

Upgrading the firmware in the WSPR-TX_LP1 Transmitter

Background information.

The WSPR-TX_LP1 transmitter has an onboard Arduino ProMini 8MHz that handles all the control of the hardware and performs the necessary calculations to set frequency, to communicate with a PC for configuration etc.

The Arduino software that runs in it is Open Source and can be upgraded by the user if he/she so desires.

This document goes over the basic steps how to do that.

You will need the following:

1. Mac or PC that can run the Arduino IDE (Integrated Development Environment)
2. The source code from GitHub,
3. The WSPR board
4. A USB cable that connects the PC/Mac to the WSPR-board.

Step one. Setting up the Arduino Environment

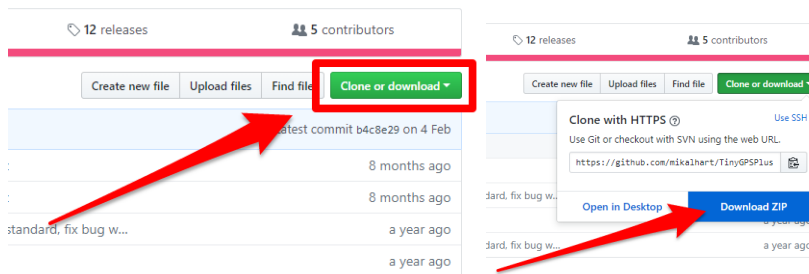
1. Download the Arduino development suite and install it to you PC. At the time I wrote this the latest PC version could be downloaded using this link:https://www.arduino.cc/download_handler.php?f=/arduino-1.8.6-windows.exe

2. The WSPR Firmware uses two libraries that needs to be installed in to the Arduino IDE. They are "TinyGPSPlus" and JTEncode.

Download the zip files for these using these links:

- a. <https://github.com/mikalhart/TinyGPSPlus>
- b. <https://github.com/etherkit/JTEncode>

The GitHub webpage can be confusing if you are new to it, find the green button and click on it, this will display two options, click the "Download ZIP"



Do this for both the libraries, do not un-pack the ZIP files but make a note where they are on your hard drive.

3. Start you Arduino IDE and use the menu "Sketch, Include library, Add .ZIP Library" first point to the TinyGPS library Zip file and install it and then repeat the process and also install the JTEncode library.
4. Set the Arduino board type, use the menu "Tools, Board" and pick "Arduino Pro or Pro Mini"
5. Set the processor type, Use the Menu "Tools, Processor and pick the "ATmega 328P (3,3V 8MHZ)" alternative.

OK good work, time to see if the firmware will compile!

Step two. Downloading the firmware and compiling it.

1. Download the WSPR Firmware by going here https://github.com/HarrydeBug/1011-WSPR-TX_LP1 and click the green button that says "Clone or download" and pick the ZIP file option just like in the previous steps.
2. Find the Zip file you just downloaded and decompress it (in many version of Windows you can right click the ZIP file and there will be an option to decompress it)
3. The unpacked ZIP file will contain lots of files and folders. The one you are interested in at this time will be the firmware folder. It is probably called "Standard firmware" or just "Firmware" go in to that folder and find the latest and most up to date file you want to use.

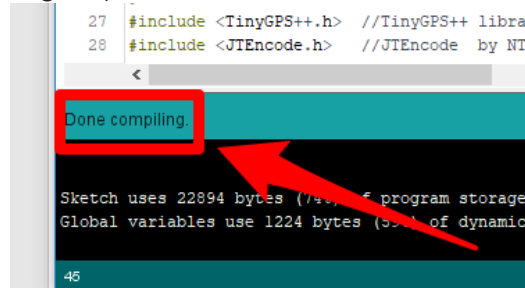
The Arduino source code have an .INO extension.

Double click the .INO file to open it up in the Arduino IDE

4. Test that it will compile by using the menu: "Sketch , Verify/Compile"

There is also a button with a tick mark that does the same (se picture).

If you are successful, it will say so at the bottom. It will say "Done compiling and the bottom divider will be a nice blue color (Blue is good)

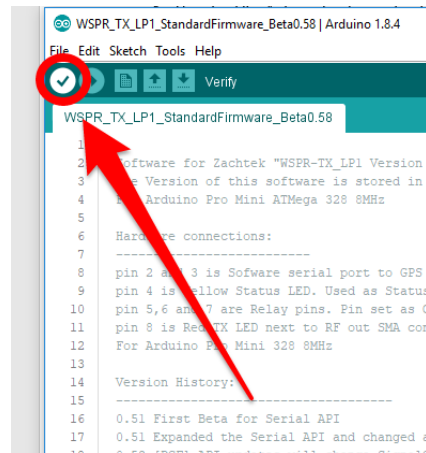


```
27 #include <TinyGPS++.h> //TinyGPS++ libra
28 #include <JTEncode.h> //JTEncode by NT
```

Done compiling

Sketch uses 22894 bytes (74% of 30720 bytes) of program storage
Global variables use 1224 bytes (3% of 4096 bytes) of dynamic memory

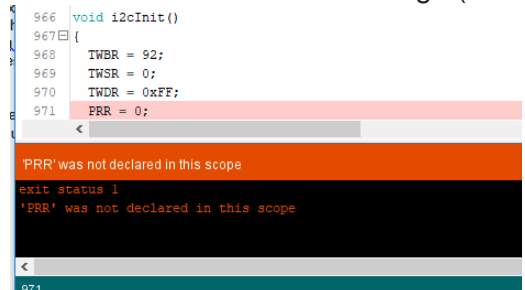
45



```
WSPR_TX_LP1_StandardFirmware_Beta0.58 | Arduino 1.8.4
File Edit Sketch Tools Help
Verify
WSPR_TX_LP1_StandardFirmware_Beta0.58
1
2 Software for Zachtex "WSPR-TX_LP1 Version
3 The Version of this software is stored in
4 Arduino Pro Mini ATmega 328 8MHz
5
6 Hardware connections:
7 -----
8 pin 2 and 3 is Software serial port to GPS :
9 pin 4 is yellow Status LED. Used as Status
10 pin 5,6 and 7 are Relay pins. Pin set as O
11 pin 8 is Red TX LED next to RF out SMA con
12 For Arduino Pro Mini 328 8MHz
13
14 Version History:
15 -----
16 0.51 First Beta for Serial API
17 0.51 Expanded the Serial API and changed a
18 0.52 WSPR TX updated with status. Status
```

If you have not been so lucky and got a compiler error then check the error to see if you can figure out what the problem is.

The bottom divider will be Orange (Orange is bad)



```
966 void i2cInit()
967 {
968     TWBR = 92;
969     TWSR = 0;
970     TWDR = 0xFF;
971     PRR = 0;
```

'PRR' was not declared in this scope

exit status 1

'PRR' was not declared in this scope

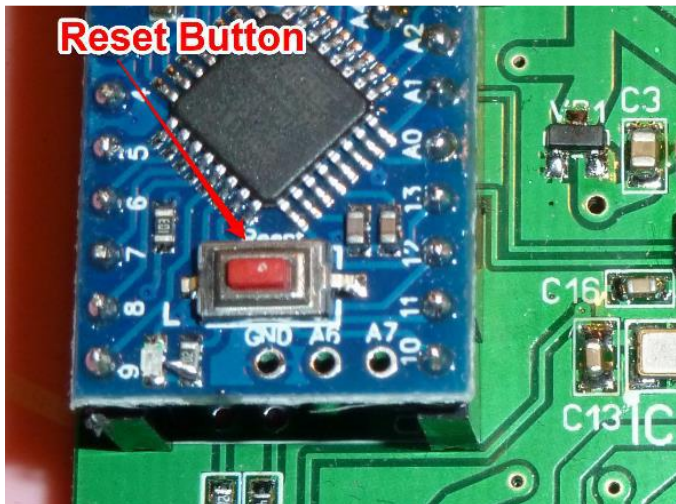
971

If this happens , check that you have done the previous steps correctly, besides missing libraries, forgetting to set the correct Arduino board (Arduino Pro Mini 8MHz) are the most common problems.

You made it this far? Great! Let us transfer the new firmware in to the WSPR Transmitter board.

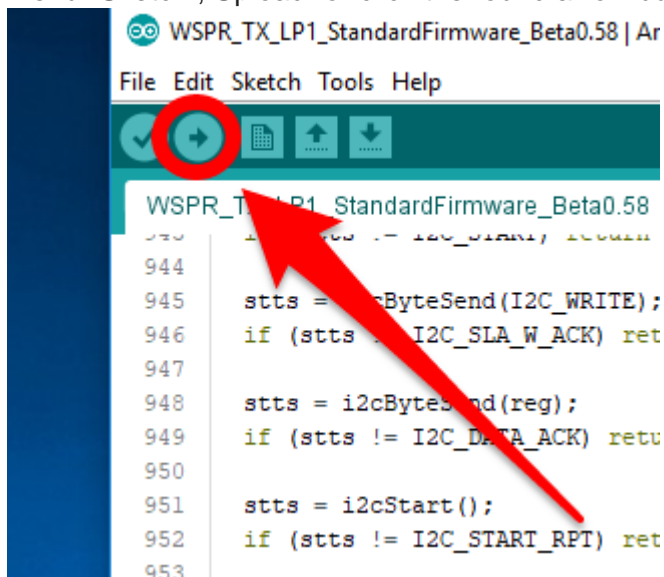
Step three. Transferring the firmware in to the WSPR board

1. Plug in the WSPR_TX-LP1 to a PC computer using a USB cable.
2. Use the Menu "Tools, Port" and pick one of the Serial ports, there may be one or there may be several in your computer.
You need to try them out to find which one is the WSPR Transmitter.
3. Use the Menu "Tools, Serial Monitor", this will bring up a new window that is the terminal window, here you will see output text from the WSPR transmitter. Set the Speed to 9600 baud in the right lower part of this window.
When you have picked the correct serial port in step 2 you will see text from the WSPR transmitter in the serial monitor window, you can press the Arduino reset button (small white or red micro switch on the Arduino Pro mini board) to make sure it reboots and see the text if needed.



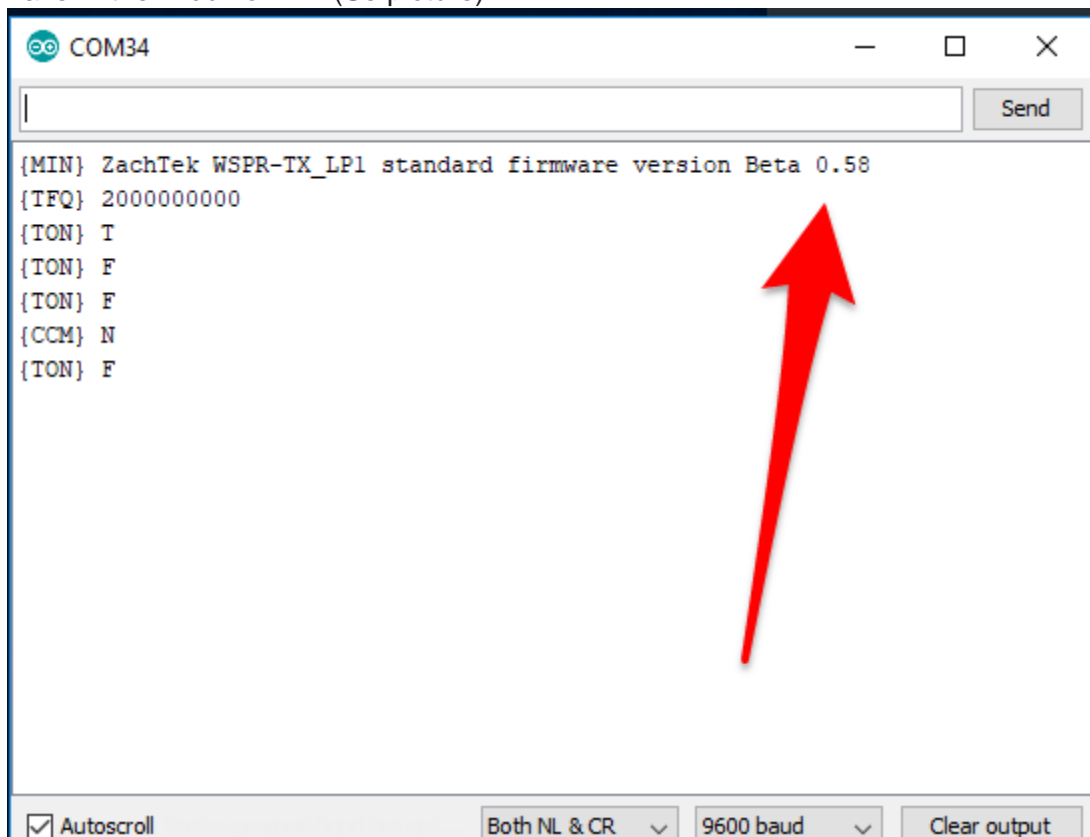
If no text is showing up you might have picked the wrong serial port
Go back and choose another port in step 2 until you are sure you got the correct Serial port.

4. Time for the final step, compile and upload the firmware to the Arduino using the menu "Sketch , Upload" or click the round arrow button on the IDE (see picture)



5. After the upload process is completed, you can verify that it is running by opening up the Serial Monitor and looking at the boot message from the WSPR Transmitter.
You can press the Arduino Reset button to force a Reset.

6. Study the boot message and verify that the version displayed matches the file you have in the Arduino IDE. (See picture)



```
COM34
[Send]
{MIN} ZachTek WSPR-TX_LP1 standard firmware version Beta 0.58
{TFQ} 2000000000
{TON} T
{TON} F
{TON} F
{CCM} N
{TON} F
Autoscroll Both NL & CR 9600 baud Clear output
```

You made it! You have upgraded the firmware to the WSPR-TX_LP1!

Now you can close the Arduino Software development and use the PC software to configure the WSPR transmitter.

You will find the PC software in the ZIP file in the directory "PC Software"

In case you have replaced the Arduino with a blank one you also have to run the Factory configuration. You will find the Exe file and documentation on how to use it in the ZIP file in the directory "Factory Config"

If you have questions, ideas, suggestions or just want to come in contact with me you are welcome to Email me at: harry@ZachTek.Com

Happy WSPR:ing and see you on the bands.

//Harry