DATV-Easy VERSION 2.08

Low-cost DATV broadcast from a PC with a LimeSDR mini or Adalm Pluto

Thanks for their great help with the development to all the beta testers.

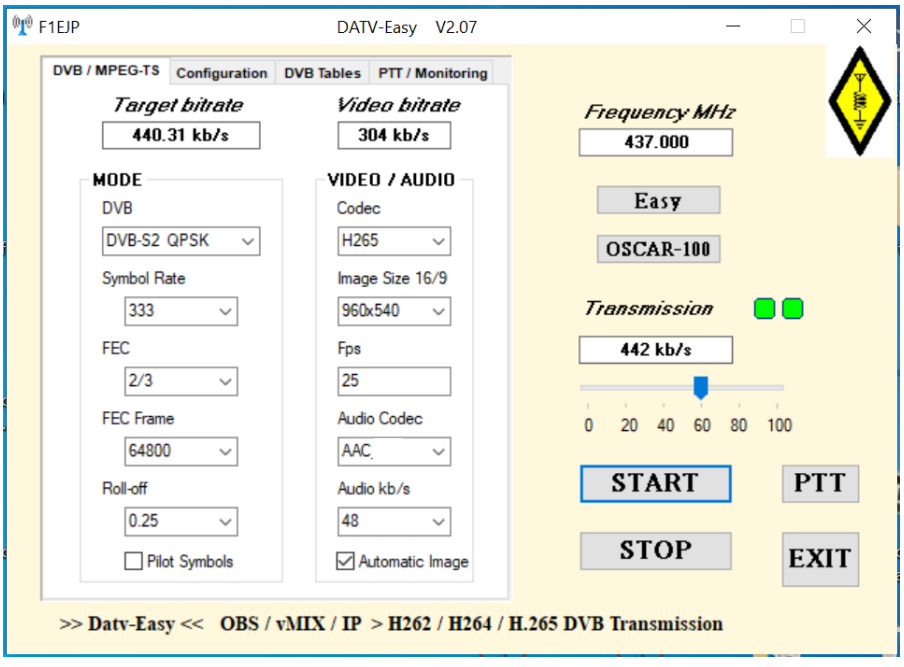
Prerequisites:

- A **LimeSDR mini SDR** with the latest Firmware (note the PortsDown dvb seems incompatible)
  or an **Adalm Pluto** with the manufacturer's original firmware
  or an **Adalm Pluto** with the Evariste firmware minimum 0201 (2021)
- An INTEL PC processor minimum Core I5, core I7 recommended or recent generation AMD.
- **Connection to USB 3 or USB 2 with Pluto SDR**
- **Ethernet port with Pluto SDR but experimental and limited by very high transfer rates .**
- If NVIDIA or AMD graphics card or Recent INTEL processor integrating GPU processor. Coding with hardware support is much more efficient than by soft
- If one of these prerequisites is not sufficient, you will have Drop Out in the program.

Functions :

- DATV-Easy allows transmission in DVB-S, DVB-S2 and DVB-T with a Limesdr mini or Adalm-Pluto and its original firmware with a Symbol Rate (SR) between 20 Ks/s and 500 Ks to 2 Ms/ s
- Parameterization is facilitated for beginners by default preset values.
- You can choose your preferred frequencies of use "Easy Button" by editing the Frequency.csv file (Modify button) Windows Notepad in C:\F1EJP (Values separated by ;)
- For Oscar 100 users you can choose the predefined frequencies (OSCAR-100 button)
- DATV-Easy uses FFMPEG with GPU processors from NVIDIA cards or recent INTEL processors to compress in H262, H264 and H265 -> Choose your encoder carefully.
- It can also code directly in soft but in this case the use is limited by the power of the processor above 333Ks or it can be saturated especially in H265.
- The Video and Audio source can be the free OBS software or vMIX or an already encoded iP stream.
- For audio you have the choice between MP2, AC3, AAC which allows lower bit rates.

Choose the SR (Symbol Rate or bandwidth) and FEC (error correction) and the software comes up with tested and roughly optimized defaults.

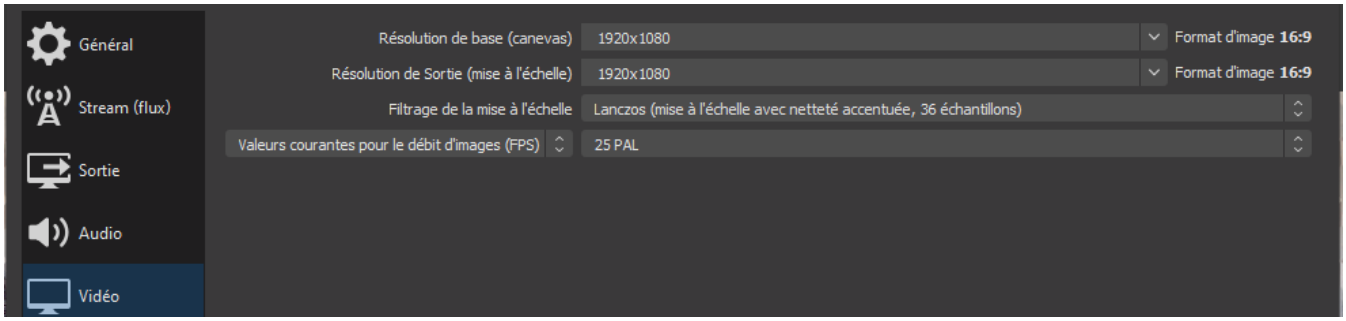


1/ If you haven't already, INSTALL OBS and the VirtualCam or vMIX plugin

- it is the best solution to stream videos from any source, camera, chart, film, etc.

https://obsproject.com/ https://www.vmix.com/

With OBS here are just the settings to apply (will be grayed out with VirtualCam started)



2/ For OBS Install : VirtualCam for OBS version < 28

or DroidCam for OBS version > 28 or VB-Audio Virtual Cable

WARNING version 28 , you have to start the virtual camera integrated in OBS and only the sound is recovered by DroidCam or VB-Audio Virtual Cam.

https://obsproject.com/forum/resources/obs-virtualcam.949/

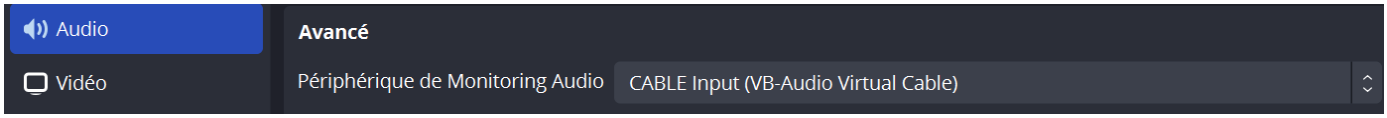
https://obsproject.com/forum/resources/droidcam-virtual-output.1580/
Installer les 2 exécutables

DroidCam.Drivers.New_0.1.0.exe

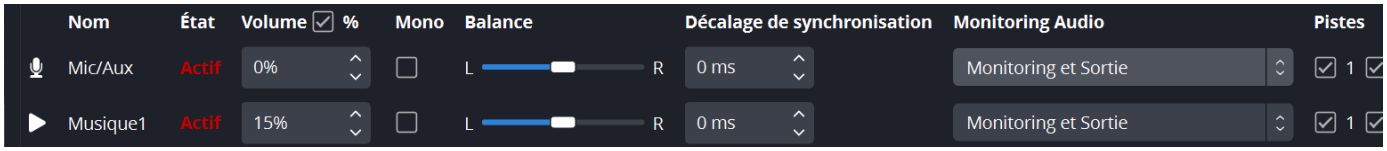
DroidCam.OBSVirtualOut.Plugin.0.1.2.exe

On OBS, go to "Tools" then "Virtual Camera" or “DroidCam” and check "Start automatically"

https://vb-audio.com/Cable/index.htm
With VB-Audio Virtual Cable you have to go to OBS in settings > Audio and modify:



Then go to Edit > Advanced Audio Properties and in Audio Monitoring select Monitoring and output for all outputs



Google is my friend for the latest versions and installation explanations.

3/ Installation and Configuration DATV-Easy

- **Install LIMESDR or PlutoSDR drivers**

[LimeSDR-Mini driver installation - Myriad-RF Wiki (myriadrf.org)]

For the Pluto SDR you have the shortcuts to install everything by connecting with your browser on the Pluto connected by USB on 192.168.2.1 or https://wiki.analog.com/university/tools/pluto/drivers/windows
You must also install the libraries libiio-0.24.gc4498c2-Windows-setup.exe zip include.
ATTENTION Adalm-Pluto can be used with the manufacturer's original firmware either via USB or with a USB 3 / Ethernet Gigabit converter. (experimental and less reliable)
Adalm-Pluto can be used with firmware from F5OEO 0201 or 0303 (addition of DVB-T) and higher by modifying the choice of SDR in Equipment
Install

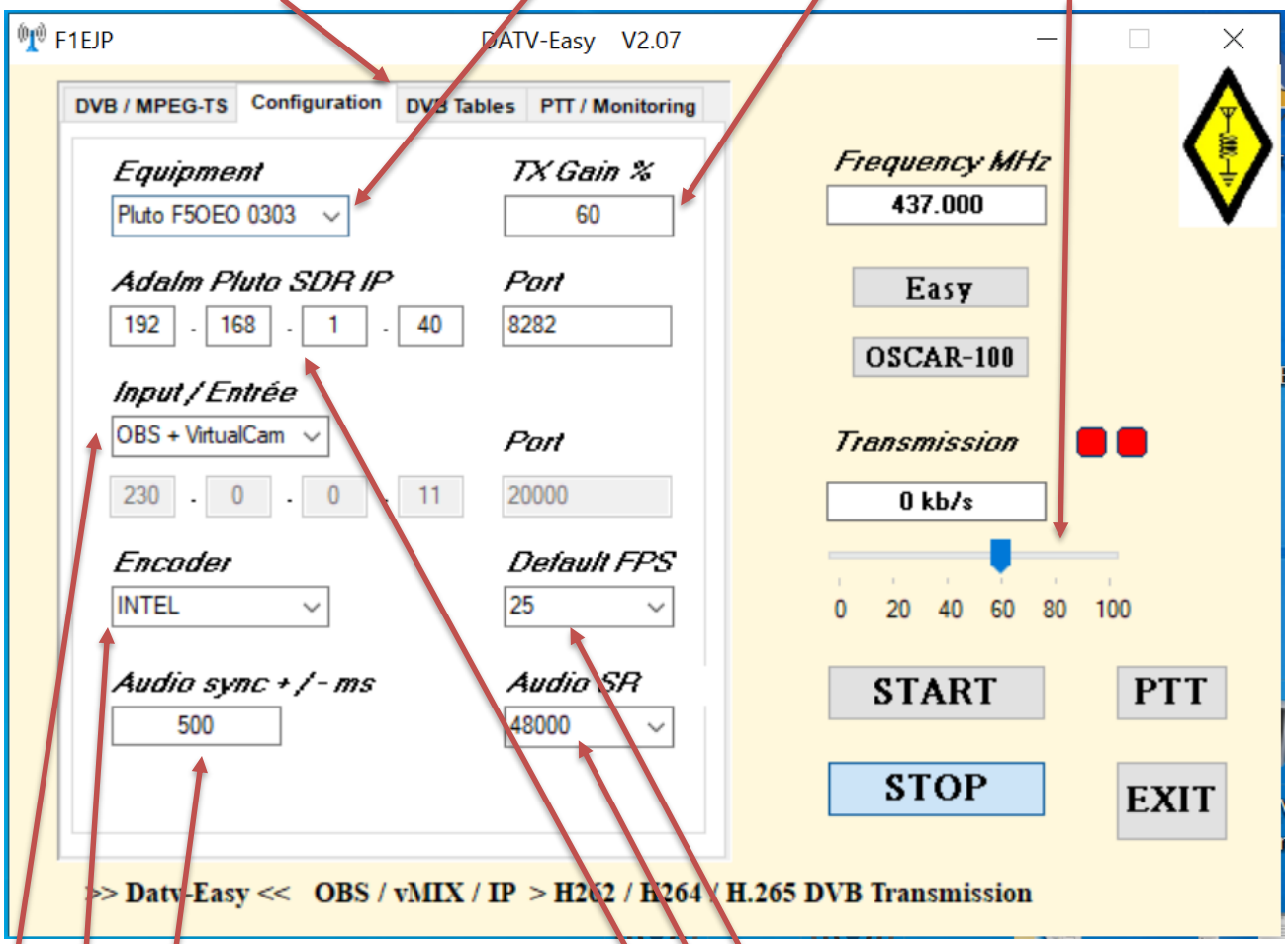
SetupF1EJP-DATV-Easy-V2.07.exe

`Attention` > During installation and on the first launch your antivirus can block several times, you will have to accept and put exclusions if necessary because it is not a virus .

A Go to the “Configuration” tab»

Choice of SDR

Transmit Power



Audio / Video synchronization + / -

Default Frame rate at 25 or 30 frames / second

Choose support for encoding
(NVIDIA or AMD card or INTEL processor or software)

Audio Sampling Rate

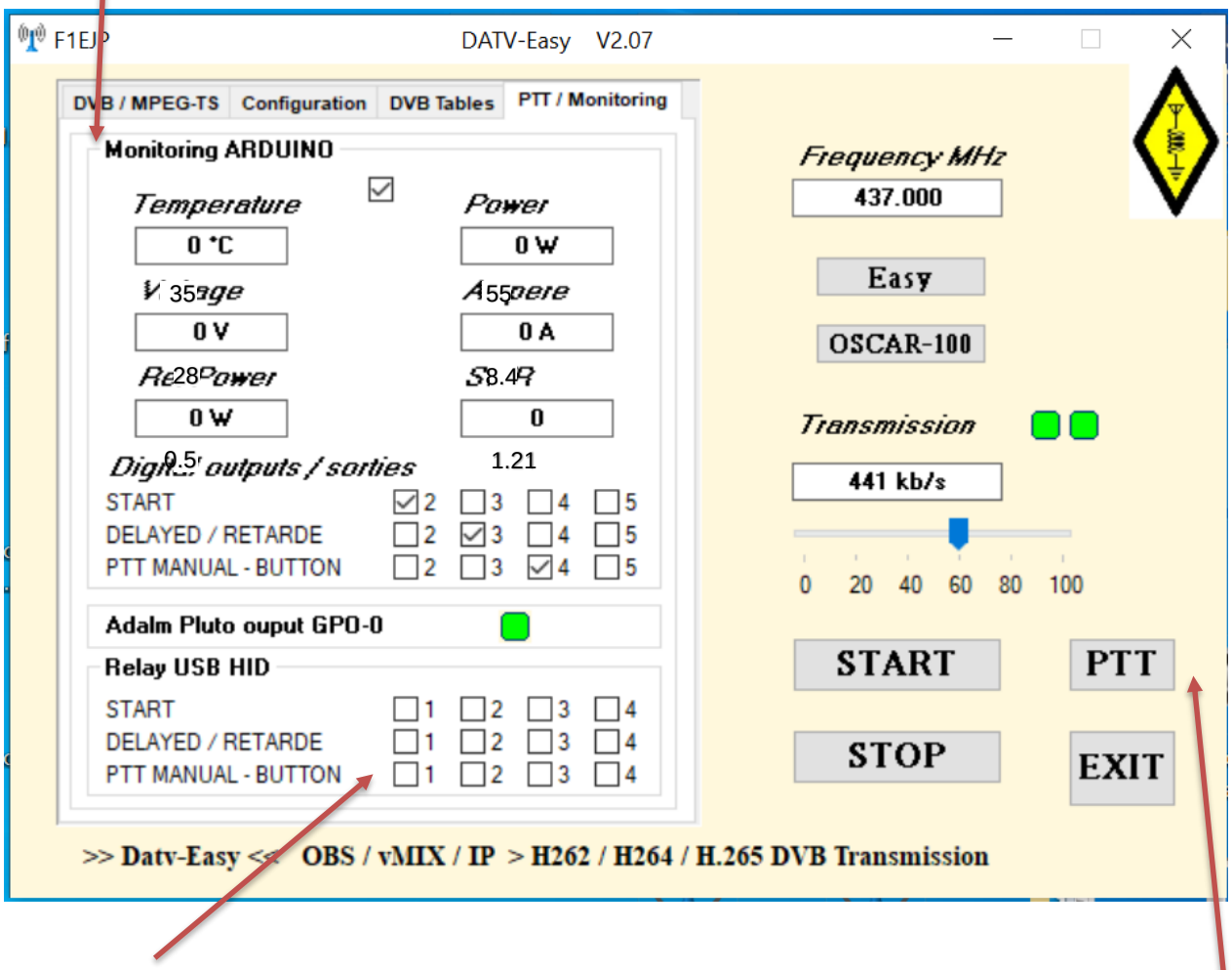
Fill in the IP for the Pluto and the port

Choose the source: OBS or vMIX software or already coded IP stream (enter the input IP address and the port)

4/ PTT commands and monitoring

- If you have entered the correct Pluto SDR IP (default USB 192.168.2.1) you can order the double PTT switching board for Adalm Pluto SDR described by the very good article by F5UII :

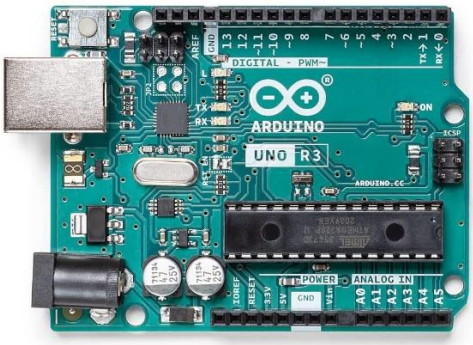
https://www.f5uii.net/actualites/dual-ptt-switching-board-for-adalm-pluto-sdr/



To control the power supplies of your amps without or with delay or manual to avoid calibration peaks :

You can use USB HID relays without the need to install any driver.
Found on Ebay or Amazon for 7 to 17 €:

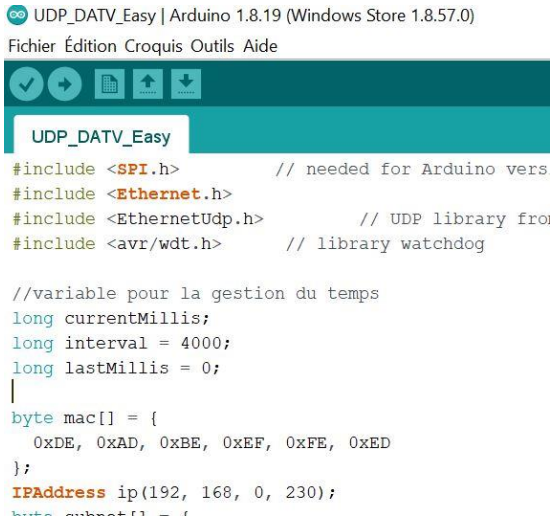


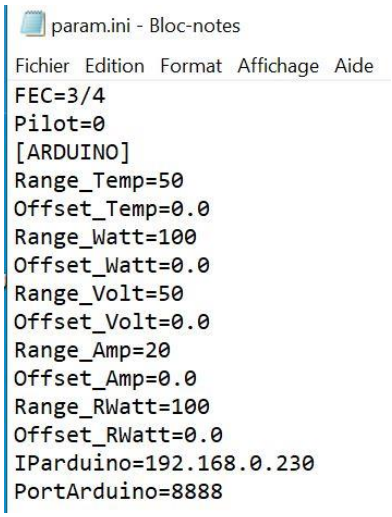


- If like many OM you have an ARDUINO UNO with a SHIELD Ethernet card and a relay card:
  - You can monitor several values of your amplifiers with the analog inputs.
  - You can control Digital outputs 2 to 5 with a relay card for your amplifiers.

Many tutorials are on the Internet to use the ARDUINO UNO but once the ADUINO program is installed you just have to inject the provided program UDP_DATV_Easy.ino

By default the IP of the ARDUINO is in the VLAN 192.168.0.x address 192.168.0.230 if your network is different you must change the IP address in the program of the ARDUINO and in the file C:\F1EJP\ param.ini



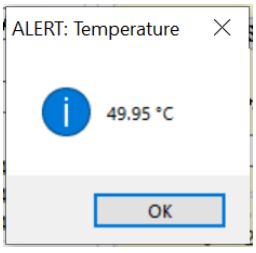


For analog inputs A0 to A4 the measured value goes from 0 V to 5 V you can adjust their end of scale (gain) and the offset in the param.ini file :

- Input A0 corresponds to the temperature ((Offset_Temp and Range_Temp)
- Input A1 corresponds to measured watts > **squared measured voltage** ((Offset_Temp and Range_Temp)
- Input A2 corresponds to the voltage of the Amplifier ((Offset_Volt and Range_Volt)
- Input A3 corresponds to the intensity ((Offset_Amp and Range_Amp)
- Input A4 is reflected watts > **squared measured voltage** ((Offset_RWatt and Range_RWatt)

Many OM articles describe power and reflected power measurement solutions.

http://www.vivadatv.org/viewtopic.php?f=87&t=698&hilit=arduino
http://f6kcz.free.fr/Technique/Telemesures/Telemesures.htm



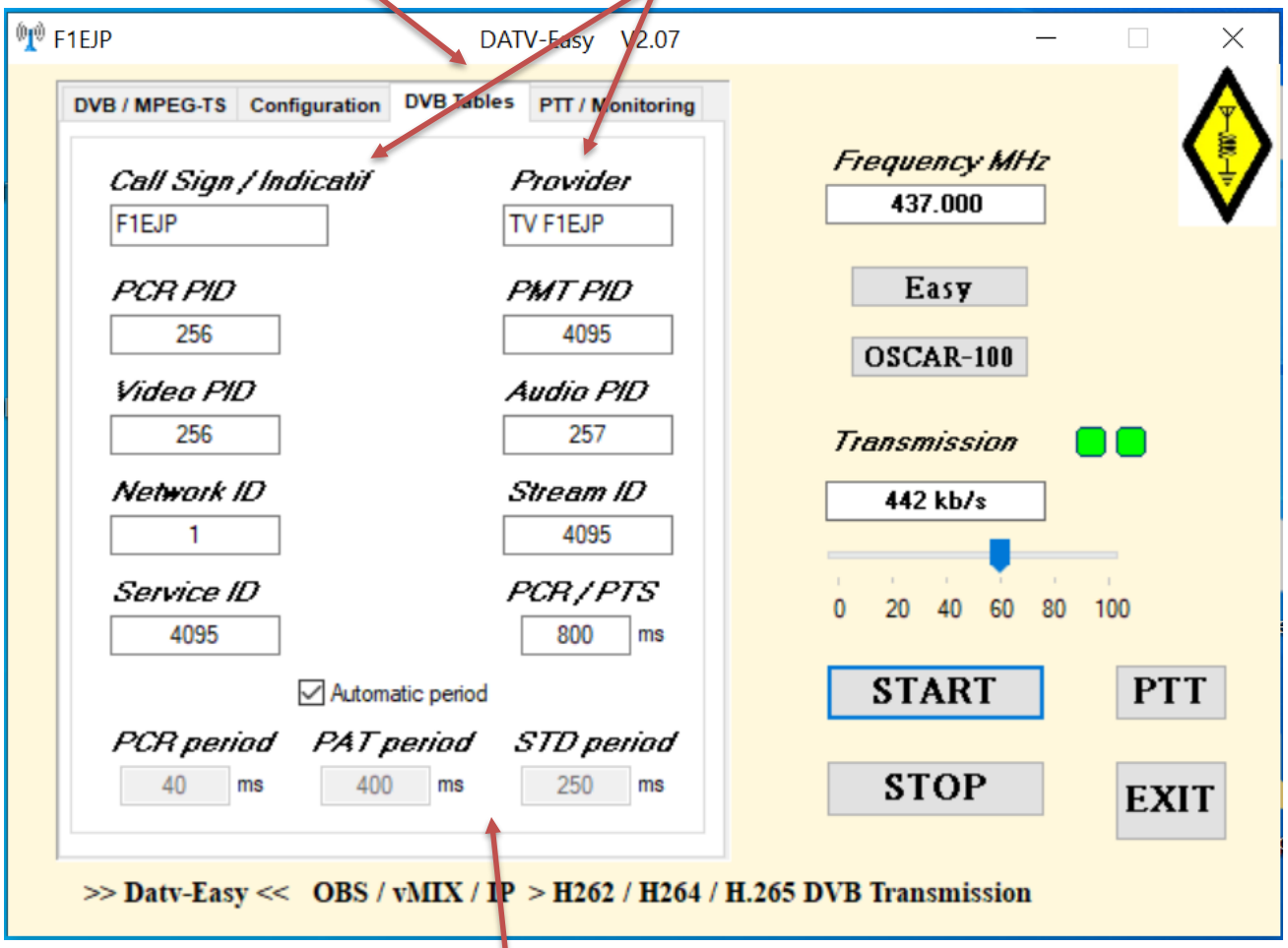
You can also set a safety threshold on the temperature which will switch off all the relays.
In the file param.ini :

- TempMax=45

5/ Optional

Go to the “DVB Table” tab

Fill in your callsign and provider



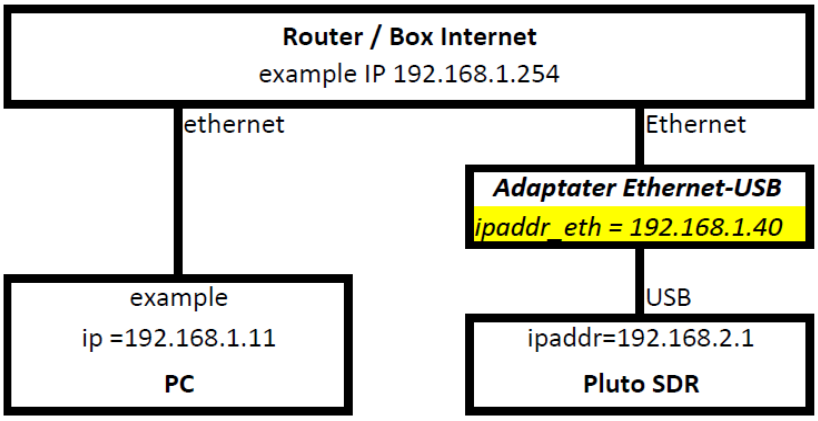
Optional:
If necessary, fill in the Identifications (PID, SID) of the different DVB streams, otherwise leave as default
Audio, Video etc. streams.
Attention the PCR PID takes the value of the video PID

Setting the maximum delay of PCR / PTS multiplexing (buffering)

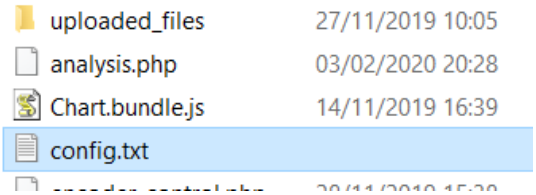
For information: the periodic values of the tables according to the parameters chosen on the first tab.

6/ Connection Ethernet with Pluto and settings :

CAUTION THIS MODE IS EXPERIMENTAL AND DOES NOT WORK AT HIGH RATES



The PlutoSDR once connected as in the diagram, should automatically have an IP address given by your network router (router, internet box).
It is preferable to have a fixed IP address, which does not change.
So you have to modify the file which is in the root directory of the PlutoSDR player in the file *config.txt*



- Open the *config.txt*
- After the line *[USB_ETHERNET]*, modify the IP address by indicating a free IP address of your network. There are network analyzer software that allow you to list all the equipment connected to your network

The Pluto will have this fixed IP address on the next restart, in the example 192.168.1.40 to put in DATV-Easy > Pluto SDR IP

Do not modify the NETWORK section address but that of the USB_ETHERNET section.

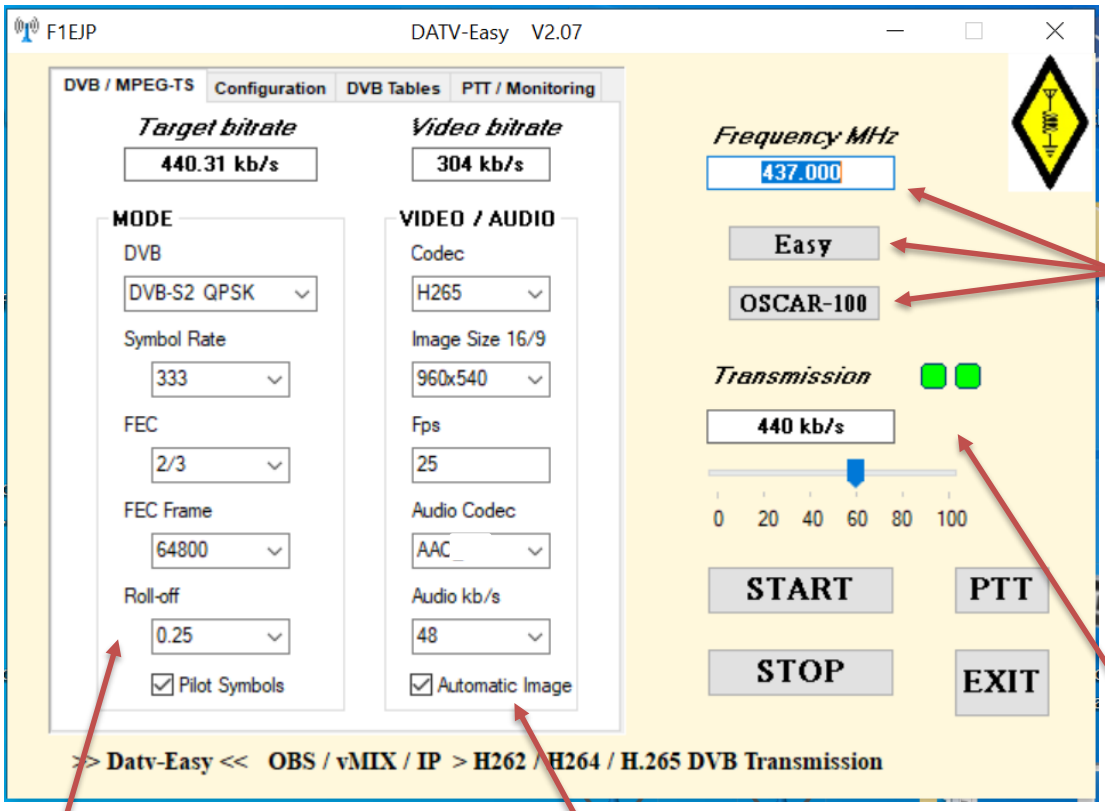
```
# Analog Devices PlutoSDR Rev.B (Z7010-AD9363)
# Device Configuration File
#   1. Open with an Editor
#   2. Edit this file
#   3. Save this file on the device USB drive
#   4. Eject the device USB Drive
# Doc: https://wiki.analog.com/university/tools/pluto/users/customizing

[NETWORK]
hostname = pluto
ipaddr = 192.168.2.1
ipaddr_host = 192.168.2.10
netmask = 255.255.255.0

[WLAN]
ssid_wlan =
pwd_wlan =
ipaddr_wlan =

[USB_ETHERNET]
ipaddr_eth = 192.168.1.40
netmask_eth = 255.255.255.0
gateway_eth = 192.168.0.254
```

7/ DATV-Easy use



Tap or choose your frequency with the buttons.

Modify C:\F1EJP\ Frequency .csv

First choose the type of DVB modulation

Choose Symbol Rate or Bandwidth and FEC Error Correction and or Guardfactor.

In DVBS2 the calculated bit rate also takes into account the parameters chosen in transmission for the FEC Frame and Pilots Symbol

In DVBT the calculated bit rate takes into account the bandwidth of the FEC and the GuardFactor

Choose the Video encoding:
H264 or H265 or H262(mpeg2)

Choose Audio encoding:
MP2, AC3, AAC

The image resolution, audio bit rate and frame rate are offered by default depending on the DVB parameters and the type of encoder used.

- You can modify them for testing. However if the settings are too high ffmpeg may no longer get the right bitrate and crashes.

The left LED displays the correct operation of the SDR and its driver

The light on the right is that of ffmpeg.

The display shows you the actual bitrate output from the encoder. It turns red if too high and 0 if there is a coding problem.

The slider allows you to adjust the power during transmission.

- Launch OBS or vMIX or the IP stream then click on **START** to start the broadcast (delay 12 seconds)
- **STOP** to stop, **EXIT** to quit the software
- **PTT** allows to manually control a relay for an amplifier or a power supply

Thank you for all your suggestions and test feedback. 73 Dominique F1EJP

PLEASE NOTE this is an AMATEUR experimental development, so there is no after-sales service !
It is not certain that I can answer all your requests. Thank you for understanding !

I am regularly on the chat: https://eshail.batc.org.uk/wb/