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"Do's and Don'ts" when using Lithium Polymer Cells Please read, understand and keep for future reference

Modern Lithium Polymer batteries (LiPo, Li-Poly) are able to store and deliver large amounts of energy from light-weight packs. Think of and treat LiPo batteries as fuel. Lithium Polymer cells, as with any high energy source (petrol, electricity, gunpowder etc) must be handled with appropriate precautions, respect and care. **Please take the risks seriously, Don't become complacent and be extremely careful – don't think it won't happen to you.**

Lithium Polymer batteries have been proven world-wide to be a practical and enjoyable power source for model aircraft. With the exception of a very small number of fires that have resulted directly from a crash, fires have nearly always occurred during charging. These fires have been almost exclusively caused by human error.

Therefore the main purpose of this information is:

A. To provide information that can help you actively avoid a dangerous charging situation.

B. To provide some standard precautions to limit loss or injury in case a fire does occur.

As long as you adhere to a few do's and don'ts when handling, using, charging and storing your cells you should enjoy many hours of safe, trouble free use from your LiPo batteries.

Do's

- **Only ever use a charger specifically designed to charge Lithium Polymer cells. Failure to do so may a cause fire, which may result in personal injury and/or property damage.**
- **Check and double check that you have set the correct voltage/number of cells and the maximum current does not exceed the stated charge rate (normally 1C). If using an automatic charger, check that it has detected the correct number of cells. Check it again through every stage of charging. Do these checks for EVERY charge.**
- **ALWAYS constantly supervise LiPo batteries on charge and NEVER LEAVE UNATTENDED.**
- Keep all batteries out of the reach of children.
- Check the voltage of your LiPo pack before charging with a digital multimeter. Only charge if it is 3.30V or greater per cell (e.g. 9.90V for a 3S pack).
- **Only charge in an isolated area away from other flammable materials** and on a **non conductive and non flammable surface. Use a fireproof container**. LiPo battery fires can not be extinguished. If a fire occurs, contain it by covering it with a fire blanket until it burns itself out.
- **NEVER use water to try and extinguish a LiPo fire.** Water acts like petrol on a LiPo battery fire.
- If at any time you notice a cell "puff up", disconnect it immediately and cover it with a fire blanket, or put it in a non-conductive container and place it outside away from all flammable objects for at least 30 minutes as chemical reactions can take this long before a fire starts.
- If charging indoors, only charge with a smoke detector above where you are charging.
- **Never leave un-attended!**
- Manually check the temperature of your LiPo battery pack **constantly** during charging. LiPo cells should never rise above ambient temperature when being charged.
  If any of the individual cells become warm/hot compared to the other cells, disconnect it immediately and either cover it with a fire blanket, or put it in a non-conductive container and place it outside away from all flammable objects for at least 30 minutes as chemical reactions can take this long before a fire starts.
- **ALWAYS use the "Balance Charge" setting on your charger. If your charger does not have this feature then don't use it and invest in one that does.**
- Store LiPo batteries at room temperature between 5ºC and 27ºC (40ºF and 80ºF) for best results. The lower the temperature the better.
- When connecting 2 packs in parallel always make sure they are from the same manufacturer, have the same capacity, are the same age and type and that there is a voltage difference of 0.03V or less, otherwise the higher voltage pack will discharge into the lower voltage pack, which may cause a fire.
- If you plan not to use your LiPo cells for an extended period (more then 4 days) then use the "Storage" setting on your charger. If your charger does not have this feature then don't use it and invest in one that does.
- Ensure connectors are insulated correctly to prevent short circuit in handling or storage.
- Always check that batteries are physically and electrically undamaged before charging or discharging.
- Over-charging LiPo batteries will damage them and possibly cause a fire. (above 4.20V per cell is considered overcharged).

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Don'ts

- **Never use a charger that is NOT specifically designed to charge Lithium Polymer cells.**
- **Do not leave cells un-attended when charging. Always remain close to the charging cells to constantly monitor the charging process and react to any potential problems should they occur.**
- Do not charge LiPo batteries in the model as you can not successfully monitor and move them quickly if necessary.
- Do not charge LiPo batteries in a vehicle or in the engine compartment of a vehicle.
- Do not carry LiPo batteries in your pocket. They have been known to short against coins and keys and cause fires.
- Do not puncture the cells as this could cause a fire.
- Do not place LiPo batteries in a fire.
- Do not short the wires of your LiPo battery. **This is very dangerous and can cause a fire or even an explosion**. If you accidentally short the wires of your LiPo battery, either cover it with a fire blanket, or put it in a non-conductive fire-proof container and place it outside away from all flammable objects for at least 30 minutes as chemical reactions can take this long before a fire starts.
- In the event of a crash, remove battery(s) and place it/them in a safe open area away from any combustible materials for approximately 30 minutes. On no account should you place it in a vehicle for at least 30 minutes as a delayed chemical re-action can occur causing a fire.
- Do not charge cells that have been stored in cold conditions (below 10ºC/50ºF), let them warm up (above (10ºC/50ºF), for a minimum of 60 minutes (longer is better).You risk an explosion if you attempt to use cells that have been stored at or below 0ºC (32ºF), Warm them first for at least 60 minutes (longer is better) above 10ºC (50ºF) before charging or discharging.
- Do not store your cells in a hot place (i.e. in your car on a hot day) as this may cause them to catch fire or even explode.
- Do not inhale the gasses of a damaged battery or ingest the contents. If you do accidentally swallow the contents of LiPo cells seek medical attention immediately.
- Do not charge hot cells after use. Warm cells are OK. Always let hot cells cool before charging.
- Do not allow charging to continue above 4.20V per cell. This is **VERY important** as a fire could result.
- Do not discharge you LiPo cells below 3.00V per cell (e.g. 9.00V for a 3S pack) as this will damage the cells and dramatically reduce the life of your cells. If you do accidentally discharge them below 3.00V per cell, leave them for 30 minutes and if the voltage recovers to over 3.30V per cell then they should be OK to use them again. If they do not recover to at least 3.00V per cell then I'm afraid you have damaged them and they should be disposed of (Please see below for the correct method of disposal).
- Do not charge dissimilar or un-matched packs in series or parallel with any difference in cell type, cell capacity, manufacturer, age, pack capacity or charge state (+/- 0.03V per cell). If in any doubt, always charge them separately.
- Do not charge any pack containing one or more damaged or swollen/puffed cell as there is a high risk of a fire. Dispose of them.

Disposing of Lithium Polymer Cells

Discharge the battery to 3.00V/Cell using your charger's "discharge" setting. Then place a high resistive load (e.g. car sidelight bulb) across it until the voltage has dropped to zero. Make sure the output wires are insulated. Then put them in salted water for a minimum of 48 hours. They can then be wrapped up and placed in your normal (grey) rubbish bin. Alternatively take them to your local re-cycling centre.

Should a LiPo Fire Occur

LiPo fires are fierce and can not be extinguished. Don't get complacent! Always charge on a non combustible, non conductive and non flammable surface and away from other combustible and flammable items/materials. Should a fire occur then all you can do is contain the flames with a fire blanket until the battery burns itself out which may take several minutes. Do not inhale the smoke! Call the fire brigade ASAP. We don't wish to frighten you but as long as you adhere to a few do's and don'ts when handling, using, charging and storing your battery/cells, you should enjoy many hours of **safe**, trouble free use from your LiPo batteries/cells.

By purchasing 4-Max's LiPo batteries, the buyer assumes all risks associated with charging, storing and using the battery. If you do not agree with this clause, please return before use.

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