



The Tuna Power System Kit

Exactly what does the TPS kit do?

The TPS kit is a 12 volt distribution system for supplying 12 volt power to multiple QRPme tuna can kits such as the Two Tinned Tunas and Sudden Storm kits. A 12 volt gel cell battery is connected to a screw terminal connector and is distributed to 5 RCA type connectors. An on board 5 volt regulator generates 5 volt power to two connectors: a USB-A connector, enables the operation of computer USB accessories like LED laptop lamps or fans etc. and a .2" spacing Molex connector allows surplus PC power cables to be used as power supply cables in homebrew kits. As in PC computers, both +5 and +12 volts are available on the power supply cables. An intelligent gel cell battery chip allows the gel cell battery to be charged under optimal conditions. The user must supply a wall adapter with at least +15 volt DC output capable of delivering the desired maximum bulk rate charge current. Old wall adapters from defunct computer printers make excellent charger supplies.



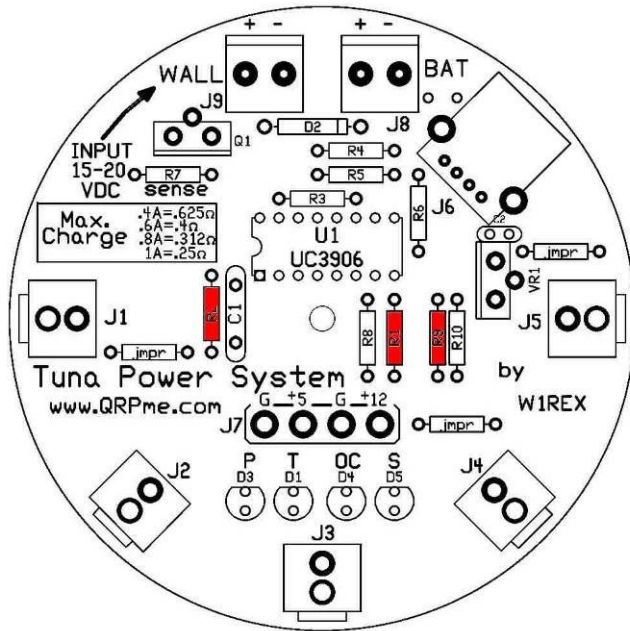
Zip open the lid and extract the parts...



It is advisable to inventory and organize the parts for ease of construction.....

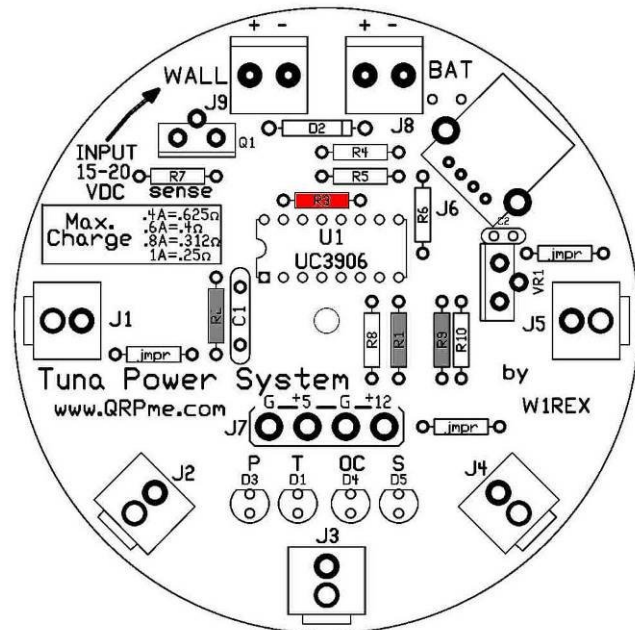
Tuna Power System Parts List

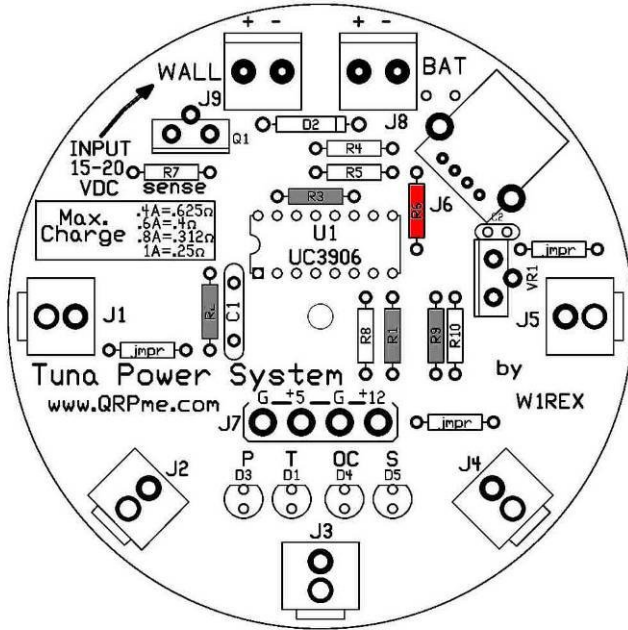
QTY	Designators	Description
3	R1,R2,R9	1K ohm resistors (Brown-Black-Red)
1	R3	200 ohm resistor (Red-Black-Brown)
1	R4	150K ohm resistor (Brown-Green-Black-Orange)
1	R5	15K ohm resistor (Brown-Green-Black-Red)
1	R6	33K ohm resistor (Orange-Orange-Black-Red)
2	xR8,xR10	1K ohm resistor (Brown-Black-Red)
1	R11mod	560K ohm resistor (Green-Blue-Yellow)
8	R7	collection of low value resistors to construct R7 2 x 1.2 ohms (Brown-Red-Silver) 2 x 1.0 ohms (Brown-Black-Silver) 2 x .68 ohms (Blue-Gray-Silver) 2 x .5 ohms (Green-Brown-Silver)
3	jmpr	0 ohm jumpers (Black)
1	C1	.1uF disc capacitor
1	C2	1uF electrolytic capacitor
1	Q1	TIP32C transistor
1	VR1	L7805 voltage regulator
1	D1	Red LED
1	D2	1N4004 diode
1	D3	Green LED
1	D4	Orange LED
1	U1	UC3906N Smart gel cell battery charger chip
1	U1	16 pin IC socket
5	J1-J5	RCA connectors
1	J6	USB-A connector
1	J7	.2"x4 Molex power supply connector
2	J8,J9	screw terminal connector
1	--	Large heatsink (for TIP32)
1	--	Small heatsink (for L7805 regulator)
1	--	1/8" Bolt & nut
1	--	printed circuit board



Start with three 1K resistors (Brown-Black-Red) resistors at positions R1, R2 and R9.

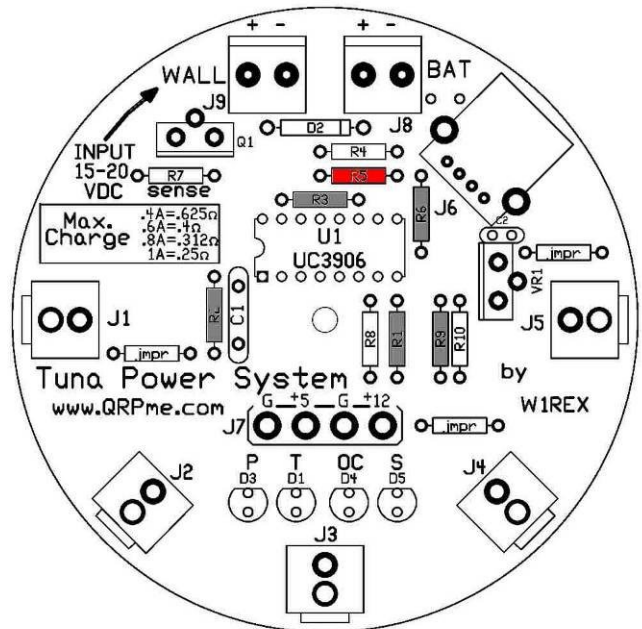
Install a 200 ohm (Red-Black-Brown) resistor at R2.

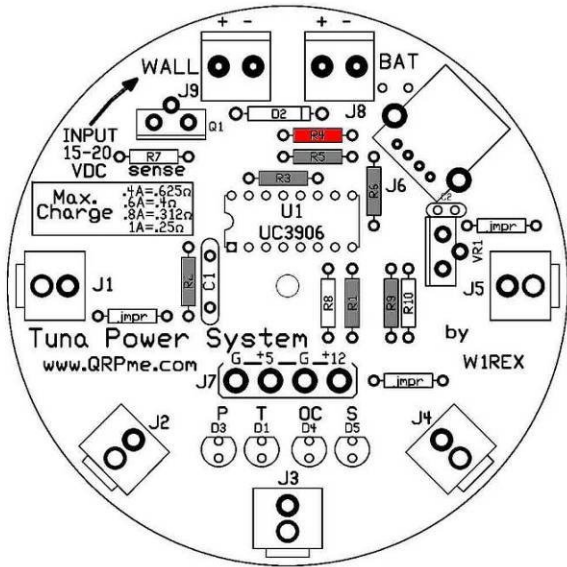




Now install a 33K 1% resistor (Orange-Orange-Black-Red-Brown) blue bodied resistor at position R6.

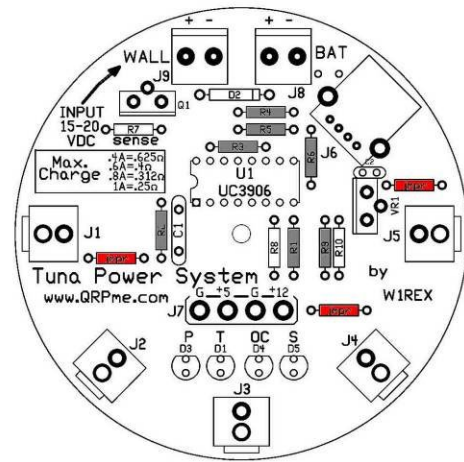
Another blue bodied 1% resistor, 15K (Brown-Green-Black-Red-Brown) is installed at board position R5.



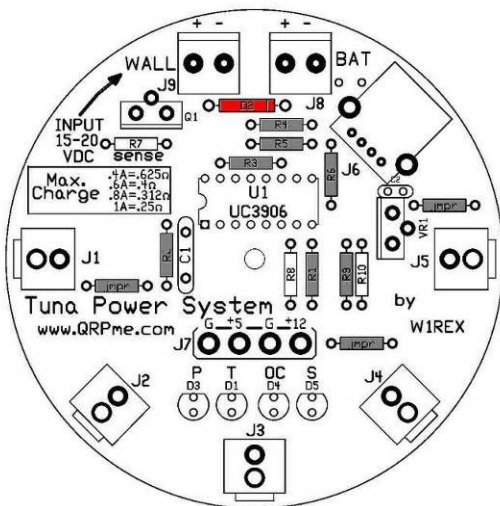


A 150K blue bodied 1% resistor (Brown-Green-Black-Orange-Brown) is installed at location R4.

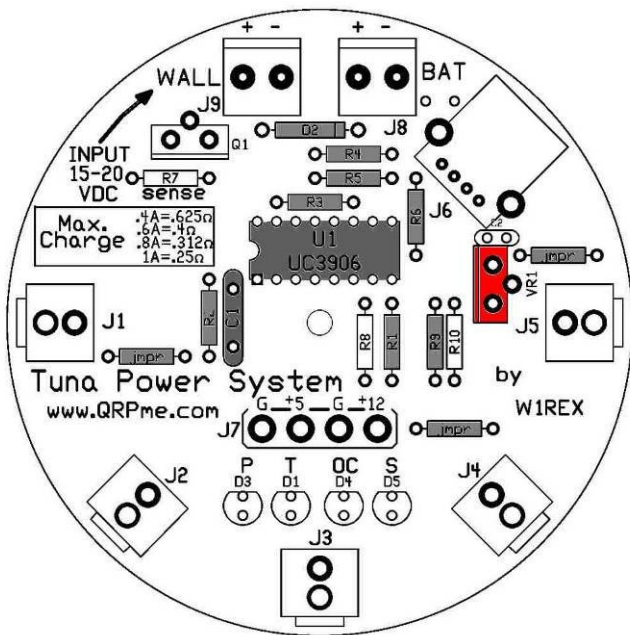
Install 3 zero ohm jumpers at the 3 locations marked jmp.



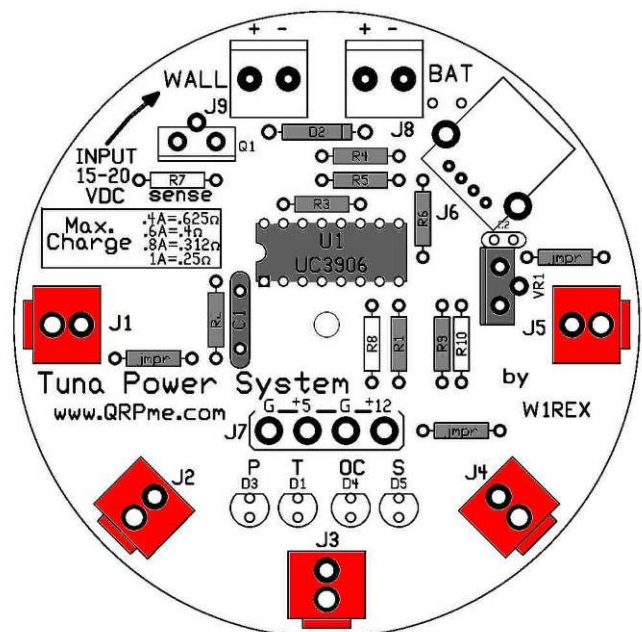
Install a 1N4004 diode at location D1. Be sure to orient the striped end of the diode with the hole as indicated by the silk screen.

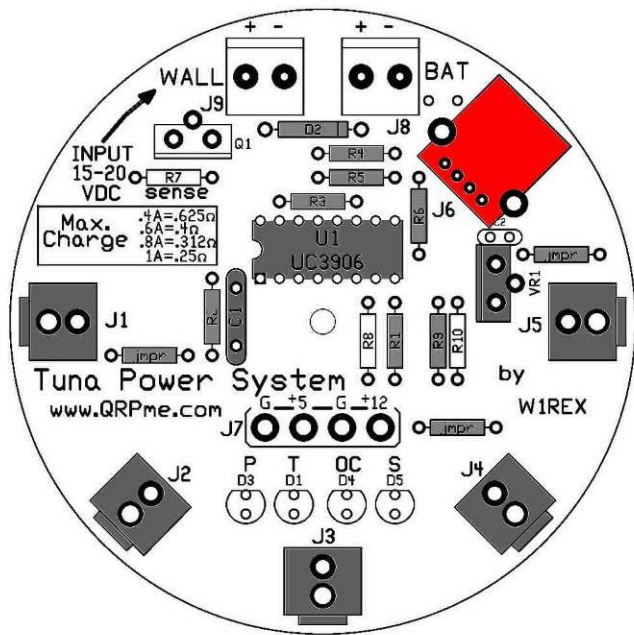


A 5 volt regulator (marked L7805) with small heat sink is installed at location VR1.



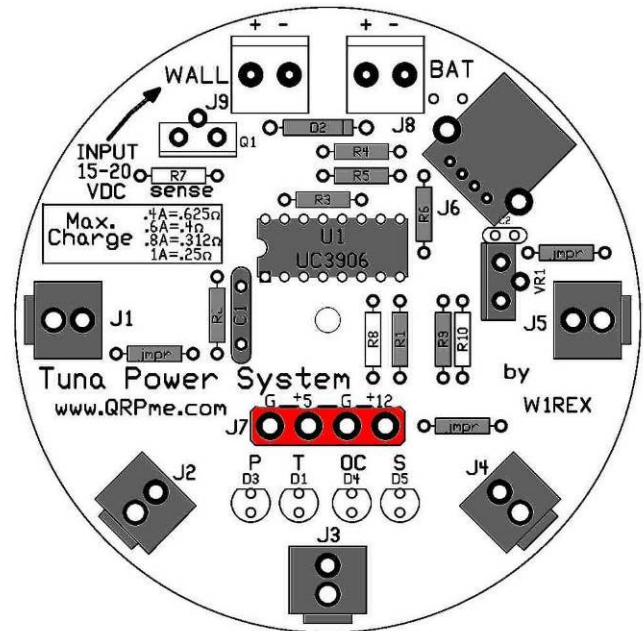
The 5 yellow RCA connectors are now installed at positions J1 through J5.

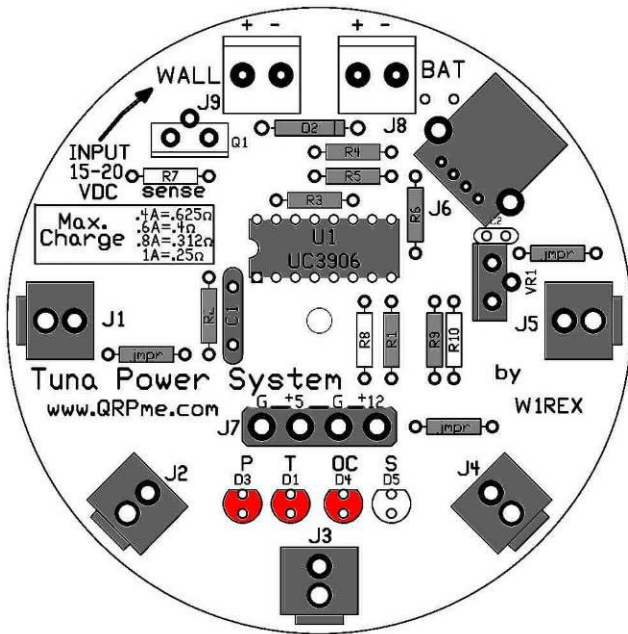




The USB connector is installed at location J6. Have the end of the connector nearest the edge of the board slightly raised in the air before soldering.

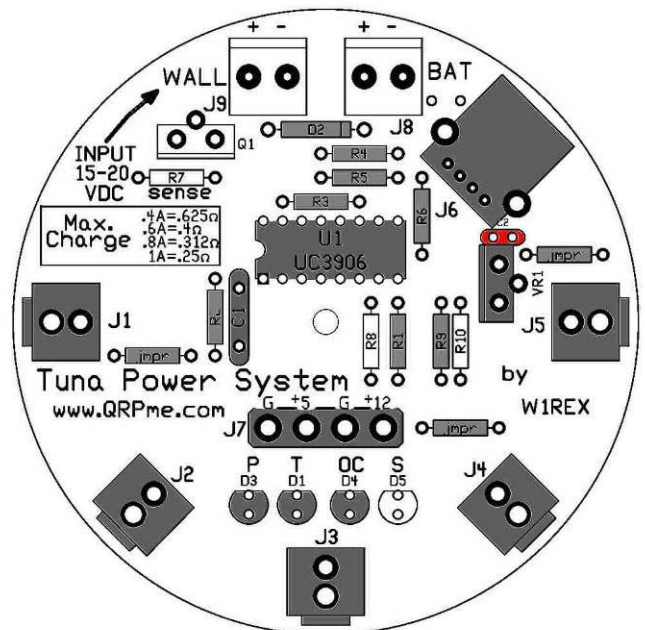
The 4 position Molex PC power supply type connector is now installed at location J7. Notice that the internal angled corners of the connector are positioned closest to the center of the board.

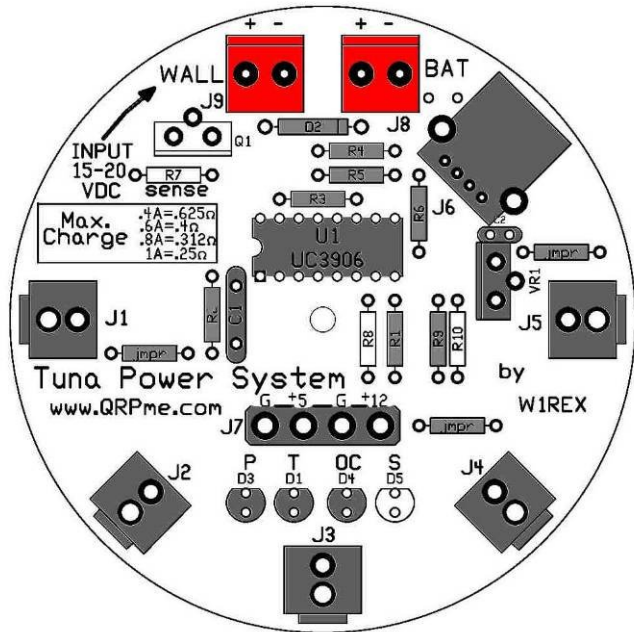




The 3 LEDs are installed at locations D1, D3 and D4. D1 = Red, D3 = Green & D4 = Orange. The short LED lead is inserted into the hole marked by the flat section on the silk screen.

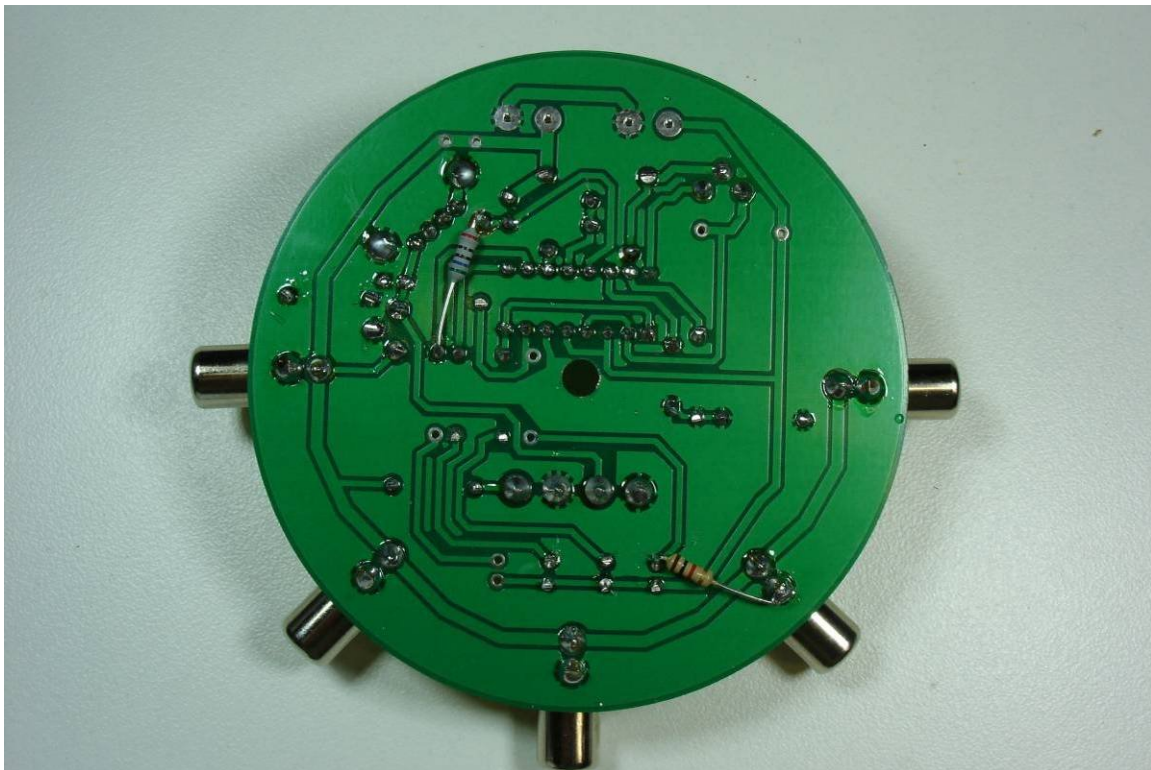
Now you can 'sandwich' in the 1UF capacitor C2 (marked 105). Although not marked on the pcb, polarity is important. The long lead is marked + and is installed in the hole closest to the center of the board.

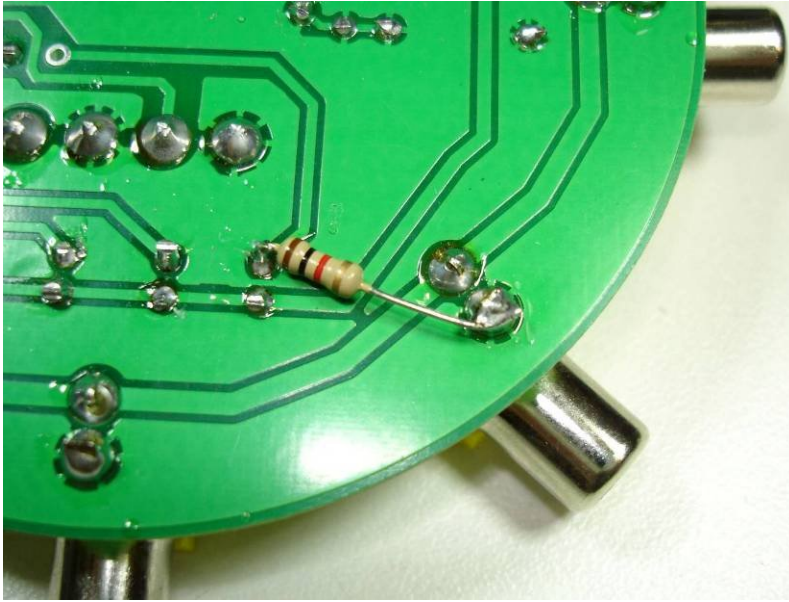




Install the 2 screw terminal connectors at locations J8 & J9 with the wire entry locations oriented towards the outside of the board.

Alert! Alert! Resistor mods ahead...

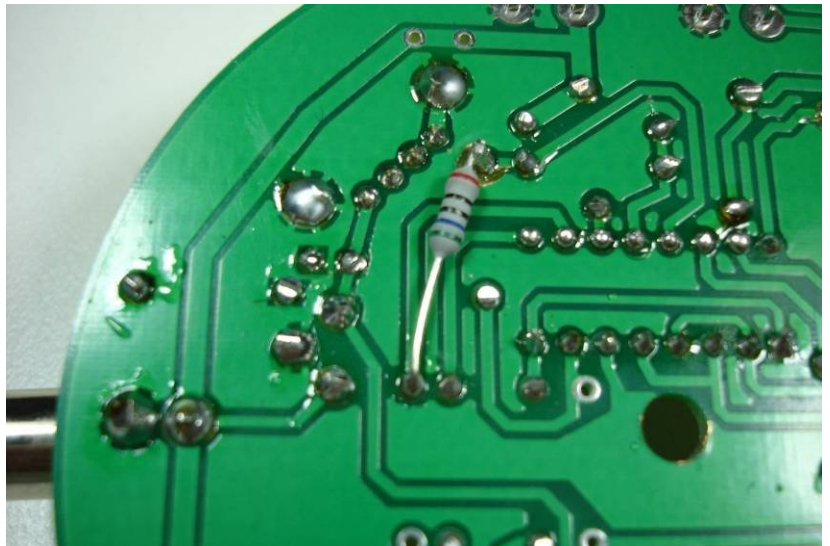




R10, a 1K ohm (Brown-Black-Red) resistor is relocated to the bottom of the board. Solder it to the top pad of LED D2 to the outside

ground pin of the nearest RCA jack.

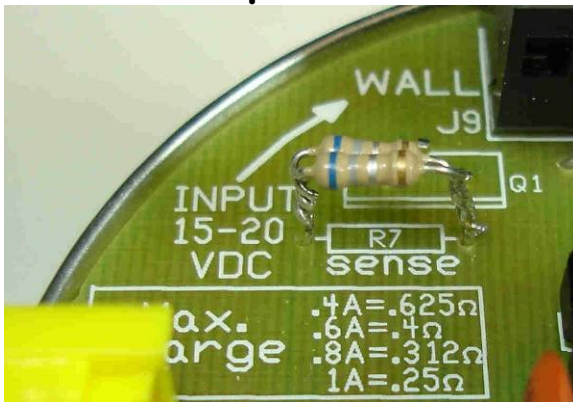
R8, a 560K (Green-Blue-Yellow) is soldered from the vacant top hole of ex-R10 to the junction of R5 & R6.



Now decide the proper current sense resistor, R_{sense} , for the size gel cell battery you want to charge. Gel cell battery manufacturers specify a maximum bulk rate charging current of $.3 * C$ or $.4 * C$ (C is the Capacity of the battery in Ahr). They typically recommend a bulk rate charging current of $.25 * C$ for maximizing the life of the cell. So for some common gel cell battery sizes:

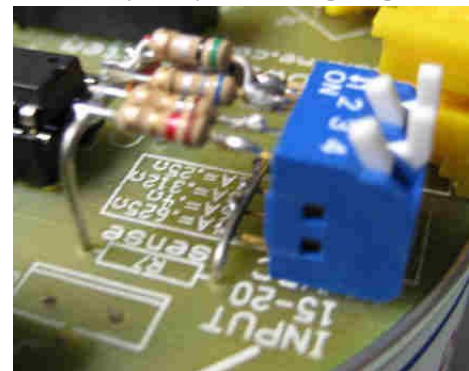
C (in Ahr)	$.25 * C$	R_{sense}	Resistors:
1.4	.35A	.71ohms	.68
2.3	.57A	.43ohms	.68//1.2
3.4	.85A	.29ohms	.5//.68
5.4	1.35A	.18ohms	.5//.68//.68
7.0	1.75A	.14ohms	.5//.5//.68

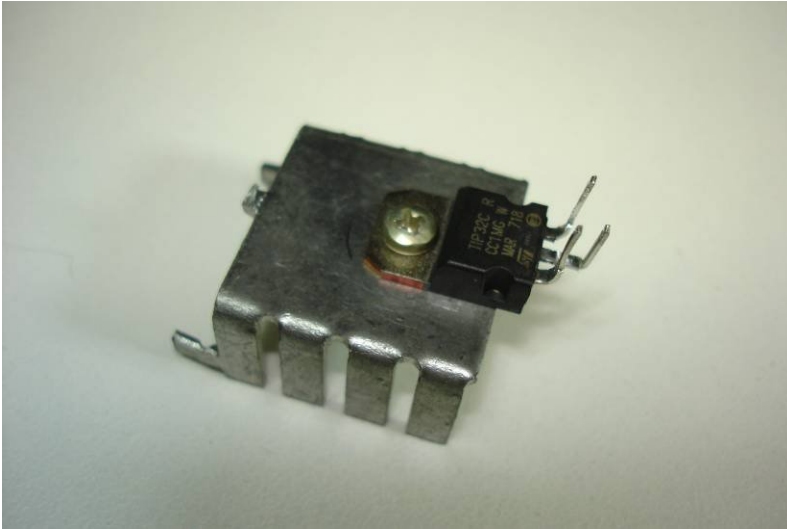
Mount the resistor(s) on the top of the circuit board with some space between the resistor and the board. If



you have different size batteries you will be charging, configure the sense resistor for the smallest battery size. Better to take a little longer to charge the bigger

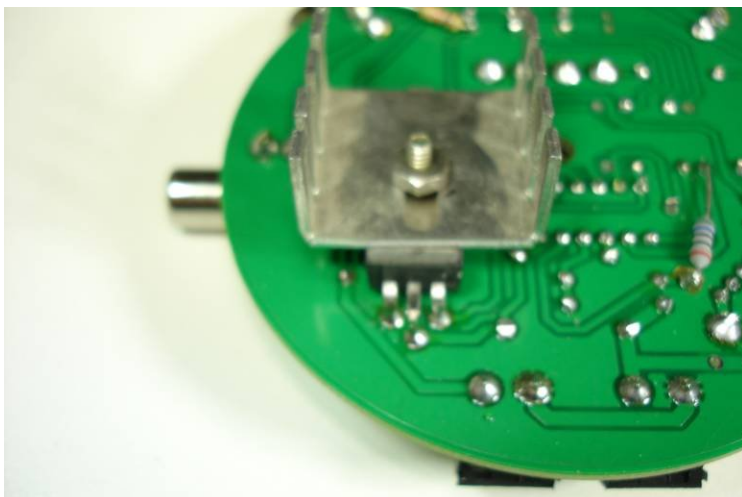
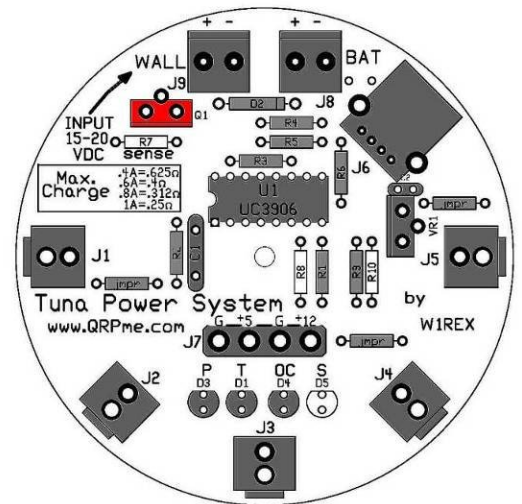
battery than 'cooking' the smaller battery by charging it with too high of a current. Here is a neat mod from Chuck Carpenter to easily change the sense resistor for different sized batteries.





Mount the heat sink to Q1 (marked TIP32C) and bend the leads like the

picture to easily insert the transistor leads into the proper location on the circuit board from the **UNDERSIDE** of the board. Test fit in the holes and carefully adjust the



leads until you have a good fit. It should look something like this...



Now you can mount the completed printed circuit board to the can using the supplied nut and bolt. The bolt is inserted through the hole in the bottom of the can and then the board. The nut is installed on the top. Do not over tighten.

FINI!

Now what do you do with it....

1. Charge your portable SLA (sealed lead acid) station battery. With an appropriately sized

wall adapter, you can easily charge SLA batteries up to 7AH in size. The 1N4004 diode included with the kit is rated for 1 amp so if you want to use the TPS to charge 7 AH batteries, it should be replaced with a diode rated for 1.5 amp.

2. Power your Two Tinned Tunas, Sudden Storm, Tuna Keyer and other accessories easily from the same source.
3. Use laptop accessories like LED notebook lights and fans at your QRP station.
4. Power homebrew creations with +12 and +5 using old PC disk drive power cables.

Suggested mods:

1. Find a small rotary switch or DIP switch at a hamfest and use it to select one of a number of Sense resistors and have a switch selectable charge rate to easily change the TPS for different sized batteries.
2. There are 2 unused holes between the Battery screw terminal connector and the USB connector. You can cut the trace between the holes and add either a switch or an amp meter.