

2022 CHEVROLET CORVETTE SERVICE MANUAL

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Supplemental Inflatable Restraint System Description and Operation

The supplemental inflatable restraint (SIR) system, comprised of the Restraints Control Module (RCM), impact sensors, air bags, and seat belt pretensioners, supplements the protection offered by the seat belts. The RCM determines the severity of a collision using data collected from impact sensors located at strategic points on the vehicle. When the RCM detects a collision, it processes the information provided by the sensors to provide the safest combination of air bag and pretensioner deployment. The RCM will deploy the air bags and pretensioners if it detects a collision of sufficient force. If the force of the impact is not sufficient to warrant air bag deployment, the RCM may still deploy the seat belt pretensioners. The RCM contains a sensing device that translates vehicle acceleration to an electrical signal. The RCM compares these signals to the threshold values stored in memory. If the signals exceed the stored threshold value, the RCM will determine the severity of the event and may deploy restraints. The RCM continuously monitors the deployment loops and electrical components for malfunctions. Upon detection of a circuit malfunction, the RCM will set a DTC and illuminate the SIR system air bag malfunction indicator. The steering column and knee bolsters are designed to absorb energy and compress during frontal collisions to limit leg movement and decrease the chance of injury to the driver and passenger.

The supplemental inflatable restraint system utilizes the following components:

- Restraints Control Module
- Air Bag Indicator
- Air Bags
- Seat Belt Pretensioners
- Impact Sensors
- Restraint Occupant Classification System
- Restraint Occupant Classification Module
- Passenger Air Bag Indicator
- Passenger Air Bag Disable Switch
- Seat Belt Tension Sensor
- Seat Belt Indicators

Restraints Control Module

The RCM is the control unit for the SIR system. The RCM contains internal sensors in addition to the external impact sensors. The RCM contains sensor which translate vehicle acceleration into an electrical signal, which may be used by other modules. In the event of a collision, the RCM compares the signals from the internal and external impact sensors to a threshold value stored in memory. When the generated signals exceed the stored value, the RCM will cause current to flow through the appropriate deployment loops to deploy the restraints. The RCM records the SIR system status when a deployment occurs and illuminates the air bag malfunction indicator. The RCM performs continuous diagnostic monitoring of the SIR system electrical components and circuitry when the ignition is on. If the RCM detects a malfunction, a DTC will set and the RCM will command the instrument cluster to illuminate the air bag malfunction indicator, notifying the driver that a malfunction exists. If power is lost during a collision, the RCM maintains a 23 V 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 V loop reserve to dissipate, which could take up to 1 minute.

Air Bag Indicator

The SIR system air bag indicator, located in the instrument cluster, is used to notify the driver of SIR system malfunctions and verify that the RCM is communicating with the instrument cluster. When the ignition is turned on, the RCM is supplied with ignition voltage. The instrument cluster will momentarily turn on the SIR system air bag indicator. While the indicator is on, the RCM conducts tests on all SIR system components and circuits. If no malfunctions are detected the RCM will communicate with the instrument cluster through the serial data circuit and command the SIR system air bag malfunction indicator to turn off. The RCM provides continuous monitoring of the air bag circuits by conducting a sequence of checks. If a malfunction is detected the RCM will set a DTC and command the instrument cluster to illuminate the SIR system air bag malfunction

indicator via serial data. The presence of an SIR system malfunction could result in non-deployment of the inflatable restraints or deployment in conditions that normally would not warrant deployment. The SIR system air bag malfunction indicator will remain on until the malfunction has been repaired.

Air Bags

The vehicle will contain a number of air bags, depending on vehicle available and optional equipment:

- Steering wheel
- Instrument panel
- Driver seat
- Passenger seat
- Left roof rail
- Right roof rail

To view the locations of the air bags refer to: Master Electrical Component List.

Air bags contain a housing, inflatable air bag, an initiating device, a canister of gas generating material and, in some cases, stored compressed gas. Each air bag has a discrete deployment loop to supply current and deploy the air bag. The current passing through the air bags 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 deflates through the air bag vent holes and/or the bag fabric.

The steering wheel and instrument panel air bag are a dual-stage design. A dual-stage air bag uses two stages of deployment, which varies the amount of restraint to the occupant according to the collision severity. For moderate frontal collisions, the air bag deploys at less than full deployment which consists of stage 1 of the air bag. During a more severe frontal collision, a full deployment is initiated which consists of stage 1 and stage 2 of the air bag.

Seat Belt Pretensioners

The vehicle will contain a number of seat belt pretensioners, depending on vehicle available and optional equipment:

- Driver "Seat belt anchor
- Driver "Seat belt retractor
- Passenger "Seat belt anchor
- Passenger "Seat belt retractor

To view the locations of the air bags refer to: Master Electrical Component List.

The seat belt pretensioners consist of a housing, seat belt retractor, seat belt anchor, seat belt webbing, 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 RCM 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 which removes 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.

Impact Sensors

The vehicle will contain a number of impact sensors, depending on vehicle available and optional equipment:

- Front
- Front Left
- Front right
- Door

To view the locations of the air bags refer to: Master Electrical Component List.

The impact sensors contain a sensing device which monitors vehicle acceleration to detect collisions that are severe enough to warrant air bag deployment. The impact sensors are not part of the deployment loop, but instead provide input to the RCM.

Restraint Occupant Classification System

The Restraint Occupant Classification system is used to monitor the type of occupant that is sitting in the front passenger seat and communicate the status to the Restraints Control Module. The Restraints Control Module then uses this information to determine whether to enable or suppress the deployment of the passenger instrument panel air bag. The Restraint Occupant Classification system consists of an electronic control module, a sensor mat in the seat, a harness, and passenger air bag ON/OFF indicators.

Passenger Air Bag Indicator

The passenger air bag indicator identifies the status of the instrument panel air bag. If an occupant is not detected in the passenger seat or the occupant type is not suitable for air bag deployment, the Restraints Control Module will illuminate the passenger air bag OFF indicator. If an occupant is detected in the passenger seat, the Restraints Control Module will illuminate the passenger air bag ON indicator.

Seat Belt Tension Sensor

The seat belt tension sensor is mounted on the passenger seat belt retractor to measure the seat belt tension. If the shoulder portion of a passenger seat belt is fully extended, the infant car seat restraint locking feature may be engaged, disabling the passenger air bag.

Passenger Air Bag Disable Switch

The passenger air bag disable switch provides the means to manually disable the ability for the passenger instrument panel air bag to deploy. The vehicle has a passenger air bag status indicator to inform the driver when the passenger air bag is on or off based on the disable switch position.

Seat Belt Indicators

The seat belt indicators are controlled by the Restraints Control Module. For further information on seat belt indicators refer to: Seat Belt System Description and Operation.

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