

Introduction

In its current revision 3, the circuit board of the *kWeld* battery spot welder has received a number of enhancements that improve its robustness and usability. These are:

- new voltage regulator with an extended input voltage range of 4V - 30V
- power switch transistors driven harder for faster switching
- improved protection against inductive kickback of both power switch and voltage regulator
- rotary encoder with push button instead of a potentiometer

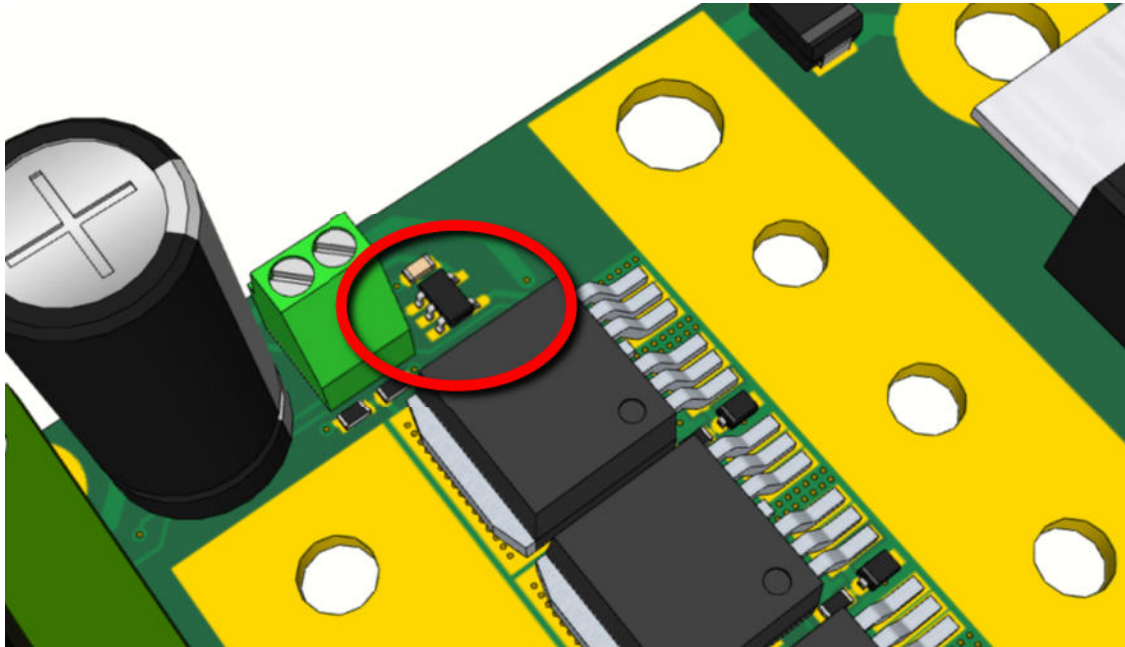
Except for the first one, all improvements can be applied to the previous revision 2 boards as well. This document describes the necessary changes.

All used parts are available from Digikey, here is a full list:

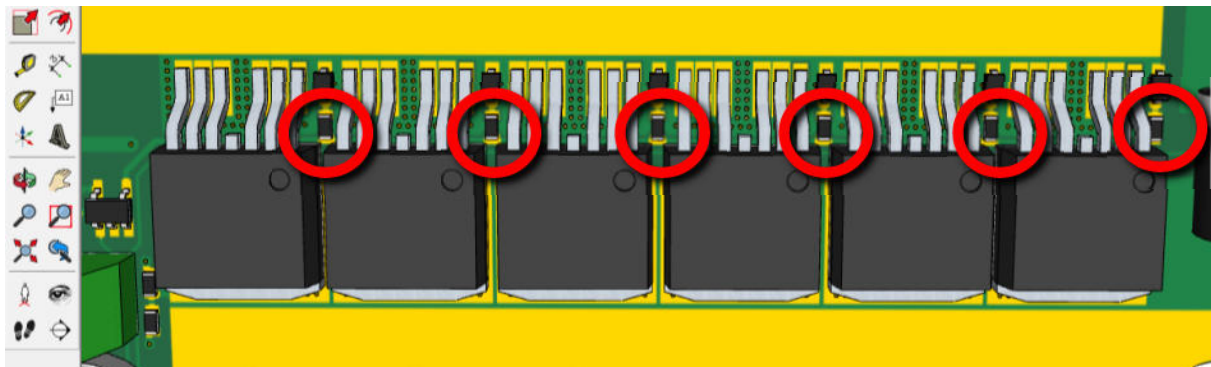
Part	Digikey P/N
IR44273LTRPBF	IR44273LTRPBFCT-ND
SLD8S28A	F8157CT-ND
SMDJ28A	SMDJ28ACT-ND
2920L030	F2865CT-ND
PEC12R-4220F-S0024	PEC12R-4220F-S0024-ND

Power switch transistors driven harder for faster switching

Replace a chip with a different component: IR44273LTRPBF (1.5A gate driver, SOT23-5). It is fully compatible but has a higher output current.



Add six 12-Ohm resistors (0603 package) on top of the ones shown in the following picture. Make absolutely sure that good contact has been made, you should be able to measure 20 Ohms from any MOSFET gate to any other (the rightmost pin).

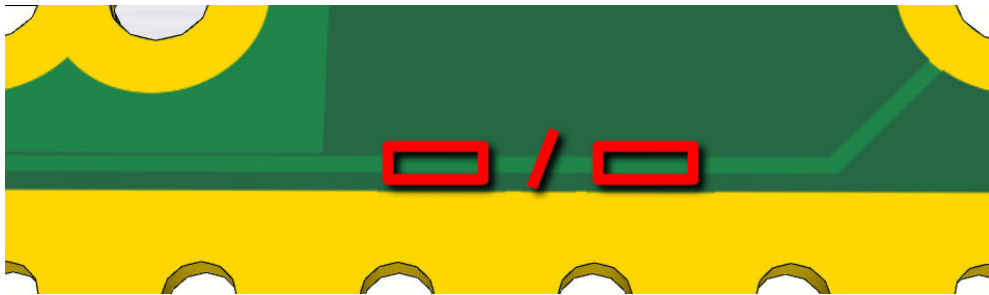


Improved protection against inductive kickback of both power switch and voltage regulator

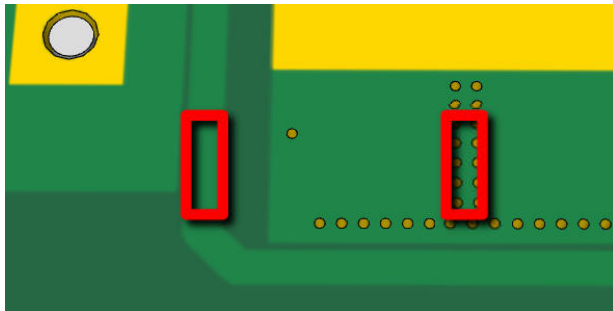
Add three protection components. These are:

- SLD8S28A (large 28V TVS, Littelfuse)
- SMDJ28A (28V TVS in SMC package, Littelfuse)
- 2920L030 (resettable PTC fuse, 300mA, Littelfuse)

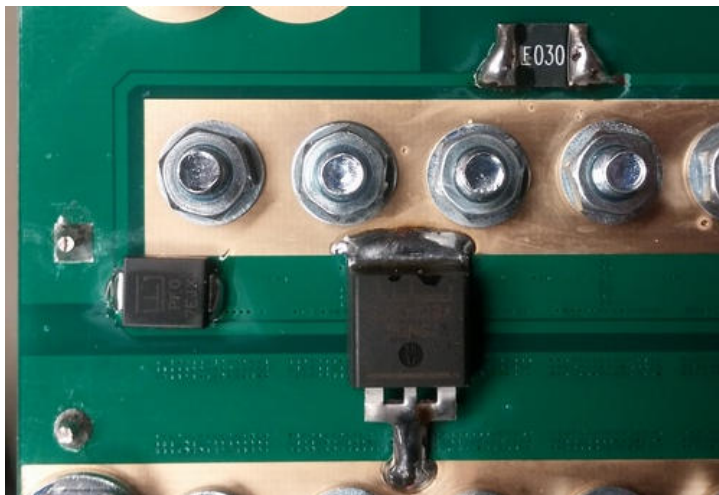
To mount the fuse, you need to cut the track and remove some solder resist at both ends. Pay attention when soldering the fuse, it is not metallized at its sides. This is why you see such large solder blobs in the last picture below.



To mount the SMDJ28A, you need to remove solder resist from the small vertical trace as well as from the large area.



To mount the SLDS28A, straighten its lead, bend it down, and solder both contacts directly to the large gold plated areas. Make sure that the solder stays away from the nuts.



Rotary encoder with push button instead of a potentiometer

This modification requires fine pitch soldering. It is not necessary to benefit from the new firmware functions, as I plan to fully maintain the firmware for the rev.2 boards, and to include all new features of the new rev.3 system as far as this is possible.

The rotary encoder (part number PEC12R-4220F-S0024) has five small leads. Straighten all of them and solder a 10cm wire to each of them. Remove the potentiometer from the board. Bend the large mounting leads such that they fit into the existing mounting holes. Solder the wires to the board as shown in the following pictures:

