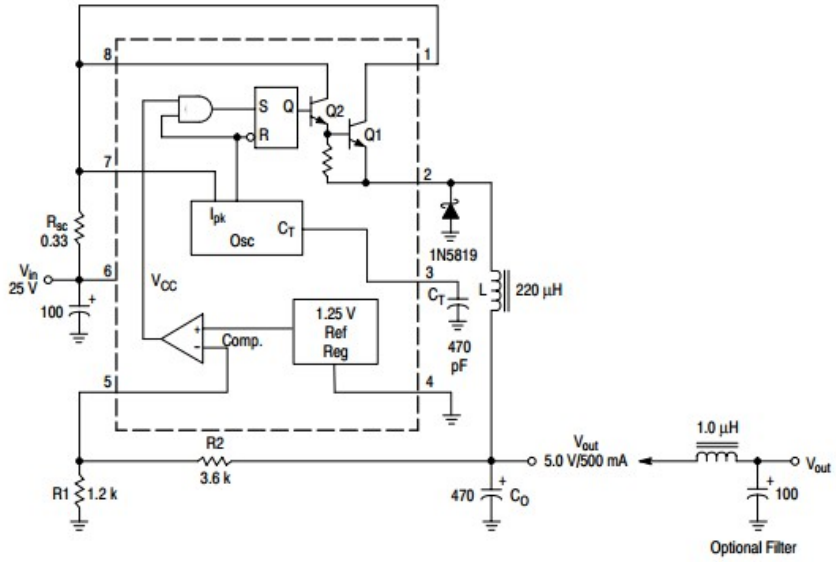
Making do with what you have

Many times in the zany life of the inveterate tinkerer I find that the solution to a problem is at hand in the bits and pieces lying around the shop (or more likely, my desk). I was looking at a cigarette adapter that came from a cellphone (or something) wondering what use it could be before relegating it to the special waste box.

Breaking open the unit I found that it was a simple switching step-down power supply built around an MC36043 chip. I called up the datasheet for the part from the WWW and it looked like I could just change one or two resistors to modify the output voltage. While the chip can handle 1.5A the adapter stated 500mA which means that not all the components can handle as much current as the chip. What could I use a 500mA voltage source for? Powering a camera... the project started.

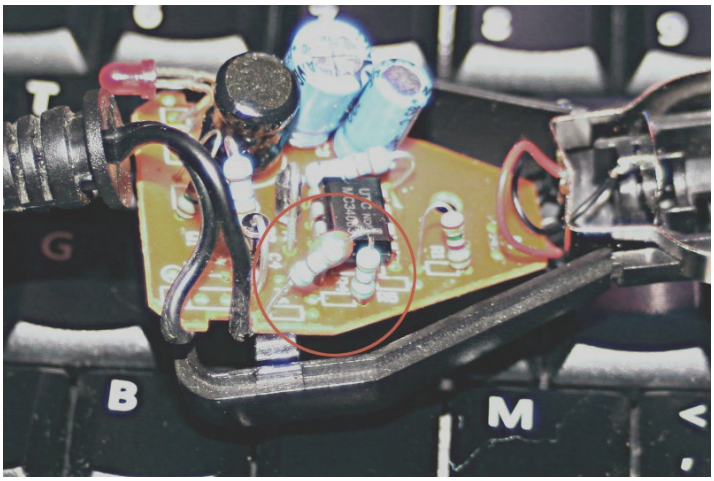
Inside the adatper is a small, triangular board that contains the MC34063, several resistors and capacitors and a few inductors (coils). Here's a snippet from the datasheet showing how to use the chip in a step-down circuit.



The datasheet states that the output voltage is calculated by:

$$Vo = 1.25 * (1 + R2/R1)$$

We can see that R2 and R1 are down in the left, lower corner of the schematic above. As the manufacture of the adapter I had wasn't nice enough to label parts the same as the datasheet I had to use a multi-meter to find the two resistors I needed to change. This only took a minute as I could see that they came off of pin 5 of the chip. The two resistors were 3.9K and 1.5K parts which, if plugged into the equation above gave about the 4.5v that the adapter was rated for. A little fiddling with a calculator told me that if I could turn the 3.9K into a 7.8K I wouldn't have to remove the original 1.5K resistor. Having two 3.9K resistors handy I soldered them in in series to make a 7.8K which allowed the adapter to deliver 7.8V... just what a Canon DSLR wants.



In the image to the left you can see the two 3.9K resistors standing up and soldered together. The original 1.5K resistor is just to their right.

Once the resistor change was done I put the adapter back together and plugged it into my battery pack to see if any smoke came out. There wasn't any and the multi-meter showed 7.78v. Perfect.

The last part of the operation was to change the plug on the end of the output wire to a 3.5mm phone plug, something my battery dummy could plug into. I had a 3.5mm stereo part which would work by just connecting the tip and sleeve leads. A few seconds with the meter told me which wires I had to work with and a few minutes later and I was done. The end result is shown below.

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