

Precision Frequency Measuring

Spectrum Lab software: <http://www.qsl.net/dl4yhf/spectral1.html>

Spectrum Lab setup tutorial is at:

<http://www.ve2azx.net/technical/FMT/SpecLabInfo.pdf>

Fldigi software and instructions are at:

<http://www.w1hkj.com/Fldigi.html>

WSPR software and FMT instructions are at:

<http://physics.princeton.edu/pulsar/K1JT/wspr.html>

http://physics.princeton.edu/pulsar/K1JT/FMT_User.pdf

ARRL Frequency Measuring Test (FMT) webpage:

<http://www.arrl.org/frequency-measuring-test>

Previous FMT results are available at: <http://www.b4h.net/fmt/>

Spectrum Lab setup:

Warm up rig and computer for at least two hours!

Options – FFT

FFT Input = Complex, with internal frequency shift

Decimate input by (divisor) = 16*

FFT input size (“length”) = 16384*

*If waterfall freezes, select lower values until waterfall moves smoothly.

Options – Audio I/O

Soundcard Sample Rate = 44100

Be sure your soundcard is selected as the **Input Device**

Set rig to AM and tune to WWV. Measure 600 Hz tone transmitted on odd minutes. In **Samplerate Calibrator** window, set **Correct Frequency** to 600.0, **Displayed Frequency** to what you measure, hit **Calibrate Input SR** and OK, then hit **Apply** to save values.

Avoid sunrise/sunset for WWV calibrations to minimize Doppler effects.

Reference Frequencies

WWV is at 5, 10, 15, 20, and 25 MHz

- 600 Hz tones on odd minutes

CHU is at 3330 and 7850 KHz

Fldigi Setup

Use online instructions at:

- http://www.w1hkj.com/FldigiHelp-3.22/digiscope_display_wwv_mode.html
- http://www.w1hkj.com/FldigiHelp-3.21/html/frequency_analyzer_page.html
- <http://navymars.org/central/area/Training/What%20Frequency%20Am%20%20On2.pdf>

Rig Calibration

1. Set rig to USB and tune to WWV 600 Hz below transmitted frequency (e.g., for 15 MHz WWV, tune rig to 14,999.400 KHz).
2. Using rig manufacturer instructions, align rig calibration (if possible) so WWV carrier is at or close to 600 Hz.
3. While in USB mode, tune to all other WWV and CHU signals 600 Hz below carrier as in step 1 and measure offset. Make a chart of offsets for correcting measurement readings.

Frequency Measurement

1. Set rig to USB and tune about 600 Hz below the frequency of the signal so carrier is displayed in Spectrum Lab/Fldigi at about 600 Hz – it may be 5-10 Hz away from 600.
2. Record rig frequency and Spectrum Lab/Fldigi frequency.
3. Measured Frequency = Rig + Spectrum Lab/Fldigi ± Offset

For ARRL FMT, enter measured frequencies to two decimal places (i.e., hundredth of a hertz). Results are usually available 48 hours after the test.

Spectrum Lab and Fldigi are capable of very precise measuring, recording, and offline data analysis. This handout is just intended to provide a quick setup.

Lots of frequency measuring info is at:

- QST April 2015, p. 37
- <http://www.ka7oei.com/fmt.html>
- <http://www.k5cm.com/>
- <http://tech.groups.yahoo.com/group/FMT-nuts/>
- <http://www.febo.com/time-freq/fmt/>

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