

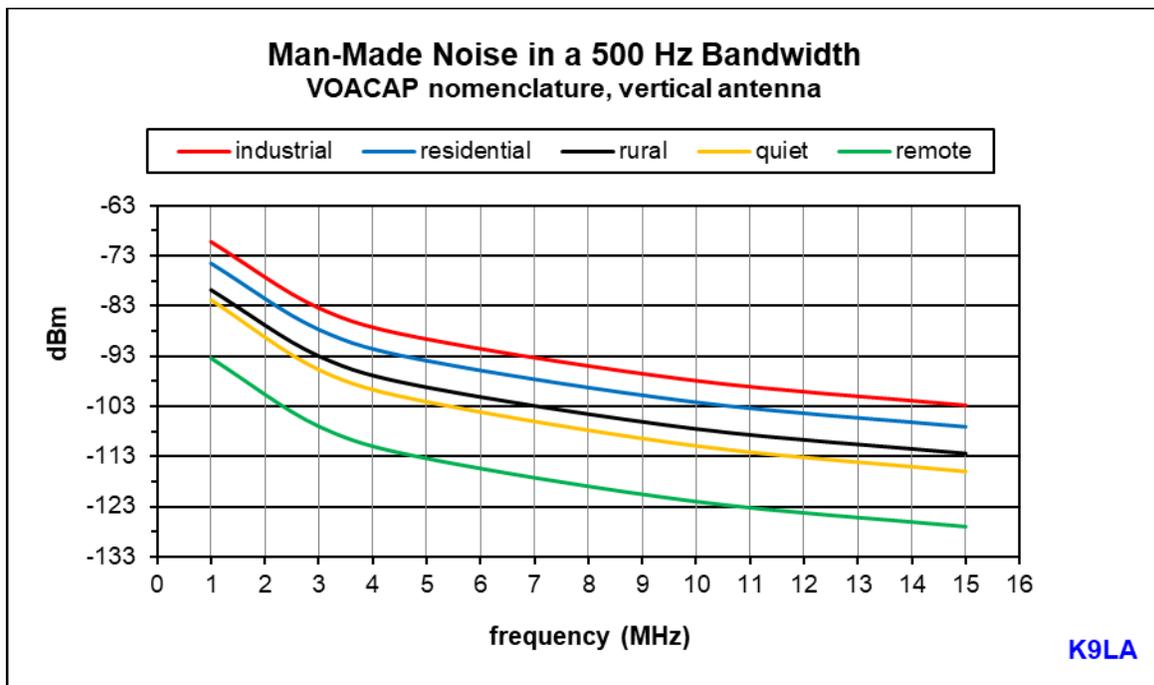
Using VOACAP to Predict FT8 Propagation
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With solar minimum between Cycle 24 and 25 approaching and FT8 showing an advantage over CW/SSB/RTTY, an obvious question is “can I use VOACAP to predict FT8 propagation?” The answer is “YES” as long as you input the correct parameters into VOACAP.

In addition to using the correct antenna gains, transmit power and the proper solar index (a smoothed sunspot number – not a daily sunspot number), FT8 predictions also require you to make your best estimate for your noise environment as FT8 works in terms of the signal-to-noise ratio (SNR).

There are two methods to estimate your noise environment. The first method is to simply use the “definition” of noise environments in VOACAP to best match what you think your location is. VOACAP defines noise environments as noisy, industrial, residential, rural, quiet and remote. You should be able to get close with this method.

The second method is to actually measure your noise in a 500 Hz IF bandwidth on a band using a vertical antenna, and then compare it to the following plot.



An important caveat with this second method – you need to calibrate your S-meter in terms of dBm. For example, my noise on 160-Meters in a 500 Hz IF bandwidth on my inverted-L (mostly vertical) is S3. Knowing the S-meter calibration on my Ten-Tec OMNI-VI, this translates to -103 dBm. Thus I am in a remote noise environment, and would use this option in VOACAP.

With the noise environment defined, what SNR value for FT8 should we input into VOACAP? VOACAP reports noise (and thus SNR) in a 1 Hz bandwidth, so we have to translate FT8 SNR values to a 1 Hz bandwidth.

FT8 can nominally decode at a -19 dB SNR in 2500 Hz. A -19 dB SNR in 2500 Hz translates to a +15 dB SNR in 1 Hz. Thus +15 is the value I would input into VOACAP for the “Req SNR” (required SNR). The resulting REL value will tell you the percentage of the days of the month that the SNR will meet the +15 dB Req SNR value.

Let’s run through a prediction for a reported FT8 QSO to see how all this works. On March 9 of this year, HB3YFP heard K3WW on 15-Meters around 1530 UTC. HB3YFP reported that K3WW’s FT8 SNR was -20 dB in 2500 Hz. That’s +14 dB in VOACAP’s 1 Hz.

An e-mail to K3WW gave me his transmit power – 40 Watts. His antennas are defined on his web site (www.k3ww.net). I assumed HB3YFP’s antenna gain and noise environment from his www.qrz.com page.

VOACAP predicts an SNR of 8 dB in 1 Hz for this FT8 QSO. That’s 6 dB lower than what actually happened. But we have to remember that VOACAP gives monthly median values. Using the tables of excess loss in the VOACAP documentation indicates the SNR on any given day in March could be from about 10 dB higher to about 15 dB lower than the median value of 8 dB. Thus the prediction range is really from -7 dB SNR to +18 dB SNR in 1 Hz, with a median of 8 dB. The actual +14 dB SNR falls nicely in this range.

The bottom line is VOACAP can be used to predict FT8 propagation. You’ll have to make some assumptions, but if they are reasonable you should be able to get some useful information from VOACAP for your FT8 operations.