

Safety Director's Bulletin

(One in a series of safety information bulletins from your Joint Insurance Fund)

S2006-2

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EMERGENCY RESPONDERS...

DO YOU KNOW HOW TO DEAL WITH THE NEW HYBRID VEHICLES?

Hybrid vehicles are becoming increasingly popular as gasoline prices go up and environmental concerns increase. More manufacturers are coming on line with these vehicles. A hybrid vehicle is one that combines a smaller-than-normal internal combustion gasoline engine with the electric motor of an electric-powered vehicle. The gasoline engine and the electric motor work separately or together to provide power to the drive wheels of the vehicle. This bulletin is to inform you of some of the general considerations in dealing with hybrid car incidents and is not a complete outline of the issues.

We suggest that if SOPs/SOGs have not been developed and trained for, that this be done.

Police, EMTS and Fire Responders need to be aware of new hazards.

- When the vehicle is stopped there may not be any sound coming from the engine compartment, just silence. A silent car does not indicate that the vehicle is turned off or that it won't suddenly engage while you are working on it.
- An additional hazard is that rescuers will encounter high voltage conditions. Rescuers may be exposed to up to 600 volts under some circumstances. The hybrid high voltage system is isolated from the body chassis and unlikely to affect rescue operations, but rescuers need to be aware of its presence.

Recognizing a hybrid isn't always easy. The Ford Escape, for example, looks identical to its gas-powered counterpart. The same is true for the Toyota Highlander, so labeling is critical.

- Most say "Hybrid" on the name plate at the rear of the vehicle. Look for warning labels inside various parts of the car.
- One must look inside the car. There is an indicator "Ready" green light that can give the alert emergency responder some indication of the status of the vehicle and its' potential to "drive away."

Rescuers should look for thick bright orange power cables running through the undercarriage or the engine. While these are not running through parts usually involved in extrications, rescuers still need to know the potential danger in touching them.

Each manufacturer has slightly different response recommendations, but a general protocol can be developed. These procedures represent hybrid vehicle 'Lock Out-Tag Out' protocols for emergency incidents that serve to maximize safety and minimize risks to personnel and patients.

Generic Task Common to All Vehicles

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Commerce Risk Control Services

There are three basic tasks associated with all motor vehicles and departments should consider including them when updating or developing SOPs/SOGs for vehicle rescue:

1. **Immobilize the Vehicle:** Prevent the vehicle from moving under power or by gravity. Chock/block the wheels, shift into **PARK** if not already done, shut the vehicle **OFF** and remove the key/keyless FOB to a point greater than **(15) feet** from the vehicle's dash. (A FOB is the keyless entry and ignition system the driver carries with him).
2. **Stabilize the Vehicle:** If extrication is required, stabilizing the vehicle is **NOT** an option. The vehicle's weight must be transferred from suspension system to the frame that is resting on cribbing or other suitable equipment designed for stabilization.
3. **Disable the Vehicle:** Once the vehicle's has been used to the responder's advantage (power down windows, open locks, move seats, etc), the responder then disconnects the battery terminal cables (negative first then positive) or cut a 3-4 inch section out of the low voltage cables. **DO NOT** attempt to disconnect the high voltage battery cables. Hybrid vehicles can run silent and in this state may provide power to the low voltage system. If the **IGNITION SYSTEM** can not be **SHUT OFF**, the responder will need to access the specific recommendation of that **MAKE** and **MODEL** hybrid vehicle. **DO NOT** touch, cut, push, or breach any **ORANGE** high voltage cable or other high voltage component. Doing so may result in serious burns or death.

Responder Safety: Shut Down/OFF the Ignition System

A primary objective for the emergency responder at a hybrid incident will be to shut the vehicle **OFF**, this provides the following:

- Shuts down the hybrid system
- Shuts down the fuel pump
- Stops electrical flow to the SRS ECU
- Isolates the high voltage current from the HV battery pack

It should be noted that the hybrid system will have high voltage capacitors that can store a high voltage current for up to 10 minutes, even after the vehicle is shut down/off. Always consider a high voltage cable to be live/hot.

Fire Suppression

Where a fully involved hybrid vehicle fire is encountered, copious (large and sufficient) amounts of water will generally be the extinguishing agent of choice. This will eliminate the radiant heat and begin cooling the metal battery box and the plastic battery cell modules inside the high-voltage battery pack itself. According to reliable sources, fire suppression crews will not be shocked or electrocuted during direct attack on a hybrid vehicle fire, even if flames are impinging on the battery pack itself.

Most authorities agree that virtually all fires involving the Ni-MH batteries or the hybrid vehicle itself can be controlled with water. When water is used, however, some hydrogen gas may be released. In this situation, ventilate by leaving the trunk or hatchback lid open is advised. If there is concern that hydrogen gas is present, fire smothering agents such as those used by hazmat teams are recommended.

Class D extinguishers are not generally recommended for use since some of them may be chemically incompatible with the battery packs.

There are potential fire situations involving a hybrid that can present unique concerns. Any fire where there is direct flame impingement on the high-voltage battery pack would be one example. A fire that has

originated within the battery pack itself or an electrical fire that begins somewhere within the high-voltage electrical system would also require special precautions.

The high-voltage battery is in a somewhat protected position in both the Toyota Prius and the Honda Insight. It will survive most crashes without physical damage due to its location above the rear axle. A violent crash, especially a side collision at the rear wheel, however, can crush or break open the internal cells of the high voltage battery. Be cautious if the high-voltage battery has been physically damaged or exposed to extreme heat impingement.

Additional Resources

An Excellent Detailed article on this subject can be found at
<http://www.firehouse.com/extrication/archives/2001/july01.html>.

Honda and Toyota have created guides for emergency workers to familiarize them with each model. The guides show the locations of the batteries and the kill switches. Toyota has offered to bring a hybrid to fire stations or ambulance stations upon request to provide a tutorial of how the car works. Other manufacturers may be contacted through your local dealer.
<http://techinfo.toyota.com/public/main/HighlandHVERG2>.