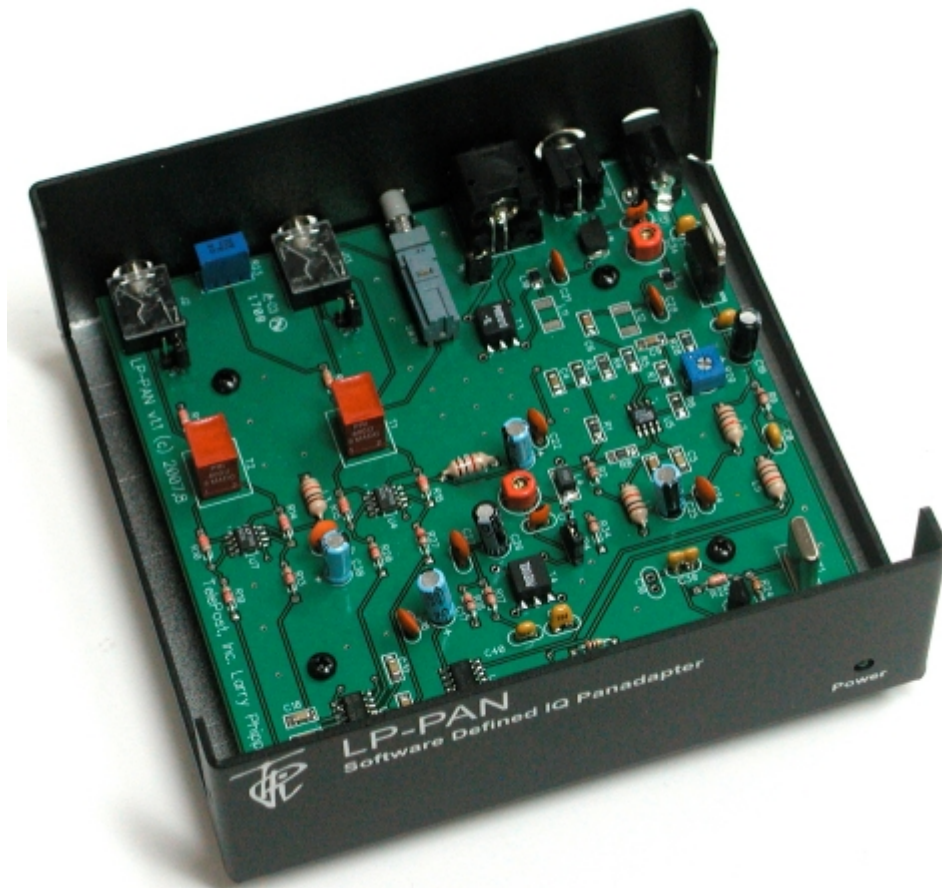


LP-PAN

Software Defined IQ Panadapter



LP-PAN Installation, Setup & Operation

Generic manual for rigs other than K3

March 2011

Rev. A2

For use with PowerSDR-IF v1.19.35

TelePost Incorporated

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Introduction

LP-PAN Features

LP-PAN is a software defined IQ direct conversion panadapter. Here is a list of current features...

- * Up to 192 kHz display on PC, sound card dependent
- * Switching quadrature detector for high dynamic range
- * Strong buffer amp with low NF and very high LO isolation.
- * Excellent THD and IMD performance
- * Ground isolated inputs / outputs with mil spec audio xfms
- * Low output Z, balanced or unbalanced.
- * Fully balanced architecture with balanced and unbalanced outputs
- * Jumperable ground lift on RF input and audio outputs
- * Works with many SDR programs.
- * Adjustable gain to interface almost any sound card
- * Point and click frequency control with PowerSDR / IF Stage. HRD required in addition for non-supported rigs. In addition, LP-Bridge allows sharing of K3 / LP-PAN with almost any logger, and even programs such as CW-Skimmer.
- * Powder coated aluminum enclosure with silk screened graphics.
- * Hardware or software mute
- * Available for IF frequencies of...
 - 8.215 MHz (Elecraft K3)
 - 8.83 MHz (Kenwood)
 - 9.0 MHz (Orion, FTdx5000)
 - 4.915 MHz (Elecraft K2)
 - 10.7 MHz (IC-R8500/9500, others)
 - 10.55 MHz (FT-950/2000)

Getting Started

Pre-requisites for this system are...

- A PC running Windows XP, Vista or Windows 7. (32- and 64-bit versions supported).
- Dual core processor with 2-4 GB RAM recommended
- A short 50 ohm RF jumper cable with BNC male connectors on each end.
- Audio cables to interface LP-PAN to your chosen sound card
- A source of 12VDC for LP-PAN. One good choice is the 12V auxiliary power connector on the rig.

Before starting, it helps to read this section in order to understand the basics of how the rig, LP-PAN, PowerSDR, Sound Card and LP-Bridge work together. In general, the duties of each part of the system are as follows:

LP-PAN – Provides broadband audio baseband IQ (In-Phase and Quadrature) signals for application to a high quality sound card, which becomes the interface to PowerSDR. The signals are derived from the broadband IF output of the rig.

PowerSDR – Provides decoding and processing of the audio signals. In addition to providing a panadapter and/or waterfall display, PowerSDR is actually a high quality receiver AND sub-receiver. It rivals the best modern radios in many ways, and adds some DSP features not available on all rigs. It also adds modern DSP features to older radios that don't have DSP of course.

Sound Card – The link between LP-PAN and PowerSDR. A high quality "pro audio" sound card is preferred, rather than a "gaming" card. These are available for about \$80-\$150. See the sound card page on the TelePost website for latest recommendations.

<http://www.telepostinc.com/soundcards.html>

This document is divided into several sections. The first is a step-by-step guide to installing and configuring the most common configuration of LP-PAN, which includes the rig, PowerSDR-IF v1.19.35 and an E-MU 0202 / 0204 USB sound card. If you get stuck, help is an email or phone call away. There are plenty of helpful users on the LP-PAN User Group, <http://groups.yahoo.com/group/LP-PAN/>, or you can send an email to n8lp@telepostinc.com. Phone support is also available at 734-455-3716.

Overview

Important. Must reading. Don't skip.

Below is a general list of the steps involved in getting LP-PAN up and running.

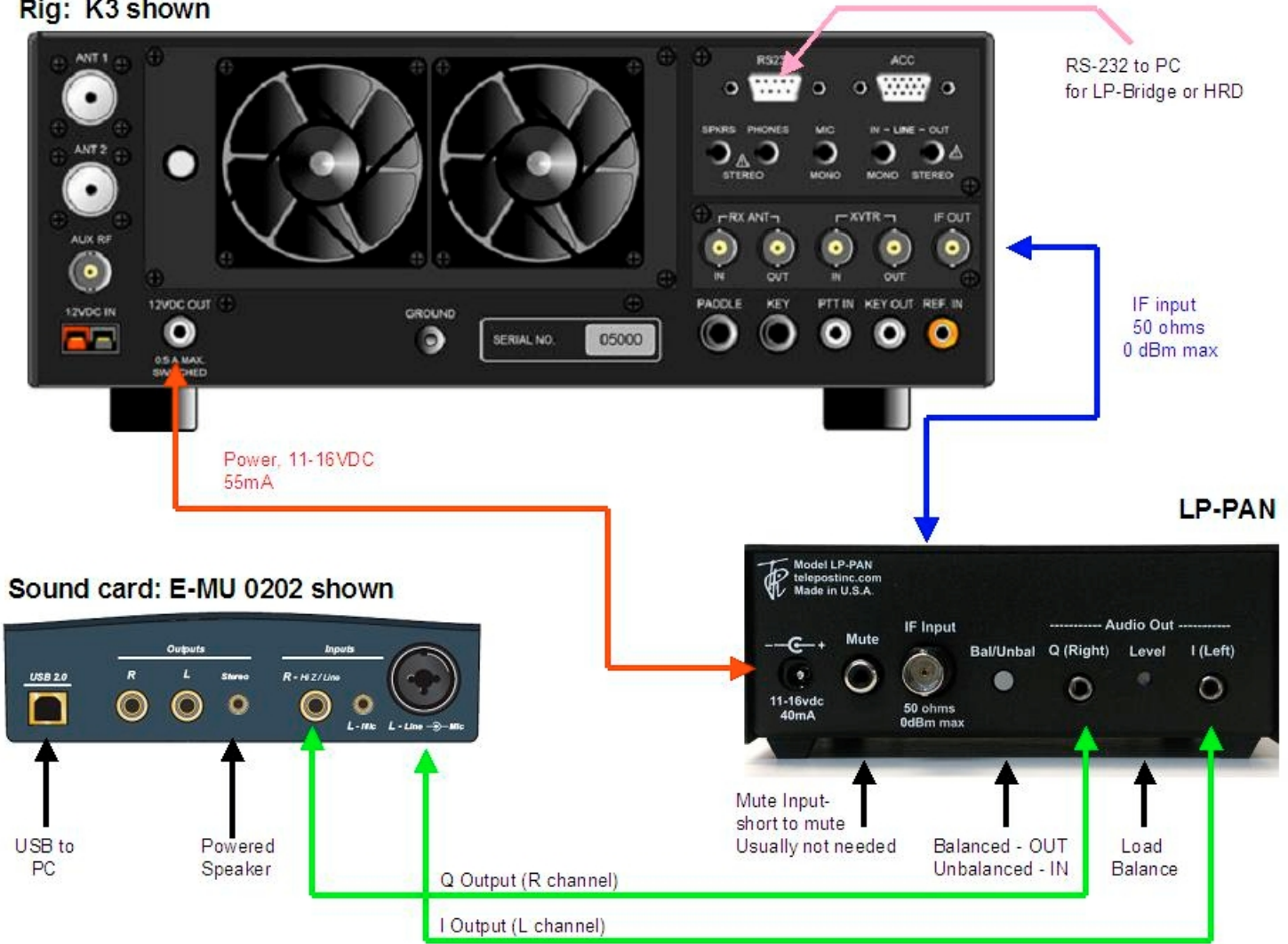
- 1). Sound card installation: Includes downloading and installing the proper driver for your sound card based on your operating system.
- 2). Hardware installation: Includes connections from LP-PAN to your sound card, connection of LP-PAN to your rig and connecting power to LP-PAN. To avoid ground loop hassles, it is generally best to get the power from your rig or from your rig's power supply.
- 3). PowerSDR/IF installation: Includes downloading and installing PowerSDR/IF based on your operating system.
- 4). PowerSDR/IF setup: Includes basic settings in PowerSDR/IF Setup menu's General, Audio and Display tabs. Most of the entries will be in the Audio tab to set proper values for your sound card.
- 5). Rig Connection setup: Includes basic settings in the Setup IF menu's Rig Connection, IF Frequencies and Collapsible Display tabs. This includes selecting rig type, com port, baud rate for the rig in the Rig Connection tab. It also includes setting the frequency offsets for each rig mode, plus a Global offset to compensate for LP-PAN's intentional local oscillator offset in the IF Frequencies tab. These entries line the display up with the rig so that both are exactly in sync. It also includes selecting which sections, if any, you would like to add to the collapsible display.
- 6). Optional CAT tab setup: This is found in the PowerSDR/IF Setup menu's CAT tab. It allows setting up PowerSDR/IF to appear to your other software as a physical rig with a com port. It involves downloading and configuring a free virtual com port program to allow creation of a virtual com port pair to connect the PowerSDR/IF "radio" to your logger or other program.

Please read all the sections of this manual which address your intended use of LP-PAN before making any adjustments to the software.

Basic Interconnect Diagram

This graphic shows the most common LP-PAN configuration... Rig, PowerSDR-IF v1.19.35 and E-MU 0202 USB sound card. Other popular rigs are interfaced similarly, such as FTdx5000. The FT950/2000 is similar except that it requires a 3rd party interface board (IF-2000 from RF Space) to be mounted in place of the DMU interface board in the radio. The IF-2000 in this case provides the IF output jack. Older Kenwoods have an IF output, but will require an RS232C "level converter" to provide a serial port. The E-MU 0204 interfaces just like the E-MU 0202 shown.

Rig: K3 shown



Connect the system as shown using the following cables...

- IF** – 50 ohm jumper cable with BNC male connectors on both ends, typically RG-58U. Some radios use an RCA connector.
- Audio** – Two cables with 1/8" (3.5mm) mono connector on one end and 1/4" mono connector on the other end. These can be homemade, premade or made up of a combination of premade cables and adapters. NOTE: Stereo plugs should not be used for the sound card side of these cables, as they can damage the special MIC/LINE connector for the left channel input. Make sure the two little switches on the bottom of the E-MU are in the same position, preferably both OFF. **L / R cables need to be reversed for FT950/2000.**
- Power** - Use the supplied cable. The end with tinned wires should be connected to a suitable source of regulated 12VDC with the same ground as the rig. This can be obtained from the switched 12V output of the rig. The "+" lead is marked with a white stripe.
- USB** – Use cable supplied with sound card. Connect to USB 2.0 port on PC. Using USB 1.1 is permissible, but will limit bandwidth to 48 kHz. If you use a hub, it should have its own power supply and be USB 2.0 compliant.
- Powered Speaker** – Requires 1/8" (3.5mm) stereo plug. It is smart to use speakers with a volume control. If you don't plan to use the sub-receiver in PowerSDR, you can use a mono speaker.
- Balanced /Unbalanced** – Use unbalanced setting for most sound cards, including E-MU 0202 (button pressed IN).

Initial LP-PAN Hardware Settings

Factory assembled units come pre-configured. The settings in this step are usually only needed for kit builders.

Set JP1 & JP3 to open, JP2 to shorted, and JP4 to pins 2 & 3 (two closest to front of the unit), as shown in the photo. Set gain pot R29 to the middle of its range, and the Match pot on the rear panel level pot to the middle as well. For most users, these settings will be adequate.

If you experience a number of spurious spikes in the display, especially near the center, you may wish to experiment with the jumpers. All the jumpers except JP4 provide a "ground lift" function. JP1 & JP3 allow the audio outputs to be grounded or "floating". JP2 does the same thing for the IF input. Depending on your radio, sound card and power supply grounds, you may be able to remove a ground loop by playing with the jumpers. The default positions are...

JP1, JP3 – Floating
JP2 – Grounded

JP4 is a test point for factory insertion of a VNA to allow tuning of the filters in LP-PAN. The default jumper position of pins 2 & 3 simply connects the RF front end of LP-PAN to the mixer and audio circuitry.

E-MU 0202 Installation

Install E-MU 0202 USB sound card per the material that was supplied with the card.

Note the funny connector for the Left channel line input. It will accept an XLR mic level input jack or a 1/4" mono line level phone plug. A pair of 1/8" (3.5mm) mono to 1/4" mono cables are needed to connect from LP-PAN to the EMU. Radio Shack part #42-2433 is perfect for the job, or you can "roll your own". You can use stereo plugs at the LP-PAN side if you make your own, but wire them for mono. On the EMU side, don't use stereo plugs, as they can get hung up in the funny connector and damage it.

The two "ground lift" switches on the bottom of the E-MU should always be in the same position, preferably in the OFF position. This will enhance the sound card's ability to reject hum and noise pickup due to ground loops.

Note also that the E-MU needs USB 2.0 to work at 192 kHz. It is wise to download the latest driver from the E-MU website. Below is a link to the E-MU 0202 sound card page on the TelePost website. It shows proper PowerSDR/IF sound card settings for the 0202, and has a link to the latest E-MU driver. The latest version as of 9-20-08 is v1.3. When installing the driver, the firmware in the E-MU hardware is also updated. The driver only supports XP, XP64, Vista and Vista 64... but appears to work with Windows 7.

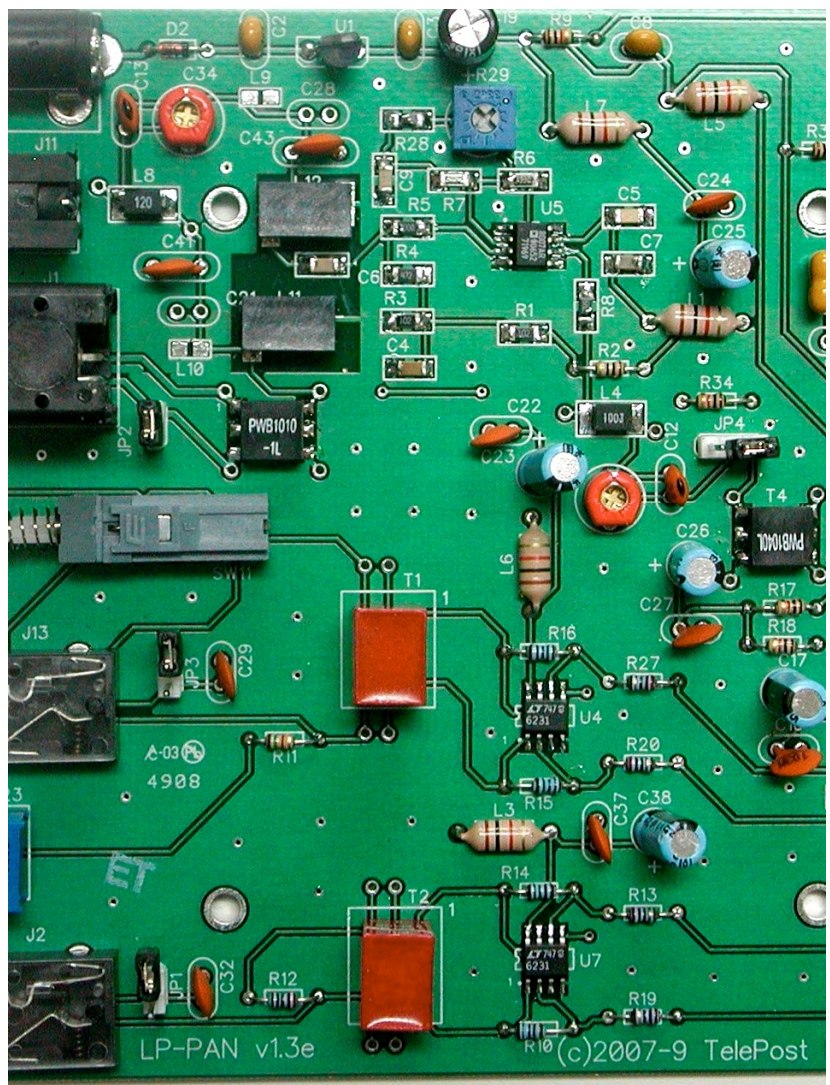
<http://www.telepostinc.com/emu0202.html>

It is wise to never power down the E-MU independently of the PC, since it will probably try to start back up with 48 kHz sampling rate. It draws very little power, and can be left on all the time. Make sure that the power management in the PC doesn't power down the USB port when the PC is asleep or standby.

This completes hardware installation and setup. The next step is to install the PowerSDR-IF software.

Other Sound Cards

For other sound cards, follow the manufacturers instructions, and then visit the LP-PAN Sound Card page, <http://www.telepostinc.com/soundcards.html>, for links to the configuration Page for your sound card. There are pages for the M-Audio Audiophile 2496, E-MU 1212m and Infrasonic Quartet. You can also use an existing internal PC sound card if you like. Contact the factory for details and limitations of this approach, especially if using a laptop.



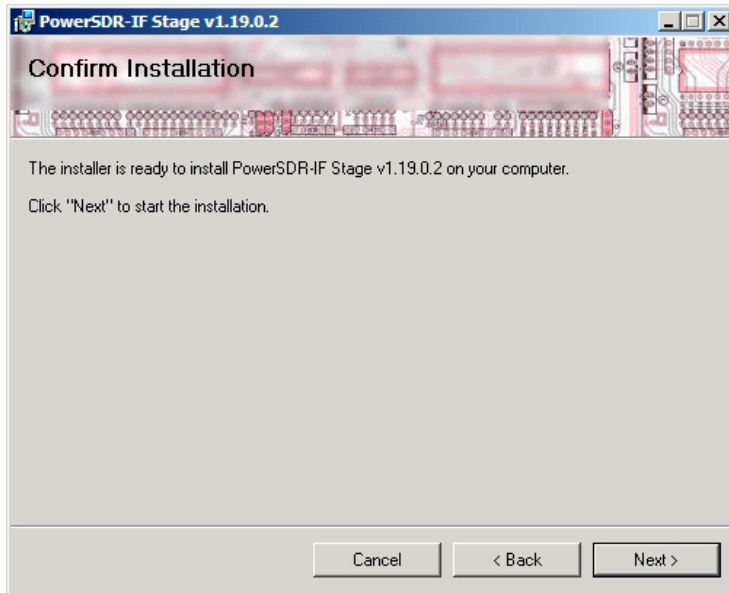
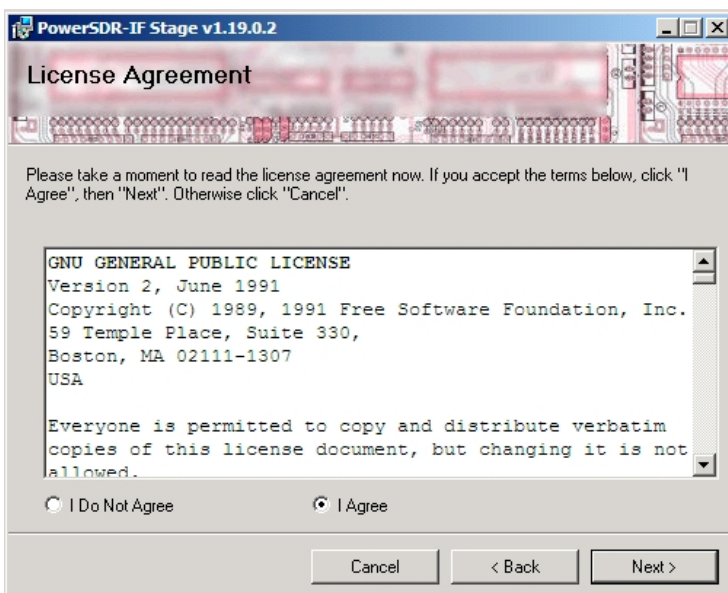
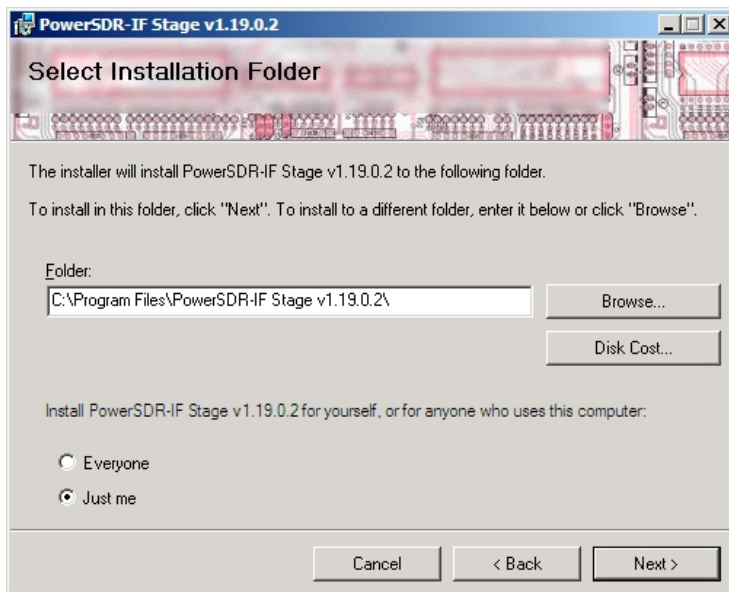
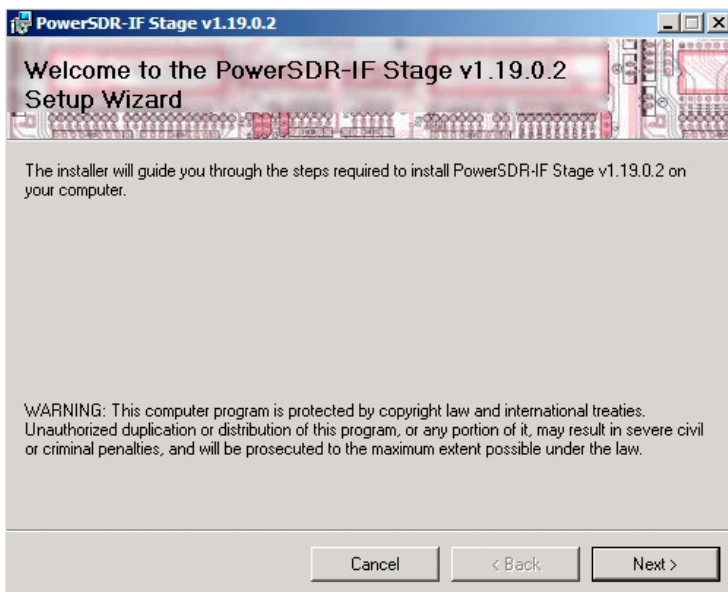
PowerSDR-IF v1.19.35 Installation & Setup

If you are running Vista or Windows 7, it is wise to be logged in as Administrator, or another user with admin privileges. If you are the only user, this is probably the case for your normal login. PowerSDR/IF requires .NET Framework 3.5 SP1 (Service Pak 1) or newer. Update to this version if necessary before installing PowerSDR/IF. Use Add/Remove Programs in the Control Panel (or Programs & Features , depending on OS) to check installed version if you have an older OS. The latest version can be found at Microsoft.com.

The PowerSDR-IF v1.19.35 program can be downloaded at <http://www.wu2x.com/downloads/PowerSDR-IF%20Stage%20v1.19.35.zip>

Download and save the file to a convenient directory such as My Downloads. Unzip the file, and then click on the resultant folder. There should be two files in the folder... PowerSDR_Setup.msi and setup.exe. Click on either file to start installation.

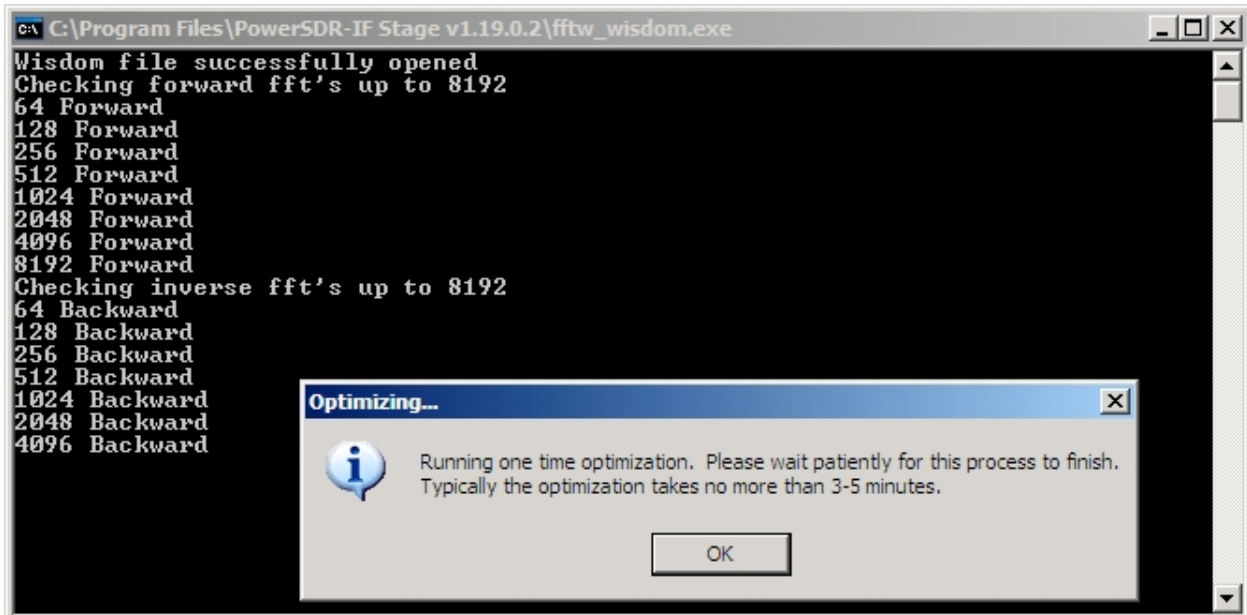
Note: The version referenced in the pictures you see will read v1.19.35, not v1.19.02 as shown. You will see the lower left screen. Click Next to continue. You will then see the lower right screen. If you are the only user on your PC, click on either of the choices. Accept the default installation folder and click Next.



Agree to the license agreement, and confirm installation. If asked at any time about replacing newer files on your system with older ones, always keep your newer existing files.

PowerSDR-IF v1.19.35 Installation and Setup Cont'd

The first time PowerSDR runs, you will see the following screen. This is a one time optimization that PowerSDR runs.



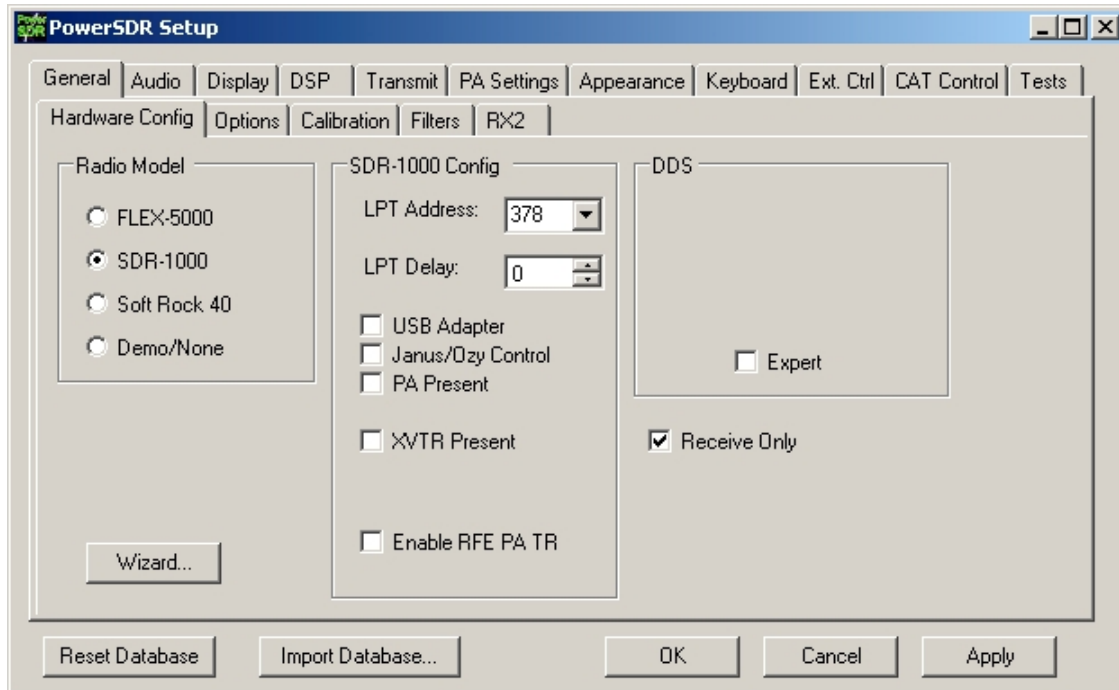
Click OK and wait for the routine to finish. PowerSDR will then launch. This is basically what it will look like (except that the name in the title bar will read v1.19.35).



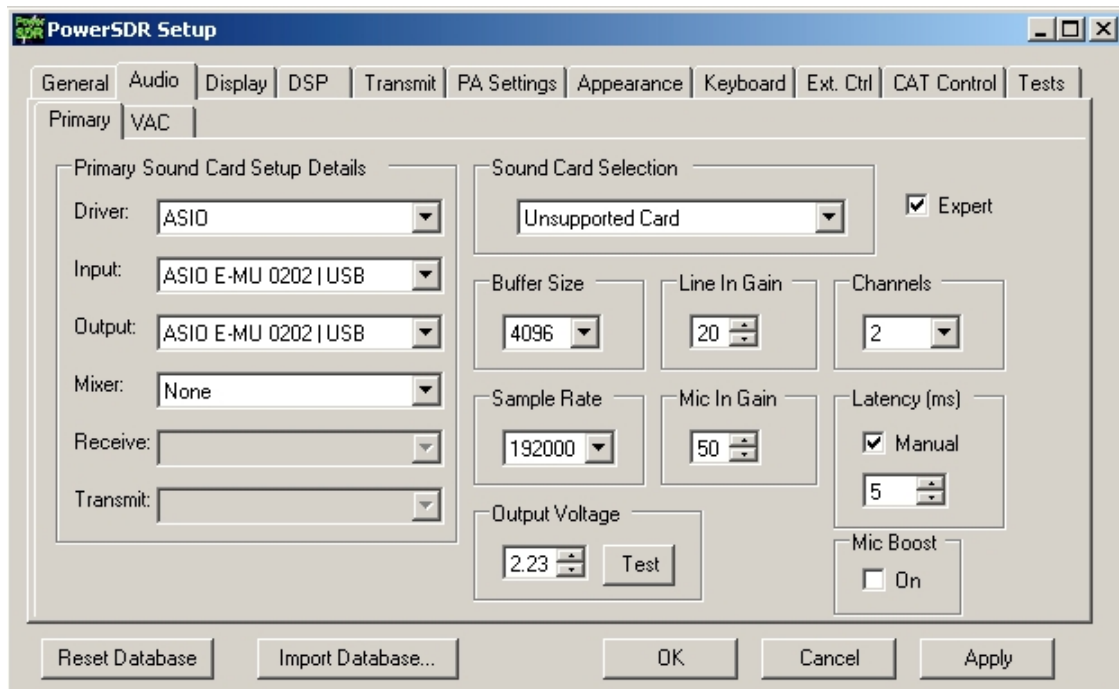
PowerSDR-IF v1.19.35 Installation and Setup Cont'd

Follow these steps to configure PowerSDR-IF...

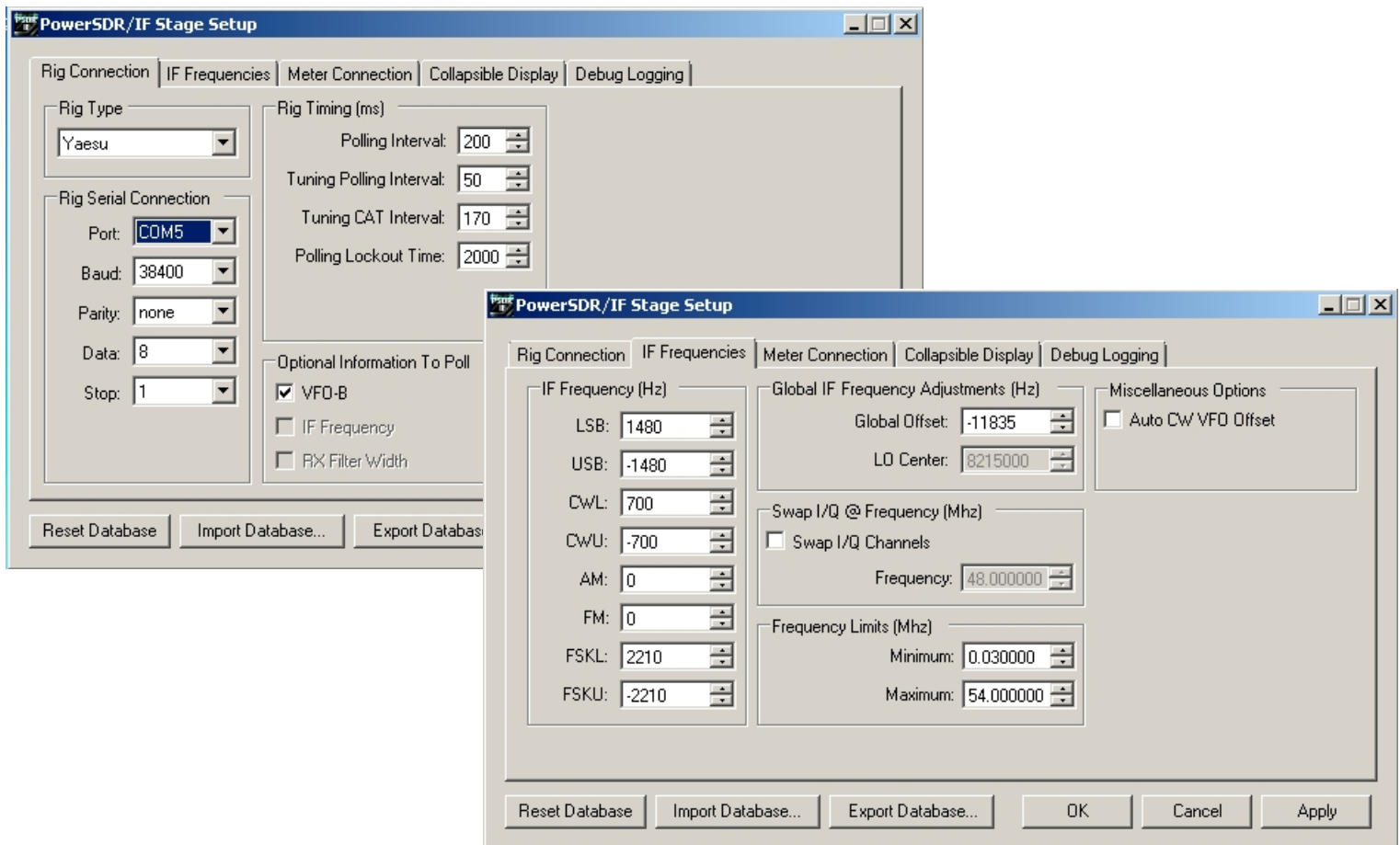
Step 1) Click on the Setup menu in the upper left of the program. This will open up the setup screen, as shown below. Most if not all of the settings will match this picture. If not, adjust them to match the picture. **It is imperative that "Receive Only" be checked.**



Step 2) Click on the Audio tab. Adjust the entries to match the picture below. Click OK to close the setup window.



PowerSDR-IF v1.19.35 Installation and Setup Cont'd



Step 3) Click on the SetupIF menu at the top center of the main PowerSDR screen. This will open the rig interface setup screen, shown above left.

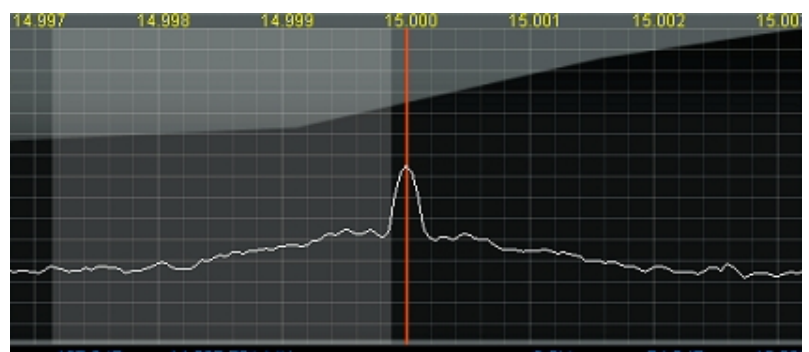
Step 4) The correct settings for an FTdx5000 connected to COM1 are shown. Other rigs will be similar, but may require a different baud rate. On some radios, the sign of the entries might need to be reversed. This appears to be the case with the FT-950/2000 because the IF-2000 interface board inverts the signals. Of course, in both cases the COM1 selection above would need to be replaced with the correct com port selection for your rig connection. This can be a real serial port, a USB-to-serial adapter or a virtual port such as those created by microHam Router. **Note: Since only one program can be connected directly to your rig, you must close all logging or similar programs before setting up PowerSDR/IF or you will get a conflict error message.**

There is also a choice for HRD, which lets you connect PowerSDR/IF to almost any rig through HRD. This method does not support VFO B, however. Refer to the “**Interfacing PowerSDR to a Logging Program**” section for details on connecting PowerSDR/IF to a logging type program. We are working on a version of LP-Bridge which will allow multiple programs and hardware to share the rig with PowerSDR/IF. Currently this capability is only available for K3.

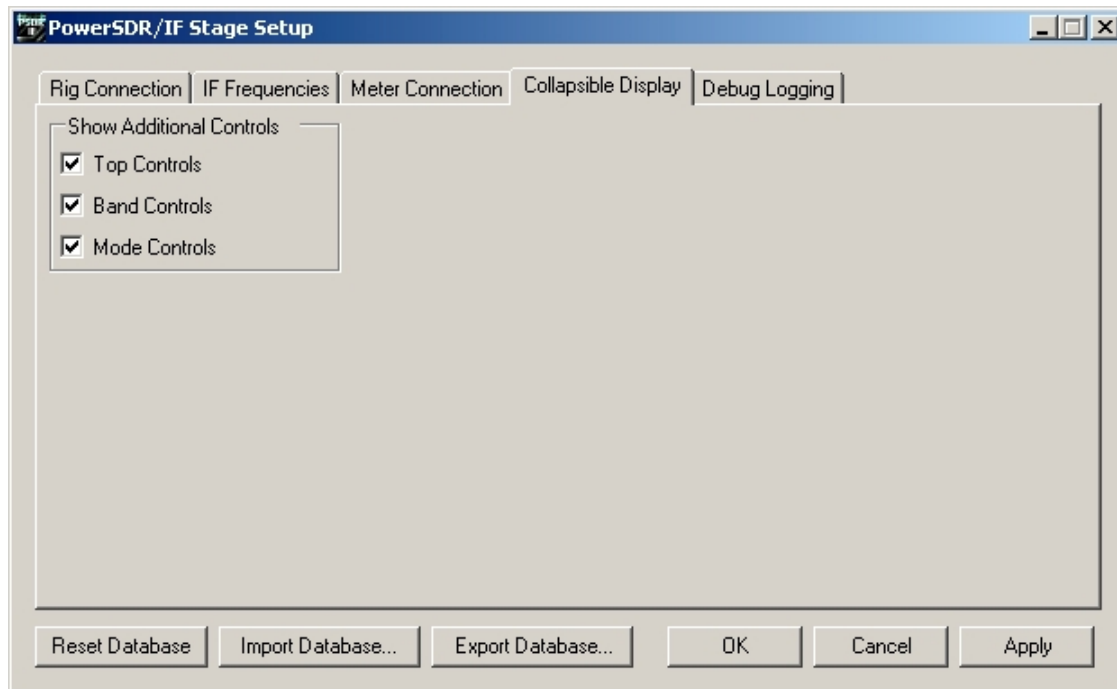
Step 5) The IF Frequency entries (mode offsets) above right are only guides. These values were provided by W6NEK from his setup. The nominal mode offset values for SSB on most radios are +/- 1500Hz. The CW offset values echo your CW pitch setting on the radio. **NOTE: The left & right audio cables need to be reversed from the drawing on page 5 for FT950/2000 or sidebands will be reversed.**

The Global Offset is an intentional offset built into LP-PAN. It's different for each version of LP-PAN. The value for the FTdx5000 is approximately 15kHz. Some radios have a plus sign, some have a minus sign. The value can be fine tuned by setting the AM offset to “0”, then tuning in WWV in AM mode. Zoom into the panadapter using the Zoom slider and center the display by clicking on the center button.

Adjust the Global Offset to center the carrier peak at the exact frequency of WWV, as shown. This will ensure that the rig will jump to the right frequency when you use point and click tuning from PowerSDR/IF.



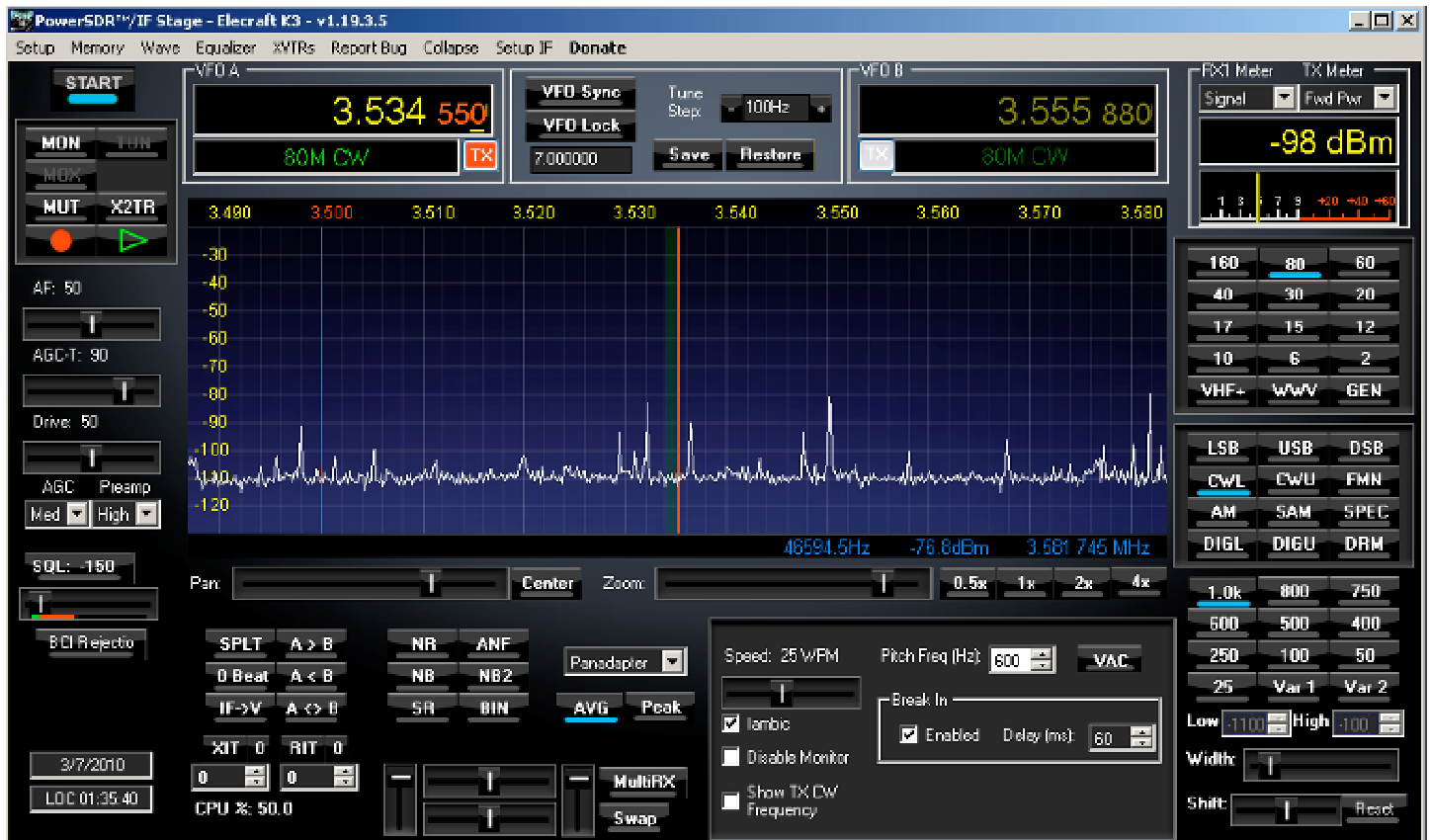
PowerSDR-IF v1.19.35 Installation and Setup Cont'd



Step 6) Click on Collapsible Display tab. Collapsible Display is a new feature that allows the user to fill the PowerSDR window with the panadapter (or waterfall or Panafall), covering up all the extraneous buttons and controls. Additional controls can be “added back” into the display as desired. Check the additional items that you want displayed whenever displaying collapsed view.

Step 7) Click OK to close the window.

Step 8) Click Start in the upper left corner of PowerSDR. You should now see the K3 VFO frequencies in PowerSDR, and you should see signals in the panadapter, as shown below. The display defaults to the “fill” style, where the graph is filled below the graph lines. This can be changed to the style shown by going to the Setup>Display tab and un-clicking the “Fill” selection. If you have speakers connected to the E-MU, you should also hear sound from them. If not, check to see if the Mute button is lit in PowerSDR. If it is, click on it to un-mute. Listening to PowerSDR is of course optional. It can be used solely as a panadapter display and interface if you choose.

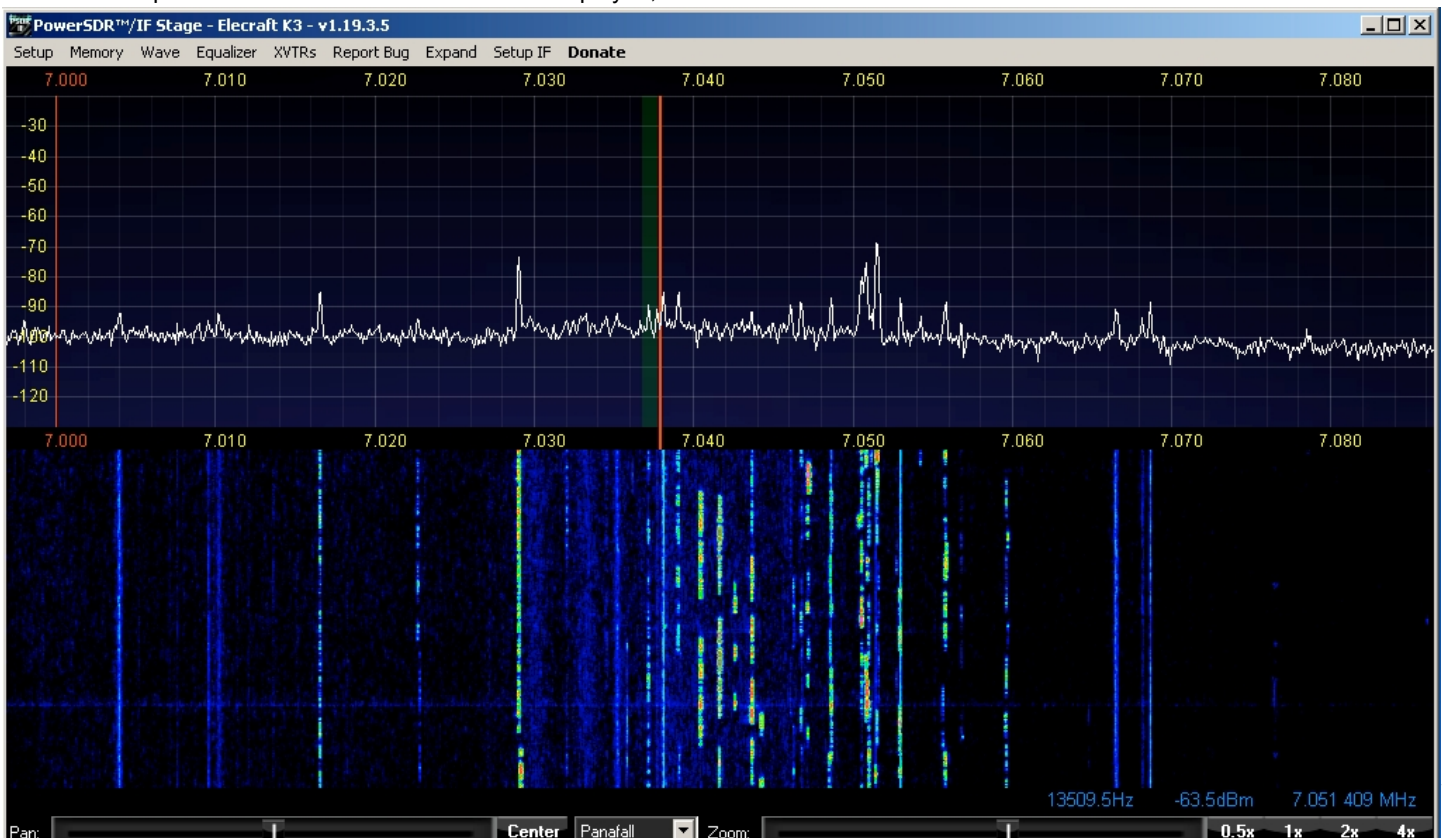


PowerSDR-IF v1.19.35 Collapsed View

PowerSDR/IF can be customized to provide the look you like, including expanded or collapsed view. The collapsed view can be toggled by clicking on the "Collapse" menu. When in collapsed view, the menu changes to "Expand" Clicking on Expand toggles back to Expanded view. The picture above shows the default expanded view. The pictures below are variations of the Collapsed view. In addition to the view, the windows can be resized, colors changed and different "skins" chosen as well.



Above... Collapsed view with all additional controls displayed, and with panadapter only selected.
Below... Collapsed view with no additional controls displayed, and with Panafall selected.

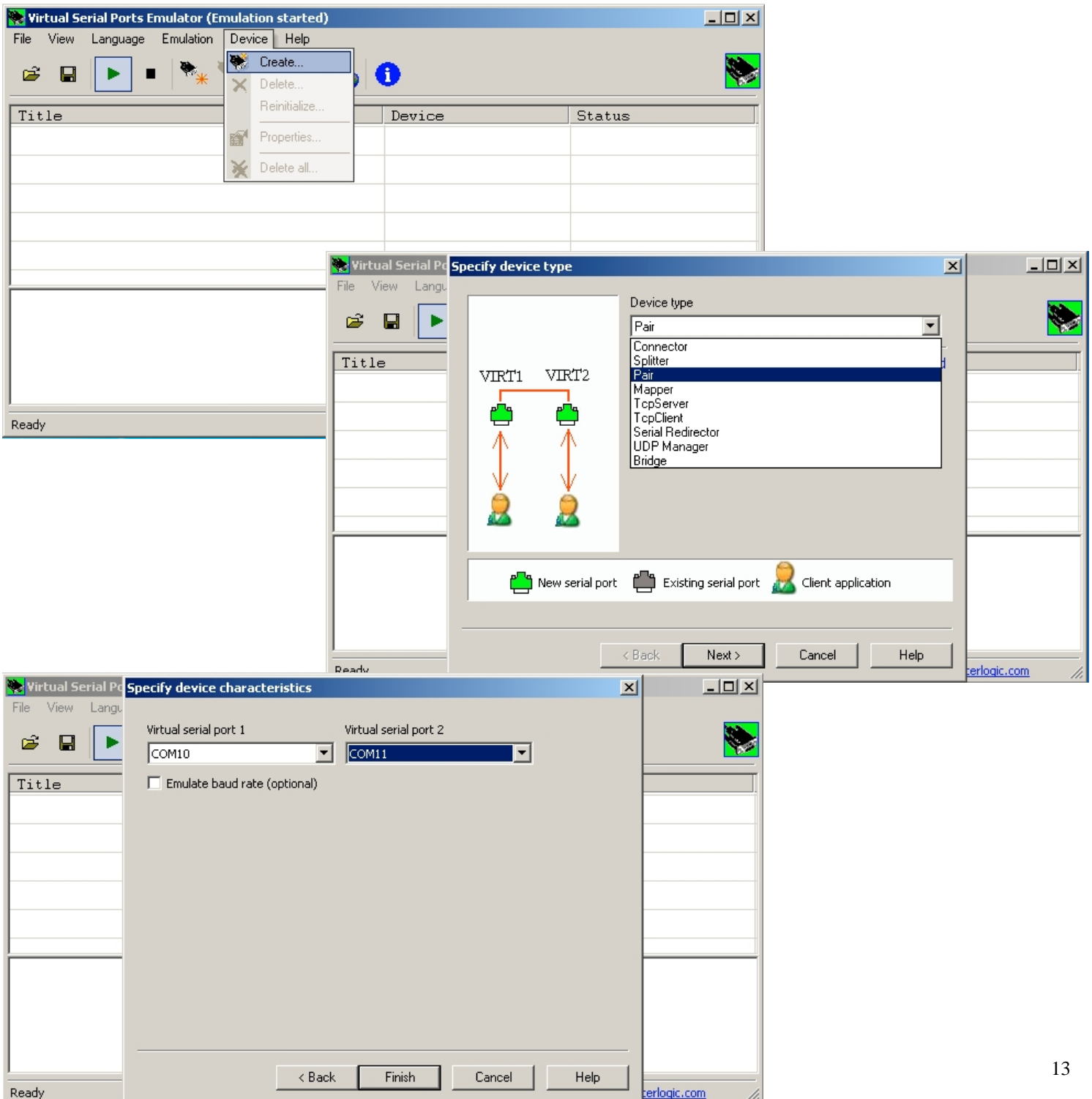


Interfacing PowerSDR/IF to a Logging Program

The first step is to create a virtual serial port pair to connect PowerSDR/IF to your logger. PowerSDR/IF is connected to one side of the pair, and your logger is connected to the other side. There are several free programs available to do this, like vCOM from N8VB, Com-o-Com, VSP from K5FR and VSPE from Eterlogic (**VSPE is not free for 64-bit**). The pictures below are from VSPE. It is simple, reliable and very versatile. It can be downloaded here... <http://www.eterlogic.com/Products.VSPE.html>

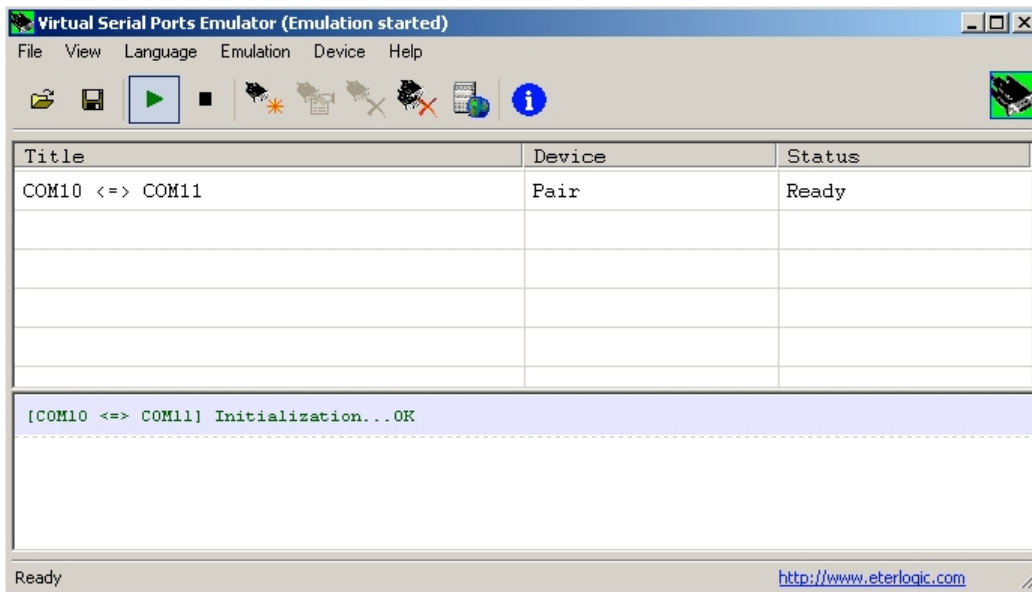
Download the program and install it. This is straightforward, so we won't bother you with the details. After successful installation, launch the program and follow these simple steps while referring to the screen captures below...

- 1). Select Create from the Device menu
- 2). Scroll down to "Pair" in the device type dialog
- 3). Select two port numbers that are not in use anywhere on your system, and that are in the range that your logger can access.
- 4). Click Finish.

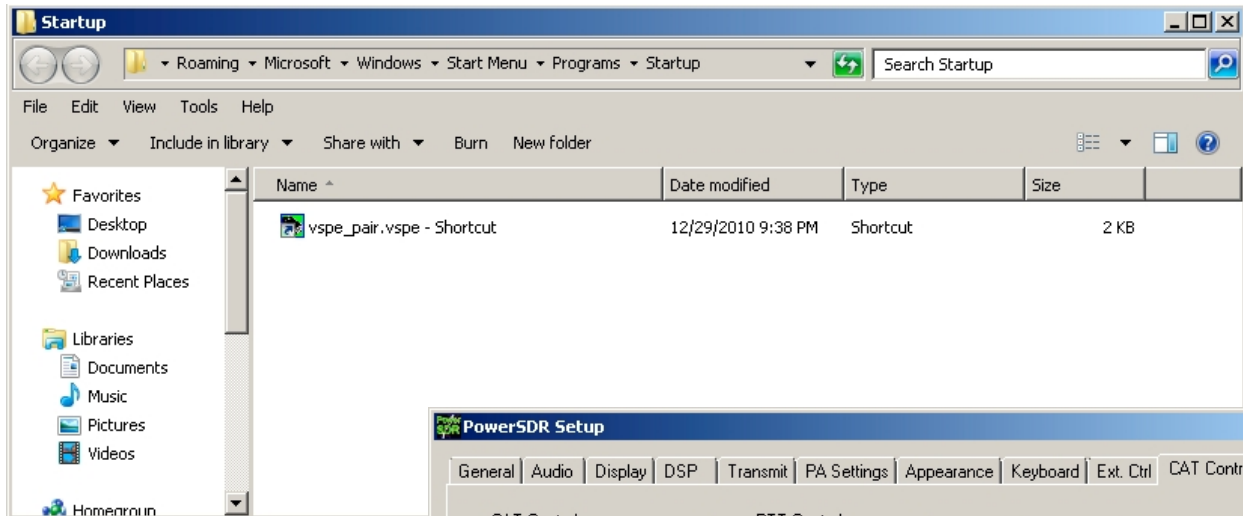


Interfacing PowerSDR/IF to a Logging Program, cont'd

This is what the screen should look like after creating the virtual port pair...

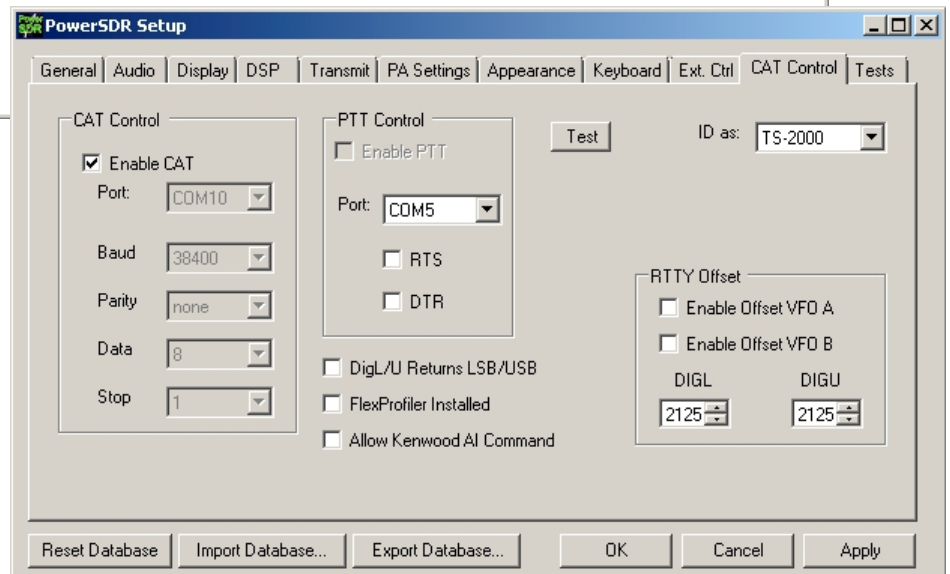


In order to automate the creation of this pair whenever you boot your computer, you will need to save the configuration using the “Save As” selection under the “File” menu. In this example, I created a file named “vspe_pair”. Then you will need to create a shortcut to the file and move or copy it to the Startup folder on your system as shown below so that it launches at startup. **The virtual pair must be started before PowerSDR/IF, and PowerSDR/IF must be started before the logger.**



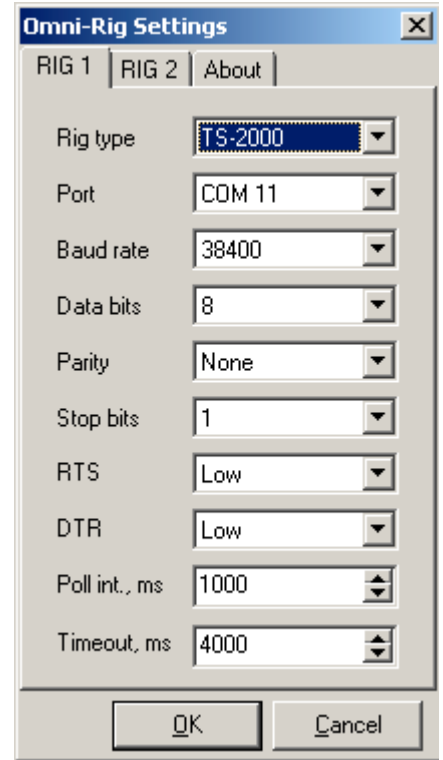
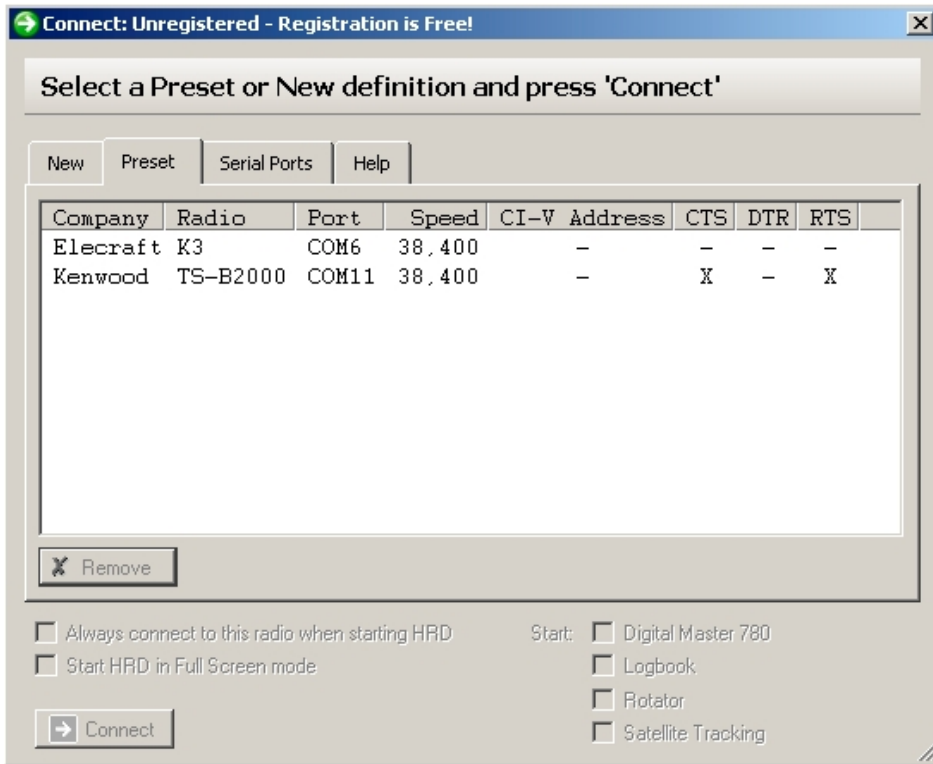
Once the virtual pair is created, you can set up the CAT interface in PowerSDR/IF to connect to one end of the pair. Use the example to the right to set up the CAT interface to connect to one side of your virtual port pair (in this case, COM10). Click the Enable CAT box after selecting your port.

If your logger doesn't poll, check the “Allow Kenwood AI Command” box to broadcast frequency and mode data to your logger.

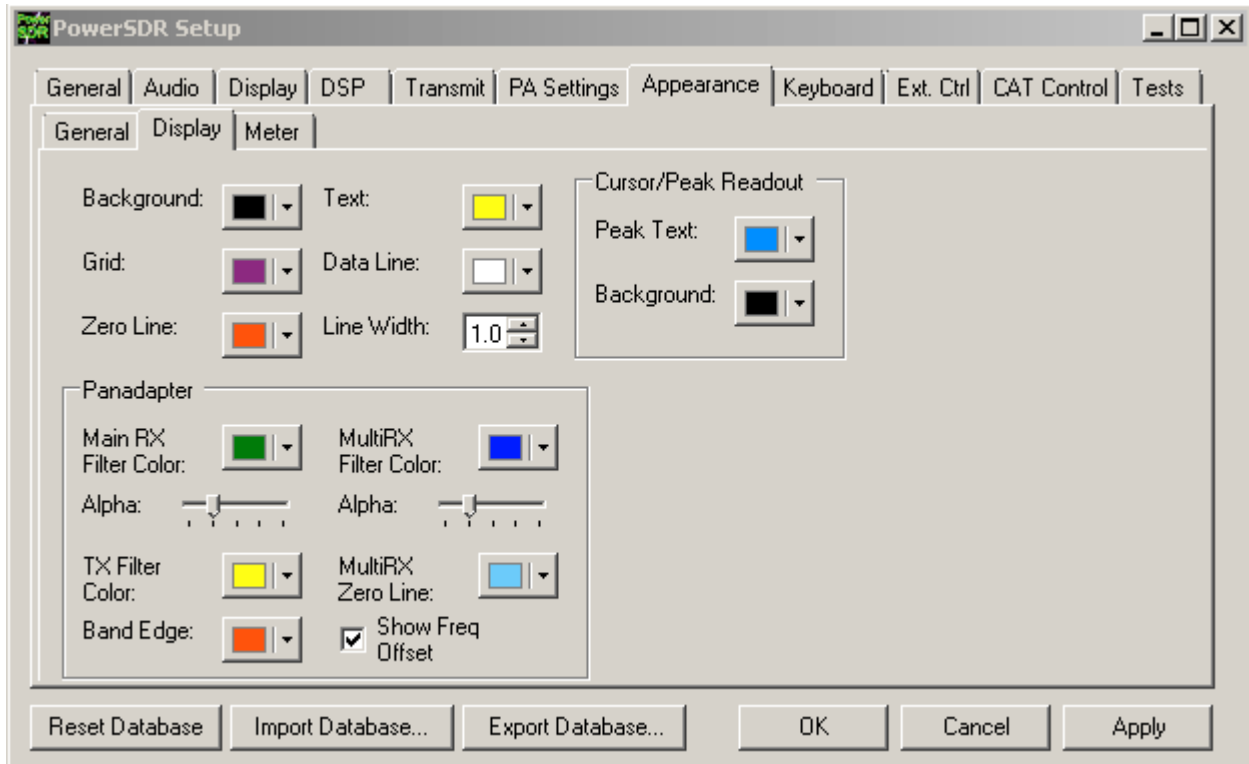


Interfacing PowerSDR/IF to a Logging Program, cont'd

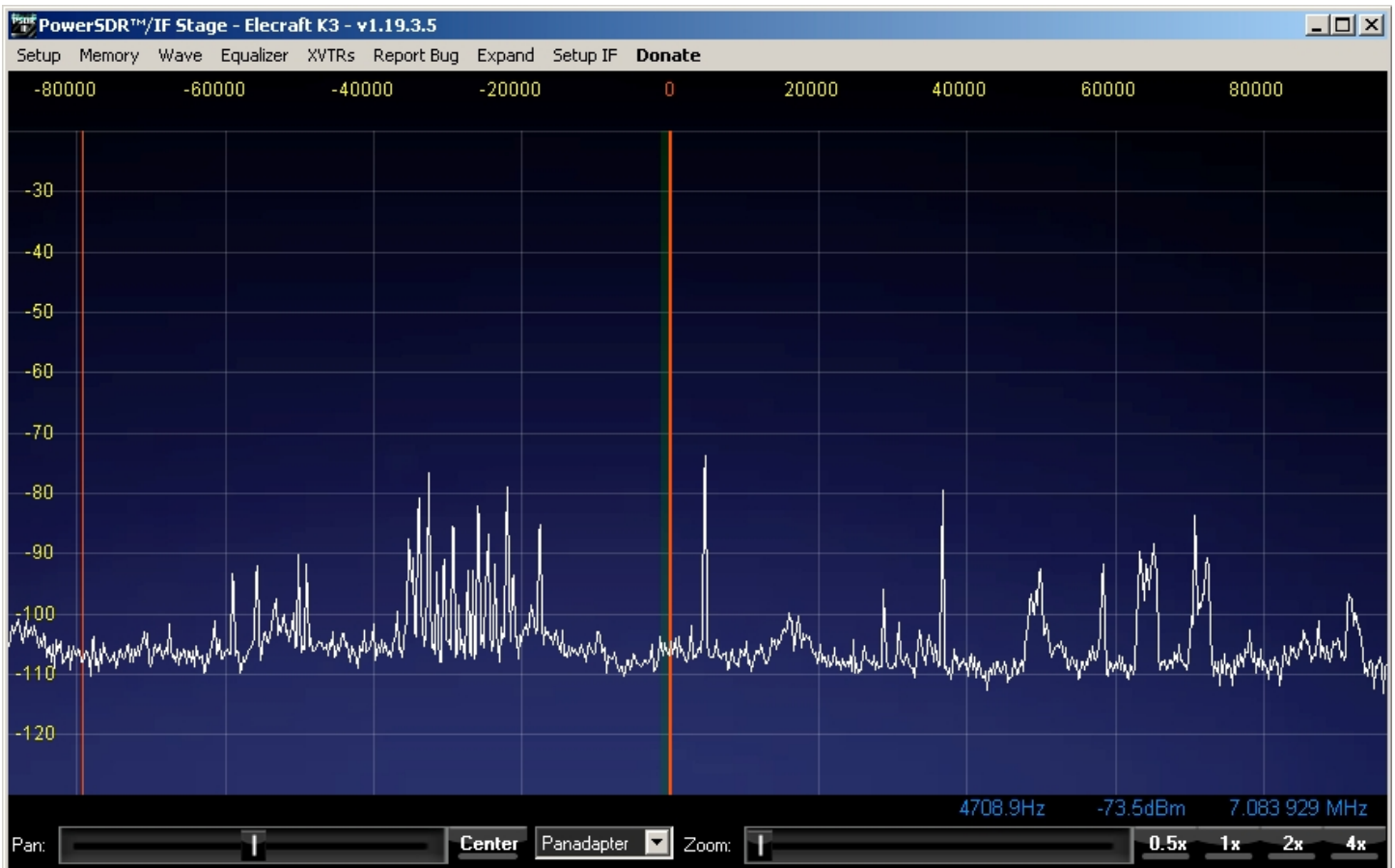
Next, set up your logger or other application to connect to the other side of the virtual port pair. The rig type should be Kenwood or TS-2000, depending on your logger's selection options. Select the com port to point to the other side of the virtual port pair, in this example, COM11. Set the baud rate for the same rate as you set in PowerSDR/IF CAT interface. Choose the fastest rate that both programs support. Below are pictures of the setup for HRD (Ham Radio Deluxe, left) and CW Skimmer (right) as examples...



Setup for Rigs Without CAT Interface



To display a relative frequency scale instead of actual rig frequency, check the "Show Freq Offset" box in the PowerSDR Setup tab depicted above. The resulting display will appear as shown below. Tuning the rig will cause the signals to shift. The red line represents the center of the IF passband, i.e. frequency the rig is tuned to.



Calibration - Optional

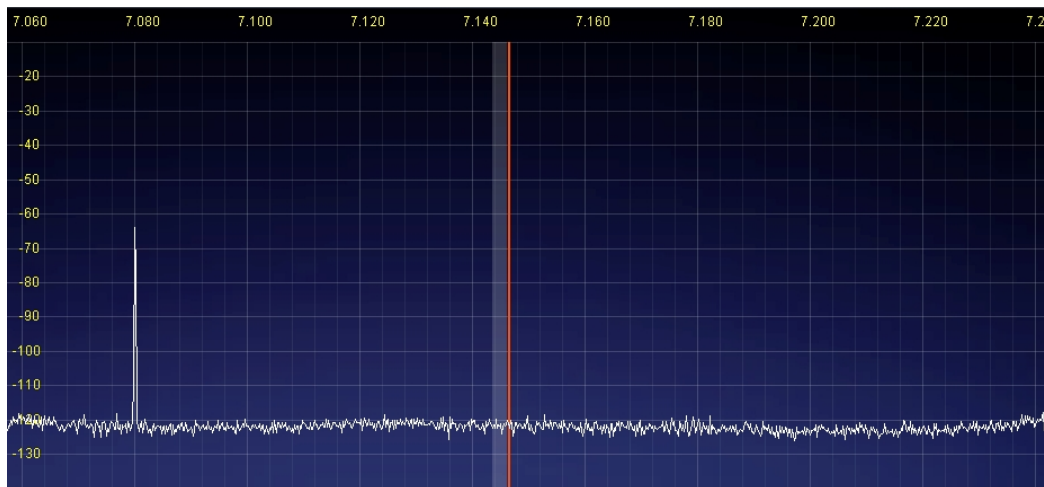
There are only a couple hardware adjustments that need to be made in LP-PAN... filter peaking and overall gain setting. **Note: Filter peaking is only required for kit versions.** Adjustments are made while monitoring the PowerSDR display.

Filter adjustment – Kits only - To adjust the LP-PAN filter, tune to a strong carrier, S9 or better, and peak C35 for maximum strength. If you don't have an insulated tuning tool, a small screwdriver can be used, but you will have to remove the screwdriver between adjustments to see the effect of the adjustment. After C35 is peaked, adjust C34 for maximum signal.

Image Rejection Adjustment - If your sound card has hardware input pots, make sure they are set for the same level. If your sound card has software level controls, set both channels for the same level. Most software mixers have a way of adjusting the levels together. Also, if there is a balance control, make sure it is centered, or if there are pan controls, make sure the left channel is panned all the way left and the right panned all the way right.

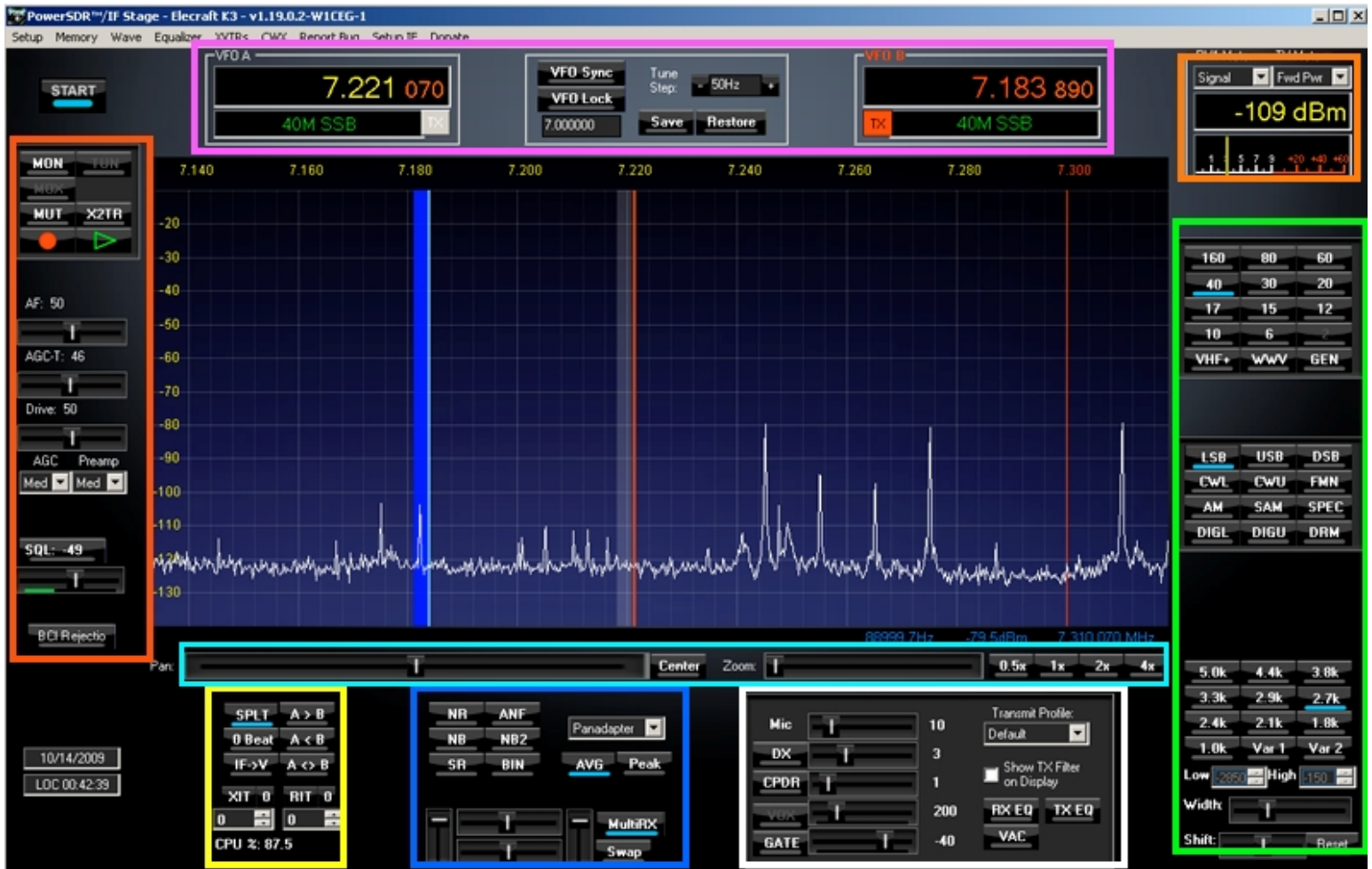
PowerSDR-IF v1.19.35 now includes a feature called Wide Band Image Rejection (WBIR). It provides automatic image rejection without any settings or adjustments. If you previously set the manual controls from an earlier PowerSDR version, these will be ignored as they are not needed. For best results, tune from one end to the other of a crowded band with strong signals. WBIR will automatically optimize image rejection.

You can verify image rejection by placing a signal between the left edge of the display and the center. The image will appear between the center and right edge. The source can be a strong carrier, such as WWV, or better still, a signal generator signal. The Elecraft XG-1 or XG-2 mini modules provide an inexpensive signal. **Connect any generator to the RX Ant connector on your rig to prevent accidental transmission into the generator. Select RX Ant.** A signal from the generator will look like that pictured below. The image would appear at about 7.205 MHz, but as you can see there is no image. WBIR provides 80-90dB image rejection on average. This means that any signal below about -30 to -40dB (S9 + 30dB to S9 + 40dB) in the picture below would show no image. **Note: A single signal as shown will not trigger WBIR unless it is at least -50dBm in strength (XG-2 is not that strong). WBIR learning must be done on a crowded band with strong signals first.**



Gain adjustment – Optional - To set the gain display accuracy requires a signal source with known output level. This can come from a calibrated signal generator, or again, something as simple as the Elecraft XG1 or XG2 test oscillators, which have an output of about -73dBm (50uV / S9). Set the K3 preamp and attenuator OFF, and the Preamp setting in PowerSDR to MED. If you are using the optional CAT port in LP-Bridge to control the PowerSDR preamp setting, this will be automatic. Turn Avg. on in PowerSDR. **Connect your generator to the RX ANT input of your rig, and select RX ANT.** Adjust your sound card inputs to about 40% of full gain. If you are using the E-MU 0202, set the pots to about the 10 o'clock position. In all cases, the left and right level controls should be set exactly the same. Most software based controls are "ganged" so that they can be adjusted together. Adjust R29 on LP-PAN to mid scale. These settings should work well for most users. If you find that you need less gain to avoid overload by strong signals, you can turn down the sound card inputs or the LP-PAN gain. If you need more sensitivity, you can increase the sound card inputs, or better still, install the K3 IF buffer mod (available from Elecraft).

PowerSDR-IF v1.19.35 Operation



Above is the normal PowerSDR-IF Stage display. We have added color box overlays to help identify the various control sections. The sub-receiver is activated in this picture. Your view may be slightly different, depending on how you size the window. PowerSDR-IF can be sized from 1024x768 up to the full screen resolution of your monitor. As you zoom up the window, the pan display becomes a larger percentage of the window. Most of the receive controls are active for LP-PAN use. The transmit controls only work with FlexRadio hardware.

PowerSDR-IF Stage provides several ways of tuning, and supports both VFO A and VFO B of the K3.

Tuning of VFO A can be accomplished in these ways...

- Using the tuning knob on the K3
- Clicking and dragging the pan display for large excursions
- Using the mousewheel for fine tuning. The tuning step size is set in the box between VFO A and VFO at the top of the program.
- Point-and-click is invoked by right-clicking in the pan display to activate a yellow cursor. Position the cursor over a signal and left-click to tune to the signal.
- Enter a frequency directly into the VFO A window

Tuning of VFO B can be accomplished in these ways...

- Using the VFO B tuning knob on the K3
- Clicking and dragging the blue sub-RX passband and dragging it
- Using the mousewheel for fine tuning. The tuning step size is set in the box between VFO A and VFO at the top of the program. Hold Ctrl while using the mousewheel to tune VFO B
- Point-and-click is invoked by right-clicking twice in the pan display to activate a red cursor. Position the cursor over a signal and left-click to tune VFO B to the signal. When the red cursors are on, mousewheel tuning adjusts VFO B.
- Enter a frequency directly into the VFO B window

PowerSDR-IF v1.19.35 Operation Cont'd

From the WU2X website... "As an additional tip here, Logitech has a series of mice that have something called "Hyper Scroll Wheel". These are mice with a weighted mouse wheel. The wheel does not have detents, it freewheels when you spin it - just like a weighted VFO knob! Coding guru Chad has implemented a time based queue so that when you spin the weighted mouse wheel, the tuning of the external radio is perfectly smooth. As it was, the free spinning VFO knob in PowerSDR/IF Stage would overload the external rig with CAT frequency changes. We really dig the hyper scroll Logitech mice and highly recommend them."

Here is a summary of the various controls that are supported in this version of PowerSDR, referenced to their location on the screen.

RED SECTION

MUT, MON... The term mute in context with PowerSDR means the muting of the audio output of PowerSDR when transmitting. If you use LP-PAN only as a display, mute has no real meaning. Normally, mute is a software function handled by LP-Bridge and PowerSDR. It can be disabled by selecting MON in PowerSDR if you want to hear your transmit signal. PowerSDR always displays the spectrum of your low level transmit signal. Hardware mute is also provided by LP-PAN, but will not be needed by most operators. In general, LP-Bridge will provide fast enough muting to handle muting in software for VOX or semi-break-in CW keying. This is not the case with HRD, which has a sizable delay. If you require faster or special muting, contact TelePost support for suggestions on using hardware mute.

X2TR... Not used

Red Dot, Green Arrow... Controls the sound recorder. Clicking on the red dot starts recording of the entire panadapter passband. Clicking on the green arrow allows playback. During playback, you can tune around anywhere in the recorded passband.

AF... Controls overall audio monitor level

AGC-T... Sets the AGC threshold

Drive... Not used

AGC/Preamp... Sets AGC speed and preamp setting, only for PowerSDR. If you set up the Aux CAT interface in LP-Bridge, the preamp setting will follow the K3

Squelch... Adjusts squelch... mainly useful for FM, but active in all modes.

BCI rejection... Not used

YELLOW SECTION

Split / A>B / A<B / A<>B... Self explanatory. Other controls in this group are not implemented.

BLUE SECTION

NR... Digital Noise Reduction (PowerSDR Only)

ANF... Automatic Notch Filter (PowerSDR Only)

NB, NB2... Digital Noise Blankers (PowerSDR Only)

SR, BIN... Not used

Display Selector... Determines what is displayed in the graph window. Choices are Panadapter, Scope, Phase, Spectrum, Waterfall, PanaFall (PowerSDR Only)

AVG / PEAK... Provide averaging or peak hold behavior for the signals in the panadapter. Settings are on the Display tab in Setup. (PowerSDR Only)

MultiRX / Swap... Controls the sub-receiver (PowerSDR Only). Sliders determine the routing and mixing of audio from the main and sub-receiver. When Sub RX is on, there are two passbands displayed... green for main and blue for sub. Green passband is linked to VFOA and blue is linked to VFOB.

PowerSDR-IF v1.19.35 Operation Cont'd

WHITE SECTION

Mode Specific Controls... Panel changes depending on Mode setting.

CW Pitch... The most important control is CW Pitch, which only appears when a CW Mode is selected. Set to match your K3 CW Pitch setting.

Show TXCW Frequency... When CW mode is selected, checking the "Show TXCW Frequency" box places a vertical yellow line on the tuned frequency. This is particularly helpful when working split and looking for an open frequency in a CW pileup.

GREEN SECTION

Band... Selects band for both PowerSDR and K3. This can be used as a quick way to change bands.

Mode... Selects mode for both PowerSDR and K3. Modes not supported in K3 are ignored by K3. Modes such as DRM require additional software to decode. SAM is Synchronous AM mode.

Filter... Selects PowerSDR DSP filters in both PowerSDR and K3, unless filter syncing is disabled in SetupIF>IF Frequencies.

Width and Shift... Follow passband indicator on the pan display. If you checked the "RX Filter Width" box in SetupIF, the Width will synchronize with the DSP settings on the K3, regardless of whether changes are made in PowerSDR or the K3. But there are limitations to the use of this, since Shift cannot be linked. This can cause erratic behavior, especially if you try to adjust the lower side of the passband. You can temporarily disable the link by clicking on "Var2", or permanently disable it in SetupIF.

ORANGE SECTION

RX Meter... allows several different modes for the S-Meter to be selected

TURQUOISE SECTION

Pan & Zoom... adjusts the portion of the passband that is displayed in the panadapter. Wide display is far left in zoom bar, PAN should be centered.

TOOLBAR

In addition to the highlighted areas, there are several other controls which are useful. They are accessed in the toolbar at the top of the program.

RX EQ... enables graphic equalizer for PowerSDR receiver. The equalizer can be set in the Equalizer pull down menu at the top of the program.

Memory... save popular frequencies for recall.

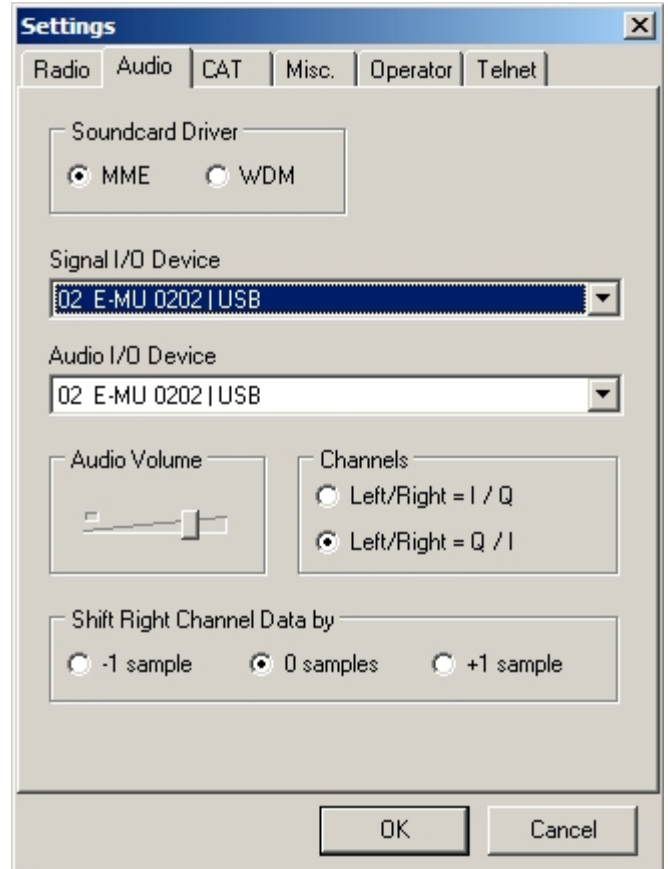
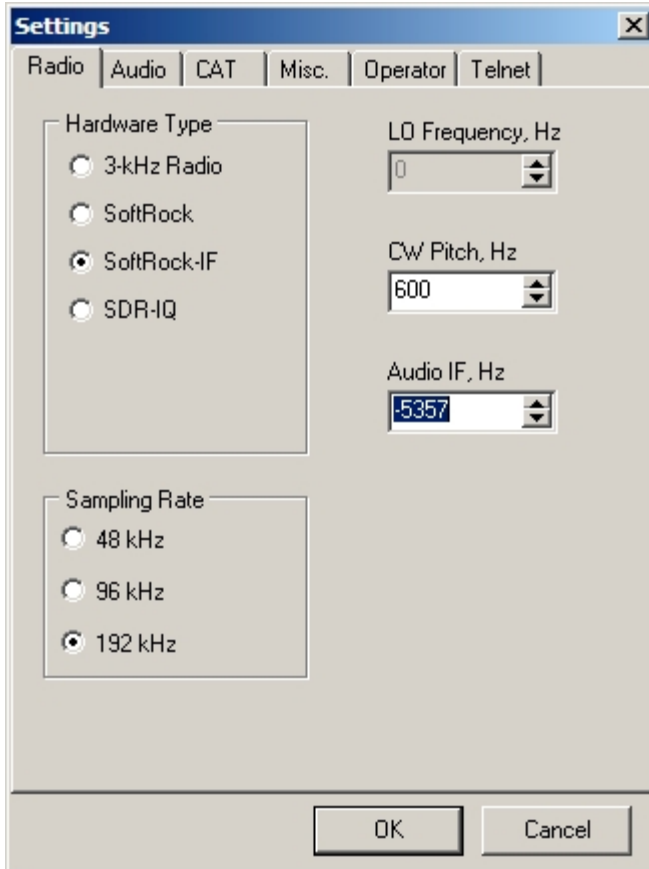
DONATE... Please consider a donation to Scott and Chad for their hard work in customizing PowerSDR-IF for use with LP-PAN!

Expand/Collapse... Toggle between the Expanded (original) view and the Collapsed (uncluttered) view.

Using LP-PAN with CW Skimmer

First, make sure that LP-Bridge/PowerSDR are set up correctly, and that the offset tracks between the K3 and PowerSDR (signals tuned in on the K3 match the pitch of signals tuned in on PowerSDR). This is covered in the manual under the Global Offset calibration.

Open CW Skimmer > Settings. On the Radio tab, Set the Skimmer Hardware Type to SoftRock-IF. Set the Skimmer Sample rate to match the rate used in PowerSDR. Ignore the other settings on this tab for the moment.



Click on Audio tab, and select driver. This depends on the sound card used. For the E-MU 0202, you must use MME in both Skimmer and PowerSDR. For the E-MU 1212m, use ASIO in PowerSDR and WDM in Skimmer. For Quartet, use ASIO in PowerSDR, and whichever driver works best in Skimmer.

Select the proper input and output sound card. If you haven't already, set Left/Right = Q/I in the Channels section. Check that "Set Shift Right Data Channel" is set to 0.

Click on Radio tab again. Unless you plan to actually listen to the output of Skimmer (not usually the case), the "CW Pitch, Hz" setting can be left at the default of 600Hz (or any other value).

Set "Audio IF, Hz" using the following formula...

$$\text{CW Pitch} + \text{Global Offset} = \text{Audio IF, Hz} \quad \text{For example... } 600 + (-6000) = -5400$$

CW Pitch is the setting used on the K3, LP-Bridge and PowerSDR (they should all be the same). Global Offset is the setting in PowerSDR-IF. This will get you very close. You can fine tune it by clicking on a signal, and comparing the resultant pitch on the K3 to the sidetone using the Spot button. Make sure the DSP controls on the K3 are set to NOR when you do this. There are a number of possible sources for the residual error, but you should be able to walk it in for the one roofing filter selection.

Note: The setting will only be dead accurate for one filter, especially if the filter is a 5-pole. The difference between multiple 8-pole filters will be much less, although the 8-pole filters have a slight offset as well. Also, adjusting the K3 DSP controls off of NOR will shift the Skimmer display. Unless the author of CW Skimmer is willing to support the K3's "FI" IF Offset command as the authors of PowerSDR-IF have done, the DSP shift problem has to be lived with. We may add a workaround to LP-Bridge in the future.

Troubleshooting

Most of the problems encountered are with the interaction of the PowerSDR-IF software and the sound card. To understand how to address problems and correct them, it helps to know what files are created when the program is installed, and where they are stored.

The main installation folder can be found in this folder...

C:\Program Files\PowerSDR-IF Stage v1.19.3.5

The files in the folder include the program (PowerSDR.exe) and supporting files. Because of the UAC user account rules in Vista / Windows 7, PowerSDR-IF does not save the database files for preferences and settings in this folder, but rather in one of the following AppData (or Application Data) folders...

XP

C:\Documents and Settings\Larry\Application Data\PowerSDR IF-Stage v1.19.3

Vista & Win7

C:\Users\Larry\AppData\Roaming\PowerSDR IF-Stage v1.19.3

(substitute your username for "Larry")

The main files are called database.xml and databaseIF.xml.

It is probably smart to create a shortcut to the appropriate folder for your OS, so that you can easily navigate to these folders in the event that your settings become damaged. It also makes sense to save a backup of the two database files to another folder somewhere.

If it becomes necessary to start over, here is the procedure I would use to uninstall / reinstall PowerSDR-IF...

Uninstall all version sof PowerSDR-IF on your computer using "Add / Remove Programs" or "Programs and Features" in the Control Panels folder. The one to use depends on your OS. I would also delete the PowerSDR-IF installation folders in Program Files after uninstalling, and remove the PowerSDR-IF folder in the AppData folder. This removes the database files where PowerSDR-IF stores your user preferences and settings. The exact path will depend on your OS and whether you chose "Just Me" or "Everyone" when installing PowerSDR-IF. If you chose "Everyone", and log in with more than one username, you will have to delete the AppData database files for each user.

You will need to substitute your username for "Larry" in the examples. Once you have removed all the PowerSDR-IF remnants, PowerSDR-IF should install as though it was on a virgin computer. You will need to re-enter all your settings unless you have previously saved backups of the database.xml and databaseIF.xml files.

On the next page are some additional problems that have been reported, and some suggested solutions. If you still have a problem, I am always available by email at n8lp@telepostinc.com and the LP-PAN Yahoo Group is available at <http://groups.yahoo.com/group/LP-PAN/>

Support is also available directly from TelePost through at n8lp@telepostinc.com anytime or telephone at 734-455-3716 during normal business hours. There is also a Yahoo User Group at <http://groups.yahoo.com/group/LP-PAN/> with a large number of helpful users.

Troubleshooting

Problem	Suggested solution
Display shows noise but no signals	<ol style="list-style-type: none"> 1) Check audio and RF cabling. 2) Make sure the correct sound card is selected in PowerSDR
There are two sets of signals that move in opposite directions as I tune, ie. there is no image rejection.	<ol style="list-style-type: none"> 1) Check that you are getting equal audio from both I and Q channels. 2) Check sound card settings 3) Check cabling.
The audio in PowerSDR drops out frequently	<ol style="list-style-type: none"> 1) Increase audio buffer size to the maximum value in Setup>Audio tab. 2) Read the excellent paper "Vista Tuneups for LP-PAN", written by Dave, W8FGU, and available on the LP-PAN User Group Files section at http://groups.yahoo.com/group/LP-PAN/files/. It is useful for XP as well. 3) Add latency by checking the "Expert" box in Setup>Audio and select manual, and enter a value between 1 and 25. Use the lowest number that provides table results.
When I start PowerSDR, the audio "motorboats".	Go to Setup>Audio tab, and check the "Expert" box. Click OK to the warning, then check the "Manual" box and set latency of 2 ms or more as needed to stop motorboating.
There is a "hump" or "hole" in the noise floor near the center of the display.	<ol style="list-style-type: none"> 1) Check your cabling for loose connection which could cause hum. 2) Play with the settings of the Bal/Unbal switch and "ground lift" jumpers on LP-PAN. 3) Make sure you are using a recommended sound card.
The center frequency in the display does not match the rig frequency.	Perform the IF Frequency offset adjustments in PowerSDR per the procedure in the Setup/Calibration section. Make sure your settings match the picture exactly, except for the Global Offset which will vary from rig to rig. Adjust Global Offset to sync the display with your rig.
I don't see my sound card listed under the available sound cards in the Audio setup tab.	<ol style="list-style-type: none"> 1) Check that your sound card is properly installed. You can do this in Device Manager. 2) It is wise not to make your LP-PAN sound card the Windows default. This can be checked under "Sounds and Audio Devices" in the Windows Control Panel. 3) Update your sound card's driver to the latest available from the manufacturer's website. 4) If your sound card is USB, it is usually recommended to have a USB 2.0 port. Use of a USB router for a sound card is not recommended. 5) Try all available drivers in the Drivers selection in PowerSDR>Setup>Audio. ASIO is the preferred driver if available, followed by WDM and then MME or other. ASIO is generally required for 192 kHz sampling.
E-MU Sound card will only work at 48 kHz	Make sure your USB ports are 2.0. The E-MU defaults to 48 kHz with USB 1.1 ports. Turn off E-MU and turn it back on. Use E-Mu control panel to
E-MU was working at 192 kHz, but after upgrading XP to SP3, it only works at 48 kHz now.	This appears to be a MS bug with SP3. Uninstall both E-MU driver and PowerSDR, reboot, reinstall driver and PowerSDR.
I can't get the rig to go to 6m when connected to PowerSDR.	Go to Setup>General>Softrock IF Stage and set Frequency Limits Max to 54.0000000
Frequency doesn't display properly in PowerSDR when using non-English Windows settings.	Use Regional settings to choose U.S. English settings, or to set number format so that comma is decimal point and period is thousands divider.
I can't connect to my rig.	<p>Make sure that "SDR-1000" is selected as the radio model in the Setup>General>Hardware Config tab.</p> <p>Make sur you have the correct rig type, com port and baud rate set in the Setup IF>Rig Connection tab.</p> <p>Make sure that no other program is connected to your rig.</p> <p>Make sure that you didn't accidentally set up the PowerSDR/IF CAT interface for the same com port as your rig.</p>

Your are getting erratic frequency and mode jumps

Try s slower polling rate.

If you are using a USB to serial adapter, it is recommended that it use an FTDI chipset. The KUSB adapter sold by Elecraft does not, and will likely cause problems.