

Apache Labs ANAN-10 Users Guide
DDC/DUC HF +6M Transceiver

ANAN-10+



ANAN-10 DDC/DUC Transceiver
Apache Labs – <http://www.apache-labs.com>

In cooperation with VK6APH and the Open Source
Hardware and Software Project
<http://openhpsdr.org>

Eratta: List of changes to the document:

- v2.1 | **July 5, 2013**
Added Trouble Shooting section Appendix "E" page 39
- 2.2 | July 7, 2013
Added CE EU Certification statement page 7

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Apache Labs LLC, Inc.
"Declarations of Conformity"

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

It has been confirmed by the relevant authorities that the ANAN-10/100/100D DO NOT require FCC certification of any sort, under rule 97 Amateur radio equipment with the exception of amplifiers and scanning receivers are exempt from certification, however, must conform to rule 97 which states that harmonic and spurious emissions must be below 43dB of the transmitted out up to 30MHz and 60dB beyond that.

Subject: Apache Labs Products CE and RTTE Certified

Date: Tue, 02 Jul 2013 11:29:09 -0000

From: abhiarunoday16 <abhiarunoday16@yahoo.com>

Reply-To: apache-labs@yahoogroups.com

To: apache-labs@yahoogroups.com

CE & EC Radio and telecommunications terminal equipment (RTTE) Certification

We are pleased to announce that the ANAN series HF & 6M SDR transceivers including the ANAN-10, ANAN-100 and the ANAN-100D are now 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,

Our EU customers may place orders directly on our website at:
www.apache-labs.com, shipments to EU commence immediately,

Regards,

Abhi

Introduction

ANAN-10 is a digital-down-conversion (DDC) and digital-up-conversion (DUC) Software Defined HF transceiver. The ANAN-10 was cooperatively designed by the OpenHPSDR Team and Apache Labs. Kevin Wheatley M0KHZ and the OpenHPSDR group developed the "Hermes" brand Transceiver board as an integrated version of three of their original backplane PCB's (Mercury + Metis + Penelope).

The Apache Labs ANAN includes the Hermes design in a series of new transceivers. The ANAN 10 provides either a 100 baseT or Gigabit (1000 baseT) Ethernet interface to the host PC. It does not require a sound card DSP, Firewire(TM), or USB interface.

Future ANAN-10 firmware updates can be achieved via the Ethernet connection, eliminating the need for special programming adapters. For more information, see Appendix I – Updating The Hermes Firmware.

ANAN-10 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 Hermes webpage: <http://openhpsdr.org/wiki/index.php?title=HERMES>

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

Minimum Requirements

Computer basic requirements

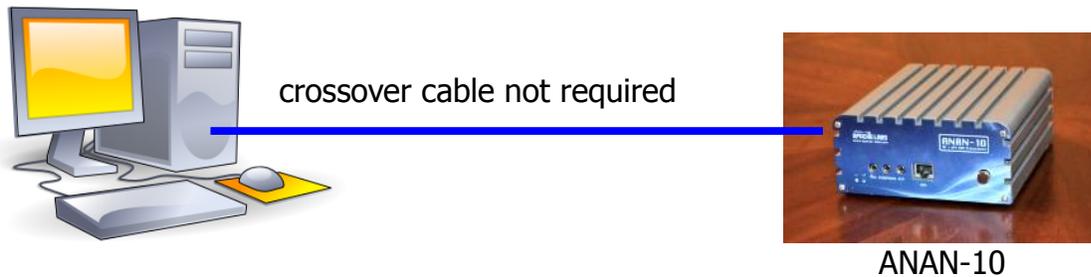
1. Intel Pentium 4, 3 Ghz (bare minimum), or Intel i3, 2ghz or better (recommended).
2. 2GB Ram, or 4GB Ram (recommended).
- 3, 1280x1024 display screen resolution recommended
4. Windows XP or newer (**Win7 recommended**). It is possible some older machines will not give satisfactory performance, regardless of processor speed.
5. Computer with Full Duplex Ethernet NIC card capable of 100 baseT or 1000 baseT (**gigabit recommended**) Ethernet port.
6. **Full Duplex Ethernet switch** or router with 1 free 100mbs or 1000mbs (**gigabit recommended**) Ethernet port.
7. CAT5E or CAT6 (recommended) Ethernet patch cable to connect ANAN-10 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.

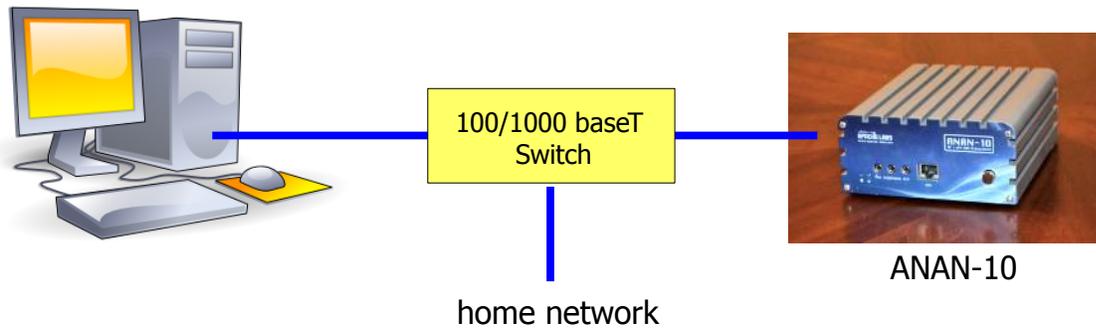
Suitable routers or LAN Network switches:

Full Duplex wired or wireless Ethernet Router with sufficient ports to connect the host computer and the ANAN-10 at 100mbs or 1000mbs (**gigabit recommended**) – 802.11N required to handle 30Mbps from ANAN-10. Optional Full Duplex Ethernet 5 port switch with 100mbs or 1000mbs (**gigabit recommended**)Internet connectivity **required** to obtain the latest software and firmware revisions. Ethernet **HUBS** will **NOT** work properly for this application.

Ethernet Connection



ANAN-10 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 in Figure 1



Ethernet switch is shown in Figure 2

For direct connection of ANAN-10 to a dedicated Ethernet port, a CAT 5 Ethernet cable is used. Note that a 'crossover' cable is not necessary.

For connection of ANAN-10 to an Ethernet switch, a CAT 5 or better Ethernet cable is used.

IMPORTANT: The Ethernet switch must be capable of operating in **full duplex** mode at 100T or 1000T. The initial release of ANAN-10 FPGA code will operate at 100 baseT, but future releases may 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 100/**1000 baseT switch is recommended**.

An Ethernet "HUB" is not recommended.

Here is what you need to get started with the ANAN-10

ANAN-10 Hardware Requirements

1. **13.8vdc minimum, 7A**

Note: some switching DC supplies create objectionable EMI/RFI which may degrade performance of the ANAN-10 transceiver.

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.

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!

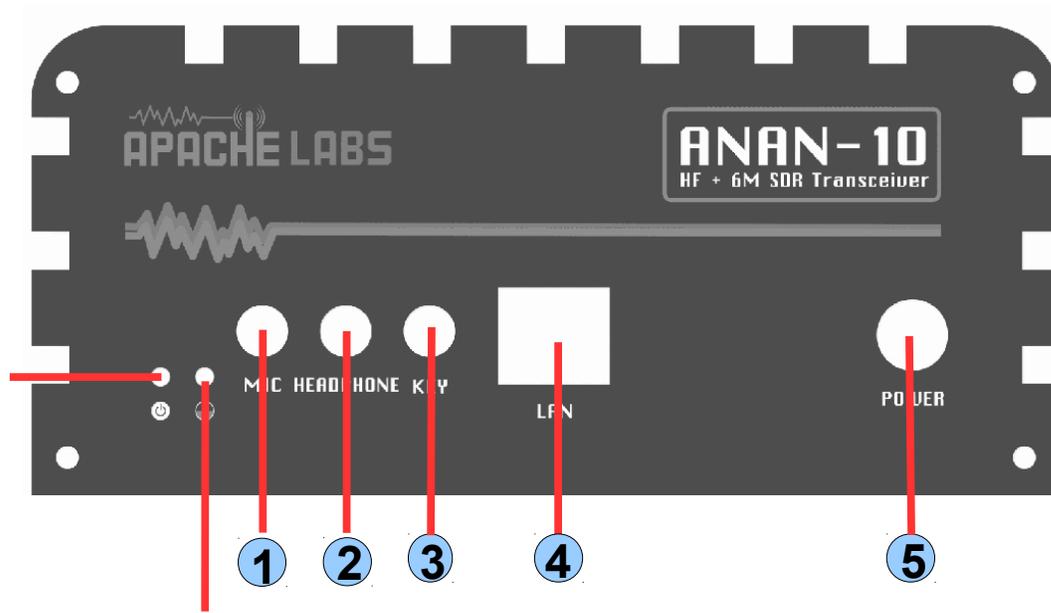
6. DO NOT TURN THE ANAN-10 RADIO ON until PowerSDR software is properly installed and configured.

ANAN-10 Software requirements:

1. Windows XP or later – Win7 recommended.
2. Microsoft .NET 4.0 Framework or later.
3. PowerSDR 2.2.4.XX W5WC - 2Rx modified version.
4. Please refer to the FLEX™ Radio FLEX-5000 manual here:
<http://support.flex-radio.com/downloads.aspx?id=344>

please see OpenHPSR Software and download information on page 10 of this manual.

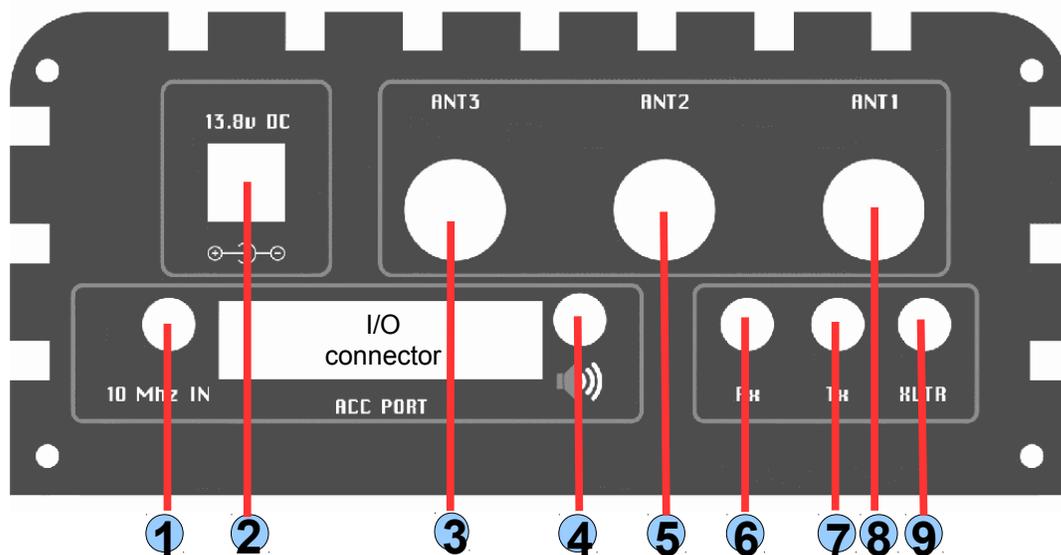
ANAN-10 Front Panel



FPGA active LED

1. 3.5mm 1/8" Stereo mic jack
2. 3.5mm 1/8" Stereo headphone stereo jack
3. 3.5mm 1/8" Stereo CW key or paddles
4. 100 baseT/1000baseT LAN RJ-45 connector
5. ANAN-10 Power ON/OFF switch

ANAN-10 Back Panel



1. External 10MHz timebase oscillator input (SMA)
2. 3.5mm x 2.5mm 13.8vdc jack
3. Female BNC Connector - Antenna 3
4. 3.5mm 1/8" stereo Audio Output to jack
5. Female BNC Connector – Antenna 2
6. Female SMA Connector Rx direct input
7. Female SMA 500mw Tx direct output
8. Female BNC Connector – ANT 1
9. Female SMA 0dbm Transverter output

Quick Start instructions

please refer to front and back panel illustrations above

Warning: these "Quick Start" instructions only apply to the ANAN-10 Apache Transceiver board with the jumpers set to the defaults at the factory.

Please refer to the OpenHPSDR webpage for the most recent documentation by Phil Harman VK6APH for details of the TAPR Hermes Transceiver

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

Hardware Setup

Connect ANAN-10 to a 13.8 VDC 5A or 7A (recommended) or better power supply to the back panel jack #2 with the supplied coaxial cable and connector.

Note: DO NOT TURN ON THE RADIO AT THIS TIME The ANAN-10 Apache Radio will not operate without the software installed and properly configured.

Connect a suitable 50 ohm Amateur Band (or Dummy load) to ANT-1 back panel jack

- | | |
|--|---------|
| 1. 3.5mm 1/8" Stereo mic jack | |
| 2. 3.5mm 1/8" Stereo headphone stereo jack | Antenna |
| 3. 3.5mm 1/8" Stereo CW key or paddles | #8. |
| 4. 100 baseT/1000baseT LAN RJ-45 connector | |
| 5. ANAN-10 Power ON/OFF switch | |

Connect Stereo speakers or Stereo headphones to the headphone jack on the panel #2.

front

Connect ANAN-10 to local LAN with a CAT-5 or better cable between the ANAN-10 **LAN** jack (front panel #4), and a 100/1000Mbps Ethernet switch, router, or directly to an Ethernet port on your personal computer.

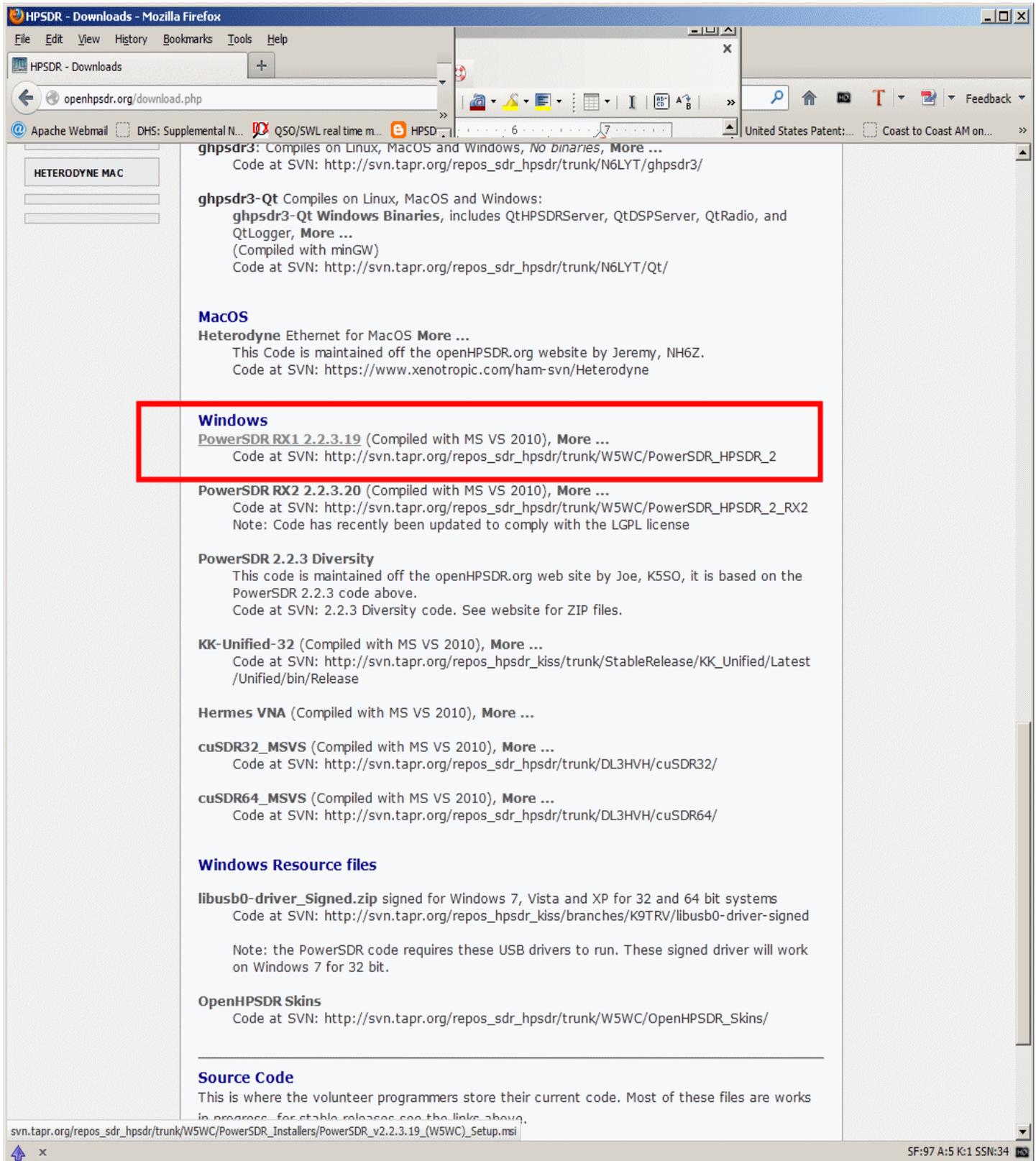
Note: find minimum detailed Ethernet requirements beginning on page 4 of this document.

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 W5WC RX2 Installer software:
<http://openhpsdr.org/download.php>



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

Windows

For example: On the OpenHPSDR Download webpage <http://openhpsdr.org/download.php> you will see: PowerSDR Rx2 2.2.3.19 (compiled with MS VS 2010)

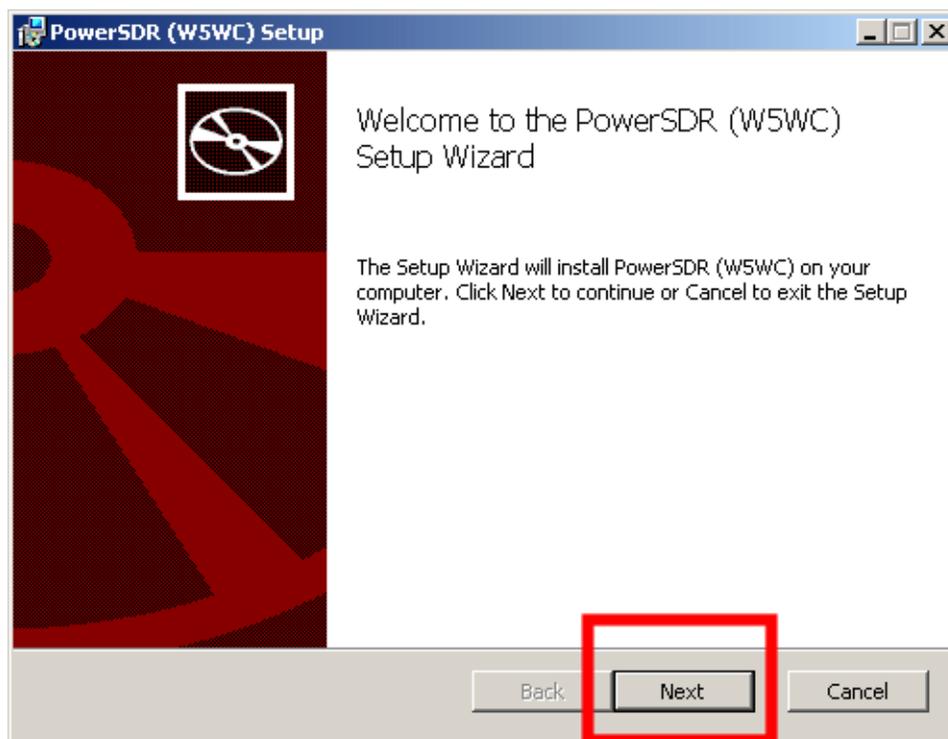
the current version of PowerSDR RX2 2.2.3.XX will have a current build number inserted in the place of "XX". click on PowerSDR RX2 2.2.3.XX and select "RUN" to install the application. Alternatively, you can SAVE the application in the directory of your choice.

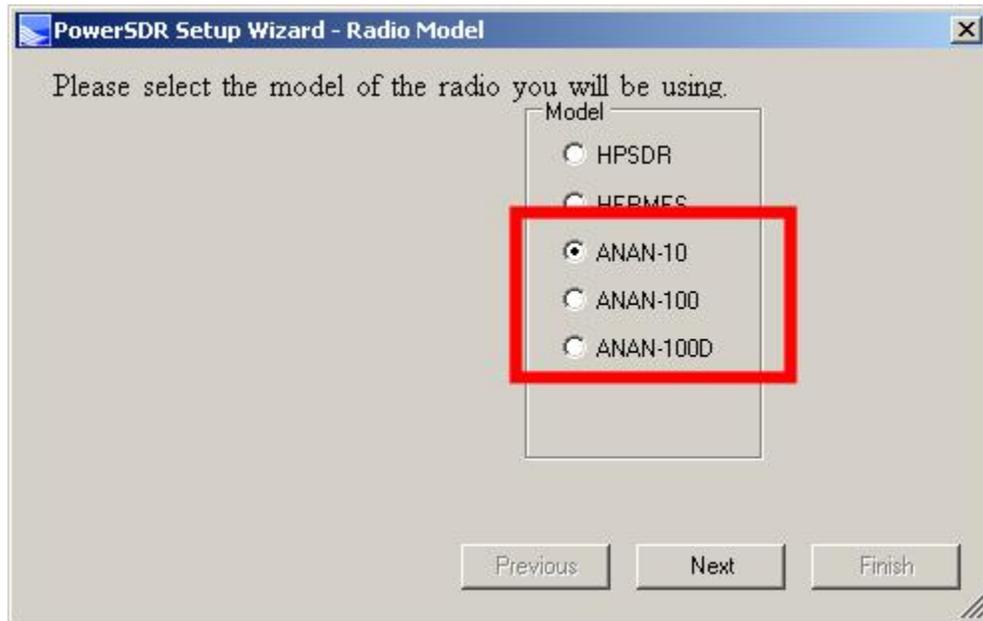
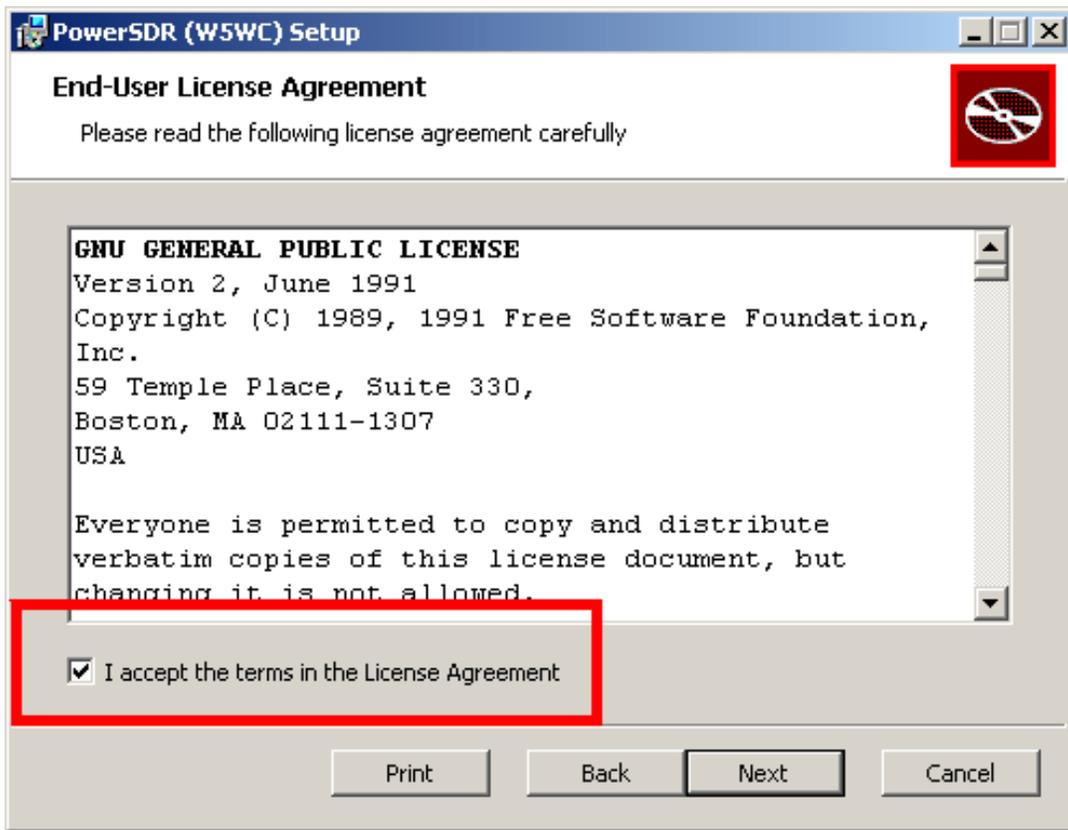
Execute (RUN) the Installer at this time.

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 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)

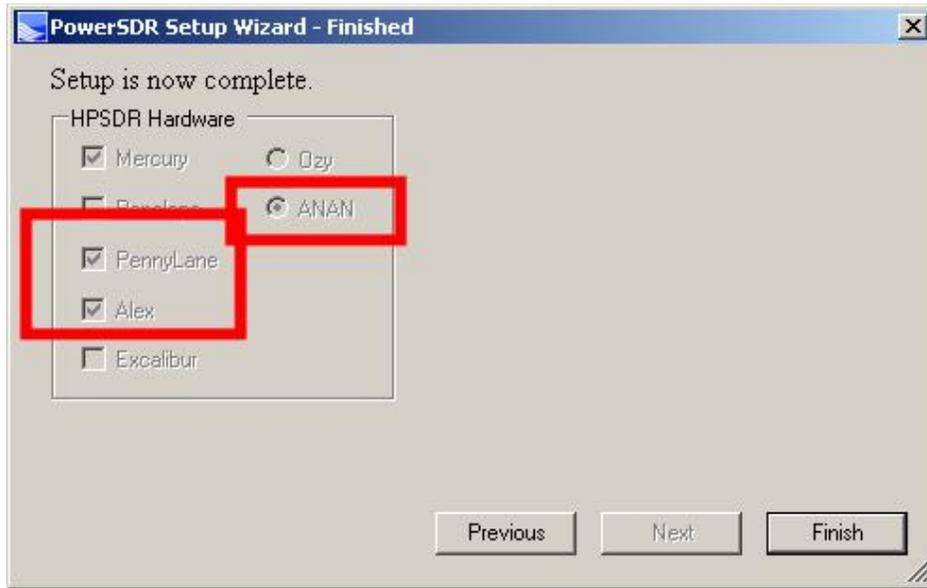
<http://www.microsoft.com/en-us/download/details.aspx?id=17851>

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

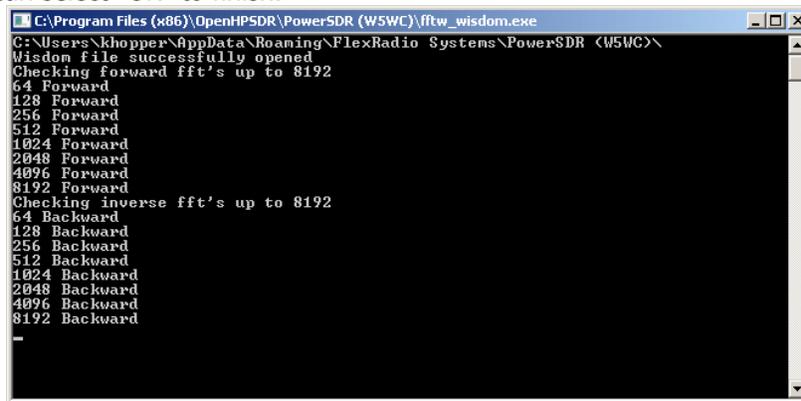




From the PowerSDR Installation dialogue screen, chose ANAN-10.



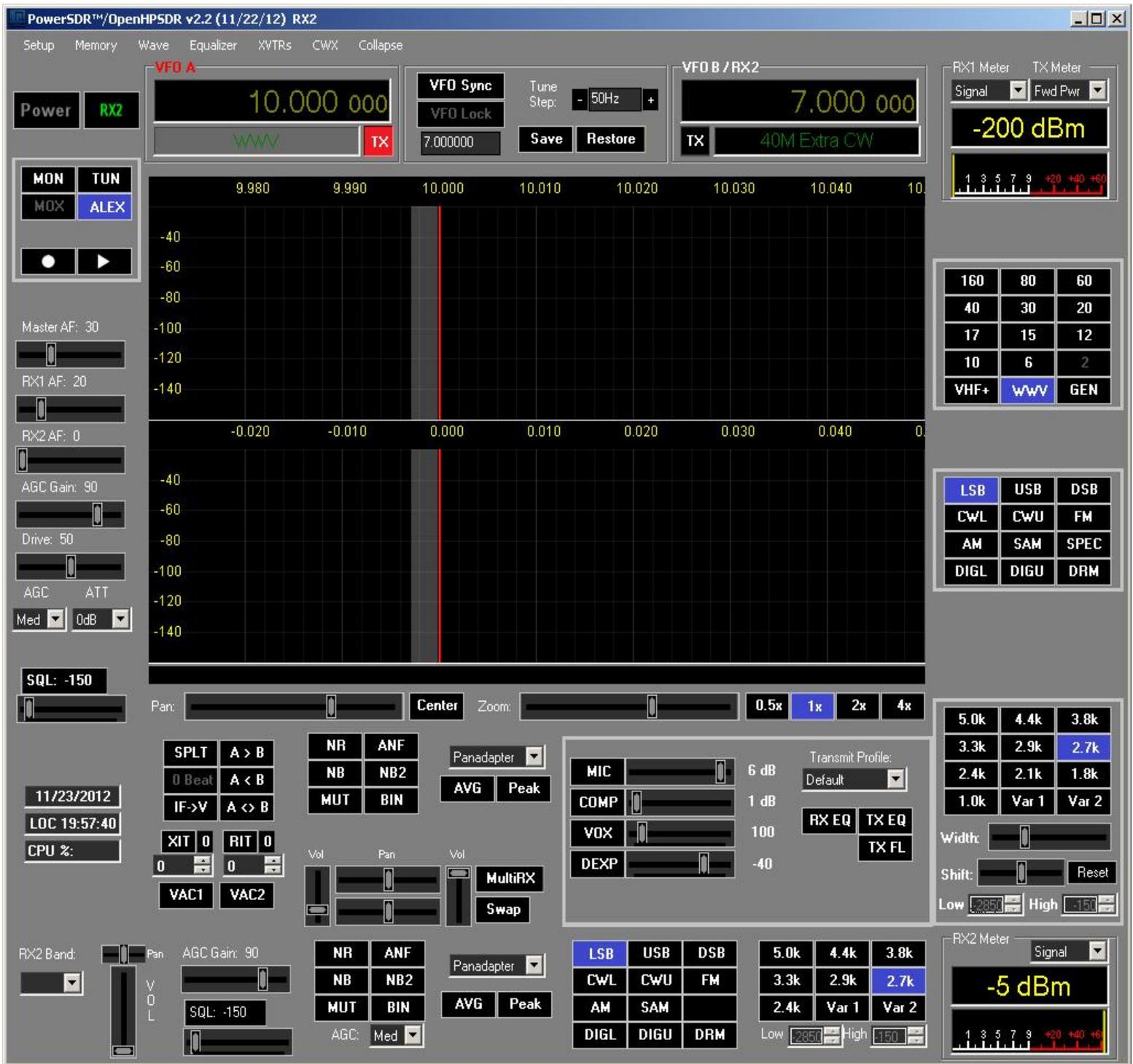
A one time DOS FFT optimization screen will appear. Wait for this process to finish and the DOS screen will disappear. Then you can select "OK" to finish.



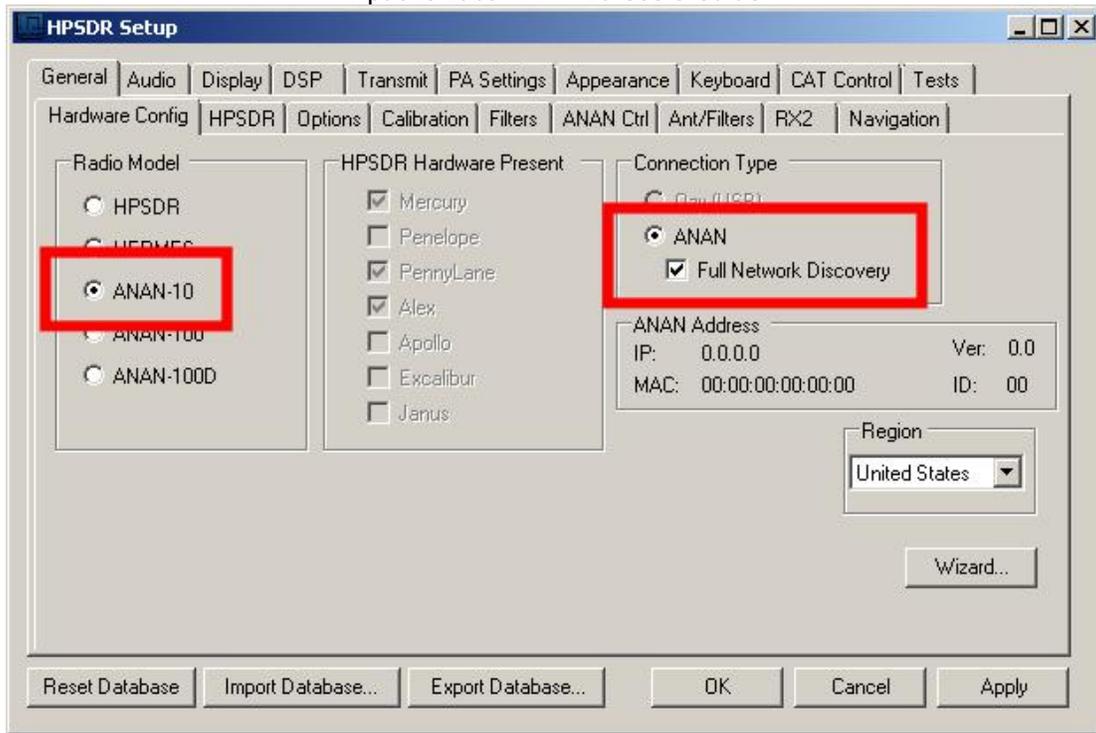
Optimization DOS Screen



Apache progress screen (your's may differ)
Wait for the Apache/PowerSDR loading screen form to finish.

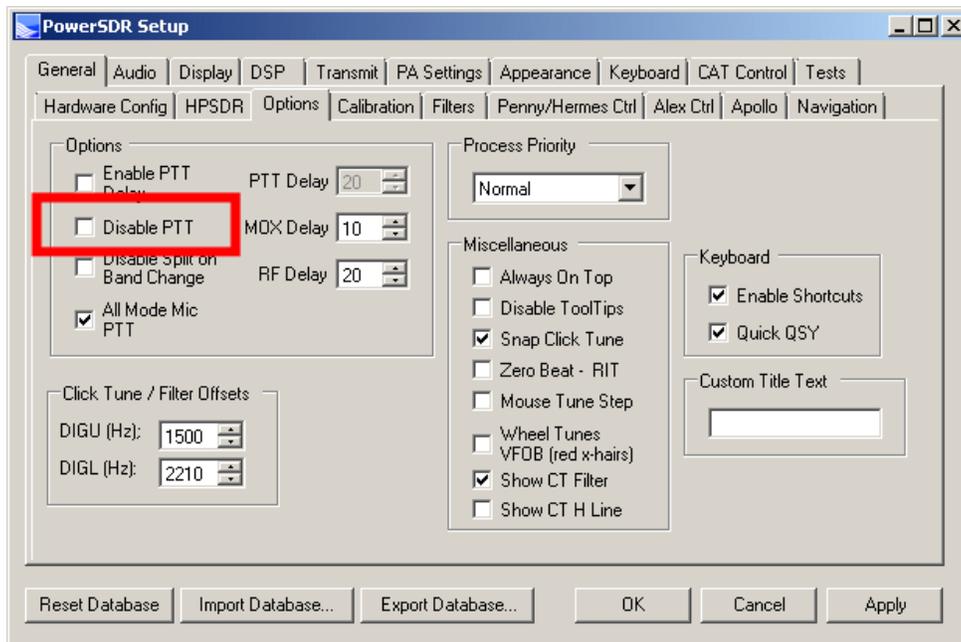


Click on the "SETUP" menu selection to configure the PowerSDR software.
PowerSDR basic display screen

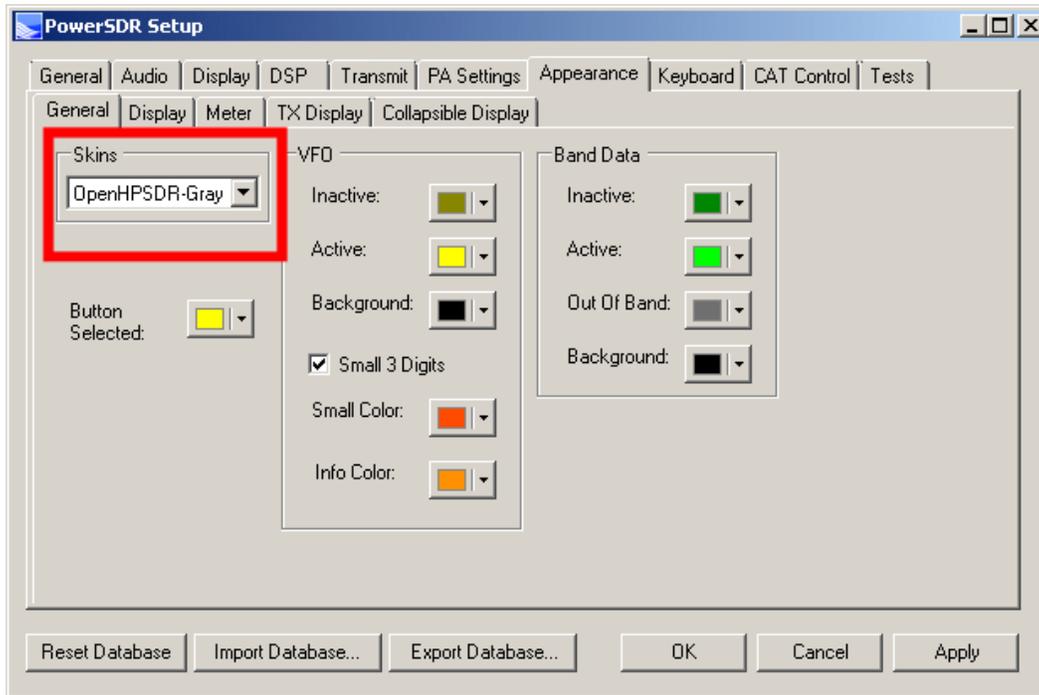


Setup ---> General tab ---> Hardware Config tab, the Radio Model should have ANAN-10 selected. Connection Type "ANAN" and "Full Network Discovery" should both be checked. In the "Region", select the Country in which you reside.

General tab ---> Options tab, insure that "Disable Push to talk" is NOT checked.



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



If you chose to experiment with different graphical appearances, go to the OpenHPSDR webiste (<http://openhpsdr.org/download.php>) and scroll down to the "**Windows Resource files**" and select OpenHPSDR Skins. This is considered an Advanced User activity.

http://svn.tapr.org/repos_sdr_hpsdr/trunk/W5WC/OpenHPSDR_Skins/OpenHPSDR_Skins.exe and RUN.

Turn Power On

Make sure you speakers or headphones are plugged into the ANAN-10 front headphone jack.

Turn on your power supply. Push the **POWER ON** button on the ANAN-10.

Then press the "**POWER**" button on PowerSDR™ wait a few seconds and then click on the Setup Menu selection. Go to → GENERAL → Hardware Configuration tab and note that in the Hermes address box the **IP** and **MAC** values should be non-zero.

Note: if the IP ADDRESS is 0.0.0.0 you must check your LAN connection. Also check your LAN connector on the ANAN-10 to insure that the green LINK light is illuminated.

If your LAN is properly configured, the ANAN-10 board IP ADDRESS and MAC ADDRESS should be automatically be detected and assigned. An incorrect default value is 169.254.1XX.XXX. PowerSDR™ will display the currently assigned IP address and MAC address of the ANAN-10 Hermes board if the LAN connection is properly connected and configured. If the ANAN-10 IP ADDRESS remains 0.0.0.0 then you must determine if 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 Advanced Installation Guide refers to "STATIC" IP ADDRESSING.
 Note: see Appendix for definition of "APIPA"

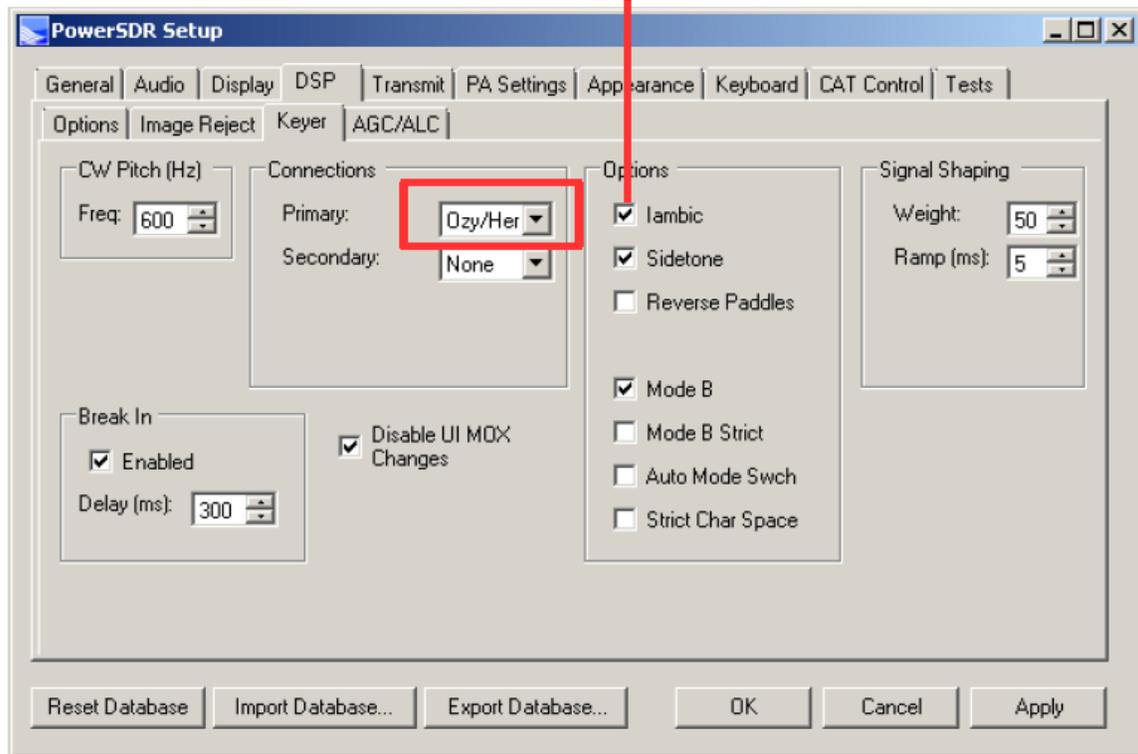
Make a note of your unique MAC address since this will be useful if there is a need for network problem-solving in the future

On Setup → General → Hardware Config tab there is a section labeled HPSDR Hardware Present with the **ALEX** box checked, so that the proper Low Passband Filter is automatically activated.

If the open-collector outputs on connector J16 are being used, they may be activated using the General ---> Penny ---> ANAN-10 Ctrl tab. Click on the 'Ext Control' button to activate the controls. Please refer to the OpenHPSDR webpage for the most recent documentation by Phil Harman VK6APH for details of the TAPR Hermes Transceiver http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Documentation

CW Key Selection and Wiring

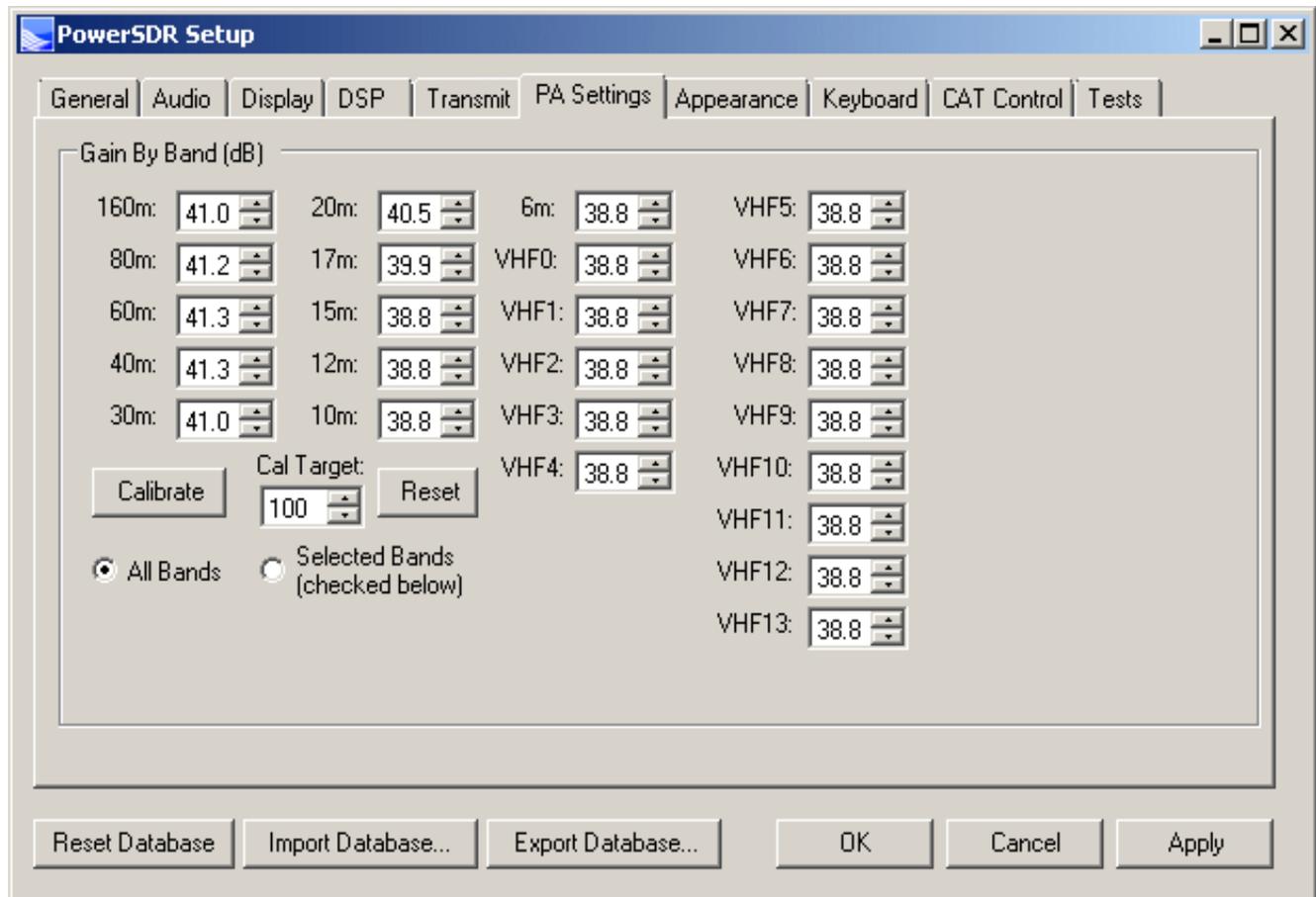
Select Iambic Paddles or straight key



To use a CW key with 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.

Manual PA Calibration



Each ANAN-10 owner needs to manually calibrate the Transmitter Power Output settings within PowerSDR™ to ensure proper operation. Some versions of PowerSDR™ offered an “Automatic Calibration”. Please do not use any automatic calibration routine. Manual calibration per band is the only recommend method at this time.

Use the following manual calibration procedure to properly set/calibrate your ANAN-10 power output:

1. Connect a 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” dropdown box in the upper right corner of the GUI.;
5. Enable the Antenna window by clicking on Setup ---> General ---> ALEX 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.

Manual Calibration continued

The PA Settings TAB allows you to set (calibrate) the ANAN-10 Power Amplifier gain by band (dB – Power Output per Band) for each of the available Ham Bands. There is a up/down gain control for each band, which regulates the PowerAmplifier 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 available power output per band can be reached at the lowest value of 38.8dB in this menu, with the main window drive level control set to 100 for each band .

The Main PowerSDR window (PA) drive control defaults to 50% on all bands. Before performing Power Setting Calibration, step thru each band and set the drive control to 100. This ensures the power calibration setting is adjusted using maximum available output .

The tab may also contain and advanced calibration routine that you should **NOT** use with the ANAN-10.

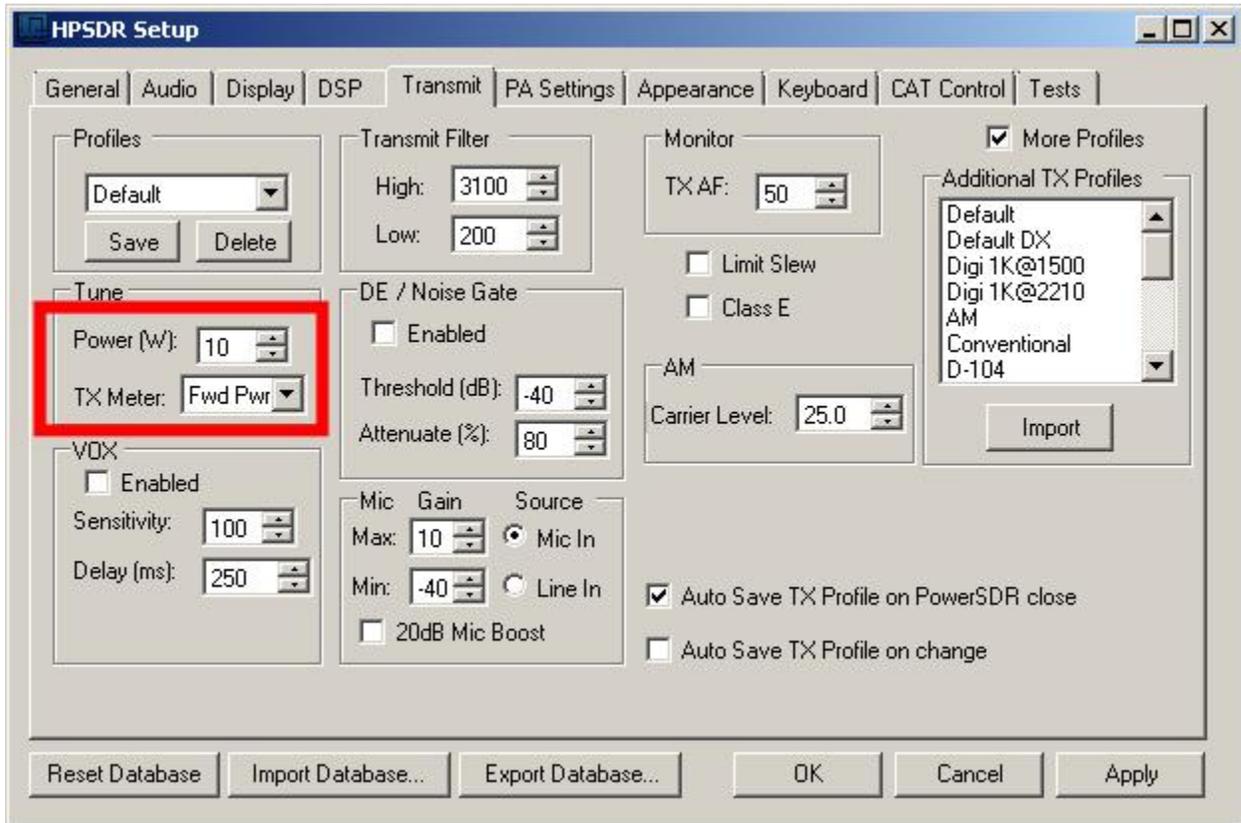
Setup PA settings form:

1. Select one of the bands on the PA settings form.
2. Ensure you have the Setup ---> Transmit tab ---> Tune control set to 100 and a **Dummy Load** connected to the selected antenna port on the ALEX setup tab.
3. Press “TUN” (Tune) on the upper left side of the PowerSDR™ main display form on your computer.
4. Adjust the band gain value for a TX Meter “FWD PWR” reading of the desired value. If you have an external wattmeter, you should rely on it's reading and not the reading on the display.
5. 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 the desired output power level. Note that the drive level should be set to 100 on each band before attempting to set power output level with this procedure .
6. When all bands have been calibrated, remove the Dummy Load and select the antenna of your choice in the ALEX setup Tab.
7. Reduce the “TUN” power wattage setting on the Setup ---> Transmit tab to approximately 10% or a value you feel comfortable with.

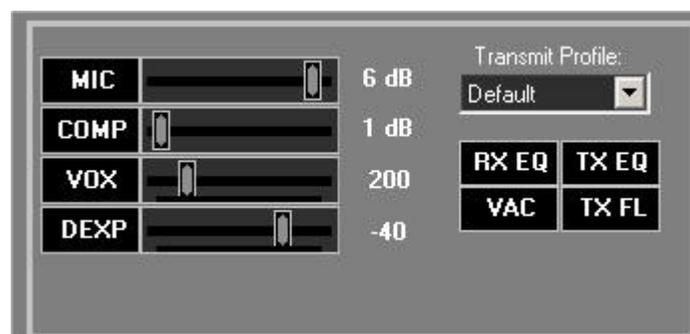
Microphone Settings

Adjusting mic gain.

The ANAN-10 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



1. You should make all microphone adjustments into a **Dummy Load**.
2. Select 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 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 PowerSDR window.
6. Locate the "MIC" gain control slider. It is located at lower right, below the pandapter. The present mic gain setting is shown just to the right of the MIC gain slider.



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 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 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.
-



Comment from Warren NR0V to email group 11/25/12

Significant portions of the audio chain have been rewritten in the HPSDR version of PSDR in order to improve various characteristics. You could try the following as a starting point:

On Setup Menu ---> Transmit:

1. set Mic Gain Max = 30
2. set Min Gain Min = -50
3. set Source = Mic In
4. BE SURE to check 20dB Mic Boost
5. Then, on the front panel, try a Mic Gain around 12 dB.
6. I also run with a COMP (Compression) level of 7dB.
7. BE SURE YOU HAVE THE **ALC ON!**
8. When things are operating properly, if you monitor the ALC meter, you should occasionally be hitting 0dB. The ALC will not allow the output to exceed the level indicated by an ALC reading of 0dB. There's no harm to hit 0dB fairly frequently.

For notes on ALC and a few other things that have been re-written for HPSDR, see: http://openhpsdr.org/wiki/images/b/b4/POWERSDR_USER_NOTES.pdf

The speech compressor (now an equivalent of RF speech processing rather than a compander), transmit leveler, ALC, and other bits and pieces of the transmit chain have been re-written in the HPSDR version of PSDR.

Transmit – by Bill KC9XG

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

The "Profiles" dropdown allows you select various transmit profiles. The default profile is (strangely enough) "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 PowerSDR window. In some versions of PowerSDR, this is actually a percentage of power output rather than output in Watts. The "Tun" button places 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 dekey 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 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.

by Bill KC9XG

Your ANAN-10 is a "knobless" radio. Most functions are performed on a PC with the mouse or via keyboard commands.

Preliminary receiver setup:

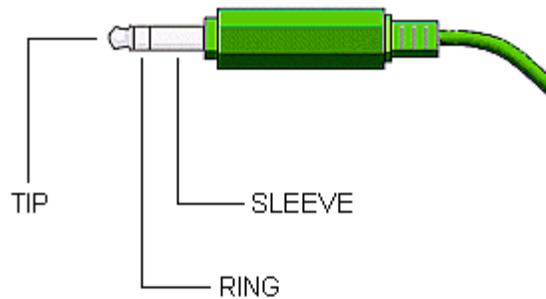
1. On the left side of the PowerSDR window, locate the "AGC Gain" control and set the slider to 90. This control works similar to an RF gain control, but actually controls the level where the "Automatic Gain Control" adjusts your receiver gain for best dynamic range. The Panadapter displays a green G 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 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 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.

Attaching a PC microphone



Updated 10/31/12

Hermes / ANAN-10+ SDR's have a 1/8" or 3.5mm stereo jack for microphone input. The following instructions outline methods for interfacing PC microphones to Hermes / ANAN-10+. Garden variety PC microphones can give surprisingly good results when used with the PowerSDR or external mic equalizers. Since I don't have a Hermes / ANAN-10+ I am unable to test these instructions with a working radio. Use at your own risk.

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

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 (e.g. 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 Hermes / Anan 10+:

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 Hermes / ANAN-10+.
4. Ensure that Hermes Jumpers JP4, JP5, and JP6 are set for intended use.
 Open Hermes / ANAN-10+ 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, Do not install jumpers (Hermes Default).
 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 Hermes / Anan 10+ housing.

Refer to

http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Documentation/Hermes_User_Manual_V1.9.pdf

to set jumpers for other intended uses.

5. Connect radio to dummy load or suitable antenna.
Power up radio.
6. Plug PC mic into one side of RS 274-375.
Left and right, or tip and ring are not marked on RS adapter.
7. If radio keys up or no mic audio is seen with mic plugged in, move PC Mic to other mono jack on adapter.
8. Adjust modulation level as needed using PowerSDR equalizer or equivalent.

Note: PowerSDR keyboard commands could be used to key Hermes / ANAN-10+ and to adjust modulation. PowerSDR must have Windows focus or these commands will not work.

Toggle MOX (PTT) or space bar CTRL + M

Mic gain increase	ALT + up arrow
Mic gain decrease	ALT + down arrow

VOX Threshold increase	ALT + right arrow
VOX Threshold decrease	ALT + Left arrow

Adding a Hand or foot operated Push-To-Talk switch for use with a PC microphone:

Standalone Push-To-Talk (PTT) switches are available from a number of Vendors and suppliers. Several hand and foot operated switches are available. Most can be supplied with 1/4" male plugs.

Some PTT Switch suppliers:

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

<http://heilsound.com/amateur/products/index.php>

<http://www.mfjenterprises.com/Product.php?productid=MFJ-1709>

1. Obtain either a hand held, or foot operated Push To Talk Switch. Typical PTT switches come with 1/4" mono plugs, or RCA plugs. The following assumes the PTT switch is equipped with a 1/4" mono plug.
2. Obtain RS274-047 1/4" mono female to 1/8" Mono Male adapter. Plug the 1/4" PTT plug into the RS 274-047 adapter and then plug 1/8" plug into RS 274-375 mono to stereo adapter used for the PC microphone as outlined above for PC microphones.
3. Remove DC power from Hermes / ANAN-10+.
4. Open Hermes / ANAN-10+ housing using grounded wrist strap and an anti-static mat. Locate jumper JP6.
5. Install jumpers between JP6-1 and JP6-2 to enable PTT on the stereo plug Ring. Close Hermes / ANAN-10 housing.
6. Connect radio to dummy load or suitable antenna. Power up radio.
7. Plug adapter into Hermes / Anan 10+ Stereo mic plug.
8. Plug PTT switch into one side of RS 274-375.
Left and right, or tip and ring are not marked on RS adapter.
9. If radio keys up with mic plugged in, exchange PC Mic and

PTT plugs in adapter.

Note that JP6 has no jumpers by default, thereby disabling PTT.

Modular Microphone connections

Updated 09/07/2012

Hermes / ANAN-10+ SDR's have a 1/8" or 3.5mm stereo jack for microphone input and PTT. The following instructions outline methods for interfacing common 8 Pin Modular microphones available from Kenwood, Yaesu and others to Hermes / ANAN-10+. Since I don't have a Hermes / ANAN-10+ I am unable to test these instructions with a working radio. Use at your own risk.

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

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 (e.g. 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 some existing 8 pin modular Ham Microphones to Hermes 1/8" or 3.5mm stereo plugs without using a soldering iron:

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-10+

Cal Rad adaptaters 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 RJ-45 Female to Terminal block provides a very simple way to interface a Stereo 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 pinouts 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> pinouts 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 CalRad 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 Hermes ANAN-10+.
2. Open Hermes / ANAN-10+ 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 Hermes / Anan 10+ housing.

Refer to

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> pinouts 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-10+ 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 Hermes ANAN-10+.
2. Open Hermes / ANAN-10+ 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 Hermes / Anan 10+ housing.
Refer to http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Documentation/Hermes_User_Manual_V1.5.pdf to set jumpers for other intended uses.



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 others 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,

Bill Diaz KC9XG

Apache Labs International Support

Technical support for ANAN-10 from the factory is available via the Apache Labs Yahoo Group
<http://groups.yahoo.com/group/apache-labs/>

or directly via email <support@apache-labs.com>

Apache-Labs-Support U.S.A.

Apache Labs is pleased to offer telephone support. In the United States you may contact the Telephone Customer Support Technician in five ways:

- (1) Skype ID "**Apache-Labs**" (with voice mail)
- (2) Illinois direct phone number 1+630-445-1194 (with voice mail)
- (3) <http://groups.yahoo.com/group/apache-labs/>
- (4) or directly via email <support@apache-labs.com>

Instructions relating to joining the OpenHPSDR Group reflector are here:
<http://lists.openhpsdr.org/listinfo.cgi/hpsdr-openhpsdr.org>

The OpenHPSDR archives may also be searched here:
<http://lists.openhpsdr.org/mmsearch.cgi/hpsdr-openhpsdr.org>

The latest version of the OpenHPSDR User Manual can be obtained from
<http://openhpsdr.org/documents.php> Revision 1.7 © Phil Harman VK6APH

Apache-labs Schematic

The current Apache ANAN-10 schematic can be downloaded from:
<https://apache-labs.com/al-downloads/1002/Hermes-Design-Files.html>

The current TAPR/OpenHPSDR Hermes Schematic seems to be here:
<http://openhpsdr.org/support/Hermes/>

Please refer to this webpage for the most recent documentation by Phil Harman VK6APH for the OpenHPSDR version of the Hermes
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

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 analyses 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

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](http://www.apache-labs.com/terms-of-use.html) 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-10 PCB 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(tm) modifications

W5WC source code: click [here](#)

http://svn.tapr.org/repos_sdr_hpsdr/trunk/W5WC/PowerSDR_Installers/PowerSDR_mRX_v3.1.5.0_Setup.msi

or

<https://apache-labs.com/index.php>

W5WC skins with installer [here](#)

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

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

Hermann, DL3HVV, is experimenting with parallel code using CUDA, OpenGL and OpenCL

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

the MinGW-version of the 32-Bit executable is a bit newer:

http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVVH/minGW32/bin

cuSDR32-VS: [cuSDR32_MSVS](#) (Compiled with MS VS 2010 requires .Net 4.0)

Code at SVN: http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVVH/cuSDR32/

cuSDR-minGW: [cuSDR32_minGW](#) "**cuSDR**" from Hermann DL3HVVH

Code at SVN: http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVVH/minGW32/

cuSDR64-VS: [cuSDR64_MSVS](#) (Compiled with MS VS 2010 requires .Net 4.0)

Code at SVN: http://svn.tapr.org/repos_sdr_hpsdr/trunk/DL3HVVH/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 J16 corrected pin-out list by Bill KC9XG

The Hermes schematic detail for J16 pins does not correspond to keyed IDC ribbon cable conventions. The following lists the IDC pin numbers, pin functions and the corresponding Hermes pin numbers.

Hermes J16 pinout for IDC ribbon cable.

(Numbers in parentheses are J16 Pinout shown on schematic)

1. User Digital input 3: Connected to 3.3V via 1K pullup resistor (26)
2. Open-drain PTT output (25).
3. OCREf Open-Collector reference/flyback diodes (24)
4. OC6 User open-collector output 7 (23)
5. OC5 User open-collector output 6 (22)
6. OC4 User open-collector output 5 (21)
7. OC3 User open-collector output 4 (20)
8. OC2 User open-collector output 3 (19)
9. OC1 User open-collector output 2 (18).
10. OC0 User open-collector output 1 (17)
11. User Digital input 2: Connected to 3.3V via 1K pullup resistor (16)
12. Right channel speaker Pair with pin 13 (15)
13. Right channel speaker, pair with pin 12 (14).
14. User Digital input 4: connected to 3.3V via 1K pullup resistor (13)
15. User Analogue input 2: 0-3V max (12)
16. User Analogue input 1: 0-3V max (11)
17. Analogue Ground (10)
18. User Digital input 1: Connected to 3.3V via 1K pullup resistor (9)
19. Right channel line Out (8)
20. Left channel line Out (7)
21. Left channel phones output (6)
22. Right channel phones output(5)
23. Right channel line-level audio input (4)
24. Left channel line-level audio input* (3)
25. Analogue Ground (2)
26. PTT : connected to 3.3V via 1k pullup resistor(1) (same as Mic PTT, J2 if JP6 used)

NOTE: Left channel line audio input is the "Line In" source on the [OpenHPSDR/PowerSDR] Setup, transmit tab. This input can be used instead of the mic jack. Pin 26 is PTT.

NOTE: The speaker jack contains the Left Channel speaker pair. The Right Channel speaker pair is on pin 12 and Pin 13. These are balanced outputs.

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

PowerSDR

As shown	IDC ribbon cable	Hermes Schematic
1	10	17
2	9	18
3	8	19
4	7	20
5	6	21
6	5	22
7	4	23
	3 OCREf.	24

Bill KC9XG

MARS operation

In PowerSDR select Settings → General → Hardware Config → Region you will be able to select band limits by country or Region. **Do not select "Extended"** unless your intended frequency of operation has been explicitly approved for your station operation on the intended frequency.

Latest USB/UDP protocol between ANAN-10 and Computer

go to [SVN](#) ---> Trunk ---> Documentation ---> USB_protocol_V1.46.doc

Appendix E Troubleshooting

Here are some ideas for troubleshooting your installation of the ANAN-10 DDC/DUC Transceiver based on Apache Customer Support experiences:

[1] Please describe your installation.

- (a) how do you have your rig attached to your computer?
- (b) what O/S are you running?
- (c) do you have .NET 4.x Framework installed?
- (d) what version of OpenHPSR-PowerSDR do you have installed?
- (e) do you have a "Link" light on the left hand side of your Rig Ethernet port?
- (f) do you have a blinking green light on the right hand side of your rig Ethernet port?
- (g) have you attempted to set a STATIC IP address? or are you using DHCP or APIPA addressing?

[2] Is your software starting normally?

- (a) what IP address, MAC address, and firmware version is SETUP showing?

[3] Have you verified your PC IP address?

[4] Have you tried connecting your rig DIRECTLY to your PC? To another PC?

[5] Have you turned on the Task Manager to see what your network traffic is?

[6] Did the previous owner of your system set a STATIC IP address? Apache Labs delivers each Transceiver ready to get an IP Address via DHCP or APIPA.

[7] Have you used your Volt Ohm Meter or DMM probes directly plugged into the power socket on the back to verify that you have 14.1vdc?

- (a) How does the supply voltage change when you use full 10W TUNE?

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](#).

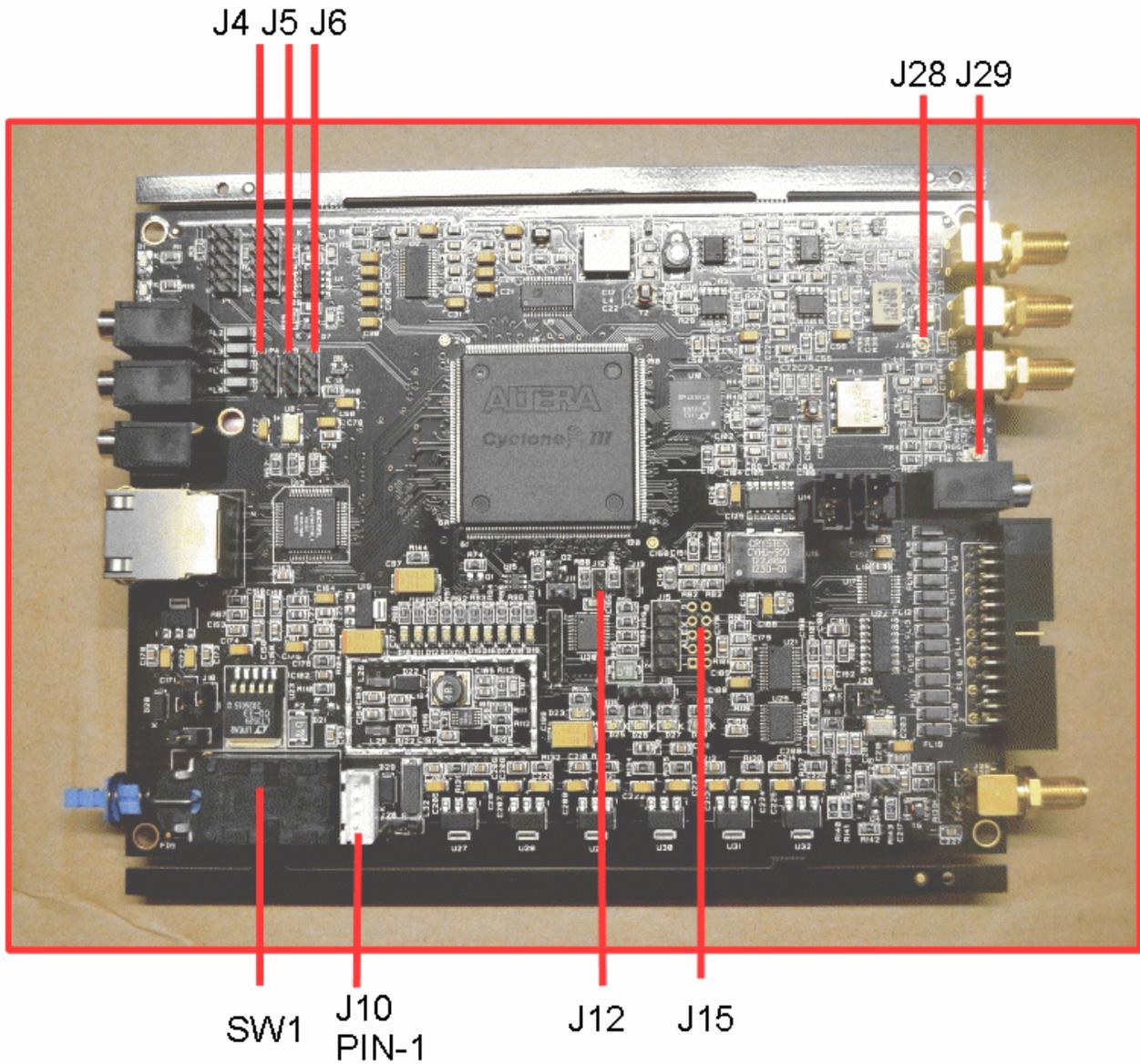
APIPA is enabled on all DHCP clients in Windows unless the computer's Registry is modified to disable it. APIPA can be enabled on individual network adapters.

Also Known As: Automatic Private IP Addressing; AutoNet

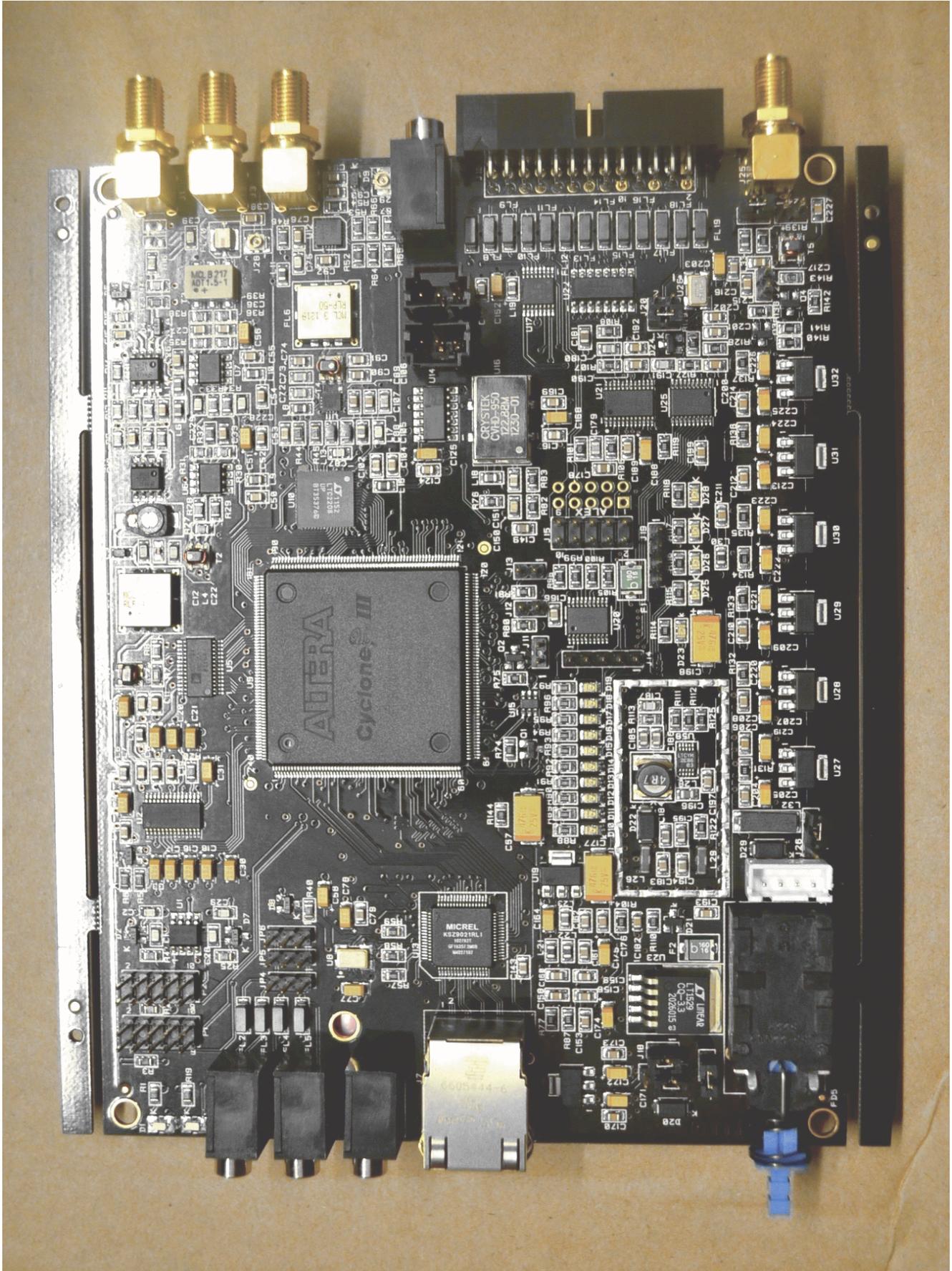
Examples:

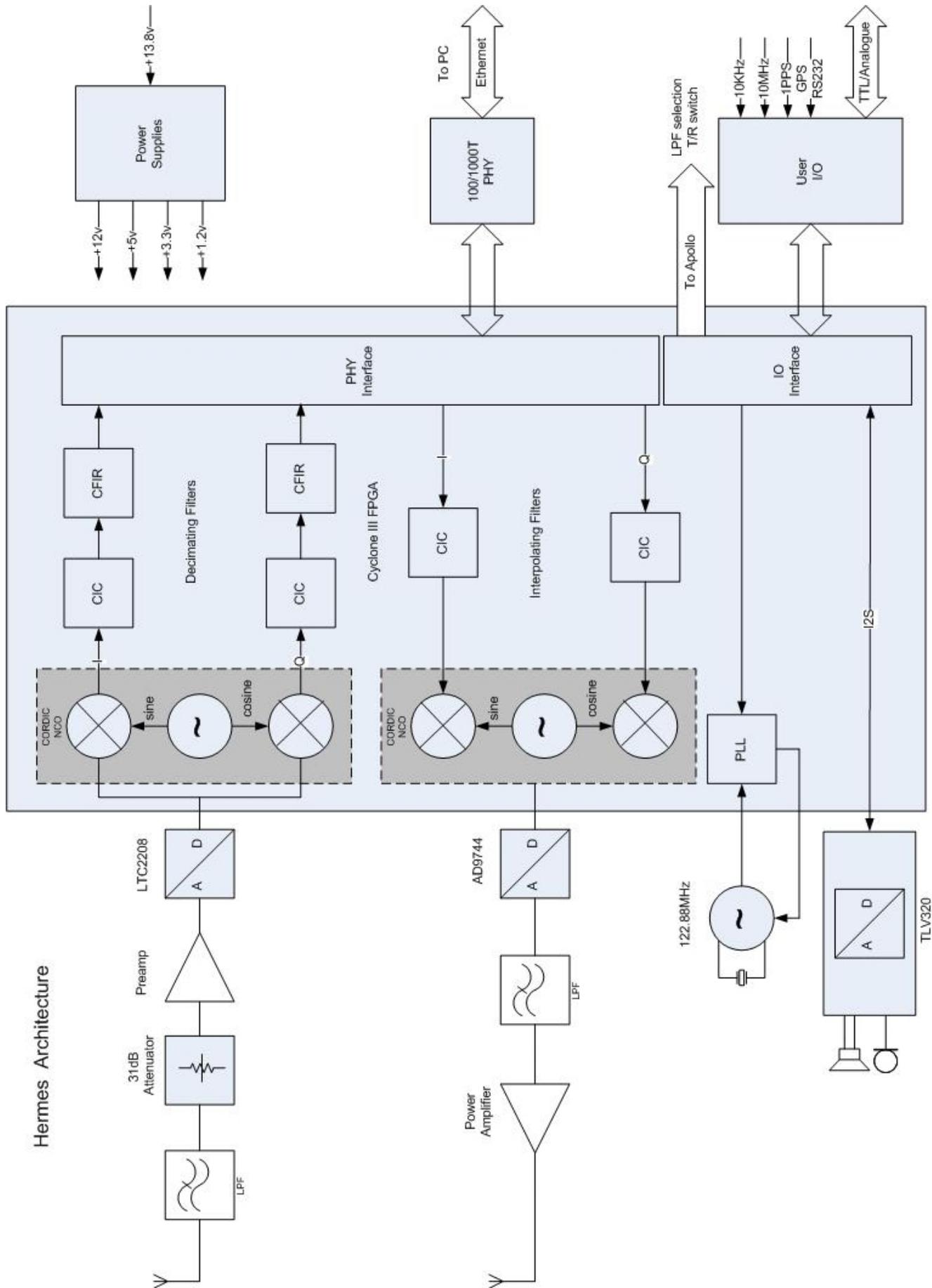
Because APIPA uses IP addresses in the private Class B space, APIPA is a feature generally only useful on home or other small intranet LANs.

Hermes jumper locations



Apache Labs (Hermes) PCB





Additional reading:

Please refer to this webpage for the most recent documentation by Phil Harman VK6APH for the OpenHPSDR version of the Hermes
http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Documentation



