

Inflatable Restraint Sensing and Diagnostic Module (SDM)

The inflatable restraint sensing and diagnostic module (SDM) is a microprocessor and the control center for the supplemental inflatable restraint (SIR) system. The SDM contains internal sensors along with several external sensors, if equipped, mounted at strategic locations on the vehicle. In the event of a collision, the SDM compares the signals from the internal and external sensors to a value stored in memory. When the generated signals exceed the stored value, the SDM will cause current to flow through the appropriate deployment loops to deploy the air bags. The SDM records the SIR system status when a deployment occurs and illuminates the AIR BAG indicator located in the instrument cluster. The SDM performs continuous diagnostic monitoring of the SIR system electrical components and circuitry when the ignition is turned ON. If the SDM detects a malfunction, a DTC will be stored and the SDM will request the instrument cluster to illuminate the AIR BAG indicator, notifying the driver that a malfunction exists. In the event that ignition positive voltage is lost during a collision, the SDM maintains a 23-volt loop reserve for deployment of the air bags. It is important when disabling the SIR system for servicing or rescue operations to allow the 23-volt loop reserve to dissipate, which could take up to 1 minute.

Inflatable Restraint Passenger Presence Detection System - If Equipped

Note: The passenger presence detection system includes an ECU and a sensor mat that can be serviced separately. After repairing or replacing any part of the passenger presence detection system, the system must be rezeroed in order to function properly.

The passenger presence detection system is used to monitor the weight of an occupant on the front outboard passenger seat and communicate the status to the inflatable restraint sensing and diagnostic module (SDM) whether to enable or suppress the deployment of the passenger frontal air bag module. The passenger presence detection system consist of an electronic control module, sensor mat, heated seat element (if equipped), wiring harness, and PASSENGER AIR BAG ON/OFF indicators. The sensor is made up of flexible plastic material placed underneath the seat cushion foam. Pressure on the passenger presence detection mass sensor is converted into an electrical signal that the module reads and determines the passengers classification. If the sensor determines that the occupant weight is less than a specified value, the passenger presence detection module will send a suppress signal to the SDM to disable the passenger frontal air bag module. If the sensor determines the occupant weight is higher than a specified value, the passenger presence detection module will send an enable signal to the SDM to enable the passenger frontal air bag module. The passenger presence system module will notify the customer of the enable/disable status by illuminating one of the PASSENGER AIR BAG ON/OFF indicators. The passenger presence system will also notify the SDM of a fault and the SDM will request the instrument cluster to illuminate the AIR BAG indicator.

Inflatable Restraint PASSENGER AIR BAG ON/OFF Indicator - If Equipped

The PASSENGER AIR BAG ON/OFF indicators are used to notify the driver and passenger when the passenger frontal air bag module is enabled or disabled.

AIR BAG Indicator

The AIR BAG indicator, located in the instrument cluster and is used to notify the driver of SIR system malfunctions and to verify that the inflatable restraint sensing and diagnostic module (SDM) is communicating with the instrument cluster. When the ignition is turned ON, the SDM is supplied with ignition positive voltage. The SDM requests the instrument cluster will momentarily turn on the AIR BAG indicator. While the indicator is on, the SDM conducts tests on all SIR system components and circuits. If no malfunctions are detected the SDM will communicate with the instrument cluster through the serial data circuit and command the AIR BAG indicator OFF. The SDM provides continuous monitoring of the air bag circuits by conducting a sequence of checks. If a malfunction is detected the SDM will store a diagnostic trouble code (DTC) and command the instrument cluster to illuminate the AIR BAG indicator via serial data. The presence of a SIR system malfunction could result in non-deployment of the air bags or deployment in conditions less severe than intended. The AIR BAG indicator will remain ON until the malfunction has been repaired.

Dual Stage Inflator Modules

Dual stage inflator modules contain a housing, inflatable air bag, two initiating devices, canister of gas generating material and, in some cases, stored compressed gas. The two initiators are part of the frontal deployment loop. The function of the frontal deployment loops are to supply current through the steering wheel and instrument panel inflator modules to deploy the air bags. The inflator modules have two stages of deployment, which varies the amount of restraint to the occupant according to the collision severity. For moderate frontal collisions the inflator modules deploy at less than full deployment (low deployment) which consists of stage 1 of the inflator module. For more severe frontal collisions a full deployment is initiated which consists of stage 1 and stage 2 of the inflator module. The current passing through the initiators ignites the material in the canister producing a rapid generation of gas and in some cases, the release of compressed gas. The gas produced from this reaction rapidly inflates the air bag. Once the air bag is inflated it quickly deflates through the air bag vent holes and/or the bag fabric.

Each dual stage inflator modules is equipped with a shorting bar located in the connectors of the module. The shorting bar shorts the inflator module deployment loop circuitry to prevent unwanted deployment of the air bag when it is disconnected.

Inflatable Restraint Seat Belt Pretensioners

The seat belt retractor pretensioners consist of a housing, seat belt retractor and/or seat belt anchor, seat belt webbing, an initiator, and a canister of gas generating materials. The initiator is part of the seat belt pretensioner deployment loop. When the vehicle is involved in a collision of sufficient force, the inflatable restraint sensing and diagnostic module (SDM) causes current to flow through the seat belt deployment loops to the initiator. Current passing through the initiator ignites the material in the canister producing a rapid generation of gas. The gas produced from this reaction deploys the seat belt pretensioners and retracts the seat belt webbing, which removes all of the slack in the seat belts. Depending on the severity of the collision, the seat belt pretensioners may deploy without the frontal inflator modules deploying, or they will deploy immediately before the frontal inflator modules deploy. Each seat belt pretensioner is equipped with a shorting bar that is located in the connector of the seat belt pretensioner. The shorting bar shorts the seat belt pretensioner circuitry to prevent unwanted deployment of the seat belt pretensioner when the connector is disconnected.

Inflatable Restraint Seat Position Sensors - If Equipped

The inflatable restraint seat position sensor is used to determine the proximity of a front driver or passenger seat position with respect to the frontal air bag. The seat position sensor interfaces with the inflatable restraint sensing and diagnostic module (SDM). The state of the seat position sensor allows the SDM to disable stage 2 of the frontal air bag for a front seat that is forward of the forward/rearward point in seat track travel. The seat position sensor is a hall effect sensor that is mounted on the outboard seat track of the driver and passenger seats. The seat track includes a metal bracket that shunts the seat position sensor magnetic circuit creating 2 states of seat position. The shunted state represents a rearward seat position. The non-shunted state represents a forward position. The seat position sensor provides 2 current ranges, one range for the shunted state and a second range for a non-shunted state. These 2 states are inputs to the SDM, state 1 (shunted) being the rearward threshold and state 2 (non-shunted) being the forward threshold. When the SDM receives input from a seat position sensor that state 1 threshold is reached (seat is rearward), the SDM will not disable stage 2 deployment, if required by the deployment sensors. When state 2 threshold is reached (seat is forward), the SDM will disable stage 2 deployment on the side the seat is forward. The SDM monitors the seat position sensor circuit and if a fault is detected, the SDM will set code B0079 and disable stage 2 frontal deployment

Inflatable Restraint Steering Wheel Module Coil

The steering wheel module coil is attached to the steering column and is located under the steering wheel. The steering wheel module coil