MicroT2 Performance with noise into microphone input
Rick Campbell 19Dec07

These are measurements of the Micro T2 exciter and low-power amplifier described in December 2006 QST and the 2008 Handbook for Radio Communications. The circuit has been modified by adding 47 ohm resistors in series with the I and Q modulator emitter follower stages to define the drive impedance to the low-pass filters on the IF ports of the diode ring mixers. This modification flattens the passband response.

Figure 1 shows the 7 MHz output spectrum across a 10 kHz bandwidth with the average output power increased in 10 dB steps. Black -10 dBm. Red 0 dBm. Blue +10 dBm. Green +20 dBm.

Figure 1 shows the 7 MHz output spectrum across a 10 kHz bandwidth with the average output power adjusted to -10 dBm, 0 dBm, +10dBm and +20 dBm by changing the input noise level. Average 7 MHz power is measured using an HP432A power meter. The signal is downconverted using a Racal RA6790/GM with 20 kHz bandwidth filter and the BFO offset 4.0 kHz from the passband center. The Racal AGC is on, so that the output power in the transmitter passband remains nearly constant. The 10 dB steps may be clearly seen in the carrier at 5.0 kHz. AGC is necessary because the plot dynamic range is 60 dB; the signal power is varied over 40 dB; and the in-channel dynamic range of the Racal receiver is less than 70 dB without AGC. The receiver noise floor with small spurious peaks is visible around 9 kHz on some of the traces. The black and red traces show opposite sideband suppression. The blue and green traces show the onset of intermod distortion.
Figure 2 is the +20 dBm average output spectrum over a 16 kHz range, showing the spectrum of distortion that causes interference in adjacent channels. The suppressed carrier is at approximately 9 kHz in this plot. Note the plateau in the opposite (upper) sideband noise at approximately 40 dB below the average power.

The input noise files are part of a standard set stored on an iPod, with the iPod volume control used to set the noise level into the Micro T2 microphone input. The 1024 point FFT spectra were calculated using the sound card input of a Apple G4 laptop running SignalScope with a Rife-Vincent window. The SignalScope data was saved as text files and imported into Excel to generate the figures.