

# AF/RF Signal Generator



AF/RF Signal generator is a simple and useful circuit create to Arduino Uno or Arduino Pro Mini 16Mhz, with a LCD de 16X2 with I2C interface, a DDS with AD9850 or AD9851 chip ,a set of 8 attenuators and one rotary encoder that allows all the operation .Range operation is between 20Hz to 32Khz for AF mode and between 100Khz to 40 or 71 Mhz according to DDS used in RF mode.

Is very easy to use. He has 121 position of attenuation each of one dB for RF mode and 65 to AF mode. In AF mode work from 1V out to 0,56mV.

The tolerance is about +- 0,5 dB, depending on the accurancy of the attenuator values

AF/RF Signal Generator is not a precision instrument.

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## **SOFTWARE INSTALATION :**

The software package consist in one hexadecimal program and this manual:

-AFRFSig.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.

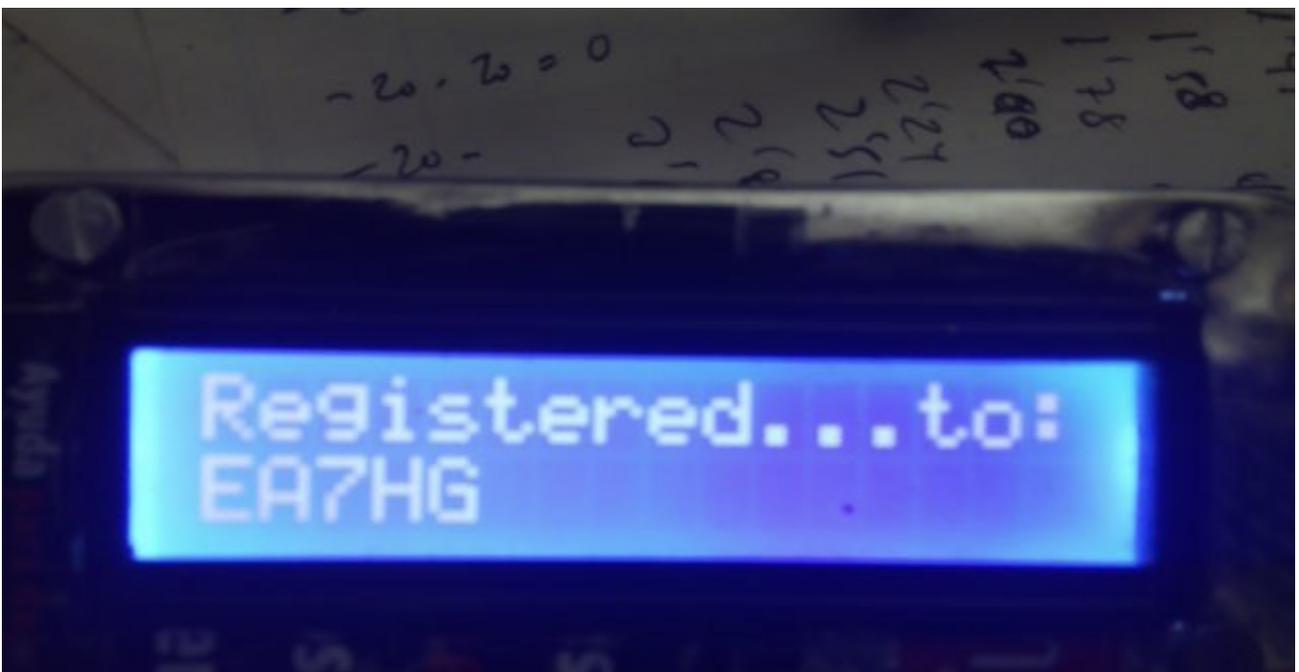
### **VERY IMPORTANT:**

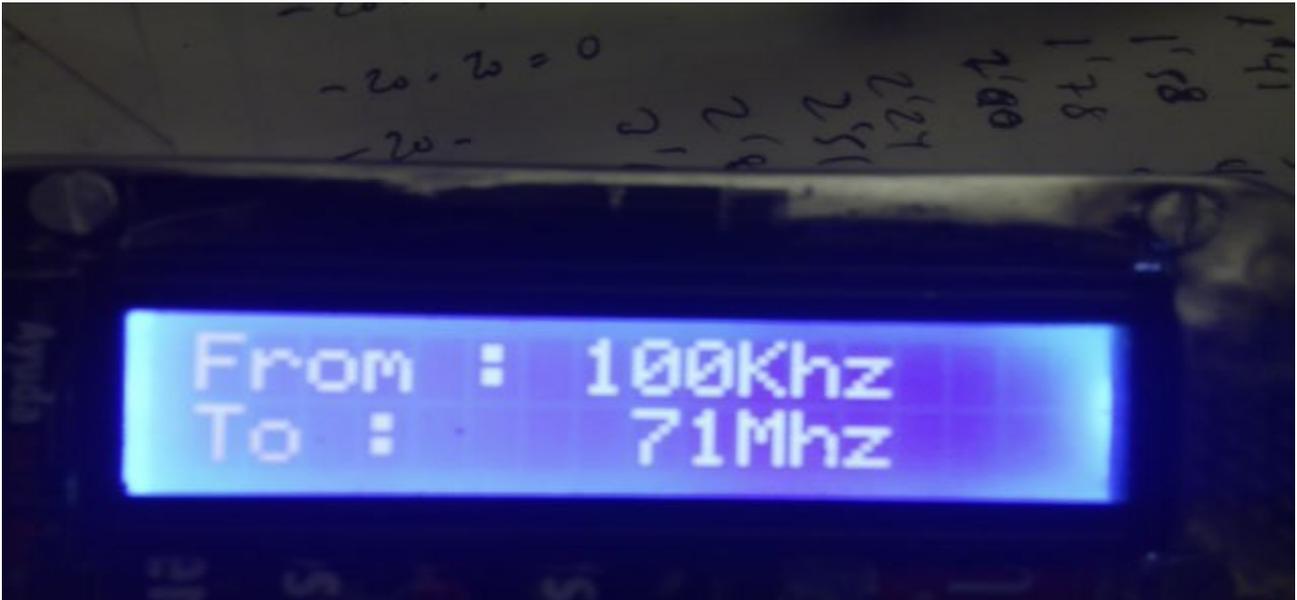
When the cicuit if fully mounted and upload software in your Arduino you must reset the Eeprom memory to save the default values. For reset the memory, push encoder button and power on your circuit. Press until on LCD say release encoder button.The defaul values save in memory are:

Signal Generator Mode	: RF
DDS active	: AD9850
Step RF	: 1Hz
Step AF	: 1Hz
Level RF	: -6 dbm

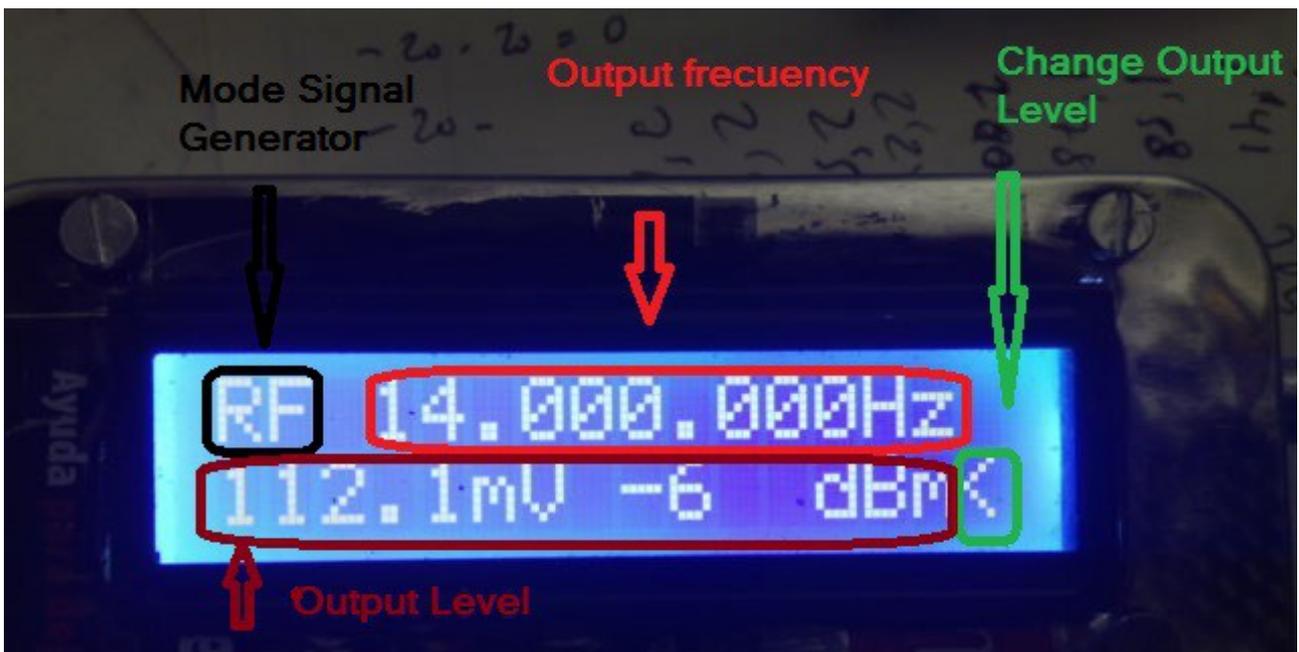
**DISPLAY INFORMATION:**

When you power on all circuit, the LCD print the name of device. Seconds later, print the software version. After this print the software registration and finally the frequency range available.





This is the information printed in LCD:



In top left corner is printed the mode of Signal Generator, RF or AF mode. On the right is printed the frequency output of Signal Generator in Hz. The simbol "<" indicates that you changed the output level. If you can to change the output frequency push button encoder and this simbol is printed to right of frequency and indicates that you can changed the output frequency. For changed again to output level press encoder button.

In the second line of LCD is printed the output values in Volts and dBm when the Signal Generator is on RF mode. In AF mode only printed the output in Volts.

**MENU FUNCTION:**

To access the Menu, press button encoder about one second and a half .



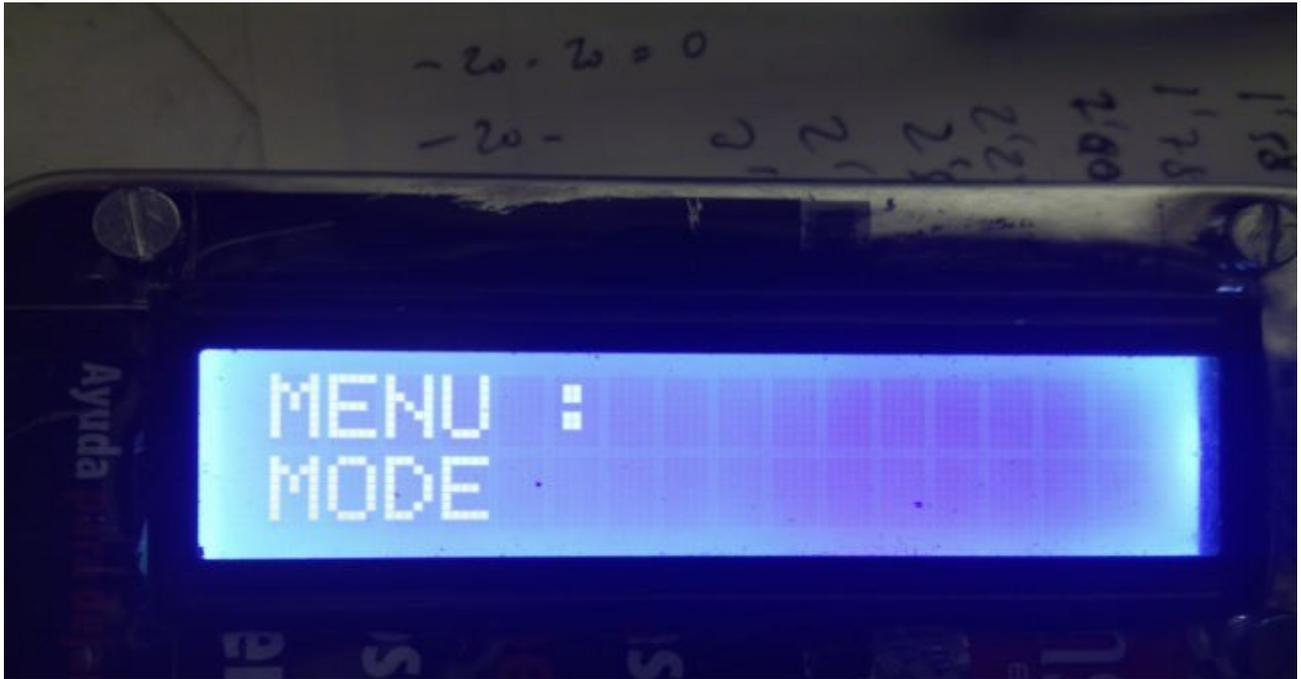
The first function is **EXIT**. If you press again the button encoder you return to normal mode of operation of Signal Generator. If you turn the encoder you access to next option.

The options are:

- EXIT
- STEP
- MODE
- SETUP



**STEP** , you can changed the step of frequency. Default value are 1 Hz. Press button encoder to select step. Turn encoder you can select the step. Values are: 1Hz,10Hz,100Hz,1Khz,10Khz,100Khz and 1Mhz. To save this value press again encoder button. You can select diferent step for AF or RF mode.



**MODE** ,you can select the Signal Generator for AF o RF mode.When you changed the mode you must power off and power on the Signal Generator to use the new mode select.



**SETUP** ,you can changed the DDS used and level output reference:

AD9850 : if you use this DDS.The value is save in memory.

AD9851 :if you use this DDS.The value is save in memory.

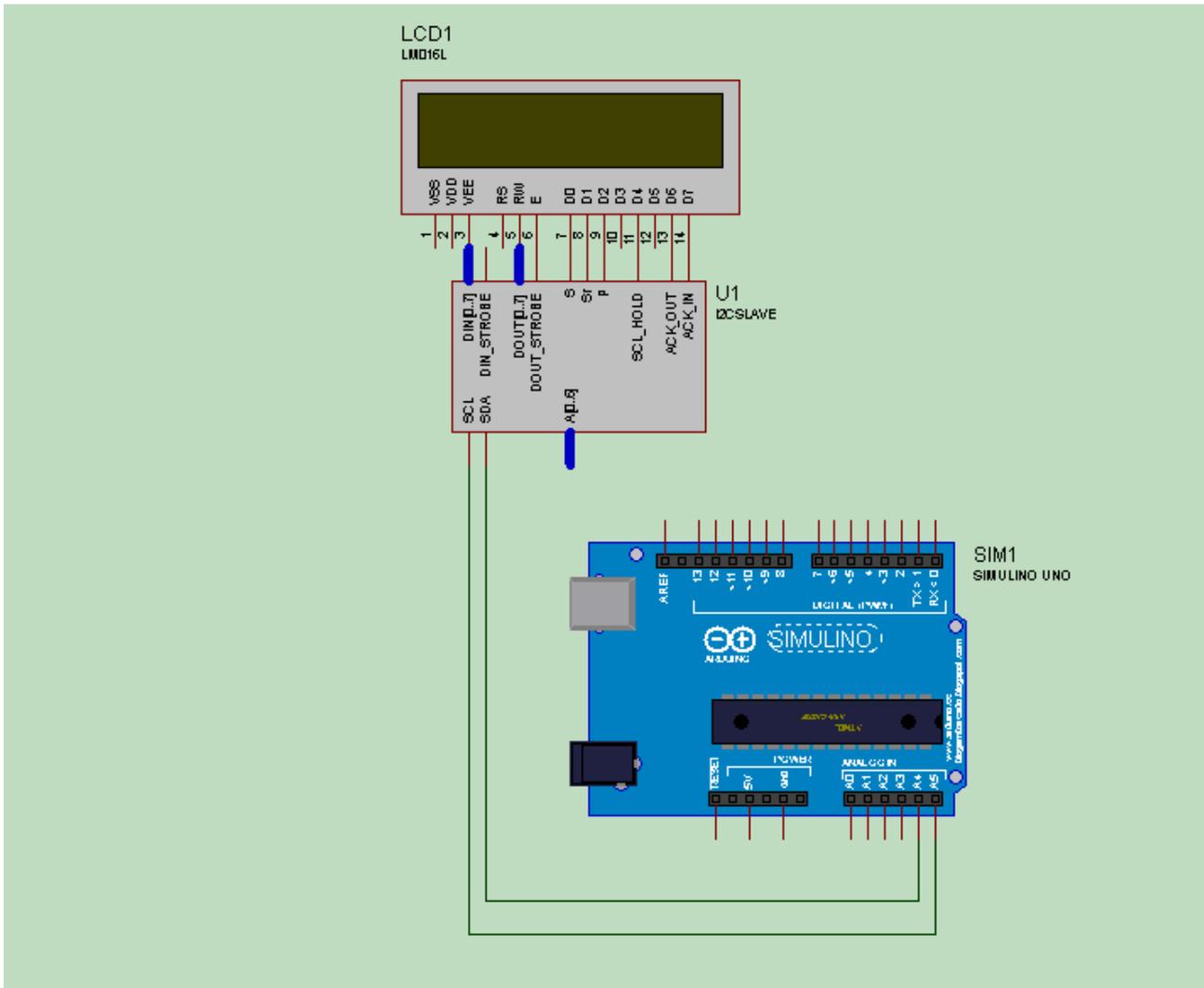
LEVEL : You can select the output level reference of Signal Generator.Values are between -20 dbm to 0 dbm. I checked with my Spectrum analyser many DDS with AD9850 and AD9851 and the output is about -6dbm and -5dbm. If you have to measures this level in your circuit used the leves reference to star.The value is save in memory.

## HOW CONNECT ALL AND CIRCUITS :

You need: One Arduino Uno or Arduino Pro Mini 16 Mhz, one rotary encoder with button , a LCD 16X2 con I2C (type PCF8574), a DDS with AD9850 or AD9851 and one circuit with 8 attenuators.

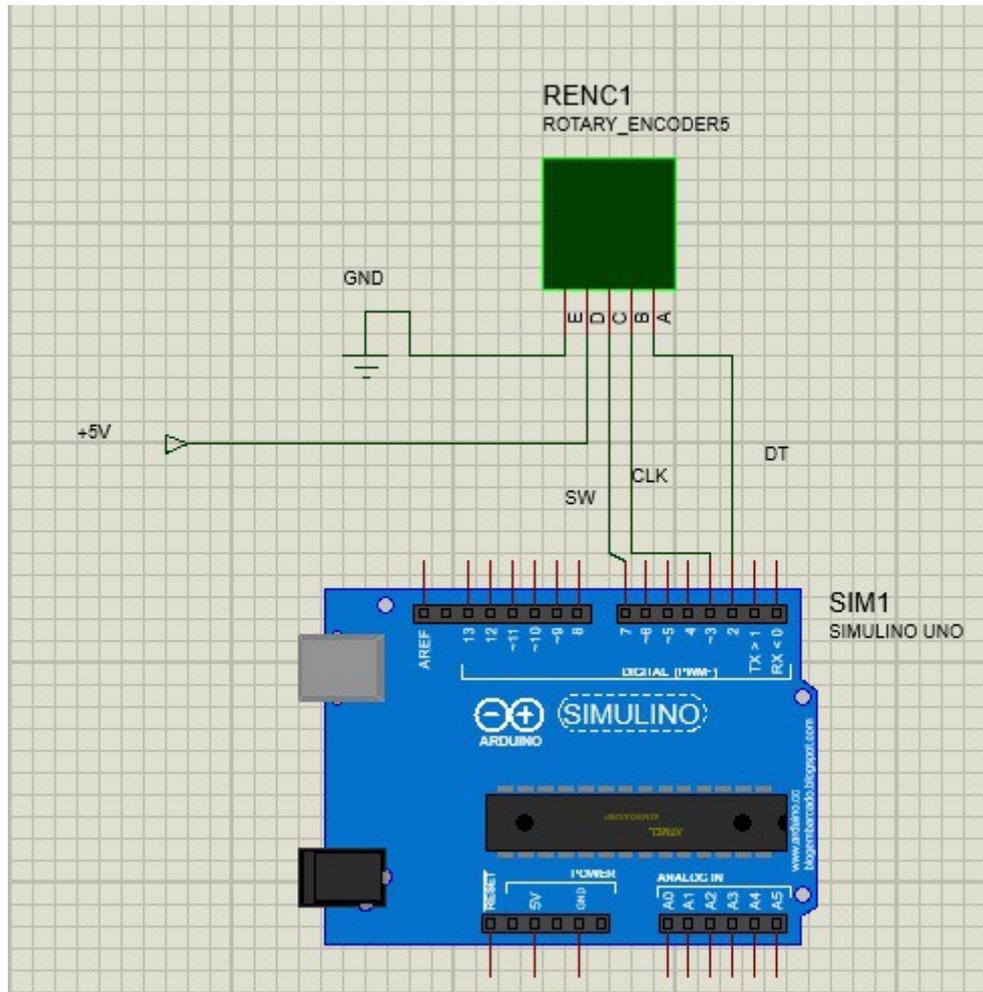
It is advisable that all modules are shielded.

How connect LCD with I2C to Arduino :



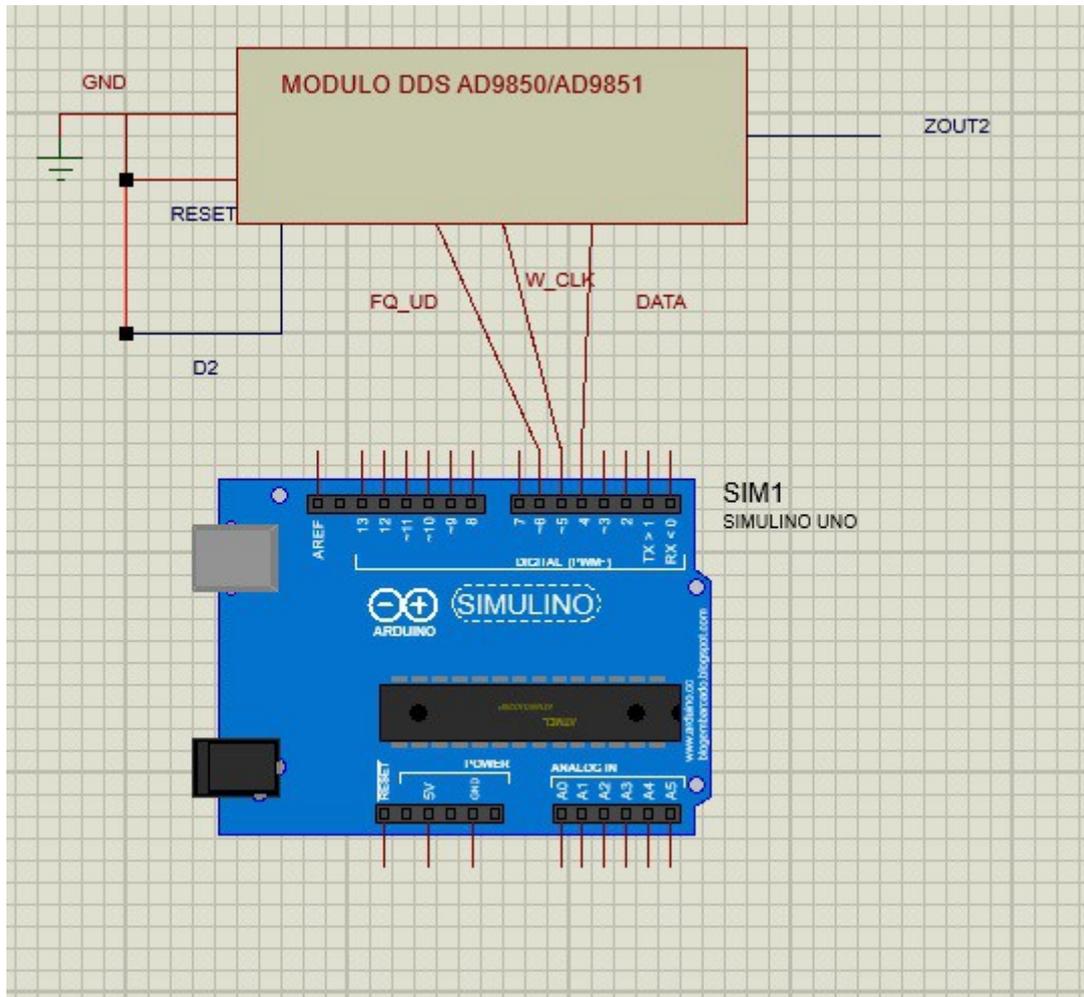
The power supply (+5V) of LCD with I2C is not printed.

How connect 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 circuit.

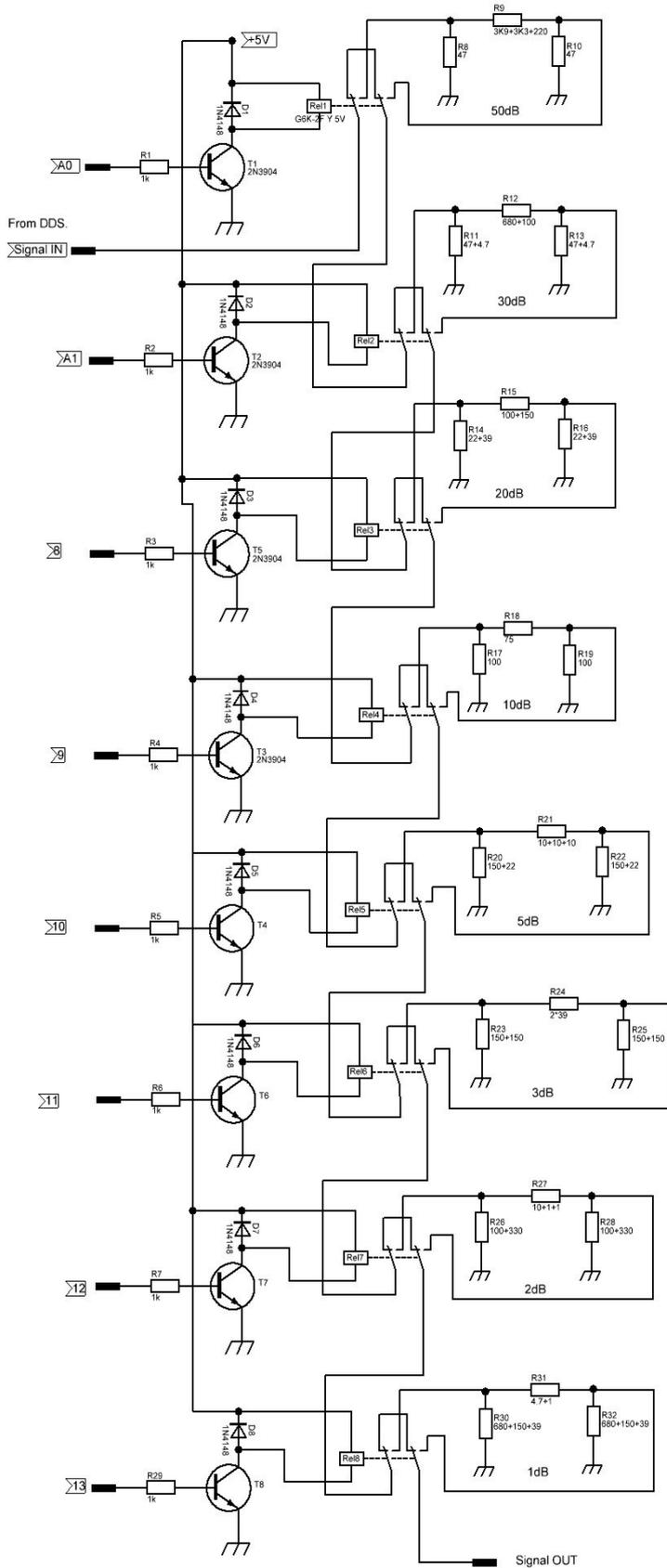
Conexionado del DDS a Arduino :



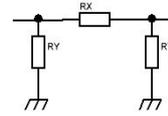
+5V (VCC) of DDS module not is show.

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.

**ATTENUATOR CIRCUIT:**



+ = Serie Resistor  
 \* = Parallel Resistor



Exact value for each attenuator.

ATT	RX	RY
50dB	7900ohm	50ohm
30dB	790ohm	53ohm
20dB	248ohm	61ohm
10dB	72ohm	96ohm
5dB	31ohm	179ohm
3dB	17ohm	292ohm
2dB	12ohm	436ohm
1dB	6ohm	870ohm

All Relais 5V ... 2 position 2 circuits

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