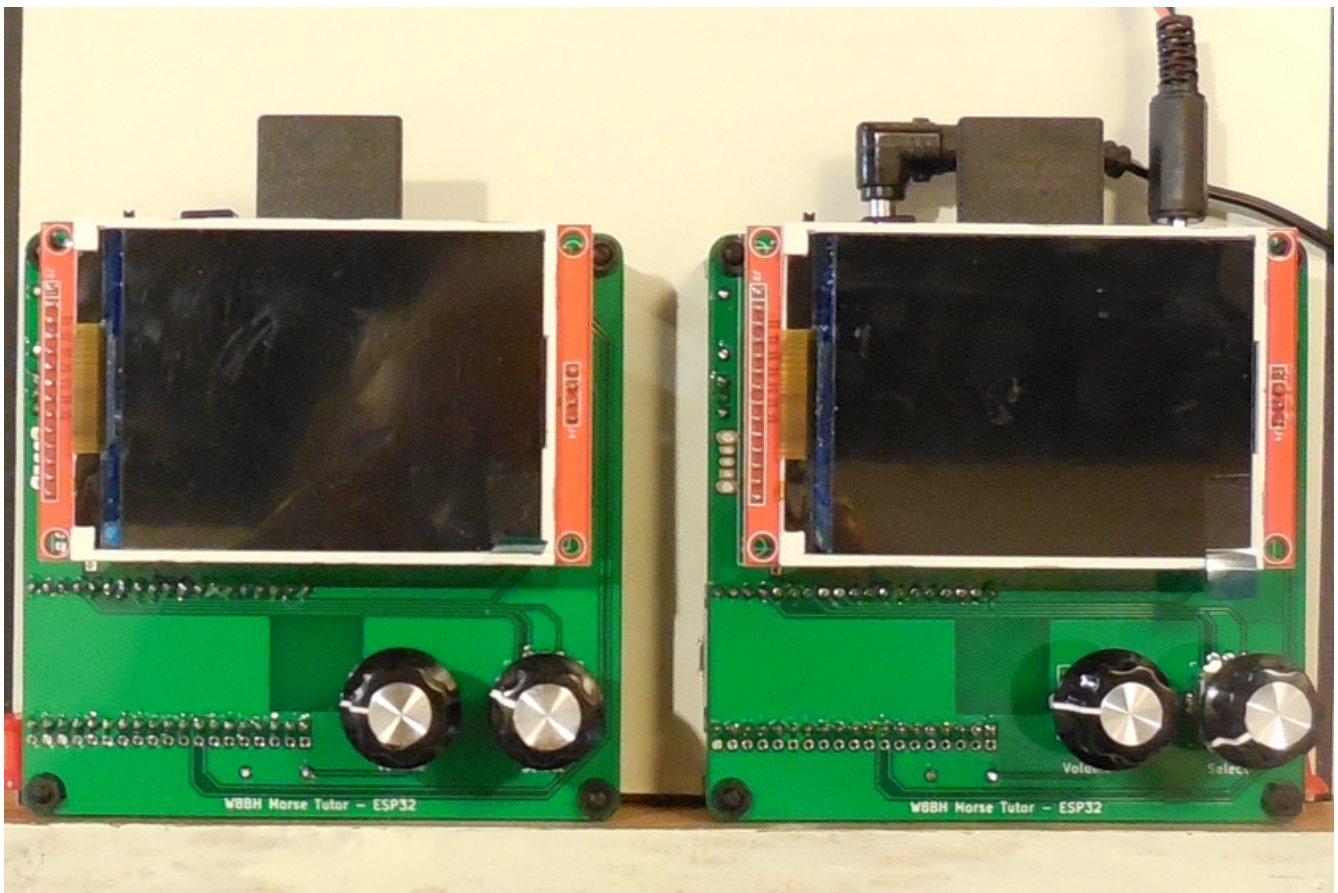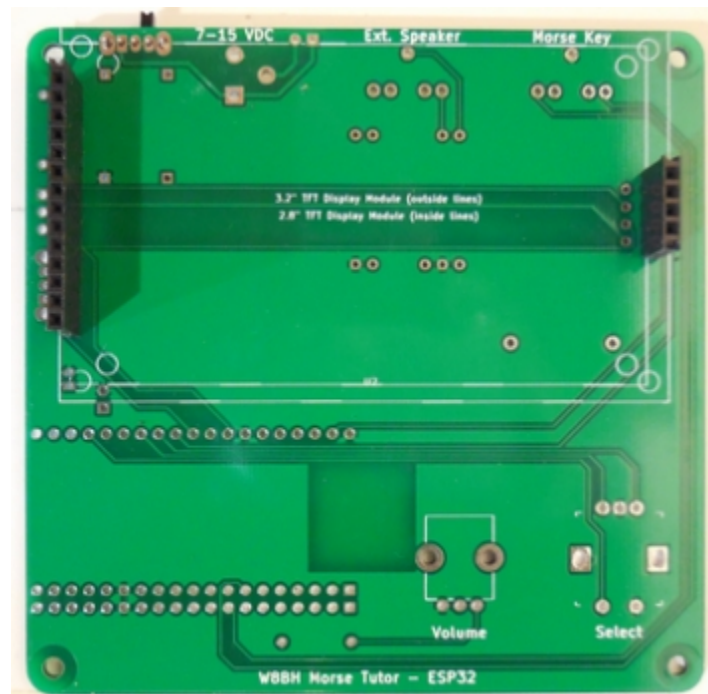# W8BH Morse Tutor ESP32 Rev 2B Build Notes 20200117

Ken, KM4NFQ

Step 0. Preparation.

I always wipe the PCB off with Rubbing Alcohol before I start. While the alcohol is evaporating, I double check that I have all the parts for the circuit.
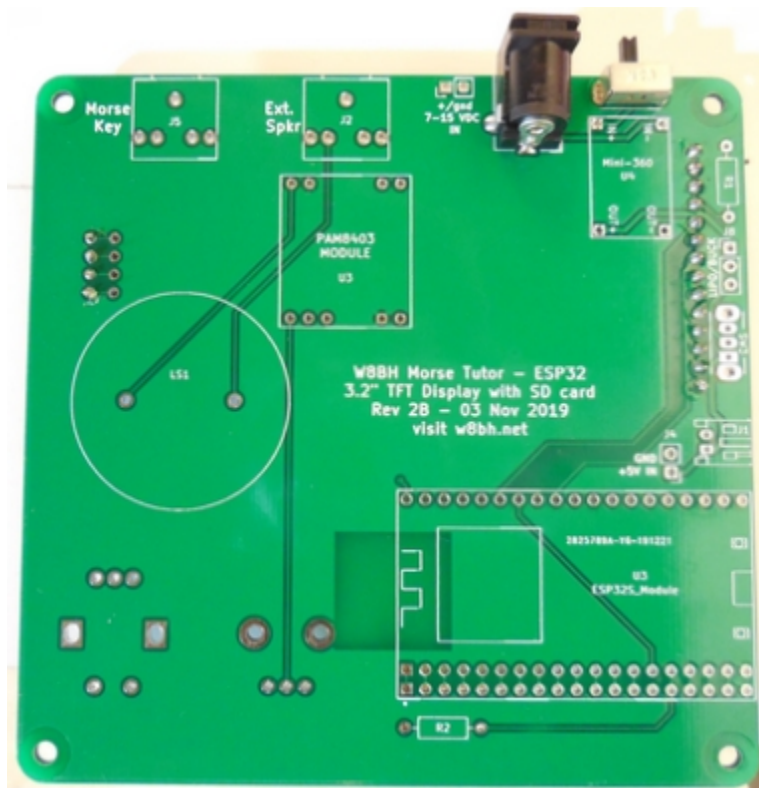
I am using ESP32-WROOM-32 boards that are already programmed, scavenged from ESP Rev 1 W8BH Morse Tutors.
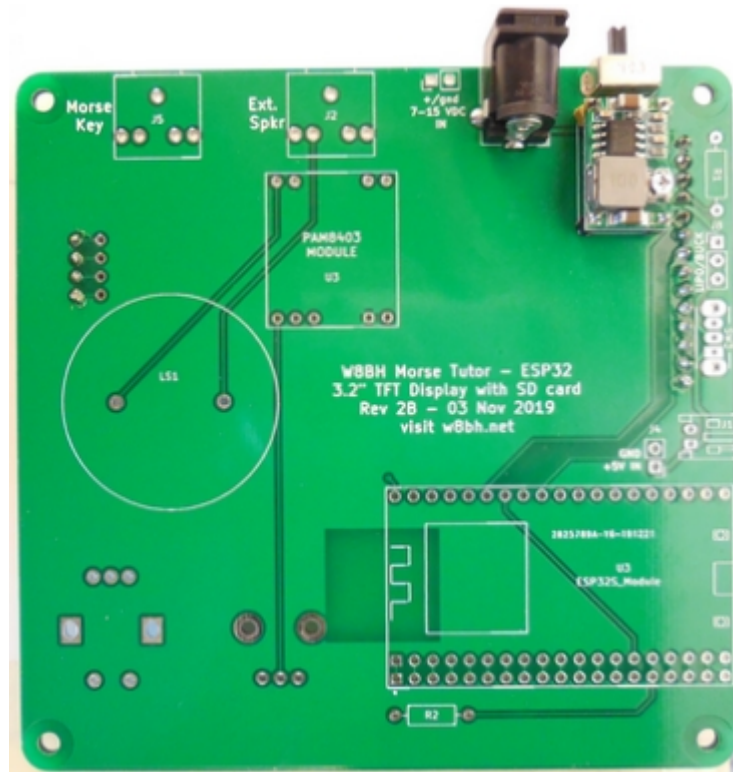
Step 1. Display Mount

I have the 3.2 inch displays, so I soldered the four pin headers to the outside four holes on the PCB.

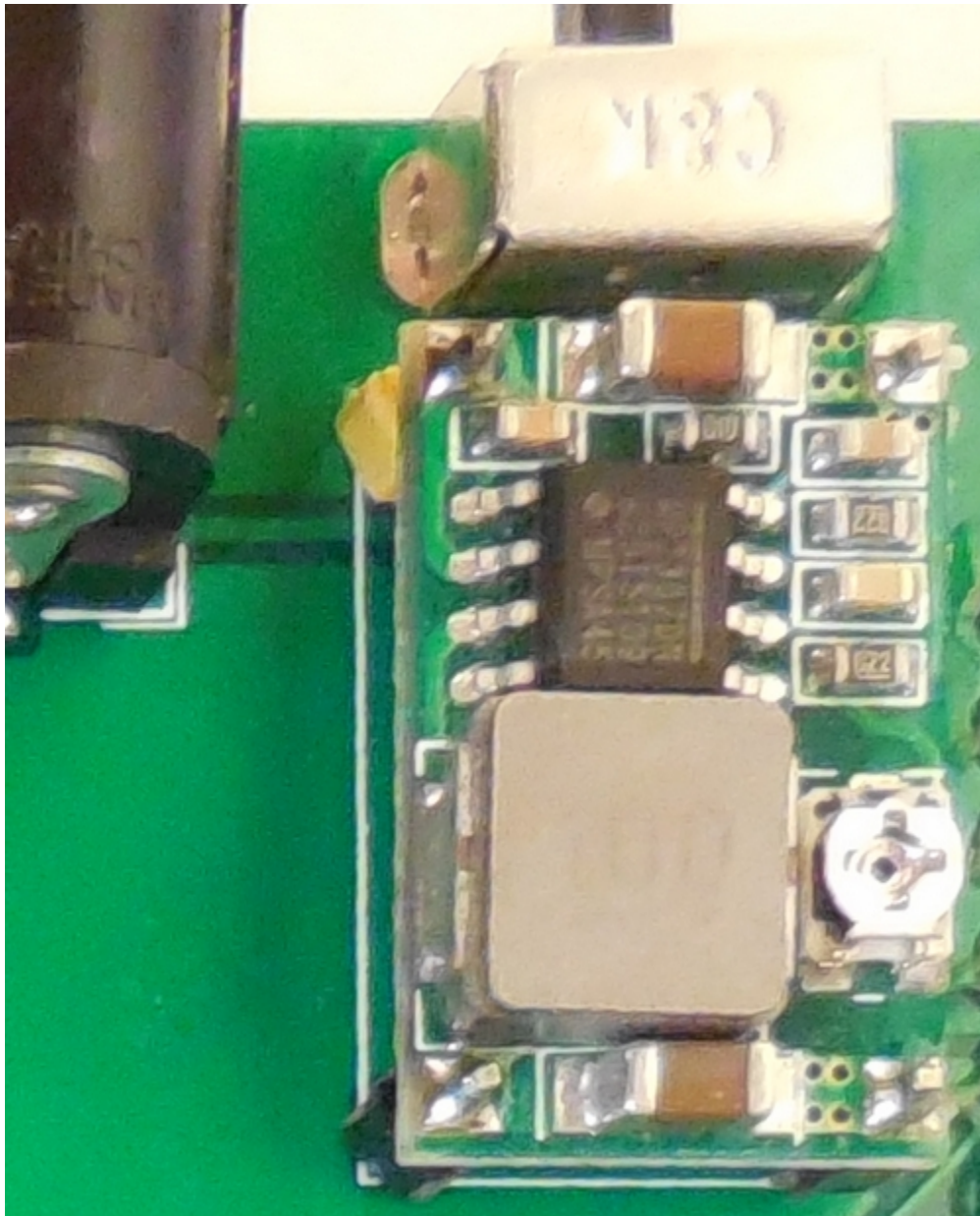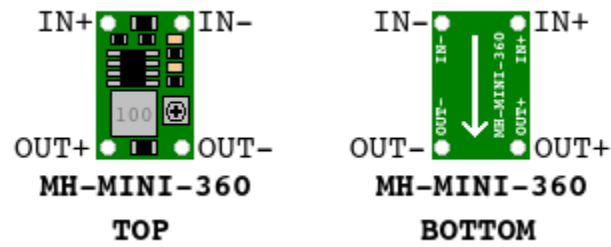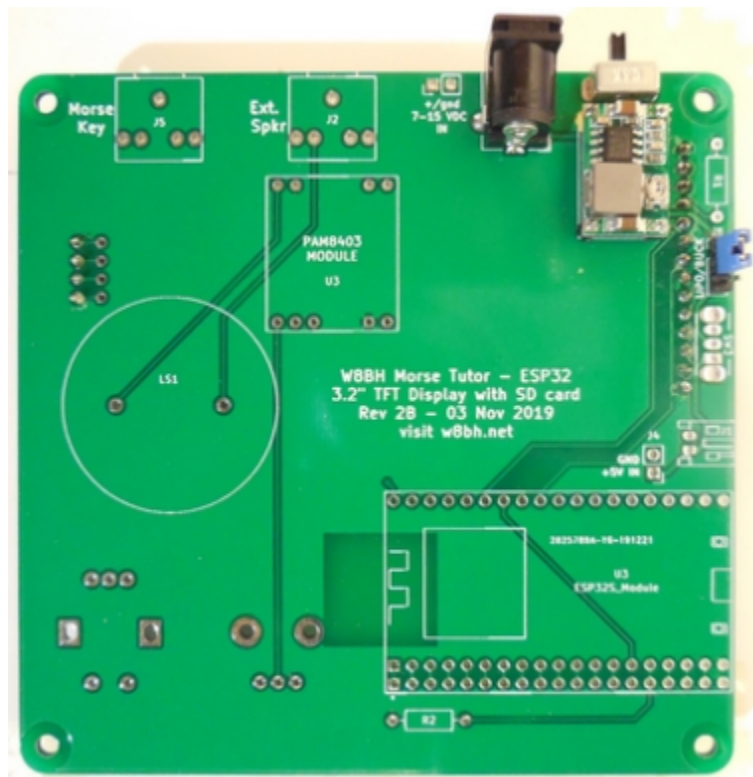The display goes on the *front* of the PCB.

Step 2. AC Power Supply

The Barrel Jack and the Switch are solderd to the *back* of the PCB. The Switch goes towards the outside of the PCB.

The MH-Mini-360 Buck Converter is soldered under the Switch using four 1x Male headers. I was not paying attention and I soldered the short end of the pins facing up. The instructions say they should point down. I was able to check the voltage by attaching clips to the long pins on the other side of the PCB. I adjusted the voltage to 4.97V.

```
IN+  IN-          IN-  IN+
                  
         100      
OUT+ OUT-        OUT- OUT+
MH-MINI-360      MH-MINI-360
   TOP              BOTTOM
```
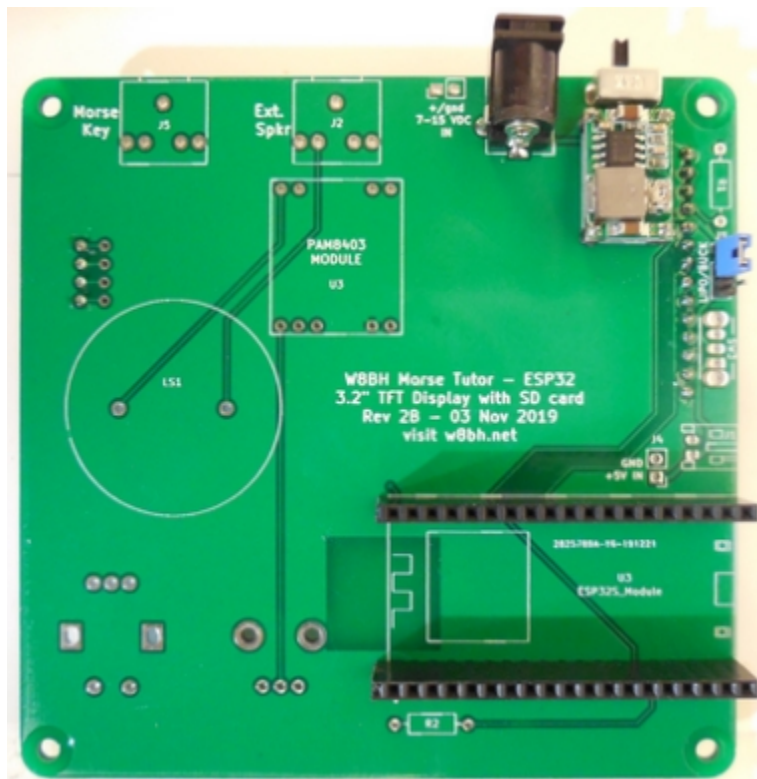
The MH-Mini-360 has a fragile trim pot.

The 3-pin Male header is soldered on the PCB and a shunt is attached to the pins that are labeled **BUCK**.

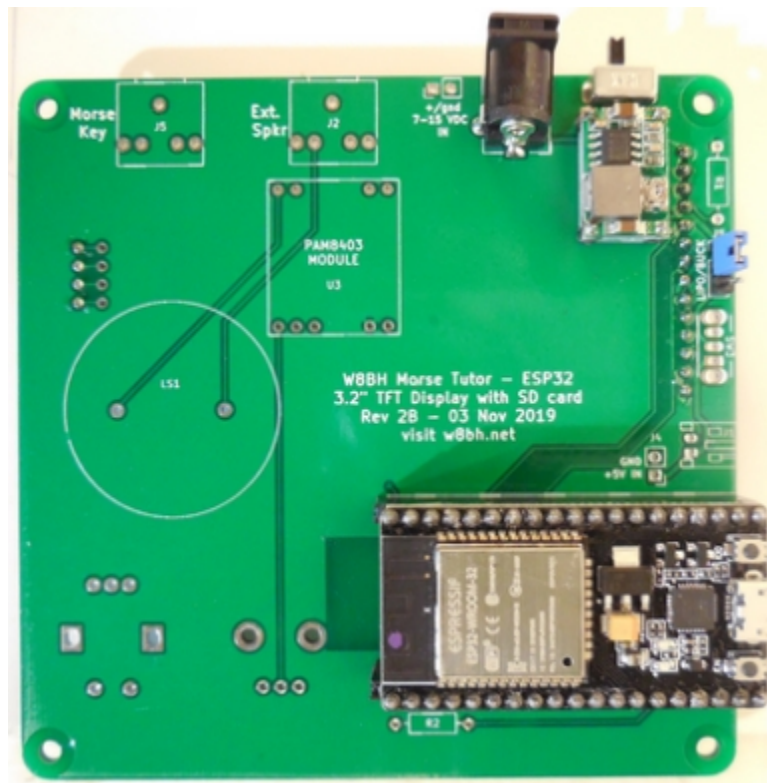The circuit will not work without the shunt.

I got a reading of 4.99V when I touched the positive DMM probe to the top hole of R1.
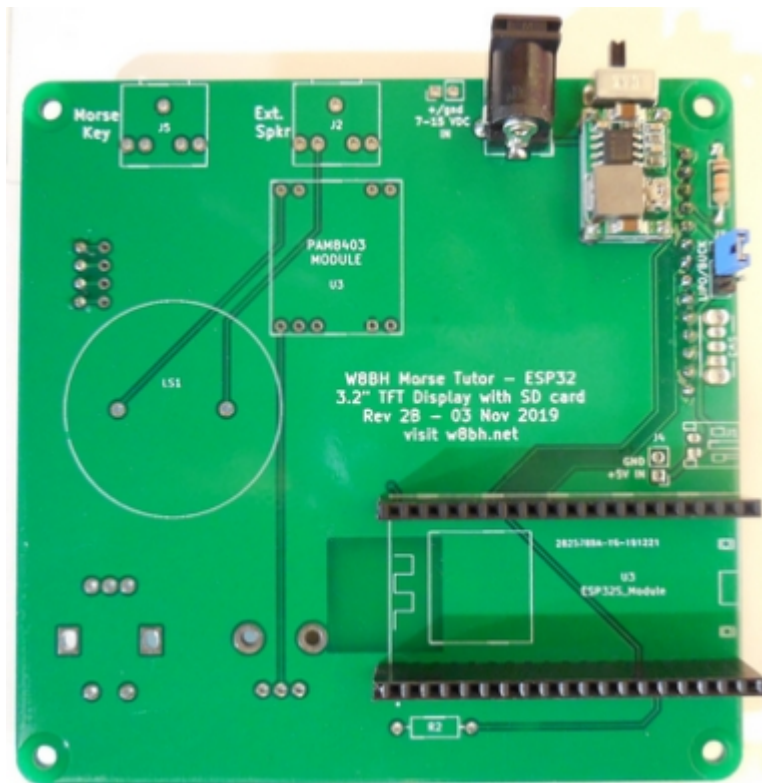
Step 3. Install the ESP32 Module

I use a jeweler's saw frame with a 2/0 blade to cut the Female headers. I use a pair of needle nose pliers to pull out the pin before I cut the header.

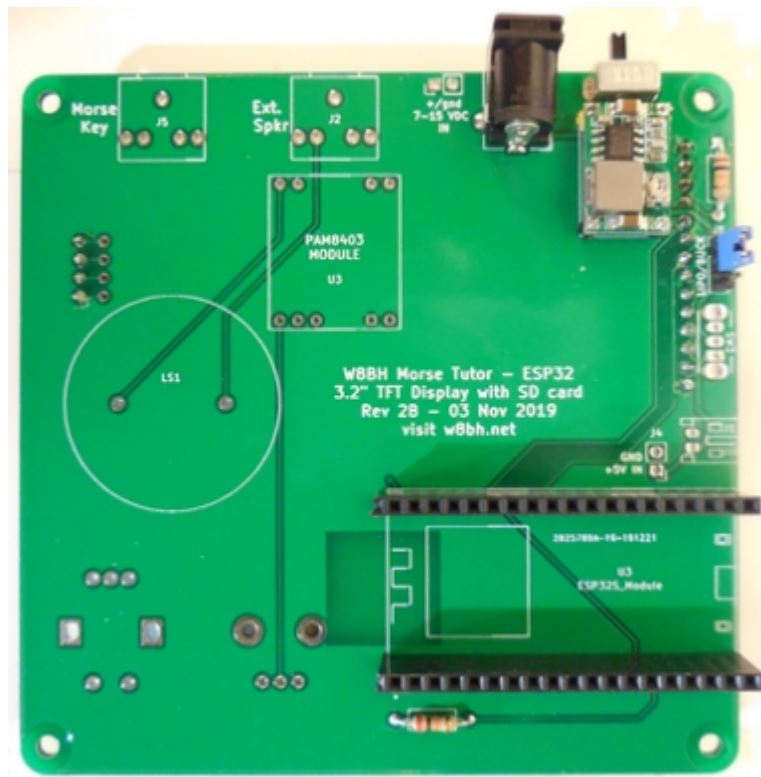My ESP32 modules already had the Male headers soldered.

The ESP32 module is soldered to the back of the board. The silkscreen on the PCB shows the orientation of the module.

The power LED on the module lit up and after a brief pause, the letter 'R' was blinked by the on-board LED.

Step 4. Install Resistors R1 and R2

R1 is right above the shunt.

R2 is right below the bottom header of the ESP32 module.

Step 5. Install the Display

My display had the 14-pin Male headers already soldered from the factory. I only had to solder the 4-pin Male headers. I did that soldering when I did Step 1 and used the display to align the Female headers on the PCB.

The test was a success!

My ESP32 modules are already programmed and my Call Sign appears on the Splash Screen when the W8BH Morse Tutor boots up. My call sign is also used in the QSO feature.
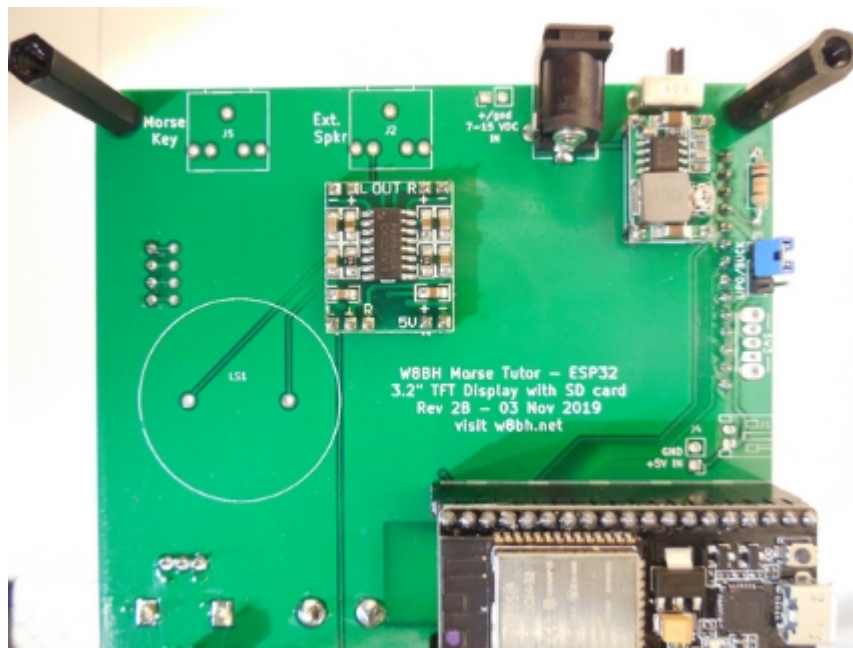
Step 6. Install the Encoder

I installed the Rotary Encoder (with Switch) and tested it successfully. I only had to adjust the large pins on the encoder slightly for them to fit in the holes on the PCB.
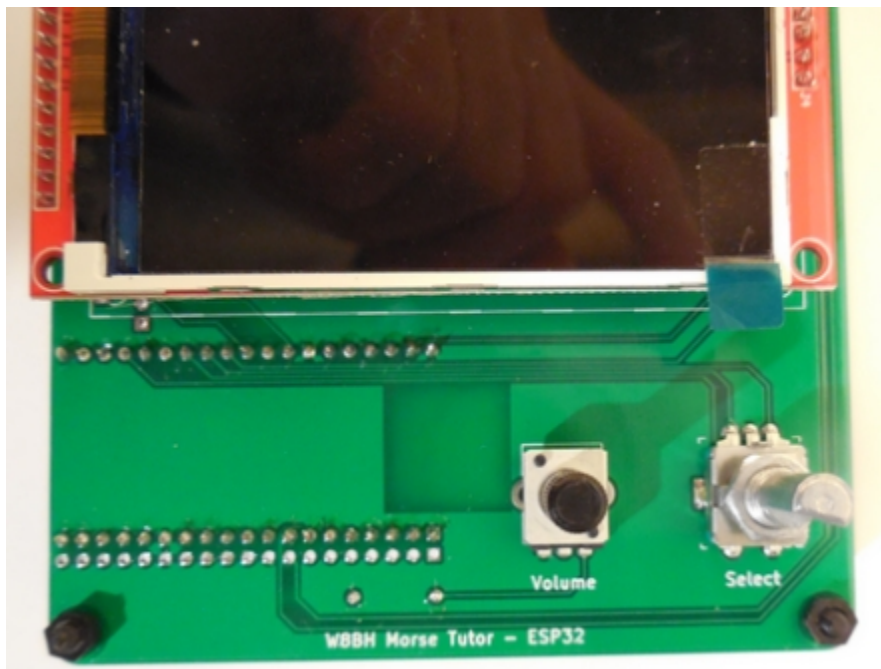
Step 7. Install the Audio Circuit

The Potentiometer goes right next to the Rotary Encode on the *front* of the PCB.

The **PAM8403** Amp module has one 3-pin Male header, and three 2-pin Male headers. This module can only fit one way. These header pins go short side up. The top is soldered first. I put a piece of masking tape on the module to hold it to the PCB while I solder the pins on the other side. The display is removed to solder these pins, as well as the pins on the speaker and the jacks.
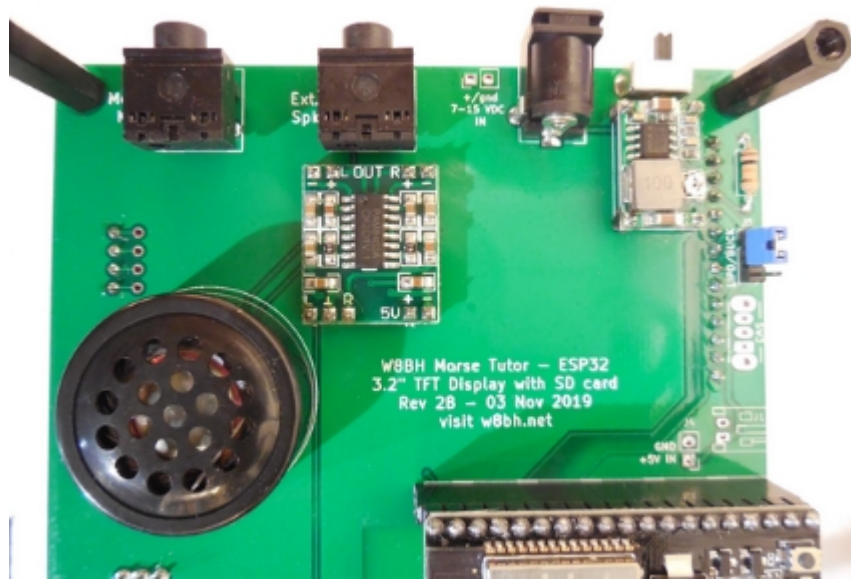
The speaker is soldered next to the Amp.

The volume pot is adjusted, starting at zero, and going up as high as you can stand it (11?).

The two jacks are soldered at the top of the board.

I added knobs to the potentiometer and rotary encode, and this project was finished.

Links

Bruce Hall, W8BH
http://w8bh.net/

Source code and Gerbers for the project:
https://github.com/bhall66

W8BH Morse Tutor at groups.io
https://groups.io/g/w8bhMorseTutor

YouTube video clip of my build.
https://www.youtube.com/watch?v=-hPkAeXV-OM