

NiCd's - Did You Know?

by Dick Sutton

Modern NiCd batteries are pretty amazing. We R/Cers seem to ask an awful lot of our batteries these days: we charge them up, go out to the field, fly around for awhile, then back home again to the charging shelf. I for one have NiCd's all over the place. There are our transmitters and receivers; then how about the starters and glow drivers, not to mention perhaps several rechargeable devices on our workbenches. We too often take these batteries for granted. We all know that the well-being of our planes are dependent on the condition of our battery packs, but:

Did you know that - NiCd cells have a sort of 'memory'? If a cell is not fully discharged and is repeatedly overcharged, it will behave as if it 'remembers' the amount it has been used.

Did you know that - this 'memory' condition can be repaired by repeatedly discharging and then recharging the battery? This is known as 'cycling' your batteries. But as always, there's a 'gotcha', read on.

Did you know that - a battery can be destroyed by discharging them too completely under a passive load? The optimum discharge of a NiCd in good condition is about 90%. Discharging beyond this point reduces the number of recharge cycles and therefore the life of the battery.

Did you know that - the optimum (safest) overnight charge rate is 1/10th of its capacity? This is usually denoted as C/10. The optimum discharge rate is also C/10. For example: if your battery pack is rated as 500 mAh (milli-amp hours) then the best charging rate is 50 mAh. You will notice that most commercial overnight chargers are rated at C/10. 'Smart' chargers are now challenging this practice (see below).

Did you know that - worn-out NiCd cells account for approximately one half of all the toxic Cadmium in U.S. landfills. Recently, we have been hearing a lot about NiMH (Nickel-Metal Hydride) technology in the headlines. This is an alternative to NiCd cells that does not exhibit the memory problems associated with NiCd's and is less toxic and is therefore more environmentally acceptable but does not hold a charge as long as NiCd cells. NiCd cells lose about 1% per day while NiMH cells lose about 2% per day. Bottom line - don't expect NiMH to solve our rechargeable battery problems.

Did you know that - NiCd cells go through three stages during a charge cycle? First, nearly all the electrical energy supplied is transformed into a form that can be later discharged. Second, as the battery approaches a full charge condition, more and more of the charging energy is wasted in the production of oxygen. Our R/C NiCd cells usually have a vent hole; however, too rapid a rate of charging may cause the cells to explode! Third, after the cells have reached a 'full charge' condition all of the charging energy goes into the production of heat and oxygen. If the rate of charge is just low enough then the gas produced recombines as quickly as it is produced. This 'steady state' condition is known as 'trickle' charging.

Did you know that - when a NiCd cell reaches an overcharge state that the voltage across the battery terminals actually decreases instead of increasing? Overcharging produces oxygen and heat, as mentioned above, which reduces your batteries life span. New 'smart' chargers are taking advantage of this by monitoring the voltage level during charging. Some can even predict the conditions for reaching a full charge by sensing a leveling off of the voltage. They then switch to 'trickle' mode with the added benefit of not reducing the number of charge/discharge cycles in the battery's life span. Sometimes, a full charge can be accomplished in as little as one to two hours. The challenge here is to minimize the charge time without damaging the

battery and then to switch into a maintenance (or trickle) mode.

The bottom line to this article is that we all need to pay a little more attention to our battery packs or one day they will provide us with a nasty surprise. There are a zillion (i.e. lots of) after market devices that can help you out from very simple (aka cheap) to very complex with all sorts of bells and whistles (aka expensive). Choose the one (or ones) that fit your needs (and pocketbook). Good flying and 'may the charge be with you!'