LP-PAN and Ten-Tec Orion
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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.)

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

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 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.

Larry, N8LP, developed a 2nd rig control interface for the K3 (LP-Bridge) that allowed K3 owners to link other rig control and logging software to the K3 and PowerSDR/IF.

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

Computer Requirements:

- PowerSDR/IF 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:

Option #1

- PowerSDR/IF available from http://www.wu2x.com/sdr.html#powersdr
- Ham Radio Deluxe setup for the Ten-Tec Orion and available from http://www.ham-radio-deluxe.com/Programs/HamRadioDeluxe/tabid/88/Default.aspx

Option #2

- PowerSDR/IF available from http://www.wu2x.com/sdr.html#powersdr
- LP-Bridge (http://www.telepostinc.com/LPD.html) was designed by N8LP to link PowerSDR/IF to the K3 for interactive control, and to allow multiple applications to talk to the K3 at the same time.
- 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.
- N8VB virtual serial port driver helps link all the software above together. (http://www.philcovington.com/SDR/Downloads/N8VBvCOMSetup-226a.exe)

Advantages / Disadvantages

Option #1

Advantages:

- All the software needed is freeware
- Provides an excellent panadapter and rig linking capability

Disadvantages:

- Does not allow the use of other rig control software.
- Does not allow the use of other logging programs.
- Does not allow the use of other digital mode programs for PSK and RTTY etc.

Option #2

Advantages:

- Allows use of other logging programs that you may already be using
- Integrates well with K-3 software developed for LP-PAN
- Automatically determines/sets the Orion's filter offsets for use in PowerSDR adjusting for both mode and filter.

Disadvantage:

- Requires purchase of N4PY Orion software
- Somewhat more complicated set-up.

Putting it all Together

Option #1

Initial Set-up

- Turn on the Orion, LP-PAN and the sound card.
- Start Ham Radio Deluxe and set it up for a Ten-Tec Orion
- Start PowerSDR/IF (remove the check box in the start-up screen and Continue). When PowerSDR/IF loads enter the **Setup** menu
  - o Under the **General** tab select SoftRock IF Stage
  - o For rig control program select **Ham Radio Deluxe**
  - o Set-up the sound card **Audio** tab as suggested in the LP-PAN manual
- Close both programs

Normal Operation

- Turn on the Orion and the sound card.
- Start **Ham Radio Deluxe**
- Start **PowerSDR/IF**
 - o Click on **Standby** and the PowerSDR/IF screen will display **On**

Option #2

Initial Set-up

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• Install N8VB virtual com port software o If you have, for example 2 comports on your computer, N8VB will come up with a list beginning 3 and 13. Check 1 pair of ports, for **example 7 and 17** o Save and close N8VB	
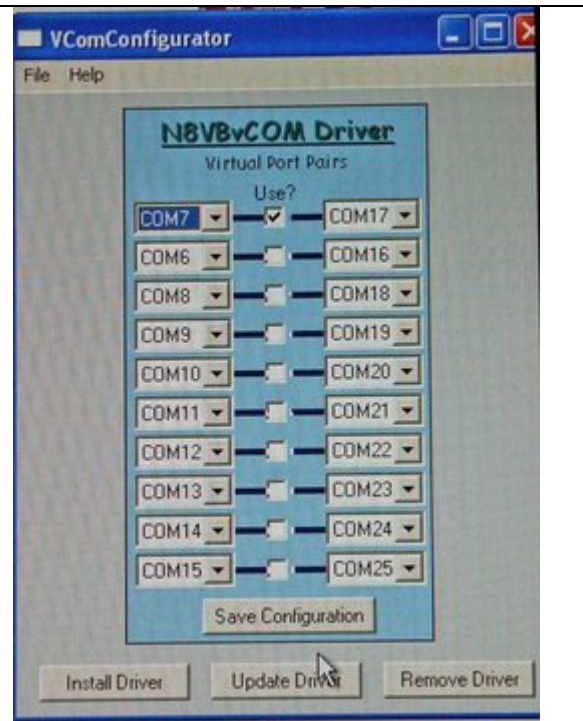
- Open N4PY software
    - Go to SETTINGS and select **User 5 TransV**
    - Check **Tokyo HP Comport** and set the port to **COM7** (as per the example selected above)**.**
    - Check **Use THP Comport for Ext Logging Program**
    - Close SETTINGS
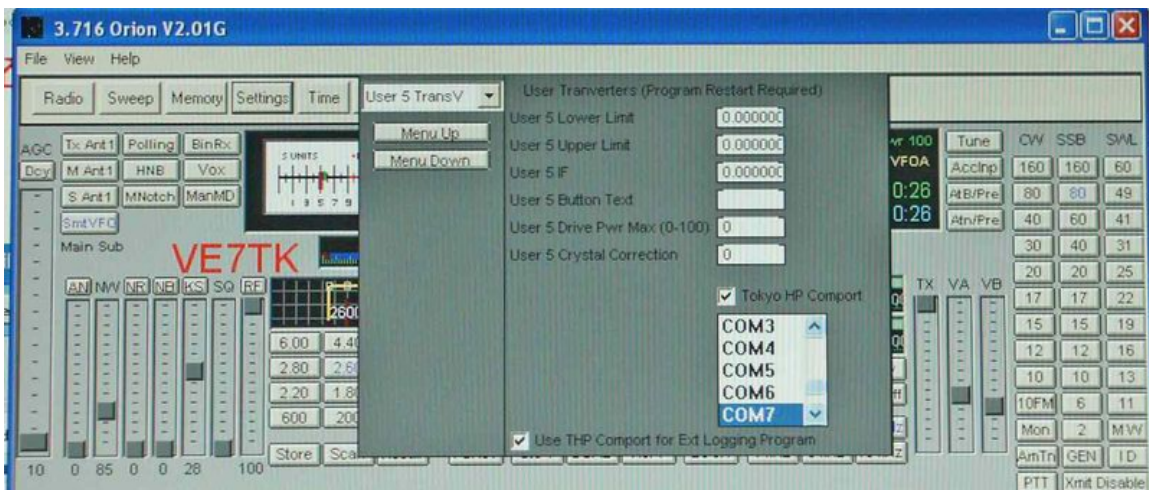
- Open LP-Bridge
 - Set the K3 to **Com Port 17** (as per the example selected above)**.**
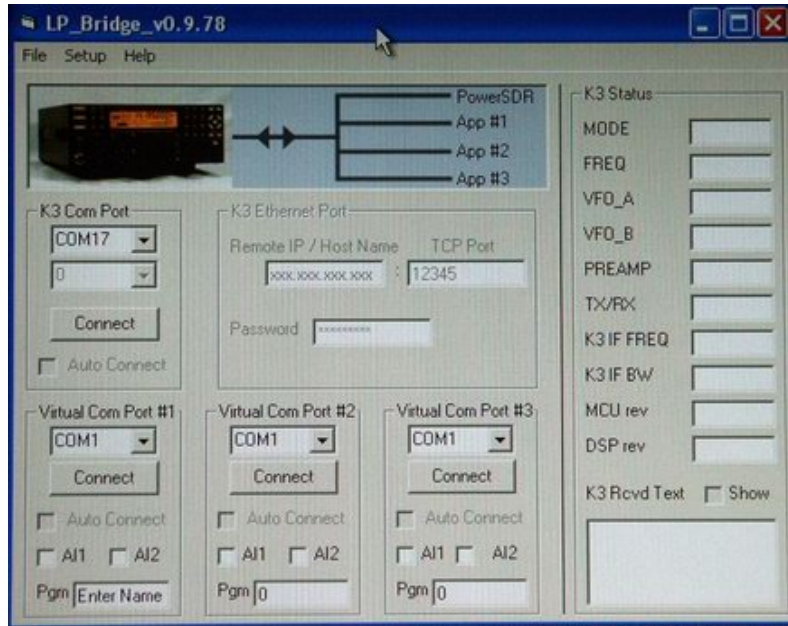
- Start PowerSDR/IF (remove the check box in the start-up screen and Continue) and enter **Setup**
  - Under the **General** tab select SoftRock IF Stage
  - For rig control program select **LP-Bridge** (see figure below)
  - Set-up the sound card **Audio** tab as suggested in the LP-PAN manual
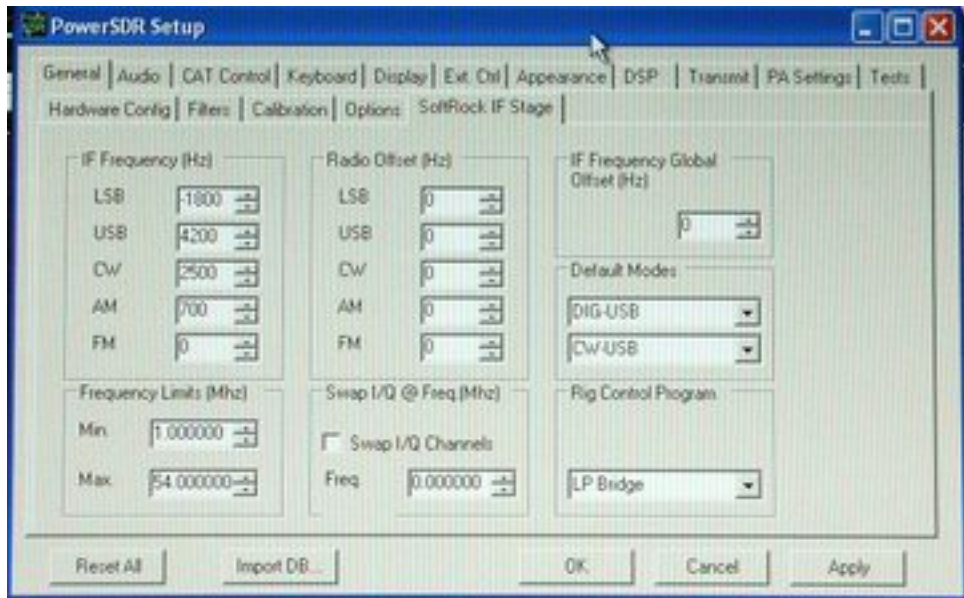

Normal Operation

- Turn on the Orion, LP-PAN and the sound card.
- Start **N4PY** (and any other logging software etc)

- Start **LP-Bridge**
  - Click **Connect** in the K3 box below the picture of the rig.
  - Note the data in the K3 status window (see picture below) and the box at the bottom left. The data at the bottom left will change as the Orion and pseudo-K3 communicate.
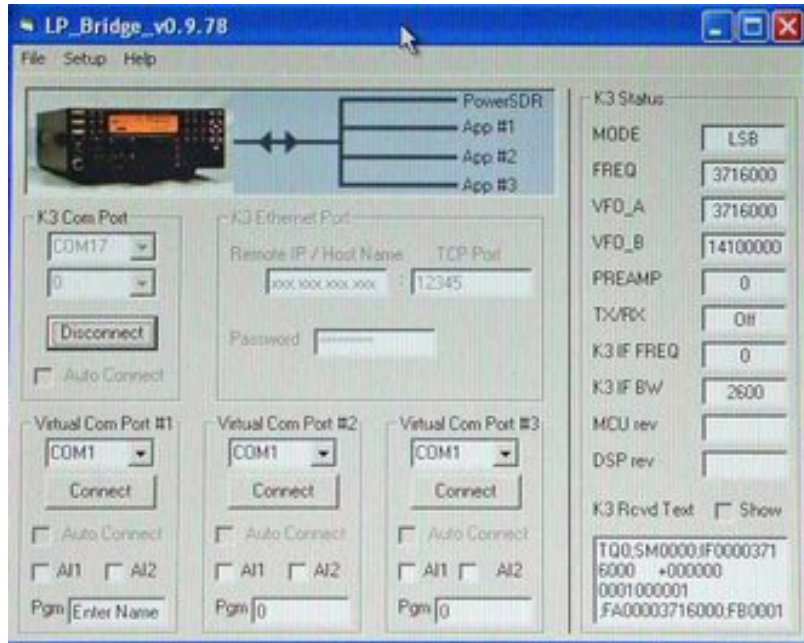
- Start **PowerSDR/IF** and click **Standby** to **On**

The screen shot below shows the whole package in operation. On the screen running together are **Logger32**, **N4PY** and **PowerSDR/IF**. LP-Bridge is also running but has been minimized.
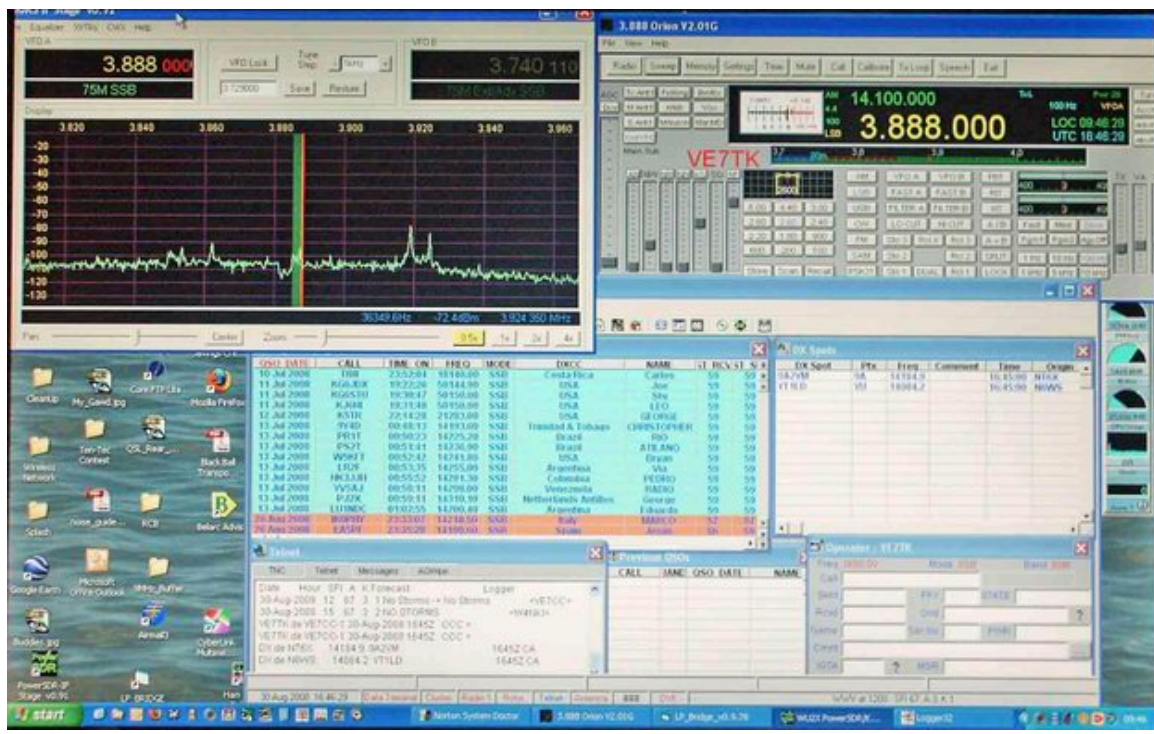
Summary and Caveats

- When closing *Windows* my computer occasionally requires that the external sound card must be turned off. If it remains on, the computer will hang and NOT complete a normal shutdown.
- Similarly, the external sound card must be OFF when booting the computer or it will 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 concave 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.
- Differences in gain were encountered when calibrating the LP-PAN. These discrepancies in the gain adjustment depended on which "down-stream" Orion roofing filter was selected. This has NO impact on the panadapter function but may limit absolute measurements.

The photos above show the software available to me in late August 2008. PowerSDR/IF, LP-Bridge and N4PY are all continually under development and improvement. New features will likely be added to all. For example:

- **PowerSDR/IF** has an alpha version on YouTube that also controls a 2nd receiver. This will be a great help for DX chasers and split operations.
- Larry, N8LP, has discussed broadening the **LP-Bridge** interface, currently limited to the K3, to include the Ten-Tec Orion.
- Carl, **N4PY**, has worked with me to provide an interface from the Orion to LP-Bridge and continues to add features to his software based on requests from his subscribers.

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