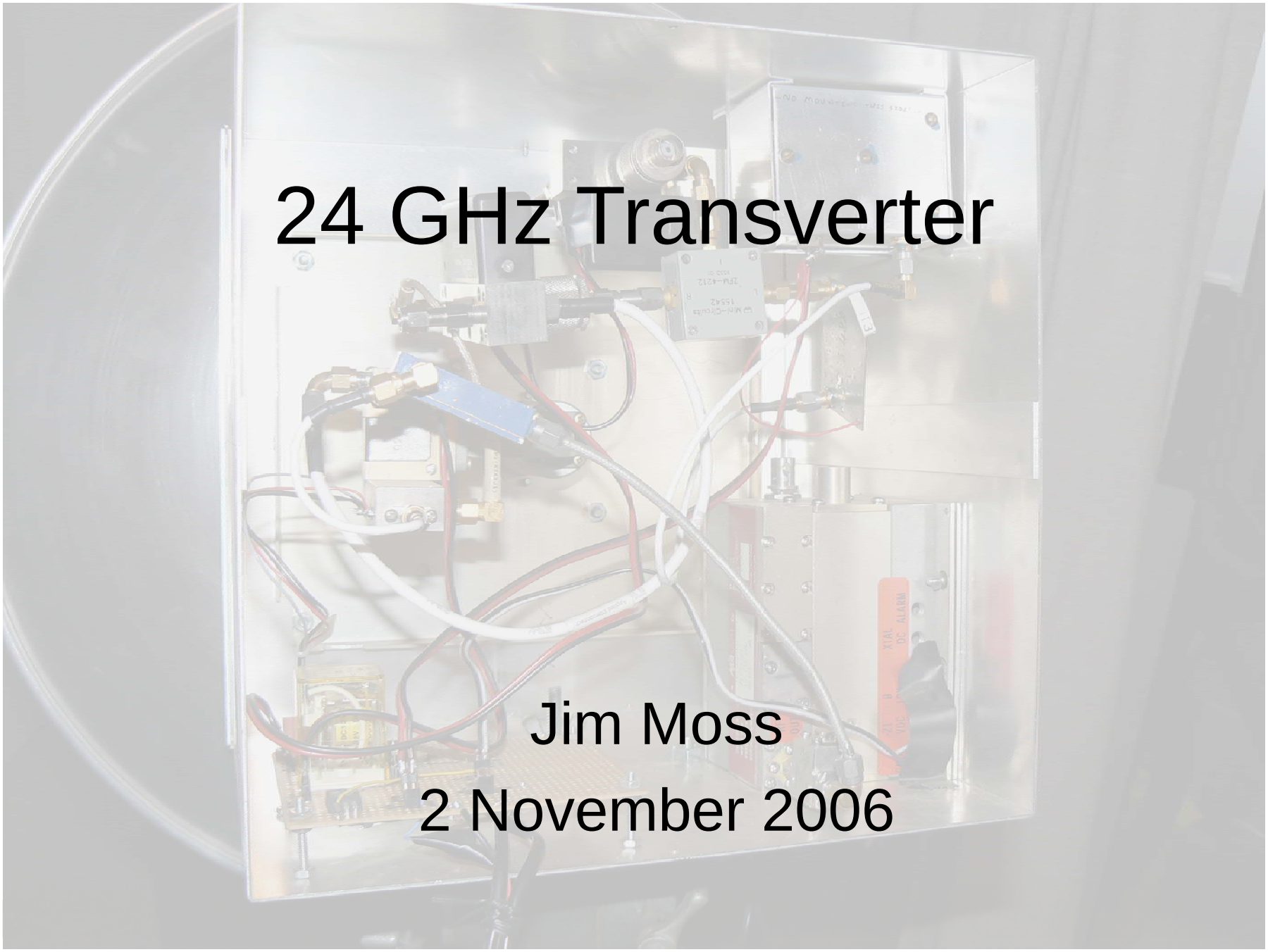


24 GHz Transverter

Jim Moss

2 November 2006

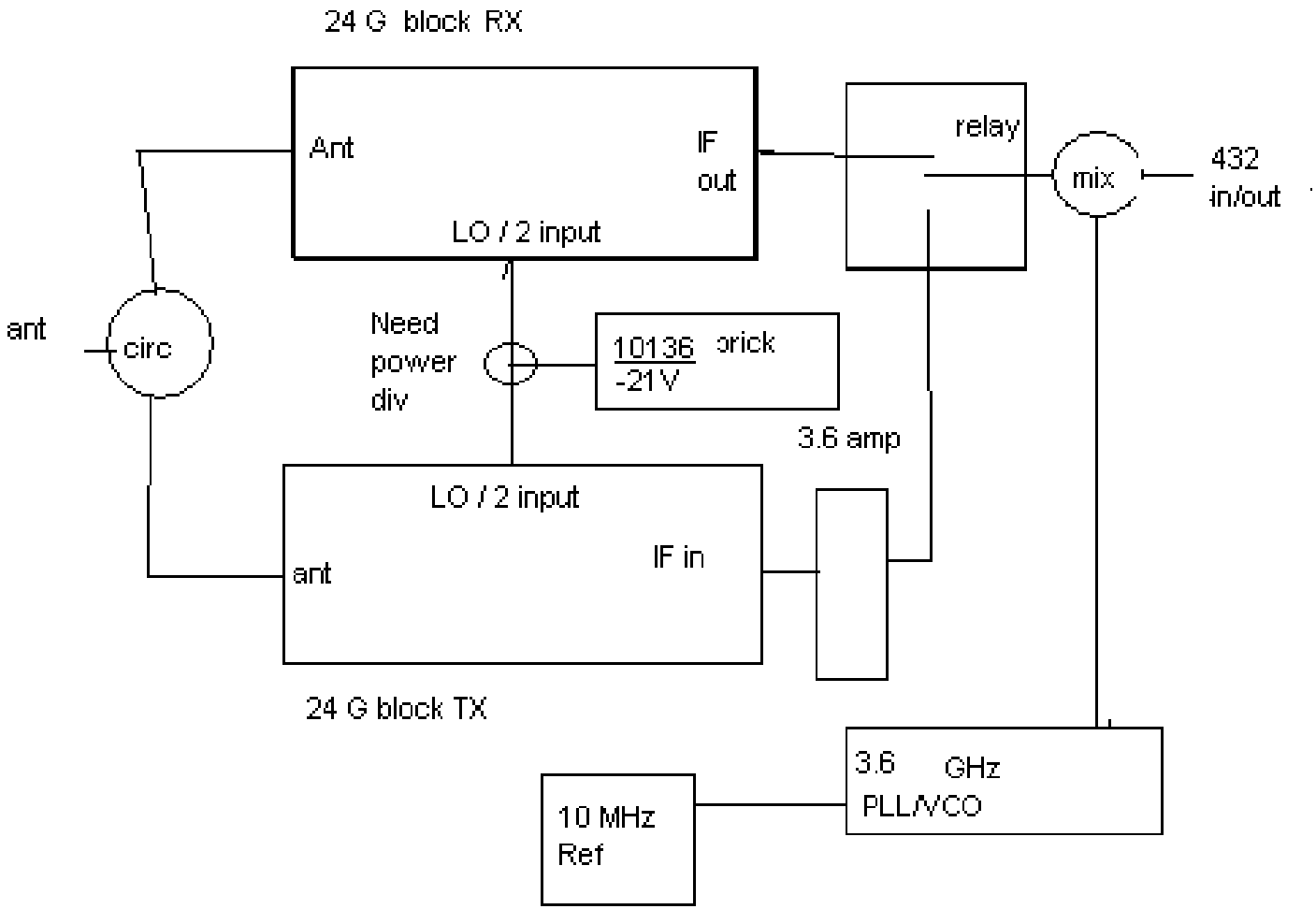
Design Objectives

- Stable frequency control
  - <1KHz drift over normal temp range
  - <1KHz drift over time (1 day)
- Inexpensive (<$200)
- Common available parts
  - Surplus 24G Tx & Rx modules
  - Surplus 10132 brick
  - Other standard parts
- Acceptable power & sensitivity
  - 200mW
  - <10dB NF front end

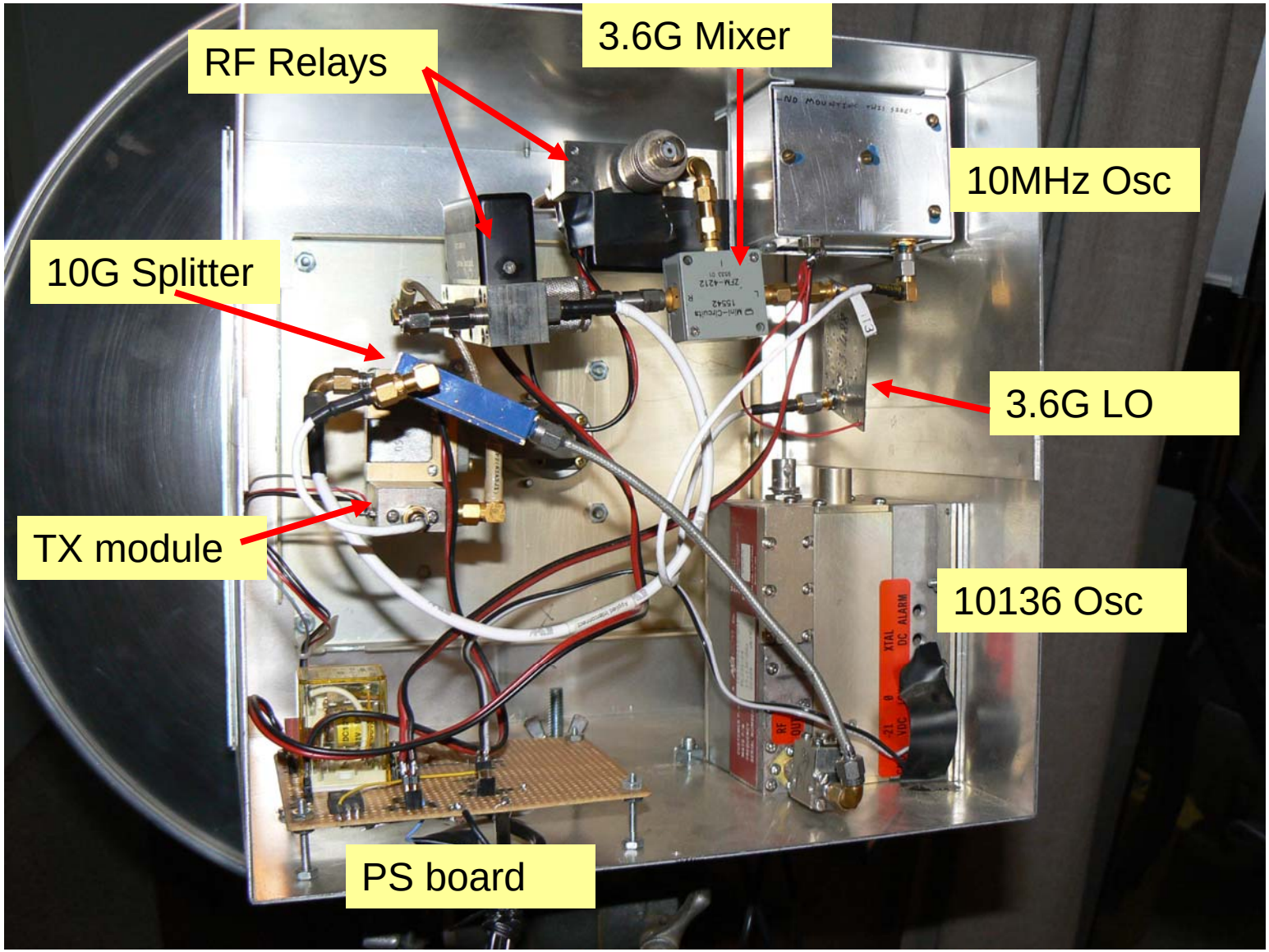
Frequency Plan

	Jim's	Common LO
RF	**24192**	**24192**
LO2	**20272**	**20448**
LO2 /2	**10136**	**10224**
IF2	**3920**	**3744**
LO1	**3488**	**3600**
IF1	**432**	**144**

Basic Block Diagram



Overall Picture

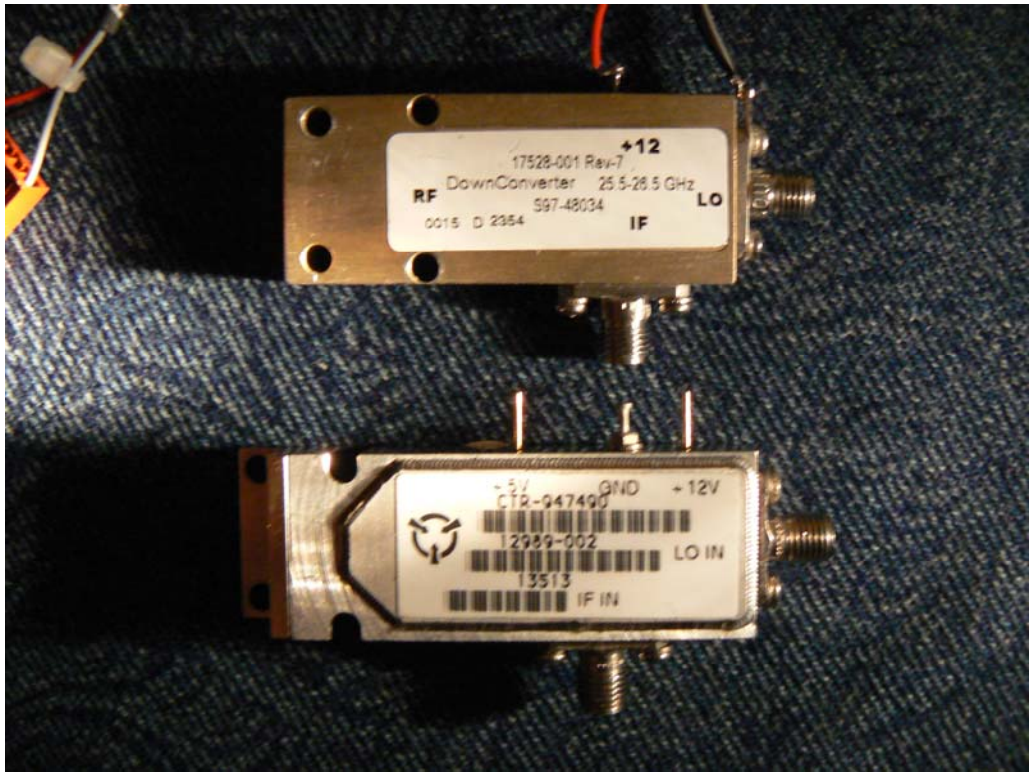


Circulator

- TX/RX modules use WR42 so either a waveguide switch or circulator is needed
- A circulator is used because of cost & availability
- The impact to design is a couple dB in power & NF (acceptable for rover use)

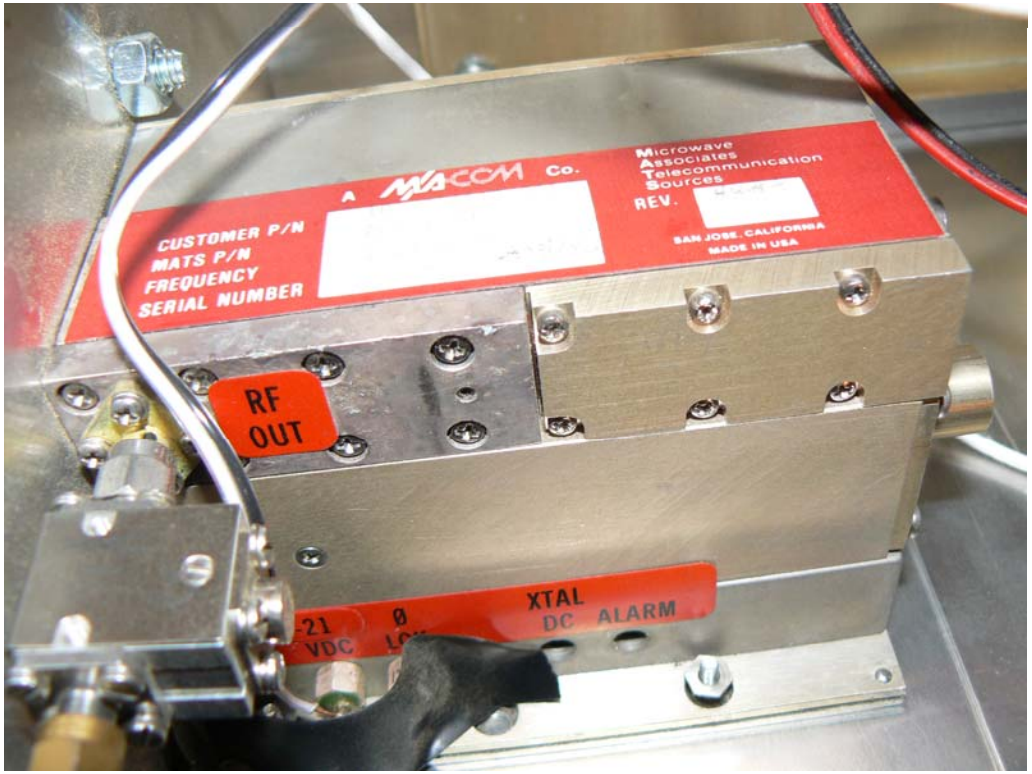
Celeritek TX / RX Modules

- Rx module is about 4.5dB NF
- Tx module is about 250 mW
- Both have an LO doubler inside
- Both are capable of IF up to 4GHz
- Power supplies are +8, +12, +5 depending on particular unit.



10136 Oscillator

- M/Acom brick – 10.136 GHz, +10dBm
- -21V Vcc
- Available from Pyrojoseph



3.6GHz Amp

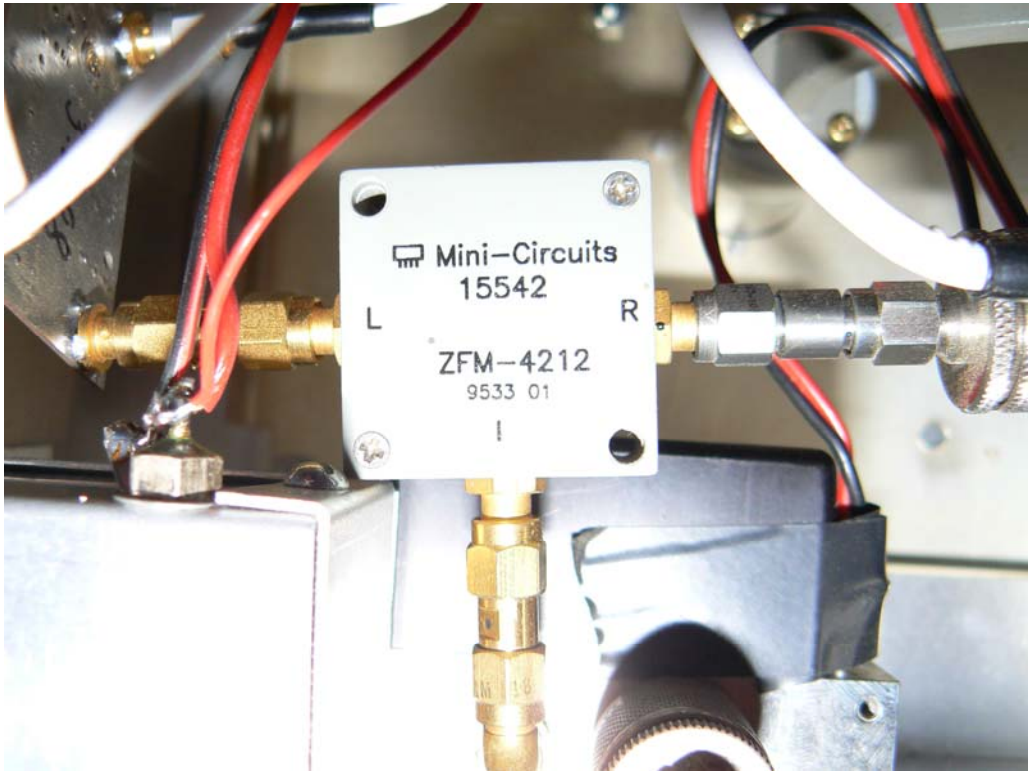
- MAR-5 amplifier to boost the output of the mixer into the TX module.
- Mixer output is -6dBm
- Amp is about 10dB
- Amp output is +4dBm

RF Relays

- SPDT 4GHz relay with 12 volt coil
- 432MHz transfer relay with 30dB attenuator for 1W to 0dBm

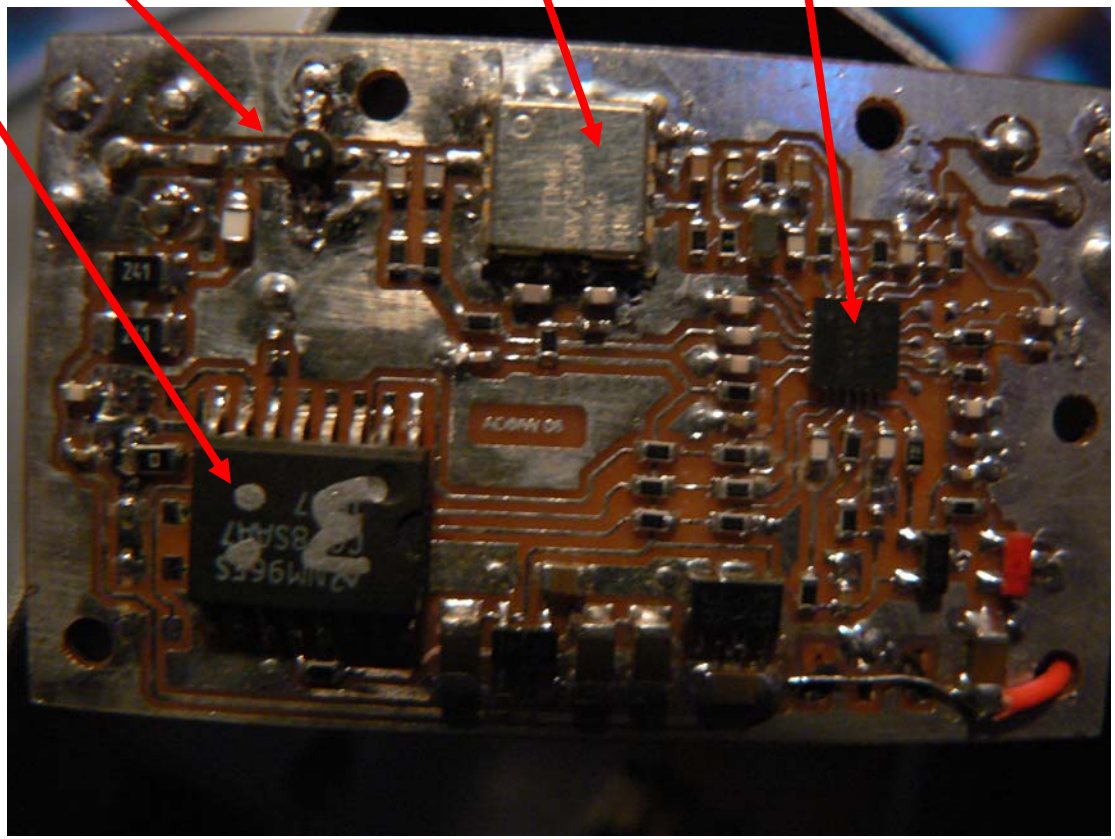
Mixer

- Minicircuits 4212 4GHz mixer
- Can be found on Ebay or other mixers can be subsituted
- LO +7dBm
- IF/RF +1dBm
- 6dB conversion



3.6GHz PLL board

- PLL: LMX2487 fractional N dual PLL
- VCO: Zcomm smv3590a
- Controller: COP8SAA with Jim's code for setting PLL frequencies
- ERA6SM – amplifier to get up to +7dBm



Power Supplies & Control

- 2 commercial power supplies 12V to 15 & 12V to 22V (This requires 2 12V sources, on for negative supply, one for positive supply
- Linear regulators for 5, 8, 10, 12V from the 15V supply
- Control board for PTT control of IF relay and power relay for TX/RX subsystems