

# Protecting Service Technicians

## The Basics of Hybrid Safety for the Service Manager

First in a 3-Part Series By Peter Zaidel

As the service manager, you are responsible for creating a safe work environment for the service technicians. Hybrid Electric Vehicles (HEVs) bring a set of new safety considerations and regulatory requirements. This article summarizes the basics of hybrid safety.

### Hybrid popularity, by the numbers

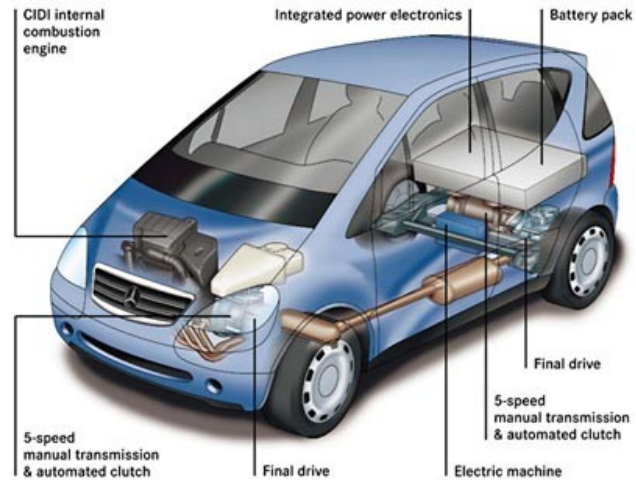
Hybrid vehicles make up less than 3% of the vehicles on the road today, so many vehicle service technicians have seen few or no hybrids in the shop. But, with the fuel efficiency of hybrids, the time is coming when hybrids will be a common sight not just on the sales floor, but also in the service department. Today 6% of U.S. car and SUV sales are hybrids; that number is expected to increase to 11% of new vehicle sales by 2012.

With 353,534 hybrid cars, crossovers, and sport utility vehicles sold in the U.S. in 2007, sales increased more than 40% over 2006, when about 250,000 light hybrids were sold (no data for hybrid pickup trucks).

Eleven automotive brands now sell at least one hybrid vehicle, with more than 25 hybrid-electric vehicle models to choose from in 2008. And at least two manufacturers have announced that they will be building all-electric commercial trucks for service soon.

### Beware: High Voltage

Hybrid Electric Vehicles differ from conventional gasoline engine vehicles by including a high-voltage electrical power system. The voltage stored and used in some hybrid vehicles presents



a new level of risk for service technicians. The manufacturers have established training, but it is the responsibility of the service manager to be sure the techs are trained and properly equipped, and follow correct procedures.

The threshold voltage at which direct current (DC) becomes dangerous can be as low as 55 to 60 volts, compared to 110 volts for AC. Service technicians are generally well trained to be cautious around electricity even on gasoline-powered vehicles. The ignition system (coil, distributor, spark plugs)

generates dangerous voltage, and there is always the danger of battery acid leaks and exploding batteries even with 12-volt DC car batteries.

The hybrid, however, poses a life-threatening risk. You can get the attention of your service technicians by telling them that the voltage from a modern-day hybrid vehicle could, in fact, be used instead of an electric chair for an execution. The electric chair issues an initial shock of

about 2,000 volts to lower the resistance of the skin, and then it delivers a sustained 8 amp current of 400 to 480 volts for 20 to 30 seconds to end a person's life. Except for the initial high voltage jolt, a hybrid electric system has the same lethal potential.

Now that you have the attention of the service technicians, here's a list of some of the basics that you want to know as a service manager.

- Hybrid identification
- Training
- High voltage safety
- Run silent
- Personal Protective Equipment
- Spills
- Battery disposal
- Fire

### **Hybrid identification**

Hybrids are sometimes a distinctive model, such as the Prius, but more frequently the hybrid is an option of a conventional gasoline model, and has the same external appearance. Almost all hybrids share these common identifiers:

- ✓ Hybrid badging on the body of the vehicle, typically including the rear right section
- ✓ READY indicator inside the vehicle, in the ignition area
- ✓ Orange high-voltage power cables

### **Training**

Hybrid training for service technicians is provided by vehicle manufacturers using manuals, hands-on training, and computer-based training. It's the job of the service manager to understand the full scope of training required in the service area, and to have service protocols in place to ensure consistent compliance.

- ✓ All service department staff needs basic hybrid training, including hybrid identification.
- ✓ For franchise dealerships, manufacturers generally require Master Technician certification to work on hybrid vehicles, including being current on OBD-II, scan tools, lab scopes, and electrical analysis.
- ✓ Training for technicians requires both hands-on training from the manufacturer, and computer-based training.
- ✓ Hybrid manufacturers are a necessary and excellent source of training and documentation for service personnel.

- ✓ There are many independent courses for teaching technicians about working on these vehicles that can be found by Internet search for “hybrid vehicle training technicians.” These are especially valuable to body shops, standalone service shops, and dealerships that want to service hybrids that are not in their franchise.

### **High voltage safety**

The extremely high voltage of hybrids creates a concern about the dangers of working on HEVs, even though actual incidents to date have been negligible. Because hybrid vehicles are still fairly rare in many service departments, many technicians have never seen a HEV in the shop, let alone worked on one.

- ✓ Every technicians needs to be aware of the high voltage danger of hybrids, no matter how remote the chance of electrocution.
- ✓ Hybrids have been designed so that the high-voltage system is insulated from the metal vehicle body, and the vehicle metal body ground is not part of the high-voltage circuit.
- ✓ While high-voltage electrical flow from the high-voltage battery pack stops when the vehicle is turned off, the current may not be dissipated from the system for up to 10 minutes. Caution and training are required.
- ✓ Battery disconnect procedures vary by vehicle and must be part of the certification training.



### **Run silent**

Hybrids are silent when they are running on battery, which is to say that they are often completely quiet even though the car is on. They automatically turn themselves off and on, switching between battery and the gasoline engine, so it is easy for the technician to be unpleasantly surprised that a vehicle thought to be off is in fact on.

Many hybrids have keyless ignition, with on/off sensitivity up to 15 feet away from the vehicle. Technicians, for their safety, need to observe the following service protocols:

- ✓ Keep vehicle keys a safe distance from the hybrid (more than 15 feet) .
- ✓ Check the vehicle dashboard hybrid indicator to ensure the vehicle is truly “off.”
- ✓ Train all technicians, whether they service hybrid vehicles or not, to be aware that a silent hybrid is not necessarily powered off until it is verified that the vehicle is powered down.
- ✓ Service managers should consider establishing a protocol of safety cones or caution tape around hybrid vehicles that are being worked on.

- ✓ Consideration should be given to acquiring a “hook” that allows someone to pull a technician who is being electrocuted to safety. This can be useful for situations beyond hybrid-specific considerations.

### **Personal Protective Equipment**

All hybrids require special personal protective equipment (PPE) that facilities must have onsite. The service manager should ensure that the equipment is available and in perfect condition.

- ✓ Special long-arm-cover gloves (also known as lineman’s gloves) are required whenever a technician works with a high-voltage battery, including removal and replacement. The gloves must be at least class O and rated to 1,000 volts.
- ✓ OSHA standards require testing of gloves for leaks prior to each use; this check can be performed manually or with a glove inflator. Electricity can find its way through an opening smaller than a pinhole.

### **Spills**

Hybrid vehicles have two batteries: the typical battery for a gasoline-powered engine, and a second, high-voltage battery for the hybrid system. That battery is typically mounted in the rear of the vehicle.

- ✓ The alkaline electrolyte in a NiMH battery module is very toxic and corrosive. However, hybrid batteries are typically designed with self-contained reservoirs, and the electrolyte will not normally leak.
- ✓ Spills should be handled in accordance with protocols for hazardous materials.

### **Battery disposal**

The high-voltage hybrid batteries are handled very differently than conventional batteries for gasoline-powered vehicles.

- ✓ The high-voltage NiMH battery pack is considered a hazardous material.
- ✓ Only trained or qualified personnel should handle the hybrid battery pack due to the high voltage potential.
- ✓ Hybrid battery packs are returned to the manufacturer for disposal. As hybrid batteries are now designed to last for the life of the vehicle, disposal will be rare for the next few years, until more vehicles reach end-of-life.
- ✓ Employees preparing the battery pack for shipment must be DOT HazMat certified.

### **Fire**

At last, something simple about the hybrid:

- ✓ Water is a suitable extinguishing agent for hybrid fires

## Service department protocols

The key to a safe and regulatory compliant workplace is to develop, train and enforce service department protocols for hybrid vehicles. Fortunately, there are resources to assist the service manager in developing such protocols.

- ✓ Environmental health and safety consultants, such as KPA, can assist in establishing standard operating procedures and related activities, such as DOT HazMat training.



Hybrid vehicles differ from conventional gasoline-powered vehicles in many ways that impact the service technician, and they bring new, potentially highly dangerous risks to the service area. Hybrids also represent new and interesting professional development opportunities for your technicians. With your active involvement as the service manager, your dealership will gain a new set of satisfied customers and your technicians will gain a new set of skills.

---

---

*This safety update is provided by KPA, the nationwide leader in Environmental Safety and Compliance Programs for vehicle and equipment dealers. For reprints of this article, questions about this topic or any environmental or safety matters, contact the KPA Marketing Dept. at 866-356-1735, or visit us online at [www.kpaonline.com](http://www.kpaonline.com).*

*This article was written by **Peter Zaidel**, Product Manager with KPA, based in Colorado.*

