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AC Propulsion Debuts tzero with LiIon

San Dimas, CA – September 15, 2003 - After 63,000 miles, the original tzero prototype wears the scars of daily use and, except for new air scoops and a decal reading super LIght versION, it still looks the same. But now, on the streets again after a six-month battery transplant, it moves with a new spring in its step.

A new lithium-ion battery has replaced the lead-acid battery and saved 500 pounds. The whole car weighs in at 1970 pounds. And despite weighing less, the LiIon tzero carries three times more energy than before. “The results are staggering” according to AC Propulsion President Tom Gage. “The LiIon tzero will drive 250 miles in left lane traffic, in LA that means 75-80 mph. Alan Cocconi (AC Propulsion founder and chief engineer) drove it to San Diego and back without charging. On any type of standardized drive cycle it will go over 300 miles”.

The weight reduction improves performance too. For the LiIon tzero, acceleration from 0-60 mph in under four seconds has become routine. The best time recorded so far is 3.6 seconds. Higher voltage with the LiIon pack also improves high-speed power. Governed top speed increases to just over 100 mph.

AC Propulsion began developing a LiIon traction battery six months ago after Alan Cocconi observed the performance of Li-based batteries in model airplane competitions. “I could see that small-cell lithium battery technology was progressing rapidly in energy, power, and importantly in cost”, noted Cocconi, an accomplished remote-control airplane builder and flyer himself. “This rapid progress comes because of huge markets for these small cells in laptops and power tools. Manufacturers produce these cells by the tens of millions, so they compete intensely based on performance and cost. The result is commercial, off-the-shelf battery technology with fantastic specs. We decided to use it in electric cars”.

AC Propulsion assembled the tzero LiIon battery from 6,800 standard cells. The cells, designated 18650 based on dimensions of 18mm diameter and 65 mm length, are slightly larger than the familiar AA cell. Within the industry, 18650 capacity is in the 1.8 – 2.0 Ahr range with a peak discharge of 6A to 8A. The 18650 cells weigh 43 g. Specifications have been improving about every six months.

“With 6,800 cells, the tzero is an extreme case” Gage observed, “intentionally so. The whole idea of the tzero is to shake things up. Most cars would use about half as many cells, but even so, people wonder how we can even consider assembling so many cells into a vehicle traction battery. The answer is it’s not our first choice, it’s our only choice if we are going to build electric cars people that people want and can afford.

“The market for big cells is small so they cost too much. The small cells for the tzero cost less, in total, than the nickel-metal hydride battery in the Toyota RAV4 EV, and they hold twice the energy. We got a quote from one battery company for a Li Ion pack made from 100 much larger cells. Their price was 10 times higher, and neither the energy or the power were as good as we get from the small cells. The 18650 is a mass-produced, completely commercialized, off-theshelf product. It keeps improving and prices keep coming down. If you want to start building electric cars right now, as we do, you have to have a commercial battery. Right now, 18650s are the only game in town”.

Each 18650 cell used in the tzero includes a built-in PTC current limiter and a membrane that stops current at very high temperature. AC Propulsion has developed proprietary current collector technology and battery control hardware and algorithms that sustain cell balance and maintain operation within cell voltage and temperature limits.

AC Propulsion is a California corporation dedicated to creating electric vehicles that people want to drive. Founded in 1992, the company develops, manufactures, and licenses technology for electric and hybrid vehicle drive systems. AC Propulsion has patented and developed several key technologies for electric vehicles, including Reductive charging – a high-power bi-directional interface between the vehicle and the power grid.

See www.acpropulsion.com for more information on the tzero and AC Propulsion’s other electric vehicle technology.

For further information, please visit www.acpropulsion.com

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