



Hybrid Vehicle Rescue: Replacing Fear with Knowledge

RON SHAW — new vehicle innovations and extrication techniques

(This is part two of a four-part series.)

Supplemental Restraint System (SRS)

Hybrid vehicles have the same passive safety features that conventional vehicles have, including airbags. Typically when airbags deploy, or the hybrid remote collision sensors activate, the following safety features will automatically occur:

- The hybrid system should shut down.
- The flow path of DC high voltage current from the

HV battery pack is interrupted as relays open preventing the electrical flow out from the HV battery pack.

- The gasoline fuel pump shuts down.
- Low voltage power is prevented from flowing to the SRS Electric Control Unit (ECU)/ or airbag computer.

Once the SRS has activated, resulting in the deployment of an airbag, the hybrid system is automatically shut down and will not start up on its own.

Notation

When the Nissan Altima or any Toyota-Lexus hybrid is involved in a crash deploying any SRS airbag, or when the responder shuts OFF the ignition, this essentially accomplishes the same shut down features as utilizing the service plug outlined in the Nissan ERG.

If it is not possible to turn a vehicle off using normal methods, every hybrid ERG provides emergency shut down procedures for the hybrid system. It is important responders consult each make and model ERG for spe-

cific emergency shut down procedures.

Performing Extrication

Extrication can be performed using the same methods as a conventional vehicle. Having a hybrid system does not affect the way and manner you perform the following tasks:

- Glass management
 - Door displacement or removal
 - Roof displacement or removal
 - Dashboard displacement
- "Hybrid vehicles are safe, and responders should not fear per-*

forming tasks normally associated with extrication."

There are NO high voltage cables or components in the normal cut zones or push points in any hybrid vehicle.

If a hybrid was operational and power disconnect was not possible, responders still could safely perform normal extrication for any of the previous mentioned tasks. However, this is unlikely, since a crash that would typically cause the need for extrication would have also activated the automatic hybrid safety features disabling the hybrid system.

Responder Concerns

With all the published manufacturers' hybrid safety information now available you wouldn't think there should be any controversy lingering about. Yet hybrids remain a hot topic at the responder round table at conventions.

The big question is why are hybrids so controversial if there is so much information readily available? This author believes it's due to misinformation, combined by the lack of proper education at the state and local levels.

Issue: The number one concern responders have expressed is the presences of high voltage cables when performing extrication.

Resolve: There are NO high voltage cables located in any of the normal cut zones in any hybrid vehicle.

The high voltage cables are routed under the floor pan, NOT in the roof, pillars or interior side of the occupant cabin. High voltage lines will clearly be indicated, and the actual cables are color coded bright ORANGE, NOT yellow or blue as indicated by misinformed presenters.

If a responder were to transverse through the body (occupant cabin) of a hybrid then you would come in contact with a high voltage cable. But, ask yourself why would you need to make that type of a cut? With over 29 years of service on a career department I have never seen a rescue that required a transverse cut through a vehicle, essentially cutting it in half.

Issue: Can a responder be electrocuted by touching a hybrid vehicle body in a crash?

Resolve: No, a hybrid's

INNO TEX

HIGH QUALITY TURNOUT GEAR

ANDERSON FIRE & SAFETY

ANDERSON FIRE & SAFETY
(888) 221-4328
www.anderson-fire.com

When tragedies strike... we're your go-to resource for Mass Casualty Incident Trailers.

We customize our trailers and equipment to fit your specific needs.

EMS, fire and hospitals have the difficult task of being prepared for mass casualties. At Southeastern Emergency Equipment, we provide you with custom designed mass casualty trailers that give you the best solution for mitigation, portability, rapid deployment and storage.

Southeastern EMERGENCY EQUIPMENT

PO Box 1196
Wake Forest, NC 27588
info@seequip.com
800-334-6656 WWW.SEEQUIP.COM

high voltage system is isolated from the vehicle's (low voltage) body ground. The orange colored power cables and connectors are insulated to prevent contact with bare wiring. A separate ground high voltage cable is routed to each component from the battery to complete the circuit (return path).

Safety Features

There are safety features on all hybrid vehicles offering both manual and automatic protection. The simplest way to manually disable the high voltage system, is to turn the ignition OFF. This isolates the high voltage battery power from the high voltage power cables.

Manual Protection

One of your first objectives at a crash is to secure the ignition by turning the ignition key to the OFF position. If equipped with a smart key/push button start, pushing the power button once will shut the vehicle OFF. Effectively opening the both positive and negative high voltage relays from the high voltage battery pack to the orange high volt-

age power cables.

Automatic Protection

The hybrid computer will automatically shut down the hybrid system when any of the following occur:

- Airbag collision sensors and hybrid impact sensors send signals to both the Supplemental Restraint System (SRS) Electric Control Unit (ECU) and hybrid ECU.
- Current/voltage sensors; detects imbalance.

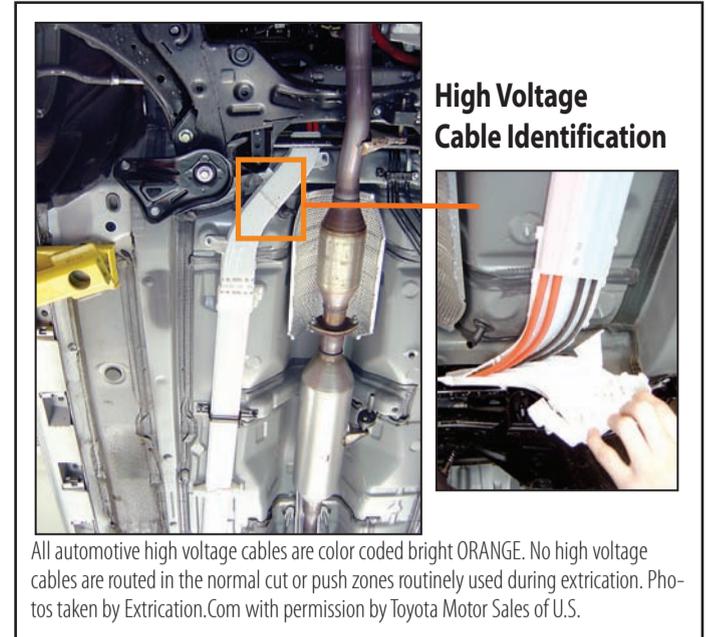
Whenever there is an airbag deployment or an electrical imbalance occurs, the hybrid ECU or computer automatically opens both positive and negative high voltage

using yellow, blue and orange color coding for high voltage cable identification?

Resolve: No. According to the Society of Automotive Engineers (SAE), only the color orange was adopted to identify high voltage cabling.

There seems to be a misconception, which I believe to be caused by misinterpreting text written in GM's hybrid and fuel cell vehicle ERGs. GM has volunteered to define low, intermediate and high voltage, in an effort to help responders have a better understanding of the company's choice of color

see HYBRID page 34



All automotive high voltage cables are color coded bright ORANGE. No high voltage cables are routed in the normal cut or push zones routinely used during extrication. Photos taken by Extrication.Com with permission by Toyota Motor Sales of U.S.

Caution: Some hybrids have large capacitors in the traction motor inverter that can store a reserve high voltage charge for up to 10 minutes. Never assume that the high voltage system is completely absent of a high voltage current and drained down under any situation. Never touch, cut or breach any high voltage cable or component. Doing so may cause serious burns, shock or electrocution.

relays from the high voltage battery pack to the orange high voltage power cables.

Issue: Are manufacturers

Oxygen Cylinder Cascade System
ULTROX™ USP 93 Medical Grade
Fully Transportable

- Warranted for 3 Years*
- Shipped Fully Assembled
- Ready to Use in Minutes

When Lives Depend on a Reliable Supply of Medical Grade Oxygen!

EMS • Hospitals • Military • Civilian
 800.320.0303 ext. 380 • tfrasier@airsep.com

AIRSEP

*Contact factory for details

Need Turnouts Now?

We can ship in 24 hours



Choose from five fully-featured ensembles

Top-Quality Turnouts at a Price You'll Love

Lion stocks five value priced, fully-featured turnouts that can ship to you as fast as 24 hours. Each model has the same high level of quality and attention to detail that makes Lion the world's leading provider of fire fighter protective clothing.

3M Scotchlite™ Reflective Material

3M and Scotchlite are trademarks of 3M company.

DuPont™ Nomex | DuPont™ Kevlar.



For a free brochure, visit www.lion24.bz/0706 or call 800.421.2926.

Hybrid Vehicle Rescue

continued from page 13

to help responders have a better understanding of the company's choice of color coding. The following chart is similar to the illustrations

depicted in the GM ERGs.

Defining Low, Immediate and High Voltages

Low Voltage DC can be defined as any direct current up

to 30 Volts.

Low Voltage AC can be defined as any alternating current up to 15 Volts RMS.

Intermediate voltage DC can be defined as any direct

current from 30 Volts up to 60V.

Intermediate voltage AC can be defined as any alternating current from 15 Volts up to 30 Volts RMS.

High voltage DC can be defined as any direct current 60V or greater.

High voltage AC can be defined as any alternating current 30 Volts RMS or greater.

I think that we sometimes forget because of familiarity that the typical house current is 120 V AC, this too is high voltage.

Educating the Responder

Today the responder can be educated in several ways; self taught by reading reference books on hybrid technology, manufacturer's ERGs, trade periodicals, or receive an information lecture by their local training officer or guest speaker know as a Subject Matter Expert (SME).

Sharing Responsibility

Hybrid vehicles are not a

fad. Hybrids are here to stay, at least until replaced by the next generation of innovative vehicles. The automotive industry assumed responsibility to provide relevant information about their products to the emergency services so responders can properly

- Off Road Rescue
- Wheeled Units
- Skis Available for Snow Rescue
- Exclusive Diamond Link™ Suspension - A Long Travel Suspension Designed For Off-road Use
- Very Adaptable For Fire Rescue, EMS Rescue And Law Enforcement Emergency Situations



**The Model 2402
RESCUE TRAILER**



320-764-6175
sleds@orionsleds.com
www.orionsleds.com

The Debit Card For North Carolina Firefighters



To learn more, go to www.lgfcu.org/firecard



Extrication techniques are the same for any type vehicle, hybrid or conventional.




Hybrid extrication testing on an actual hybrid involved in a collision. Photos taken by Extrication.Com with permission by Toyota Motor Sales of US.

HIGHEST QUALITY • MOST DEPENDABLE • ECONOMICAL





Multiple work bays and parts storage to expedite repairs to your apparatus. Mobile service units available.

- Akron Brass
- Elkhart Brass
- Kocheck

- Tempest Technology
- MAKO Air Compressors
- Able 2/SHO-ME
- Firequip

- Code 3/PSE
- Federal
- Weldon
- Whelen

- Pelican
- Streamlight
- Chemguard Foam
- Superior Fire Hose

- Hale Products
- Class 1 Products
- Genesis Rescue Tools



800-671-2184

www.johnsonfire.net



train for any emergency situation, safely and efficiently.

As subject matter experts (SME)/presenters, we have a

responsibility to our audience to present fact, not hearsay or conjecture. The information we present is intended to save lives.

As emergency responders, it's our responsibility to learn how to cope with new innovations and to maintain that level of training throughout our career.

If everyone does their part, responders can safely provide maximum care to the public with minimal risk to themselves, and without fear.

Web Based Resources

Extrication.Com: <http://www.extrication.com>

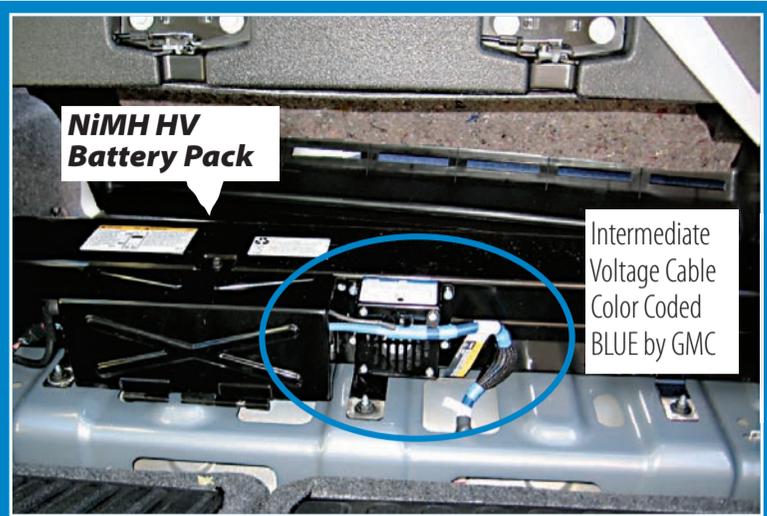
Ford Motor Company: <http://www.fordtechservice.dealerconnection.com/vdirs/quickref/guide-escape.pdf>

General Motors Company: http://www.gmstc.com/courses/available_courses.asp

Honda: <http://techinfo.honda.com/rjanisis/pubs/web/ER2005.pdf>

Nissan Motor Company, Ltd.: http://www.nissanusa.com/pdf/techpubs/altima_hybrid/2007/2007_Altima_Hybrid_FRG.pdf

Toyota Motor Company: <http://techinfo.toyota.com/techInfoPortal/appmanager/>



BLUE color coded cables are NOT considered high voltage, but do have a higher energy potential than low voltage. Photo courtesy of Jorg Heck Germany.

GM Voltage Classification System

This illustration depicts Low, Intermediate and High Voltage Cable Identification by color coding.

Classification	Low Voltage	Intermediate (Blue)	High Voltage (Orange)
Voltage Range	DC ≤ 30V AC ≤ 15V RMS	DC 30-60 V AC 15-30V RMS	DC > 60V AC > 30V RMS

Note: Presently there are no industry standards to identify intermediate voltage. GM has chosen BLUE for this cable color.

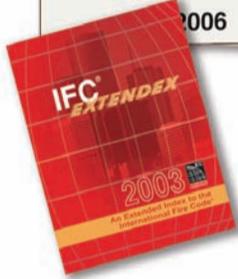
Know Fire Code. Save Lives. ICC® Makes It Easy.



North Carolina State Building Code: Fire Code 2006

Based on the 2003 International Fire Code® with State amendments. (Loose Leaf).

#5741L06 List \$87.50 ICC Member \$70



Extensex: An Extended Index to the 2003 International Fire Code

This helpful extended index makes it easy to find what you're looking for by listing the section where a subject is covered.

#4402S03 List \$20 ICC Member \$16

Order Yours Today!
1-800-786-4452
www.iccsafe.org/cfrej



INTERNATIONAL CODE COUNCIL®
 People Helping People
 Build a Safer World™

REF 44-05-221

Don't Air Your Dirty Gear...

Allow Tri-State/TLC to Make it *DISAPPEAR*




- World's Leading Distributor of Laundry Equipment
- Full Service Distributor
- Design to Installation of Fire House Equipment
- Specialized Milnor Gear Guardian to ensure cleaning and preserving Protective Gear
- Programmable Controls
- 3-5 Year Parts Warranty
- Same Day/Next Day Service
- Planned Maintenance Agreements Available
- Local Service Techs
- Local Parts Warehouse with Genuine Factory Parts




Serving Georgia, North Carolina, South Carolina and Southern Virginia



Tri-State Technical / TLC
1-866-755-WASH (9274)
www.tristatetechnical.com

