
DESCRIPTION AND OPERATION

Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS)

The air bag supplemental restraint system (SRS) is designed to provide increased collision protection for front seat occupants, in addition to that provided by the 3-point safety belt system. The SRS will also provide increased collision protection for the rear occupants when equipped with optional safety canopy modules. Safety belt use is necessary to obtain the best occupant protection and to receive the full advantage of the SRS.

This vehicle line contains dual-stage deployment (advanced restraint system) driver and front passenger air bag modules.

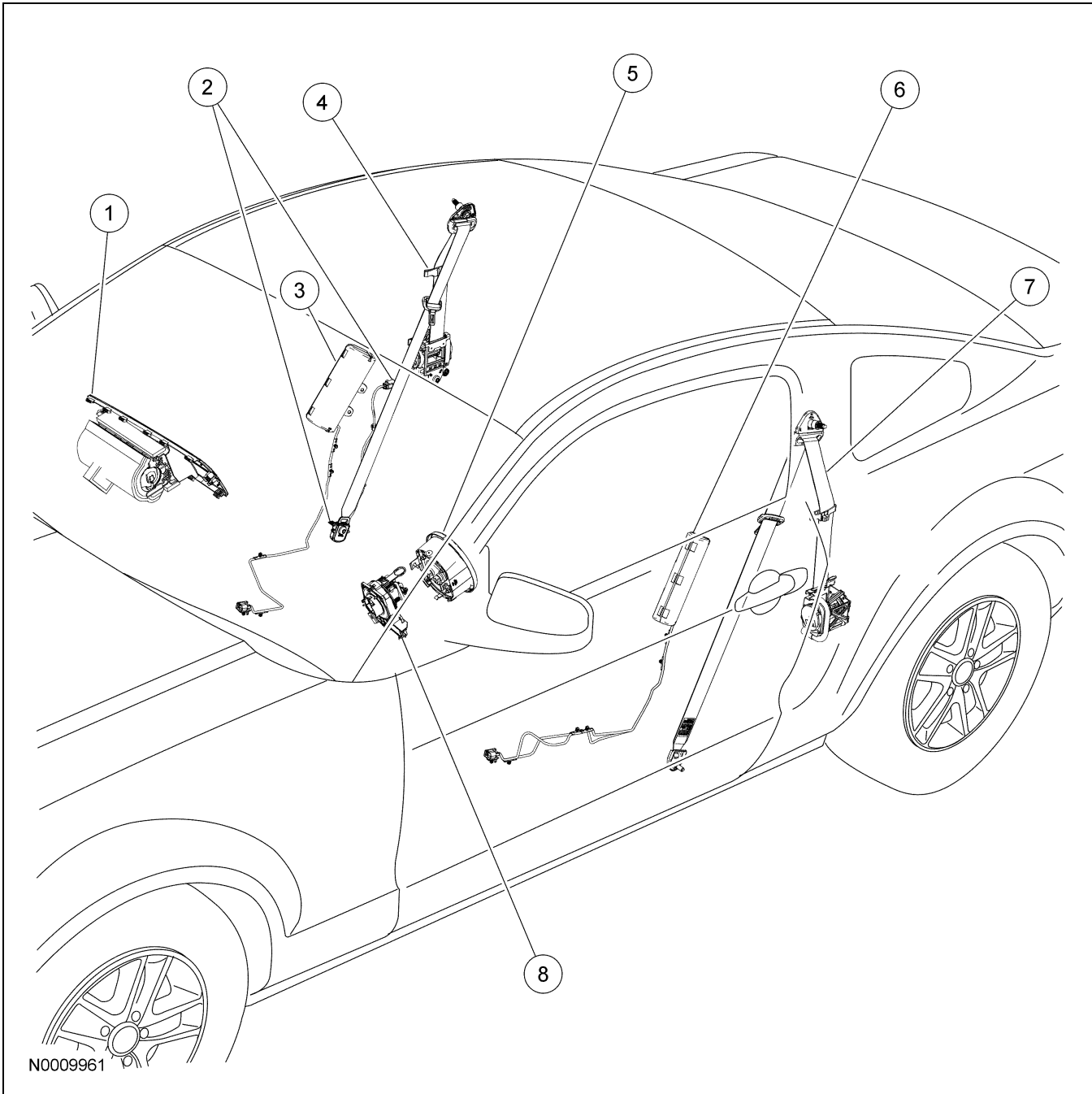
This vehicle line can also be equipped with seat side air bag modules. Seat side air bag modules deploy from the outboard front seat backrest upon a side impact.

Before servicing the SRS, the system must be depowered. For additional information, refer to Supplemental Restraint System (SRS) Depowering and Repowering.

The air bag and safety belt pretensioner SRS components are shown in the following illustration.

DESCRIPTION AND OPERATION (Continued)

Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) Components (Illustration 1 of 2)



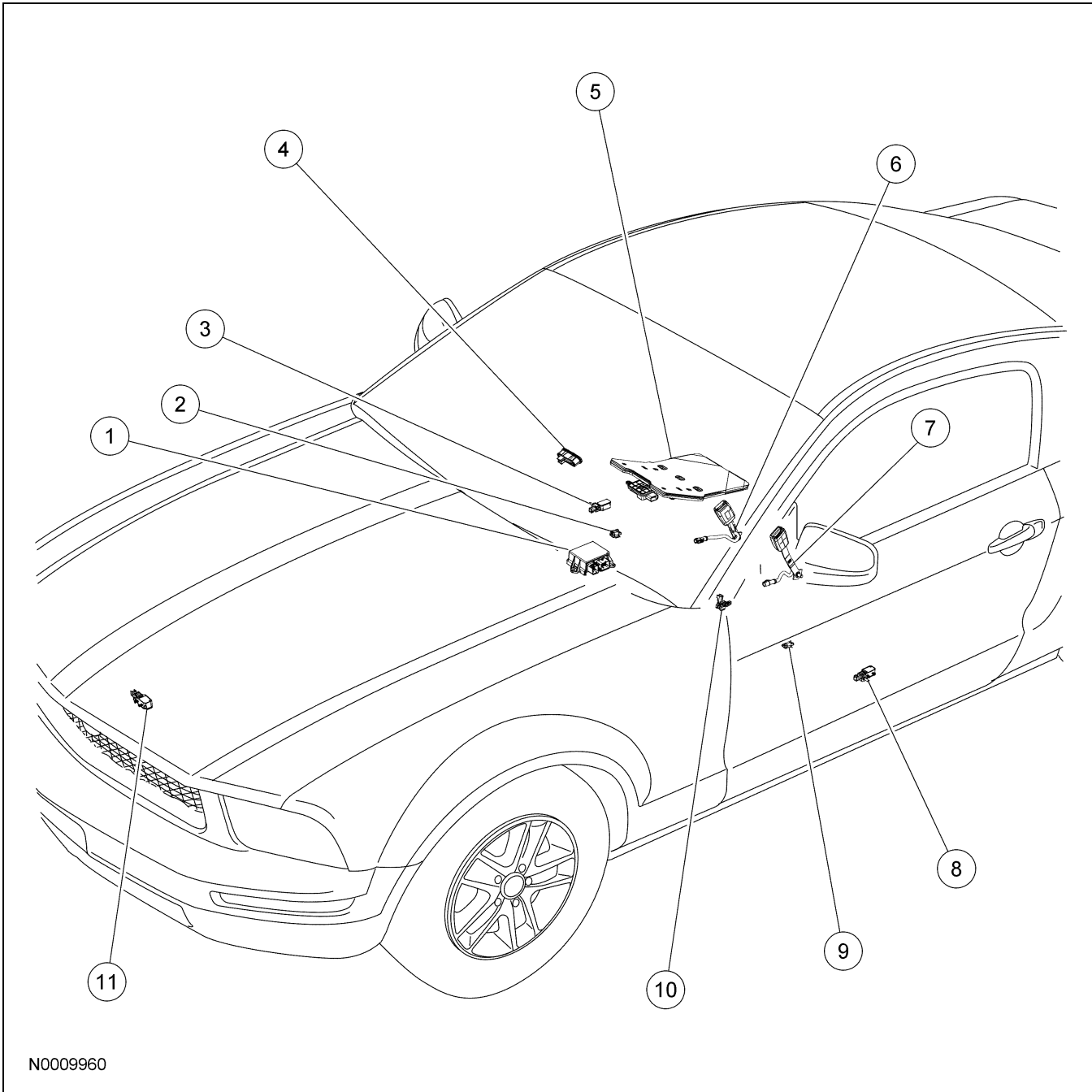
Item	Part Number	Description
1	044A74	Passenger air bag module
2	—	Belt tension sensor (BTS) (part of 611B08)
3	611D10	Passenger seat side air bag module (if equipped)
4	611B08	Passenger safety belt retractor and pretensioner

Item	Part Number	Description
5	042B13	Driver air bag module
6	611D11	Driver seat side air bag module (if equipped)
7	611B09	Driver safety belt retractor and pretensioner
8	14A664	Clockspring

(Continued)

DESCRIPTION AND OPERATION (Continued)

Air Bag and Safety Belt Pretensioner Supplemental Restraint System (SRS) Components (Illustration 2 of 2)



N0009960

Item	Part Number	Description
1	14B321	Restraints control module (RCM)
2	14B022	Passenger seat side air bag bridge resistor (if equipped)
3	14B345	Passenger side impact sensor (if equipped)
4	—	Passenger air bag deactivation (PAD) indicator
5	603B02	Occupant classification sensor (OCS)

Item	Part Number	Description
6	61202	Passenger safety belt buckle (includes safety belt switch)
7	61203	Driver safety belt buckle (includes safety belt switch)
8	14B345	Driver side impact sensor (if equipped)
9	14B022	Driver seat side air bag bridge resistor (if equipped)
10	14B416	Seat position sensor
11	14B006	Front impact severity sensor

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DESCRIPTION AND OPERATION (Continued)

Bridge Resistors

NOTE: Do not deactivate the seat side air bag module circuit by removing the bridge resistor from the electrical connector.

If the seat side air bag bridge resistor is removed, an open circuit fault will be generated by the RCM.

If a restraint system diagnostic tool is installed at the seat side air bag electrical connector, a low-resistance fault will be generated.

The seat side air bag bridge resistor:

- is equipped on vehicles without seat side air bag modules.
- must not be removed in the deactivation procedure.
- is mounted under the driver and passenger seat to the seat pan.

Clockspring

The clockspring:

- is mounted on the steering column, behind the steering wheel.
- allows continuous electrical contact between the RCM and the driver air bag module when the steering wheel is turned.

Driver Air Bag Module

NOTE: References to the driver air bag module must not be confused with the side (seat-mounted) air bag components of the SRS.

The driver air bag module:

- is steering wheel mounted.
- is a dual-stage air bag, deploying at 1 of 2 different rates depending upon impact severity, safety belt usage and driver seat position.
- will deploy upon receiving a flow of current from the RCM.
- has no subassemblies.

Driver Seat Side Air Bag Module

NOTE: References to side air bag modules refer to the seat-mounted and not to the steering wheel or instrument panel-mounted air bag components of the SRS.

NOTE: For additional information, when servicing a seat equipped with a seat side air bag module, refer to Section 501-10.

The driver seat side air bag module:

- will deploy upon receiving a flow of current from the RCM, initiated by the driver seat side impact sensor and internal RCM circuitry.
- is installed as an assembly.
- is mounted in the driver seat back.

Passenger Air Bag Module

NOTE: References to the passenger air bag module must not be confused with the side (seat-mounted) air bag components of the SRS.

The passenger air bag module:

- is a dual-stage air bag, deploying at 1 of 2 different rates depending upon impact severity and safety belt usage.
- will deploy upon receiving a flow of current from the RCM.
- is installed as an assembly.
- is mounted in the right side of the instrument panel.

Passenger Seat Side Air Bag Module

NOTE: References to side air bag modules refer to the seat-mounted and not to the steering wheel or instrument panel-mounted air bag components of the SRS.

NOTE: For additional information, when servicing a seat equipped with a side air bag module, refer to Section 501-10.

The passenger seat side air bag module:

- will deploy upon receiving a flow of current from the RCM, initiated by the passenger seat side impact sensor and internal RCM circuitry.
- is installed as an assembly.
- is mounted in the passenger seat back.

Safety Belt Buckle Switch

As part of the SRS, the driver and passenger safety belt buckles are equipped with a Hall-effect switch. The safety belt buckle switches indicate to the RCM whether the safety belt buckles are buckled or unbuckled.

The RCM uses this information in determining the deployment rate of the dual-stage driver and passenger air bag modules.


DESCRIPTION AND OPERATION (Continued)

The safety belt buckle switches are also used for the driver safety belt warning system and the driver and passenger Belt Minder. For additional information, refer to Section 501-20A.

Safety Belt Pretensioners

As part of the SRS the safety belt retractors are equipped with pretensioners. The pretensioners remove excess slack from the safety belt webbing. The pretensioners are activated by the RCM when the module detects an impact event force exceeding a programmed limit. For additional information, refer to Section 501-20A.

Occupant Classification Sensor

 **CAUTION: It is necessary to rezero the OCS system when a front passenger seat cushion is disassembled, a new trim cover installed or an OCS service kit is installed. A diagnostic tool is used to trigger the active command to carry out rezeroing of the OCS system.**

NOTE: To identify between a production OCS system and a service OCS system (OCS service kit), inspect the electronic control unit (ECU) electrical connector. A production OCS system allows the disconnection of the ECU electrical connector. A service OCS system (OCS service kit) has the ECU electrical connector glued to the ECU, it cannot and should not be disconnected or altered.

The seat occupant classification sensor (OCS) system is found only on the front passenger seat. The front passenger seat OCS system is comprised of a silicone gel-filled bladder mounted in the seat cushion, a pressure sensor that is mounted to the seat frame and an ECU which is also mounted to the seat frame. Pressure is applied to the OCS system bladder when the weight of any occupant or object in the front passenger seat is sensed. The pressure is then transferred through a tube, is sensed by the OCS system pressure sensor, then electronically communicated to the OCS system ECU. Based on preprogrammed set points, the OCS system ECU will inform the RCM, via a high-speed controller area network (HS-CAN), of the necessary information. The RCM uses this information in determining if the passenger air bag module is to be deployed in the event of a deployable collision. The RCM may also use this information to illuminate/not illuminate the passenger air bag deactivation (PAD) indicator. For additional information regarding PAD indicator operation, refer to Passenger Air Bag Deactivation (PAD) Indicator in this section.

When an OCS system fault is present, the air bag indicator lamp will illuminate or the air bag warning chime will be activated (if an air bag indicator fault is present). The SRS then defaults the passenger air bag module to ON (activated) regardless of the size of the occupant in the front outboard passenger seat.

The OCS system components (seat cushion foam pad, bladder with pressure sensor and electronic control unit) are calibrated to each other and are serviced as an assembly. **OCS system components are not to be installed separately.** If installing a new OCS system, OCS system component or seat cushion foam pad, a new OCS system service kit (seat cushion foam pad, bladder with pressure sensor, electronic control unit and seat wiring harness) must be installed as an assembly.

The OCS system also interprets a variable voltage signal provided by the safety belt tension sensor to identify the presence of a properly fastened child safety seat in the front outboard passenger seat. The OCS system then communicates with the RCM, automatically deactivating the passenger air bag module. Refer to Safety Belt Tension Sensor in this section.

DESCRIPTION AND OPERATION (Continued)

Passenger Air Bag Deactivation (PAD) Indicator

⚠ CAUTION: The passenger air bag deactivation (PAD) indicator is part of the hazard/traction control switch assembly and cannot be separately serviced.

The passenger air bag deactivation (PAD) indicator is a visual indicator used to inform the front seat occupants of the passenger air bag deactivation state. The PAD indicator is located in a position visible to each front seat occupant.

The RCM controls the state of the PAD indicator through a direct hardwire connection, based on information provided by the OCS system. The PAD indicator is lit to indicate the passenger air bag module is deactivated (OFF). An exception to this is when the front passenger seat is determined to be empty, and therefore indication of a deactivated passenger air bag module is not necessary. In all other cases the PAD indicator is unlit when the passenger air bag module is enabled.

When the ignition switch is in the RUN position, the PAD indicator prove-out period is initiated by the RCM. The RCM briefly activates the PAD indicator to prove-out the indicator function and verify to the front occupants correct functional operation of the PAD indicator.

The PAD indicator will illuminate/not illuminate within 1.0 ± 0.5 seconds of a change of state from the OCS system.

When an OCS system fault is present the SRS defaults the passenger air bag module to enabled regardless of the size of the occupant in the front outboard passenger seat. The PAD indicator will be unlit.

The following table indicate the passenger air bag status and the PAD indicator status based the size of the front outboard passenger occupant.

Passenger Air Bag and PAD Indicator Status

Occupant Size	Passenger Safety Belt Buckle Status	Passenger Air Bag Status	PAD Indicator Status
None	Unbuckled	Disabled	Unlit
None	Buckled	Disabled	Lit

Passenger Air Bag and PAD Indicator Status (Continued)

Occupant Size	Passenger Safety Belt Buckle Status	Passenger Air Bag Status	PAD Indicator Status
Small	Buckled/Unbuckled	Disabled	Lit
Large	Buckled/Unbuckled	Enabled	Unlit

Safety Belt Tension Sensor

The safety belt tension sensor:


- is part of the front outboard passenger safety belt and retractor assembly.
- is located at the safety belt anchor point.
- is used in conjunction with the OCS system.
- is a 3-wire Hall-effect sensor that is part of the front passenger safety belt and retractor assembly.

The safety belt tension sensor is used by the OCS system to identify the presence of a child safety seat on the front outboard passenger seat. The safety belt tension sensor senses the tension on the safety belt assembly then provides an output to the OCS system ECU, indicating that the safety belt assembly is cinched. After sensing the weight applied to the seat by the occupant and using the safety belt tension sensor input, the OCS system determines how the occupant should be classified and communicates this information to the RCM. If the occupant is classified to be a child, the RCM will then automatically deactivate the passenger air bag module.

Seat Track Position Sensor

The seat track position sensor is a Hall-effect sensor located on the driver seat track. The seat track position sensor informs the RCM of the driver seat position. The RCM uses this information in determining the deployment rate of the dual-stage driver air bag module.

DESCRIPTION AND OPERATION (Continued)**Restraints Control Module (RCM)**

 **WARNING:** The RCM orientation is critical for correct system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) has been involved in a collision in which the center tunnel area has been damaged, inspect the mounting and bracket for deformation. If damaged, a new RCM must be installed whether or not the air bags have deployed. In addition, make sure the area of the RCM mounting is restored to its original condition.

NOTE: When installing a new restraints control module (RCM), always make sure the correct RCM is being installed. If an incorrect RCM is installed, erroneous DTCs will result.

The RCM is mounted on the center tunnel under the instrument panel. The RCM:

- deploys the air bags in the event of a deployable impact.
- activates the safety belt retractor pretensioners to remove slack from the safety belt webbing.
- monitors the SRS for faults.
- illuminates the air bag warning indicator if a fault is detected.
- illuminates the PAD indicator when conditions warrant illumination.
- flashes the air bag warning indicator to indicate the lamp fault code (LFC) detected.
- communicates through the data link connector (DLC) the current or historical DTCs.
- signals the instrument cluster module to activate a chime if the air bag warning indicator is not available and another SRS fault exists.
- records deployable and non-deployable impact data.

The RCM monitors the SRS for possible faults. If a fault is detected while the ignition switch is in the RUN position, the RCM will illuminate the restraints indicator lamp located in the instrument cluster.

When the ignition is cycled (turned off and then on), the air bag warning indicator will remain lit for 6 seconds and then go out. If an SRS fault exists, the air bag warning indicator will then flash the 2-digit LFC associated with that fault. The air bag warning indicator will flash the LFC 5 times, then remain illuminated for the rest of the key cycle. The RCM will communicate current and history DTCs through the DLC using a diagnostic tool. If the air bag warning indicator does not function, and the RCM detects a fault condition, the RCM will signal the instrument cluster module to activate an audible chime. The chime is a series of 5 sets of 5 tone bursts. If the chime is heard, the SRS and the air bag warning indicator require repair.

LFCs are prioritized. If 2 or more faults occur at the same time, the fault having the highest priority will be displayed first. After that fault has been corrected, the next highest priority fault will be displayed.

The RCM includes a backup power supply. This feature provides sufficient power to deploy the front air bags, seat side air bags (if equipped) and the safety belt pretensioners in the event that the ignition circuit is damaged in a collision before the air bags are deployed. The backup power supply will deplete its stored energy reserve in approximately 1 minute after the battery ground cable is disconnected.

Electrical System

The electrical system that supports the air bag SRS:

- is powered from the battery through the ignition circuit.
- provides the electrical path from the RCM to the SRS components.
- provides the electrical path from the RCM to the air bag warning indicator.
- provides the electrical path from the RCM to the DLC.
- provides the electrical path from the RCM to the instrument cluster module.

DESCRIPTION AND OPERATION (Continued)**Impact Sensors**

⚠ WARNING: Mounting orientation of the impact sensors and the RCM is critical for correct system operation. If a vehicle has been involved in a collision in which the center tunnel area has been damaged, inspect the RCM mounting area for deformation. Inspect the impact sensor mounting area for damage. If damaged, a new RCM and sensors must be installed whether or not the air bags have deployed. In addition, make sure the mounting area of the RCM and impact sensors are restored to the original production configuration.

⚠ WARNING: Vehicle sensor orientation is critical for correct system operation. If a vehicle equipped with an air bag supplemental restraint system (SRS) is involved in a collision, inspect the sensor mounting bracket and wiring pigtail for deformation. Install and correctly position a new sensor or any other damaged supplemental restraint system (SRS) components whether or not the air bag is deployed.

The impact sensors provide data to the RCM for use in calculating impact severity. This is accomplished using various electrical sensors located throughout the vehicle. A front impact severity sensor is located in the front-center of the vehicle, behind the grille. In addition, on vehicles equipped with seat side air bags, there are side impact sensors located near the base of each B-pillar.