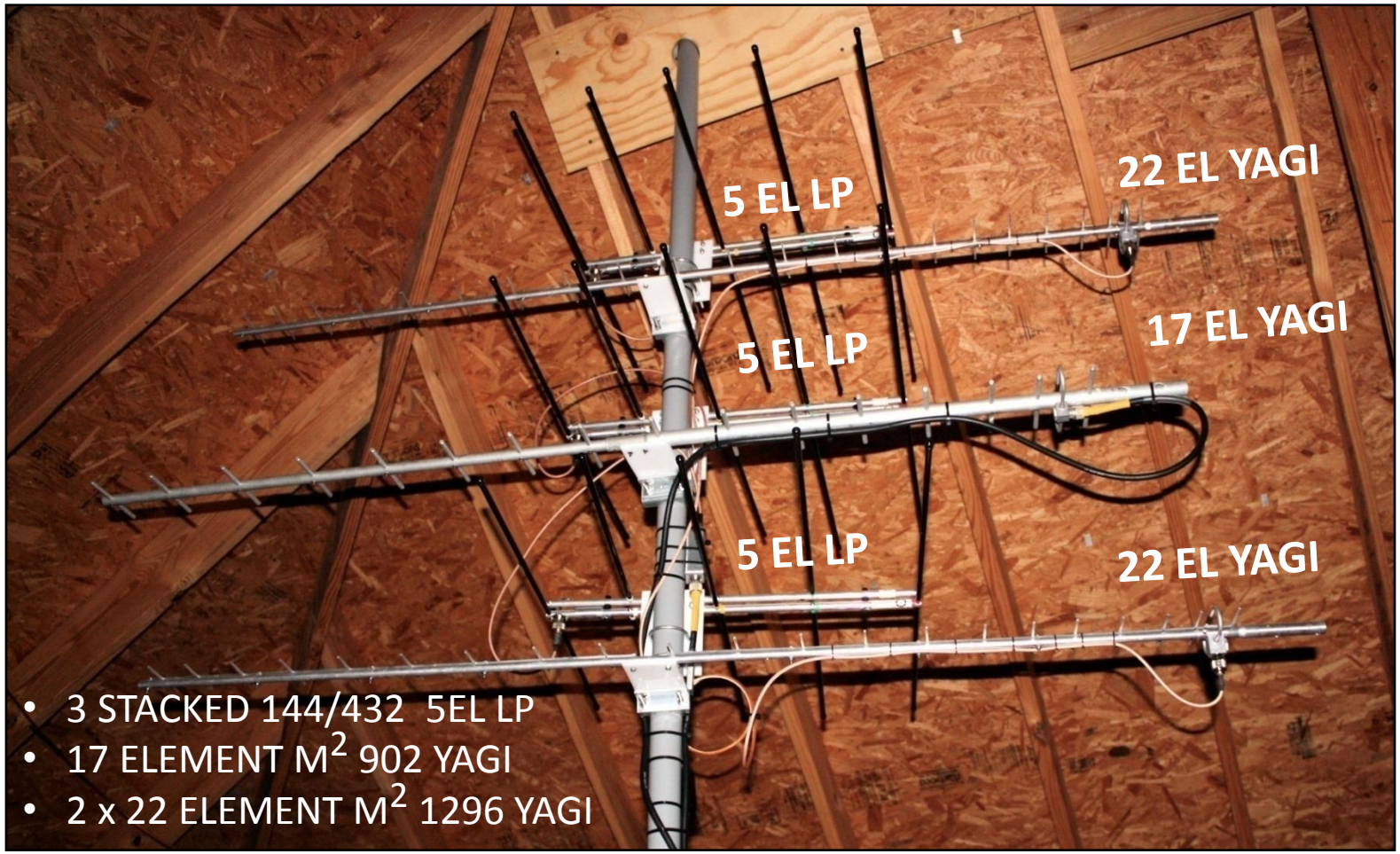
Shack Configuration



HF and Weak Signal Antennas

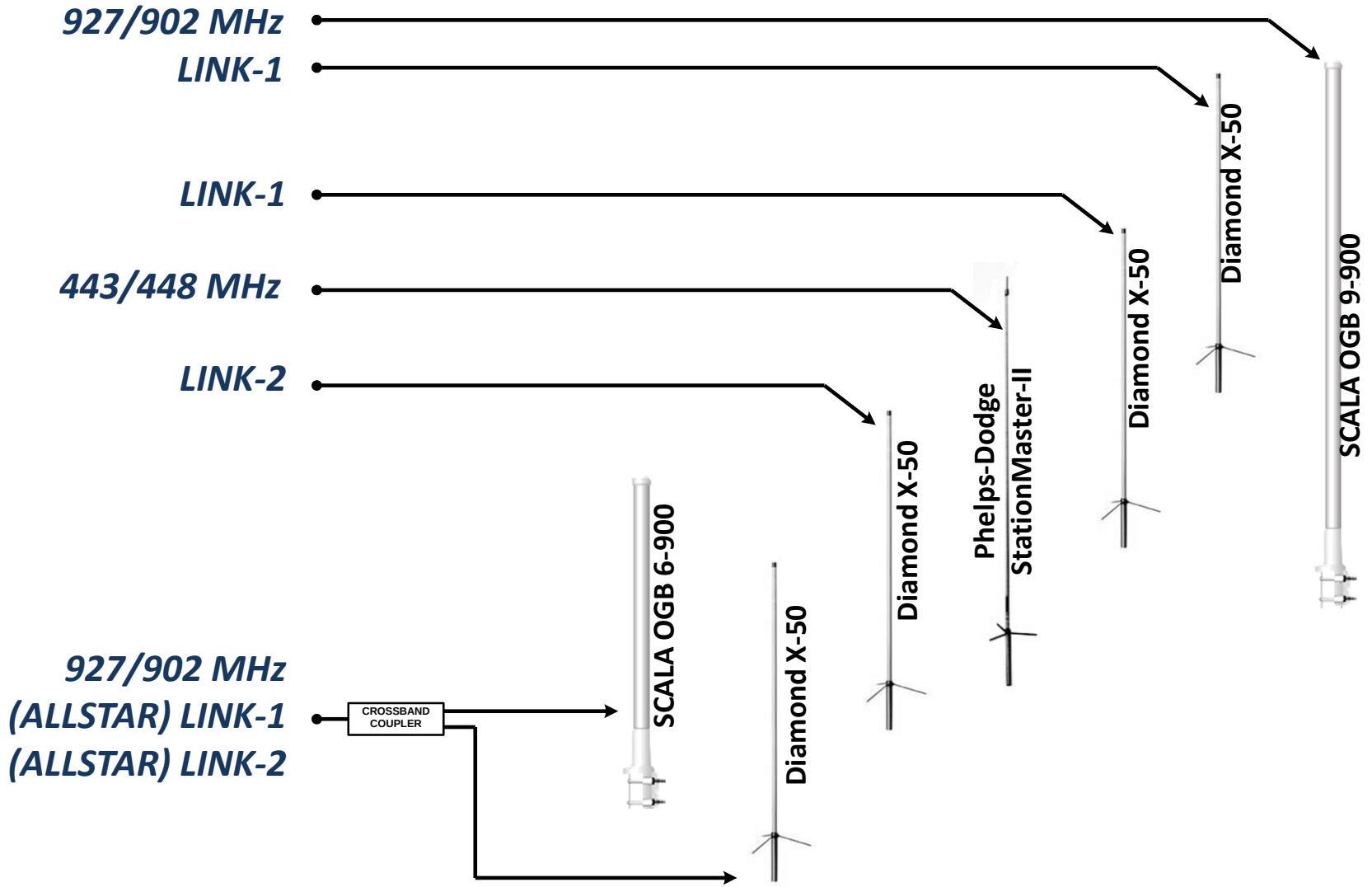


Beam Antennas

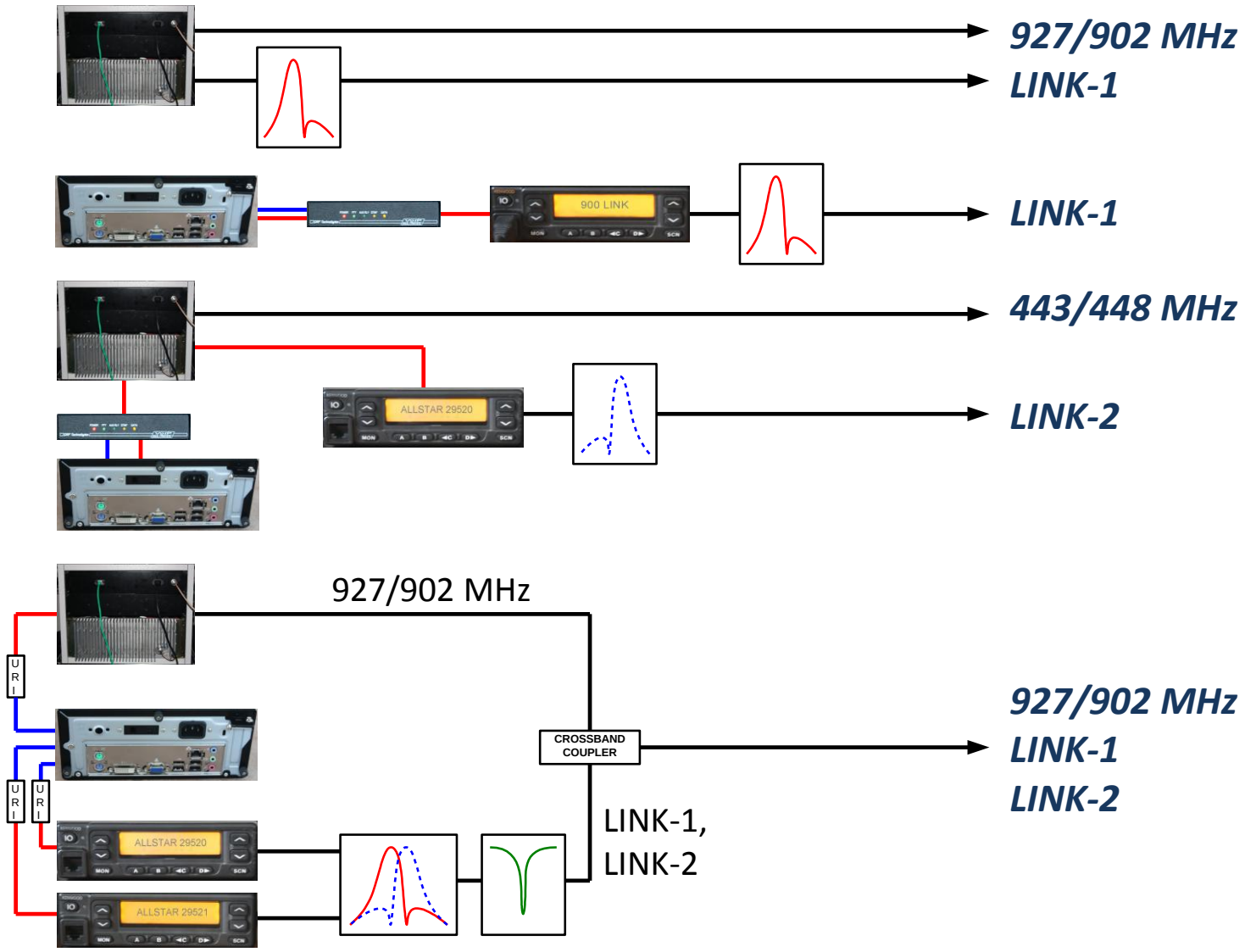


- 3 STACKED 144/432 5EL LP
- 17 ELEMENT M^2 902 YAGI
- 2 x 22 ELEMENT M^2 1296 YAGI

Repeater and Link Antennas

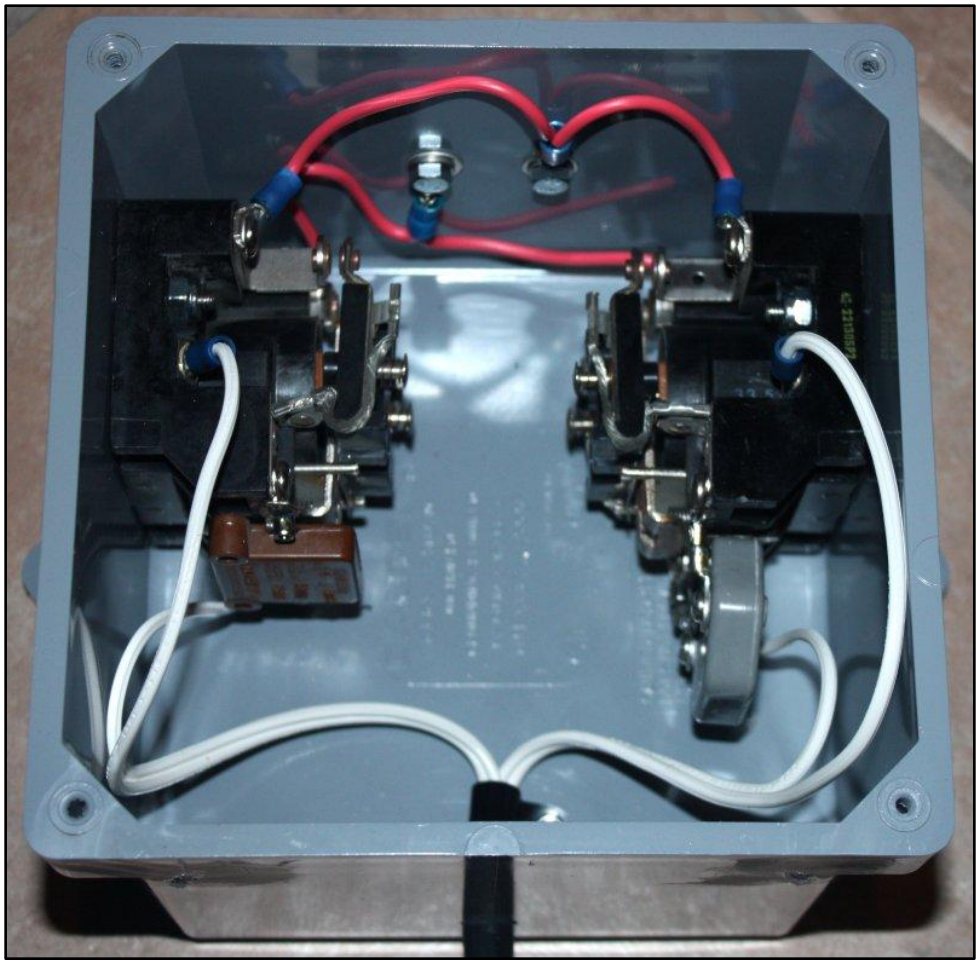


Repeaters and Links



Balun Feed for HF Loop

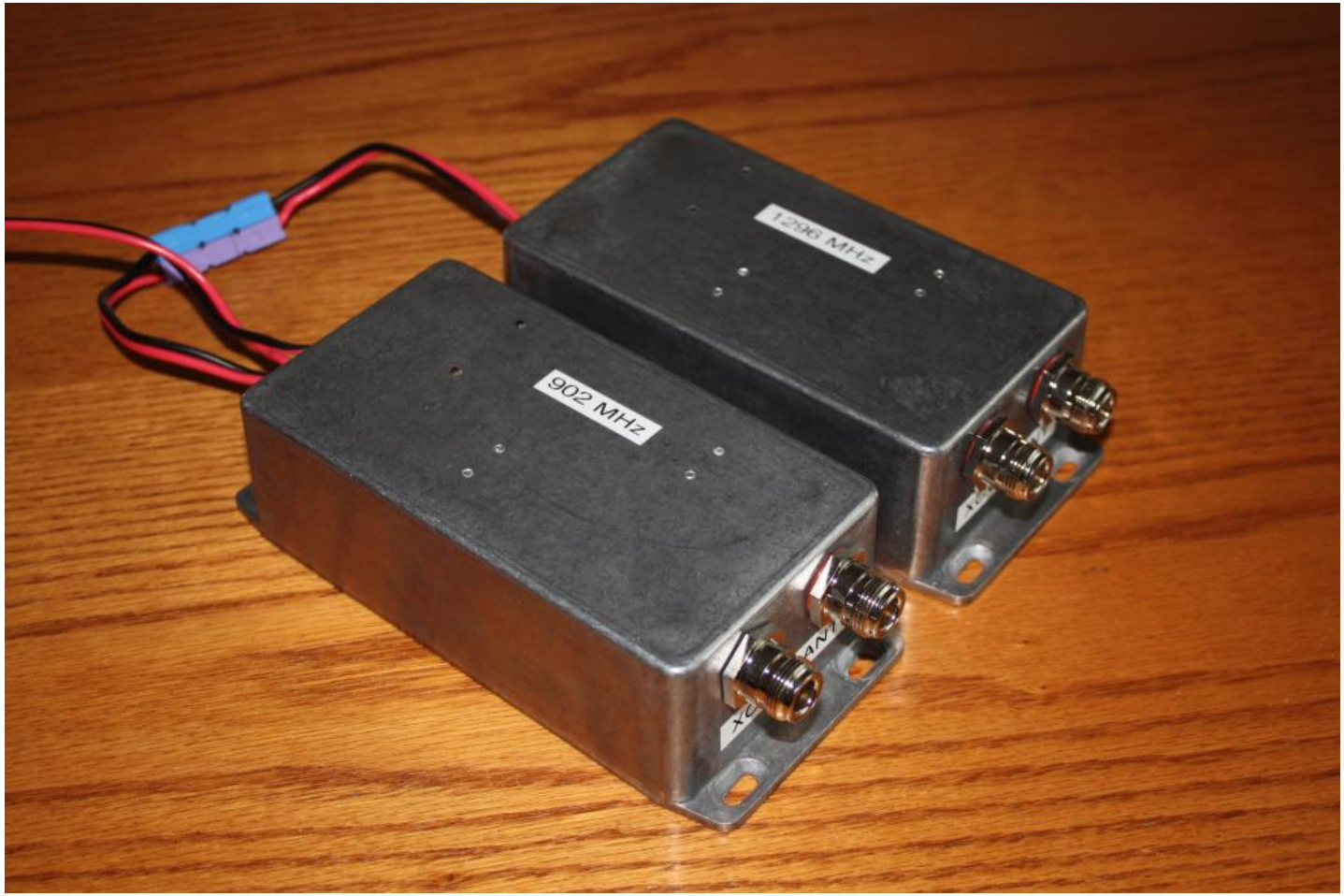
HF Loop Tuning Capacitor Switch



WEB Controlled Power-Strip

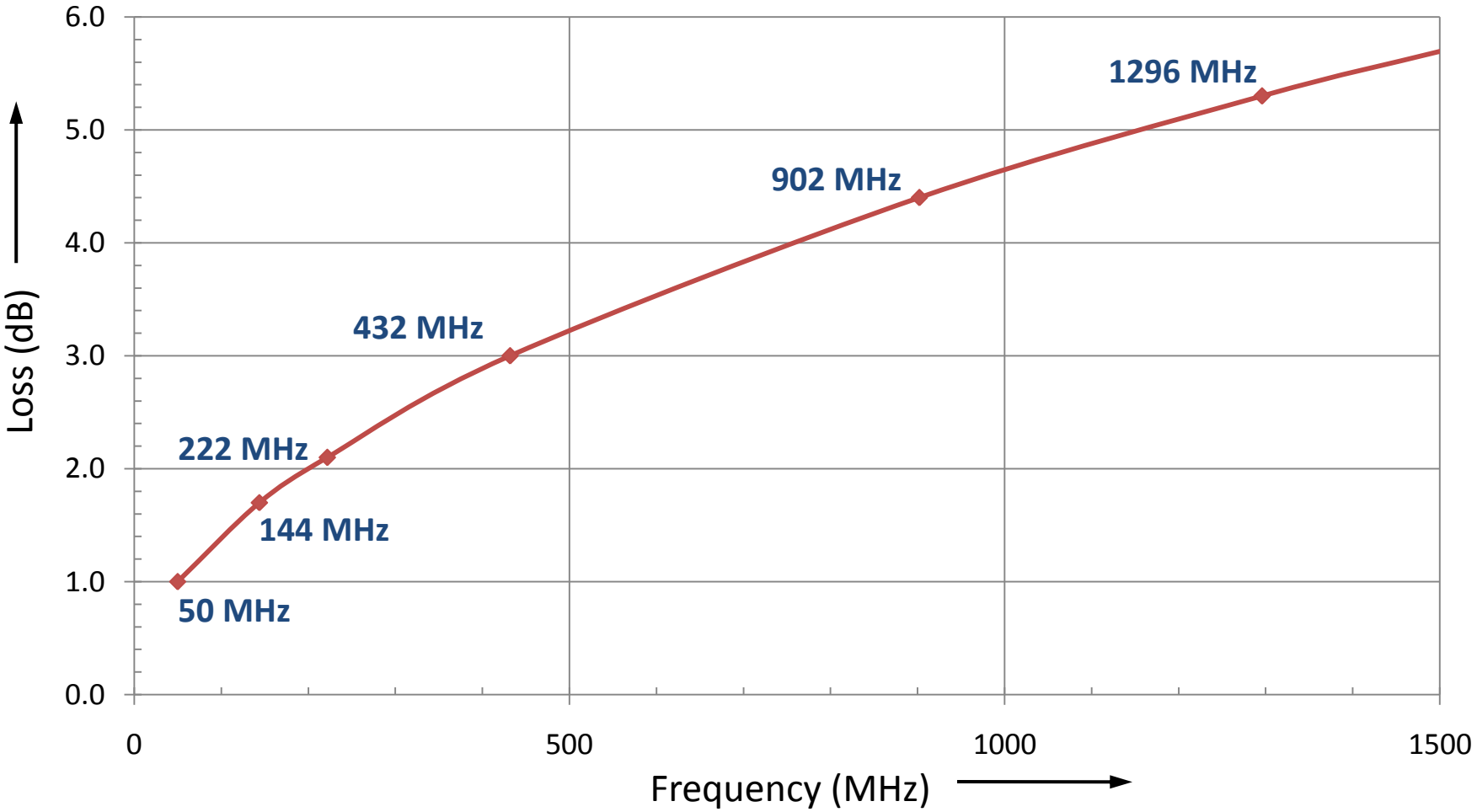
- Remote PA and LNA on-off control
- HF loop tuning capacitor switching

Remote 902 MHz and 1296 MHz LNAs



Loss of LMR-400

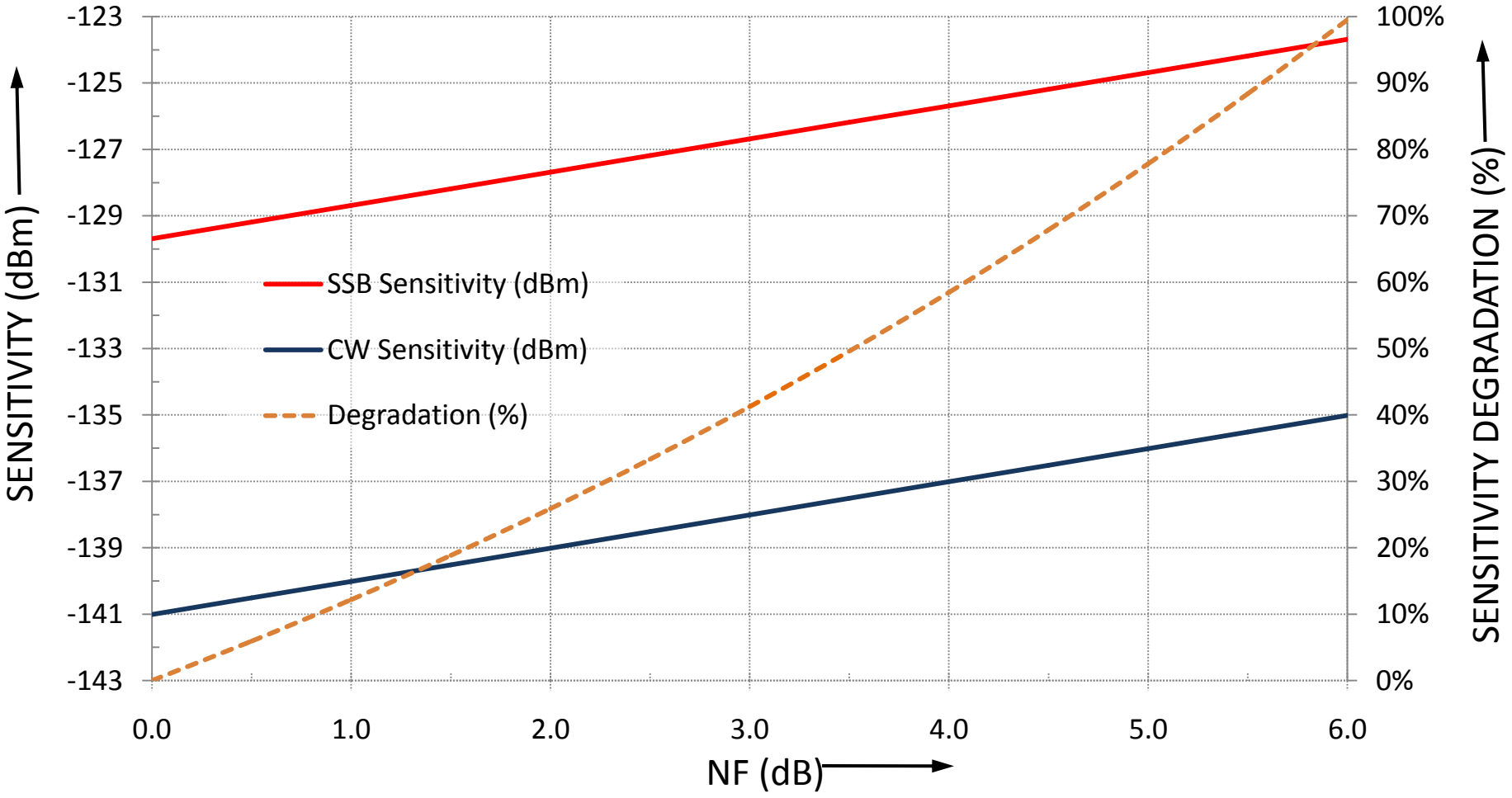
(100 ft, with connectors)



Sensitivity vs NF

SSB: 2.7 KHz BW, 10 dB S/N, 50 Ω

CW: 500 Hz BW, 6 dB S/N, 50 Ω



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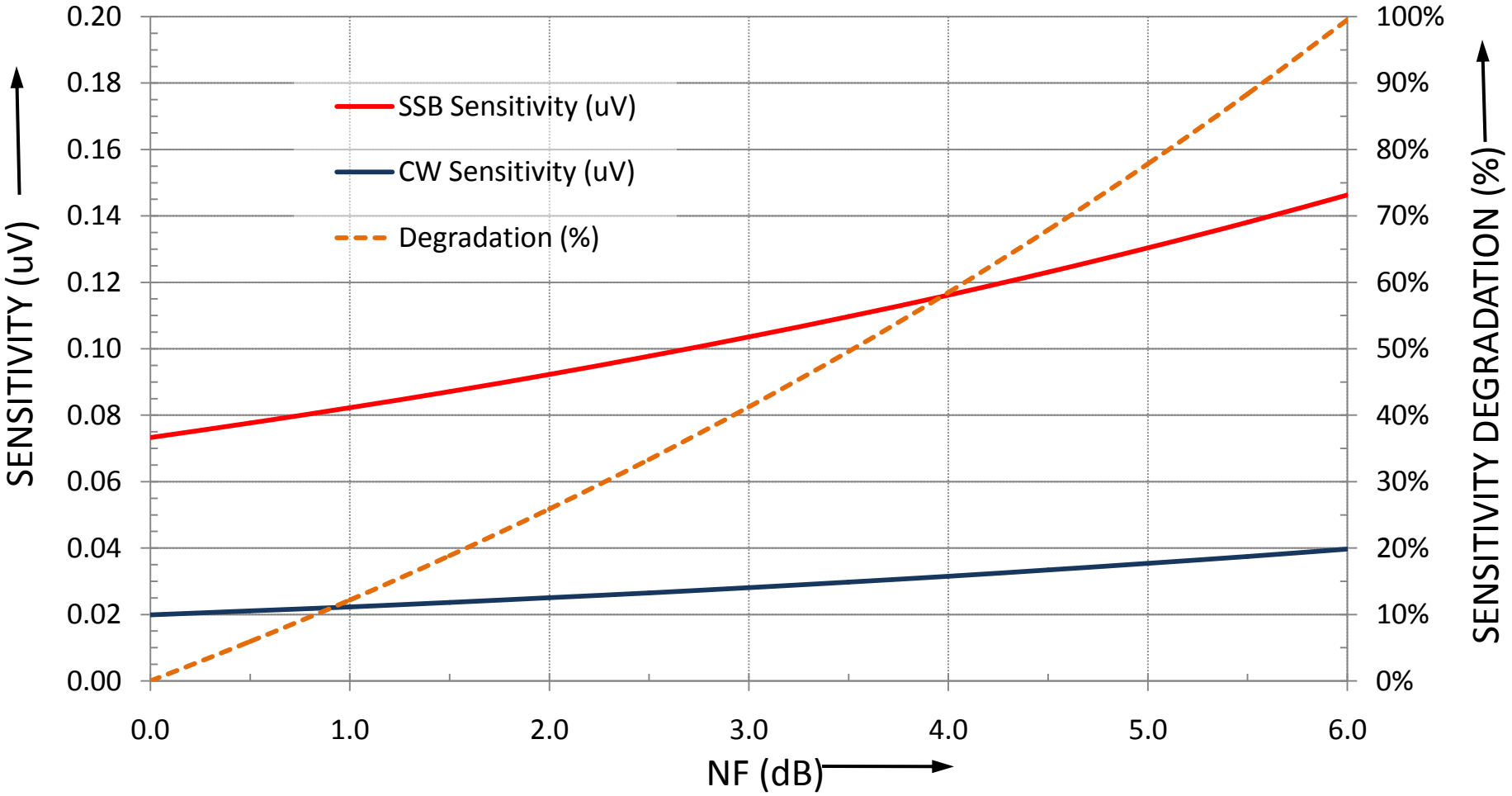
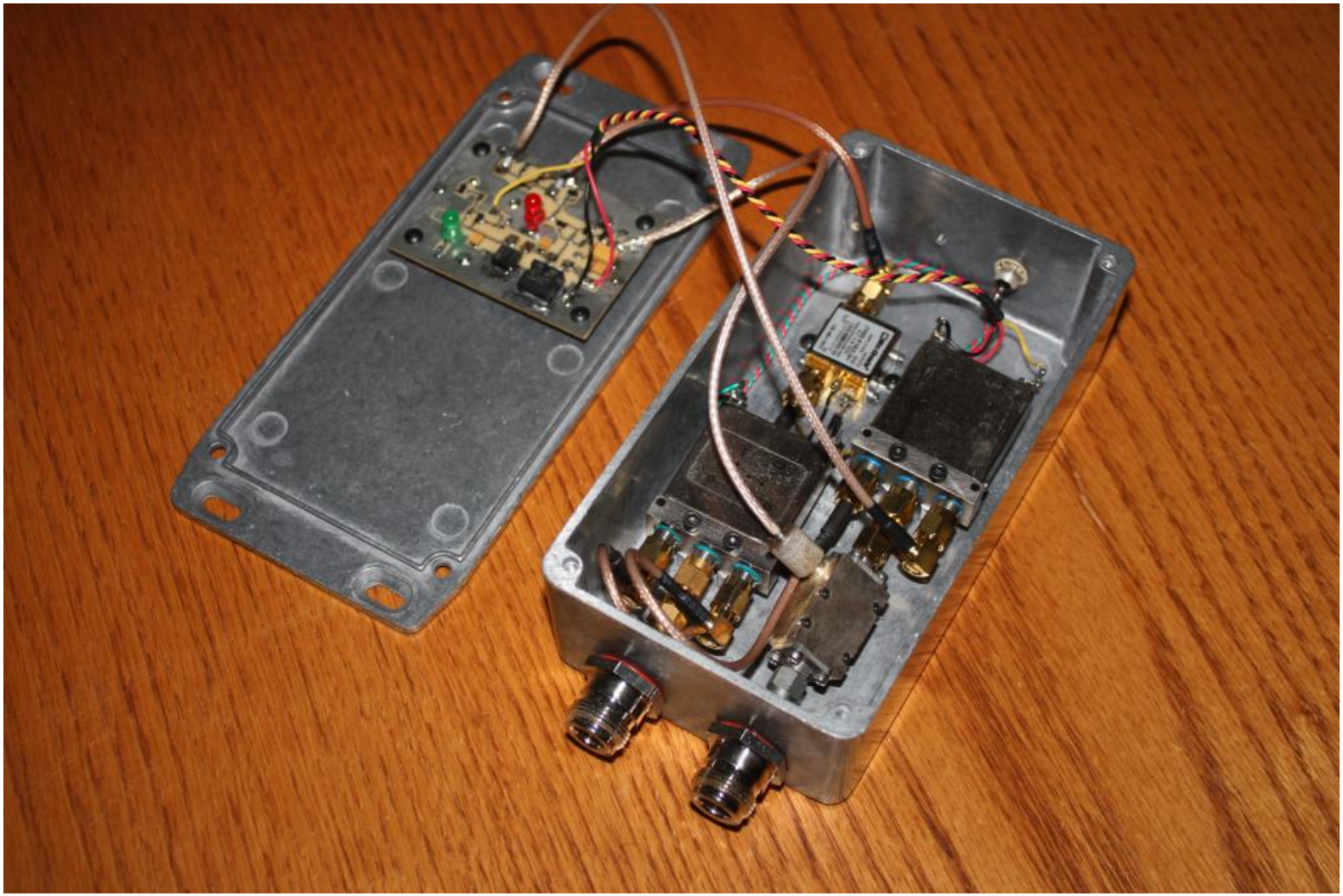
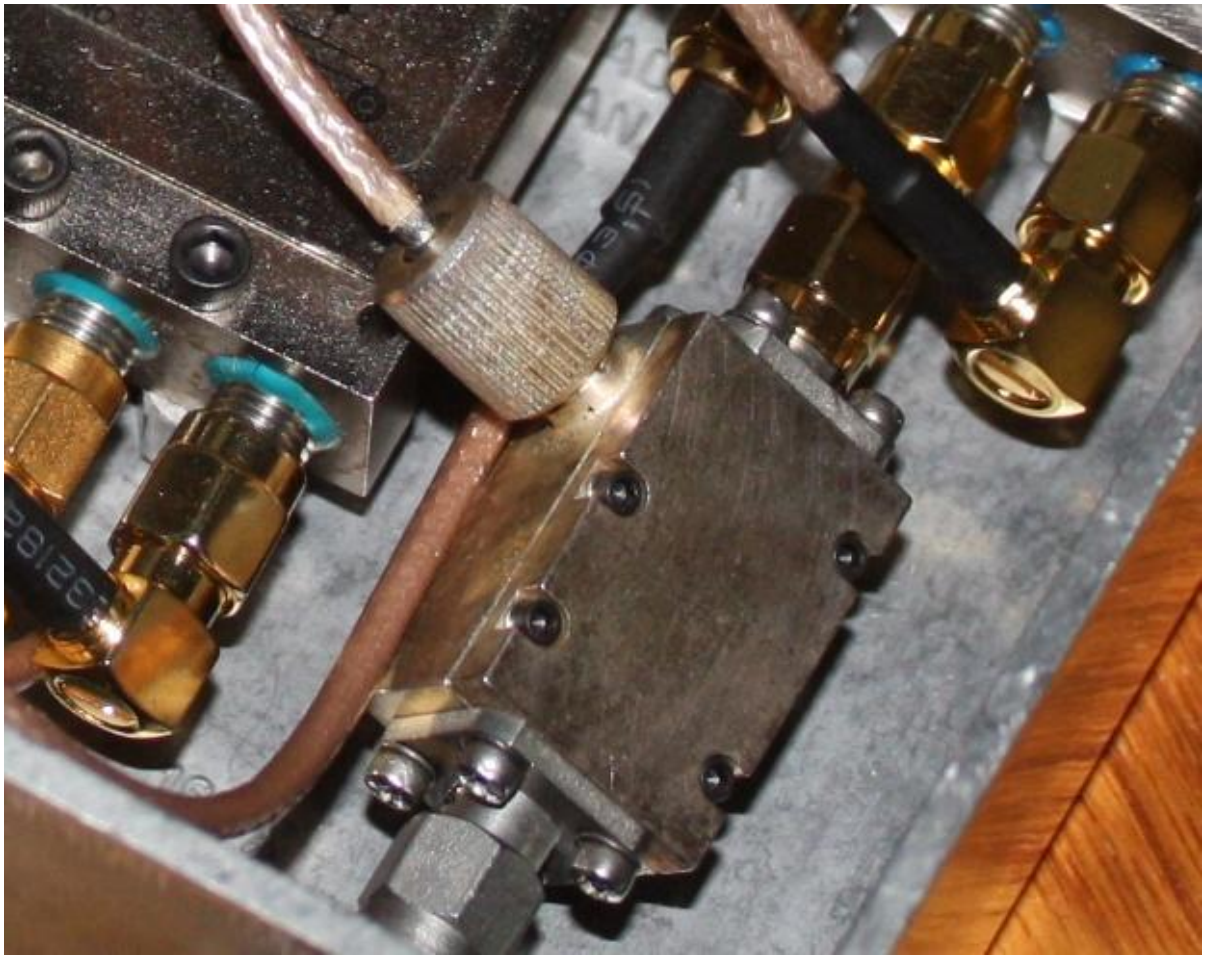


Remote 902 MHz and 1296 MHz LNAs



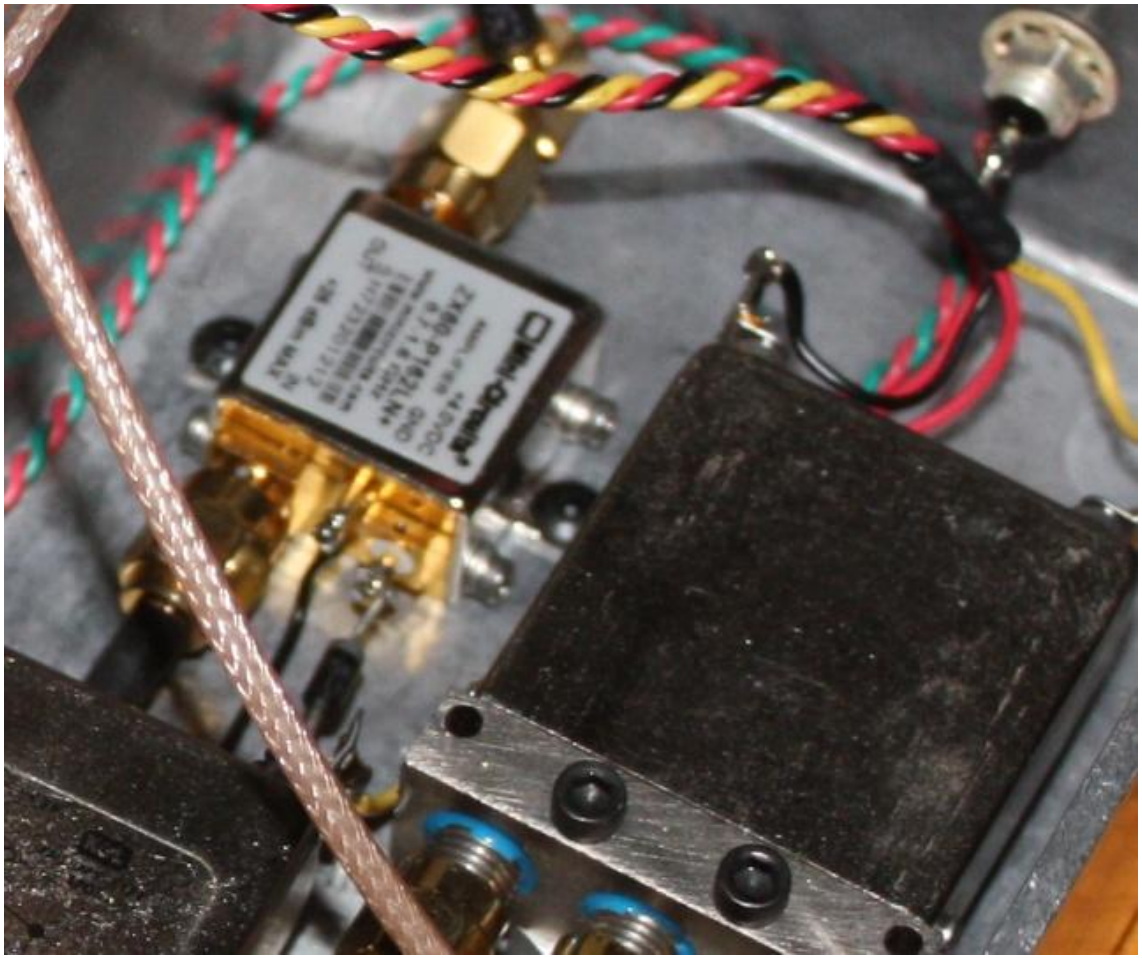
Schottky Detector

CONTROL SENSITIVITY DOWN TO +13 dBm

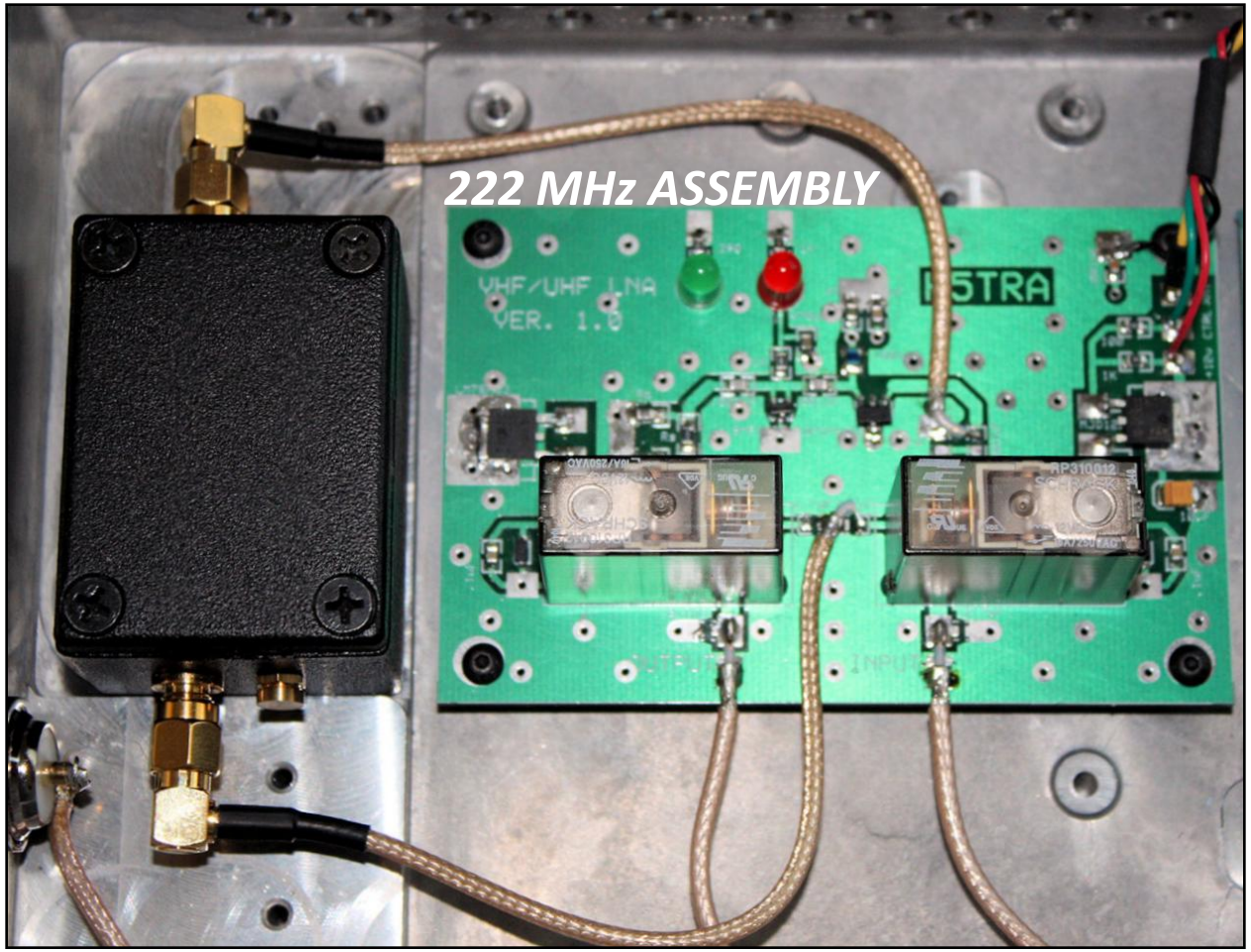


Mini-Circuits ZX60-P162 LNA

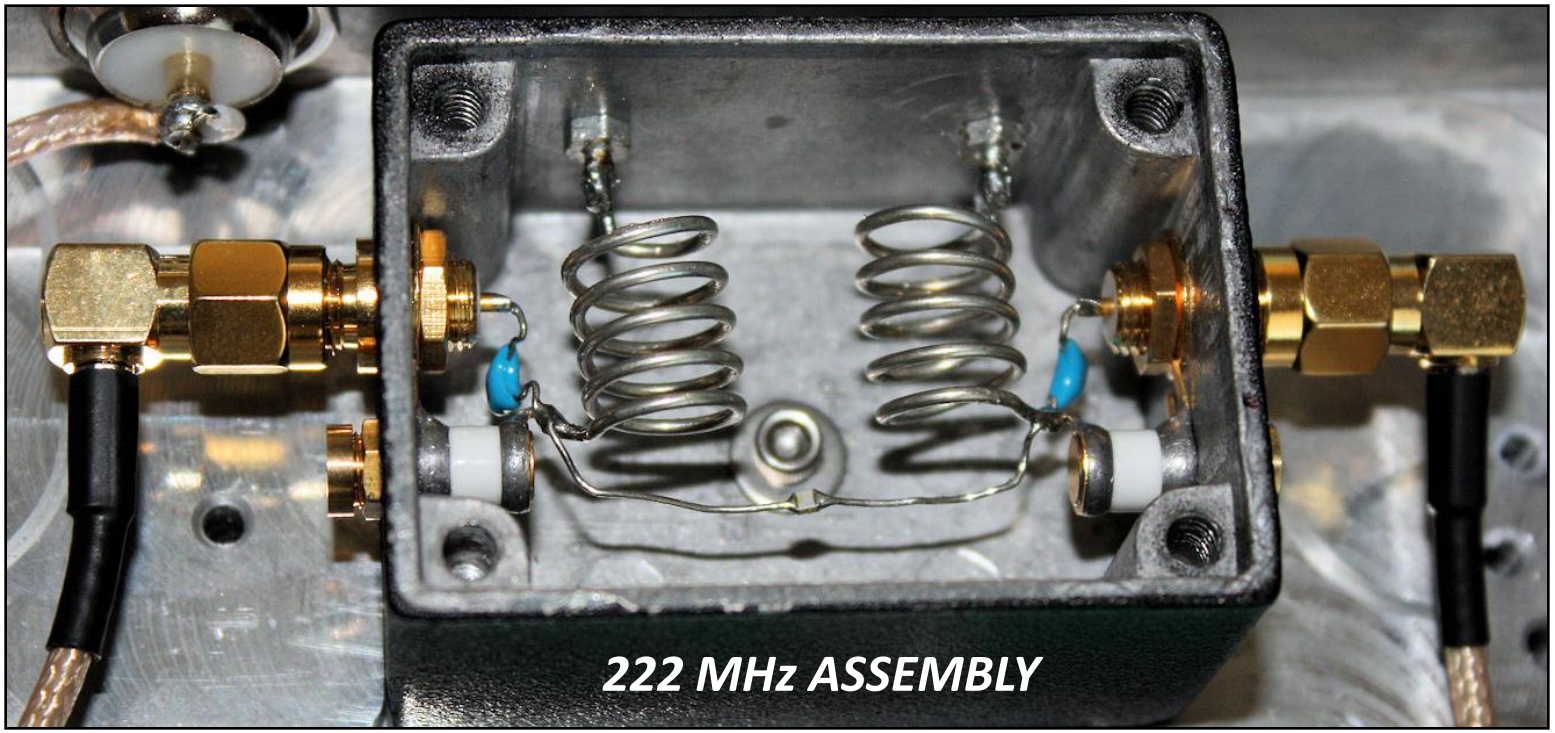
0.5 dB NF and 20 dB gain



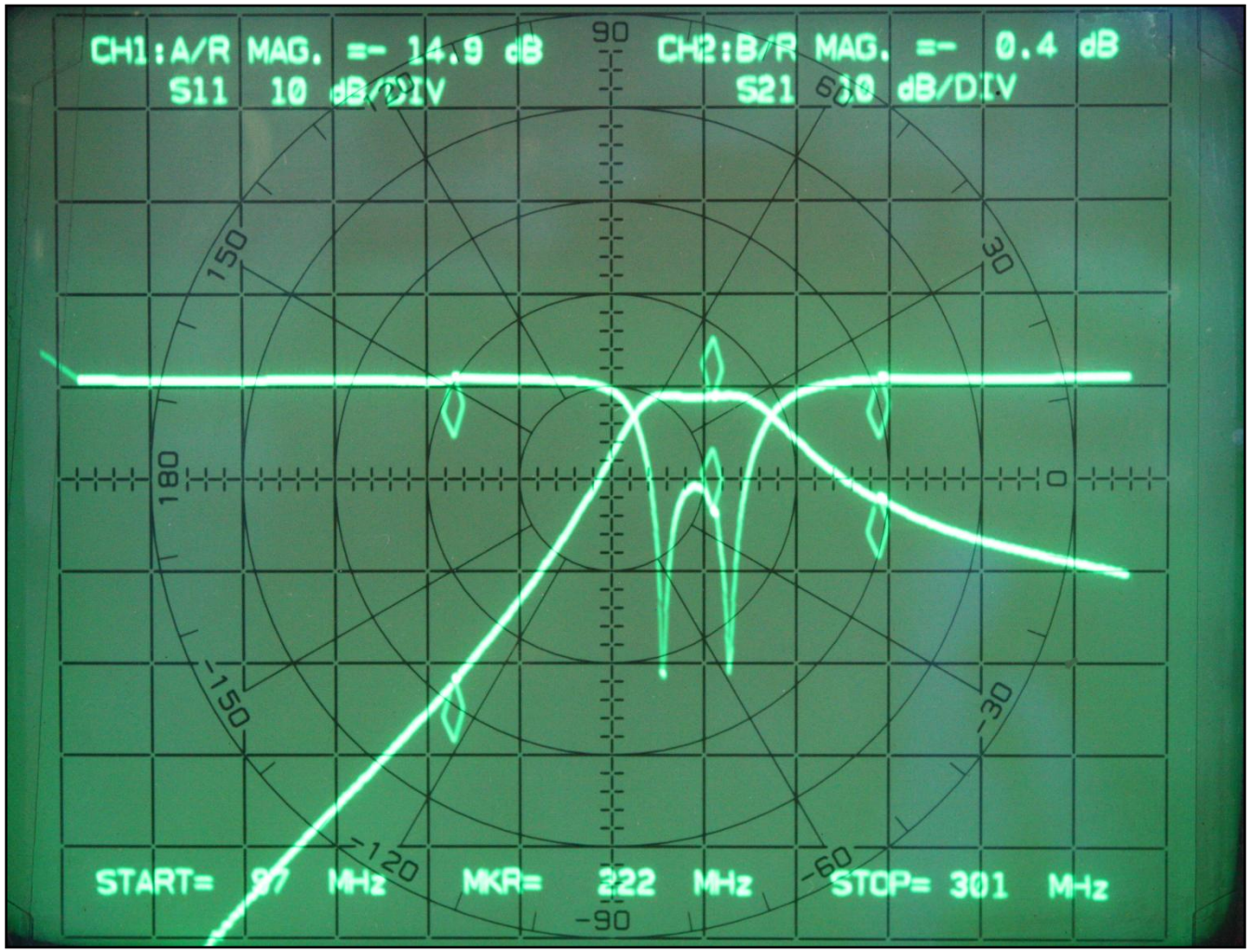
VHF and UHF Remote LNA's



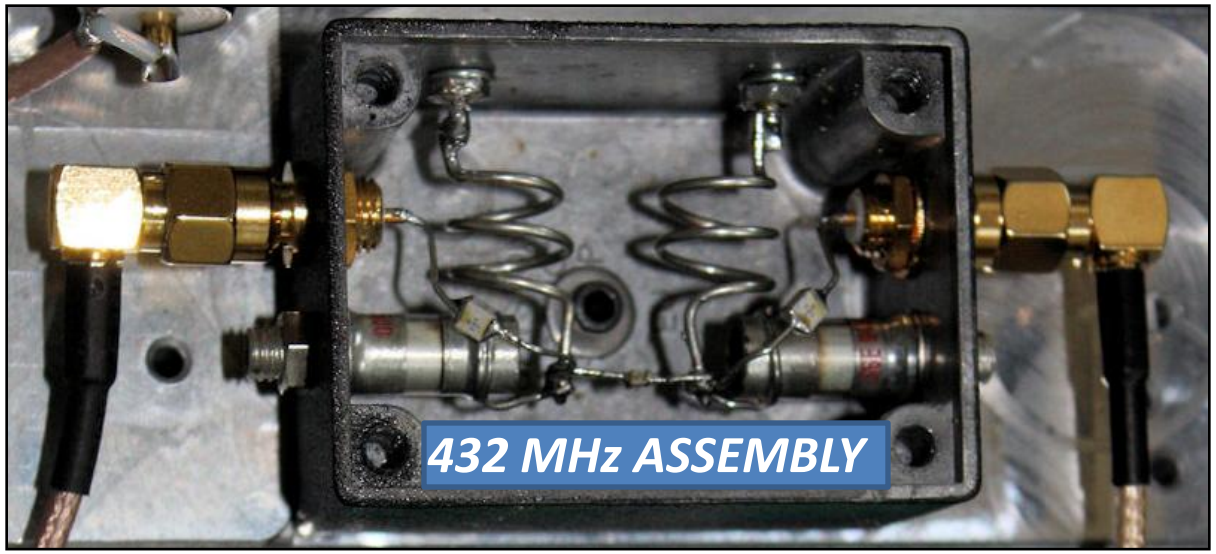
Helical BPF

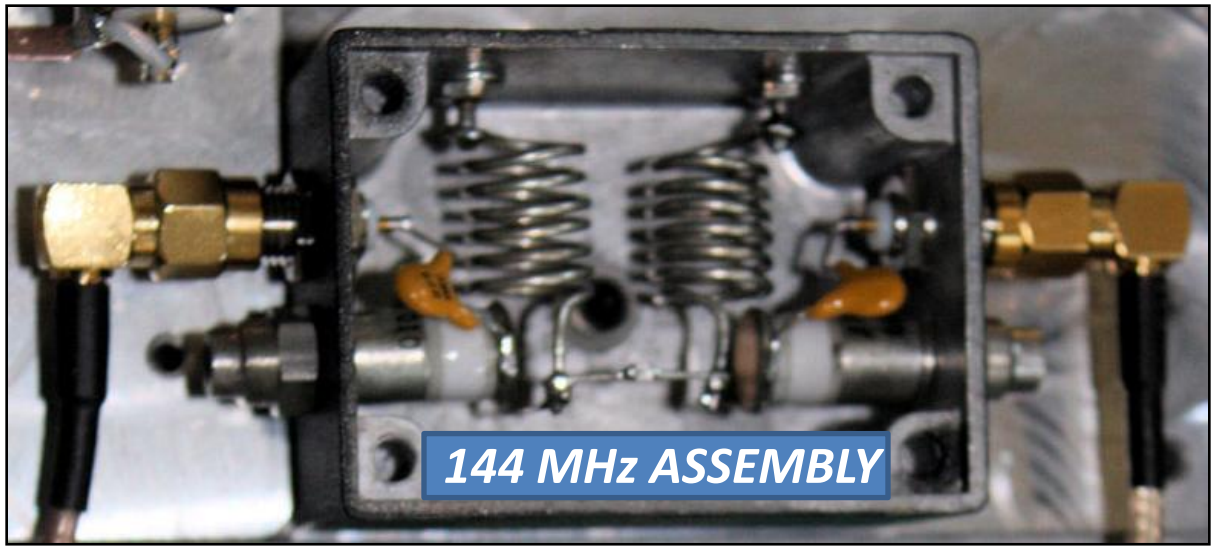


LNA Preselector Response

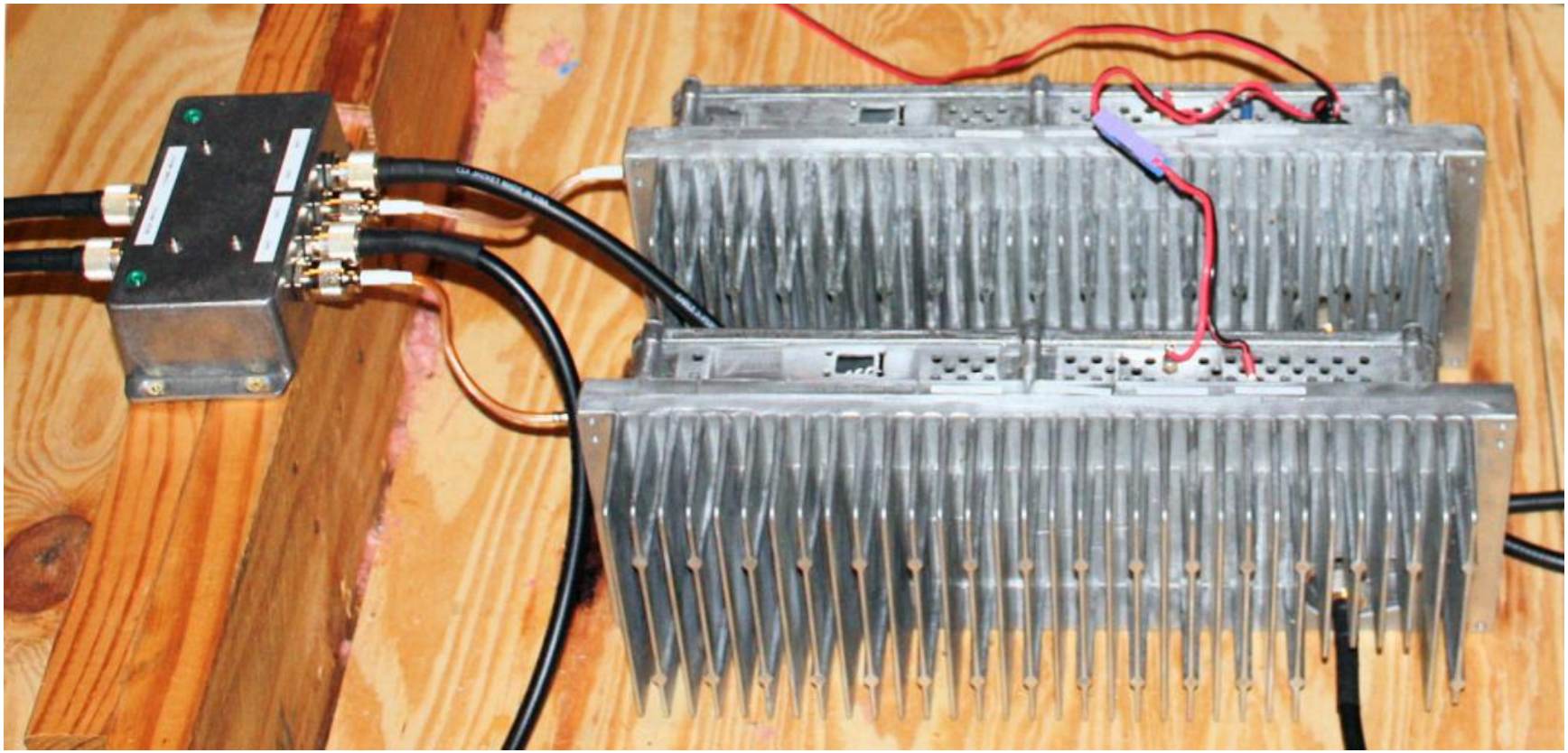


More Helical BPFs

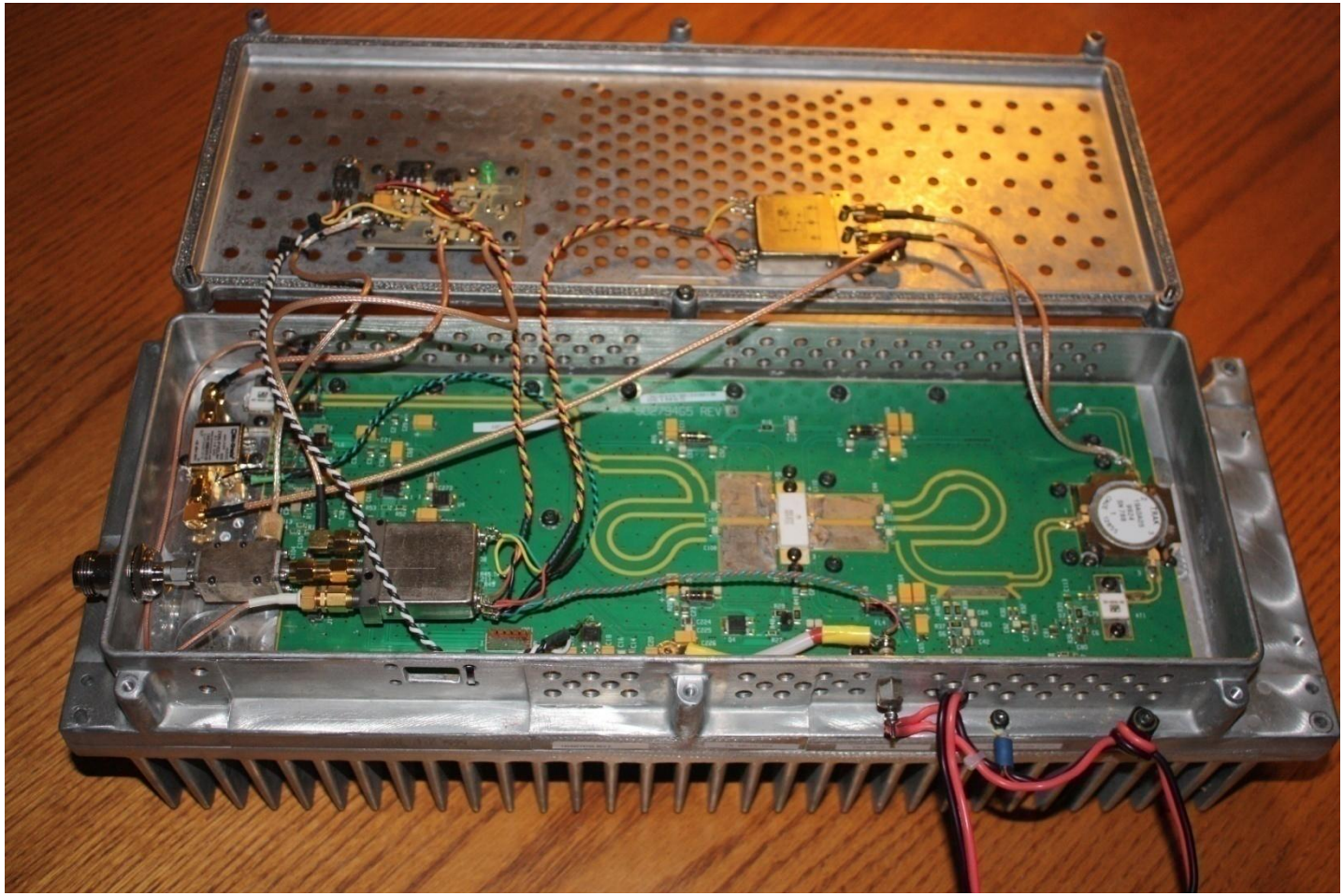




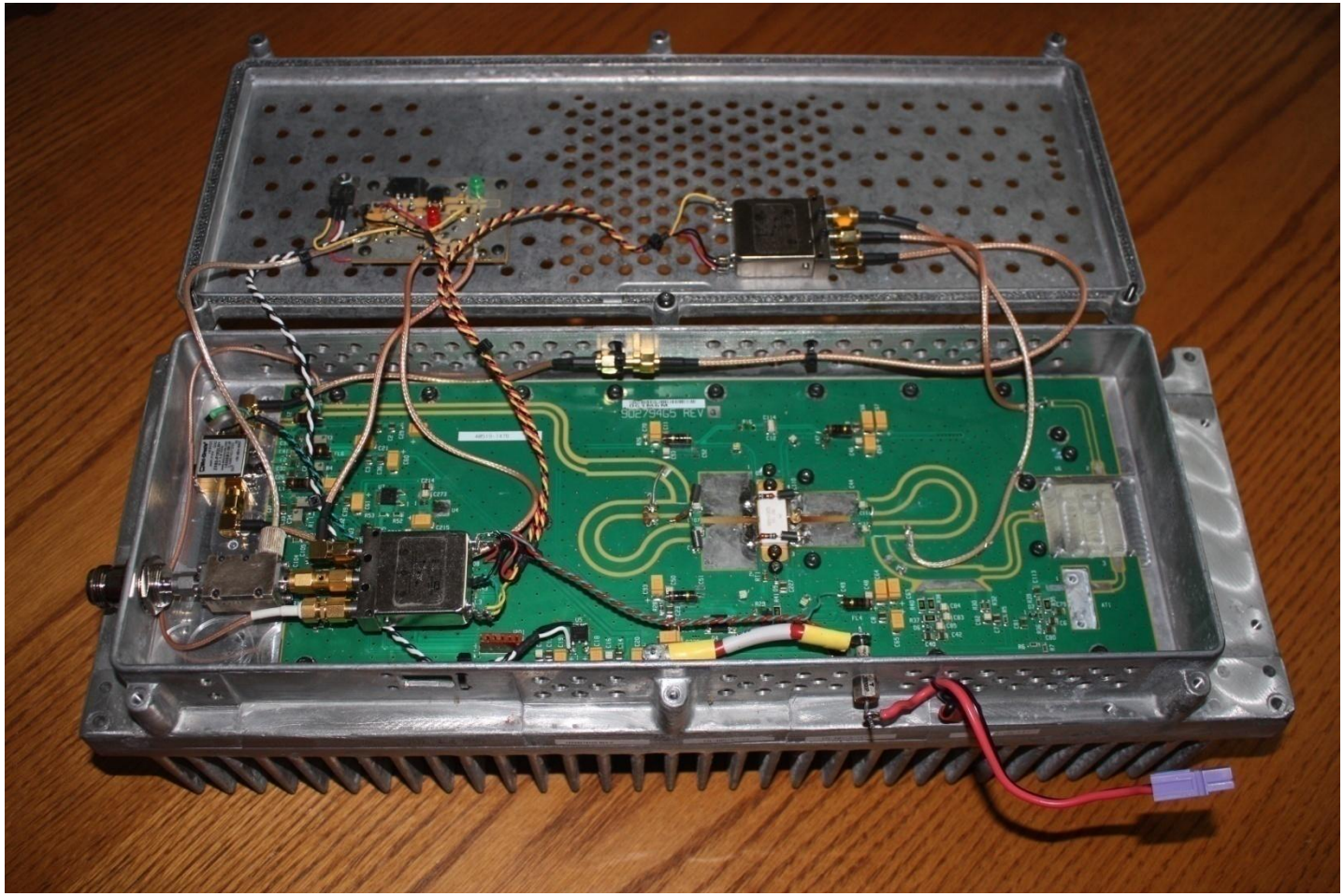
902 MHz and 1296 MHz Remote PA & LNA



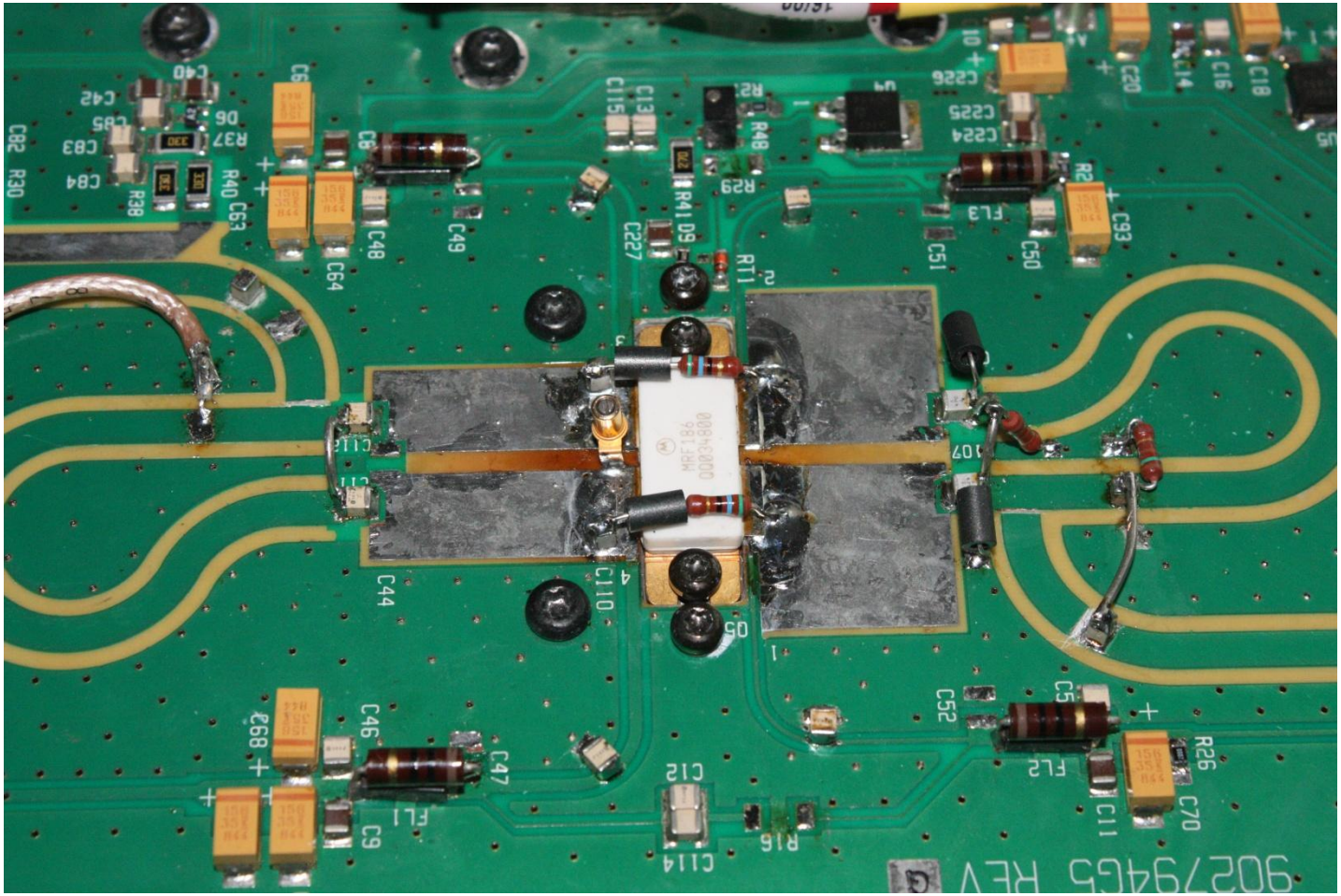
900 MHz Remote PA & LNA



1296 MHz Remote PA & LNA

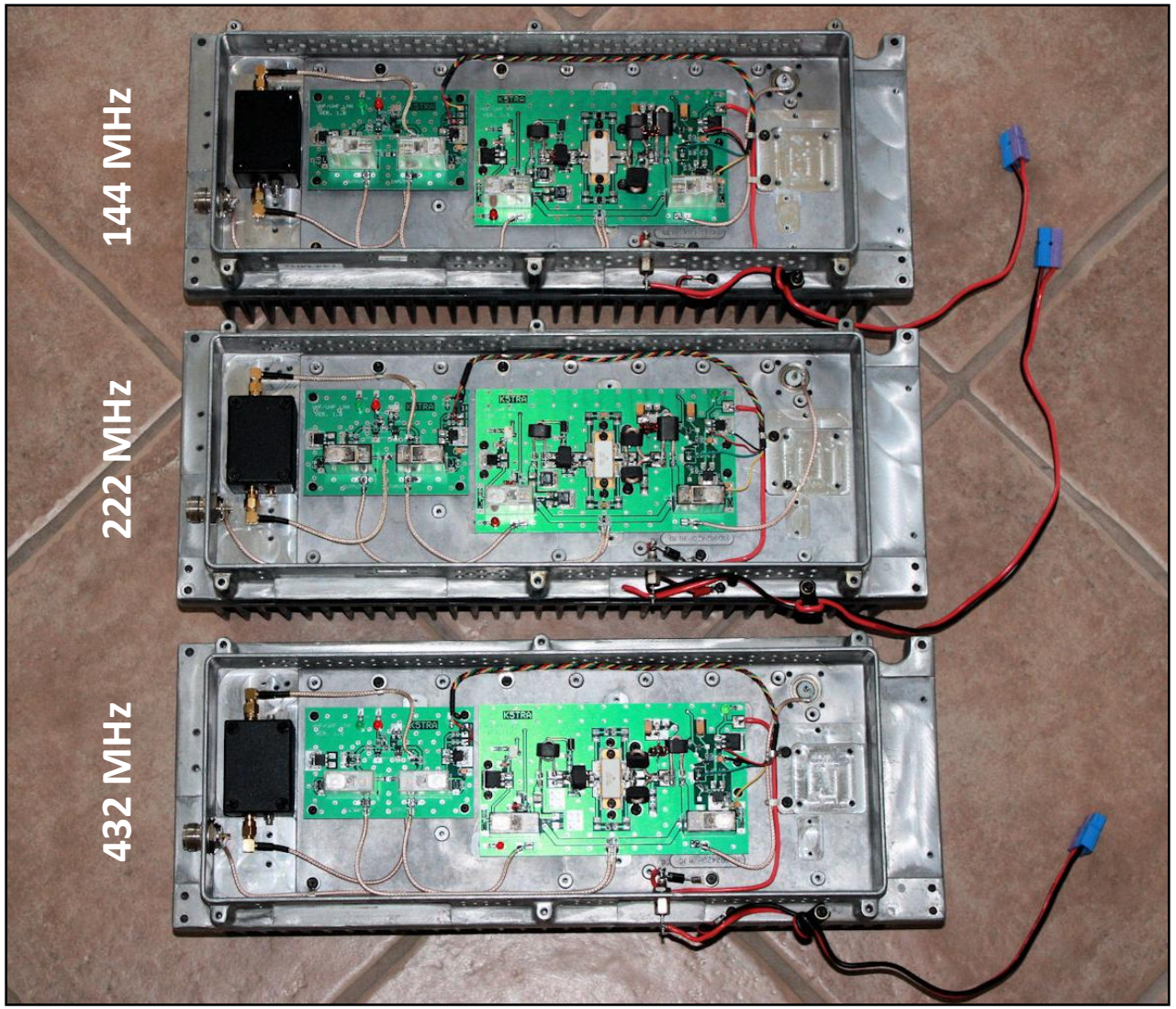


Modified 1296 MHz PA

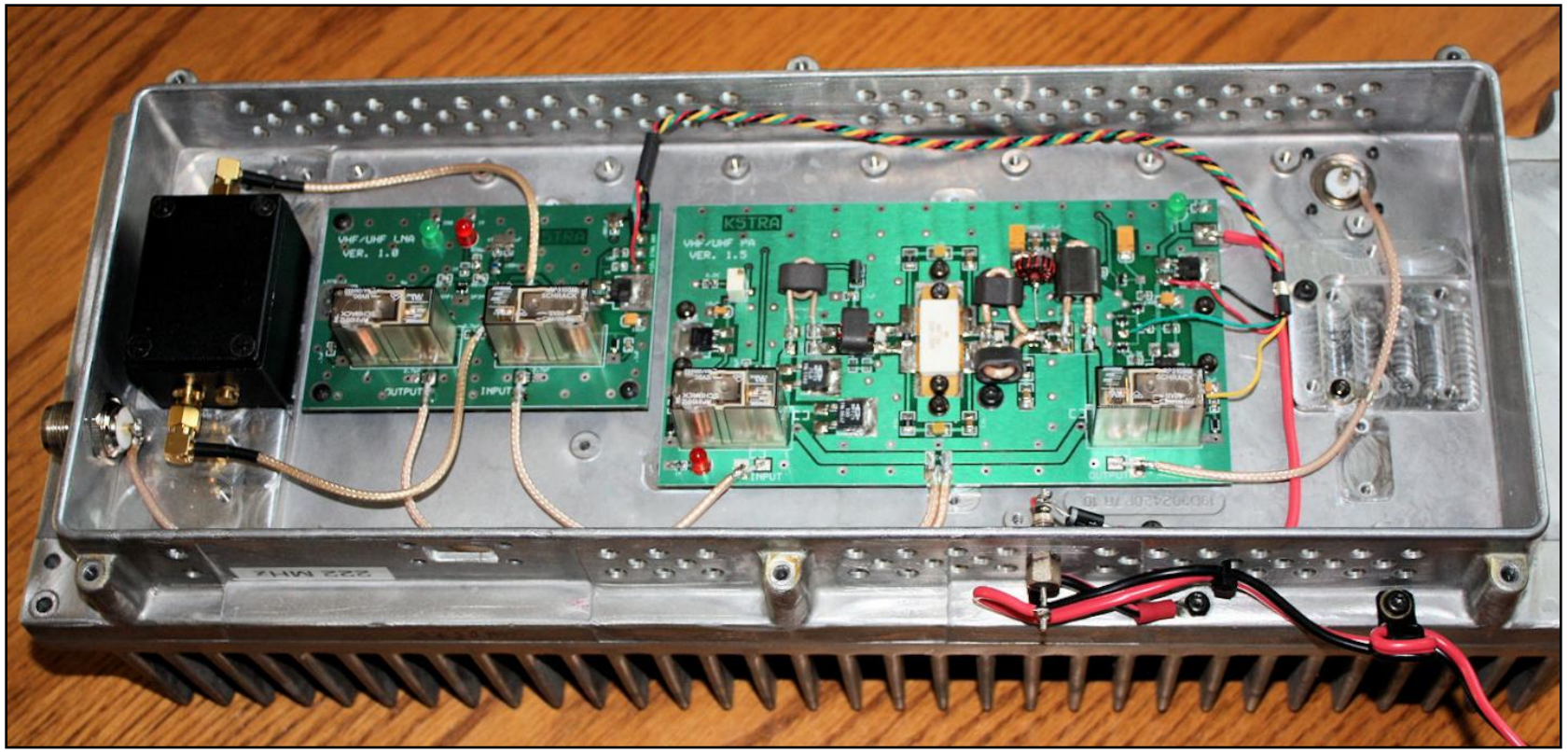


VHF-UHF Remote PA & LNAs

VHF-UHF Remote PA & LNAs



222 MHz Remote PA & LNA



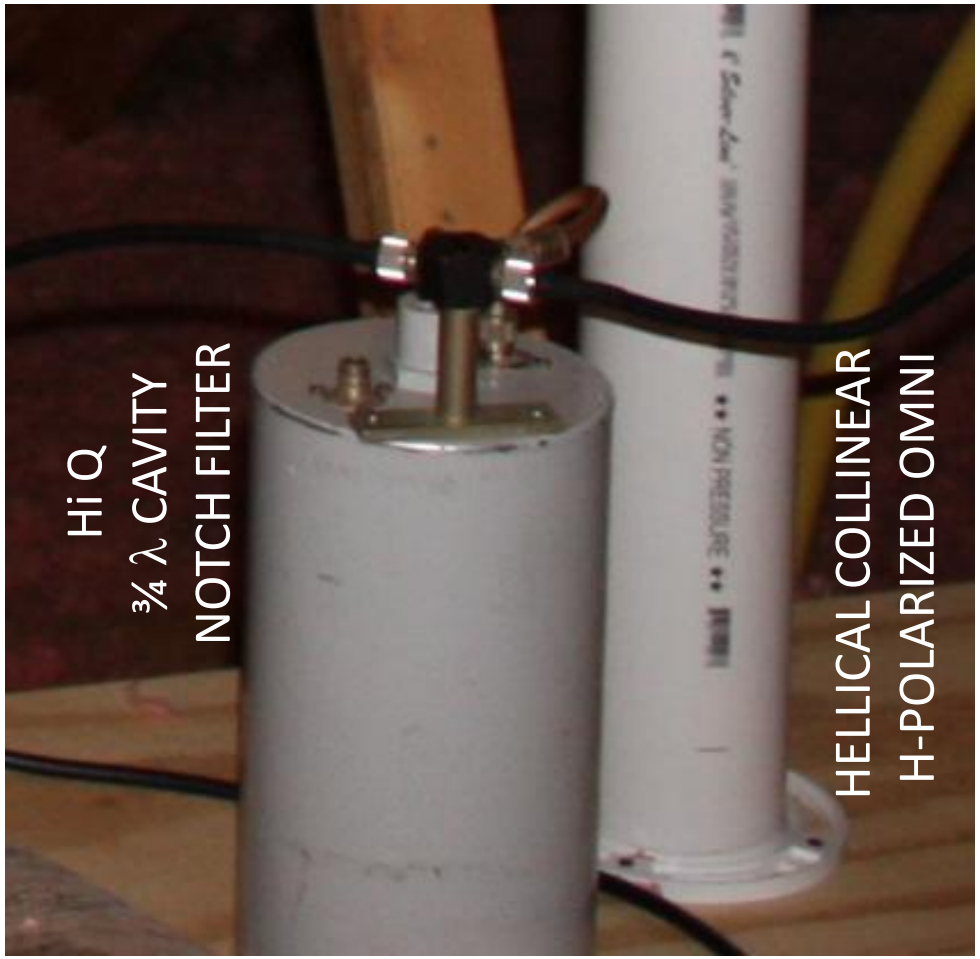
H-Polarized Omni's

222 MHz HELICAL COLLINEAR

1296 MHz HELICAL COLLINEAR

902 MHz HELICAL COLLINEAR

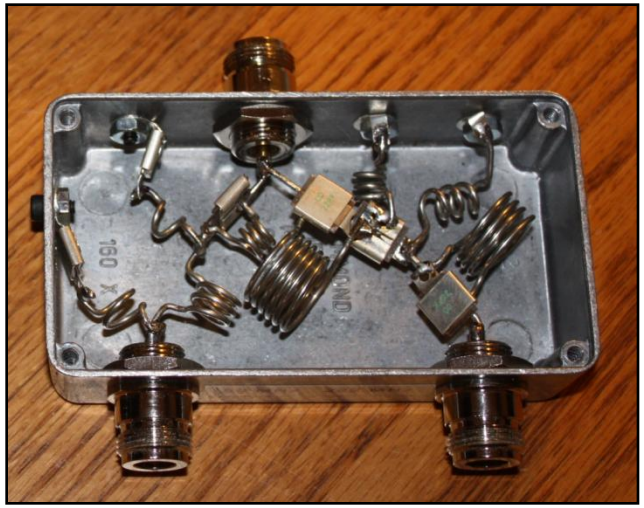
927 MHz Notch Cavity with 902 MHz Omni



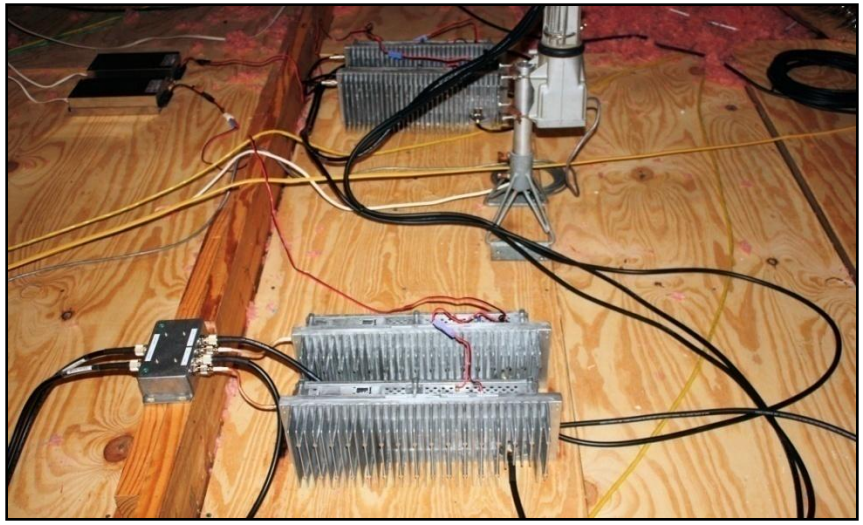
Link Radios Share Feedline and Antenna

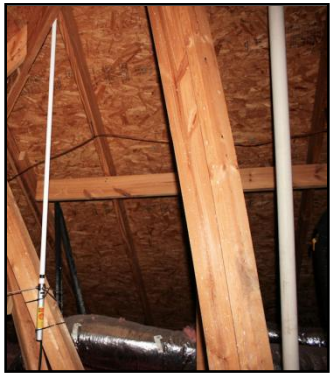
Crossband Couplers

(BAND SPLIT DIPLEXERS)



Some Attic Photos





Summary

- Location, location, location ! (elevation, elevation, …)
- Plan before you begin
- Key to performance:
  - Remote LAN with BPF ⇐ Establish NF at antenna !
  - Remote PA
  - Filters needed for co-located links and repeaters
  - Crossband couplers for efficient use of coax runs
  - Link radios can share feed and antenna through cavity duplexer
- No rain, lightning or UV deterioration
- Easy maintenance