



PLEASE
READ THIS
FIRST!

AVOID TROUBLE!

**PLEASE REVIEW
THIS
DOCUMENT CAREFULLY.**

**AVOID 90%+ OF PROBLEMS
BY READING FIRST!**

Lithium Polymer Batteries, model airplanes, model airplane motors, propellers and related accessories, tools and equipment can be hazardous if improperly used. Be cautious and follow all safety recommendations when using your POLYPRO battery. Keep hands, tools, clothing and all foreign objects well clear of equipment prior to and during operations. Take particular care to safeguard and protect your eyes and fingers and the eyes and fingers of other persons who may be nearby. Use only a good quality propeller that has no cracks or flaws. **Stay clear of the propeller and stay clear of the plane of rotation defined by the propeller prior to connecting your battery to any motor or power system.**

ALWAYS disconnect the battery from any motor, device or charger when transporting, storing or not using.

Liability Disclaimer

It is important that the following liability disclaimer be
READ BEFORE CHARGING OR USING THIS PRODUCT

Proceeding with use of this product indicates
Agreement With and Acceptance of the Liability Disclaimer
& Warranty Conditions.

The Manufacturer, Distributor, Retailer and/or other suppliers of this product expressly disclaim any warranties or representations, either expressed or implied, including but not limited to implied warranties of fitness for the purposes of achieving and sustaining remotely controlled flight.

In no event will the Manufacturer, Distributor, Retailer and/or other suppliers of this product have any obligation arising from contract or tort, or for loss of revenue or profit, or for indirect, special, incidental, consequential or other damages arising from the use of this product.

In purchasing and/or using this product, the user accepts all responsibility for its use and accepts all liability associated with such use. **There is NO WARRANTY on Lithium Polymer batteries. Pay particular attention to recommendations re charging, charge current & discharge rates. Use a Smart Charger and a Protective Circuit Module that have been designed for Lithium Polymer batteries.**

WARNING

CEASE USE IMMEDIATELY IF BATTERY:

Swells, Smells or Overheats then Re-locate Battery to Safe Outdoor Location.
Do NOT Short Circuit, Drop, Mechanically Damage or Immerse
Ensure Discharge Current is Limited to Maximum Battery Discharge Rate

DO NOT CHARGE UNATTENDED

Do NOT Charge Near Flammable Materials. Do NOT Charge when Hot.
Use Smart Lithium Polymer Battery Chargers ONLY. Use a Protective Circuit Module When Charging.
Ensure Charger Voltage is Correct. Ensure Charge Rate is 1C or Less

POLYPRO LITHIUM POLYMER (LiPo) BATTERIES

Lithium Polymer ("LiPo") batteries have made possible dramatic improvements to portable device operations and in particular to flight and run times in electric models. LiPo technology offers much higher energy densities (energy available as compared to weight and size) than earlier technologies.

Please pay particular attention to the following warnings, procedures and cautions when using LiPo batteries.

For more POLYPRO LiPo batteries, accessories, connectors, chargers & VMAR Electric ARF models
Visit us on the web at www.richmondrc.com

Our Support Services Knowledge Base is a good source of technical information.

1) BATTERY LIFE.

THERE IS NO WARRANTY ON BATTERIES. Battery life varies widely with use. Generally LiPo batteries will work for around 500 discharge/charge cycles or for a period of up to 2-3 years in a non-hobby application where deep discharge is avoided, discharge rates are relatively low and the battery is slow charged.

In hobby applications, the life expectancy and discharge/charge cycles noted above will vary widely and will be significantly less, particularly the number of cycles. Although hobby applications are hard on batteries due to deeper discharges, rapid rates of discharge, more heat and often faster charging rates, you can maximize both the number of cycles and the life expectancy of your LiPo battery by strictly adhering to the following.

2) HANDLING LiPo BATTERIES.

LiPo cells can be easily damaged by sharp objects and mechanical impact. Do NOT DROP or PUNCTURE LiPo batteries. If a LiPo pack is dropped or "crashed", locate the battery to a safe fireproof location outdoors and observe carefully for 30 minutes. Watch for swelling, smoke or overheating. If the LiPo battery swells, smokes, smells or overheats, it must be disposed of.

Do NOT SOLDER directly to the battery. Wire leads should be pre-soldered to tabs and the tabs then spot welded to the battery by authorized factory trained personnel only.

Do NOT DISASSEMBLE a LiPo battery.

Do NOT IMMERSE a LiPo battery in any fluid (See disposal instructions).

3) STORING LiPo BATTERIES.

Do NOT STORE FULLY CHARGED or FULLY DISCHARGED.

Do NOT STORE in a HOT location. Avoid storing in a an automobile or automobile trunk.

Store at 40% charge in a cool dry location.



4) DISCHARGING - (POWERING YOUR MOTOR or OTHER APPLICATION)

Do NOT SHORT CIRCUIT the battery. Work with only one lead at a time when installing connectors to the wire leads.

Do NOT discharge the battery below 2.5 - 3 volts per cell. (Occasional discharges under load down to 2.5 volts per cell are usually OK but each time you approach the 2.5V/cell level you run the risk of reducing the overall life expectancy of the battery)

Do NOT discharge the battery at higher than the rated discharge rate. It is a good idea to allow for a margin of safety when calculating discharge rates. Use about 80% of the manufacturers published ratings. For example it would be safer to discharge a 10C factory rated battery at no more than 80% of 10C = 8C and it would be safer to discharge a 20C factory rated battery at no more than 80% of 20C = 16C.

LiPo batteries are shipped from the factory with about a 40% charge. For first use, discharge the battery using a medium load (such as your motor) for a few minutes until it starts to sag off and then charge it according to the charging instructions provided below.

5) CHARGING

Do NOT CHARGE UNATTENDED.



We cannot emphasize this enough. Many batteries, chargers, models, automobiles, basements and other equipment and facilities would have been saved if someone was in attendance at all times during the charging process... so... here it is again...

DO NOT CHARGE UNATTENDED

Do NOT CHARGE NEAR FLAMMABLE MATERIALS. Many people place their battery pack in a small metal box or in a metal bread pan when charging. Although you need to be careful not to have any exposed leads or wires when working around metal, a metal box or pan in most cases is a good idea. Do not leave or charge your battery on a car seat, dashboard or carpet.

Do NOT CHARGE inside an automobile.

Do NOT CHARGE WHEN HOT. If a LiPo battery is hot to the touch, it's too hot for charging. Understand why it's hot and if the battery is found to be OK, then wait until the battery cools before charging it.

To charge a LiPo Battery charger you **MUST USE A LITHIUM POLYMER (LiPo) BATTERY CHARGER.** LiPo battery chargers are very different than other battery chargers. The charger must reduce charge current to .05C above 4.20V/cell and terminate the charge when the battery has been charged to 4.3V/cell.

CHARGE AT THE CORRECT VOLTAGE. Ensure that your LiPo Charger output voltage is correct. This is related to the number of cells in the LiPo battery pack.

Do NOT CHARGE at faster than a 1C rate. For example, an 1800mAh LiPo battery should be charged at 1800mA or less while a 1200mAh LiPo battery should be charged at 1200mAh or less.

USE A PROTECTIVE CIRCUIT MODULE (PCM) between your LiPo battery and your LiPo battery charger whenever possible. If your battery has a Voltage Port lead (usually lighter weight wires leading to a multi-pin connector) that is separate from the power leads (2 heavier weight wires), the battery will usually support the use of a PCM. The PCM helps to ensure that no cell in the pack gets overcharged. POLYPRO PCM's are designed for Voltage Ports on POLYPRO LiPo's.

AVOID FIELD CHARGING. You are far better off, to have 2, 3 or more LiPo battery packs charged up before you arrive at a flying field or other activity venue rather than trying to get by with 1 pack and field charging it between use. If you want your LiPo batteries to last longer and work better then fewer charge cycles at the right temperature, in a controlled environment, with a good shop LiPo battery charger is preferred to rushing a field charge immediately after use so that you can get back into action again.

6) DISPOSAL

Do NOT INCINERATE or DISPOSE OF IN FIRE.

Batteries that have lost more than 20% of their initial capacity should be removed from service and correctly disposed of.

Consult with your local disposal authorities for requirements in your area. In the absence of any particular requirements, the following procedure is recommended:

- discharge the battery pack to 3.0V/cell or less.
- let the battery pack cool.
- working outdoors and using eye protection and rubber gloves, puncture several small holes in each cell that make up the LiPo battery pack and immerse the battery pack in salt water. Leave immersed outdoors overnight.
- using eye protection and rubber gloves, apply tape over the battery terminals or leads, place in a plastic bag and dispose in an outdoor trash receptacle.



Here's a good quality low cost way to charge your POLYPRO Battery.

Available OnLine at
www.richmondrc.com

Apache Smart Charger 2020 #RRC-SC2020

The Apache 2020 is an economical Smart Charger that works with any reliable 12-15V DC input to charge Lithium Polymer Batteries. You set the charge current and the output voltage & the Smart Charger does the rest.

Output Current can be set at 110mAh, 250mAh, 500mAh, 750mAh or 1200mAh. Output Voltage can be set for 3.7V (1 LiPo cell), 7.4V (2 LiPo cells) or 11.1 (3 LiPo cells). Indicator lights warn if you choose the wrong voltage and indicate the charging status.

The Apache 2020 comes with alligator clips for connecting to the 12-15VDC power source and a female JST connector for the output.

Please ensure you read all of this document before using or charging your POLYPRO battery. Read it once and then read it again! Once you've read things over twice, here are some basic parameters that will help you with charging your POLYPRO battery.

- A)** Look at your battery label and confirm the Voltage and mAh capacity numbers. For example, 11.1V 1800mAh is a popular LiPo battery used to power many VMAR Electric ARF models.
- B)** Consult your charger manual with regards to how to set the voltage and charge current. Some chargers use switches, some use jumpers. The Apache 2020 uses jumpers. Also note what the indicator lights are used for.
- C)** Set the Charger Voltage first. Make sure you get it right. 1 cell LiPo packs need 3.7 volts, 2 cell LiPo packs need 7.4 volts, 3 cell LiPo packs need 11.1 volts. If your pack says 11.1 volts on its label, set your charger to 11.1 volts.
- D)** The maximum charge rate should be 1C meaning that the battery should never be charged faster than within 1 hour. For example, a battery having a capacity of 1800mAh should be charged at 1800mA or less while a battery having a capacity of 1200mAh should be charged at 1200mA or less. Again using the 11.1V 1800mAh battery that is popular with many VMAR Electric ARF's as an example, you would set your charger to 11.1 volts and a charge rate of 1800mA or less for this battery. If your charger has a maximum rate of 1200mA like the Apache Smart Charger 2020, then a 1200mA maximum charge rate will charge a fully discharged 1800mAh battery in approximately 1.5 hours. This time will be less if the pack has not been discharged and may be more when allowing for trickle charging to top up the battery to full capacity.
- E)** Only after carefully setting the voltage and the charging current should you hook up your charger to your power source & your battery to the charger. Immediately look at the indicator lights to ensure that you have hooked things up properly. **If any indicator, heat, noise or smell suggests that something is wrong disconnect all wiring and review the instructions again.**

DO NOT CHARGE UNATTENDED



Be cautious and follow all safety recommendations when using your POLYPRO battery.

ALWAYS disconnect the battery from any motor, device or charger when transporting, storing or not using.



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What the heck is a "PROTECTIVE CIRCUIT MODULE" (aka PCM) ?

Should I use a PCM?

PCM's are designed to further reduce the risk of damage to your LiPo pack during charging. Given that LiPo's are somewhat costly & have no warranty, the more protection the better.

Our POLYPRO PCM units are designed to work with our POLYPRO LiPo packs and the Apache Smart 2020 Charger.

The PCM makes the Smart Charger even smarter by working with the white voltage port connector on POLYPRO LiPo's to help keep the cells balanced during charging. PCM's also come with the proper plugs for connecting the Apache 2020 to your POLYPRO LiPo.

#PPR-PCM2D for 2 cell POLYPRO packs.
 #PPR-PCM3S for 3 Cell POLYPRO packs