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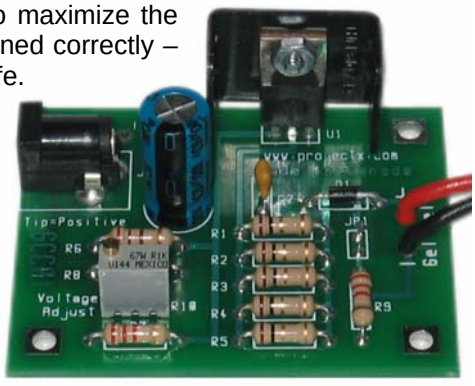
Gel Cell Charger

GCC01 – Gel Cell Charger

Gel Cell batteries have become very popular in the last few years, rapidly dropping in price to a level that experimenters can afford to have several batteries in their collection. To maximize the life of your Gel Cell battery, it is imperative they are charged and maintained correctly – overcharging or undercharging will result in a drastically reduced battery life.



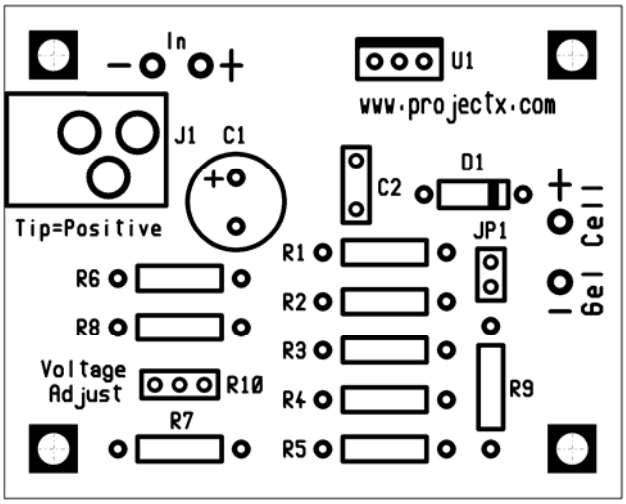
The ***GCC01 – Gel Cell Charger*** utilizes a highly accurate and effective solution, which will fully charge 12v Gel Cell batteries and indefinitely maintain your cells on a float charge. This will also allow you to leave your battery pack connected to the charger without worrying about overcharging.

Construction of the charger can be completed in under an hour by a novice electronics builder. The parts list outlines all of the required components. In addition, you will have to provide a current source to supply power to the charger board. The current source can be a standard DC wall adapter that outputs approximately 18 volts DC. The voltage of the DC adapter must be 4-6 volts more than the float voltage of the battery pack. *Failure to follow this guideline will result in regulator U1 running very hot.* Power applied at power jack ***J1*** must have the center conductor (tip) being positive and the barrel being ground. Alternately, power can be applied to the "In" terminals just above ***J1***.

The ***GCC01 – Gel Cell Charger*** has been used in a variety of applications, ranging from maintaining batteries in emergency lighting systems to charging batteries when connected to solar panels.

Although originally designed to charge 12v Gel Cell batteries, 6v Gel Cell batteries can also be safely and reliably charged. Simply change resistor ***R7*** from 2.2k-ohm to 680-ohm.

The ***GCC01 – Gel Cell Charger*** has been tested on Gel Cell (Sealed Lead-Acid Maintenance-Free) batteries. Do not use this charger with other battery chemistries such as Nickel-Metal Hydride (Ni-MH), Nickel-Cadmium (Ni-CD), Lithium Ion, or others.



Parts List

Resistors 1/2 watt, 5% Carbon Film:
[ ] (5) 1.0 Ω (brown-black-gold-gold) ..... ***R1 to R5***
[ ] (2) 270 Ω (red-violet-brown-gold)..... ***R6, R8***
[ ] (2) 2.2K Ω (red-red-red-gold) ***R7, R9***
[ ] (1) 1.0K Ω variable resistor ***R10***

Capacitors:
[ ] (1) 100uF 50v ***C1***
[ ] (1) .1uF ***C2***

Semiconductors:
[ ] (1) 1N4002..... ***D1***
[ ] (1) LM317 – Regulator TO-220 Case ***U1***

Connectors and Accessories:
[ ] (1) 2.1mm or 2.5mm Coaxial Jack PCB..... ***J1***
[ ] (1) Heat Sink for LM317 Regulator ***U1***

Initial Setup

After constructing the board, an initial alignment of the output voltage must be completed. This is accomplished by placing a jumper across ***JP1*** – this will place a small load on the charger when power is applied.

A volt meter should be placed across the terminals labeled "***Gel Cell***". Power can now be applied at the ***J1*** or the DC input area labeled "***In***". Adjust resistor ***R10***, while watching the voltage change on the output.

The optimal output voltage setting is determined by the battery pack manufacturer. The limit voltage varies by the manufacture and size of battery. The voltage must be within the range listed in the specifications for your battery in the "Standby Use" recommendation value.

For example, if the recommended "Standby Use" voltage is rated at 13.6v to 13.8v, adjust ***R10*** so the output voltage, with the jumper across ***JP1,*** is as close (but not over) the higher end of the recommended range. For this example, this is 13.8v.

Once the output voltage has been set, the jumper installed at ***JP1 must*** be removed before you begin to use the charger.

Operation

After completing the initial setup of the board, it can be used for charging your Gel Cell battery. Make certain to remove the jumper installed across ***JP1*** during the "Initial Setup" phase. The charging rate has been optimized so that a full charge will be obtained in 18 to 24 hours (larger batteries may require additional time). After this, the board will automatically switch to trickle charge mode. This will allow the battery to be left on charge indefinitely without worrying of overcharging.

The regulator used in the design (***U1*** LM317) is designed to have a heat sink attached to it. During the charging process, it is normal for the regulator and heat sink to run hot.

The case of ***U1*** is directly connected to the output of the regulator and *is not* a ground connection. Care should be taken not to allow the case to come in contact with other circuit components.

With Thanks: Many people assisted in the development of the GCC01 Charger, including extra assistance from Robert Atkinson, G8RPI.