902 MHz Transverter

DESIGN AND CONSTRUCTION DETAILS

1296 and 902 MHz TRANSVERTERS

33 CM OVERVIEW

- 2M IF
- SSB and CW use (no FM TX offset)
- IF sensed keying
- 146.0 MHz converts to 902.0
- Si530 single frequency LO (756 MHz)
- Mitsubishi 20W PA module
- 0.5 dB NF front-end (Mini-Circuits LNA)

CIRCUIT SUMMARY

- Four circuit boards:
  - RF board
  - Sequencer (IF keyed)
  - PA board
  - TX IF pad
- Surface mount assembly
- Silicon Labs Si530 LO
- Printed RF filters
- IF TX sensed, T/R sequenced
- IF TX power load
- IF pass through to antenna when powered off

LOCAL OSCILLATOR

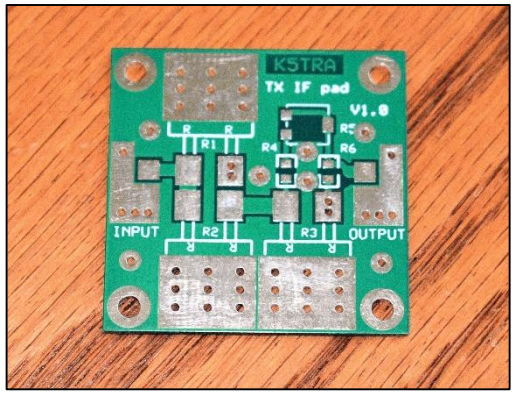
- Silicon Labs Si530 XO IC
- IF frequency = 146.000 MHz
- LO frequency = 756.0 MHz (for RF= 902.0 MHz)

RECEIVER

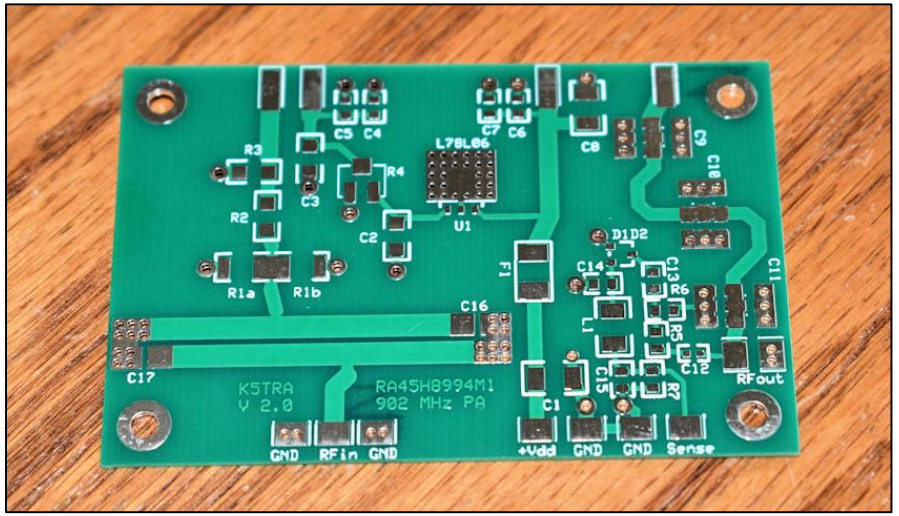
- LNA is TAMP-960LN+
  - pHEMT IC
  - Minicircuits
  - Fmin=0.5 dB
- ADEX-10H mixer: 7 dB conversion loss, +17 dBm LO
- Sirenza SGA6486 IF amplifier followed by a π pad
- π pad also has PIN diode to step loss during transmit
- Overall RX NF $\approx$ 0.8 dB

Transmitter

- PA is 20 W Mitsubishi RA20H8994M module
- Bias regulator on PA board
- Transmit VHF IF drive is 45 dBm (nominal)
- IF power pad is adjustable (IF drive dependent)
- Printed RF BP and PA LP filters
- RF level detector on PA board drives LED display



TX IF PAD



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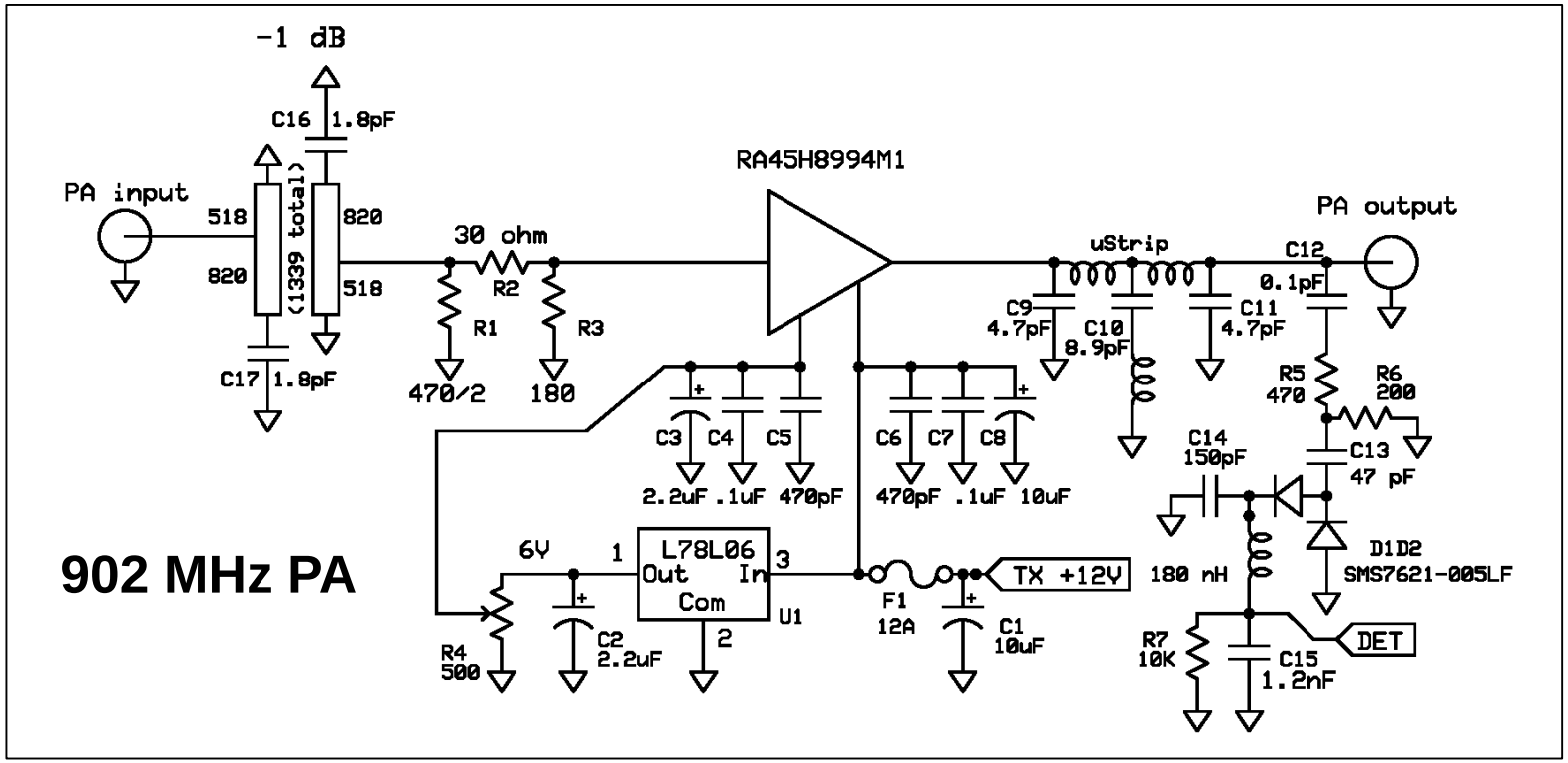
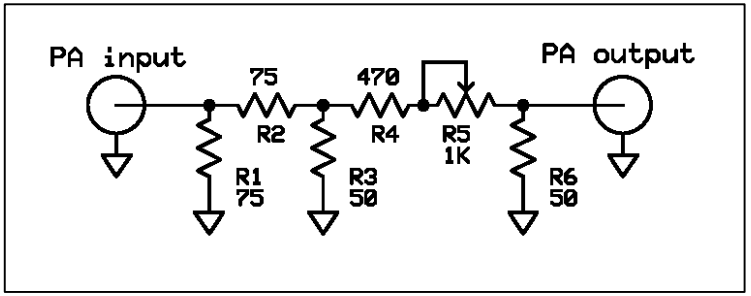
33 CM PA BOARD

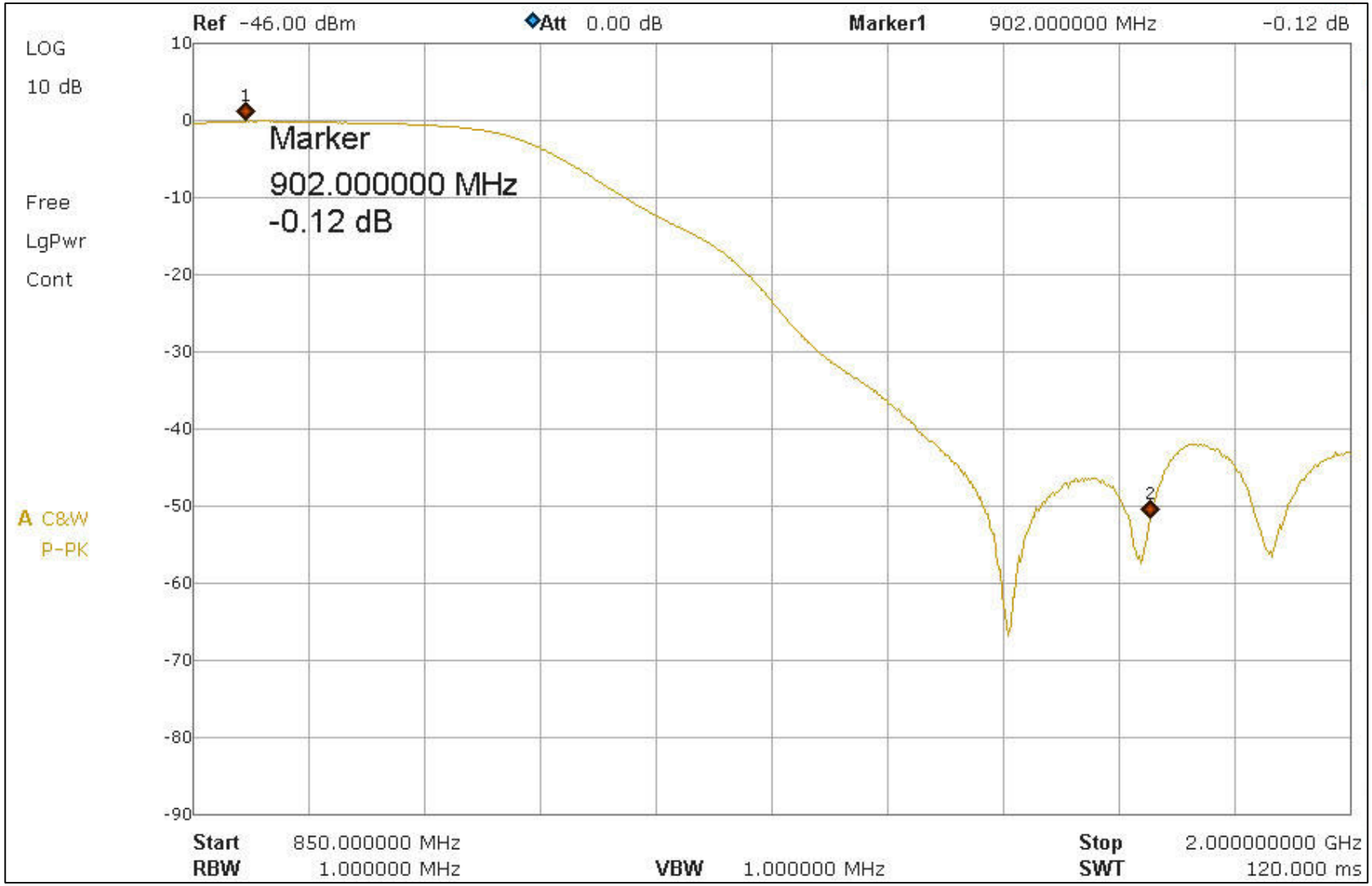
PA and TX IF PAD SCHEMATICS



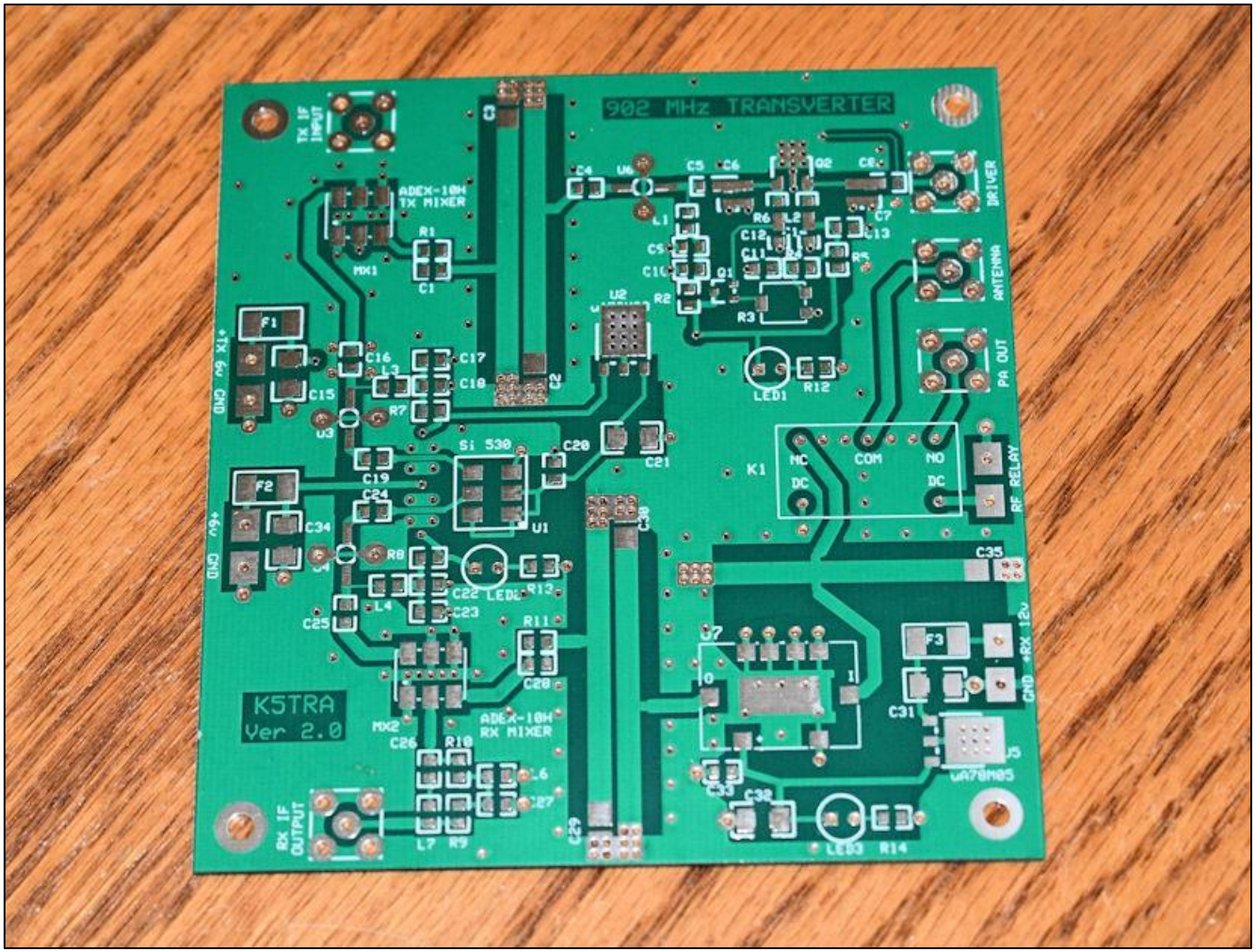


VHF IF PAD

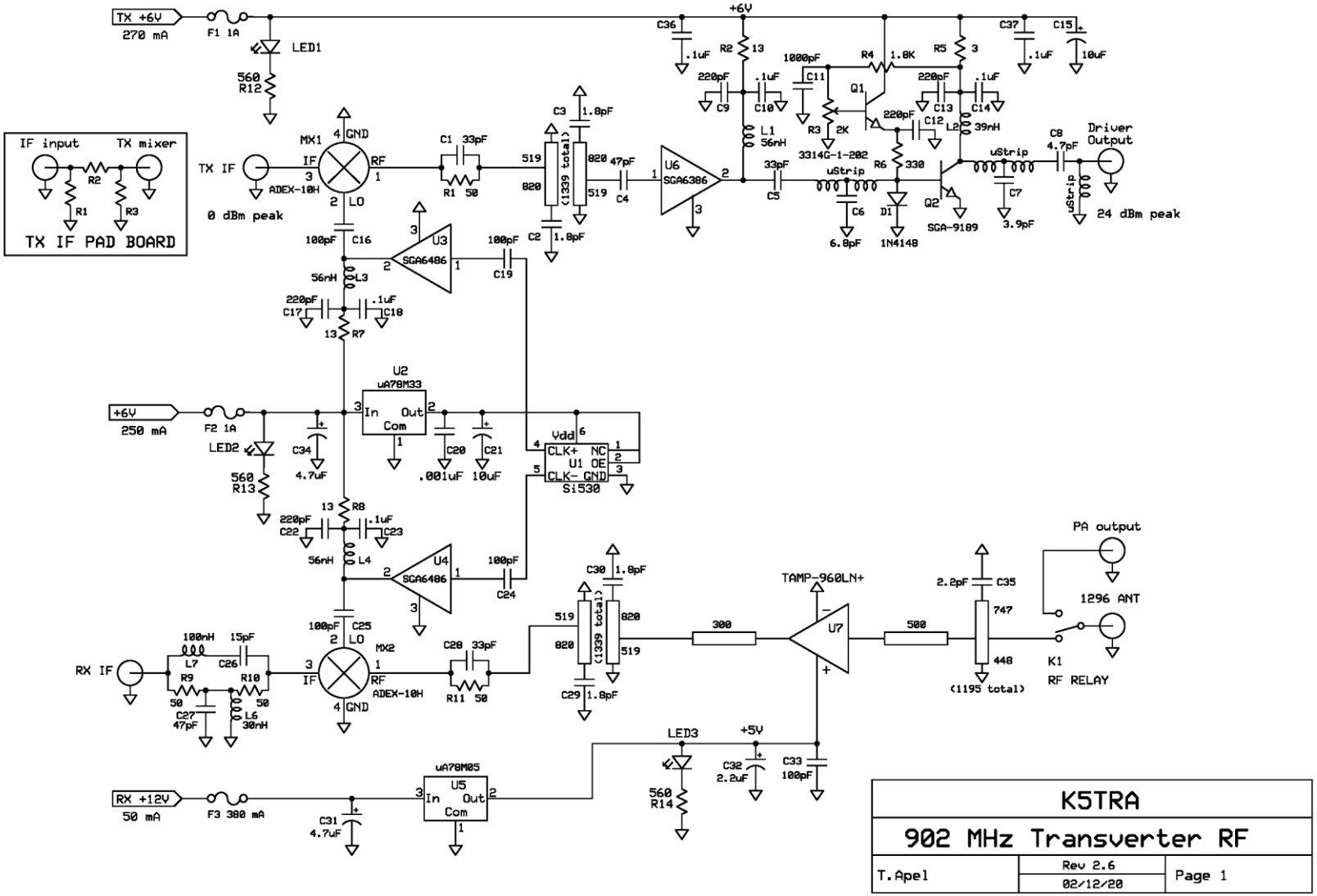
PA LPF


Ref -46.00 dBm
Att 0.00 dB
Marker1 902.000000 MHz -0.12 dB
LOG
10 dB
Free
LgPwr
Cont
A C&W
P-PK
Marker
902.000000 MHz
-0.12 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Start 850.000000 MHz
RBW 1.000000 MHz
VBW 1.000000 MHz
Stop 2.000000000 GHz
SWT 120.000 ms

33 CM RF BOARD



33 CM RF BOARD SCHEMATIC



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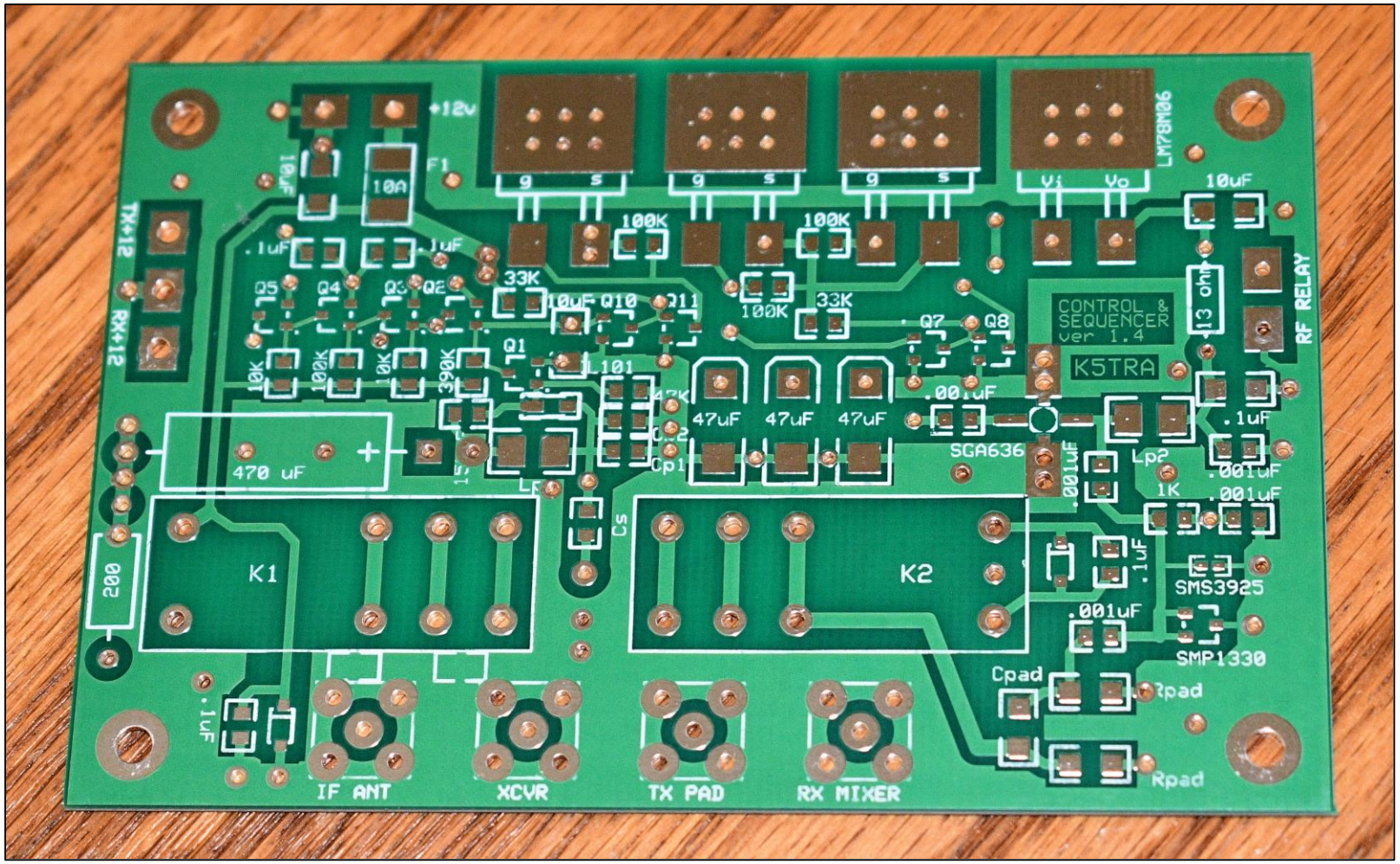
33 CM GAIN and POWER BUDGET

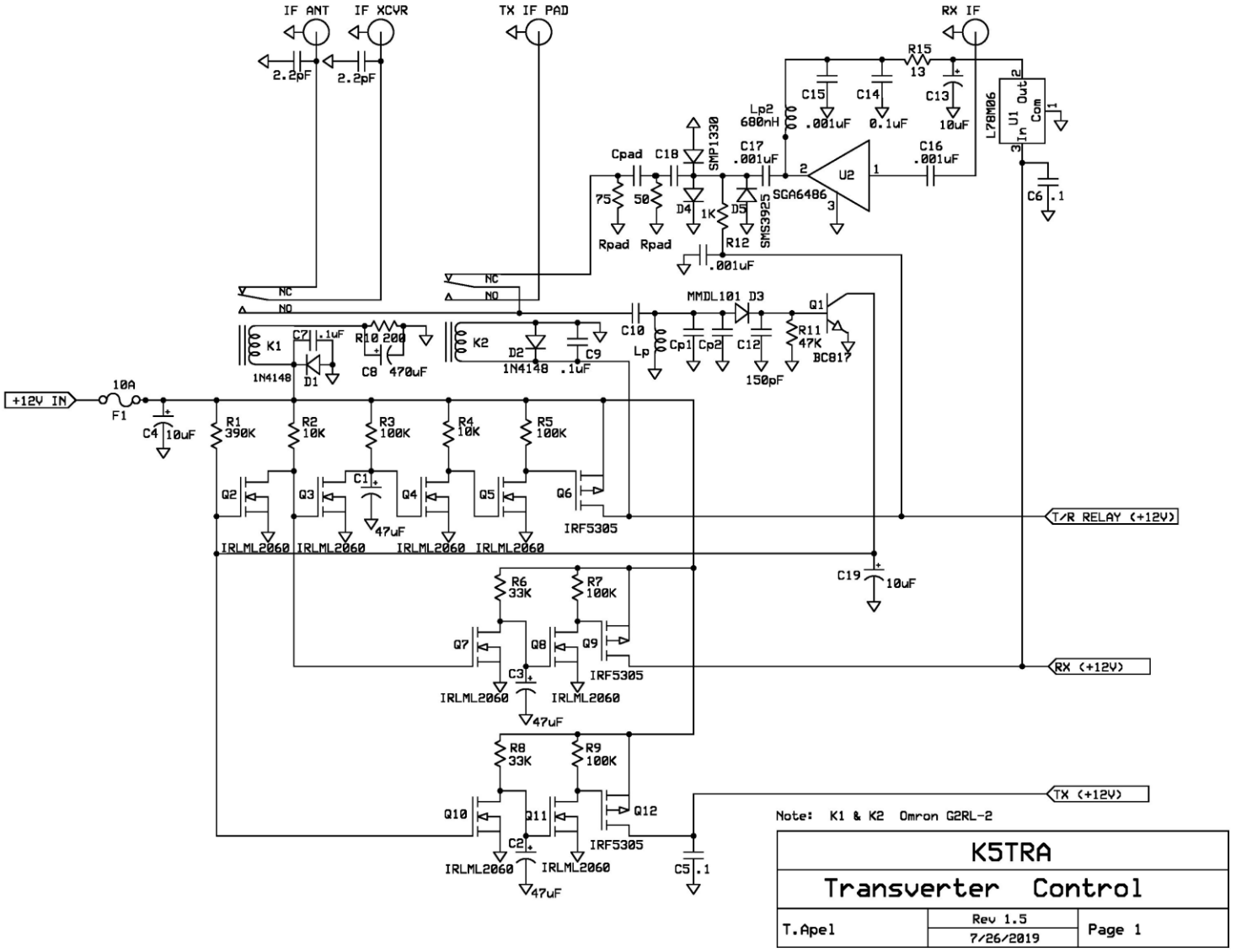
TRANSMIT	Gain	Output Level
RF relay	-0.2	43.0
LPF	-0.3	43.2
PA	23.0	43.5
Pad	-3.0	20.5
BPF	-0.5	23.5
Driver	16.0	24.0
PreDriver	10.0	8.0
BPF	-0.5	-2.5
Mixer	-7.0	-2.0
TX IF pad	-40.0	5.0
IF XCVR		45.0
Total Gain =	37.5	

RECEIVE	Gain	Input Level
RF relay	-0.2	-138.0
Input resonator	-0.6	-138.2
LNA	19.0	-138.8
BPF	-0.5	-119.8
Mixer	-7.0	-120.3
Bridged-T	-1.5	-127.3
RX IF Amp & pad	9.0	-128.8
IF XCVR		-119.8
Total Gain =	18.2	

SEQUENCER BOARD

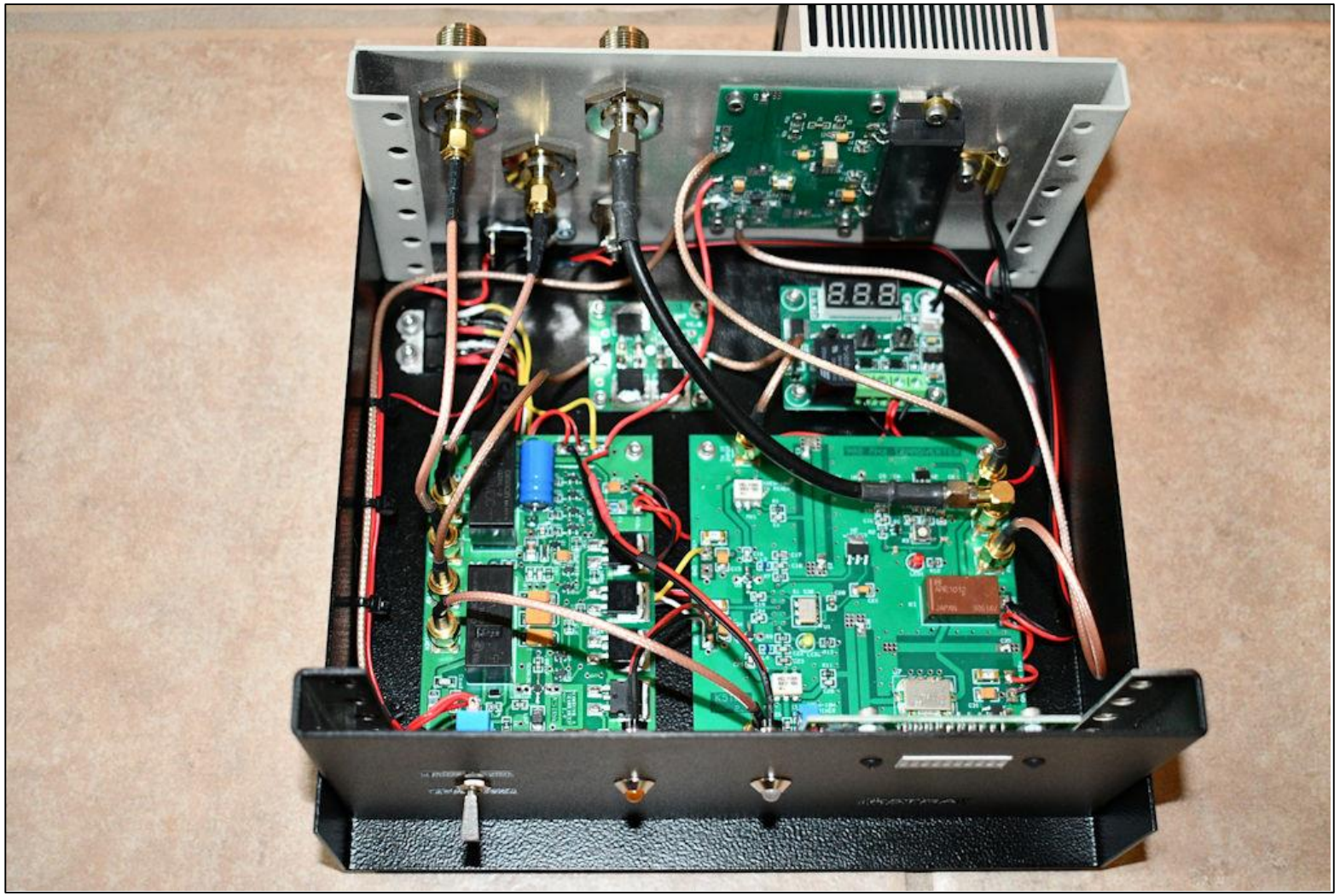


SEQUENCER SCHEMATIC



CHASSIS & BOARDS BEFORE WIRING

COMPLETED TRANSVERTER – TOP VIEW



REAR PANEL of 23CM and 33CM UNITS

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