

# Super - Vfo



Super-Vfo is really a DDS VFO software program for Arduino Uno and Arduino Pro Mini 16Mhz, with LCD screen of 16X2 (HD44780 type) , a DDS module with AD9850 or AD9851 and one rotary encoder, which it allows all functions of VFO without requiring any button more.It is very easy to use.

It has 2 Vfo's. VFO A and VFO B,Step, Split ,IF config, decode CW, SMeter\*, Wattmeter\*,etc

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## **SOFTWARE PACKAGE & INSTALLATION :**

The software package consist in two programs and this manual:

- Super-Vfo init. (Vfo-ini.Hex)
- Super-Vfo. (Super-Vfo.Hex)

To LOAD the software on Arduino , you must use a program for hexadecimal files.  
Ej : AXLOADER or XLOADER for Windows, downloadable easy in Internet.

XLOADER, you can down on: <http://xloader.russeotto.com/>

AXLOADER, you can down on: <http://www.softpedia.com/get/System/System-Miscellaneous/AX-Loader.shtml>

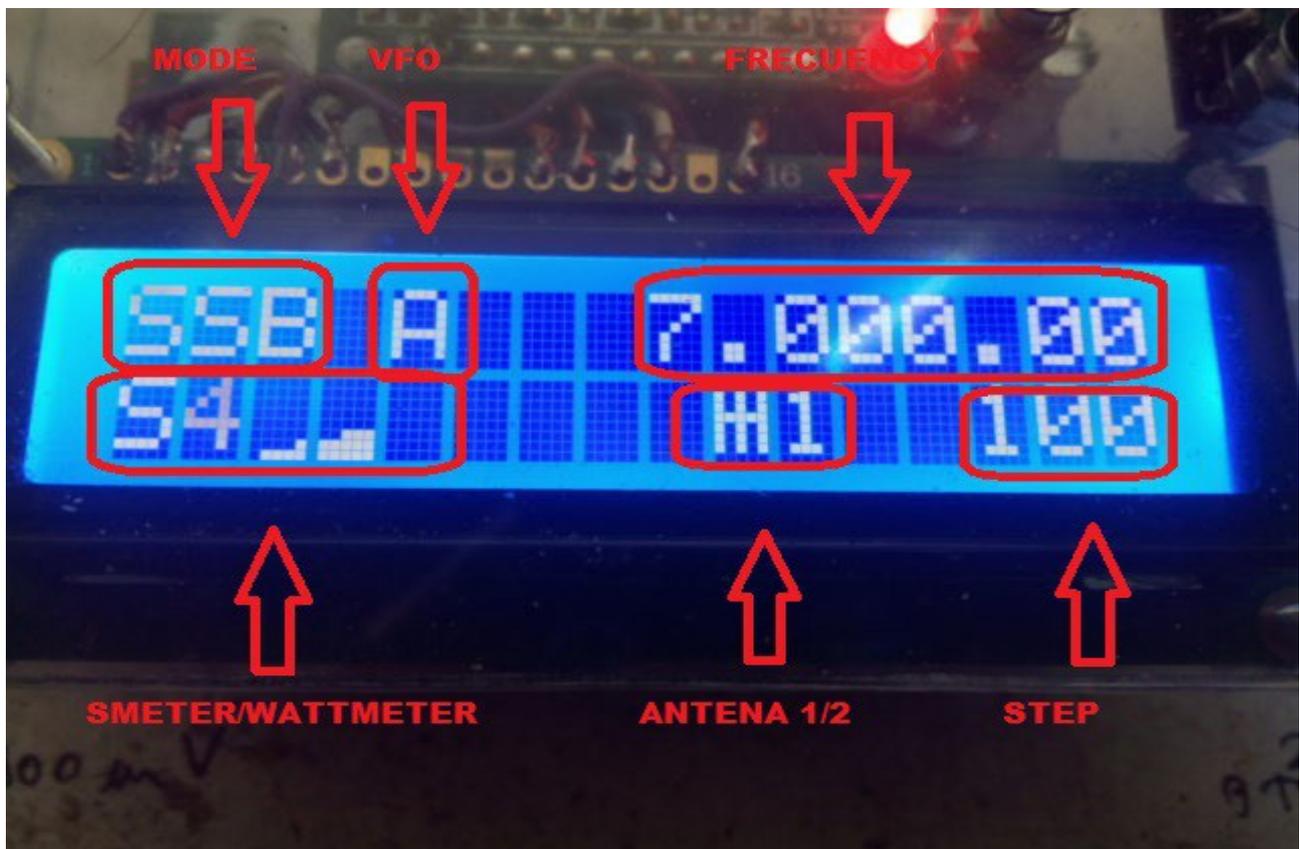
First ,select the port COM , where is connected your Arduino.Select for upload the first file , Vfo-ini.Hex . Once loaded and executed (about 10-20 seconds), the program will tell you that you can now upload the next file. Super-Vfo.Hex. When you upload this program, Super Vfo is now , for use.

**DISPLAY INFORMATION:**

When you power up the Super Vfo,you can see the version of software. After 2 seconds displays the welcome message and your call.



The display shows the following information:



In the top left-hand corner ,you can see the VFO MODE, SSB or CW. If in Menu you have chosen CW DECODE MODE , the signal of CW ,it will be decoded on the bottom line of screen.The Smeter\*, Antenna and Step are not show. To CW DECODE need to tune in a signal and when it appears an \* to the right of CW mode began to decode the signal rate. Speed decode is automatic,select by software. The SSB or CW mode is save on eeprom of your Arduino. The CW DECODE mode not is saved. When you power up again the VFO , put the last mode used. If you select SPLIT mode in Menu , the MODE is changed to RA/TB, RA= you RX with VFO A and TB = you TX with VFO B.

In MODE SSB or CW ,to the right of the mode label show up A if you are in VFO A or B if you are in VFO B.

Finally to the right of VFO A or B indicator appears the VFO frequency. This frequency is automatically calculated with the parameters of the SETUP Menu options.

In the lower left corner of screen, show the Smeter\*, with letter S, followed by a number between 0 and 9 and finally + indication for maximum signal received besides signal indicator ladder. On your right show the antenna icon indicated selected antenna 1 or antenna 2. Finally in the lower right corner show the STEP of frequency when you changed with the rotary encoder.

If the VFO is in TX mode the Smeter\* is change for Wattmeter\*, and show up TX label instead of Step.

The rotary encoder or DIAL has all the control of VFO. Turn left or right the DIAL and frequency change up or down according to the chosen Step. Pressing the button of rotary encoder (DIAL), will enter the main menu of Super Vfo (**MAIN MENU**) del Super-Vfo and you can browse through the various options turn the DIAL.

## MENU FUNCTIONS:

Pressing the button of rotary encoder (DIAL), you access the MAIN MENU. You have the next options:



First option is **EXIT**. If you press the DIAL in this option you are back to the VFO mode. If you turn left or right the DIAL, they will be appearing the next options:

Options of Main Menu:

- EXIT
- VFO
- STEP
- SPLIT
- MODE
- ANT
- SCAN
- SETUP



**VFO :**

Pressing button DIAL, you can select the VFO with two options turn left-right the DIAL,VFO A or VFO B. If VFO A appears on the screen and you press the DIAL then VFO A is select. If appears on the screen VFO B and press button DIAL, VFO B is select . After selecting the option you exit the Main Menu automatically. On screen show up the VFO selected, A or B.



**STEP :**

Pressing button DIAL, you can select the step for change frequency. Default value is 100 Hz. For change this value press button DIAL. Turn left or right the change this value. Value are 10,100,1K,10K and 100K. Once you have chosen the value, press the button DIAL and value is select. After selecting the option you exit the Main Menu automatically. On screen show up the Step value selected.



**SPLIT :**

Pressing button DIAL, you can select the two options turn left-right the DIAL:

NO SPLIT: You TX and RX in same VFO.

A:RX/B:TX: You RX in VFO A and you TX on VFO B.

After selecting the option you exit the Main Menu automatically. If you select A:/RX/B:TX on screen show up RA/TB instead of SSB or CW Mode. If you select NO SPLIT, on screen show up the SSB or CW mode selected.



### MODE :

Pressing button DIAL, you can select the three options turn left-right the DIAL :

SSB : if is selected on screen show up SSB . At the moment it is only an information.

CW : if is selected on screen show up CW . At the moment it is only an information.

CW DECODE: if is selected on screen show up CW. the signal of CW ,it will be decoded on the bottom line of screen. The Smeter\*, Antenna and Step are not show.

To CW DECODE need to tune in a signal and when it appears an \* to the right of CW mode began to decode the signal rate. Speed decode is automatic,select by software.

See Super-Vfo Connections for interface.

The SSB or CW mode is save on eeprom of your Arduino. The CW DECODE mode not is saved.



**ANT :**

Pressing button DIAL, you can select the two options turn left-right the DIAL:

ANT 1: Select Antenna 1

ANT 2: Select Antenna 2

After selecting the option you exit the Main Menu automatically. On screen show up the Antenna icon ( Yagi Antenna) and the number of antenna select, 1 or 2.

See Super-Vfo Connections for interface.



**SCAN :**

Pressing button DIAL, Super Vfo begin to scan from the lowest frequency to the highest frequency saved in setup options. It does not stop when detecting a signal. You can change the direction of scan turning the DIAL,up or down. To exit this mode,press until only the S letter ,appears on screen instead of SCAN. About ½ second. And you exit of SCAN and return to VFO mode.



**SETUP :**

Pressing button DIAL, you can select the nine options turn left-right the DIAL:

IF SSB: Change the IF frequency used in SSB mode in our transceiver when you install Super VFO on this. This frequency and the DDS frequency it allows the program calculates the frequency for screen. You can change the frequency turn left o right DIAL.The frequency change according to STEP value selected. Finally pressing button DIAL the frequency is saved and return to VFO mode.

IF CW: Change the IF frequency used in CW mode in our transceiver when you install Super VFO on this. This frequency and the DDS frequency it allows the program calculates the frequency for screen. You can change the frequency turn left o right DIAL.The frequency change according to STEP value selected. Finally pressing button DIAL the frequency is saved and return to VFO mode.

- VFO: It allows you to save lowest frequency at which you can access with the VFO. You can change the frequency turn left o right DIAL.The frequency change according to STEP value selected. Finally pressing button DIAL the frequency is saved and return to VFO mode. Values are : from 1 Mhz until 39 Mhz.

+ VFO: It allows you to save highest frequency at which you can access with the VFO. You can change the frequency turn left o right DIAL.The frequency change according to STEP value selected. Finally pressing button DIAL the frequency is saved and return to VFO mode. Values are : from 1 Mhz until 39 Mhz.

DDS – IF : It allows subtracting the DDS frequency the IF frequency (IF-SSB or IF-CW), to obtain the correct operating frequency and show the frequency on display.Finally pressing button DIAL the data is saved and return to VFO mode.

DDS + IF : It allows add the DDS frequency the IF frequency (IF-SSB or IF-CW), to obtain the correct operating frequency and show the frequency on display.Finally pressing button DIAL the data is saved and return to VFO mode.

DDS F : It allows you to save the frequency of DDS.You can change the frequency turn left o right DIAL.The frequency change according to STEP value selected. Finally pressing button DIAL the frequency is saved and return to VFO mode.

AD9850 : It lets you choose which module used as DDS. Finally pressing button DIAL the data is selected and saved and return to VFO mode.

AD9851 : It lets you choose which module used as DDS. Finally pressing button DIAL the data is selected and saved and return to VFO mode.

## **SUB-MENU SETUP DETAILS:**

For the proper functioning of the Super Vfo we see an example of all options of SETUP.

Ej:ILER-40 SSB Spanish 40M SSB QRP transceiver.

VFO : 7.000.00 Mhz to 7.200.00 Mhz

IF: 4.915.00 Mhz

Signal to mixer from VFO : 11.915.00 Mhz to 12.115.00 Mhz.

To obtain 7Mhz on ILER-40 the operation is simple.  $11.915.00 - 4.195.00 = 7.000.00$  Mhz

In SETUP MENU changed the next:

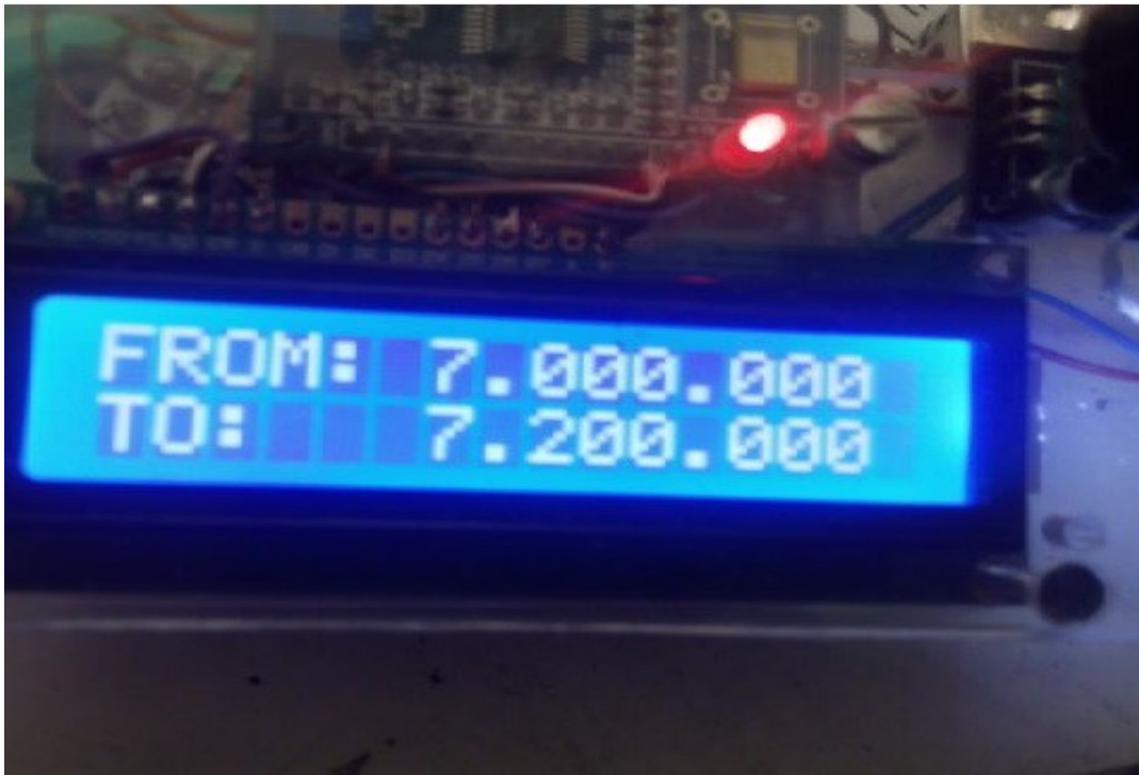
- 1) DDS- F : write 11.915.00 Mhz.
- 2) IF-SSB : select 4.915.00 Mhz.
- 3) DDS-IF : select this.
- 4) - VFO : write 11.915.00 Mhz.
- 5) + VFO : write 12.115.00 Mhz.

The result:

Frequency show in VFO mode : 7.000.00Mhz to 7.200.00 Mhz.

DDS frequency output : 11.915.00 to 12.115.00 Mhz.

When you changed + VFO or - VFO, the screen show the low and high VFO range frequency about 3 seconds



If you can changed the range of VFO ,changed frequency of + VFO and – VFO.

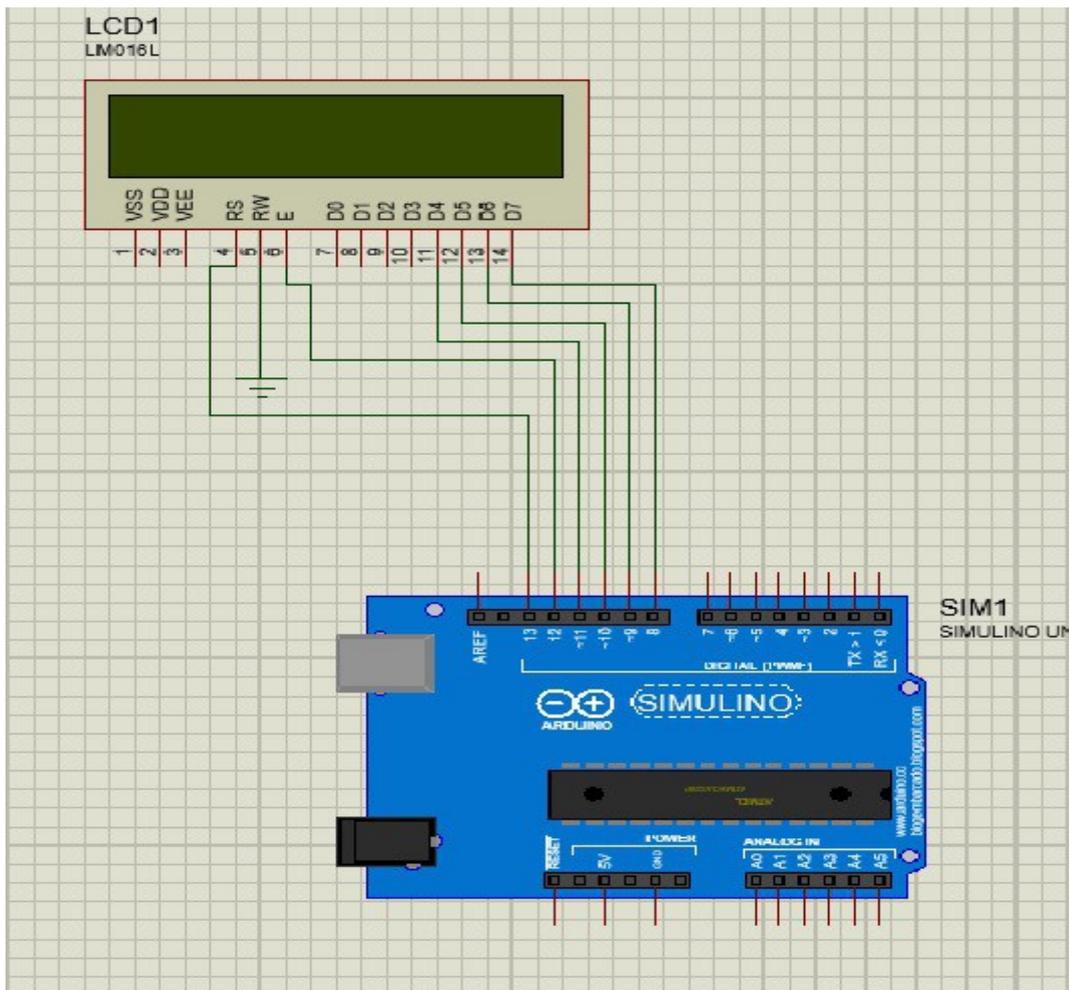
Ej:

VFO from 7.000.00Mhz to 7.100Mhz. + VFO value are 12.015.00 Mhz and – VFO value are 11.915.00 Mhz

## HOW CONNECT SUPER-VFO :

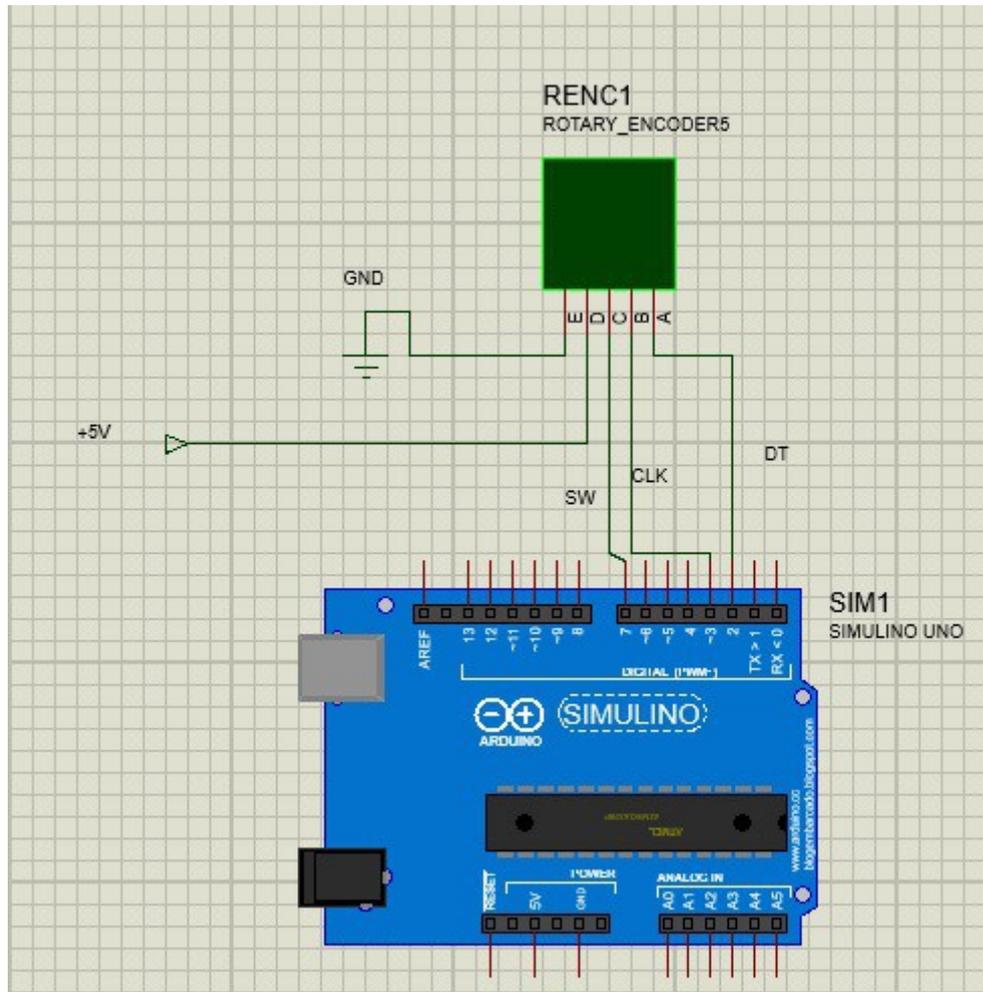
To connect Super VFO to transceiver and Arduino configuration is very easy.  
 You need : Arduino Uno or Arduino Pro Mini 16 Mhz , Rotary encoder with button,  
 LCD screen 16X2 (HD44780 type) and DDS module with AD9850 or AD9851. In  
 Arduino Pro Mini 16 Mhz the pin are the same.

LCD with Arduino :



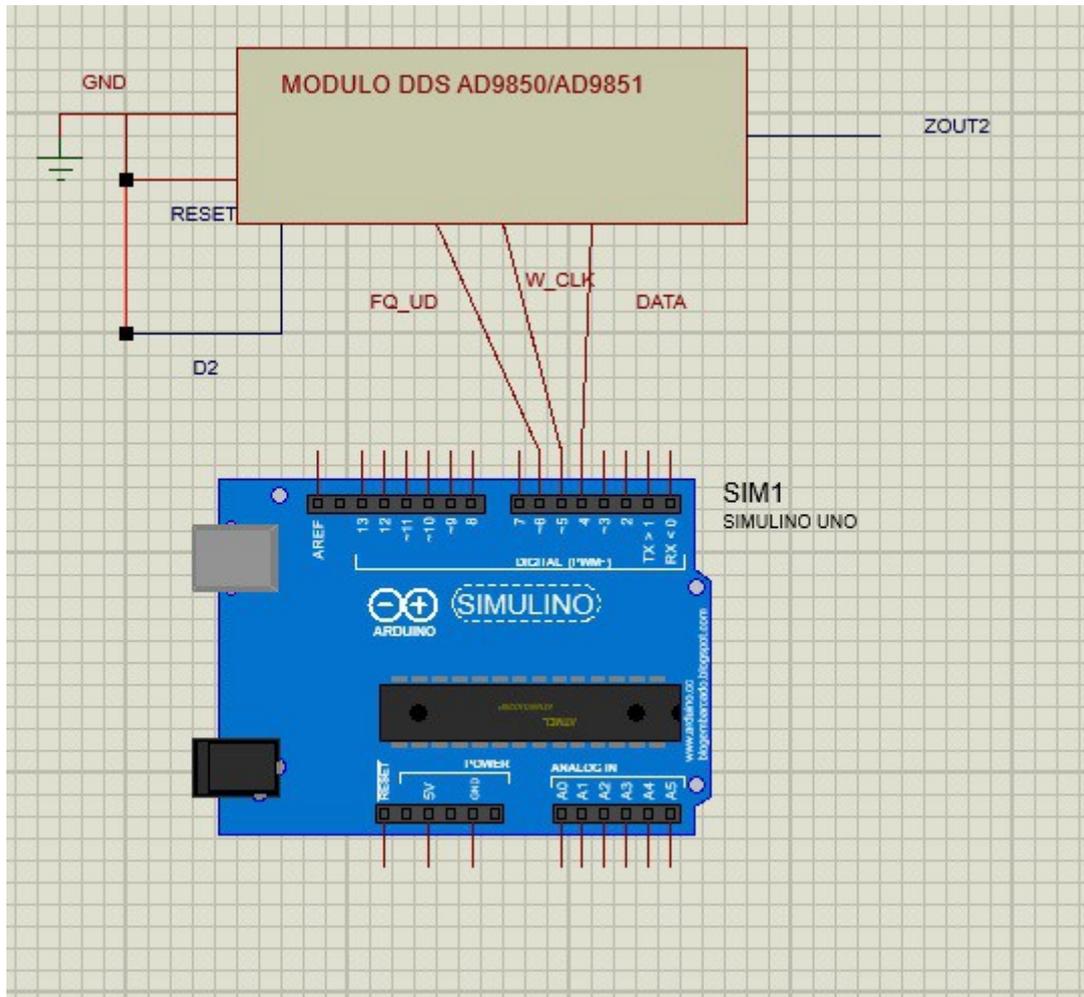
+5V (VCC) and contrast not is show.

Rotary encoder to Arduino :



Pin of rotary encoder :GND, + , SW, DT y CLK. Between pin DT and CLK of rotary encoder and GND you must solder a 100nF Capacitor respectively to minimize rebounds of rotary encoder. Pin DT of rotary encoder connected to Pin 2 of Arduino.Pin CLK of rotary encoder connected to Pin 3 of Arduino. Pin SW of rotary encoder to Pin 7 of Arduino.Pin GND of rotary encoder to GND of all VFO.

DDS module to Arduino :



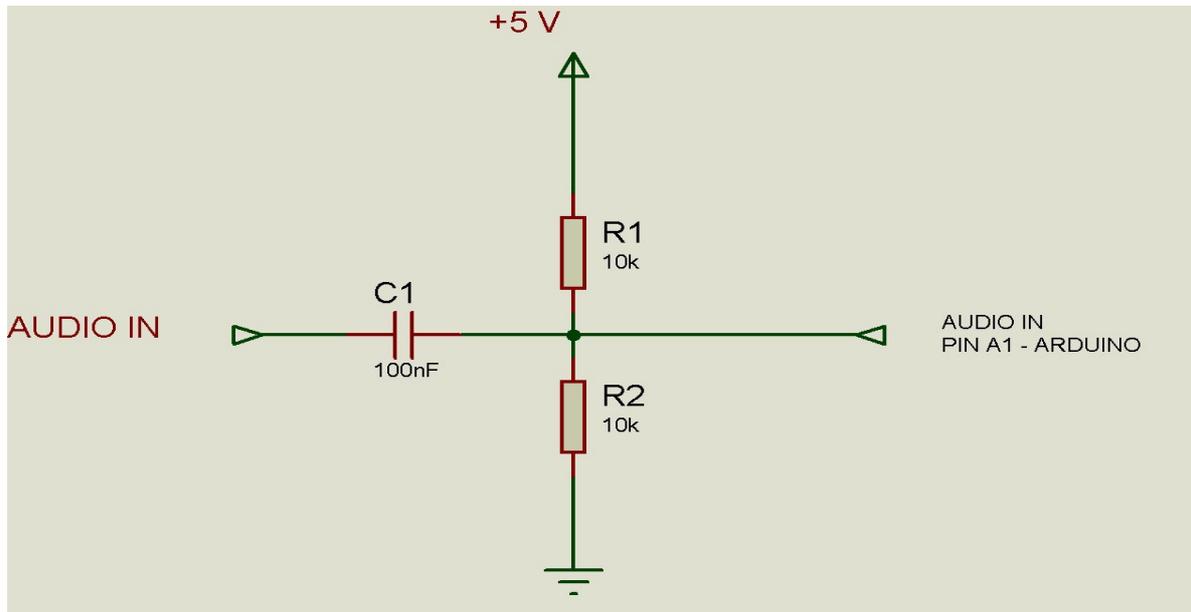
+5V (VCC) of DDS module not is show.

Pin DATA of DDS to Pin 4 of Arduino. Pin W\_CLK of DDS to Pin 5 of Arduino. Pin FQ\_UD of DDS to Pin 6 of Arduino. Pin D2 of DDS to GND. Pin RESET of DDS to GND. Zout2 is RF output of DDS module.

Interface transceiver to Arduino :

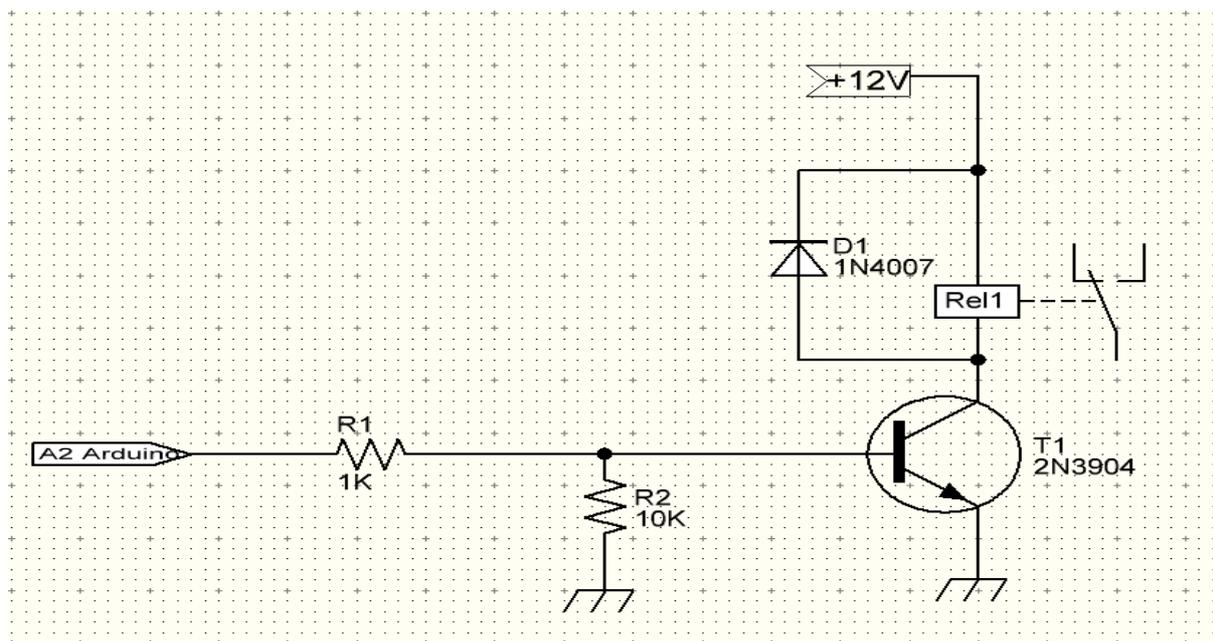
AUDIO IN :

Pin A1 of Arduino.To CW DECODE.



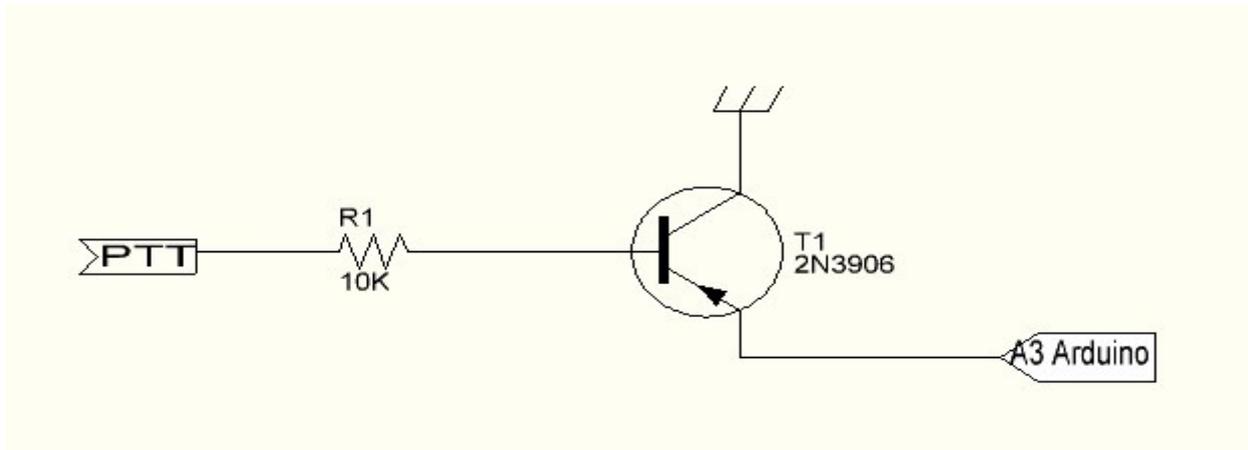
ANTENA 1 ó 2:

Pin A2 of Arduino. To activate a relay for 2 antennas.



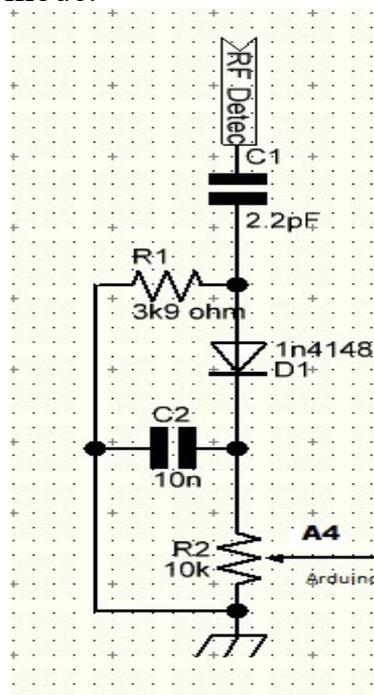
**TX/RX :**

Pin A3 of Arduino. To VFO en TX mode, show wattmeter\* instead of Smeter\* and TX label, and you can make SPLIT fuction. Interface to TX/RX. PTT is to ground to activate.



**VATIMETRO :**

Pin A4 of Arduino. The maximum voltage that supports Arduino are +5V. If it exceeds this value, Arduino will be damaged. Check the voltage before connecting the detector. Wattmeter it is not a real wattmeter calibrated, read values from 0 y 5V and these values graphed in lineal mode.



SMETER :

Pin A5 of Arduino. The maximum voltage that supports Arduino are +5V.If it exceeds this value, Arduino will be damaged. Check the voltage before connecting the detector. Smeter it is not a real Smeter calibrated,read values from 0 y 5V and these values graphed in lineal mode.

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