

Starting Hermes for the First Time

Please read the *Hermes User Guide* and check that the various jumpers are set appropriately. The Guide may be found on the [HPSDR manuals page](#).

Computer Real-Time Capabilities

If you are in any doubt as to the ability of your computer to support PowerSDR and Hermes, please see Appendix A.

Bare Board Initial Load

If you have purchased your Hermes board ready built and tested then please ignore these steps and proceeded to *Preparation for PowerSDR Installation*.

If you have built your Hermes board, or are aware that the EEPROM on the board may not have been programmed, then it will be necessary to program the board before using it.

This is a two step process. Firstly load the Bootloader code into the EEPROM, using an Altera USB Blaster (or clone), then use the Bootloader to load the main Hermes code.

The Bootloader code is in SVN as follows:

http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Release

Alternatively from the [HPSDR Downloads page](#).

Using the USB Blaster load the Bootloader.pof file into the EEPROM on Hermes then power off the board. Ensure that jumper **J12** is inserted then apply power to the board.

Then follow the instructions in the *Hermes User Guide* that explains how to load the Hermes code using the Bootloader. The latest Hermes_V*.*.rbf file will can be found in SVN here:

http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Release

Alternatively from the [HPSDR Downloads page](#).

NOTE: If you load the Hermes code other than via the Bootloader then you will overwrite any existing Bootloader code which will then no longer be available.

Preparation for PowerSDR Installation

.NET Framework

The HPSDR version of [PowerSDR](#) requires that your system has Microsoft's .NET Framework version 4.0 installed. Most systems already have the framework; try installing PowerSDR with what you have on your computer - however, in case you need it here is the link:

[Microsoft .NET V4.0](#)

PowerSDR Software Installation

Currently, there is a lot of development activity and expected updates to HPSDR firmware and software. Because the software is fluid, and the developers desire to post releases quickly and as often as possible, a manual installation is easier to manage. This step will eventually be replaced with a more standard software setup.

To use Hermes, you will need the latest released PowerSDR software that supports Hermes from the [W5WC](#) branch of the open-source development tree. The repository is managed by Subversion, which is a popular collaborative software/firmware development tool for open-source projects. To access this software you will need to install and use a Subversion (SVN) client, see [How to use SVN](#). There are several out there, however, TortoiseSVN for Windows is recommended and can be downloaded from here:

[TortoiseSVN](#)

Once TortoiseSVN is installed, follow these steps:

1. *Create the following directory structure*
C:\HPSDR\PowerSDR
(this is an arbitrary convention, but logical and easy to find)
2. *Navigate to HPSDR*
Click Start and select Run...
Type: C:\HPSDR then [Enter]
You should see a PowerSDR directory in the window that opens.
3. *Download the latest software*
Right click on the PowerSDR directory
Select SVN Checkout...
Type or copy & paste the following line into the "URL of repository" field:

http://svn.tapr.org/repos_sdr_hpsdr/trunk/W5WC/PowerSDR_HPSDR_2/bin/Release/

Click OK
At this point, TortoiseSVN should begin downloading the current version of

the PowerSDR client for HPSDR. Once it completes go to step 4.
(**Note:** To update to subsequent releases, you can right click the
C:\HPSDR\PowerSDR directory and select SVN Update...)

4. Copy the files to a working directory for better version control.
This directory can be anywhere you like, but we recommend using
C:\Program File \HPSDR\Hermes
If you are updating an existing installation, make sure PowerSDR is **not** running
before you write over the old version.

5. To create a PowerSDR desktop shortcut
Open the working directory (where you copied the files i.e.
C:\Program Files\HPSDR\Hermes)
Locate the PowerSDR application file (PowerSDR.exe)
Right-click on PowerSDR.exe then drag and drop it to your desktop
Select "Create Shortcuts Here"

6. **Installing PowerSDR Skins (to be written)**

Hermes Installation

Follow the networking setup instructions in the *Hermes User Guide* before proceeding.

PowerSDR Configuration

Double-click on the shortcut you created to start PowerSDR. When it first starts, it will go through a short system speed test.

The latest PennyMerge PowerSDR release features a Wizard to more easily configure HPSDR systems. If this is the first time PowerSDR has run the Wizard should automatically start. Just answer the Wizard's questions.

1. Select HPSDR radio button
2. Click Next
3. Select Hermes as the hardware you have installed. Click Finish
4. Select Setup from the main menu. (*note that you can also restart the Wizard here*)
5. Select the General Tab.
6. Select the HPSDR tab (*next to Hardware Config*)
7. Click Apply if you changed anything.
8. Select the Audio tab in the PowerSDR Setup window and confirm that the Sample Rate is 192000.
9. Click Apply if necessary - then close the Setup window.

Startup

At this point you should be ready to start up the system for the first time. Click "Start" in PowerSDR and you should be good to go.

For instructions on how to operate PowerSDR, and further information on how to configure PowerSDR, please read Chapters 3, 4, 5, 6 and Appendix A of the Flex-5000 manual on the FlexRadio website [Flex-5000 Owners Manual](#)

*(Note: If you receive an error message indicating that the Hermes software is not loaded, then you probably don't have all of the release software files in your working directory. Follow the instructions above in the **PowerSDR Software Installation** section above and copy **ALL** of the release files from the SVN managed directory into your working directory.*

Calibration

The latest version of PowerSDR allows calibration of both frequency and level and is supplied with an approximate calibration file*. It is only necessary to calibrate Hermes when you update firmware or the settings file (PowerSDR.mdb) is deleted or you wish to more accurately calibrate your Hermes.

*not yet done

Level Calibration

1. Connect a calibrated RF generator to the RF-in BNC connector on Hermes.
2. Set the RF generator to an appropriate frequency and output level (I use 10 MHz @ 750 μ V or -50 dBm)
3. In the PowerSDR Setup->General->Calibration tab, set the Frequency and Level values in the Level Cal group box to match the output of your RF generator. Mosely has a nice dBm to μ V table here: [Microvolts to dBm Conversion Table](#)
4. Click the Start button in the Level Cal group box and wait for the routine to complete.

Frequency Calibration

1. Connect a calibrated RF generator to the RF-in BNC connector on Hermes. If you intend to use WWV as the frequency calibration source, connect an appropriate antenna instead. *(Note: the higher the frequency used here, the more accurate the result.)*
2. In the PowerSDR Setup->General->Calibration tab, set the Frequency value in the Freq Cal group box to output frequency of your RF generator or use the appropriate WWV frequency.
3. Click the Start button in the Freq Cal group box and wait for the routine to complete.

Firmware Programming or Upgrade Instructions

As received, your Hermes board may not be loaded with the latest firmware, and the version loaded may be mutually incompatible with the latest version of PowerSDR. These steps are required to program or update the Hermes firmware. This procedure may be altered for a specific update or release, so please read any additional installation notes or instructions from the release team.

Preparation

Using SVN download the latest Hermes_V*.*.rbf file from:

http://svn.tapr.org/repos_sdr_hpsdr/trunk/Hermes/Release

Follow the instructions in the *Hermes Users Guide*.

Appendix A - 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 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](#)

Thesycon'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 PC is capable of powering your HPSDR system or 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: [DPC Latency Checker](#)