

<https://www.rcgroups.com/forums/showthread.php?2863122-A123-LiFe-performance-as-Receiver-Battery-Packs>

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A123/LiFe performance as Receiver Battery Packs

I've posted information on the use of these A123 or LiFe two cell receiver packs as a reply to user questions many times in RCGroups. Perhaps, a general thread will help on how these cells work and can be used for receiver/servo purpose.

Those A123/LiFe's are a near perfect replacement for a 5 cell Nih AA size receiver battery pack. But, for the larger models, these LiFe/A123's far outperform the Nih packs when pulling higher currents. I've got test results on my Western Mountain CBA battery analyzer that shows what happens to a Eneloop battery with 6 Amps load. It nearly instantly dropped below 4 Volts DC on a 5S Eneloop. I've also got test results on a 2S A123 pack at 32 degrees F. It's voltage dropped an extra 0.45 Volts DC at 12 Amps, compared to 70F.

Not to mention what effect temperature has on these Nih packs. Their performance really drops off at below freezing temperatures. Before retiring, our company purchased some 600 24 Volt NiCad battery packs per month for our outdoor equipment. They had to be certified to operate down to minus 40 degrees, and be able to put out 15 Amps at 22 Volts DC. These Nicads were specially built for us. One pack was over \$900.00.

The A123's and similar LiFe's have a lot of very good qualities when used for receiver power. Voltage sagging with heavy duty servos pretty much becomes a non-issue. I've checked A123's at 32 degrees F, and they still worked very well. There is no issues with fire hazard, no issues with storage voltages, no issues with charging procedures. That's the good news.

But A123's do have a very flat discharge curve, varying only a percent or three of voltage from 80% to 20% state of charge. And, using a multimeter is not very useful to determine the battery packs state of charge. (Nothing new here, Nih packs are somewhat similar with the voltage versus state of charge)

So, other means must be used for these packs. These cells are very efficient in recharging. If you pull 1000 mah OUT of the pack, it will take around 1050 mah to recharge it. I use my "50%" rule on these cells for receiver power. That is to **NEVER, NEVER, NEVER** take more than 50% OUT of the battery pack during any day's flying. For a 2500 Mah A123 pack, that drops its EFFECTIVE capacity to 1250, for a safety factor of two.

So, to determine what is safe, take your A123 pack, charge it up, and go fly, putting three flights on your pack. Then, field charge the pack and check how many milliampere hours were put back **INTO** the pack. If the receiver pack took 460 Mah, that is $460/3$ or 153 mah PER FLIGHT. With the effective capacity of 1250, divide that by the 153 mah per flight, and you get a maximum of 8 flights, with the safety factor of two.

If you're in need of more capacity, either field charge after 8 flights, or use a dual A123 2500 Mah pack. For 30 to 50 cc gassers, my RC members are using dual 2500 A123 packs, each with their own receiver switch, each with their own connection to the receiver power input. They are finding that each flight pulls around 250 MilliAmpere Hours OUT of the battery pack. With dual A123's and 5000 Mah capacity, they have enough battery capacity to pretty much fly all day.

And, as a matter of practice, top them off after every day of flying, so you'll always know their state of charge. And, if there is any question, just top the battery pack off again. A fully charged A123 pack will top off in a couple of minutes.

Now, after the days flying is finished, take your model home, charge the receiver battery(s) with any quality charger. Record the number of MilliAmpere Hours it took to recharge it. Once both cells hit 3.60 Volts DC, it's charged. Simple as that. Now, the model is ready to go next day, next week, next month, don't matter much. A123's hold some 95% of their charge after a full year on the shelf. And, they will last many years in service. As a comparison, a two cell 2500 Mah A123 pack weighs about one ounce more than a five cell "AA" size Nih pack.

Your results can and will vary. Run your own numbers on each type of model you're flying. Flying a sailplane with small control surfaces will require much less mah per flight than a 50 cc, 3D gasser with its giant control surfaces that can rotate 45 degrees.

A couple of my RC members are flying 150 cc twin cylinder gassers, and are using a pair of 2S2P 5000 Mah A123 packs. These packs are wired with #16 wire, leading to a power panel for distribution to the large number of high powered digital servos used on these size models. The average current pulled by the receiver and servos on these models is some 4.5 Amperes. Yes, 10,000 mah is overkill for receiver power on these giant models, but they will never have to worry about sufficient power to the receiver, and those powerboxes that are used with them.