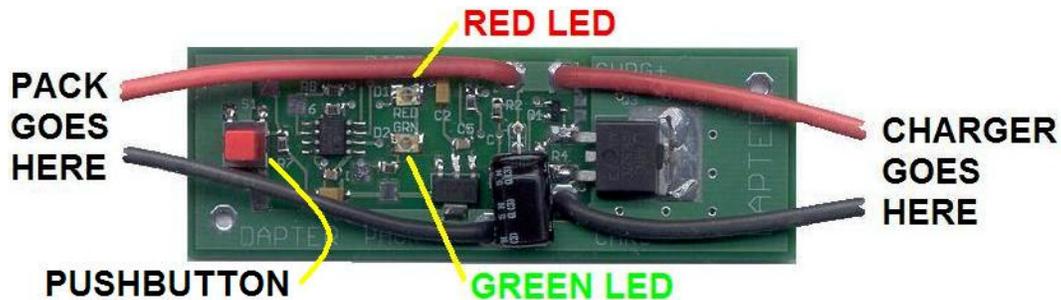


Dapter Instructions

(a.k.a. LiPoDapter+)
Including Dual Dapter



!!!! IMPORTANT !!!!

Hopefully you have read the warning instructions that came with your LiPo pack. These cells can cause a lot of damage if not treated properly. This is not an urban legend. You need to pay attention to what you are doing. The *Dapter* requires you to pay some attention to what you are doing. You are ultimately responsible for what happens to your packs and whatever might catch fire nearby. Don't leave charging cells unattended!

It's a good idea to observe your charger when you first use your *Dapter*. Most chargers have a voltage readout. These are generally not as accurate as a voltmeter, but will at least indicate if the charge is not going to terminate at 4.2V/cell (3.7V for M1 cells). You can also use an Astro Whattmeter to monitor. When charge is complete, check pack voltage with a digital voltmeter. Reading should be 4.0-4.2V/cell (3.5-3.7V for M1 cells). It's always a good idea to charge in a "containment vessel" such as a Pyrex baking dish with lid.

Overview

NiCad cells have been the mainstays for electric model power. These cells are normally charged with a constant current source, typically in 20 minutes. End of charge is detected as a decrease in the previously increasing voltage. This is referred to as peak detection. Most of us are heavily invested in chargers that can charge large numbers of NiCad cells at high currents. NiMH has also become widely accepted. It's behavior is almost identical to NiCad, with a somewhat less pronounced peak and a one-hour charge recommendation for long life. Most NiCad chargers can charge NiMH as well. Now we are faced with a new technology with a very different chemistry. LiPo cells must be charged to a fixed voltage. This is generally done with a current-limited voltage supply of 4.1V - 4.2V per cell [for our discussion, cells in parallel are considered as a single "cell"]. The current is usually limited to no more than 1C. For example, a 2 amp-hour capacity cell would be charged at no more than 2 amps. As the cell voltage approaches its desired value, the charge current tapers off to zero. This process takes close to two hours. If these cells were charged on a NiCad charger at 1C, they would reach 4.2V/cell in less than an hour. Unfortunately, there is no voltage "peak" to detect and the cell voltage continues to increase until the cell is destroyed. *Dapter* monitors the pack voltage until it is a tad less than 4.2V/cell and then abruptly disconnects the pack from the charger. After the charger is disconnected, the pack voltage "sags" over the next few minutes until the final value of 4.0-4.1V/cell. This is nominally 80-90% of full capacity, with full capacity defined with a starting voltage of 4.2V. *Dapter* typically gives 85% charge. Is this bad? Would you rather wait an hour for a 17-minute flight or two hours for a 20-minute flight? Some battery pundits are now recommending charging to 4.0 - 4.1V/cell for longer cell life.

Dual Dapter

The *Dual Dapter* is two identical *Dapters* with switches and a common charger connection. Operation is identical except for the switches, which will be explained later.

Connectors

Attach whatever connectors you need to mate with your charger and packs. Please get the polarity correct and the right connector on the right end. The end of *Dapter* with the pushbutton connects to your packs. NOTE: do not allow the charger end leads to touch each other with a pack connected. This can result in the destruction of your pack and/or your *Dapter*.

Early Charge Termination

If your charger shuts off without a steady **GREEN** LED indication, there are a number of possibilities:

- If the **RED** LED is still blinking, your charger probably timed out or somehow got fooled. Try starting it again.
- If the **GREEN** LED is blinking, **Dapter** got unhappy for some reason and reset itself. The pack is not electrically connected to the charger.
- If the **RED** LED stays on, **Dapter** is REALLY unhappy. The pack is not electrically connected to the charger. If this happens frequently, let us know.

If you want to terminate the charge via **Dapter**, hold down the pushbutton until the LEDs flash. The unit is reset and the pack is not connected to the charger. You can repeat the activation sequence without unplugging everything.

Cell Count

LiPo chargers employ either manual or automatic cell count selection or a combination. Every method has its pros and cons. **Dapter** uses an automatic detection algorithm based on the pack voltage. The thresholds are set so that the only way it can think the cell count is higher than it really is (**very bad**) is to connect a pack that has been overcharged (>> 4.2V/cell). This means that sometimes it will indicate a lower cell count (safe, but won't charge enough). This occurs when a pack has been highly discharged, and normally only for higher cell counts. It is your responsibility to increase the count manually and **verify** the correct count. **Dapter** decides the cell count the first time it blinks the count and does not change it's "mind" unless you tell it to. You should verify the "GREEN" count before going to "RED" mode, and then again in "RED" mode.

M1 Cells (A123 Systems / DeWalt 36V)

A123 Systems has introduced a new lithium technology that promises greatly increased safety and longer life. These were first introduced in DeWalt 36V power tools. Check out www.sikelectronics.com/DeWalt/. They require a significantly different charge cutoff. The **Dapter** is designed to provide this capability. The manufacturer recommends that these cells not be charged on LiPo chargers. The **Dapter** will allow charging of M1 packs with LiPo chargers, provided the charger can be set for a fixed "S". The Astro 109 sometimes will not set itself for a high enough cell count. This is not a problem with the charger. It is simply trying to keep you from ruining a LiPo pack. M1 cells can be charged with a 109, but not as easily as when using a good NiCad charger.

To charge M1 cells, press and hold the pushbutton immediately after plugging in the pack (during RED-GREEN-RED). The LEDs should begin rapidly alternating RED-GREEN. Release the button and operation proceeds normally, except that different cutoff voltages will be used. If you don't see the rapid flashing, you were too slow. Unplug and try again.

Do not charge M1 cells if you do not see the rapid flashing. When holding down the button to start charging, the RED LED will flash rapidly to confirm that you are in M1 mode. **Do not** charge M1 cells if you do not see the rapid flashing. You can charge M1 cells at the maximum current your charger can supply, up to 8 amps. Packs can be charged in less than 20 minutes.

Balancing

Balance refers to how close the individual cell voltages are to each other. It is important for both LiPo and M1 packs to be in balance when charging. A severe imbalance can cause damage to the pack. That being said, there are different levels of paranoia when it comes to balancing. At the one extreme there are those who never balance packs. Indeed, many early packs had no access to the individual cells to check. At the other extreme are those who feel the need to balance their packs with every charge. Our personal experience has been that these packs stay in balance for a long time unless abused. Whatever your preference, note that checking the balance of a discharged pack is a waste of time. The critical matching should occur at or near full charge. Most balancers can be used during charge or after.

Capabilities/Charger Requirements

Dapter is designed to work with 2S to 8S LiPo packs and 2S to 10S M1 packs. It is rated for 8 amps charge current.

Dual Dapter is designed to work with 2S to 6S LiPo or 2S to 8S M1 packs (per side) and one side can do LiPo while the other is doing M1. It is rated for 8 amps charge current. Keep your unit out of direct sunlight. If your charger can function well charging 18 NiCad cells, it should handle 6S LiPo packs just fine. Astro 112Dx and Triton will handle 10S M1 and 8S LiPo packs. Note that even though the dual is theoretically capable of charging 2 8S M1 packs, you are still limited by your charger's voltage capability. We're still learning which chargers work and which don't. **Dapter** should allow M1 cells to be charged with many LiPo chargers, but this is a whole new learning curve. Be sure to check our web site for a listing of chargers. If you have a "smart" charger, don't put it in a mode that can decide on it's own how much current to output. We have also found a situation where a user was running two different "smart" chargers off of the same power supply and this somehow made the **Dapter** nuts. Avoid this.

