

SSB-03 Receiver Characteristics

Phase Noise Limited:

Phase noise limited (or what the ARRL now has defined as reciprocal mixing dynamic range, RMDR) has to do with how clean the local oscillator (synthesizer in modern rigs) is. If one is testing for third-order dynamic range (DR3), the distortion product being measured may be covered up with noise from the LO (local oscillator). There are two potential problems here, noise sidebands on the receiver LO, and transmitted noise by a very strong near-by station. Field Day is the worst case for most hams since there is likely more than one transmitter on the air at the same time, and maybe on the same band. (CW and SSB).

In the old days of PTOs and band crystals (Drake, Collins, etc.) phase noise was a non-issue. Now we have phase noise but no drift.

Noise Floor (dBm):

Band noise is usually way above the noise floor of any radio. On 20 meters the typical noise floor in a rural area is about -109 dBm with a 500-Hz bandwidth. That is just below 1 microvolt. Most receivers will have a noise floor around -128 dBm with no preamp, or almost 20 dB lower than the band noise.

What people associate with quiet has much more to do with how the gain and filtering are distributed. Also the AGC threshold affects how quiet the receiver appears. That is why backing off the RF gain makes the radio seem quieter, and why people talk about the signal popping out of a quiet background. Audio hiss can make a radio sound noisy even if from a test standpoint it barely affects the measurement.

Sensitivity:

From a practical standpoint almost no radio made since and including the [Collins] 75A-4 has a problem with sensitivity. Considering how noisy it is now in an urban environment, worrying about noise floor / sensitivity is almost pointless. Also if a radio has a dynamic range of 80 to 85 dB close in (for a CW pile-up), this will be completely acceptable MOST of the time. Wanting 100 dB vs. 90 dB is also almost pointless.

There are lots of other important aspects one needs to consider once the DR3 is good enough.

Attenuator:

If band noise is reading upscale to any significant amount, which is very likely on 40 meters and below, **turn on your attenuator!** This is a whole different subject, but there is nothing to lose and much to gain if your 6, 10 or 12 dB attenuator is ON most of the time on 40 meters and below, assuming you are using your transmit antenna on receive.

NOTE: **BOLD** was added to some of the text by DJ0IP for the purpose of emphasis.