

Care and Feeding of Batteries for RC

NiCAD

Recommendations:

Always trickle charge a new NiCAD, even if it's a fast charge type. A trickle charge is considered C/10. That is, one-tenth of the rated capacity. A 900 mah receiver pack should therefore be charged at no more than 90 milliamps. Supposedly, this conditions the pack (by giving it a "normal" and stable voltage curve) so it can be accurately charged with a peak-detection type charger.

Never charge NiCAD's at more than 2C (twice their capacity) unless they are specifically rated as a fast charge cell. (In which case you can go as high as 3C). NiCAD's also will discharge when sitting at a fairly high rate (C/50) so always charge or top them up right before flying. Don't just leave them on trickle, however, as some say this shortens their life.

Some people recommend charging NiCAD's only with chargers that are also designed to charge NiMH type batteries. Apparently, these chargers are much more sensitive to the peak voltage surge and are better able to prevent overcharging.

If you are noticing shorter life, the batteries may need restorative cycling or possibly replacing. Certain chargers have a discharge function and can tell you how many amp hours the cells gave up during the discharge. If the amp hours drops down below 80% of the rated capacity, its time to retire them if cycling doesn't cure them. Some cautious flyers replace any battery older than 3 years.

NiCAD's can suffer from "memory". Not the loss of it, but the gaining of it. If you never fully discharge a NiCAD, it will load up with crystal formations and refuse to discharge below that point when you finally ask it to. This is often curable by cycling—a sequence of three full discharge, charge cycles.

NiCAD's should be charged to at least 140% of their rated capacity. Some people go as high as 160%. To see how long this will take with a 1800 mah battery:

140% of 1800 = 2520. If your trickle charger puts out 125 milliamps, then it will take $2520/125 = 20.16$ hours to charge to 140%. To charge to 160% (better), it will take $1.8 \times 1.6/125 = 23.04$ hours.

Used up NiCAD's should be taken to recycle center as the cadmium is quite toxic.

NiMH

The biggest advantage of NiMH over NiCAD's is their energy density. For the same weight, you get twice the capacity.

Always trickle charge a new NiMH to establish the initial stable power curve. Never charge a NiMH past 2C. To be cautious, never go past 1C. **NiMH are much more vulnerable to overheating than NiCAD's. They do not have the memory effect of NiCAD's, however, so do not need to be discharge/charge cycled. Avoid deep discharging in general. They do, however, self-discharge when sitting around—much more so than NiCAD's. Therefore, always top them up right before flying, not the night before!**

Never use a dedicated NiCAD peak charger. They are generally not sensitive enough to detect the peak voltage of a NiMH, and will thus deeply overcharge the battery before shutting off, ruining these type of batteries.

NiMH batteries are environmentally friendly and can be disposed of in regular trash.

Lithium Polymer

The biggest advantage of LiPo's over NiMH is about the same as of NiMH over NiCAD's!! That is, they weigh about half of a NiMH for the same capacity. **Another big benefit is they exhibit very little self-discharge. You can charge a lithium up literally weeks before you fly with them and experience very little capacity loss.**

CAUTIONS:

Never use any charger other than one designed specifically for Lithium batteries. These batteries are very sensitive to overcharging—they are easily ruined and may even swell, burst open and subsequently burst into flame! The best chargers are those that require a manual setting, but also have automatic detection of cell count to override an error. Always check to be sure the voltage is correct for the cell count before walking away from the charger—and don't leave Lipo's completely unattended at any time. You need to be around to be sure the packs aren't starting to swell up. If they are, something has gone wrong with either the pack or the charger and you need to unplug NOW! Because of the potential for delayed chemical reaction, place the swelled battery in a metal box or outside for at least 15 minutes before handling it again. It is also recommended that you do this if the battery has been in a crash or otherwise mistreated!

You can stop and restart the charge cycle (which you should if you need to be away for a while) without screwing up the charger's ability to detect the peak. The charge time is simply extended.

Charge a new Lithium battery at no more than .5 amp (500 mA), checking constantly for overheating. If it stays cool, increase subsequent charges to as much as 1C.

I always charge (and transport) my Lipo's in a steel box—just in case. I also keep a bucket of sand and/or a ABC fire extinguisher nearby. (Never use water to extinguish a Lipo fire because it probably won't!) Never charge a Lipo (or probably any other type of battery) while still in your plane!

Automatic chargers charge at 1c and shut off charging at 4.25 volts per cell. Never charge a Lipo at more than 1C or the capacity and life cycle times will be reduced. Also notice if its taking longer than usual for the pack to recharge—this could indicate a damaged or decayed cell and should be retired.

If your charger has a temperature probe, use it when charging lithiums as they are very sensitive (and potentially dangerous) to overheating. Set the temperature cutoff to 100F (37 C)

They are also very sensitive about how they are discharged. Never take them below 3 volts per cell. If you do, they won't blow up, but they will loss a significant amount of capacity.

Always store lithiums charged up to at least 50% capacity, and recharge unused cells yearly to prevent over-discharging during storage.

Lipo's are environmentally friendly disposal wise. Its recommended that they be fully discharged, however, before discarding to prevent fires due to shorting the leads.

General Notes on all Batteries:

Regularly inspect packs (unwrap if necessary if suspicious) for swelling, leakage and/or corrosion.

Never leave them sitting in direct sun. In fact, don't leave them in your car at all during the summer.

Never charge motor battery's hot. Wait until they cool down to the touch. (under 100).

Store batteries when not in use with some charge left in them.

When soldering on plugs on battery leads, be careful not to touch the wires together. I always keep one covered while I'm soldering the other. Remove any rings on your fingers. REALLY!

Don't let your kids or pets poke them with sharp objects (or shoot them with BB guns etc!.).

If the cells are punctured and you get electrolytes on your hands, it will try to burn you. Immediately rinse with soap and water. Rinse out of eyes with cold water and then go to the ER.