

TECH TALK, by Chris Fagas, WB2VVV

GaASFET Preamps

When I started to use low noise, and then GaASFET Preamps I was startled at the difference in the noise floor between various units. Some units caused little increase in the basic receiver noise floor, as indicated by little change in the "no signal" S-meter reading when engaging the device. Other units caused a dramatic increase in the "resting position" of the S-meter, sometimes as high as s5 or s6. The funny thing was that there was no relationship between the level of technology incorporated in the design of unit, including the active devices themselves, and receiver noise floor degradation. It didn't seem to matter whether the active devices were GaASFETs, bipolars, MOSFETs, JFETs, etc. In addition, there was usually a startling difference between two theoretically identical devices. To further complicate the issue, this would all change when I switched antennas, with some poor performers improving dramatically.

The fact that antennas made such an impact seemed proof that this might be an impedance issue. I knew that virtually all of the preamps had both an input and output impedance adjustment via trimmer capacitors, but also that most manufacturers cautioned against "tweaking" them.

The following is a step by step system approach that you can use to tweak these adjustments, which is simple and requires no fancy test equipment (which would of course present a different impedance to the preamp input than the antenna system anyway):

1. Tune your receiver across the desired frequency range, hooked up to your antenna, and listen for a weak continuous tone which just barely moves the s-meter. A good signal will be no more than S1 to S3 when peaked for frequency and antenna direction.
2. Write down on a pad the frequency of this signal and then another frequency which is absolutely clear, 5 to 25 KHz away. Note the S-meter readings under the two frequencies in the two columns which you should head: "signal" and "no signal".
3. Now turn on the preamp and re-check the two frequencies noting your readings. An ideal preamp would boost only the "signal", indicated by a higher S-meter reading, with no noticeable increase at the "no signal" frequency. A noticeable increase in the S-meter reading with "no signal" indicates receiver noise floor degradation.
4. Keeping notes, tweak and then re-check both readings. Your goal after many tweaks is for a maximum reading on the "signal", along with a minimum reading on "no signal". Be careful not to be fooled by the effect that removing the preamp's cover has on its circuitry. You will need to reinstall the cover before re-checking your readings to mitigate this. A small adjustment port comes in handy in this regard.

Adjusting in this manner takes your whole system into account. It is unfortunately tiring when the adjustments are inside a box at the top of your tower, as numerous trips will undoubtedly be necessary. This is not an advantage to mast-mounted preamps.