

# 2007 Saturn VUE Green Line Hybrid

## Emergency Response Guide



GM Service Technical College provides First Responder Guides (FRG) and Quick Reference (QR) Sheets *free of charge* to First Responders. FRGs and QRs can be displayed in a classroom as long as they are represented as GM information and are not modified in any way.

GM's First Responder Guides are available at [www.gmstc.com](http://www.gmstc.com)

The intent of this guide is to provide information to help you respond to emergency situations involving the 2007 Saturn VUE Green Line Hybrid in as safe a manner as possible.

While the majority of the components that make up our hybrid are common to traditional GM vehicles, there are some differences that may affect how a rescue procedure is performed.

This guide contains a general description of how the Saturn VUE Green Line Hybrid system operates, shows the location of the badging, and offers illustrations of its unique components. It also suggests ways of disabling the system and presents cut zone information.



## System Operation

The 2007 Saturn VUE Green Line Hybrid is a gasoline-electric hybrid vehicle that uses up to 20 percent less fuel than the non-hybrid Saturn VUE.

Introduced in the summer of 2006, the hybrid model uses a 36 volt electrical system coupled with a traditional 12 volt battery and sophisticated technology to achieve its fuel savings.

The vehicle is equipped with a 2.4 liter, 4-cylinder engine and a traditional 12 volt starter motor, which is used only for initial starts of the vehicle.



### System Operation (cont.)

During braking and deceleration, energy is recovered and stored in the hybrid battery (also known as the generator battery). The engine's fuel supply is interrupted and the engine temporarily shuts off as the vehicle comes to a full stop. This is referred to as Auto Stop.

The fuel supply to the engine is resumed and a special generator with starter restarts the engine when any of the following occurs:

- The brake pedal is released
- The accelerator pedal is applied
- The gear shift lever is moved from Drive to another gear selection
- The climate control system is turned from OFF to ON
- The hybrid battery charge is low and requires recharging
- Auto Stop has timed out (maximum of 90 seconds while in A/C Economy position; maximum of 120 seconds while A/C is in OFF position)

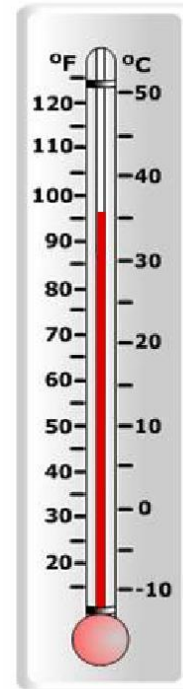
**NOTE:** The generator with starter CANNOT propel the vehicle by itself. It is used for starting the engine after an Auto Stop and for engine assist during hard accelerations.



### System Operation (cont.)

Several factors affect how long the engine remains off during Auto Stop:

- Outside temperature (95 F (35 C) or above decrease the time the engine remains off)
- Air Conditioning setting (A/C is affected by outside temperature when green Economy light is illuminated)
- Time limit





### System Operation (cont.)

Auto Stop will not shut down the engine if any of the following conditions apply:

- Engine is not warmed up
- Outside temperature is 95 °F (35 °C) or higher
- Shift lever is in any gear except Drive
- Hybrid battery charge is low
- 12v vehicle battery charge is low, or charge requirements are high
- Hood is not fully closed



### Vehicle Identification

Special badging is used on the Saturn VUE Green Line Hybrid liftgate.



**Vehicle Identification (cont.)**

A hybrid badge is on the driver and passenger front doors.





**Vehicle Identification (cont.)**

A tachometer with Auto Stop indicator and a Charge/Assist gauge are unique to the Saturn VUE Green Line Hybrid.

**Tachometer  
with  
Auto Stop  
Indicator**



**Charge/Assist Gauge**

### Vehicle Identification (cont.)

Under the hood is:

- A hybrid badge on the engine cover
- A label showing the battery locations (attached to the hood)








⚠ CAUTION 36V		⚠ ATTENTION 36V	
<b>Two Battery Locations</b>		<b>Emplacements des deux batteries</b>	
To help avoid personal injury during 36V hybrid system service, disconnect both locations. See diagram.	<b>12V</b>	Afin d'éviter les blessures pendant l'entretien du système hybride de 36 V, débrancher les deux batteries. Voir schéma.	<b>36V</b>
<small>Printed in U.S.A.</small>		<small>WLC</small>	<small>15804643</small>



**Vehicle Identification (cont.)**

Under the rear cargo floor is a label showing the battery locations (attached to the hybrid battery case).



<b>CAUTION</b>	<b>36V</b>	<b>ATTENTION</b>	<b>36V</b>
<p><b>Two Battery Locations</b>                  Service by qualified personnel only. To help avoid personal injury, see Service Manual before removing cover. Disconnect  both battery locations. See diagram. </p>		<p><b>Deux emplacements de batterie</b>                  L'entretien doit être effectué par du personnel qualifié seulement. Afin d'éviter des blessures, consulter le manuel de réparation avant de soulever le couvercle. Débrancher  les deux batteries. Voir le schéma. </p>	
<b>12V</b>			<b>36V</b>
<small>Printed in U.S.A.</small>		<small>WLC 15802259</small>	

## DC/AC Voltage Classifications

Electricity is categorized as either low, intermediate, or high voltage.

- Low voltage – from 0 to 30 volts DC / 0 to 15 volts AC
- Intermediate voltage – from 30 volts or greater to 60 volts DC / 15 volts or greater to 30 volts AC
- High voltage – any voltage greater than 60 volts DC / 30 volts AC

Color coding is used to identify the different levels – blue for intermediate voltage and orange for high voltage.

The Saturn VUE Green Line Hybrid falls within the intermediate range.

Two-mode hybrids and GM’s Silverado and Sierra Parallel Hybrid Trucks are a combination of intermediate and high voltage systems (see chart footnote).

Classification	Low Voltage	Intermediate Voltage	High Voltage
<b>Voltage Ranges</b>	DC $\leq$ 30v — AC $\leq$ 15v	DC $>$ 30 $\leq$ 60v — AC $>$ 15 $\leq$ 30v <sup>RMS</sup>	DC $>$ 60v — AC $>$ 30v <sup>RMS</sup>
<b>Vehicle Application</b>	Conventional	Saturn VUE Green Line Hybrid  * GMC Sierra/Chevrolet Silverado Parallel Hybrid Trucks	Two-mode Hybrid  ** GMC Sierra/Chevrolet Silverado Parallel Hybrid Trucks
<p>* Applicable to 36v DC Hybrid Battery Pack, 36v DC Power Steering System and 36v DC Starter Generator Control Module (input)</p> <p>** Applicable to Starter Generator Control Module (inverted APO output) and 120v AC Accessory Power Outlets (APO)</p>			

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

### DC Voltage Classifications (cont.)

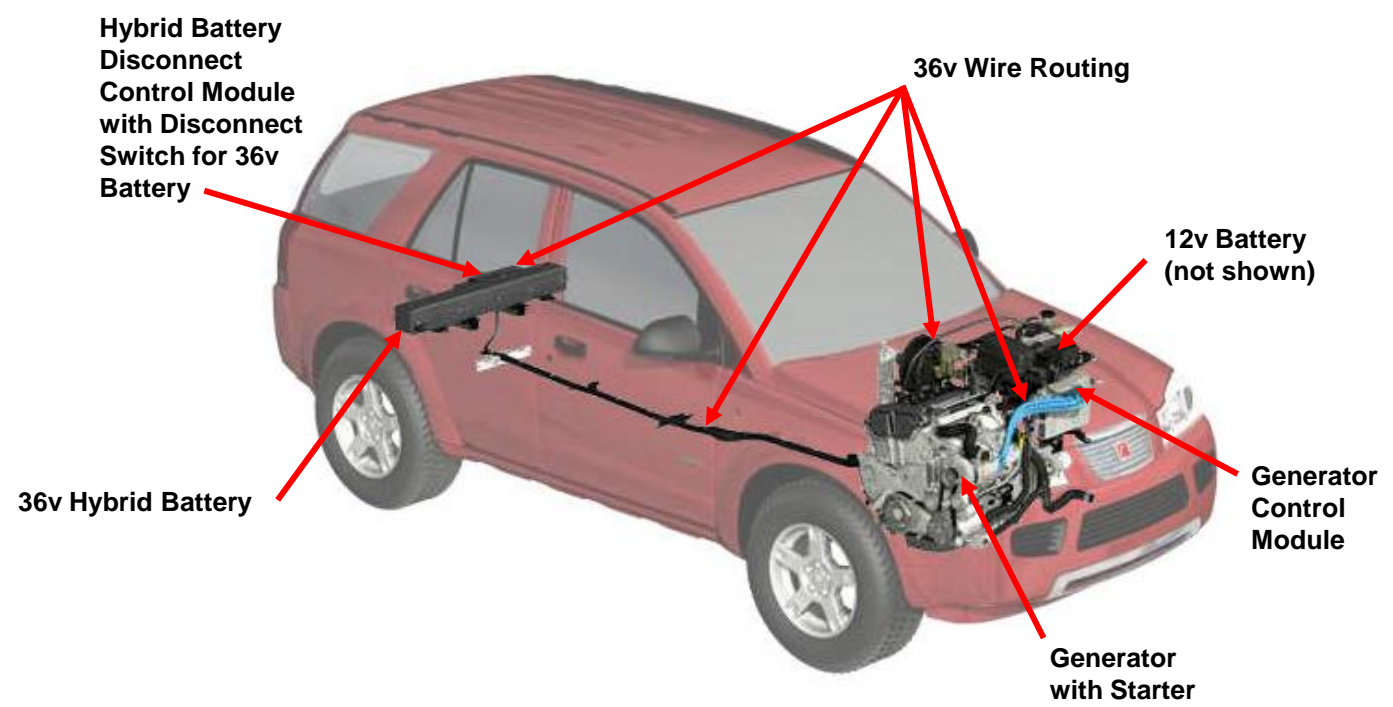
Even though the Saturn VUE Green Line Hybrid uses lower voltage than other hybrids you may encounter, it must still be approached with caution.





## Key Hybrid Components

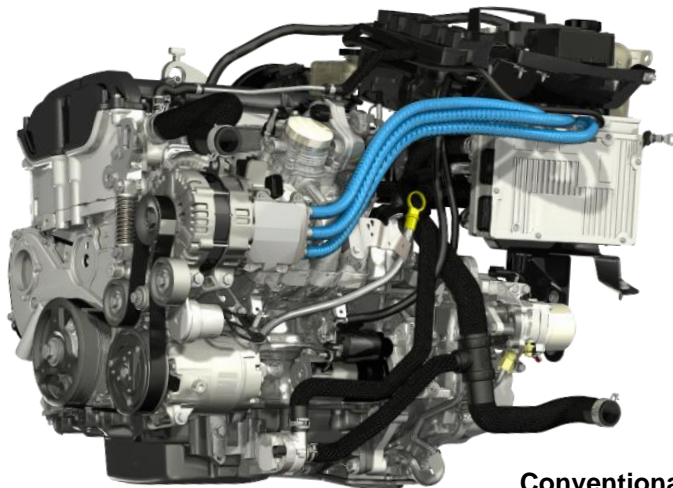
This illustration shows the location of the hybrid components.



### Key Hybrid Components (cont.)

The 2007 Saturn VUE Green Line Hybrid uses a conventional internal combustion engine coupled with a generator with starter to efficiently power the vehicle.

Note that all intermediate voltage cables used on the hybrid model are colored blue for easy identification.



**Conventional Engine  
with a Generator with Starter**

### Key Hybrid Components (cont.)

A 3-phase generator with starter, capable of creating up to 6,000 watts of power, starts the engine when the vehicle is in Auto Stop mode. The unit is mounted on the right side of the engine and replaces the standard generator used on non-hybrid models.

Intermediate voltage cables are routed through the back of the generator with starter. The cables carry 36-42 volts of electricity.

Always use caution when you are near these cables until you are sure the hybrid electrical system is disabled!



Generator with Starter

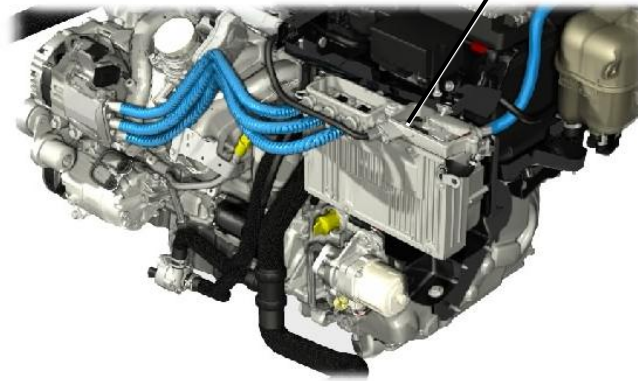
### Key Hybrid Components (cont.)

The generator control module, which is mounted on the left side of the engine, manages the routing of the 36 volt electrical system.

A 36 volt cable from the hybrid battery and three 36 volt cables from the generator with starter enter the module at the top of the component. A protective plate covers the cables.

Two coolant hoses, attached to the back of the module, connect the generator control module with the engine's cooling system. These hoses may contain hot coolant that could scald if they are disconnected or cut.

Note that blue wiring is used to indicate intermediate voltage.



**Cables from the Generator with Starter, 12v battery and 36v battery enter the top of the Generator Control Module (cover removed for clarity)**

### Key Hybrid Components (cont.)

A Nickel Metal Hydride (NiMH) 36 volt hybrid battery is enclosed in a metal case located beneath the rear cargo floor.



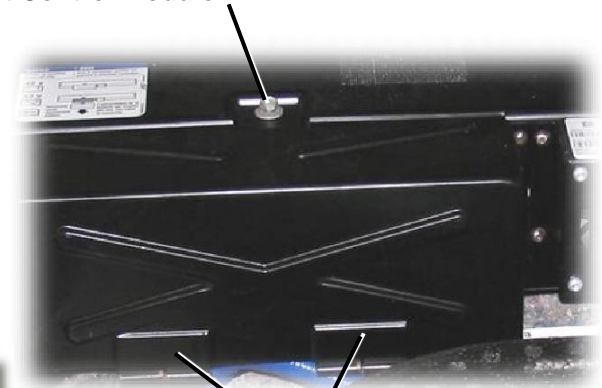


### Key Hybrid Components (cont.)

A separate box, called the hybrid battery disconnect control module, is attached to the hybrid battery case.

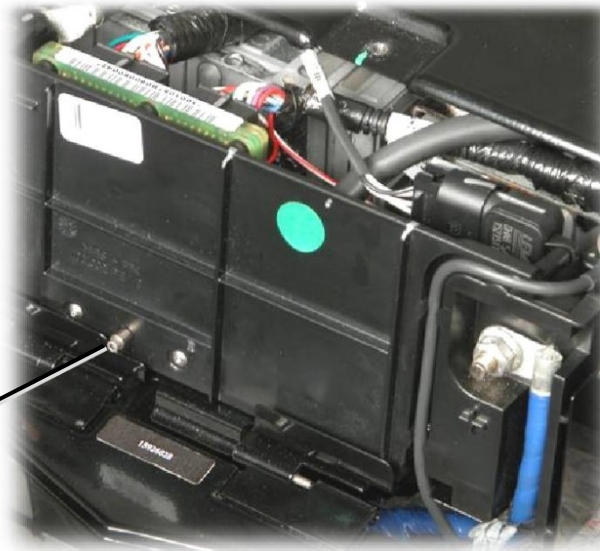
Within the box are the negative and positive battery cables for the hybrid battery. Opening the hinged cover causes a spring-loaded disconnect switch to interrupt electrical flow from the hybrid battery to the generator control module.

A 10 mm hex head bolt  
secures the Hybrid Battery  
Disconnect Control Module



Hinges hold the  
cover in place

Disconnect Switch  
(shown with Hybrid Battery  
Disconnect Control Module  
cover open)

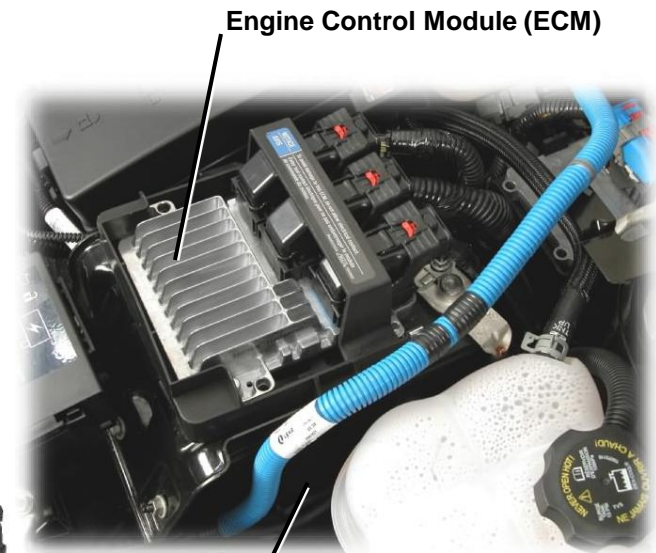


### Key Hybrid Components (cont.)

A 12 volt battery provides power for the vehicle's accessories such as the radio, HVAC, and lighting. It is also used during the initial start-up of the vehicle.

Two negative (-) cables attach to the negative (-) battery terminal.

Note that the 12 volt battery is located beneath the Engine Control Module (ECM) in the engine compartment.



Engine Control Module (ECM)

The 12v Battery is located beneath the ECM (actual battery has two negative (-) cables)

### Key Hybrid Components (cont.)

A hood ajar switch is mounted near the hood latch and prevents Auto Stop from functioning if the hood of the vehicle is open.

If the hood is opened while the vehicle is in Auto Stop, the tachometer will move to the OFF position and the engine will be disabled from restarting unless the ignition key is used.

Note the hood ajar switch will not prevent current flow through the 36 volt electrical system.



## Airbag Deployment

A contactor inside the hybrid battery is designed to open if one or more air bags deploy. This will cause current flow in the 36 volt cable to be reduced to a low level.

After air bag deployment, wait for at least 10 seconds to elapse to allow any undeployed air bag reserve energy to dissipate.

In an instance in which one or more air bags remains undeployed, disabling 12 volt power is essential to ensure personal safety.



30 amp Ignition Maxi Fuse

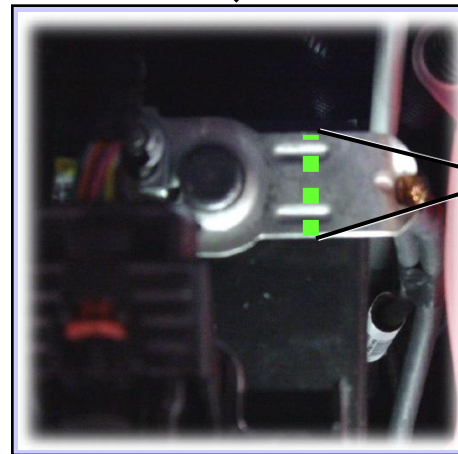
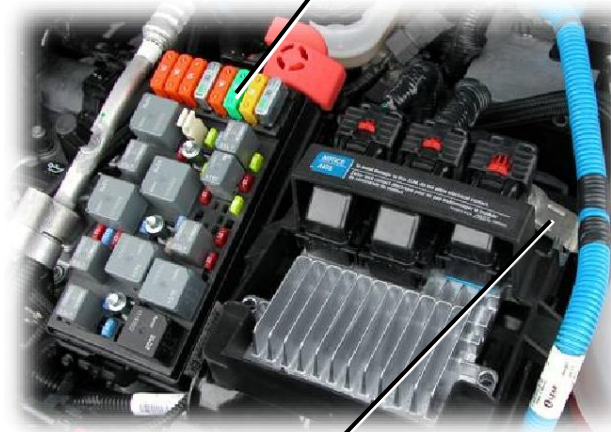
## Disabling 12 Volt Power

Perform ALL of the following 3 steps to disable the 12 volt electrical system. This includes power to the airbag system.

1. Turn the ignition key to the OFF position  
**OR** if the ignition key is not accessible, remove the 30 amp ignition maxi fuse (green) located in an underhood fuse block
2. Disconnect or cut BOTH 12v negative (-) battery cables
3. Verify tachometer needle is pointing to OFF

**WAIT** a minimum of **10 seconds** to allow any undeployed airbag reserve energy to dissipate.

Note: Since one of the 12v negative (-) cables is partially hidden from view, it is best to disconnect the cables from the terminal or cut the cables near the terminal as shown at right.



Cut here to disable BOTH 12v negative cables at the same time

**WARNING: WAIT a minimum of 10 seconds to allow the undeployed airbag reserve energy to dissipate.**

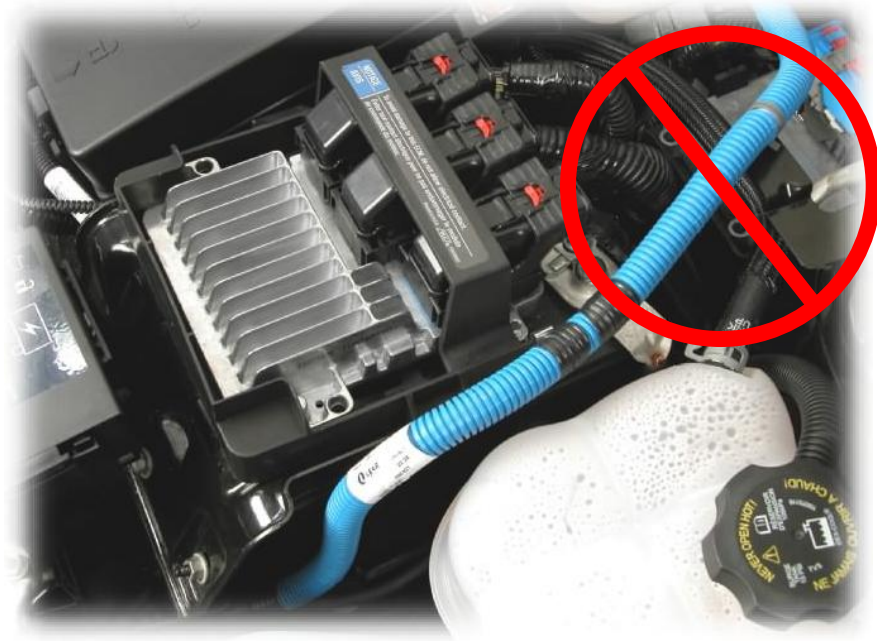


## 36 Volt Electrical System

Do NOT cut the blue intermediate voltage (36v) cable, because there is a higher arc potential.

First perform the “Disabling 12 Volt Power” procedure on the previous page to eliminate current flow on the 12 volt electrical system. This also reduce the 36 volt current flow to a low level in the blue intermediate voltage (36v) cable. No further action is required.

**CAUTION:** Cutting the blue cable may result in an arc hazard.



**CAUTION:** Cutting the blue cable may result in an arc hazard.

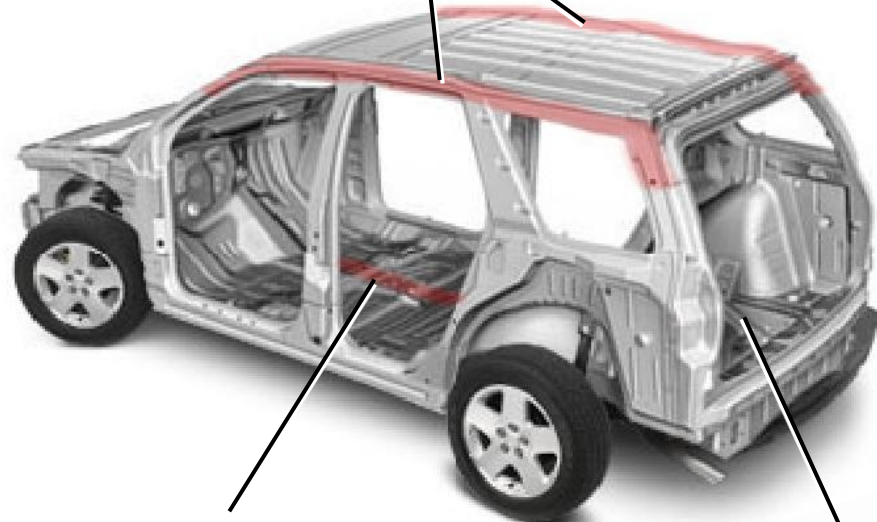
## Cut Zones

CAUTION: DO NOT cut the vehicle until all of the electrical systems have been deactivated and isolated. Cutting into the vehicle prior to disconnecting and isolating the electrical energy sources may cause an electrical arc and/or personal injury.

Do not cut the:

- Center of the vehicle. Intermediate 36 volt wiring is routed in a channel beneath the vehicle.
- Roof rails between the windshield and 'D' pillars (rear pillars). Approximately 33% of Saturn VUE hybrid models are equipped with side impact air bags.
- Hybrid battery. The hybrid battery has 36 volt electrical potential at all times.

**DO NOT CUT HERE. Roof rails may contain side impact air bag inflator canisters**



**DO NOT CUT HERE. Channel beneath the vehicle contains intermediate 36v electrical wires**

**DO NOT CUT HERE. Hybrid Battery has 36v electrical potential at all times.**



For information regarding modification of GM's First Responder Information for other uses, contact GM's Licensing Manager at:

GM Licensing Program Headquarters

5775 Enterprise Ct

Warren, MI 48092

Attn: Licensing Coordinator

## Conclusion

We are serious about making your job as safe as possible.

As you have seen, certain differences exist between the Saturn VUE Green Line Hybrid and conventional vehicles. These differences require forethought when approaching an emergency situation concerning a Saturn hybrid.

We are confident the information contained in this guide will prove useful as you prepare to assist those involved in the event.