NEWSLETTER ARCHIVES

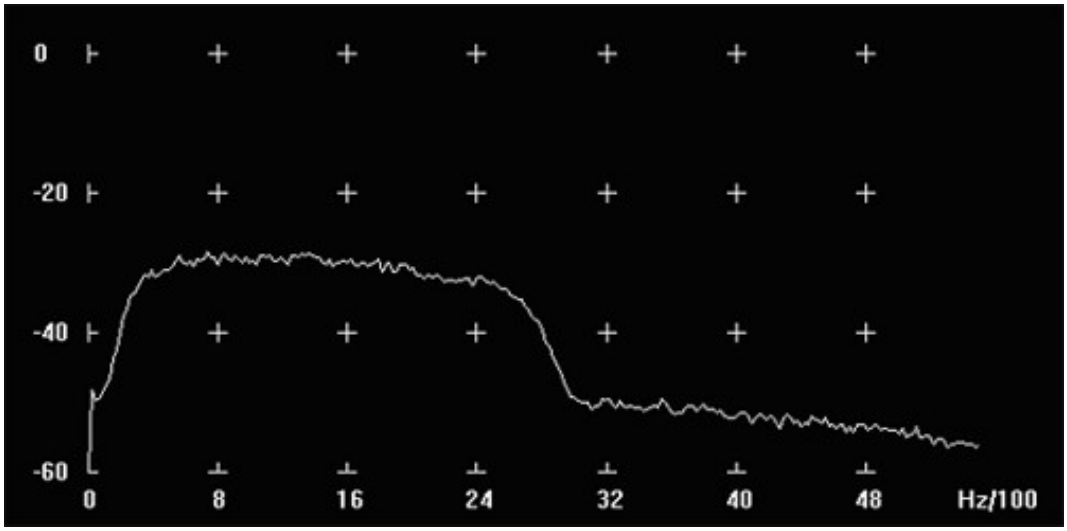
Receiver Bandpass Checking

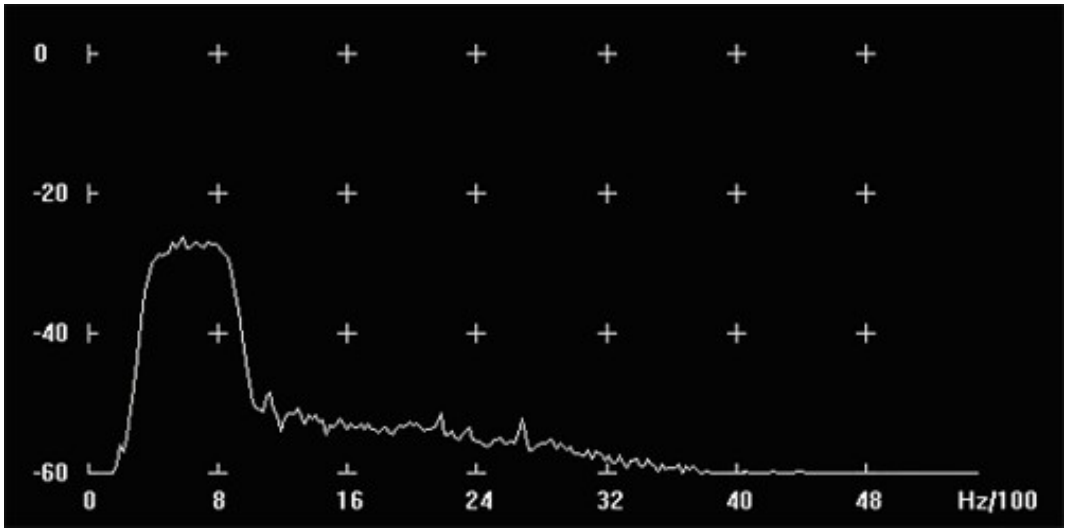
A few days ago, Monty Northrup (N5FC) posted as interesting comment to the Low Power Amateur Radio Discussion group, qrp-l@Lehigh.edu outlining his work using the N0SS noise generator to check receiver filters. The use of a noise generator to check filter response is a fairly old idea, but it had not occurred to me that one can be used to directly check the filter characteristics of a receiver. The trick is to inject noise at the antenna, and then to measure the audio spectrum with one of the audio spectrum analyzer programs such as spectrogram running on a PC with a soundcard. This technique is apparently good enough to align a receiver using a Cohen Filter (one that has a number of crystals of the same frequency in series) without any other signal generation capability. It is hence a most valuable technique to the QRL community. Monty has described his experiments on his web site: http://www.io.com/~n5fc/noise.htm. In an earlier version of either his web site or the N0SS kit web site (I cannot remember which), there was a description of the noise generator, but this has subsequently been removed. This noise generator, is the standard zener diode and 2 * 2N2222 amplifier arrangement seen in many of the amateur text books, and at about $12 the kit looks good value for money.

I decided to try some experiments with this approach to filter measurement. Instead of the N0SS noise generator I used a quite tuner, on loan to me from Lech G3KAU, which incorporates a similar noise generator. I connected this to the antenna with an open circuit on the antenna side so that all the noise was reflected back to maximize the noise at the receiver. My first observation was that this overloaded my receiver so much that either phase noise or inter-modulation products caused the filter to look like a barn door. This may well explain the razor sharp antenna tuning effect that made this quite tuner so difficult to use in practice. In experimenting to find out why my receiver filter was showing up much wider that it seemed in practice I happened to turn off the noise generator. The result was a perfect filter characteristic displayed on the PC generated by the receiver s own input noise. This very simple approach worked well on both my TS940 and my IC706 IIG, both of which are known to be in working order.

The two figures below show the IC706 tuned to 28MHz with no antenna, receiving CW with the wide and narrow filters respectively. The vertical scale is in dB, and the horizontal scale shows DC to 4800Hz.

This seems to me to be a most useful technique when checking of setting a receiver s IF or audio filter stages.





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