

Adjusting the K2 Filters Using a Macintosh

By: Dave Belsley, W1EUY

This document describes how to tune the K2 filters using "Spectrum Analyser" on the Macintosh. This program is available at:

<<http://hyperarchive.lcs.mit.edu/HyperArchive.html>>

Once there, simply enter Spectrum Analyser into the search field, download the result, and unstuff it. The package contains a "fat" version (for all Macs) and a special 68K-with-FPU version.

There are two methods for setting the filters, the 'peak' method, similar to that described by Bruce L. Bevelheimer, W3GDZ, using Spectrogram in the Windows environment, which places the filter's peak on the sidetone, and the 'centering' method that I (and Tom Hammond, NØSS) proposed earlier, which centers the filter's pass band on the sidetone. It is difficult for me to advise you which of these two methods to use; they are equally straightforward, result in settings that are very close, and, in my opinion, produce results that are, for all practical purposes, indistinguishable. The description that follows is initially the peak method, but a paragraph at the end explains how simply to modify it to become the centering method. Take your pick.

Set the K2 up as follows:

- choose a noisy lower band and find a clear spot (antenna connected), or if one is available, connect a broadband noise generator to the ANT input
- set RF gain low(ish), 9 o'clock or less
- set AF gain mid-range
- turn AGC off (press and hold PRE/ATT and AGC simultaneously)

Now launch "Spectrum Analyser" and connect the audio of the K2 to the sound or Mic input of your computer (and to an external speaker, if you want to be able to hear what's going on). You may have to select between "sound in" and "microphone" using the Sound or Monitors and Sound Control Panel. You will immediately see some sort of spectral depiction of your sound output. You might want to go to the Options Menu and reset some of the colors. The default has a black background with green lines. I prefer a yellow background with red lines, but whatever turns you on.

In the Options Menu, Sound Input, select the highest bit sound your machine will allow and the highest sampling rate, although you may want to experiment with this.

Spectrum Analyser's main window allows parameters to be entered for both horizontal and vertical scales. The horizontal scale should be linear with a very small resolution (set with a pull-down menu right below 'Frequency Settings'). I used 1.358. This gives a good view of the pass band, but refreshes slowly on slower Macs.

Pick a range for the horizontal scale that is wide enough for the filter widths and that places your sidetone right in the middle. My sidetone is 680Hz, and I simply used a range of 0 to 1360 with 10 divisions. If your sidetone is 600Hz, try 0 to 1200. This might not be as wide as your FLT 1 width, but that really doesn't matter; you don't need to see the whole pass band for this filter.

Next set the vertical scale. For this method, pick the linear option. I started with a range of from $3e-13$ to $4e-12$ with 8 divisions. But different Macs have different sound input systems and so could respond differently. You should pick a range that produces a well-defined mound of color. This mound will be better defined for filters 2, 3, and 4 than for the broadest filter 1, so you might want experiment initially with filter 2 to get as clear a display as possible. Pick the 'from' value to allow this mound to be firmly planted on the bottom of the graph, with little activity occurring to its left or right. Picture a hay mound in a field of grass. Keep the mound, get rid of the grass. Pick the 'to' value to keep your mound within bounds. Remember, in setting these values, you can set both the coefficient and the exponent. Once you have a reasonable order of magnitude with the exponent, you can fine tune by changing the coefficient, say from $3e-13$ to $4e-13$.

You may leave all other parameters and check boxes in this window at their defaults.

You should now have a mound of splotchy color showing your filter shape, dancing around a bit with each refresh, and having several sharp spikes popping up and down at and near the center. With the broadest filter, there will be two separate humps.

Now go into CAL | FIL | Band- (I'm assuming you've already set your filter widths) and change the BFO setting to bring the peak position of the mound to the center vertical line, which is your sidetone. You'll have to use some judgement as to where the actual peak is, but, after a few refreshes, this becomes reasonably clear. For filters 2, 3, and 4, there will be a single peak to bring onto the center line. On the broadest filter, there will be two mounds. Bring the peak of the lower one onto the center line. You can now just pop from one filter to the next, setting the BFO for each. Then you can proceed through CW REVerse, SSB L, and SSB U using the same set up. Recall that, in setting cw reverse and SSB U, your BFO is on the other side of the filter.

If you prefer to use the centering method, do exactly the same as above, but, in the previous paragraph replace the part about moving the peak onto the center vertical (sidetone) line with the following: As you look at the mound of splotchy color, pick a horizontal line that has a vertical height about 1/5 way up from the bottom of your vertical scale. Focus your eyes only on the part of the mound whose height is above this line. This central part is your "bandwidth". Adjust the BFO to bring the center of this bandwidth onto the center vertical (sidetone) line.

See the next page for an example display from Spectrum Analyser for the Mac while aligning the K2's filters. It would appear that the filter bandwidth may have been set to 400 Hz for this screen capture.

Sample screen from Spectrum Analyser for the Mac

