

# Remote PA & LNA



*For 902 & 1296 MHz*

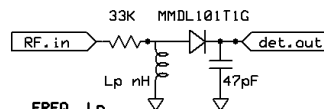
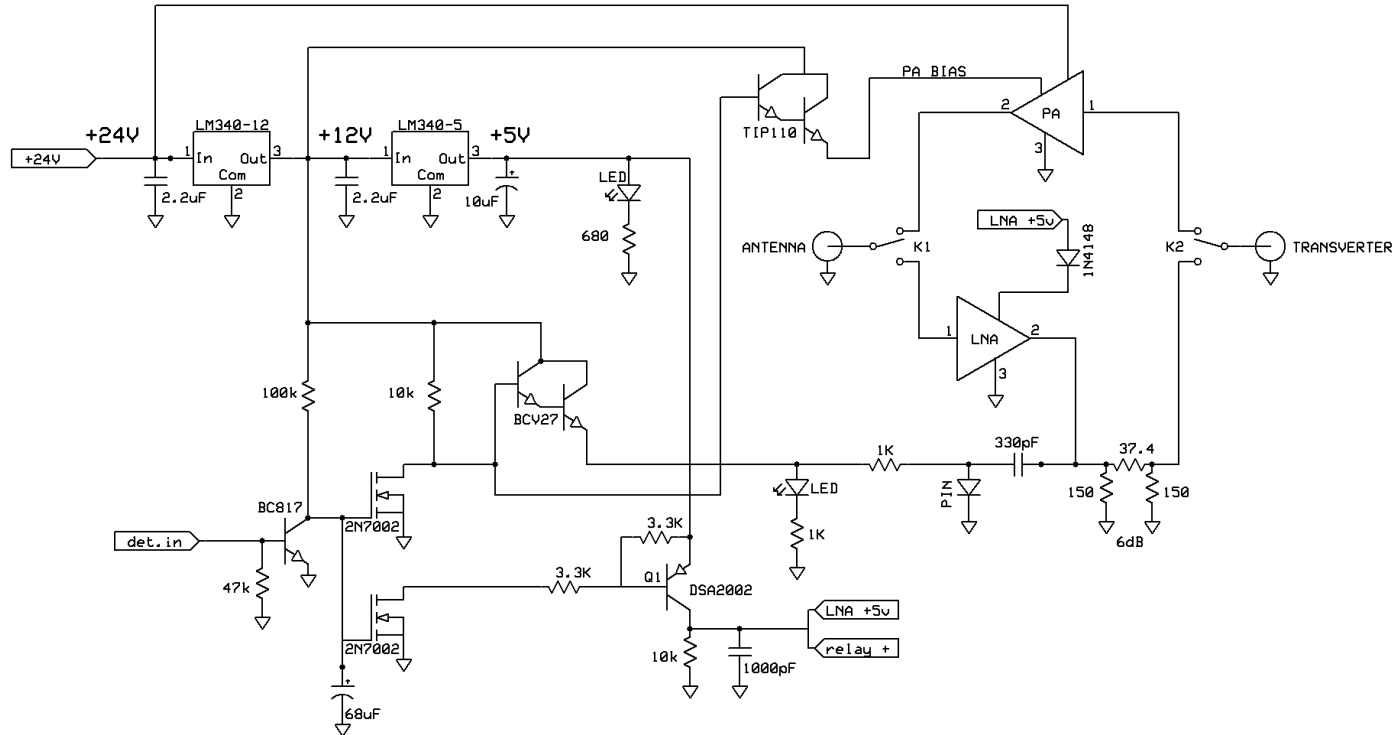
# Overview

- Remote PAs and LNAs for operation at the antenna
- Units constructed for 902 MHz and 1296 MHz
- GE MASTR-III 800 MHz 120W PAs used as basis
  - Pushpull final stage used
  - 1296 PA required significant modification from original
- Mini-circuits ZX60-P162 LNA provides:
  - 0.5 dB NF @ 902 MHz and 0.56 dB NF @ 1296 MHz
  - +23 dB gain @ 902 MHz and + 21 dB gain @ 1296 MHz
- T/R switching is drive sensed
- Schottky detector circuit is tweaked for sensitivity
  - As low as +13 dBm will key the control circuit
- TX key hold time constant is 1.2 seconds

# Control

- RX mode:
  - LNA is powered ON
  - PA BIAS is removed
  - Coaxial relays select LNA signal path
- TX mode:
  - LNA is powered OFF
  - LNA PIN protect is turned ON
  - PA BIAS turned ON
  - Coaxial relays select PA signal path

# Remote LNA Control

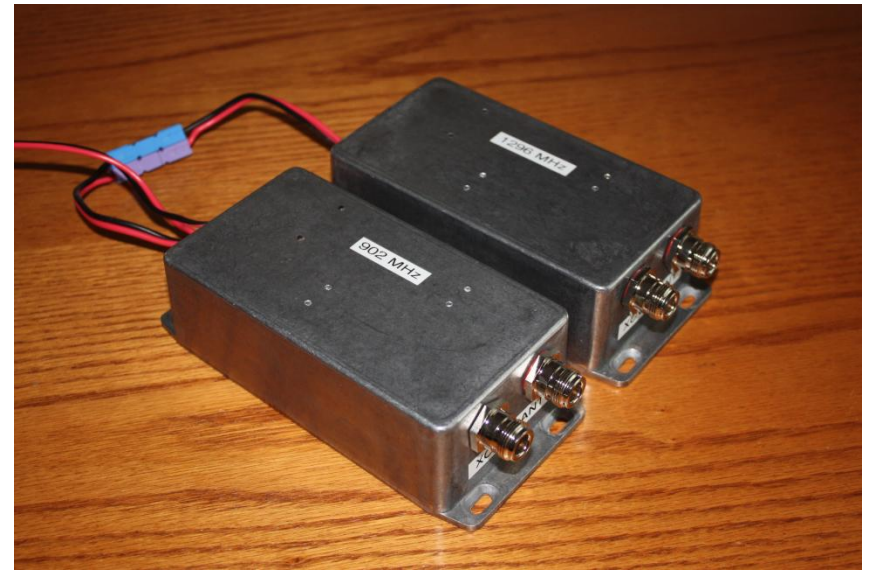
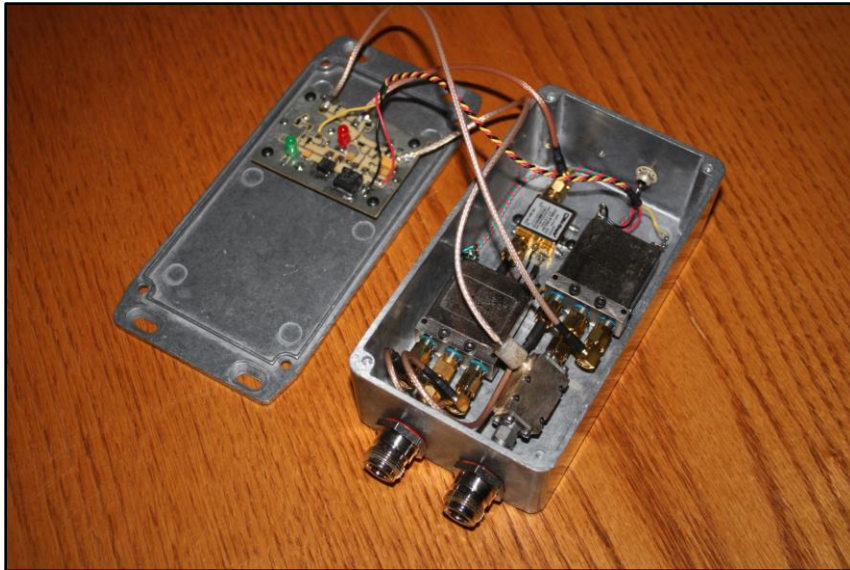


| FREQ | Lp |
|------|----|
| 902  | 27 |
| 970  | 22 |
| 1180 | 12 |
| 1300 | 10 |

***$L_p$  is selected for best sensitivity in the operating band***

|                      |            |  |
|----------------------|------------|--|
|                      |            |  |
| Remote Relay Control |            |  |
| K5TRA / T. Ape1      | Rev 2.0    |  |
|                      | 01/20/2013 |  |

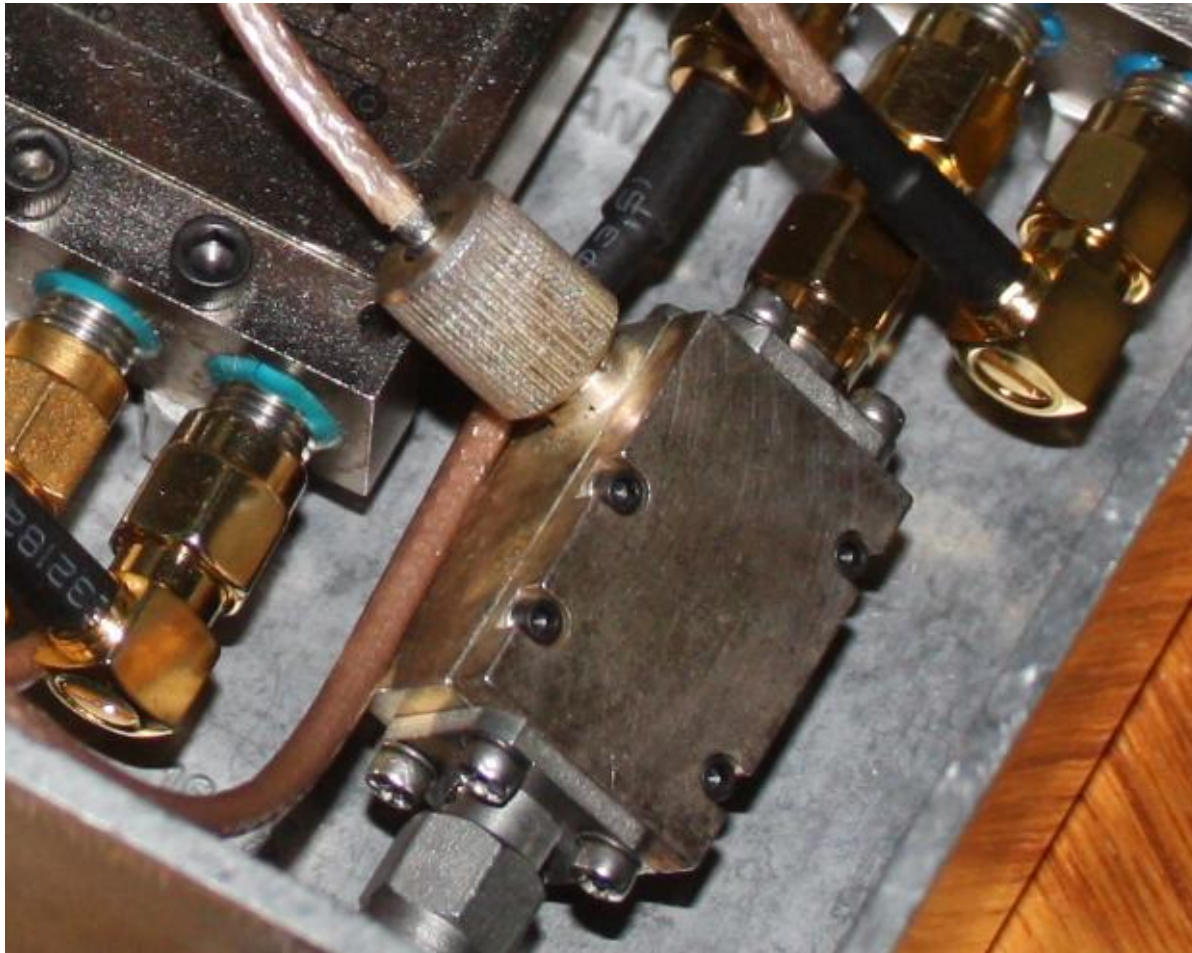
# Previously Presented: Remote LNAs





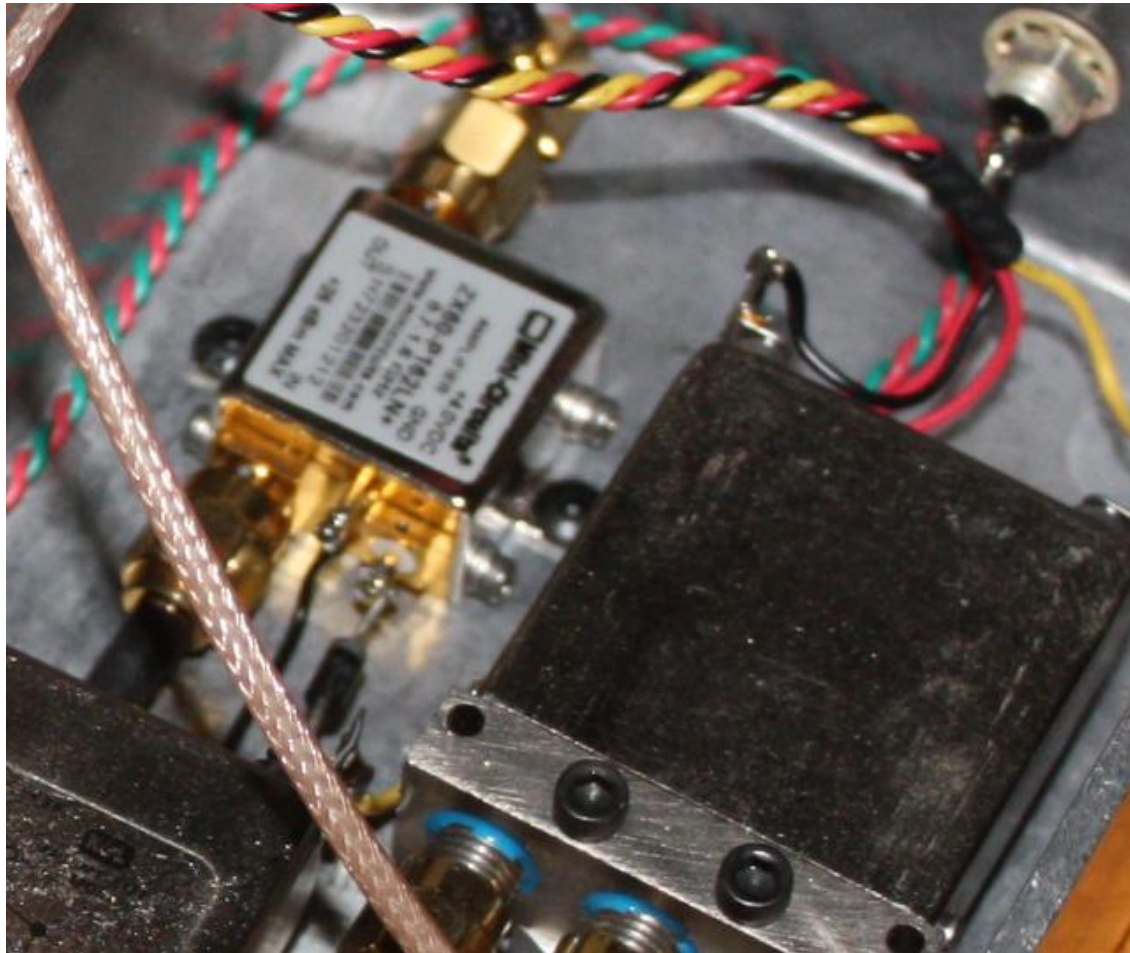
# Schottky Detector

*CONTROL SENSITIVITY DOWN TO +13 dBm*



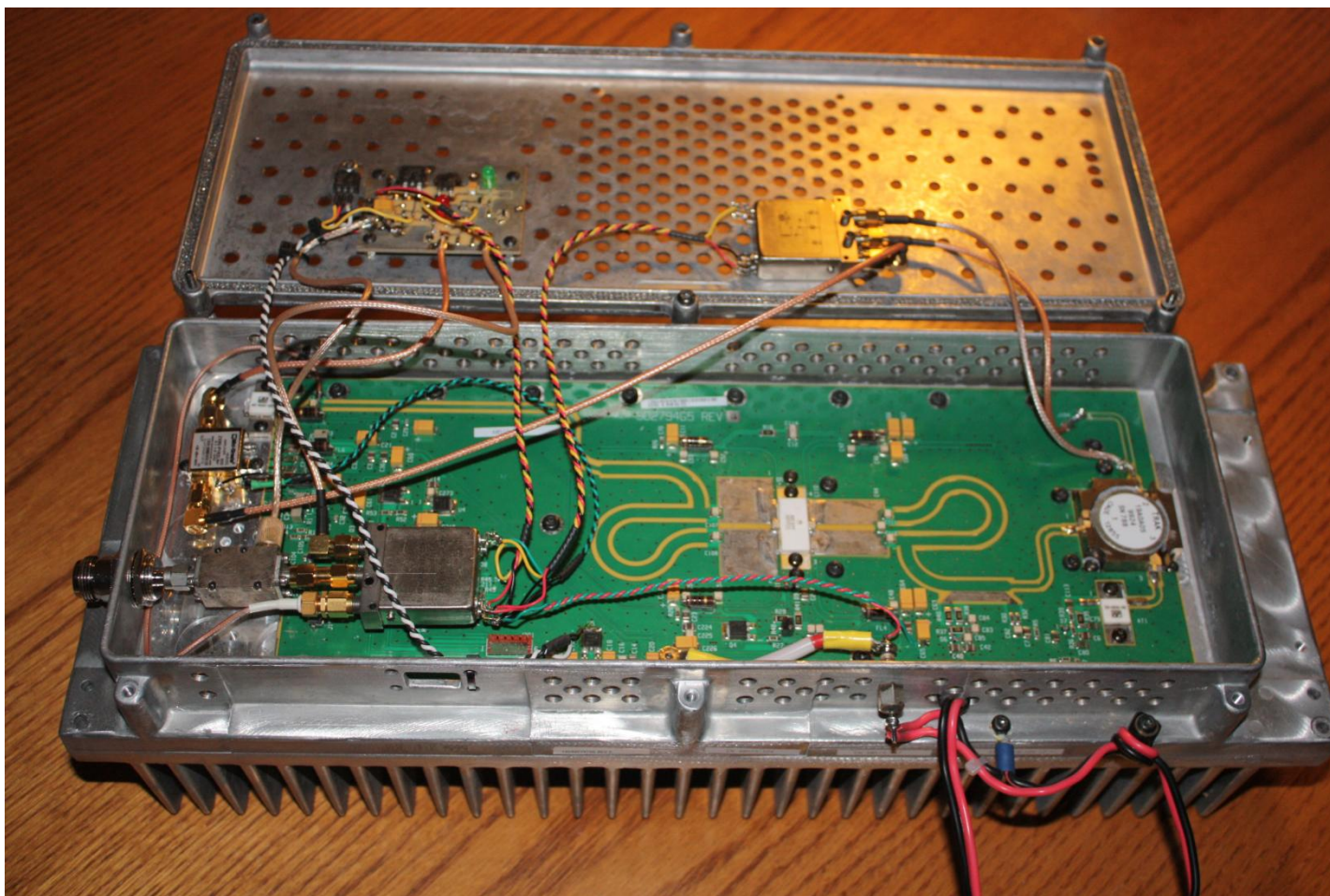
# Mini-Circuits ZX60-P162 LNA

*0.5 dB NF and 20 dB gain*



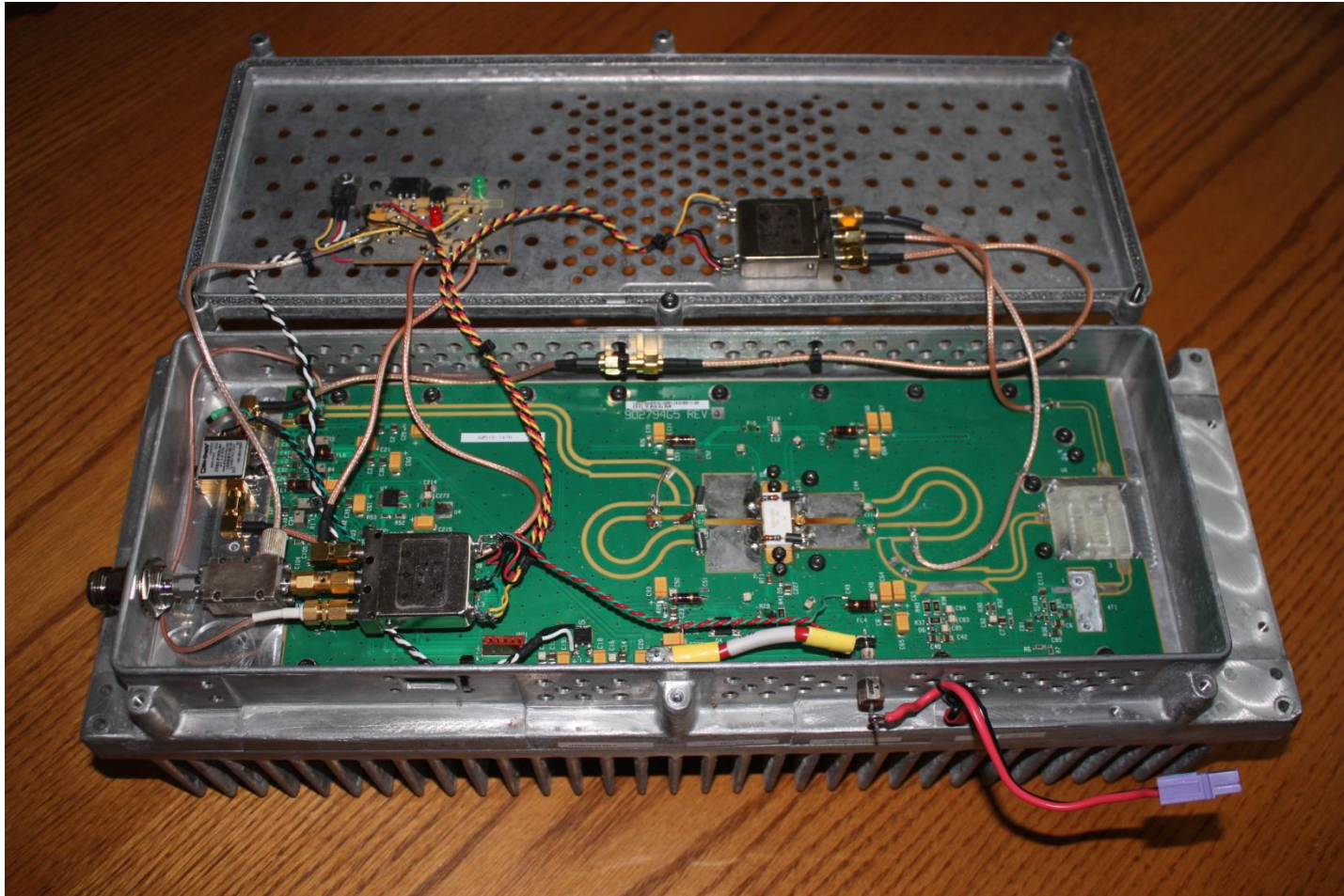


# 900 MHz Remote PA & LNA





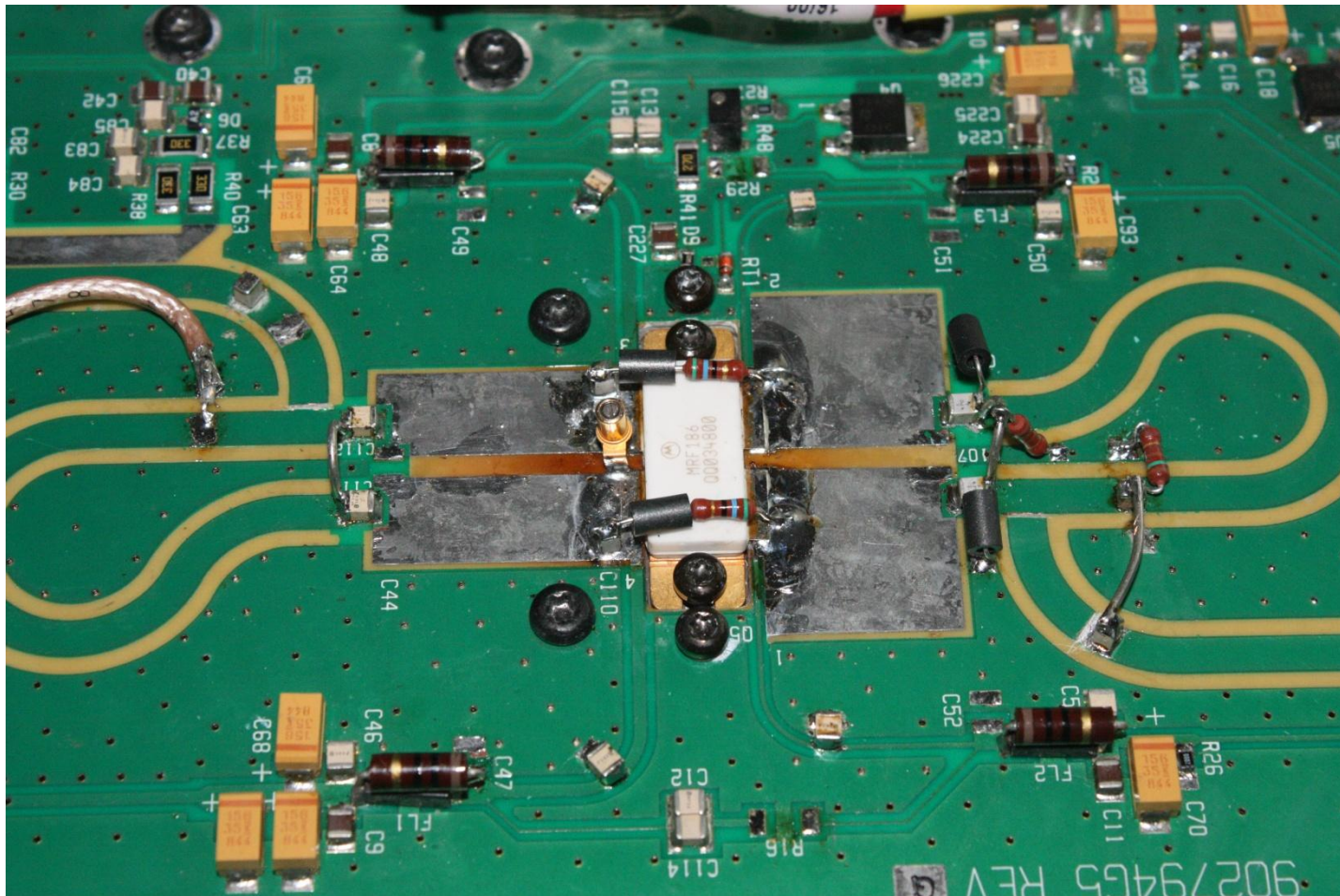
# 1296 MHz Remote PA & LNA



# PA modifications for 1296 MHz

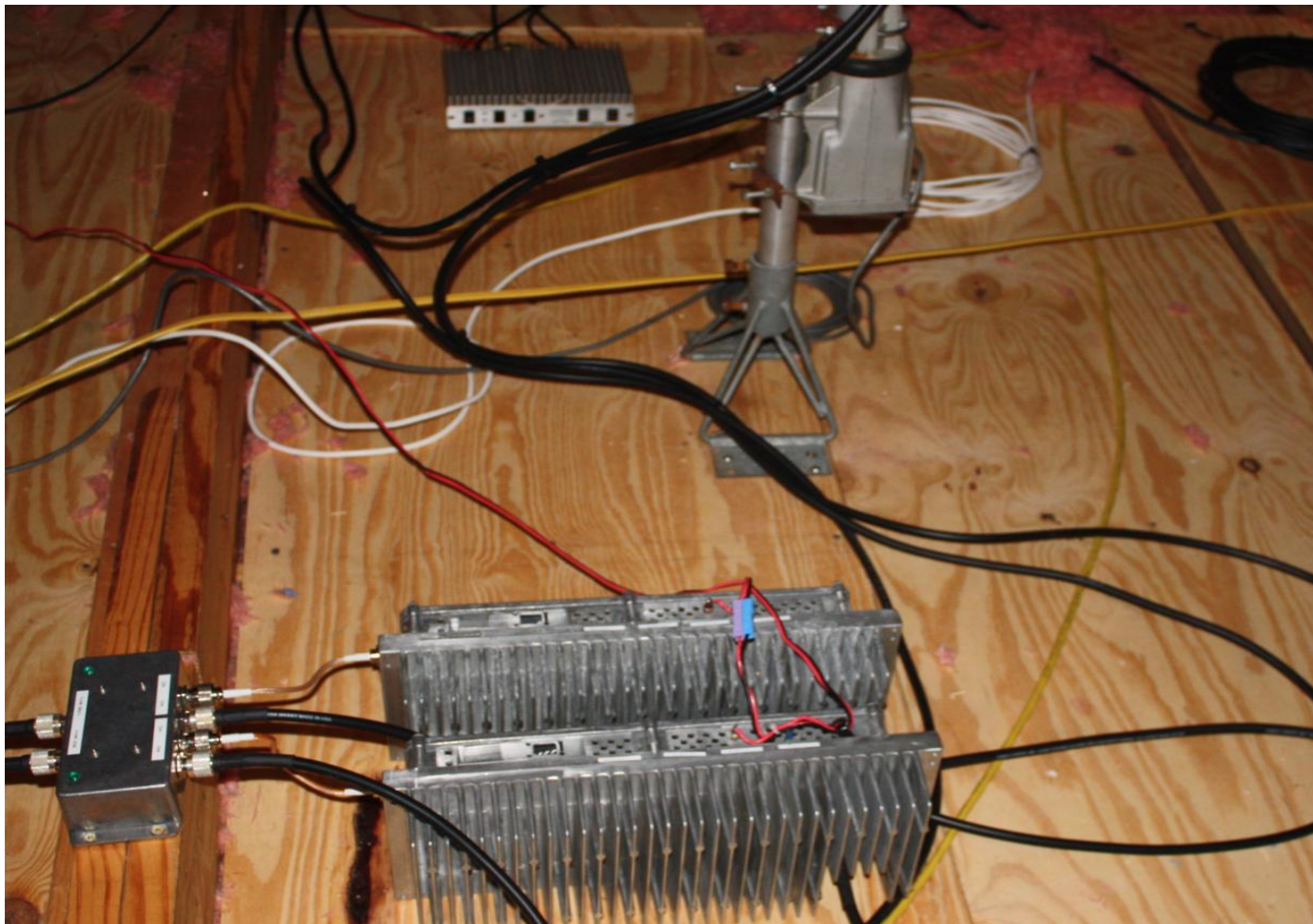
- Remove 900 MHz circulator
- Replace MRF899 (BJT) with MRF186 (LDMOS)
- Modify bias circuit for FET (4.5v instead of BJT 0.7v)
- Retune bias  $\frac{1}{4} \lambda$  lines for 1296 (move bypass caps)
- Cut feed to  $180^\circ$  lines and move tap points
- Apply new matching to input & output circuits
- Add stability feedback
- Remove driver module

# Modified 1296 MHz PA





# Installed Remote PA/LNAs





902: 17 Elements      1296: 44 Elements

