



First Responder 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



Airbags and Pretensioners

This guide specifically addresses Airbags and Pretensioners in GM Vehicles. We will provide information on vehicles equipped with frontal, knee, door mounted, seat mounted, and roof rail airbags, as well as safety belt pretensioners.

Modern frontal airbag systems that provide automatic restraint began appearing as standard equipment in GM vehicles in the 1990 model year and have been required in all cars since model year 1998 and in all trucks since model year 1999.

The types of airbags and pretensioners in current GM vehicles, based on location, include:

- **Frontal** airbags are mounted in the steering wheel for the driver and in the front instrument panel for the front passenger
- **Knee** airbags (if equipped) are located in the lower area of the instrument panel in front of both driver and passenger seats
- **Door mounted** airbags are located in the front doors on both sides of the vehicle (1997 - 1999 Cadillac DeVille)
- **Seat mounted** airbags (if equipped) are located in the outboard side of the seats for the driver, front passenger and rear seat passengers in some vehicles. There may also be a Front Center Airbag mounted on the inboard side of the driver seat on some vehicles.
- **Roof rail** airbags (if equipped) are located behind the trim covering the roof rails on each side of the vehicle
- **Pretensioners** are part of the safety belt system for the driver and front passenger of many vehicles. Some vehicles may have more than one pretensioner at a given seating position.
 - Retractor pretensioners may be in the B-pillar or in the seat.
 - Buckle pretensioners are attached to the inboard side of the front seat.
 - Anchor pretensioners are usually attached to the outboard side of the front seat, or they may be attached to the floor, next to the outboard side of the front seat.

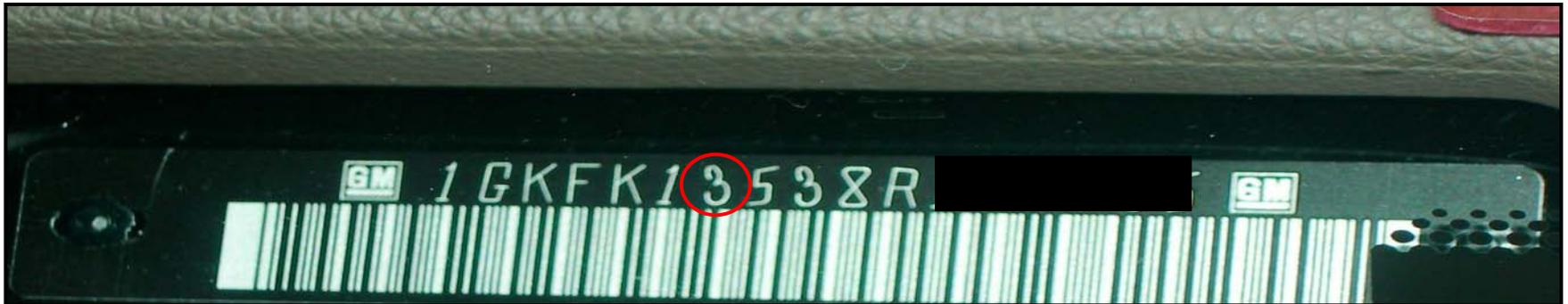


In crashes of sufficient severity, these systems initiate the tightening of the seatbelt in a split second.



GM cars equipped with an airbag have the number 2, 3 or 4 in the seventh position of the Vehicle Identification Number (VIN), which is visible through the bottom of the windshield on the driver's side. In most vehicles on the rear driver door inner panel, close to the latch, there is a vehicle identification tag which also includes the VIN. In 1997 and later passenger cars (not light trucks or minivans), a 4, 5, 6 or 7 in this position indicates the vehicle is also equipped with a side impact airbag. In addition, there is identifying information in the vehicle at the airbag locations.

If you cannot determine whether the car is equipped with an airbag, take the same precautions as if it were equipped with an undeployed airbag. Always assume that any late-model vehicle is equipped with a front impact airbag. There is no specific marking to indicate dual-stage airbags.





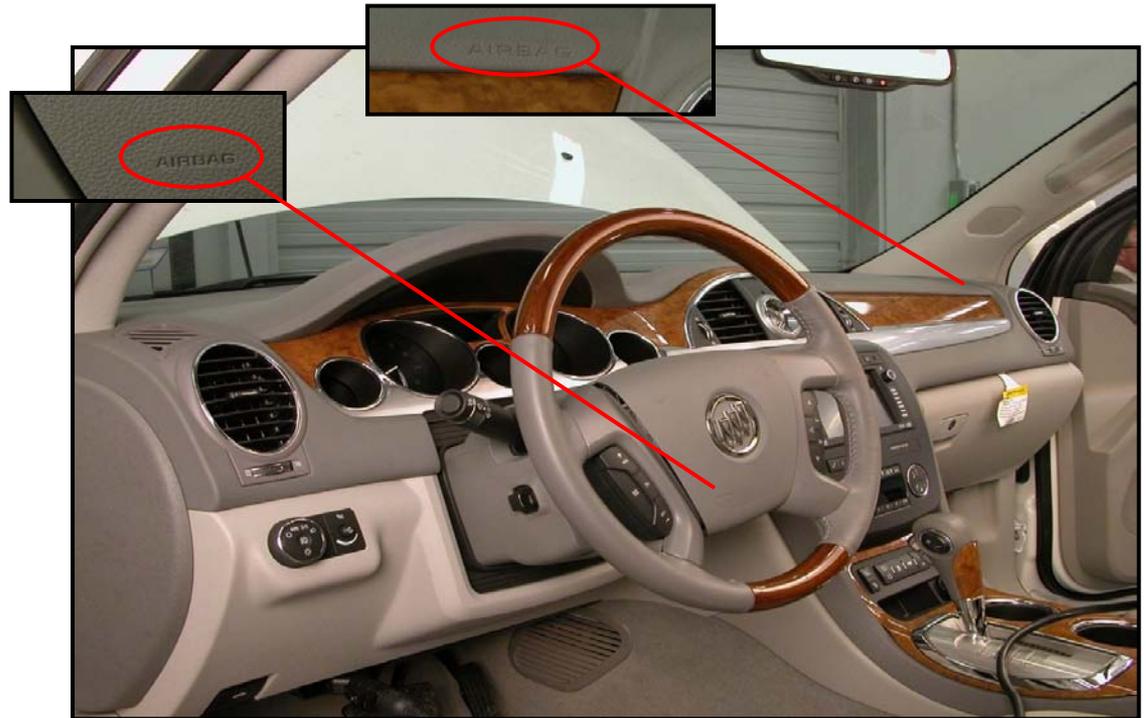
Frontal Airbags

Frontal airbags are designed to deploy in moderate to severe frontal or near frontal crashes. Frontal airbags are not intended to inflate during vehicle rollovers, in rear impacts or in many side impacts. So it is possible that you will be involved in rescue operations after crashes in which a frontal airbag did not deploy. Most GM models with frontal airbags will display “SIR” or “Airbag” on the steering wheel hub and passenger side instrument panel on or near the deployment opening. Some passenger airbags have a discrete deployment door on the instrument panel. Some newer models may open the entire upper instrument panel (I/P) or may have hidden deployment seams.

Starting with the 2001 model year, certain vehicles have dual-stage frontal airbags. In moderate severity crashes only the first stage may be deployed. Both stages will deploy in severe crashes. Depending upon the vehicle make and model year, the passenger frontal airbag may be suppressed from deploying in some scenarios, based on seating conditions or an airbag off switch.

Note:

The presence of a deployed airbag does not guarantee that both stage inflator modules are inactive. Always treat airbags as live and do not strike or sever the module.





Knee Airbags

Starting with the 2011 Model Year, some GM Vehicles incorporate knee airbags. Knee airbags are designed to deploy in moderate to severe frontal or near frontal crashes. Knee airbags are not intended to inflate during vehicle rollovers, in rear impacts, or in many side impacts. Also in some scenarios, the passenger knee airbag is suppressed from deploying based on seating conditions. It is possible that knee airbags will not deploy during a collision. Do not cut, strike or pry against an airbag regardless of deployment state. GM models with knee airbags will display "Airbag" on the bottom of the instrument panel on or near the deployment opening. Some knee airbags have a visible deployment door on the rearward surface of the instrument panel and some have a module configuration where the airbag deploys from under the instrument panel.

Driver Side Knee Airbag



"AIRBAG"
Label

Airbag
Module

Knee airbag with door on rearward
surface of dash
(*11 Chevrolet Volt)

Passenger Side Knee Airbag



"AIRBAG"
Label



Knee airbag deploying from
under
Instrument panel
(*13 Chevrolet Malibu)

Airbag
Module





Seat Mounted Side Airbags

Seat mounted side airbags are located on the outboard sides of the seat cushion on the driver and passenger side of the vehicle. In some vehicles, they are also located on the outboard sides of the seat cushions for the rear seat passenger(s) or under the trim panels just outboard of the rear seats such as in late model Chevrolet Cruze, and Buick Verano.

Seat mounted side airbags are designed to work with safety belts to provide protection in moderate to severe side impacts. A seat-mounted side impact airbag is designed to inflate on the side of the vehicle that is struck. Seat-mounted side impact airbags are not designed to inflate in frontal impacts, near frontal impacts, rollovers, rear impacts or when the opposite side of the vehicle is struck. In addition, depending on seating conditions, the front passenger seat located side impact airbag may not inflate in certain crashes on some vehicles.

Some seat mounted side airbags deploy through a discrete door on the outboard side of the seat. Other seat mounted side airbags deploy through the outboard seat cover seam. The word "Airbag" will appear on the deployment door or on a tag in the seat cover seam.

Rear seat airbag locations (if equipped)



Rear seat airbag locations (if equipped)



Door on the outboard
Side of the seat





Seat Mounted Front Center Airbag

Beginning in model year 2013, the Buick Enclave and certain GMC Acadia and Chevrolet Traverse vehicles feature a Front Center Airbag. Additional applications are planned. The airbag is an inflatable restraint designed to work with safety belts to help protect front seat occupants in moderate to severe side impact crashes. The airbag is designed to inflate in impacts to either side of the vehicle. The airbag is also intended to inflate when the sensing system predicts that the vehicle is about to roll over on its side. This airbag deploys out of the inboard side of the driver seat in a similar manner to an outboard side airbag with some modifications to ensure proper positioning and inflation duration. The Front Center Airbag is not designed to inflate in frontal, near frontal or rear collisions.

Note:

To determine if a vehicle is equipped with this feature, look for the word "AIRBAG" on a tag on the inboard side of the drivers seat cover seam. If manipulation of the drivers seat is required during extraction procedures, first ensure the vehicle battery is disconnected and do not strike or cut the inboard area of the drivers seatback.





Roof Rail Airbags

Roof rail airbags are located behind the covering of the roof rails on both sides of the vehicle compartment. The word “Airbag” will appear in one or more places on the pillar trim or headliner near the roof rail. The inflator can be in different locations within the vehicle, such as above the front seating positions, above or rearward of the B-pillars, on or rearward of the C-pillars, and rearward of the rear seating positions, as shown in the images that follow. In addition, some GM vehicles contain roof rail airbags with two inflators on a side. Larger SUVs may have a two inflator system on both sides and large vans may have a two inflator system only on the side with the sliding door. If a roof rail airbag is not deployed, and the roof structure needs to be cut in the area that could potentially contain an airbag inflator, peel back the trim in the area where cutting is to occur and confirm that an inflator is not present prior to cutting the vehicle.

Roof rail airbags are designed to deploy in:

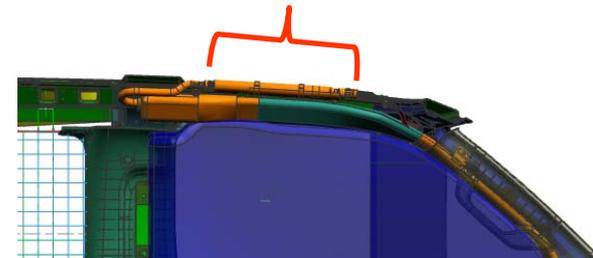
- Moderate to severe side impacts
- Certain rollover events (if equipped with rollover sensing)
- Severe frontal impacts (in some vehicles)

Note:

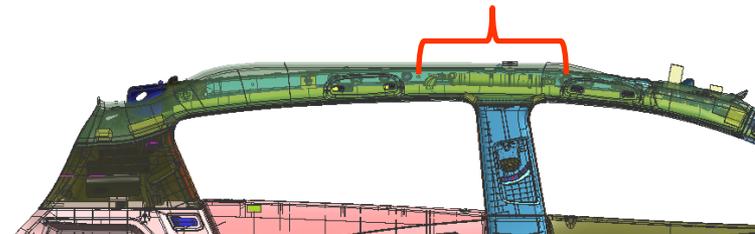
Roof-rail airbags are not intended to inflate in rear impacts.

Images below are shown with trim removed

Inflator above front seating position



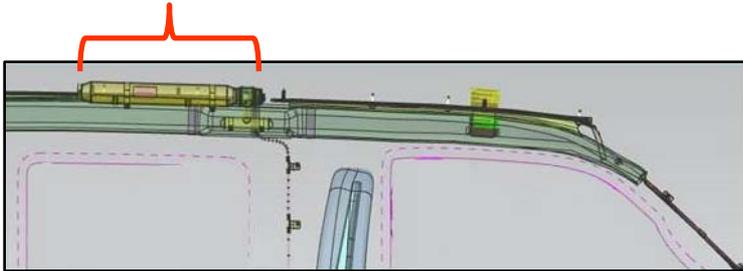
Inflator above B-pillar



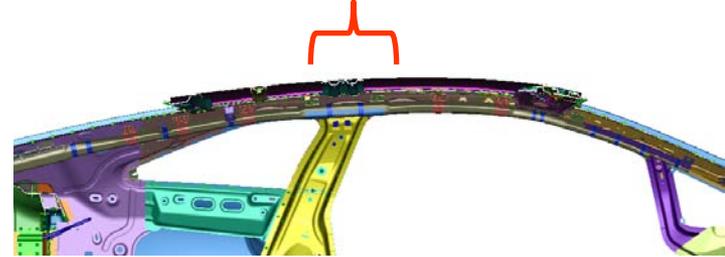


Roof Rail Airbags (continued)

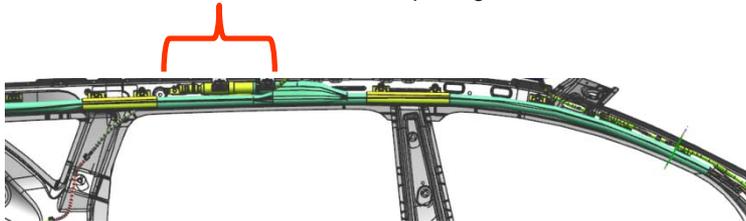
Inflator just rearward of B-pillar



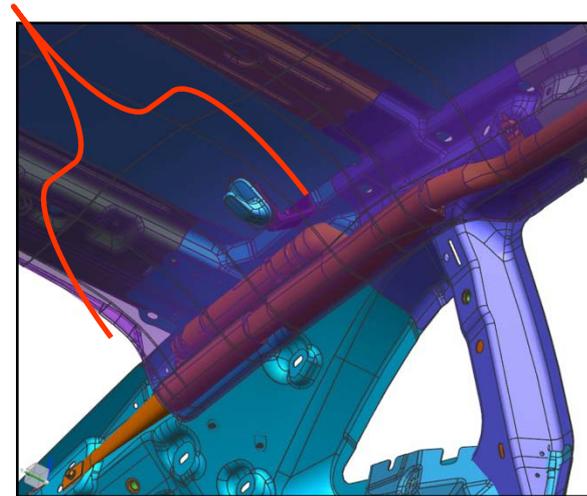
Inflator above B-pillar in a coupe



Inflator centered on second row door opening



Inflator rearward of B-pillar in a coupe



Inflator at rear of second row door opening

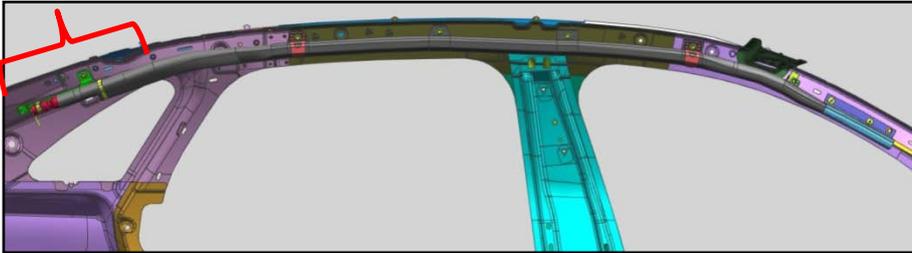


All images are shown with trim removed

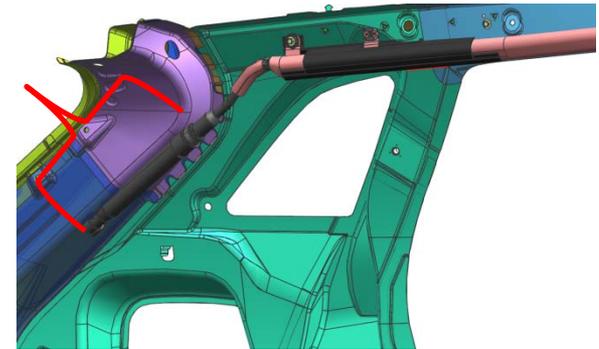


Roof Rail Airbags (continued)

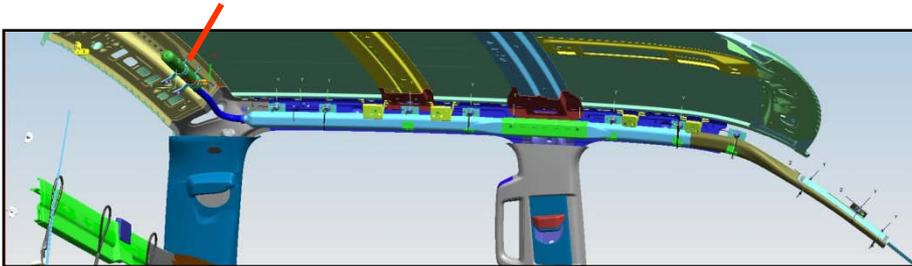
Inflator rearward of C-pillar in a sedan



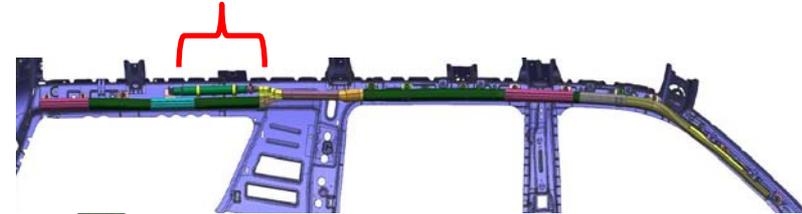
Inflator on C-pillar



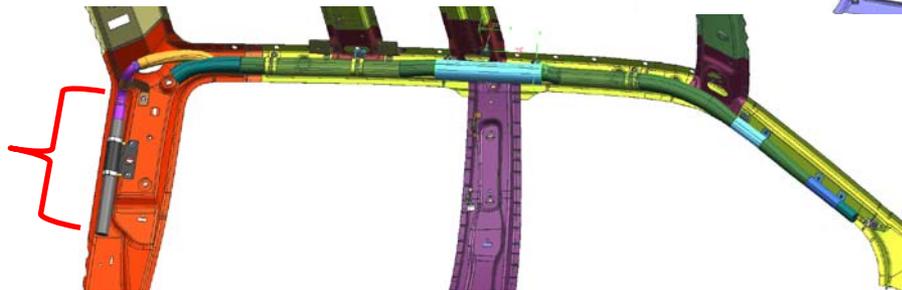
Inflator inboard and above rear backlight glass



Inflator rearward of C-pillar in a large SUV



Inflator on C-pillar



All images are shown with trim removed



Deployed Airbags

A vehicle in which a front impact airbag has deployed can be identified by the fabric bags drooping from the steering wheel hub or instrument panel. Newer model year (2001 and later) vehicles may have dual stage airbags and for these, there may be an undeployed stage in the airbag inflator.



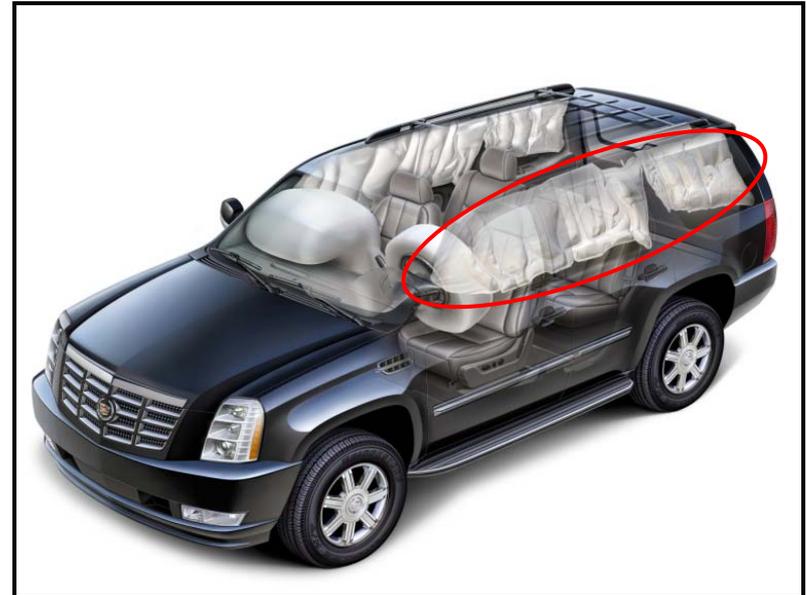
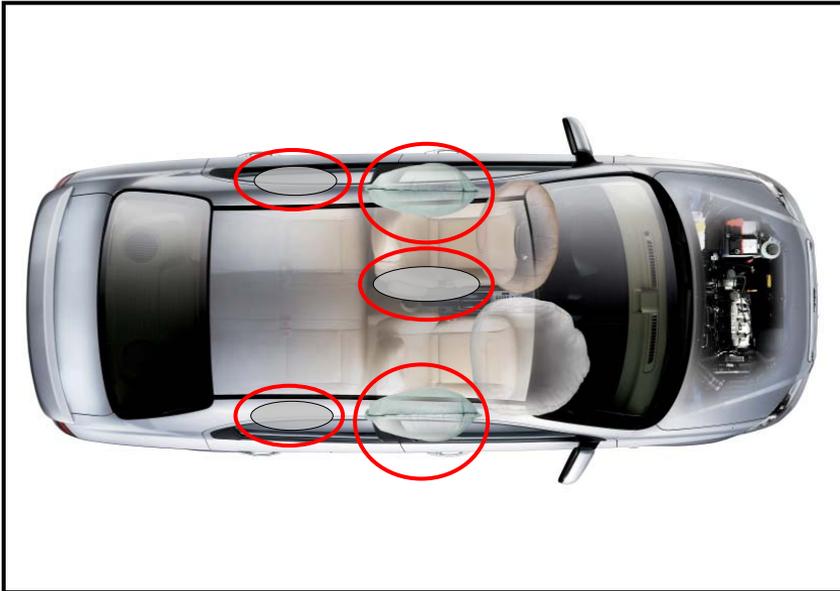


Deployed Seat Mounted Side Impact Airbag

A vehicle in which a seat mounted side impact airbag has deployed can be identified by a fabric bag drooping from the outboard side of the seat on the struck side of the vehicle or from the inboard side of the left seat in vehicles with a Front Center Airbag. The outboard seat mounted airbags are of relatively small size and may be obscured by the occupant of the seat.

Deployed Roof Rail Airbag

In vehicles equipped with roof rail airbags, the deployed airbag is identified by large airbags extending from the roof rails inside the vehicle. Some roof rail airbags may hold pressure for an extended period of time.





Although an airbag that has deployed in a crash is not hot to the touch, some components within the airbag module will be hot for a short time. A small amount of smoke coming from a deployed airbag module is normal and should not be cause for concern. When the gas is vented out of the airbag, small particles from inside the bag are also vented into the passenger compartment. These airborne particles look like smoke, and some of the particles are deposited as residue on and around the airbag.

Airbags, in most vehicles prior to the 2003 model year, use sodium azide as a propellant. There will be no detectable amount of sodium azide present in the passenger compartment of the vehicle after the airbag deploys. Prior to deployment, the sodium azide is sealed in the metal canister until it converts to nitrogen gas to deploy the bag. The residue vented during deployment consists primarily of sodium hydroxide which may cause a slight irritation to the skin. The sodium hydroxide quickly converts to sodium carbonate and sodium bicarbonate (baking soda). Thus, it is unlikely that significant amounts of sodium hydroxide will remain after the crash.

Beginning in the 1997 model year, some airbags use other propellants that do not produce sodium hydroxide as a deployment byproduct. However, these airbags have some inert residue, primarily potassium chloride (like table salt) and potassium carbonate.

CAUTION:

When an airbag inflates there may be dust in the air, this dust could cause breathing problems for people with a history of asthma or other breathing problems.

As in all other rescue procedures, wear protective gloves and safety glasses. If gloves are not worn, wash your hands with mild soap and water after handling the deployed airbag. Also, avoid rubbing your eyes after handling the bag until you have removed the gloves and/or washed your hands. Take care to avoid introducing the residue into the eyes or any wounds of the patient. These precautions will help prevent eye or skin irritation in the unlikely event that you do contact any sodium hydroxide

Note:

Use any effective fire-fighting medium, including water, to extinguish a fire in a car equipped with an airbag. If the airbag module uses sodium azide as a propellant, it is sealed within a metal canister and is unlikely to come into contact with water used in fire-fighting efforts.



In the event of an emergency rescue with an undeployed airbag, disconnect the negative battery cable first and then disconnect the positive battery cable to remove power to the airbag system. Not all vehicles have the battery in the engine compartment. Regardless of the battery location, it is best to disconnect vehicle power at the battery.

In most crash situations, a vehicle with seat mounted or door mounted side impact airbags may have at least one airbag undeployed since those airbags are generally designed to inflate only on the struck side of the vehicle. In some vehicles, roof rail airbags are also designed to inflate only on the struck side of the vehicle.

DANGER:

Anyone who is up against or very close to any airbag when it inflates could be seriously injured or killed. If you cannot disconnect the battery power, do not place your body or any objects on or very close to any airbag module.

Newer models may have dual-stage frontal impact airbags. The airbag(s) may have an active second stage even if the first stage has deployed.

Note:

Some vehicles have the battery under the rear seat or in the trunk.

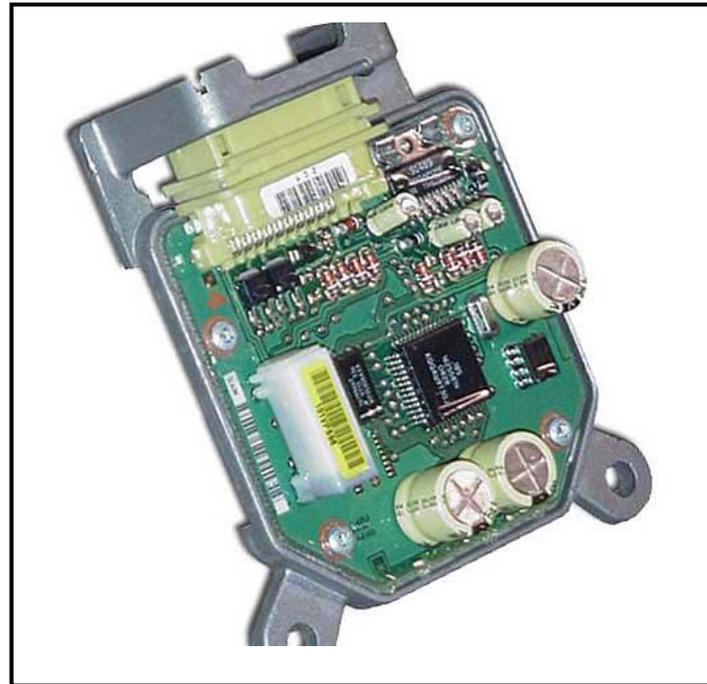
Ruptured Airbag Module

In the unlikely event that an inflator canister is ruptured in a crash or in rescue operations, do not touch or ingest any exposed chemicals.



GM airbag systems are equipped with an energy reserve feature that enables the airbag(s) to deploy, under some circumstances, even if the power has been interrupted in a crash. Though unlikely, it is possible that the energy reserve in some airbag systems has power to deploy the airbag(s) for a short period of time after the battery is disconnected or the ignition is turned off.

Although it is possible for an undeployed airbag to inflate during rescue operations, it is unlikely to occur. Carry out your normal patient care and rescue operations, but do not place your body or objects against or very close to the airbag module except for essential maneuvers.





Each GM model equipped with airbags has unique sensor locations. Generally, these sensors are located in the doors, B-pillar, upper tie bar or lower tie bar. After a crash, wiring to the sensors might be damaged, which could initiate an unwanted deployment.

Disconnecting the battery cables is the best way to reduce the likelihood of unwanted airbag deployment in rescue operations.

Airbag sensors typically have yellow connectors





After an airbag has been deployed and the power removed, there are no cutting restrictions due to that particular airbag. However, you should consider any other airbags that are not deployed prior to cutting. In all cases, with or without deployment of the airbags, after removing power, the A-pillar and/or B-pillar can be cut. In the absence of door mounted side airbags, the door can be cut or removed.

Note: all information below assumes electrical power has been removed.

- **Frontal airbags** – Do not cut into an undeployed airbag module. Otherwise, removal, spreading or cutting of steering column or instrument panel components is acceptable.
- **Knee Airbags** – Do not ...
- **Door mounted side impact airbags** – Whether the door mounted side impact airbag is deployed or not, there are no issues with cutting the door wires where they enter the door at the hinge, because the firing loop for the side impact airbag is contained in the rear of the door between the side impact sensing module and the airbag module. If the door mounted side impact airbag did not deploy, you may pry or cut in the forward half of the front door, but do not cut or drill in the upper rearward quadrant of the front door where the side impact airbag module is packaged.
- **Seat mounted airbags** – Even if the seat mounted airbag is deployed, the pretensioner may still be live and should not be cut. If the outboard seat mounted airbag is not deployed, do not cut into the outboard bolster cushion. In addition, if equipped with an inboard driver seat mounted Front Center Airbag, and this airbag is not deployed, do not cut into the inboard driver seat bolster cushion.
- **Roof rail airbags** – If the roof rail airbag is deployed, all pillar and rail locations can be cut. If the roof rail airbag is not deployed, you should not cut the rear pillar or upper rail without visually identifying and avoiding the location of the inflator by removing trim. Cutting other portions of a roof rail airbag system is acceptable.

Any undeployed airbag is designed to self-deploy in the event of a fire, and applying heat could cause the self-deploy feature to activate. Do not expose the airbag to any heat source (torches, etc.). This precaution will help prevent an unwanted airbag deployment.

Rescue Training Vehicles

Before using a car with an airbag for rescue training purposes, manually deploy or remove the airbags in the car. Refer to the manual deployment or removal procedures described in the service manual for the specific car being used. Contact a GM dealer or zone office for assistance.



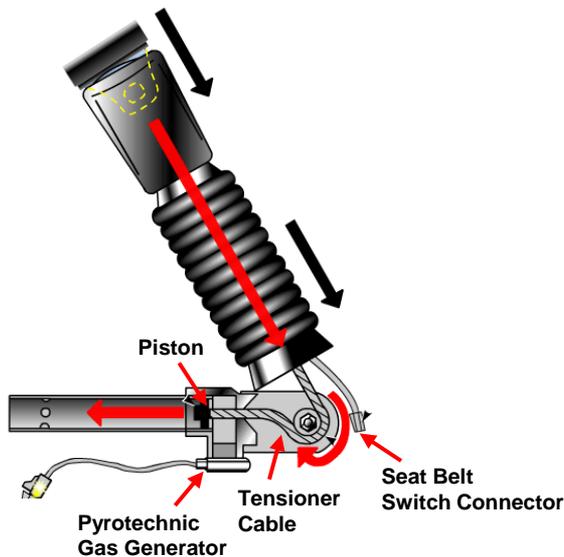
Seat Belt Pretensioners

A pretensioner is a device that is connected to the safety belt buckle, safety belt retractor or / and outboard lower safety belt anchor assembly. The pretensioner tightens the seat belt during certain crashes. Pretensioners may deploy with or without airbag deployment. Depending upon the vehicle, pretensioners may activate in certain frontal, side, rear and/or rollover crashes. (For some vehicles, pretensioners will only deploy if the safety belt is buckled.)

The **buckle** pretensioner uses a pyrotechnic gas generator to propel a piston that is attached to the safety belt buckle with a cable. The cable pulls the buckle down toward the seat tightening the belt.

The **anchor** pretensioner uses a pyrotechnic gas generator to propel a piston that is attached to the outboard lower safety belt anchor assembly with a cable. The cable pulls the anchor assembly down toward the floor tightening the belt.

The **retractor** pretensioner uses a pyrotechnic device that “backwinds” the retractor spool tightening the belt.



Buckle Pretensioner



Anchor Pretensioner



Retractor Pretensioner



Pretensioner Deployment

The top of the safety belt buckle may appear to be at or below the top of the seat cushion when the **buckle pretensioner** is deployed. Also, in most vehicles, an “accordion” sleeve below the buckle may be compressed.

Most **anchor pretensioners** also have accordion sleeves that may be compressed if the anchor pretensioner is deployed.

When a **retractor pretensioner** deploys it pulls the webbing tight. If the safety belt was not worn by an occupant, the webbing may not easily be extended. If the safety belt was worn, the safety belt webbing may be extended and may not retract.



Pretensioner Non- Deployment

Use the same precautions you would for the other inflatable restraint components. There may be power to activate a pretensioner for a short time after the battery is disconnected or the ignition is turned off.



The contactors inside the Hybrid battery are designed to open if one or more airbags deploy. This causes an interruption of the 300 volt electrical system and discontinues current flow in the high voltage cables.

It is essential to disable the 12 volt power in order to ensure personal safety even if the airbags seem to have been deployed. Certain vehicles may have dual-stage airbags and the appearance of deployed airbags does not ensure that all parts of the airbag system have been deployed. After disabling 12 volt power, wait at least 10 seconds to allow any un-deployed airbag reserve energy to dissipate.

Refer to the vehicle specific Emergency Response Guide to review the steps for disabling the 12 volt power. Emergency Response Guides are located at gmstc.com. Click on the "First Responder" link to access First Responder Guides and Quick Reference Sheets.





By taking the precautions described, you can help reduce the risk of injuries in emergency rescue operations involving GM vehicles equipped with airbags and pretensioners.

1. Knee Airbags
2. Driver and Front Passenger Airbags
3. Roof Rail Airbags
4. Front-Row Side Impact Airbags
5. Second-Row Side Airbags



Front Center Airbag and Seatbelt Pretensioners not shown

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GM Licensing Program Headquarters, 5775 Enterprise Ct. Warren, MI 48092, Attn: Licensing Coordinator**