Introduction

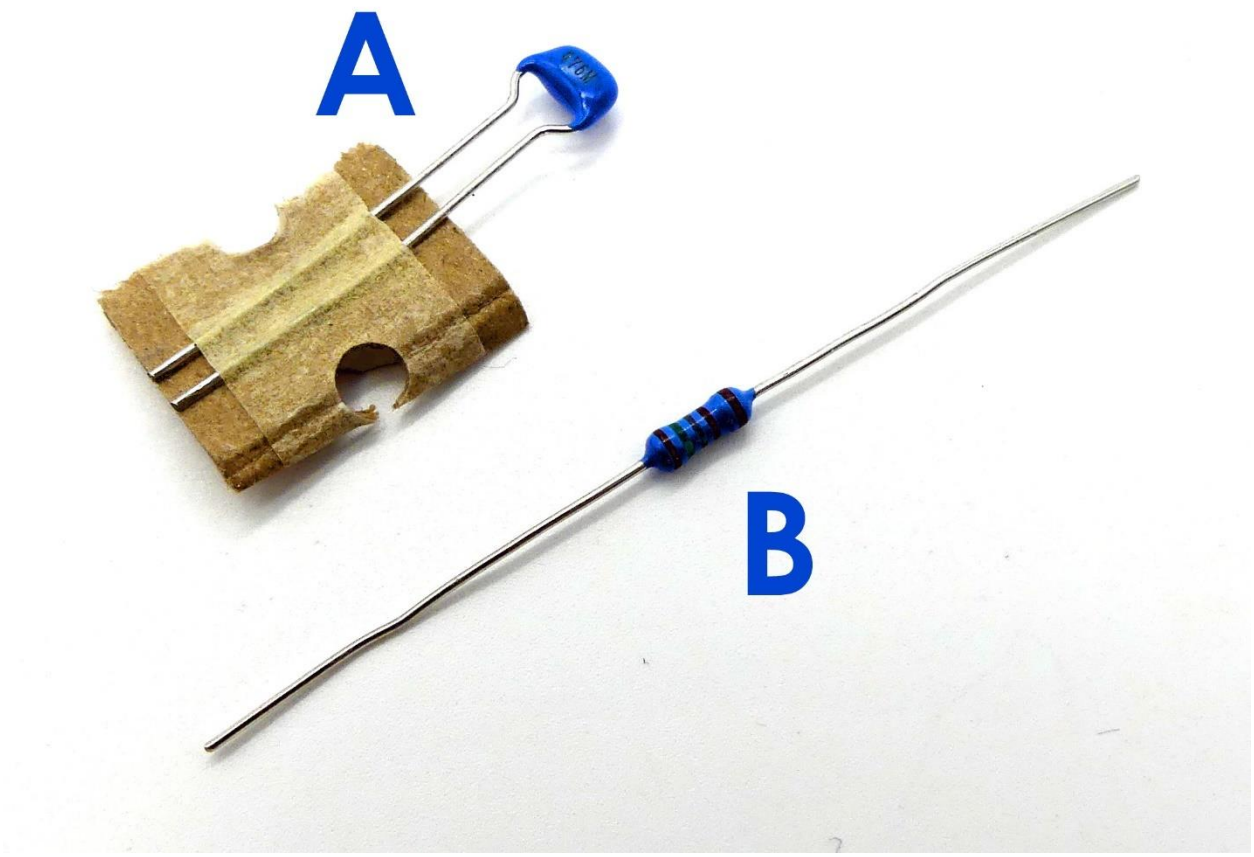
This is a kit to fix two issues with the first generation of the Spengler Link and Spengler Sound Board combination.

There are two main issues when the boards are combined in normal use:

1) A high frequency whine can be heard from the speaker when the wand is off and the volume is near the maximum.

2) When the volume level of the Spengler Sound Board is above about 1/2 volume, a hissing sound occurs. Depending on the boards this can be subtle or very obnoxious. In the worst cases a resistor on the sound board (R2, near the center edge of the board on the side that has the speaker connector and the audio input jack) can get hot and possibly smoke.

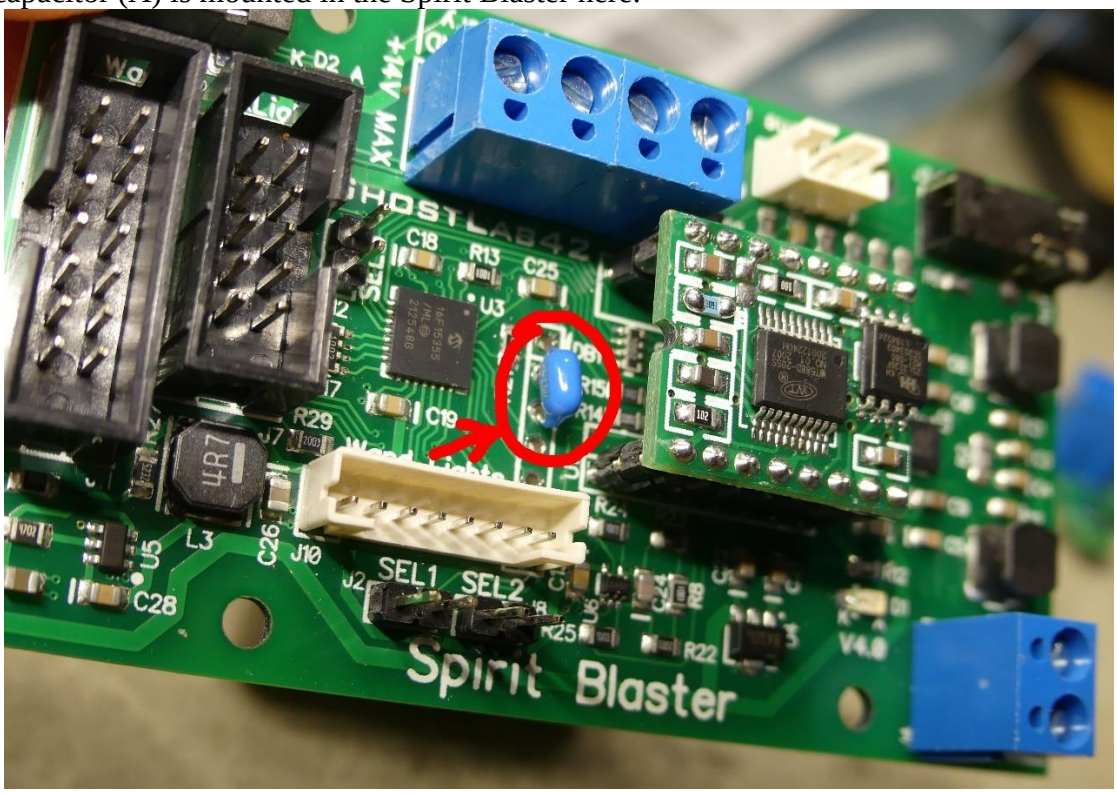
This kit contains two parts, one for each board, that needs to be added to fix or significantly reduce the issues:



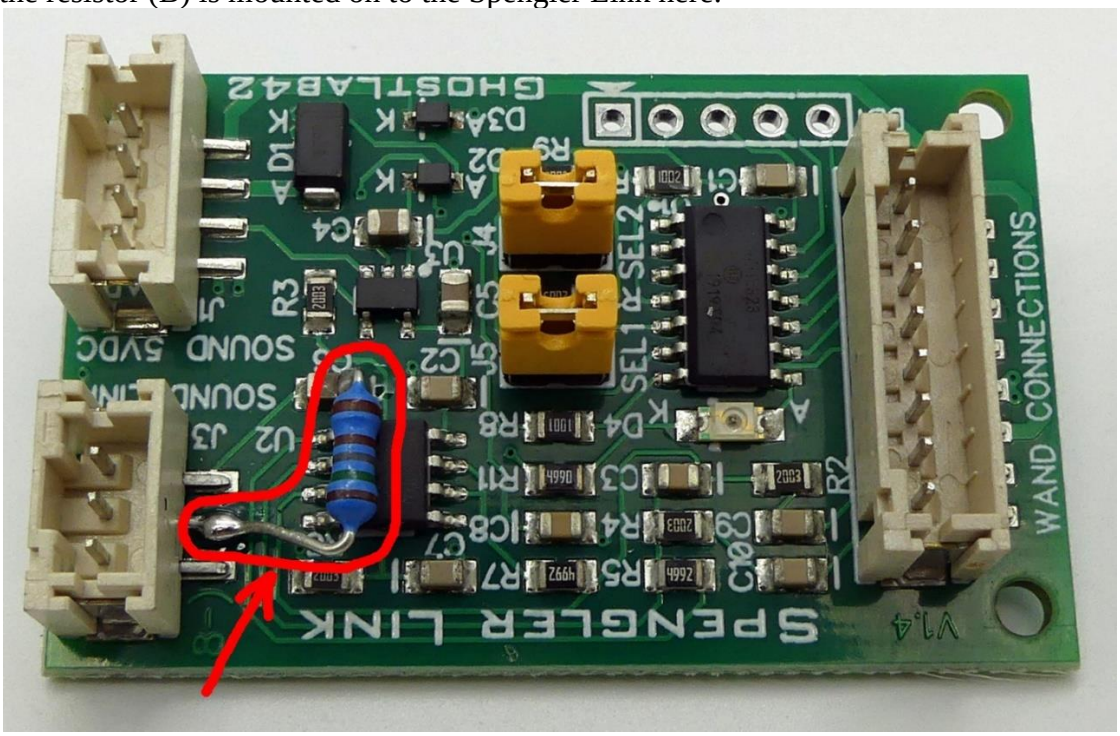
Part (A) is a 47uF cap that needs to be added to the Spengler Sound board and part (B) is a 1.57KOhm resistor that needs to be added to the Spengler Link board.

Adding the parts to the boards:

The capacitor (A) is mounted in the Spirit Blaster here:



And the resistor (B) is mounted on to the Spengler Link here:

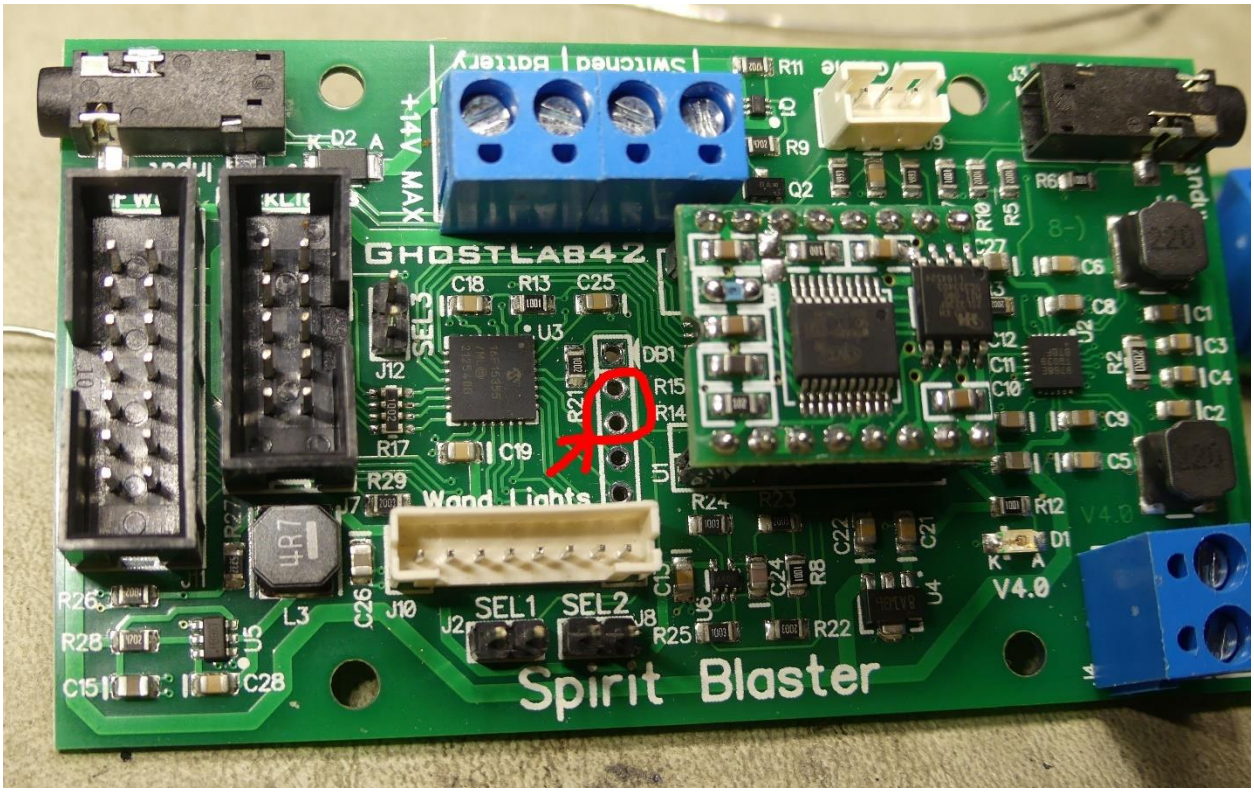


Capacitor (A) mounting to the Spengler sound board.

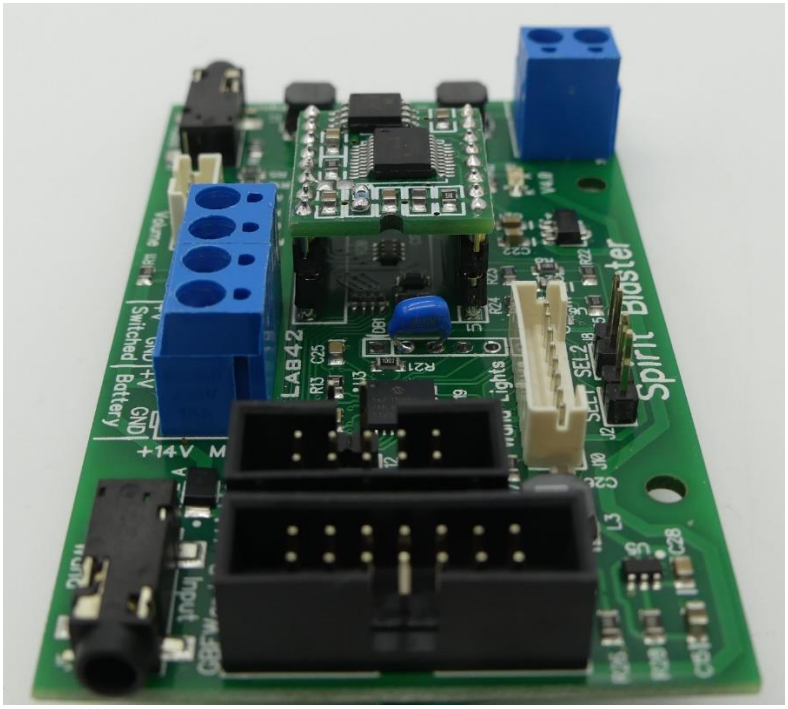
The new 5V power supply for the V4.0 Spirit Blaster board (new because the previous part was not available) is more efficient under light loads, but the switching frequency is a high-pitched audio frequency. This switching frequency gets coupled into the Link's amplifier, so we need some additional filtering on the 5V to lower the amount of that coupled signal. The next board design will use yet another power supply design, so should not have this issue. The cap will reduce the high pitched tone (or "whine") but may not completely eliminate it.

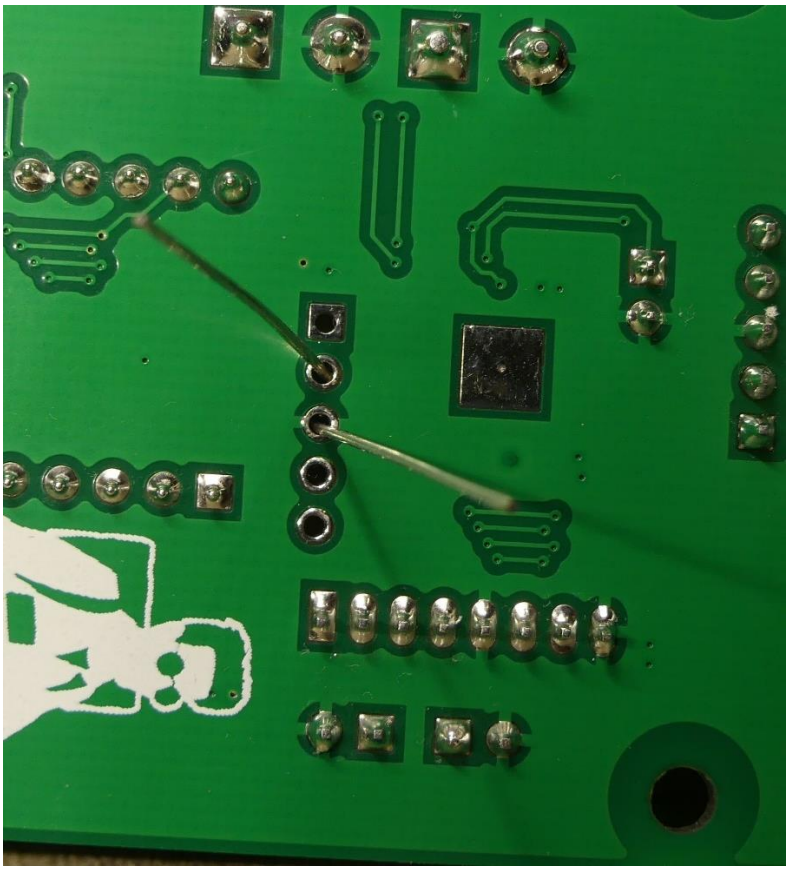
Remove the Capacitor from any paper packaging so that the two wires are free. The part orientation does not matter, but the two holes that are used for mounting this part are critical.

The holes are near the center of the board in a line of 5 holes that are designated as "DB1". The two holes that are needed are the center hole and the hole above that, next to the hole with the square pad. See the image below to locate the two holes:

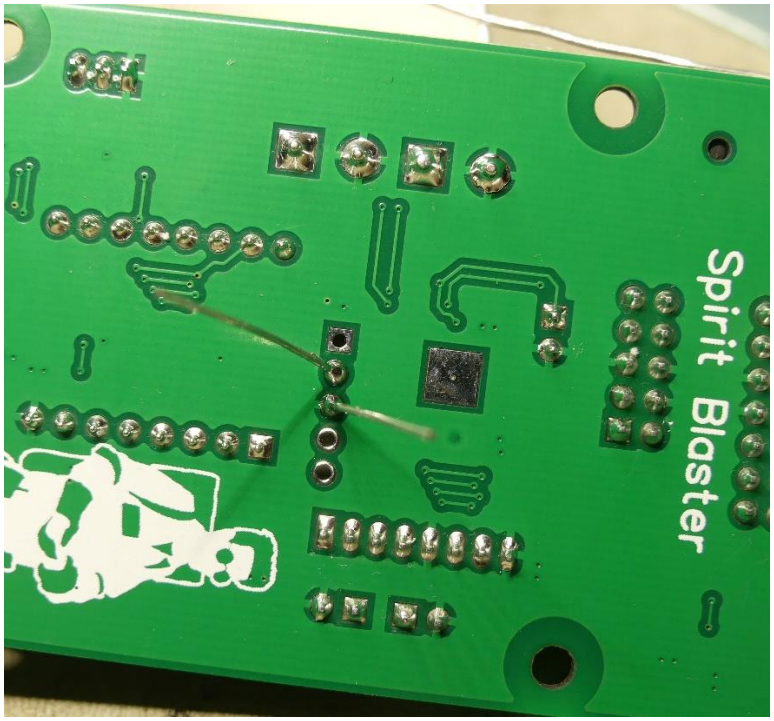


Now place the part in the hole from the top side of the board so that the wires stick out the bottom side of the board.

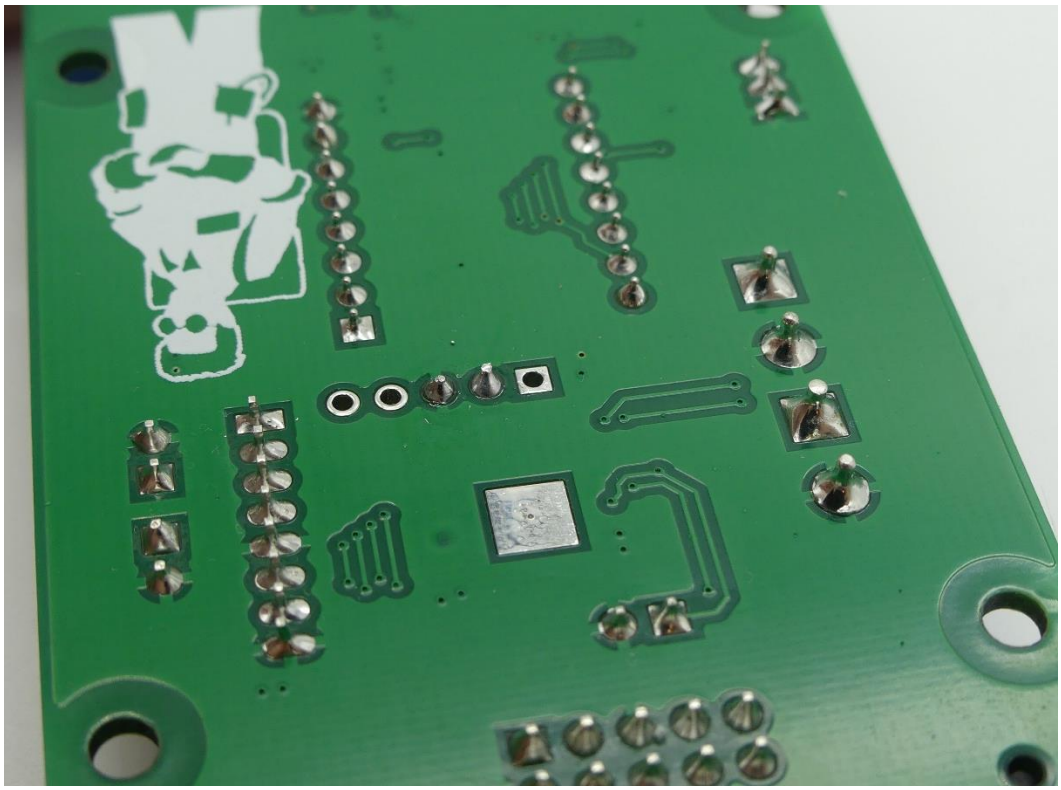




Solder the two wires on the bottom side of the board:



Then cut the excess wires off:



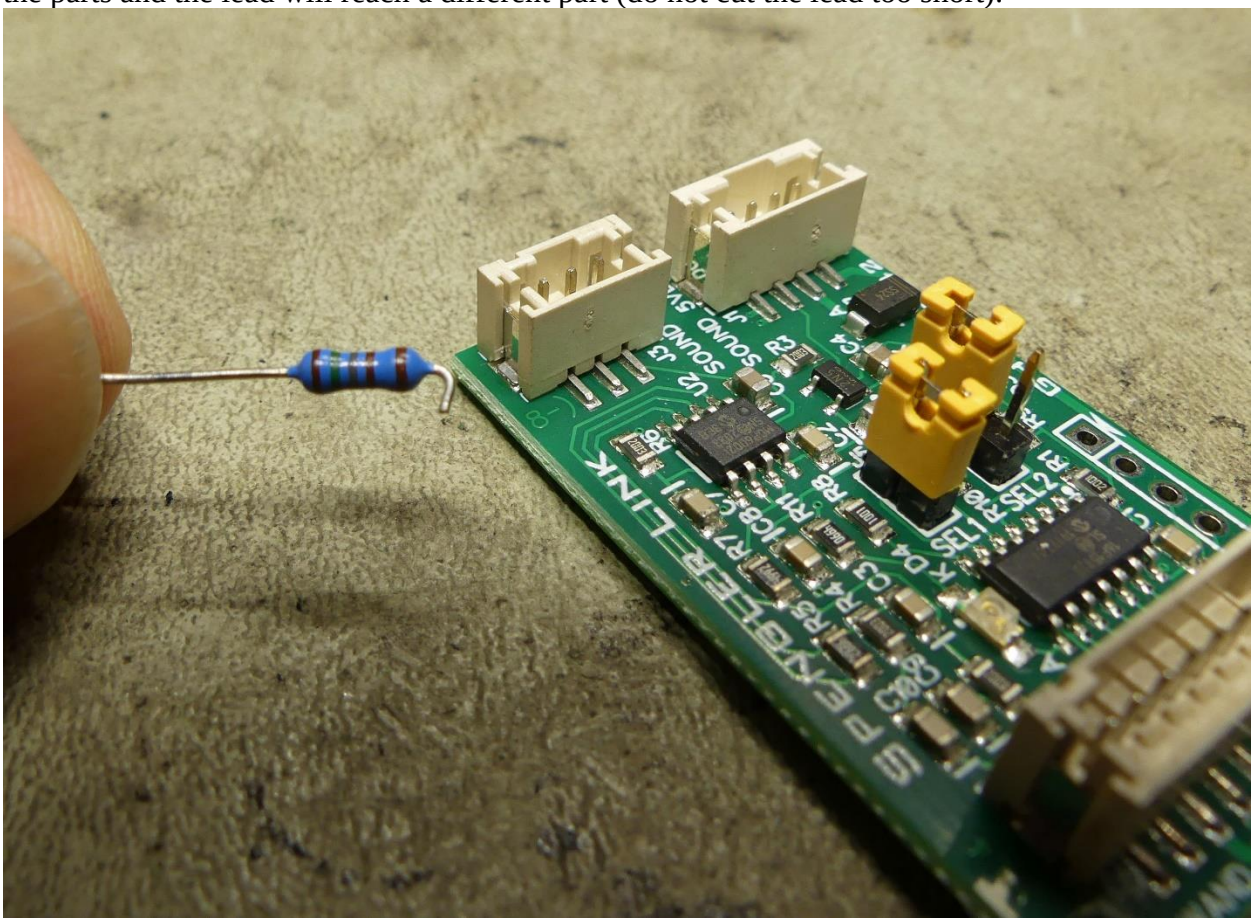
Resistor (B) mounting to the Spengler Link board:

The output amplifier in the V1.4 Spengler Link design reacts to the loading of some of the audio cables and goes into a high frequency oscillation, usually at higher volume levels. This is not audible, but causes the audio amplifier to output a lot of power that can make the resistor R2 on the Spengler sound board get very hot. The oscillation is not at a constant frequency, so this can also be accompanied by a ”hiss” or white noise sound that can be fairly loud.

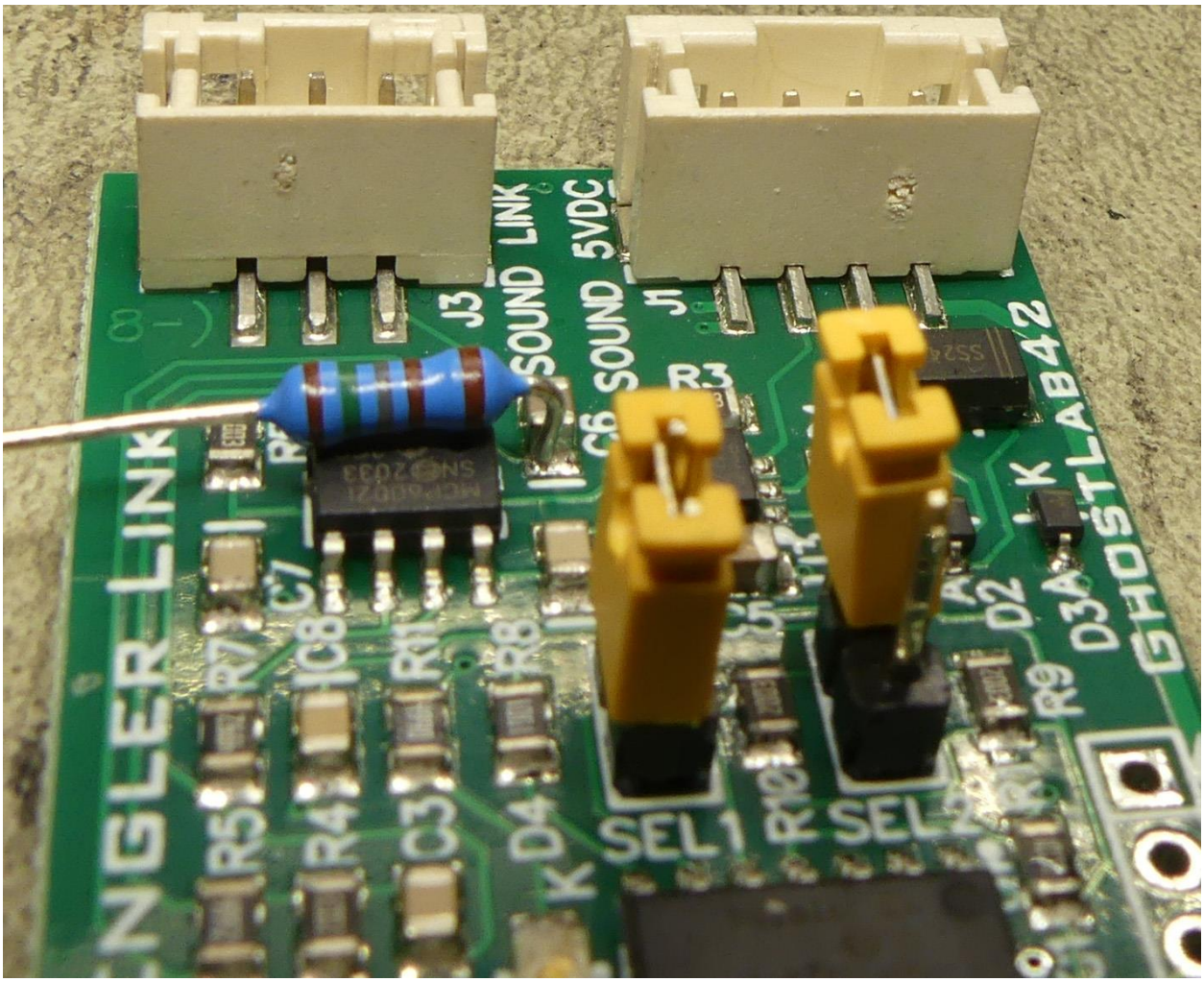
Adding a resistor to the output will provide damping of the high frequencies so will stop the oscillations (R2 should not get hot!) and remove the accompanying hissing/noise sounds.

The resistor leads need to be formed to make the connections with the leads we want and not with other leads of other parts.

Start by bending one lead at 90 degrees to the resistor and cutting it off so that it can sit on one of the parts and the lead will reach a different part (do not cut the lead too short):

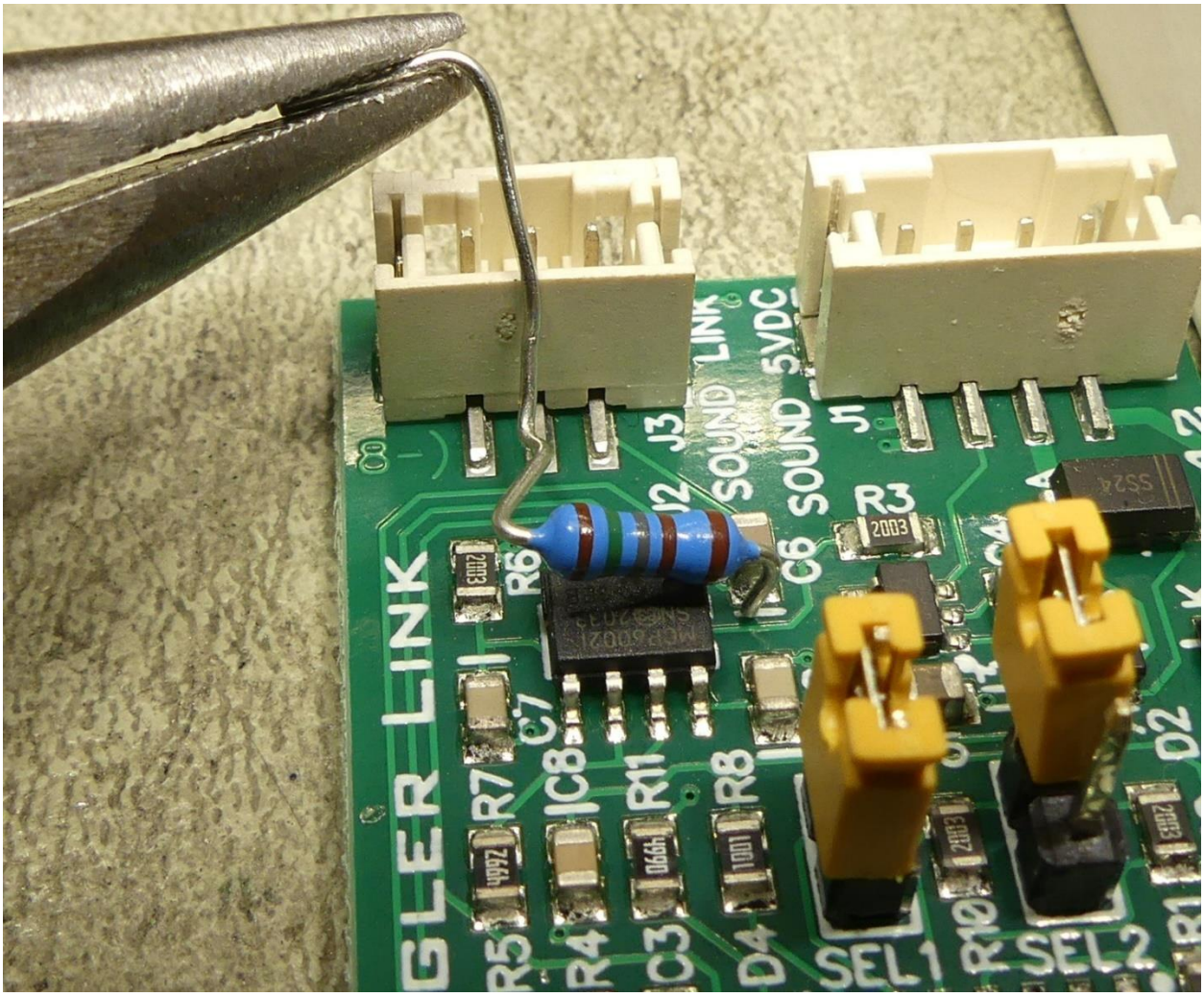


Here is a test fit to make sure the cut lead is the right length. Do not make it too short, as it is easy to cut off a bit more, but a real pain to make it longer!



One lead needs to attach to the surface mount capacitor C6 on the side closest to the black integrated circuit that the resistor is sitting on. Before we solder this, we need to form the other lead so that it reaches the middle lead of the 3-wire connector J3.

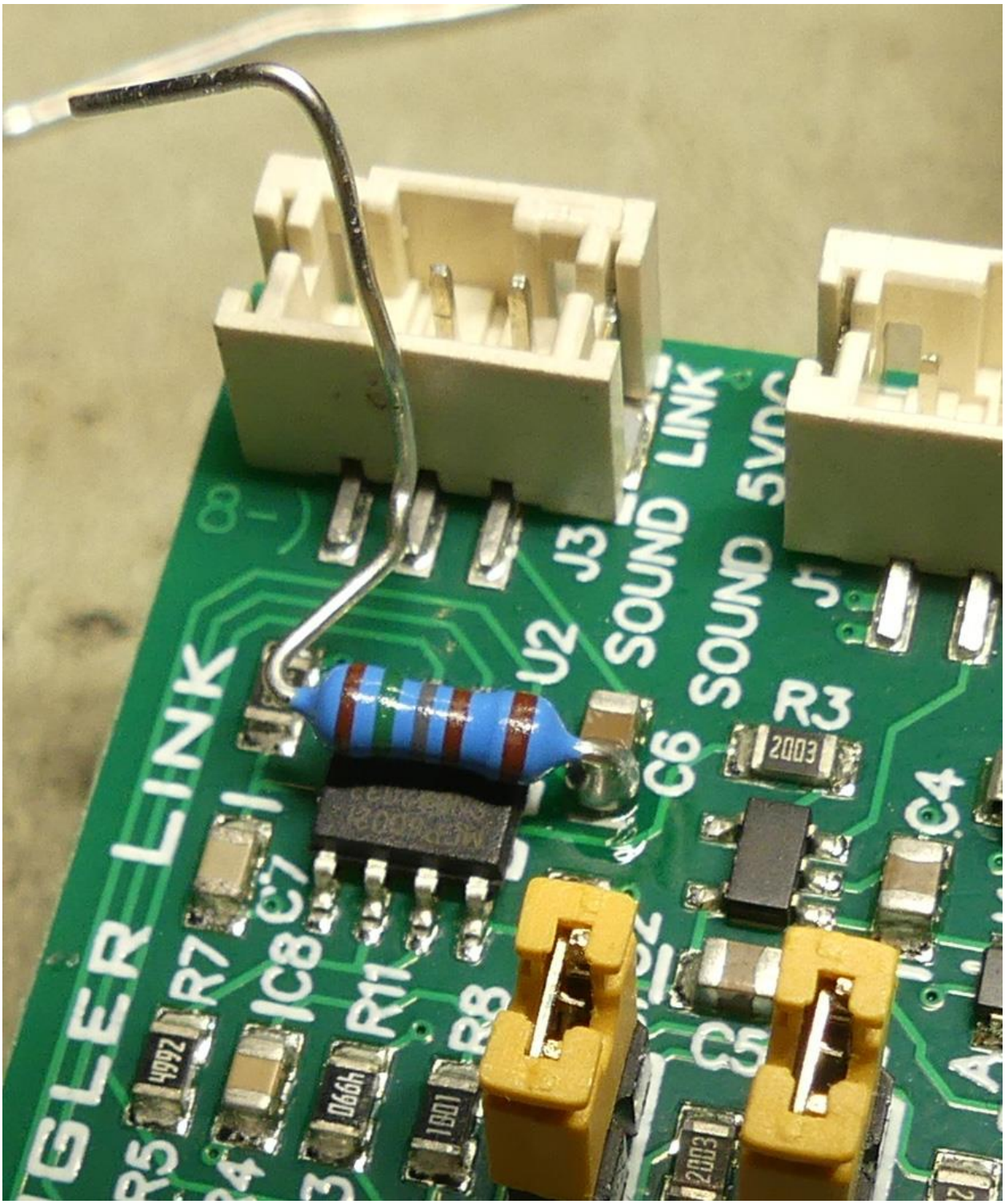
Here is a test fit of the resistor after the other lead is bent so that it can reach that middle leg of J3:



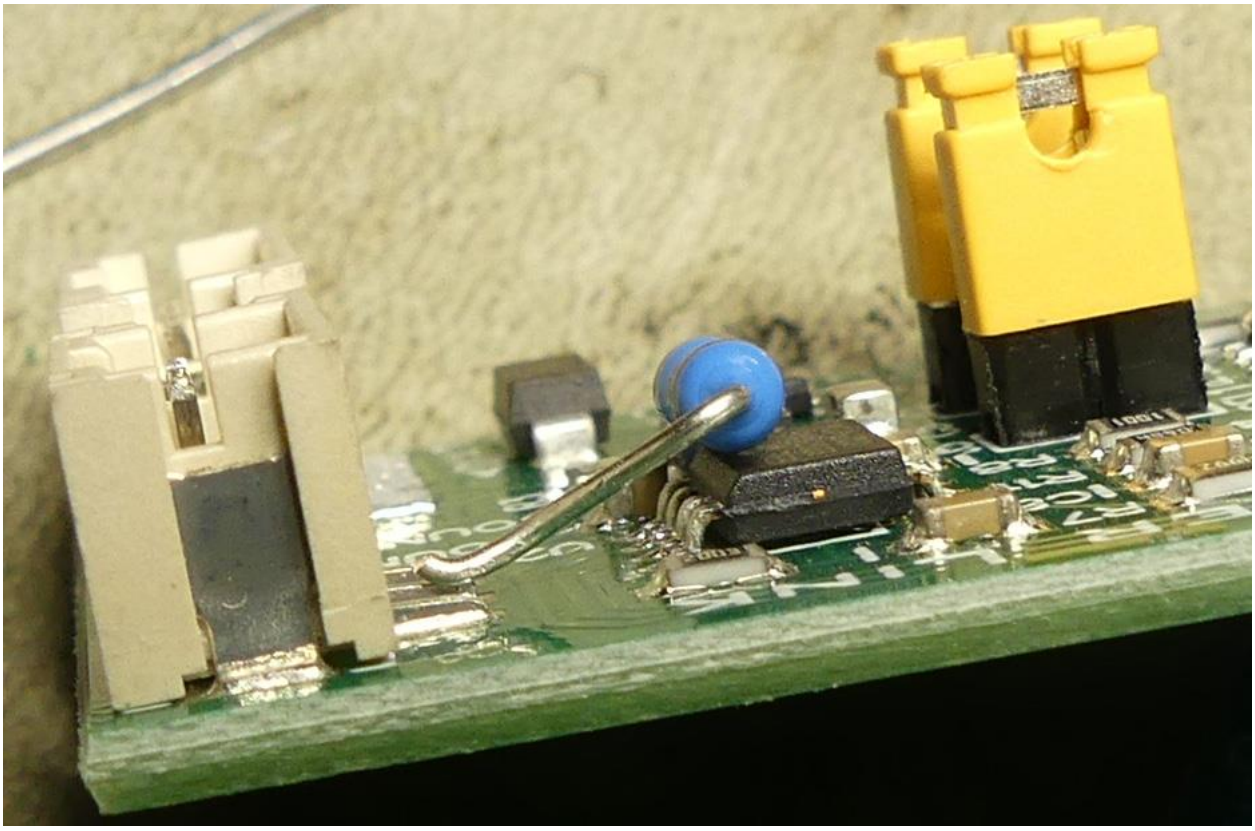
To make this easier to install, first add some solder to the parts we are going to solder:

1) One side of C6
2) The middle leg of J3
3) Both leads of the resistor where they are going to be attached to the circuit board

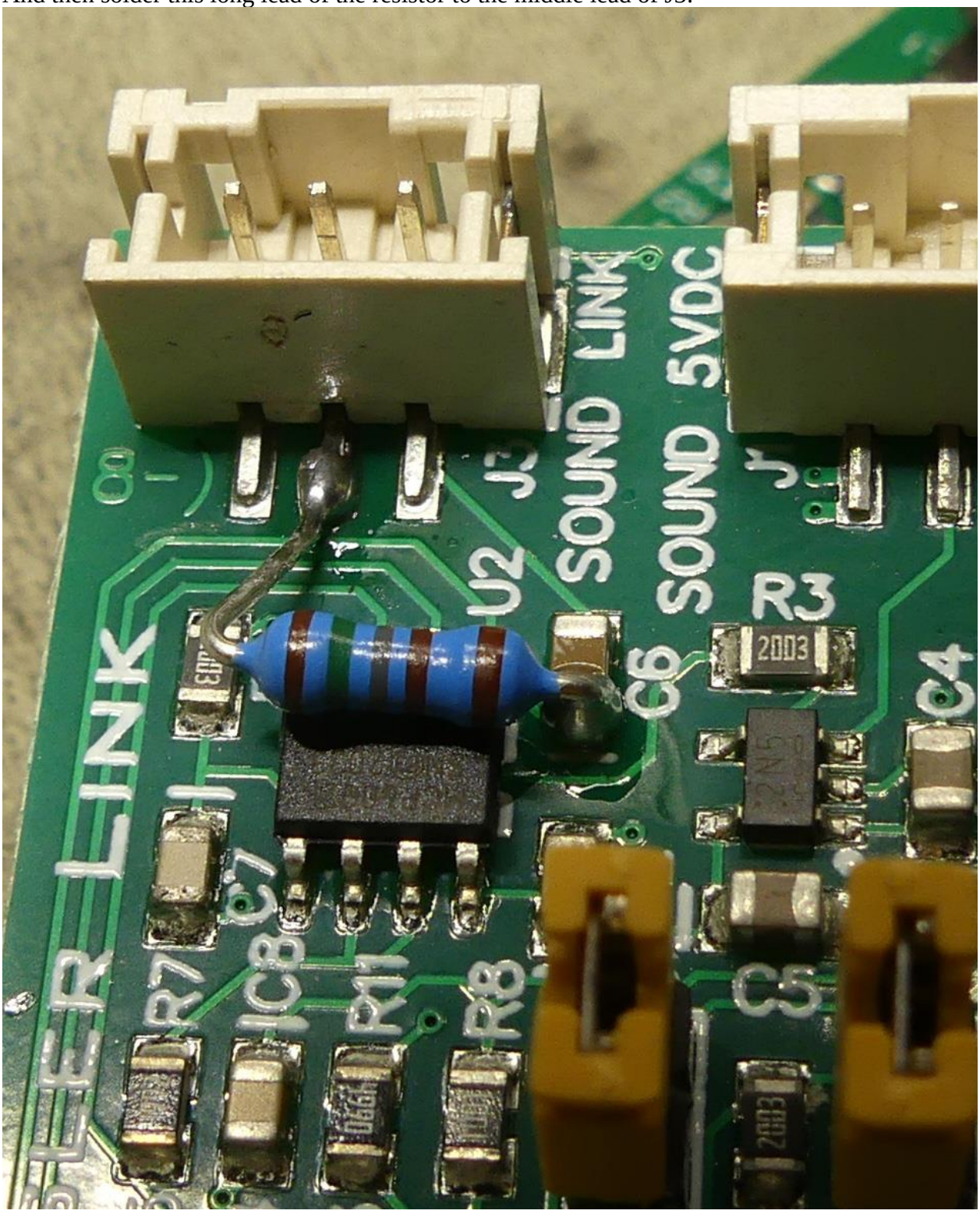
I soldered the short leg of the resistor to C6 first, and left the other resistor lead long so it was easier to hold the resistor in place while soldering the short leg.



Next cut the long lead to the desired length so it can just cover the middle leg of the 3-wire connector J3:



And then solder this long lead of the resistor to the middle lead of J3:



The fixes are now complete!
Both boards can be used as per the original instructions. These new components should not interfere with anything and don't require any changes to how they are mounted or connected.