Yaesu FT-817 12 Volt NiMH External Battery Box With Charger Circuit

This is a simple design to provide an alternate portable
12v volt NiMH 2500mA battery supply for the Yaesu FT817.

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Design Considerations.

The 12 volt battery box & power supply solution requires :-

1. A Simple design using readily available components.
2. Its own simple mains powered charging solution. i.e at least 16-18v
3. The battery box to house the constant current circuitry.
4. Optional battery condition metering.
5. Safeguards to prevent damage by accidental over voltage or reverse polarity.
6. Double insulated mains transformer.
7. Battery box to fit inside a coat pocket < 1kg.

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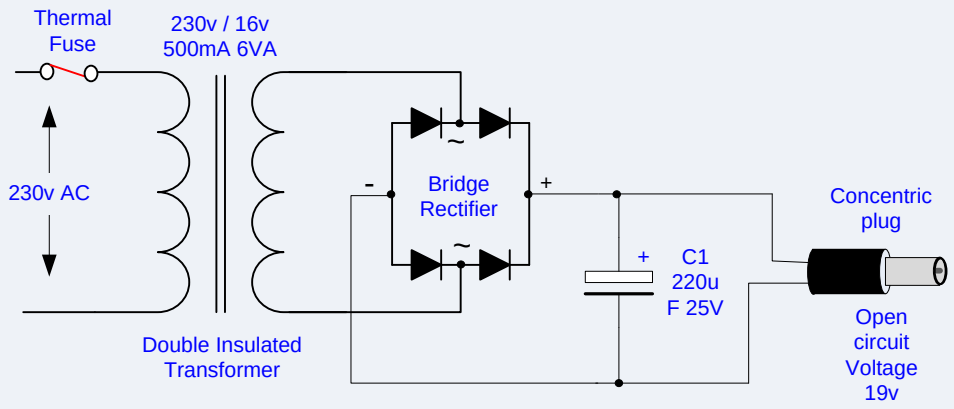
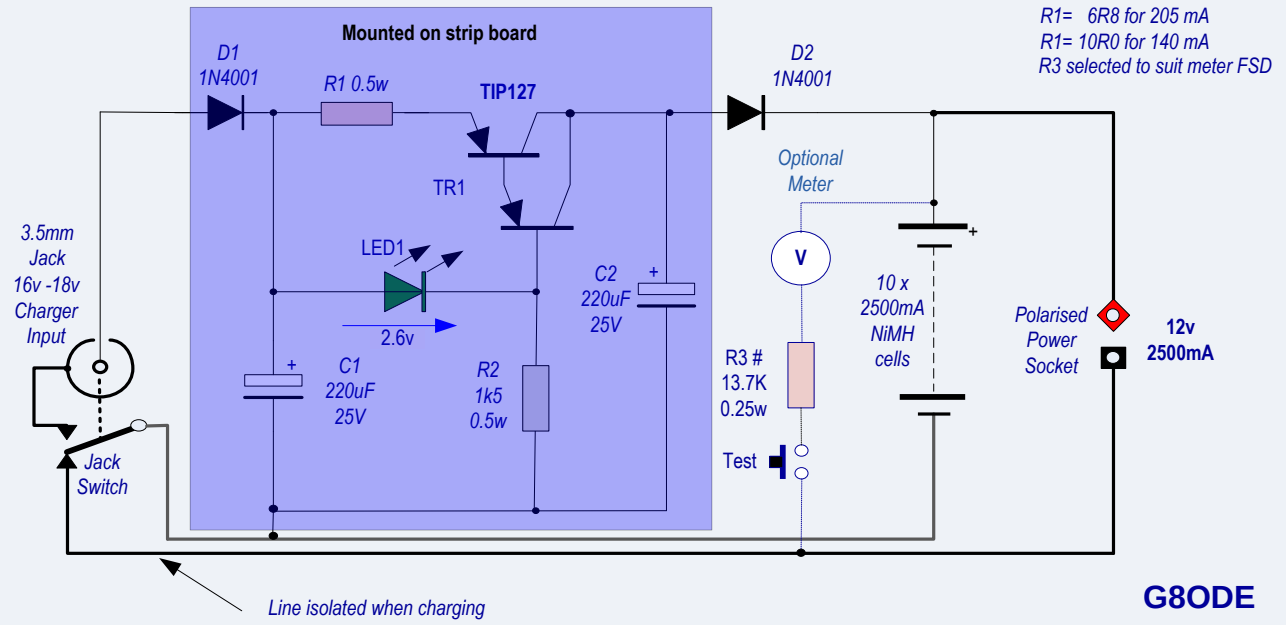
DC Power Supply (ex 12v Cordless Battery Drill)



Simple 12v NiMH Battery Box & Charger



N.B. This design is based on the circuit from http://electroschematics.com/6073/nimh-battery-charger/

The voltage drop across the green LED is about 2.6v and is presented to the base of TR1(TIP 127 Darlington pair). The transistor's two base-emitter junctions combined voltage drop is about 1.2 volts. The voltage across R1 is therefore 2.6v – 1.2v = 1.40v and the current passing through R1 will be 1.40 / 6.8 = 0.205 Amps or 205 milliamps.

The LED also acts as the charging status indicator of the battery. If the battery goes faulty the LED flashes momentarily as C2 charges up when the power supply is first connected. Reverse voltage protection from the charger input is provided by D1 and D2 to prevent the battery discharging when the charger is not connected.

The charger input jack is switched so that the charger 16-18volts does not appear across the battery boxes output terminals. TR1 is mounted on a small finned heat sink. The design incorporates an optional battery voltage condition meter that only measures the battery voltage when the charger is not connected.

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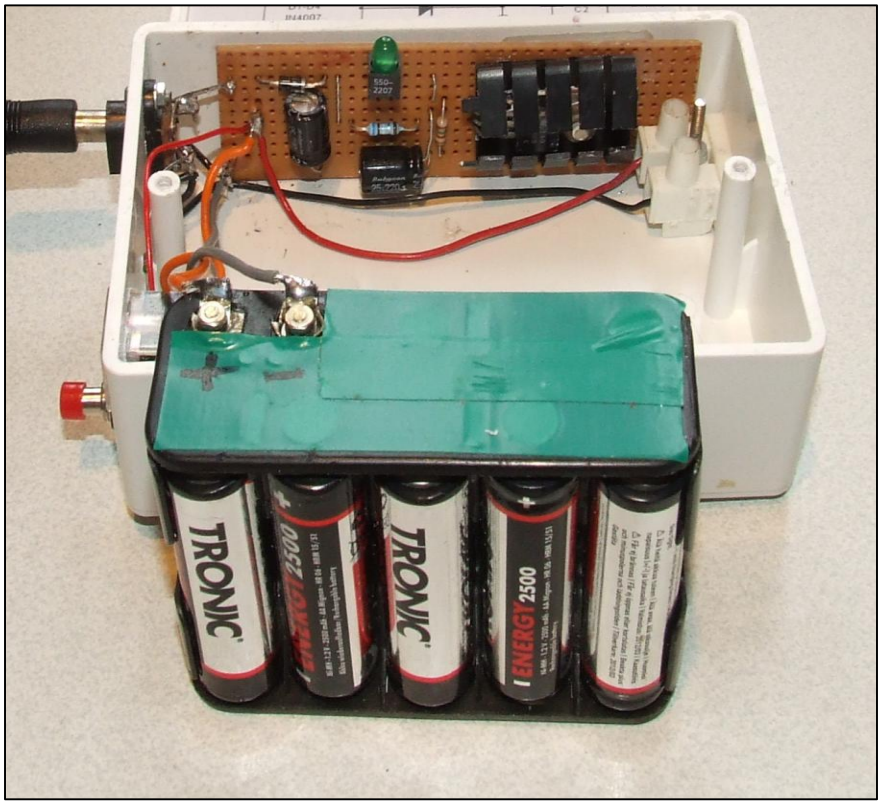
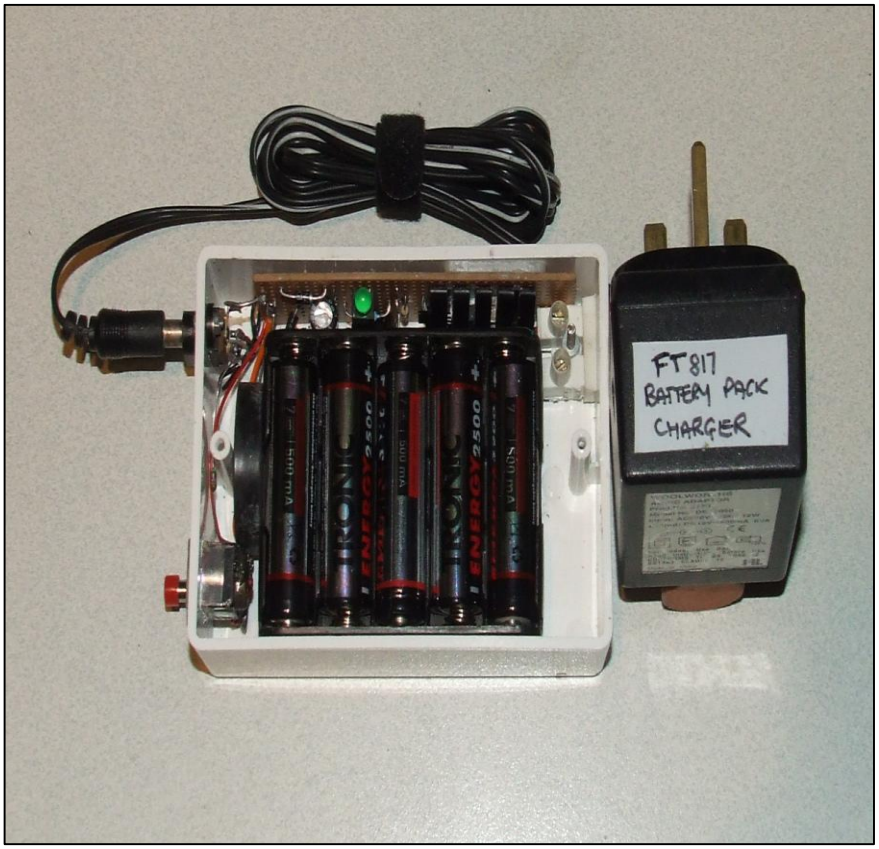


Modify the battery holder by cropping the snap-on connector and adding small solder tags fastened with 8BA bolts through the centre of the original fastenings as shown.

This reduces the overall width of the battery holder so that it does not foul the constant current charging circuit and provides a more reliable connection.

The thick green insulation tape covers the battery holder rivets that hold the spring contacts in place. This prevents any accidental shorting to the charger circuitry when the holder is inserted into the box.

The charger circuitry is built on 0.1inch Paxolin strip board. The LED is mounted on a holder that secures it so that it can protrude through a hole in the box lid. The black heat sink fins are bent over to enable the battery holder to fit inside the box.



The assembled battery box. The battery holder is held in place by the white output terminal block(top right) and by the black piece of solid rubber on the centre left.

The constant current circuit delivers 200mA so the 2500mA batteries need a long charge period, up to 16 hours minimum if not fully discharged.

With longer charging times the batteries do not get overly hot because the current eventually reduces to about 75-95mA as the batteries become fully charged.

IMPORTANT NOTE

Periodically the AA batteries should be taken out, discharged and then charged in a commercial fast charger to ensure that the batteries remain in good condition. This simple design does not have a means of detecting when individual batteries are fully charged.

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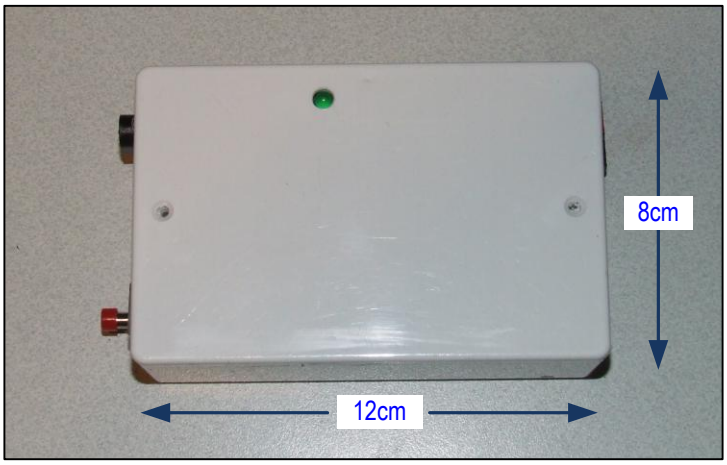
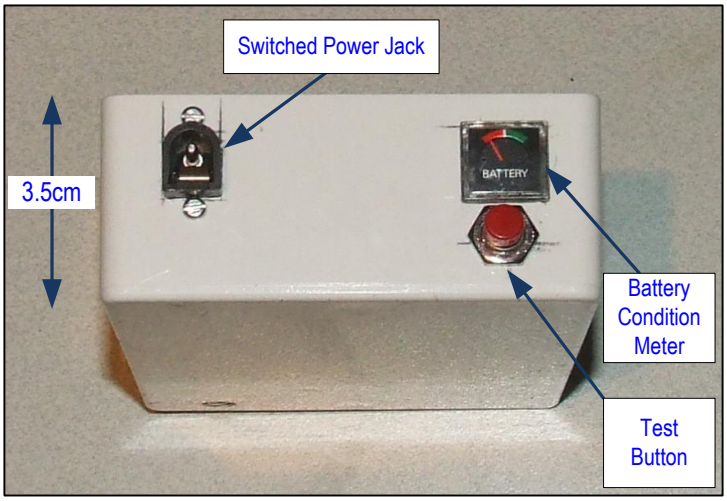
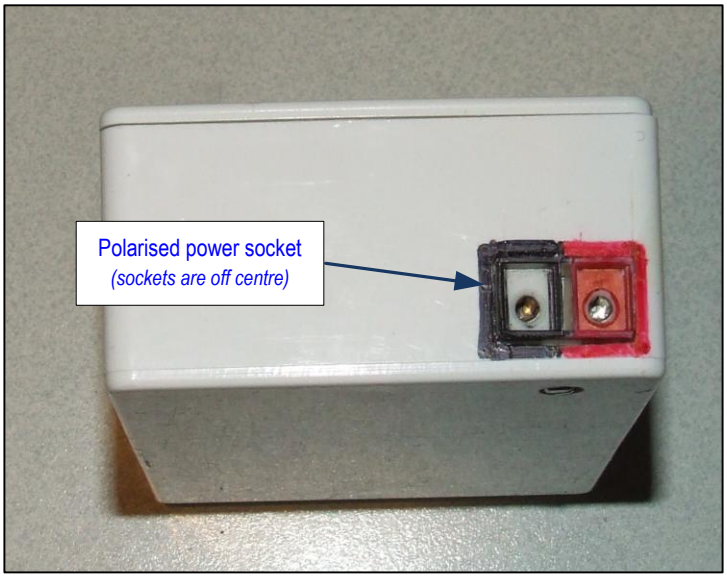


Assembled battery box (12 x 8x 3.75 cm)
total weight 450gms(16oz).

The green charging LED can be seen poking through the 6.5mm hole in the lid.



The optional small square battery condition meter from a junk box required a 13.7K resistor for a 15v full-scale deflection(FSD). The centre line indicates 7.5v which is too low for the FT817 to operate. Other meters may required different values for R3



Power connectors are a personal choice but should be polarised so that it is not possible to inadvertently reverse the power to the rig. This is an important point that avoids expensive repairs.

Bear in mind that the 10 AA batteries fully charged can deliver in excess of 10 Amps to a short circuit e.g. through a protection diode fitted across the rigs power rails and will easily burn the PCB copper tracks out.

The 12v battery box does not have a fused output, it is therefore essential that the rig's power cables have 3A fuses fitted to use this battery box.

Final Safety Note :

NiMH batteries are higher capacity and generally more reliable that NiCD batteries, but need to be treated with respect because of their very high prospective short circuit current. If abused the batteries can easily overheat, melt wire insulation and even melt the plastic case they are housed in. In the worse case the battery box might catch fire!

Build this project at your own risk.

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