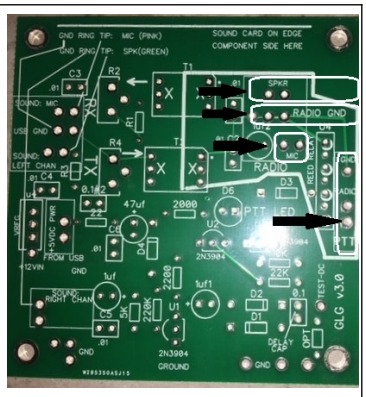
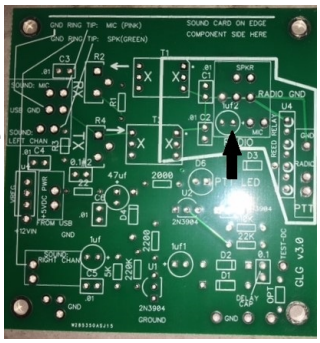
SOUND CARD ISOLATOR

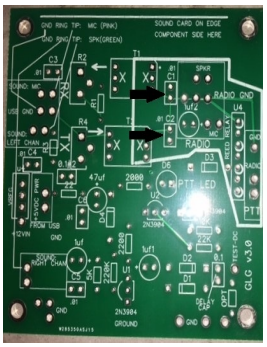
1. Solder the wires that will go to your RADIO -- either directly, or to a modular jack that will allow you to plug in different radio cables. If possible, these should be SHIELDED wires, at least for the microphone wire. You will need to connect to your radio's GROUND, MIC, PushToTalk (PTT), and Speaker audio. The RADIO GROUND is completely unconnected to the serial USB ground on this board -- that's part of the ISOLATION provided. Use ANY of the radio ground pads; either of the speaker pads; either of the mic pads and either of the PTT pads. Additional pads are provided as a convenience.



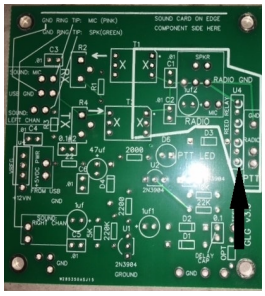
2. Solder a 1 or 2 or similar electrolytic microphone DC bias blocking capacitor. Note the + marking to the RIGHT. Many radios have +8VDC on the mic and the transformer would short this out without this capacitor.



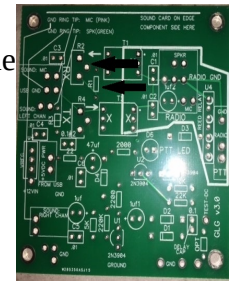
3. Solder in 0.01microfarad (uf) ceramic capacitors for bypassing unwanted radio frequencies at C1 and C2. (.001 will also work) If you later still have RFI problems, you can add two more at C3 and C4.



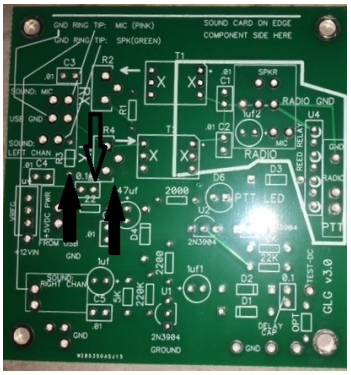
3. Solder in a "reed relay" to operate your radio's PTT circuitry. The relay's pins are symmetrical so up or down doesn't matter.



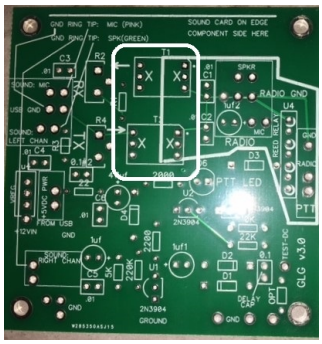
4. Solder in R2 trimmer potentiometer 500 ohms to set the signal level from the receiver to the sound card. Also R1, typically 4700-10,000 ohms to step down the received signal.



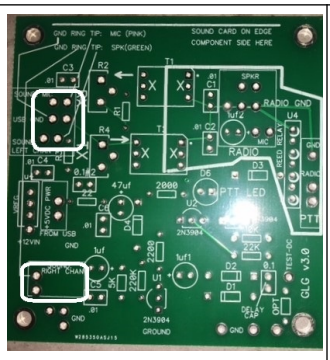
5. For the TRANSMIT signal level control, solder in R3 (typically 4700 ohms). For VHF solder in a 500 ohm trimmer at R4. For HF you may wish to run three wires out to a potentiometer to allow frequent adjustment. Capacitor "0.1#2" provides DC isolation in case your sound card has a DC bias....
C3 and C4 are optionally added if you have RFI problems.



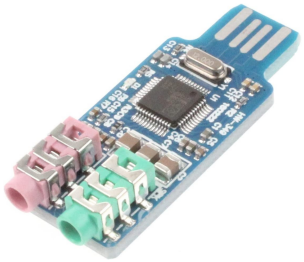
6. Finally, solder in transformers T1 and T2. They are symmetrical so can go either way.



7. Solder four thin, flexible wires that will make the ground, mic, Left and Right channel output audio connections to the SOUND CARD.



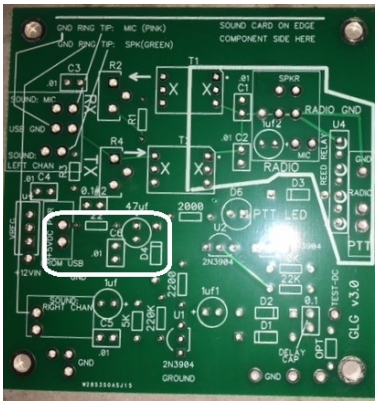
8. You may need help to solder the wires to the proper terminals on the Mic and Spkr jacks of the sound card. These have to be done quickly to avoid melting the jacks. Writing on the board shows you where to solder.



9. Now we begin to construct the PushToTalk (PTT) control circuitry. Some digital systems (e.g. FLDGI) purposefully send a solid push-to-talk Tone on the RIGHT speaker terminal. Other systems (soundmodem) we set to send their audio to both channels, and we pick off the right channel to detect when the transmitter needs to be enabled.

In either case, you generally need to have the USB Codec volume set to 80%-95% to operate the PTT properly. Then you set your transmitter modulation level with the R4 control inserted above.

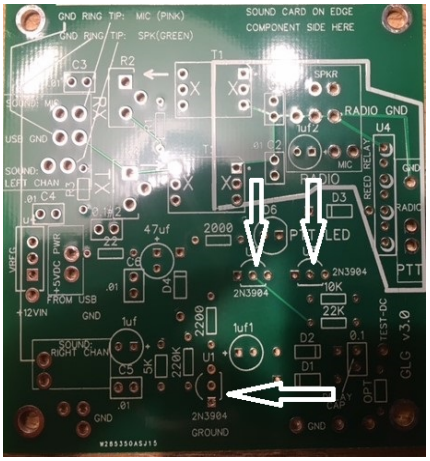
10. We obtain +5VDC from the sound card. Your mentor may need to help you make this connection. A 22 ohm 1/4 watt resistor acts as a current limiter to protect the USB output of your computer should something go awry.



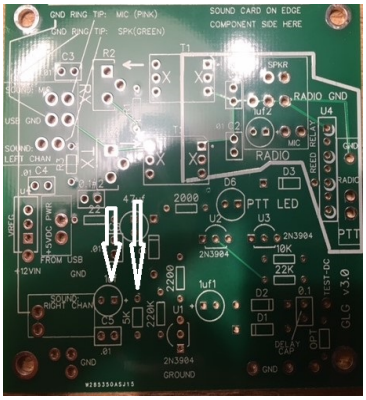
Filtering by a 47uF electrolytic (watch polarity!), and C6 (0.1 or 0.01 ceramic) give us a solid DC source. Diode D4 protects against reverse bias. Be sure to put the BAND of the diode to match the band shown on the board screenprint.

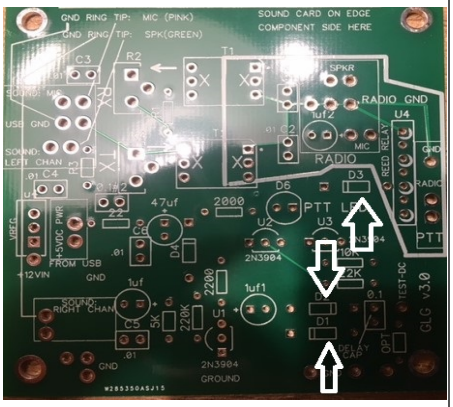
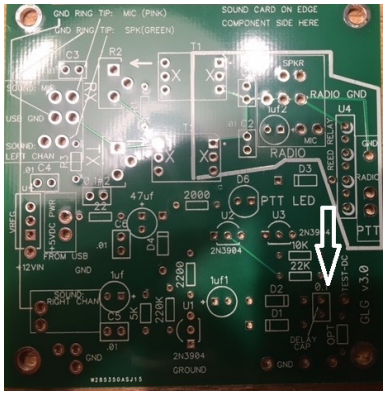
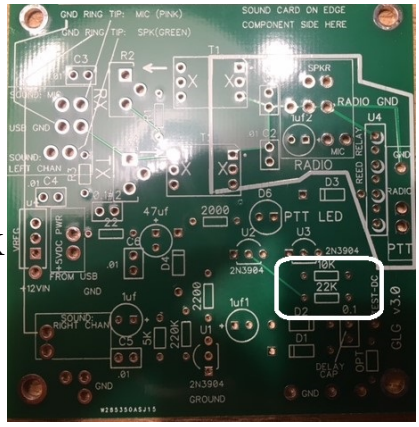
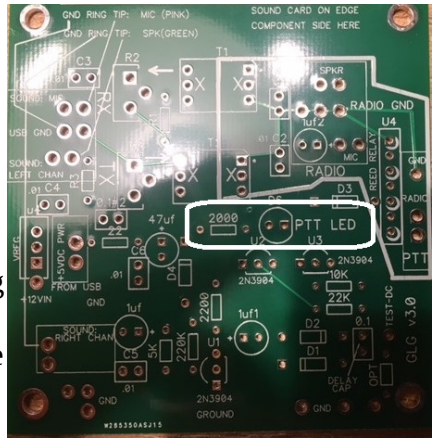
We don't normally use the 12V Regulator pads unless you're powering this board from a separate 12VDC power supply.

11. Three 2N3904 NPN transistors are soldered quickly and carefully to the board, avoiding overheating them and also solder "shorts." Give them a bit of height above the board (3/8 or 1/4") so their leads act to reduce the soldering



12. The push-to-talk audio amplifier takes the small audio signal and amplifies it to make a strong AC signal. C5 is optional. The 1uF (polarized) capacitor blocks DC. The 5K (or 4700) ohm resistor sets the input signal loading



temperature reaching the transistor die.	
13. 220K (see board screenprint) provides a bit of base current to bias U1 into linear region.	14. 2200 (see board screen print; a 2000 can also be used or even a 4700) in the collector lead causes the amplified current to develop a strong AC voltage (Ohms Law V = I R). Capacitor "1uF1" (1 or 2 uF) send this toward Diodes D1 and D1 for rectification.
15. Diodes D1 and D2 RECTIFY the AC audio voltage to make a DC voltage that shows up whenever we need to ground the PTT.  Diode D3 squelches the reverse peak voltage transient that the Reed Relay can make when its current is suddenly turned OFF. Be sure the band on the actual diode matches the band on the screenprint.	16. Delay Capacitor 0.1 uF keeps the PTT grounded during tiny pauses in transmitted signal strength. If you need more delay, another capacitor can be added at the "OPT" pads. The Test-DC allows you  to see the filtered DC that should be >1VDC when it is time to transmit.
17. The DC control drives U2 and U3 through current limiting resistors 20K (begins with RED BLACK) and 10K (begins with BROWN BLACK) to their respective base input terminals. 	18. To provide a VISUAL indication of transmit operation, LED D6 is driven through U2 with a current limiting 2000 ohm resistor. Be sure the flat side of D6 matches the  flat side of the screenprint or it won't work. U3 (2N3904) drives the PTT reed relay, the same way U2 drives the LED.
19. When mounting the printed circuit board, the bare solder connections on the bottom must not be shorted out if your case is conductive. Use standoffs or insulating material. The board includes a "ground plane" on the solder side and	20. If you have "radio frequency interference" the usual symptom is that when transmitting, the transmitter STAYS IN TRANSMIT after you are done....and the cure is usually better shielding, reduction of "common mode currents" with ferrite

thus is somewhat self-shielded and CAN operate just laying bare on a table. Extra ground pads are provided at the bottom of the board. The mounting holes ARE connected to the sound-card /computer ground.	chokes on RF lines, and possibly additional capacitors on this board.