



**High-Performance Lithium Polymer Technology**  
**SAFETY and USAGE Guidelines Nov 27th, 2006**

Thank you for purchasing Apogee brand batteries. For your safety and product longevity, read and understand these guidelines before initial product use. Lithium batteries can cause harm to person and/or property if misused. If you have any questions, please do not hesitate to contact us directly. We love answering questions before problems arise. The end consumer agrees to assume all risk associated with the use of Apogee batteries, except where prohibited by law. If you do not understand and assume all risk, return the pack unused to the place of purchase for a refund.

**PRIOR TO USE:**

- Check the pack's voltage and polarity. All packs come charged to 50% capacity. Cell voltage should therefore be around 3.6V per cell. IE: a 2-Cell pack would equal approximately 7.2V. If the voltage is a little higher it's not a problem, but if it's significantly lower or higher, please call PFM Distribution for warranty assistance.
- Set your low voltage cut-off to 3.0V per cell on your speed controller prior to use. If your speed controller does not have a programmable cut-off, or a 3.0V per cell cut-off, we suggest purchasing an Apogee L.O.A. Over discharging (less than 3.0V per cell under load) a lithium battery WILL ruin the battery and void your warranty.
- Ensure that you have a proper charger for lithium batteries. Chargers should have a lithium ion or lithium polymer charging schema. Using a Nickel Metal or Nickel Cadmium charger on a lithium ion or polymer pack will destroy the pack. All Apogee products are Lithium Polymer (4.2V per cell fully charged).
- Solder your connector of choice on the pack. We recommend using a strip-solder-insulate, strip-solder-insulate procedure, doing one wire at a time. Directly shorting a lithium pack, even if for only an eye blink, can cause permanent damage to the pack. Be VERY careful when soldering on the connector.

**BATTERY BREAK-IN PROCEDURE FOR AIRCRAFT:** Contrary to popular beliefs, lithium polymer battery packs have a "break-in" period. Before you run new Apogee packs continuously at their maximum continuous discharge rate, we recommend you cycle the battery packs at no less than 4C and no more than 7C for a minimum of 15 cycles down to 3.2V per cell under load. All Apogee packs are to be charged as per labeling. By following this break-in procedure, your batteries will run much cooler and give higher voltage under load when you run them continuously at the maximum discharge rates.

**HOW DO I CALCULATE "C"?** "C" is an abbreviation for "current". To find 1C, take the pack capacity and divide by 1000. Thus, 1C on a 1500 mAh pack would be 1.5 (1500 / 1000 = 1.5) To find 4C or 7C as per above for break-in, multiply 1C times 4 or 7.

**BATTERY BREAK-IN PROCEDURE FOR 1/10<sup>th</sup> SCALE CARS/TRUCKS:** For R/C cars/trucks, break-in is much less complicated. Simply use a pinion that's about 2-3 teeth smaller than the usual pinion for the first 15 cycles. Drive normally. Regularly check pack temperature to ensure 140F is not exceeded. After your 15th cycle, go back to the normal gear ratio.

**BATTERY BREAK-IN PROCEDURE FOR 1/18<sup>th</sup> SCALE CARS/TRUCKS:** Rejoice, no break in period is needed. Enjoy your pack!

**CHECKLIST FOR SUCCESS:**

Have you read through these guidelines?	Yes	No
Have you tested the voltage of the new pack before use? (About 3.6 V times the number of cells in the pack.)	Yes	No
Do you have a speed controller with a LVC that can be set to 3V per cell? (6V or 9V)	Yes	No
Do you have a lithium charger?	Yes	No
Have you verified your power (volts/amps) requirements of your power system with a watt meter? (aircraft only)	Yes	No

If you answered 'No' to any of the above questions, there is a high likelihood you are not prepared to use Apogee lithium batteries properly. Please ensure you have studied/understand these guidelines. If you are unsure, please contact us.

**HOW DO I CHARGE MY BATTERY PACK?** Always charge Apogee battery packs through the main battery leads. Do not charge through the voltage port unless you have a "balance charger". The voltage ports are for accessories such as lithium battery balancers.

**HOW DO I CONNECT MULTIPLE APOGEE PACKS?** If you are connecting multiple packs together in series or parallel to form a large pack, several variables should be taken into account.

- All packs should be of the same capacity and charge state (fully charged preferred).
- All packs should be charged separately, preferably simultaneously.
- The speed control low voltage cut-off should be increased to 3.2V/cell under load.

All Apogee packs have cells that are matched within the pack; however, there are variances in capacity and internal resistance from pack to pack. It is for this reason that the above must be heeded in combining packs to form a larger pack.

**HOW DO YOU CYCLE AN APOGEE PACK?** If you have a lithium polymer charger (e.g. Triton/Orbit/Schulze/Ice/Etc) that has a lithium battery discharge cycle, discharge your battery at the 7C rating or lower until the 3.2V per cell reached. If you don't have a charger with a lithium discharge cycle, you can discharge through your speed controller. Make sure the speed controller LVC is configured properly for the number of cells. If you have a Watt Meter or inductive pickup amp meter, choose the prop/gearing that gets you closes to 7C, and fly normally for 15+ flights to the properly set LVC. Charge and repeat for 14 or more cycles.

**BATTERY STORAGE PROCEDURE:** If you plan to store your batteries for periods of greater than 4 weeks at a time, it is necessary to store your batteries in a 50% discharge state. 50% capacity is the listed voltage on the pack (7.4V or 11.1V)

**HOW DO YOU GET TO A 50% DISCHARGE STATE?** Charge or discharge the pack, monitoring voltage. When unloaded voltage is as per pack labeled voltage (7.4 or 11.1), you are at proper storage voltage. Monitor the pack once a month to make sure voltage has not crept up or down.

**PRODUCT WARNINGS:** Lithium packs have the potential to burn if mistreated. We therefore recommend the following cautions:

**DO NOT**

**DO**

<ul style="list-style-type: none"> <li>• Over Charge or Over Discharge any lithium pack.</li> </ul>	<ul style="list-style-type: none"> <li>• Follow our usage guidelines above.</li> </ul>
<ul style="list-style-type: none"> <li>• Exceed charge or discharge ratings printed on the pack.</li> </ul>	<ul style="list-style-type: none"> <li>• Charge in a fire proof area without flammable materials nearby.</li> </ul>
<ul style="list-style-type: none"> <li>• Puncture, crush, or malform any lithium pack.</li> </ul>	<ul style="list-style-type: none"> <li>• Heed all voltage and amperages tolerances listed on the pack.</li> </ul>
<ul style="list-style-type: none"> <li>• Continue to use any pack that exhibits swelling or puffiness.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that there is proper airflow for pack cooling during discharge.</li> </ul>
<ul style="list-style-type: none"> <li>• Store packs at or below freezing, or above <b>110F</b> degrees.</li> </ul>	<ul style="list-style-type: none"> <li>• Quarantine the pack for no less than 24 hours if a severe crash occurs.</li> </ul>
<ul style="list-style-type: none"> <li>• Allow packs to exceed 140F degrees during discharge.</li> </ul>	<ul style="list-style-type: none"> <li>• Unplug your speed controller immediately after use. Turning the switch off does not stop current drain by the speed controller.</li> </ul>
<ul style="list-style-type: none"> <li>• Charge on or near flammable items.</li> </ul>	<ul style="list-style-type: none"> <li>• Ask questions BEFORE you have an issue. We love questions.</li> </ul>
<ul style="list-style-type: none"> <li>• Charge the battery unattended.</li> </ul>	<ul style="list-style-type: none"> <li>• Operate lithium batteries between 110F and 115F for maximum performance.</li> </ul>
<ul style="list-style-type: none"> <li>• Cut wires simultaneously if removing connectors (thus shorting the pack).</li> </ul>	<ul style="list-style-type: none"> <li>• Speak English when you call. We reside in the USA.</li> </ul>

**WARRANTY & LIFETIME REPLACEMENT POLICY**

Please visit the website for warranty information. [www.ApogeePacks.com](http://www.ApogeePacks.com)