

The care and handling of A123 battery packs.

A123 batteries are Lithium Nano Phosphate chemistry. They have the following characteristics.

High current output, up to 60C (C=capacity of the cell in milliamp hours).

Fast charge capability, can be charged at up to 10 amps.

Rugged laser welded aluminum can.

Little or no self discharge, charge them today and they will still have 95% of their charge in 3 months.

Can be discharged/recharged 1000 times minimum.

3.3v per cell nominal voltage **Voltage regulators are not required on receiver installations.** A 2 cell A123 pack is approximately the same voltage as a 5 cell NiCd or Nimh pack and can be used anywhere that a 6V Nimh pack would apply.

Charging--A123 packs must be charged like any lithium cell using a charger that complies with the CCCV protocol. The difference between these cells and Lipo or LI-Ion is that the charge must cut off at 3.6v per cell instead of the more common 4.2v. You must use a charger that has this capability. It is permissible to overcharge A123 cells up to 4.2v per cell, however this will not add more power and repeated overcharging will significantly reduce the cell's life span.

How do I check A123 packs? A freshly charged 2 cell pack will have a voltage around 7.2 volts, basically the same as a freshly charged 5 cell Nimh pack. The A123 pack will rapidly decline under any load to 6.6 volts and will then hold at 6.4 to 6.6 volts until it is nearly depleted. Therefore **it is not possible to determine the charge state with a voltage tester, not even one with a substantial load.** The only way to determine how much battery is left is by calculation.

You can expect a fully charged 2300mah pack to be able to supply about 20 amps and stay at or above 5.00 volts for a capacity of 2000 mah. When you have drawn over 2000mah expect the voltage to drop off rapidly.

Here is how to determine the charge condition of your pack. Starting with a freshly charged battery pack either devise some type of discharging circuit like a light bulb or use it in your airplane. Assuming you are using it in your plane on your radio receiver/servos make one flight with your plane. Recharge the pack and observe how much power is added to the pack, it will probably accept something like 200mah on a small plane up to maybe 500-600 mah on a large plane and a long flight. Now, with your freshly recharged pack make two flights and recharge again. The amount of power added should be roughly twice what you use on the first flight.

You can continue this procedure to 3 flights. At this point you should have a good idea of how much power your plane uses per flight. Since a single 2300mah pack will deliver full power up to about 2000mah, I have a rule that I never start a flight if my calculations tell me that I have used 75% (1500mah) of available capacity. With a plane that uses 300mah per flight this would

mean that I can make 5 flights with plenty of safety margin but my rule says recharge before making a sixth flight. Using this rule I have never had a battery failure in 2+ years.

If you are using dual battery packs then the capacity numbers will double, but you should charge the packs separately and observe how much power each pack will accept. If you find a significant difference you should account for the difference before venturing too far into discharging.

Caution do not fully discharge-- A123 packs like any lithium battery must not be fully discharged. **If you discharge the pack to less than 1 volt per cell it is likely that you will ruin the battery/pack and the warranty will be voided.** So be careful not to leave switches on after you are finished using these batteries.

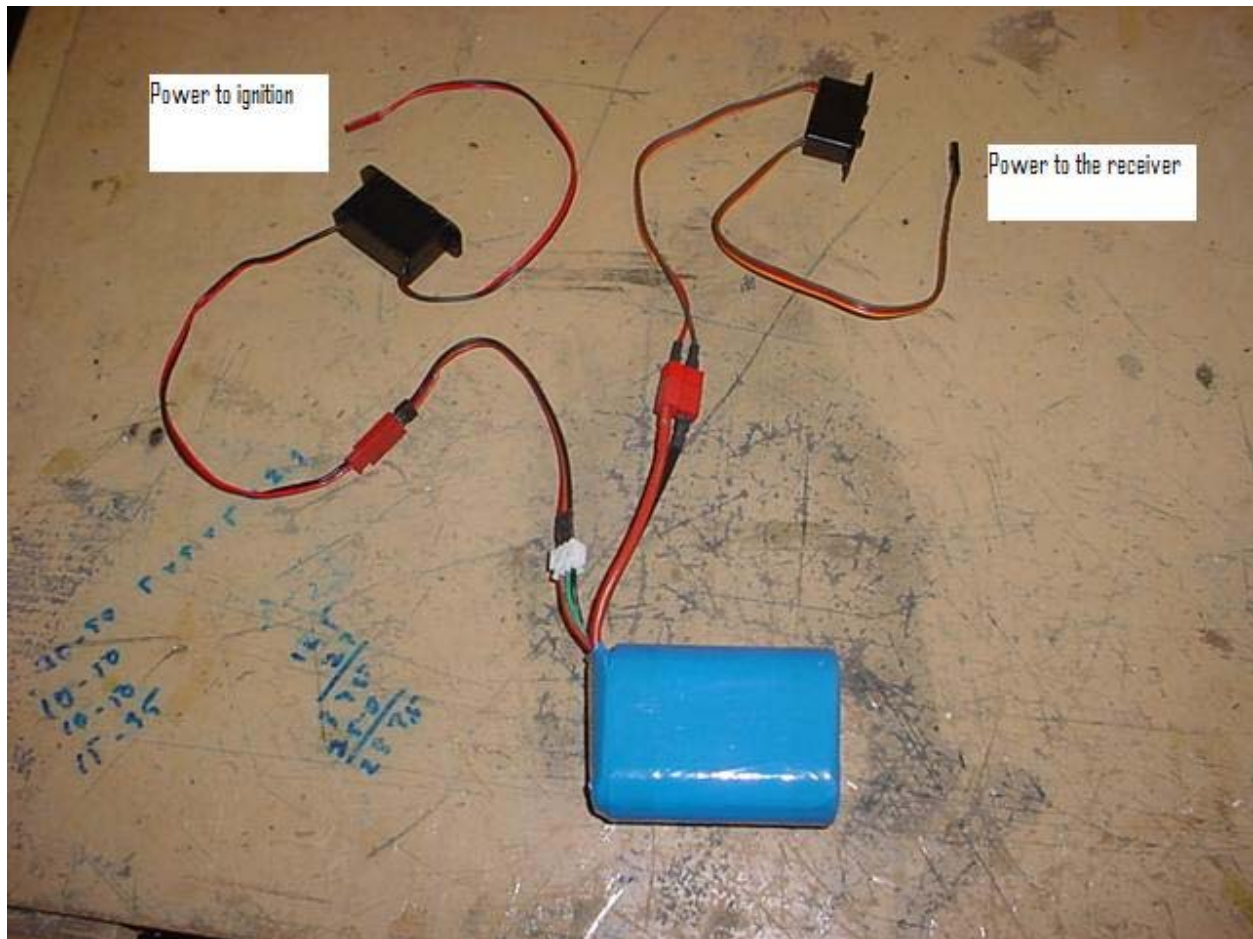
Balancing-- A123 packs do not need to be balanced at every charge, but you should balance them when charging whenever possible. This will prevent a condition where one cell can get slightly out of balance and then gets progressively worse at each charge. Nothing is hurt to do the occasional unbalanced charge but balance whenever possible to keep get maximum life from your packs.

Connections-- The packs that Wild Hare supplies have 2 leads. One is a heavy duty 16 gauge 2 wire lead with a Deans connector. This lead is normally used to supply the receiver. If you are using a switch it should have a mating Deans connector to minimize losses from electrical resistance. In this case a Smart Fly super switch is an excellent way to go because it has the Deans connector on a heavy duty 18 gauge input lead and 2 output leads which can be plugged directly into a receiver. Normally you can use any two slots/ports on a receiver to supply power. Using two connectors minimizes resistance losses and also provides some mechanical redundancy in case a connector were to come unplugged. With the super switch you can charge through the charge-jack in the switch.

The best way to power a large R/C aircraft is to plug directly into a **power expander , we recommend the Smart Fly power expander pro** or similar product. The PE-pro has an integrated fail-safe switch which eliminates the need for a mechanical switch and yields the ultimate in performance and reliability.

The other lead is a 3 wire lead that is used for balancing. Charging (with the Top-Modeltech charger that Wild Hare sells) is always done through the heavy duty 2 wire lead. If you want to balance then you will have to also plug the 3 wire lead into the charger and set it to balance.

Battery packs are always equipped with a balancing lead. We supply an adapter cable that converts the balance lead to/from a female servo connector. Please note the arrangement of the wiring on your pack, it should have a label attached which denotes how the 3 wires are arranged. If you are connecting this adapter to something be sure of what you are doing, some devices connect the signal wire (directly or indirectly) to either +v or ground which would cause a short circuit. If in doubt you can just use two wires.



The photo above illustrates how one would connect a single 2 cell A123 pack to power the receiver of a small (30cc size) plane and the ignition system of its gas engine. Note there are two switches that are powered from two leads from the battery pack. The switch which is connected to the heavy duty lead/Deans connector powers the receiver and servos. The other switch connects to the engine's ignition box.

Note that it is the user's responsibility to thoroughly test the radio for interference from the engine while the engine is running. We have used this arrangement of components extensively and it has never exhibited any abnormal behavior with many of the popular 2.4 ghz. radio receivers, however, only you can make the determination that it is safe to fly.