One day a few weeks ago, Jock shared a YouTube™ video of a brand new Yaesu 80-Watt, VHF radio with a new DSP feature. When I watched the advertisement/self-proclaimed assessment, the first question I had was, "What's the receiver's specifications prior to enabling the DSP?" and when I re-watched it, I was disappointed in the lack of actually testing conducted and/or reported.

I looked on-line and I saw that Yaesu actually released three (3) new radio models with this new DSP feature, denoted by RASP as suffix to the radio's model number. The marketing literature describes this as "New Evolving Super-DX and Audio Digital Signal Processor". As such, a quest to obtain a radio and provide a review ensued. I found a dealer that had them in stock (not everyone did) and ordered an FTM-150RASP, a true dual-band mobile radio.

The radio eventually landed here (was delayed by UPS due to weather and an apparent accident my route driver got in to). I then came down with whatever cold is going around but eventually unboxed the radio and ran it over to my service monitor. This is what I found:

- The 55-Watt spec for VHF came in at 60 Watts and was flat from 144-148 MHz
- The 50-Watt spec for UHF came is at 51 Watts at 446.000 an was flat from 439-450, but it sagged below 439 almost linearly to 430 where the Tx power at 430 MHz was measured at only 42 Watts
- On receive sensitivity across the entire frequency range on both bands exceeded specs. Squelch threshold was around 0.10 uV and 12 dB quieting was achieved with a signal level less than 0.3 uV.

Knowing that the native radio worked to industry standards led me to wondering just how was the Super DX ADSP going to improve this.

I initially started with setting the radio on 146.52 and injected the 20 dB quieting signal. This opened the receiver. I engaged the ADSP and the radio muted the audio and the S-Meter went up suggesting a pre-amplifier in included in the ADSP chipset, but it muted the audio and no squelch noise / open carrier was "heard". Using a couple of different methods – made difficult by the muting of the squelch on carriers – I was able to calculate the pre-amplifier is adding about 6 dB to the receiver's link budget.

I then tried a 1000 Hz tone (typical for FM transmitter alignment) and the ADSP simply eliminated that audio by more than 50 dB – meaning I could hear the tone in the radio speaker, but barely. I then tried to use DTMF but the DSP figured it out in about a second and mostly muted it too, but only by about 30 dB. My deduction at this point is that the ADSP simply removes constant signals as “undesired audio”.

I then turned my attention to using the national weather service (NWS) channels on 162 MHz – since they have full-time audio and are at more than maximum deviation for a 20 kHz emission bandwidth channels. The computer-generated audio used by NWS has an underlying tone. The ADSP stripped that constant as unwanted noise, combined with the gain from the receiver pre-amplifier, the audio, albeit clearly processed, was understandable and without noisy artifacts. Further, moving around to the different weather channels – it really cleared up the audio on the stations that were noisy when the ADSP was not engaged, even one of the NWS channels that I couldn’t hear normally came in and was clear.

So, given that the ADSP clearly is an improvement, now I wanted to see what it was doing from an RF-filtering perspective and what kind of impact signals from “nearby” might cause. In summary, it looks like the ADSP implements a narrower RF filter. This deduction comes from an evaluation of the ACCPR (Adjacent Channel Coupled Power Ratio). What is ACCPR? ACCPR is the amount of undesired signal needed to actually disrupt the desired reception. The native receiver has a 59 dB ACPR value for 15 kHz which is increased to 68 dB. For a 10 kHz offset, the 44 dB ACCPR is unchanged suggesting the filter is approximately right around 25 kHz wide – so an offset of 12.5 kHz, or more, is protected from adjacent signal noise. A 25 kHz offset channel is identical to the 12.5 kHz measurements. When the same tests where conducted 1 MHz, 5 MHz and 10 MHz away the results were also the same – which suggests that path to the detector in an RF-rich environment may be direct with ADSP engaged, possibly opening the radio up to receive blanking. Once I get the time to install in my truck, I’ll be able to better verify / understand this.

In summary, Yaesu’s “New Evolving Super-DX and Audio Digital Signal Processor” exceeded my expectations, which admittedly where not that high, and suggests that ADSP could improve reception and audio quality for amateur radio operation I am led to wonder if this might find its way into the Commercial market, but considering the market transformation to digital radio, I am not sure it will come to fruition.

As I concluded writing this review, I became curious if the FTM-150RASP is actually an SDR or not and if there will be firmware releases, and if so, will there be additional improvements. There is no clear indication in the FTM-150RASP service manual or the sales literature if this is an SDR, but there also isn’t any indication that it is not.