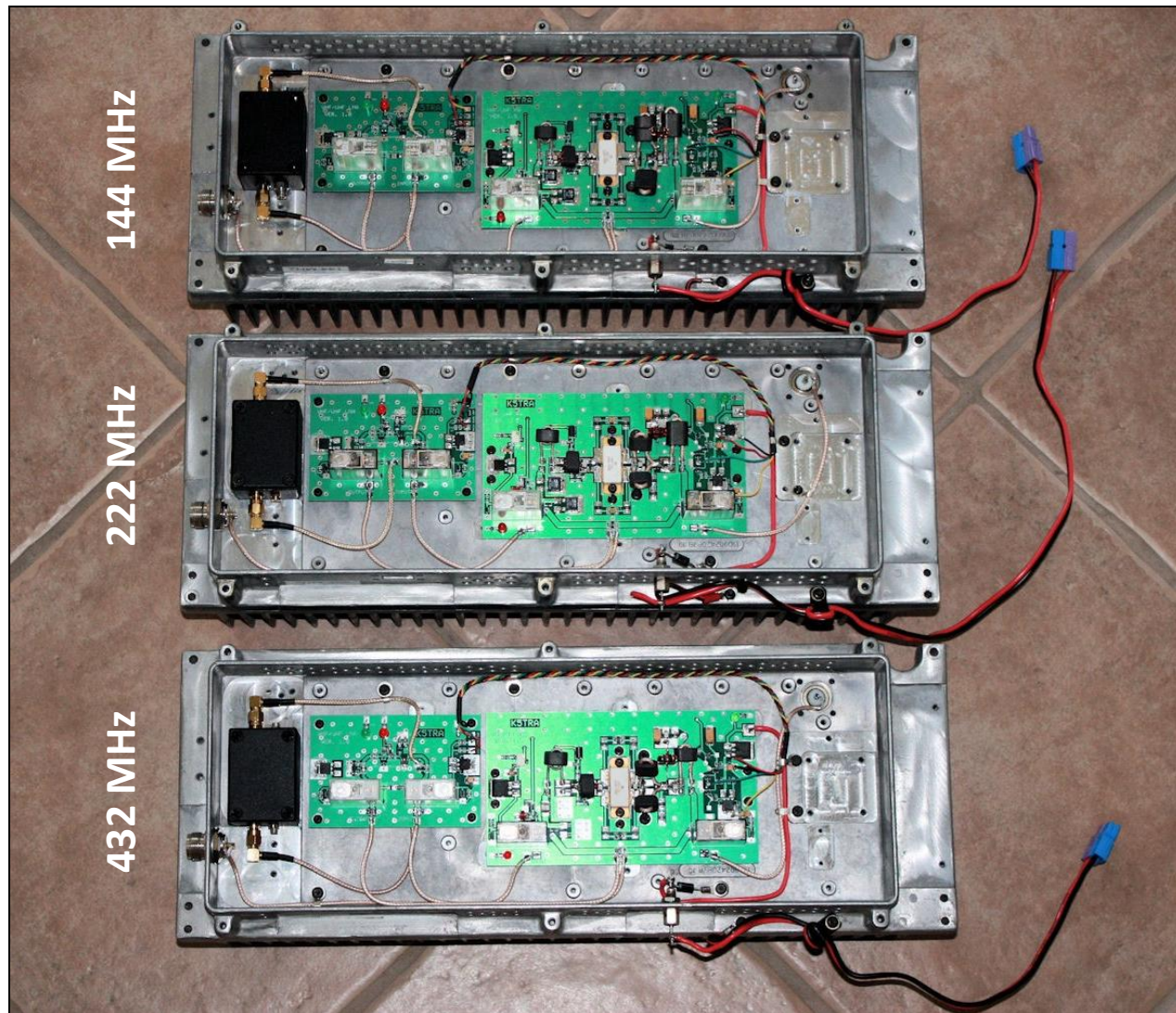


# Remote PA & LNA

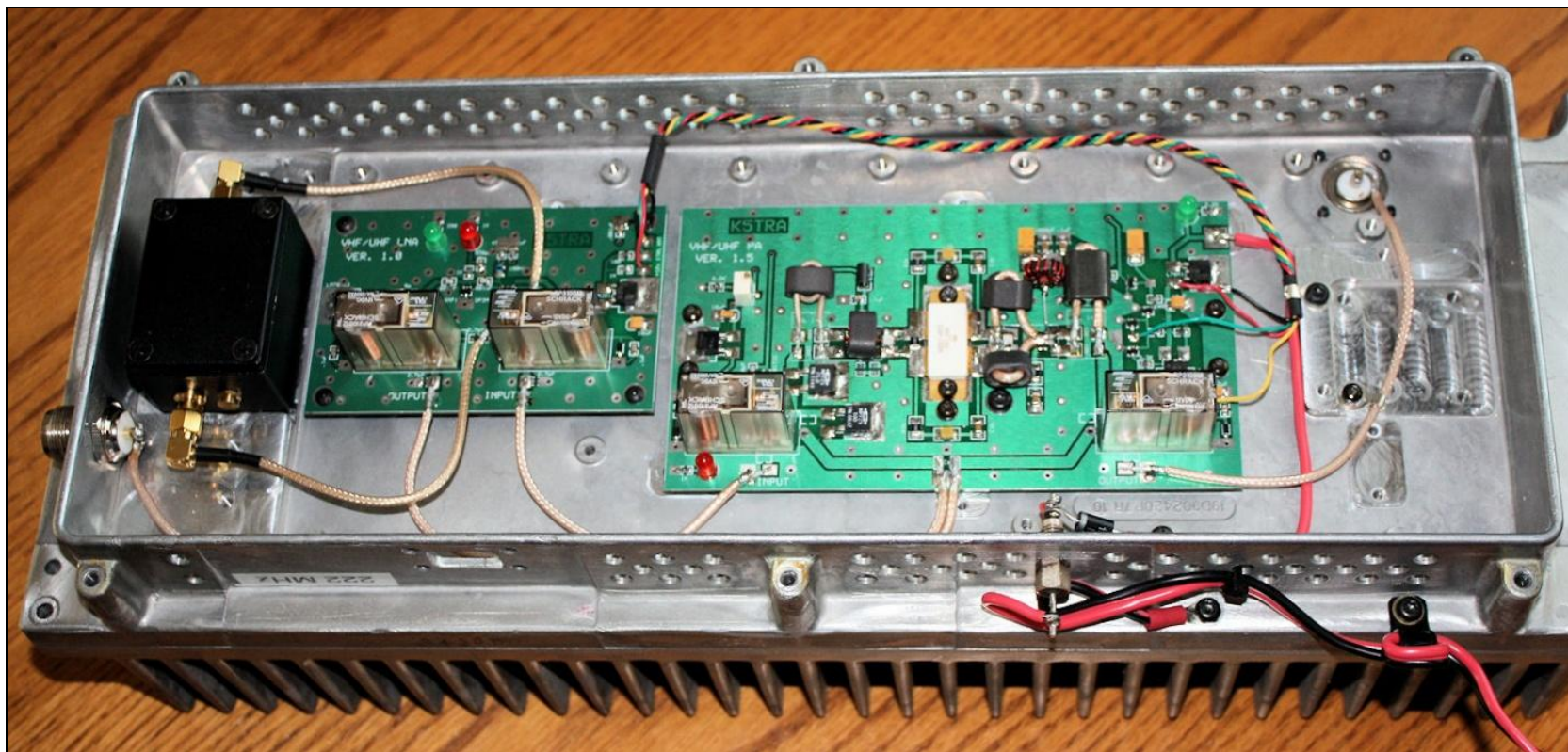


*For 144, 222, and 432 MHz*

# VHF-UHF Remote PA & LNAs



# 222 MHz Remote PA & LNA



# Overview

- Remote PAs and LNAs for operation at the antenna
- T/R switching is drive sensed
- Schottky detector circuit is tweaked for sensitivity
  - As low as +18 dBm will key the control circuit
- TX key hold time constant is 1.2 seconds
- Housing-heatsink from GE MASTR-III 120W PA
- Motorola MRF151 LDMOS final provides:
  - 125 W output on 144 and 222 MHz
  - Gain padded at input for available drive
- Motorola MRF372 LDMOS final provides:
  - 125 W output on 432 MHz
  - Gain padded at input for available drive
- Triquint TQP3M9008 LNA provides:
  - 0.8 dB NF on each band: 144, 222, and 432 MHz
  - Gain ( approx.+22 dB) padded at output to + 12 dB

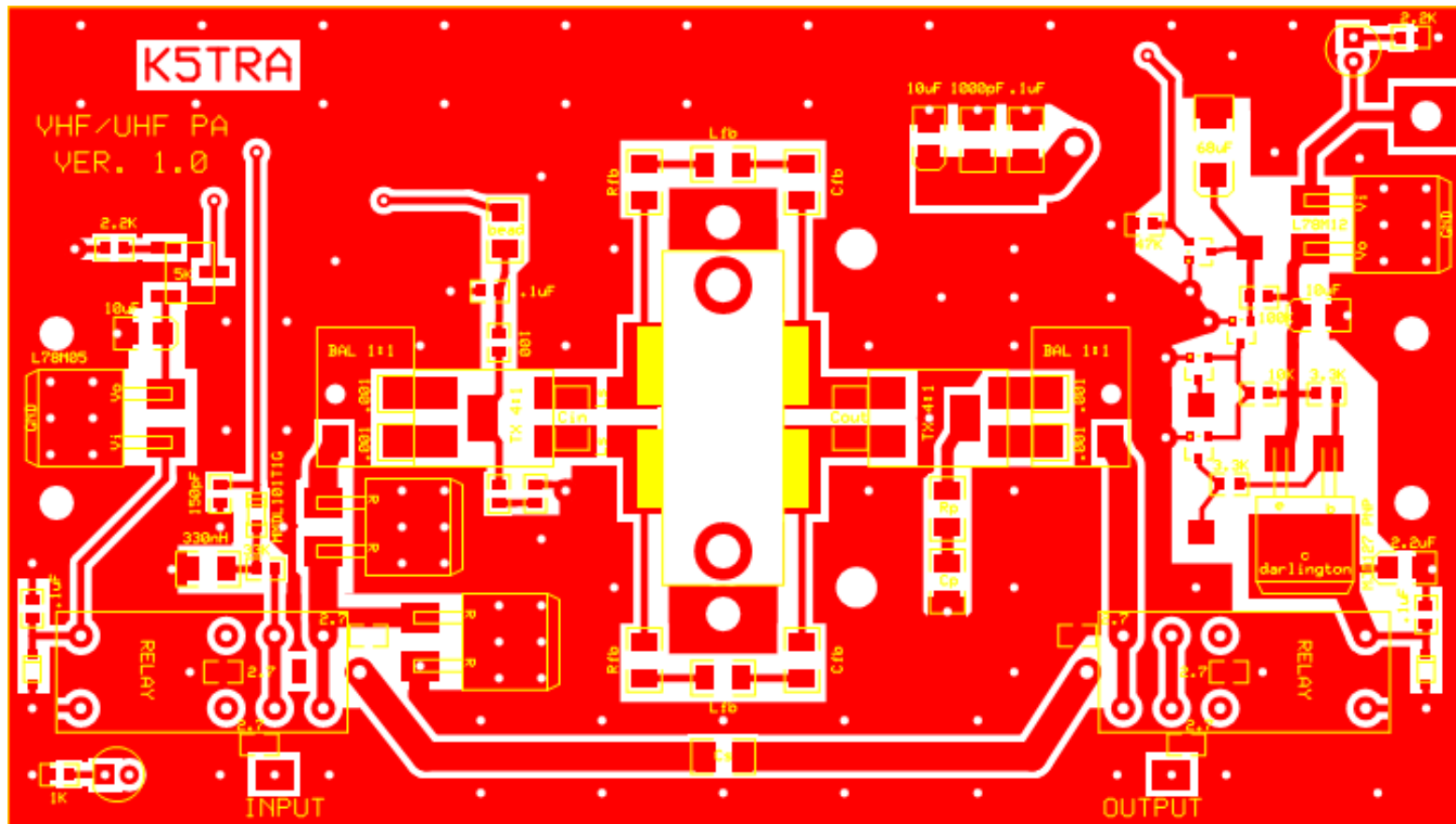
# Important Details

- LNA preselector filter is required
  - FM and TV broadcast signals will overwhelm the LNA without filtering
  - Two helical resonator BPF used
- LNA protection diodes required
  - Leading edge protection while relay control activates
  - Leakage capacitance in relay can allow excessive RF into LNA when transmitting
- PA input pad prevents overdrive
  - Two resistor, compact L-pad topology
  - For ruggedness to overdrive and mismatch, the final is MRF151G for VHF and MRF372 for UHF (both FETs are capable of higher voltage operation)

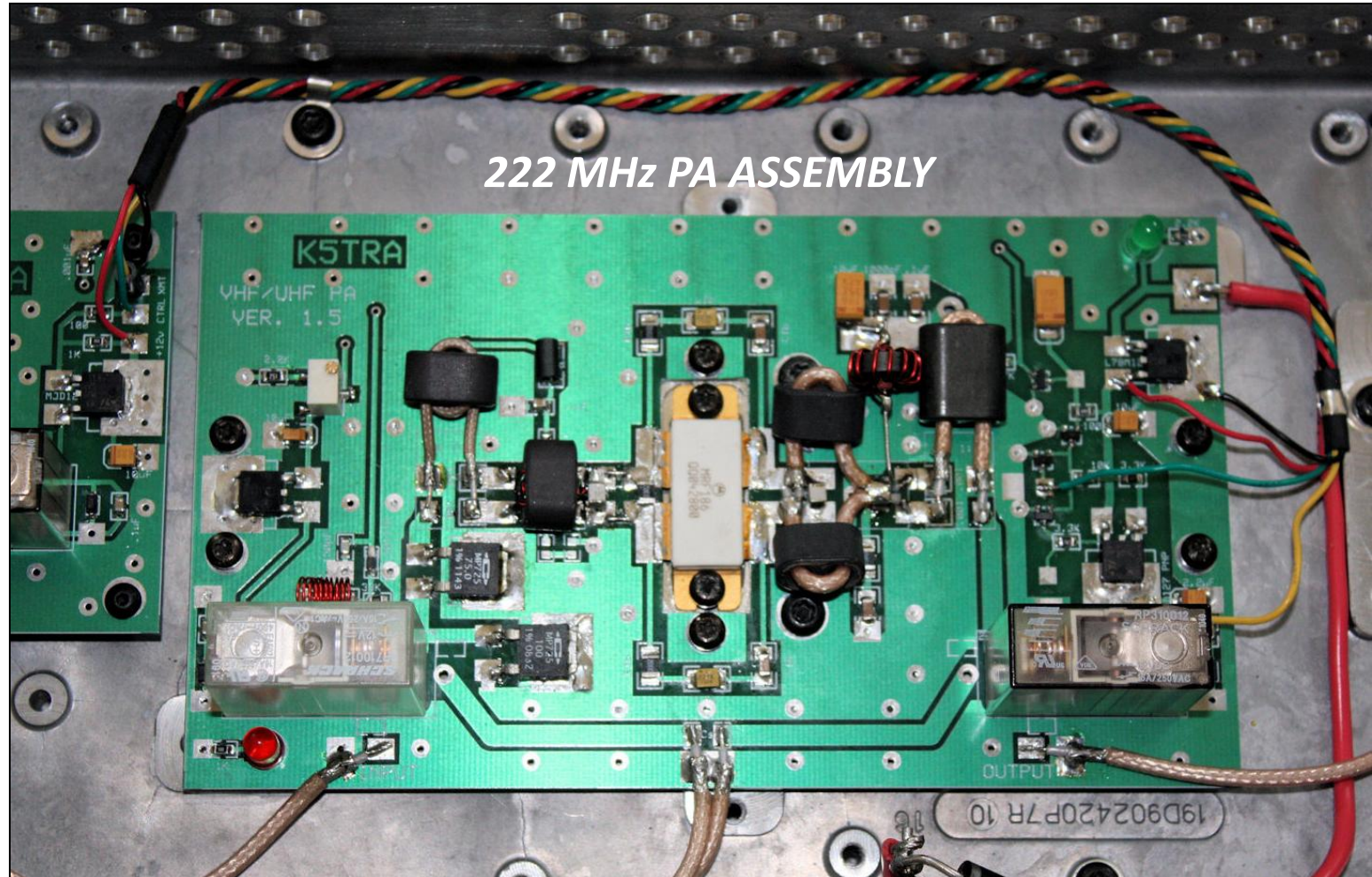
# Control

- Off mode:
  - RF pass through
- RX mode:
  - LNA is powered ON
  - PA BIAS is removed
  - Relays select LNA signal path
- TX mode:
  - LNA is powered OFF
  - LNA PIN protect is turned ON
  - PA BIAS turned ON
  - Relays select PA signal path

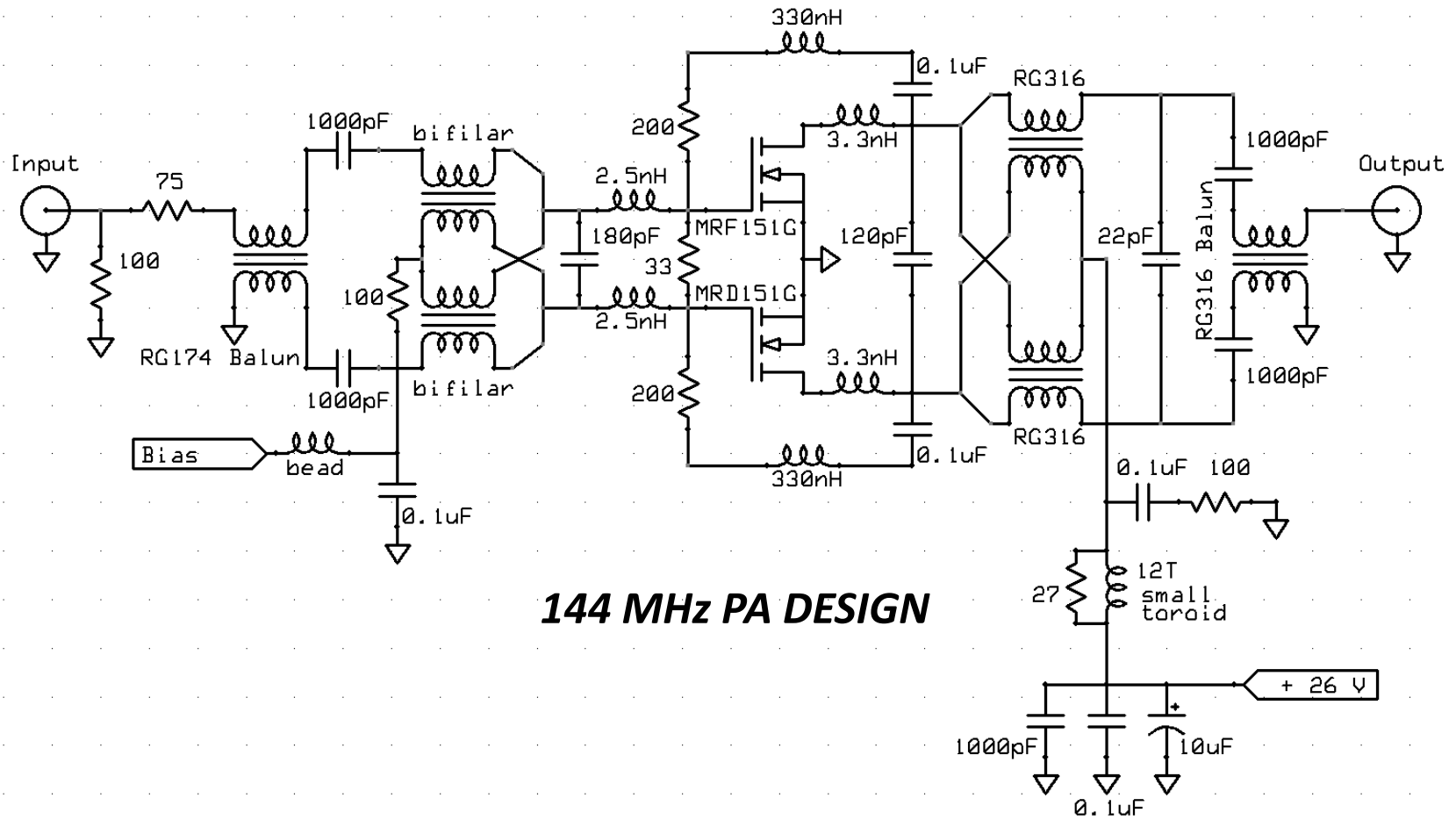
# PA Board Layout



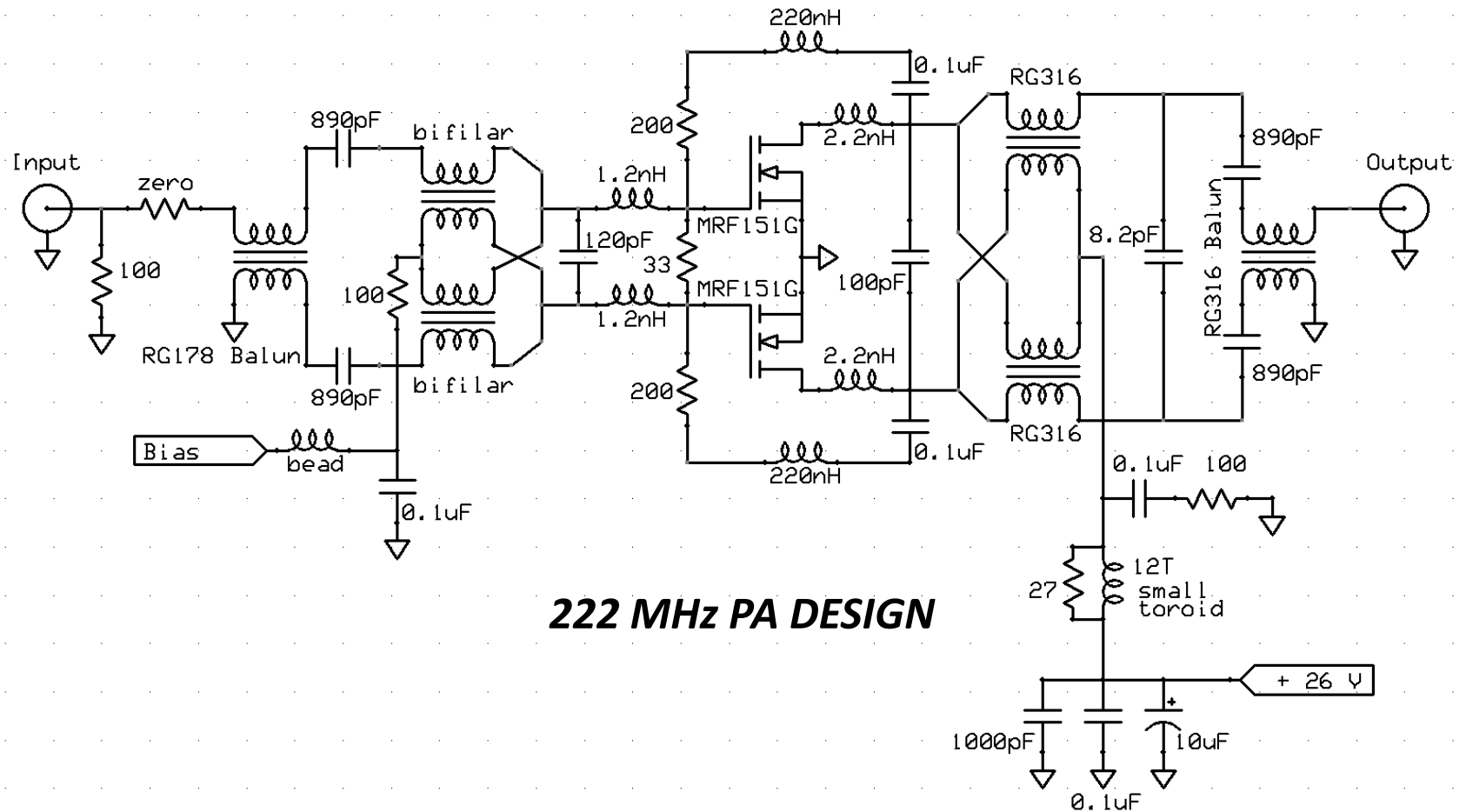
# Remote PA



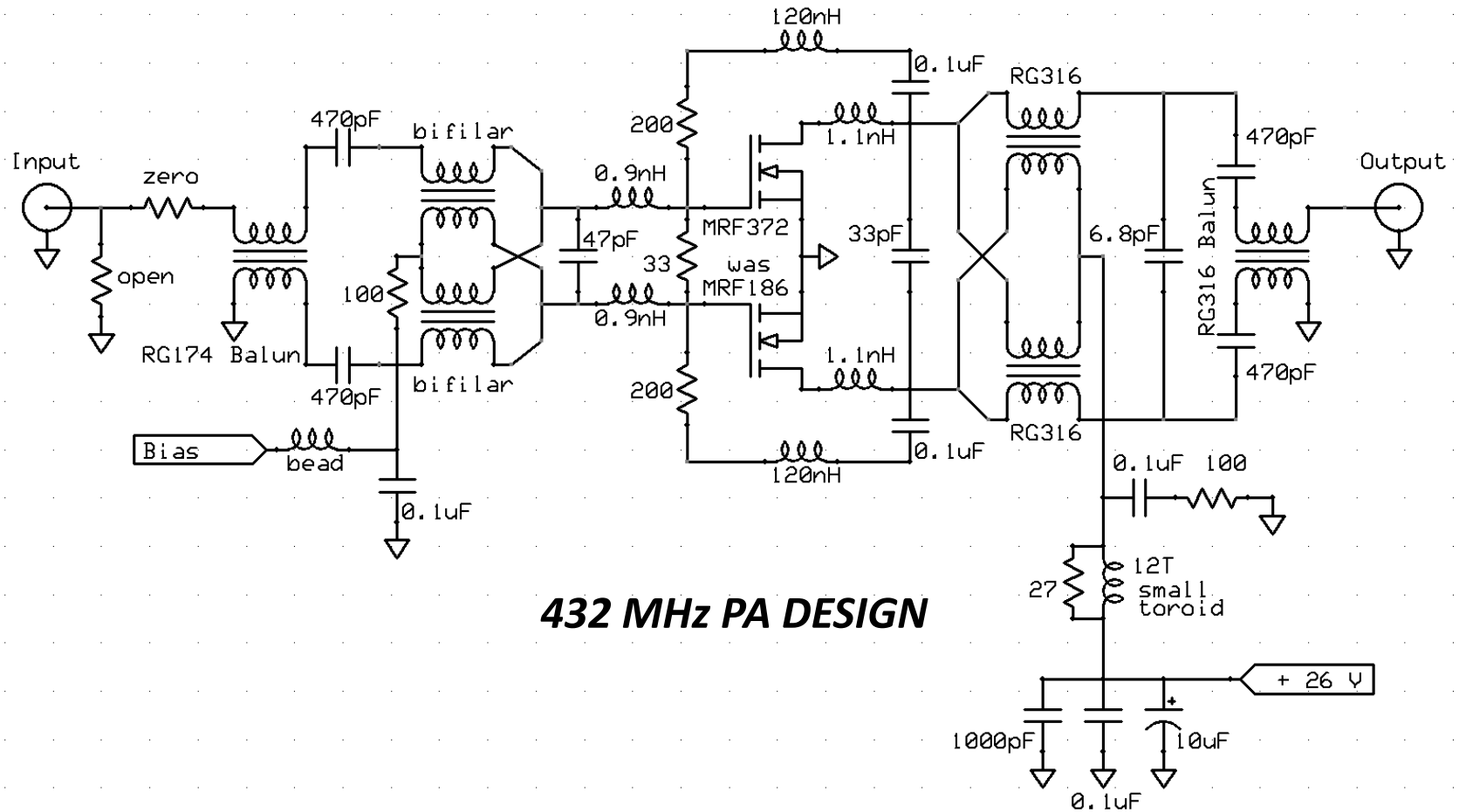
# PA Schematic



## PA Schematic



# PA Schematic



# PA Input L-Pad Design

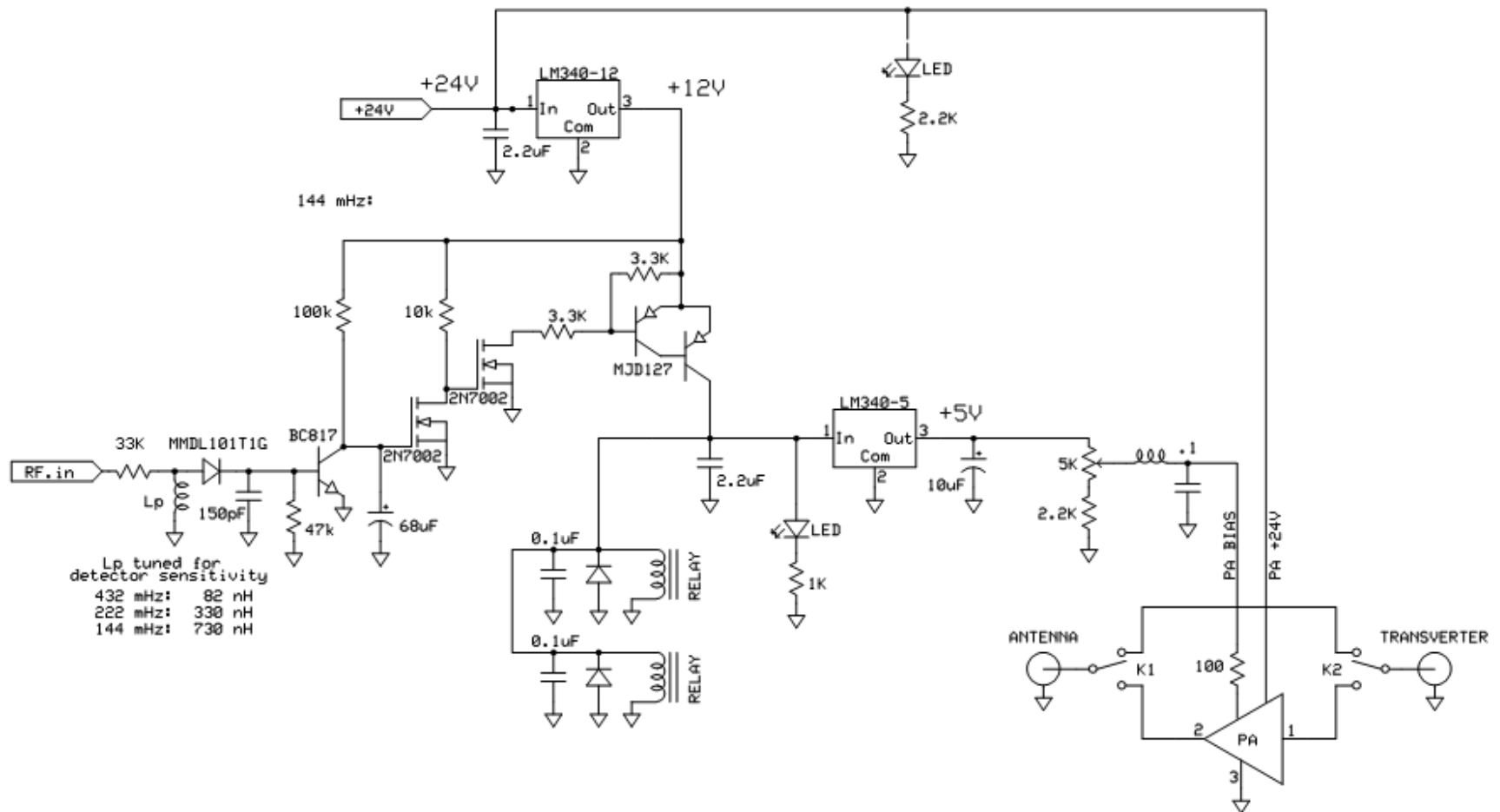
S21 (dB)

	Rp = 10	Rp = 20	Rp = 25	Rp = 30	Rp = 50	Rp = 75	Rp = 100	Rp = 150
Rs= 0	-10.88	-7.04	-6.02	-5.26	-3.52	-2.50	-1.94	-1.34
Rs= 10	-12.26	-8.30	-7.23	-6.44	-4.61	-3.52	-2.92	-2.28
Rs= 20	-13.44	-9.40	-8.30	-7.48	-5.58	-4.44	-3.81	-3.13
Rs= 25	-13.98	-9.90	-8.79	-7.96	-6.02	-4.86	-4.22	-3.52
Rs= 30	-14.49	-10.37	-9.25	-8.41	-6.44	-5.26	-4.61	-3.90
Rs= 50	-16.26	-12.04	-10.88	-10.01	-7.96	-6.72	-6.02	-5.26
Rs= 75	-18.06	-13.76	-12.57	-11.67	-9.54	-8.24	-7.51	-6.72
Rs= 100	-19.55	-15.19	-13.98	-13.06	-10.88	-9.54	-8.79	-7.96
Rs= 150	-21.94	-17.50	-16.26	-15.32	-13.06	-11.67	-10.88	-10.01

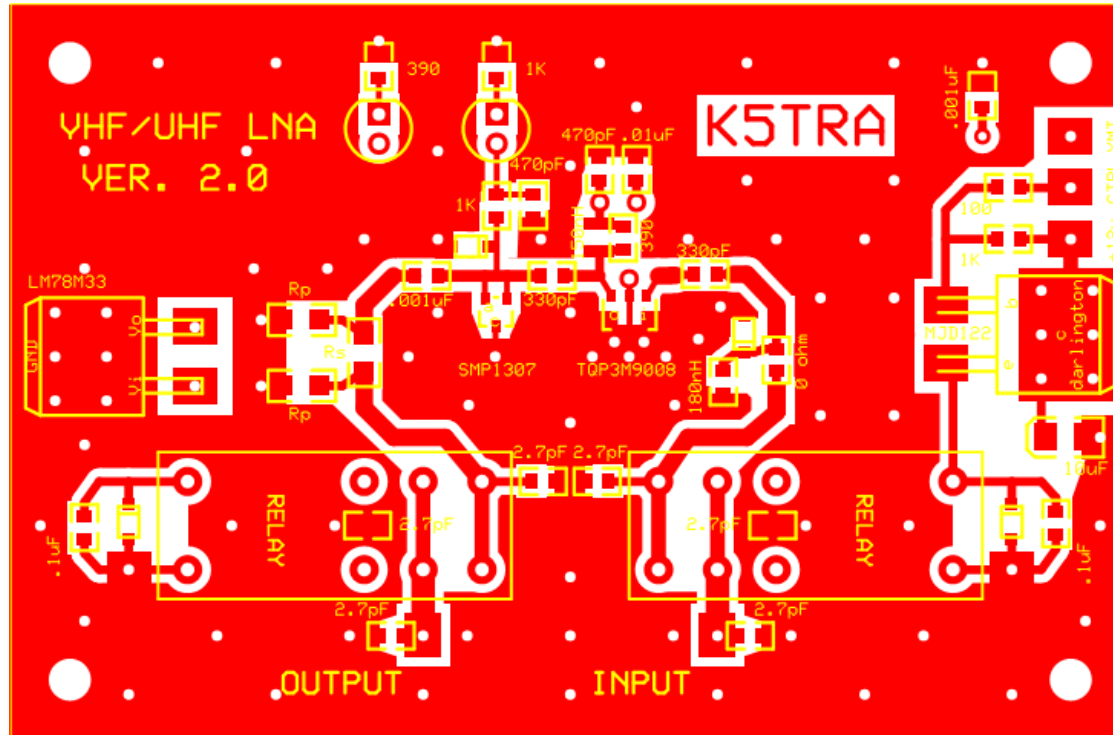
S11 (dB)

	Rp = 10	Rp = 20	Rp = 25	Rp = 30	Rp = 50	Rp = 75	Rp = 100	Rp = 150
Rs= 0	-2.92	-5.11	-6.02	-6.85	-9.54	-12.04	-13.98	-16.90
Rs= 10	-3.01	-5.38	-6.41	-7.36	-10.63	-13.98	-16.90	-22.28
Rs= 20	-3.07	-5.59	-6.72	-7.78	-11.60	-15.92	-20.29	-32.67
Rs= 25	-3.10	-5.68	-6.85	-7.96	-12.04	-16.90	-22.28	-323.53
Rs= 30	-3.12	-5.76	-6.97	-8.13	-12.47	-17.91	-24.61	-33.44
Rs= 50	-3.19	-6.02	-7.36	-8.67	-13.98	-22.28	-800.00	-20.83
Rs= 75	-3.25	-6.25	-7.71	-9.17	-15.56	-29.83	-25.58	-16.26
Rs= 100	-3.30	-6.41	-7.96	-9.54	-16.90	-328.31	-20.83	-13.98
Rs= 150	-3.35	-6.62	-8.30	-10.05	-19.09	-27.24	-16.90	-11.60

## PA Control Schematic

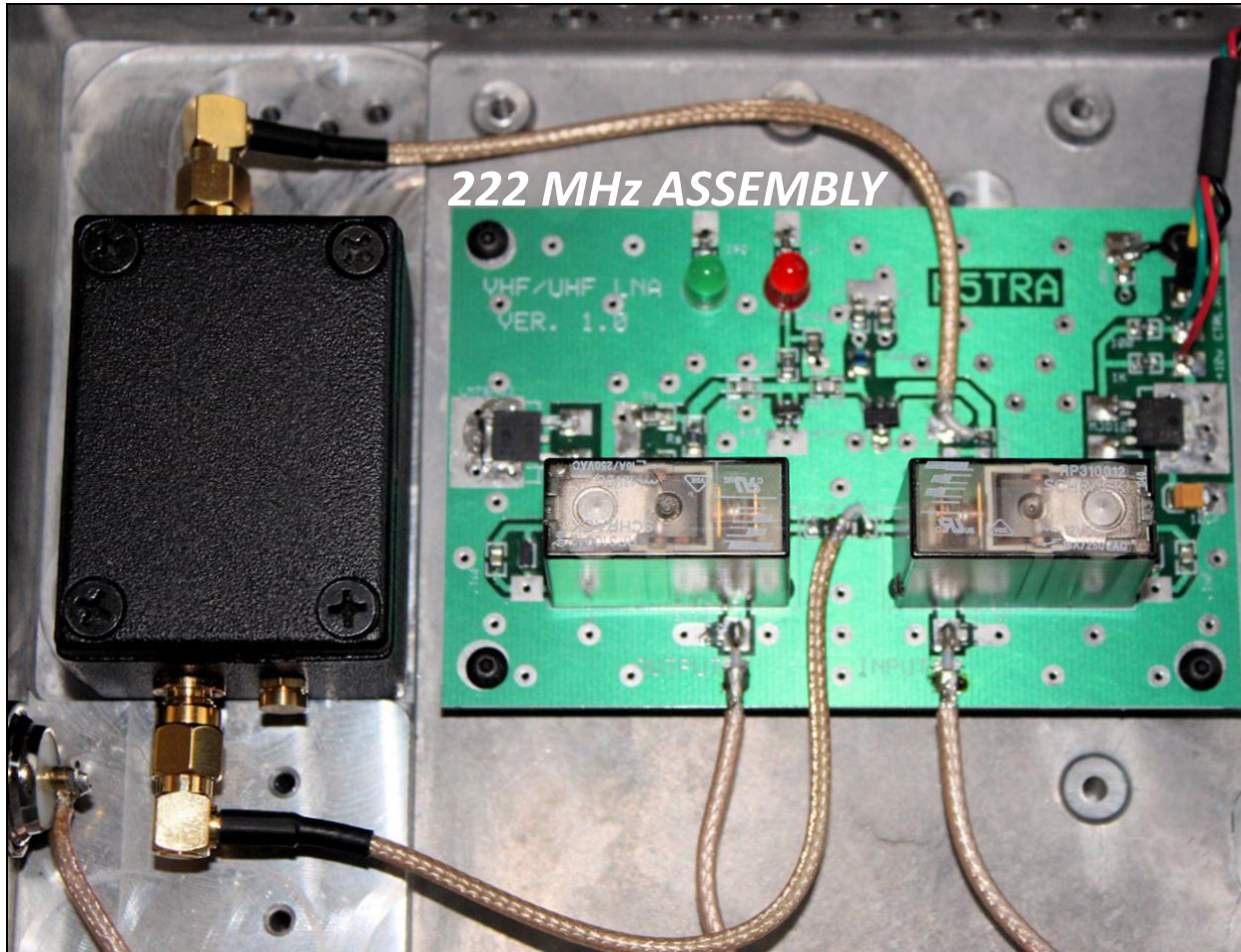


# LNA Board Layout

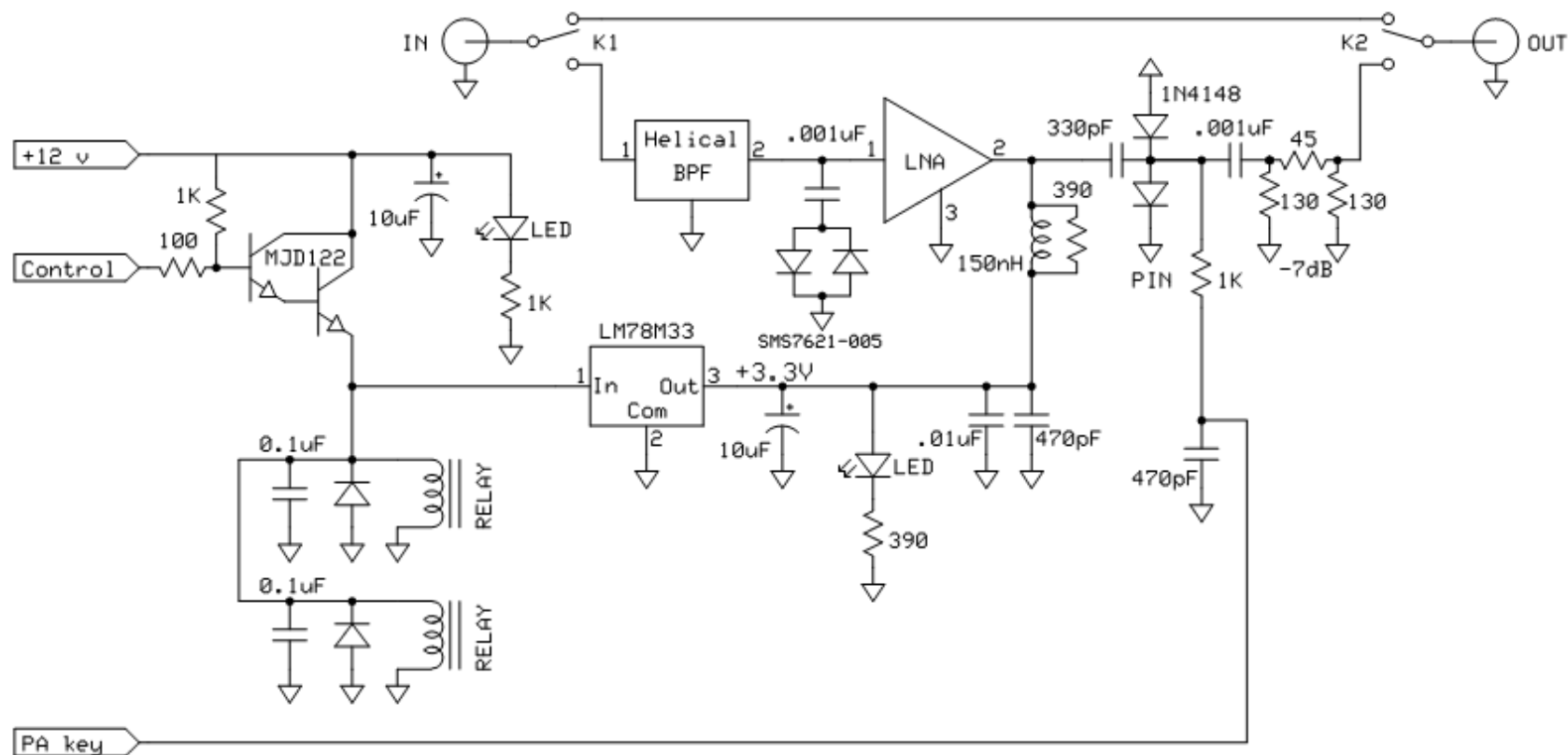


**LNA BOARD IS OPTIONAL**

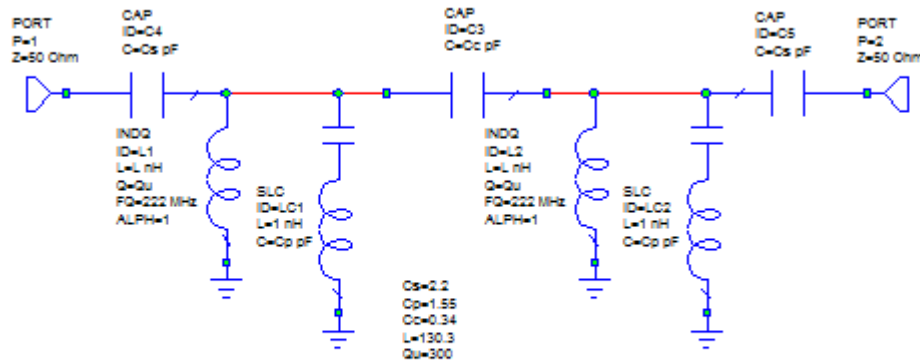
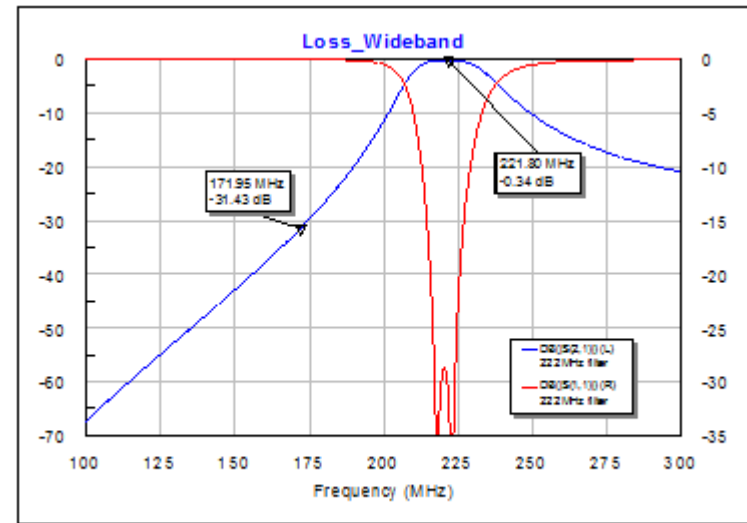
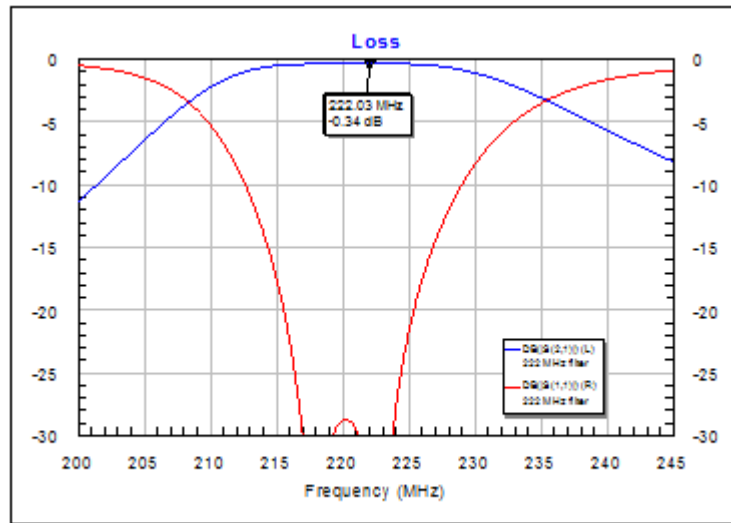
# Remote LNA



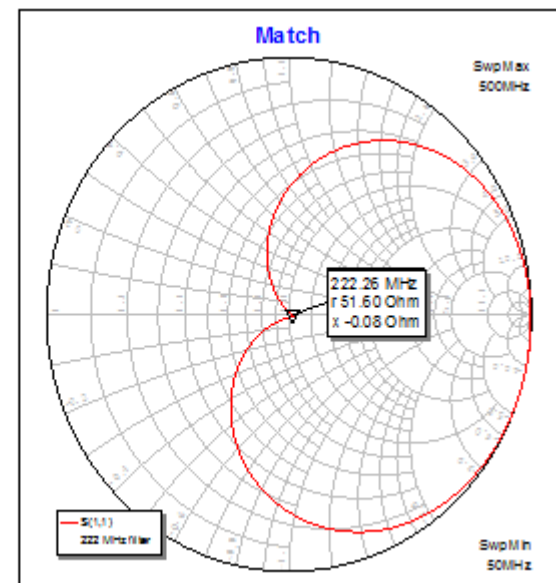
# LNA Control Schematic



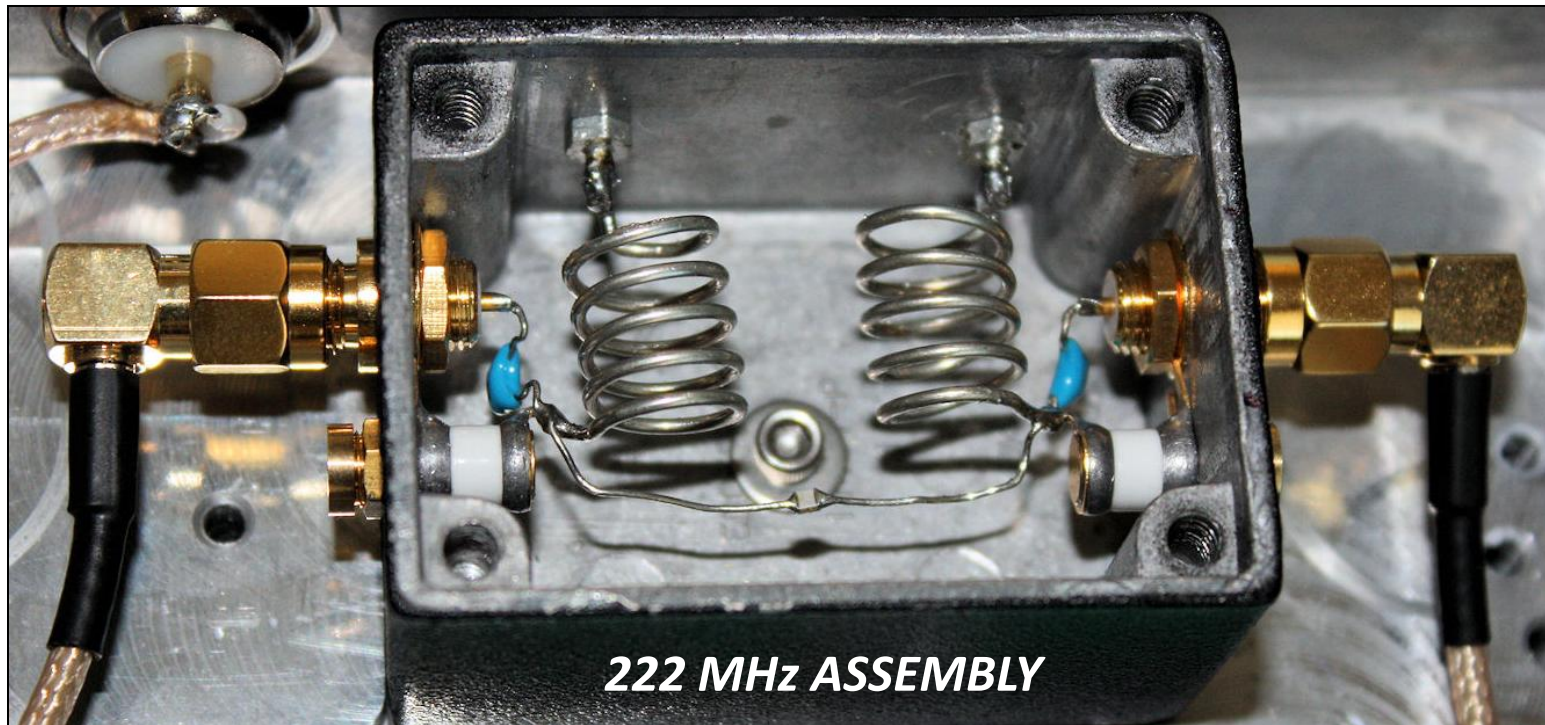
# Preselector Design



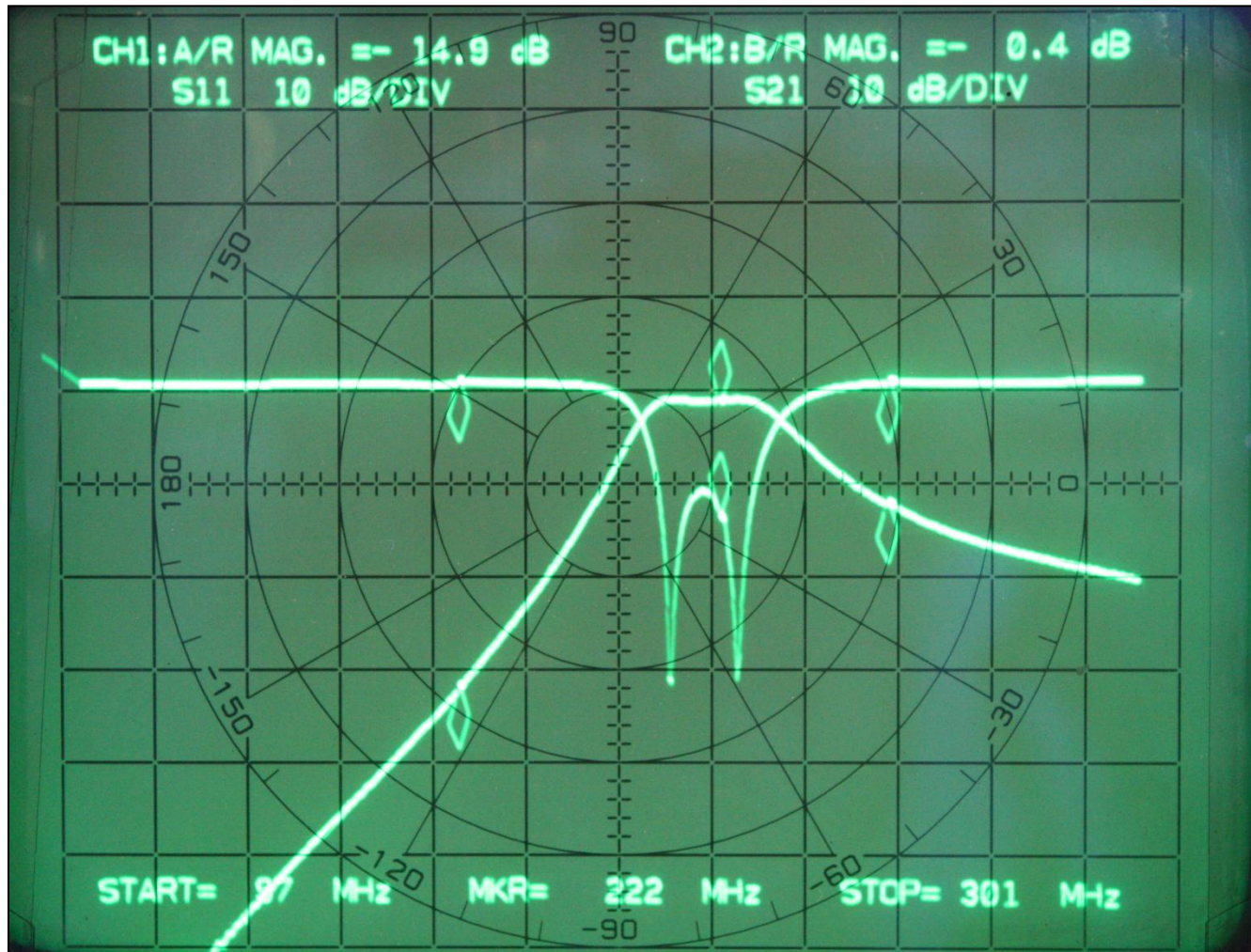
**222 MHz BPF**



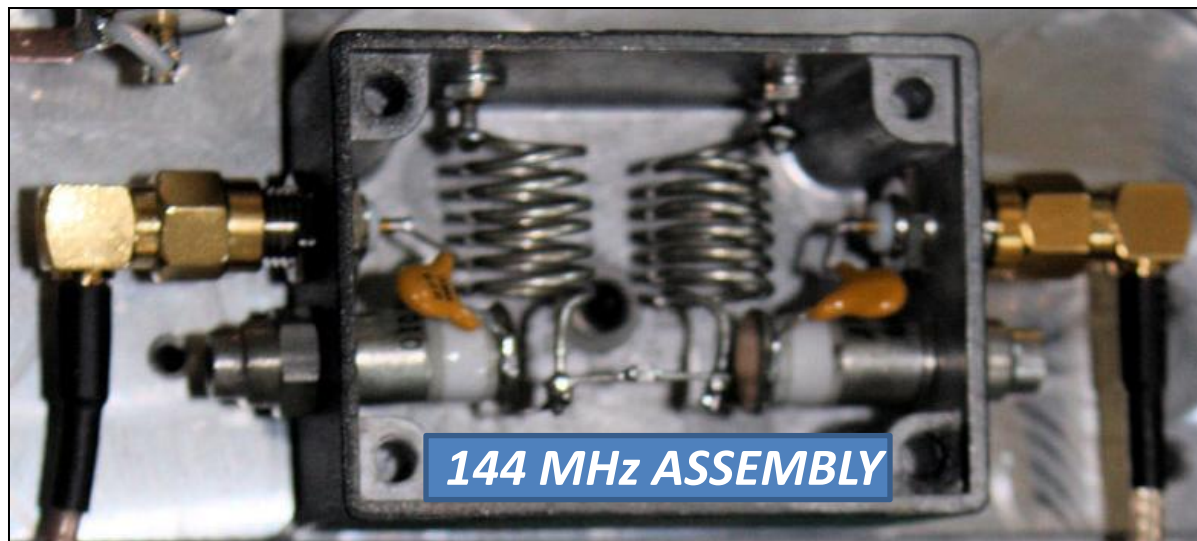
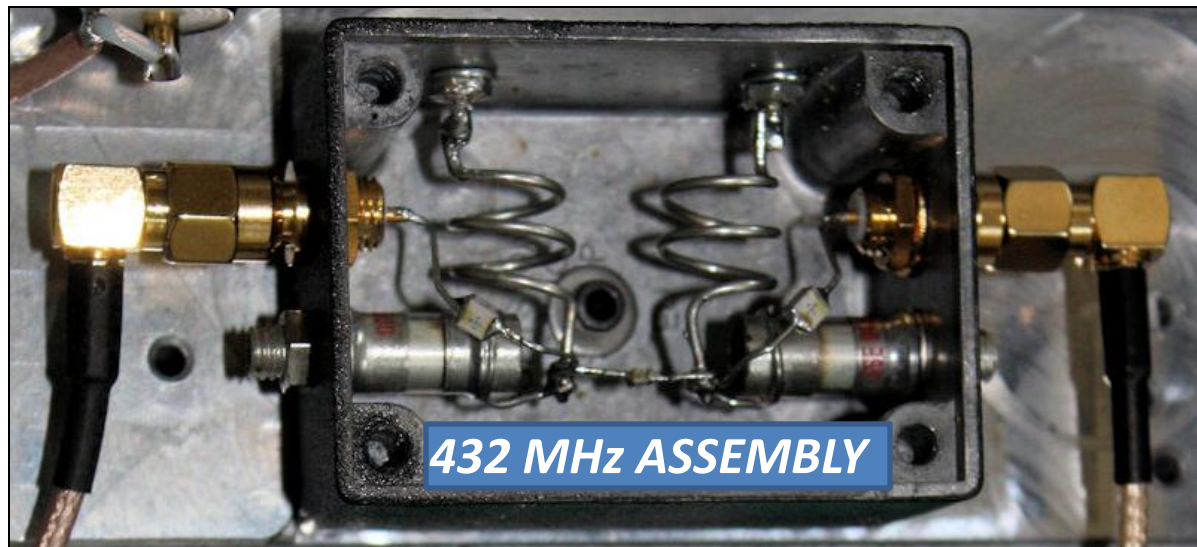
# Helical BPF



# LNA Preselector Response



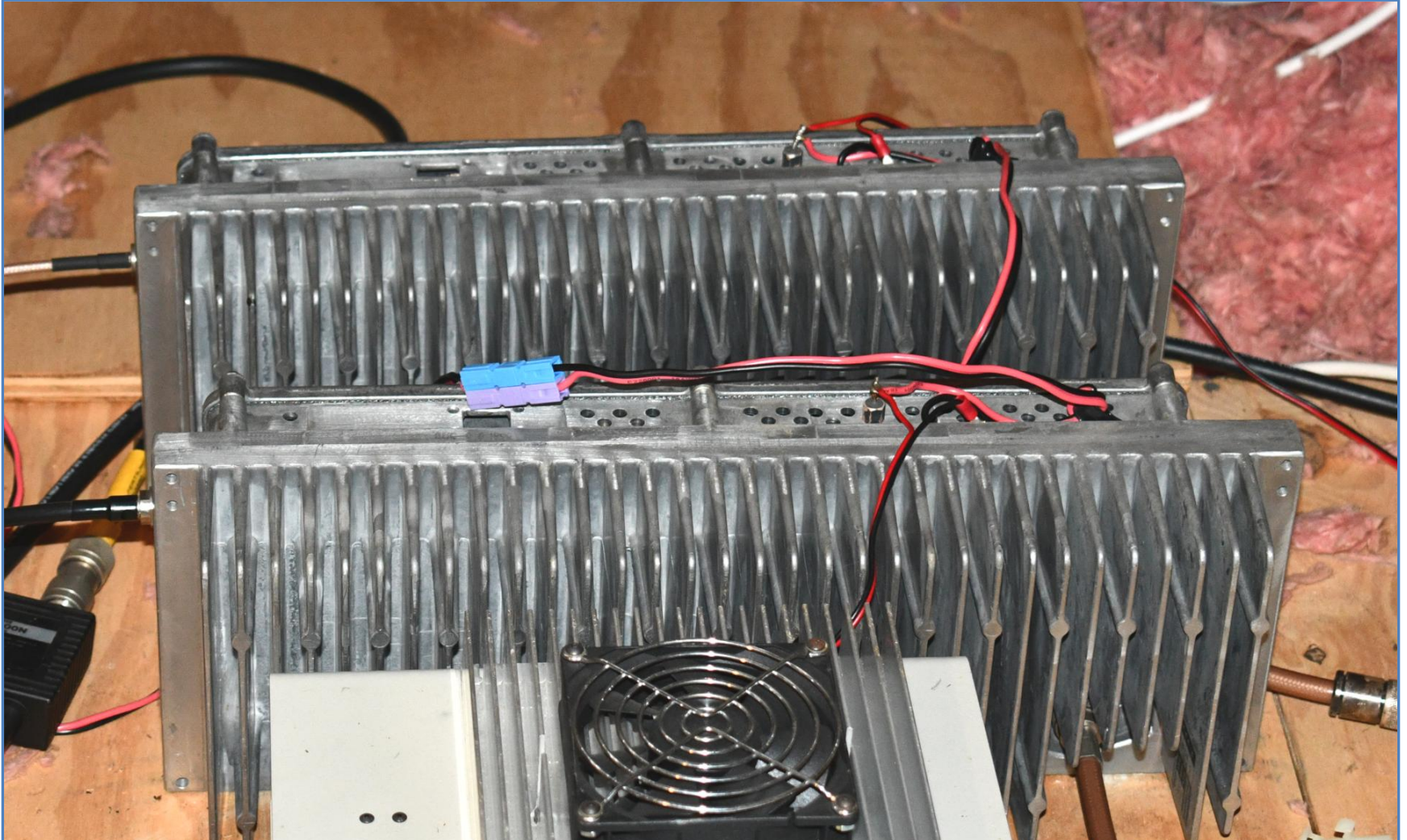
# More Helical BPFs



# 222 MHz Remote Amplifier in Attic



# 144 & 432 MHz Remote Amplifiers in Attic



# Attic Yagis



# Some more stuff in attic



# WEB-IP Power Strip



# VHF-UHF Remote PA & LNAs

