The Amateur in You, Part 2

What have you been pondering?

Displaying spurs using a tinySA

If you have a radio that gives you more than you bargained for, that could be good and not-so-good. I mean, it's possible that your radio might be transmitting more than just 2 meters when you press that PTT. And you really don't want that if, for example, the bonus transmission occurs on a commercial, fire, or worse, a police channel.

When your radio transmits on a particular frequency, it's possible that, because of internal circuit *nonlinearities*, your radio will also transmit *harmonics* of the frequency you're attempting to send. These harmonics will often fall outside the 2-meter band, and we call these *spurious emissions* ("spurs" for short), meaning *counterfeit* transmissions. Most radios have circuitry that filters out these spurs, only sometimes poorly. But how would you know?

Measuring spurs requires an instrument known as a *spectrum analyzer*, a typically expensive device. Turns out you can use a miniature and less-expensive version of one, called the ***tinySA*** to do the job. The FCC dictates that spurs must be at least ***60 dB*** lower (one millionth!) than the fundamental (carrier) signal on the 2-meter band. So, if your 2-meter radio transmits at 15 watts, any spurs must be 15 microwatts or less.

Getting set up

Connect the included telescopic antenna to the ***LOW*** connector if you're testing a 2-meter frequency, or to the ***HIGH*** connector if you're testing a 70-cm frequency. I'll use my Yaesu FT-60R, set to 146.500 MHz, to demonstrate.

The steps

Turn on the tinySA and tap the screen, then **PRESET**, **LOAD STARTUP**

Tap, then **FREQUENCY**, **START, 144M**

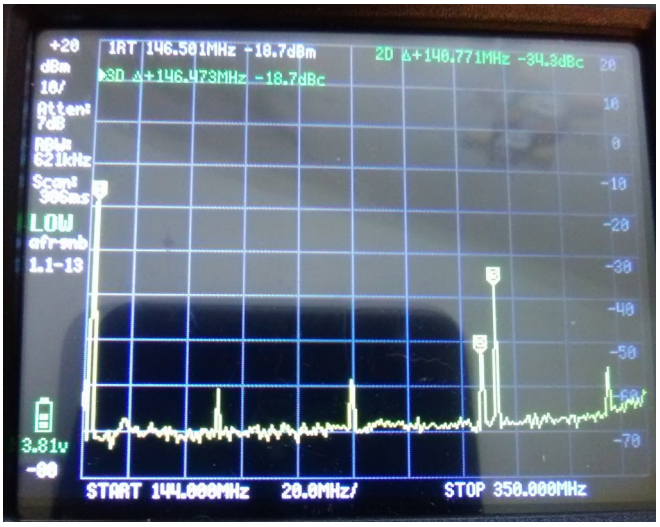
Tap, then **BACK**, **MARKER**, **SEARCH MARKER**, **ENTER FREQUENCY**, **146.50M**

Tap, then **BACK**, **BACK**, **MARKER**, **MODIFY MARKERS**, **MARKER 2**, **DELTA**, **SEARCH**, **PEAK SEARCH**, **BACK**, **BACK**

Tap, then **MARKER 3**, **DELTA**, **SEARCH**, **PEAK SEARCH**, **MAX RIGHT**

Turn on the radio, and press the PTT, saying your call sign.

The tinySA will display the frequency spectrum graph between 144 MHz and 350 MHz,



with the "1" marker over the carrier at 146.500 MHz, and the "2" and "3" markers over the next two highest peaking signals, if any. In this case, it shows marker 2 over 146.500 + 140.771 = 287.271 MHz with a **-34 dBc** signal and marker 3 over 146.500 + 146.473 = 292.973 MHz with a **-18.7 dBc** signal. According to Part 97.307(e), no markers after marker 1 should display a signal greater than **-60 dBc**, so this HT failed the spurious emissions test.

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