Li-Ion Battery Usage and Maintenance Guidelines

Lithium Ion batteries are a stable and reliable source of power for your device. Because every battery depends on a chemical reaction to provide power, it is important to monitor the number of charge cycles and the age of the battery when determining the proper time to replace and recycle. Both of these factors can result in an increase of internal resistance and therefore, chemical instability. This can result in excessive and sometimes unsafe heat generation.

Lifecycle and Charging

Manufacturers take a conservative approach and specify the life of Li-ion in most consumer products as being between 300 and 500 discharge/charge cycles. Evaluating battery life by counting cycles is not conclusive because a discharge may vary in depth and there are no clearly defined standards of what constitutes a cycle. Batteries should be discarded and recycled after ***no longer than 500 cycle charges or 5 years after date of purchase***, whichever comes first.

Charging to 80-85 percent each day increases the battery life considerably, compared to charging to 100 percent each day. Icom's BC-225 charger in Eco mode allows you to charge to 85 %, and holds the charge at that level.

In a Cadex study, all packs started at a capacity of 88–94% and decreased to 73–84% after 250 full discharge cycles

- New batteries do not have a full charge when you purchase them. They must be fully charged before use.
- Unless otherwise noted in the charger instructions, do not charge batteries with the radio power on.
- Always charge batteries in a cool, dry location that is well ventilated.
- Charge only in Icom Chargers.
- The smaller the discharge (low DoD), the longer the battery will last over time. A partial discharge reduces stress and prolongs battery life, so does a partial charge.
- Avoid full discharges and charge the battery more often between uses. Partial discharging of Li-ion batteries is not an issue.
- Li-Ion batteries do not have memory issues so the battery does not need periodic full discharge cycles to prolong life.
- Remove batteries from chargers when the charge cycle is complete. Continuous charging will shorten battery life. Batteries should not be left in chargers in an unmonitored location.
- Regular testing of batteries with a specified battery analyzer is recommended to ensure safe operation and optimal battery capacity.
- Properly dispose/recycle batteries after their useful life.

Battery Storage

- Always store batteries in a cool, dry location that is well ventilated.
- Batteries in storage for extended periods lose their charge and should be fully recharged before use.
- Over time, batteries lose capacity, regardless of whether they are used or in storage. After five years, the battery chemistry can become unstable; use beyond this range is not recommended.
- For prolonged storage, keep batteries at room temp and at 40% charge.

Battery Capacity while Stored

The following table estimates the recoverable capacity **when storing Li-ion for one year at various temperatures.** Elevated temperatures hasten permanent capacity loss. Li-ion batteries will not always exhibit the same charge capacity while stored.

Temperature	40% charge	100% charge
0°C	98% (after 1 year)	94% (after 1 year)
25°C	96% (after 1 year)	80% (after 1 year)
40°C	85% (after 1 year)	65% (after 1 year)
60°C	75% (after 1 year)	60% (after 3 months)

Battery Hazards

- Using a battery that is past its useful life increases the possibility that the battery could generate excessive heat, causing smoke or flame. Any battery exhibiting these conditions should be removed from the radio and disposed of properly.
- Never use a battery that has been physically damaged or is generating excessive heat.
- Never charge or use batteries above or below operating temperatures of the radio.
- Water or any other conductor across the contacts can short circuit the battery, causing smoke or flame.