Phase Noise / Blocking Test

Operating Field Day involves coordination among the transmitters and antennas to minimize interference. Simple solutions involve using the full 1000' circle for the antennas, dedicating a station for a single band, and/or using single band filters such as the W3NQN filters which are in both the transmit and receive path. With the limited propagation due to the sunspots there is often a desire to operate on 40m or 20m CW and SSB at the same time with 2 stations as these bands produce to most points. However issues of interference quickly become apparent with two 100 watt transmitters spaced 80 to 100 KHz apart having antennas separated only a few hundred feet. Many Field Day sites and groups are unwilling or unable to use the maximum 1000' circle and building filters that can handle 100W (low passband loss) while producing 20+ dB loss only 80 KHz away are not easily done. Antenna isolations (on the same band) can be as little as 20dB (no work) or as much as 75dB (considerable work if even possible). The question becomes, what antenna isolation is necessary for a particular set of radios to operate interference free?

There are two primary types of interference: Phase noise and Blocking

Phase noise is a transmitter issue and all transmitters have phase noise. When a transmitter operates on a particular frequency it actually transmits on all frequencies. The other radio may hear this phase noise above any band noise rendering reception impossible or limited.

Blocking is a receiver issue. All receivers suffer from blocking which occurs when an extremely strong off frequency signal is delivered to the receiver reducing the sensitivity or producing artifacts rendering reception impossible or limited.

What antenna isolation is needed for a particular choice of radios?

Two filters were built for this test as shown on the next page:

20m 5 pole crystal filter:

Passband: 14.314 - 14.319 MHz (~1dB insertion loss) SWR < 1.5:1
Stopband: more than -90dB for f < 14.285 MHz & f > 14.334 MHz

40m 5 pole crystal filter:

Passband: 7.160 - 7.163 MHz (~1dB insertion loss) SWR < 1.5:1
Stopband: more than -85dB for f < 7.125 MHz & f > 7.168MHz

L.Benko, W0QE
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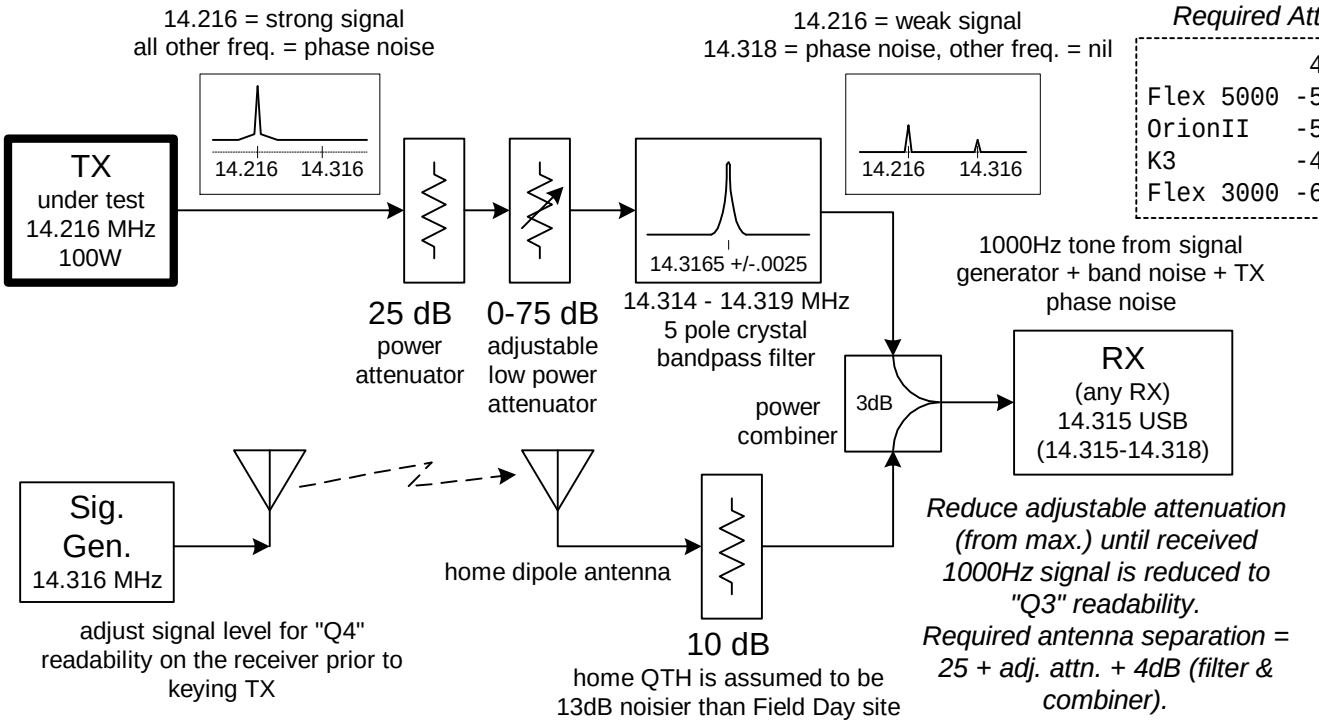
Phase Noise / Blocking Test

Figures show 20m tests @ 100KHz spacing, tests were also done on 40m @ 80KHz spacing

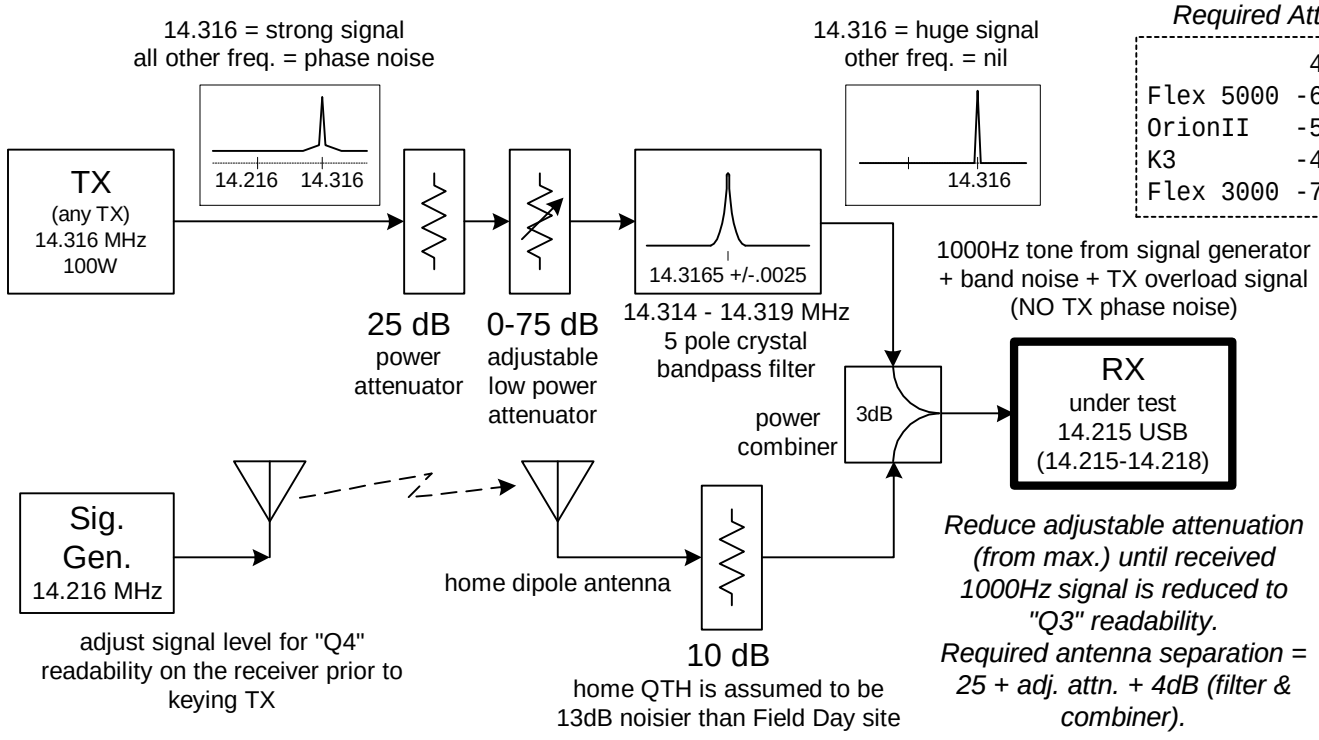
Phase Noise Measurement (test of transmitter)



Required Attenuation

	40m	20m
Flex 5000	-54dB	-74dB
OrionII	-54dB	-69dB
K3	-44dB	-54dB
Flex 3000	-69dB	-74dB

Blocking/Overload Measurement (test of receiver)



Required Attenuation

	40m	20m
Flex 5000	-64dB	-64dB
OrionII	-54dB	-69dB
K3	-49dB	-49dB
Flex 3000	-74dB	-74dB

Final step is to design the antennas to produce more than the larger of the 2 required separations (in dB) for the tested TX/RX pair.

L.Benko, W0QE
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