

I've written up this little set up procedure for the use of Spectrogram 16 which you can get from this location:

<http://audiosystemsgroup.com/spectrogram.exe>

This procedure will help you setup the program and then set your K3's REF Cal alignment and then check your P3 against it. I think that you'll find this helpful if you haven't already used something like this.

First off, download the program. Install it. Next, plug your audio out (line out) of the K3 into your computer's sound card input. Mic or Line input will work fine. Make sure that you have your Computer's sound card set up in the Audio settings to input from the source that you have selected on the back of the computer's sound card. You want to go to audio settings on the computer and MUTE the output of that source. IE. If you put the K3 into Mic input on the computer, make sure that you select the input to be from the MIC in, and then MUTE the computer's MIC output. Otherwise you're going to get feedback. Next set your Mic input level for about Mid point. We will adjust this again later if you find out that the levels on the Spectrogram are too Low or High for the display to show. Once you have that done, set your "Config: LIN OUT" level on the K3 to 008. That seems to work well in most cases.

Open the Spectrogram program. Once it's launched set the following things up (These settings are for CODE not SSB, you'll need to make changes after this procedure if you want to use it as a SSB Scope later.)

At the top of the screen select the drop down menu "Preferences" Click on "analysis controls". Check "Manual Controls". Next in the same "preferences" drop down menu, select "Display Pointers". Check "White Cross". Again, under the "preferences" drop down menu, select "Display Freq. Mark". Click "On". Once you do that another box will come up in the middle of the screen. When it does in the first empty box "Marker 1" put your K3's "PITCH" freq. in there (this is the freq. you selected as your K3' side tone output). IE if you set your pitch to 500Hz put 500 in there. You can leave the second box empty. Click OK to save it.

Now, you should be back at the main menu. At this point set your K3 to CW mode, select a band that doesn't have too much QRM/QRN. Go to a spot where there is NO ONE transmitting in. Open your filters all the way to 2.8KHz or 3KHz if you can. Next, Click on the first drop down menu at the top of the spectrogram screen called "Function". Select "Freq. response Cal." Select "Calibrate". Then hit OK to let it do its calculations. When it has finished you should see movement on the main screen window. If that movement is displaying higher or Lower than -60 on the left side of the spectrogram display go to your Mic input setting and adjust it so the "noise floor" your watching is riding somewhere between -90 and -60. A setting of -60 would be equal to

about an S5 noise floor on your K3's S meter. If you have an S1 noise floor you should set your Mic input where the signal on the spectrogram is displaying about -75.

Now, go to the Bottom of the screen and hit the "STOP" button. Once the program stops go back to the top of the screen and select the "Functions" drop down menu again. Click on "F1 Scan input". A new box with lots of information will pop up in the middle of your screen. Set/Click the items as I give them to you. If I don't mention something it's because it's probably grayed out.

Left side items

Rate: 96K

Type: Mono

Resolution: 24bits

Display: Scope 1

Plot Type: Signal

Averaging: msec (enter 50 in the blank white box)

Spectrum: Max=30 (slide the bar till you get it to read 30 in the box)

Level (dB/Hz): -100 (slide the bar till you get it to read -100 in the box)

Palette: CB

Right side items

Freq Scale: Linear

FFT Size: 16384

Freq. Resolution: 10

High Band limit: Set this number to your K3's Pitch freq. PLUS 500Hz. So if you're using 500Hz make this number 1000

Low Band limit: 0 (slide the bar till you get it to read 0 in the box)

Cursor Freq. offset: 0

Recording Enable: OFF

Once you have these settings made as I've given them to you, click the OK button. You will now go live with the new settings. In order to make changes you will have to Hit the "STOP" button at the bottom of the screen. In order to run this set up again, all you have to do is (from stop) go to the top of the page, select Functions and then click on Scan input, then Hit the OK button again. The program will remember all of these settings I have given you.

Now, let's set your REF cal up on the K3. BE SURE YOU WARM UP YOUR K3 FOR AT LEAST 30 MIN. BEFORE YOU DO THIS.

Select CW mode. Set your "Width" filter on the K3 to 500Hz. Now, set your K3 to 10.000.000 (WWV, or use a KNOWN carrier for your area of the world) Make sure that you can see the final 3 zeros on the display, this is VERY important.

You should hear a carrier tone now. HOLD the "Menu" button down on the K3.

Once you are in the CONFIG menu rotate the sub dial until you get to "REF CAL"

on the display. You should see the long set of numbers on the K3's display. Look at the Spectrogram display. You should have it running now (IE. Selected OK from the Scan Input screen under the functions drop down menu) Notice that you have a several peaks on the display. The main (loudest) peak should be PERFECTLY aligned in the center of the FIRST red line (this is your K3's PITCH freq. you programmed in the "marker 1" area). If that Main peak of the signal is NOT in the EXACT center of the FIRST red line, Use the K3's Main VFO Knob to turn your REF CAL number up or down to place it there. Once you have aligned your REF CAL on the K3 to the EXACT center of the FIRST red line you will be within .05Hz of Zero Beat on WWV. This is the best you're ever going to get your K3 aligned for accuracy.

From this point you can go to your favorite band that you work CW on, and find a signal to listen to. The display will now show you all of the audio that is able to pass through your Width Filter. The wider the filter you have, the more information you'll see on the spectrogram, the tighter you have your filter the less you will see. Notice that when you tighten your filter all the way down to 50Hz you will pretty much only be displaying an area very near to that First RED line. If you use the Shift knob on the K3 you will see how you can move away from that center area. Again, the Red line is the ZERO BEAT freq. of your selected PITCH setting. In other words, if you find a CW signal, then (while in CWT mode) Auto "SPOT" the signal, you should see the peak of the CW tone move right to the center of the First RED line.

You may notice that it doesn't move EXACTLY to the center of the red line though. This is because the K3's auto spot isn't as accurate as you may think. However, with the Spectrogram you can now move your VFO to place that CW tone right in the middle of that first red line. At this time you will notice, as long as your Shift is centered in the IF (the little * is displayed next to the shift number) you can quickly crank that WIDTH filter down to 50Hz from 500Hz (or where ever you usually keep it) and you will NOT loose the signal. This is because you've got that CW signal exactly in the ZERO BEAT, or center of the IF, of your K3.

With this in mind, if you have noise above or below that signal and you want to move away from the Zero Beat area, you can now see where the noise is. If you slowly move the VFO up or down away from the noise while using the shift knob on the K3, you can follow the CW tone away from the noisy area. Just be sure to keep the tone peak in the middle of the Width filter you have set up.

Another useful use for Spectrogram is if you choose to use the Manual NOTCH filter. You can now turn on the notch filter and as you adjust the Freq. of it, you will see what area of the signal you are affecting. For example, if you have noise at 300Hz and your pitch is set to 500 hz, you can now watch the Notch as you move it to eliminate the noise below the Zero beat freq. (500Hz) yet keeping it as close as possible without cutting out any of your target CW signal. This will

allow you to completely remove the adjacent noise without affecting the CW tone.

A combination of the three (Width, Shift and Notch) can be VERY handy tools to use in order to remove QRM/QRN. Having the Spectrogram to watch what you're doing will make doing those adjustments both VERY easy and affective.

There are a ton of other great uses for the Spectrogram, but I think that at this point you need to play further with it, get used to it, and I'm sure you'll be able to find new reasons that you may have for it.

Next, This is how you can set up your P3 so that you know your REF Cal is aligned to your K3 as best as it can be done:

(If you don't have a P3 skip this section and continue down)

First, this is how to get your P3 properly calibrated: MAKE SURE YOUR P3 HAS WARMED FOR AT LEAST 30 MINUTES (The P3 tends to drift in different climates, you need to make sure that your shack is temperature regulated if you can. I recommend that you do this alignment after the amount of time you tend to use your rig. IE. If you only operate for 1 hour a day, set this when your P3 has been on for 30 to 45 minutes)

step 1

Hold the "Center" button

once in the center mode (center displayed on the screen);

Hold the "Center" button AGAIN.

This will center your P3 so that at 10.000.050 it switches to 10.000.1 and when you get to 9.999.950 it changes to 9.999.9 on the P3 display. This also avoids the need to set a "fuzzy" center on the P3.

Step 2

Put your rig on 10.000.000 (WWV, or another known carrier for your area of the world)

Step 3

Set your P3 "SPAN" to 2 (2KHz)

Step 4

Turn off your K3 RIT and XIT, Turn off your P3 "Marker" and "Peak" Hold. (this just makes things easier to see)

Step 5

Enter the REF CAL menu

Step 6

Move the carrier to the middle of the P3's center white line

Step 7

Push the MENU button again turn get out of the adjustment menu. DO NOT push the QSY button to exit, this could move your alignment again.

To re-check how far you have drifted later on do the following.

Step 1

Complete steps 1 - 4 above (Do NOT enter the REF CAL menu)

Step 2

Move your K3 in "FINE" mode until you center the WWV carrier in the middle of the P3's white center line.

Step 3

Read the K3 display. You should be at 10.000.000, if not make a note of where the freq. is

Step 4

Check again in 30 minutes.

(Continued from above) **Setting the Ref Cal PERFECT dead nuts on...**

Okay, so on Spectrogram 16 there's a button called "capture" (it's on the main window when you're running the scope). We're going to take a measurement, and we're going to set your K3 EXACT. This is what I want you to do. Go to the Scan input window, set your "Frequency Resolution" to 5.9 (this should be the lowest number you can set it to) Next, Set your K3's Pitch to the freq. that you like to use it at. Set your marker #1 up for that Freq. (as described in the document I sent you) Next, go to some band where you can transmit. Start Spectrogram's Input scan mode.

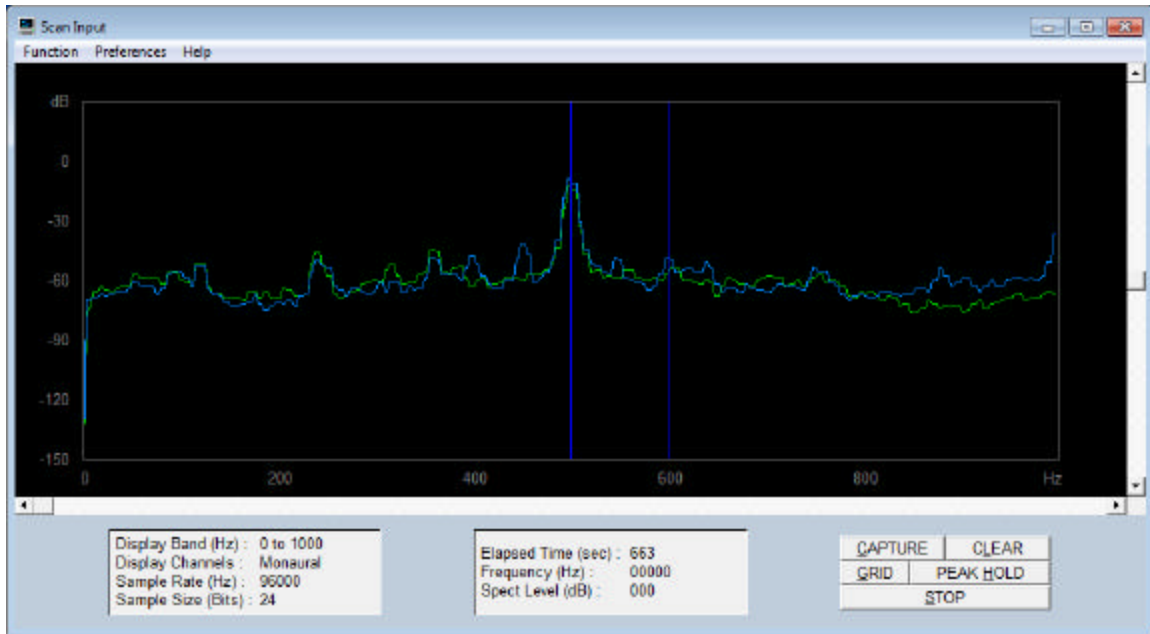
Now, Push down on your straight key to get a carrier (you can't use "TUNE", OR "PITCH" buttons because they don't produce a side tone at the line out jack) once you have that tone going out, I want you to push the button on Spectrogram in the bottom right corner of the working screen that says "Capture"

This will capture your Tone and place it exactly where the Side tone pitch is. It SHOULD line up exactly on the Red Marker line. If it isn't I now want you to take your cursor (with the white Cross hair) and place it in the center of the top box being displayed (IE. The peak of the captured signal) look down in the bottom information box and see what the frequency readout is under "Frequency". This number will indicate what your offset is (IE. Pitch Freq – Number in cross hairs = offset).

Next Keep that Green capture just where it is. Now, go to WWV 10.000.000 (or another known carrier for your area of the world). I want you to turn your RF gain up or down until the WWV signal is the exact strength as the Green captured side tone. If they aren't lined up **exactly** the same, than that means you need to do a REF CAL alignment on your K3.

You can now take the K3 in CONFIG: REF CAL and literally overlap the WWV tone with the Captured tone. The signal should look **EXACTLY** like the Captured tone. BOX FOR BOX. If the captured signal has got 2 little boxes on the left side, and only one big box on the other, Tune that REF CAL until they look EXACTLY the same.. Trust me, IT WILL... You may have to ride the RF gain a little to get to a point where they line up over each other because WWV may be going QSB up and down. This is how you can get your K3 to REF CAL with the Spectrogram to 2/10th of a hertz! That's pretty close.

After looking at my Side Tone Pitch freq of 380, I can clearly see that my tone is EXACTLY at 380 Hz. I can't say that when I go to 500 Hz that it still will be, but for me, 380 is exact. Yours should be too



I have turned the RF gain slightly high so you can see that the two signals are EXACTLY the same at the peak, right down to the pixel. If you're having a hard time riding the RF Gain to get the two signals the same, try this other method:

With your RF Gain set to max, go to the Carrier freq. (WWV Etc.) Capture THAT signal. Now, go to a band where you can transmit. Key down your rig in CW. Change your MONITOR level until you are able to match the level of the monitor with the level of the signal. This will allow you to over lap the two signals EXACTLY the same. Note, you will not be able to set the REF CAL while using this method because the Carrier freq. will determine the center of your REF CAL. Because you've captured that signal (instead of the "base line" PITCH FREQ.) you will not be able to move it around. You will only be able to use this method as a secondary check.