LITHIUM-ION BATTERIES

LONG RUN TIME

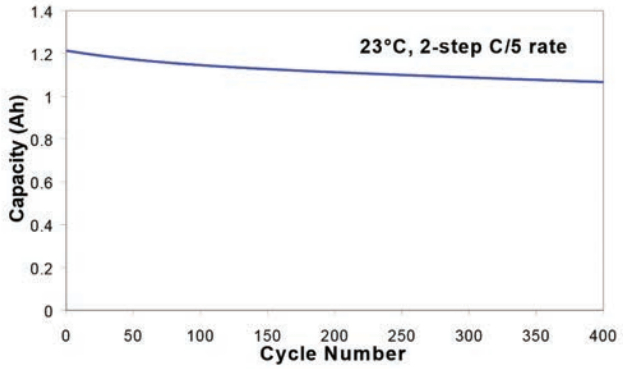
Lithium-ion (Li-Ion) is the most advanced battery technology available today for portable devices. Li-ion has the highest energy density available, meaning that it is the lightest rechargeable battery for the power provided. For the same space used by NiCd (Nickel-Cadmium) or NiMH (Nickel-Metal Hydride), Li-Ion batteries provide longer run time for much less weight. In the MultiRAE Plus, the 4.8 oz (136 gram) Li-Ion battery provides approximately 20 hours of run time, while the old 5.6 oz (159 grams) NiCd battery provides just 10 hours of run time.

Excellent Charge Retention

NiCds can self-discharge. Even if there is no load on the battery a NiCd will lose charge all on its own. Li-Ion batteries were designed for powering satellites and have excellent charge retention.

Long Cycle Life

Li-ion batteries still have 80% of their original capacity even after 400 complete discharge cycles.



For the QRAE Plus, which has a 20+ hour battery, a complete charge cycle would be using it 10 hours, recharging it, and then using again for 10 hours and recharging it again.

After 1,000 charging cycles, a MultiRAE Plus or QRAE Plus Li-Ion battery still has 80% of its original 20-hour capacity. Even if used eight hours per day, five days per week, after 3.8 years (which is 400 complete discharge cycles), these Li-Ion batteries still have 16 hours of run time available (20 x 0.80 = 16).

No "Memory Effect"

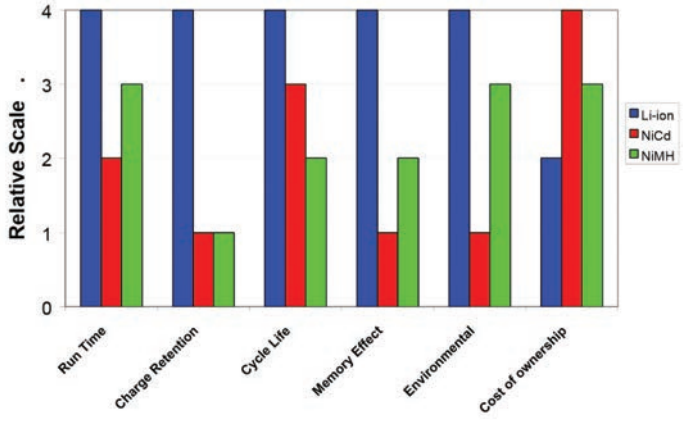
Li-Ion batteries have no "memory effect," unlike NiCd and even NiMh to a lesser degree; they don't need to be completely discharged to maintain their working duration. If a 10-hour NiCd battery is used repeatedly for just 2 hours and then returned to a charger without a complete discharge, it soon develops a memory and becomes just a 2-hour battery. A 10-hour Li-Ion battery can be used repeatedly for just 2 hours without compromising its full working duration.

Environmentally Safe

Elemental lithium is highly reactive. When mixed with water, it reacts violently. Some lithium batteries used in cameras react violently with water if they are opened. However, Li-Ion batteries are stable and safe. The lithium in Li-Ion batteries is bound into the polymer of the battery. Even if cut open and exposed to water, Li-Ion batteries are safe and are rated non-hazardous for air transportation and disposal. Li-Ion batteries contain the lowest amount of toxic heavy metals and are much more environmentally "friendly" than NiCd batteries. Throwing out a Li-Ion battery is similar to disposing of a hunk of plastic.

Lowest Cost of Ownership

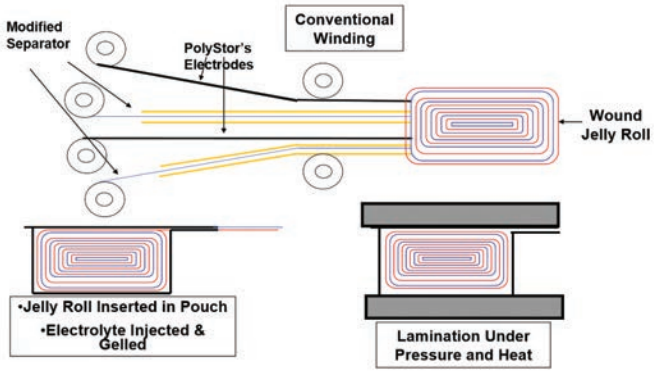
While Li-Ion batteries have a higher initial cost, their long life and superior performance translates into the lowest "cost of ownership" for any battery used in portable instruments. Where a $155 NiCd might only last two years, a $200 Li-Ion can easily deliver four or more years of use. That is a 100% increase in lifetime for just a 29% increase in battery purchase cost. Another way of looking at it is that a NiCd costs $77.50 per year of use while a Li-Ion battery costs just $50.00 per year of use.



"Prismatic" Li-Ion Batteries

Part of Li-Ion battery efficiency is their "prismatic" nature. Batteries were traditionally round metal "cans." Battery packs were made by shrink-wrapping a number of cans together until the desired capacity was reached. However, the space between the cans was wasted.

As most batteries are part of a square device, room in the square battery compartment was lost to the round batteries. Li-Ion batteries can be made to fit the available space. They are assembled like a jelly roll. Then they are laminated under pressure to form their final shape.



MULTIRAES AND QRAES CAN BE UPGRADED TO LI-ION BATTERIES

Upgrading to Li-Ion batteries can provide substantial increase in battery runtime and life. Upgrading to Lithium-Ion batteries must be done by RAE Systems factory personnel because a new UL label is required. Contact RAE Systems Service for more details.

Product	NiCd Run	Li-Ion Run	$% Inc
QRAE	12 hours	20 hours	+66%
MultiRAE Plus	10 hours	16 hours	+60%

Many of our customers who have upgraded have noticed that sometimes when a new Li-Ion battery is put into a MultiRAE or QRAE, the screen does not display "Charging…" and the charge LEDs blink red/green at a high rate. This is not an indication that the battery's internal protection (fuse) has gone bad. When the Li-Ion battery drops below a critical voltage, it exhibits this behavior. If the MultiRAE is left on a charger, and the battery gets a charge in it, the problem goes away and normal charging resumes. Used under normal conditions, when the battery isn't allowed to completely discharge, this problem should not reappear.