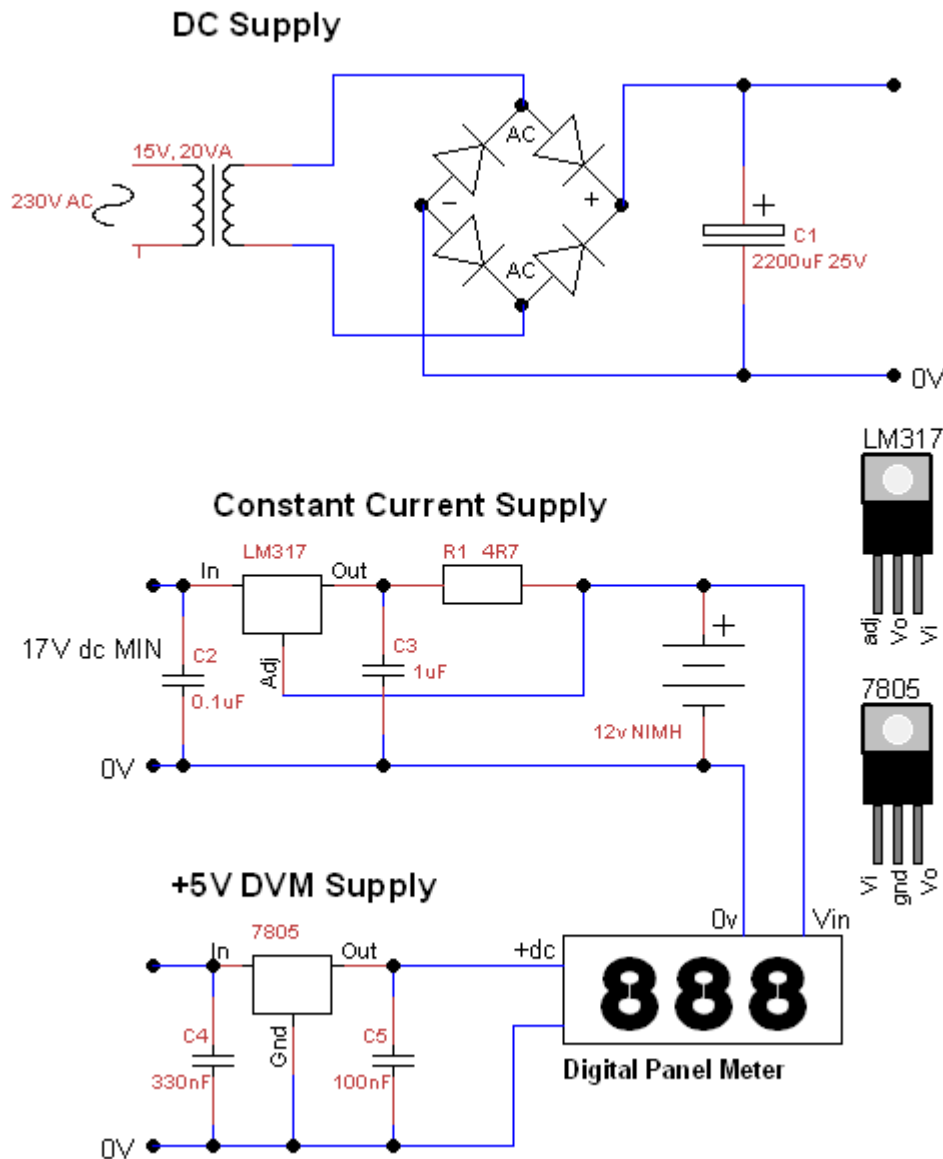


Constant Current Supply suitable for charging 3AH NIMH Battery

The simplest way of charging a NIMH battery is to charge at C/10 or less (10% of the batteries rated capacity per hour). So a 3000mAH battery would be charged at 300mA for 15 hours. At this rate, the battery can't be over charged.

This circuit is suitable for charging a 10 cell 3AH NIMH battery pack. As the charge rate is less than 0.1C (300mA) the battery should be charged over a period of approximately 15 hours. The Digital panel meter enables the battery voltage to be monitored while charging. The battery will be fully charged when the voltage reaches approximately 14.1V (1.41V per cell)



DC Supply

A 15V transformer is rectified and smoothed using a 2200uF capacitor. Alternatively a 17v regulated power supply can be used in place of the DC Supply.

Constant Current Supply

This circuit is based on the LM317 regulator. The input voltage needs to be at least 3V higher than the battery voltage. C2 & C4 limits high frequency noise on the input to each regulator. C3 and C5 stop any oscillations on the output of the regulator.

Battery Current Setting

The regulator will always set the voltage between the Adj pin and the Out pin to be 1.25 Volts (Across R1). If the current changes through the battery and hence the resistor (R1), then the voltage between Adj and Out will also change. The regulator will change the output voltage to maintain the 1.25V, and thus the current will be held constant.

The voltage between Adj and Out is always 1.25v (Vref)

Therefore the resistance (R1) to give current (Iconst) = $V_{ref}/I_{const} = 1.25V/0.3A = 4.2 \text{ Ohms}$.

At 300mA charge current, the battery pack gets quite warm when fully charged, so I decided to lower the charging current a little.

Using a 4.7 Ohm resistor: $I_{const} = V_{ref} / R = 1.25/4.7 = 0.266A$

5V DVM Supply

This provides the power for the digital panel voltmeter and is based on a 7805 +5Volt regulator.

Testing

The total current drawn by the circuit, measured by placing an ammeter in series with the output of C1 was 330mA.

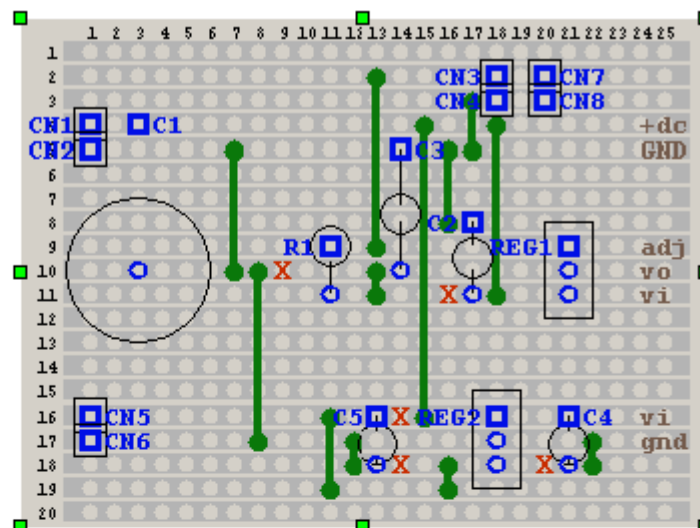
I measured the output current of the circuit for three conditions.

1. Short across output with battery removed
2. Flat battery in circuit and charging (11.5V)
3. Almost fully charged battery (14.0V)

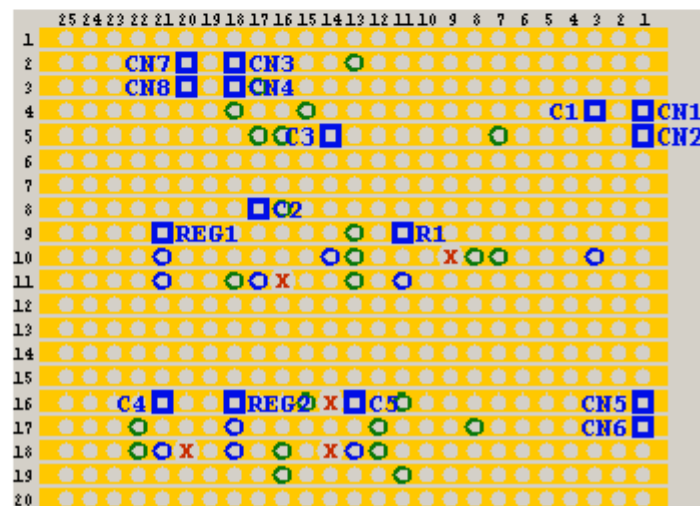
In each case I measured a current of approximately 264mA. This compares favourably with the calculated value of 266mA. The measured voltage between Vout and Adj of the LM117 was 1.25V as expected.

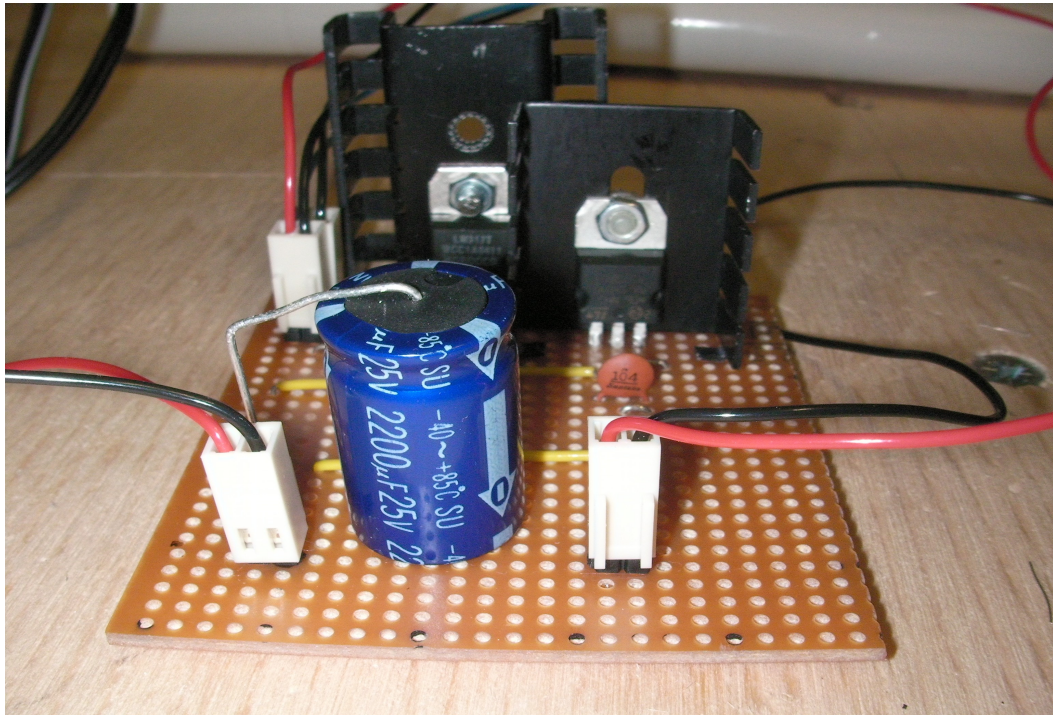
Stripboard Layout

Top - Board View

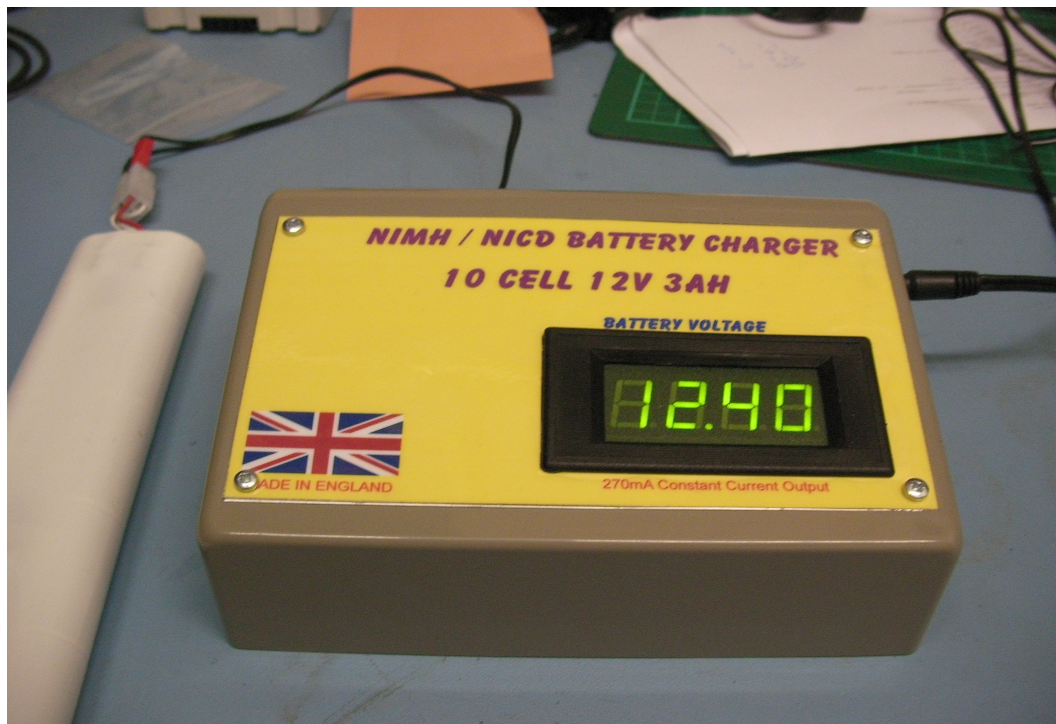


Bottom - Track View





The finished Charger



The Charging characteristic of the battery

