Lithium Battery Problems!

Link to Boeing Battery Woes!

On March 21, a pack in an Outlander PHEV overheated at a Yokohama dealership. One of the three segments that make up the battery, about 80 cells in all, overheated the outcome, an inoperable vehicle. Mitsubishi says owners of the Outlander PHEV should hold off on plug in charging until further investigation of the cause of the incident is conducted. Mitsubishi says the fire will not delay the plug-in Outlander's American launch, scheduled for May.
There is no official word if a recall will be required for either the Outlander or i-MiEV vehicles. To date Mitsubishi has sold 4,000 Outlander PHEVs in Japan.

Mitsubishi's Lithium cells have an indirect connection to the units that caused fires in the Boeing Dreamliner in January this year; the same cells that Tesla Motors CEO called "fundamentally unsafe." Mitsubishi's cells come from Lithium Energy Japan, which is a joint venture between Mitsubishi and GS Yuasa that was started in 2007. Mitsubishis GS Yuasa cells are not exactly the same as the Boeing devices, but there is a rumour that there may have been some contamination of the raw ingredients in both assembly lines. Another angle on the predicament was over discharging.

Mitsubishi i-MiEV & Outlander PHEV Fires

Two separate incidents – both in Japan – involved plug-in vehicle battery-pack fires and, until the cause is found, production will be suspended. The two fires caused the Japanese automaker to halt production of both the Outlander plug-in hybrid and one specific version of the all-electric i-MiEV
The first fire occurred on March 18 in the battery pack of a Mitsubishi i-MiEV at the company's Mizushima factory in southern Japan. The pack overheated, causing a 98-minute long fire, during which no injuries or building damage was reported. The accident may have been caused by what Mitsubishi calls "a change in the manufacturing process of the battery supplier." As a result, the company is calling fleet-vehicle operators with i-MiEVs whose batteries were made under the same process as those that overheated and is working on a possible fix.

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Personal Vehicles

The ultra-compact, three-wheel i-ROAD measures 2,350mm long and 1,445mm high and has a 1,700mm wheelbase. Its most significant dimension, though, is its width: at only 850mm, it is no wider than a conventional motorbike. Not only does this make for easy manoeuvring through congested traffic, it also means four can be parked in a single parking spot. Range is only 50km and maximum speed is just 45kmh – adequate but not exciting performance.
Toyota tell us, "People using this kind of vehicle want something that is more comfortable, offers better weather protection and is safer than a two-wheeler such as a scooter or motorcycle, but has similar benefits of low running costs, easy parking and around-town manoeuvrability".
The i-ROAD design provides a more car-like environment on board, with the potential for features such as lighting, heating, audio and Bluetooth.

Toyota i-ROAD

Toyota's new i-ROAD, making its world debut at the Geneva motor show starting this week, is a new, flexible form of transport designed for city streets. Seating two in tandem and under cover, i-ROAD is an electric vehicle with a range of up to 50km on a single charge. It uses 'Active Lean' technology that automatically balances the vehicle when cornering or travelling over stepped surfaces. As a result, it is safe, intuitive and enjoyable to drive, with no need for driver or passenger to wear a helmet. The zero-emissions, all-electric powertrain uses a lithium-ion battery to power two 2kW motors mounted in the front wheels, giving brisk acceleration and near-silent running. The battery can be fully recharged from a conventional power point in three hours. Toyota's amazing intuitive Active Lean technology is the key to i-ROAD's high levels of stability, safety, comfort and fun-to-drive character. The system uses a lean actuator and gearing mounted above the front suspension member, linked via a yoke to the left and right front wheels. An ECU calculates the required degree of lean based on steering angle, gyro-sensor and vehicle speed information, with the system automatically moving the wheels up and down in opposite directions, applying lean angle to counteract the centrifugal force of cornering.

US EV Sales at all Time High!

March has set a new benchmark for sales of plug-in vehicles, as huge monthly gains at some automakers (and steady results at others) have pushed the overall number of plug-in sales to an all-time high in America.

Leading the way was Nissan who set the monthly sales record for any pure electric vehicle with 2,236 LEAFs sold. A close second went to Tesla, who have ramped up production to over 500 vehicles per week during March, and sold around 2,150 Model S cars.

Chevy sold 1478 Volts

Next in line was Ford with a total of 969 sales, comprising;

- Ford C-Max Energi – 494
- Ford Fusion Energi – 295
- Ford Focus Electric – 180

Toyota delivered 919 units

- Toyota Prius – 786
- Toyota RAV4 EV – 133

Honda supplied 49

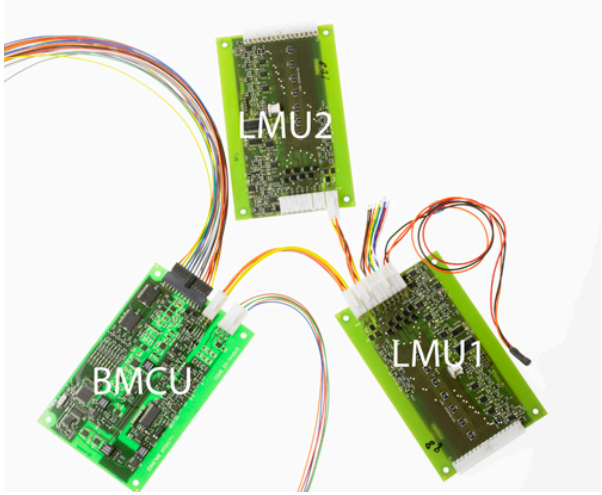
- Honda Accord PHEV – 26
- Honda Fit EV – 23

And lastly Mitsubishi who sold 31 i-MiEV, this was a major downturn from February which saw 337 i-MiEV's sold.

This information is being supplied by InsideEVs.com who have been compiling EV sales statistics since the beginning of last year.

Chevy Volt is leading the tally board with 23,500 for 2012. Interestingly Tesla has sold nearly twice there 2012 figures in the first 3 months of 2013.

Lithium Balance



Out of Denmark comes Lithium Balance and their s-BMS. The system is designed around a centralised architecture with a master board (BMCU) communicating over an isolated RS485 bus with up to 32 slave boards (LMU). Each slave board can manage 3 - 8 cells in series and 2 temperature sensors. This means a 1000V pack can be safely monitored.

s-BMS comes as either loose PCB's, for custom installs or in IP64 housings for installation in harsh locations. The BMS manages each serially connected cell or cell block, monitoring voltage, local pack temperature and logs all faults and errors to onboard memory for later analysis.

The s-BMS calculates state of charge (SoC) using a combination of voltage and current measurements that can be both temperature and rate compensated. A contactor driver circuit is included that can control four contactors independently.

Pack cooling and heating outputs are available. All common charger control interfaces are supplied including: CAN bus, PWM, inverted PWM and analog voltage control.

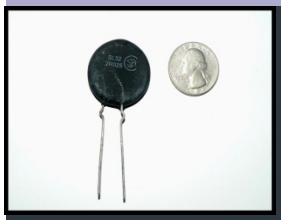
Most commercially available CAN chargers are supported natively; simply select your charger model on the PC configuration software. The charging algorithm is user-definable with a low temperature trickle charge function and a top-of-charge regulation function. The system is capable of equalising all connected cells to within 3mV using a progressive balancing algorithm that improves the pack balance during each charge cycle and a measurement circuit that can be calibrated in-situ using the PC Diagnostic software. Onboard current balancing up to 1 Amp and off board up to 4 Amps is supported. The BMCU can interface with controllers as well as chargers over the CAN bus.

Look Where EV's Are Going Now!!

This time last year in issue 38, we looked at the Ferrari F70 hybrid concept (or F150). This week in Geneva Ferrari has revealed a limited production run of the Ferrari LaFerrari, which is essentially the production version of the F150 hybrid.

The Ferrari LeFerrari is powered in part by an 800 HP V12 engine. The other part is an electric motor that provides an additional 163 HP. With all of this power, (720KW), the LeFerrari can accelerate from 0 to 100kmh in under 3 seconds and has a top speed of 345kmh.

The layout of the cabin is tailored to the driver - where unusually, the seat is fixed, while both the pedal box and steering wheel are adjustable F1 Style. Driving position is similar to that of a single-seat racer, which isn't surprising as the configuration was based on input from F1 drivers Fernando Alonso and Felipe Massa, who played an active role throughout the entire development process. Ferrari plans on manufacturing only 499 LeFerraris, each with a $1,690,000 price tag.



This Month's Q&A Technology Tip

Q. I'm having trouble with fuses blowing occasionally when I activate the DC/DC converter. Is this normal or can it be fixed?

A. This can happen with DC/DC converters that are originally designed as AC Switch mode power supplies. The AC doesn't mind the inrush current to charge the capacitors in the converter. However when used in a DC input circuit the inrush current can pop the fuse or even blow the High Voltage Solid State relay you are using to activate the DC/DC. The fix is reasonably easy though; you can get Circuit Protection Thermistors, a device that changes its resistance with the amount of current that is drawn through it. These will limit the current to below your fuse value and all should be well.