

# A Timed Fast / Trickle Charger



Having bought 9V6 3000mAh and 12V 4000mAh NiMh batteries, I needed something to charge them with.

I tried a couple of dedicated charging chips without too much success, they would either cut out before the battery was charged fully, or if restarted wouldn't cut out when the battery was full.

I couldn't see what I was doing wrong with them, so decided to go back to a straight forward constant current charger.

The circuit uses an LM317 as a constant current source, with switched resistors to give two fast rates and two trickle rates, which are a fair compromise that enable me to charge the new batteries, or packs of 2300mAh AA cells.

It uses a simple timer to terminate the fast charge, at which time it switches back to the selected trickle charge rate.

If the battery had been run down, it is easy to charge it for the correct time, and if it had only been lightly used, an estimate is made of how much had been used.

The timer circuit uses a "parking meter timer", which was a key ring with a timer that can be set in 15 minute intervals, at the end of which it beeps. The beep signal is taken off and used to switch an op-amp.

The op-amp has a generous amount of positive DC feedback, so that once it is switched, it stays in that state until a signal is applied to switch it the other way.

The start button is used to start the timer, and switch the op-amp output high, which drives a relay that bypasses the trickle charge resistors, putting the charger into fast mode. At the end of the timed period, the beep from the timer is applied to the op-amp, switching its output low, opening the really putting the trickle charge resistors back into circuit.

The circuit can be used to charge one cell or a battery up to 18V when using a 24V supply.

The lower the voltage of the battery being charged, the more heat the LM317 has to dissipate.

I used a CPU heat sink and fan, and it will stay within limits with a direct short across the

charging terminals. I put an resistor in series with the fan to lower the speed and noise until it would just do the job. When charging the 12V battery it stays very cool. The 7812 regulator also needs a fair bit of cooling, the heat sink sits just behind the fan when the two halves of the case are assembled, and the air is drawn in from the front bottom of the case, thus flowing over the 7812 on its route and then out the back of the case.



