

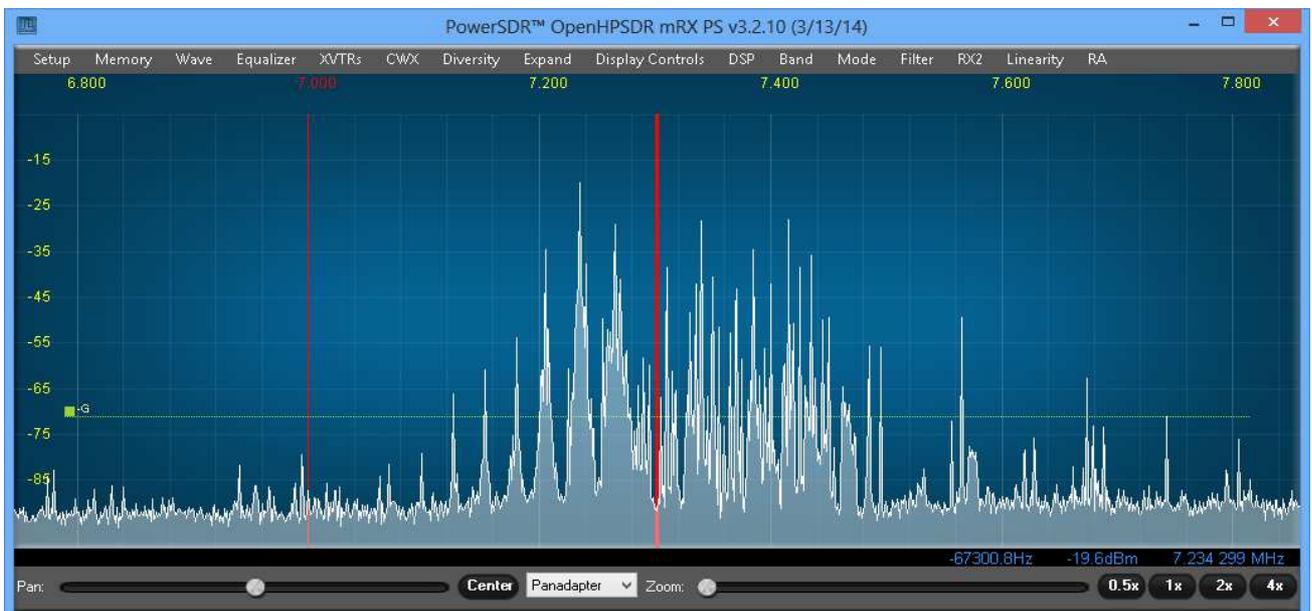
## **ANAN-10/100/100D/200D Transceivers User Guide**

**Warning: Beta release Documentation**

Apache Labs – <http://www.apache-labs.com>

In cooperation with VK6PH and the Open Source Hardware and Software Project  
<http://openhpsdr.org>

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**Apache Labs LLC, Inc.**

**Declarations of Conformity**

The ANAN-10/100/100D/200D complies with FCC Part 97 rules for the Amateur Radio Service.

The ANAN series HF & 6M SDR transceivers including the ANAN-10, ANAN-100, ANAN-100D and the ANAN-200D are CE and RTTE certified as per EU trade directives,

All ANAN radios are RoHS compliant as well, we ensure that our products are of the highest quality and meet international standards of quality and compliance.

This User Manual is a compilation of work by volunteer ANAN users, the contributions are duly acknowledged in this manual, this document is maintained by the ANAN SDR Community and users.

## **Important Operation tips**

- 1. IMPORTANT: install the supplied 4 rubber feet on bottom of case for proper cooling.**
2. Do **not** short the rear speaker jack.
3. Do not cover rear or bottom ventilation holes. Proper air circulation throughout the ANAN-100/D is necessary to prevent possible overheating and failure.
4. Calibrate power output to 100W using a 50 ohm Dummy Load. Operating SSB/CW at higher levels will damage the radio.
5. The PTT Out is a 300mA (Peak) FET Drain, shorting this to ground or using an accessory which requires more current will destroy the FET.
6. Data/AM/FM and other continuous duty modes must be operated at 30W or less to remain within the operational limits of the ANAN-100/D
7. Input voltage must be 13.8 +/- 5%, well regulated at higher amperages and proper POLARITY must be observed.
8. DISCONNECT the Antenna during Thunderstorms or when not in use.
9. Please ensure that you select the correct model during software setup.

### **Heat Dissipation**

Apache has stated that "The ANAN-10/100/100D/200D use the [heavy duty] Aluminum extruded housing to dissipate heat just like most military equipment, the 100W extruded section weighs around 2.2Kgs and has [a generous] 1515 sq cms of surface area".

**Ventilation holes in the bottom and back panel of the ANAN-100 and ANAN-100D must be clear of obstructions so that the internal fan can circulate cooling air through the unit.**

The ANAN-100, ANAN-100D and the ANAN-200D should not be operated at greater than 30% of their rated power when used for extended duty cycles such as digital operation.

**Clarification:** AM/FM, CCS (Continuous Commercial Service) **30W**,  
SSB, CW and all **ICAS** modes (Intermittent Commercial/Amateur Service) **100W PEP**.

The Power Amplifier MOSFET transistors have characteristics that far exceed the needs of normal Transceiver operation. They are quite rugged. However, other internal components such as the Filters, Integrated Circuits, and some small SMT parts must also be considered when modes with high duty cycles are in use.

## Introduction

The ANAN-100/100D/200D radios are 100W Amateur Radio direct-down-conversion (DDC) and direct-up-conversion (DUC) Software Defined HF transceiver plus 6 Meters. The ANAN-100D/200D have a proud heritage from the ANAN-10 DDC/DUC 10W Transceiver introduced in 2012. The ANAN-10 was cooperatively designed by the OpenHPSDR Team and Apache Labs. Kevin Wheatley M0KHZ and the OpenHPSDR group developed the original "Hermes" brand Transceiver board as an integrated version of three of their original backplane PCB's (Mercury + Metis + Penelope).

The Apache Labs ANAN equipment includes the Hermes design in a series of new transceivers. The ANAN-100/100D/200D provide a Gigabit (1000 baseT) Ethernet interface to the host PC. The ANAN-100/100D/200D does not use a Firewire™, or USB interface.

Future ANAN-100/100D/200D firmware updates can be easily downloaded via the Transceiver standard Ethernet connection, eliminating the need for special programming adapters.

ANAN-100/100D/200D can be used with a number of different PC Software Defined Radio programs including those written for Windows®, Linux and MacOS/X® operating systems.

Note: Please see the Apache Labs ANAN Transceivers webpage:  
<https://apache-labs.com/1001/Ham-Radio-Products.html>

OpenHPSDR software webpage: <http://openhpsdr.org/download.php>

and a volunteer website <http://www.n9vv.com> with loads of Apache product information.

## Minimum Requirements

### Computer basic requirements

1. Intel Pentium 4, 3 Ghz (bare minimum), or Intel i3, 2.8Ghz or better (recommended).
2. 4GB Ram, or 6GB Ram (recommended).
- 3, 1280x1024 display screen (or higher) resolution recommended
4. Windows XP or newer (**Win7 recommended**). It is possible some older machines will not give satisfactory performance, regardless of processor speed.
5. Computer with Full Duplex Ethernet NIC card capable of 1000 baseT/Gigabit Ethernet.
6. **Full Duplex Ethernet switch** or router with 1 free 1000Mbs Ethernet port.
7. CAT5E or CAT6 (recommended) Ethernet patch cable to connect ANAN-100/100D/200D to Ethernet switch, router or computer.

Older and slower computers may require considerable optimization before they can provide necessary performance for trouble free SDR operation. This optimization may require that certain applications and services be stopped in order for Hermes to operate correctly. It is possible some older machines will not give satisfactory performance, regardless of processor speed.

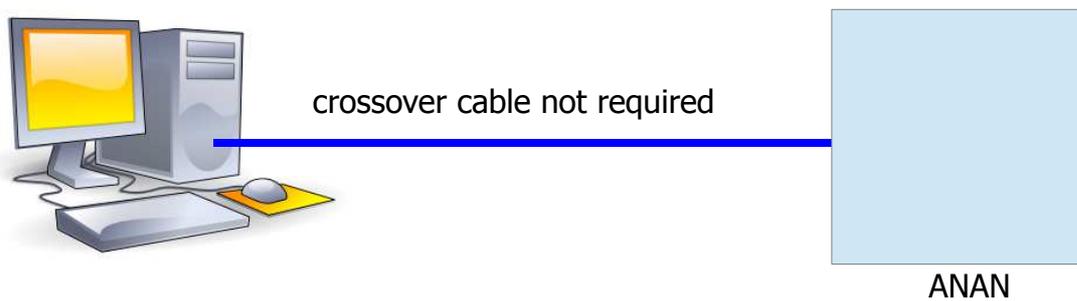
Neal Campbell K3NC shared this optimization link: <http://www.blackviper.com/service-configurations/>

(Neal's web page: <http://www.abrohamnealsoftware.com/>)

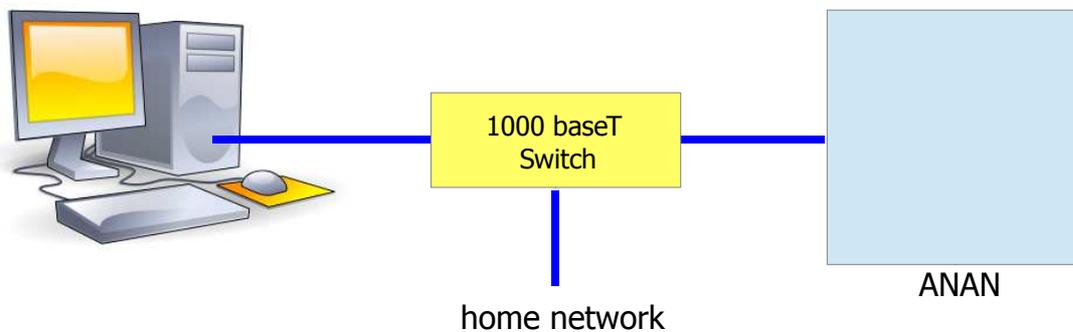
Suitable routers or LAN Network switches:

A Full Duplex wired or wireless Ethernet Router with sufficient ports to connect the host computer and the ANAN-100/100D/200D at 1000 baseT required to handle 80Mbps. Optional Full Duplex Ethernet 5 port **switch** with 1000 baseT Internet connectivity may be required if additional Ethernet ports are needed. Ethernet **HUBS** will **NOT** work properly for this application.

Ethernet Connection



The ANAN must be connected directly to a dedicated Ethernet port on the host PC or to a port on a suitable Ethernet router or switch. Connection to a dedicated Ethernet port is shown above



Ethernet switch is shown above

For direct connection of the ANAN to a dedicated Ethernet port, a CAT 5 Ethernet cable is used. Note that a 'crossover' cable is **not** necessary.

**IMPORTANT:** The Ethernet switch must be capable of operating in **full duplex** mode at 1000 baseT. The initial release of the ANAN FPGA code operates at 100 baseT, but future releases will run at 1000 base-T. For this reason, a 100 baseT Ethernet switch may be used in the interim, but if a new purchase is planned then a **1000 baseT switch is recommended**.

An Ethernet "HUB" will not work properly and is **not** recommended.

## Simple network setup

The OpenHPSDR Hermes/Angelia, ANAN-10/ANAN-100/ANAN-100D/ANAN-200D radios are designed to work via Ethernet cabling on a "Local Area Network" or "LAN". Ethernet simplifies the installation, and configuration of hardware and software on a PC, making the installation basically plug and play. No sound card interface wiring, no Firewire cards or drivers, no USB ports or drivers needed. It just works!

How simple does it get? This simple:

1. For the most basic network, you don't need any external hardware other than a CAT5 or CAT6 network/Ethernet cable between your OpenHPSDR Hermes/ANAN-\* LAN port and your computer's LAN port.
2. Done. Nothing more to do. It just works, but it may take a while to connect each time unless you assign static IP addresses.

OK, how do I hook my brand new OpenHPSDR Hermes/ANAN-\* to my home WiFi (wireless network) router?

1. Connect a CAT5 or CAT6 network/Ethernet cable between the OpenHPSDR Hermes/ANAN-\* LAN port and a free LAN port on your Linksys/Belkin/NetGear/DLink 802.11n wireless router.
2. Done. Nothing more to do. It just works.

Note : Direct connection between ANAN-\* and PC is not recommended due to the excessive time which may be required for an IP address to be assigned.

Note : CAT5 and CAT6 Ethernet cables have 8 pin male modular connectors on both ends. The Hermes/Angelia ANAN-\* radios have a corresponding female 8 pin modular LAN port on the front panel.

Author KC9XG

### **APIPA - Automatic Private IP Addressing**

**Definition:** A feature of Microsoft Windows, **APIPA** is a [DHCP](#) failover mechanism for local networks. With APIPA, DHCP clients can obtain IP addresses when DHCP servers are non-functional. APIPA exists in all modern versions of Windows except Windows NT.

When a DHCP server fails, APIPA allocates IP addresses in the private range 169.254.0.1 to 169.254.255.254. Clients verify their address is unique on the network using [ARP](#). When the DHCP server is again able to service requests, clients update their addresses automatically.

In APIPA, all devices use the default network mask 255.255.0.0 and all reside on the same [subnet](#).

APIPA is enabled on all DHCP clients in Windows unless the computer's Registry is modified to disable it. APIPA can be enabled on individual network adapters.

Also Known As: Automatic Private IP Addressing; AutoNet

Examples:

Because APIPA uses IP addresses in the private Class B space, APIPA is a feature generally only useful on home or other small intranet LANs.

Reference:

<http://en.wikipedia.org/wiki/APIPA>

Here is what you need to get started with the ANAN-100/100D/200D

ANAN-10/100/100D/200D Hardware Requirements

1. **13.8v DC minimum, 25A and 13.8v DC 4.5A for the ANAN-10**

Note: some switching DC supplies create objectionable EMI/RFI which may degrade performance of the ANAN-100/100D/200D transceivers.

2. Ham band resonant 50 ohm **HF antenna** and **Dummy Load** required for calibration.
3. PC microphone terminated in 3.5mm - 1/8" plug, optional.
4. CW key or keyer terminated in 3.5mm - 1/8" Stereo plug, optional.
5. A set of stereo speakers or stereo headphones with a 3.5mm - 1/8" stereo plug should be connected to the front panel headphone jack. The rear panel speaker jack should NOT be used for speaker or headphone connections! The rear panel speaker jack provides a balanced, **Left channel** speaker output only and will not work as expected with stereo speakers. The rear panel audio was designed for someone working in the field where they might have a simple portable 2-wire speaker.

**WARNING:** If a mono plug or a shorted stereo plug is inserted into the rear panel Speaker jack, damage will occur to the audio output IC. Do NOT short these stereo pins or connect either side to ground!

6. DO NOT TURN THE ANAN RADIO ON until OpenHPSDR/PowerSDR software is properly installed and configured.

ANAN-10/100/100D/200D Recommended Software requirements:

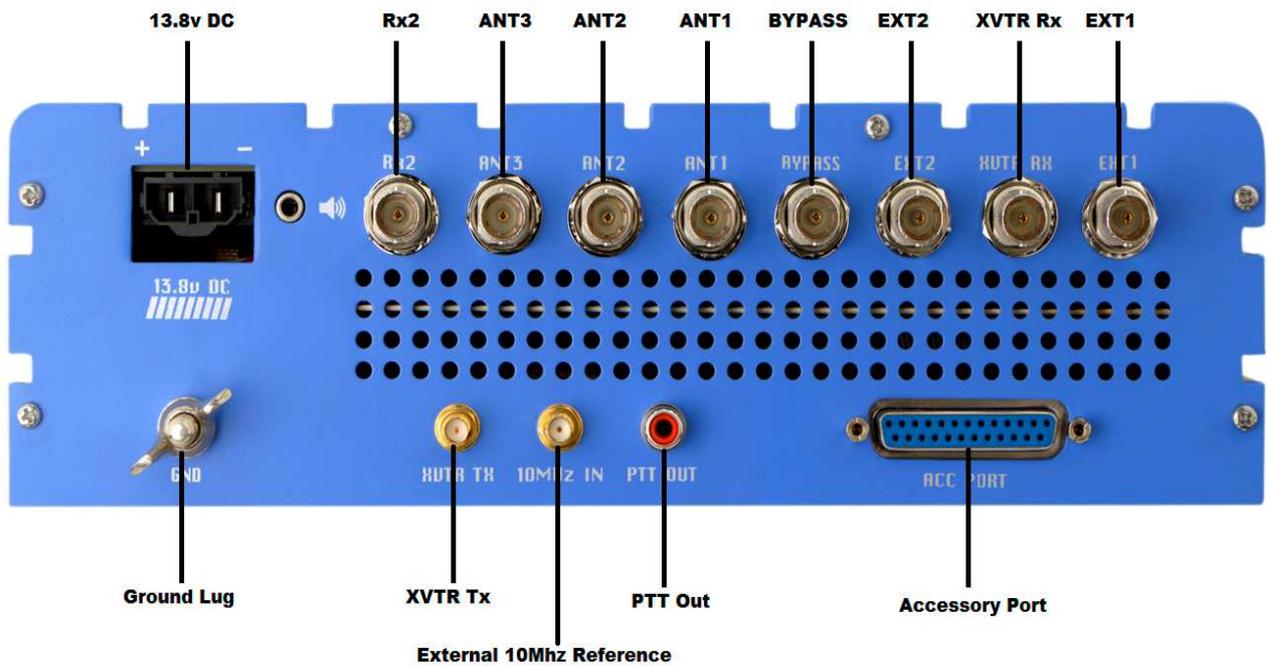
1. Windows XP or later – Win7 recommended.
2. Microsoft .NET 4.0 Framework or later.
3. OpenHPSDR/OpenHPSDR/PowerSDR mRx 3.0.XX or OpenHPSDR/OpenHPSDR/PowerSDR 2.2.XX 2Rx version

\*\* please see OpenHPSDR Software and download information <http://openhpsdr.org/download.php>.

### ANAN-100/100D/200D Front Panel

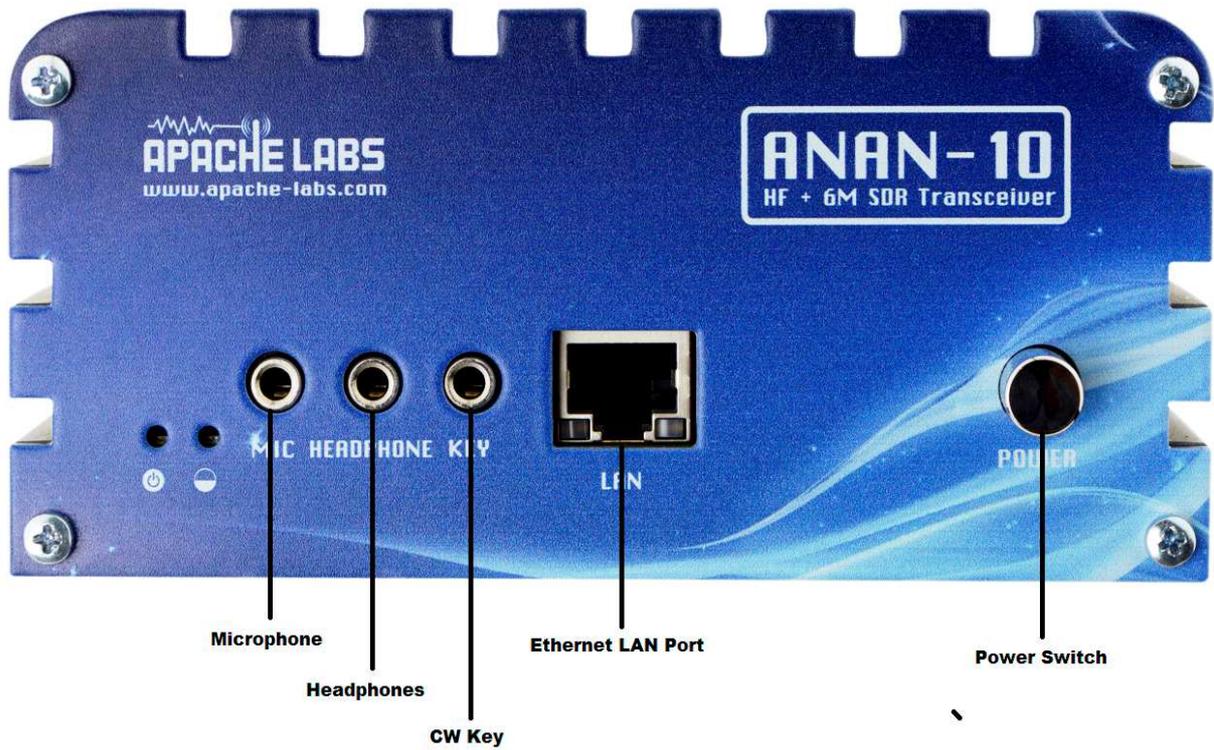


### ANAN-100/100D/200D back panel

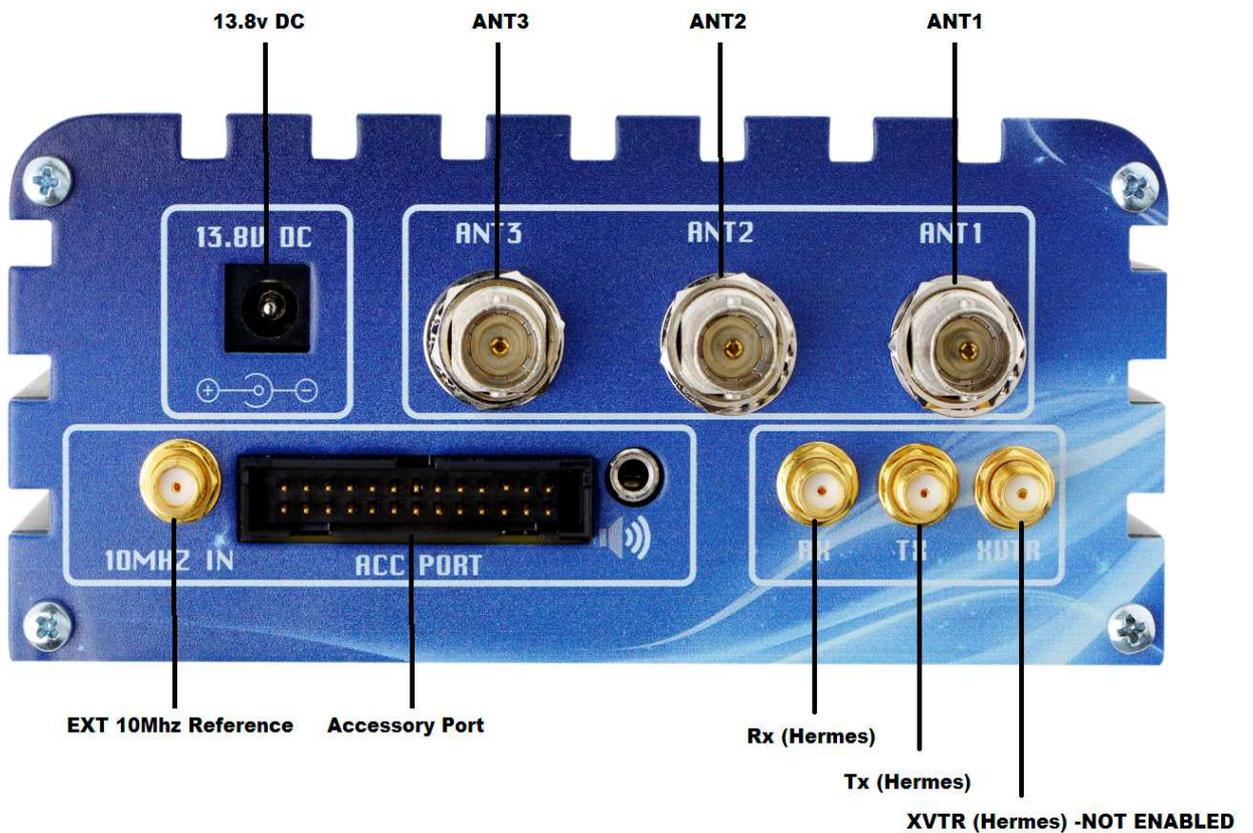


**IMPORTANT-** Please note that the PTT Out is a 300mA (Peak) FET Drain, shorting this to ground or using an accessory which requires more current will destroy the FET.

### ANAN-10 Front Panel



### ANAN-10 back panel



## ANAN-100/100D/200D Rear Panel connections

Author William Diaz KC9XG

ANAN-100/D Antenna connections as shown on 100W\_Rev15A.pdf and as built on the back panel. 100W\_Rev15A.pdf connector labels differ considerably from the ANAN-100/D back panel labels. 100W\_Rev15A.pdf shows 2 separate RX2 in connectors, but they are, in fact, different as indicated by the underline.

<b>Schematic</b> October 12, 2012	<b><u>ANAN-100/100D/200D back panel</u></b>	<b><u>Hermes board</u></b>	<b><u>Angelia board</u></b>	<b><u>PA FILTER BOARD</u></b>
Rx_Master_In (LPF)	NC, Internal only	NC		
To_RX (HPF)	NC	RX1_In	RX1_In	J13
TX IN		TX Out	TX Out	J2
3.5mm audio Balanced Speaker Output	1/8" 3.5mm 3 conductor jack	J16-14 and J16-15	J16-14 and J16-15	
PTT-IN	Accessory port DB25-13	J16-1	J16-1	
PTT-OUT	Accessory port DB25-1 RCA Jack on back panel	J16-25	J16-25	
XVTR-TX		TX-in		J3 (ØdBm)

<b>Schematic</b> October 12, 2012	<b><u>ANAN-100/100D/200D back panel</u></b>	<b><u>Hermes board</u></b>	<b><u>Angelia board</u></b>	<b><u>PA FILTER BOARD</u></b>
RX2 IN (No underline)	RX2 (BNC)	NC	RX2 IN	J10
ANT1, ANT2, ANT3	ANT1, ANT2, ANT3 (BNC)			J4, J5, J6
Rx_Bypass_Out	Bypass (BNC)			J18
Rx2_In	EXT1 (BNC)			J15
XVTR Rx In	XVTR RX (BNC)			J14
Rx3_In	EXT2 (BNC)			J16

### SEE NOTES BELOW:

Default RX1 Receive Signal path from ANT(n) is ANT(n), LPF, HPF, Hermes/Angelia receiver 1.

Default Transmit signal path from Hermes/Angelia TX-Out is Tx IN, HF TX, LPF, Ant(n).

One connector must be selected from ANT1, ANT2, or ANT3. Default is ANT1

Only one connector can be selected from Ext1, Ext2, or XVtr RX. Default is none active.

RX\_Bypass\_Out is optionally used with an external filter or pre-amp connected between Bypass and selected EXT1, EXT2 or XVTR RX. The receive signal path is then Ant(n), LPF, Bypass, external filter or pre-amp, Ext(n) or Xvrt RX, HPF, To\_RX, then to Hermes/Angelia RX1\_in.

**EXT1, EXT2, or XVTR RX can be used with an external receive antenna, but TX/RX switching/attenuation must be provided to protect the receiver from excessive receive levels which could damage the receiver.**

## Quick Start Instructions

please refer to front and back panel illustrations above

**Warning:** these "Quick Start" instructions only apply to the ANAN-10/100/100D/200D Apache Transceiver board with the jumpers set to the factory defaults.

Please refer to the OpenHPSDR webpage for the most recent documentation by Phil Harman VK6PH for details of the TAPR Hermes Transceiver

[http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/Hermes/Documentation](http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Documentation)

also put this in your bookmarks as an excellent resource site: [http://openhpsdr.org/wiki/index.php?title=HPSDRwiki:Community\\_Portal](http://openhpsdr.org/wiki/index.php?title=HPSDRwiki:Community_Portal)

## Hardware Setup

Note: DO NOT TURN ON THE RADIO AT THIS! TIME The ANAN Radios will not operate without properly configured software.

**WARNING:** If a mono plug or a shorted stereo plug is inserted into the rear panel Speaker jack, damage will occur to the audio output IC. Do NOT short these stereo pins or connect either side to ground!

DO NOT TURN THE ANAN RADIO ON until OpenHPSDR/PowerSDR software is properly installed.

**The following connection instructions assume the ANAN-10/100/100D/200D jumper settings are at factory defaults.**

1. Install the 4 supplied rubber feet.

The ANAN transceiver should be placed to allow unobstructed airflow around and beneath the housing. Damage can occur if the ventilation openings on the bottom or rear panel of the ANAN-100/100D/200D are blocked. Allow room for airflow between the housing and other equipment.

2. Connect the supplied 13.8VDC cable to the rear panel power connector and to a filtered 13.8VDC +/- 5%, power supply capable of providing up to 25A.

3. Connect a suitable ground cable to the rear panel ground terminal and to a suitable RF ground, in accordance with good amateur practices.

4. Connect a 50 ohm transmission line between the rear panel ANT1 BNC connection and a 50 ohm dummy load capable of dissipating 100 watts for at least 5 minutes.

## Apache Labs ANAN SDRs

5. Connect powered stereo speakers, or a stereo headset to the front panel 1/8"/3.5mm stereo jack. Note: Do NOT connect powered stereo speakers or headsets to the rear panel speaker jack! This is a balanced output and damage can result if either tip or ring is connected to ground.
6. Optional. Connect a dynamic PC microphone equipped with a 1/8"/3.5mm mono plug into the front panel mic jack. See appendix for interfacing other mics. NOTE: If radio transmits when 1/8" / 3.5mm mono plug is installed, Jumper JP6 has been installed at the factory. See Mic Interfacing notes in appendix for more info.
7. Connect a CAT 5 Ethernet cable between the front panel RJ45 LAN jack and your router or PC Ethernet port.

**Note:** find minimum detailed Ethernet requirements beginning on page 8 of this document.  
Do Not install a microphone or CW key at this time. DO NOT TURN THE RADIO AT THIS TIME!.  
Insure that your PC is properly connected and communicating over your network (LAN) to the Internet.

## Software Setup

Go to the OpenHPSDR download page and download the OpenHPSDR/PowerSDR\_mRX Installer software:  
<http://openhpsdr.org/download.php>

scroll down to the WINDOWS section and look for the **latest** W5WC software

### Windows

**PowerSDR\_mRX\_v3.0.2.0\_Setup** (Compiled with MS VS 2010), **More ...**

Code at SVN: [http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/W5WC/PowerSDR\\_HPSDR\\_2](http://svn.tapr.org/repos_sdr_hpsdr/trunk/W5WC/PowerSDR_HPSDR_2)

**PowerSDR\_RX2\_v2.2.14.0\_(W5WC)\_Setup** (Compiled with MS VS 2010), **More ...**

Code at SVN: [http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/W5WC/PowerSDR\\_HPSDR\\_2\\_RX2](http://svn.tapr.org/repos_sdr_hpsdr/trunk/W5WC/PowerSDR_HPSDR_2_RX2)

Note: Code has recently been updated to comply with the LGPL license

**PowerSDR 2.2.3 Diversity**

This code is maintained off the openHPSDR.org web site by Joe, K5SO, it is based on the PowerSDR 2.2.3 code above.

Code at SVN: 2.2.3 Diversity code. See website for ZIP files.

**KISSKonsoleSetup** (Compiled with MS VS 2010), **More ...**

Code at SVN: [http://svn.tapr.org/repos\\_hpsdr\\_kiss/trunk/StableRelease/KK\\_Unified/Latest/Unified/bin/Release](http://svn.tapr.org/repos_hpsdr_kiss/trunk/StableRelease/KK_Unified/Latest/Unified/bin/Release)

**HermesVNASetup** Version 1.6.0 16-11-2012 (Compiled with MS VS 2010), **More ...**

**cuSDR32\_MSVS** (Compiled with VS 2010), **More ...**

Code at SVN: [http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/DL3HVVH/cuSDR32/](http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVVH/cuSDR32/)

**cuSDR64\_MSVS** (Compiled with VS 2010), **More ...**

Code at SVN: [http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/DL3HVVH/cuSDR64/](http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVVH/cuSDR64/)

example of OpenHPSDR Download webpage

## Windows

For example: On the OpenHPSDR Download webpage <http://openhpsdr.org/download.php> you will see: OpenHPSDR/PowerSDR mRx (compiled with MS VS 2010) the current version of OpenHPSDR/PowerSDR mRx 3.0.X.XX will have a current build number inserted in the place of "XX". click on OpenHPSDR/PowerSDR mRx 3.0..XX and select "RUN" to install the application. Alternatively, you can SAVE the application in the directory of your choice.

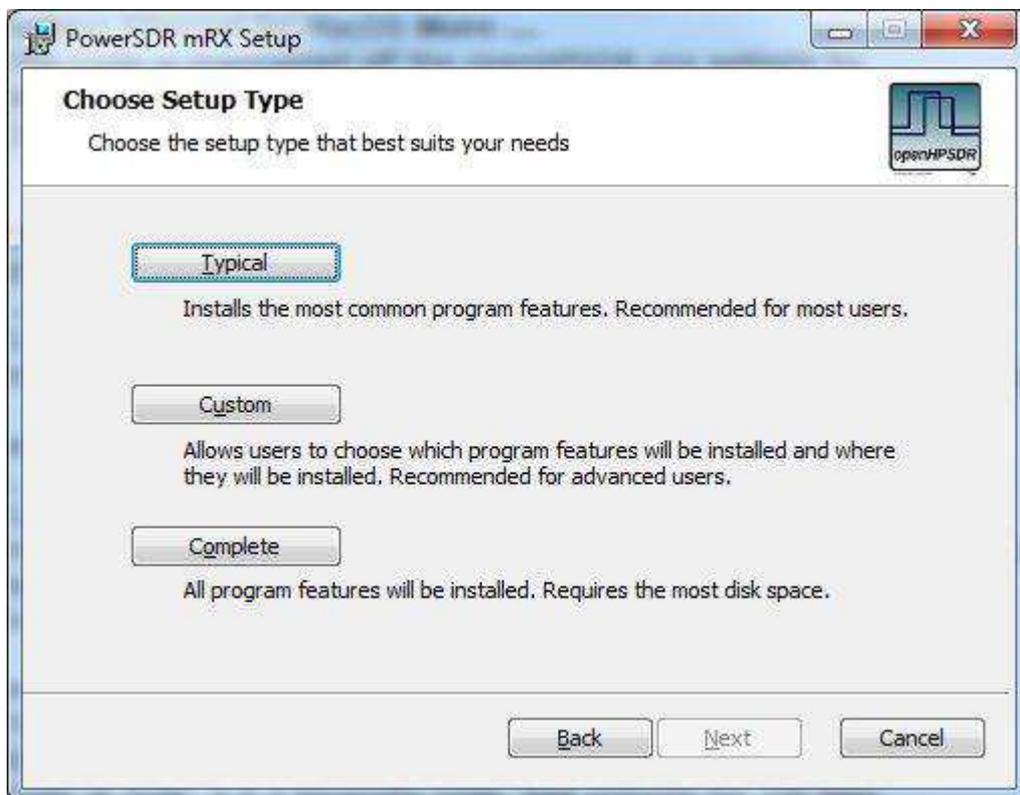
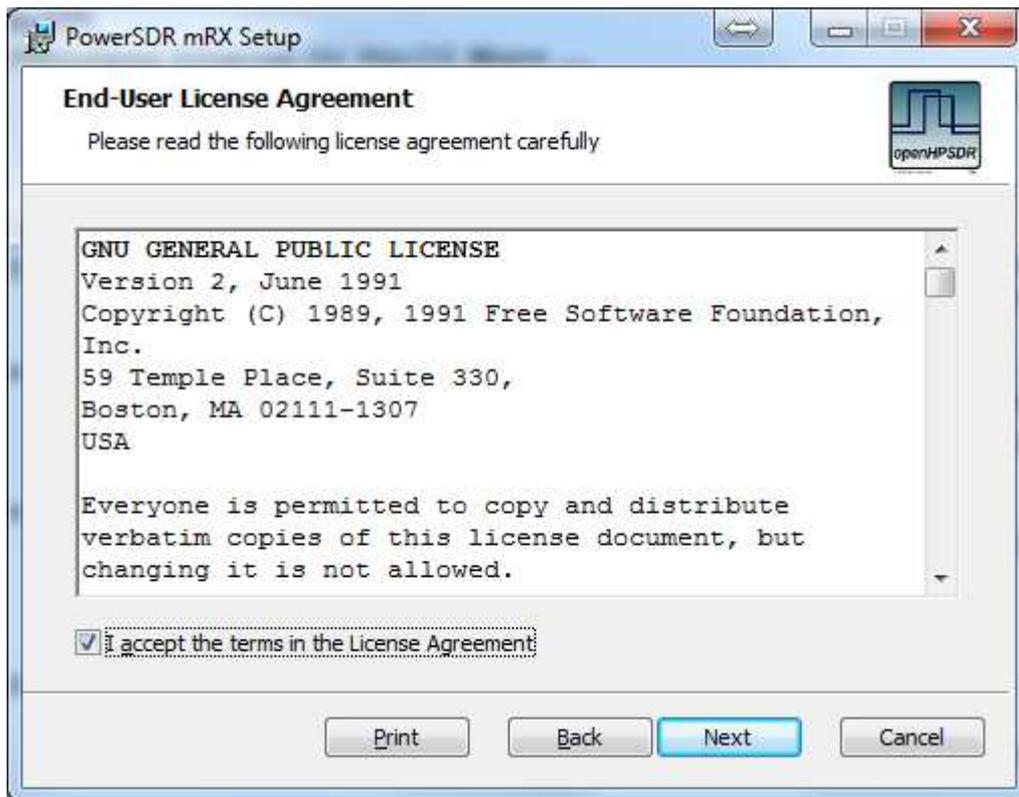
Execute (RUN) to start the Installer at this time.

Note: You may be asked to install the full Microsoft .NET 4.x Framework at this time if the Installer determines that your PC does not have the necessary .NET full 4.0 version installed. If you receive this message, chose "O.K." then you will get a dialogue that will indicate that OpenHPSDR/PowerSDR installation failed at this point. If you have reached this point, you must install the Microsoft .NET 4.0 Framework from [HERE](#)

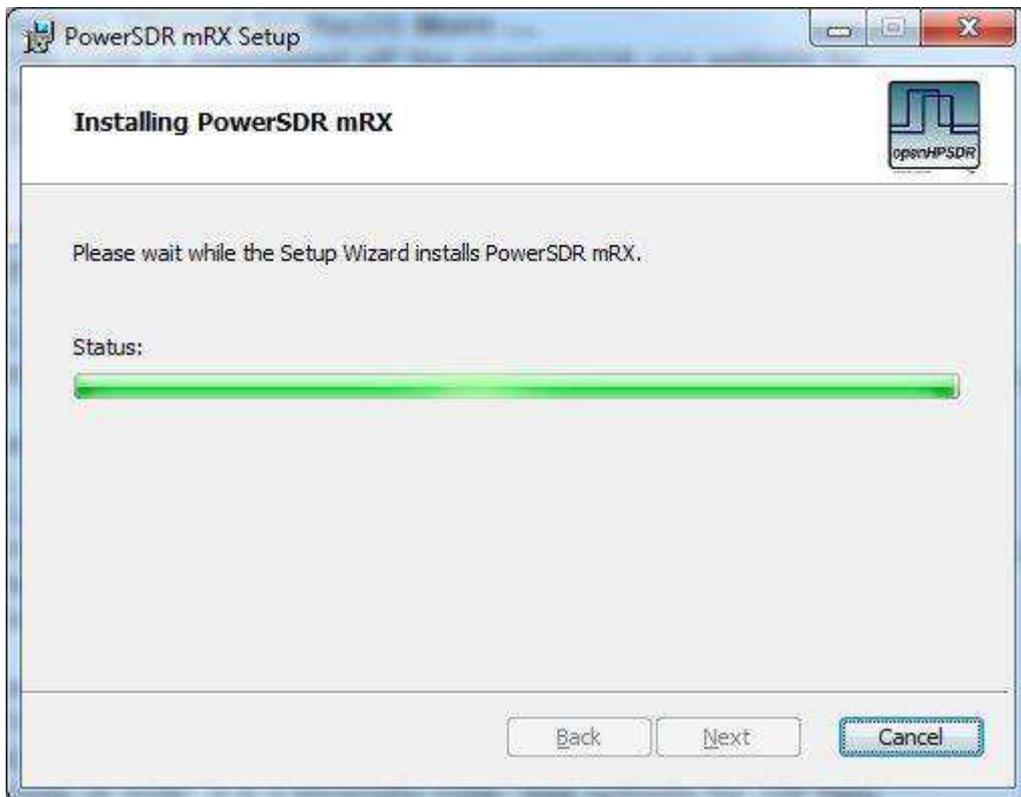
**<http://www.microsoft.com/en-us/download/details.aspx?id=17851>**

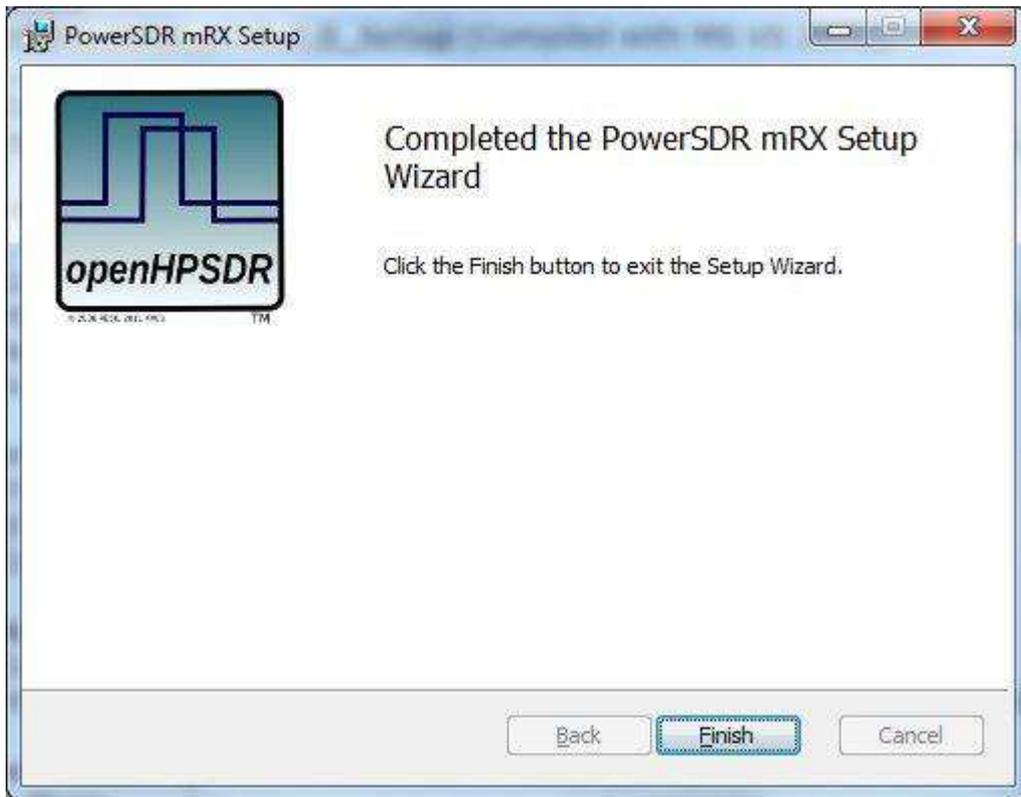
Once you have Microsoft .NET 4.0 installed successfully, you can run the OpenHPSDR/PowerSDR installer again to complete this process. See the example above:





# Apache Labs ANAN SDRs

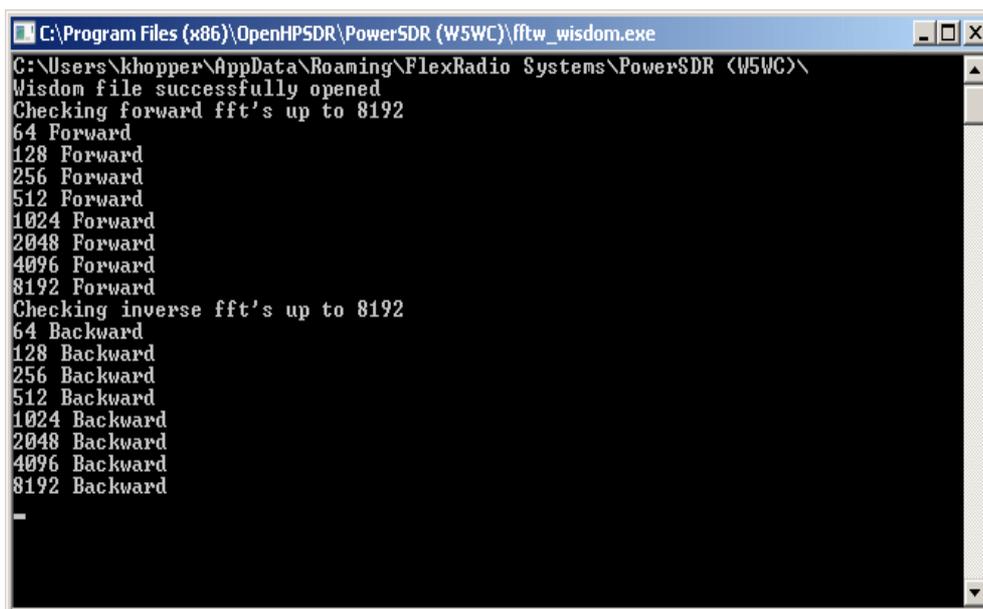




Click on the desktop ICON to start OpenHPSDR/PowerSDR-mRX.

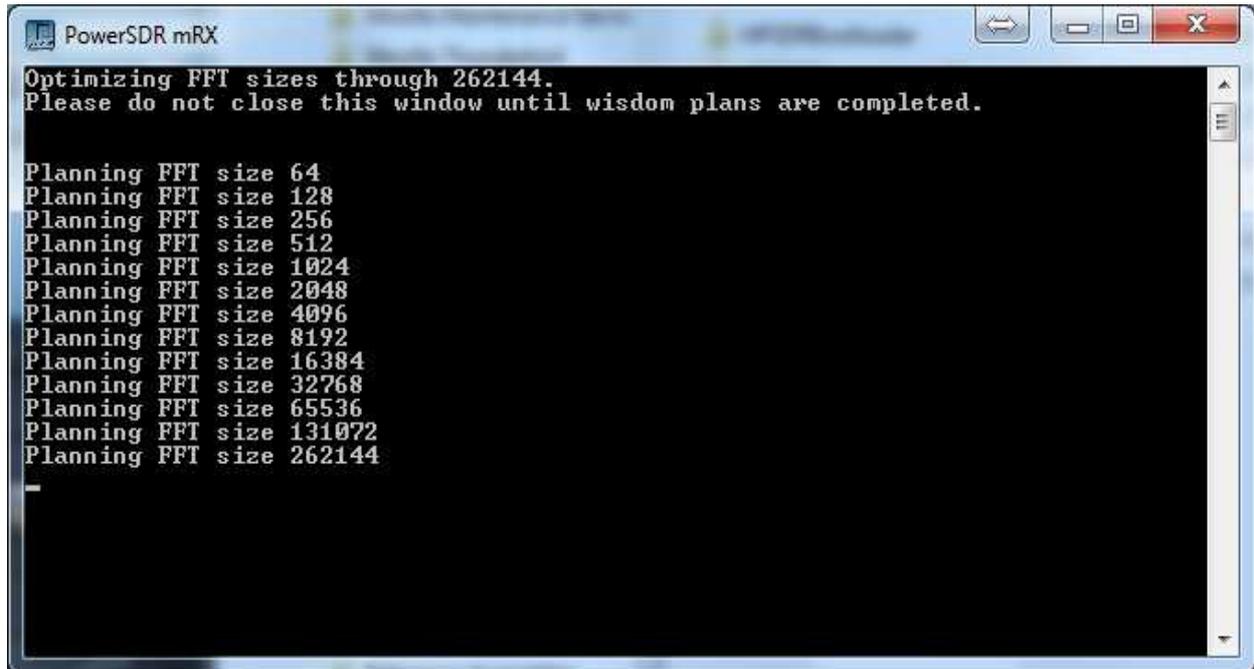
If a OpenHPSDR/PowerSDR\_mRX icon is not clearly apparent on your screen, use your start menu to locate the program.

The program will begin with the "WISDOM" optimization. A one time DOS FFT optimization screen will appear. Wait for this process to finish and the DOS screen will disappear.



Optimization DOS Screen

A second Wisdom screen will appear which continues the optimization through a lengthy calculation.



This may take 10 minutes or more to complete the extended FFT calculation through 262144.

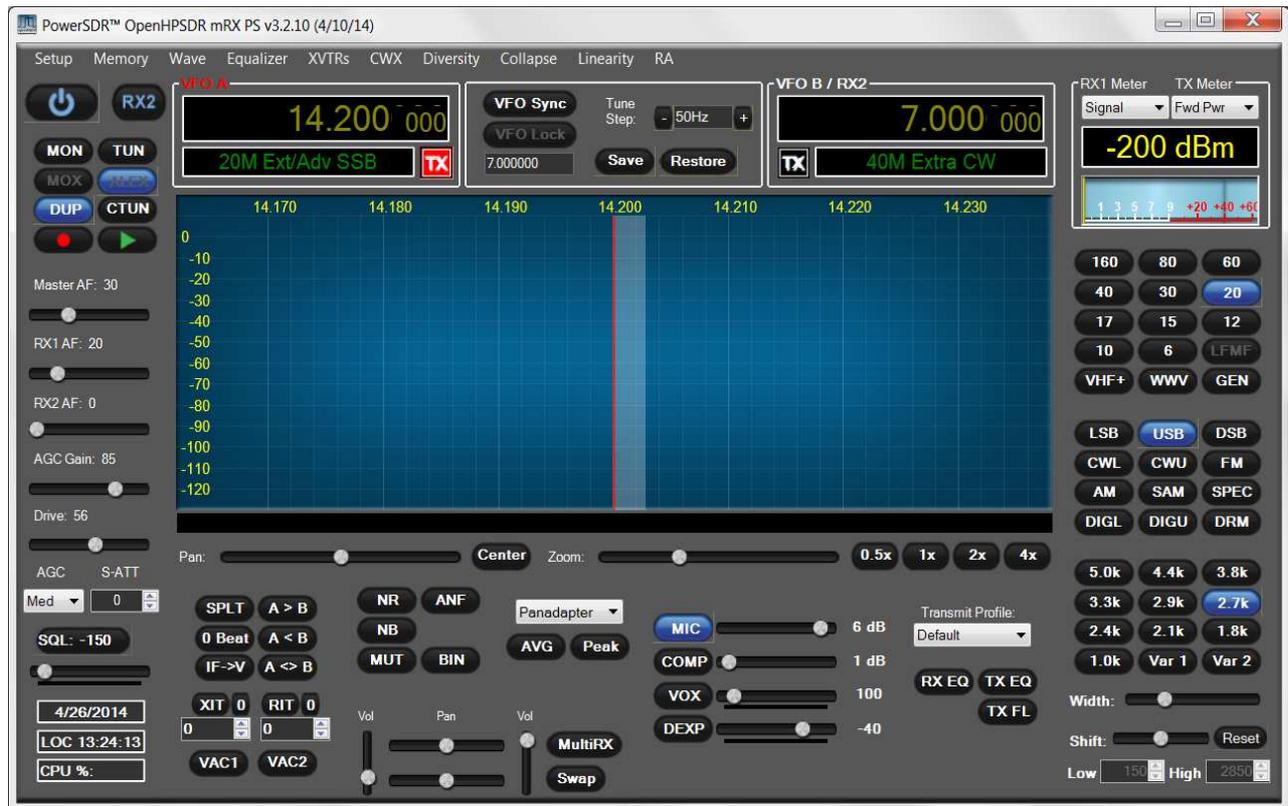
Wait for the message that it is OK. select "OK" to finish.

Turn on your power supply. Push the **POWER ON** button on the ANAN  
Then press the **POWER** button on OpenHPSDR/PowerSDR™.

Wait a few seconds and then click on the Setup Menu selection.

## Apache Labs ANAN SDRs

Click on the "SETUP" menu selection to configure the OpenHPSDR/PowerSDR software.  
OpenHPSDR/PowerSDR basic display screen



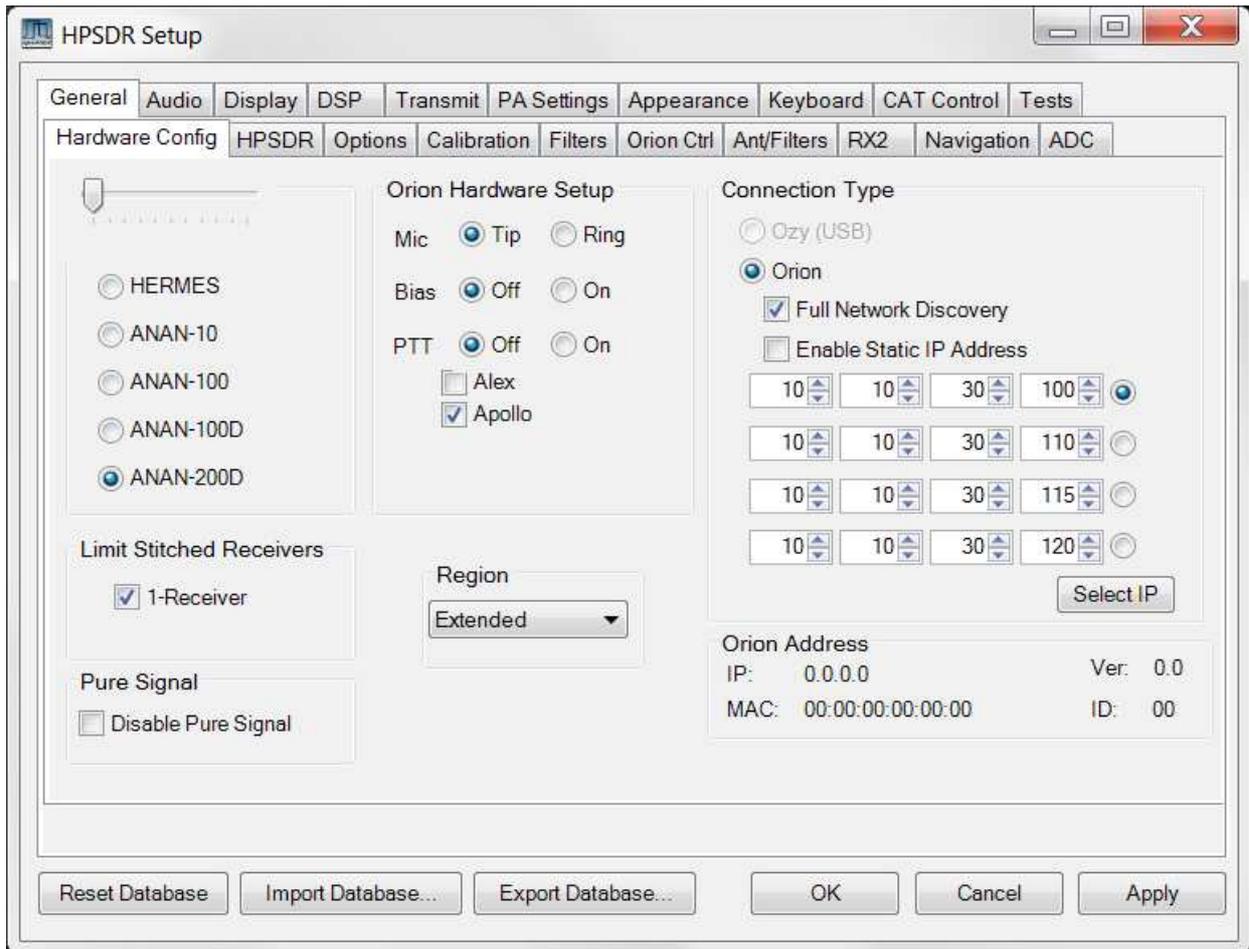
Go to → GENERAL → Hardware Configuration tab and note the IP Address and MAC address that are read from the ANAN Transceiver.

Note: if the IP ADDRESS is 0.0.0.0

- you must check your LAN connection.
- OpenHPSDR/PowerSDR/OpenHPSDR software has not been started
- Power button on the rig has not been activated

Also check your LAN connector on the ANAN to insure that the Link Light on the LEFT side of the LAN connector is illuminated.

## Apache Labs ANAN SDRs

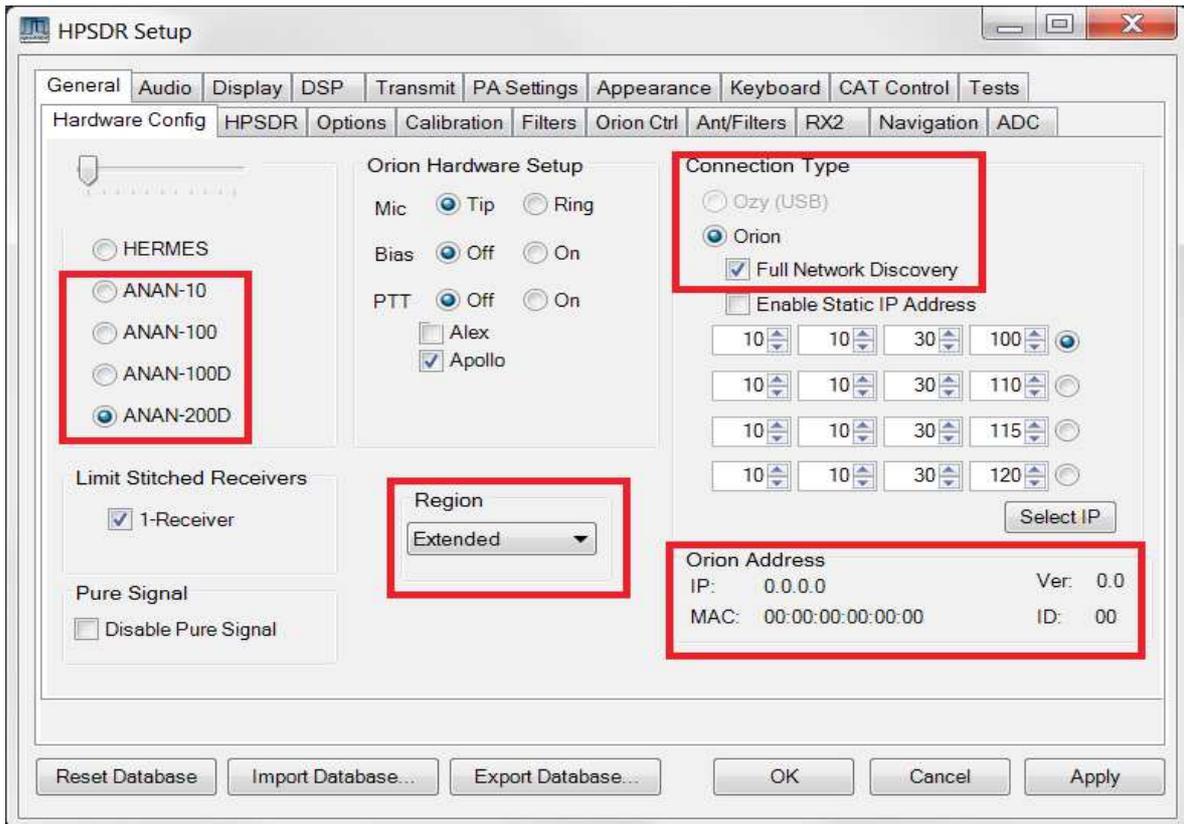


Make a note of your ANAN Transceiver unique MAC address since this will be useful if there is a need for network problem-solving in the future.

**WARNING:** Make sure you have selected the proper radio model from the selections on the LEFT side of the Hardware Configuration box. Failure to do so will result in an improper set of menu options and displays.

The Static IP Addresses are available to point your instance of OpenHPSDR/PowerSDR/OpenHPSDR to a particular Apache Transceiver. There may be several Transceivers on your LAN and the Static IP address is a convenience for pointing this software to a particular unit – where each unit has it's own IP address.

## Apache Labs ANAN SDRs



Setup ---> General tab ---> Hardware Config tab, the Radio Model should have the appropriate ANAN radio selected. Connection Type "**ANAN**" and "**Full Network Discovery**" should both be checked. In the "**Region**", select the Country in which you reside.

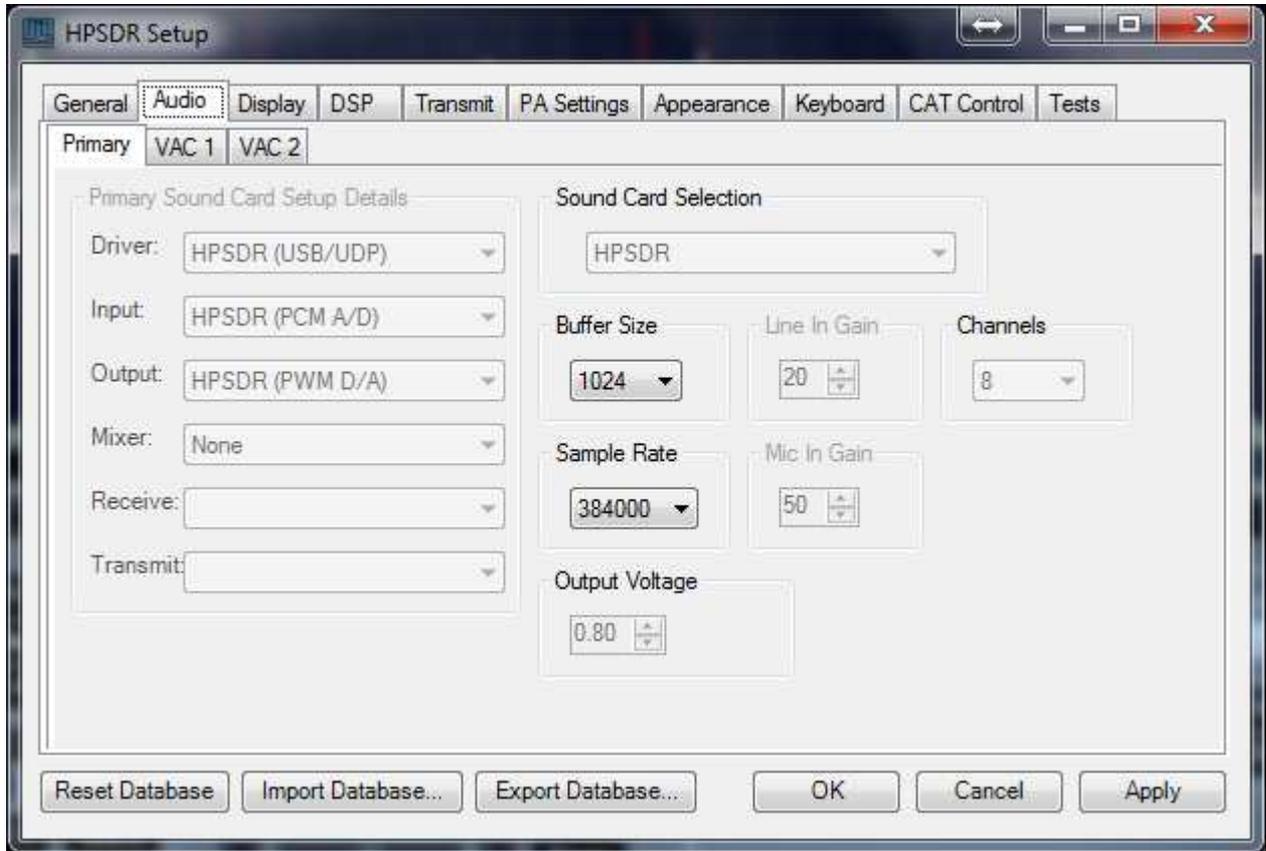
The ANAN IP address and Firmware version number in the green box highlighted above will be set automatically by your network router DHCP server, or if connected directly to your PC, the IP address will be assigned by the "APIPA" process – WHICH MAY TAKE UP TO SEVERAL MINUTES TO ASSIGN AN IP ADDRESS.

If your LAN is properly configured, the ANAN board IP ADDRESS and MAC ADDRESS should be automatically be detected and assigned. An incorrect default value is 169.254.1XX.XXX.

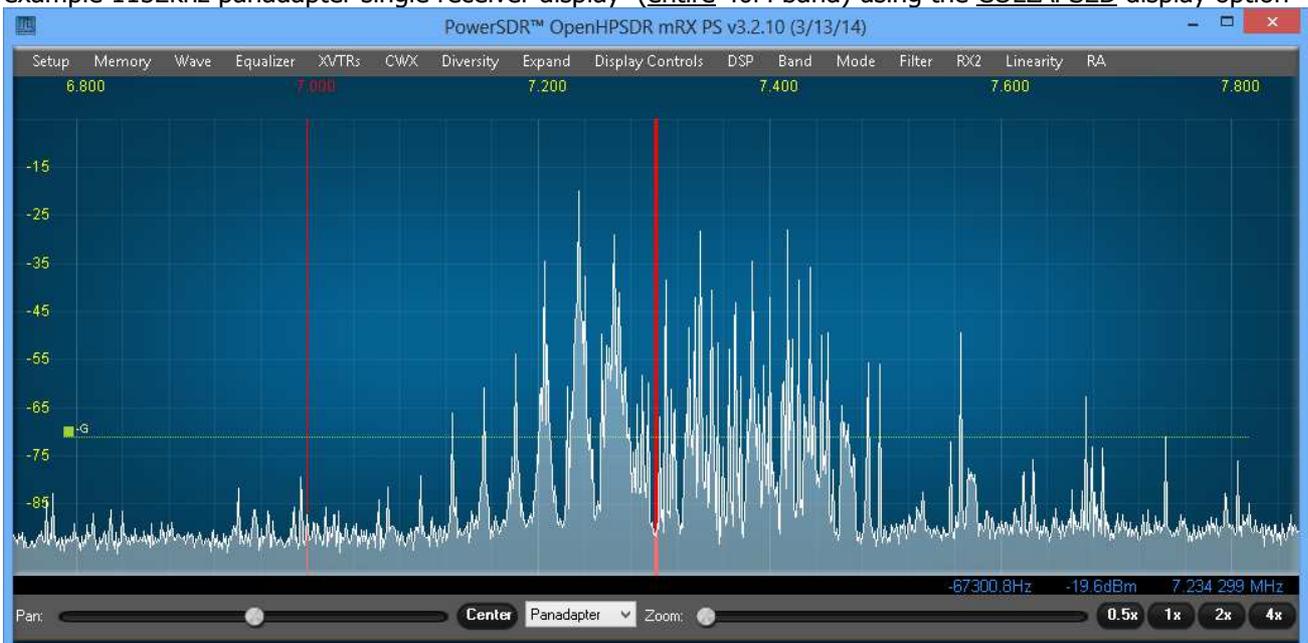
OpenHPSDR/PowerSDR™ will display the currently assigned IP address and MAC address of the ANAN Hermes board if the LAN connection is properly connected and configured. If the ANAN IP ADDRESS remains 0.0.0.0 then you must determine if OpenHPSDR/PowerSDR and your PC network connection is operating correctly. Some typical problems could be that the Ethernet connection to your PC or LAN connector is disabled in Windows. The Ethernet connector may not be properly seated in your PC or Router. DHCP addressing must be properly enabled on your router. The new HPSDRProgrammer V2 utility allows you to assign a STATIC IP ADDRESS if you wish.

## Apache Labs ANAN SDRs

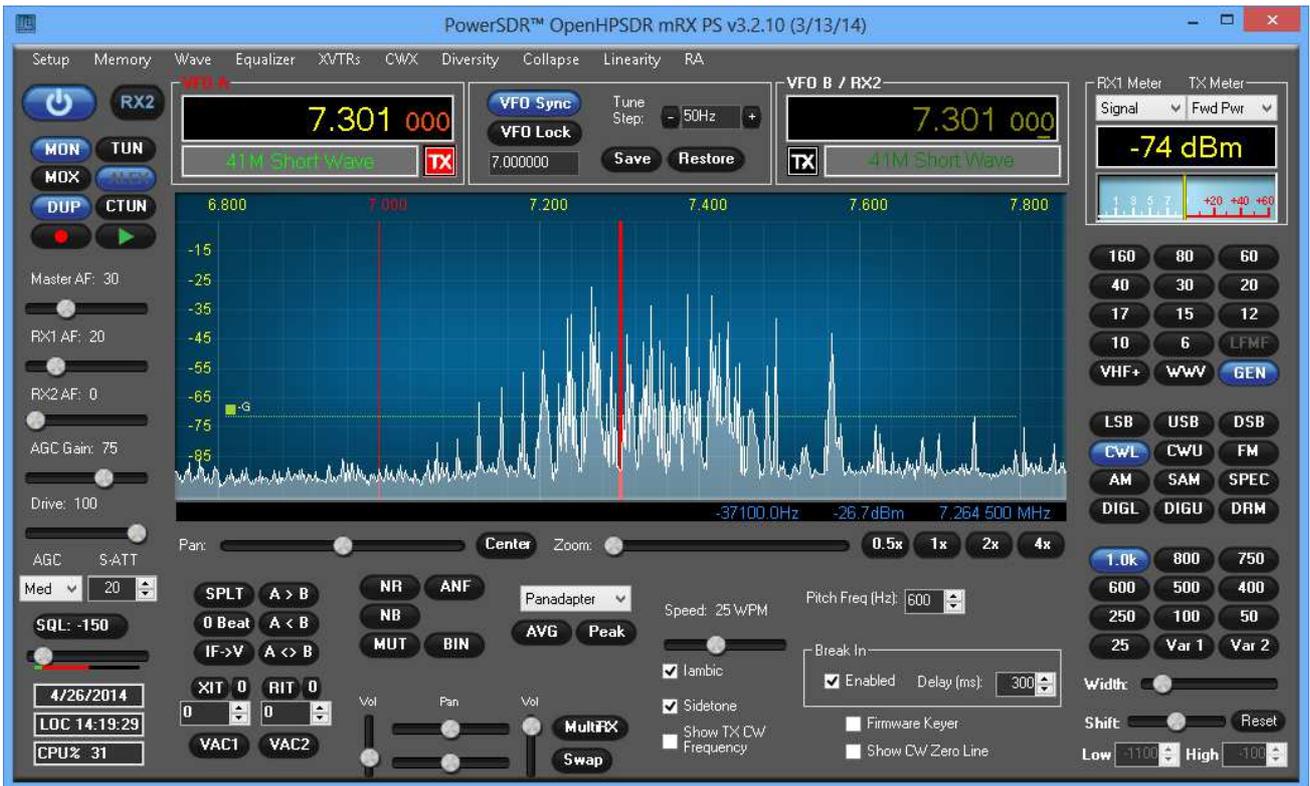
Please select a Sample Rate of 384kHz, for the Panadapter display width, at this time (running OpenHPSDR/PowerSDR/OpenHPSDR 3.0.2.x)



example 1152kHz panadapter single receiver display (entire 40M band) using the COLLAPSED display option

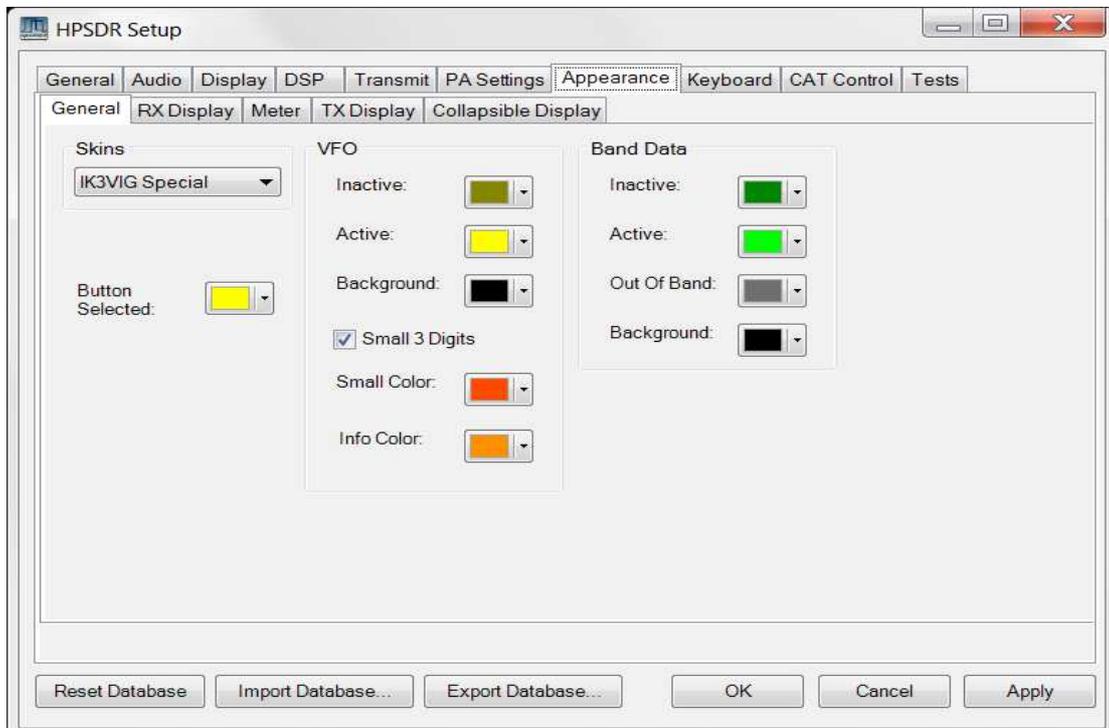


## Apache Labs ANAN SDRs

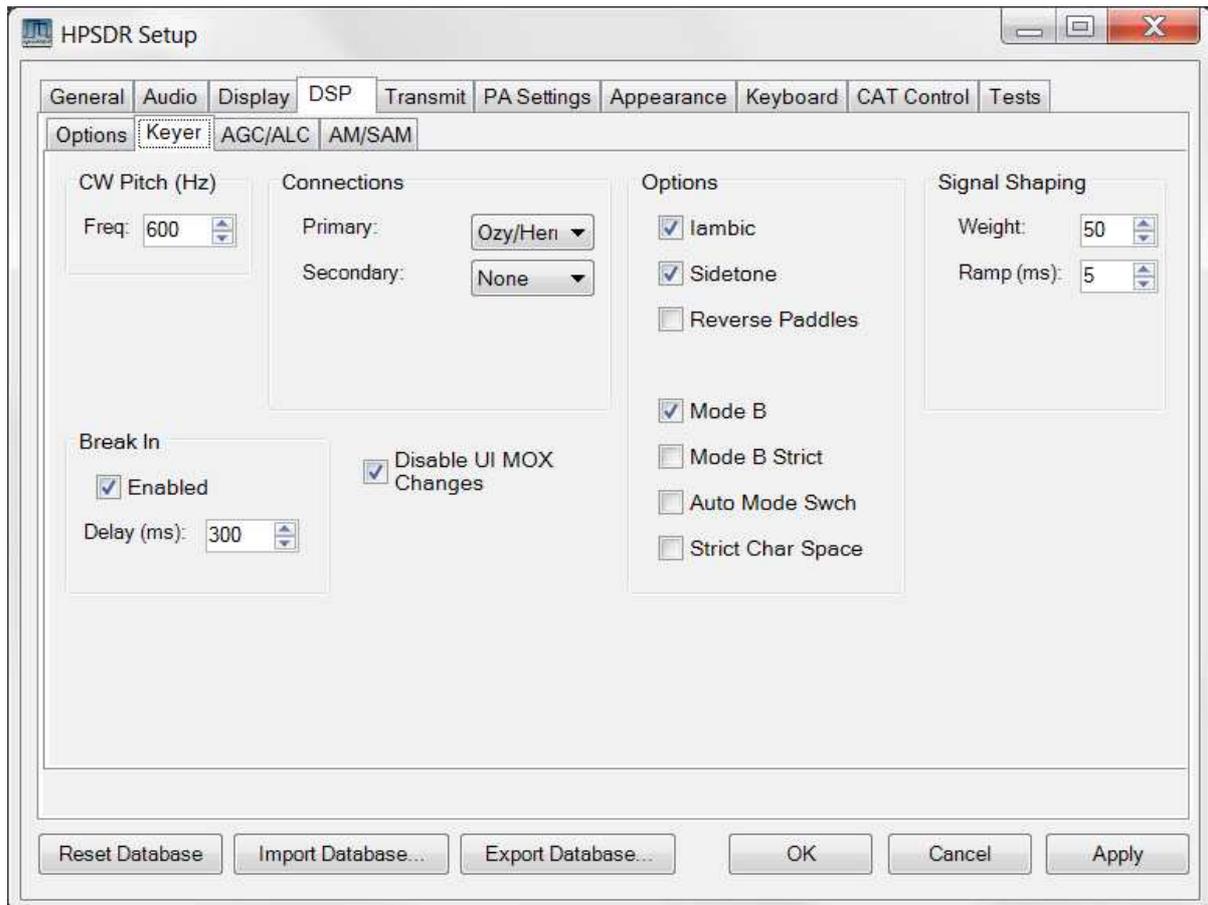


40M AM Broadcast band  
shown using 3 x 384kHz for RX1

General tab ---> APPEARANCE tab, and you should be able to change the graphical appearance of OpenHPSDR/PowerSDR by selecting different "skins".



## CW Key Selection and Wiring



### Select Iambic Paddles or straight key

To use a CW key with OpenHPSDR/PowerSDR™ you will need to enable it in the menu. To do so, click on Setup → DSP tab followed by the Keyer tab.

Provides connection for a CW key, either straight, single-paddle or Iambic. If using dual-paddle or Iambic mode, the common connection of the key should be made to the sleeve of a 3.5mm 1/8" stereo plug, the "dot" side to the ring and the "dash" side to the tip. If a straight key is used, this should be connected between the sleeve and the tip of the plug. Some PC SDR Software enables the dot and dash connections to be reversed via a menu selection (above). The dot and dash connections are connected to a 3.3vdc via a 1k resistor.

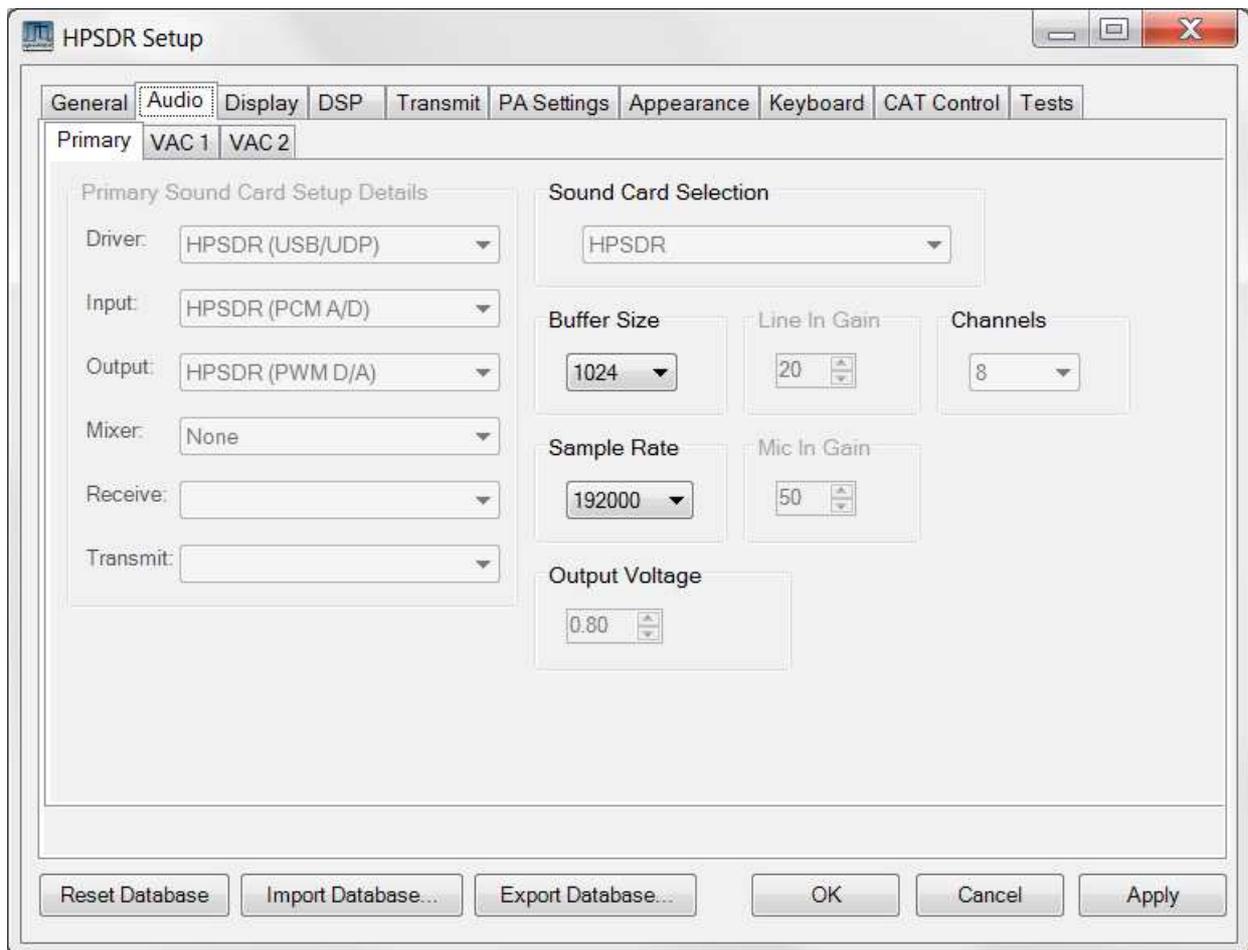
## PureSignal Setup

### Firmware Requirements

Special features are required in the firmware for PureSignal operation.

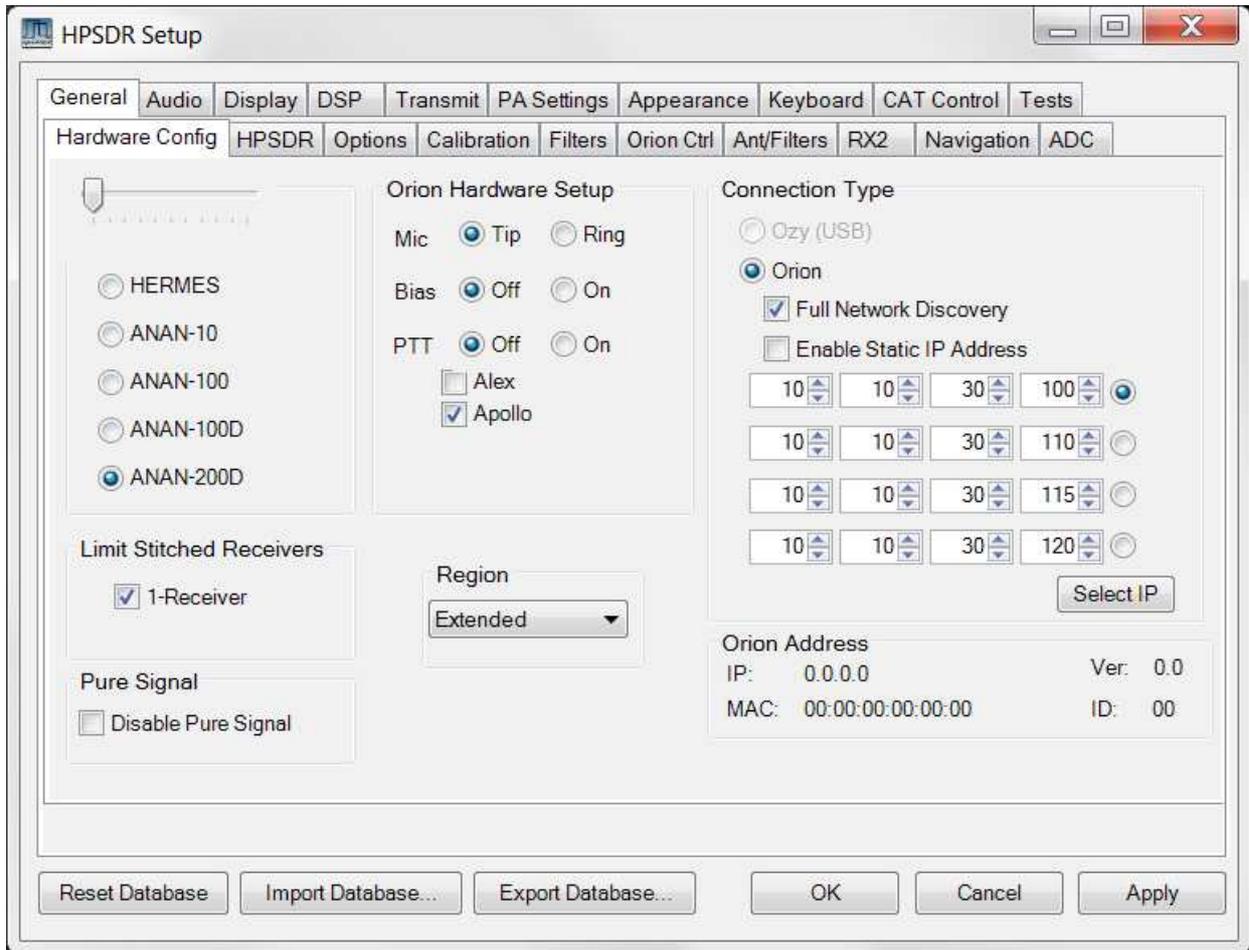
- Firmware for Hermes/ANAN-100 must be Hermes\_v2.5 or later.
- Firmware for Angelia/ANAN-100D must be Angelia\_v2.2 or later.
- Firmware for Orion/ANAN-200D must be Orion\_v1.9 or later.

### PowerSDR(tm) Settings



Sample Rate: On the Setup > Audio tab, please set the sample rate to 192K. When Gigabit Ethernet firmware is available, in the future, we will move to 384K.

## PureSignal Controls & Operation



Ensure that the "Disable PureSignal" is NOT checked on the "Setup>General>Hardware Config" tab. Why is this box even there? Having PureSignal enabled MAY require more network bandwidth. Therefore, for users that are operating wireless or have limited bandwidth, it would be best to check the box unless they want to use PureSignal. This is very similar to the situation with the "Limit Stitched Receivers" checkbox just above. At this point, we have made Stitched Receivers and PureSignal mutually exclusive.

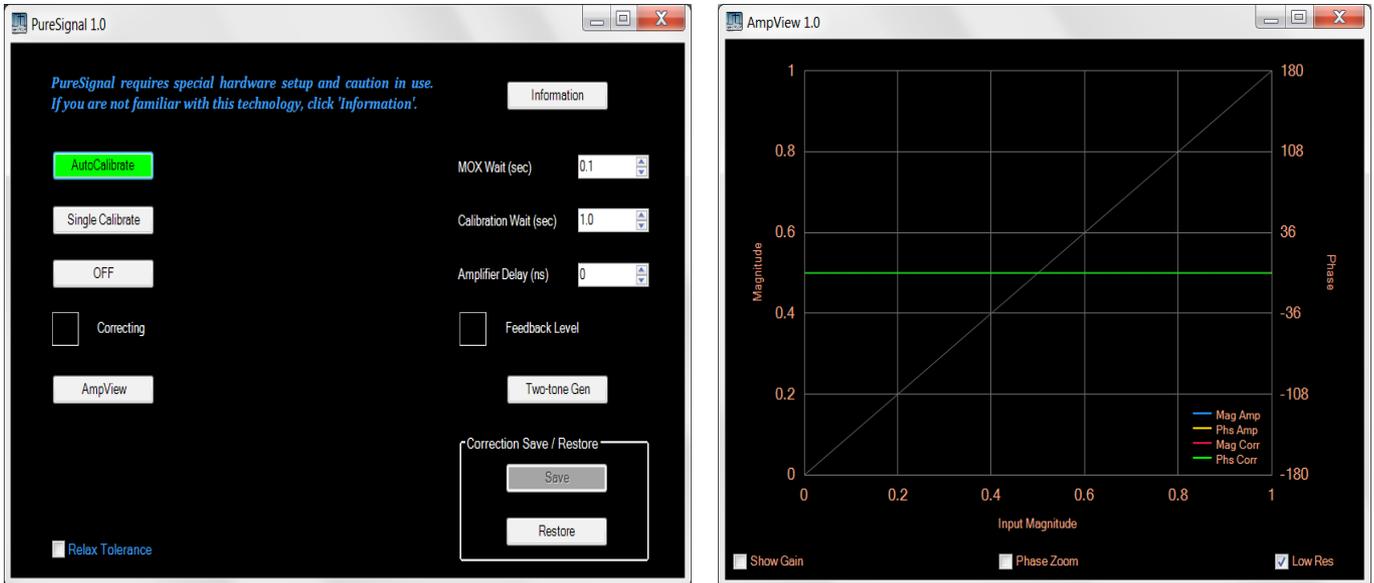
Clicking 'Linearity' on the menu strip along the top of the PowerSDR\_mRX console will open the PureSignal form.

For 6m Puresignal operation please check "Disable 6m LNA" "Tx" checkbox in **Setup—ANT/Filters—HPF/LPF**.

For linearising an external PA internal ANAN crosstalk needs to be reduced, check "Disable HPF on "Tx" in **Setup—ANT/Filters—HPF/LPF**.

## Apache Labs ANAN SDRs

Enable PureSignal by clicking on the Linearity tab (PowerSDR), doing so will bring up the PureSignal Screen, click on Autocalibrate.

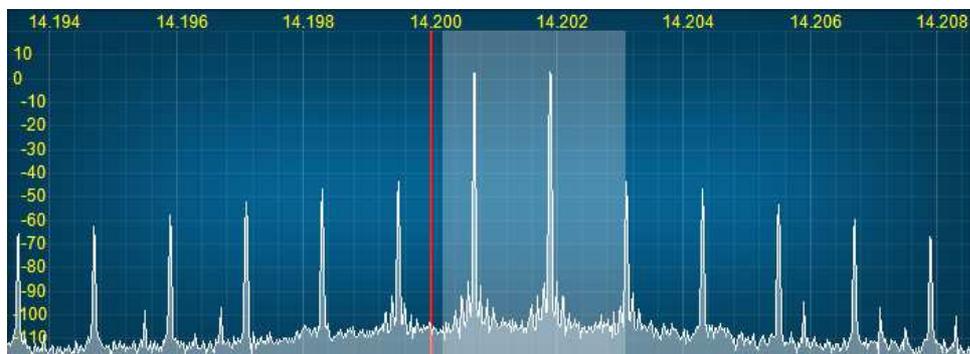


Internal Feedback is used in the ANAN100/100D/200D for sampling the transmitted signal via Rx1, the PureSignal algorithm is extremely resilient and extensive testing results have demonstrated that even with low feedback levels the software will work as desired.

You may adjust the RX1 attenuator settings for each band for optimum feedback (indicated by green) in the puresignal Feedback Level.

All settings may be left at default, please do not check the Relax Tolerance TAB.

Clicking on the AmpView TAB will bring up this screen which displays the phase & magnitude errors in the PA and the corrections being applied by the PureSignal Algorithm.

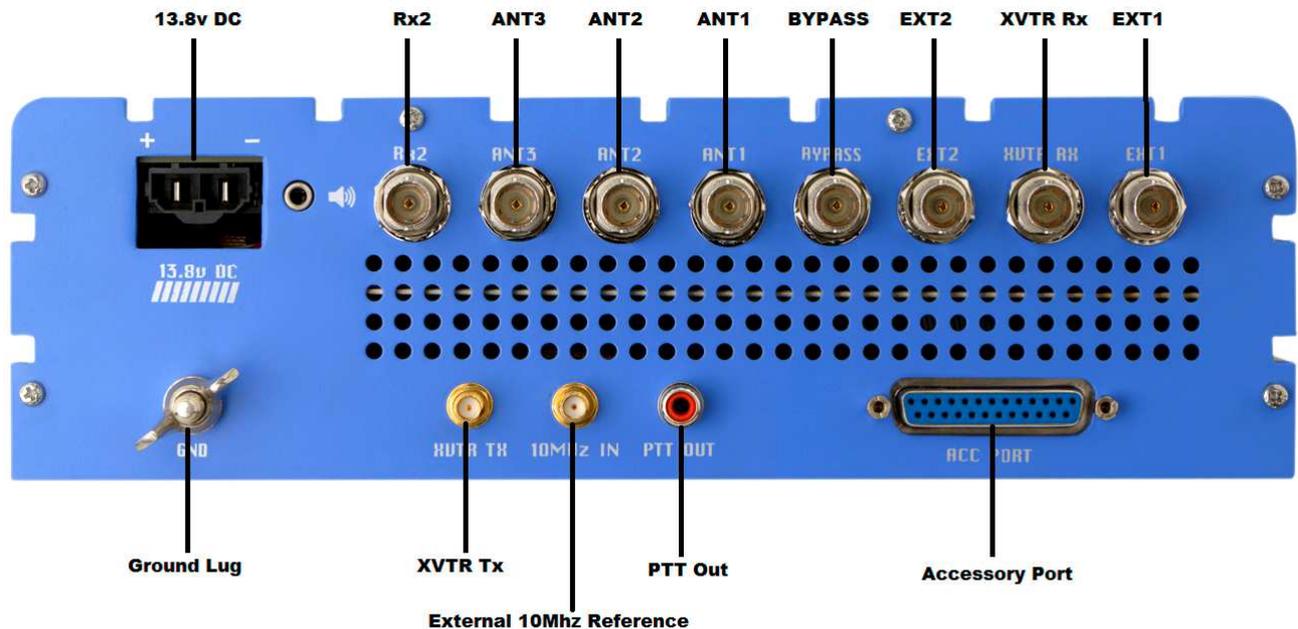


Typical two tone IMD with DUP mode enabled during transmit, Duplex mode can be used to monitor the functioning of Puresignal.

PureSignal Setup Video, Courtesy, Nige (G7CNF) - <https://www.youtube.com/watch?v=0adHZOTqTIQ>

**NOTE: The Internal feedback is sufficient for PS and addition of an external coupler is not required.**

## Antenna Connections



The ANAN-10/100/100D/200D provide multiple ways a user can connect antennas and provides great flexibility with numerous options for transmit and receive. Three (3) different Antennas can be connected to the back of the ANAN-10/100/100D/200D and be configured to support send or receive on all or a selection of bands by each Antenna. This can be configured on the Ant/Filters tab and additional configuration detail follows later in this manual.

Your Anan assumes a 50 Ohm standard antenna will be connected to Ants 1-3. The Anan 100/100D does not have a built in Antenna tuner and therefore unless your antenna's have a resonant 2:1 SWR, an external tuner should be used to optimized antenna SWR and performance. Ideally you will be able to tune your antenna to 2:1 or less for SWR for operations.

The Anan by default provides limited isolation between the Ant 1, Ant 2 and Ant 3 connections by sending the signal to ground and attenuating the receivers input during transmit. Additional attenuation can be selected via the ATT to TX setting on the Ant/Filters tab in PowerSDR MRX Settings.

A very nice feature of the ANAN-10/100/100D/200D is it's ability to monitor your transmit signal on the receivers while transmitting. If you select DUP (DUPLEX) on the main screen in PowerSDR MRX the transmit signal will be visible on the Panadapter while you transmit allowing you to visually monitor your signal. You must be in Panadapter or Panafall modes to see your signal.

Above generously contributed by Mark NIØZ

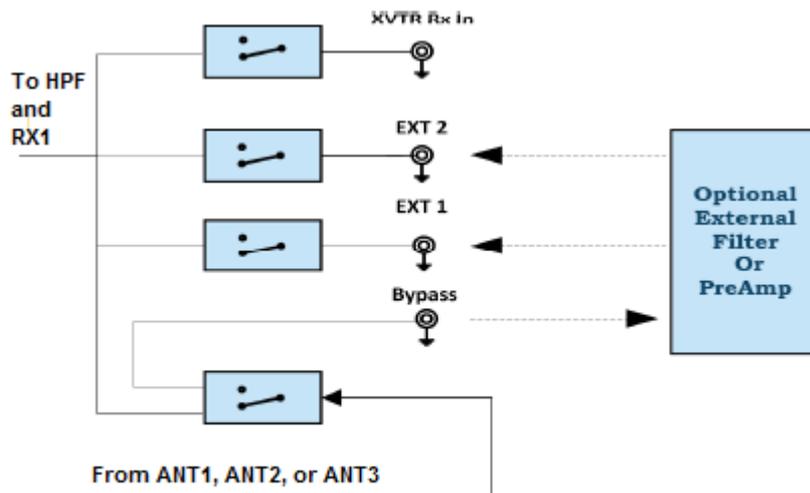
### Antenna use and switching in ANAN-100/100D/200D

There are many Antenna switching options for the Apache Labs ANAN-100/100D/200D. Below you see a screen picture of the Setup ---> General ---> Ant/Filters, Antenna tab.

The 1, 2, 3 selections correspond to the rear panel ANT1, ANT2, and ANT3 BNC connectors. You can select different antennas for receive and transmit on each band. As you change bands, the selected antenna ports will automatically change according to the settings on this form.

You can also optionally select EXT1, EXT2, or XVTR to receive on the selected port while transmitting on ANT(N). These correspond to the EXT1, EXT2 and XVTR BNC connectors on the ANAN-100/D back panel.

When you select EXT1, EXT2, or XVTR, the receive path from ANT(n) bypasses the "LPF" and routes the signal to the rear panel ByPass connector.

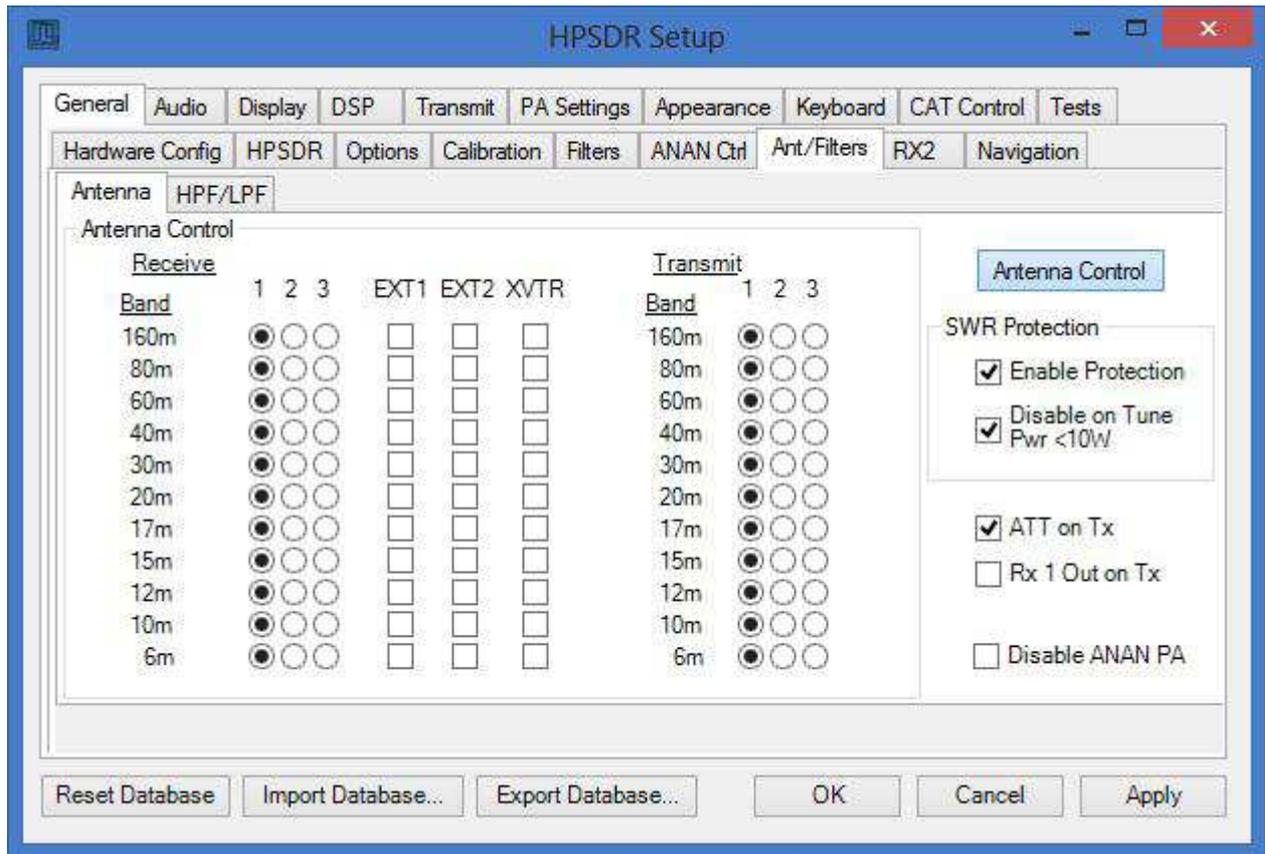


If you select EXT1, EXT2, or XVTR you can modify the received signal path by:

1. Connecting an external filter or pre-amp between the ByPass connector and the selected EXT1, EXT2 or XVTR connector. The signal would then pass thru the HPF to the receiver.
2. Attaching an external receive antenna to the EXT1, EXT2, or XVTR connector. The selected antenna would then be routed thru the HPF to the receiver. If EXT1, EXT2, or XVTR is selected, ANT1-3 would no longer be used for receiving.

**WARNING:** During transmit, the selected EXT1, EXT2, or XVTR antenna could experience high levels of RF which could result in damage to the receiver. An external T/R switch should be configured to protect the receiver input while transmitting.

## Apache Labs ANAN SDRs



Note the Antenna Control menu allows you to control the following options:

1. Software SWR Protection.  
Enabling this option will reduce power output when high SWR levels are detected.
2. Disable on Tune Pwr < 10W.  
Enabling this option will disable Software SWR protection when the Tune power level is less than 10 watts. The Tune power level can be set on the Setup, Transmit tab.
3. ATT on TX. This option inserts attenuation in the receiver when the ANAN-\* is transmitting. This can prevent or reduce the ADC/Receiver overload warnings during transmit.
4. RX 1 Out on Tx. This option switches the receive path from ANT(n) to the rear panel Bypass connector.
5. Disable ANAN PA (only functional via the XVTR form)

## HPF/LPF Filters and switching in ANAN-100/100D/200D

The ANAN-100/100D/200D have a very effective set of High Pass Filters (HPF) and Low Pass Filters (LPF), available on the Setup, General, Ant/Filters/HPF/LPF tab. The HPF and LPF are automatically selected as you change bands, according to the settings on this form.

The ByPass check box on the left side of the HPF/LPF tab, when checked, removes the selected high pass filter from the receive path.

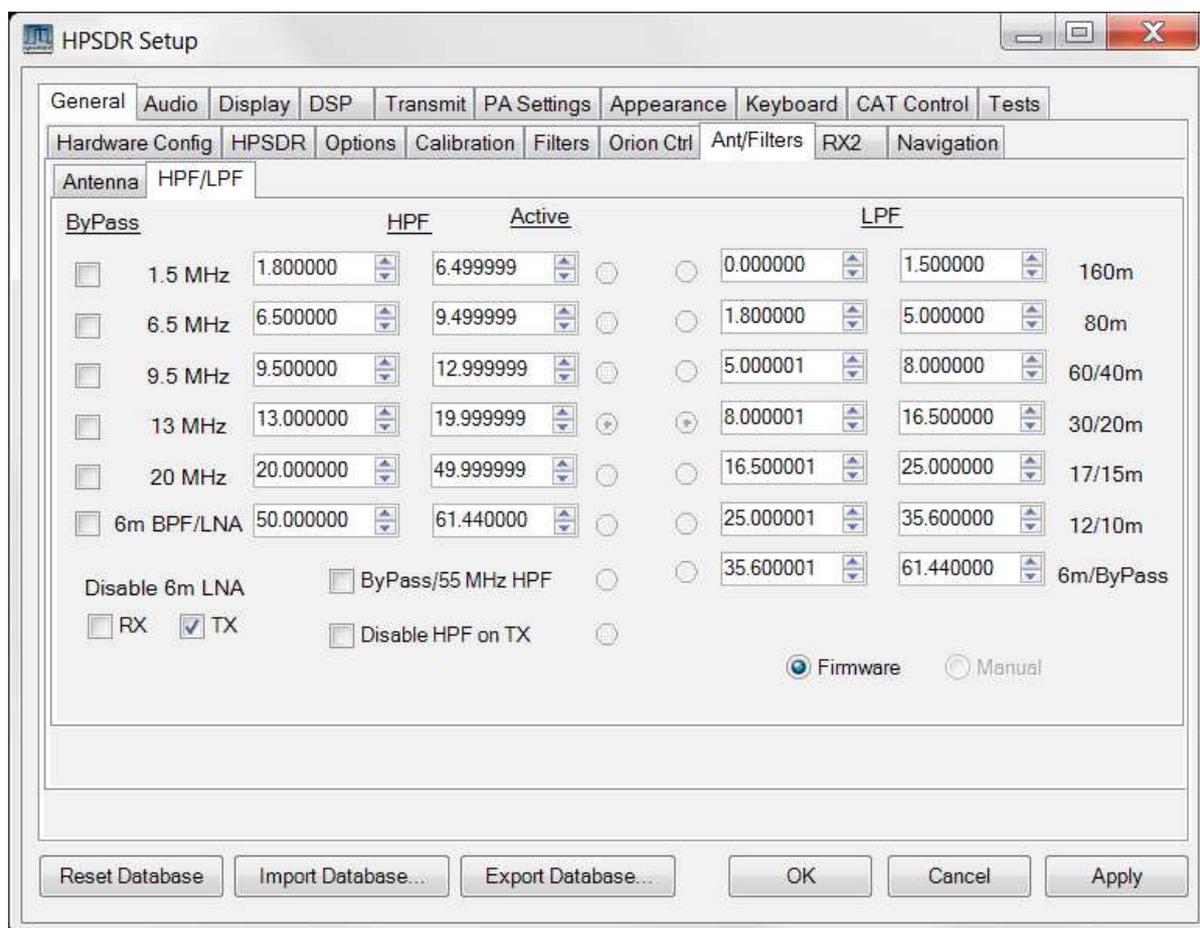
The values in the up/down boxes control the frequency ranges when these filters are automatically selected.

The 6m BPF/LNA bypass check mark controls the 6 meter low noise amplifier and filtering.

The ByPass/55mhz HPF check mark, when enabled bypasses all high pass filters.

The active buttons displayed between the HPF and LPF show which filters are currently active.

The Auto/Manual radio buttons should be left in Auto mode for most operations. Selecting manual will allow you to see what receive filters are selected when you bypass or change receiver frequency ranges etc.

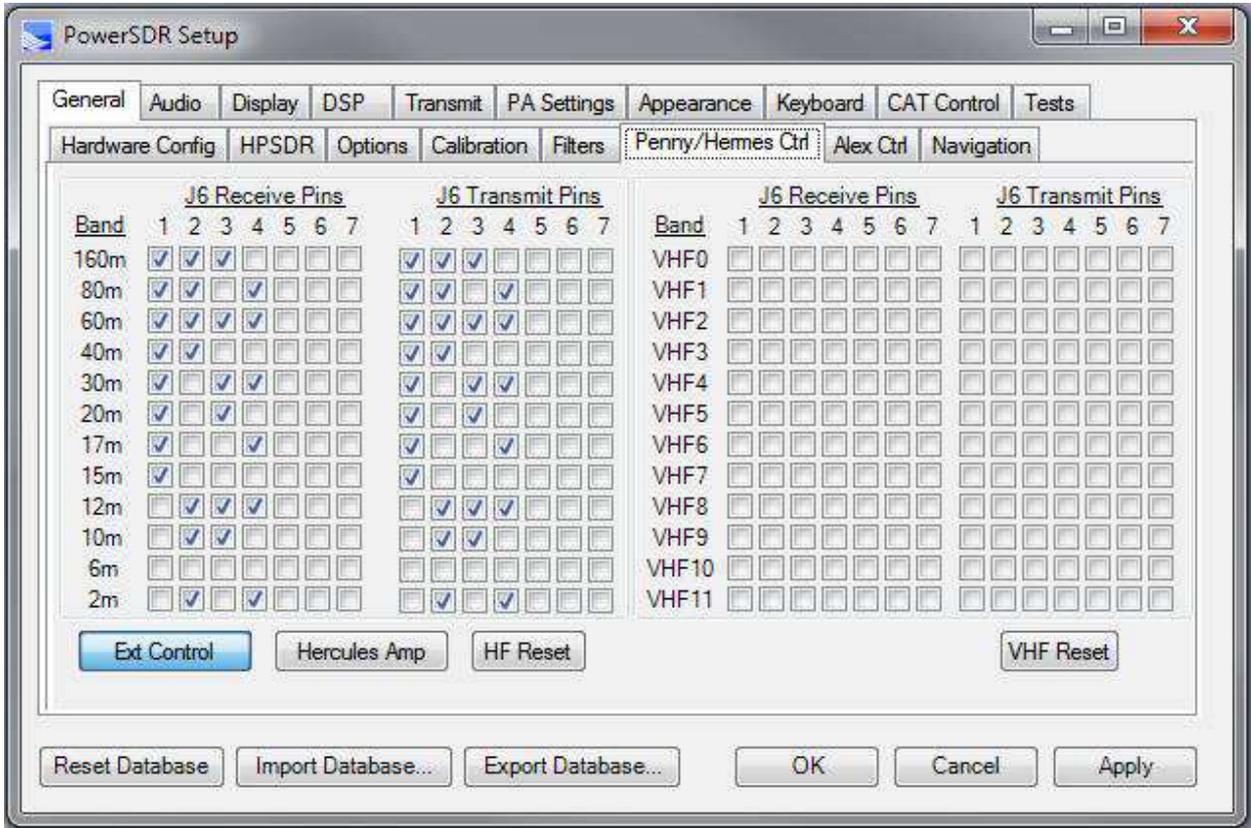


For 6m Puresignal operation please check “Disable 6m LNA” “Tx” checkbox in **Setup—ANT/Filters—HPF/LPF**.

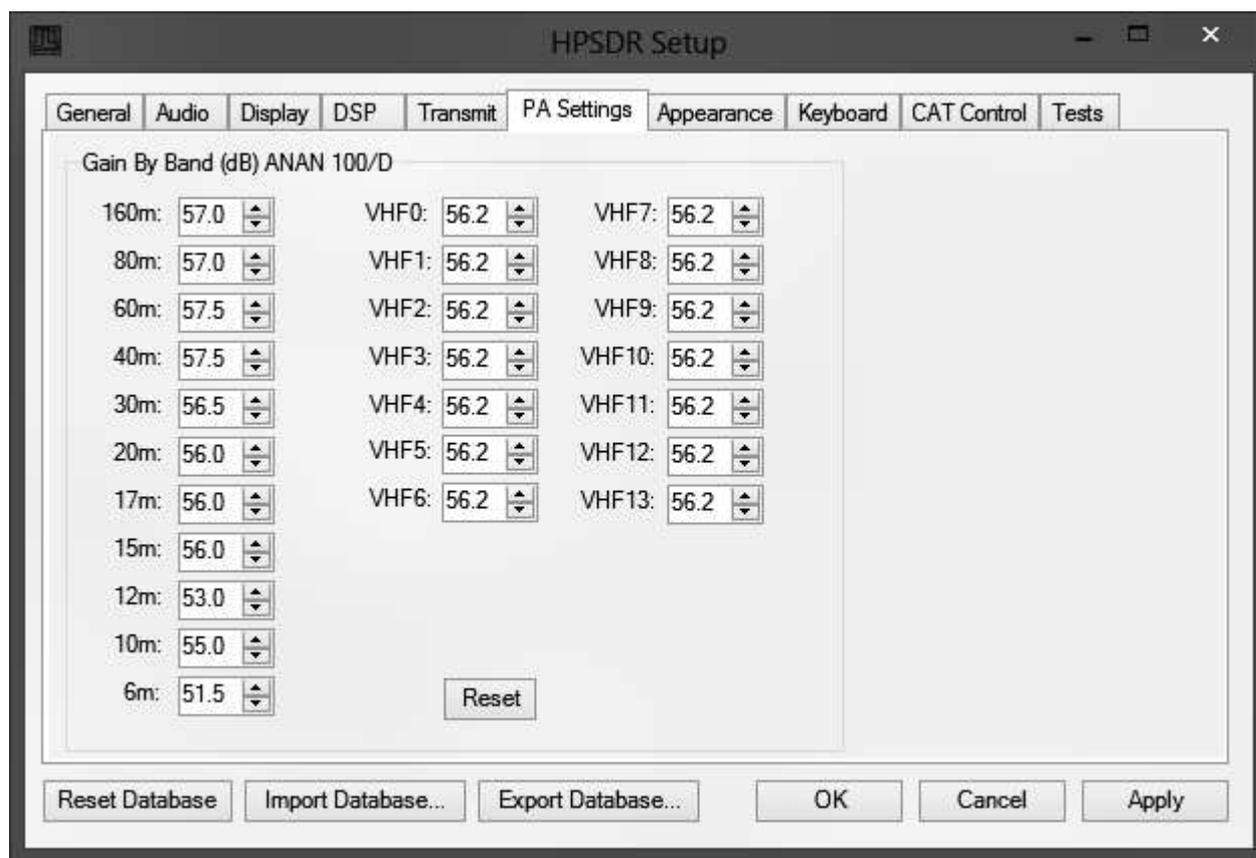
For linearising an external PA internal ANAN crosstalk needs to be reduced, check “Disable HPF on “Tx” in **Setup—ANT/Filters—HPF/LPF**.

### OpenCollector BCD example by VK6PH

This is an example provided by Phil Harman VK6APH of how to code the OpenHPSDR/PowerSDR/OpenHPSDR Power\_mRX program to give a BCD (binary coded decimal) output for control of external equipment (such as band information for a Linear Amplifier).



## Manual PA Calibration



Each ANAN-100/100D/200D user needs to manually calibrate the Transmitter Power Output settings within OpenHPSDR/PowerSDR™. OpenHPSDR/PowerSDR/OpenHPSDR allow a slight touch-up of transmitter power output.

Use the following manual calibration procedure to properly set/calibrate your ANAN-100/100D/200D power output into a dummy load:

1. Connect a suitable Dummy Load to ANT1 BNC port on the back panel of the Transceiver.
2. Click on menu selection, Setup, Transmit.
3. Set "TUNE" (left side of window), Power (W) to 100
4. Select "FWD Pwr" from the "TX Meter" upper right corner of the main OpenHPSDR/PowerSDR/OpenHPSDR window.
5. Enable the Antenna window by clicking on Setup ---> General ---> ANT/FILTERS tab to access the antenna settings.
6. Select the Transmit antenna ANT1 where you connected the Dummy Load.
7. Select the PA settings TAB on the Setup menu window.  
The PA Settings TAB allows you to set (calibrate) the ANAN-100/D Power Amplifier gain by band (dB – Power Output per Band) for each of the available Ham Bands. There is an up/down gain control for each band, which regulates the Power Amplifier output for that band. **As you increase the Gain By Band, power output will decrease. Conversely, decreasing Gain By Band will increase Power Amplifier output.**

Maximum power output per band can be reached at the lowest value in this menu.

### Setup PA settings Band:

8. Select one of the bands on the PA settings TAB.
9. Ensure you have the Setup ---> Transmit tab ---> Tune control set to 100 and a **150W** or larger **Dummy Load** connected to the selected antenna port on the ANT/FILTERS setup tab.
10. Press "TUN" (Tune) on the upper left side of the OpenHPSDR/PowerSDR™ main display form on your computer.
11. Adjust the band gain value for a **MAXIMUM** TX Meter "FWD PWR" output reading of 100 watts while using your suitable Dummy Load. Do NOT use an Antenna for this calibration adjustment.
12. Press "TUN" button again to unkey the radio.

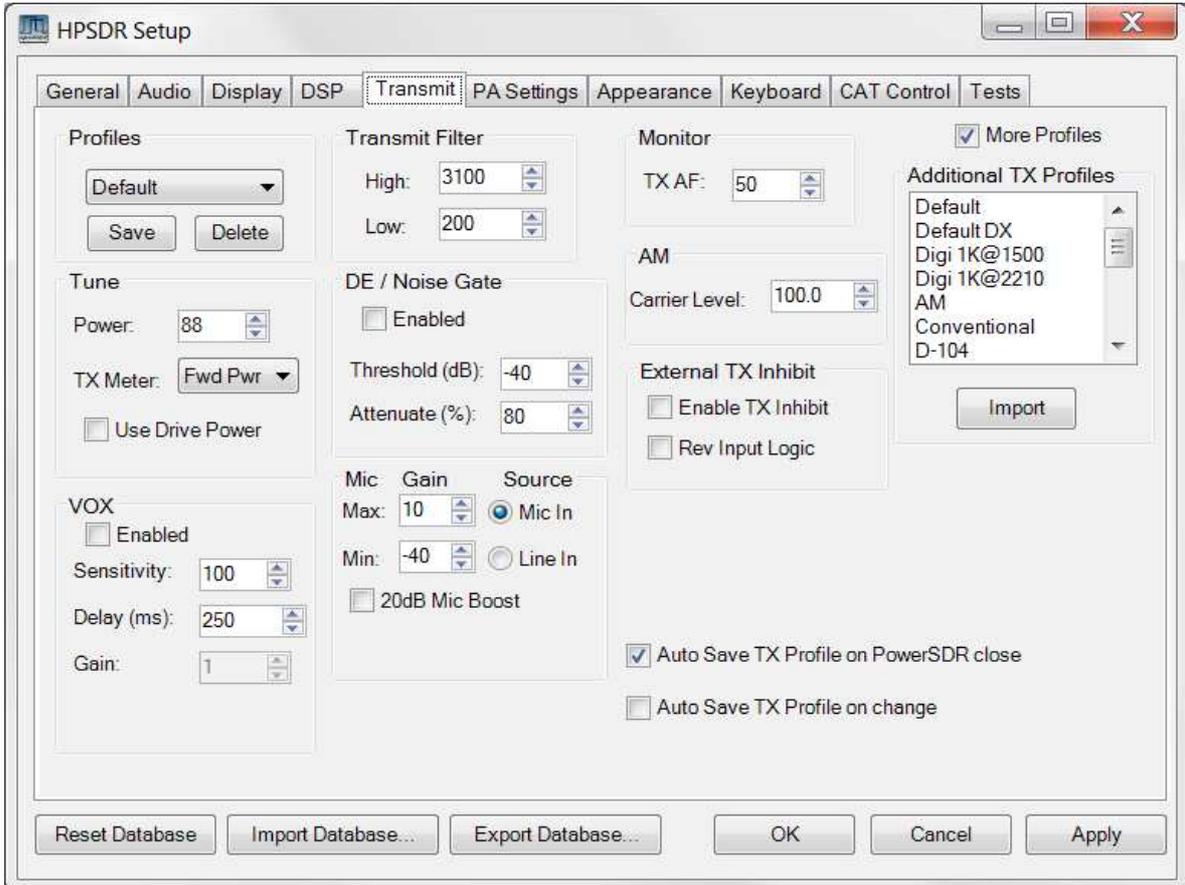
Repeat the above procedure for each Ham Band to properly calibrate the RF CW power output for a **MAXIMUM** 100 watts.

13. When all bands have been calibrated, remove the Dummy Load and select the antenna of your choice in the ANT/FILTERS setup Tab.
14. Remember to reduce the "TUN" power wattage setting on the Setup ---> Transmit tab to approximately 9W.

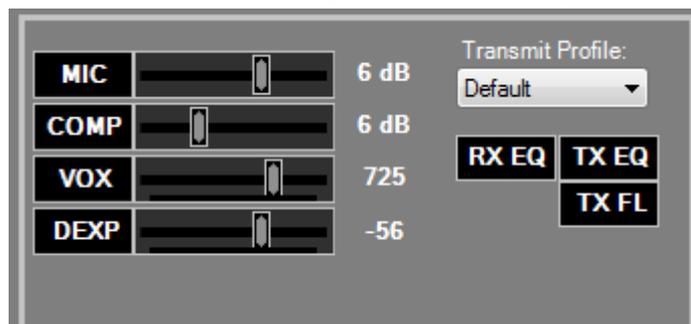
## Microphone Settings

### Adjusting mic gain

The ANAN-100/D microphone gain must be adjusted for each microphone used with the radio. The internal jumpers JP4, JP5, and JP6 on the Hermes board must be set properly for the type of microphone used. See the reference section of this document for the jumper settings, or refer to the document by Phil Harman VK6APH: [http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/Hermes/Documentation](http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Documentation)



1. You should make all microphone adjustments into a **Dummy Load**.
2. Select OpenHPSDR/PowerSDR menu Setup ---> DSP ---> AGC/ALC tab. The "Leveler" and "ALC" enabled check boxes must be checked or enabled before the Microphone gain can be properly set.
3. Select Setup, transmit tab and at lower left, Set "Mic Gain Max" to 20 and select Source as "Mic In".
4. On the OpenHPSDR/PowerSDR main window, use the "TX meter" (Upper right corner) dropdown box to select "Mic".
5. Select modulation mode of USB or LSB at the right, center of the OpenHPSDR/PowerSDR window.



6. Locate the "MIC" gain control slider. It is located at lower right, below the panadapter. The present mic gain setting is shown just to the right of the MIC gain slider.

## Apache Labs ANAN SDRs

7. Press your mic PTT button or click the "MOX" button on the main form to key the radio. With the radio keyed and while speaking into the mic in a normal voice adjust mic gain for peaks at 0db

8. If 0 db voice peaks cannot be achieved with the slider at the extreme right, go to the Setup, transmit tab (lower left), check "**20db mic boost**" and try again to adjust the "MIC" gain control on the main OpenHPSDR/PowerSDR window for 0 db on voice peaks.

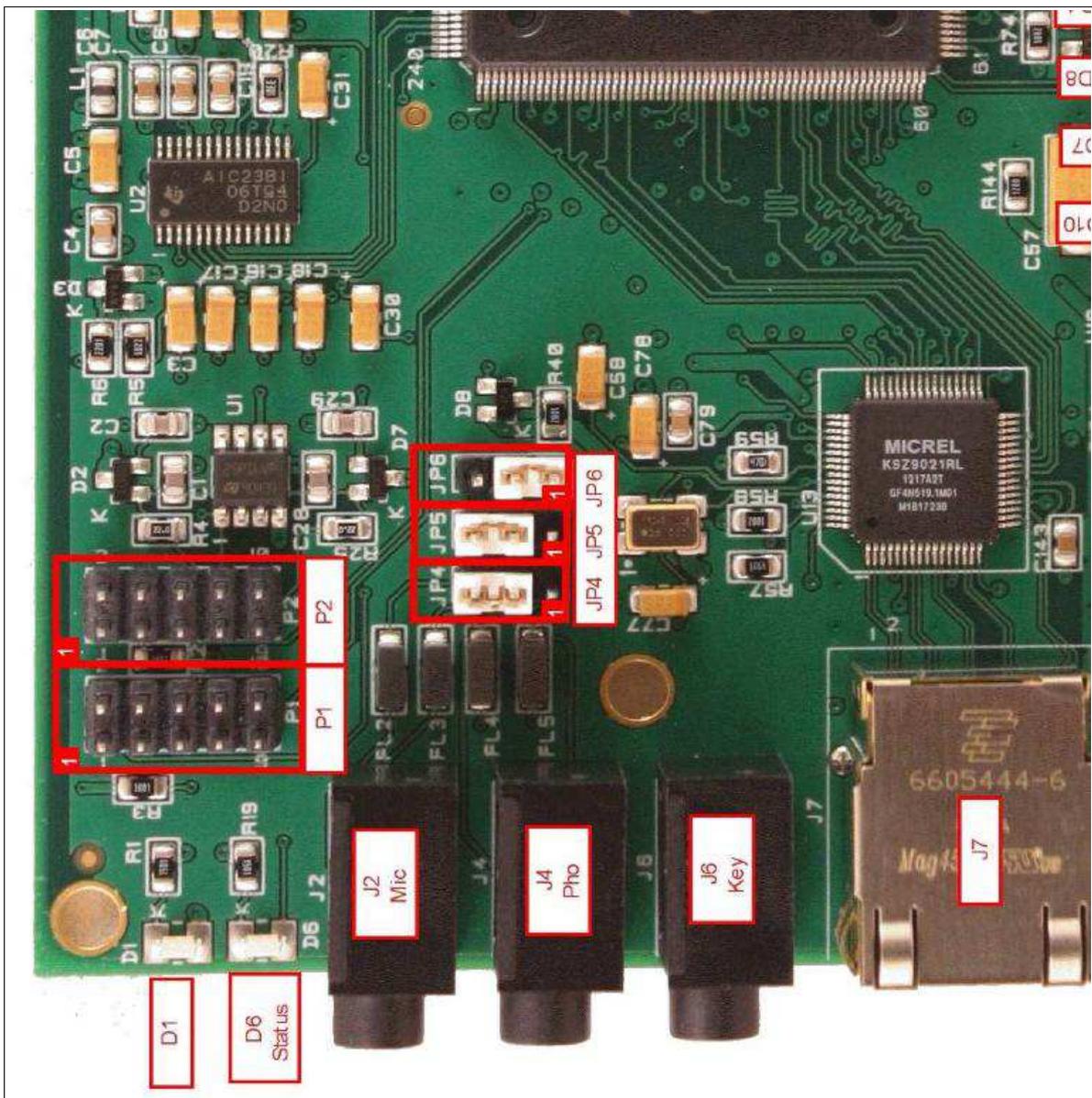
If you are still unable to achieve 0 db on voice peaks you can try increasing the Setup, Transmit tab "Mic Gain Max" to 30 db and try again to adjust the "MIC" gain control on the main OpenHPSDR/PowerSDR window for 0 db on voice peaks.

9. If you are still unable to achieve 0 db on voice peaks:

(a) Check your JP4, JP5 and JP6 jumper settings on the Hermes board.

(b) Try a different mic.

10. To enable or disable COMPRESSION you click on the COMP button. We recommend that you set COMPRESSION to no more than 6dB.



Picture courtesy VK6APH OpenHPSDR.org Hermes Documentation

## **Transmit** – Author Bill KC9XG

The Setup, Transmit tab is used to set various transmit parameters.

The "Profiles" drop down menu allows you select various transmit profiles. The default profile is "Default".

You can modify profile settings on this tab and save them to a profile name you select, or you can just modify the included profiles to your liking. You can recall saved profiles at a later time.

### Tune:

1. The "Tune Power(W)" spinner allows you to select the power output used when the "TUN" button is pressed on the main OpenHPSDR/PowerSDR window. In some versions of OpenHPSDR/PowerSDR, this is actually a percentage of power output rather than output in Watts. The "Tun" button places OpenHPSDR/PowerSDR in CW mode and keys the transmitter using the specified power output level.

2. The "TX Meter:" drop down selects what the TX Meter on the main form displays when the "Tun" button is pressed.

### VOX:

1. Click the "enabled" button to enable "Voice Operating Transmit" if you want to cause the transmitter to key when you speak.

2. Set the sensitivity spinner to a higher value if your wish to have a higher voice level cause the transmitter to key.

3. Set the delay to cause the VOX to de-key the transmitter after not hearing voice for "Delay (ms)" milliseconds.

4. Use this with care. Local noises (dog barking, TV playing, door bell, computer sounds) can cause your transmitter to key when you do not want this to happen. Extreme cases can cause your transmitter to key for excessive periods of time resulting in damage to your radio and attached power amplifier.

### Transmit Filter:

1. This filter tailors the transmitting frequency response in voice modes.

2. The default for high is 3100hz in some versions of OpenHPSDR/PowerSDR.

3. This value exceeds the frequency response allowed on 60 meters in some regions.

4. You can modify this and other values as needed before hitting the "Save" profile button to save to disk for later recall.

### Mic Gain:

This was covered previously in the previous paragraphs.

## Tuning the PowerSDR receiver

Author Bill KC9XG

Your ANAN-100/D is a "knobless" radio. Most functions are performed on a PC with the mouse or via keyboard commands.

Preliminary receiver setup:

1. On the left side of the OpenHPSDR/PowerSDR window, locate the "AGC Gain" control and set the slider to 90. This control works similar to an RF gain control, but actually controls the level where the "Automatic Gain Control" adjusts your receiver gain for best dynamic range. The Panadapter displays a green G and a dotted line showing the current "AGC Gain" setting. This should be set just above the noise floor displayed on the panadapter.

2. the "ATT" or Attenuator dropdown box (lower left, below the "AGC Gain" control, should be set to 0db. Note that some versions of OpenHPSDR/PowerSDR have some attenuator settings that may not work as expected.

Changing frequency:

The mouse can be used to tune signals on the Waterfall or Panadapter. Select an active amateur band by clicking on one of the band buttons located just below the "S Meter" in the upper right portion of the OpenHPSDR/PowerSDR window.

1. If you press and hold the left mouse button you can "drag" the frequency of interest into the panadapter highlighted filter area.

2. If you right click the mouse on the Panadapter you can go into "click tune" mode. Left clicking with the mouse will then QSY the receiver to that frequency. You can right click again to revert from "click tune" mode to "drag" tuning mode.

3. The "Zoom" slider and the "0.5x, 1x, 2x and 4x" buttons can be used to modify the frequency range displayed in the Panadapter. These controls are located just below the Panadapter/waterfall display. The "Pan" button can be used to move the displayed frequencies within the selected range.

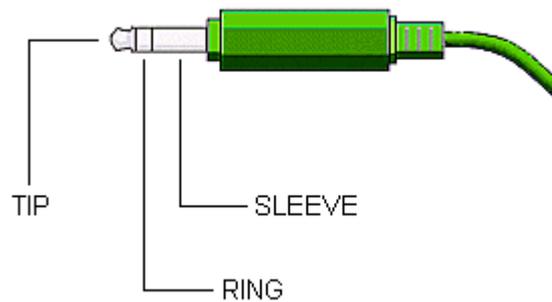
### PowerSDR "Dup" button

The PowerSDR "DUP" (DUPLEX) button enables RX1 reception during transmit, allowing the user to view the transmitted RF signal in the Panadapter. The ANAN-\* transceivers switch the selected antenna (ANT1, ANT2, or ANT3) to ground during transmit, thereby protecting the receiver from damage due to high RF levels. Monitoring of the RF transmission using the "DUP" feature is only possible in Pandapter and Panafall modes.

PowerSDR "CTUN" button

The PowerSDR "CTUN" button enables "Click Tuning" while using the panadapter and waterfall displays. "Click tuning" when active, allows you to click within the pandapter or waterfall to QSY without shifting the Panadapter or Waterfall display. When "CTUN" is inactive, clicking on the Panadapter re-centers the panadapter, thereby shifting the entire panadapter. Note that the "CTUN" function only works within a frequency range equal to the sample rate. IOW, if the selected sample rate is 384khz and RX1 panadapter is 1 MHz, wide, CTUN will only function within the center 384khz of the panadapter or waterfall display.

## Attaching a PC microphone



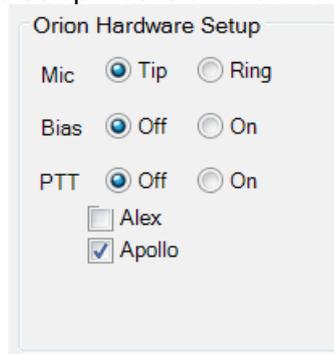
Updated 13/3/13

Hermes / ANAN-10/100/100D/200D SDR's have a 1/8" or 3.5mm 3 conductor jack for microphone input. The following instructions outline methods for interfacing PC microphones to the ANAN, **PLEASE NOTE THAT A STEREO PC MIC WILL NOT WORK WITH THE ANAN-200D.**

These instructions assume the user has properly installed and configured a OpenHPSDR/PowerSDR version compatible with Hermes and installed the appropriate Hermes firmware for this version.

### Mic Settings for the ANAN-200D

The ANAN-200D does not require hardware jumpers to be set for the Microphone, all settings are under software control and can be accessed via Setup---General---Hardware Config



**IMPORTANT: Please note that a stereo Mic will not work with the ANAN-200D, the ring connector is used for PTT and must not have a microphone input on it.**

### Mic Jumpers for the ANAN-10/100/100D

**JP4:** This jumper selects the microphone connection, either tip or ring - see the diagram below. Some microphones come with their element wired between a 3.5 mm jack plug 'tip' and sleeve (ground), whilst on others the element is wired between a 3.5 mm jack plug 'ring' and sleeve (ground). To select the tip, place the jumper on pins 2 and 3 (default); to select the ring, use pins 1 and 2.

**JP5:** This provides bias if you wish to use an electret microphone. If the microphone is connected between to the 3.5 mm jack plug 'tip' and sleeve (ground), then place a jumper between pins 2 and 3. If the microphone is connected between the 3.5 mm jack plug 'ring' and sleeve (ground), then use pins 1 and 2. If bias is not required then do not fit this jumper (this is the default setting).

**JP6:** If your microphone is fitted with a PTT button, then this jumper enables it. If the PTT button is connected between the 3.5 mm jack plug 'tip' and sleeve (ground) then place a jumper between pins 2 and 3. If the PTT is connected between the jack plug 'ring' and sleeve (ground) then place the jumper between pins 1 and 2. If your microphone is not fitted with a PTT, or you do not wish to use it, then do not fit

a jumper to JP6 (this is the default setting).

**WARNING:** If your microphone plug uses tip and sleeve connections only and you set the PTT jumper to the ring setting, then the PTT will be permanently enabled (i.e. the transmitter will be permanently switched on). An alternative PTT input connection is available via pin 1 of connector J16.

**NOTES:** Ensure that the jumper on JP6 is NOT connected to the same terminal (tip or ring) that your microphone is connected to. The PTT button should present a voltage-free contact that connects its associated pin to the outer sleeve (ground) of the coaxial microphone cable when pressed. This is the **most common way of wiring a PTT button, but users are advised to check the connections with a multimeter set to the lowest ohms range if unsure of the exact configuration.**

**WARNING:**

The FPGA and other components on the Hermes PCB can be damaged by Electrostatic Discharge (ESD). When handling the PCB, you should take ESD precautions (i.e. use a work bench with an antistatic mat on it and wear a grounded wrist strap).

**WARNING:**

Remove DC power before opening housing to change jumpers. Failure to remove DC power could result in damage to circuit boards.

Adapting typical (NON-USB) PC microphone for use with the ANAN :

1. Obtain PC type microphone equipped with 1/8" or 3.5mm mono plug.

NOTE: USB terminated microphones will not work with these instructions.

2. Obtain Radio Shack RS 274-375 dual 1/8" or 3.5mm mono jack to 1/8" or 3.5mm stereo plug adapter or equivalent.

NOTE: Do NOT use a 1/8" stereo Y adapter!

3. Remove DC power from the ANAN.
4. Ensure that Hermes Jumpers JP4, JP5, and JP6 are set for intended use, the ANAN-200D does not require jumpers to be set for the Mic. Open the ANAN housing using a grounded wrist strap and an anti-static mat. Locate the following jumpers and change as needed:

JP4, Mic audio on Tip, jumper pins JP4-2 and JP4-3 (Hermes Default).

JP5, Electret mic. Install jumper (2+3) for electret mic. Jumper is **not** installed by default.

NOTE: It has been reported some radios have been shipped with JP6 installed and configured to PTT on the RING of the Mic jack, while other radios have been reported to have no jumper installed. JP6, No PTT, Do not install jumpers (Hermes Default) or, Alternately, JP6, Separate PTT switch connected between stereo plug Ring and ground, install jumpers between

pins

JP6-1 and JP6-2. Close the ANAN housing.

## Modular Microphone connections

### CalRad adapters:

CalRad (<http://www.calradstore.com/72-173.html>) makes several modular (RJ-45 or 8 pin Modular) to 8 pin terminal block adapters which can be used to easily interface modular microphones to a 3.5mm / 1/8" stereo plug required by Hermes / ANAN-100/D+ Cal Rad adapters are also available at <http://www.markertek.com/Connectors-Adapters/Data-Connectors-Adapters/RJ45-Adapters/Calrad-Electronics/72-173.xhtml> The Calrad 72-173 CAT5/CAT6 solderless R-45 Female to Terminal block provides a very simple way to interface a 3 conductor jack to a RJ45 modular connector.

The CalRad 72-173 has a terminal block with 8 screw terminals on one end and a female 8 pin modular or RJ45 jack on the other end. It is just a matter of connecting 3.5mm / 1/8" stereo plug wires to the Calrad adapter using a small screw driver. No soldering required.

A very good source of information for microphone pin-outs is <http://homepage.ntlworld.com/rg4wpw/date.html>. This site was used in the following modular microphone adaption schemes.

**WARNING:** The CalRad adapters numbering scheme is the reverse from <http://homepage.ntlworld.com/rg4wpw/date.html> pin-outs for Yaesu and Kenwood radios.

The following pin assignments use the CalRad pin numbering scheme, not the mic numbering scheme.

### Example adaptation:

Adapting a Yaesu MH-31A8J (FT-817) microphone for use with Hermes 1/8" / 3.5mm jack:

1. Obtain a Yaesu MH-31A8J 8 pin modular microphone. Used by Yaesu FT-817 and others.
2. Obtain a 1/8" / 3.5mm stereo plug with attached shield, and 2 stranded wires, neoprene covered, typical. RS 4202497 or equivalent. Tin wire ends before use.
3. Obtain CalRad 72-173 adapter or equivalent.
4. See <http://homepage.ntlworld.com/rg4wpw/date.html> for details on the pinout of MH-31A8J microphone.

Note that the CalRad numbering scheme is different than the numbering on the above web page.



5. Using an ohm meter on the stereo plug wires, identify which wire colors correspond to the stereo plug tip and stereo plug ring.

6. Connect the Stereo Plug Tip wire to CalRad pin 5 (Mic Audio).

7. Connect the Stereo Plug Ring to CalRad pin 6 (PTT).

Microphone Connector Database

<http://www.qsl.net/g4wpw/date.html>

1.

8. Connect the Stereo Plug shield to Cal Rad pin 7.

The Hermes Jumpers JP4, JP5, and JP6 must now be configured to accept the Yaesu MH-31A8J mic as wired above.

1. Remove DC power from the ANAN.

2. Open the ANAN housing using a grounded wrist strap and an anti-static mat. Locate the following jumpers and change as needed:

3. JP4, Mic audio on Tip, jumper pins JP4-2 and JP4-3 (Hermes Default).

4. JP5, Electret mic, Do not install jumpers (Hermes Default).

5. JP6, install jumpers between pins JP6-1 and JP6-2 placing PTT on ring.

6. Close the ANAN housing.

Refer to

[http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/Hermes/Documentation/Hermes\\_User\\_Manual\\_V1.6.pdf](http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Documentation/Hermes_User_Manual_V1.6.pdf) to set jumpers for other intended uses.

Note: The CalRad 72-RJ45-T CAT6 Solderless RJ45 to terminal block pigtail is similar but requires the addition of a double female RJ45 adapter. The terminal block end has a rather nice shroud and tie down facility for attaching your stereo plug cable.

**WARNING:** The CalRad adapters numbering scheme is the reverse from <http://homepage.ntlworld.com/rg4wpw/date.html> pin-outs for Yaesu and Kenwood radios.

The following pin assignments use the CalRad pin numbering scheme, not the mic numbering scheme

See <http://www.calradstore.com/72-172.html> for details.

Microphone Pin-outs for use with CalRad 72-173, 72-172 or similar Adapters and the Hermes / ANAN-100/D+ 1/8" or 3.5mm stereo plug:

<http://homepage.ntlworld.com/rg4wpw/date.html> has a large number of pin out drawings and related info. Use at your own risk. The following info was derived from this page.

The Hermes Jumpers JP4, JP5, and JP6 must be configured to accept the desired microphones:

1. Remove DC power from the ANAN.

2. Open the ANAN housing using a grounded wrist strap and an anti-static mat. Locate the following jumpers and change as needed:

3. JP4, Mic audio on Tip, jumper pins JP4-2 and JP4-3 (Hermes Default).

4. JP5, Electret mic, Do not install jumpers (Hermes Default).

5. JP6, install jumpers between pins JP6-1 and JP6-2 placing PTT on ring

6. Close the ANAN housing.

**WARNING:** The CalRad adapters numbering scheme is the reverse from <http://homepage.ntlworld.com/rg4wpw/date.html>

The following pin assignments use the CalRad pin numbering scheme, not the mic numbering scheme.

USE AT YOUR OWN RISK!

Kenwood Modular RJ45 TS480, TM-710, TM 710A and other Stereo CalRad terminal block.

Plug

Shield: Pin 6 Ground

Ring: Pin 5 PTT See Hermes JP6

note! Pin 4 Mic ground, no connection.

Tip: Pin 3 Mic audio

Yaesu Modular RJ45 FT2500M?, FT2400H? 8 pin modular MH-26G8J, MH 27G8J

Stereo CalRad terminal block.

Plug

Ring: Pin 6 PTT See Hermes JP6 note!

Tip: Pin 5 Mic

Shield: Pin 4 Ground

FT-817, 857, 897, 900, 450

Stereo Calrad terminal block

plug

Shield: Pin 7 Ground

Ring: Pin 6 PTT See Hermes JP6 note!

Tip: Pin 5 Mic

: Pin 4 Mic Ground

ICOM Modular (NOTE HERMES JUMPER SETTINGS MUST BE CHANGED FROM DEFAULTS!)

(Connections not verified, use at your own risk!)

IC-703 706MK1, 706MK2, 706Mk3, 2000, 2000h

ICE-208, 2100H, 2725E, 2820, 7000,2800

Stereo Calrad terminal block.

plug

Ring: Pin 4 PTT See Hermes JP6 note!

: Pin 5 Mic Ground

Tip: Pin 6 Mic Hermes JP5 jumper between

pins 2 and 3 for ICOM mics. Remove JP4?

Shield : Pin 7 Ground

MFJ has a Universal Microphone Convertor to convert from

8 Pin Round to modular :

See <http://www.mfjenterprises.com/Product.php?productid=MFJ-1251>

HTH,

Author Bill Diaz KC9XG

=====

## 10Mhz Oscillator Jumpers

J20: When a jumper is inserted between pins 1 and 3 (the default setting) the internal 10 MHz reference oscillator is selected. When pins 2 and 4 are jumpered, an external 10 MHz reference is selected at J25.

J22: When inserted (the default setting) this jumper terminates an external 10 MHz reference with 50 ohms.

J23: When inserted (the default setting) this jumper enables power to be supplied to the internal 10 MHz TCXO reference oscillator.

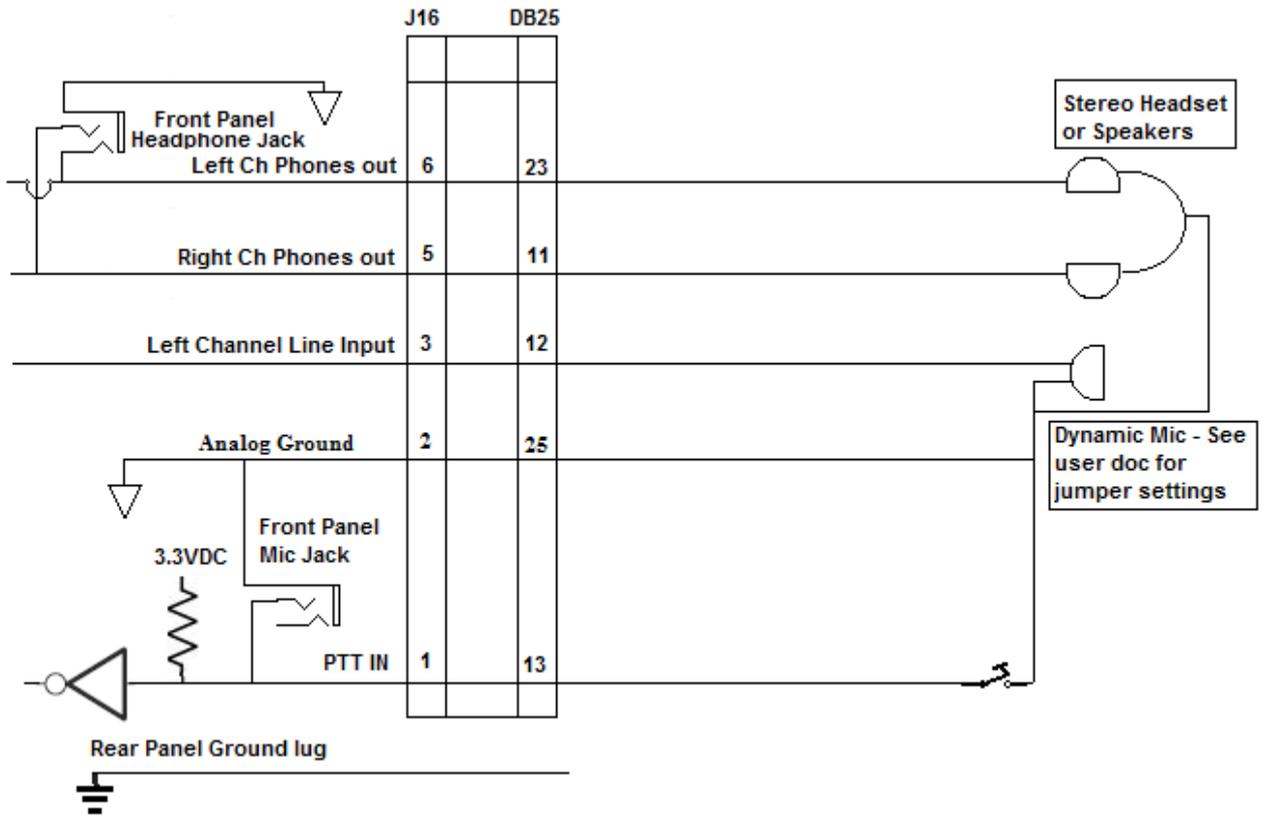
J24: When inserted (default) this jumper connects the outer of J25 to the ground of the Hermes board.

Please note that the ANAN-200D does not require jumper settings for the external reference switching, this is automated via the FPGA firmware.

## Rear Panel Mic and Headphone connections

# Apache Labs ANAN SDRs

## Rear Panel Mic and Headphone connections ANAN-100 / ANAN-100D

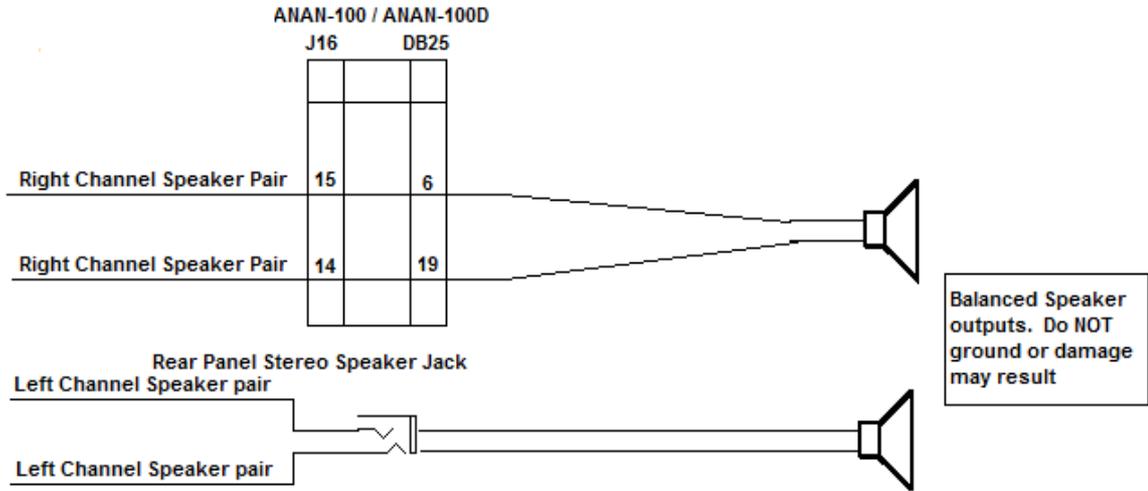


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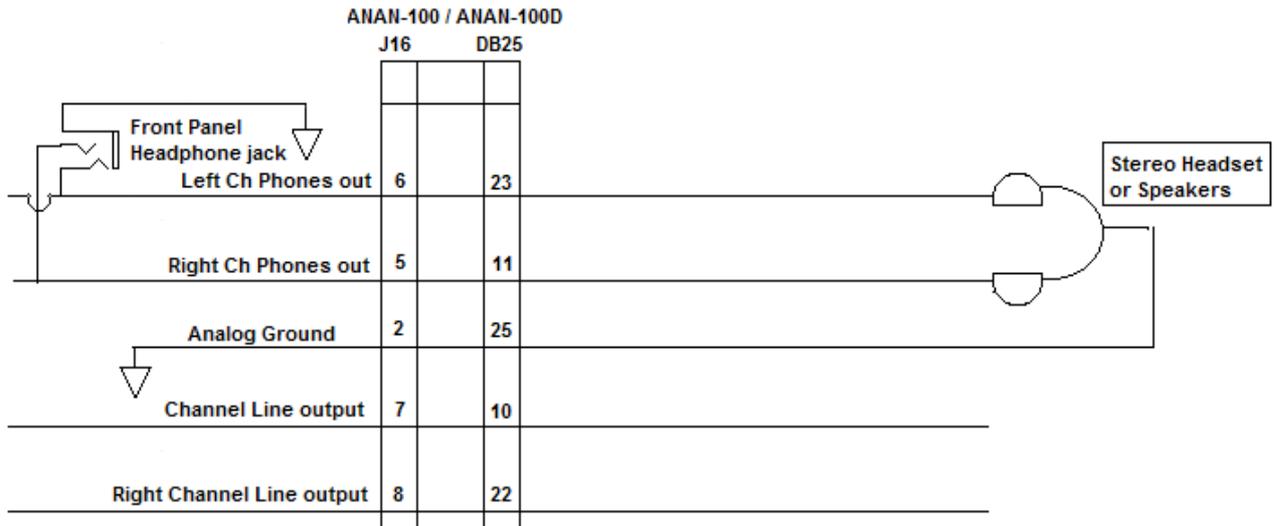
william.diaz@comcast.net

## Audio inputs and Outputs

### Balanced Audio Outputs



### Unbalanced Audio Outputs



See <http://www.ti.com/lit/ds/symlink/tpa0202.pdf> and <http://www.ti.com/lit/ds/symlink/tlv320aic23b.pdf> for audio specs

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william.diaz@comcast.net

## Troubleshooting section:

OpenHPSDR OpenHPSDR/PowerSDR is generally a stable application designed specifically for use with Hermes, Angelia and ANAN-\* radios. However, when OpenHPSDR/PowerSDR or your SDR does not function as expected, it can often be traced to a corrupt database.xml file. The following steps can be used to resolve issues with corrupted or incompatible database.xml files:

Resetting Database.xml:

1. Click on "Setup" menu selection.
2. Click on the "Reset Database" button at lower left.
3. OpenHPSDR/PowerSDR will shut down and you must restart it manually.
4. Power Cycle the ANAN before restarting OpenHPSDR/PowerSDR.
5. Follow the prompts to start reconfiguration of OpenHPSDR/PowerSDR for your radio.
6. Manually modify settings to your preferred configuration.
7. On the Setup form, click on the "Export Database" to save the new settings to disk for later recall.

If resetting Database.xml did not resolve your issues:

1. Shut down OpenHPSDR/PowerSDR.
2. Use windows explorer to navigate to your current OpenHPSDR/PowerSDR folder.
3. OpenHPSDR/PowerSDR mRX should be located at  
C:\Users\Bill\AppData\Roaming\FlexRadio Systems\OpenHPSDR/PowerSDR mRX.
4. Delete database.xml by selected the file and press the delete button your keyboard.
  - A. Alternately, rename the file instead of deleting.
5. Power Cycle the ANAN before restarting OpenHPSDR/PowerSDR.
6. Restart OpenHPSDR/PowerSDR.
7. Follow the prompts to start reconfiguration of OpenHPSDR/PowerSDR for your radio.
8. Manually modify settings to your preferred configuration.
9. On the Setup form, click on the "Export Database" to save the new settings to disk for later recall.

Upgrading OpenHPSDR/PowerSDR.

1. When notified of a OpenHPSDR/PowerSDR update, please Export your Database before performing the upgrade installation.
2. Shut down OpenHPSDR/PowerSDR before installing the upgrade.
3. Follow the prompts and wait for OpenHPSDR/PowerSDR to finish the install.
4. Start the new OpenHPSDR/PowerSDR version.
5. You can attempt to import a previously exported database.xml file to recall your settings.
  - A. File should be named something like  
OpenHPSDR/PowerSDR\_Database\_export\_4\_12\_2013\_7.46 AM.xml or similar.
  - B. The file name should contain the date time the database file was exported.
6. Click Setup menu selection.
7. Press the "Import Database" button to import a previously exported database.
8. If this does not resolve your issues, you may have to manually enter a new configuration.

Troubleshooting symptom ANAN receiver deafness:

Improper/unintended settings:

1. Your ANAN receive signal path is routed to the bypass connector when EXT1, EXT2, or XVTR is selected on the Setup, Ant/Filters tab.
2. A pre-amp, or filter must be connected between the bypass connector and the selected EXT1, EXT2 or XVTR RX rear panel BNC connector.
3. Alternately, an antenna must be connected to the select EXT1, EXT2, or XVTR IN BNC connector on the rear panel.
  - a. Suitable external T/R switching must be supplied by the user to protect the receiver during transmit.
4. Attenuator active.
5. Wrong antenna selected.

Troubleshooting symptom, no transmit audio.

1. Mic is disabled by default when VAC1 is enabled.
  - A. Setup, audio tab has check boxes for enabling PTT etc, while VAC is active.
  - B. Alternately, disable VAC when transmitting with the mic.

Trouble shooting Power Output.

1. Ensure Driver level is set to a non-zero value.
2. If the "TUNE" button has insufficient output to activate auto-tuners"
  - A. Menu selection, "Setup", "Transmit" tab, increase "Tune" "Power (W)" value.
3. If external autotuner seems to give erratic results, try unchecking "Enable Protection" on "Setup", "Ant/Filters" tab.

## APPENDIX – A – Computer performance

### **Computer Performance**

Processing of streaming data in real-time can be a challenging task for Windows-based applications and device drivers. This is because by design Windows is not a real-time operating system. There is no guarantee that tasks can be executed in a deterministic (timely) manner.

Audio or video data streams transferred from or to an external device are typically handled by a kernel-mode device driver. Data processing in such device drivers is interrupt-driven.

Typically, the external hardware periodically issues interrupts to request the driver to transfer the next block of data. In Windows NT-based systems (Windows 2000 and later) there is a specific interrupt handling mechanism. When a device driver cannot process data immediately in its interrupt routine, it schedules a Deferred Procedure Call (DPC). Microsoft defines them as: A Deferred Procedure Call (DPC) is a queued call to a kernel mode function that will usually be executed at a later time. DPCs are used by drivers to schedule I/O operations that do not have to take place in an ISR at a high IRQL, and can instead be safely postponed until the processor IRQL has been lowered. When you look at Windows Task Manager and sort the running processes by CPU (Processor Utilization), the System Idle Process is almost always at the top of the list. What you may not know is that 'process' is really a roll-up of several things. Among other things included in that CPU number, is hardware interrupts and DPCs. You can see these two items by using the Microsoft "SysInternals" Process Explorer available here: [Process Explorer](#)

The sycon's DPC Latency Checker is a free Windows tool that analyzes the capabilities of a computer system to handle real-time data streams properly. It may help you to determine if your personal computer is capable of powering your HPSDR system or to find the cause for interruptions in real-time audio and video streams, also known as 'drop-outs'. The program supports Windows 2000, Windows XP, Windows XP x64, Windows Server 2003, Windows Server 2003 x64, Windows Vista, Windows Vista x64, Windows 7 32 bit and 64 bit and is available here. Latency checker found by N9VV

<http://www.resplendence.com/latencymon>

and

[http://www.thesycon.de/deu/latency\\_check.shtml](http://www.thesycon.de/deu/latency_check.shtml)

## **APPENDIX - B – Warranty**

### **WARRANTY:**

We warrant that our products are free of defects in material and workmanship and extend this warranty under intended use and normal service conditions to the original owner for a period of one year from the date of purchase. This warranty does not apply to any product that has been repaired (Unauthorized) or altered in any manner and is void if damaged by accident, neglect, unreasonable use, improper installation, lack of proper impedance matching (High SWR), improper tuning, over driving power limits, damage due to use of any third party accessories, or any other cause not arising specifically out of defects in material or workmanship.

Our obligations are limited to repairing or replacing, at our sole discretion, any product or part that is returned to the mailing address, all shipping or transportation charges must be pre-paid, accompanied by proof of purchase and which examination reveals to have been defective within the warranty period stated above.

Our Warranty does not imply any obligation other than herein stated. Any implied warranties, including but not limited to fitness for a particular purpose, are limited in duration for the above one year period.

We shall not be liable under this warranty, or any implied warranty, for loss of use of the product or for any other consequential loss or damage incurred by the purchaser.

[Warranty -- Apache Labs website](#) has a link to explain their warranty and other pertinent information:

<http://www.apache-labs.com/terms-of-use.html> under "Terms of Use".

### **IMPORTANT**

**The FPGA and other components on the ANAN PCBs can be damaged by Electrostatic Discharge (ESD). When handling the PCB, you should take ESD precautions (e.g. use a work bench with an antistatic mat on it and wear a grounded wrist strap).**

**When powered on do not touch the top of any IC in order to determine its temperature. In particular, do not touch the Switch Mode Regulator IC. Touching its leads can change the switching frequency and alter the output voltage.**

## **APPENDIX – C – OpenHPSDR Software**

OpenHPSDR/PowerSDR modifications

W5WC source code: click [here](#)

[http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/W5WC](http://svn.tapr.org/repos_sdr_hpsdr/trunk/W5WC)

KD5TFD source code: click [here](#)

[http://svn.tapr.org/repos\\_sdr\\_windows/OpenHPSDR/PowerSDR/branches/kd5tfd](http://svn.tapr.org/repos_sdr_windows/OpenHPSDR/PowerSDR/branches/kd5tfd)

W5WC skins with installer [here](#)

[http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/W5WC/OpenHPSDR\\_Skins/](http://svn.tapr.org/repos_sdr_hpsdr/trunk/W5WC/OpenHPSDR_Skins/)

A BIG thank you to Joe, K5SO and Doug, W5WC for adding support for the **100W PA** and other refinements to the code!

### **K.I.S.S Konsole from OpenHPSDR team**

[http://svn.tapr.org/repos\\_hpsdr\\_kiss/branches/K9TRV/KISSKonsoleUnified](http://svn.tapr.org/repos_hpsdr_kiss/branches/K9TRV/KISSKonsoleUnified)

VK6APH has added new VNA capabilities to FPGA and K.I.S.S. codes.

Hermann, DL3HVH, is experimenting with parallel code using CUDA, OpenGL and OpenCL

<https://plus.google.com/107168125384405552048/posts>

**cuSDR32-VS:** [cuSDR32 MSVS](#) (Compiled with MS VS 2010 requires .Net 4.0)

Code at SVN: [http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/DL3HVH/cuSDR32/](http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVH/cuSDR32/)

**cuSDR64-VS:** [cuSDR64 MSVS](#) (Compiled with MS VS 2010 requires .Net 4.0)

Code at SVN: [http://svn.tapr.org/repos\\_sdr\\_hpsdr/trunk/DL3HVH/cuSDR64](http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVH/cuSDR64)

### **ghpsdr3 - QtRadio from John Melton** GØORX/N6LYT

and a new branch by Alex Lee

### **Heterodyne (MAC/OS) by Jeremy McDermond**

### **OpenHPSDR software repository and information**

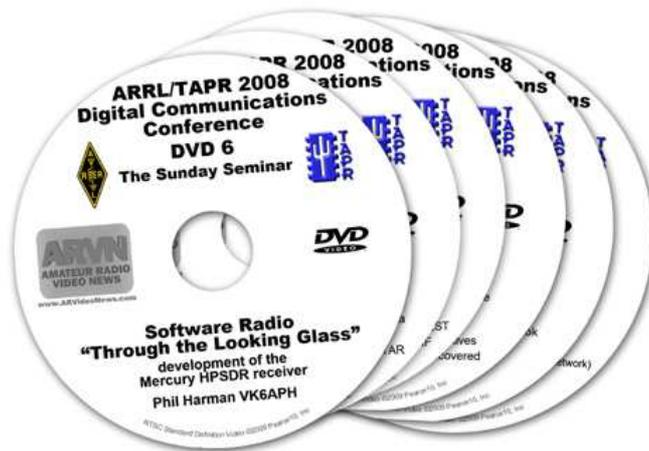
<http://openhpsdr.org/download.php>

## Appendix – D -- VK6PH DDC/DUC Presentation

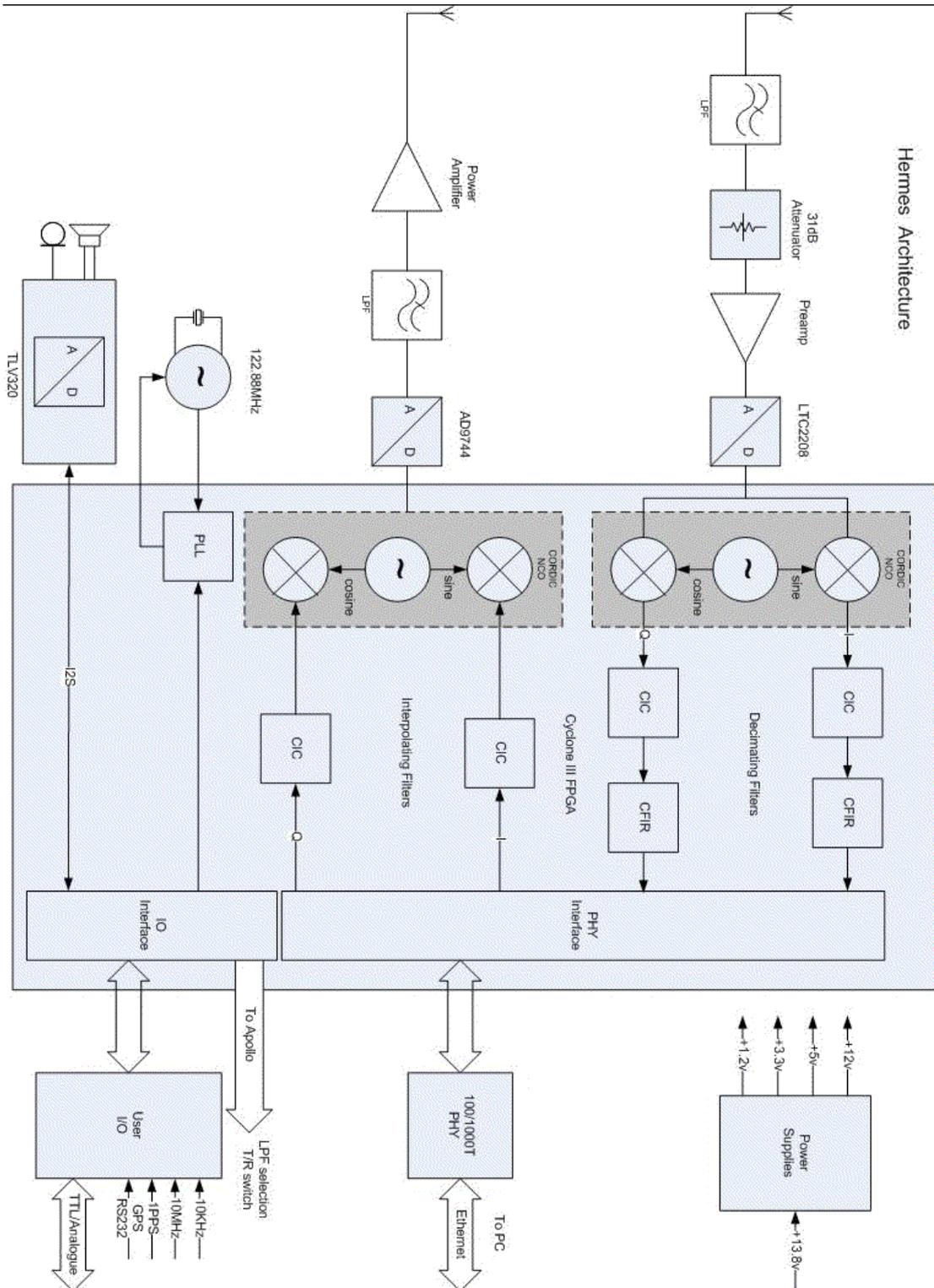
### HIGHLY RECOMMENDED FOR ALL NEW DDC LEARNERS

To learn all about Digital Down Converter technology, **please purchase DVD #6** from ([Amateur Radio Video News](http://www.arvideonews.com)) in which Phil Harman VK6APH teaches us the practical details from his wonderful presentation at ARRL/TAPR DCC-2008. The DVD consists of 4 hours of high quality education in DDC by Phil Harman. The ARVN webpage says: Software Defined Radio "Through the Looking Glass" Phil Harman VK6APH leads you on an entertaining, detailed trip through the design of the Mercury SDR receiver. With the A/D converter preceded only by a bandpass filter, Mercury does everything in software, at a price hams can afford. It is the leading edge in ham radio technology.

<http://www.arvideonews.com/dcc2008/>



### Appendix – F Hermes functional diagram VK6PH



## Appendix – H – HPSDRProgrammer

OpenHpSDR/ ANAN-\* SDR: Updating firmware and assigning a static IP address.

The OpenHPSDR HPSDRProgrammer\_V2 application provided by KVOs can be used to load new firmware and assign or change IP address with properly configured OpenHPSDR ANAN-\* radios. No jumper changes needed. This assumes initial bootloader code has been installed properly.

### **Attention: Angelia ANAN-100/D owners:**

If you need to update the Bootloader, jumper J17 (seventeen) must be in place and then you can use the Altera Quartus-II serial programmer to load in the most recent ".pof" bootloader file.

### **Attention: Angelia ANAN-10 and ANAN-100 owners:**

If you need to update the Bootloader, jumper J12 (twelve) must be in place and then you can use the Altera Quartus-II serial programmer to load in the most recent ".pof" bootloader file.

**The ANAN-200D Bootloader switch is on the bottom panel and does not require disassembly of the radio or any jumpers to be set**

### **Installing OpenHPSDR's KVOs HPSDRProgrammer\_V2:**

1. Ensure that no applications are currently connected to your ANAN-\* SDR.
2. Install WinPCap per instructions at <http://openhpsdr.org/download.php>.
  - A. Windows WinPCap available at <http://www.winpcap.org>  
Note: Win8 users may have to download, then right click downloaded file and select Win7 compatibly mode.
  - B. Linux, simply install libpcap from the repository.
3. Download and install HPSDRProgrammer\_V2 from <http://openhpsdr.org/download.php>.
  - A. Windows version at [http://openhpsdr.org/downloads/programs/HPSDRProgrammer\\_V2.msi](http://openhpsdr.org/downloads/programs/HPSDRProgrammer_V2.msi)
  - B. Linux, Debian 64 bit at [http://openhpsdr.org/downloads/programs/HPSDRProgrammer\\_V2-debian-64.tgz](http://openhpsdr.org/downloads/programs/HPSDRProgrammer_V2-debian-64.tgz)
  - C. Linux, Debian 32 bit at [http://openhpsdr.org/downloads/programs/HPSDRProgrammer\\_V2-debian-32.tgz](http://openhpsdr.org/downloads/programs/HPSDRProgrammer_V2-debian-32.tgz)

### **Using OpenHpSDR HPSDRProgrammer:**

1. Run the HPSDRProgrammer application.
2. The HPSDRProgrammer Interface section should now contain the following information:
  - A. Computer IP address: x.x.x.x      MAC hh:hh:hh:hh:hh:hh  
Where x indicates numeric values and hh indicates hex values.
3. Connect your OpenHpSDR Hermes/ANAN-\* to your LAN or directly to your computer and power up the device.
  - A. If you connect your Hermes ANAN-\* directly to your PC and an IP address has not been assigned, the unit will be waiting for assignment of a Dynamic IP address, and this process can take up to 20 minutes for APIPA to assign a workable IP address.
  - B. If you connect your Hermes/ANAN-\* to a LAN router or switch where a DHCP server has been enabled, IP Address assignment should only take a few seconds.
  - C. If a static IP address has been previously assigned to your ANAN-\*, the SDR should be available in a second or so.

4. The ANAN-\* front Panel LAN connector LED's should indicate if an Ethernet link is available on the left and Ethernet data activity on the right.
  - A. If the LED's do not light, check your LAN or PC connection to ensure your ANAN-\* is connected to your PC or LAN. Ensure your PC TCP/IP capability has been enabled as well.
5. In the OpenHPSDRProgrammer Device section, Press the "Discover" button located at the right center of the HPSDRProgrammer Window.
  - A. The "Device" text box should now show something similar to:  
00:04:A3:6A:54:B5 (192.168.1.88)
  - B. If your ANAN-\* MAC and IP address are not shown as indicated above, your OpenHPSDR ANAN-\* cannot be found on your network. Please check your Ethernet connections and try again.

#### **Upgrading OpenHPSDR firmware using HPSDRProgrammer:**

1. Download new firmware by visiting **The Apache Webpage** <https://apache-labs.com/index.php> or you may go to the <http://openhpsdr.org/download.php>. Find the **appropriate** .rbf firmware file for your **SDR**. For example, the current firmware file for ANAN-\* radios should be listed as \*.rbf. Download and save the appropriate .rbf for your SDR to a convenient location on your computer, for later recall.

**If you are unsure, DO NOT UPGRADE YOUR FIRMWARE WITHOUT ASKING APACHE SUPPORT FOR GUIDANCE.** There are separate FPGA chips in each model of the Apache Transceivers and each one requires a specific Verilog programmed .rbf file. Upgrading without knowledge of your system (Hermes, Angelia, ...) will result in a corrupted EEPROM and require Apache Support to help you re-load the appropriate firmware.

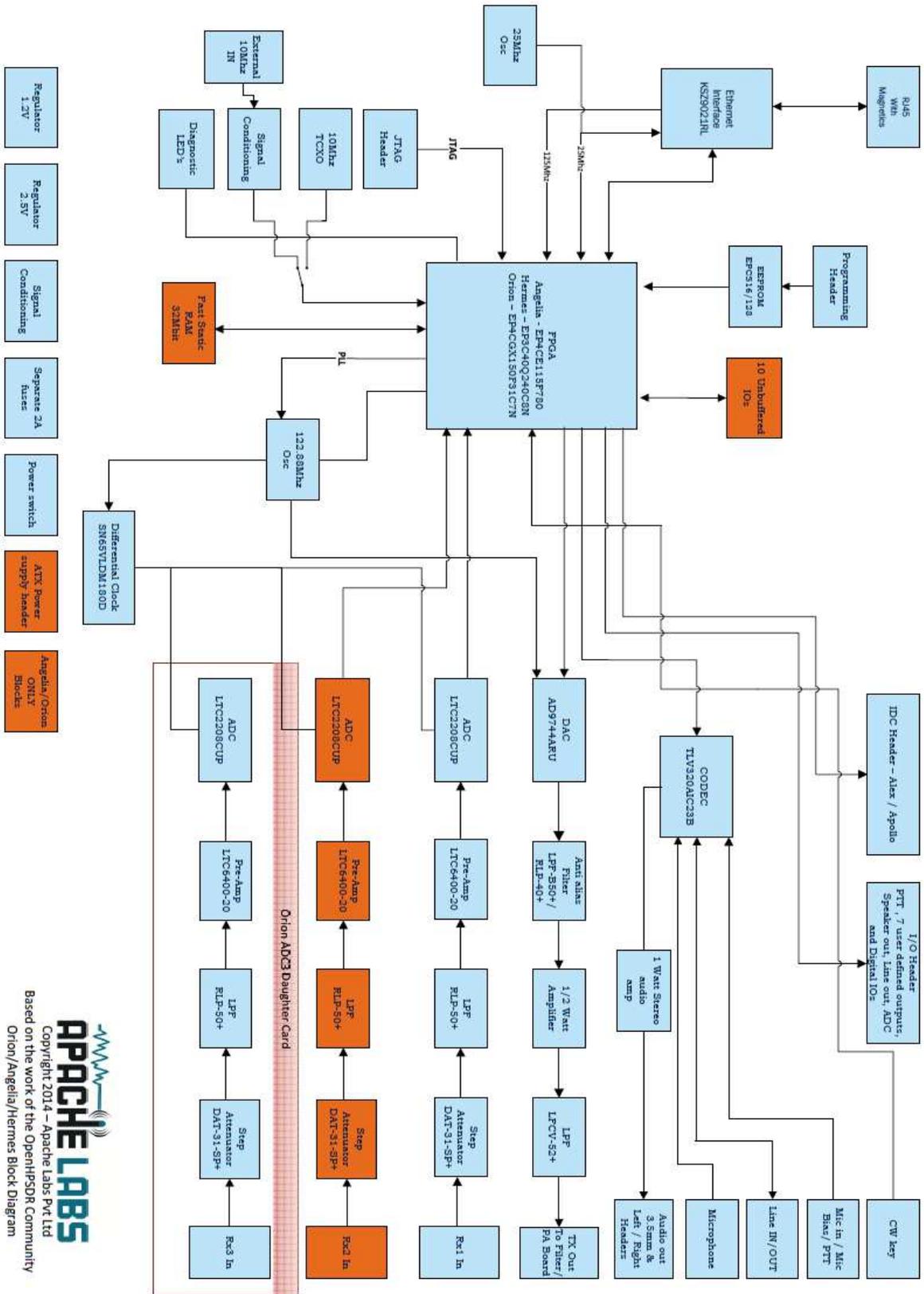
2. Press the "Browse" button in the "Programmer" section of HPSDRProgrammer and locate the \*.rbf firmware file you downloaded previously and select it in the browse "Open" dialog and then press the "OK" button.
3. The Hermes\_v2.x.rbf or whatever firmware **filename you selected previously** must now be displayed in the "Programmer", "RBF file" text box.
4. Press the "Program" button to load the .rbf file into your OpenHpSDR ANAN-\* SDR.
5. HPSDRProgrammer should display the progress of the firmware loading process.
6. Upon successful completion of loading the new firmware, the Device text box should contain the new version number.

#### **Assigning an IP address using HPSDRProgrammer:**

Click on Menu Selection "Tools", "IP", or simply click on the IP text just below the menu selections.

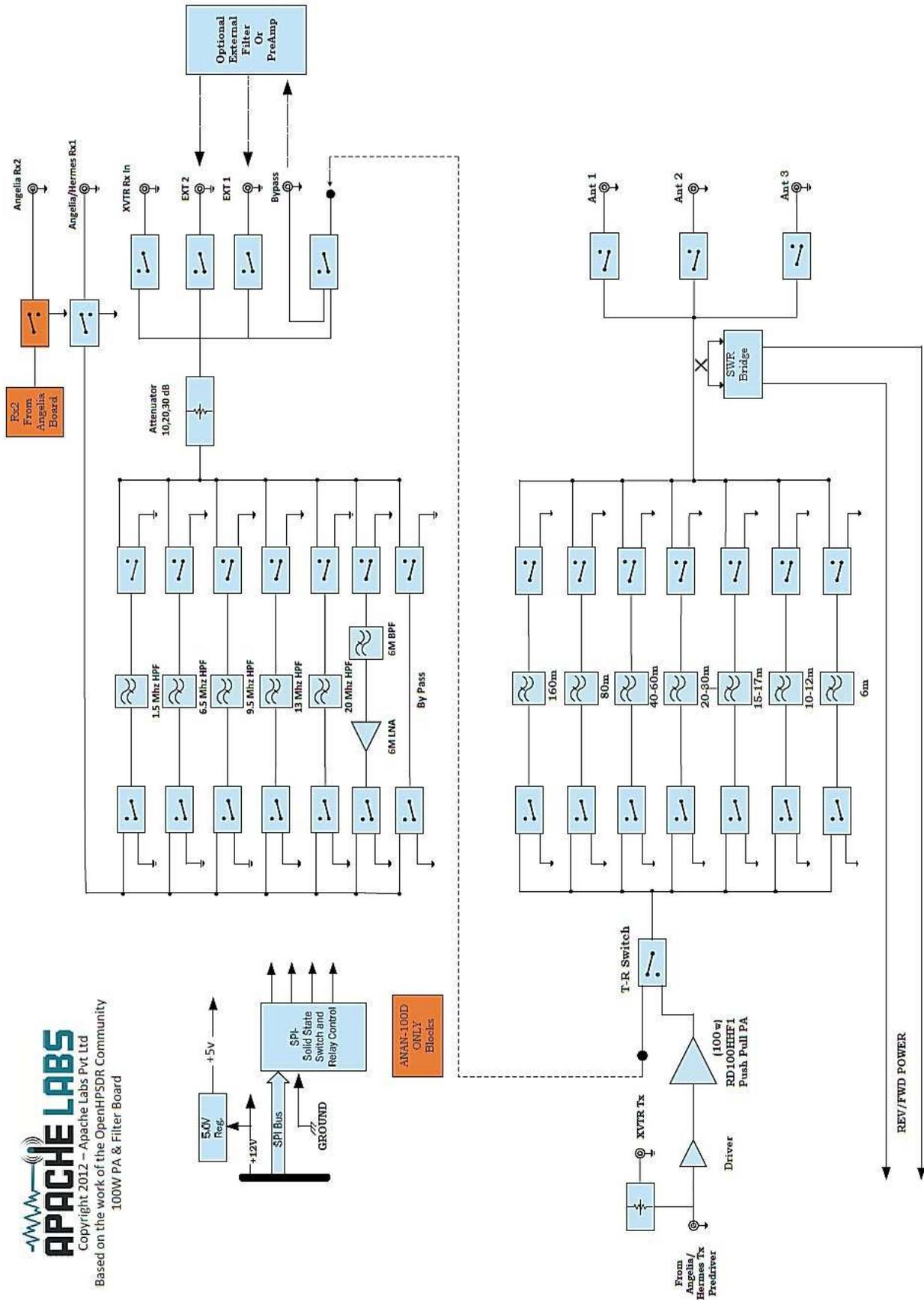
2. The "Address Dialog window will appear.
3. An IP address can be assigned by placing 8 bit values in each of the 4 text boxes.
  - A. 8 bit values are numbers which can range from 0 to 255.
  - B. Each of the 4 text boxes must have a valid value entered.
  - C. If you do not know what IP address to use, just enter 0's in each box to revert to automatic IP assignment (DHCP).
  - D. Press the Write IP button to write the entered IP address to your ANAN-\*
4. Entering 0's in all 4 text boxes will revert your ANAN-\* to DHCP or dynamic IP address assignment.
  5. After entering a new IP address, close the "Address Dialog" window.
  6. Hit the "Discover" button again to verify the IP address you just wrote.

### ANAN block diagram



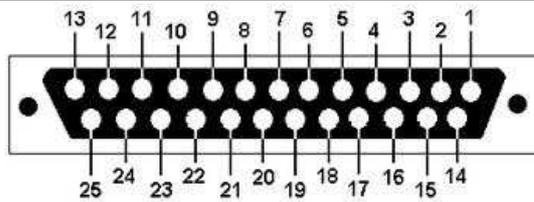
**APACHE LABS**  
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 Based on the work of the OpenHPSDR Community  
 Orion/Angelia/Hermes Block Diagram

## ANAN PA and Filters



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 Based on the work of the OpenHPSDR Community  
 100W PA & Filter Board

### ANAN-100/100D/200D Accessory Port (back panel)



The Hermes/Angelia schematic detail J16 pin numbering does not correspond to keyed IDC ribbon cable numbering conventions. An IDC to DB25 adapter cable further re-arranges the pin numbers.

<b>Pin number</b> Number in parentheses is the J16 pin number shown on the schematic	<b>Apache AN-100/D Aux connector usage</b>
1 (25)	<b>Open-drain PTT output</b> (same as rear panel RCA jack)
2 (23)	OC6 User open-collector output 7
3 (21)	OC4 User open-collector output 5
4 (19)	OC2 User open-collector output 3
5 (17)	OC0 User open-collector output 1
6 (15)	Right channel speaker Pair with pin 19 – <b>see note below</b>
7 (13)	User Digital input 4: is connected to 3.3V via 1K pullup resistor
8 (11)	User Analog input 1: 0-3V max
9 (9)	User Digital input 1: is connected to 3.3V via 1K pullup resistor
10 (7)	Left channel line Out
11 (5)	Right channel phones output
12 (3)	Left channel line-level audio input - see note below
13 (1)	PTT input, is connected to 3.3V via 1K pullup resistor
14 (24)	OCREF Open-Collector reference/flyback diodes
15 (22)	OC5 User open-collector output 6
16 (20)	OC3 User open-collector output 4
17 (18)	OC1 User open-collector output 2
18 (16)	User Digital input 2: is connected to 3.3V via 1K pullup resistor
19 (14)	Right channel speaker, pair with pin 6 – <b>see notes below</b>
20 (12)	User Analog input 2: 0-3V max
21 (10)	Analog Ground
22 (8)	Right channel line Out
23 (6)	Left channel phones output
24 (4)	Not implemented.
25 (2)	Analog Ground

**The Hermes/Angelia schematic detail J16 pin numbering does not correspond to keyed IDC ribbon cable numbering conventions. An IDC to DB25 adapter cable further re-arranges the pin numbers.**

Pin out and connections between 26 pin J16, Modified (shifted) 26 pin IDC ribbon cable and DB 25.

J16	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
IDC	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
DB25	13	25	12	24	11	23	10	22	9	21	8	20	7	19	6	18	5	17	4	16	3	15	2	14	1	

**DB25 Acc Port pinout. Number in parentheses is the J16 pin number shown on the schematic.**

1. Open-drain PTT output (25)
2. OC6 User open-collector output 7 (23)
3. OC4 User open-collector output 5 (21)
4. OC2 User open-collector output 3 (19)
5. OC0 User open-collector output 1 (17)
6. Right channel speaker Pair with pin 19 (15)
7. User Digital input 4: connected to 3.3V via 1K pullup resistor (13)
8. User Analog input 1: 0-3V max (11)
9. User Digital input 1: Connected to 3.3V via 1K pullup resistor (9)
10. Left channel line Out (7)
11. Right channel phones output(5)
12. Left channel line-level audio input\* (3)
13. PTT input, connected to 3.3V via 1K pullup resistor (1)
14. OCREF Open-Collector reference/flyback diodes (24)
15. OC5 User open-collector output 6 (22)
16. OC3 User open-collector output 4 (20)
17. OC1 User open-collector output 2 (18)
18. User Digital input 2: Connected to 3.3V via 1K pullup resistor (16)
19. Right channel speaker, pair with pin 6 (14)
20. User Analog input 2: 0-3V max (12)
21. Analog Ground (10)
22. Right channel line Out (8)
23. Left channel phones output (6)
24. not implemented
25. Analog Ground (2)

**NOTE: Left channel line audio input is the "Line In" source on the Setup, transmit tab. This input can be used instead of the mic jack. Pin 13 is PTT in.**

**NOTE: The speaker jack contains the Left Channel speaker pair. The Right Channel speaker pair is on pin 6 and Pin 19. These are balanced outputs. Do NOT ground these lines!**

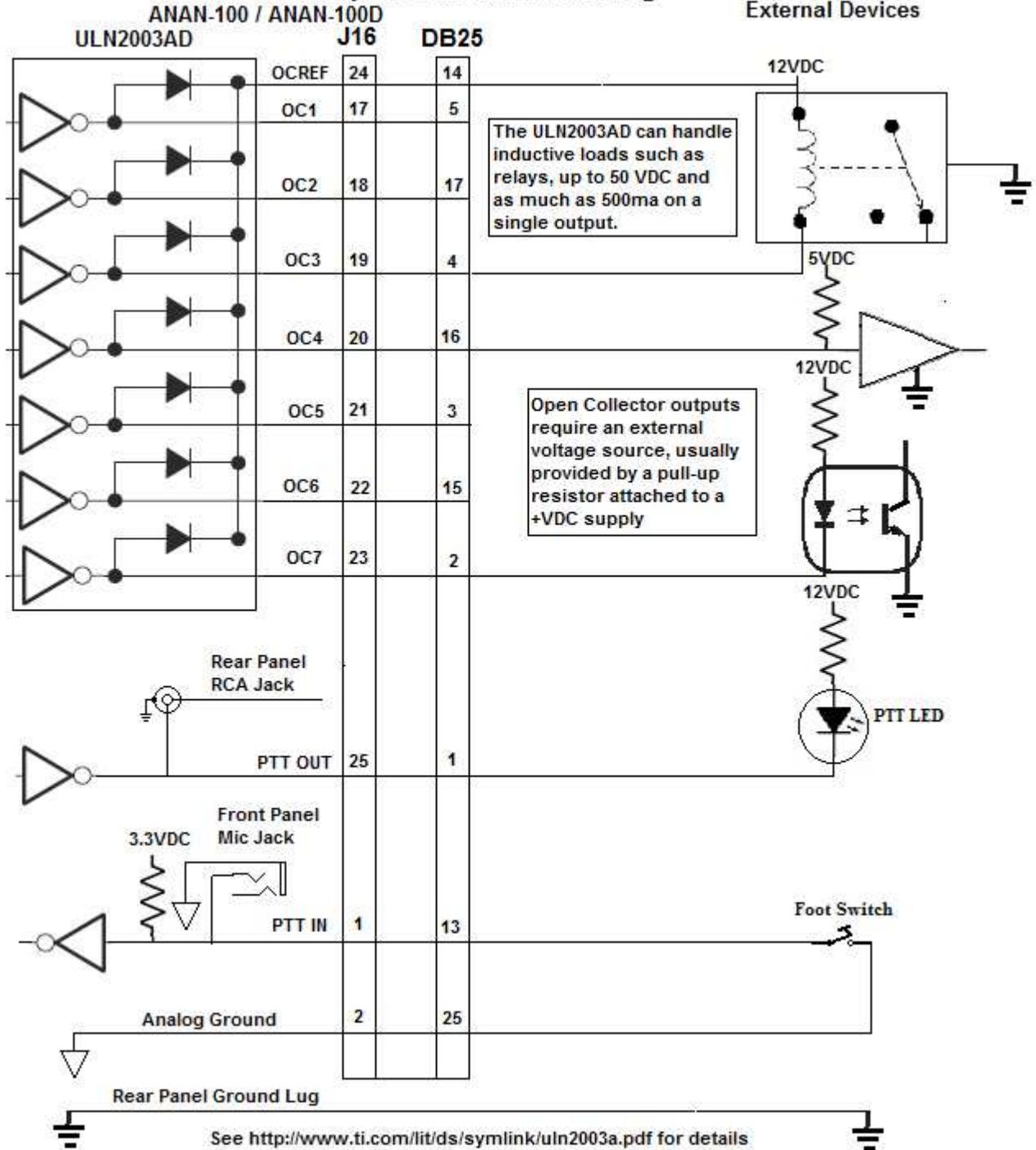
**The OpenHPSDR/PowerSDR Setup, ANAN Ctrl tab numbering scheme for the J16 Receive and transmit pins does not represent the actual pin numbers.**

Apache Labs ANAN SDRs

<b>OpenHPSDR/PowerSDR ANAN CTRL Tab as shown</b>	<b>Accessory I/O (female) Port DB25 cable</b>	<b>Hermes/Angelia Schematic J-16</b>
1	5	17 OC0
2	17	18 OC1
3	4	19 OC2
4	16	20 OC3
5	3	21 OC4
6	15	22 OC5
7	2	23 OC6
	14 OC REF	24 OC REF

Open Collector Interfacing

Open Collector Interfacing



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## Disassembling and Reassembling the ANAN-100/100D/200D

Generously contributed by Brian Lloyd, WB6RQN

2013-05-21

1. Remove all external connectors and cables.
  2. Place the unit on a workbench which will provide sufficient room to open the unit up to twice its length and width.
  3. Remove the nuts and lock washers from all the BNC connectors. Do **NOT** remove the attaching hardware for the XVTR TX, 10MHz IN, PTT OUT, or ACC PORT connectors.
  4. Remove all the phillips-head screws from the front and back panels. Use a good #1 Phillips screwdriver so as to not damage the screw heads.
  5. Turn the 100/D on its side so that the top is facing you and the front panel is to the right.
  6. Swing the front panel to the back. This will allow the bottom plate to slide to the left (toward the rear of the unit) without over stressing the wiring to the front panel power switch.
  7. Route the coax bundle over the top of the cooling fan (toward you). The wire bundle will remain stationary while the bottom plate with the attached Hermes/Angelia board slides left (aft).
  8. Carefully slide the bottom plate to the left (aft) in order to expose the SMA connectors on the Hermes/Angelia board. This will also expose the board connector for the Accessory jack.
  9. Unplug the accessory cable from the Hermes/Angelia board.
  10. Carefully disconnect the SMA connectors on the coax bundle from the connectors on the Hermes/Angelia board.
  11. Unplug the two-wire connector from J9 (Angelia).
  12. Lift the back panel up and around so that it can set on top of the main chassis out of the way.
  13. Carefully slide the bottom plate right (forward). Once the bottom plate is about 8cm (3") to the right (forward), you will be able to remove the two-pin Molex power connector from the PA board (through the cutout in the center shield plate).
  14. Note the position and orientation of the 10-conductor ribbon cable near the center of the Hermes/Angelia board. Note that the red stripe that normally denotes pin 1 is actually on pin 10. Remove the ribbon cable.
  15. You can now slide the bottom plate with the attached fan, power supply, and Hermes/Angelia board completely clear of the case.
  16. Follow the instructions for setting the microphone jumpers for your microphone. Quick reference:
    - JP4 - mic input: 1-2 audio on ring, 2-3 audio on tip
    - JP5 - mic bias: 1-2 bias on ring, 2-3 bias on tip, jumper remove for no mic bias.
    - JP6 - PTT select: 1-2 PTT on ring, 2-3 PTT on tip, jumper removed for no PTT connection.
1. Follow the instructions for setting external or internal 10MHz reference. Quick reference:
    - J23 - Internal reference power: jumper in - internal reference powered, jumper out - no power to internal reference.
    - J20 - 10MHz source select: jumper toward center - internal reference, jumper toward edge - external reference.
    - J22 - 50 ohm load: jumper in - 50 ohm load on 10MHz external reference in.
    - J24 - ground isolation - jumper in - 10MHz ext ref shield grounded to board, jumper out - ext ref shield isolated (no ground loops)

Reassembly is the reverse of assembly.

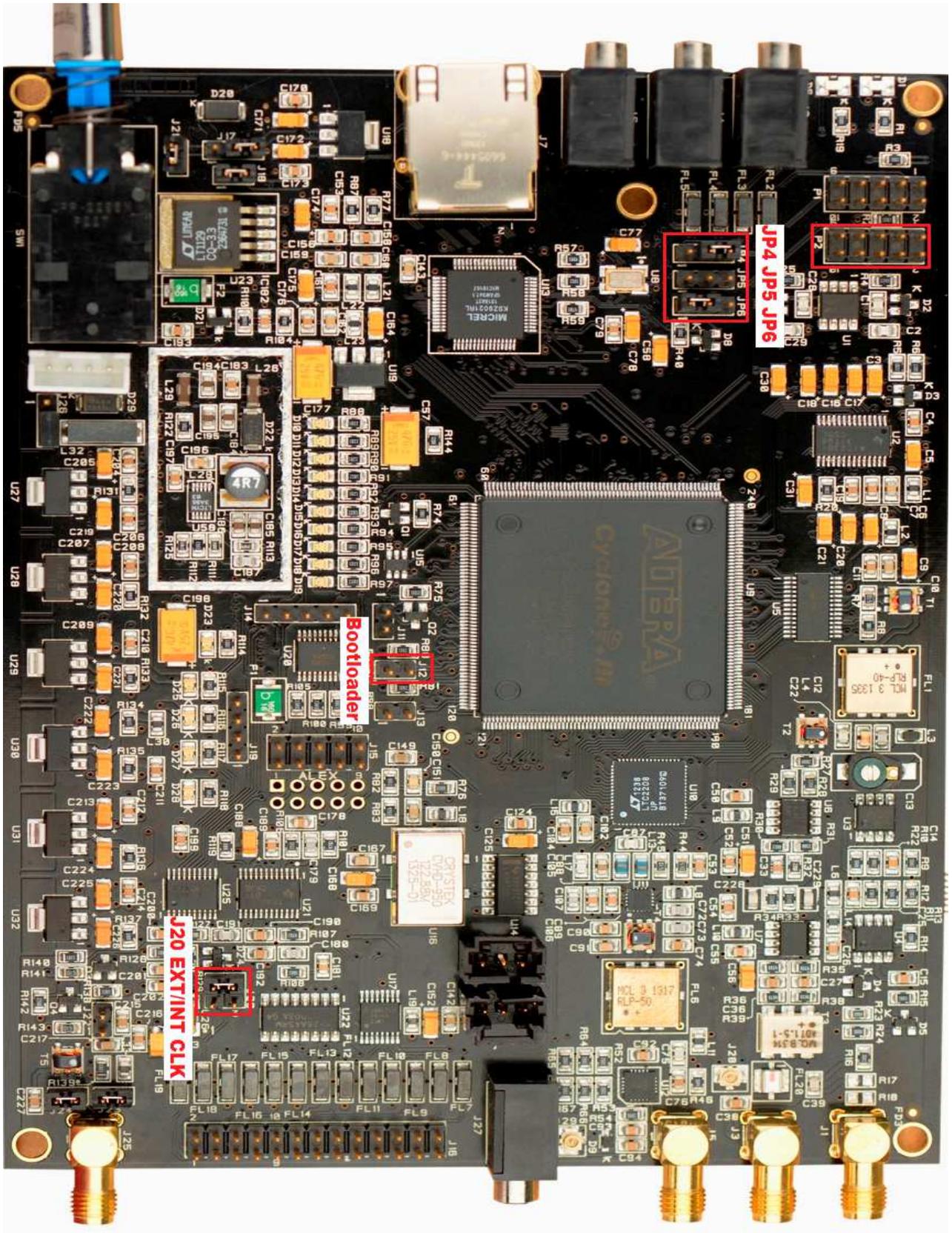
1. Reattach the 10-conductor ribbon cable to J15. Remember that the red stripe goes to position 10. (Apache may correct this error on future runs of the radio so be sure to verify orientation is the same as when it was removed.)
2. Slide the bottom plate part way in so that the two-pin molex power connector may be reattached to the PA board.
3. Continue sliding the bottom plate left until the SMA connectors and Accessory connector are visible.
4. Reposition the rear plate so that the two conductor connector may be reattached to J9.
5. Reattach Accessory connector ribbon cable to J16. Red stripe goes to pin 1.
6. Reattach coax bundle to SMA connectors as follows (Angelia):
  - 1 to J25 (External 10MHz reference connector)
  - 2 to J10
  - 5 (separate cable from PA board) to J5 4 to J3

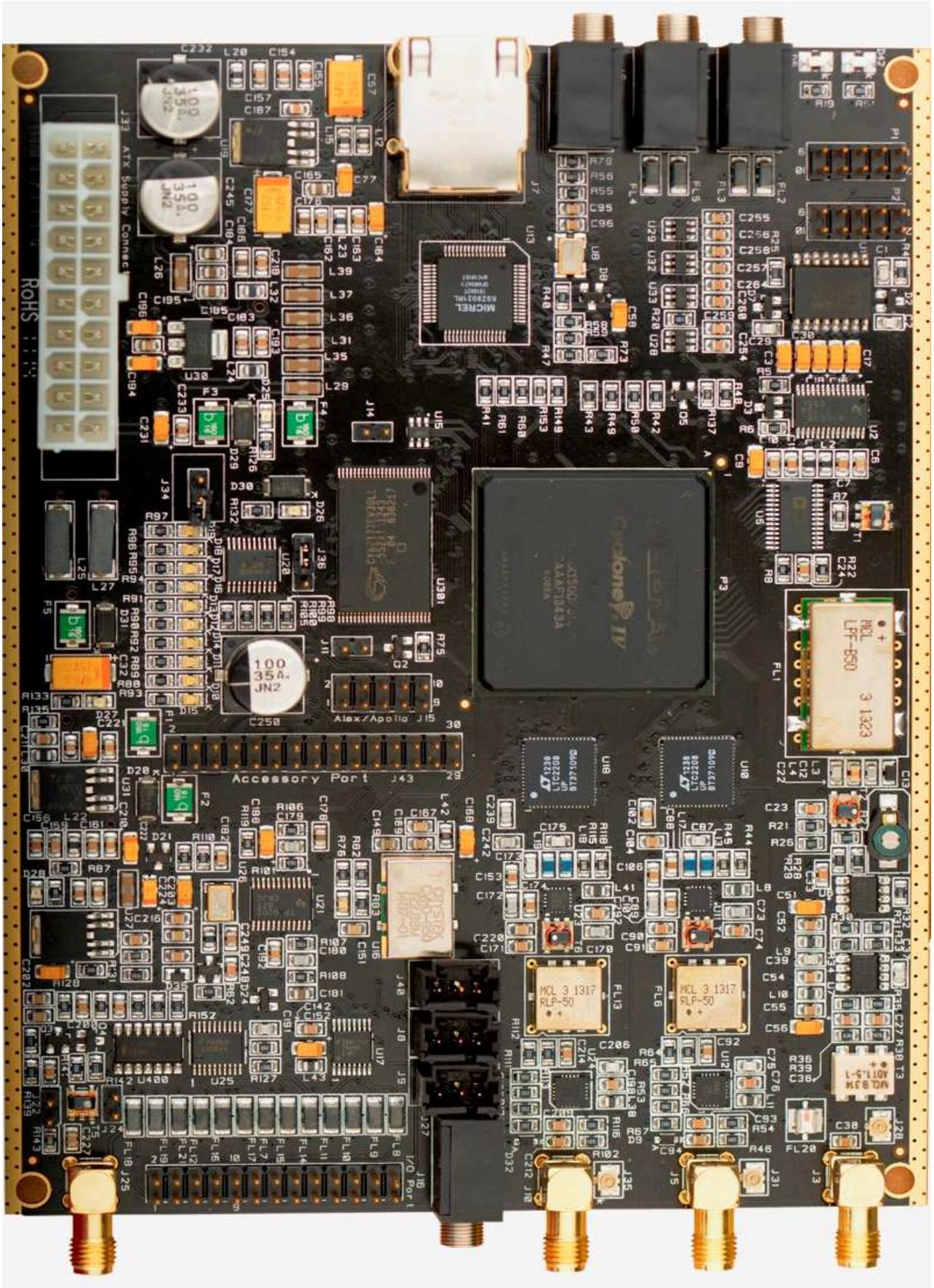
**NOTE:** tighten SMA connectors barely more than finger tight. If you use a wrench be very careful not to over torque the SMA locking collars.

1. With the rear panel held in proper orientation, slide the bottom plate back to the center of the main chassis. The rear panel should neatly and easily fit over the BNC connectors. Pay particular attention that the coax bundle slides into place along side of the fan.
2. Reorient the main case so that it is on its feet and no longer on its side.
3. Reinstall Phillips-head screws in the front panel. HINT: do not tighten any screws all-the-way until all screws are in place. Do NOT over-torque.
4. Reinstall Phillips-head screws in the rear panel. HINT: do not tighten any screws all-the-way until all screws are in place. Do NOT over-torque.
5. Reinstall lock washers and hold-down nuts on BNC connectors. Do NOT over-torque.

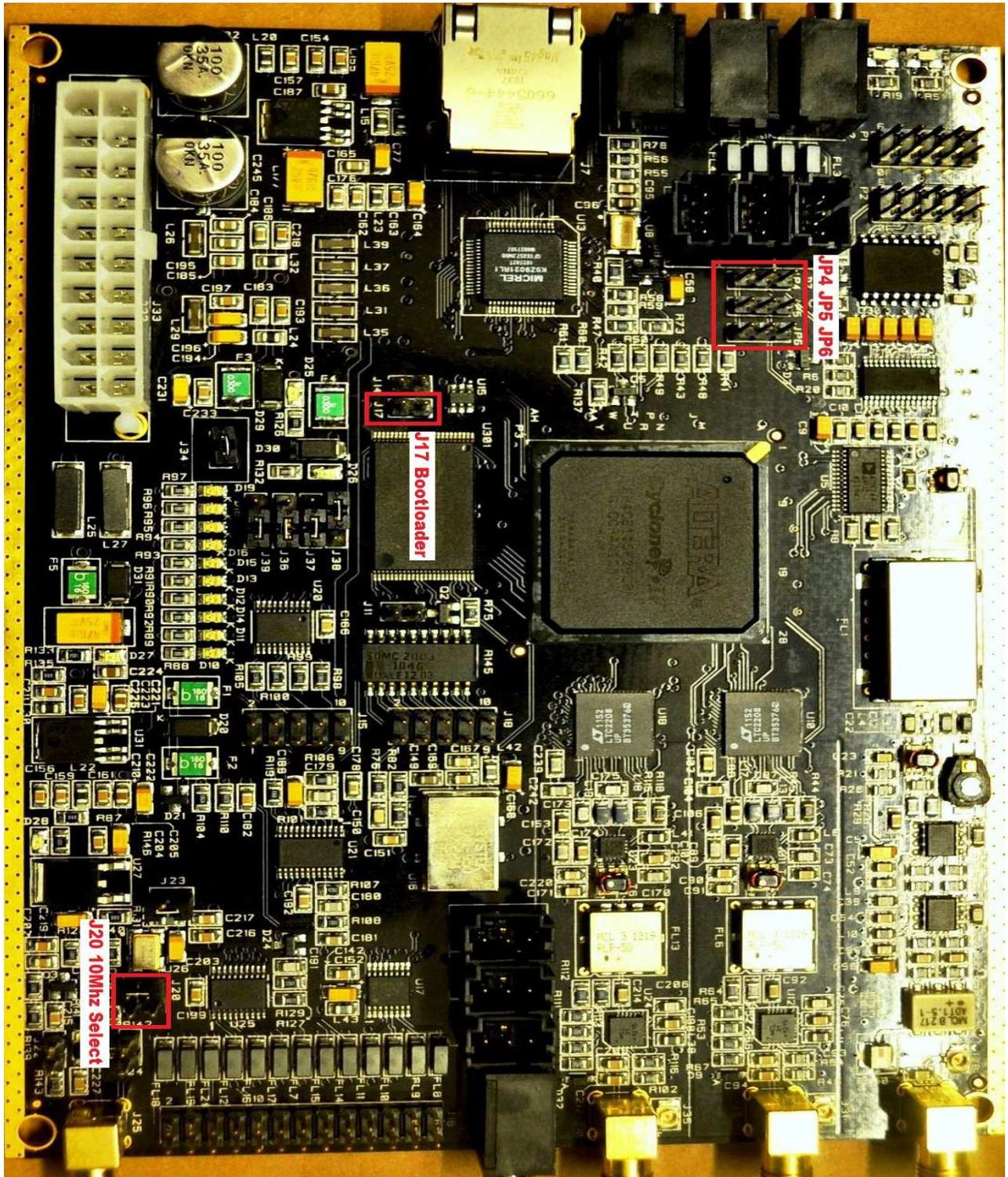
Done!

### Hermes PCB (ANAN-10/100)



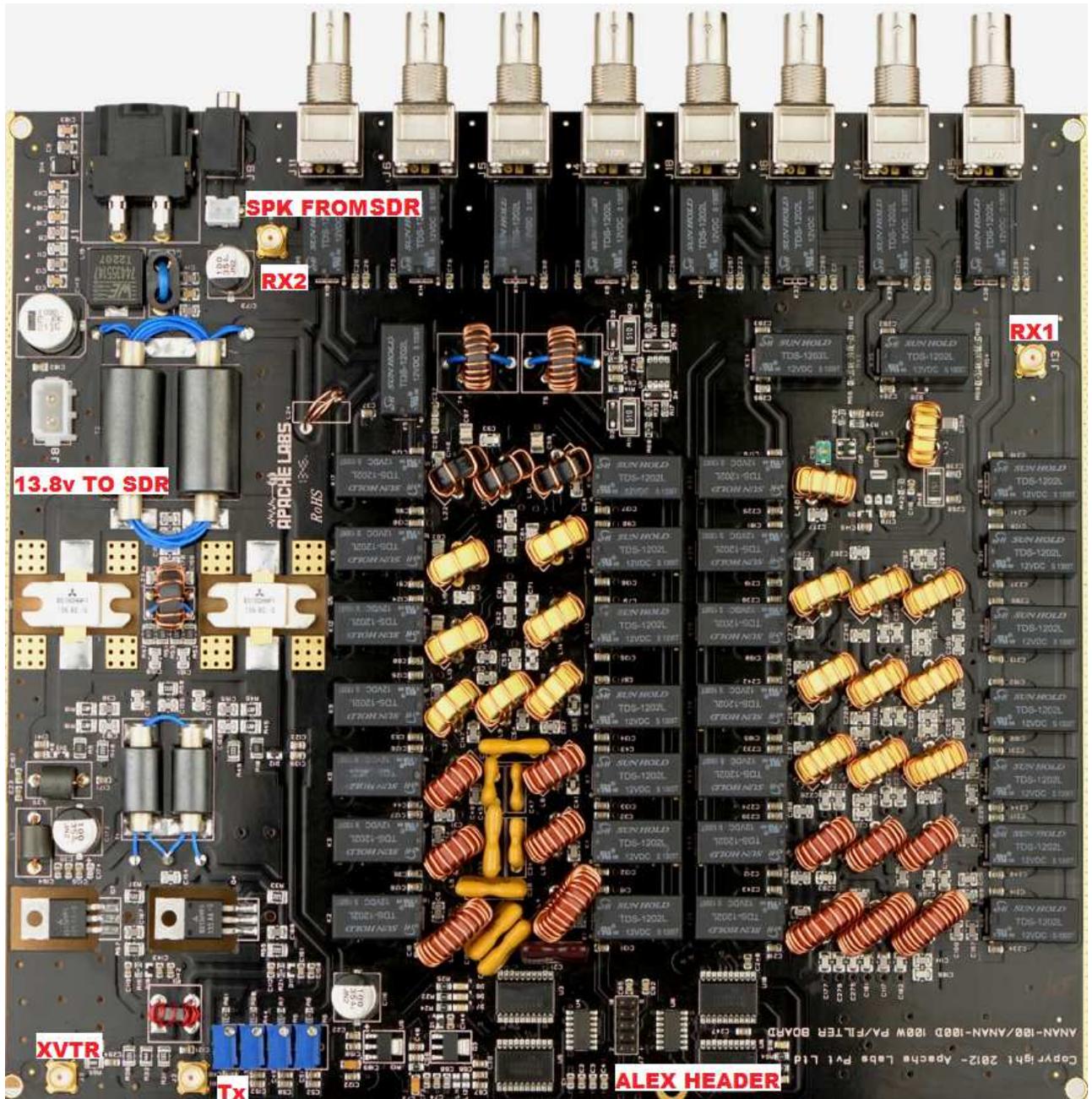


Orion PCB (ANAN-200D) --note no jumper settings required



Angelia Jumpers

Apache Labs ANAN SDRs



ANAN PA Board

