Subject: Recovering Old NICAD/NIMH Cells

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To : TECH@WW

(Updated Feb 04)

Old Nicads batteries & sometimes NMHI batteries usually end up with several cells being short circuit, as they suffer from crystal growth in the electrolyte. This is often called the memory effect as a battery with 1 cell shorted seems to have very short life as the battery voltage is unusable soon after charging. The chemistry of NMHI batteries are supposed to be more immune to this problem but often they are not!

To reclaim the cell before charging, (as normal charging will not remove the short) a very high current pulse must be used.

With a sealed battery pack this can blow any internal safety fuse! So it is best done when U have opened the pack. The good cells will withstand the high current OK, but having them in series can reduce the current pulse depending on how you are applying it, if you have a really bad cell.

Current up to 10 x C (e.g. 5A on a 500mAH AA cell, 40A on a 4AH D cell) can be safely applied until the pack warms up, (this is how fast chargers detect 70% charge & drop back to trickle).

For more difficult cells, current over 10 x C may be required, this can destroy the internal cell wires, but you have nothing to loose! Charge up a large capacitor e.g. 10,000uF to say 40V & connect to cell (computer must not be nearby! & mind the sparks) with thick wires, the few 100A of pulse current usually clears the short after a few pulses. This method is less likely to fuse the internal connections than putting the cell across a car battery!

Once all the cells are over 1V & stay there for a while, then trickle charge (Cx0.1) until warm or 14 hours. A few cycles of discharge & charge will normally bring back old cells to 100%.

If the capacity is less than 100% after a few cycles or there is excessive volt age (>2V) across a cell when charging, it is O/C or dry & will need to be replaced.

Tony, G8TBF@GB7NND says cells going short due to crystallisation is not due to the electrolyte but the cadmium electrode; cadmium has a property of 'cold crystallisation' (like Tin & Zinc) and can form 'needle' type spikes that bridge the cell.

The way to prevent this is to occasionally give the cells a long charge at a low current (<= 10 hour rate). This dissolves any 'needles' and replates the surfaces.

The other effect of the cadmium crystallisation is the 'memory effect' - this happens when cells are not fully discharged for long periods, and is caused by the 'deeper' parts of the cadmium plate crystallising.
The effect is that once the amorphous metal on the surface of the plate has been dissolved during discharge & the crystalline part is exposed, the cadmium is much less reactive - a crystalline structure simply does not break down as easily as amorphous metal.

The cure for 'memory effect' is to deep-discharge the cell, by connecting (e.g.) a 10 ohm resistor across it and leave it until absolutely dead.
Normal recharging will then give full capacity & no 'memory'.

Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP
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