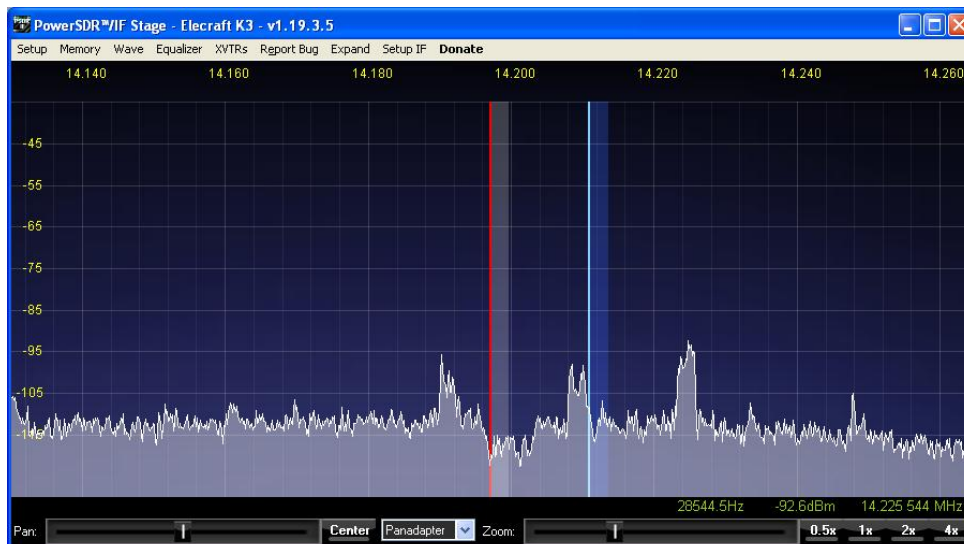
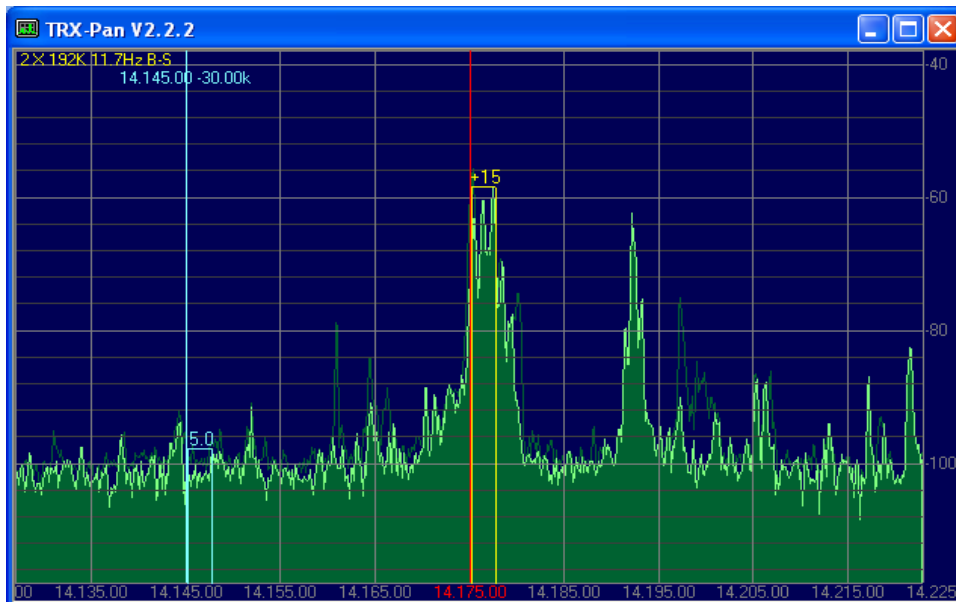
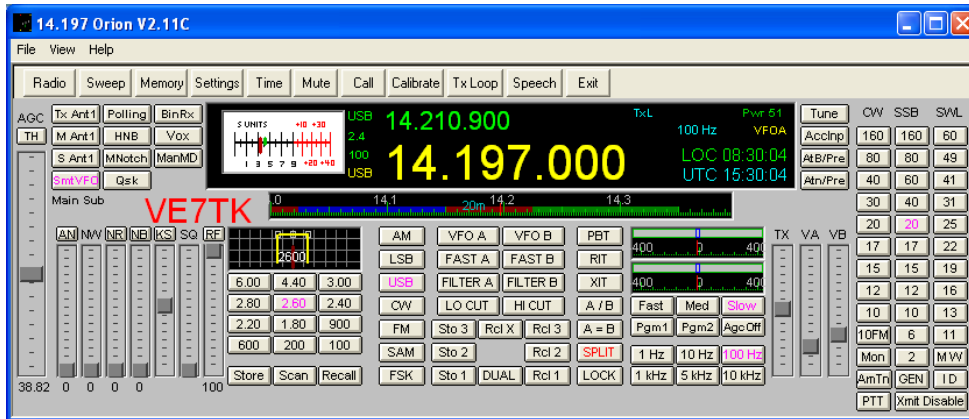


# Linking LP-PAN Hardware, PowerSDR-IF / TRX-Pan and N4PY Software to the Ten-Tec Orion



# Linking LP-PAN Hardware, PowerSDR-IF / TRX-Pan and N4PY Software to the Ten-Tec Orion

Prepared by Rick Williams – VE7TK

In early 2008 I began discussions with Larry, N8LP, exploring the possibility of using the LP-PAN, which is optimized for the Elecraft K-3, with my Ten-Tec Orion (Model 565). After significant arm twisting Larry ran a simulation and announced an Orion version should not be too difficult.

I immediately began work on gathering all the necessary hardware and software. This included modifying the Orion to get a 9 MHz I.F. signal out for use with the LP-PAN. This modification is described elsewhere on my website at:

[http://www.ve7tk.com/9MHz\\_IF.pdf](http://www.ve7tk.com/9MHz_IF.pdf)

The LP-PAN is described on Larry's website as "a software defined IQ direct conversion panadapter. .... LP-PAN consists of a multipole bandpass filter, followed by a strong buffer amplifier with high isolation, followed by a balanced switching mixer. The output of the mixer is fed to two pairs of balanced low noise op-amps with ultra wideband 600 ohm output transformers for flexibility in sound card interfacing."

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

For those interested in the theory behind the unique mixer design used in the LP-PAN, details of the switching mixer can be found at:

[http://www.norcalqrp.org/files/Tayloe\\_mixer\\_x3a.pdf](http://www.norcalqrp.org/files/Tayloe_mixer_x3a.pdf)

## **Purpose:**

My purpose in preparing this document is to assist Ten-Tec Orion owners in setting up the Orion with the LP-PAN and other external software. Complete instructions on setting up the LP-PAN and calibrating the output are available in the LP-PAN manual.

<http://www.telepostinc.com/LP-PAN-Manual.pdf>

The LP-PAN integrates with PowerSDR/IF or TRX-Pan software to give a panadapter display. Originally the LP-PAN was optimized for the Elecraft K3. Control of the K3 was done through Ham Radio Deluxe (HRD) software developed by HB9DRV.

I use N4PY software to control my Orion and Carl, N4PY, has developed a method of emulating the necessary commands for a K3 from the Orion's command set.

This document will concentrate on linking together the software for a Ten-Tec Orion and LP-PAN that will allow full rig control, point and shoot mouse click QSY - all using N4PY software.

## **Hardware needed:**

- LP-PAN suitable for 9 MHz I.F.
- High quality sound card (I chose the E-Mu 0202 and found a used unit through an on-line auction for \$80 plus shipping. A summary of suitable cards can be found at <http://www.telepostinc.com/soundcards.html> )
- Clifton Laboratories buffer amp for Orion 9 MHz I.F. modification  
[http://www.cliftonlaboratories.com/z10000\\_buffer\\_amp.htm](http://www.cliftonlaboratories.com/z10000_buffer_amp.htm)

## **Computer Requirements:**

- PowerSDR/IF or TRX-Pan and a good quality sound card require significant computer power.
- The card I have chosen requires USB 2.0 for optimum bandwidth.
- PCI cards are available that meet the necessary requirement BUT they MAY require a pair of PCI slots
- Adequate memory (I have 2 MB of RAM) and a fast processor (I have a 1.8 GHz Core2 Duo processor) are needed to handle the processing requirements of the software.

## **Software Needed:**

- PowerSDR/IF available from <http://www.wu2x.com/sdr.html#powersdr> or TRX-Pan software available from <http://www.telepostinc.com/TRXP.html>
- N4PY Orion control software (<http://www.n4py.com> ). This software already provides my Orion with rig control from the keyboard, and links to my logging program (Logger32) and SteppIR antenna. In addition, Version 2.16 and later allow concurrent use of PowerSDR-IF or TRX-Pan, and 2 additional programs such as N1MM and CWSkimmer.
- VSP Manager virtual serial port driver helps link all the software above together. ([http://k5fr.com/ddutilwiki/index.php?title=VSP\\_Manager](http://k5fr.com/ddutilwiki/index.php?title=VSP_Manager))  
Note: Other virtual serial port drivers can be used – this one is my personal favourite and will be included in the examples that follow!

## **Putting it all Together**

**Note:** The set-up for TRX-Pan is done through the computer registry when it is installed. As a result the installation is much simpler.  
To install TRX-Pan go to **Section b) page 7.**

### **Section a) PowerSDR-IF Initial Set-up**

With N4PY operating in a normal manner you will need to set up several pairs of virtual serial ports using VSP Manager. However, first I would suggest that you look in the Windows Device Manager to determine which serial ports are currently in use. In Windows XP do the following:

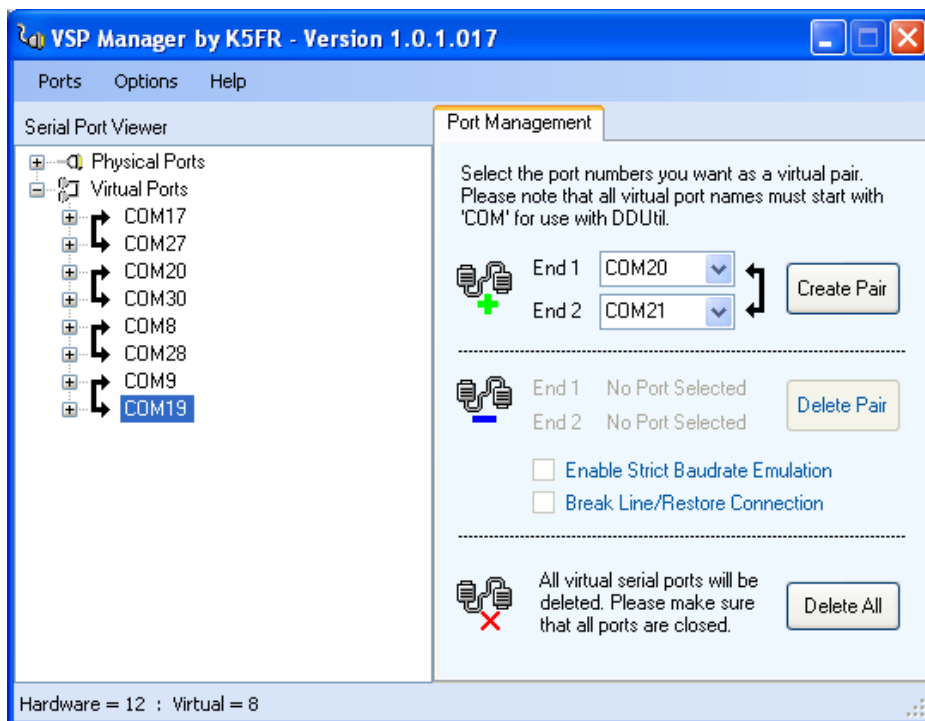
Right click on My Computer >> Properties >> Hardware >> Device Manager  
Then click on Ports (COM & LPT)

I would recommend you make a list of the ports in use and label them accordingly.

On my computer **COM3** is my normal Orion port set on the **Interface** menu in N4PY.

### Install VSP Manager virtual com port software

- Add 4 pairs of ports in VSP Manager
- In my situation I have set-up
  - COM 17 paired with COM27
  - COM 20 paired with COM30
  - COM8 paired with COM28
  - COM9 paired with COM19
- Save and close VSP Manager



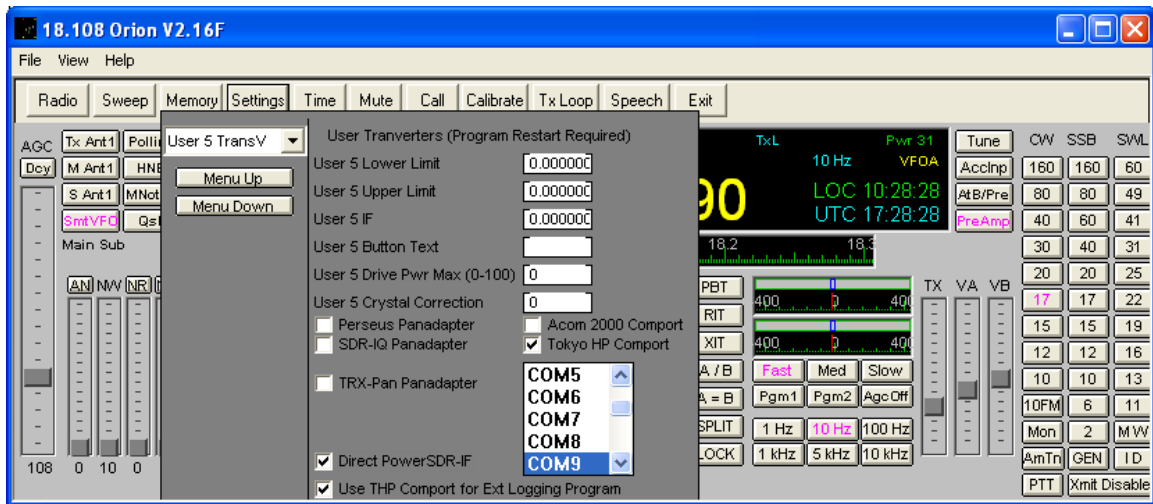
At this point it is suggested that you reboot the computer and revisit Device Manager and look at the list of Ports (COM & LPT). The list should now include 8 new **ELTIMA Virtual Serial Ports**.

**Note:** *What follows is based on the COM port numbers used in my installation. Your installation may differ.*

## Open N4PY software

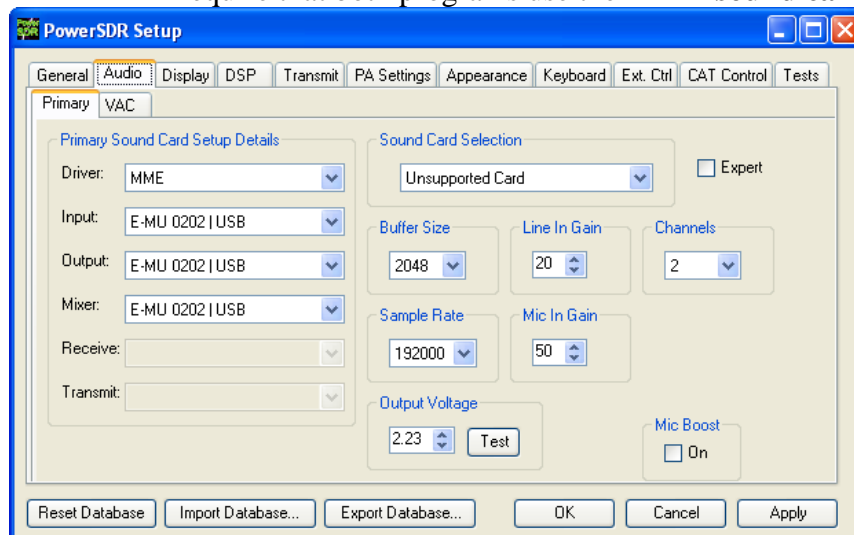
Set the port to be used with PowerSDR-IF

- Go to **SETTINGS** and select **User 5 TransV**
- Check **Tokyo HP Comport** and set the port to **COM9** (as per the example selected above).
- Check **Use THP Comport for Ext Logging Program**
- Make a note that the pair used with COM9 is COM19 and COM19 will be the port used when setting up PowerSDR-IF.
- Check **Direct PowerSDR-IF**
- Make sure **TRX-Pan Panadapter** is NOT checked
- Close **SETTINGS**

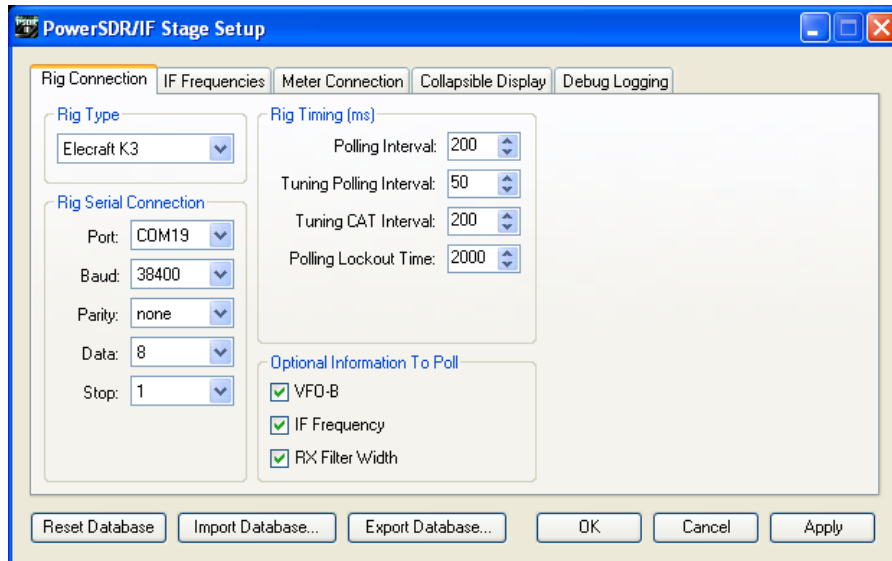


Open PowerSDR-IF (Described below is the set-up using PowerSDR-IF Version 1.19.3.5)

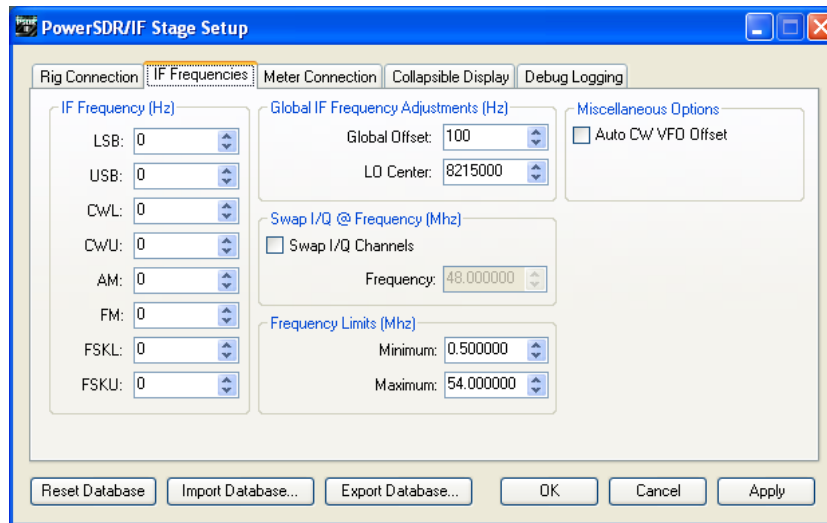
- Go to the **SETUP** tab and set the **General > Hardware Configuration > Radio Model** to **SDR-1000**
- In the **Audio** tab set the sound card to *your configuration*.
- When using PowerSDR and CW Skinner concurrently some soundcards **MAY** require that both programs use the **MME sound card driver**.



- Close the PowerSDR Setup menu and open the **SetupIF** menu. In the *Rig Type* select **Elecraft K3**.
- In the *Rig Serial Connection* select the port that is paired with the comport chosen in **N4PY User 5 TransV**. In my case that is **COM19**.



- Continue with the IF Setup by selecting the *IF Frequencies* tab. The menu selects the IF frequency of the K3 (*LO Center 8215000*). You may need to adjust the *Global Offset* to fine tune your display.
- Make sure **Auto CW/VFO Offset** is not checked.



### Preliminary Test

At this point in the installation the LP-PAN panadapter should function with N4PY and PowerSDR-IF software.

- Close PowerSDR-IF and N4PY if they are open.

- Ensure the sound card is turned on (if an external sound card is used) and the LP-PAN is connected to the sound card and Orion.
- Turn on the Orion.
- Start the N4PY program (this must be started first)
- Start PowerSDR-IF
- Click on the **START** button on the PowerSDR-IF screen
- The panadapter display should start to display signals.

### Activating **SPLIT & DUAL** Display from N4PY

Most of the buttons on the PowerSDR-IF screen can be activated from the N4PY software. As a result when PowerSDR-IF is in *Collapse* mode most functions can be controlled from N4PY.

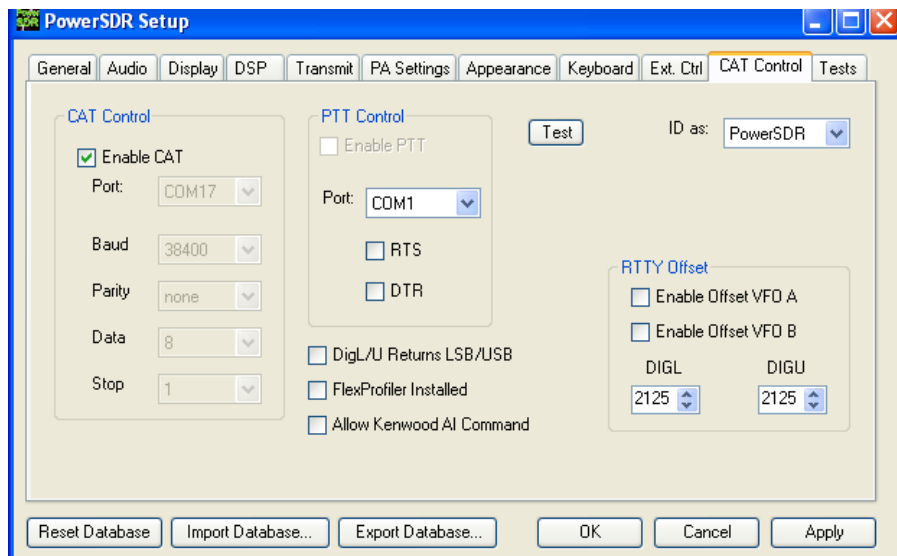
Unfortunately, **SPLIT** and **DUAL** cannot be controlled from N4PY without the addition of another set of comports. This requires additional set-up in the **Orion.ini** file of N4PY and the **CAT Control** tab of PowerSDR-IF.

### Orion.ini Changes

- Change PSDR CAT COMPORT=NONE to the appropriate port pair. In my case the pair is COM27 and COM17. My set-up is therefore:  
**PSDR CAT COMPORT=COM27**
- Save Orion.ini and close

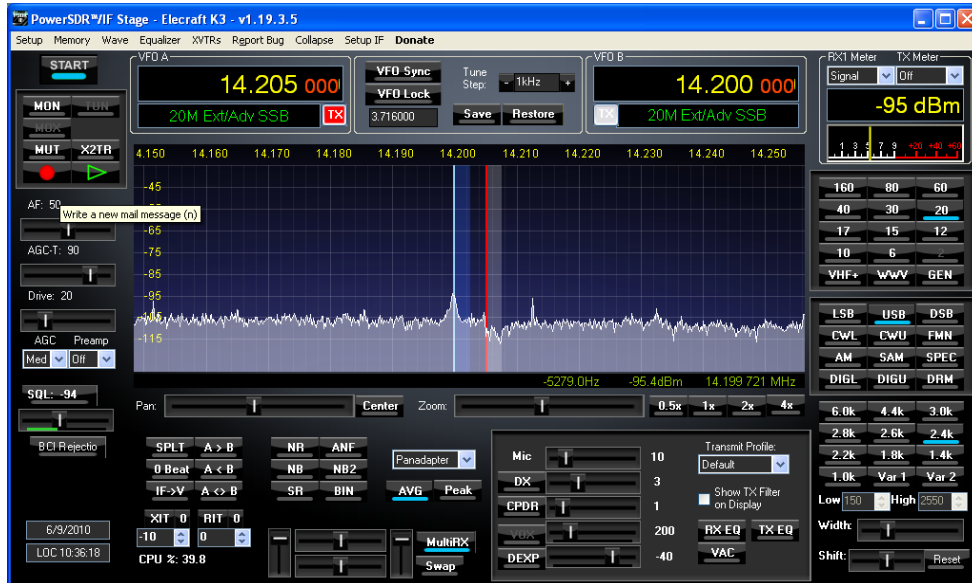
### PowerSDR-IF Set-up

- Open PowerSDR-IF Setup
- Open the *CAT Control* tab
- In the **CAT Control** section enter the other end of the COM port pair above. In my case that is **COM17**.
- Enter the baud rate for the K3
- Click **Enable CAT** (this will gray out the port settings)
- Click OK and close the Setup menu.



## Testing Dual & Split Function

- Close N4PY and PowerSDR-IF, if they are open.
- Open N4PY
- Open PowerSDR-IF
- In N4PY click on **A=B**
- Tune main VFO up or down about 5kHz
- Click on **Dual** or **SPLIT** in N4PY



- The BLUE line and shadow area will appear indicating the location of the Orion's 2<sup>nd</sup> receiver in SSB.

This completes the basic set-up for the Ten-Tec Orion using N4PY and PowerSDR-IF software. To use it concurrently with N1MM or CWSkimmer got to **page 11**.

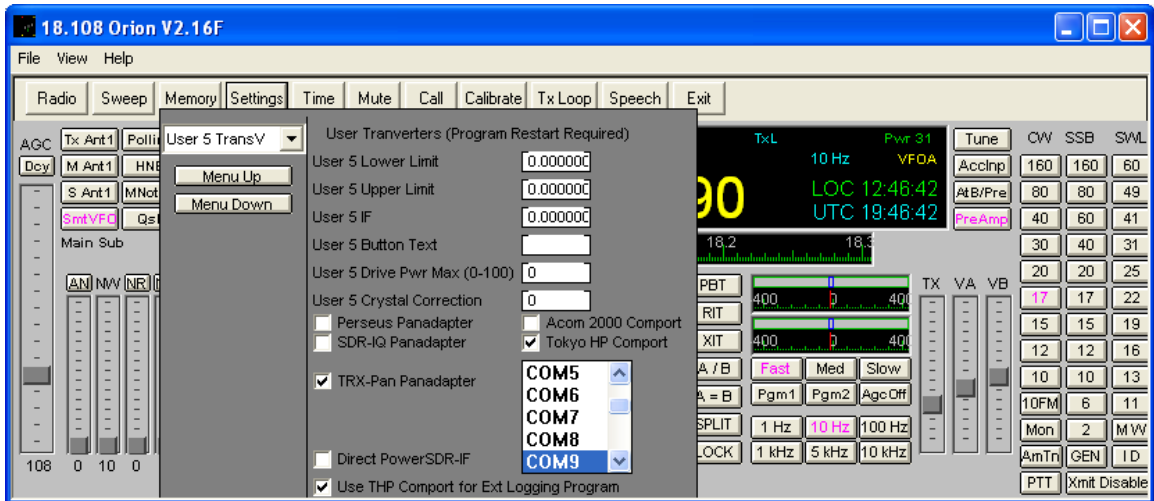
## Section b) TRX-Pan Initial Set-up

As previously mentioned, the installation of TRX-Pan is more straight forward than PowerSDR-IF. The basic installation will include a panadapter complete with an indication of the sub-receiver (assuming it is in the same passband as the main receiver) and a representation of filter bandwidth.

### Open N4PY software

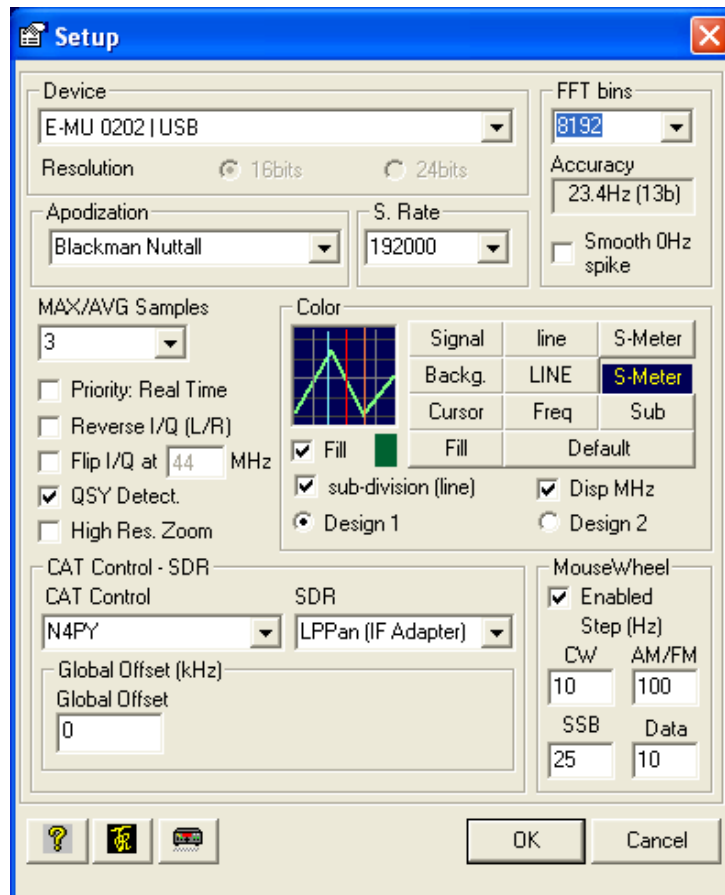
Set the port to be used with TRX-Pan

- Go to **SETTINGS** and select **User 5 TransV**
- Check **Tokyo HP Comport** and set the port to **COM9** (as per the example selected above).
- Check **Use THP Comport for Ext Logging Program**
- Check **TRX-Pan Panadapter**
- Make sure **Direct PowerSDR-IF** is NOT checked
- Close **SETTINGS** and close N4PY

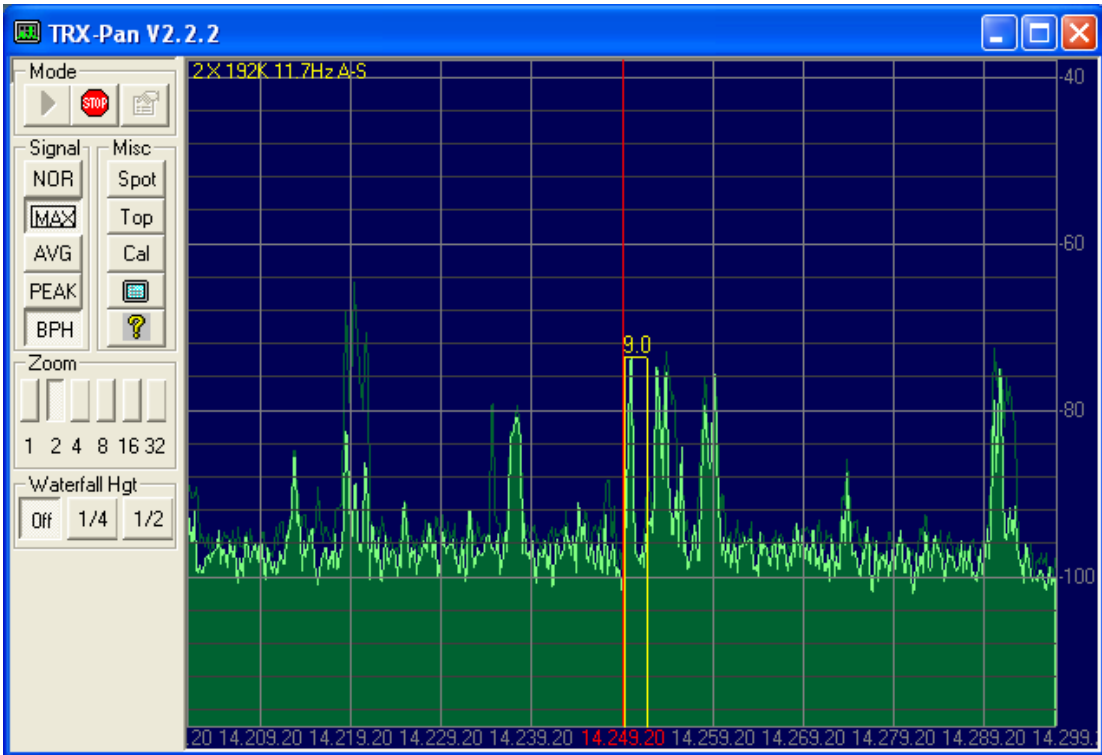


TRX-Pan (Described below is the set-up using TRX-Pan Version 2.2.2)

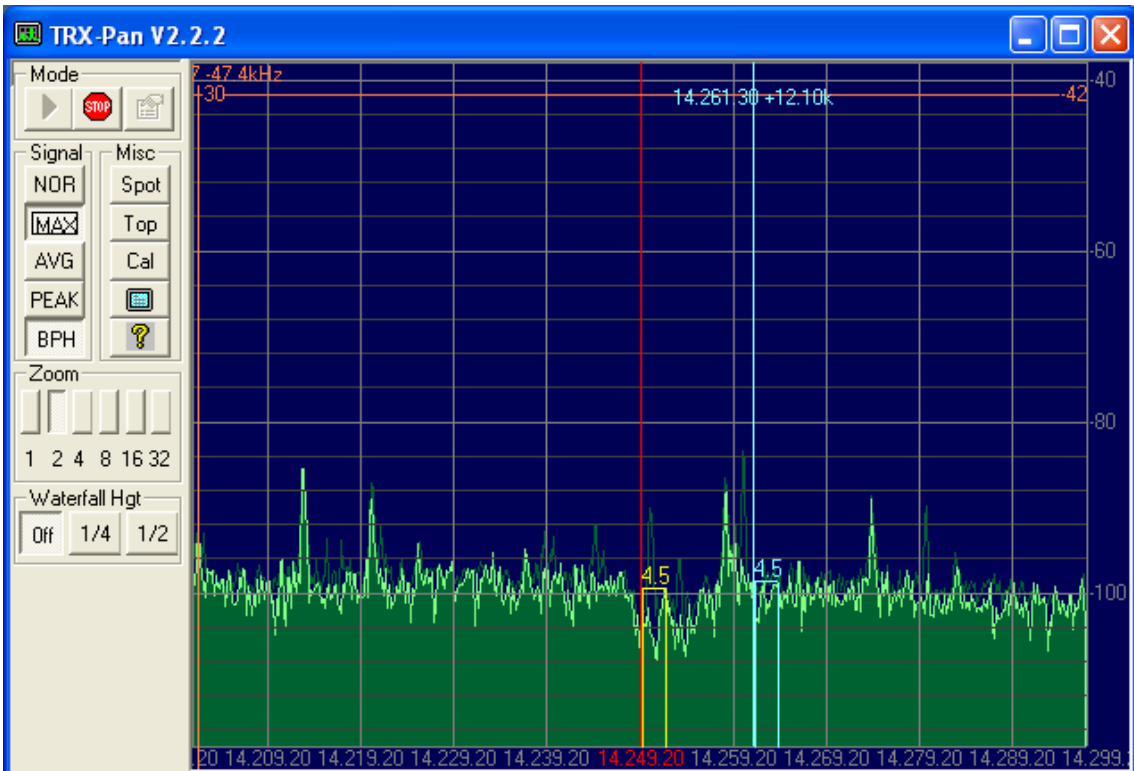
- Go to the **SETUP** button to the right of the **STOP** button
- In the Device box select the sound card for *your configuration*.
- In CAT Control select **N4PY** and SDR select **LP-Pan**.
- Close TRX-Pan



Restart N4PY, ensure that the Panadapter sound card is turned on and turn on TRX-Pan. The panadapter should look something like this on an active band.



Placing the Orion in **Dual** or **Split** will show the 2<sup>nd</sup> receiver in blue (if it is in the passband of the panadapter.)



Calibration of TRX-Pan is described at:

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

At this point the panadapter should be completely functional, however, if you wish to use additional software such as N1MM or CWSkimmer you will need to do some more work. This includes, creating some virtual comports and modifying the N4PY **Orion.ini** file.

Right click on My Computer >> Properties >> Hardware >> Device Manager  
Then click on Ports (COM & LPT)

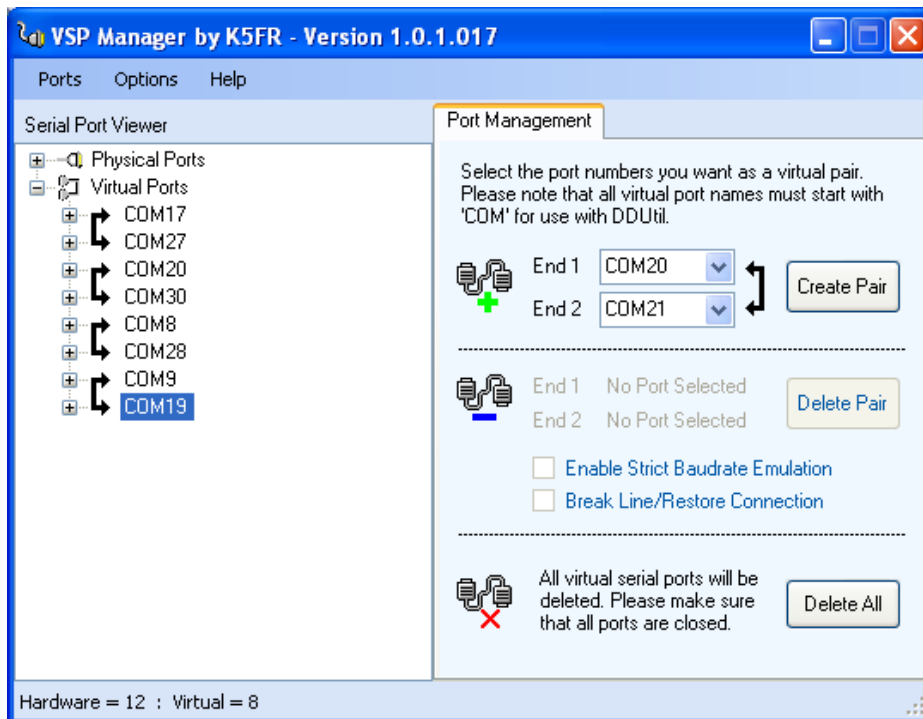
I would recommend you make a list of the ports in use and label them accordingly.

On my computer **COM3** is my normal Orion port set on the **Interface** menu in N4PY.

Install VSP Manager virtual com port software

- Add pairs of ports in VSP Manager
- In my situation I have set-up
  - COM 20 paired with COM30
  - COM8 paired with COM28
- Save and close VSP Manager

The example below shows **MY** 4 pairs of ports. Your set-up should contain **2 pairs** of ports.



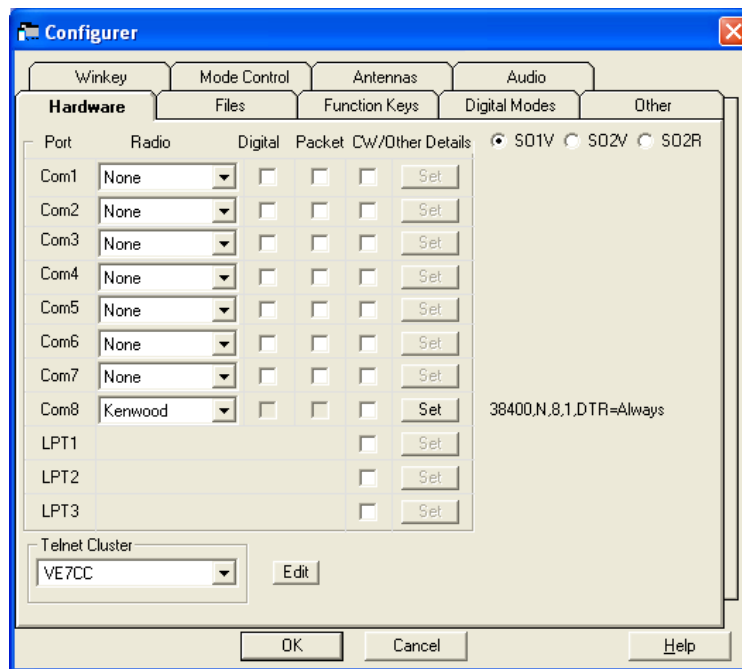
It is recommended that you reboot the computer and revisit Device Manager and look at the list of Ports (COM & LPT). The list should now include 4 new **ELTIMA Virtual Serial Ports**.

**Note:** What follows is based on the COM port numbers used in my installation. Your installation may differ.

I use N4PY and the LP-PAN panadapter with both **N1MM** contest logging program and **CWSkimmer** for chasing DX operating SPLIT. The set-up for both these programs follows. (Again I must emphasize that the Comport settings given are from my installation and yours may differ.)

### **N1MM Set-up with N4PY and LP-PAN**

- N1MM **must** be installed on comport 1 to 8
- I have N1MM installed on **COM8** with the port at a baud rate of 38,400, 8 bit and 1 stop bit, DTR=Always
- The radio selected is **Kenwood**



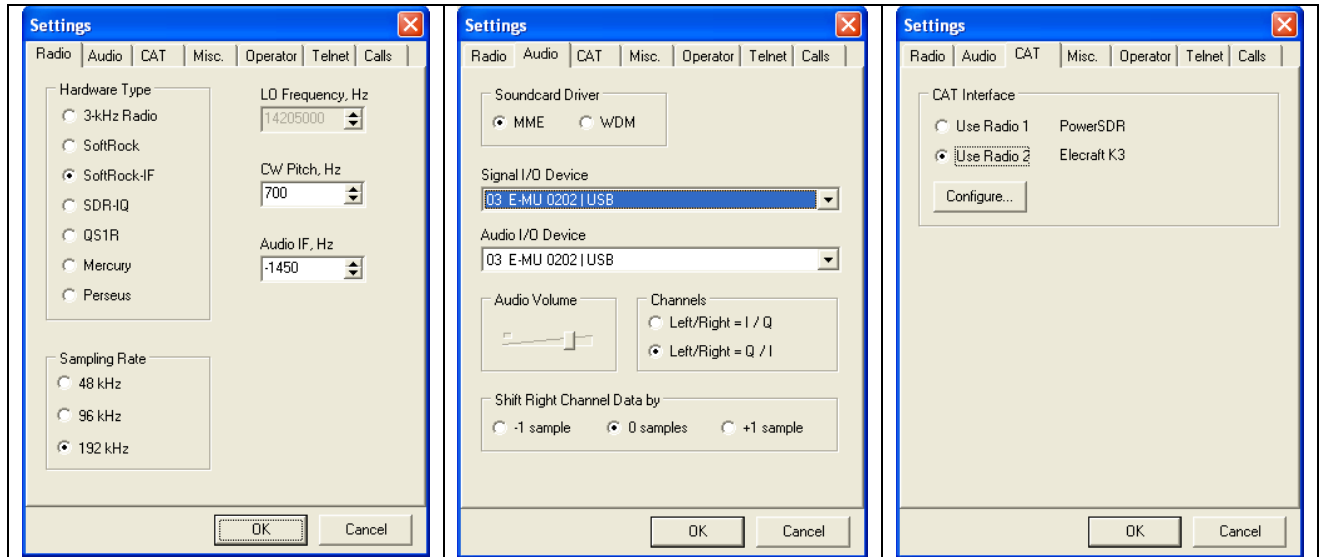
- The N4PY Orion.ini file must be edited.
- Change the default THP2 COMPORT=NONE to the appropriate Comport pair (in my case that is pair COM8 and COM28).  
**THP2 COMPORT=COM28**
- Close N4PY and N1MM and PowerSDR-IF or TRX-Pan if they are open.
- Reopen N4PY
- Reopen N1MM and PowerSDR-IF or TRX-Pan

**Note:** This may sound obvious, but, when using N1MM no other logging program can be used at the same time.

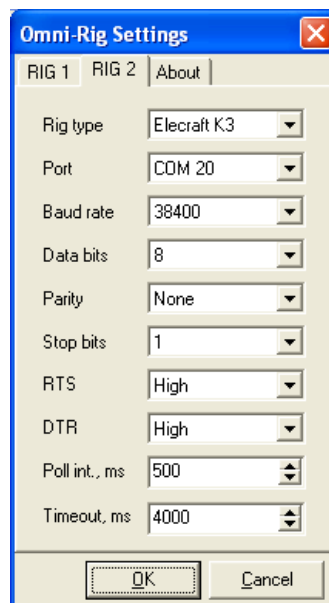
## CWSkimmer Set-up with N4PY and LP-PAN

- CWSkimmer is available from [CWSkimmer](#) at a cost of \$75 (US).
- (Radio Tab) Hardware type = **Softrock-IF**, (Audio Tab) Soundcard driver **MME** (select your sound card), and (CAT Tab) Use Radio **Configure** button to configure the radio as an **Elecraft K3**
- Settings are shown below.

Note: the **Audio IF Hz** (Radio Tab) setting *may* be different on your Orion. This setting is adjusted to set the CWSkimmer display/decode frequency to the zero-beat CW signal frequency of the Orion.



- The 3<sup>rd</sup> screen above shows a link to **Configure** the Elecraft K3 on Radio2. In my case, the Elecraft K3 **Port** is **COM20** (one end of the COM20 – COM30 pair set-up earlier). The K3 **Configure** screen is shown below:



- The N4PY Orion.ini file must be edited.
- Change the default THP3 COMPORT=NONE to the appropriate Comport pair (in my case that is pair COM20 and COM30).  
**THP3 COMPORT=COM30**
- Close N4PY and CWSkimmer and PowerSDR-IF / TRX-Pan if they are open.
- Reopen N4PY
- Reopen CWSkimmer and PowerSDR-IF / TRX-Pan (if needed)

### Summary and Caveats

- When closing *Windows* my computer occasionally requires that the external sound card must be turned off. If it remains on, the computer **may** hang and NOT complete a normal shutdown.
- Similarly, the external sound card **may** need to be OFF when booting the computer or it **may** hang.
- My observations suggest that the Orion “front end” may not be 192 kHz wide (more likely near 120 kHz). This results in a somewhat convex noise floor curve dropping approximately 10 dBm from the centre to the extreme edges. This has NO impact on the LP-PAN as a panadapter. It does, however, limit absolute measurements at the extremes.
- A dip of approximately 3db near the centre frequency is visible on the Orion panadapter display. This dip disappears when the Hardware NB is engaged. My guess is that this is an Orion hardware design issue.
- Periodically, for unknown reasons, PowerSDR, TRX-Pan and CWSkimmer lose track of the necessary sound card. This is pretty obvious as the screen has no signals and a lot of “white noise”. To fix this all that is needed is to go to the appropriate **Audio** tab and reselect the correct sound card.

The photos included in this document show the software available to me in May 2011. TRX-Pan, PowerSDR/IF and N4PY are continually under development and improvement. In time, new features will likely be added to all.

Rick Williams  
VE7TK

Original document prepared: August 2008