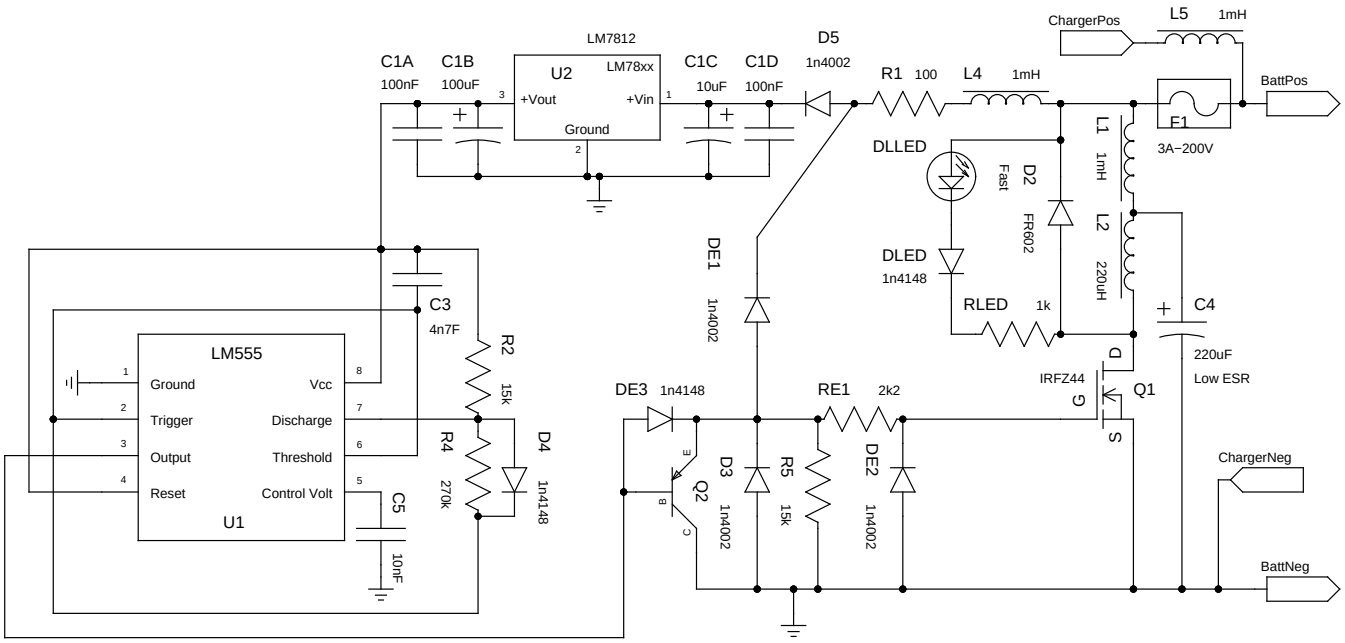
Pulse Generator For 12v Lead Acid Battery Desulfation

2011−07−23



R2 is pulse width? Can add thermistor (20k).
0.01ohm resistor in series with the negative battery terminal and an oscilloscope can show waveform pulses. Ohm's Law for current.
5" of 22g wire will be about 0.01ohm.
Add a FR602 diode in front of L5 for better protection?
Once a day, put a very heavy load (close to a short) across the battery terminals to prevent dendrite growth and cells shorting out.

This is a moderately enhanced version from previous circuits by Alastair Coputer, Ron Ingraham, and Alastair Evans. Where possible, part numbers have been kept for consistency.

L1 and L2 inductors should be at least 1amp rated (the fatter/larger the better). D2 can be doubled for higher current. C4 can be doubled for lower ESR. Q1 can be paralleled for higher current. Capacitors and other parts not protected by the regulator should be voltage rated for the highest peak the pulser can put out. This can sometimes be 3−4x the battery voltage on a badly sulfated battery. F1 probably won't provide that much protection and may be omitted by expert users. If parts start overheating, change R2 and R4 to reduce the pulse width for lower current. R2 and R4 may be pots for starting out and calibration. MOSFET gates are known to be static sensitive, so be careful. Some MOSFET gates saturate at 5v and some closer to 10v. To avoid overheating, enough voltage needs to be given to the gate for full on.

My main contribution is adding a voltage regulator to help protect and stabilize the signal level circuits. Previous zener shunt regulators are easily overloaded and do not provide quite the protection they should. A trickle charger can be added at the indicated points to help keep the voltage consistent. Given the voltage drop of the LM78xx series, a trickle charger is mandatory on a low battery. The L5 inductor should protect it reasonably well from the pulses. Increasing L4 and L5 is permissible. L5 will get hot with heavy current pulses.

DLLED should only flash when there is a pulse. Since the pulses are 1kHz, it will look like it is solid on. L1+L2 will also whine a little.

For different voltage batteries, change L2 accordingly: 24v=330uH, 36v=470uH, 48v=680uH. L1 may need to be doubled at higher voltages. R1 may need to be increased for higher voltages. Note that the LM78xx series can only take voltages so high before it will get blown. I'm guessing the 555 circuit and output should be getting at least 100mA for consistent performance.
??? L2 was increased but timing didn't seem to change? Used as a resivoir only???

Use very thick wire (18g for small batteries, 8g for large batteries) on the output high current section. For the battery hook ups, tin, crimp, and solder the connectors to help avoid corrosion problems. Keep the output wires as short as practically possible to avoid losses.

L1 and L2 need to be big enough to provide the charging and current pulses. L5 needs to be big enough to allow large currents to be received from the charger. Smaller inductors will limit this, warm up, and increase charging/desuflation time.

The 1n400X diodes can handle much higher pulse currents than the 1n4148's, but react slower. There are "UF" versions (for ultra fast) and those should be used when available. For battery voltages higher than 12v, use a 1n4002 or better.