

THE FUN CUBE DOGLE HF CONVERTER



By. Tony CT1FFU and Diogo CT2IRW

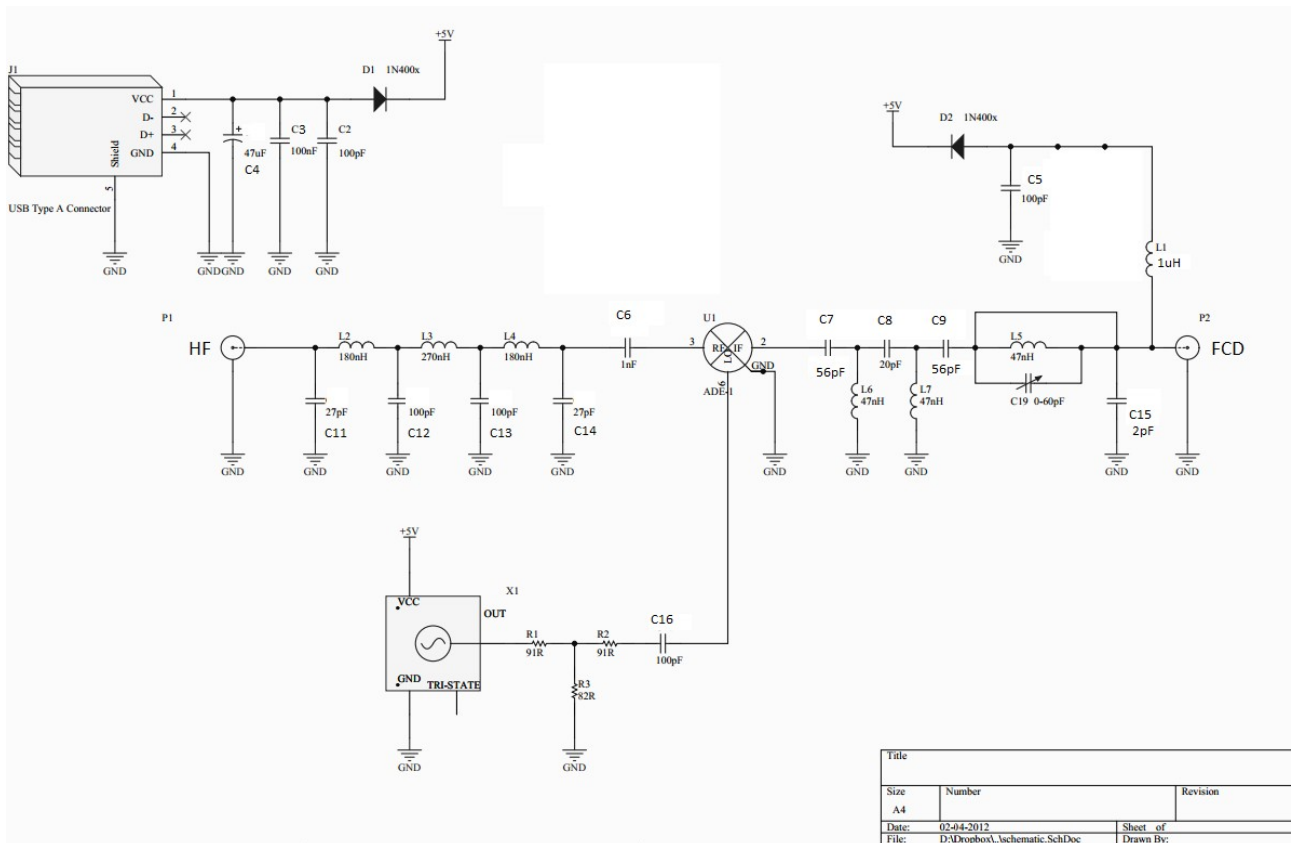
If you are a FCD owner I am sure you are a very satisfied with the quality and performance receiving satellites and all sorts of communications in VHF and UHF.

However, the FCD only starts receiving properly from 64Mhz up, and misses all the good fun that is receiving HF and 6m on a SDR.

That is why we decided to make a simple HF converter to the FCD, and get access on all the bands, extending the RX now from DC to 1700Mhz.

The HF converter is very simple, as you can see in diagram, any person with some soldering experience in kit build, will have no problems to get it work properly.

Circuit description:



The Filter on the Input is a Low Pass Filter. Designed the aloud only frequencies from DC to 52Mhz travel into the mixer.

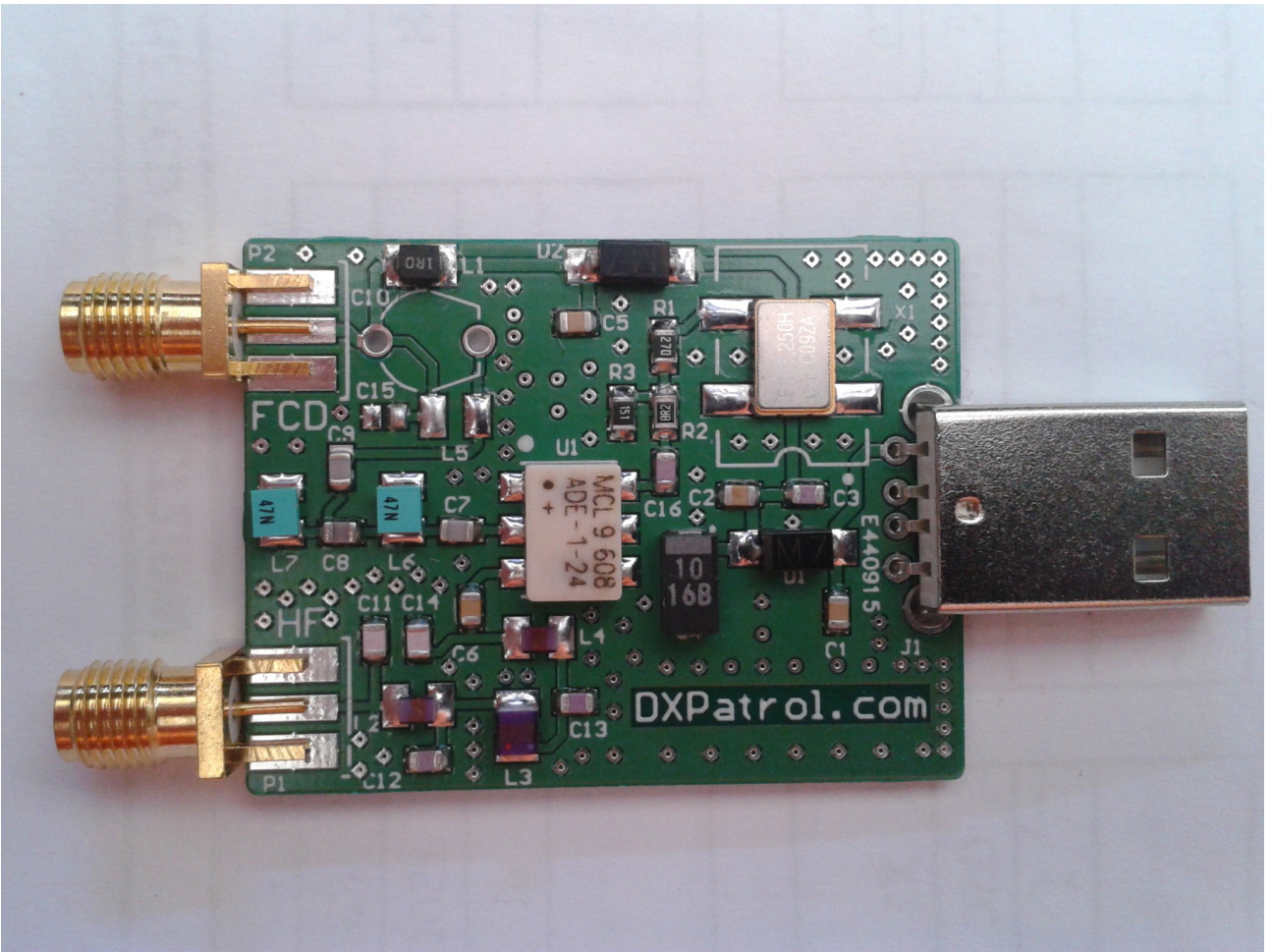
The Local Oscillator is a crystal clock and runs on 106.250Mhz. (this is our IF)

The mixer ADE-1 minicircuits, making the conversion of signals.

In the output we have another filter, Hi Pass Filter, preventing image frequencies and aloud only the signals up 100Mhz be received by the FCD

VCC, 5V are supplied from a USB connector or from Phantom-power of FCD.

Aspect of the Converter ready build.



KIT HF FCD CT1FFU/CT2IRW										
Ref.	L1	L2/L4	L3	L6/L7	L10	L11	R1	R2	R3	
Value	1uH	180nH	270nH	56nH	1mH	100uH	27Ω	8,6Ω	150Ω	
Qty	1	2	1	2	1	1	1	1	1	
Ref.	C1/C5	C2	C3/C12/ C13/C16	C4	C6	C7/C9	C8	C11/ C14	X1	U1
Value	10nF	100nF	100pF	47uF	1nF	47pF	20pF	27pF	OSC	ADE-1
Qty	2	1	4	1	1	1	1	2	1	1
www.dxpatrol.com										

You have a paper like this, check that all the parts are there.
Carefully remove the tape, you don't want to lose any small SMD.

Assembling it's be easy, start with caps and resistors first, then go to coils, and finally the mixer and clock.

You might need to use solder flux so it will help the SMDs to get well soldered to the PCB.

The Trap L5/C10 and C15 are optional, and not supplied on this version.

On Mixer and Clock look carefully on DOT mark, the PCB and parts face together, as show on picture.

Testing:

Wen plug the converter to a USB, check with a multimeter for 5V on Clock Oscillator VCC pin.
And on both diodes.

If you have a Frequency counter or Oscilloscope you can now check for 106.250 Mhz carrier on the output of clock.



Test point.

Read 106.250Mhz on R1.

You will use this frequency on LO, the more accurate reading, the better

Nice sin wave from clock.

(in fact, the LO is not sin wave, it is more like square wave, but on a 100Mhz oscilloscope this is how it looks. You will need a higher frequency oscilloscope to see the real wave shape)

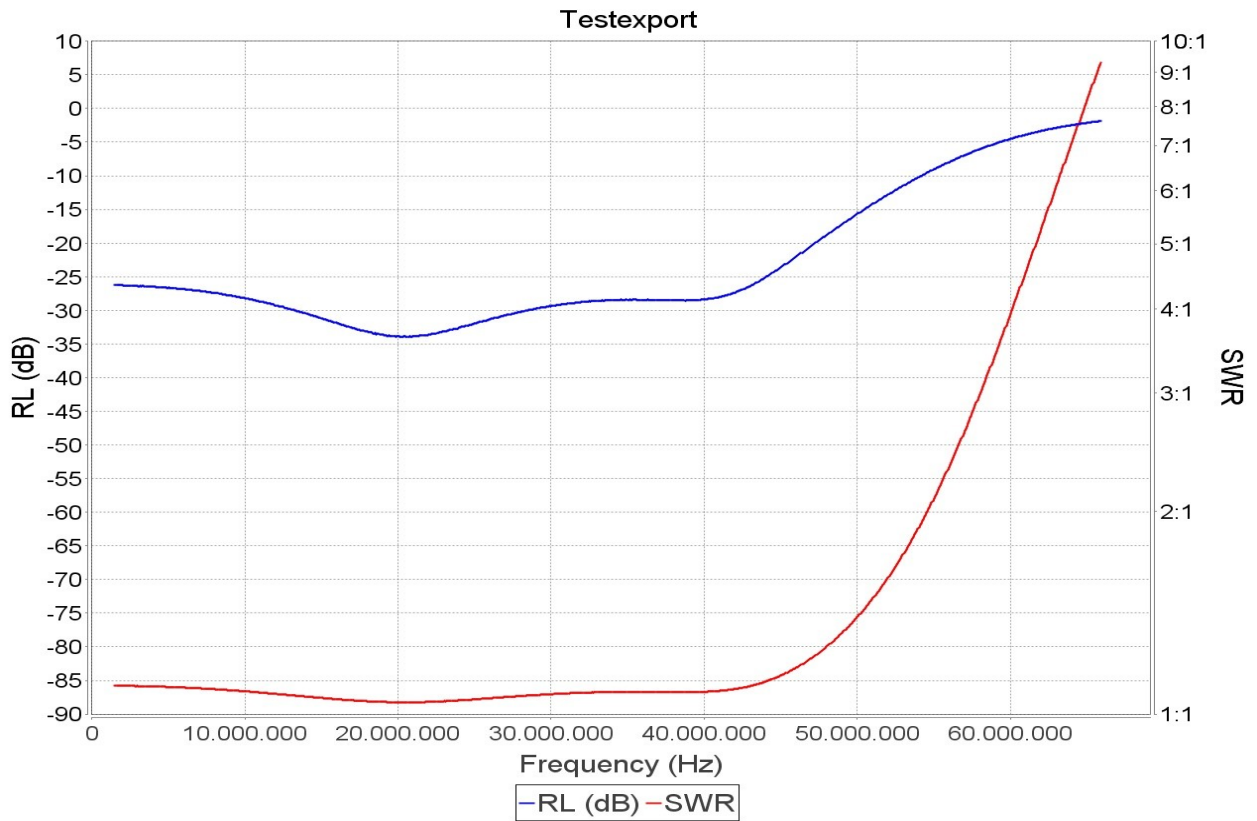
However, if you see a wave like this, it means you have LO running!



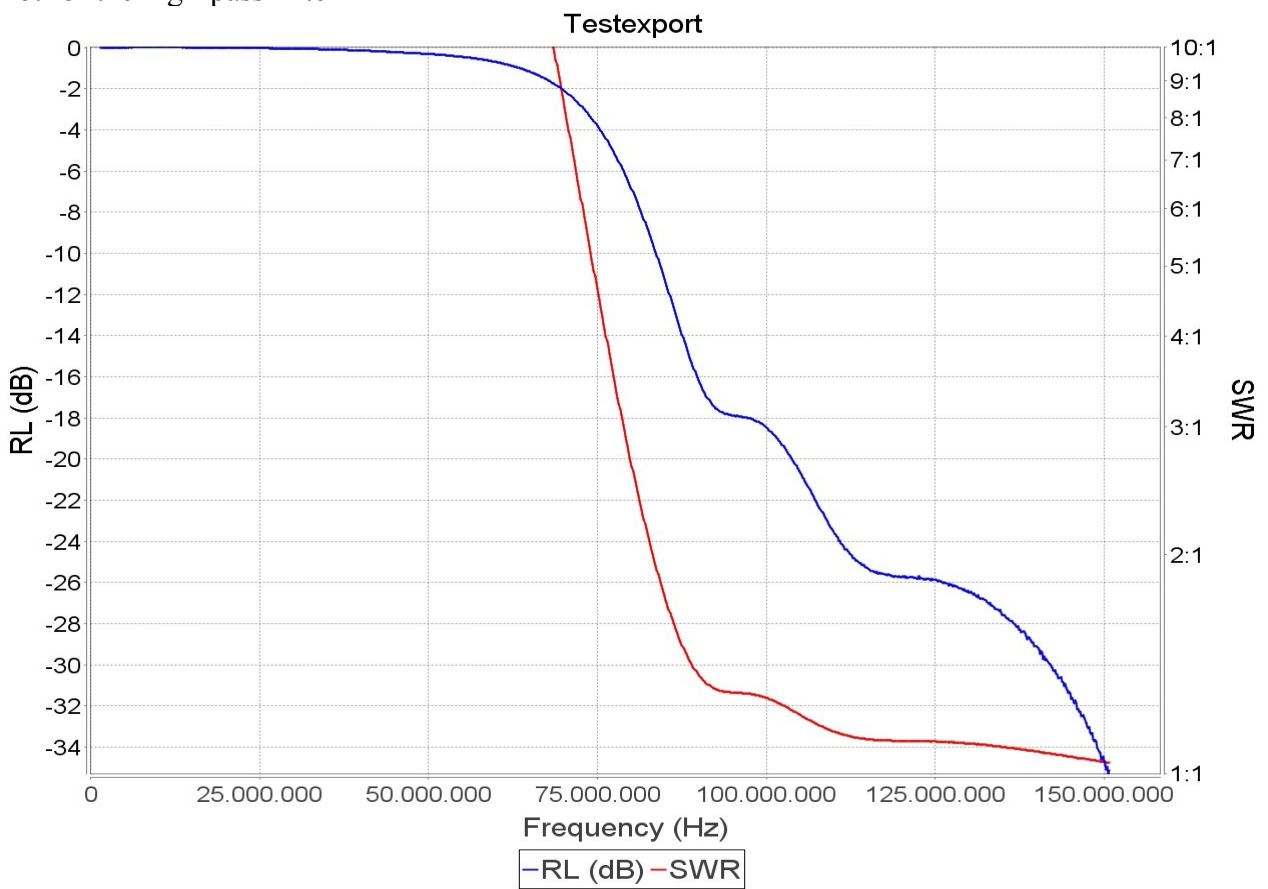
If you don't have no frequencies meter or oscilloscope, you can listen to the LO carrier on a FM receiver or a Walkie-talkie tuned near the frequency 106.250 Mhz



Plot for the input Low-pass-filter



Plot for the high-pass-filter



You can connect now the converter into your FCD with a SMA-SMA cable.
Connect your HF antenna to the Input of the Converter.
Turn on your favourite SDR program and start enjoy receive HF on the FCD.

This new version 3.0 , with a new mixer ADE-1 from minicircuits have a higher performance and residual LO level on output.
This makes reception a lot more clear, less noise and intermodulation.

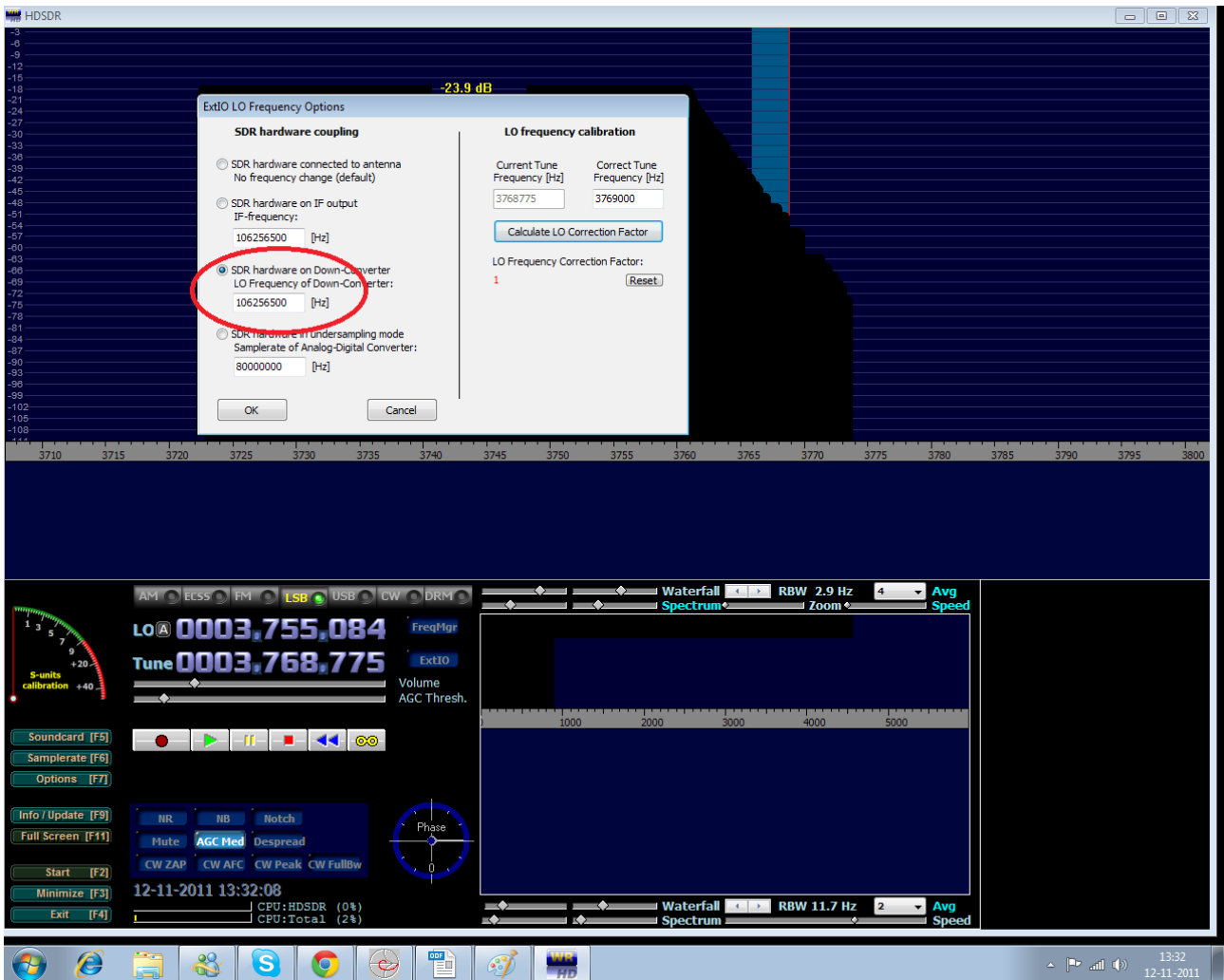
FCD and HF Converter together.

To tune the bands on HF.
You just need to sum 106.250 Mhz with the frequency you want to receive.
Ex: if you want to receive 20m, Calculate $106.250 + 14.250 = 120.500$
120.500 is the frequency you will tune your FCD

The easy way, use HSDR.
HSDR software have the converter option.

To work with the HSDR:
go to Options> Extio LO Options
and insert the LO frequency: 106250000Hz (read from your frequency counter, must be in HZ)

Now you can tune you HF band with the correct frequency on screen .



About SDR-Radio:

As Version 3.0 have very high gain on conversion, you will improve the reception by reducing the LNA gain on FCD.

SDR-RADIO version 1.5 build 994 (Beta) :: Microphone (FUNcube Dongle V1.0)

Input Source: Windows Console AF Output Record Tools Help Options Compact Full Screen RFSpace

Radio: FUNcube Dongle Soundcard: Microphone (FUNcube Dongle V1.0)
 Frequency: FUNcube Dongle Sample rate: 96.000 kHz

Start Stop Autostart Swap IQ External Options Radio

Soundcard (SoftRock; FUNcube, ...)

FUNcube Dongle Up 106.246000

Options Connect +Track +Plot Sat Help

MOON

10.108.992

1.8 3.5 5 7 10 14 18 21 24.5 28/29 NAV ENT... CW-U More...

LSB AM... USB DSB CW-L FM... CW-U

S2

More... Audio Zoom Tune QMB... Filters... AGC ANF CW NB NR Scroll** Tune: Center

Filter: Save Organise CW 400Hz 600Hz 800Hz 1000Hz 1200Hz 1400Hz

Scope: Low Auto High Auto Waterfall: Resolution Contrast

[span] VFO-A :: CW-U :: 364Hz

10.104.810 10.114.810

-90 dBm -100 dBm -110 dBm -120 dBm -130 dBm

10.105 10.106 10.107 10.108 10.109 10.110 10.111 10.112 10.113 10.114

[span] 12:33:26

10.051.000 10.151.000

-80 dBm -90 dBm -100 dBm -110 dBm -120 dBm -130 dBm -140 dBm

10.061 10.071 10.081 10.091 10.101 10.111 10.121 10.131 10.141

9.850 9.900 9.950 10.000 10.050 10.100 10.150 10.200 10.250 10.300 10.350

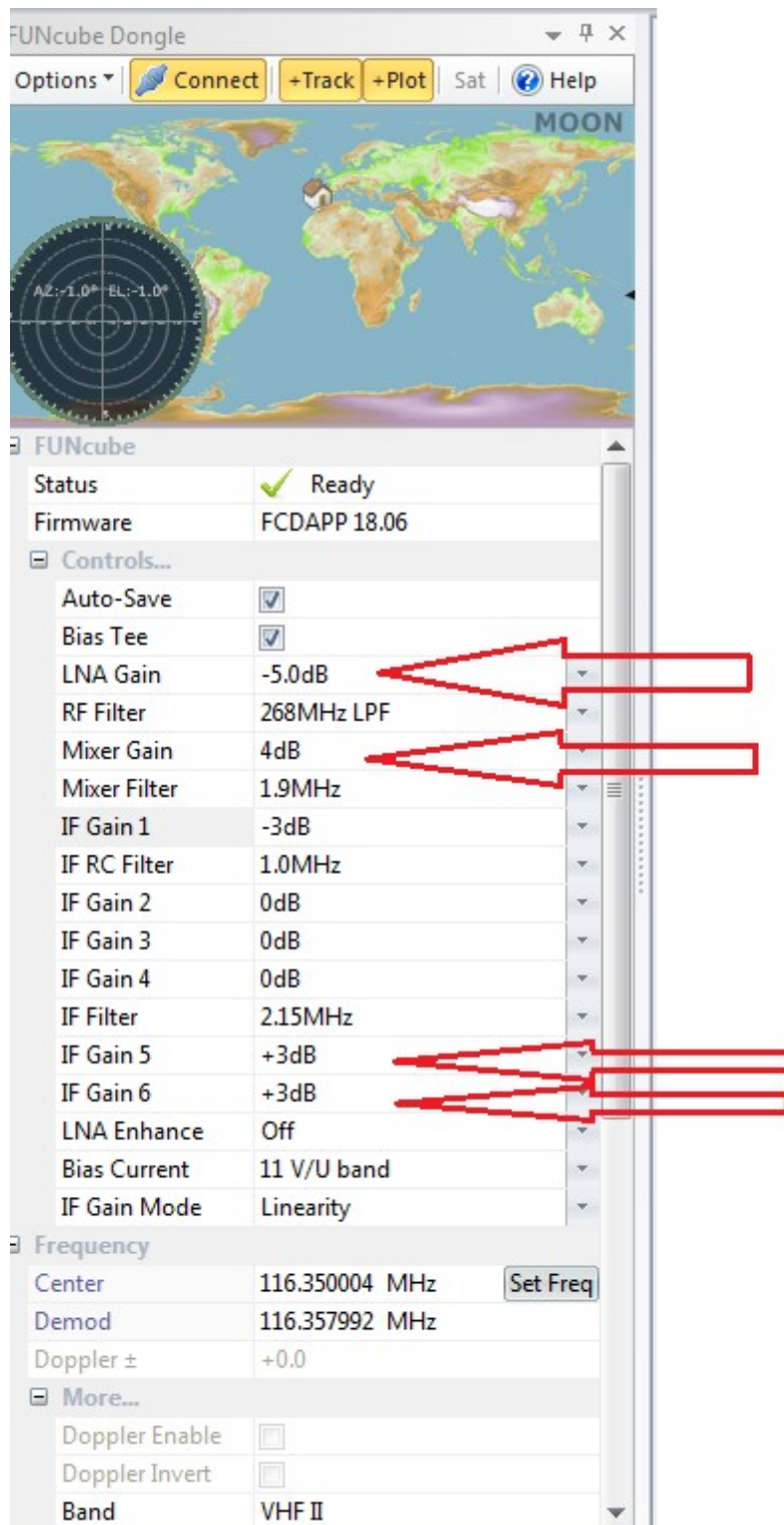
Waterfall: Automatic

IF Gain 1

Ready

Waterfall: 12 lines/s, 40 Hz, 11.7 RBW Mem: 209MB CPU: 40% Speakers AF Gain

FUNcube
 Status: Ready
 Firmware: FCDAPP 18.06
 Controls...
 Auto-Save:
 Bias Tee:
 LNA Gain: -5.0dB
 RF Filter: 268MHz LPF
 Mixer Gain: 4dB
 Mixer Filter: 1.9MHz
 IF Gain 1: -3dB
 IF RC Filter: 1.0MHz
 IF Gain 2: 0dB
 IF Gain 3: 0dB
 IF Gain 4: 0dB
 IF Filter: 2.15MHz
 IF Gain 5: +3dB
 IF Gain 6: +3dB
 LNA Enhance: Off
 Bias Current: 11 V/U band
 IF Gain Mode: Linearity
 Frequency
 Center: 116.350004 MHz Set Freq
 Demod: 116.357992 MHz
 Doppler ±: +0.0
 More...
 Doppler Enable:
 Doppler Invert:
 Band: VHF II



Adjust your Options table as here, reduce all gains to minimum.

For more info or any help
please contact ct1ffu@gmail.com
or diogo.condeco@gmail.com

Best 73 all
enjoy HF on you Fun Cube Dongle
Tony and Diogo

www.dxpatrol.com

Many tnx.
Enjoy you new possibilities of SDR radio.