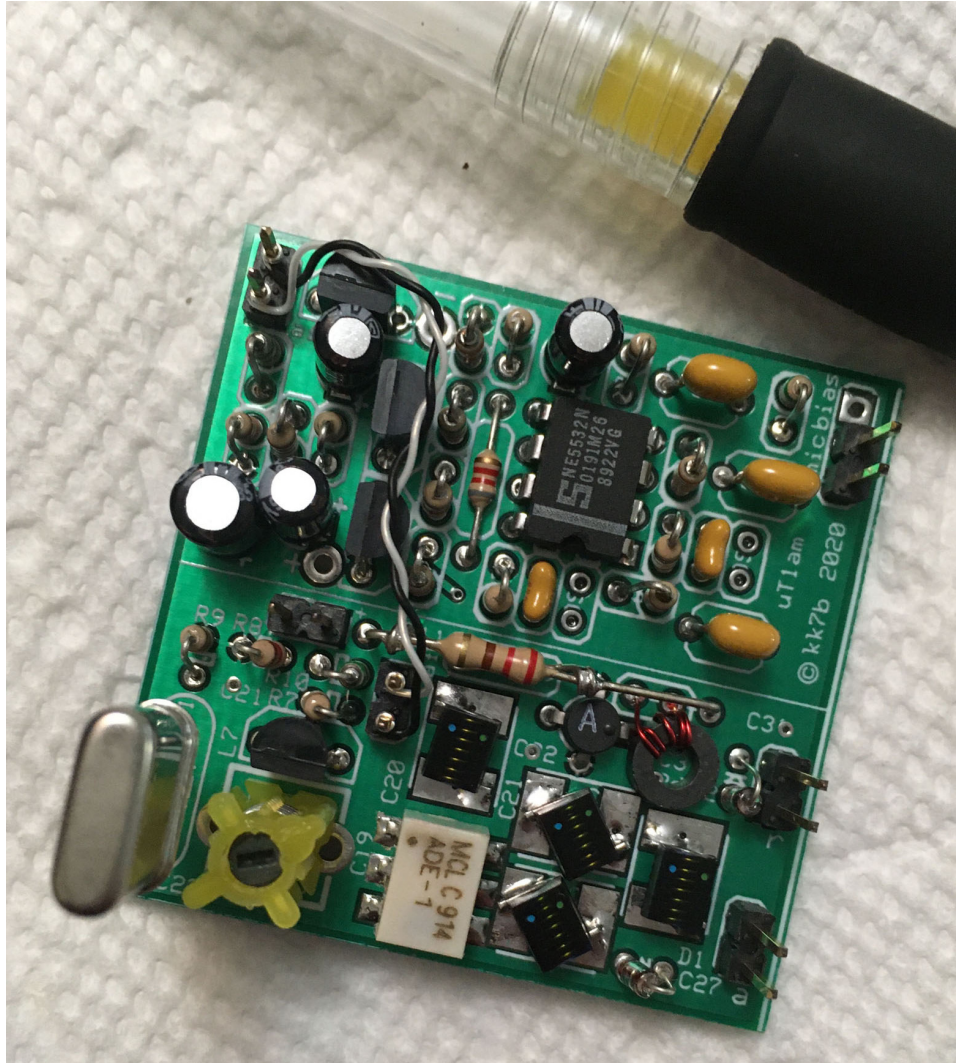


144.270 MHz AM transmitter

Rick Campbell KK7B 30 March 2020



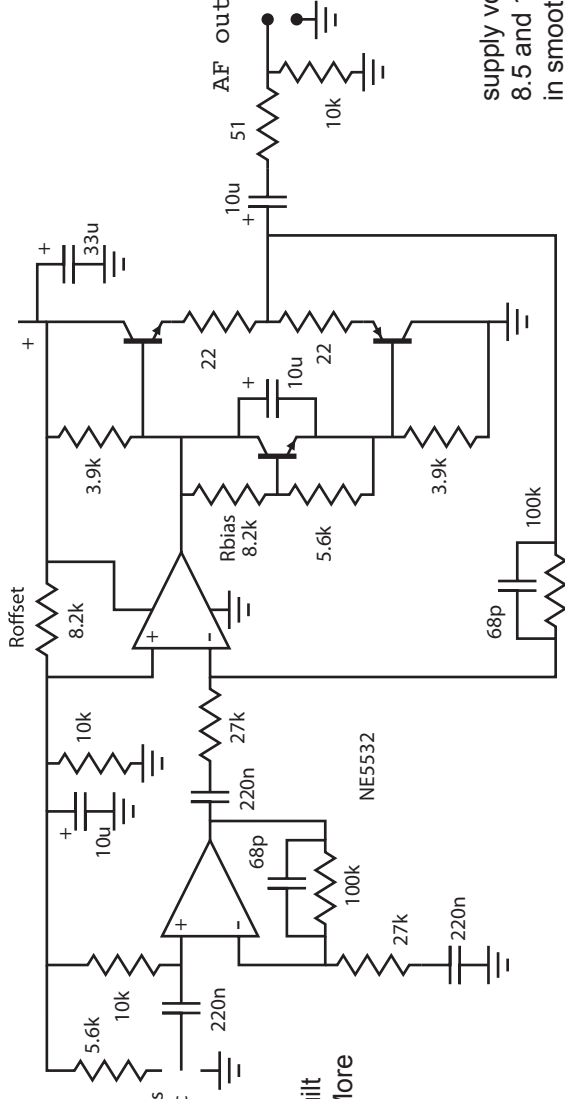
0 dBm carrier output 144.270 MHz transmitter
ball point pen for scale

This small 2m AM transmitter was inspired by the availability of 7th overtone crystals from QuartSLab in the UK and high Q slug-tuned and surface mount inductors from Coilcraft. It is a variation on a previous design sketch for 50 MHz radio control applications. The modulator is a high linearity audio amplifier, as used in IQ modulators for phase cancellation SSB exciters such as the T2pro described in Experimental Methods in RF Design, the uT2 from December 2006 QST, and the more recent instrumentation exciter iT2 designs. Since the modulation sidebands are generated using a diode ring mixer with significant power backoff, the distortion products are quite low, and the MAV-11 output amplifier is also backed off nearly 10 dB from its 1dB compression point. The carrier is inserted by introducing a small dc current into the diode ring, which makes carrier and sideband levels independent. Thus overmodulation, when the vector sum of the sideband pair exceeds the carrier level, does not introduce any distortion at the transmitter. The over-modulation distortion appears in receivers using basic envelope detectors, which may be significant but doesn't result in on-the-air interference.

0 dBm carrier output and -6dBm sideband pair
144.270 MHz transmitter

Rick Campbell KK7B 06 March 2020

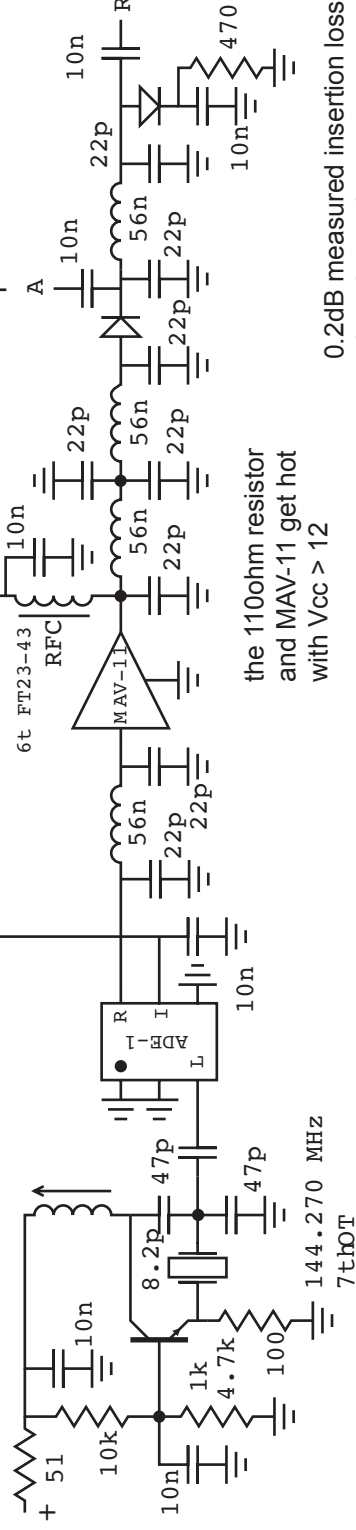
Output 2nd harmonic at 288 MHz is -50dBc
and 3rd harmonic at 432 MHz is -60dBc.



Roffset and Rbias are as built
in prototype number one. More
optimization is encouraged

supply voltages between
8.5 and 19.0 volts result
in smooth variation in
carrier level from -6dBm
to +2dBm

1k and 4.7k resistors from the 7th OT
oscillator 2N5770 base to ground have
been used in different versions of this
circuit. More experiments are necessary.



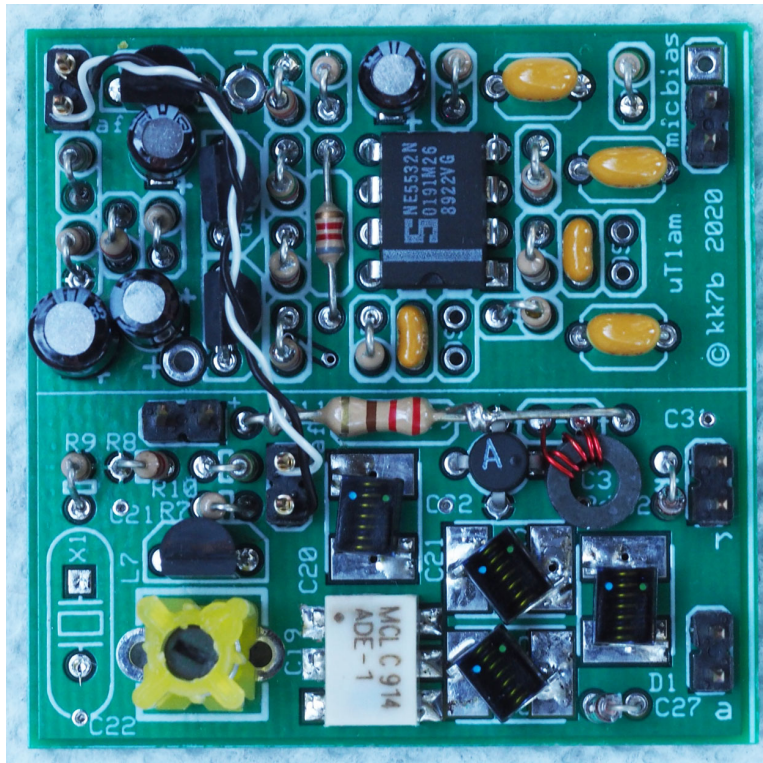
the 110ohm resistor
and MAV-11 get hot
with Vcc > 12

+13.8 volts provides
0dBm carrier output

0.2dB measured insertion loss from A to R
when the exciter power supply is off.

Detail Photos uT1am 144.270 MHz AM transmitter

+12v transmit
Audio amplifier from mic input to ADE-1 mixer IF port



mic input

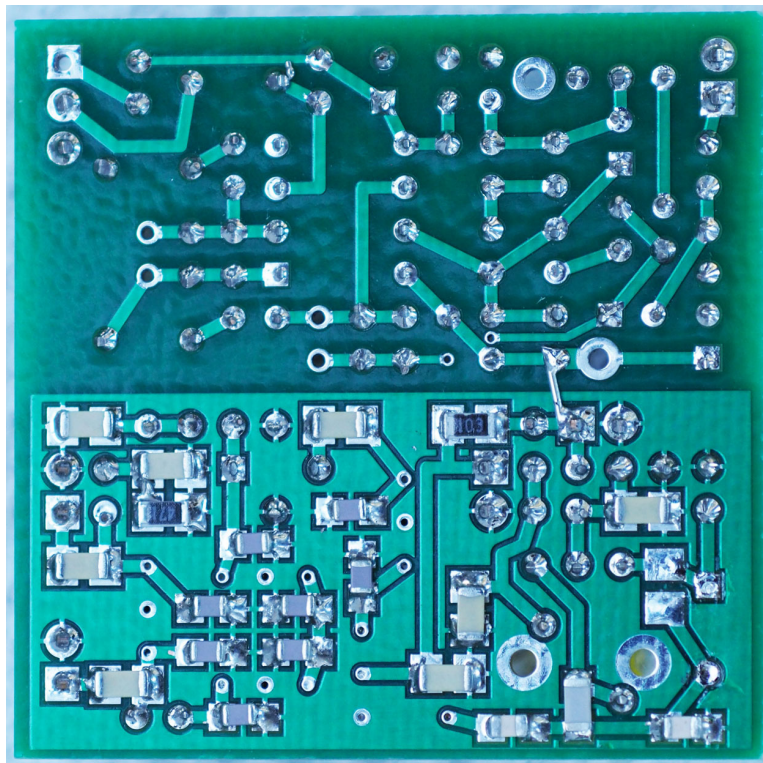
RF section with crystal oscillator, modulator, RF amp LP filter and PIN diode TR switch

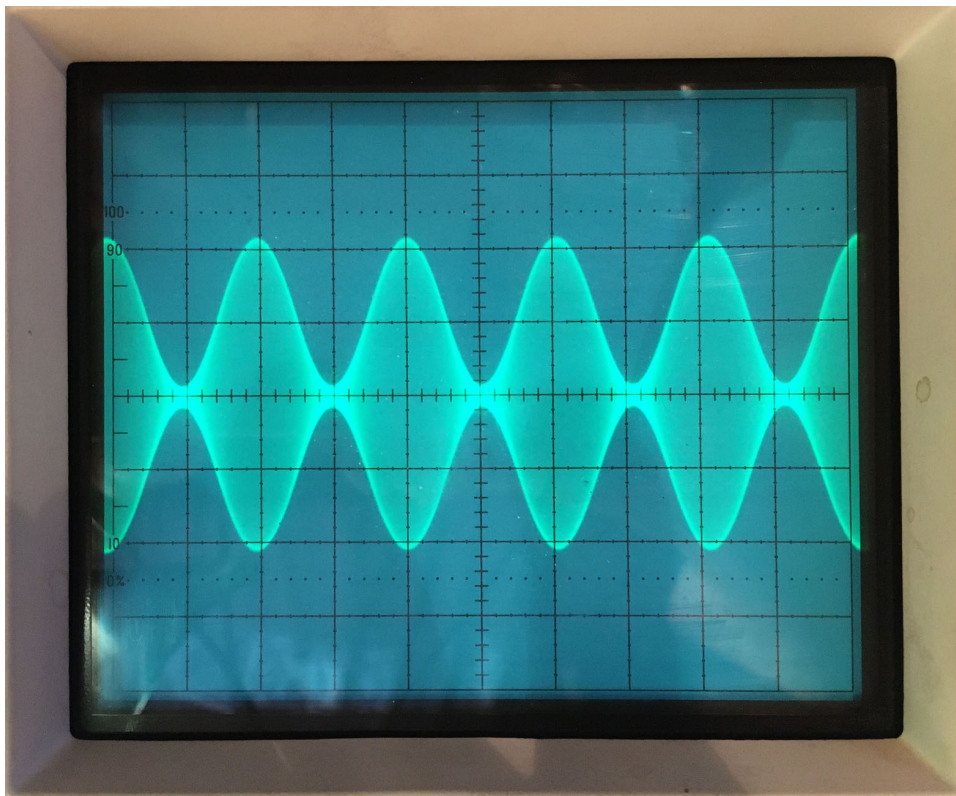
connection to receive antenna

transmit and receive antenna

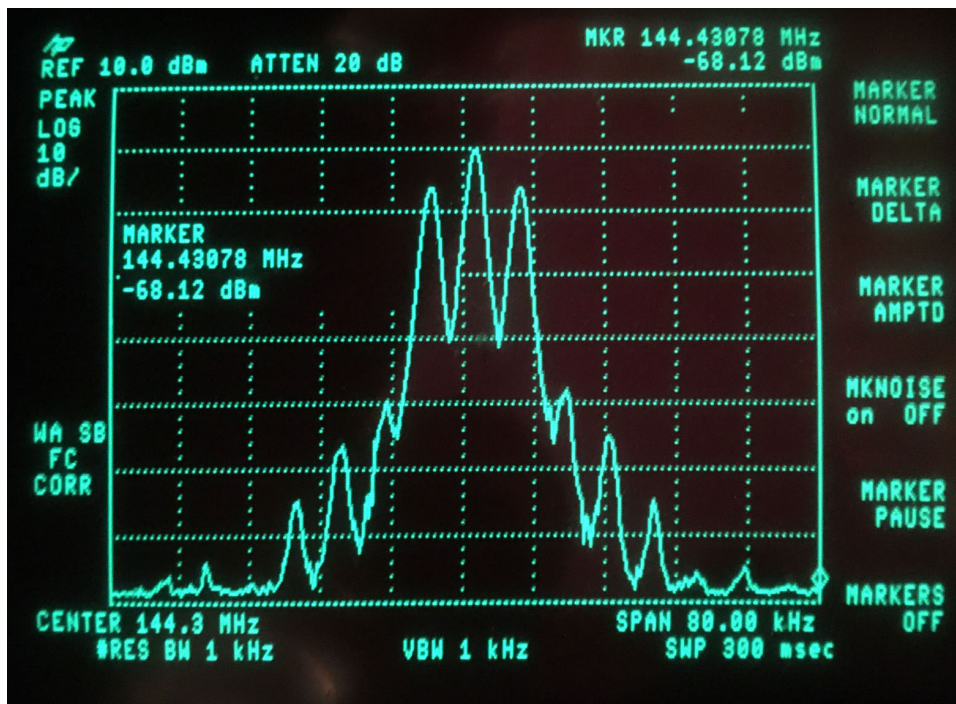
Top Side of circuit board with through hole audio components and RF components

Back side of circuit board showing surface mount resistors and capacitors



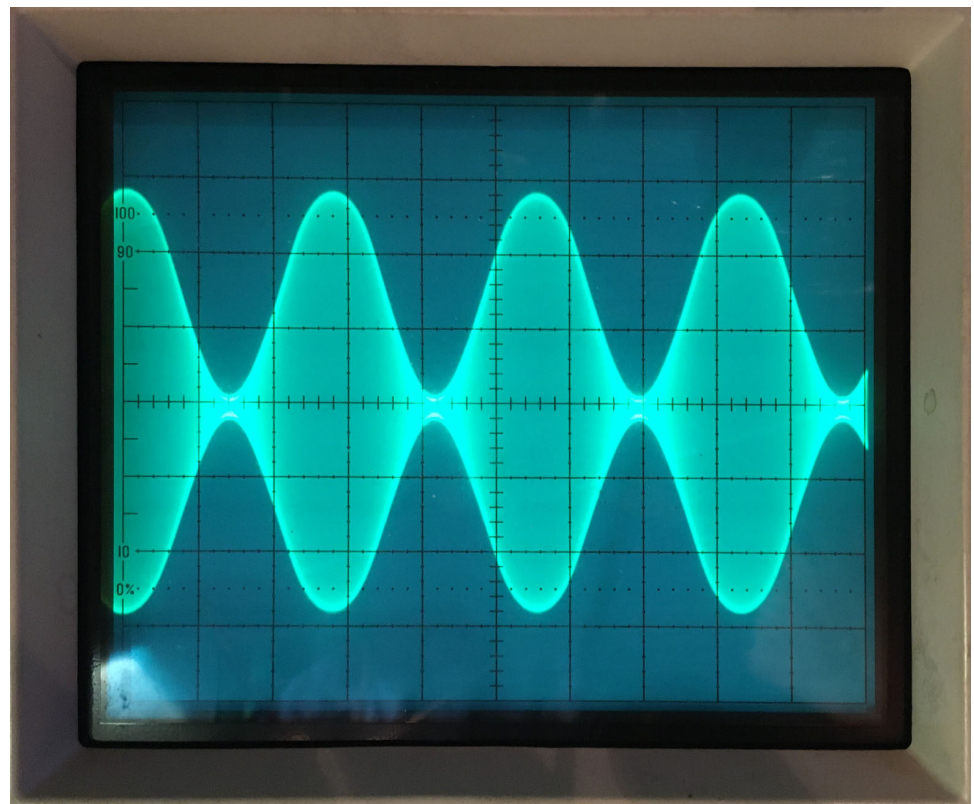


0 dBm carrier output and -6dBm sideband pair
144.270 MHz transmitter



Output spectrum with carrier adjusted to 0dBm
and audio input 5.0 kHz so the sidebands are
visible on a vintage spectrum analyzer with
1kHz resolution bandwidth

0dBm carrier level
exciter driving Mitsubishi
RA07M1317MSA linear
amplifier module to 2.0w
carrier and nearly 8w
PEP output. Note that
the modulation peaks
experience some com-
pression.



2w carrier with a pair of
sidebands at -6dBc.
The 2nd modulation
harmonics are greater
than the 0dBm exciter
output spectrum. This
is still a very good am
transmitter. Most
receiver envelope
detectors have more
distortion.

