

Nano DDS VFO Firmware Installation Instructions for Arduino IDE

Farrukh Zia, K2ZIA, 2016_0220

Please follow the sequence of steps given below.

- *If you are an experienced Arduino programmer and radio operator, you may not need to read all the details and may use this information as a general guide to get up and running quickly.*
- *If you get stuck with a non-trivial issue while following these steps, please take a look at www.arduino.cc/en/Guide/Troubleshooting*

1. Download and install Arduino IDE Version 1.6.5 on your PC.

- a) Arduino IDE Version **1.6.5** is available from www.arduino.cc/en/Main/OldSoftwareReleases
- b) **VfoSource.ino (Rev. 6) currently compiles under older Arduino IDE V-1.6.5 (and lower versions V-1.6.x) and runs on Arduino Nano on the DDS VFO Board correctly. However, even though VfoSource compiles under newer Arduino IDE versions (V-1.6.6 and V-1.6.7) the I2C LCD does not display text properly. This issue is being investigated (~ Feb. 2016) and an update will be posted on the web site when it is resolved.**
- c) Refer to the Arduino Getting Started page at www.arduino.cc/en/Guide/HomePage for IDE installation instructions.

2. Download and unzip the vfo-source-rev6.zip file to a local folder on your PC.

- a) The unzipped folder contains the VfoSource.ino file and two add-on library files LiquidCrystal_I2C.zip and Rotary.zip. There is no need to unzip LiquidCrystal_I2C.zip and Rotary.zip files.

3. Launch Arduino IDE and install the two libraries LiquidCrystal_I2C.zip and Rotary.zip included in vfo-source-rev6 unzipped folder.

- a) See the instructions on www.arduino.cc/en/Guide/Libraries for installing additional Arduino Libraries. Follow the instructions in section '*Importing a .zip Library*'
- b) Arduino IDE V-1.6.5 comes with a built-in library named 'LiquidCrystal', which *does not* seem to cause any conflicts with the installation of 'LiquidCrystal_I2C' library.
- c) There are several third party libraries available for rotary encoders. If you already have a rotary encoder library installed, it may cause a conflict with the 'Rotary' library. It is recommended to remove any previously installed rotary encoder library before installing the 'Rotary' library from Rotary.zip file.

4. Connect the fully assembled Nano DDS VFO board (*fully populated VFO PCB + Arduino Nano v3 module + AD9850 DDS module + I2C LCD + Rotary Encoder*) to your PC with the help of a Mini-B USB cable.

- a) You will need to provide your own Mini-B USB cable.
- b) There is no need to power the DDS VFO board with 12V power supply at this stage. The Arduino Nano module and the AD9850 module can also receive their power from USB 5V supply. The only part of the circuit that will not work without 12V power is the RF buffer amplifier.
- c) **If this is the first time you have connected the Nano module to your PC, its USB driver will need to be installed. There are two most common Nano modules available in the market; 1) Original Arduino Nano v3 module with FTDI USB interface chip and 2) Cheaper clone Nano v3 module with CH340 USB interface chip. At the time of writing these instructions (~Feb. 2016) signed drivers for both types of USB interface chips were available for Windows, MacOS and Linux. If your PC is configured for automatic signed driver updates from the web, correct driver will most likely get installed automatically. If you run into trouble at this step,**

you may need to install the correct driver manually. Please see troubleshooting link at the top of this document or get help in the online forums.

d) If all goes well, a virtual serial port will get assigned to the USB connection.

5. In the Arduino IDE Tools menu, select Board:"Arduino Nano", Processor:"ATmega328" and Port:<select correct USB serial port>.

a) The Nano DDS VFO board is now ready for uploading basic functionality test programs as well as the VfoSource code.

6. In the Arduino IDE File menu, Open... VfoSource.ino included in the vfo-source-rev6/VfoSource folder and upload the code to the Nano module on the DDS VFO board by clicking the Upload button (or click Sketch > Upload).

a) It is recommended that before uploading the main VfoSource code, some basic functionality tests are performed by running the following test programs.

b) For general Nano hardware and IDE functionality test, upload the [File > Examples > Basics > Blink](#) program. This will make the Nano Pin 13 LED blink with one second interval.

c) For testing I2C LCD, upload [File > Examples > LiquidCrystal_I2C > HelloWorld](#) program. This program displays the infamous "Hello, world!" text on the LCD. **If the characters are not visible on the LCD, adjust the contrast potentiometer on the LCD module's piggy-back I2C interface board.**

d) For testing the rotary encoder, upload [File > Examples > Rotary > Polling](#) program. This program will display the direction of rotation (Left or Right) of the rotary encoder in the IDE Serial Monitor window on the PC.

<Additional instructions for testing the main VfoSource program will be added here in the future.>