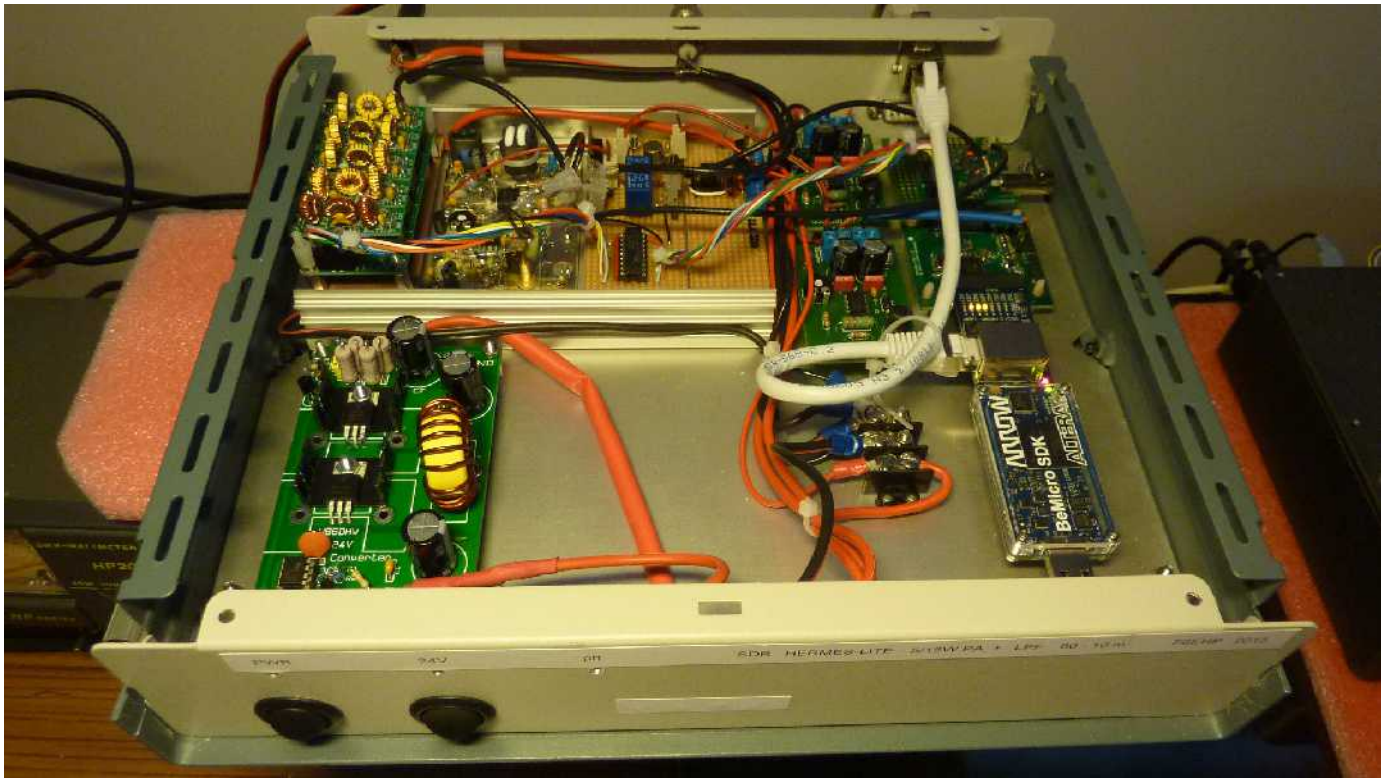
Hermes-Lite DUC/DDC experimental station

2m, 6m (+ transverters) & HF 10m to 80m - QRP 10W



un SDR DUC/DDC avec le projet HERMES-LITE de KF7O à suivre ici sur le forum dédié à ce développement collaboratif.

Output power is 5W when PA DC is 12V and around 12W with PA DC to 24V

Notes about HARDWARES used in the setup showned on the photo:

in the box:

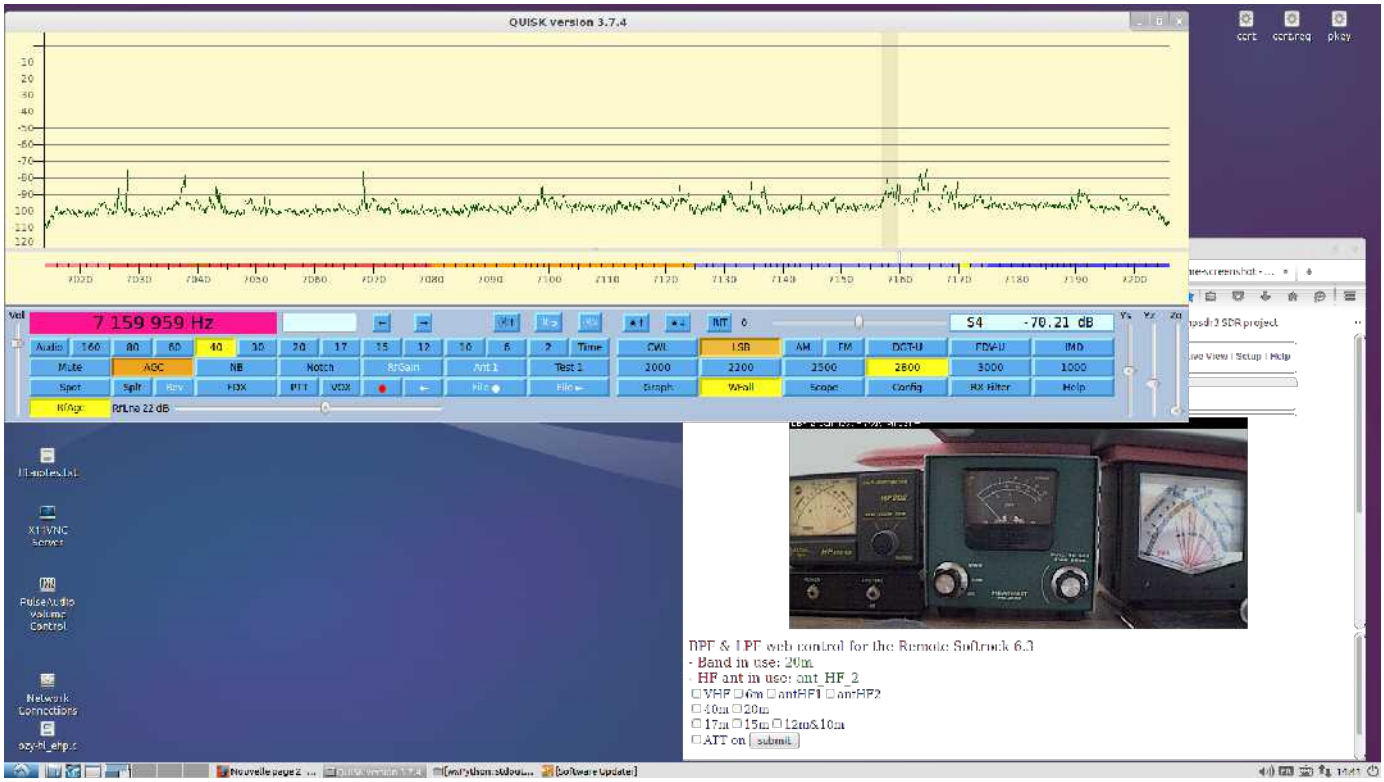
- *Bemicro SDK from arrow (http://www.arrow.com/bemicro/#sdk) usd74 + shipping + tax*
- *HL 1,21 kit from KF7O (03/2015) new release 1,22 (07/2015) and v2,0 in 2016...*
- *5V & 3.3v regulator from Pollin (810-025 pollin.de)*
- *12V to 24V DC/DC converter from WB6DHW (to double the outpout power of the PA)*
- *PA 5W from DL2EWN (http://www.box73.de/product_info.php?products_id=1899)*
- *LPF from QRP-labs (http://www.qrp-labs.com/ultimatelpf.html) with 5 modules 80m , 40m , 20m, 15m & 10m*
- *A control system with a uln2803 to secure the CN2"J16" & "ptt" lines between the HL and the output devices.*

Details:

> *LPF module 1 for 160m,80m – module 2 for 60m,40m – module 3 for 30m,20m – module 4 for 17m,15m – and module 5 for 12m,10m (I don't really use 160m)*

> *internal cabling between HL-CN2 (J16) ULN2803 and LPF control input >>>> see on the last page*

Piloté par différents logiciels : ghpsdr3-Alex, PowerSDR, Quisk ou the new Radio from Alan



> a webcam looks all wattmeters and an ethernet Arduino SBC manage a web page for a manual choice of the antennas & transverters.

<u>Notes about SOFTWARES :</u>

I use SSB with my SDR everyday and with the Hermes-lite hardware, we have the chance to choose between at least 4 softwares able to run voice. (may be more ?)
- GHPsdr3-Alex, that I have used a long time to work my remote station through a half a mile wifi link and sometimes via internet. Unfortunatly, the necessary bandwith between the client and the server seems more important with HL than with a softrock setup. And the tx audio quality is also less interesting with HL server. I don't use it anymore now.
- PowerSDR on Windows, of course works very well, nice modulation, 2 RX/TX....no more comment.
- QUISK from Jim : my first choice that I run on several linux ODROID SBC, now easy to install on Linux or Windows OS, very good audio quality, with now freedv included (not tested) .
- And the new one : Radio from Alan (no name ?) a few qso only in SSB, but good reports, its main use will probably be WSPR that is included and works very well, easy to install, on Windows only.
All these softwares allow (with HL, not with a Softrock for which ghpsdr is necessary) to operate the pc or SBC away from the HL inside a building with a LAN.

J'utilise mes SDR tous les jours en SSB et en particulier le DUC/DDC Hermes-lite, avec lequel nous avons la possibilité de choisir entre au moins 4 logiciels capables de fonctionner pour la voix. (peut-être plus ?)
- GHPsdr3-Alex, que je l'ai utilisé beaucoup de temps pour travailler ma station distante d'un demi-mile un lien wifi et parfois via internet. Malheureusement, la bande passante nécessaire entre le client et le serveur semble plus important avec HL qu'avec une configuration softrock. Et la qualité audio tx est aussi moins intéressant avec le serveur de HL. Je ne l'utilise plus maintenant.
- PowerSDR sur Windows, bien sûr fonctionne très bien, belle modulation, 2 RX / TX .... pas plus de commentaire.
- QUISK de James Ahlstrom: mon premier choix que jj'ai installé et utilisé sur plusieurs cartes ODROID sous linux Ubuntu, maintenant facile à installer sur Linux ou Windows OS, de très bonne qualité audio, avec désormais freedv inclus (pas testé).

- Et la nouvelle: Radio d'Alan (? Pas de nom) quelques qso seulement en SSB, mais de bons rapports, son utilisation principale sera probablement WSPR qui est inclus et fonctionne très bien, facile à installer, sous Windows uniquement.

Tous ces logiciels permettent (avec HL, pas avec un Softrock pour laquelle ghpsdr est nécessaire) de faire fonctionner le PC ou la SBC à distance du module HL à l'intérieur d'un bâtiment sur un même réseau LAN.

More notes about software setup with some of my own files as exemple, mainly for the J16 configuration:

ghpsdr3-Alex : ***(linux only for the server)***

- ***installing on U14 here http://napan.ca/ghpsdr3/index.php/Main_Page***
- ***operating with HL here on the wiki by KF7O https://github.com/softerhardware/Hermes-Lite/wiki/Software#ghpsdr3-alex***

hpsdr-server:

After compilation and installation, the first server to start on your Linux machine is hpsdr-server. Depending on how you installed ghpsdr3-alex, this program may or may not be in your path. The executable may be found at ghpsdr3-alex/trunk/src/server. It is a command line server. The following demonstrates several common configurations to use with the Hermes-Lite. Look at the README file found in the same directory, or type ./hpsdr-server -h for more usage details.

Single Receiver, 96kHz Bandwidth

hpsdr-server --hermes 0 --samplerate 96000 --receivers 1 ***--j16*** *# (-j16 if you need to use it)*

Dual Receivers, 384kHz Bandwidth

hpsdr-server --hermes 0 --samplerate 384000 --receivers 2 ***--j16***

dspserver:

The second server is dspserver found in ghpsdr3-alex/trunk/src/dspserver. You must execute an instance of dspserver for each receiver you are running.

First Receiver

dspserver --lo 0 --hpsdr --nocorrectiq --receiver 0

Second Receiver

dspserver --lo 0 --hpsdr --nocorrectiq --receiver 1

dspserver.conf:

```
call = "F6EHP";
location = "BRITANY IN88";
band = "all";
rig = "Hermes-Lite & Odroid U3";
ant = "dipoles";
share = "no"; # Can be yes, no
lookupcountry = "no"; # Can be yes, no
#### Following are new TX options #####
tx = "yes";  #Can be: no, yes, password
#ve9gj = "secretpassword";  #add users/passwords one per line (Remove leading # ! max 20 characters each
f6ehp="xxxxxxx"
groupnames = ["txrules1"];  #add group or rulesset names in ["name1", "name2"]; format (max 20 characters each
# Add user names in ["call1", "call2"]; format to list members for each groupname above with an suffix of "_members"
txrules1_members = ["f6ehp"];
# Rule sets are defined as group or rulesset name =( ("mode", StartFreq in Mhz, End Freq in Mhz),("mode", StartFreq in
Mhz, End Freq in Mhz) );
#  Valid modes are  * SSB, CW, AM, DIG, FM, DRM ,SAM, SPEC Where * means any mode is OK
#  The two rules below allow any mode on 20M and CW only on the bottom 100Khz of 80M
#  You can make as many rules and rulesets as you wish. The first matching rule will allow TX
txrules1 = (
   ("*",3.5,28.950), # mode, StartFreq Mhz, EndFreq Mhz
   ("CW",3.5,28.95)
      );
```

At first run, you will be invited to setup the ssl certificate (useless but necessary...):

```
openssl genrsa -out pkey 2048
openssl req -new -key pkey -out cert.req
 openssl x509 -req -days 365 -in cert.req -signkey pkey -out cert
```

To use the J16 output in order to control external devices such LPF or antenna switch, you must modify ozy.c
I give here under my setup but you have to study it following your own system.

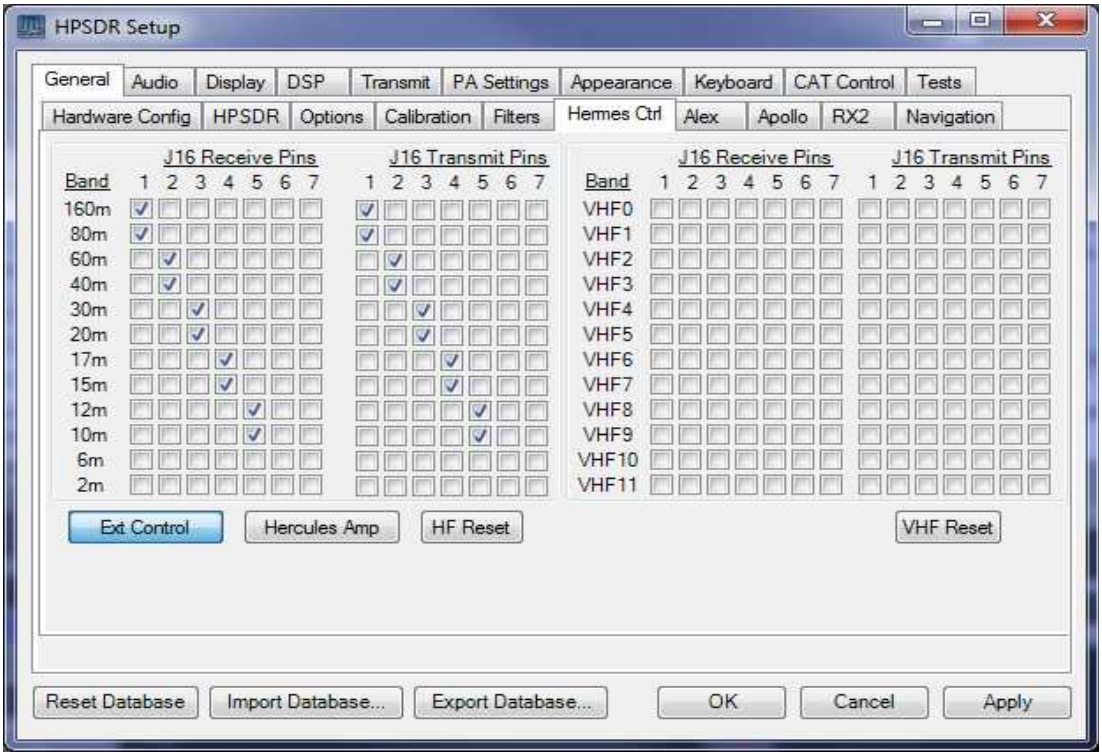
In /home/odroid/ghpsdr3-alex/trunk/src/server/ozy.c look for J16 pins and modify the last §

```
/*
J16 pins
=====
17 out1   D    bit 0
18 out2   C    bit 1
19 out3   B    bit 2
20 out4   A    bit 3

e.g D switches 15m filter.

Band------------------------------J16 ----------------BPF/LPF DB25 Pins ---
1 ---->   39.85 - 64.4 MHz   BC      (6m)            1 2
2 ---->   23.2 - 39.85 MHz  ABC     (12m/10m)       4 2 1
3 ---->   19.6 - 23.2 MHz      D    (15m)             3
4 ---->   16.2 - 19.6 MHz   A  D    (17m)            4 3
5 ---->   12.1 - 16.2 MHz    B D    (20m)            1 3
6 ---->   8.7 - 12.1 MHz    AB D    (30m)           4 1 3
7 ---->   6.2 - 8.7 MHz,      CD    (40m)           2 3
8 ---->   4.665 - 6.2 MHz   A CD    (60m)           4 2 3
9 ---->   2.75 - 4.665 MHz   BCD    (80m)           1 2 3
10 -- >   1.70 - 2.75 MHz   ABCD    (160m)         4 1 2 3

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)
*/

typedef struct _filter_j16 {
   long f1;
   long f2;
   unsigned char j16;
} filter_j16;
filter_j16 fltj16_tbl [] =
{
          { 1700000,  2750000,   0x01 },
          { 2750000,  4665000,   0x01 },
          { 4665000,  6200000,   0x02 },
          { 6200000,  8700000,   0x02 },
          { 8700000,  12100000,  0x04 },
          { 12100000, 16200000,  0x04 },
          { 16200000, 19600000,  0x08 },
          { 19600000, 23200000,  0x08 },
          { 23200000, 39850000,  0x10 },
          { 39850000, 64400000,  0x10 },
};
```

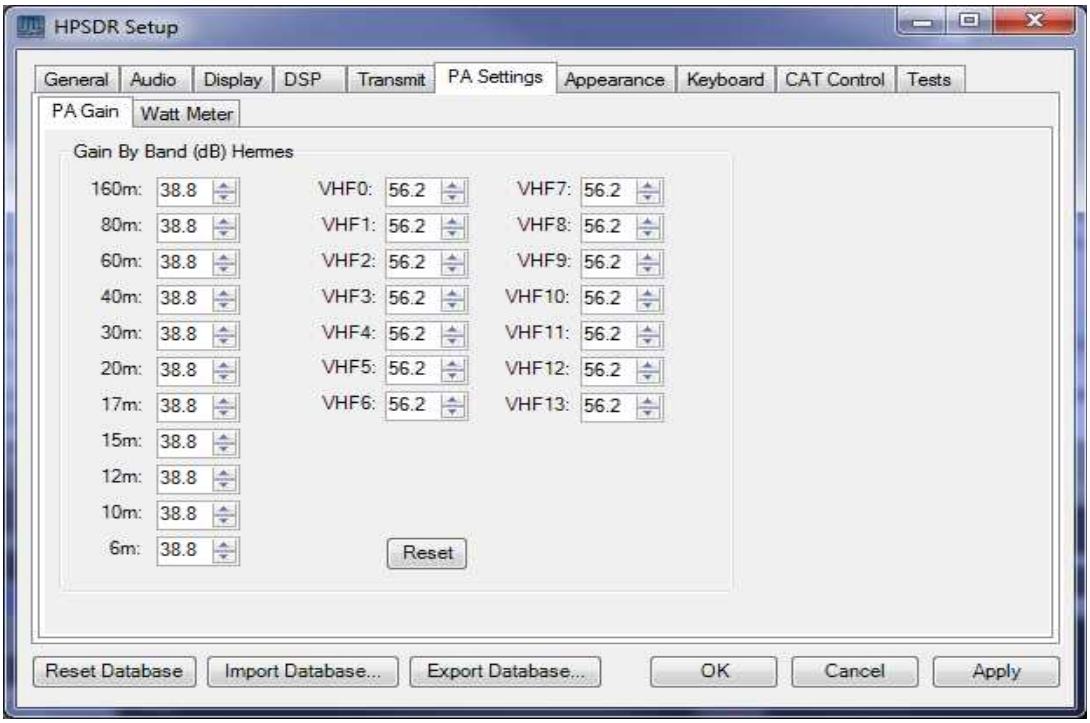
***PowerSDR or openHPSDR**:* *(windows only !)*

- ***installing https://github.com/softerhardware/Hermes-Lite/wiki/Software#powersdr by KF7O***

- ***J16 configuration :***



- ***don't forget : the PA gain must be ajusted to 38,8 for a maximum output in SSB :***



QUISK from N2ADR : ***(on linux or windows)***

- ***intallation from Jim page*** *: http://james.ahlstrom.name/quisk/*
- *hereunder my own quisk_conf.py file with J16 :*

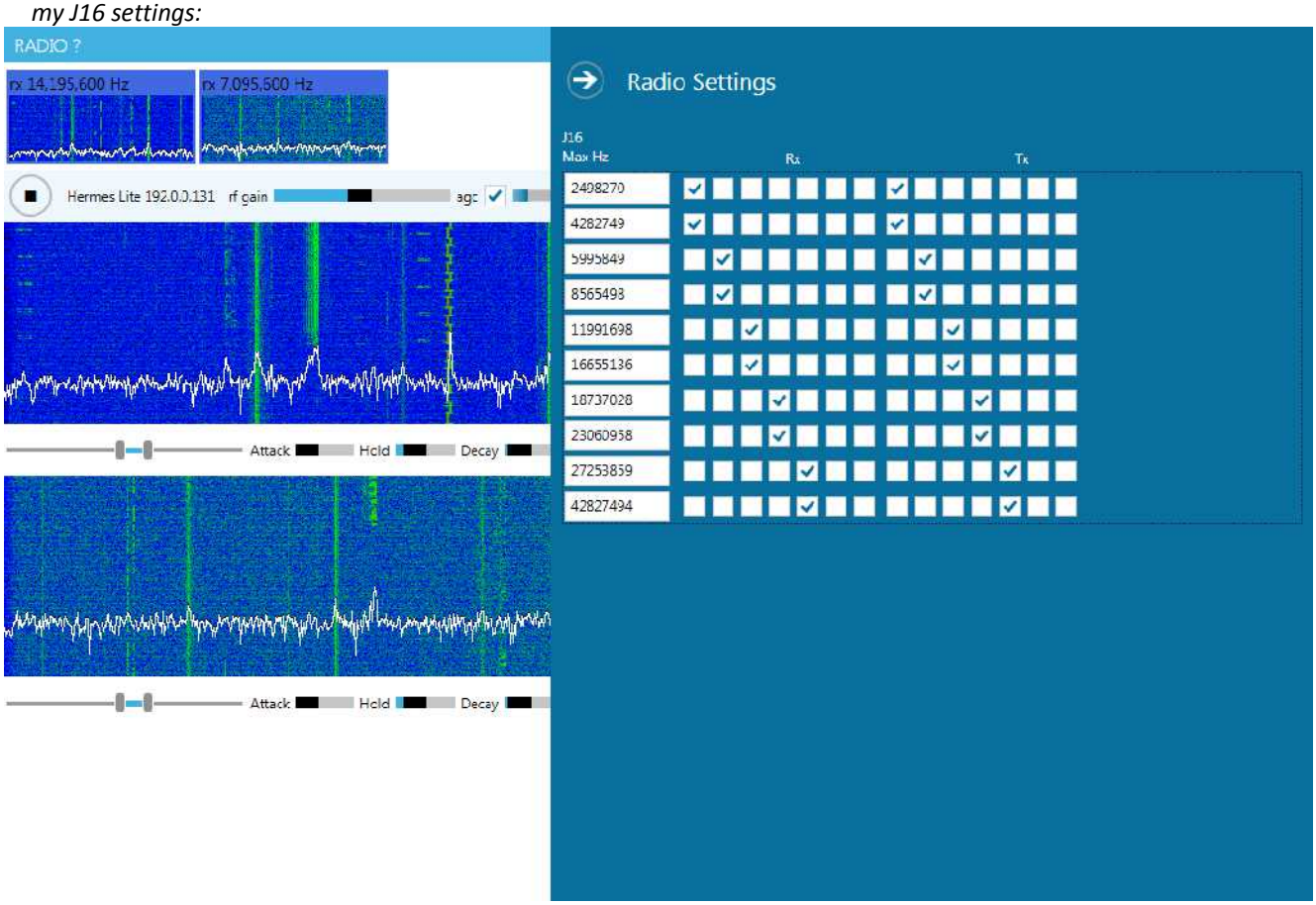
```
# This is the F6EHP file  for the Hermes-Lite on Odroid U3 Ubuntu 14 - July 2015
    from hermes import quisk_hardware
    from hermes import quisk_widgets

    use_rx_udp = 10                         # Use this for Hermes-Lite
    rx_udp_clock = 61440000                 # The clock is 73.728 or 61.440 megahertz.  Adjust slightly for
                                            actual frequency.
    rx_udp_ip = ""                          # Sample source IP address "" for DHCP
    rx_udp_port = 1024                      # Sample source UDP port; must be 1024
    data_poll_usec = 10000                   # poll time in microseconds
    sample_rate = 192000
    name_of_sound_capt = ""             # We do not capture from the soundcard
    name_of_sound_play = 'hw:1'         # Play radio sound here.  Linux.
    microphone_name = 'hw:1'            # The microphone is here.
    #name_of_sound_play = 'Primary' # Play radio sound here. Windows.
    #microphone_name = 'Primary'     # The microphone is here.

    graph_y_scale = 100
    graph_y_zero  = 100
    playback_rate = 48000
    add_imd_button = 1
    freedv_tx_msg = 'F6EHP pascal'
    add_fdx_button = 1

    bandLabels = ['Audio', '160', '80', ('60',) * 5, '40', '30', '20', '17',
            '15', '12', '10', '6',"2",('Time',) * len(bandTime)]

    do_repeater_offset = True
    hot_key_ptt1 = wx.WXK_RIGHT         # hot key for ptt
    tx_level = {None:255, '60':110}     # Adjust your power for each band

    # Quisk can implement the frequency shift needed for repeaters.  If the repeater frequency
    # is on the favorites screen, and you tune close (500 Hz) to that frequency, and there
    # is an entry in the "offset" column, and the mode is FM, and this parameter is True,
    # then Quisk will shift the Tx frequency by the offset when transmitting.  Your hardware
    # file must define the method RepeaterOffset(self, offset=None).
    do_repeater_offset = True

    # If you use a transverter, you need to tune your hardware to a frequency lower than
    # the frequency displayed by Quisk.  For example, if you have a 2 meter transverter,
    # you may need to tune your hardware from 28 to 30 MHz to receive 144 to 146 MHz.
    # Enter the transverter offset in Hertz in this dictionary.  For this to work, your
    # hardware must support it.  Currently, the HiQSDR, SDR-IQ and SoftRock are supported.
    bandTransverterOffset = {
       '2': 144000000 - 28000000, '6': 50000000 - 14000000
    }

    persistent_state = True

    # Control the J16 connector according to the band.  If the band is not here, the default is 0x00.
    Hermes_BandDict = {'160':0b0000001, '80':0b0000001, '60':0b0000010, '40':0b0000010, '30':0b0000100,
    '20':0b0000100,  '17':0b0001000,'15':0b0001000, '12':0b0010000, '10':0b0010000,'6':0b0000100,'2':0b0010000 }
```

RadioAlanHopper from Alan Hopper M6NNB:

- ***installing from Alan page*** *: http://www.ihopper.org/radio/*

no config file, easy to install and work, specially adapted for WSPR
WSPR requires a time reference like ntp http://www.ntp.org/

my J16 settings:



I hope this could help....if any more question , ask through the forum, or by e-mail pascal at f6ehp.fr – thanks & 73

forum for the hermes-lite project : https://groups.google.com/forum/#!forum/hermes-lite

- internal cabling between HL-CN2 (J16) ULN2803 and LPF control input

HF band	J16	CN2 on HL	ULN in	ULN out		QRP-Labs LPF in
160/80	1 = B	3 user 0				Bd5 > 80m Mod
60/40	2 = C	2 user 1				Bd4 > 40m Mod
30/20	3 = D	1 user 2				Bd3 > 20 m Mod
17/15	4 = A	7 user 3				Bd2 > 15m Mod
'12/10	5	8 user 4				Bd1 > 10 m Mod
ptt		4 ptt				Ant relay & PA bias

notes :

- ***CN2 output level = 3,3V***
- ***a 10k pull-up is located at output of the ULN***
- ***ULN in/out as you want (see the data sheet).***
- ***An attenuator between HL output and PA input is often welcome if not already included on the PA (at least to adjust the impedance, and to avoid any bad coupling...)***

ugly schematic of the ptt circuit for PA bias supply and antenna RX/TX relay.