

## **1.0 INTRODUCTION**

As more & more FUNcube Dongles (FCDs) make their way into the hands of eager hams, many new FCD owners have asked if there is an “FCD for Dummies” reference. I hesitate to call this document by that name. For one, I don’t want to tempt anyone in the litigious community to take me to task for riding the tails of someone else’s well-known series of documentation titles, and for another, I don’t want any FCD owners to be insulted by such a title.

This guide is intended for the first-time FCD user, but my hope is that it is written in such a way as to be useful to FCD owners with a variety of experience levels. Some may be put-off by the length (30+ pages), but I tried to give pertinent explanation to go along with the step-by-step instructions to aid in understanding not just the “what” of a particular step, but also the “why” of that same step, as well as the “how” of the resulting effect of that step.

The FCD was my first exposure to any kind of Software Defined Radio (SDR). When I set out to use my FCD, there were certainly some early documents available, and I am very grateful that the respective authors took their time to create & provide that documentation for newbies like me. Personally, I’m very comfortable around radios & electronics in general, but in contrast, I was very timid with my FCD. Being afraid to turn my shiny new multi-\$100 receiver into a non-functional desk ornament, I was very careful with each step that I performed.

Here’s where I have to say that the documentation was quite good with the “step-by-step” instructions, but with no prior SDR experience at all, I was at a severe loss when I encountered even the slightest deviation in the results that I got, versus what was described in the documentation. That’s partially what inspired me to write this document & what drove me to take the approach that I did (which should quickly become apparent as you make your way through it). I am also indebted to my fellow radio club members that have (rightly or wrongly) turned to me as the “expert” in helping them to setup their FCDs in the same way that I have learned how to do with mine.

## **2.0 GETTING STARTED**

So, you just bought a new FUNcube Dongle (FCD) and you’re itching to quickly jump in & make it do something . . . hold your horses, cowboy . . . there are a few things that should be done first !! This guide will lead you through the initial steps necessary to get your new FCD updated with the latest firmware & then help you to get it setup on a Windows machine so you can take full advantage of its capabilities. I’m running Windows XP Pro/SP3 and Windows 7 Pro 32-bit . . . sorry, someone else with Mac/linux experience will have to write a similar document for those particular platforms.

Most of the steps in this guide will only need to be done once in order to set up your FCD on a given computer . . . if you move your FCD to a different computer, you will need to repeat some of the steps (these will be appropriately noted).

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Figure 1 – Your FCD, pristine in the package & fresh from the factory

OK, so the first thing you have to do is you must get over any initial fears that you have of hurting your brand new FCD . . . after all, it isn't doing you any good by keeping it in the package !! Go ahead & remove the FCD from the package, taking proper precautions to protect it from electrostatic discharge (ESD), of course.

As you plug the FCD into an available USB port on your PC (after completing the instructions in this document, in order to reduce the noise floor as received by the FCD, you'll probably want to plug your FCD into a USB extension cable, rather than plugging it directly into the PC . . . for now, a direct connection is just fine), after a couple of “da-dink” sounds, the status bar should show the detection of the new device as follows (red highlight):

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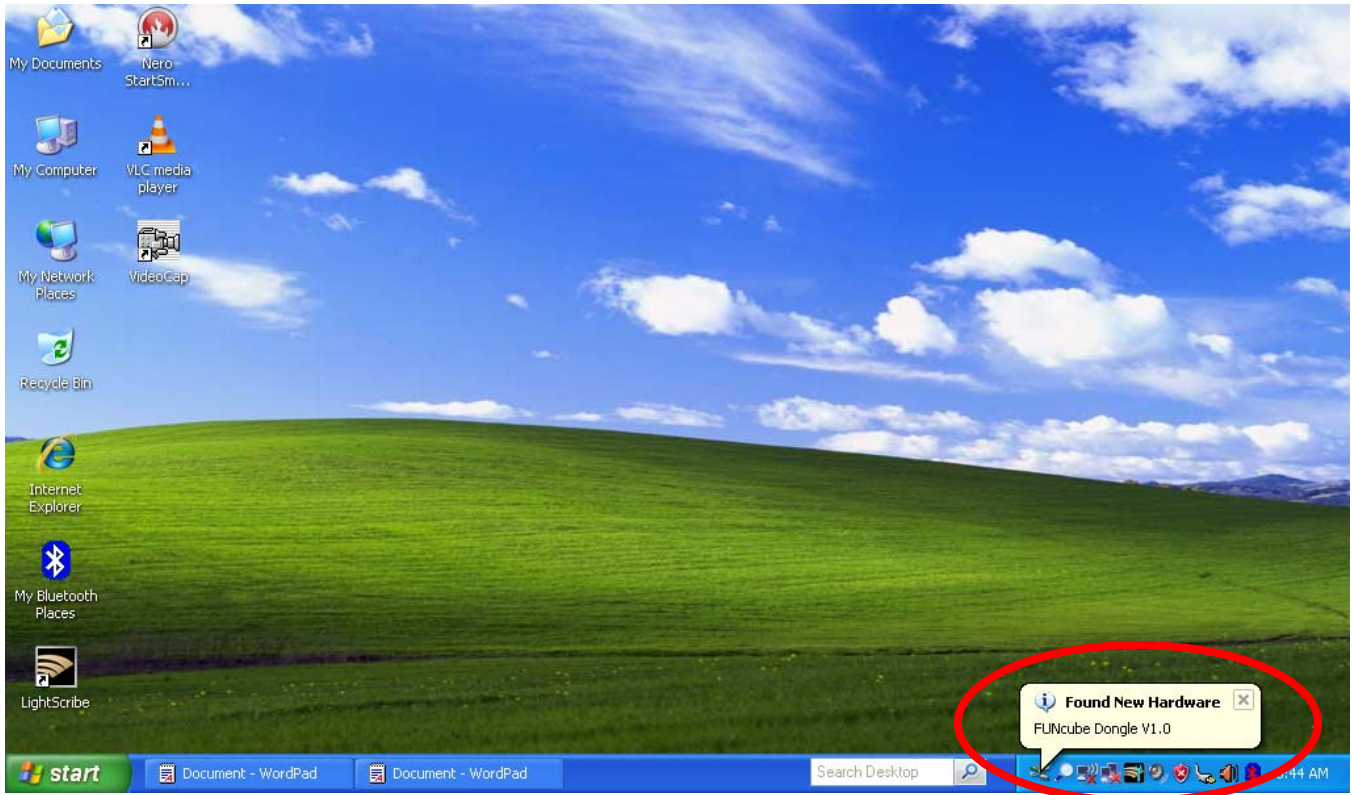


Figure 2 – Windows detects the new FCD device

Be patient . . . you will get several similar notifications (USB Audio Device, USB Composite Device, etc.) . . . wait until you see the notification that the device is ready to use as follows (red highlight):

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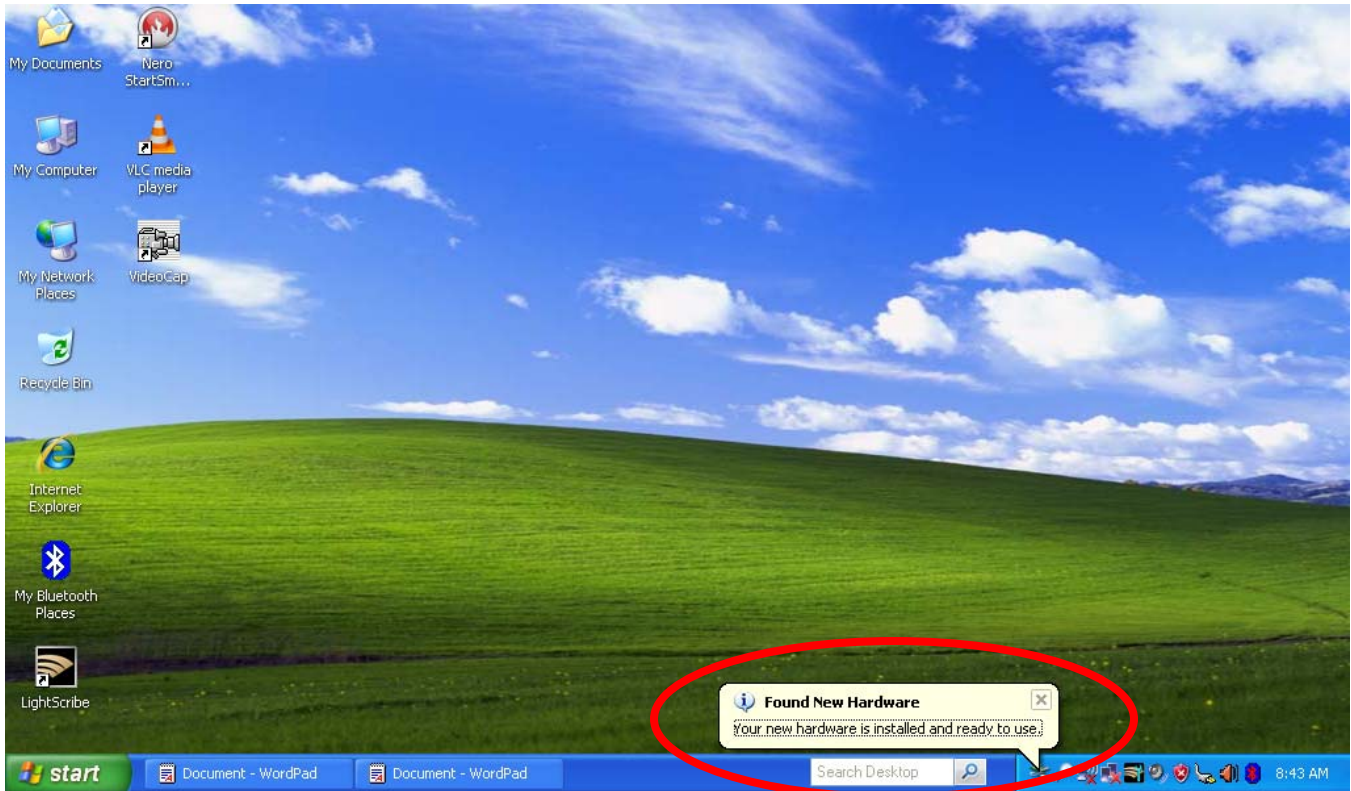


Figure 3 – Windows reports that the FCD is ready to use

### **3.0 UPDATING FIRMWARE**

Now that Windows knows about the FCD, you can go about the process of updating the firmware. As of the time that this document was written, all FCDs come with firmware version 18b installed. This version is referred to as the “baseline firmware”, and it primarily provides just enough functionality to allow the FCD to be tested following production, but it does not provide much in the way of useful functionality to support the way you really want to use it !! You’ll need to update the firmware to get your FCD to that state.

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NOTE: throughout this section, the “???” designation will be used to indicate versions numbers that are bound to change after this document is released . . . the intent is for you to download & use the latest version(s) available and to use the actual version numbers in place of the “???” when following the instructions given

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All of the latest utilities and firmware (as well as the documentation, including this document) for the FCD can be found at the following URL: [www.funcubedongle.com/?page\\_id=313](http://www.funcubedongle.com/?page_id=313)

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Download the following files (make sure to right-click on the name and select “Save Link As” in firefox or “Save target as” in Internet Explorer) & place them somewhere convenient (C:\FCDstuff):

Latest bootloader software: FCHIDBL???.zip (currently FCHIDBO001.zip)

Latest firmware: export???.bin (currently export18f.bin)

[NOTE: future versions of this file for the agile FCD are anticipated to be named export???.pro.bin]

Latest “fully functional front-end with source” software: FCHID???.zip (currently FCHID006.zip)

Start by extracting the files from the FCHID???.zip file & place them somewhere convenient (C:\FCDstuff\FCHID???.). Now run the following file (use your convenient location where you placed your files):

C:\FCDstuff\FCHID???\Debug\FCHid.exe

What you get will look something like the following:

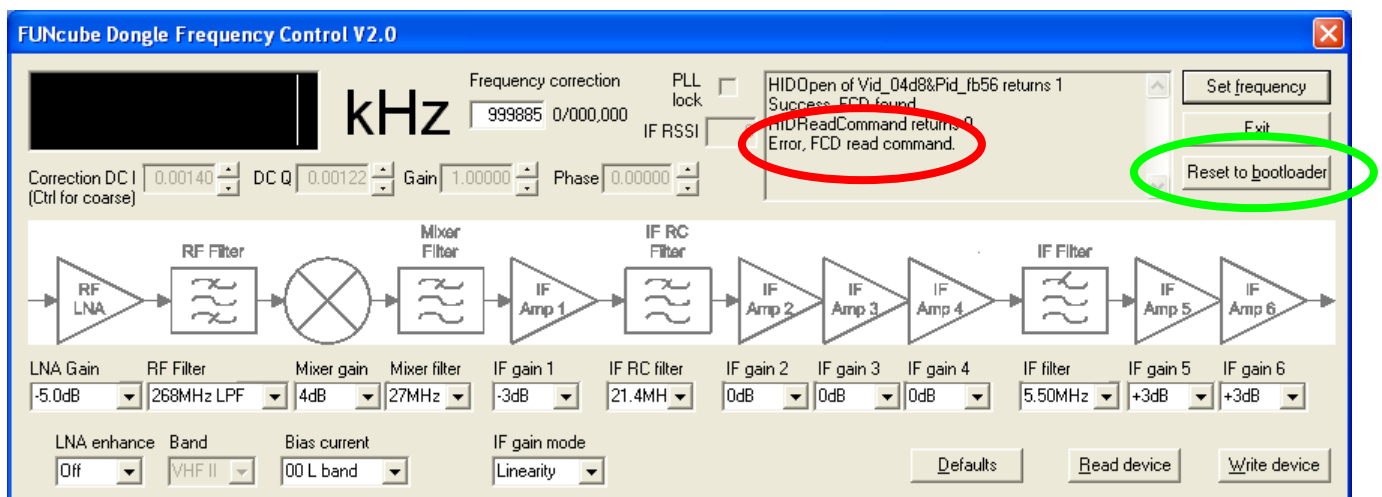


Figure 4 – Initially running the FCHid application

Looking at the status area in the upper right-hand corner of the window, you can safely ignore the “Error, FCD read command.” message (red highlight) . . . this results from the combination of the FCD running firmware version 18b (little to no functionality support) and your PC running FCHID??? (lots of new functionality support). Not to worry . . . by following the remaining instructions in this guide, you will easily remedy that mismatch !!

Now that you’ve got the front-end application talking to the FCD (in a limited fashion), left-click on the “Reset to bootloader” button (green highlight), which will result in the following report (again, in the status area):



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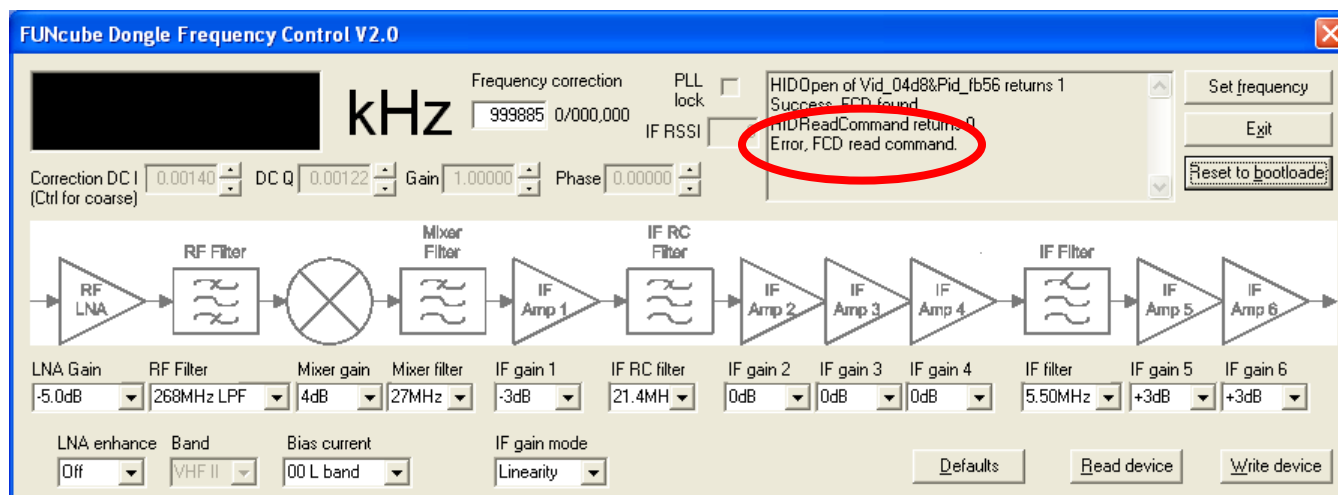


Figure 5 – Using FCHid to send the FCD to bootloader mode

Once again, you can safely ignore the “Error, FCD read command.” message (red highlight) . . . this results from the fact that you just sent the FCD into bootloader mode, & FCHid is still trying to talk to the FCD in application mode.

**[ THIS STEP IS VERY IMPORTANT ]** Close the FCHid application to continue.

Next, extract the files from the FCHIDBL???.zip file & place them somewhere convenient (C:\FCDstuff\FCHIDBL???). Now run the following file (use your convenient location where you placed your files):

C:\FCDstuff\FCHIDBL???\FCHIDBL\_\_\_Win32\_Debug\FCHIDBL.exe

What you get will look something like the following:

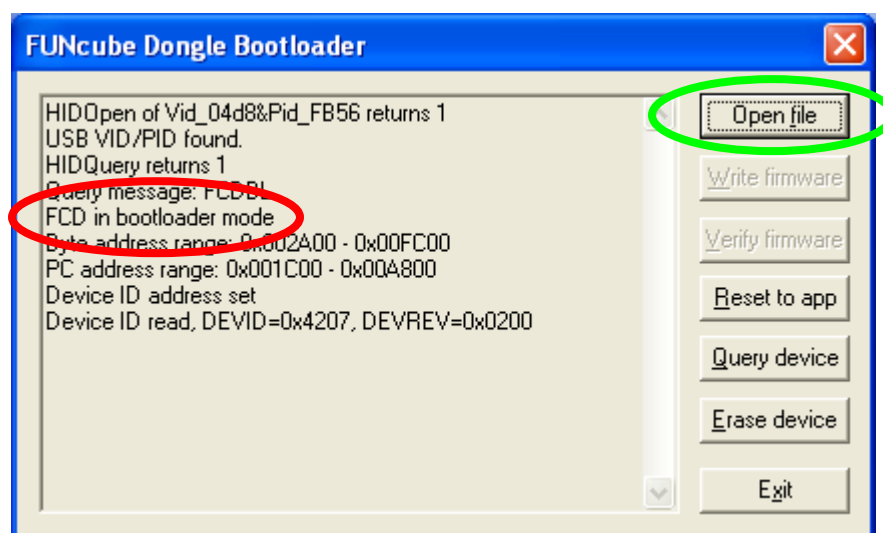


Figure 6 – Initially running the FCDHIDBL bootloader application

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Note that the bootloader application indicates “FCD in bootloader mode” (red highlight). This is definitely a positive indication that you are talking to your new FCD !! To proceed, left-click on the “Open file” button (green highlight) & a file dialog will open. Navigate to your convenient location where you placed your files, and the resulting file dialog will look something like the following:

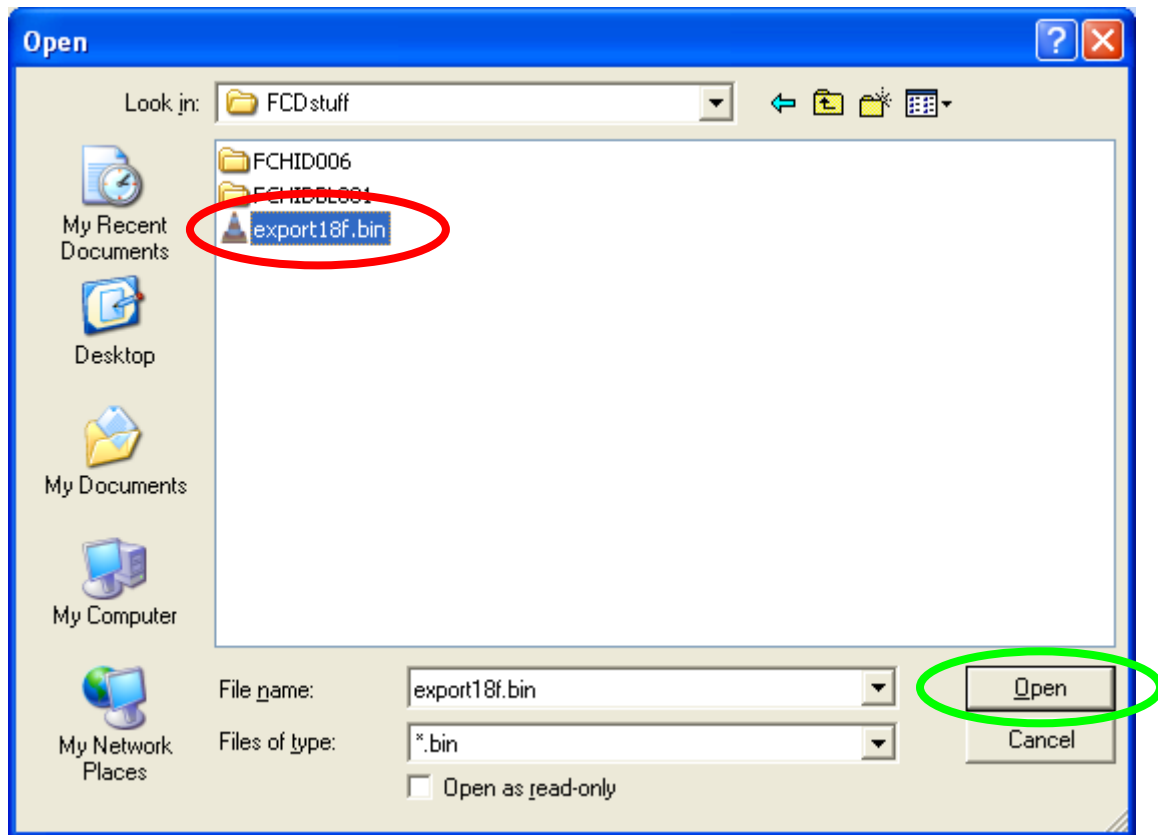


Figure 7 – Selecting the firmware file

Highlight the export???.bin file (use the name of the latest firmware file that you downloaded earlier, again noting that future versions of this file are anticipated to be named export???.pro.bin) by left-clicking on it (red highlight). Left-click on the “Open” button (green highlight) and the display will look something like the following:

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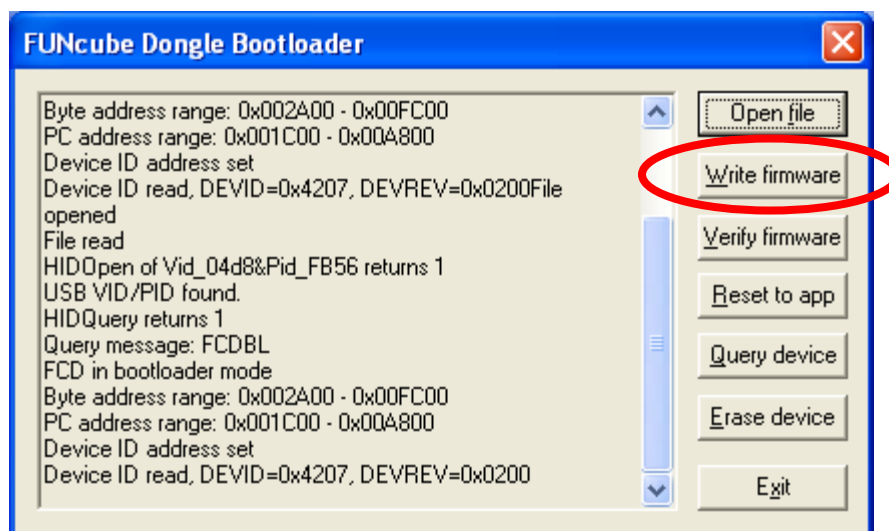


Figure 8 – After opening the firmware file

To continue, left-click on the “Write firmware” button (red highlight). Multiple lines of status will scroll by, including indications such as “Erase completed”, “Firmware written”, and finally “Firmware verified” as follows:

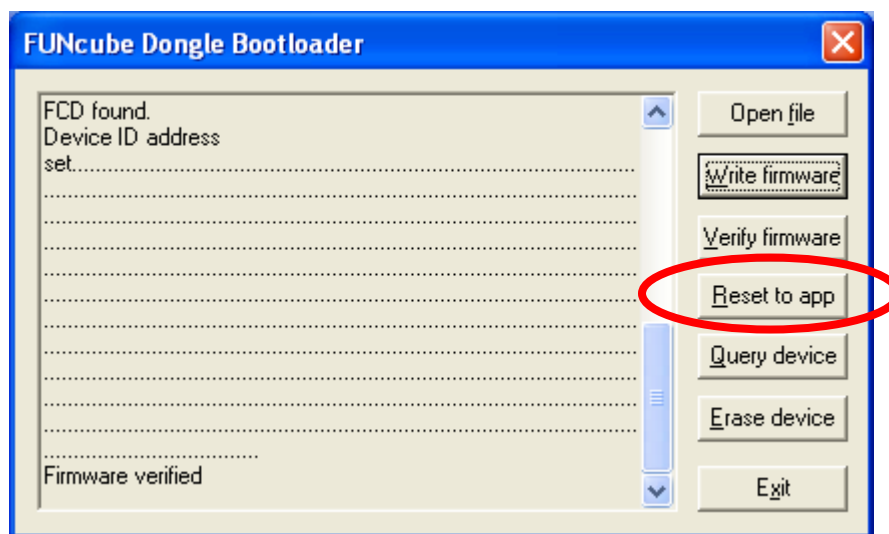


Figure 9 – After writing the export18f.bin firmware file

To finish the firmware update, left-click the “Reset to app” button (red highlight). Congratulations, you have successfully updated your FCD firmware to give it some really powerful capabilities !!

What you will get is something that looks like the following:



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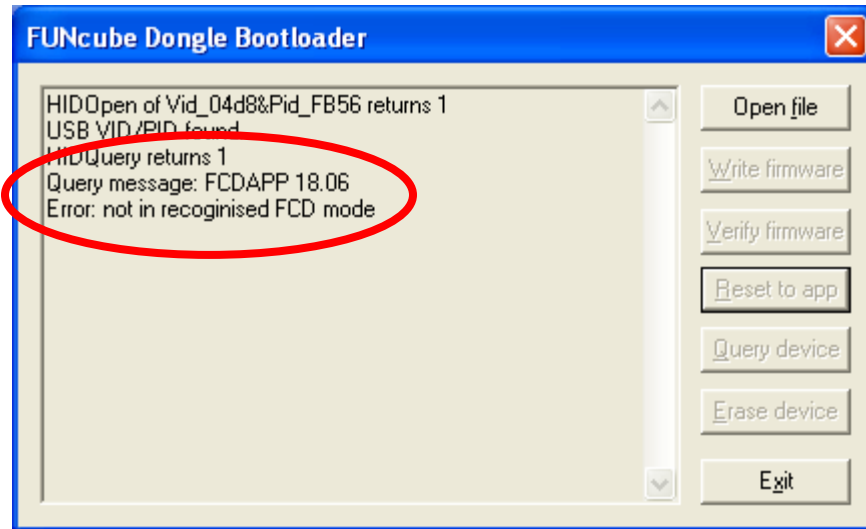


Figure 10 – After writing the export18f.bin firmware file

Once again, the error in the status area indicating “Error: not in recognised FCD mode” can be safely ignored (red highlight) . . . this results from the fact that you just sent the FCD back into application mode, & FCHIDBL is still trying to talk to the FCD in bootloader mode. More importantly, the line just preceding the error status shows that version 18.06 of the firmware is currently loaded (“18” represents the major version firmware number & “06” is a decimal representation of the minor revision letter “f” as the sixth letter in the alphabet).

**[ THIS STEP IS VERY IMPORTANT ]** Exit the FCHIDBL application to continue.

### **4.0 INSTALLING & CONFIGURING SPECTRAVUE**

Now that you have updated the FCD firmware, you can go about the process of adjusting the accuracy of the center frequency. The crystal used in the FCD is a high precision component (on the order of 12ppm in the latest version), but with the natural variability of all of the components combined, reality is that this FCD device, like all electronic devices, may not be precisely on frequency.

This guide will now lead you through the steps for calibrating the center frequency of your particular FCD, but first, you need to install the tools that will be used to help make the adjustments.

Download the following files & place them somewhere convenient (C:\FCDstuff):

Latest SpectraVue software (version 3.18 at the time that this document was written):

<http://www.moetronix.com/files/spectravueinstall.zip>

Start by extracting the file from the spectravueinstall.zip file & place it somewhere convenient (C:\FCDstuff\SVinstall). Now run the following file (use your convenient location where you placed your files):

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C:\FCDstuff\SVinstall\spectravuesetup???.exe

Accept all of the default selections & complete the installation.

Now run the following file (use your convenient location where you placed your files earlier):

C:\FCDstuff\FCHID???\Debug\FCHid.exe

What you get will look something like the following:

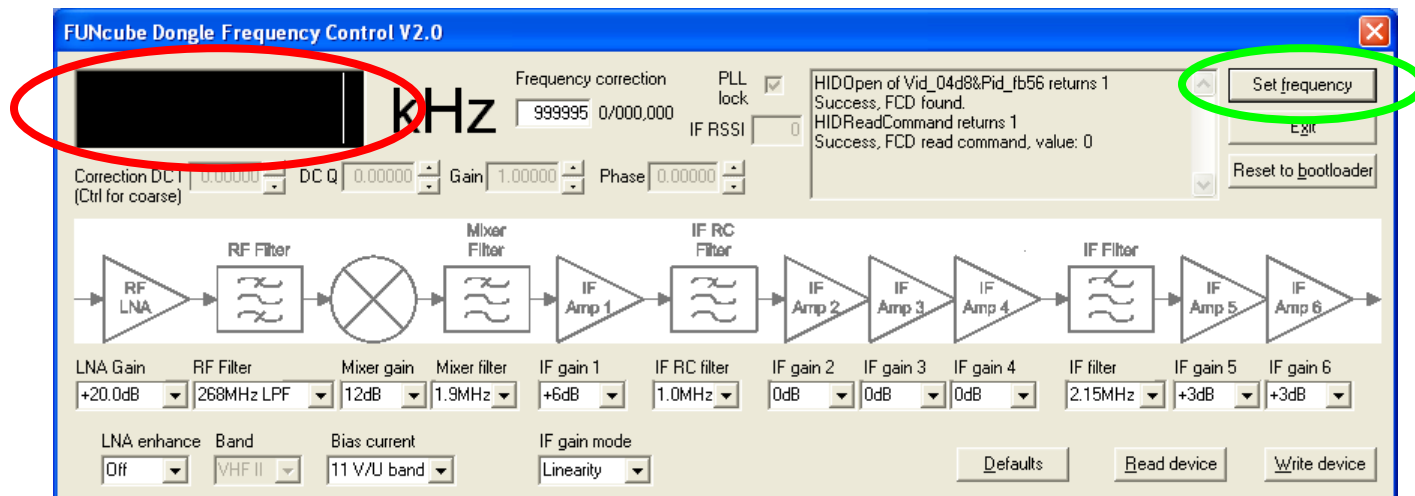


Figure 11 – Running the FCDHid front-end application

For this adjustment activity, choose a frequency that is likely to have a continuous (or at least, mostly continuous) signal. A good choice is to use one of the National Weather Service weather broadcast channels (e.g. 162.550MHz in Fort Worth, TX & 162.400MHz in Dallas, TX) or a local repeater with lots of activity. Using another transmitter as a low-power source (carrier only) through a dummy load also works very well.

Enter your frequency of choice in the frequency entry area (red highlight) and left-click on the “Set frequency” button (green highlight).

What you get will look something like the following:

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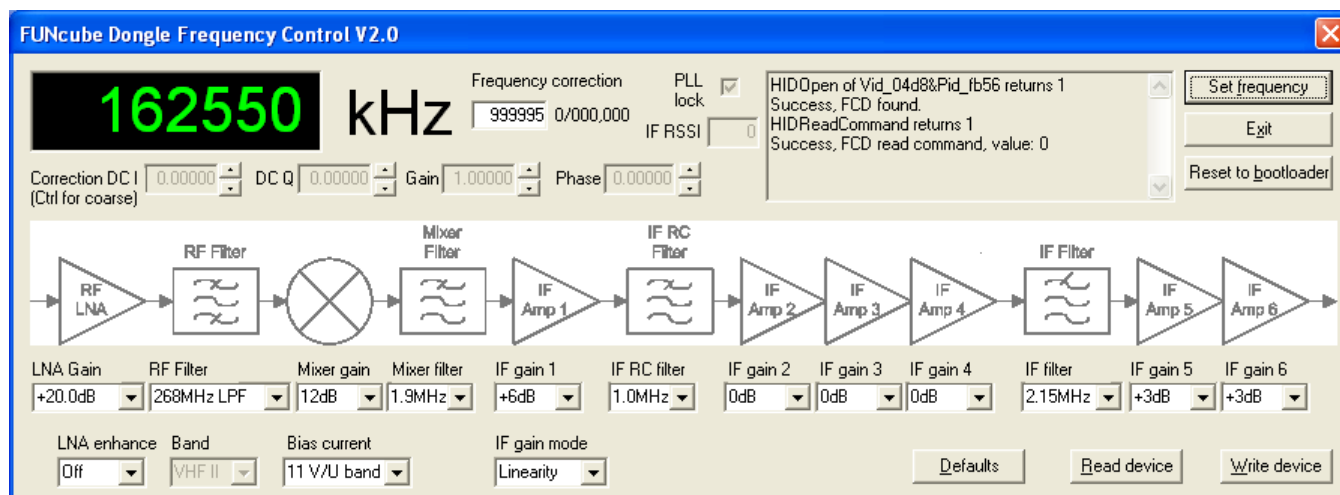


Figure 12 – Entering a frequency into the FCDHid front-end application

OK, enough of the wait already. Run the SpectraVue application (by double-clicking on the SpectraVue shortcut that was placed on your desktop during the installation).

What you get will look something like the following:

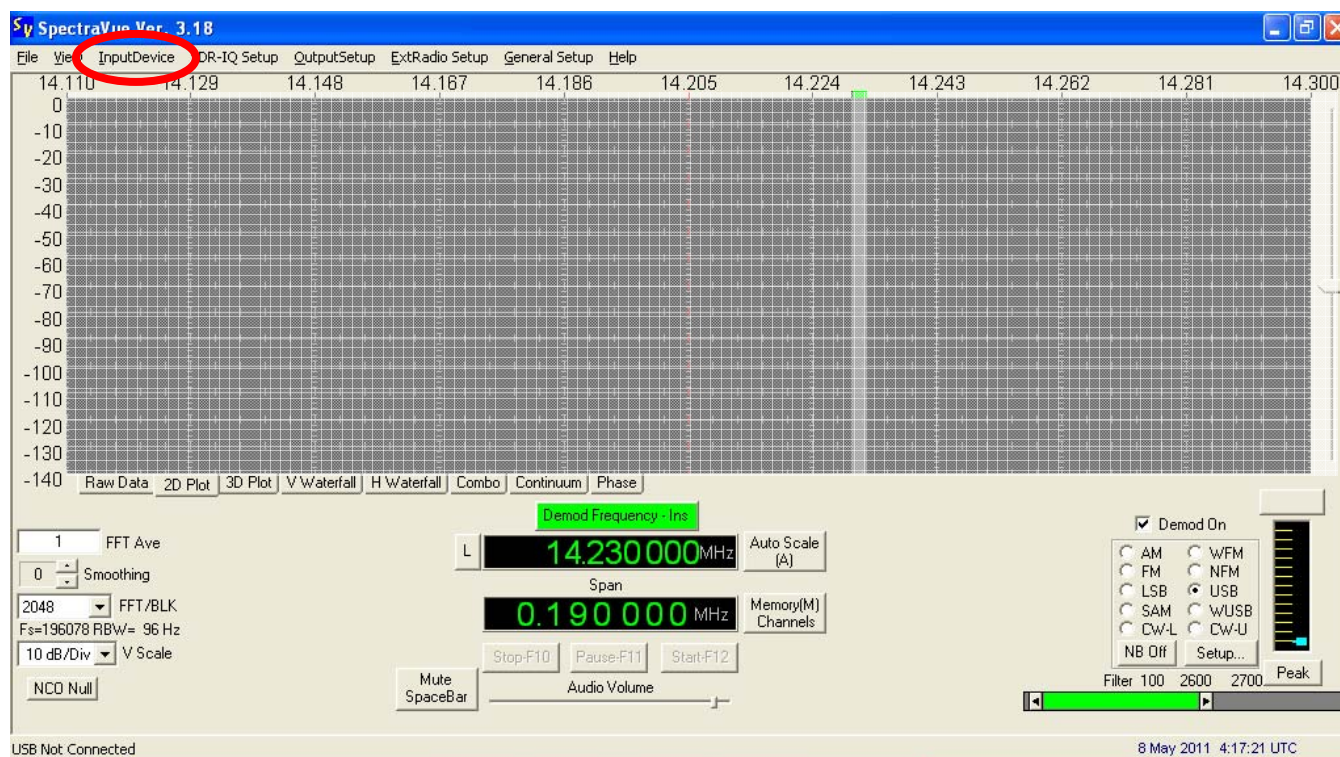


Figure 13 – Initially running the SpectraVue application

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On the SpectraVue menu bar, left-click on the “InputDevice” menu item (red highlight), then left-click on “SoundCard” to select it.

Now you will get something that looks like the following:

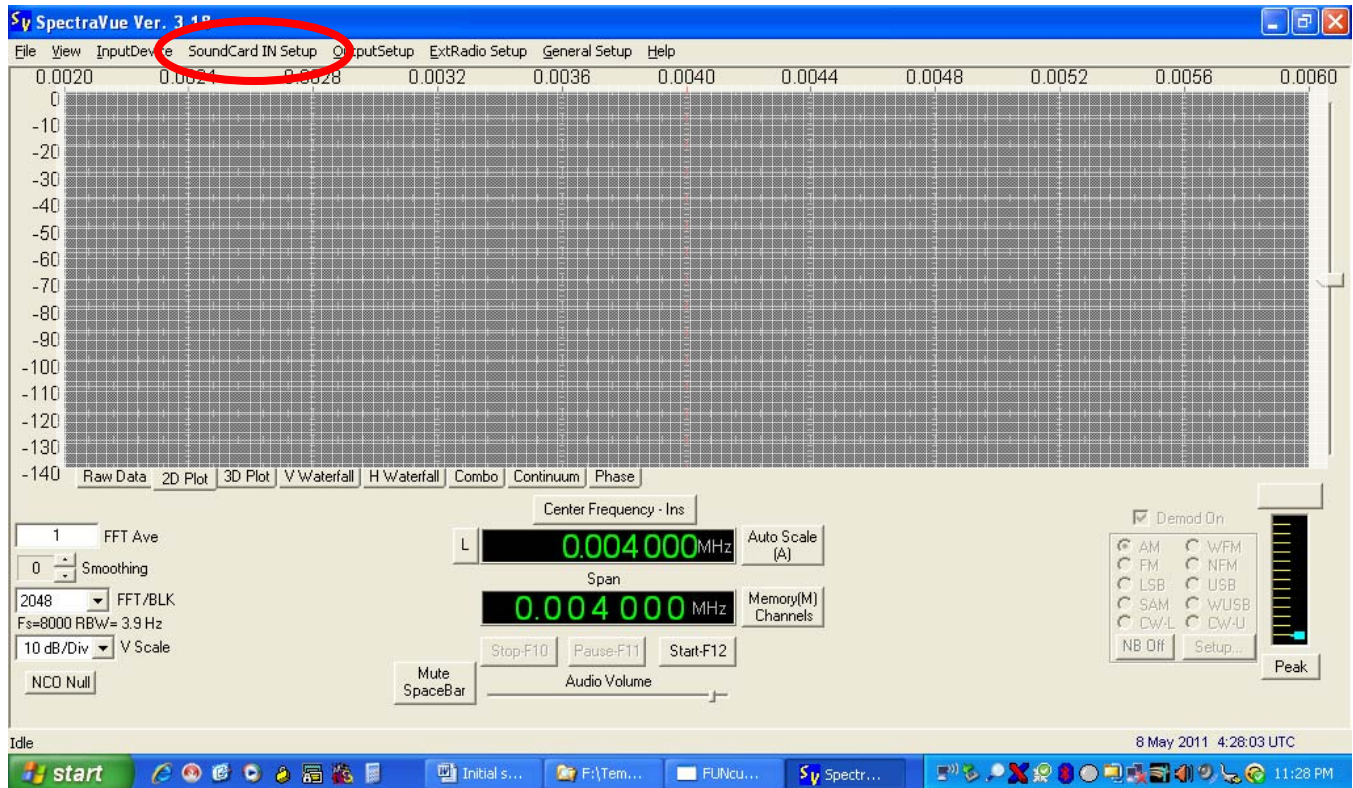


Figure 14 – SpectraVue application after choosing soundcard as input device

Now, on the SpectraVue menu bar, left-click on the “SoundCard IN Setup” menu item (red highlight). A SoundCard Input Setup dialog will open. Make changes as needed to make all of the fields and selections as follows (this sets the FCD soundcard sample rate to 96000, the maximum that SpectraVue supports, sets up for full bandwidth at this sample rate, and sets the center frequency at the mid-point of the sampled data):

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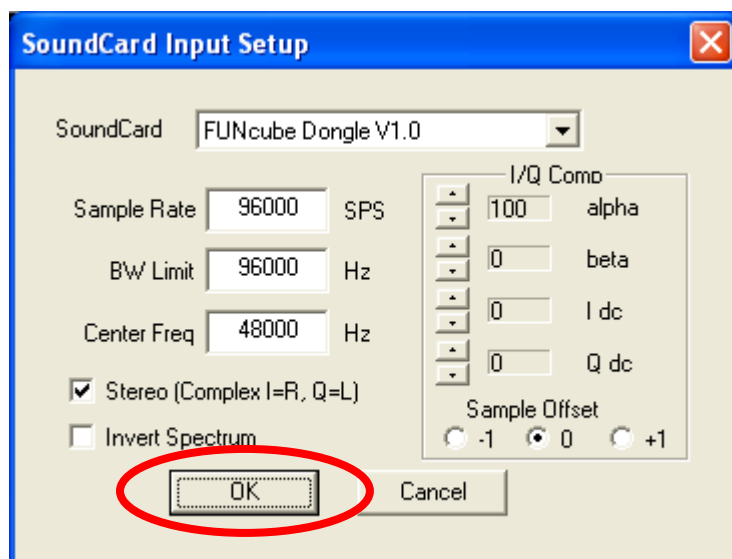


Figure 15 –SpectraVue soundcard input setup

Left-click the “OK” button to activate the settings (red highlight) and the dialog will close.

Now you will get something that looks like the following:

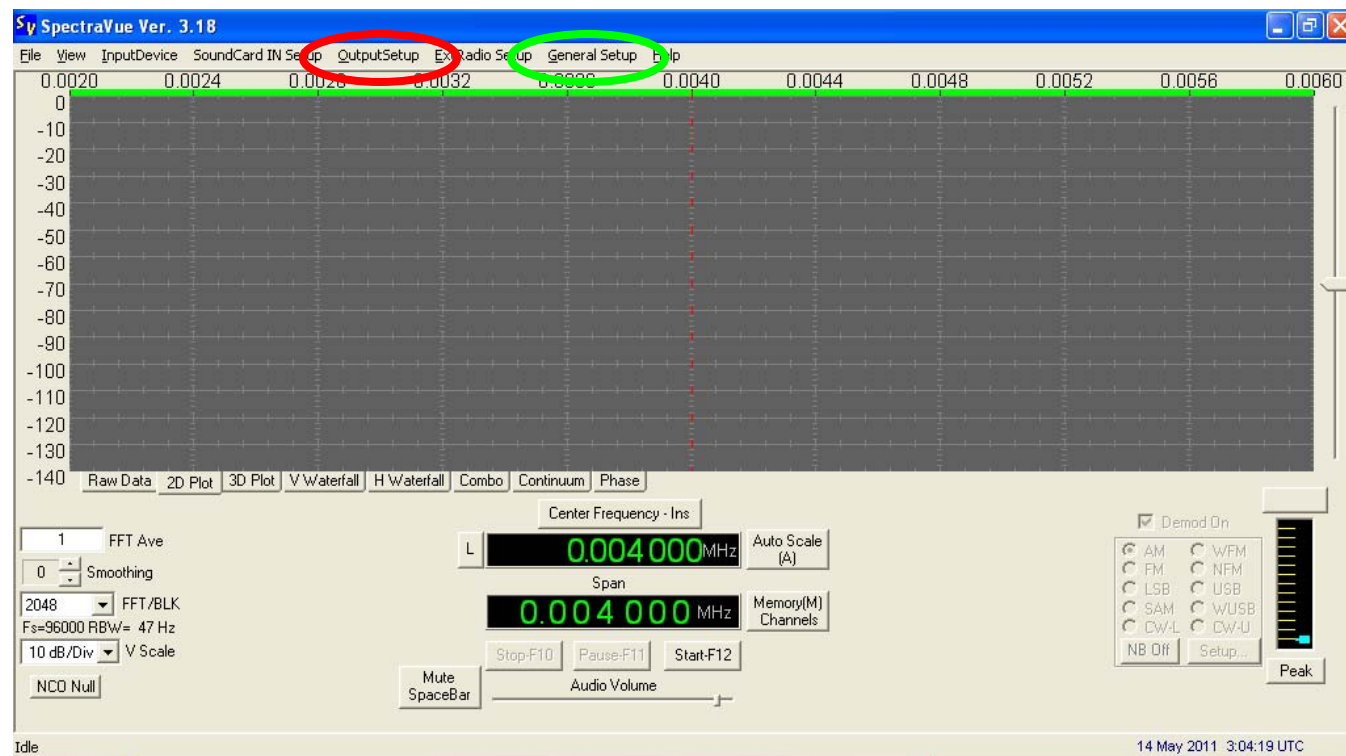


Figure 16 – SpectraVue application after choosing soundcard as input device

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Now, on the SpectraVue menu bar, left-click on the “Output Setup” menu item (red highlight). A Data Output Selection dialog will open. Make changes as needed to make all of the fields and selections as follows (make sure to choose your particular sound output device . . . mine is a RealTek HD Audio output as shown) . . . be sure to choose only the “Single Channel Demod” selection for now:

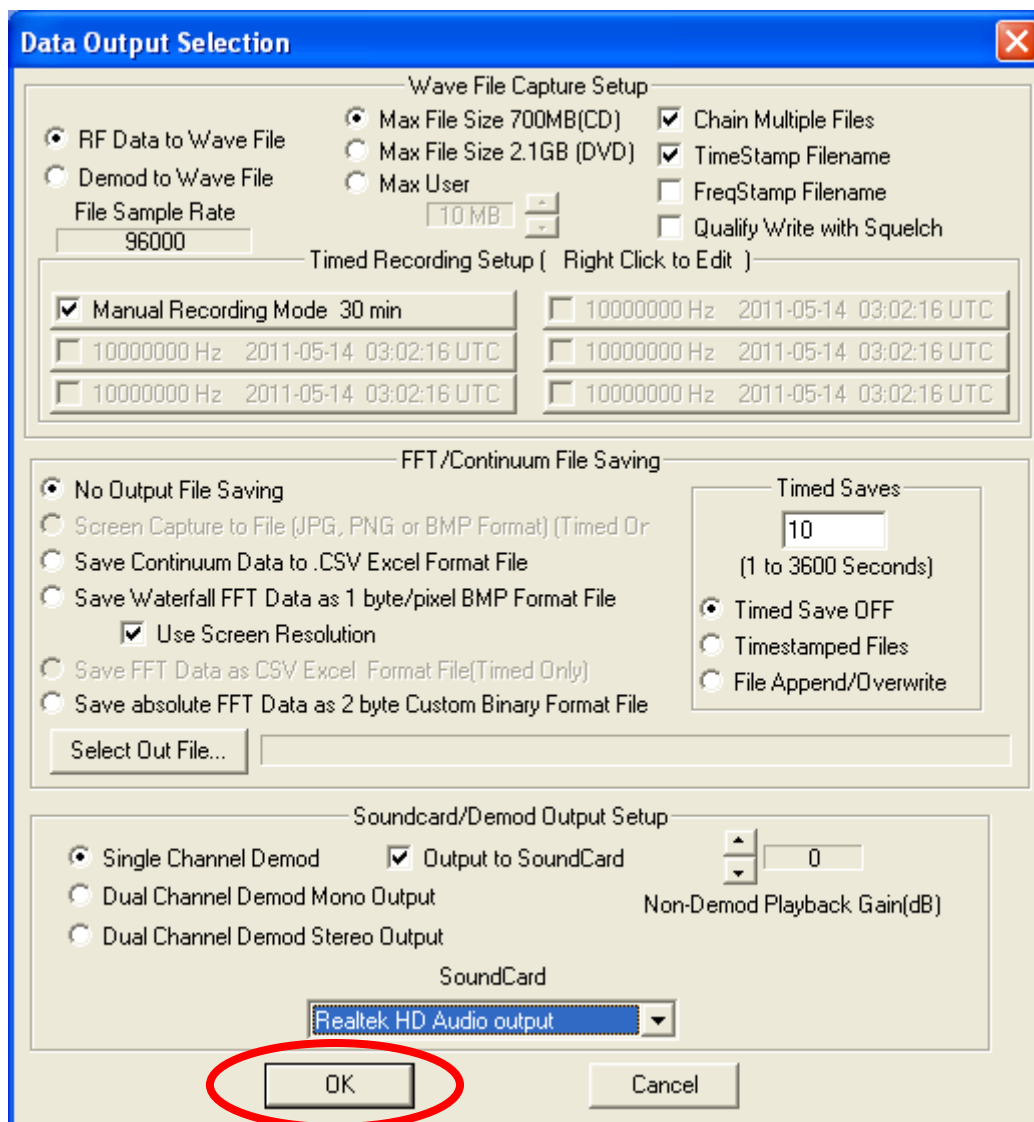


Figure 17 –SpectraVue data output selection

Left-click the “OK” button to activate the settings (red highlight) and the dialog will close.

Now, on the SpectraVue menu bar, left-click on the “General Setup” menu item (green highlight in Figure 16). A General Program Setup dialog will open. Make changes as needed to make all of the fields and selections as follows:



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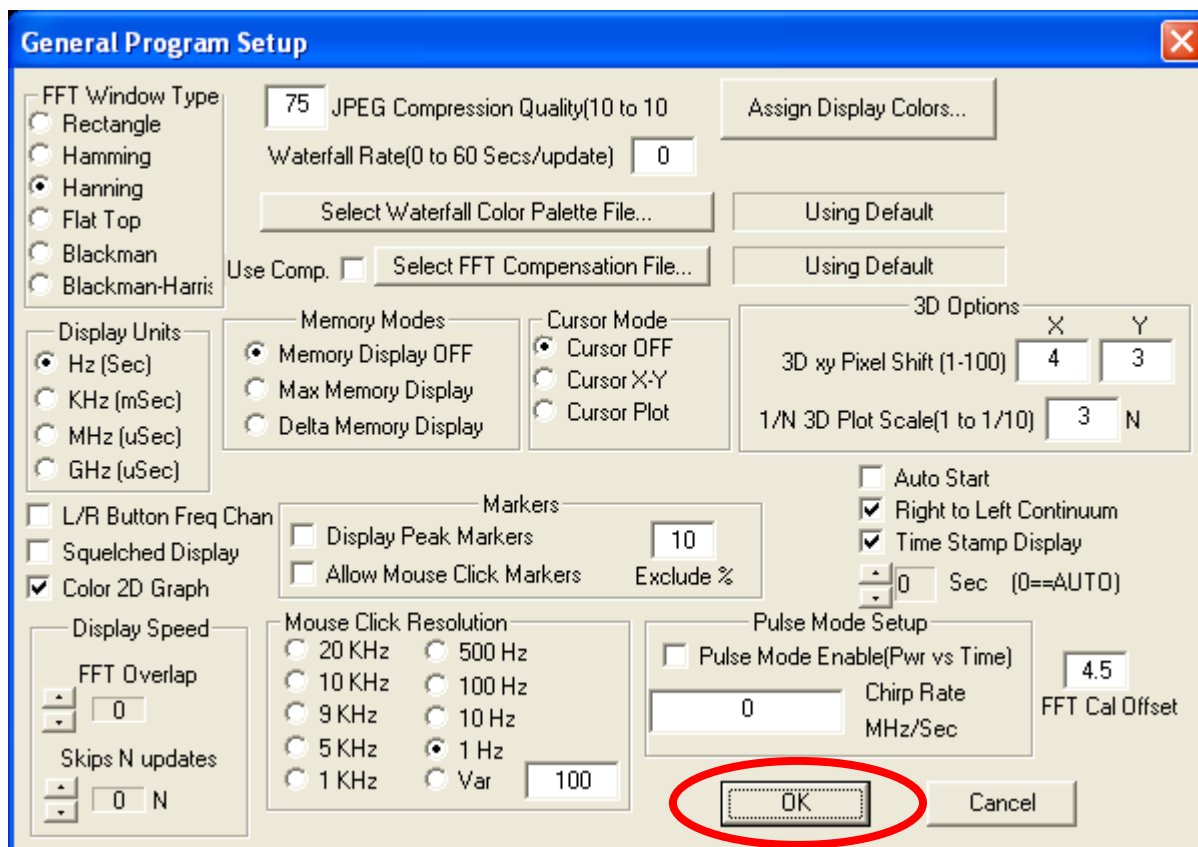


Figure 18 –SpectraVue general program setup

Left-click the “OK” button to activate the settings (red highlight) and the dialog will close.

Now you will get something that looks like the following:

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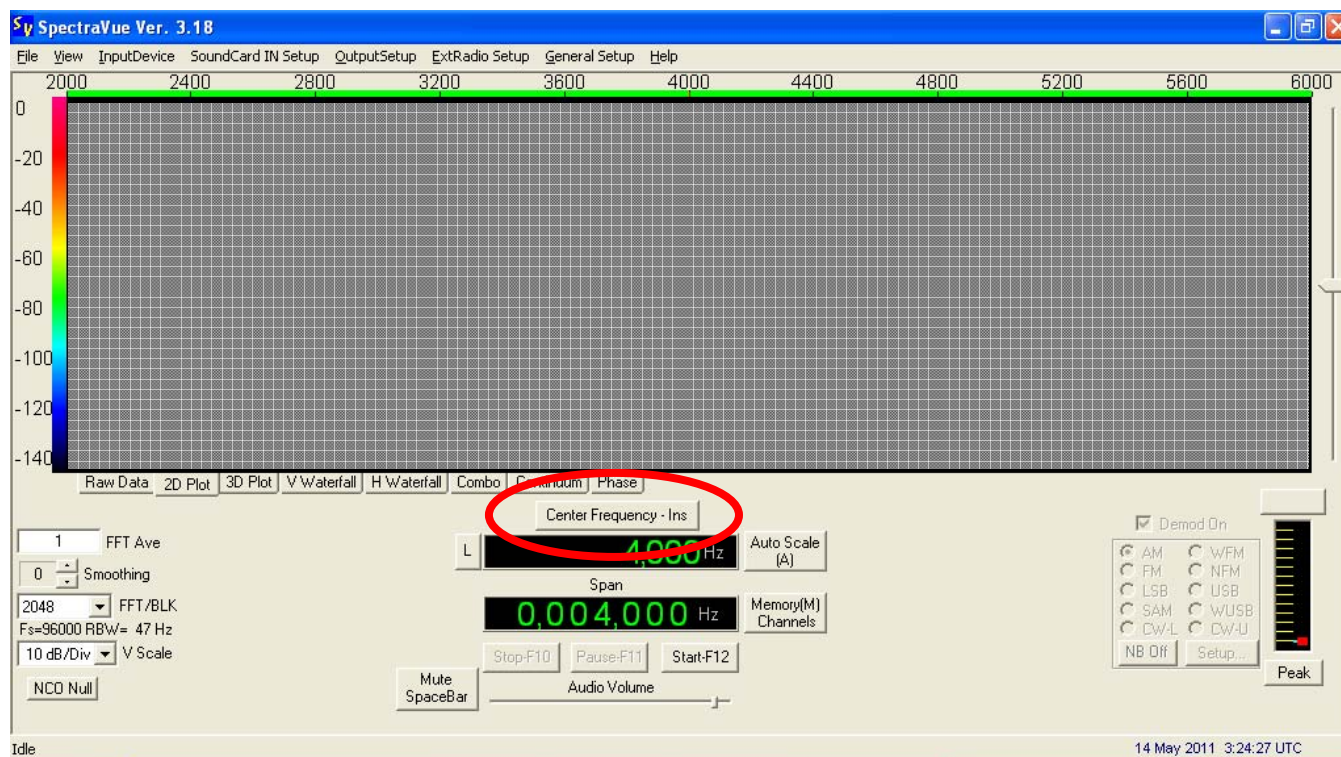


Figure 19 – SpectraVue application after general setup

Now, left-click on the “Center Frequency – Ins” button (red highlight) to change it to “Demod Frequency – Ins”.

The next step is one that you will use repeatedly each time that you exercise the SpectraVue utility. To increase any particular digit in either the Span field or the Demod Frequency field, left-click on the upper half of the desired digit. To decrease any particular digit in these two fields, left-click on the lower half of the desired digit.

Now, use this newfound knowledge to increase the Span to 96,000 Hz and to set the Demod Frequency to 48,000 Hz.

You will get something that looks like the following:

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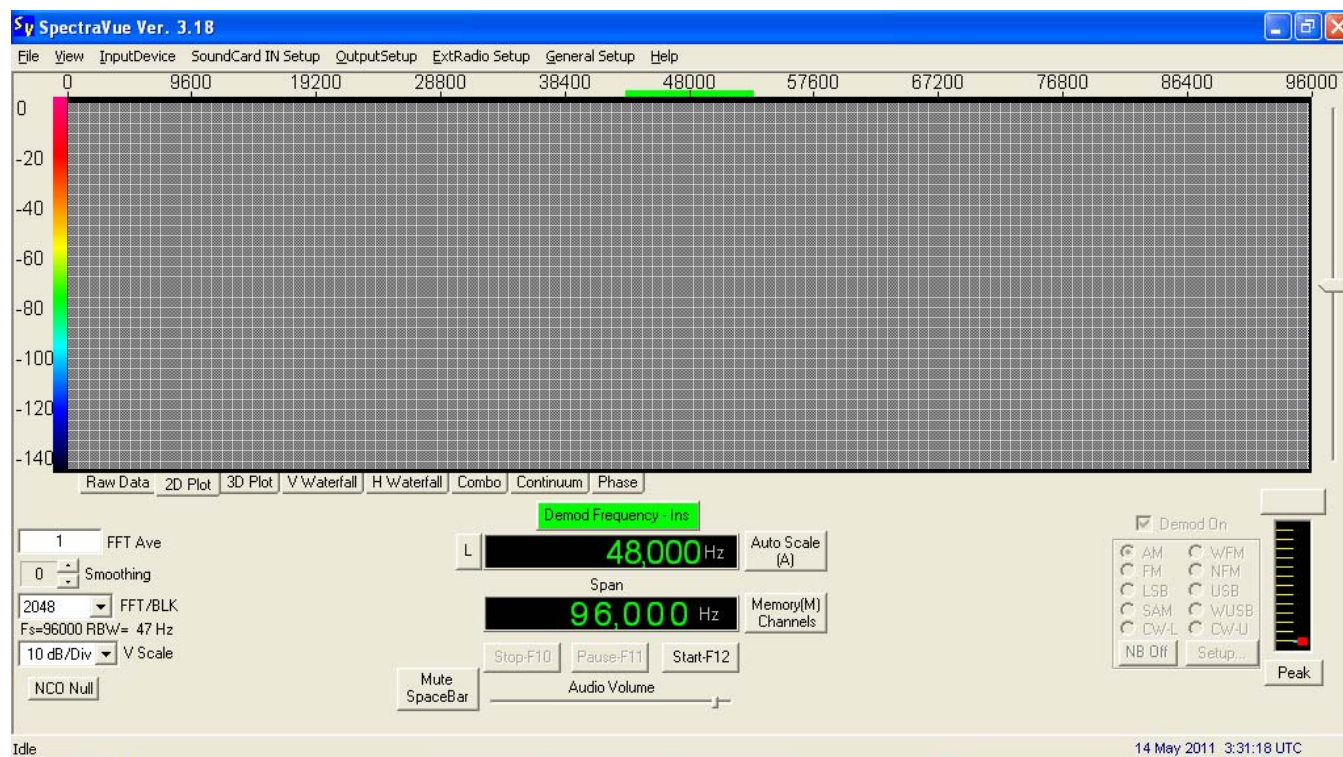


Figure 20 – SpectraVue application after adjusting span & demod frequency

Now, you will need to check the settings in the Windows Volume Control application to make sure it is configured to allow the demodulated audio from the FCD to be heard. Open the Windows Volume Control and display the input adjustment controls (again, I'm using Windows XP/SP3, so that's what's shown here).

You will get something that looks like the following:

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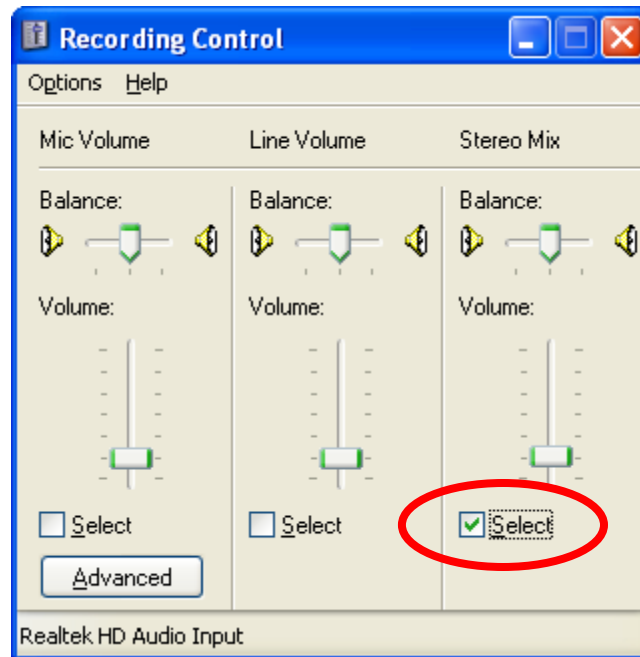


Figure 21 – Input adjustment control in Windows Volume Control application

Others have reported that selecting the “Stereo Mix” device for the input (red highlight) will allow you to route the demodulated audio to other applications for chain processing (e.g. running AGWPE to decode APRS broadcasts, etc.). You will need to play with the level controls later for best decoding.

Now, change the Windows Volume Control to display the output adjustment controls.

You will get something that looks like the following:

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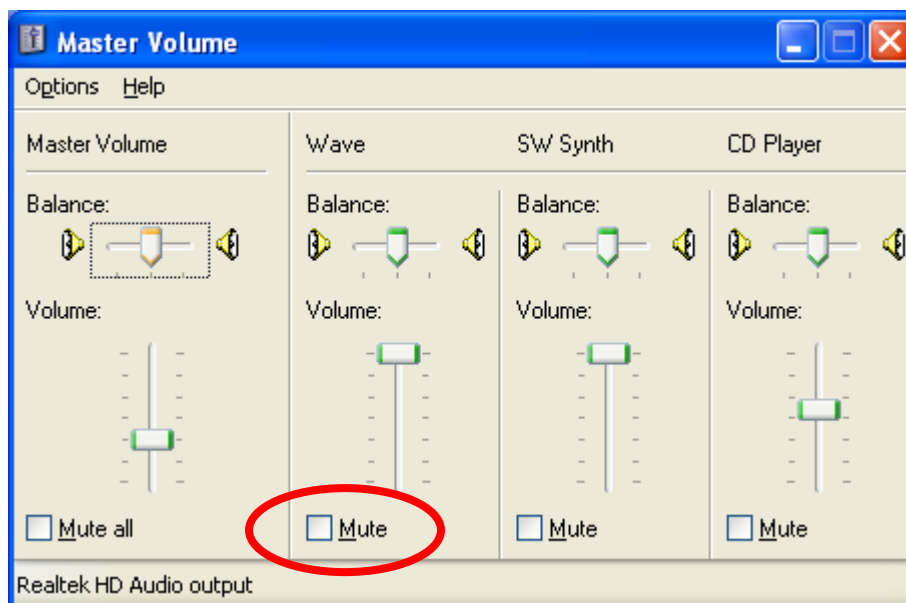


Figure 22 – Output adjustment control in Windows Volume Control application

Make sure that the “Wave” output is not muted (red highlight) & the level is at least mid-range. Also make sure that the “Master Volume” is not muted & the level is adjusted appropriately. You may close the Windows Volume Control application.

Finally, with all of that setup behind you, you are now ready to calibrate the center frequency on the FCD !!

## **5.0 CALIBRATING THE CENTER FREQUENCY**

Earlier, you entered an active frequency into the FCHid front-end application. Now, to take the I&Q data coming out of the FCD & turn it into demodulated audio, left-click on the “Start-F12” button in the SpectraVue application. Make sure that the “Demod On” check-box is activated & select an appropriate (de)modulation for your signal.

Congratulations, assuming that you have your FCD connected to an appropriate antenna, you should now hear whatever is present on the frequency being tuned by the FCHid front-end application, but you’re still not quite finished !!

You will get something that looks like the following:

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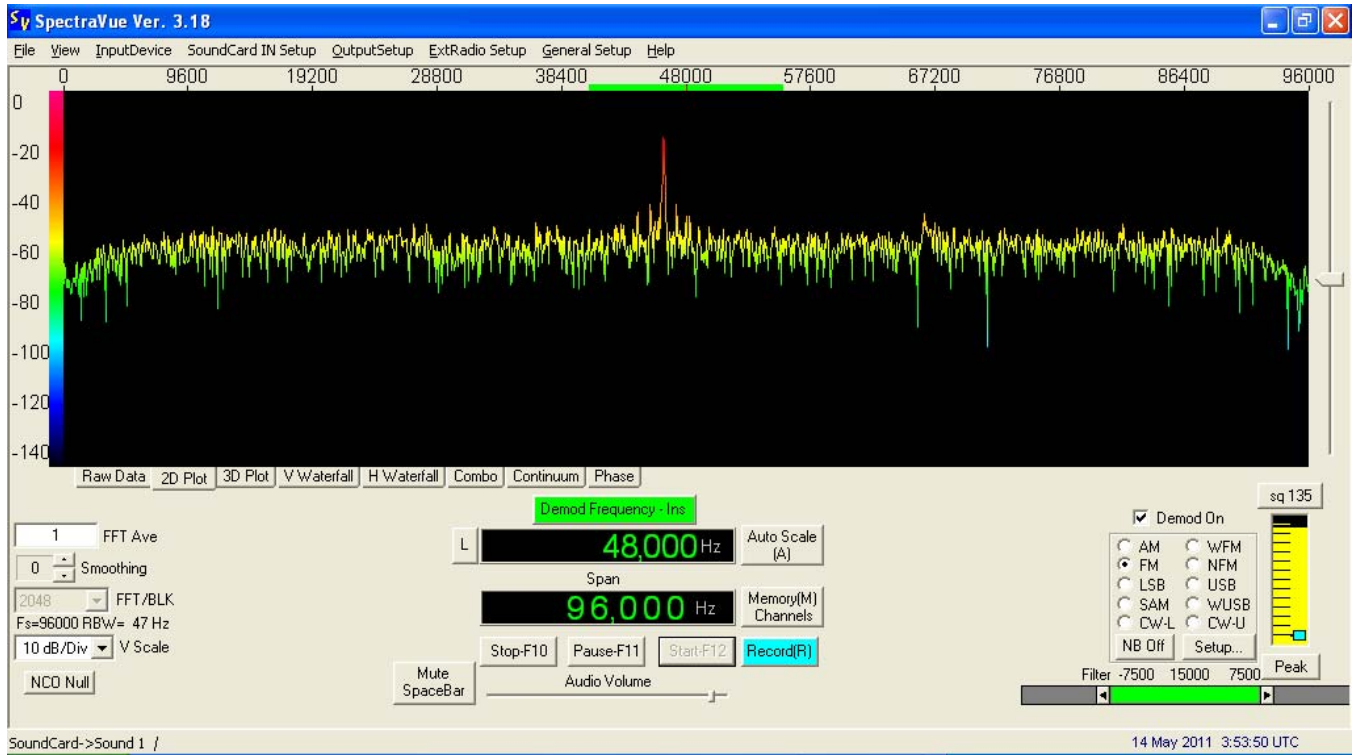


Figure 23 – SpectraVue application demodulating a signal from the FCD

Notice the spike near the center frequency. It is located within the span of the green bar, but very likely it is not located directly at the center frequency (which is right under the 48000 on the scale across the top). We will reduce some of this spike later, but for now, we will make use of it to aid in calibrating the center frequency.

While leaving SpectraVue running, bring the FCHid front-end application back to the foreground and position FCHid so that it is below the SpectraVue application (or, if you are using a netbook that has a very small 1024x600 display like mine, so that it covers the bottom portion of the SpectraVue display, leaving the center spike clearly visible).

You will get something that looks like the following (mine looks especially crowded with the small display):



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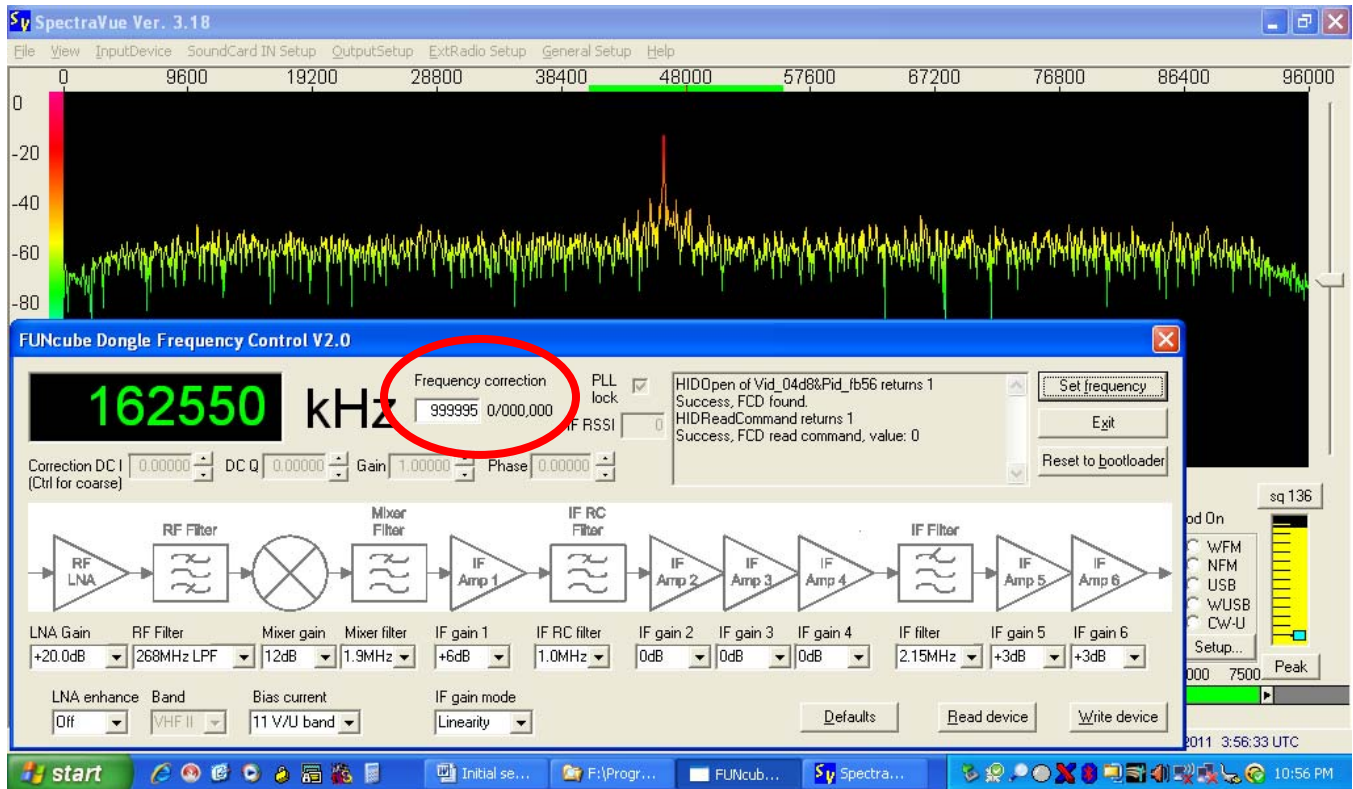


Figure 24 – SpectraVue application with FCHid laid in front

On the FCHid front-end application, reduce the value of the Frequency correction value (red highlight) by 10 (in my case, 999995 was changed to 999985) & left-click on the Set frequency button, taking note of where the center spike moved to. If the spike is still to the left of center, then reduce the value of the Frequency correction value again. If the spike is now to the right of center, then increase the value of the Frequency correction value.

Continue this adjustment procedure until you get the spike as close as possible to the center (if small adjustments don't seem to be causing any change, try making offsetting large adjustments in order to see the effect of the small change . . . for example, to reduce the value by a single digit in the downward direction, e.g. changing from 999988 to 999987, increase the value by 9 to 999997, then decrease it by 10 to 999987, for a resulting change of -1).

NOTE: Once you get the spike centered as close as possible, the resulting Frequency correction value that you just determined is particular to your FCD & this value will need to be set likewise in the FCHid front-end application if you move your FCD to a different computer.

My preference is to write the Frequency correction value on a small sticker that is then attached to the specific FCD, that way you always know how to setup for that specific unit (yes, I have several).

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You will get something that looks like the following:

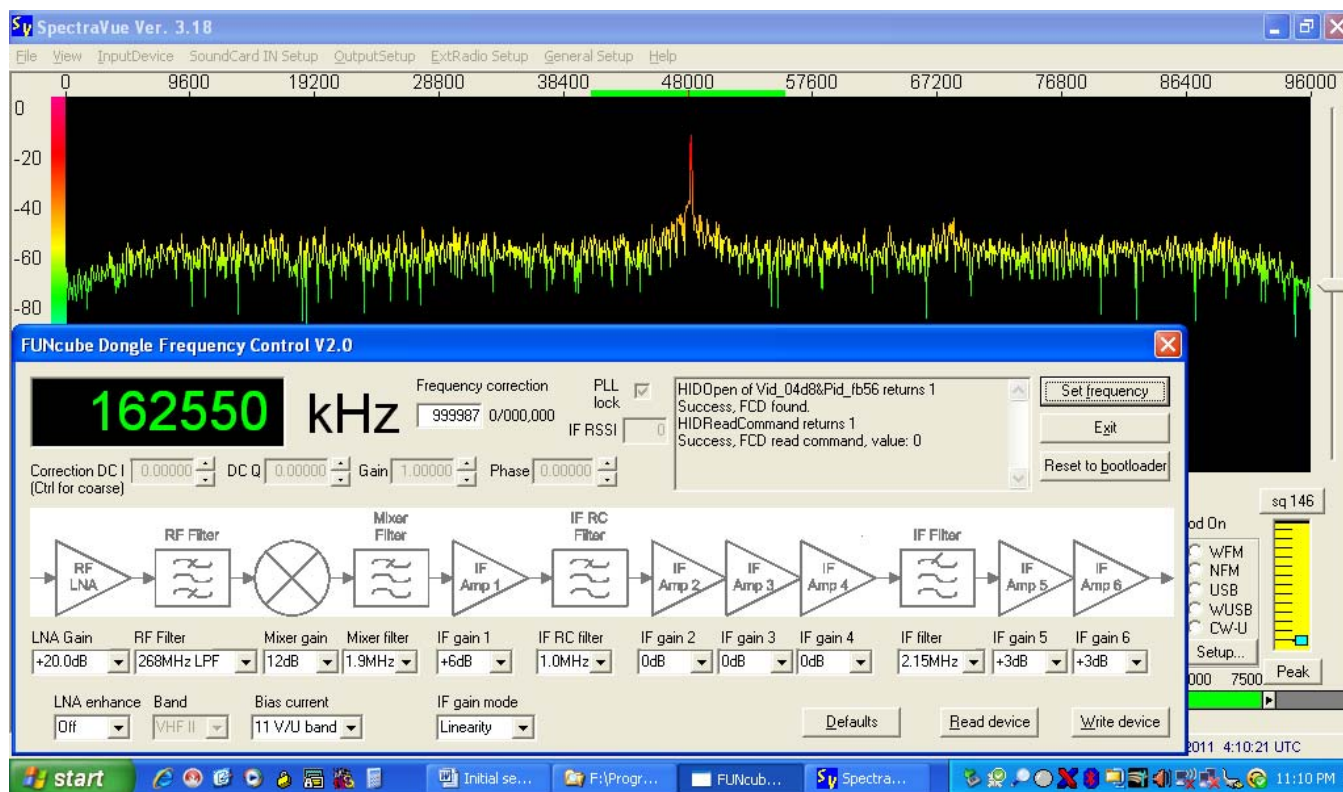


Figure 25 – SpectraVue application with center frequency calibrated

## **6.0 COMPENSATING FOR THE I & Q DC OFFSETS - SETUP**

Now that you have calibrated the center frequency for your FCD, you can go about the process of adjusting the DC offsets on the I & Q signals. We will start with the understanding that sound from a stereo PC soundcard is inherently a pair of varying AC signals carried on the left & right audio channels.

All PC soundcards are slightly imperfect in that the left & right channels actually include a very small DC voltage in what should be a pair of perfect AC signal outputs. Once again, reality is that the sound output from the FCD device, like all soundcard output devices, may not be perfect AC but may actually contain a very small DC component.

These small DC components on the I & Q signals end up causing the demodulation algorithm to think that there's a signal where there isn't really . . . this false signal shows up in the center spike on the spectrum display & can interfere with very low level signals that are real & located in the same area of the received spectrum as the DC spike.

This guide will now lead you through the steps for compensating for the DC offsets in the I & Q signals from your particular FCD. You may use either of the methods listed below to make these adjustments.

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In fact, I would recommend that you try them both & see which one works best for you . . . the end result is the same from both methods.

### 6.1 COMPENSATING FOR THE I & Q DC OFFSETS – METHOD #1

The first method of compensating for the DC offsets in the I & Q signals from your particular FCD will use the “Raw Data” display in SpectraVue. Start by bringing the SpectraVue application to the foreground & left-click on the “Raw Data” tab. Then, bring the FCHid front-end application in the foreground (once again, just covering the bottom portion of the SpectraVue display if necessary).

You will get something that looks like the following:

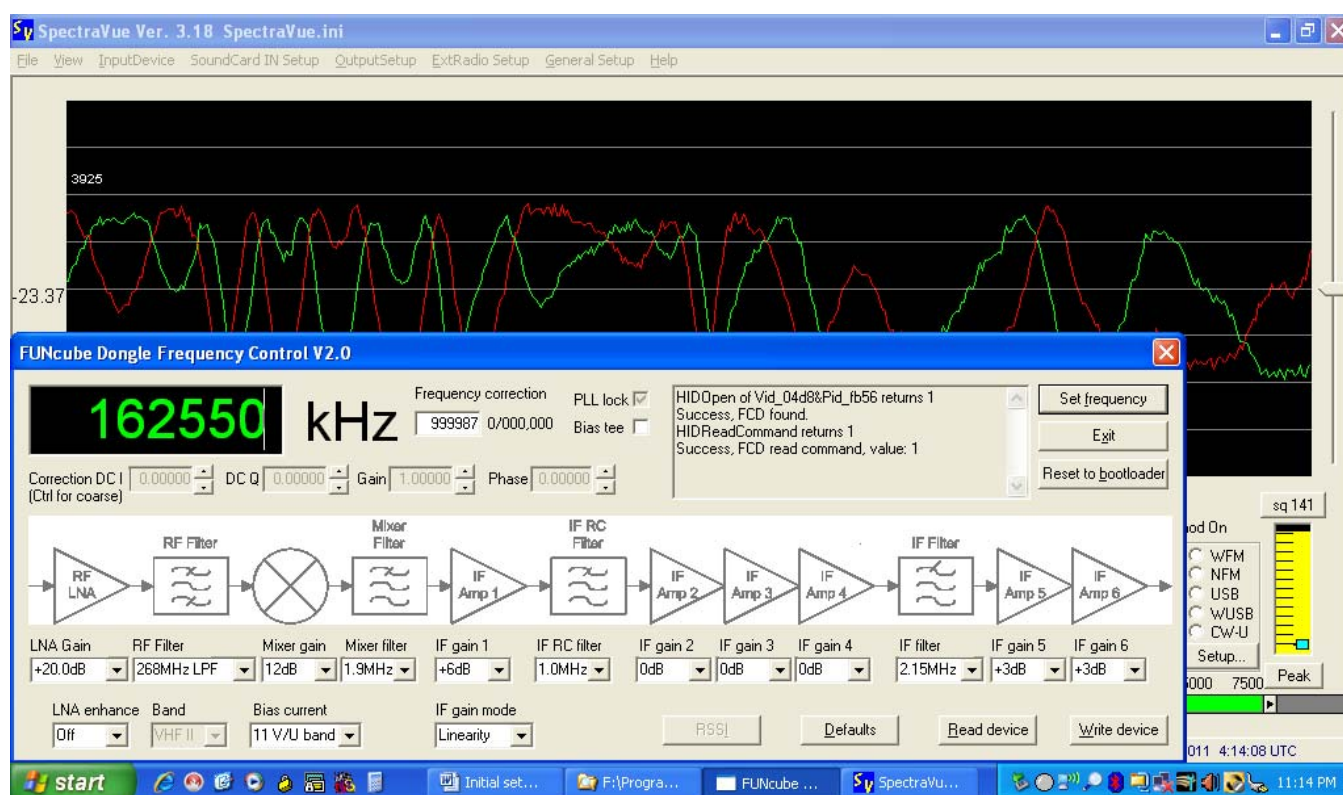


Figure 26 – SpectraVue application with raw data displayed & FCHid laid in front

Note that the raw data is displayed in what appears as two AC audio signals (green=I & red=Q). Compensating for the I & Q DC offsets for your FCD will allow you to center these two AC audio signals vertically about the horizontal axis (this also has the desirable side effect of reducing the center spike as implied earlier in the center frequency calibration section of this guide).

For this adjustment activity, once again, choose a frequency that is likely to have a continuous (or at least, mostly continuous) signal. Using one of the National Weather Service weather broadcast channels (e.g. 162.550MHz in Fort Worth, TX & 162.400MHz in Dallas, TX) is again a good choice. Using another transmitter as a low-power source (carrier only) through a dummy load also works very well.



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While pressing & holding the CTRL key (for quicker adjustments in larger steps), use the mouse to left-click on the adjustment arrows in the FCHid tool to change the DC-I setting so that the I signal (green trace) is at least one "division" away from center (the farther from center, the better). Doing this intentionally moves the I signal on the Raw Data display away from center, effectively reducing its interaction effect on the Q signal.

You will get something that looks like the following (note, your display will appear to have more “overlapping” signals for the I & Q displays):

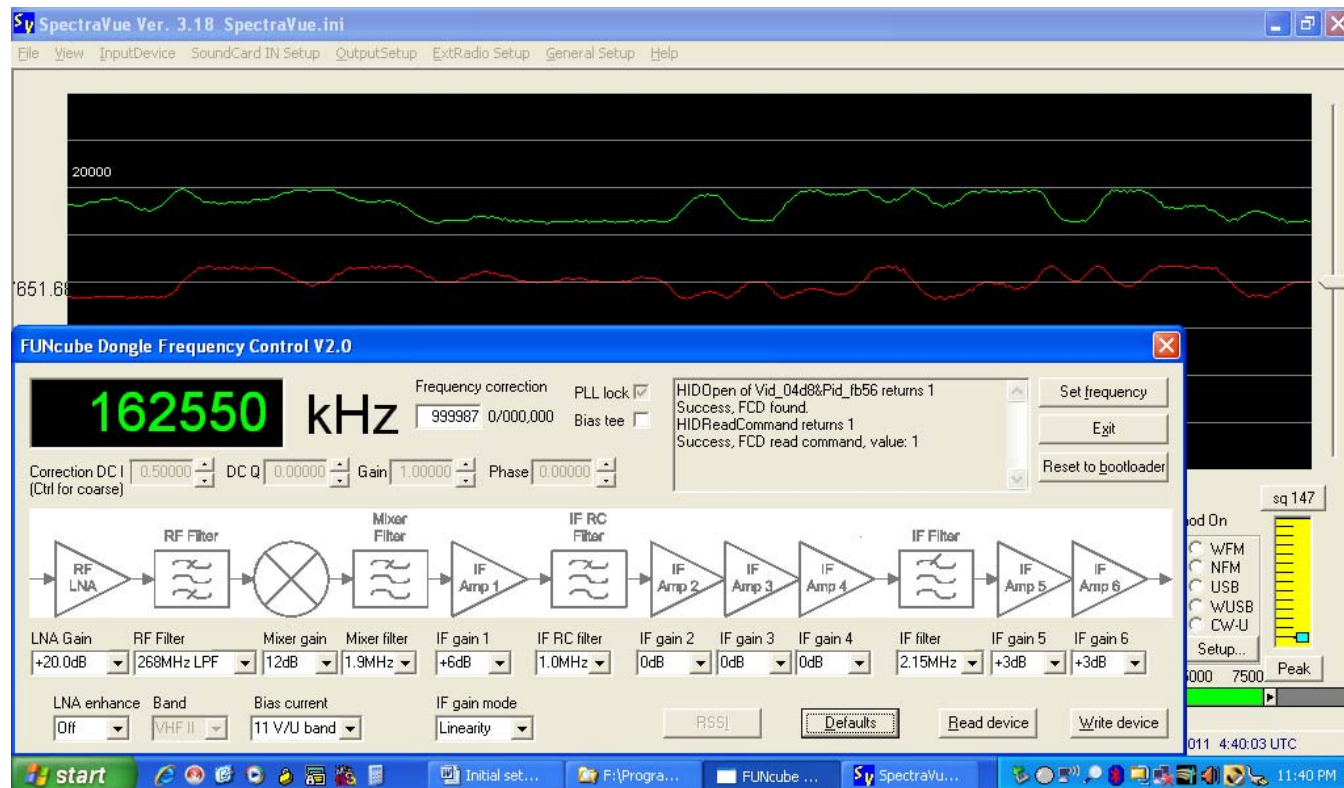


Figure 27 – SpectraVue application with the I signal (green) moved away from center

Now, use the mouse to left-click on the adjustment arrows (adding the CTRL key for quicker adjustments in larger steps as needed) to change the DC-Q setting such that the Q signal (red trace) appears to be centered as much as possible around the "0" axis.

You will get something that looks like the following:

# Initial setup of the FUNcube Dongle – 20110604

## By: Mark J Culross KD5RXT

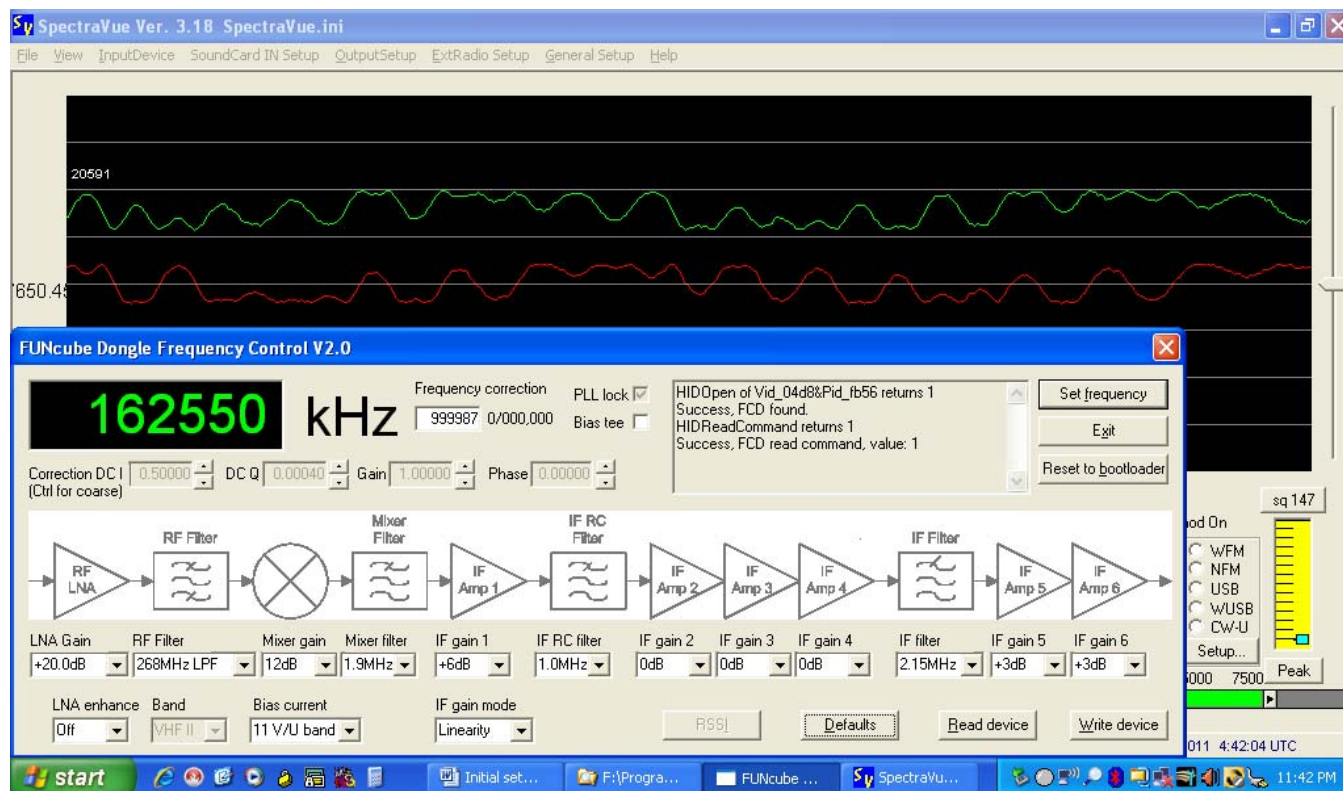


Figure 28 – SpectraVue application with the Q signal (red) centered

After taking note of the resulting DC-Q (this is the Q signal DC offset for your particular FCD), return the DC-I setting to “0”.

While pressing & holding the CTRL key (for quicker adjustments in larger steps), use the mouse to left-click on the adjustment arrows in the FCHid tool to change the DC-Q setting so that the Q signal (red trace) is at least one "division" away from center (the farther from center, the better). Doing this intentionally moves the Q signal on the Raw Data display away from center, effectively reducing its interaction effect on the I signal.

You will get something that looks like the following (again, your display will appear to have more “overlapping” signals for the I & Q displays):

## Initial setup of the FUNcube Dongle – 20110604

### By: Mark J Culross KD5RXT

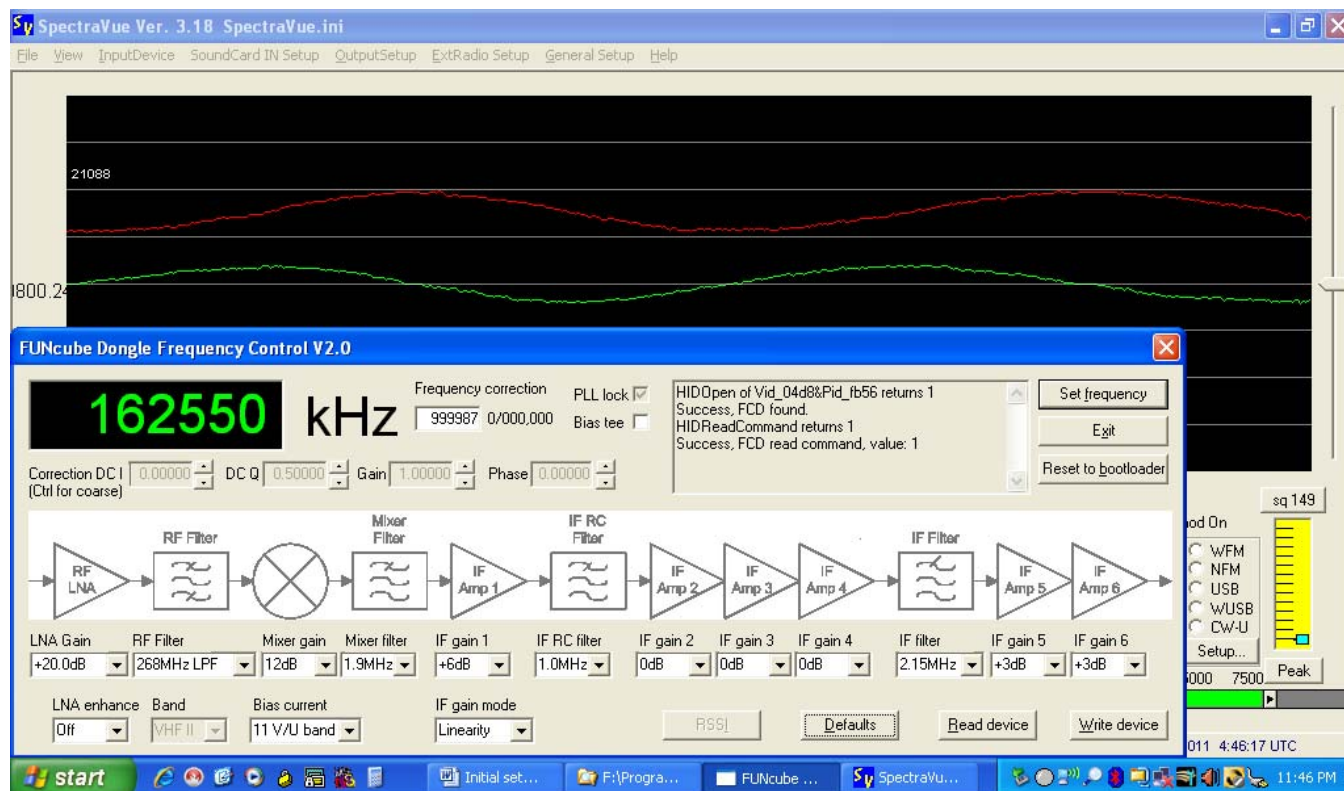


Figure 29 – SpectraVue application with the Q signal (red) moved away from center

Now, use the mouse to left-click on the adjustment arrows (adding the CTRL key for quicker adjustments in larger steps as needed) to change the DC-I setting such that the I signal (green trace) appears to be centered as much as possible around the "0" axis.

You will get something that looks like the following:



# Initial setup of the FUNcube Dongle – 20110604

## By: Mark J Culross KD5RXT

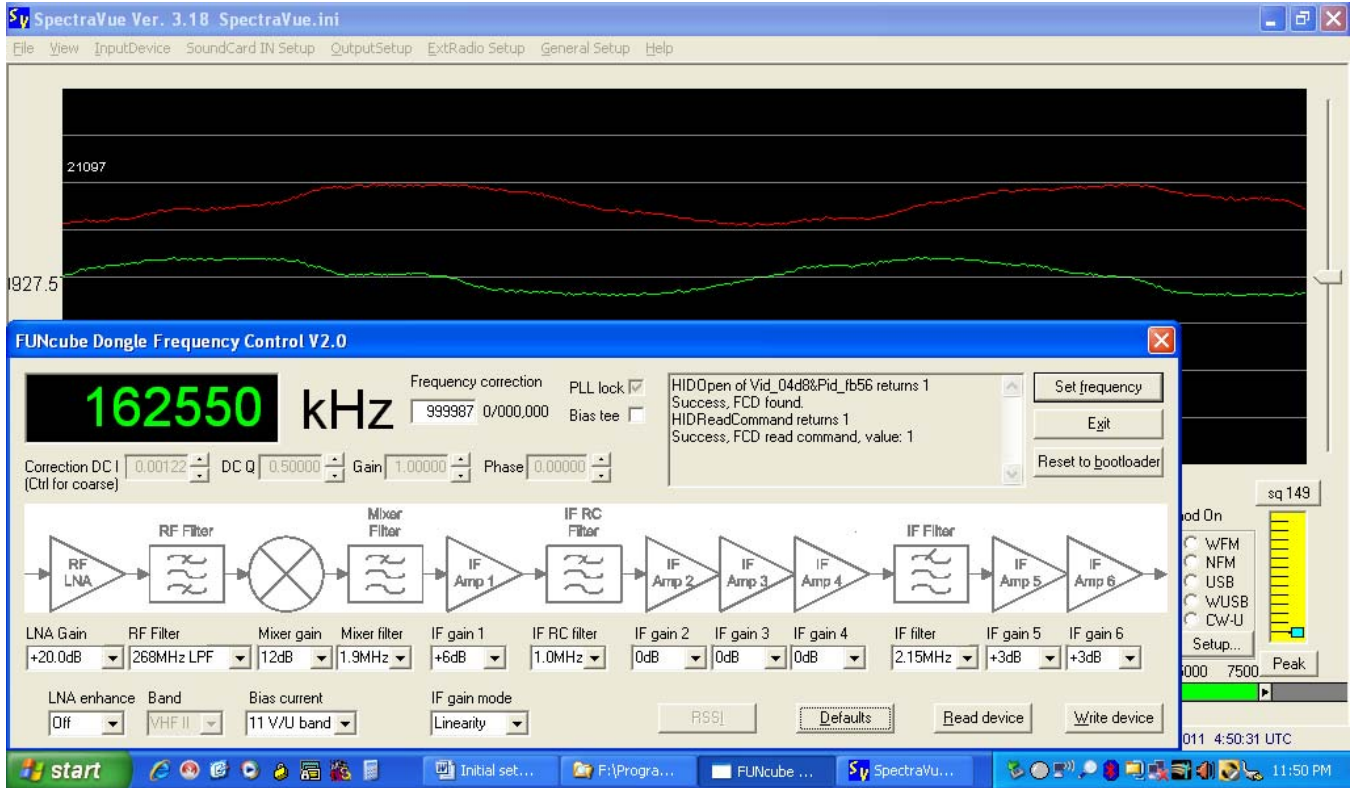


Figure 30 – SpectraVue application with the Q signal (red) centered

After taking note of the resulting DC-I (this is the I signal DC offset for your particular FCD), return the DC-Q setting to the value determined earlier.

NOTE: Once you get the I & Q signals centered as close as possible around the horizontal axis on the Raw Data display, the resulting DC-I & DC-Q correction values that you just determined are particular to your FCD & these values will need to be set likewise in the FCHid front-end application if you move your FCD to a different computer.

My preference is to write the DC-I & DC-Q correction values on a small sticker that is then attached to the specific FCD, that way you always know how to setup for that specific unit (yes, I have several).

## 6.2 COMPENSATING FOR THE I & Q DC OFFSETS – METHOD #2

The second method of compensating for the DC offsets in the I & Q signals from your particular FCD will use the “Phase” display in SpectraVue. Start by bringing the SpectraVue application to the foreground & left-click on the “Phase” tab. Then, bring the FCHid front-end application in the foreground (once again, just covering the bottom portion of the SpectraVue display if necessary).

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You will get something that looks like the following:

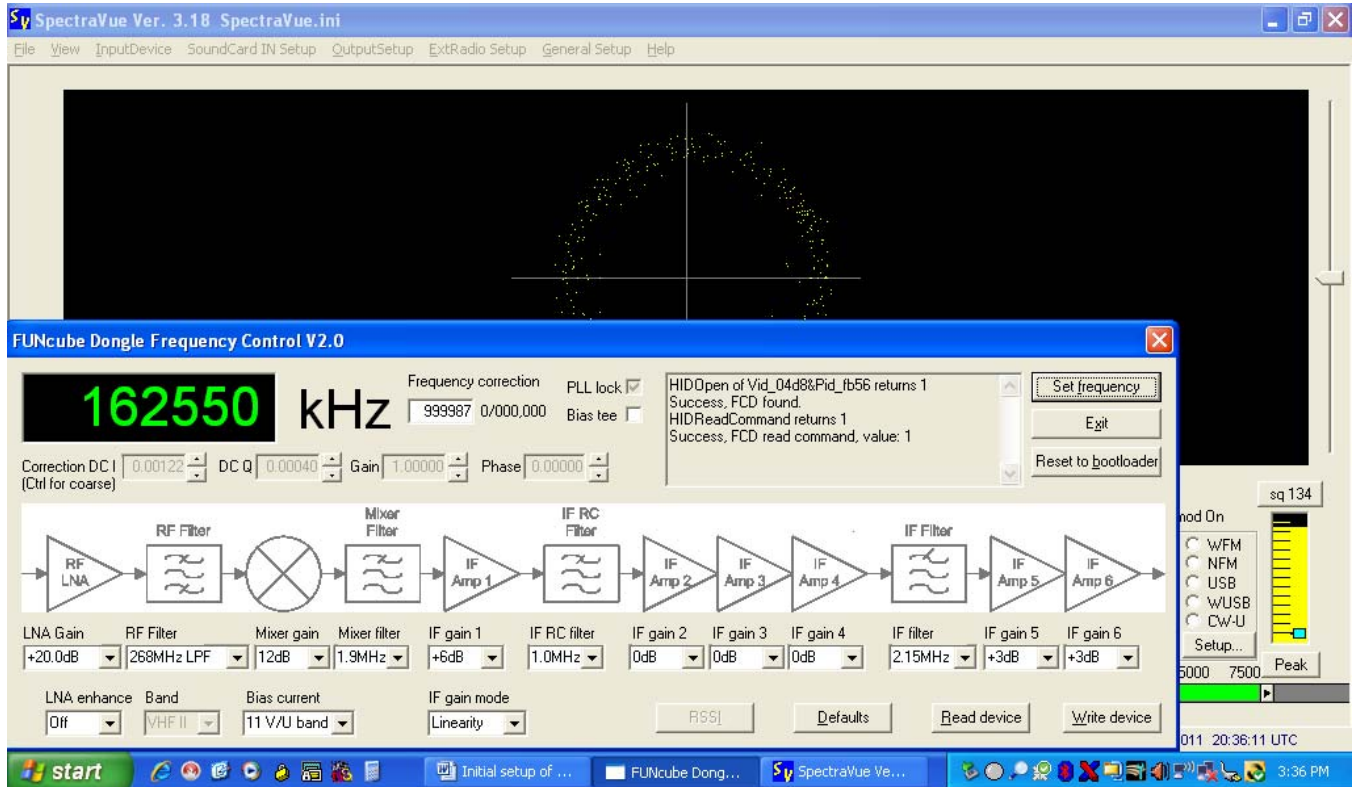


Figure 31 – SpectraVue application with phase displayed & FCHid laid in front

Note that the phase is roughly displayed as a scattered circle. Compensating for the I & Q DC offsets for your FCD will allow you to center this phase circle vertically & horizontally about the origin (this also has the desirable side effect of reducing the center spike as implied earlier in the center frequency calibration section of this guide).

**[ THIS STEP IS VERY IMPORTANT ]** You'll need to set the LNA Gain low enough in the FCHid tool to avoid overload distortion (which appears as a SQUARE on the phase diagram, rather than the CIRCLE that you really want). Depending upon the input signal, you might have to take the LNA Gain all the way down to -5 dB. If that isn't enough, see what you can do to reduce the signal that the FCD is receiving (turn down the transmitter power, insert some pad into either the transmit chain or the receive chain, use an inferior antenna, etc.).

For this adjustment activity, once again, choose a frequency that is likely to have a continuous (or at least, mostly continuous) signal. Using one of the National Weather Service weather broadcast channels (e.g. 162.550MHz in Fort Worth, TX & 162.400MHz in Dallas, TX) is again a good choice. Using another transmitter as a low-power source (carrier only) through a dummy load also works very well.

While pressing & holding the CTRL key (for quicker adjustments in larger steps), use the mouse to left-click on the adjustment arrows in the FCHid tool to change the DC-I setting just enough so that the

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appearance is that you could fit another phase circle between the displayed phase circle and the vertical axis (but not so far that the phase circle is no longer clearly visible). Adjustments to the DC-I setting causes the phase circle to move around on the horizontal axis, where positive values move the phase circle to the left of the origin & negative values move the phase circle to the right of the origin. Intentionally moving the phase circle away from center effectively reduces the interaction effect of I signal on the Q signal, allowing independent adjustment of the Q signal's DC offset in the next step.

You will get something that looks like the following (note, your display will appear to have more dots in the phase display):

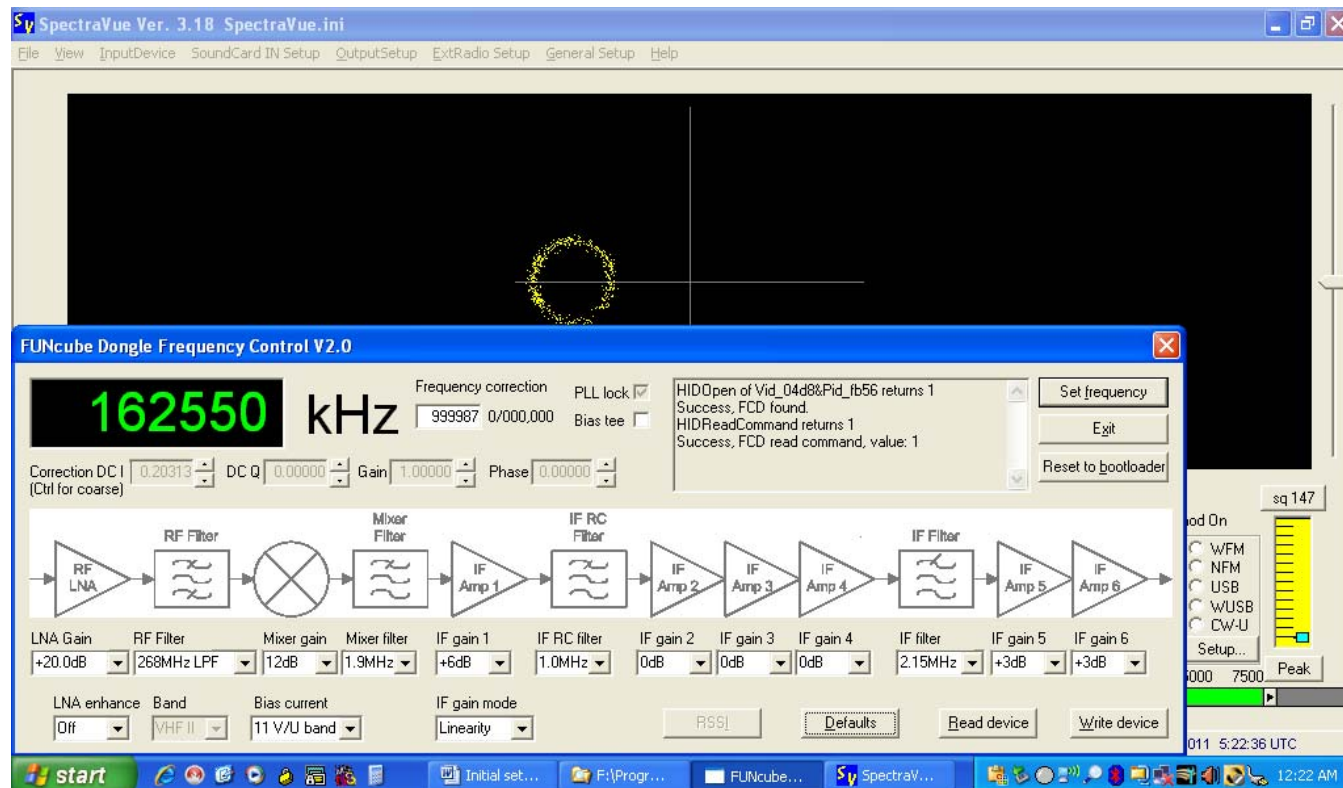


Figure 32 – SpectraVue application with the I signal (horizontal) moved away from center

Now, use the mouse to left-click on the adjustment arrows (adding the CTRL key for quicker adjustments in larger steps as needed) to change the DC-Q setting such that the phase circle appears to be centered top-to-bottom as much as possible around the horizontal axis.

You will get something that looks like the following:

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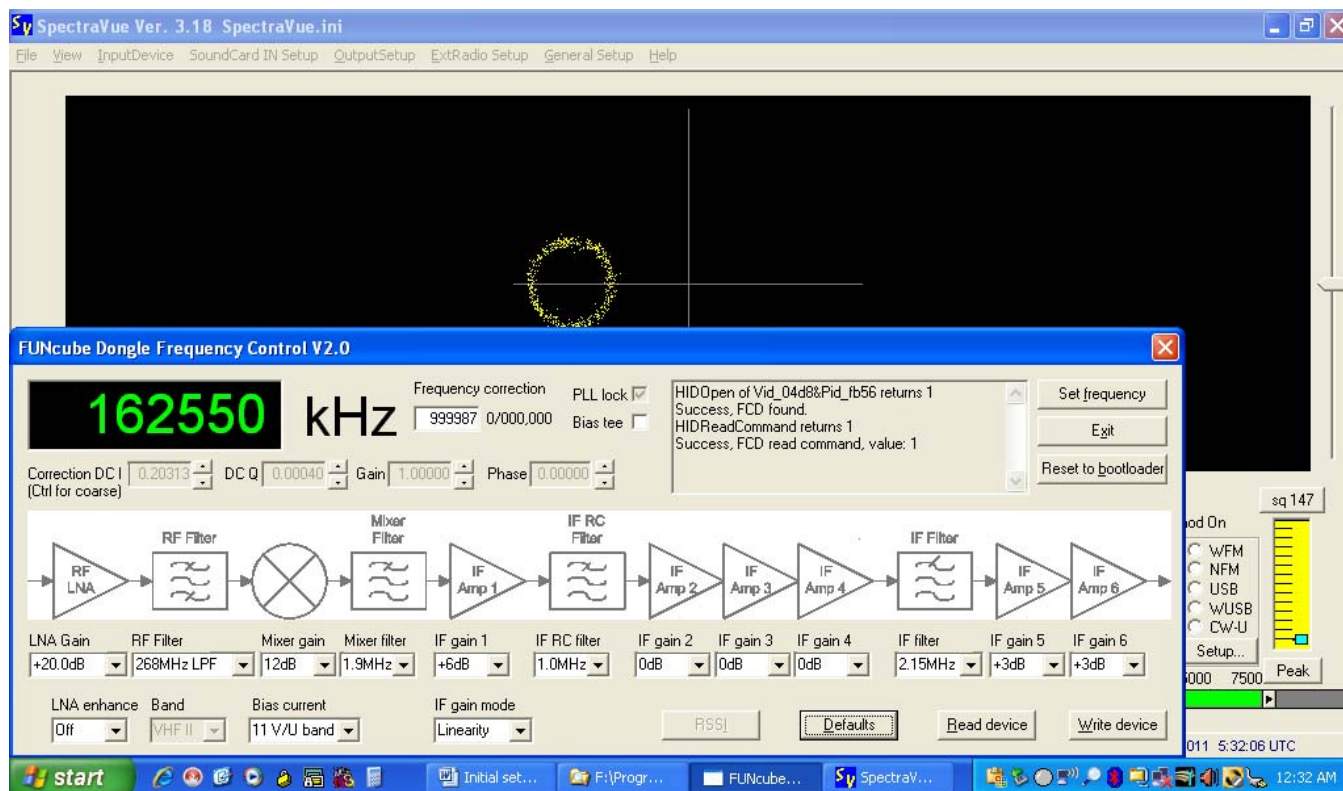


Figure 33 – SpectraVue application with the phase circle centered top-to-bottom

After taking note of the resulting DC-Q (this is the Q signal DC offset for your particular FCD), return the DC-I setting to 0.

While pressing & holding the CTRL key (for quicker adjustments in larger steps), use the mouse to left-click on the adjustment arrows in the FCHid tool to change the DC-Q setting just enough so that the appearance is that you could fit another phase circle between the displayed phase circle and the horizontal axis (but not so far that the phase circle is no longer clearly visible). Adjustments to the DC-Q setting causes the phase circle to move around on the vertical axis, where positive values move the phase circle above the origin & negative values move the phase circle below the origin. Intentionally moving the phase circle away from center effectively reduces the interaction effect of Q signal on the I signal, allowing independent adjustment of the I signal's DC offset in the next step.

You will get something that looks like the following (again, your display will appear to have more dots in the phase display):



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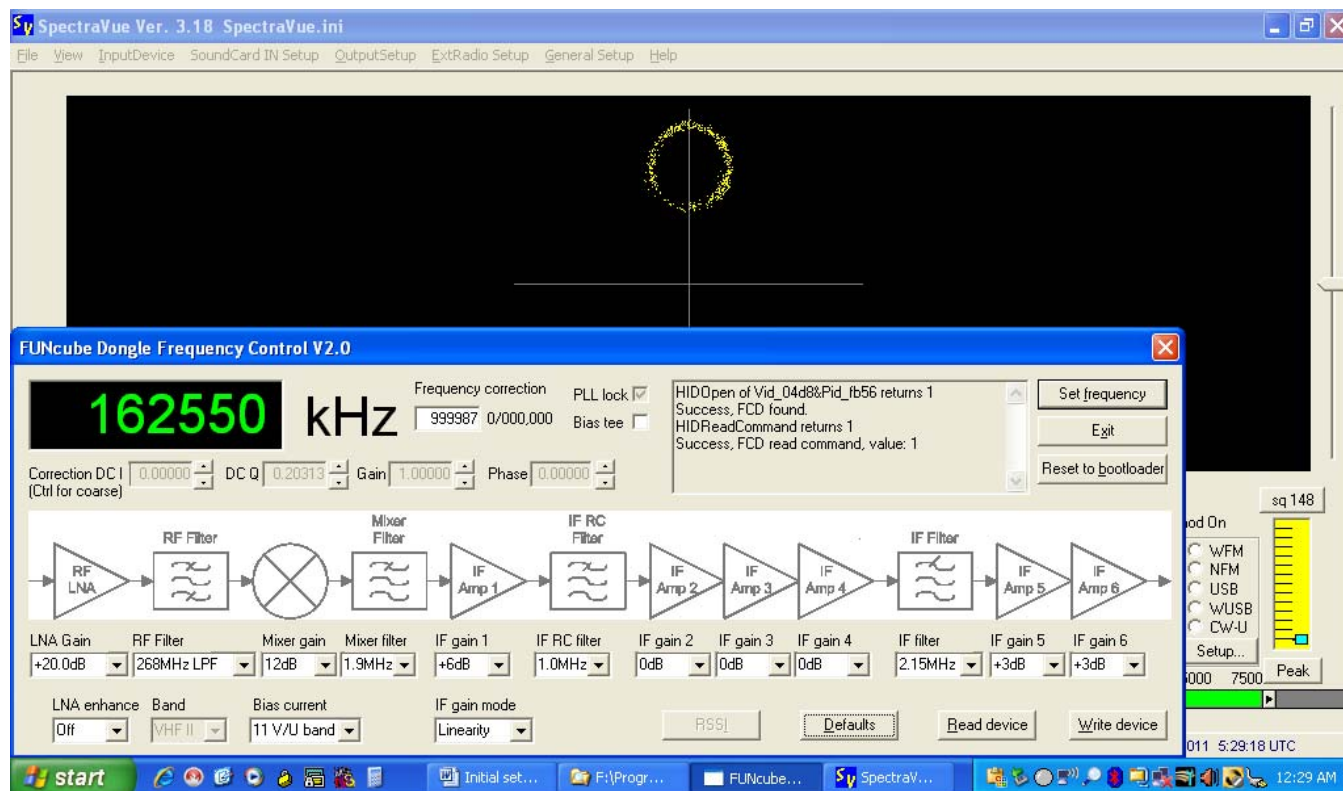


Figure 34 – SpectraVue application with the Q signal (vertical) moved away from center

Now, use the mouse to left-click on the adjustment arrows (adding the CTRL key for quicker adjustments in larger steps as needed) to change the DC-I setting such that the phase circle appears to be centered left-to-right as much as possible around the vertical axis.

You will get something that looks like the following:

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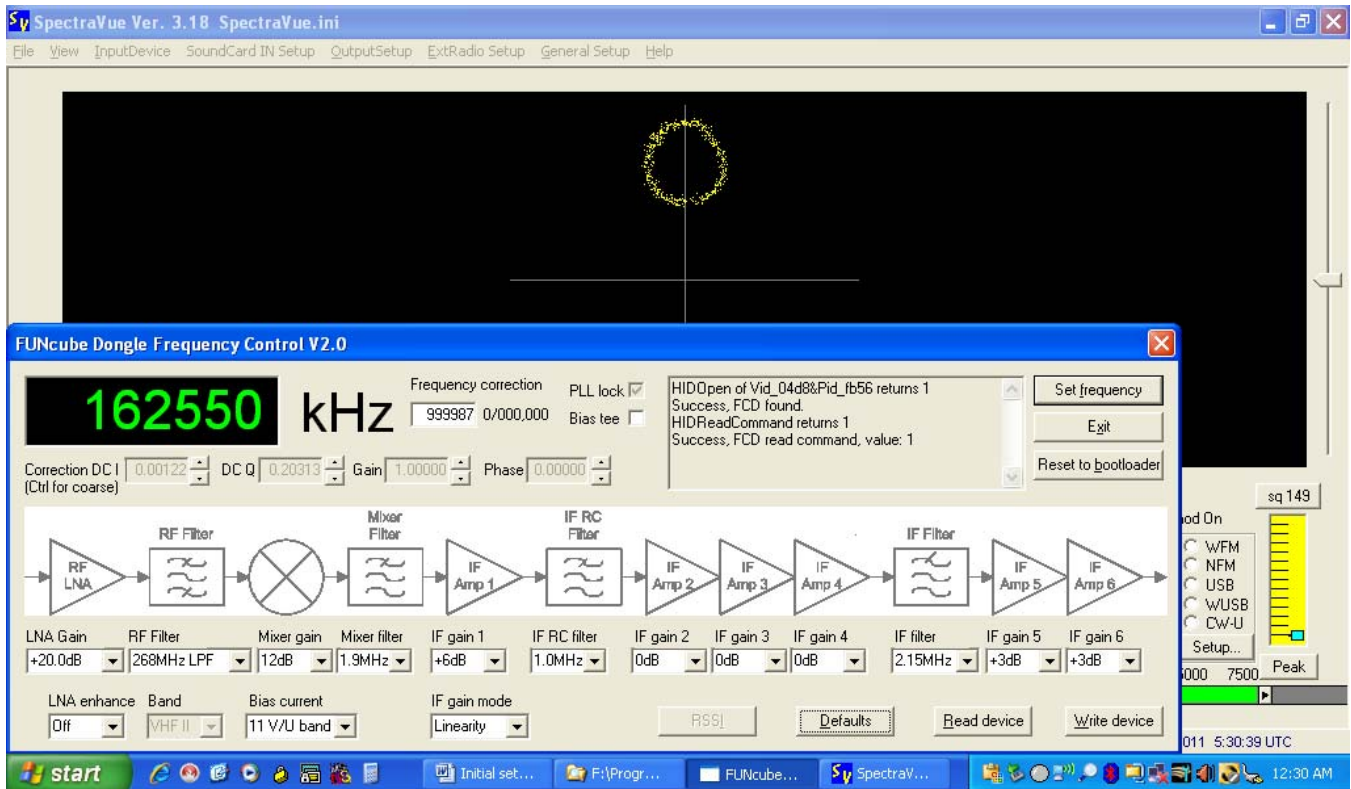


Figure 35 – SpectraVue application with the phase circle centered left-to-right

After taking note of the resulting DC-I (this is the I signal DC offset for your particular FCD), return the DC-Q setting to the value determined earlier.

=====

NOTE: Once you get the I & Q signals centered as close as possible around the origin on the Phase display, the resulting DC-I & DC-Q correction values that you just determined are particular to your FCD & these values will need to be set likewise in the FCHid front-end application if you move your FCD to a different computer.

My preference is to write the DC-I & DC-Q correction values on a small sticker that is then attached to the specific FCD, that way you always know how to setup for that specific unit (yes, I have several).

=====

### **7.0 SETTING THE FCD MICROPHONE GAIN**

In order to avoid overdriving the audio chain in the FCD and the demodulator in the SpectraVue application, adjustments to the microphone gain associated with the sound card in the FCD need to be made in Windows 7 (unfortunately, this is not adjustable in Windows XP, so as a consequence, when using the FCD in Windows XP, your input to the demodulator is very likely to be overdriven . . .



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bummer !! You might be able to compensate for this some by lowering the LNA Gain, but you do so at the expense of signal strength . . . bummer, again !!).

From the taskbar, open the Recording Devices control panel.

You'll get something that looks like the following:

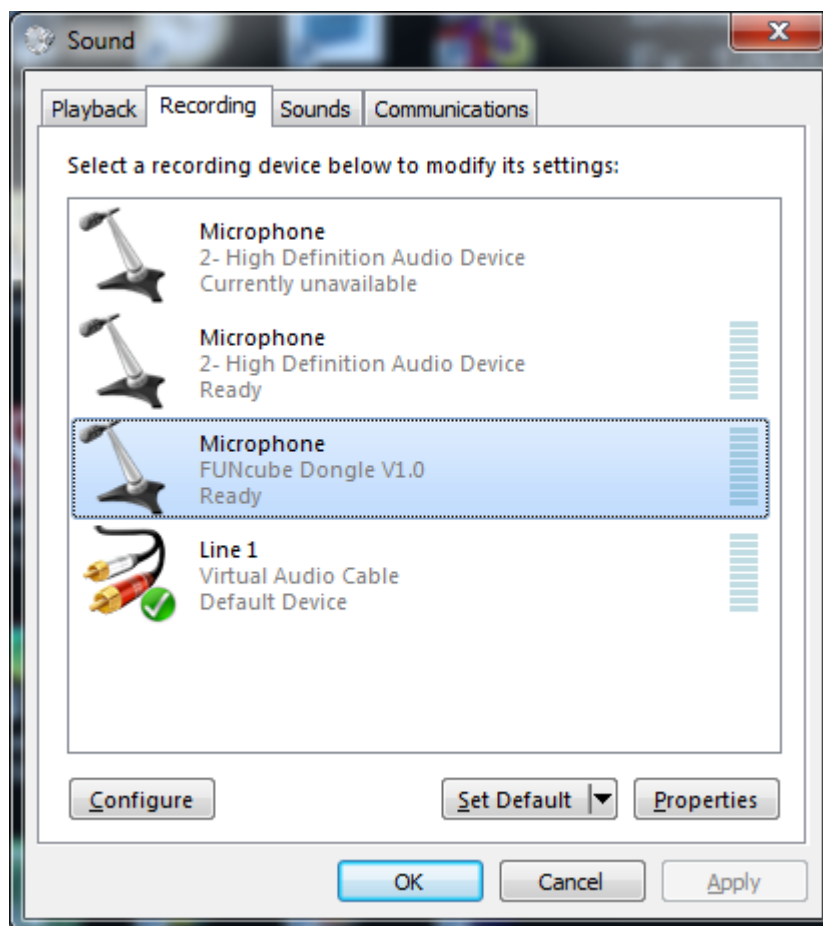


Figure 36 – Adjusting the Sound Recording devices in Windows 7

Highlight the FUNcube Dongle Microphone as shown and left-click on “Properties”. This will open the “Microphone Properties” dialog.

You will get something that looks like the following:

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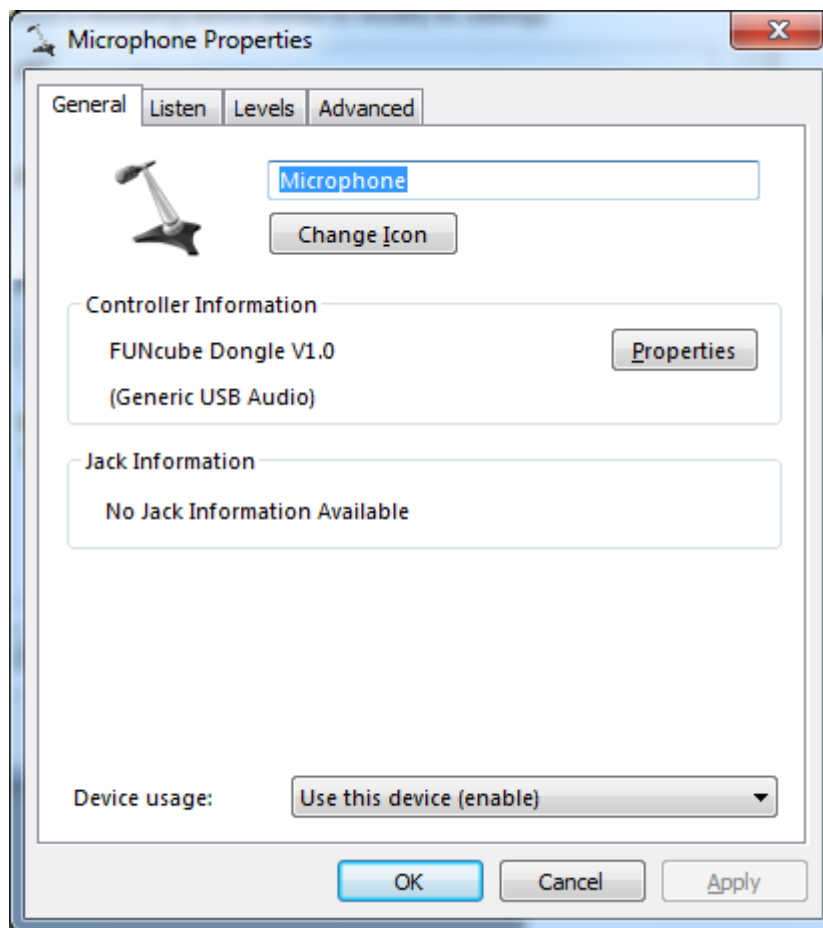


Figure 37 – Adjusting the FUNcube Dongle Microphone Properties in Windows 7

Left-click on the “Listen” tab.

You will get something that looks like the following:

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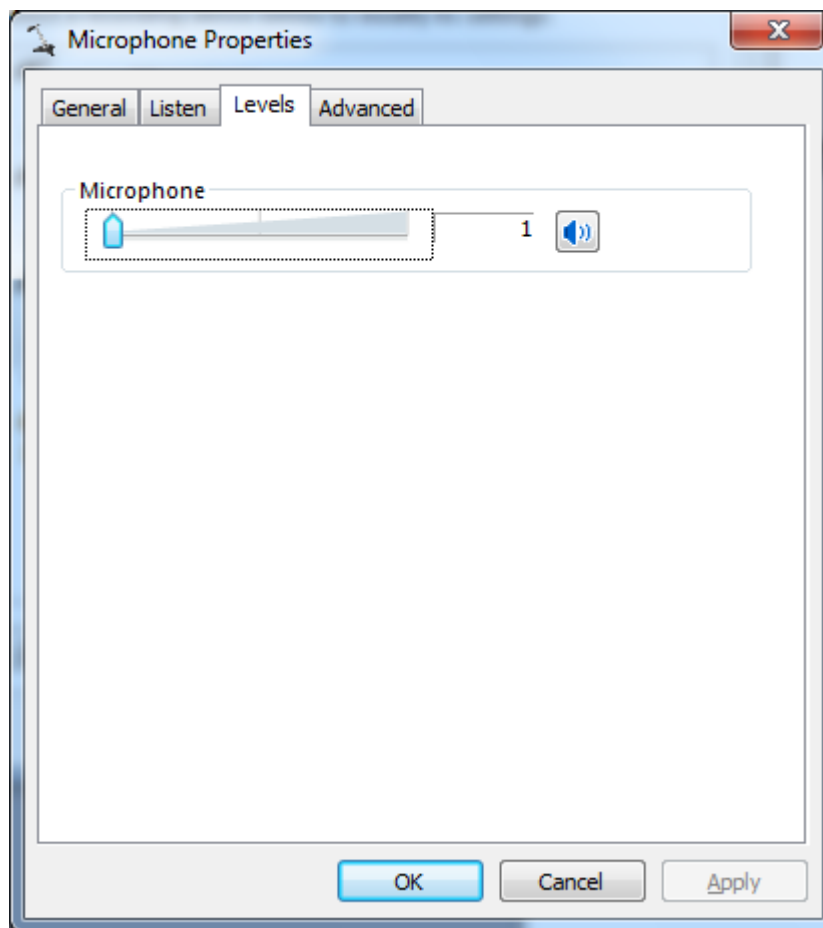


Figure 36 – Adjusting the FUNcube Dongle Microphone Level in Windows 7

Finally, in this dialog, adjust the microphone level to “1”. This will keep the FCD audio chain & subsequent SpectraVue demodulator from being overloaded. When finished, close each of the open dialogs by left-clicking on the OK button in each case.

Your FCD is now ready for action !! Good luck & most of all, have fun !! If you have any questions or need any help, a good place to start is with the FUNcube Dongle Yahoo group.

Mark J Culross  
KD5RXT



Web: [www.hamradio.co.uk](http://www.hamradio.co.uk)

Outline House, 73 Guildford Street, Chertsey, Surrey KT16 9AS

**Tel: 0845 2300 599**

(Local Call Number) Tel: 01932 567 333 (Direct Dial Number)

E-mail: [sales@hamradio.co.uk](mailto:sales@hamradio.co.uk)