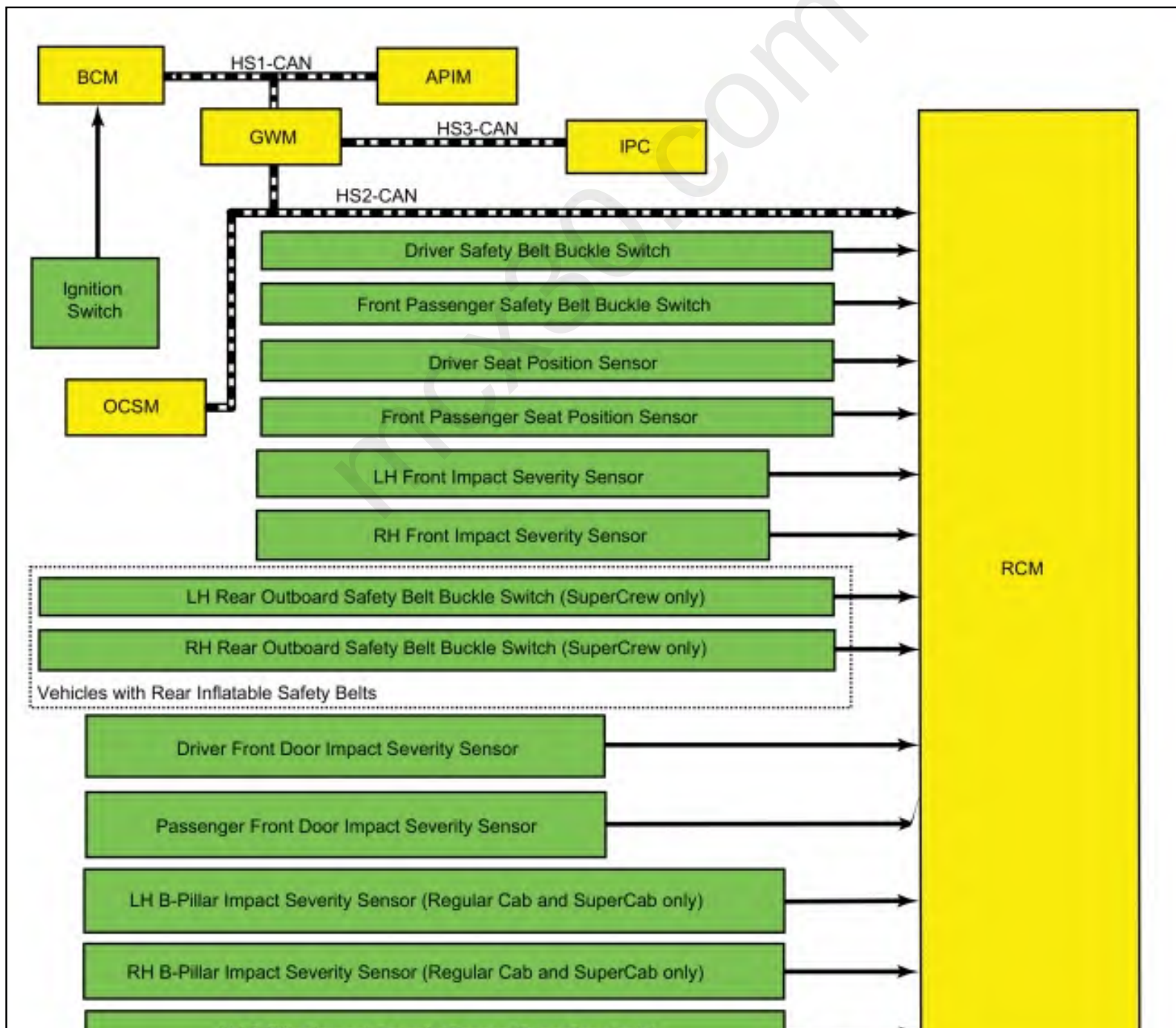


Airbag and Seatbelt Pretensioner Supplemental Restraint System (SRS) - Raptor - System Operation and Component Description

System Operation

System Diagram - Supplemental Restraint System (SRS)



E191349

RH B-Pillar Impact Severity Sensor (Regular Cab and SuperCab only)

LH C-Pillar Impact Severity Sensor (SuperCrew only)

RH C-Pillar Impact Severity Sensor
(SuperCrew only)



E191350

RCM

Driver Airbag (Stages 1 and 2)

Passenger Airbag (Stages 1 and 2)

Passenger Airbag Canister Vent

Deployable Steering Column

Driver Side Airbag

Passenger Side Airbag

Driver Side Air Curtain

Passenger Side Air Curtain

Driver Safety Belt Retractor Pretensioner

Passenger Safety Belt Retractor Pretensioner

Driver Safety Belt Anchor Pretensioner

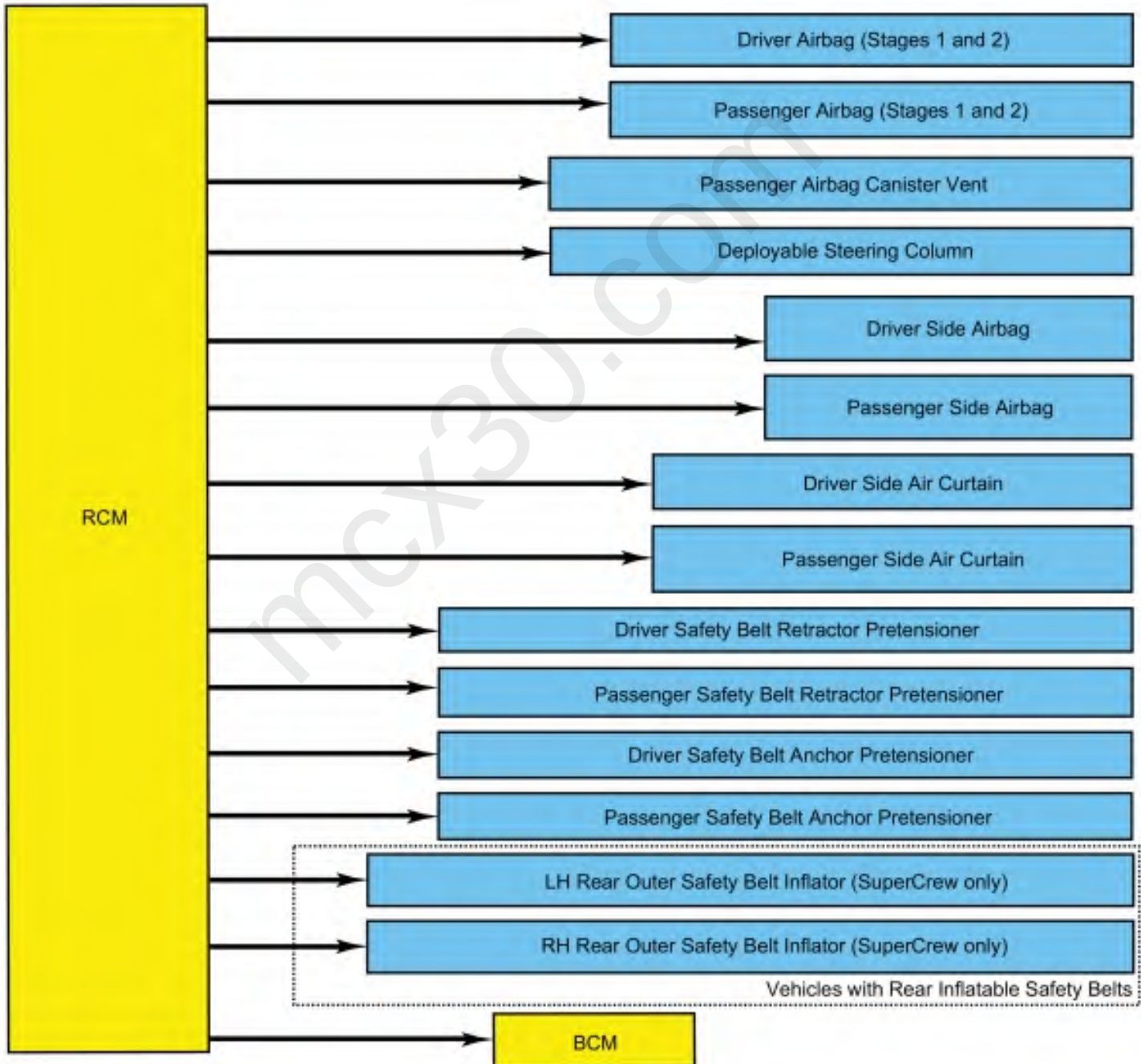
Passenger Safety Belt Anchor Pretensioner

LH Rear Outer Safety Belt Inflator (SuperCrew only)

RH Rear Outer Safety Belt Inflator (SuperCrew only)

Vehicles with Rear Inflatable Safety Belts

BCM

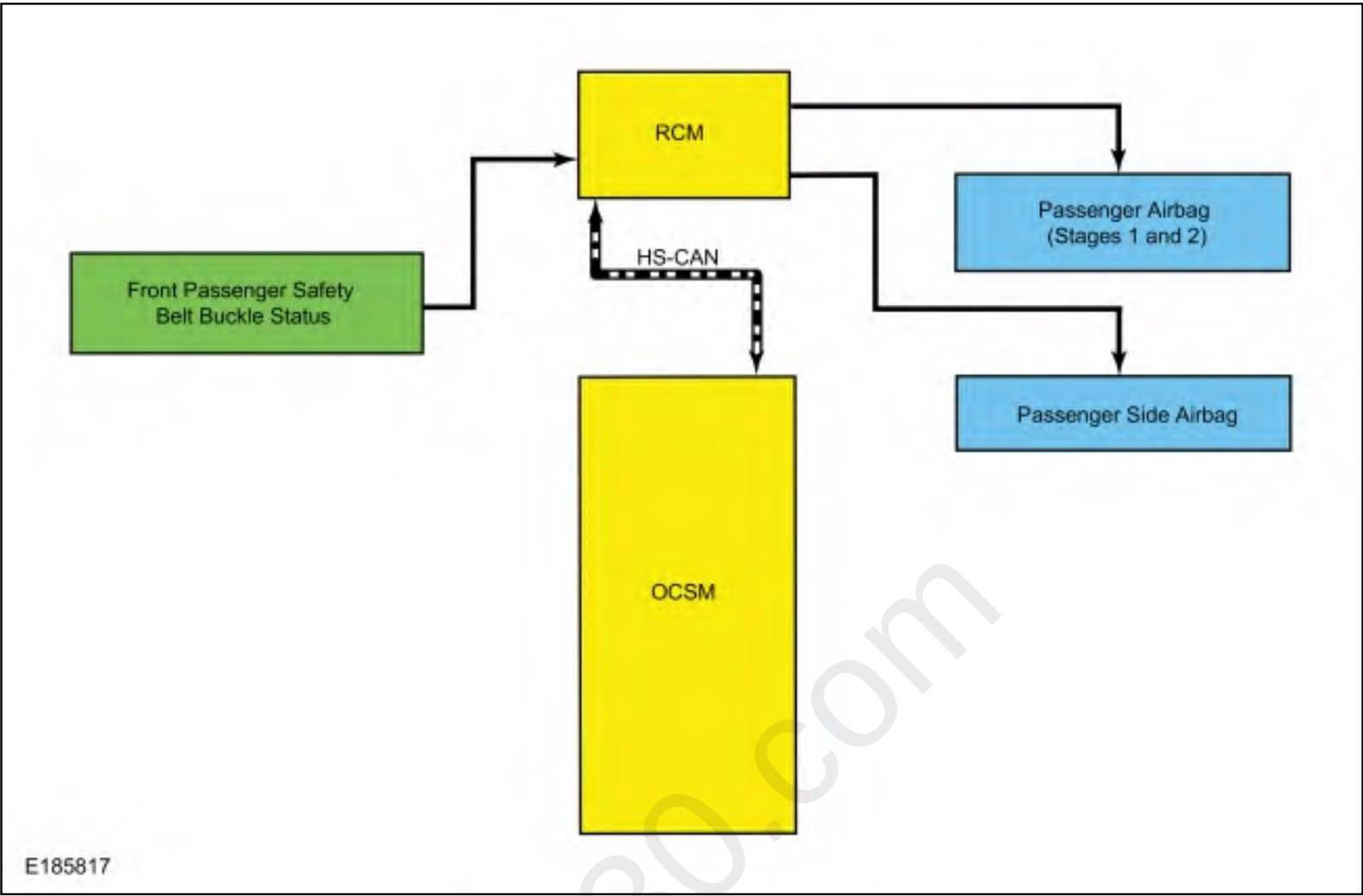


Network Message Chart - Supplemental Restraint System (SRS)

Module Network Input Messages - RCM

Broadcast Message	Originating Module	Message Purpose
eCall confirmation	APIM	Used for SYNC® 911 Assist™ operation. Indicates whether eCall notification is in progress after an airbag deployment.
Ignition status	BCM	Used to qualify certain faults during RCM self-diagnostics.
Airbag warning indicator status	IPC	Confirms airbag warning indicator status to the RCM.
OCS vehicle calibration data	OCSM	Shares application-specific data for comparison purposes to make sure the correct OCSM and RCM are installed.
OCS fault status	OCSM	Indicates an OCS fault, if present.
OCS sensor data	OCSM	OCS sensor readings.
OCS serial number	OCSM	OCSM serial number.
Vehicle configuration data	BCM	Used for verifying vehicle configuration data.

System Diagram - Occupant Classification System (OCS)



Network Message Chart - Occupant Classification System (OCS)

Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Front passenger safety belt buckle status	RCM	Used for determining passenger airbag disable status.
RCM serial number	RCM	RCM serial number.

Supplemental Restraint System

The SRS is controlled by the RCM, which continually monitors various inputs. When these inputs indicate a frontal or side crash, the RCM may deploy some components, based upon the severity of the crash and the sensor inputs.

Although some deployable devices may not have activated for all occupants during a crash, it does not mean that something is wrong with the SRS.

The RCM performs a self-test of the complete SRS during each startup. In addition to the self-test at start up, the RCM continuously monitors all of the SRS components and circuitry for correct operation.

Airbag Warning Indicator

The airbag warning indicator:

- proves out by lighting for 6 seconds and then turning off.
- flashes and/or illuminates based on the message the IPC receives from the RCM.
- illuminates if the IPC does not receive a message from the RCM.

When the ignition is turned ON during normal operation, the IPC illuminates the airbag warning indicator continuously for 6 seconds. If the SRS is free of faults, the airbag warning indicator turns off and remains off. If a SRS fault exists, the airbag warning indicator illuminates and remains illuminated for the rest of the ignition cycle. The RCM communicates with the IPC via the HS-CAN. The IPC illuminates the airbag warning indicator based on messaging from the RCM. The IPC also illuminates the airbag warning indicator if there is no communication between the RCM and IPC.

Event Notification Signal

The event notification feature provides other vehicle subsystems with information pertaining to SRS deployment or fuel cutoff status. When an impact occurs which exceeds a pre-determined threshold, the RCM sends a signal on a dedicated circuit to the BCM.

When the BCM receives the crash signal input, it initiates fuel cutoff to disable the fuel system.

After the fuel system is disabled, the vehicle can be re-started after carrying out the following steps:

- Turn the ignition ON and wait 10 seconds.
- Turn the ignition OFF.
- Turn the ignition ON.
- Turn the ignition OFF.
- Turn the ignition ON.

Occupant Classification System (OCS)

The OCS classifies the size of the front passenger seat occupant and provides this information to the RCM.

Pressure is applied to the OCS bladder when weight of any occupant or object in the front passenger seat is present. The pressure is then transferred through a tube and sensed by the OCS pressure sensor within the OCSM. The OCSM sends information concerning the weight of any occupant or object on the front passenger seat to the RCM via the HS-CAN. The RCM uses this information when determining if the passenger airbag or side airbag needs to be deployed in the event of a crash.

The OCS is also used for operation of the passenger Belt-Minder®. For information about Belt-Minder®, Refer to: [Seatbelt Systems - System Operation and Component Description](#) (501-20A Seatbelt Systems,

Description and Operation).

To deactivate or reactivate the passenger Belt-Minder® feature,
Refer to: [Seatbelt Minder Deactivating/Activating](#) (413-01 Instrumentation, Message Center and Warning Chimes, General Procedures).

Passenger Airbag Deactivation (PAD) Indicator

The RCM controls the PAD indicator through messages sent on the HS-CAN2 and MS-CAN, based on information provided by the OCS. The PAD indicator illuminates to indicate the passenger airbag is disabled.

The RCM briefly activates the PAD indicator during prove out to verify the indicator function and confirm proper functional operation of the PAD indicator to the front occupants.

The following table indicates the passenger airbag and PAD indicator status based on the size of the front passenger occupant.

Occupant Size	Passenger Safety Belt Buckle Status	Passenger Airbag Status	PAD Indicator Status
Empty	Buckled or Unbuckled	Disabled	OFF: Lit
			ON: Unlit
Small	Buckled or Unbuckled	Disabled	OFF: Lit
			ON: Unlit
Large	Buckled or Unbuckled	Enabled	OFF: Unlit
			ON: Lit

Airbag Second Stage Deployment Check

The driver and passenger front airbags each have 2 deployment stages. After an airbag deployment, it is possible that stage 1 has deployed and stage 2 has not. If a front airbag has deployed, the front airbag must be remotely deployed using the appropriate airbag disposal procedure to make sure both stages have been deployed. For information on driver airbag and/or passenger airbag remote deployment,
Refer to: [Pyrotechnic Device Disposal](#) (501-20B Supplemental Restraint System, General Procedures).

SOS Post-Crash Alert System™

The SOS Post-Crash Alert System™ is controlled by the BCM, but initiated by the RCM.

When a deployment or fuel cutoff event occurs, the RCM sends a message on the HS-CAN2 (via the GWM) to the BCM. The BCM flashes the turn signal lamps and sounds the horn (except when 911 Assist™ is active) until it is turned off. The system can be turned off 10 seconds after a crash event by pressing the hazard switch. The BCM

also unlocks the doors and illuminates the courtesy lamps after a crash event.

Vehicle Spin-out Detection

When internal RCM sensors detect that the vehicle has spun out, the BCM activates the hazard warning flashers and displays a message in the IPC to indicate the hazard warning flashers are activated due to the spin-out.

Component Description

Front Impact Severity Sensor

The front impact severity sensors measure acceleration (g-rate) and are hardwired to the RCM. Mounting position and orientation is critical for correct operation of the front impact severity sensors.

Occupant Classification System (OCS)

The OCS is found only on the front passenger seat. The OCS classifies the size of the front passenger seat occupant.

The OCS is comprised of a silicone gel-filled bladder mounted between the seat cushion foam and pan, an OCSM which is mounted to the seat frame, and a pressure sensor that is internal to the OCSM. Pressure is applied to the OCS bladder when weight of any occupant or object in the front passenger seat is present. The pressure is then transferred through a tube and sensed by the OCS pressure sensor and OCSM. The components of an OCS bladder system (bladder, tube, and OCSM with integrated pressure sensor) are serviced as an assembly, and the OCS bladder system is serviced as a kit with the seat cushion and seat heater mat (if applicable).

Safety Belt Buckle Sensor

The safety belt buckles contain integrated sensors that are Hall-effect switches. The safety belt buckle sensors are serviced with the safety belt buckle.

On vehicles equipped with rear inflatable safety belts, the buckle at each rear outboard seating position includes the safety belt buckle sensor and safety belt inflator. The rear safety belt buckle is serviced only as an assembly with the sensor and inflator.

Seat Position Sensor

The seat position sensor is a Hall-effect sensor which indicates the position of the seat along the seat track. The sensor detects the presence of a shunt bracket on the track, indicating the seat has moved past a certain point in the adjustment range.

Side Impact Sensor - Front Door

The front door side impact sensors monitor air pressure within the door in order to detect certain crashes, such as a side impact. Mounting position and orientation is critical for correct operation of the front door side impact sensors.

Side Impact Sensor - Second Row (SuperCab and SuperCrew only)

The second row side impact sensors measure acceleration (g-rate), and are hardwired to the RCM. Mounting position and orientation is critical for correct operation of the second row side impact sensors.

Deployable Steering Column

The deployable steering column includes a device that, once deployed, reduces the amount of force necessary to collapse the steering column during a crash event. The deployable device is activated by the RCM, depending on the driver seat position and the force of the crash. After deployment, a new steering column must be installed.

Driver Airbag

The driver airbag is a dual-stage airbag. Upon receiving a flow of current, it deploys at 1 of 2 different rates, depending upon vehicle impact severity and sensor input.

Passenger Airbag

The passenger airbag is a dual-stage airbag which deploys at 1 of 2 different rates depending upon vehicle impact severity and sensor input.

Passenger Airbag Canister Vent

The passenger airbag canister vent is a deployable device that is part of the passenger airbag. Canister venting controls the inflation rate of the passenger airbag and the escape rate of gases from the airbag. The canister vent cannot be serviced separately from the passenger airbag.

Passenger Airbag Deactivation (PAD) Indicator

The PAD indicator is a LED which is part of the FCIM. The PAD indicator cannot be serviced separately from the FCIM.

Safety Belt Anchor and Pretensioner

The safety belt anchor pretensioner is a pyrotechnic device that removes excess of webbing slack from the safety belts when deployed. One is included as part of each front row outboard safety belt assembly and cannot be serviced separately.

To diagnose any pretensioner Diagnostic Trouble Codes (DTCs),
Refer to: [Airbag Supplemental Restraint System \(SRS\) - Raptor](#) (501-20B Supplemental Restraint System, Diagnosis and Testing).

Safety Belt Inflator (SuperCrew only, if equipped)

The safety belt inflator is a pyrotechnic device that deploys upon receipt of current flow initiated by the RCM. It is

a canister that releases inert gas to deploy the inflatable shoulder belt.

The safety belt inflators are built into each second row outboard safety belt buckle. The inflator cannot be serviced separately from the buckle.

To diagnose any safety belt inflator Diagnostic Trouble Codes (DTCs),
Refer to: [Airbag Supplemental Restraint System \(SRS\) - Raptor](#) (501-20B Supplemental Restraint System, Diagnosis and Testing).

Safety Belt Retractor and Pretensioner

The safety belt retractor and pretensioner is a pyrotechnic device that removes excess of webbing slack from the safety belts when deployed. The retractor and pretensioner are serviced together with the front row outboard safety belt assembly.

To diagnose any pretensioner Diagnostic Trouble Codes (DTCs),
Refer to: [Airbag Supplemental Restraint System \(SRS\) - Raptor](#) (501-20B Supplemental Restraint System, Diagnosis and Testing).

For any concerns regarding safety belt retractor function,
Refer to: [Seatbelt Systems](#) (501-20A Seatbelt Systems, Diagnosis and Testing).

Side Air Curtain

The side air curtain is a single-stage airbag which is designed to provide head and upper body protection to the vehicle occupant(s) during certain crashes.

Side Airbag

The side airbag is a single-stage airbag which is designed to provide protection for the seat occupant's torso. It deploys upon receipt of current flow and is attached to the outboard side of each front seat. It is used in conjunction with the side air curtain.

Clockspring

The clockspring allows for continuous electrical connections between the driver airbag and the RCM. A spiral-wound cable wraps around the center of the clockspring and as the steering wheel is turned, the spiral cable inside expands or contracts in diameter as the 2 halves of the clockspring turn.

Restraints Control Module (RCM)

NOTE: *This vehicle may be equipped with SYNC®, which contains the 911 Assist™ option. Refer to the Owner's Literature for information about this feature.*

The RCM monitors various sensor inputs and uses that data for controlling SRS outputs such as event notification

function and airbag deployment.

The RCM includes a backup power supply. This feature provides sufficient backup power to deploy the airbags in the event the ignition circuit is lost or damaged during impact. The backup power supply depletes its stored energy approximately one minute after power and/or ground has been removed from the RCM.

The RCM requires PMI when being replaced. Refer to the diagnostic scan tool instructions to carry out PMI.

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