

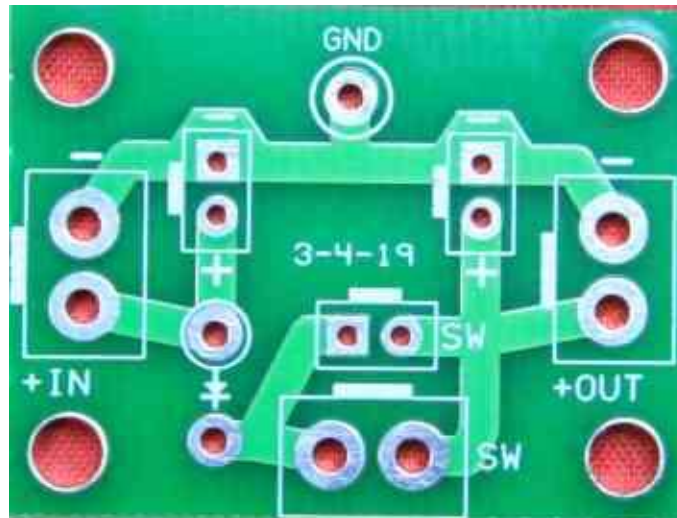
Switched Power Adapter Kits With and Without Onboard Auxiliary Power Regulator

Construction Manual

From the Triumvirate Skonk Worx, www.w0eb.com

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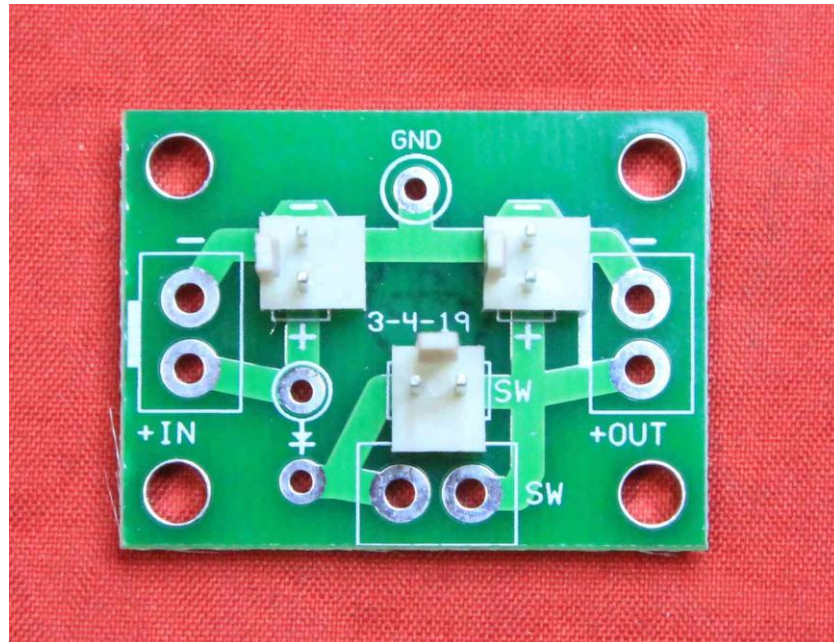
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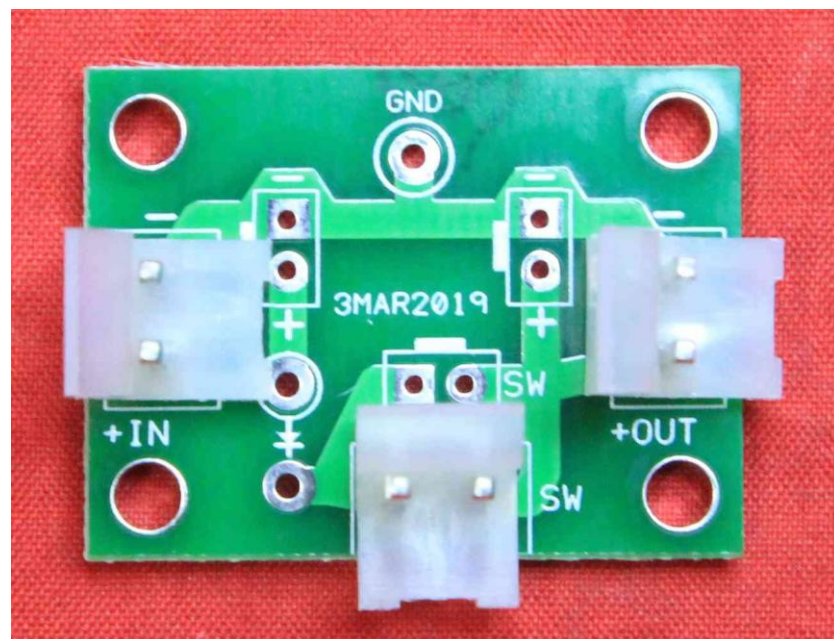
Switch Adapter (without regulator) bare PC board shown slightly larger than actual size.

The adapter allows for power input, on/off switch and power output wiring to be conveniently connected on a common board and have the option of using plugs for quick connect/disconnect or permanently soldering wires to the PC board. An optional polarity protect diode is also provided for and can be jumpered out if not used. The traces are duplicated on the back side of the board and holes are plated through. This allows for heavier current handling if needed.

PC board pads for Molex or Molex style polarized pin plugs and jacks of either 2.56 or 3.54 millimeter spacing are included so that DC input power, output power and the switch connections can be plugged and unplugged easily.



Completed Switch Adapter using the smaller 2.56 mm MOLEX pins, diode not yet jumpered.



Completed Switch Adapter using the larger 3.96 mm MOLEX pins, diode not yet jumpered.

This allows for convenient control panel on/off switching connections and makes them easy to remove and reconnect for trouble shooting without having to unsolder/re-solder the wire connections. It also provides a convenient place to mount a “reverse polarity protection” diode in case one isn’t already provided for.

Construction:

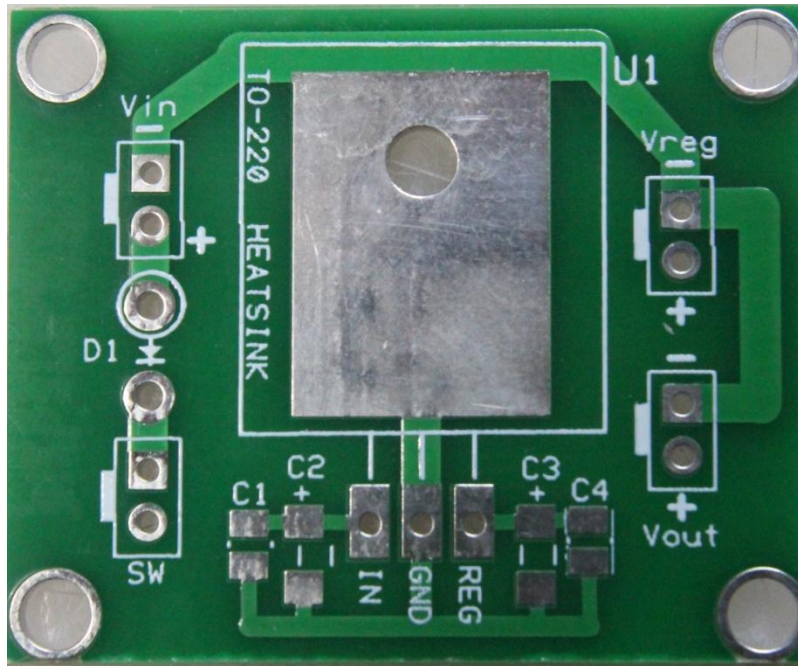
P1-P3: Solder the Molex polarized male pin headers (whichever size you have chosen) to the appropriate pads on the PCB, making sure the polarizing tab is oriented to the side shown on the board silkscreen. Choose one or the other as they won’t both fit at the same time.

Solder one pin first and check to make sure the header is vertical and the base is flat against the board. If not, reheat the connection and re-seat the header. When you are satisfied, solder the other connection and check your work for shorts and proper solder joints.

D1: If installed, orient the diode vertically with the Anode (unbanded end) flush to the board inside the white circle shown. The Cathode (banded end) connects to the marked terminal next to the “switch” header. If you choose not to use the reverse polarity protection diode, solder a jumper across the diode’s pads on the PC board.

Check for bad solder connections and shorted pins and when you are satisfied they are all good, this completes the non-regulated switch adapter board.

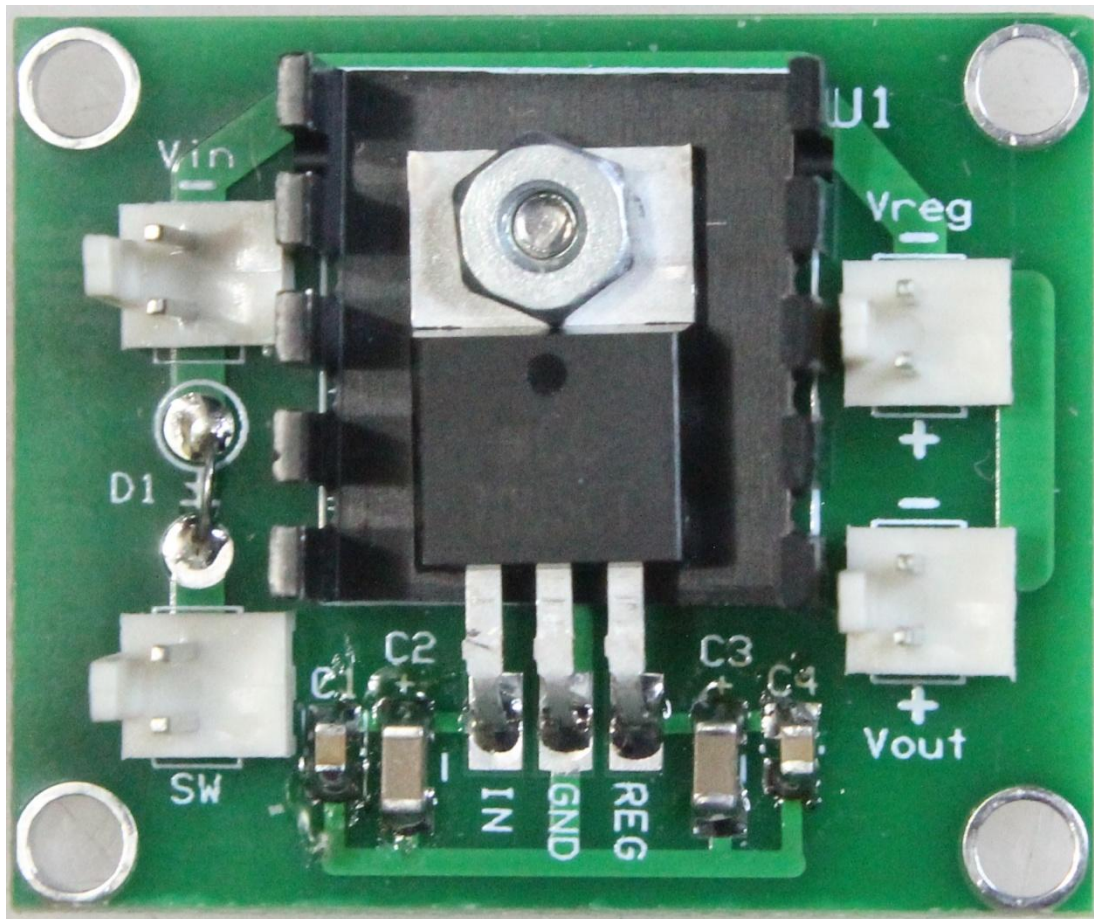
Switched Adapter with regulated auxiliary power output:



Switched Adapter (with regulator) board shown slightly larger than actual size.

This adapter only has the 2.56 mm MOLEX style headers in order to keep the size of the board smaller. The current carrying capability in this configuration is such that it will handle any QRP radio kit equipment currently on the market. The polarity protection diode, regulator and heatsink along with the standard regulator input/output bypass capacitors are optional (user supplied), as any regulator between 3.3 and 10 volts that fits the left to right "IN-GND-OUT" footprint can be used with this board. An added feature which was not intended in the initial design, is that, should an additional switched output equaling the voltage of V_{in} can be had by just omitting the regulator and soldering an INSULATED jumper across the regulator's IN and REG terminals. If this is done, the regulator bypass capacitors C1-C4 should be omitted though C1 or C4 could be installed for RF bypass and the suggested value would be .1 uF 50 volt 0805 SMD ceramic.

Here is a picture of a completed board with a TO-220 7805 5 Volt regulator, heat sink and bypass caps installed. The Polarity Protect diode should be a Schottky type with voltage and amperage sufficient for the equipment being protected. In this case, a jumper is shown in place of the diode as the author's application already has protection circuitry built in.



When constructing this version, start with the surface mount capacitors. C2 and C3 should be polarized 10uF 25V 1206 size SMD Tantalum electrolytics (banded end goes to +++) though 10uF 50V ceramics are shown in the prototype picture above they are not recommended. C1 and C4 are .1uF 50V 0805 size ceramic SMD chip caps.

Next, install the MOLEX style headers. On each, solder 1 pin first. If the header isn't straight and flat to the board, carefully reheat that pin and orient the header so it sits properly. Once you are satisfied, solder the other pin and check for shorts between them. Do the same for the other 3 headers.

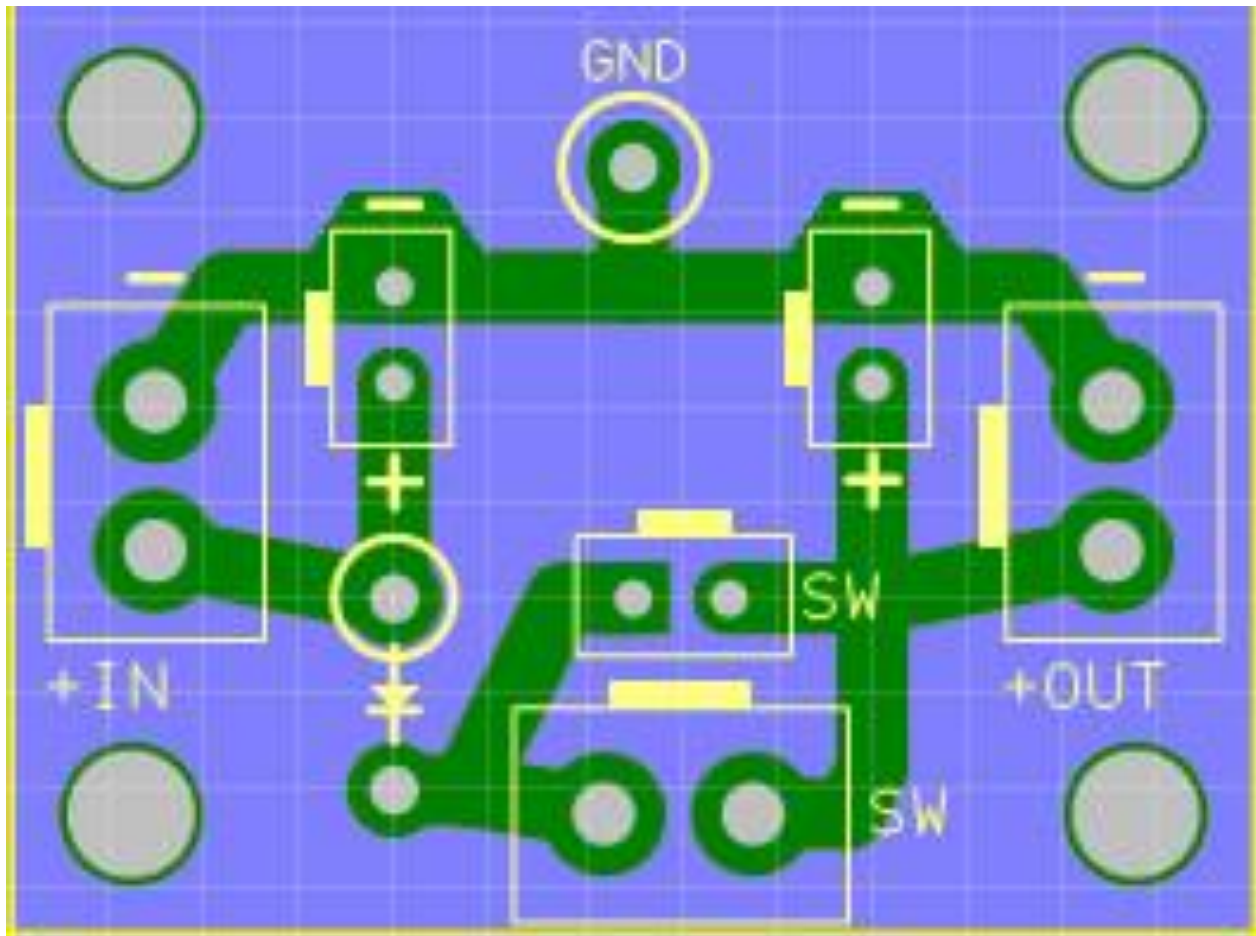
Provision has been made to allow for a heat sink to be used on the regulator IC, but it may not be needed as the PCB has been designed to act as a small heat sink itself. If a 3.3V regulator is used, since it's dropping the voltage from a nominal 12V V_{in} , a heat sink is recommended if more than 100 milliamps of current will be drawn by the powered 3.3V device(s).

Install the TO-220 3 terminal regulator of choice and form the leads so the hole in the devices tab lines up with the hole in the PCB. Use a 4-40 by .25" screw and nut to secure it in place. Solder the 3 terminals and trim off the excess. Check for shorts and unsoldered connections.

Finally, install the polarity protection diode, if used, with the anode (unbanded end) over the white silkscreened circle and the cathode (banded end) to the connection next to the SW header.

Check all connection to ensure there are no shorts or cold solder joints and when satisfied, this completes your adapter board with auxiliary output.

PC Board layout of the NON regulated adapter (enlarged for clarity):



Top of the board is shown. The traces are duplicated on the underside to allow for greater current handling when the larger 3.96 mm connectors are used. Small solid white rectangles on the edges of the male header's silkscreen indicate the placement of the header's polarizing tab. For the power input and output headers, this makes the header's PIN 1 the negative or ground pin in keeping with most schematic conventions.

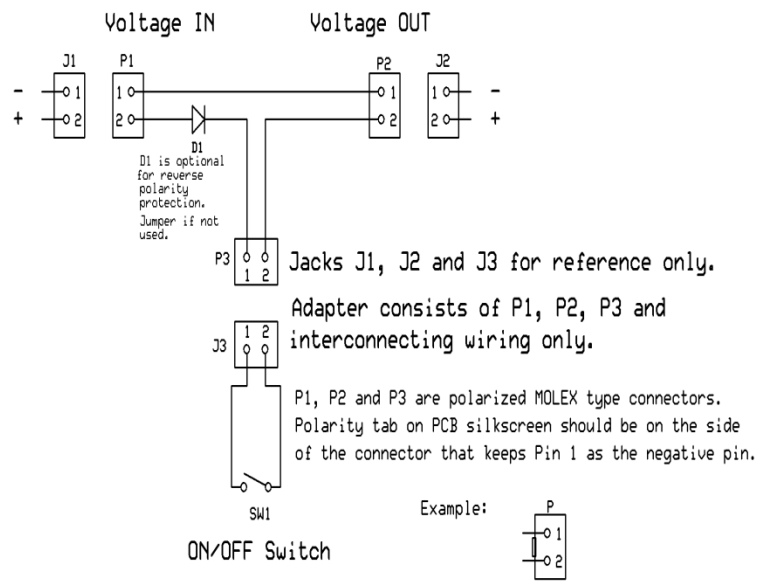
Schematic:

BOM

D1, Schottky Diode (amperage to suit max current to be drawn by unit being switched.)

P1,P2,P3 2 pin polarized Molex Male, either 2.56 or 3.96 mm pin spacing, user's choice.

J1,J2 J3 2 pin Molex Female to match spacing of P1, P2 and P3. Pads for both sizes are provided.



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Switched Power Adapter

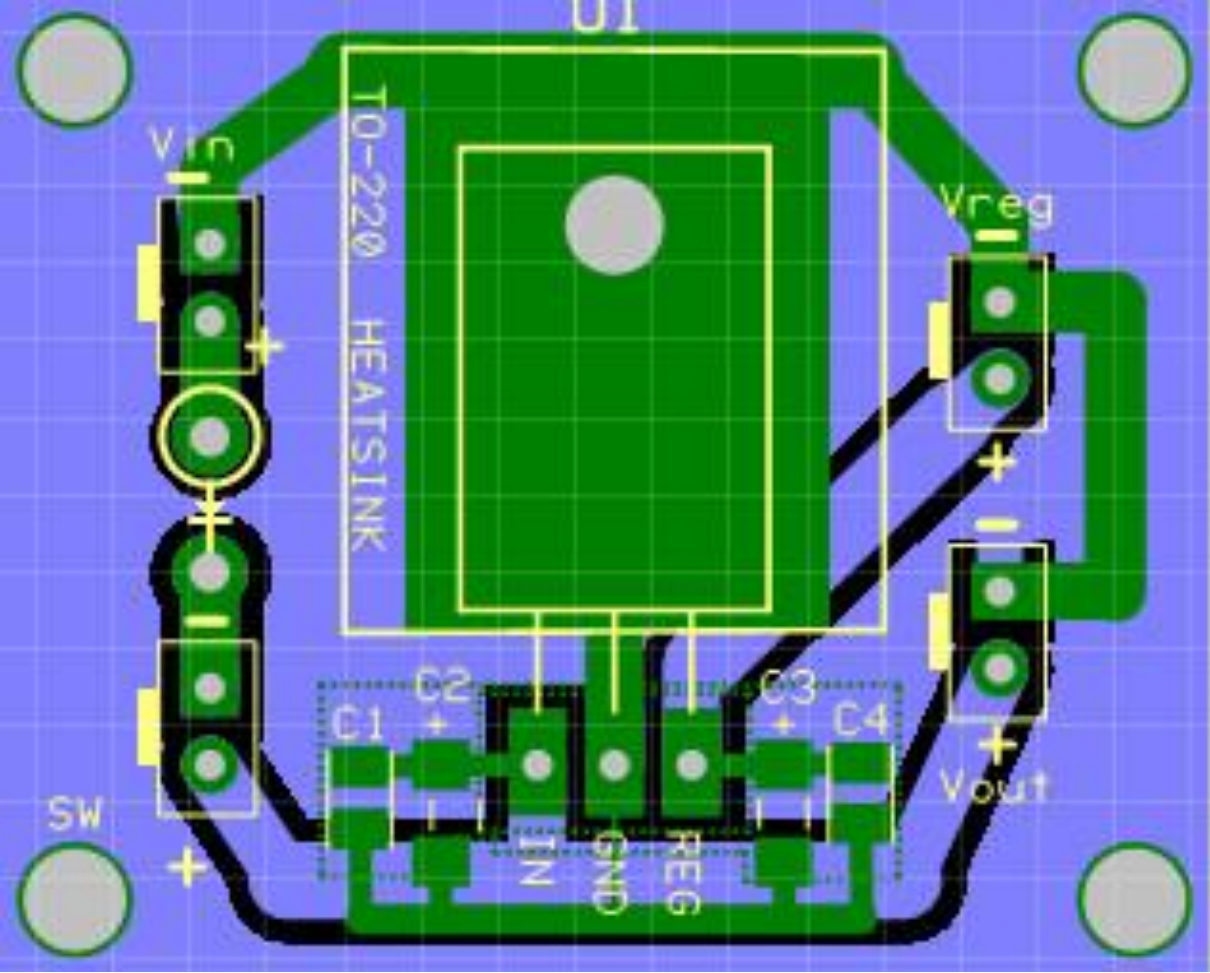
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Rev 1.1

03/03/2019

Sheet 1 of 1

PC Board layout of the NON regulated adapter (enlarged for clarity):



Mounting conventions for the MOLEX style headers are the same as those for the non-regulated adapter and the diode should be jumpered if not used.

Schematic of the Regulated adapter:

BOM

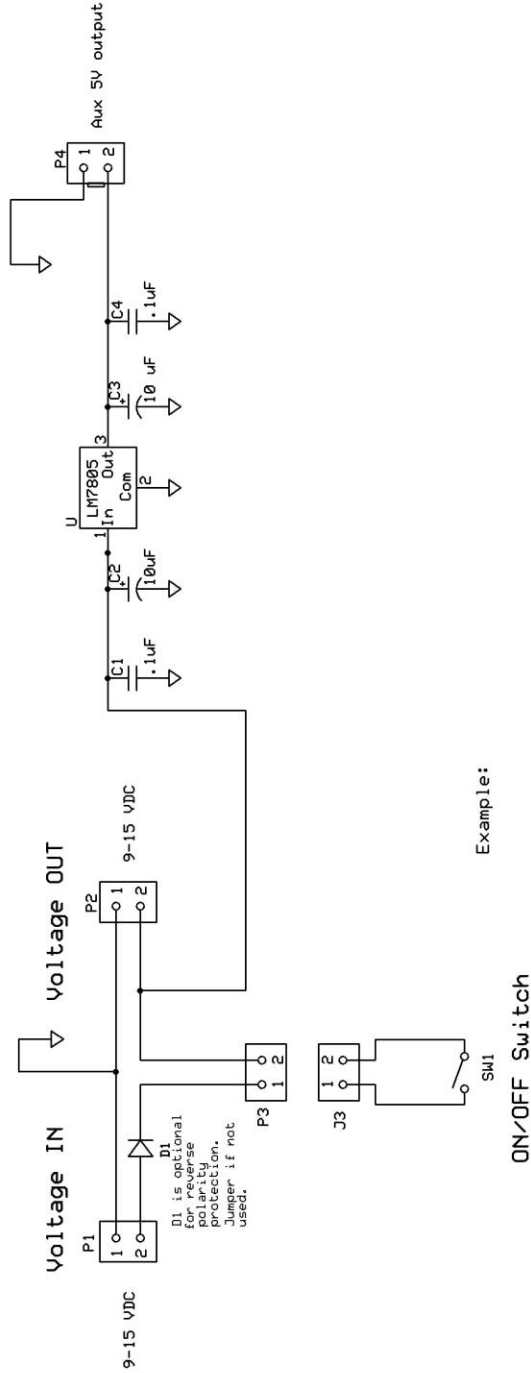
D1, Schottky Diode (amperage to suit max current to be drawn by unit being switched.)

P1, P2, P3 2 pin polarized Molex Male, 2.56 mm spacing

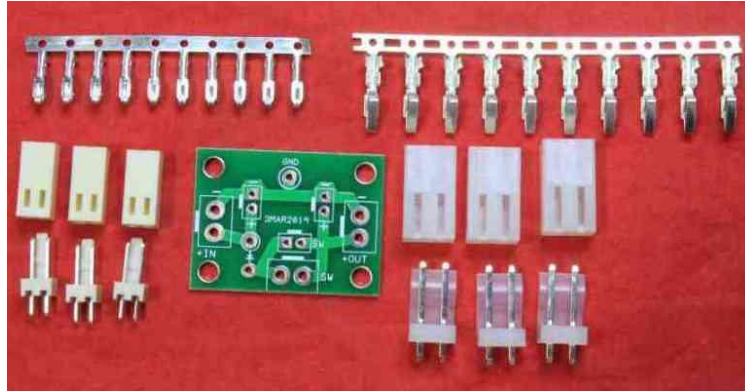
J1, J2 J3 2 pin Molex Female, 2.56 mm spacing.

P1, P2 and P3 are polarized MOLEX type connectors.

Polarity tab on PCB silkscreen should be on the side of the connector that keeps Pin 1 as the negative pin.



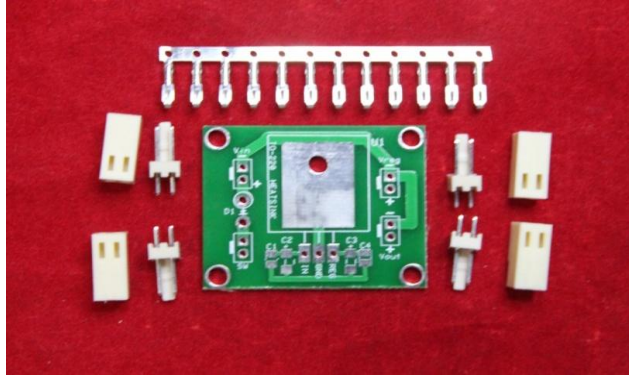
Triumvirate Skonk Worx	
Switched Power Adapter With Auxiliary 5 volt supply	
Jim Sheldon	Rev 1.0 03/14/2019
Sheet 1 of 1	



Everything you get in the NON regulated Switch Adapter Kit is shown in the above photograph.

Parts List:

- D1 Any low forward resistance diode (preferably Schottky) of sufficient current capacity for the device(s) being switched.
- P1-P3 Molex or Molex type polarized male pin header, 2.56 mm or 3.96 mm pin spacing. 2.56 mm Part# Tayda A-804, 3.96 mm Part# Tayda A-776.
- J1-J3 Molex or Molex type female connector shell, either 2.56 mm or 3.96 mm pin spacing. 2.56 mm Part# Tayda A-826, 3.96 mm Part# Tayda A-794
- QTY 10 Crimp terminals for 2.56 mm housing Part# Tayda A-837.
- QTY 10 Crimp terminals for 3.96 mm housing Part# Tayda A-803.
- PC Board (available from TSW, www.w0eb.com).



Everything you get in the Regulated Switch Adapter Kit is shown in the above photograph.

Parts List:

- | | |
|----------|---|
| C1, C4 | .1uF 0805 SMD Ceramic (user supplied)
Part# Tayda A-3511 |
| C2, C3 | 10uF 1206 Tantalum SMD, BANDED END ++++
part# Mouser 581-TCJA106M025R0150 |
| D1 | Any low forward resistance diode (preferably Schottky)
of sufficient current capacity for the device(s) being
switched. |
| P1-P4 | Molex or Molex type polarized male pin header, 2.56 mm.
Part# Tayda A-804 |
| J1-J4 | Molex or Molex type female connector shell, 2.56 mm
spacing. 2.56 mm Part# Tayda A-826 |
| U1 | TO-220 3 terminal regulator, IN-GND-OUT footprint
(user supplied) |
| QTY 12 | Crimp terminals for 2.56 mm housing Tayda A-837. |
| PC Board | (available from TSW, www.w0eb.com). |

Credits: Circuit Design, Jim Sheldon, W0EB TSW Project Coordinator
PCB Layout, Jim Giammanco, N5IB TSW PC Layout Engineer