DESCRIPTION AND OPERATION > BLIND SPOT MONITOR SYSTEM > DESCRIPTION - BLIND SPOT MONITOR SYSTEM

Fig 1: Blind Spot Monitoring (BSM) System

Courtesy of CHRYSLER GROUP, LLC

Blind Spot Monitoring (BSM)

The system continuously monitors the rear blind spots on both sides of the vehicle when any forward gear is engaged and the speed of about 10 km/h (6 mph) is exceeded, through the use of two radar modules mounted behind the rear bumper in the side area. If a vehicle detected in these areas does not exceed the speed of approximately 50 km/h (31 mph), the system will warn the driver of its presence by turning on the dedicated icon in the door mirror.

Fig 2: Blind Spot Monitoring (BSM) Warning Light

Courtesy of CHRYSLER GROUP, LLC

If another vehicle is overtaken slowly (with a speed lower than about 24 km/h / 15 mph) and this stays in the blind spot for about 1.5 seconds, the warning light on the door mirror of the corresponding side lights up. If the speed difference between the two vehicles is higher than about 24 km/h (15 mph), the warning light does not light up.

Rear Cross Path Detection

The system monitors the vehicles and/or objects in the rear area of the vehicle (always through the two radar sensors which also perform the BSM function) having a perpendicular movement to the vehicle and speed lower than 35 km/h (22 mph), during reversing maneuvers providing feedback to the driver via buzzer and/or visual icons.

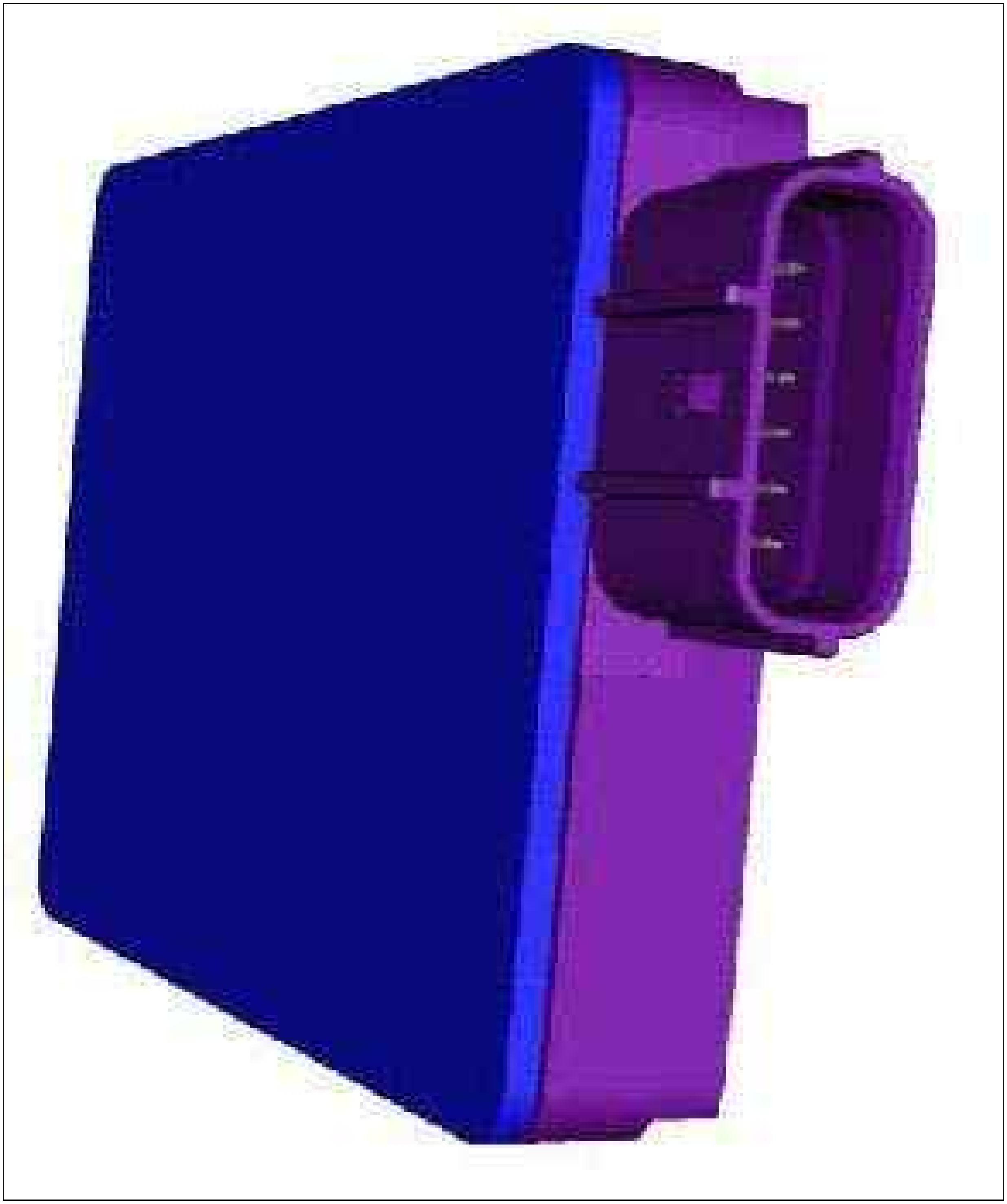
Summary:

- Monitors the vehicle's blind spots and warns the driver when another vehicle is present
- It uses dual broadband radar sensors located behind the rear side panels
- Lights up the icons in the door mirrors and, if necessary, uses the buzzer together with the direction indicators (when this was previously selected into the dedicated menu)
- Notifies the presence of vehicles in the blind spots when the lane is changed or other vehicles are

overtaking

- Notifies the detection of vehicles moving in the rear area transversely to the vehicle, when this vehicle is reversing
- The driver can activate / deactivate the system and select the function mode via the radio menu.

Fig 3: Radar Sensors



Courtesy of CHRYSLER GROUP, LLC

Radar sensors

The radar sensors have an operation frequency that ranges from about 24 GHz to 200 MHz.

IMPORTANT:

The blind spot monitoring system can help the driver avoid accidents using visual and audible warnings. However, the system is not a substitute for, and cannot mitigate unsafe driving practices. The driver must remain alert and in control of the vehicle at all times.

DESCRIPTION AND OPERATION > BLIND SPOT MONITOR SYSTEM > OPERATION - BLIND SPOT MONITOR SYSTEM

The primary components of the Blind Spot Monitor (BSM) system are the microcontroller based Electronic Control Units (ECU) integral to each of the two RAdio Detection And Ranging (RADAR) sensors, one behind each outboard side of the rear bumper fascia. Each ECU operates on battery current received from a fuse in the Body Control Module (BCM) whenever the status of the ignition is On and the ECU has a path to ground at all times through a take out and eyelet terminal of the body wire harness that is secured to the body sheet metal. Each of these ECU communicate with each other as well as with other electronic modules in the vehicle over the Controller Area Network (CAN) data bus network.

The BSM system ECU continually monitor all of the BSM system circuits and components for readiness, and will store a Diagnostic Trouble Code (DTC) for any fault that is detected. The ECU also communicate with a diagnostic scan tool over the CAN data bus. When a BSM system ECU stores a DTC, it sends an electronic request message to the Electronic Vehicle Information Center (EVIC) in the Instrument Panel Cluster (IPC) and a **SERVICE BLIND SPOT SYSTEM** or **BLIND SPOT SYSTEM TEMPORARILY UNAVAILABLE** textual message is displayed by the EVIC to alert the vehicle operator.

The BSM system ECU also monitor electronic messages received over the CAN data bus from the Radio Receiver Module (RRM) indicating the Setup Menu settings selected by the customer for the BSM system. The BSM system ECU receive and analyze data inputs directly from the radar sensors, calculate and provide the proper hard wired outputs to illuminate the visual alert displays in their respective right or left outside rear view mirrors, as well as calculate and communicate the proper audible alert output requests to the IPC over the CAN data bus.

The BSM radar sensors allow the BSM system ECU to locate and identify nearby objects of interest meeting the criteria established by algorithms within the system software. The BSM displays provide the vehicle operator with a visual alert indicating that an object of interest has been detected within one of the vehicle detection zones. The BSM audible alerts are then issued by the IPC based upon electronic **audible alert request** messages received from the BSM system ECU. The BSM system ECU also send electronic **radio mute request** messages over the CAN data bus to the Radio Receiver Module (RRM) whenever an audible alert is requested. This message activates the radio mute function while the audible alert is being sounded, then resumes normal radio function when the alert is completed.

The hard wired circuits between components related to the BSM system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM system or the electronic controls and communication between ECU and other devices that provide some features of this system. The most reliable, efficient and accurate means to diagnose the BSM system or the ECU and communication related to BSM system operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

DESCRIPTION AND OPERATION > BLIND SPOT MONITOR SYSTEM > OPERATION - BLIND SPOT MONITOR SYSTEM > BLIND SPOT MONITOR MODE

Unless disabled in the setup routine settings received through the Radio Receiver Module (RRM), the Blind Spot Monitor (BSM) mode is active only when the manual transmission gear selector is in a position other than Reverse (**R**) or the automatic transmission gear selector is in a position other than Reverse (**R**) or Park (**P**). The BSM mode is intended to provide a visual alert to the driver when a target vehicle (object of interest) is located in the lane adjacent to and just behind either outside rear view mirror (the detection zone), in the blind spot area where vision of target vehicles may be inhibited by the rear structure of the host vehicle. If a turn signal is activated in the host vehicle in the same direction as that in which the target vehicle is located, an audible alert tone will also be generated. The audible alerts of the BSM mode are not active unless the turn signal is activated.

The width of the BSM mode detection zone covers one traffic lane over on each side of the host vehicle, approximately 4.0 m (13 ft). The length of the BSM mode detection zone starts at the outside rear view mirror and extends approximately 4.5 m (15 ft) rearward from the rear edge of the rear fascia. The BSM mode visual alerts are activated immediately if an object of interest is within the detection zone and meets the warning criteria. However, the BSM system will not activate these alerts if:

- The object of interest (target vehicle) comes from the rear of the detection zone and passes the host vehicle at a speed greater that 50 km/h (31 mph).
- The object of interest (target vehicle) enters the detection zone from the front and remains in the zone for less than 1.5 seconds.
- The object of interest (target vehicle) passes through the detection zone with a relative speed greater than 20 km/h (12 mph).
- The object of interest (target vehicle) passes the host vehicle from the opposite direction.

The BSM mode audible alert may be deactivated if the operator prefers using the Setup Menu within the RRM. The BSM mode can be configured for visual and audible alerts, visual alerts only or for the entire BSM system (including Rear Cross Path/RCP mode) to be turned Off.

DESCRIPTION AND OPERATION > BLIND SPOT MONITOR SYSTEM > OPERATION - BLIND SPOT MONITOR SYSTEM > REAR CROSS PATH MODE

Unless disabled in the Setup Menu settings received through the Radio Receiver Module (RRM), the Blind Spot Monitor (BSM) system provides a feature called Rear Cross Path (RCP) mode. The RCP mode is active only when the transmission gear selector (manual or automatic) is in the Reverse (**R**) position. The RCP mode is intended to aid the driver when backing out of parking spaces where vision of vehicles crossing laterally through the rear path of the host vehicle may be blocked. The host vehicle must proceed slowly and cautiously out of the parking space until the rear end of the vehicle is exposed. The BSM radar sensors will then have a clear view of the crossing traffic and, if an oncoming vehicle (object of interest) is detected, will generate visual and audible alerts to the operator of the host vehicle.

The BSM system monitors the rear detection zones on both sides of the vehicle for objects that are moving toward the side of the vehicle with speeds of from 1 to 3 km/h (1 to 2 mph) up to 35 km/h (22 mph), such as typically encountered in parking lot situations. In vehicles equipped with the BSM option, the RCP mode is enabled from the factory as a default. The RCP mode can be manually disabled and enabled by the vehicle operator using the setup routine of the IPC.

The RCP mode normally uses the same BSM system settings. However, the RCP mode will always include the audible alert feature, even if it was disabled for the BSM mode using the RRM Setup Menu. The audible alert can not be deactivated for the RCP mode. The RCP mode visual alert is illuminated only in the display located on the same side of the vehicle where the object of interest is detected.

DESCRIPTION AND OPERATION > BLIND SPOT MONITOR SYSTEM > OPERATION - BLIND SPOT MONITOR SYSTEM > STANDBY MODE

The Blind Spot Monitor (BSM) system remains in standby mode as long as the park brake is applied in a vehicle with a manual transmission, or while the automatic transmission gear selector lever is in the Park (**P**) position. In the standby mode the system receives vehicle information, responds to changes in the Setup Menu settings received through the Radio Receiver Module (RRM) and can perform limited self-diagnostics indicating hard system fault conditions.

DESCRIPTION AND OPERATION > CHIME WARNING SYSTEM > DESCRIPTION - CHIME WARNING SYSTEM

A chime warning system is standard factory-installed equipment. The chime warning system uses an electromechanical transducer that is soldered onto the electronic circuit board inside of the Instrument Panel Cluster (IPC) to provide audible indications of various vehicle conditions that may require the attention of the vehicle operator or occupants.

The electromechanical transducer can produce signals that vary in intensity and frequency, dependency on the function being signalled. The microcontroller-based IPC utilizes electronic **chime request** messages received from other modules in the vehicle over the Controller Area Network (CAN) data bus along with hard wired inputs to monitor many sensors and switches throughout the vehicle. In response to those inputs, the circuitry and programming of the IPC allow it to control the audible outputs that are produced through its on-board transducer.

Hard wired circuitry connects the IPC and the various chime warning system switch and sensor inputs to their modules and to each other through the electrical system of the vehicle. These hard wired circuits are integral to several wire harnesses, which are routed throughout the vehicle and retained by many different methods. These circuits may be connected to each other, to the vehicle electrical system and to the IPC through the use of a combination of soldered splices, splice block connectors, and many different types of wire harness terminal connectors and insulators. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin out and location views for the various wire harness connectors, splices and grounds.

The IPC chime warning system circuits and components cannot be adjusted or repaired. If the circuitry or the on-board transducer are damaged or ineffective, the IPC unit must be replaced.

DESCRIPTION AND OPERATION > CHIME WARNING SYSTEM > OPERATION - CHIME WARNING SYSTEM

The chime warning system operates on battery voltage received through a fuse in the Power Distribution Center (PDC) on a non-switched fused B(+) circuit so that the system may operate regardless of the ignition switch position. The chime warning system also monitors the ignition switch position so that some chime features are functional only with the ignition switch in the On position, while others are functional regardless of the ignition switch position.

The chime warning system provides an audible indication to the vehicle operator or occupants for the following conditions:

- **Alarm, Warning or Danger Signals**
- **Button Press Acknowledgment Beeps**

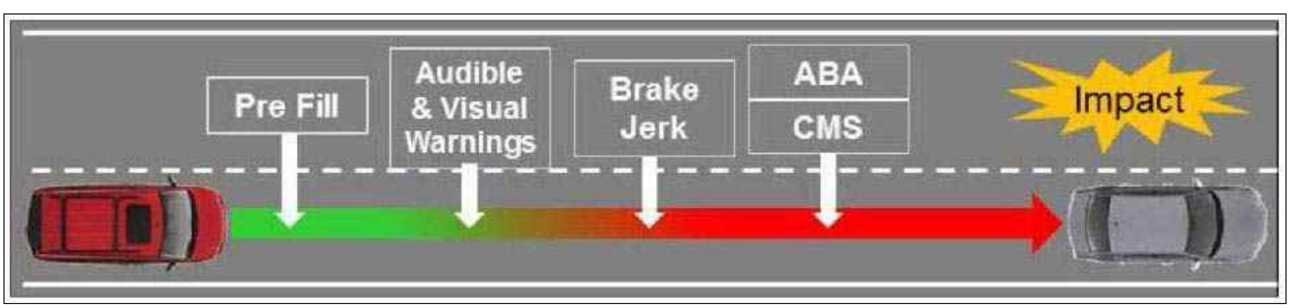
The Instrument Panel Cluster (IPC) provides chime service for all available features in the chime warning system. The IPC relies upon its internal programming, numerous hard wired inputs, and electronic message inputs received from other modules over the Controller Area Network (CAN) data bus to provide the chime warning system features. The internal programming of the IPC determines the priority of each chime request input that is received, as well as the rate and duration of each chime that is to be generated.

The hard wired circuits between components related to the chime warning system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the chime warning system or the electronic controls and communication between modules and other devices that provide some features of the chime warning system. The most reliable, efficient and accurate means to diagnose the chime warning system or the electronic controls and communication related to chime warning system operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

DESCRIPTION AND OPERATION > FORWARD COLLISION WARNING > FORWARD COLLISION WARNING PLUS

Fig 1: Forward Collision Warning Plus (FCW+)



Courtesy of CHRYSLER GROUP, LLC

The Forward Collision Warning Plus (FCW+) operates from about 7 km/h (4 mph) to 200 km/h (124 mph). By providing audible and visual alerts and through the use of the car's braking system, it creates a jolt/jerk to draw the attention of the driver if a frontal collision is imminent.

Fig 2: Vehicle Braking System Activation Screen

Courtesy of CHRYSLER GROUP, LLC

If the driver does not react, the vehicle's braking system is activated to prevent or mitigate the potential impact. Detail below:

- It uses a radar sensor and a video sensor to detect if the vehicle is approaching another vehicle or a big obstacle too fast and warns/helps the driver to avoid/mitigate any collision.
- FCW+ meets the NHTSA and ENCAP regulations.
- Using the dedicated menu, the driver can adjust the sensitivity (close, medium, far) and activate or deactivate the warning.
- **The Prefill function** prepares the braking system for an emergency braking.
- FCW+ **provides audible, visual and haptic alerts.**
- **The jerk** produced by the use of the braking system alerts the driver of the possible impact with a haptic signal.
- **Advanced Brake Assist (ABA)** : if the driver reacts, but does not brake enough, the ABA will increase the braking force to prevent/reduce the collision.
- **Collision Mitigation System (CMS)** : if the driver does not react, the system activates the braking system to prevent/reduce the collision.

IMPORTANT: Both on versions equipped with manual gearbox and on those with automatic transmission, after the vehicle is stopped the brake calipers may be stuck for about 2 seconds for safety reasons. Make sure you press the brake pedal if the vehicle moves slightly forwards. The system has been designed for road use only. If the vehicle is driven off-road, the system must be deactivated, to avoid unnecessary warnings. By selecting the 4WD LOW mode, the system is automatically deactivated.

DESCRIPTION AND OPERATION > FORWARD COLLISION WARNING > FORWARD COLLISION WARNING PLUS

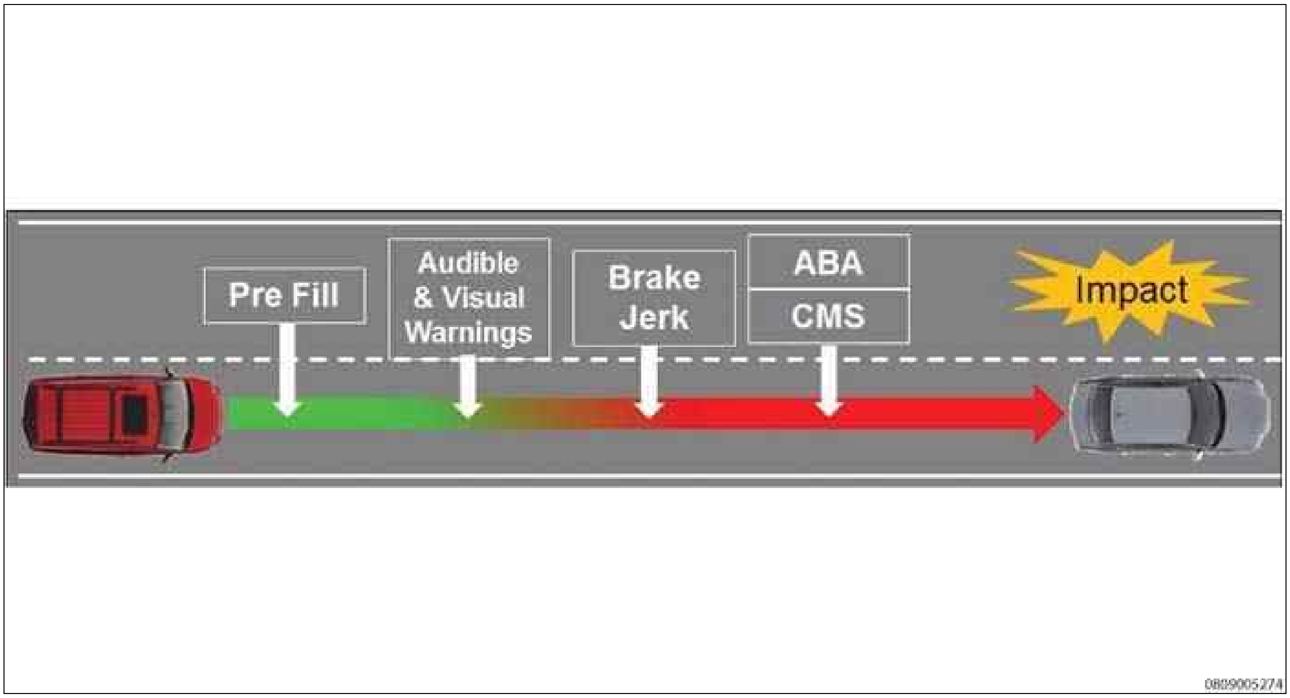
The Forward Collision Warning Plus (FCW+) system is only active when the status of the ignition switch is ON and the PRNDL is in D (Drive). The system can be manually disabled and enabled by the vehicle operator using menu options within the radio. The default status of FCW+ is "On". The system state is kept in memory from one key cycle to the next. If the system is turned OFF, it will remain OFF when the vehicle is restarted. The minimum speed for FCW+ activation is 7 km/h (4 mph).

Components that make up the FCW+ system are the Forward Facing Camera (FFC), Powertrain Control Module (PCM), Switch Bank and the Adaptive Cruise Control Plus (ACC+) module. The ACC module is the component that is responsible for the FCW+, Lane Departure Warning Plus (LDW+) and ACC+ decision making. The ACC module receives data from the FFC and performs a data fusion with its own sensor data. At this point, the ACC module determines if a FCW+, LDW+ or ACC+ event needs to occur.

Since there are multiple modules involved in the operation of the FCW+ system, all faults or diagnostic trouble codes should be checked during diagnosis. The system utilizes the radar sensor in front of the vehicle, so any alignment or configuration issues may cause the system to be inoperative. If the ACC radar detects incorrect or compromised information from the FFC, the ACC+ and the FCW+ will function in an limited capacity. If the data consistency continue to occur from the FFC, a fault code will set.

> *NOTE:*
>
> ***The FCW+ does not stop the vehicles automatically, but alerts and assists the driver to help avoid or mitigate a collision. If the driver does not respond to any of the audible, visual, and haptic warnings, the impact may not be avoided***

Fig 1: Forward Collision Warning Plus



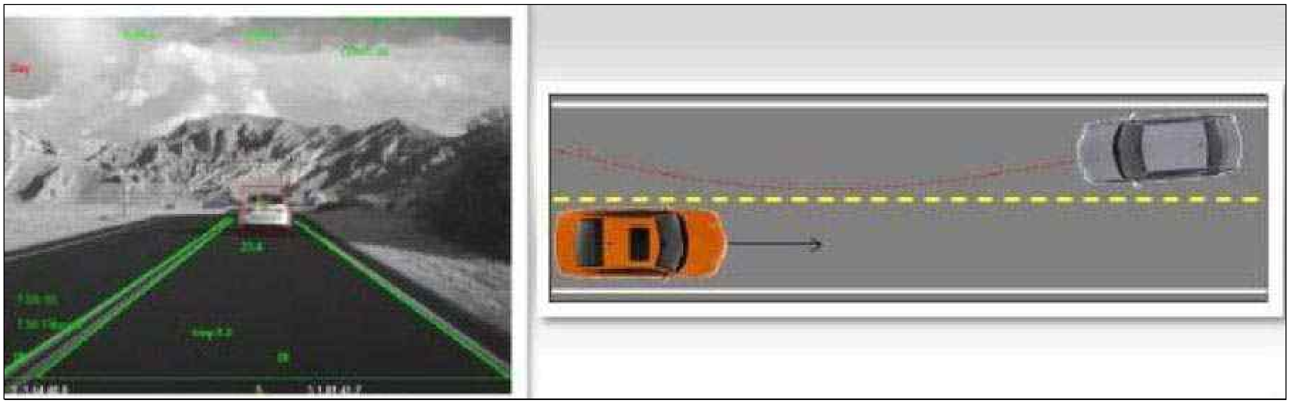
Courtesy of CHRYSLER GROUP, LLC

The FCW+ system uses fusion of the sensor data from the ACC radar and the FFC to detect a probable frontal or forward collision. The following actions will be performed when qualified:

- **Pre Fill -** The pre-fill process prepares the brakes for emergency braking by engaging the pump and applying a small amount of pressure to the brakes. This allows for immediate braking. Sufficient pressure applied between the brake pads and the discs means that driver intervention has a more immediate impact.
- **Audible and Visual Warnings -** Audible sounds within the cabin of the vehicle and visual warnings shown within the EVIC are activated when necessary to notify the driver.
- **Brake Jerk -** A short deceleration is performed to alert the driver.
- **Collision Mitigation System (CMS) -** CMS assists braking operation by automatically applying an appropriate amount of braking force to help avoid or minimize the chances of hitting a vehicle. CMS allows up to 1.5 seconds of braking to give the driver additional reaction time. When CMS activates its automatic brake, it also turns the brake lights on.
- **Advanced Brake Assist (ABA) -** Once the driver presses the brake pedal, advanced brake assist (ABA) will engage If the driver is not applying enough force. ABA will increase the braking force required to avoid or mitigate the accident. If the driver does not react to any of the previous warnings, the collision cannot be avoided.

DESCRIPTION AND OPERATION > LANE DEPARTURE WARNING SYSTEM > LANE DEPARTURE WARNING PLUS (LDW)

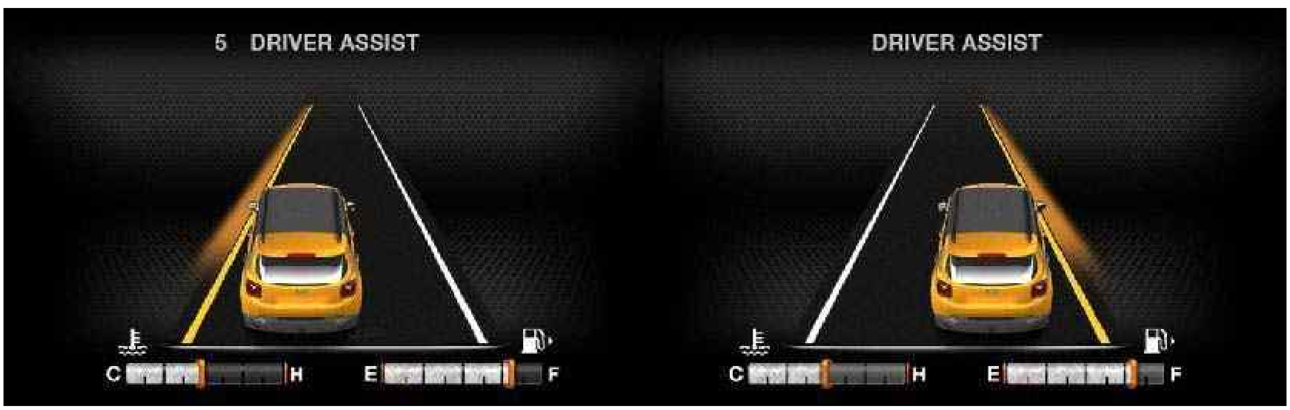
Fig 1: Lane Departure Warning Plus (LDW)



Courtesy of CHRYSLER GROUP, LLC

By means of a video sensor mounted behind the rear view mirror and in contact with the windshield, the system is able to detect the lines on the road and keep the car on its own lane preventing involuntary lane changes.

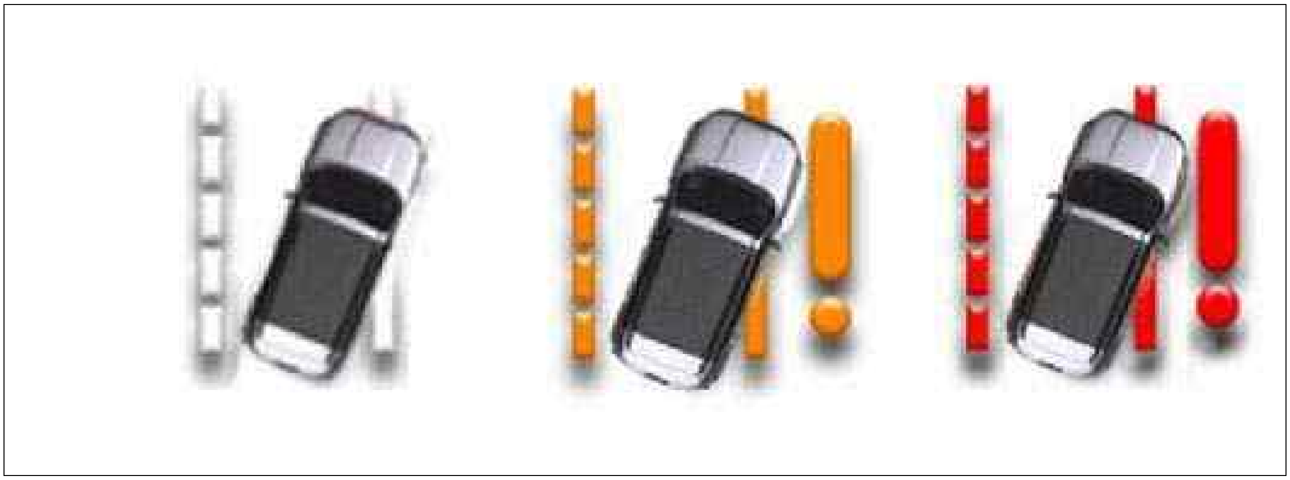
Fig 2: Driver Assist Screen



Courtesy of CHRYSLER GROUP, LLC

If the vehicle starts to drift into another lane and the driver, having the hands on the steering wheel, does not use the direction indicator, the system alerts the driver that the car is going to depart from the lane through two feedbacks: a visual indication on the instrument panel and a haptic signal by applying a torque on the steering wheel.

Fig 3: Direction Indicator



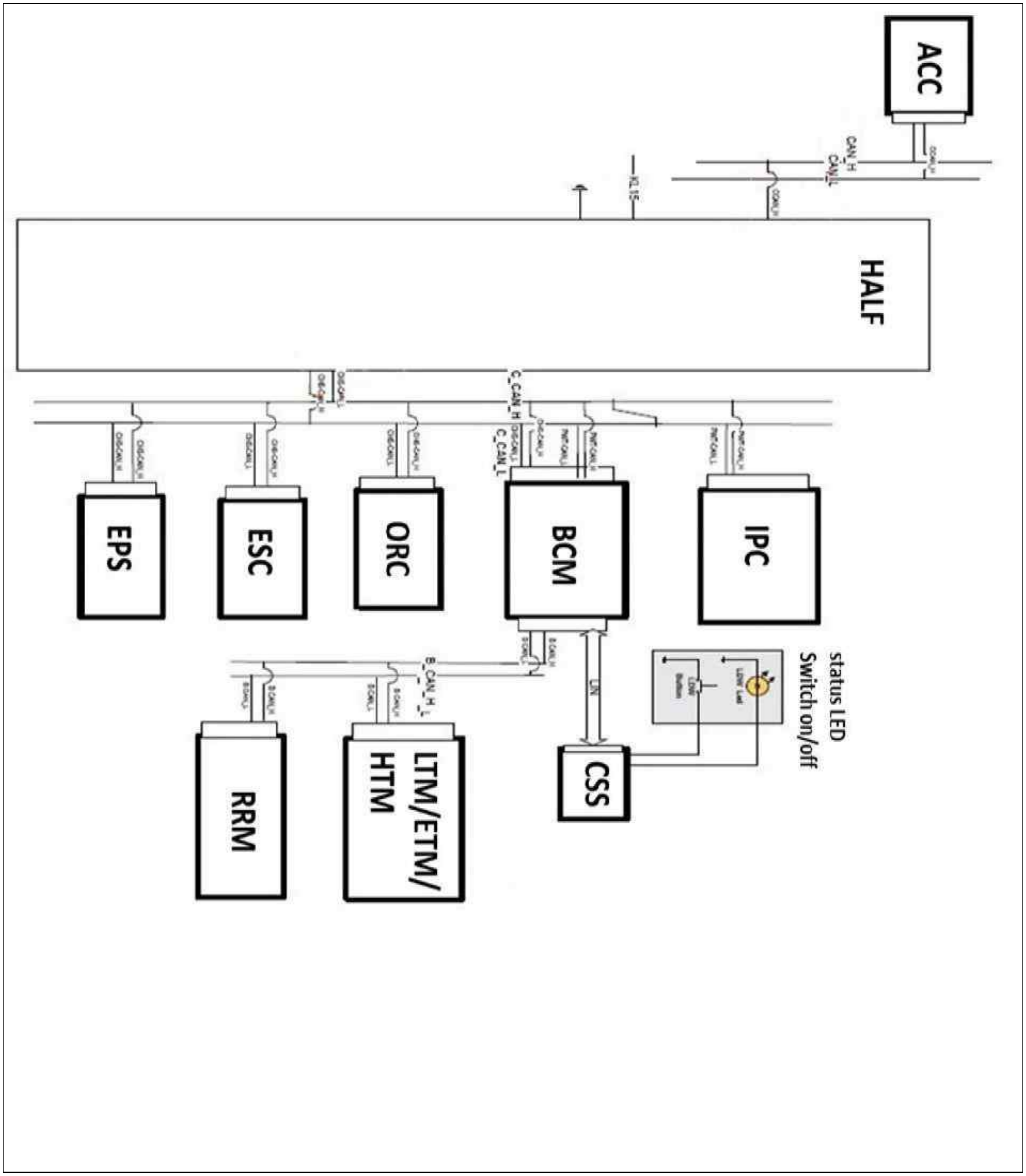
Courtesy of CHRYSLER GROUP, LLC

Detail below:

- The system uses a camera-based sensor to detect and measure the position of the vehicle within the borders the lane.
- During a drift towards another lane (direction indicator not active), the system will provide a visual warning and a haptic warning by applying a torque to the Electric Power Steering (EPS) system.
- The system checks if the driver's hands are on the steering wheel; if they are not present the system provides a warning to induce the driver to position them. The system is deactivated if the driver does not place the hands on the steering wheel within 5 seconds.
- The system can be partially activated or deactivated via a button located in the center console. The LED on the button will inform the driver on system status.
- The driver can configure the amount of torque applied to the steering wheel as a feedback and the distance from the area where the visual warning will start using the radio customization settings.
- When activated, the system works at speeds higher than 60 km/h (37 mph) and lower than 180 km/h (110 mph).
- The driver can bypass the system in different ways, including: use of direction indicators, torque applied by the driver higher than that applied by the EPS system.
- The system is deactivated automatically when a safety system such as ABS, TCS, ESC, FCW etc. is activated.

DESCRIPTION AND OPERATION > LANE DEPARTURE WARNING SYSTEM > LANE DEPARTURE WARNING (LDW+)

Fig 1: Lane Departure Warning (LDW+) - Circuit Diagram



Courtesy of CHRYSLER GROUP, LLC

Input/output:

- ACC
    - FCW+ function status
    - Data on video objects

- IPC

  - Status, DTC, LDW function configuration and buzzer

- BCM

  -

  - LDW function ON/OFF switch
  - Status of LDW function LED
  - Brake pedal status
  - Direction indicator status
  - Vehicle speed
  - Status of acoustic warning for hands on the steering wheel

- ORC

  - Side acceleration value.

- BSM/ESC

  - ABS / ESC status

- EPS

  - Steering angle
  - Torque applied to the steering wheel

- CSS

  - LDW activation/deactivation

- LTM/ETM/HTM

  - Audio signal for hands on the steering wheel LDW configuration status

- RRM

  - Buzzer

"Lane Assist" is a warning system which notifies the driver if they cross lanes, assisting the driver when distracted. A video sensor, on the windshield near the interior rear view mirror, detects horizontal road signs and the position of the vehicle in relation to them. If the vehicle is travelling in the middle of the lane then the system does not intervene.

If, on the other hand, the vehicle gets close to the edge and the direction indicator is not operated, a slight torque is applied to the steering wheel making the driver aware of what is happening. The drive maintains full control of the vehicle and there is a great benefit in terms of safety.

The system is not on when the vehicle is started. The system can be partially activated or deactivated via a button located on the left steering column stalk. When activated, the system starts recognizing operating conditions, a condition signalled to the driver by the flashing icon on the instrument panel display. The system can be switched off automatically in the following conditions:

- the driver does not keep their hands on the steering wheel: the corresponding indication is shown on the instrument panel and after a few seconds a buzzer sounds until the driver places their hands back on the wheel. This is considered a dangerous condition and the system is automatically deactivated;
- intervention of vehicle safety systems (ABS, ASR and electric power steering). The automatic switching off is signalled to the driver by three consecutive acoustic warnings and the message in the instrument panel display.

The video sensor that manages the lane departure warning function has an ignition-controlled power supply (INT) provided from a line protected by a fuse located in the Body Control Module (BCM).

The sensor is connected, via the CAN line to the BCM and to the instrument panel to manage the "lane departure warning on" warning light and failure signals.

The lane departure warning function control button, located in steering column stalk, sends the activation signal via LIN line to BCM.

Sensor is also connected to radar sensor of the ACC+ system, with a dedicated CAN line.

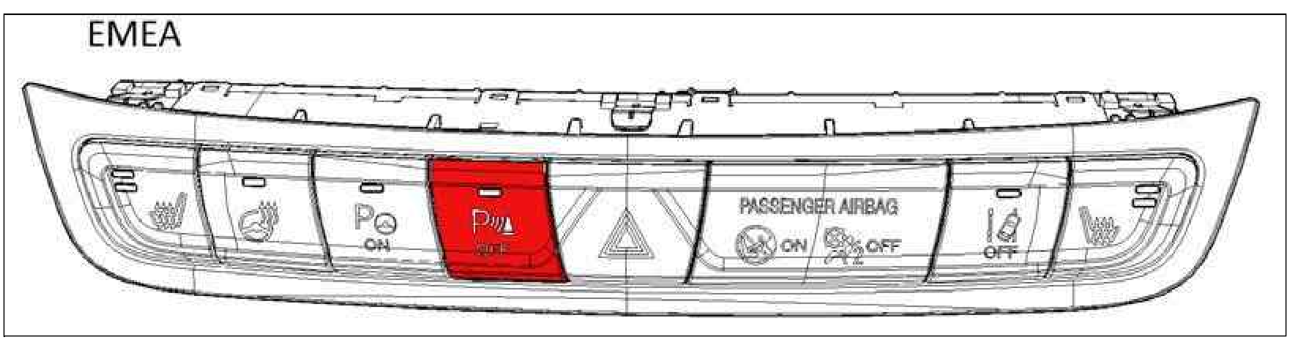
DESCRIPTION AND OPERATION > PARK ASSIST SYSTEM > DESCRIPTION - PARK ASSIST SYSTEM

Fig 1: Park Assist System Screen

Courtesy of CHRYSLER GROUP, LLC

The system uses four sensors located in the rear bumper fascia. The sensors send ultrasonic waves when the vehicle is driven in reverse at low speed. The sensors send and receive ultrasonic waves from the echo coming back from any objects placed in the path of the vehicle. The control unit processes data from the sensors and performs a data triangulation to determine the relative distance, depending on the time elapsed between the output signal and the return signal. Acoustic warnings and signals are output from the instrument panel to alert the driver of the proximity of an object at the rear of the vehicle.

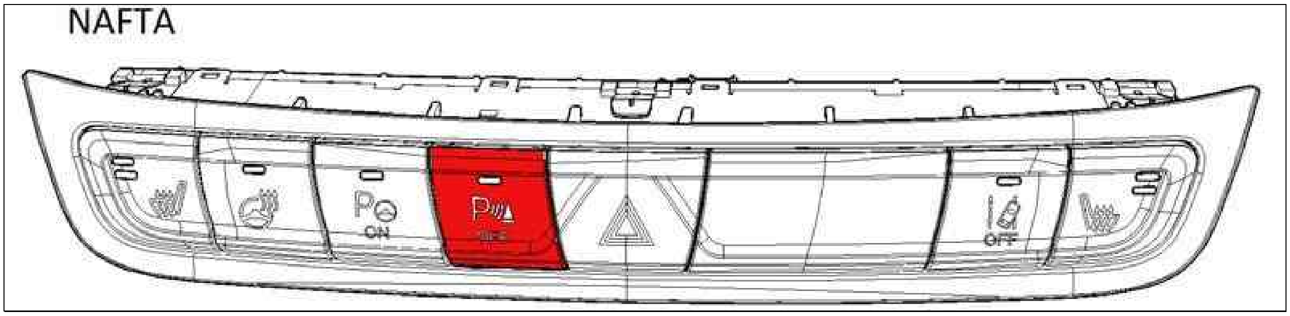
Fig 2: Park Assist System Button (EMEA)



Courtesy of CHRYSLER GROUP, LLC

EMEA

Fig 3: Park Assist System Button (NAFTA)



Courtesy of CHRYSLER GROUP, LLC

NAFTA

The system can be deactivated using the button on the switch pod under the radio.

In case of system failure an audio signal is output and, when reverse is engaged, the display shows a dedicated message for about 5 seconds.

Semi-automatic parking assist system (parallel and perpendicular)

When the car is equipped with the semi-automatic parking assist system (EMEA only), the PAM module is able to park the vehicle in parallel or perpendicular spaces.

Fig 4: Semi-Automatic Parking Assist System (Parallel Parking)

Courtesy of CHRYSLER GROUP, LLC

Parallel Parking

Fig 5: Semi-Automatic Parking Assist System (Perpendicular Parking)

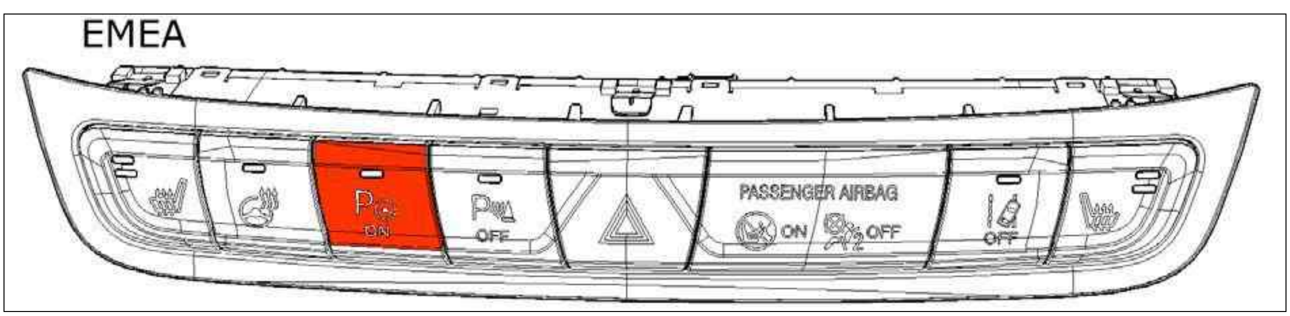
Courtesy of CHRYSLER GROUP, LLC

Perpendicular Parking

For the semi-automatic parking function the system uses 12 ultrasonic sensors. The ultrasonic sensors are located on the front and rear bumpers. The two bumpers have 6 sensors each. Two of these sensors are placed on the side of the bumper.

The driver activates the system by pressing the button of the switch pod on the center of the dashboard.

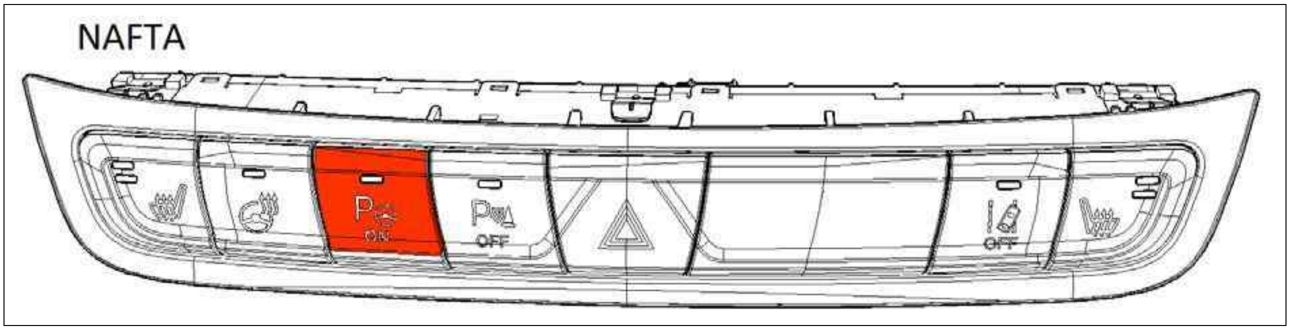
Fig 6: Semi-Automatic Parking Function Button (EMEA)



Courtesy of CHRYSLER GROUP, LLC

EMEA

Fig 7: Semi-Automatic Parking Function Button (NAFTA)



Courtesy of CHRYSLER GROUP, LLC

NAFTA

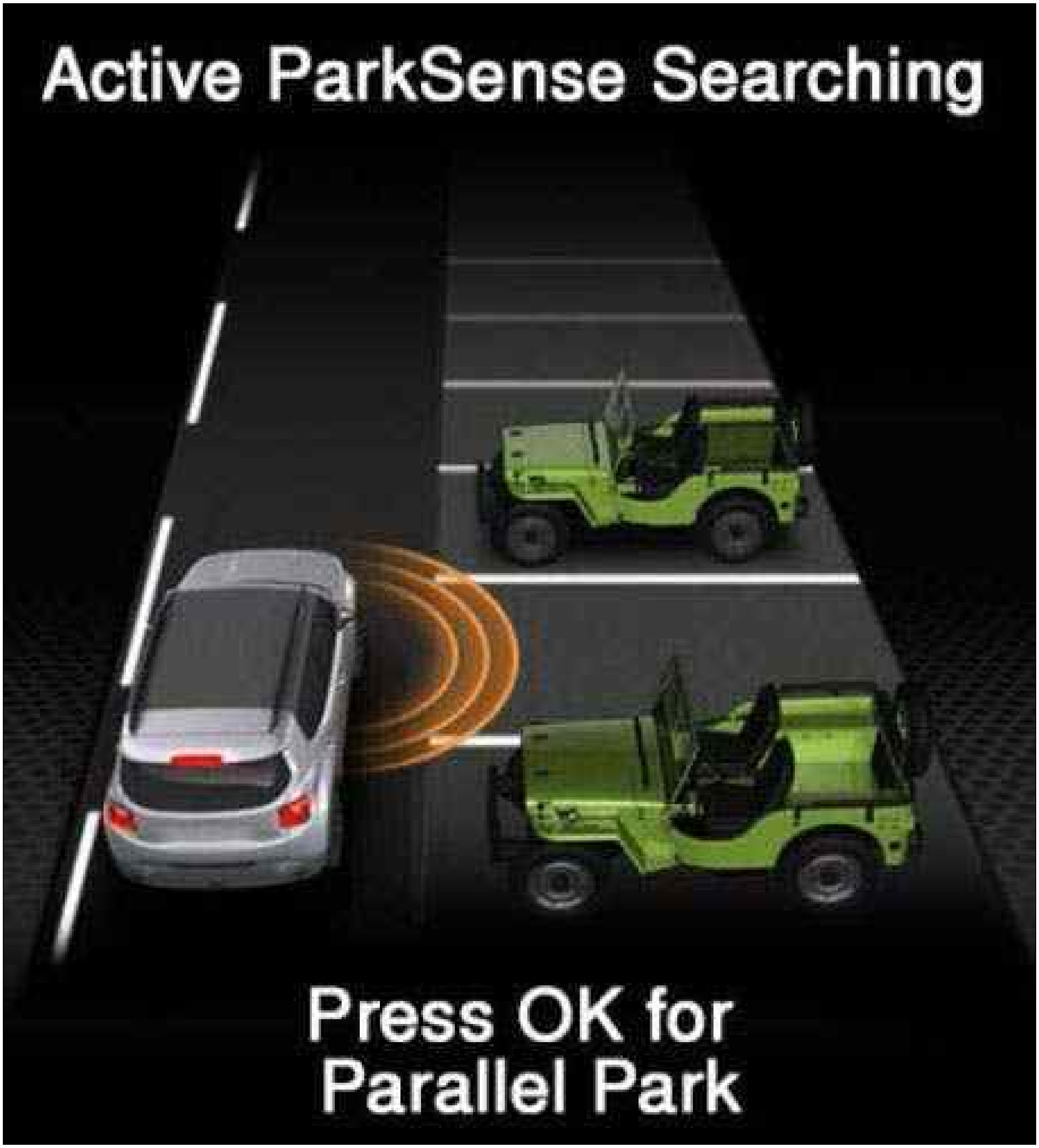
After activation, the EVIC displays the graphics that allows you to select the desired maneuver (parallel or perpendicular parking).

Fig 8: EVIC Display (Parallel)

Courtesy of CHRYSLER GROUP, LLC

Parallel

Fig 9: EVIC Display (Perpendicular)



Courtesy of CHRYSLER GROUP, LLC

Perpendicular

When the system detects a suitable space, it will advise the driver to stop by visual and acoustic signals.

It will communicate to the driver when to engage reverse and operate the brake. Through the combined action with the electric power steering module, the system controls the movement of the steering wheel and the steering angle. The driver controls the position of the gearbox, brake and accelerator.

The perpendicular and parallel parking are available on both sides of the vehicle.

Fig 10: Parallel Parking Mode Display

Courtesy of CHRYSLER GROUP, LLC

When the parallel parking mode is active, the driver is assisted also when driving out of the parking lot.

The RPA and PPPA system components cannot be adjusted or repaired. If any of these components is damaged or ineffective, that component must be replaced.

DESCRIPTION AND OPERATION > PARK ASSIST SYSTEM > DESCRIPTION - PARK ASSIST SYSTEM > REAR PARK ASSIST

A Rear Park Assist (RPA) system is an optional factory-installed electronic parking aid. During parking and other similar vehicle maneuvers this system alerts the vehicle operator to the approximate relative distance of obstacles located in the path immediately behind the vehicle which, due to the surrounding rear vehicle structure, might be otherwise difficult to perceive. When an obstacle is detected, the system uses graphics and chimes to provide the vehicle operator with visual and audible indications of the presence and proximity of such objects.

The RPA system includes the following major components, which are described in further detail elsewhere in this service information:

- **Body Control Module** - The Body Control Module (BCM) serves as the gateway between the Local Interface Network (LIN) data bus of the park assist Off switch and the Controller Area Network (CAN) data bus network used to communicate between the Park Assist Module (PAM), the Instrument Panel Cluster (IPC) and the Radio Receiver Module (RRM).
- **Instrument Panel Cluster** - In vehicles equipped with the optional RPA system, the Electronic Vehicle Information Center (EVIC) within the Instrument Panel Cluster (IPC) displays vehicle graphics that illustrate the approximate location and relative distance of obstacles within the rear path of the vehicle. The EVIC also displays textual warnings and error messages along with issuing audible alerts related to the current operating status of the RPA system.
- **Park Assist Module** - Vehicles equipped with the RPA system include a 4 channel Park Assist Module (PAM), which is secured through integral mounting tabs to the left quarter inner panel above the left rear wheel house, where it is concealed beneath the quarter inside trim within the cargo area of the vehicle.
- **Park Assist Off Switch** - The park assist system can be manually disabled or enabled using a park assist Off switch. The park assist Off switch is integral to the instrument panel switch pod in the instrument panel center stack below the Radio Receiver Module (RRM). This switch allows the operator to turn the park assist system Off.
- **Park Assist Sensors** - Vehicles equipped with the RPA system have four ultrasonic park assist sensors that are concealed behind the rear bumper fascia. Only the sensor membrane is visible on the outer surface of the rear bumper fascia. Each sensor is snapped into an individual molded plastic mounting bracket located at horizontal intervals along the inside surface of the rear bumper fascia.
- **Radio Receiver Module** - In vehicles equipped with the RPA system, the PAM sends electronic message requests to the RRM to mute audio system output during chime tone generation. In addition, the RRM provides an interface that allows the vehicle operator to manually disable or enable the RPA system using the Setup Menu function.

DESCRIPTION AND OPERATION > PARK ASSIST SYSTEM > DESCRIPTION - PARK ASSIST SYSTEM > PARALLEL AND PERPENDICULAR PARK ASSIST

In Europe-Middle East-Africa (EMEA) markets only a Parallel and Perpendicular Park Assist (PPPA) system is an optional factory-installed electronic parking aid. During parking and other similar vehicle maneuvers this system alerts the vehicle operator to the approximate relative distance of obstacles located in the paths immediately behind and ahead of the vehicle which, due to the surrounding vehicle structures, might be otherwise difficult to perceive. When an obstacle is detected, the system uses graphics and chimes to provide the vehicle operator with visual and audible indications of the presence and proximity of such objects.

The PPPA is also capable of providing an autonomous brake warning feature. When enabled, this feature will alert the vehicle operator when the automatic transmission gear selector is in the Reverse (**R**) position and an object is detected in the rear path of the vehicle by aggressively applying and releasing the brakes. Following an autonomous brake warning application, an icon representing the rear of the vehicle with three red arcs and the text **BRAKE!** will appear in the Electronic Vehicle Information Center (EVIC) within the Instrument Panel Cluster (IPC). This brake warning feature is not available in vehicles equipped with a manual transmission.

Finally, the PPPA provides a semiautomatic parallel and perpendicular park assist feature. When enabled, this feature will identify a suitable parking spot and help to steer the vehicle into a selected parallel or perpendicular parking spot accordingly.

The PPPA system includes the following major components, which are described in further detail elsewhere in this service information:

- **Antilock Brake Module** - The Antilock Brake Module (ABM) controls the application of the vehicle brakes to implement the autonomous brake warning feature when it receives the appropriate electronic message input over the Controller Area Network (CAN) data bus from the Park Assist Module (PAM).
- **Body Control Module** - The Body Control Module (BCM) serves as the gateway between the Controller Area Network (CAN) data bus networks used to communicate between the Park Assist Module (PAM), the Antilock Brake Module (ABM), the Electronic Power Steering (EPS) module, the Instrument Panel Cluster (IPC) and the Radio Receiver Module (RRM).
- **Electronic Power Steering Module** - The Electronic Power Steering (EPS) module controls the vehicle steering in order to maneuver the vehicle into a selected parallel or perpendicular parking space based upon electronic message inputs received over the Controller Area Network (CAN) data bus from the Park Assist Module (PAM).
- **Instrument Panel Cluster** - In vehicles equipped with the optional PPPA system, the Electronic Vehicle Information Center (EVIC) within the Instrument Panel Cluster (IPC) displays vehicle graphics and amber or red arc sections that illustrate the approximate location of obstacles within the front or rear paths of the vehicle. The EVIC displays graphics and text to support the parallel and perpendicular parking features, textual warnings and error messages along with issuing audible alerts related to the current operating status of the PPPA system.
- **Parallel And Perpendicular Park Assist On Switch** - The Parallel and Perpendicular Park Assist (PPPA) features of the optional PPPA system can be selected and toggled using a PPPA On switch. The PPPA On switch is integral to the instrument panel switch pod, which is secured to the instrument panel center stack just below the Radio Receiver Module (RRM). Refer to POD, SWITCH, DESCRIPTION AND OPERATION . This switch allows the operator to turn the PPPA features On and toggle between the parallel and the perpendicular park assist features.
- **Park Assist Module** - Vehicles equipped with the PPPA system include a 12 channel Park Assist Module (PAM), which is secured with plastic push-in fasteners through integral mounting tabs to the inner surface of the lower deck opening closure panel just below the left tail lamp mounting panel, where it is concealed beneath the left rear wheel house carpet extension within the trunk of the vehicle.

- **Park Assist Off Switch** - The optional PPPA system can be manually disabled or enabled using a park assist Off switch. The park assist Off switch is integral to the instrument panel switch pod in the instrument panel center stack below the heater and air conditioner controls. This switch allows the operator to turn the PPPA system Off.
- **Park Assist Sensors** - Vehicles equipped with the PPPA system have twelve ultrasonic park assist sensors. Six are concealed behind the rear bumper fascia and six are concealed behind the front bumper fascia. Only the sensor membrane is visible on the outer surface of the bumper fascia. Each sensor is snapped into an individual molded plastic mounting bracket located at horizontal intervals along the inside surfaces of the front and rear bumper fascias.
- **Radio Receiver Module** - In vehicles equipped with the PPPA system, the PAM sends electronic message requests to the RRM to generate audible signals indicating the approximate distance of obstacles from the front and rear paths of the vehicle. The RRM is capable of generating repetitive single chime tones at several varying frequencies or continuous tones through the front or rear audio system speakers. If the audio system speakers are already in use, the RRM will mute that output during chime tone generation. In addition, the RRM provides an interface that allows the vehicle operator to manually disable or enable the PPPA system using the customer programmable features option.

DESCRIPTION AND OPERATION > PARK ASSIST SYSTEM > OPERATION - PARK ASSIST SYSTEM

Details for the two versions of the park assist system available for this vehicle (Rear Park Assist/RPA or Parallel and Perpendicular Park Assist/PPPA) can be found under dedicated, separate headings within this service information.

The hard wired circuits between components related to the park assist system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist system or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist system or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

DESCRIPTION AND OPERATION > PARK ASSIST SYSTEM > OPERATION - PARK ASSIST SYSTEM > REAR PARK ASSIST

The Rear Park Assist (RPA) system is active only when the status of the ignition is On, the transmission gear selector lever is in the Reverse (**R**) position and the vehicle speed is less than about 11 km/h (7 mph). The system can be manually disabled and enabled by the vehicle operator using the park assist Off push button in the instrument panel switch pod. In vehicles equipped with this option, the system is enabled from the factory as a default.

Reasons for disabling the system include trailer towing and off road use. With a trailer attached to the vehicle the audible and visual RPA alerts would be incessant whenever the gear selector lever was in the Reverse (**R**) position due to the proximity of the trailer to the rear of the vehicle. Similarly, operating the vehicle off road may cause the RPA alerts to become distracting due to the proximity of large trees or boulders and the extreme rear approach angles that may be encountered while maneuvering on off road trails or terrain.

When the system is disabled, a **PARK ASSIST SYSTEM OFF** graphic and textual message will appear in the Electronic Vehicle Information Center (EVIC) display of the Instrument Panel Cluster (IPC) at the beginning of each ignition On cycle, and whenever the gear selector lever is in the Reverse (**R**) position. When the system is enabled, a **PARK ASSIST SYSTEM ON** graphic and textual message will appear in the EVIC display of the IPC at the beginning of each ignition On cycle, and a **PARK ASSIST READY** graphic and textual message will appear in the display whenever the gear selector lever is in the Reverse (**R**) position.

The microcontroller based, 4 channel Park Assist Module (PAM) is the central component of the RPA system. It supplies voltage to the park assist sensors, receives and analyzes data from the sensors, calculates and communicates the proper display information to the EVIC display, calculates and communicates the proper audible outputs to the Radio Receiver Module (RRM), performs system diagnostics and communicates with other electronic modules in the vehicle or with a diagnostic scan tool over the Controller Area Network (CAN) data bus. The PAM operates on battery voltage received through a fused ignition (run) fuse in the Power Distribution Center (PDC) and is grounded through a take out of the body wire harness secured to the body sheet metal.

Four ultrasonic park assist sensors in the rear bumper fascia allow the RPA system to locate and identify the proximity of nearby obstacles. These sensors each generate ultrasonic sound pulses when triggered by the PAM, then signal the PAM when an echo of the reflected sound pulses is received. The detection distance range from the rear of the vehicle is about 2 m (80 in), and the detection height range from the ground is about 0.2 m (7.8 in) to about 0.8 m (31 in). The detection area extends somewhat around both rear corners of the vehicle.

The EVIC display unit provides the vehicle operator with a graphical representation of the vehicle along with numerous illuminated arc sections that indicate the relative location and range of detected objects. The display is visible directly in front of the vehicle operator and operates based upon the electronic message inputs received from the PAM over the CAN data bus. There are three regions at the rear of the vehicle designated for arc alerts: Center, Left and Right. The Center region consists of six zones, while the Right and Left regions consist of two zones. The zones range from furthest to nearest from the rear of the vehicle. The arc sections are illuminated in an amber color until the nearest zone is reached, at which point the arc sections become illuminated red in color.

Meanwhile, the RRM generates audible indications of a detected object by emitting a series of chime tones that grow progressively higher in frequency as the vehicle gets closer to the object. As the vehicle comes within about 30 centimeters (12 inches) of the object, the audible warning changes from a high frequency series of chime tones to a single continuous tone. If the audio system is active when the RRM receives a chime request message from the PAM, the audio output will be muted automatically while the RPA audible warnings are being generated.

When the PAM monitors a problem in any of the RPA system circuits or components, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit, sends an electronic message to the EVIC and the EVIC displays a graphic with a **SERVICE PARK ASSIST SYSTEM** textual message. If the PAM detects that the park assist sensors are inoperative due to an accumulation of road film, mud, ice or snow on the rear fascia, the EVIC will display a **WIPE OFF REAR PARK ASSIST SENSORS** graphic and textual message. When the system is disabled by the PAM due to a detected external error or influence, a **PARK ASSIST SYSTEM DISABLED** graphic and textual message will appear in the EVIC display of the IPC whenever a new ignition cycle begins and each time the gear selector lever is in the

Reverse (**R**) position.

DESCRIPTION AND OPERATION > PARK ASSIST SYSTEM > OPERATION - PARK ASSIST SYSTEM > PARALLEL AND PERPENDICULAR PARK ASSIST

The Parallel and Perpendicular Park Assist (PPPA) system is active only when the status of the ignition is On, the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) position, the manual transmission gear selector lever is in the Reverse **R** or is not in Reverse **R** and the vehicle speed is less than about 11 km/h (7 mph). The front and rear park assist features of this system can be manually disabled and enabled by the vehicle operator using the Park Assist Off push button in the instrument panel switch pod. In vehicles equipped with this option, the system is enabled from the factory as a default.

Reasons for disabling the system include trailer towing and off road use. With a trailer attached to the vehicle the audible and visual park assist alerts would be incessant whenever the gear selector lever was in the Reverse (**R**) position due to the proximity of the trailer to the rear of the vehicle. Similarly, operating the vehicle off road may cause the park assist alerts to become distracting due to the proximity of large trees or boulders and the extreme front and rear approach angles that may be encountered while maneuvering on off road trails or terrain.

When the system is disabled, a **PARK ASSIST SYSTEM OFF** graphic and textual message will appear in the Electronic Vehicle Information Center (EVIC) display of the Instrument Panel Cluster (IPC) at the beginning of each ignition On cycle, whenever the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) positions, or whenever the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions. When the system is enabled, a **PARK ASSIST SYSTEM ON** graphic and textual message will appear in the EVIC display of the IC at the beginning of each ignition On cycle, and a **PARK ASSIST READY** graphic and textual message will appear in the display whenever the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) positions and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour), or whenever the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions and the vehicle speed is less than about 11 kilometers-per-hour (7 miles-per-hour).

The microcontroller based, 12 channel Park Assist Module (PAM) is the central component of the park assist system. It supplies voltage to the park assist sensors, receives and analyzes data from the sensors, calculates and communicates the proper display information to the EVIC display, calculates and communicates the proper audible outputs to the Radio Receiver Module (RRM), performs system diagnostics and communicates with other electronic modules in the vehicle or with a diagnostic scan tool over the Controller Area Network (CAN) data bus. The PAM operates on battery voltage received through a fused ignition (run) fuse in the Power Distribution Center (PDC) and is grounded through a take out of the body wire harness secured to the body sheet metal.

Six ultrasonic park assist sensors in the front bumper fascia and six sensors in the rear bumper fascia allow the park assist system to locate and identify the proximity of nearby obstacles. These sensors each generate ultrasonic sound pulses when triggered by the PAM, then signal the PAM when an echo of the reflected sound pulses is received. The detection distance range from the front of the vehicle is about 1.2 m (47 in), or from the rear of the vehicle is about 2 m (80 in). The detection height range from the ground is about 0.2 m (7.8 in) to about 0.8 m (31 in). The detection area extends somewhat around both front and rear corners of the vehicle. In the PPPA system, the four sensors on the outboard right and left ends of the front and rear fascias have increased range over the other eight sensors and are not interchangeable.

In vehicles with an automatic transmission, the PPPA has an available autonomous brake warning feature. When the transmission gear selector position is Reverse (**R**), an object is detected at the rear of the vehicle at a vehicle velocity based distance value and the ultrasonic sensors are capable of detecting an object the PAM sends an electronic **brake and release** message to the Antilock Brake Module (ABM) over the CAN data bus network. The autonomous brake warning is aggressively performed by the ABM to reduce vehicle speed and pre-fill the brake hydraulic system in an effort to warn and to give the vehicle operator more time to react to a detected object at the rear of the vehicle.

The autonomous brake warning feature is an alert function, not a comfort function; therefore, the brake application will be sharp and sudden to disturb, rather than smooth and discrete. This feature is enabled from the factory as a default, but can be manually disabled or enabled by the vehicle operator using the customer programmable features settings menu of the Radio Receiver Module (RRM).

The EVIC display unit provides the vehicle operator with a graphical representation of the vehicle along with numerous illuminated arc sections that indicate the relative location and range of detected objects. The display is visible directly in front of the vehicle operator and operates based upon the electronic message inputs received from the PAM over the CAN data bus. There are three regions at the front or rear of the vehicle designated for arc alerts: Center, Left and Right. The Front Center region consists of five zones, the Rear Center region consist of six zones, while the Right and Left regions at the front and rear both consist of two zones. The zones range from furthest to nearest from the vehicle. The arc sections are illuminated in an amber color until the nearest zone is reached, at which point the arc sections become illuminated red in color.

Meanwhile, the RRM generates audible indications of a detected object by emitting a series of chime tones that grow progressively higher in frequency as the vehicle gets closer to the object. As the vehicle comes within about 30 cm (12 in) of the object, the audible warning changes from a high frequency series of chime tones to a single continuous tone. If the audio system is active when the RRM receives a chime request message from the PAM, the audio output will be muted automatically while the park assist audible warnings are being generated.

The semiautomatic parallel and perpendicular parking feature is designed to assist the vehicle operator, not to substitute for the vehicle operator. The vehicle operator must stay in full control of the acceleration and braking of the vehicle. The driver initiates the parallel and perpendicular parking feature by using the Parallel And Perpendicular Park Assist On push button in the instrument panel switch pod.

Once the parallel and perpendicular park feature is turned On, an Active Park Sense Search screen pops up in the EVIC display unit. The initial search screen to pop up will be for the parallel parking feature, but text at the bottom of the EVIC display advises, **Press OK for Perpendicular Park**. The vehicle operator can then press the **OK** push button in the EVIC switch pod on the left horizontal spoke of the steering wheel to toggle back and forth between the parallel parking space and perpendicular parking space search screens. From this point through completion of the selected parking maneuver, the system will automatically coach the vehicle operator through the location of an appropriate parking space and the parking maneuver using both graphical representations and text that pops up within the EVIC display unit.

During parallel and perpendicular parking maneuvers the PPPA system assists the vehicle operator by measuring and identifying an appropriate parking space while driving slowly past the potential space. Then the system calculates the appropriate trajectory and controls the steering wheel to steer the vehicle into the selected space. Depending upon the parking maneuver selected, the PPPA system is capable of steering a vehicle into a parallel or a perpendicular parking space on either the driver side or the passenger side of the vehicle. The PAM controls the measuring and maneuvering of the vehicle by monitoring the ultrasonic sensor inputs and sending the appropriate electronic messages to the Electronic Power Steering (EPS) module over the CAN data bus.

When the PAM monitors a problem in any of the park assist system circuits or components, it stores a fault code or Diagnostic Trouble Code (DTC) in its memory circuit, sends an electronic message to the EVIC and the EVIC displays a graphic with a **SERVICE PARK ASSIST SYSTEM** textual message. If the PAM detects that the park assist sensors are inoperative due to an accumulation of road film, mud, ice or snow on the front or rear fascia, the EVIC will display a **WIPE OFF FRONT PARK ASSIST SENSORS** or **WIPE OFF REAR PARK ASSIST SENSORS** graphic and textual message. When the system is disabled by the PAM due to a detected external error or influence, a **PARK ASSIST SYSTEM DISABLED** graphic and textual message will appear in the EVIC display of the IC whenever a new ignition cycle begins and each time the automatic transmission gear selector lever is in the Drive (**D**) or Reverse (**R**) position or the manual transmission gear selector lever is in the Reverse (**R**) or not in Reverse positions.

DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - BLIND SPOT MONITOR SYSTEM

WARNING:

To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbags, airbag curtains, knee blocker, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect the IBS/negative battery cable assembly from the negative battery post, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

The following textual messages related to the Blind Spot Monitor (BSM) system may appear within the Electronic Vehicle Information Center (EVIC) display of the Instrument Panel Cluster (IPC):

- **BLIND SPOT SYSTEM OFF** - This message to the vehicle operator when the ignition first transitions to the On status indicates that the BSM system has been turned Off using the Setup Menu of the Radio Receiver Module (RRM).
- **SERVICE BLIND SPOT SYSTEM** - This message to the vehicle operator while the ignition status is On indicates that the BSM system is unavailable due to a monitored system fault or faults.
- **BLIND SPOT SYSTEM TEMPORARILY UNAVAILABLE** - This message to the vehicle operator while the ignition status is On indicates that the BSM system is temporarily unavailable as a result of one of the following:
    1. **Sensor Blockage** - The amber BSM visual icon in both outside rear view mirrors will be illuminated as long as blockage exists or until the ignition status transitions to Off, whichever occurs first.
    2. **Monitored System Fault** - The BSM system has detected a monitored system fault condition and has stored a Diagnostic Trouble Code (DTC). The amber BSM visual icon will be illuminated in both outside rear view mirrors for as long as the condition exists or until the ignition status transitions to Off, whichever occurs first.

NOTE:

If the ***BLIND SPOT SYSTEM TEMPORARILY UNAVAILABLE*** *message is received for a minimum of 5 minutes, please verify that the outboard area at each end of the rear fascia behind the rear wheel openings where the radar sensors are located is not blocked by snow, ice or road debris. If the area is blocked, remove the blockage and verify that the message is no longer present in the EVIC display.*

NOTE:

If the vehicle has experienced any trauma in the outboard area at each end of the rear fascia behind the rear wheel openings where the sensors are located, even if the fascia is not damaged, the radar sensor may have become misaligned. A misaligned radar sensor will result in the BSM system not operating properly.

The hard wired circuits between components related to the BSM system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM system or the electronic controls and communication between modules and other devices that provide some features of the system. The most reliable, efficient and accurate means to diagnose the BSM system or the electronic controls and communication related to BSM system operation requires the use of a diagnostic scan tool. Refer to DIAGNOSIS AND TESTING or DIAGNOSIS AND TESTING .

DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - CHIME WARNING SYSTEM

WARNING:

To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbags, airbag curtains, knee blocker, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect the IBS/negative battery cable assembly from the negative battery post, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

The hard wired circuits between components related to the chime warning system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the chime warning system or the electronic controls and communication between modules and other devices that provide some features of the chime warning system. The most reliable, efficient and accurate means to diagnose the chime warning system or the electronic controls and communication related to chime warning system operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - FORWARD COLLISION WARNING

The hard wired circuits between components related to the Forward Collision Warning (FCW+) system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the FCW+ system or the electronic controls and communication between modules and other devices that provide some features of the FCW+ system. The most reliable, efficient and accurate means to diagnose the FCW+ system or the electronic controls and communication related to FCW+ system operation requires the use of a diagnostic scan tool.

DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - LANE DEPARTURE WARNING SYSTEM

The hard wired circuits between components related to the Lane Departure Warning (LDW+) system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the LDW+ system or the electronic controls and communication between modules and other devices that provide some features of the LDW+ system. The most reliable, efficient and accurate means to diagnose the LDW+ system or the electronic controls and communication related to LDW+ system operation requires the use of a diagnostic scan tool.

DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - PARK ASSIST SYSTEM

WARNING:

To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbags, airbag curtains, knee blocker, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect the IBS/negative battery cable assembly from the negative battery post, then wait two minutes for the system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.

A park assist system warning icon or textual message may appear within the Electronic Vehicle Information Center (EVIC) reconfigurable display in the Instrument Panel Cluster (IPC). If a warning appears in the EVIC display, and the condition is related to the park assist system; be certain to confirm the following:

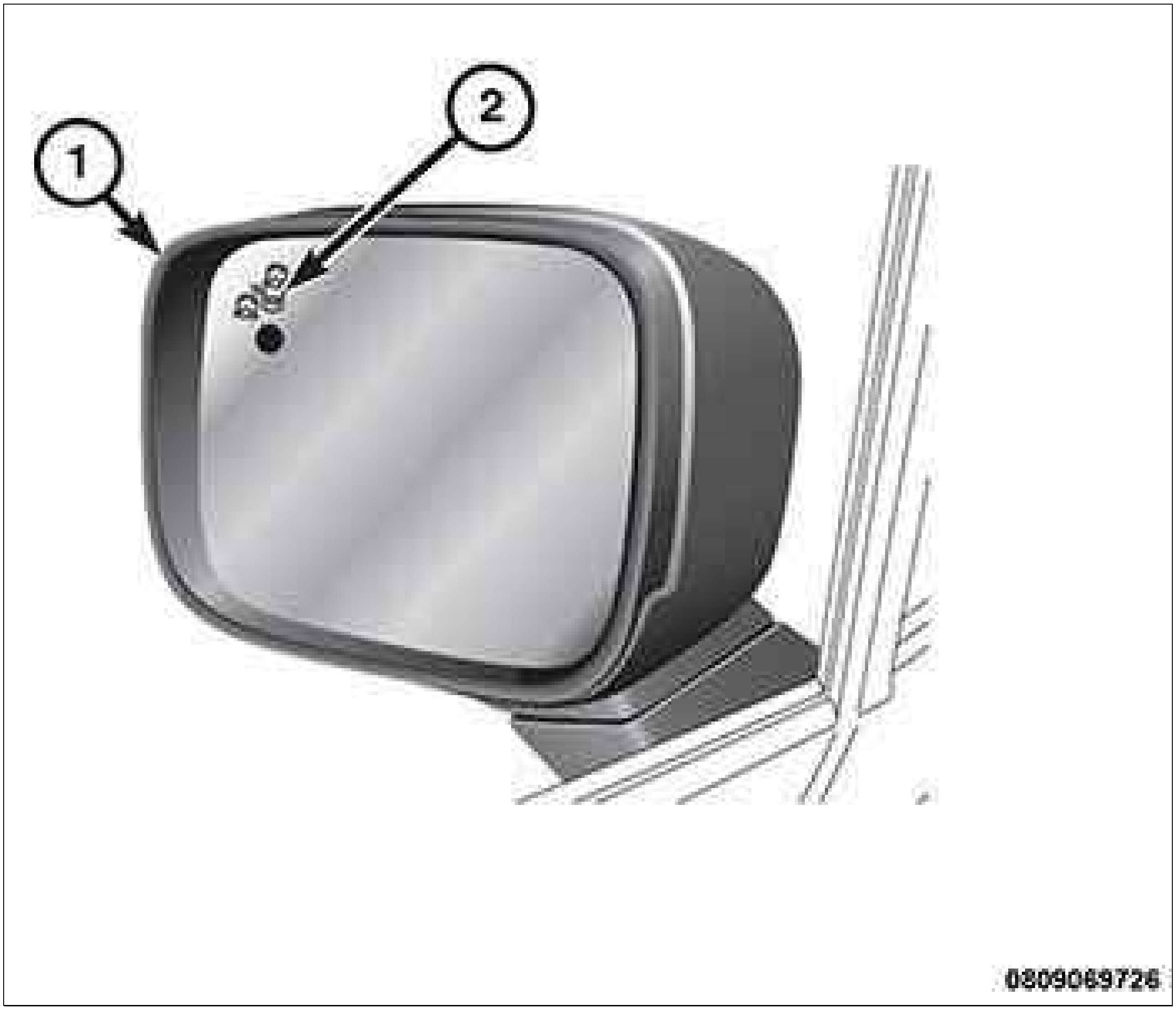
- Be certain that the rear bumper fascia is free of dirt and debris to keep the system operating properly. The park assist system is self correcting, please verify that the area of the rear bumper fascia where the sensors are located (both the face and the back) is not blocked by ice, snow, mud or other obstructions. If the area is blocked, remove the blockage, shift the transmission selector lever into Reverse (**R**) and verify the warning is no longer present in the EVIC display.
- Be certain that the parking brake is not applied.
- The presence of operating heavy construction equipment, large trucks and other vibrations in the vicinity of the vehicle could impact the performance of the system.

The hard wired circuits between components related to the park assist system may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist system or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist system or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

DISPLAY, BLIND SPOT > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > DESCRIPTION

Fig 1: Blind Spot Monitor (BSM) System Display



Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the Blind Spot Monitor (BSM) system have a display that appears in both the right and left outside rear view mirrors (1). The display consists of a translucent icon (2) in the mirror glass that is illuminated by an amber Light Emitting Diode (LED) unit mounted behind the icon on the mirror glass case. When illuminated, only the amber colored icon is visible on the outer surface of the mirror glass. The LED unit for the display is connected to the vehicle electrical system along with the other wiring for the power mirror through a dedicated take out and connector of the door wire harness.

The BSM displays are each integral to the outside rear view mirror glass and case unit. The displays cannot be adjusted or repaired. If a BSM display is ineffective or damaged, the entire mirror glass and case unit must be replaced. Refer to MIRROR, OUTSIDE REARVIEW, REMOVAL AND INSTALLATION .

DISPLAY, BLIND SPOT > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > OPERATION

The Blind Spot Monitor (BSM) displays provide the vehicle operator with a visual alert that a target vehicle (object of interest) has been detected by the BSM system within one of the BSM or Rear Cross Path (RCP) detection zones. The BSM display is also illuminated momentarily as a bulb test each time the ignition status transitions to On as a part of the BSM system self tests. If a BSM display remains illuminated with the park brake applied or with the automatic transmission gear selector in the Park (**P**) position, it indicates that the BSM system has registered a system fault and may require service.

Each BSM display is completely controlled by a hard wired output of the RAdio Detection And Ranging (RADAR) smart sensor (also known as Left Blind Spot Sensor/LBSS or Right Blind Spot Sensor/RBSS) for the same side of the vehicle as the display. The display units are grounded at all times through a takeout and eyelet terminal of the body wire harness that is secured to the body sheet metal.

The hard wired circuits between the BSM displays and the LBSS or RBSS may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM displays or the electronic controls and communication between other modules and devices that provide some features of the BSM displays. The most reliable, efficient and accurate means to diagnose the BSM displays or the electronic controls and communication related to BSM display operation requires the use of a diagnostic scan tool.

DISPLAY, BLIND SPOT > DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - BLIND SPOT DISPLAY

The hard wired circuits between the Blind Spot Monitor (BSM) displays and the Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the BSM displays or the electronic controls and communication between other modules and devices that provide some features of the BSM displays. The most reliable, efficient and accurate means to diagnose the BSM displays or the electronic controls and communication related to BSM display operation requires the use of a diagnostic scan tool.

DISPLAY, BLIND SPOT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

The Blind Spot Monitor (BSM) display Light Emitting Diode (LED) indicator and icon are integral to the outside rear view mirror glass and case unit. Refer to MIRROR, OUTSIDE REARVIEW, REMOVAL AND INSTALLATION .

DISPLAY, BLIND SPOT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

The Blind Spot Monitor (BSM) display Light Emitting Diode (LED) indicator and icon are integral to the outside rear view mirror glass and case unit. Refer to MIRROR, OUTSIDE REARVIEW, REMOVAL AND

INSTALLATION .

MODULE, BLIND SPOT > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > DESCRIPTION

The optional Blind Spot Monitor (BSM) system used in this vehicle has two control modules. One control module is dedicated to each side of the vehicle. A Blind Spot Module (BSM) is integral to the Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) for the same side of the vehicle. Refer to SENSOR, BLIND SPOT, DESCRIPTION AND OPERATION .

MODULE, BLIND SPOT > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > OPERATION

The optional Blind Spot Monitor (BSM) system used in this vehicle has two control modules. One control module is dedicated to each side of the vehicle. The blind spot modules are each integral to the blind spot sensor for the same side of the vehicle. Refer to SENSOR, BLIND SPOT, DESCRIPTION AND OPERATION .

MODULE, BLIND SPOT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

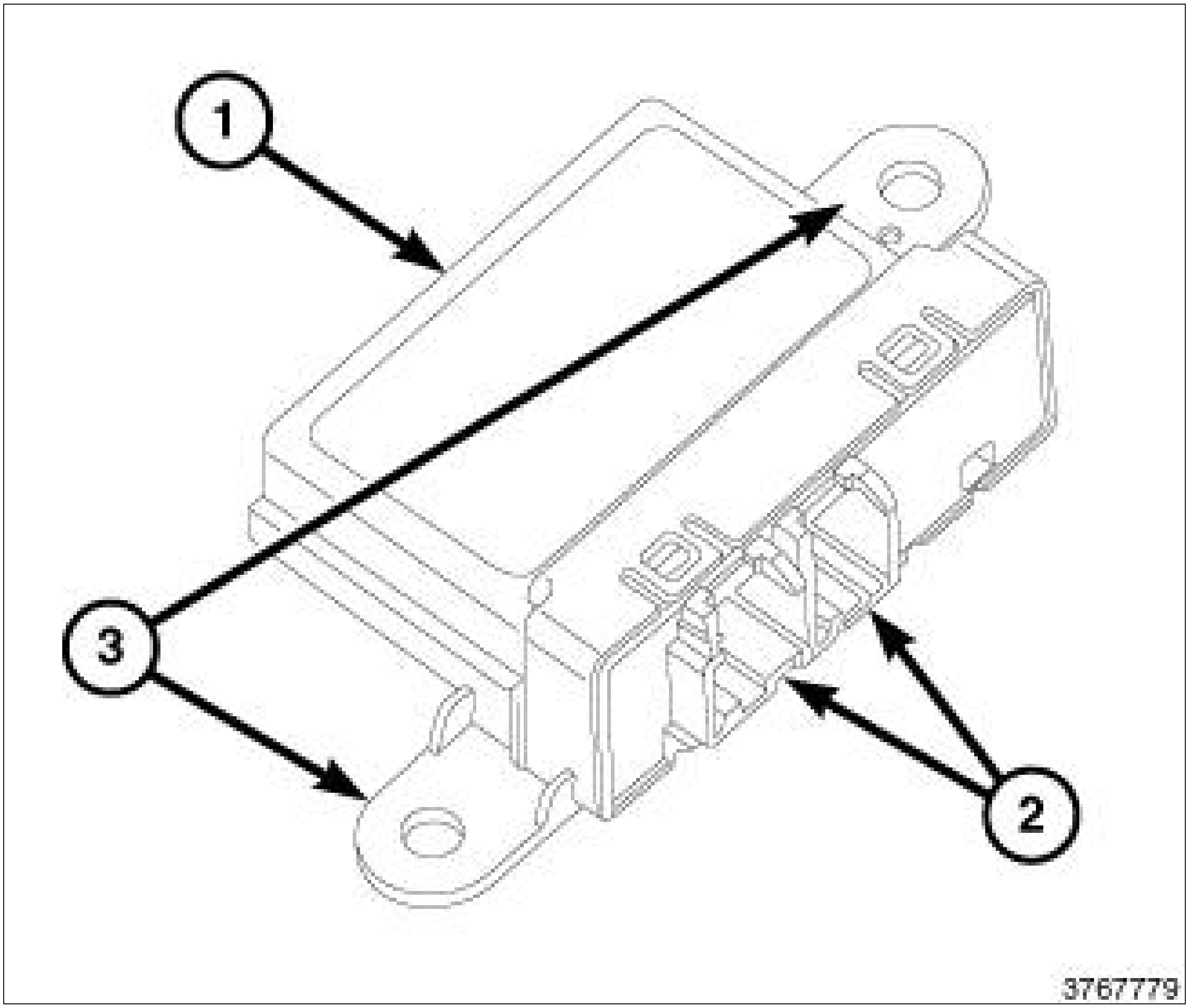
Two blind spot modules are used in this vehicle, one for the left side and one for the right side. Each blind spot module is integral to the blind spot sensor on the same side of the vehicle. Refer to SENSOR, BLIND SPOT, REMOVAL AND INSTALLATION .

MODULE, BLIND SPOT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

Two blind spot modules are used in this vehicle, one for the left side and one for the right side. Each blind spot module is integral to the blind spot sensor on the same side of the vehicle. Refer to SENSOR, BLIND SPOT, REMOVAL AND INSTALLATION .

MODULE, PARK ASSIST > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > DESCRIPTION

Fig 1: Park Assist Module, Connector Receptacles & Mounting Tabs



Courtesy of CHRYSLER GROUP, LLC

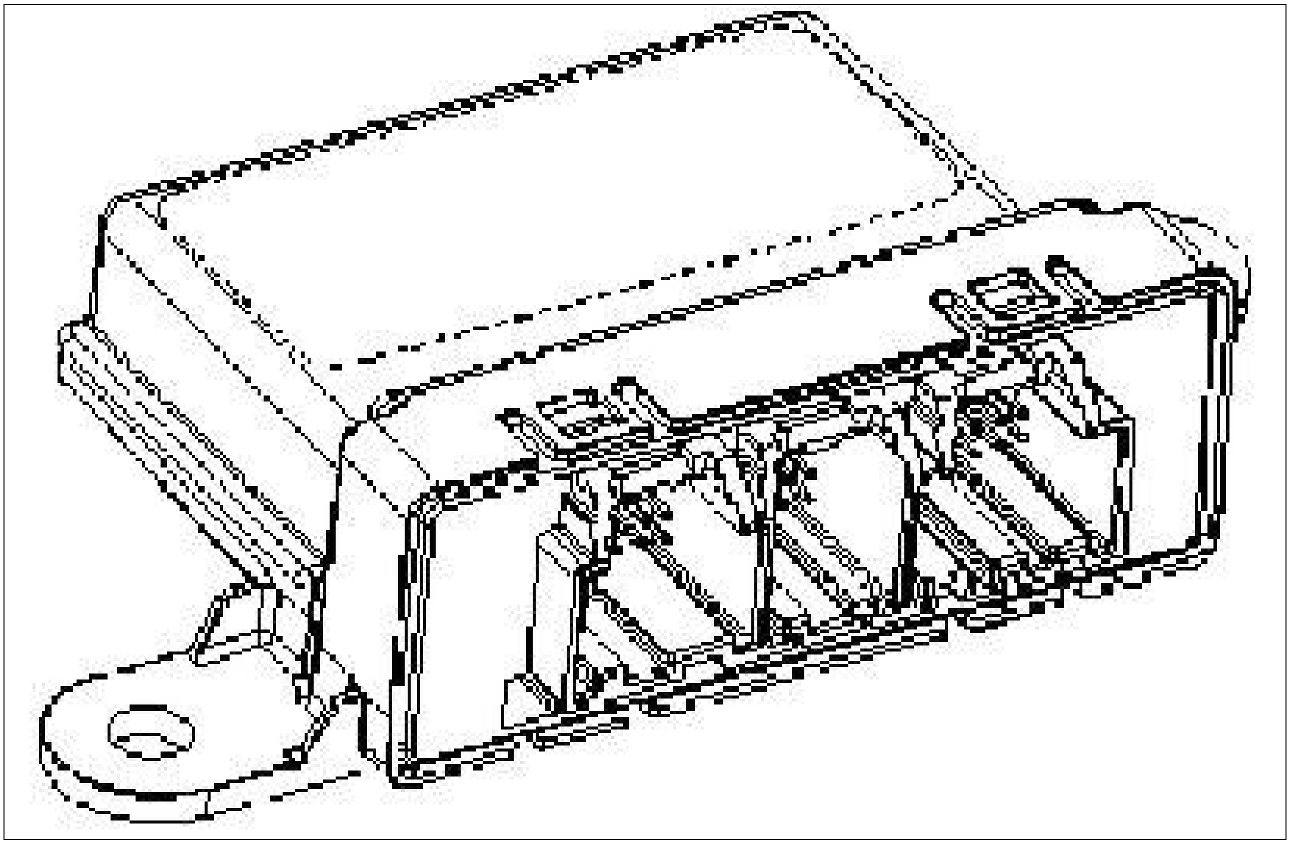
The Parking Assist Module has the following characteristics:

- It receives power supply for its operation.
- It provides power supply to the 4 sensors.
- It receives signals from the 4 ultrasonic sensors.
- It manages the presence of a possible trailer: it is configured to deactivate the rear sensors when a trailer is present.
- It communicates and transmits data over the high-speed CAN-C2 network.

If a fixed tow hook is present, the signal "Trailer presence" informs the PAM control unit to deactivate the rear sensors if a trailer is attached to the car. The signal "Trailer presence" is sent by the Trailer Tow Module (TTM) via CAN-BH.

To ensure the proper operation of the system when the trailer is not attached to the vehicle, the PAM control unit changes the sensor detection area range in order to take into account the space occupied by the tow hook.

Fig 2: Semi-Automatic Parking Control Unit (PAM)



Courtesy of CHRYSLER GROUP, LLC

Semi-automatic parking control unit PAM

The semi-automatic parking control unit PAM has the following characteristics:

- It receives power supply for its operation.
- It provides power supply to the 12 sensors.
- It receives signals from the 12 ultrasonic sensors.
- It manages the presence of a possible trailer: it is configured to deactivate the rear sensors when a trailer is present.
- It communicates and transmits data over the high speed CAN-C2 network.

The PAM cannot be adjusted or repaired and, if damaged or ineffective, it must be replaced with a new unit. The PAM software is flash programmable.

MODULE, PARK ASSIST > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > OPERATION

The microcontroller in the Park Assist Module (PAM) contains the park assist system logic circuits. The

PAM uses On-Board Diagnostics (OBD) and can communicate with other electronic modules in the vehicle as well as with the diagnostic scan tool using the Controller Area Network (CAN) data bus. This method of communication is also used for park assist system diagnosis and testing through the 16-way data link connector located on the driver side lower edge of the instrument panel.

The PAM provides voltage to the four park assist sensors located in the bumper fascia or fascias. The PAM monitors return inputs from each of the sensors on dedicated hard wired data communication circuits. These sensor inputs allow the PAM to determine when an obstacle is in the rear path of the vehicle. When an obstacle is detected the sensor inputs allow the PAM logic to calculate the relative location of the obstacle, and whether the distance to that obstacle is increasing or decreasing.

Pre-programmed decision algorithms and calibrations allow the PAM microcontroller to determine the appropriate park assist system outputs based upon the inputs received from the park assist sensors and electronic messages received from other modules in the vehicle over the CAN data bus. When the programmed conditions are met the PAM sends electronic messages to the Instrument Panel Cluster (IPC) over the CAN data bus to obtain the proper park assist system audible outputs and textual messages in the IPC display. The PAM also broadcasts electronic messages over the CAN data bus to enable the other electronic features of the park assist system.

The PAM microcontroller continuously monitors all of the park assist system electrical circuits and components to determine the system readiness. If the PAM detects a monitored system fault, it sets a Diagnostic Trouble Code (DTC) and sends the appropriate electronic messages to the IPC over the CAN data bus to control operation of certain park assist system audible and textual warnings.

The PAM receives battery current on a fused ignition output (run-start) circuit through a fuse in the Power Distribution Center (PDC). The PAM receives ground through a ground circuit and take out of the body wire harness connected to the body sheet metal. These connections allow the PAM to be operational whenever the status of the ignition is Start or On.

The hard wired circuits between components related to the PAM may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the PAM or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the PAM or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

MODULE, PARK ASSIST > DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - PARK ASSIST MODULE

WARNING:

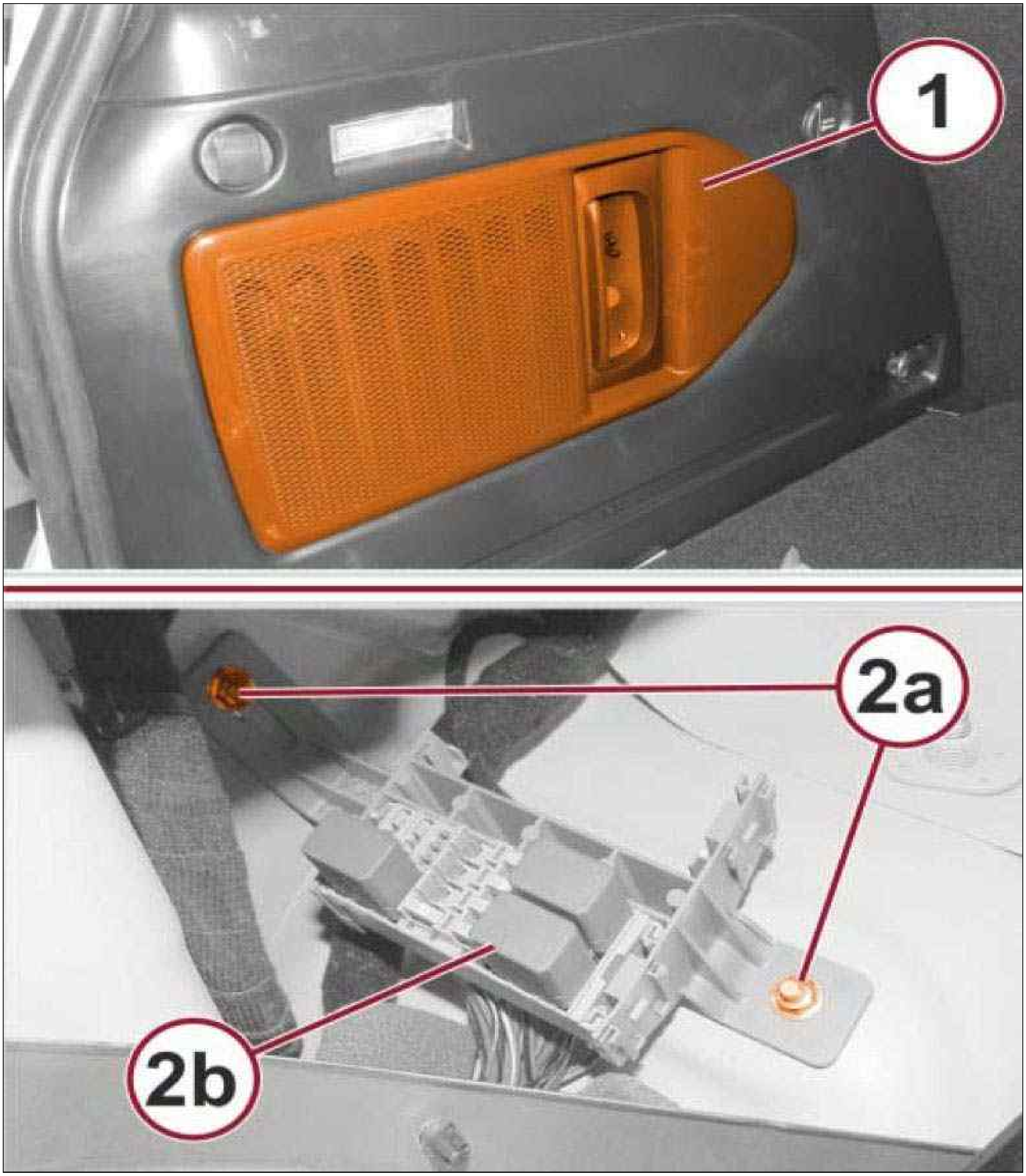
To avoid serious or fatal injury on vehicles equipped with airbags, disable the Supplemental Restraint System (SRS) before attempting any steering wheel, steering column, airbags, airbag curtains, knee blocker, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect the IBS/negative battery cable assembly from the negative battery post, then wait two minutes for the system capacitor to discharge before *performing further diagnosis or service. This is the only sure way to disable the SRS. Failure to take the proper precautions could result in accidental airbag deployment.*

The hard wired circuits between components related to the Park Assist Module (PAM) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the PAM or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the PAM or the electronic controls and communication related to park assist system operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

MODULE, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

Fig 1: Remove/Install Park Assist Module (PAM)



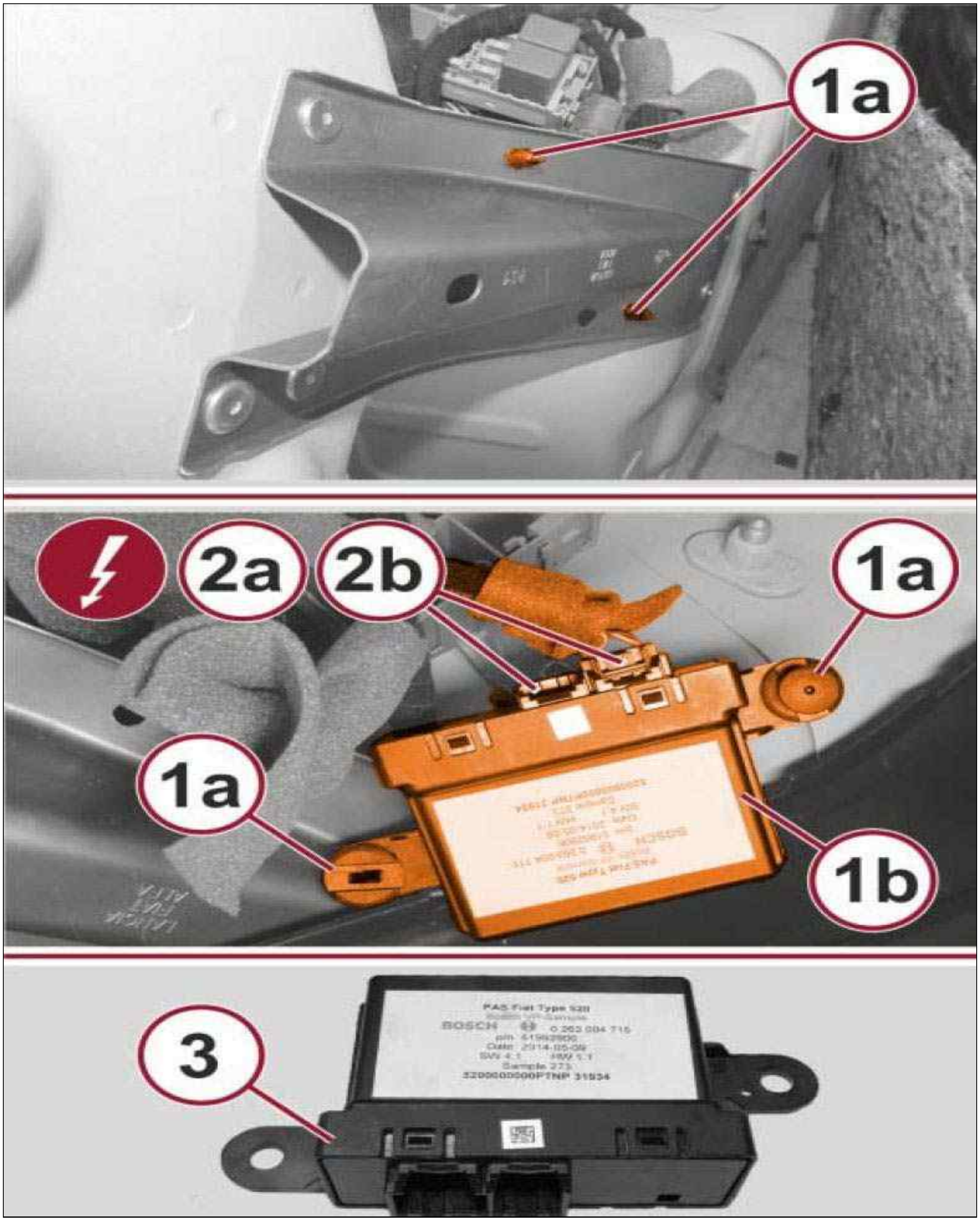
Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector before disconnecting the negative cable from the battery.

2. Remove the trim from the left inner quarter panel (1) to access the Park Assist Module (PAM) behind the left rear wheel house. Refer to PANEL, QUARTER TRIM, REMOVAL AND INSTALLATION .

3. Remove the two nuts (2a) that secure the supplemental Junction Box (JB) (2b) and move the JB aside.

Fig 2: Park Assist Module (PAM), Wire Connectors & Fasteners



Courtesy of CHRYSLER GROUP, LLC

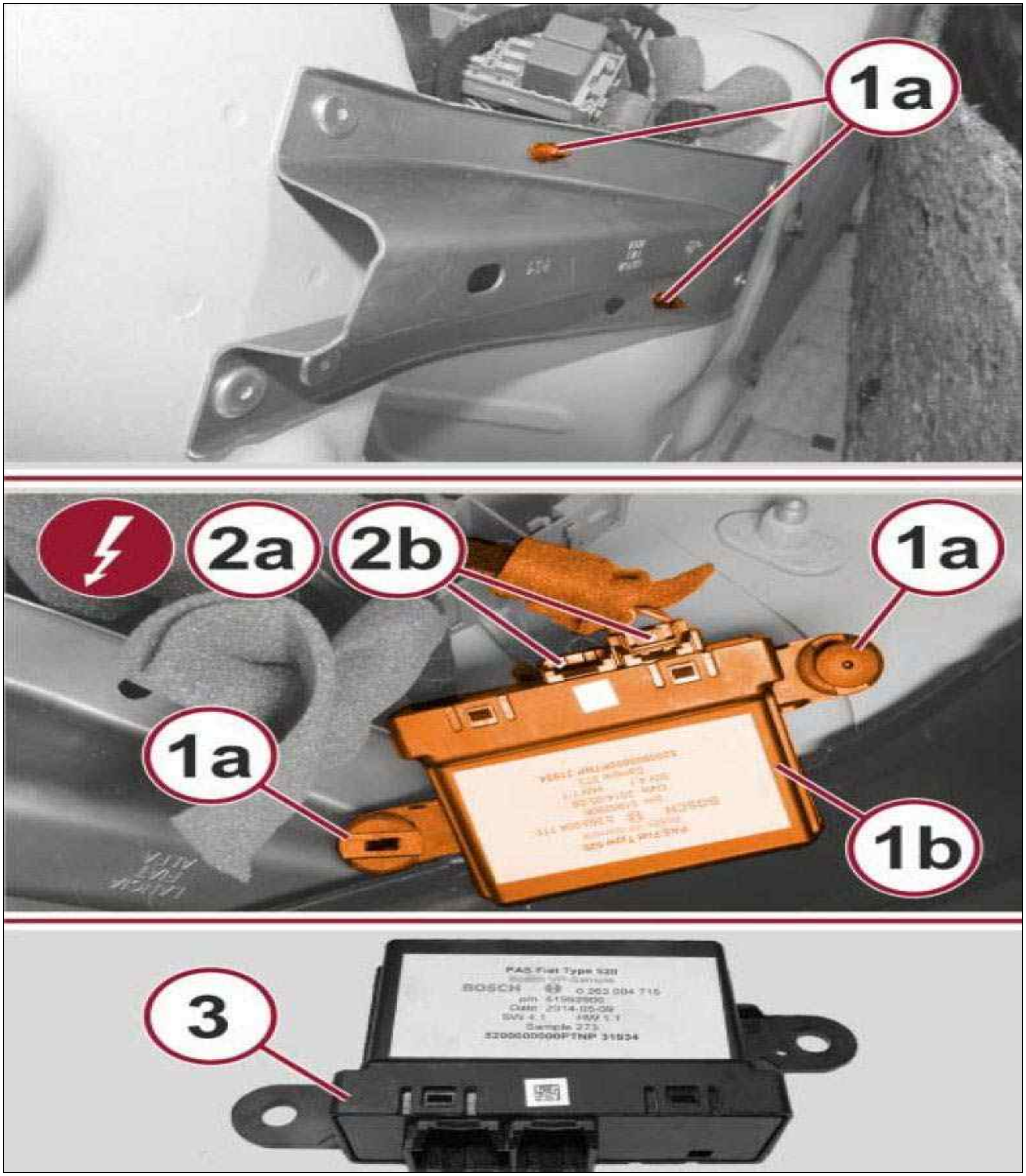
4. Remove the two plastic push-pin retainers (1a) that secure the PAM (1b).

5. Disconnect the two or three wire harness connectors (2a and 2b) from the PAM connector receptacles.

6. Remove the PAM (3) from the vehicle.

MODULE, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

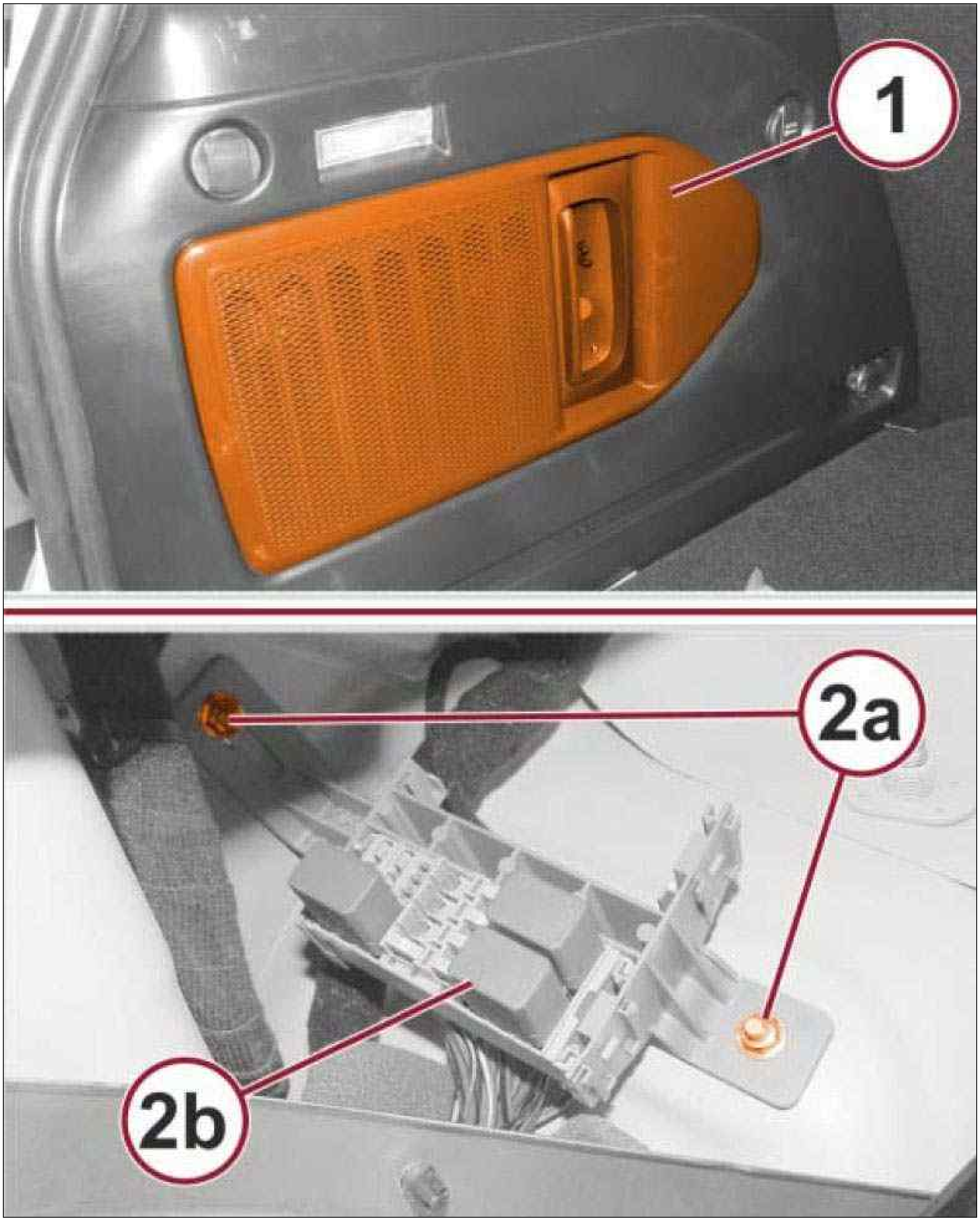
Fig 1: Park Assist Module (PAM), Wire Connectors & Fasteners



Courtesy of CHRYSLER GROUP, LLC

1. Position the Park Assist Module (PAM) (1b) into the left of the cargo are behind the left rear wheel house.
2. Connect the two or three wire harness connectors (2a and 2b) to the PAM connector receptacles.
3. Position the PAM to its mounting location.
4. Install the two plastic push-pin retainers (1a) that secure the PAM.

Fig 2: Remove/Install Park Assist Module (PAM)



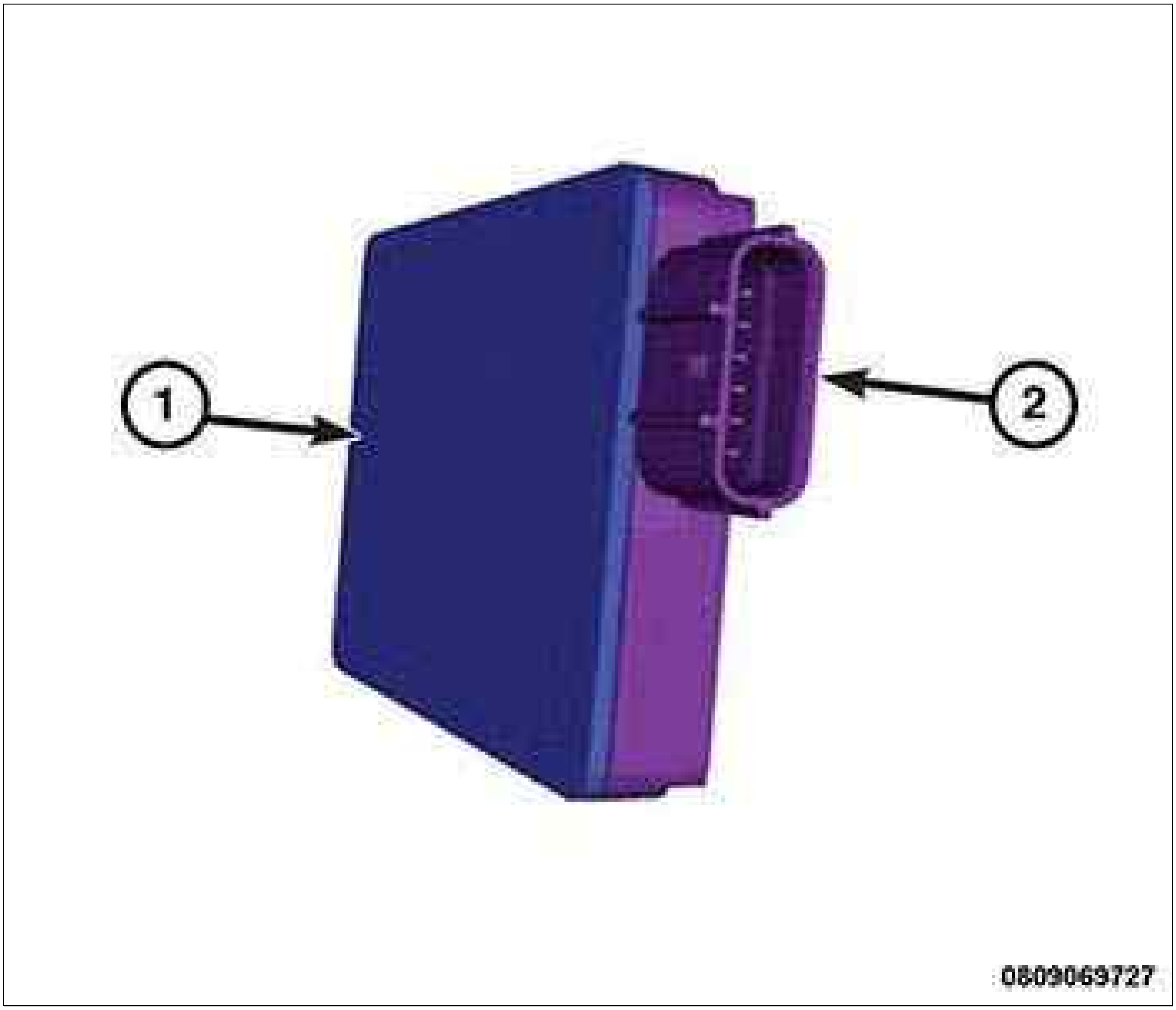
Courtesy of CHRYSLER GROUP, LLC

5. Position the supplemental Junction Block (JB) (2b) onto the mounting studs.
6. Install and tighten the two nuts (2a) that secure the JB. Tighten the nuts securely.
7. Install the trim onto the left inner rear quarter panel. Refer to PANEL, QUARTER TRIM, REMOVAL AND INSTALLATION .
8. Connect the negative cable to the battery. If equipped with an Intelligent Battery Sensor (IBS), reconnect the IBS connector.

> *NOTE:*
>
> *If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool MUST be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM) Miscellaneous Functions menu.*

SENSOR, BLIND SPOT > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > DESCRIPTION

Fig 1: (RADAR) Blind Spot Sensor & Connector Receptacle



Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the optional Blind Spot Monitor (BSM) system have two primary components. These components are the two RAdio Detection And Ranging (RADAR) blind spot sensors (1) (also known as the Left or Right Blind Spot Sensors/LBSS or RBSS). In this vehicle, each sensor also includes an internal microcontroller and control circuitry that monitors and controls both the sensor and the blind spot display for the same side of the vehicle. This explains why the sensors are sometimes referred to as smart sensors.

Each sensor with control circuitry is contained and protected within a molded plastic case that includes an integral connector receptacle (2) at one end. The sensors are each connected to the vehicle electrical system through a dedicated take out and connector of the rear bumper fascia wire harness. The two sensors are concealed behind the outboard ends of the rear bumper fascia. Each sensor is snapped into a dedicated molded plastic mounting bracket that is permanently affixed to the inside surface of the fascia just behind the left and right rear wheel openings.

The blind spot sensors and control circuitry cannot be adjusted or repaired. If a sensor is damaged or ineffective, it must be replaced with a new unit. The sensor module software is flash capable. The mounting bracket for each sensor is serviced only as a unit with the rear bumper fascia.

SENSOR, BLIND SPOT > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > OPERATION

The Blind Spot Monitor (BSM) RAdio Detection And Ranging (RADAR) smart sensors (also known as the Left Blind Spot Sensor/LBSS and Right Blind Spot Sensor/RBSS) are each controlled by their on-board microcontroller and control circuitry. When the microcontroller recognizes that the appropriate conditions exist, it will energize the sensor to generate 25 Gigahertz radar pulses through the blind spot zone on that side of the vehicle. The sensor receives and filters the radar signals being returned from any objects detected within the zone, then transmits the appropriate data identifying the position and speed of identified objects to the microcontroller.

The microcontroller analyzes the sensor data to determine whether any detected objects should be reported. When it is determined that an object should be reported, the microcontroller sends electronic request messages over the Controller Area Network (CAN) data bus to the Body Control Module (BCM) and the Instrument Panel Cluster (IPC) to generate chime tones as an audible alert. The DDM or PDM then controls its respective left or right BSM display directly through a hard wired output. The microcontroller of the LBSS or RBSS also sends electronic messages to the Radio Receiver Module (RRM) to mute any current output through the sound system speakers.

Each of the two BSM smart sensors is independent and communicates on the CAN data bus. The sensor performs a bulb test by requesting illumination of the icon in its respective right or left blind spot display for a few seconds each time the status of the ignition transitions to On. Each sensor microcontroller also continually monitors the BSM system and the sensor circuits and will store a Diagnostic Trouble Code (DTC) for any fault that is detected.

The hard wired circuits between of the smart sensors may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the smart sensors or the electronic controls and communication between other modules and devices that provide some features of the BSM system. The most reliable, efficient and accurate means to diagnose the smart sensors or the electronic controls and communication related to LBSS or RBSS operation requires the use of a diagnostic scan tool. Refer to DIAGNOSIS AND TESTING or DIAGNOSIS AND TESTING .

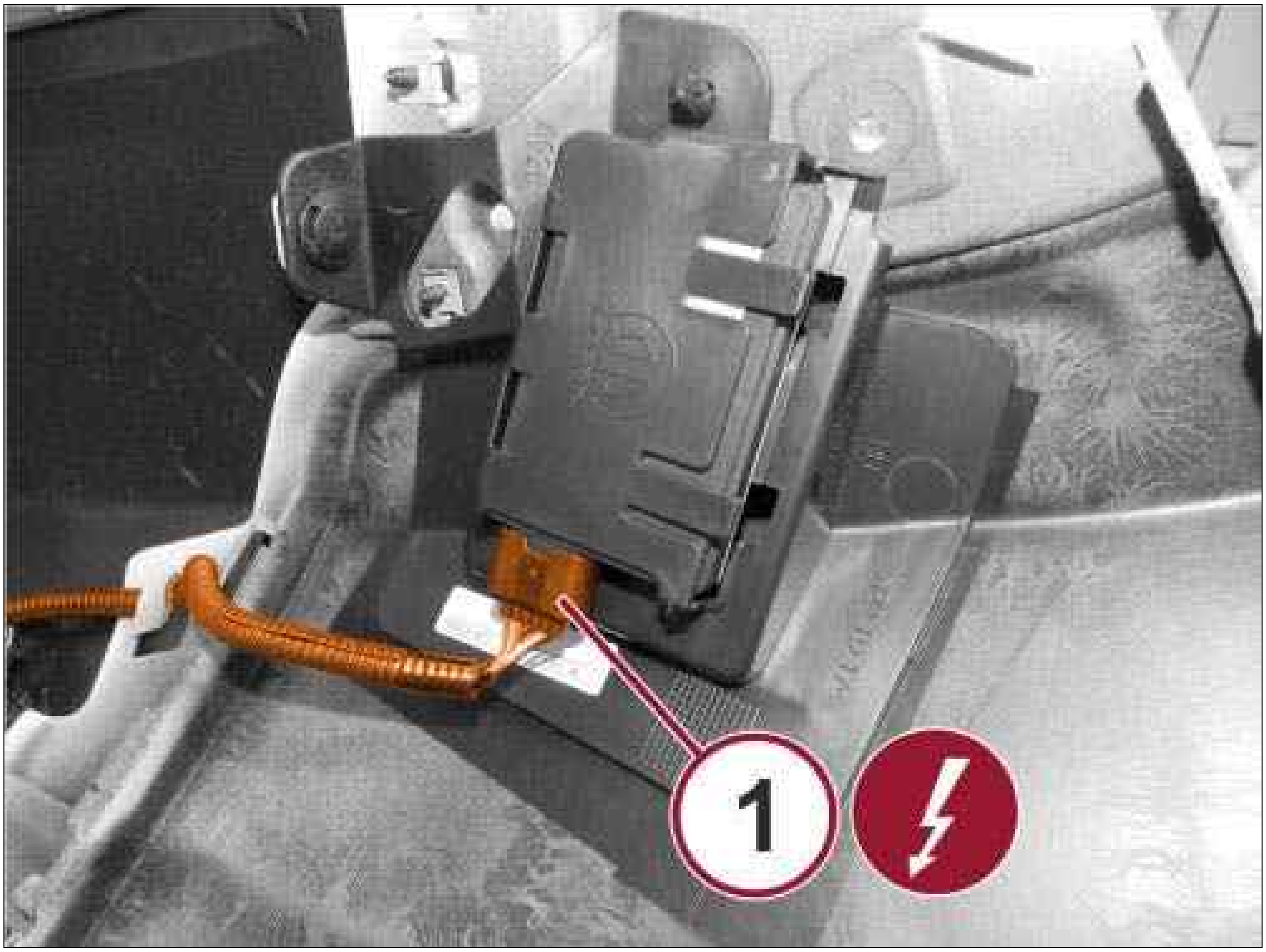
SENSOR, BLIND SPOT > DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - BLIND SPOT SENSOR

The hard wired circuits between the Blind Spot Monitor (BSM) smart sensors (also known as the Left Blind Spot Sensor/LBSS and the Right Blind Spot Sensor/RBSS) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the smart sensors or the electronic controls and communication between modules and other devices that provide some features of the BSM system. The most reliable, efficient and accurate means to diagnose the smart sensors or the electronic controls and communication related to LBSS or RBSS operation requires the use of a diagnostic scan tool.

SENSOR, BLIND SPOT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL

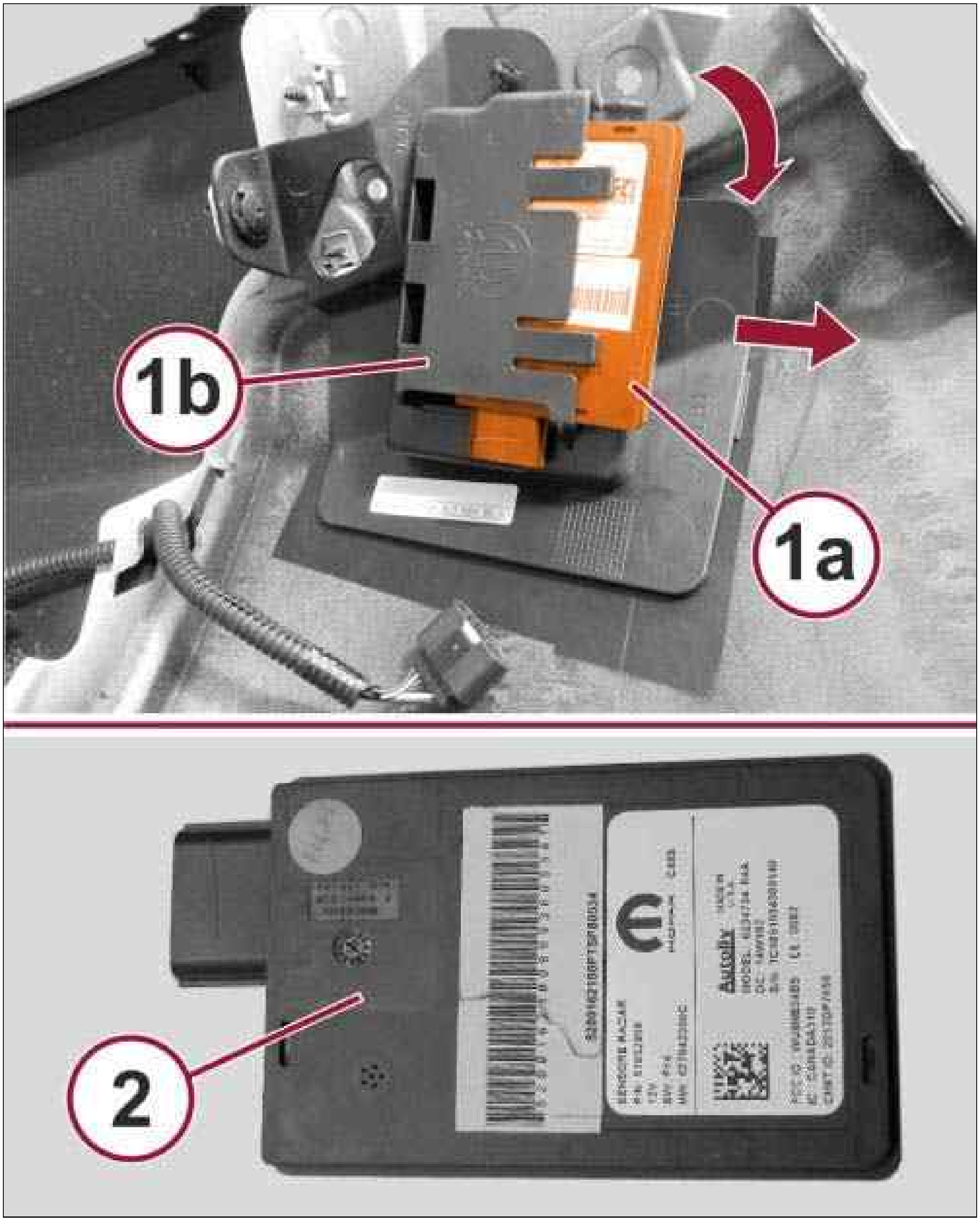
Fig 1: Blind Spot Sensor Wire Connector



Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector before disconnecting the negative cable from the battery.
2. Raise and support the vehicle.
3. Reach up behind the outboard end of the rear bumper fascia to access and disconnect the rear bumper fascia wire harness connector from the Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) connector receptacle.

Fig 2: Remove/Install LBSS Or RBSS



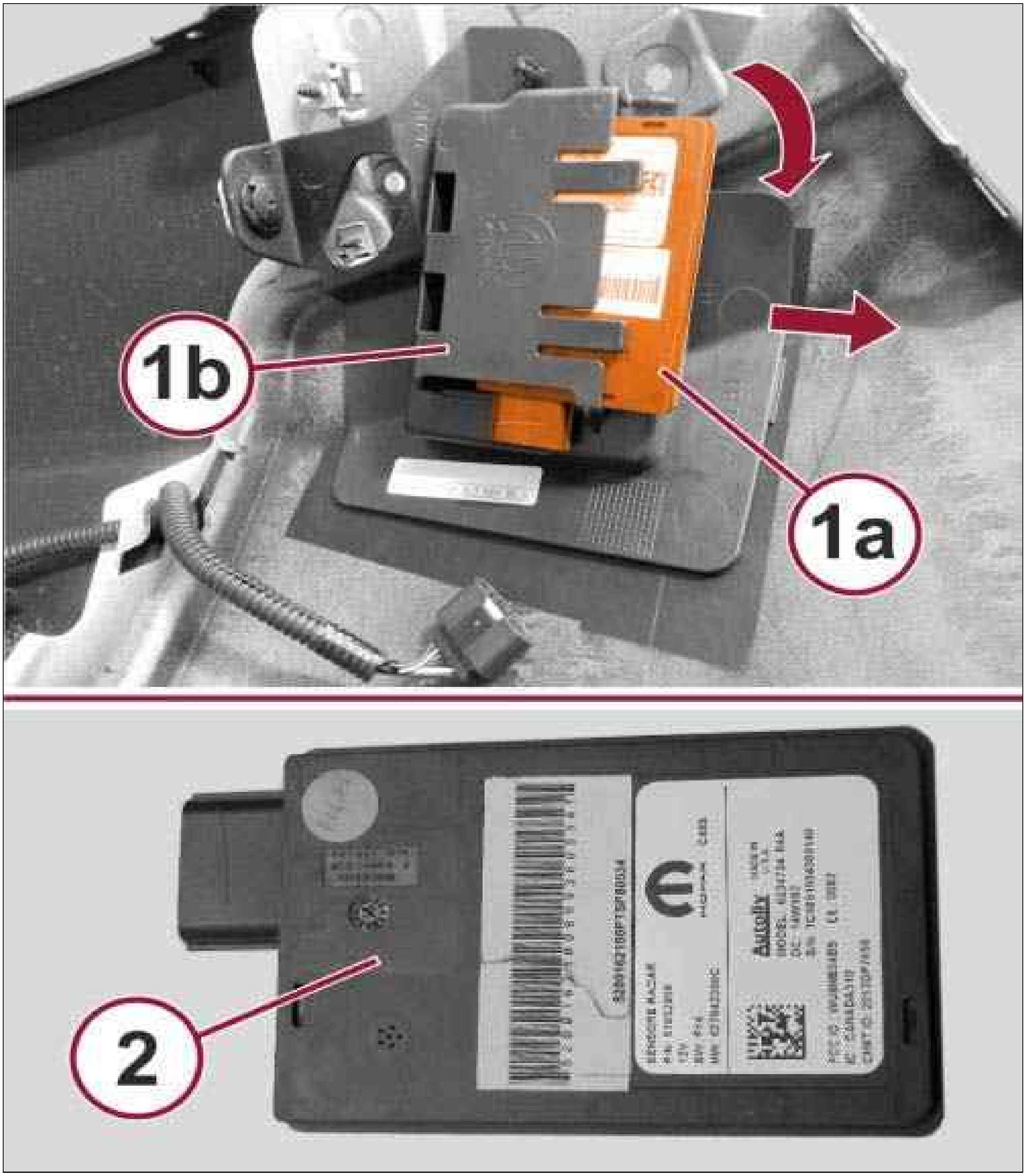
Courtesy of CHRYSLER GROUP, LLC

4. Disengage the latch tabs of the sensor mounting bracket (1b) and pull the LBSS or RBSS (1a) out of the bracket.

5. Remove the LBSS or RBSS (2) from the vehicle.

SENSOR, BLIND SPOT > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION

Fig 1: Remove/Install LBSS Or RBSS

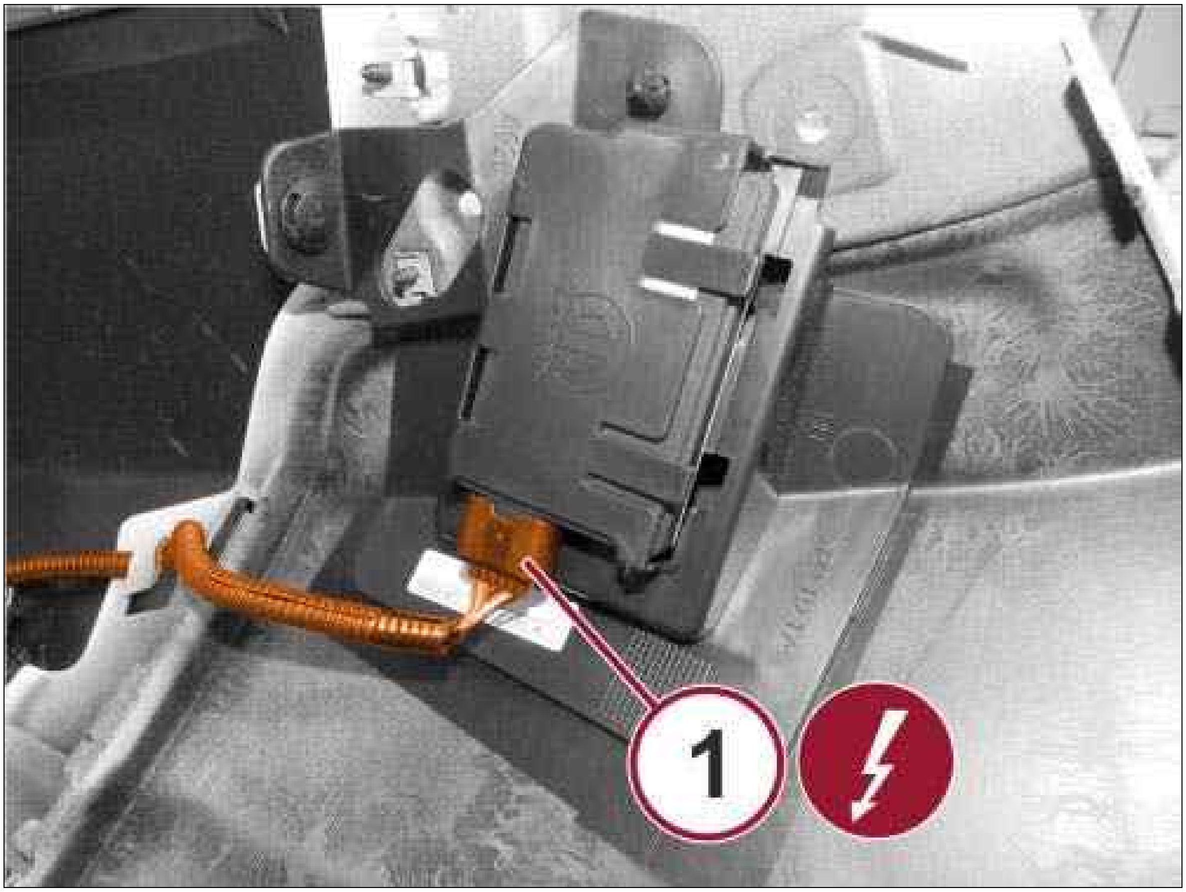


Courtesy of CHRYSLER GROUP, LLC

1. Reach up behind the outboard end of the rear bumper fascia to position the Left Blind Spot Sensor (LBSS) or Right Blind Spot Sensor (RBSS) (2) to the mounting bracket on the inside surface of the fascia.

2. Using hand pressure, press the LBSS or RBSS (1a) firmly and evenly into the mounting bracket (1b) until the latch tabs of the bracket are fully engaged.

Fig 2: Blind Spot Sensor Wire Connector



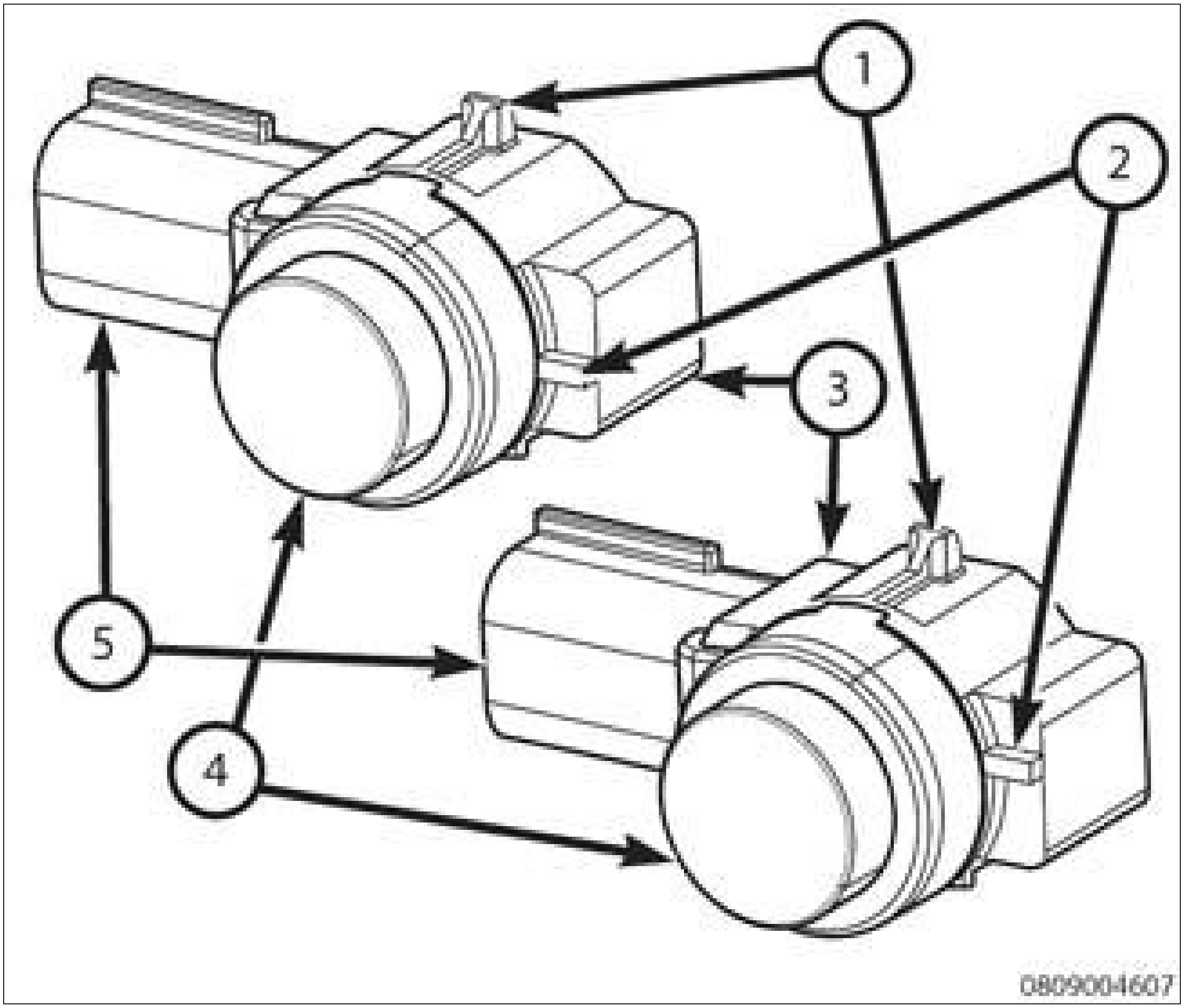
Courtesy of CHRYSLER GROUP, LLC

3. Connect the rear bumper fascia wire harness connector (1) to the LBSS or RBSS sensor connector receptacle.
4. Connect the negative cable to the battery. If equipped with an Intelligent Battery Sensor (IBS), reconnect the IBS connector.

> *NOTE:*
>
> *If this Electronic Control Unit (ECU) is being replaced with a new unit, a diagnostic scan tool MUST be used to align the PROXI configuration data into the new ECU. Follow the routine outlined in the diagnostic scan tool for PROXI Configuration Alignment under Body Control Module (BCM) Miscellaneous Functions menu.*

SENSOR, PARK ASSIST > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > DESCRIPTION

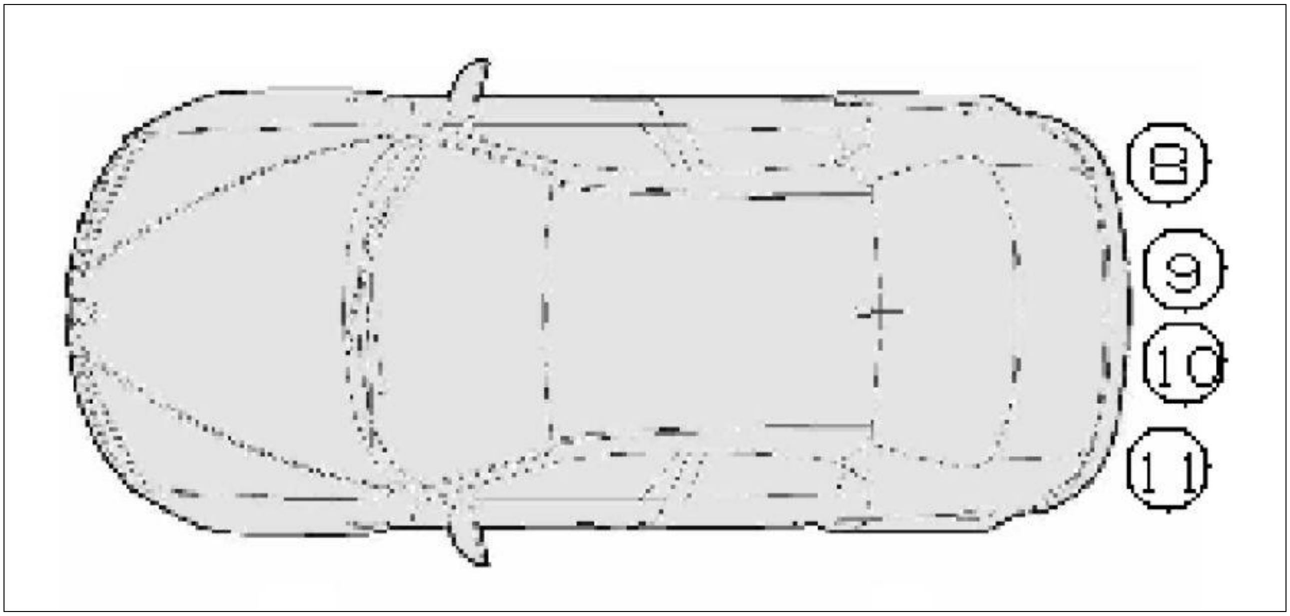
Fig 1: Park Assist Sensor



Courtesy of CHRYSLER GROUP, LLC

Vehicles equipped with the park assist system have up to twelve park assist sensors (3).

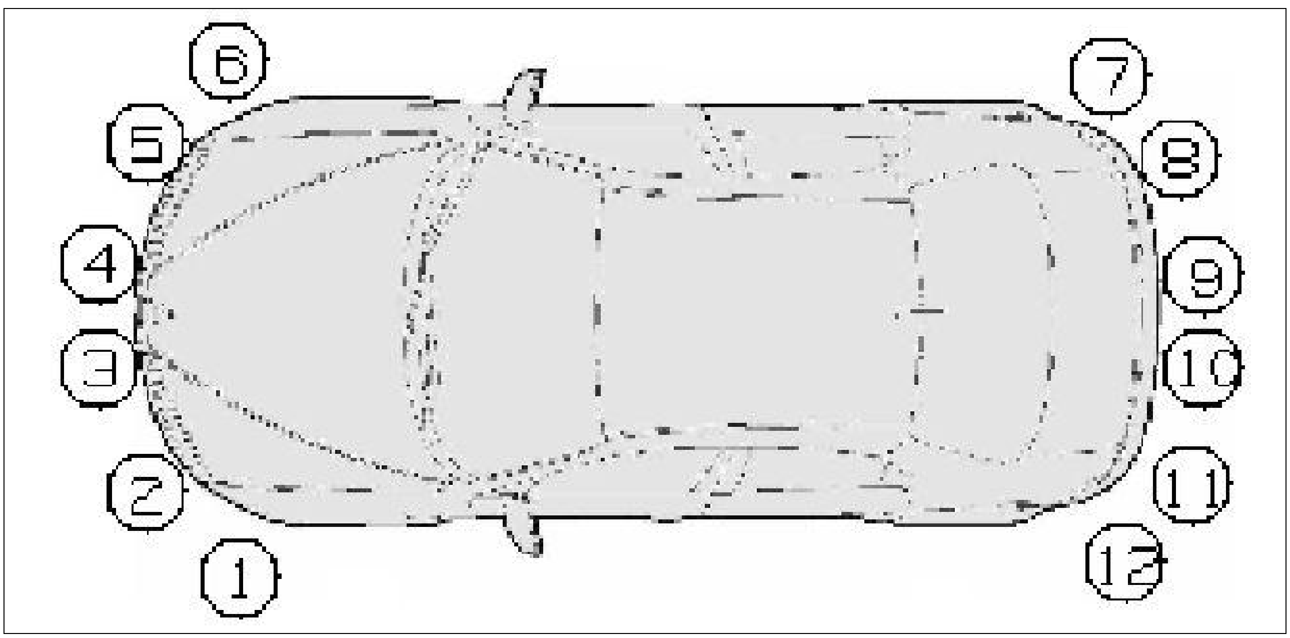
Fig 2: Rear Park Assist (RPA)



Courtesy of CHRYSLER GROUP, LLC

Vehicles with Rear Park Assist (RPA) have four sensors installed in the rear bumper fascia. Each of these sensors is a Generation 5.0 sensor and is identical in construction and is interchangeable.

Fig 3: Parallel & Perpendicular Park Assist (PPPA)



Courtesy of CHRYSLER GROUP, LLC

Vehicles with Parallel and Perpendicular Park Assist (PPPA) have six sensors in the rear fascia and six sensors in the front fascia. However, the sensors in each right and left outward-facing end of the front fascia has a unique Generation 5.1 sensor, while the other ten sensors are still the Generation 5.0 type. The Generation 5.1 sensors offer increased range required to support the parallel and perpendicular parking features of the PPPA system. The only physical difference between the two sensor types besides the part number is the offset location of the indexing feature (2) on the sensor body. This offset indexing feature is designed to match up with an indexing notch in the sensor bracket to prevent installation of a sensor in an incorrect location.

The numbering system for the park assist sensors allows for up to twelve sensors on the vehicle, six front and six rear. The sensors are numbered in a clockwise manner starting at the left end of the front fascia. Regardless of whether the vehicle is equipped with RPA or PPPA the left front sensor location is always considered the number 1 sensor. The numbering continues in a clockwise direction around the vehicle to the left rear sensor, which is always considered the number 12 sensor.

Only the membrane (4) of each sensor is visible through a hole in the outer vertical surface of the fascia. The remainder of each sensor including the sensor mounting bracket, the sensor spacer (also known as the O-ring or decoupling ring) and the sensor wiring connection is concealed behind the fascia. A sensor wire harness behind the fascia connects the sensors to the vehicle electrical system.

The electronic circuitry and a communication chip for each sensor is enclosed and protected within the molded black plastic sensor housing. The housing includes an integral connector receptacle (5) and two integral latch tabs (1). The sensor membrane extends from the surface of the sensor housing, and is finished to match the outer surface of the fascia.

A resilient O-ring spacer (also known as a decoupling ring) around the circumference of the sensor membrane isolates the membrane from the openings in the fascia. Each sensor is snapped into its own dedicated molded plastic mounting bracket. Each sensor mounting bracket is heat-staked to the back side of the bumper fascia.

The park assist sensors cannot be adjusted or repaired. If a sensor is ineffective or damaged it must be replaced with a new unit. The sensor spacers are available for individual service replacement. The sensor mounting brackets are serviced only as a unit with the bumper fascia.

SENSOR, PARK ASSIST > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > OPERATION

The park assist sensors are ultrasonic transceivers that are completely controlled by the Park Assist Module (PAM). The sensors transmit and receive ultrasonic signals. The sensors each receive battery current and ground in parallel from the PAM, but are each connected to individual dedicated serial bus communication circuits to the module.

Each sensor membrane is oscillated, then quieted by the PAM in a pulsing fashion. While the sensor membrane oscillates, it emits an ultrasonic signal. This signal will bounce or echo off of objects within the field of vision for that sensor. While quieted, each membrane receives the echoes of the ultrasonic signals it and the other sensors have transmitted. The sensors then communicate this echo pulse data over the serial bus lines back to the PAM. The microcontroller within the PAM uses the intervals between the ultrasonic transmission and reception data from the sensors to calculate the distance to any obstacles identified by the ultrasonic echoes.

The hard wired circuits between components related to the park assist sensors may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist sensors or the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist sensors or the electronic controls and communication related to park assist sensor operation requires the use of a diagnostic scan tool.

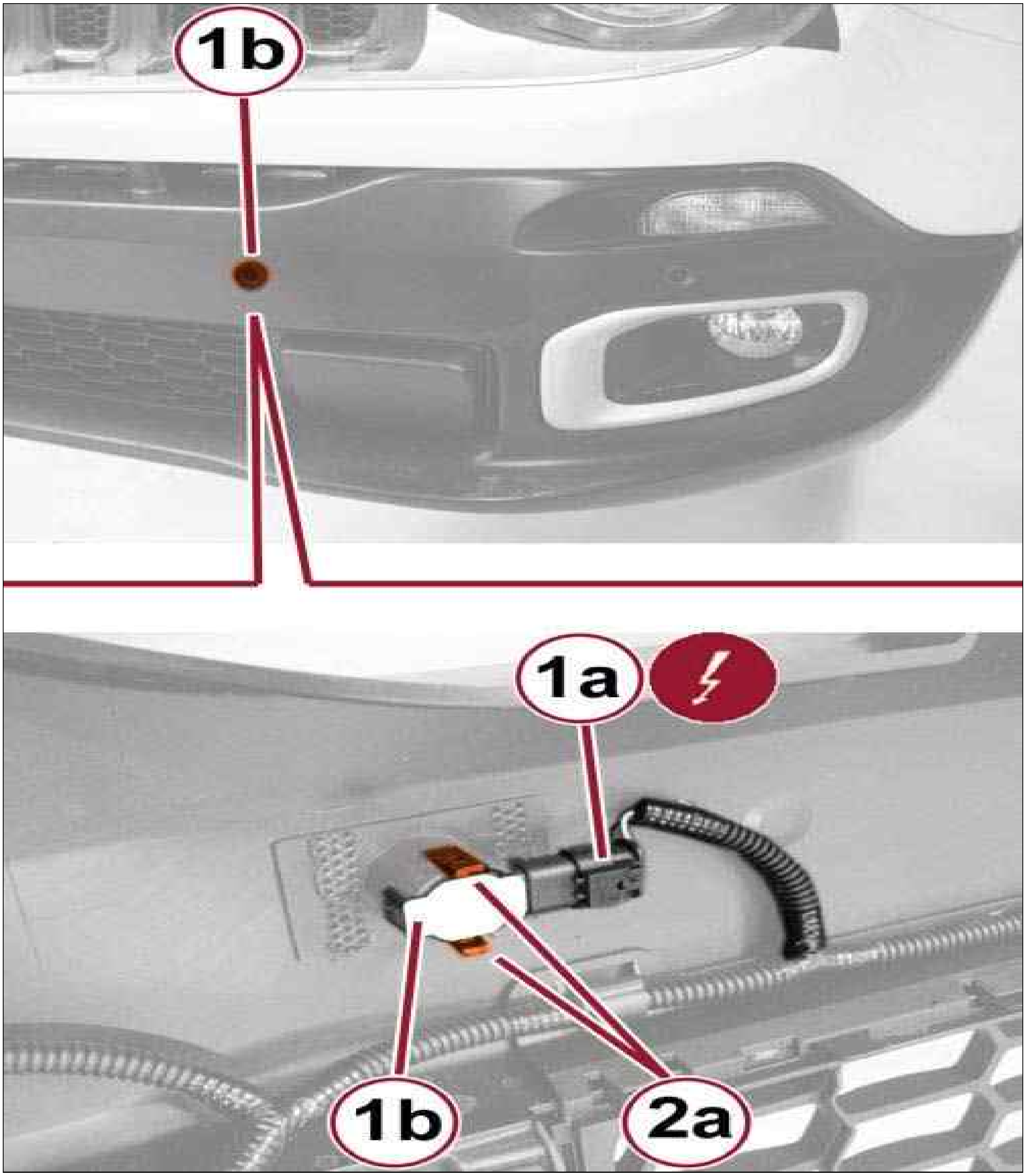
SENSOR, PARK ASSIST > DIAGNOSIS AND TESTING > DIAGNOSIS AND TESTING - PARK ASSIST SENSOR

The hard wired circuits between the park assist sensors and the Park Assist Module (PAM) may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin out information and location views for the various wire harness connectors, splices and grounds.

However, conventional diagnostic methods will not prove conclusive in the diagnosis of the park assist sensors or the electronic controls and communication between other modules and devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist sensors or the electronic controls and communication related to park assist sensor operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL - FRONT CENTER

Fig 1: Remove/Install Front Center Sensor



Courtesy of CHRYSLER GROUP, LLC

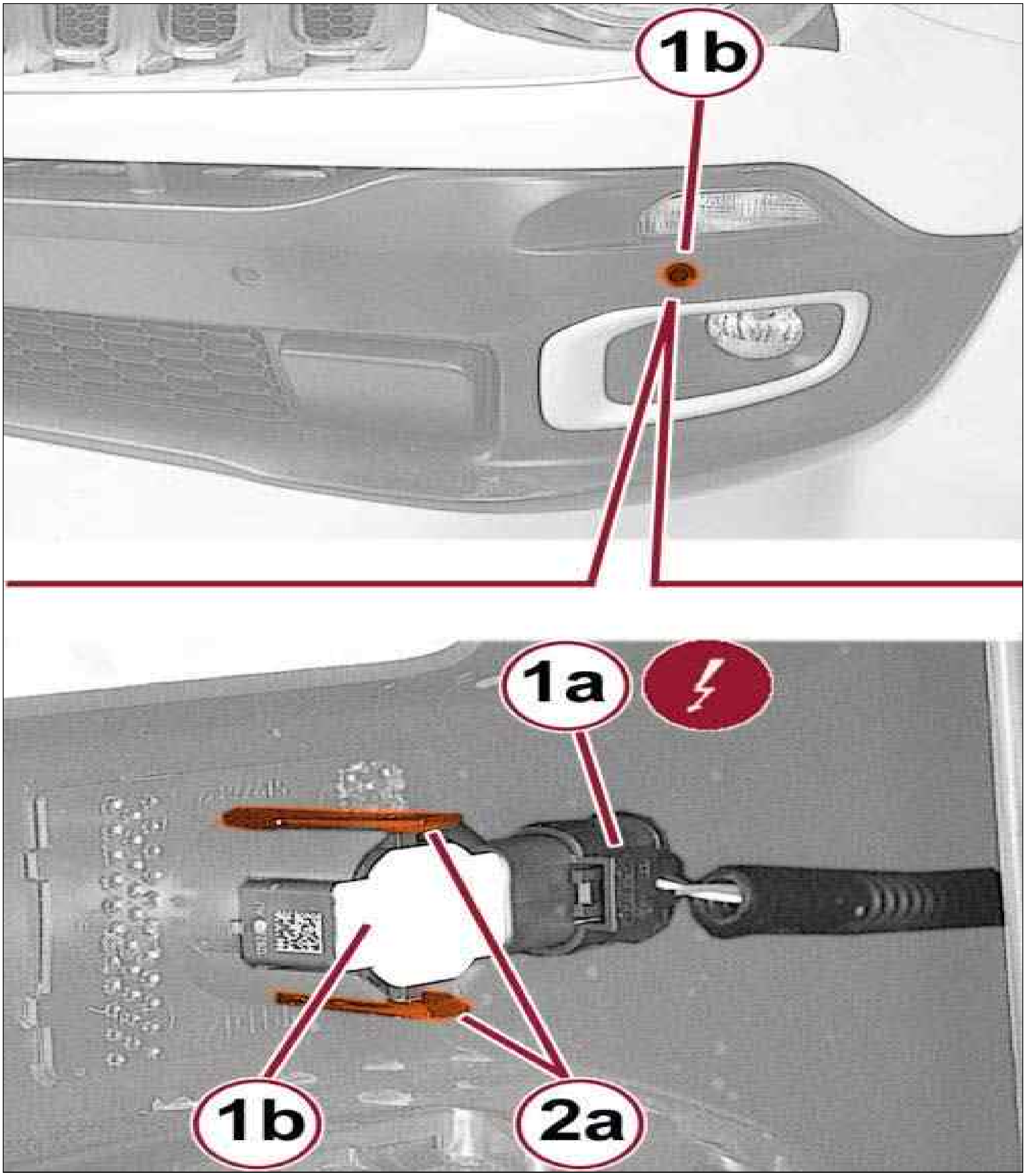
1. Disconnect and isolate the negative cable from the battery. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector before disconnecting the negative cable from the battery.
2. Raise and support the vehicle.
3. From the back of the front fascia, disconnect the wire harness connector (1a) from the

connector receptacle of the front center sensor (1b).

4. Carefully pry the park assist sensor bracket latch features (2a) away from the latch tabs of the sensor far enough to disengage the sensor from the bracket.
5. Disengage the resilient O-ring spacer from around the circumference of the sensor membrane protrusion.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL - FRONT OUTBOARD

Fig 1: Remove/Install Front Outboard Sensor



Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector before disconnecting the negative cable from the battery.
2. Raise and support the vehicle.
3. Remove the front wheel and tire from the same side of the vehicle as the front outboard sensor

(1b) being serviced.

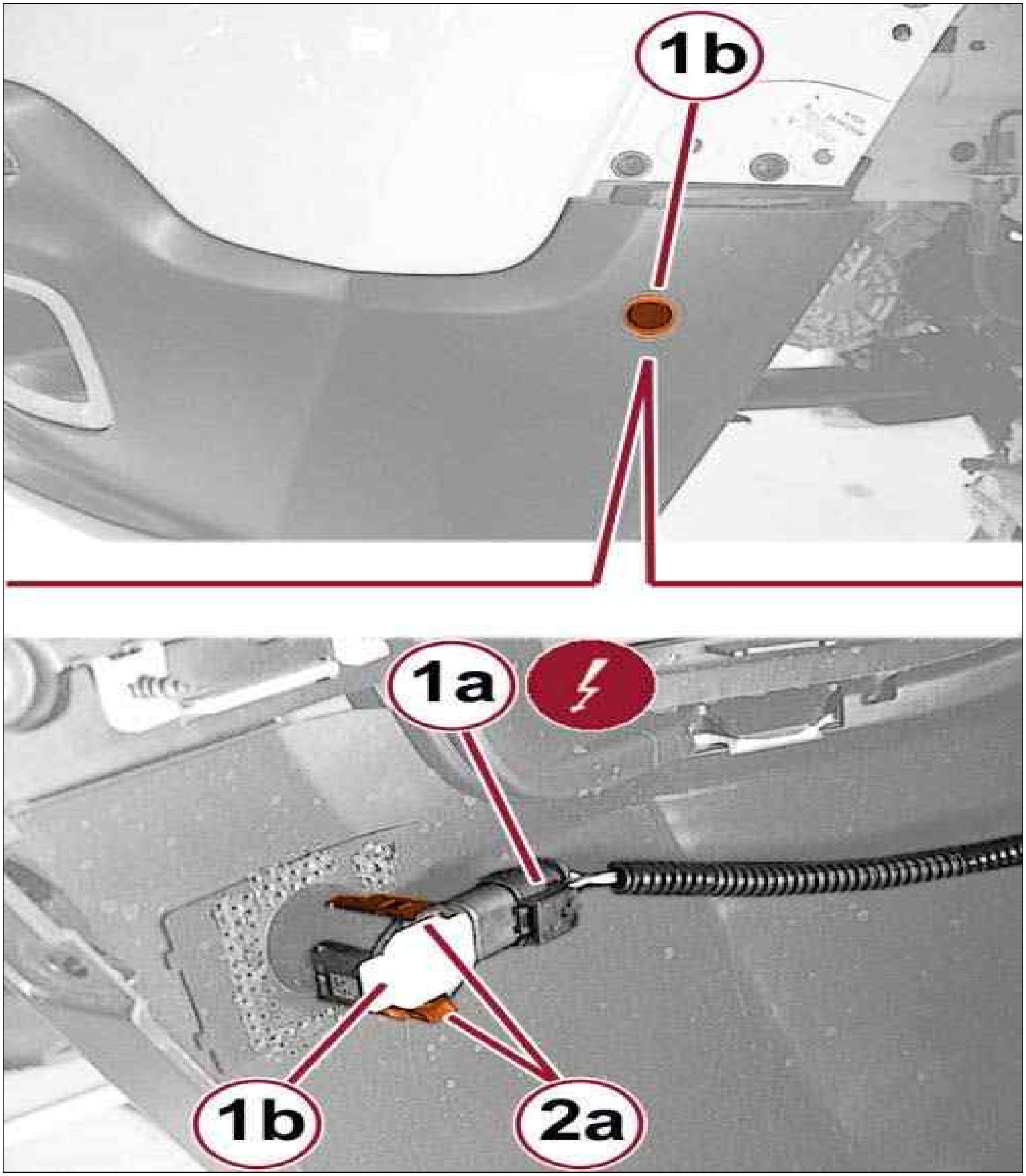
4. From the back of the front fascia, disconnect the wire harness connector (1a) from the connector receptacle of the front outboard sensor (1b).

5. Carefully pry the park assist sensor bracket latch features (2a) away from the latch tabs of the sensor far enough to disengage the sensor from the bracket.

6. Disengage the resilient O-ring spacer from around the circumference of the sensor membrane protrusion.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL - FRONT OUTWARD FACING

Fig 1: Remove/Install Front Outward Facing Sensor



Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector before disconnecting the negative cable from the battery.

2. Raise and support the vehicle.

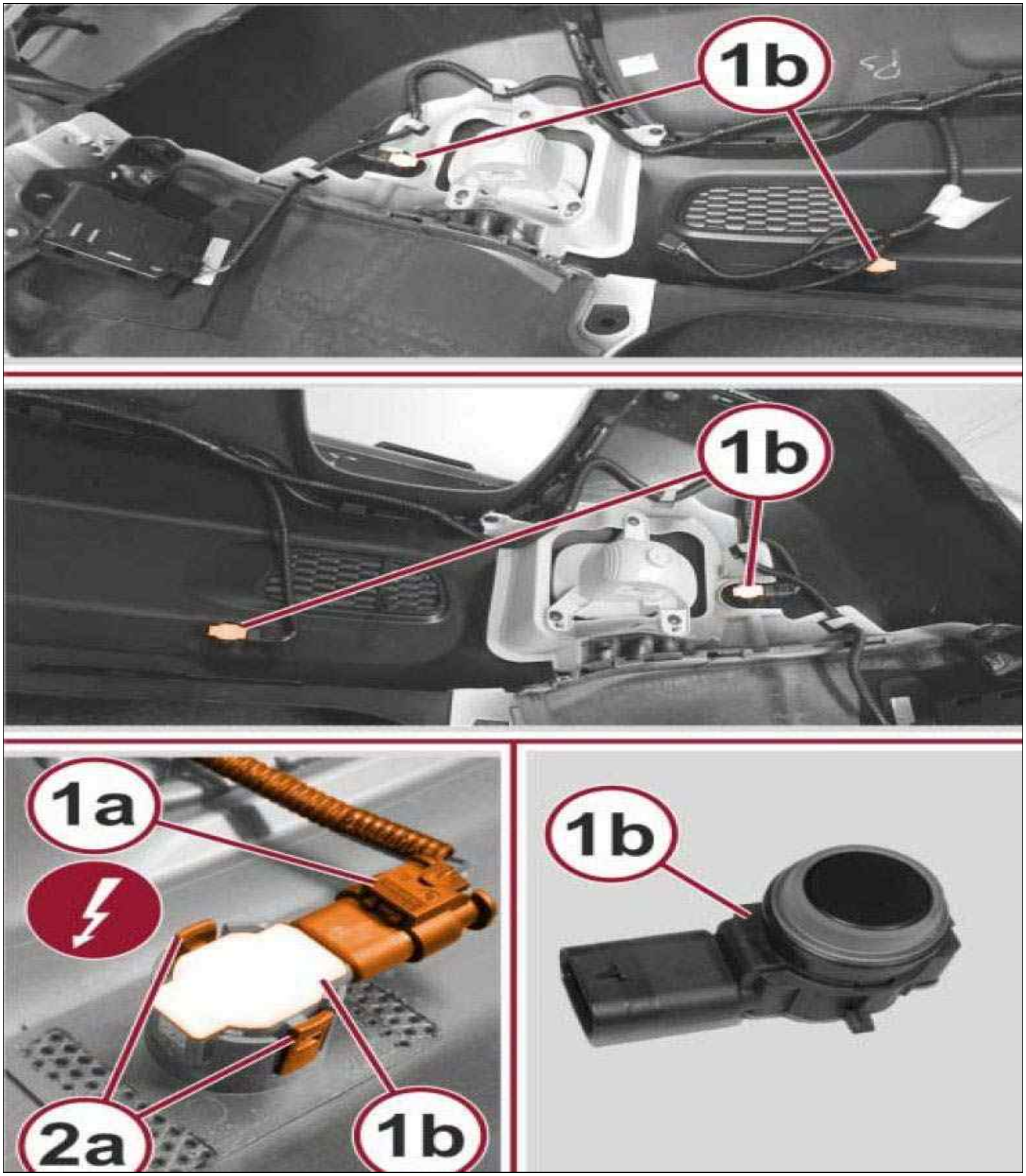
3. Remove the front wheel and tire from the same side of the vehicle as the outward facing

sensor (1b) being serviced.

4. From the back of the front fascia, disconnect the wire harness connector (1a) from the connector receptacle of the outward facing sensor (1b).
5. Carefully pry the park assist sensor bracket latch features (2a) away from the latch tabs of the sensor far enough to disengage the sensor from the bracket.
6. Disengage the resilient O-ring spacer from around the circumference of the sensor membrane protrusion.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > REMOVAL - REAR

Fig 1: Remove/Install Rear Sensor



Courtesy of CHRYSLER GROUP, LLC

1. Disconnect and isolate the negative cable from the battery. If equipped with an Intelligent Battery Sensor (IBS), disconnect the IBS connector before disconnecting the negative cable from the battery.

2. Raise and support the vehicle.

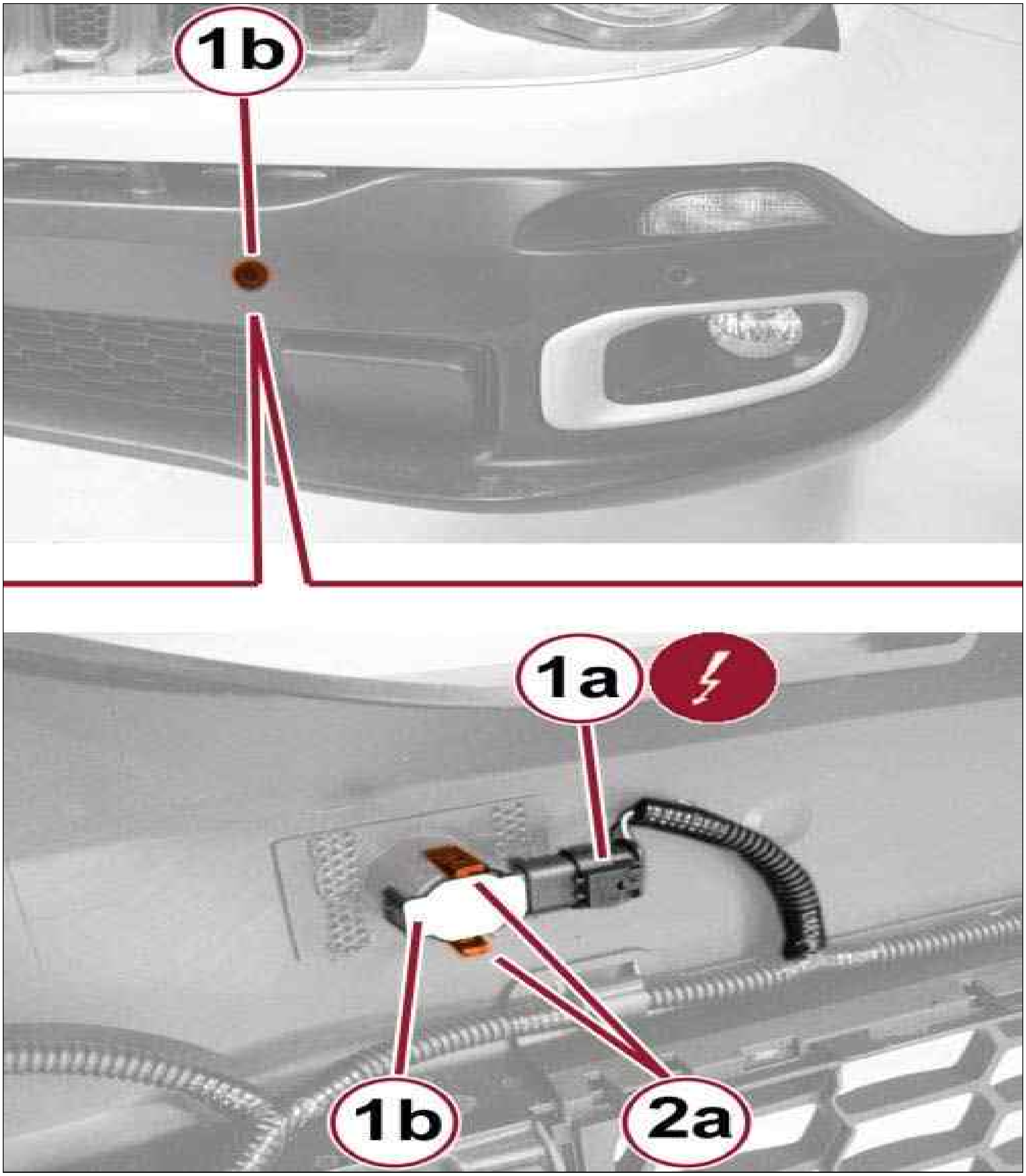
3. From the back of the rear fascia, disconnect the wire harness connector (1a) from the sensor

(1b) connector receptacle.

4. Carefully pry the park assist sensor bracket latch features (2a) away from the latch tabs of the sensor far enough to disengage the sensor from the bracket.
5. Disengage the resilient O-ring spacer from around the circumference of the sensor membrane protrusion.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION - FRONT CENTER

Fig 1: Remove/Install Front Center Sensor



Courtesy of CHRYSLER GROUP, LLC

NOTE:

In vehicles equipped with the optional Parallel and Perpendicular Park Assist option, the park assist sensors located in the outward facing ends of the front bumper fascia are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Engage the O-ring spacer (also known as the decoupling ring) around the circumference of the front center sensor (1b) membrane protrusion.

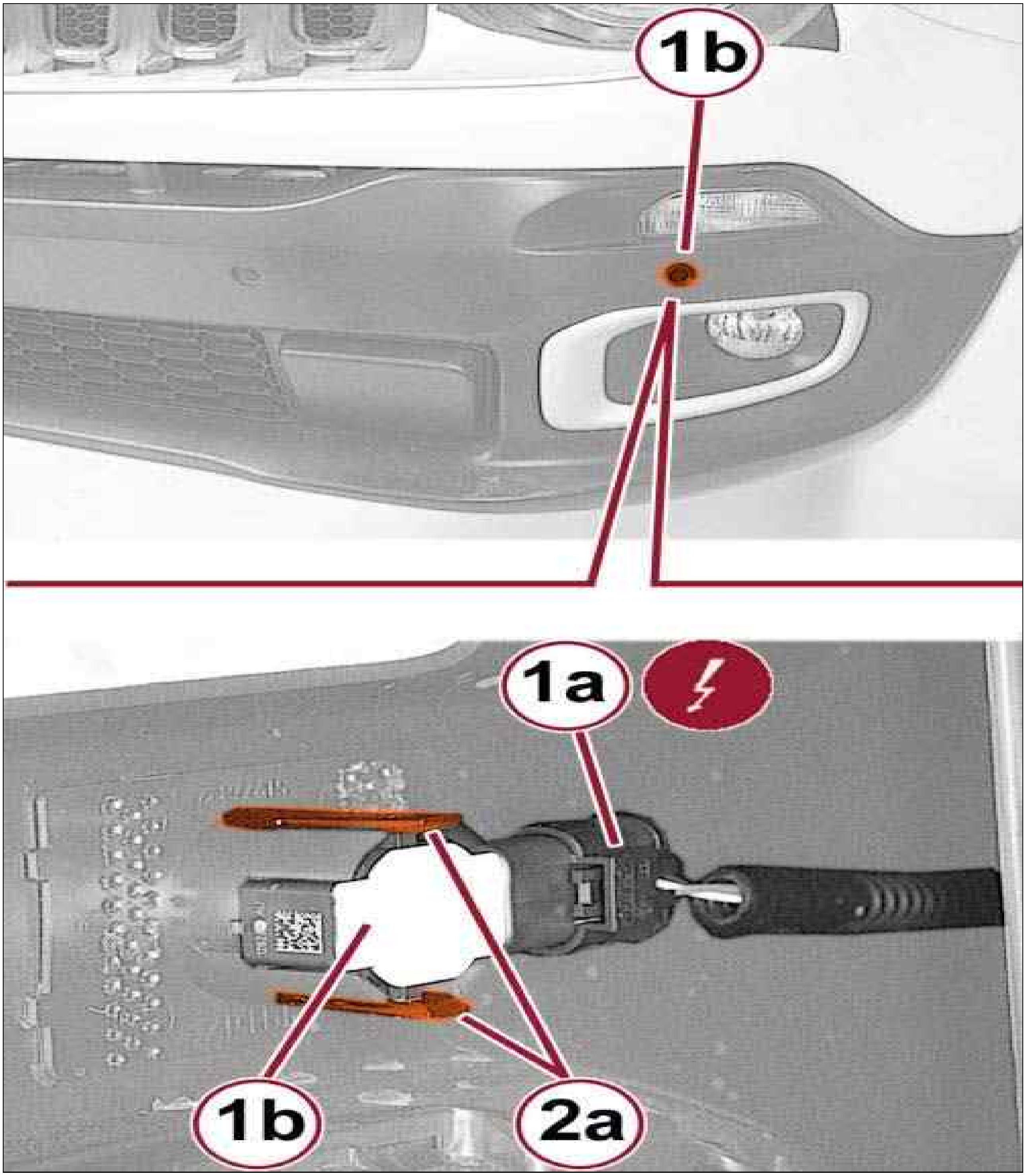
   NOTE:

   Production and all service replacement O-ring spacers are tapered. The wide side (base) of the O-ring should be seated against the sensor housing and the narrow side should be oriented toward the outer surface of the sensor membrane and the front fascia.

2. From the back of the front fascia, align and insert the sensor (1b) into the sensor bracket behind the front fascia until the bracket latch features (2a) are fully engaged over the latch tabs of the sensor.
3. Connect the wire harness connector (1a) to the park assist sensor connector receptacle.
4. Connect the negative cable to the battery. If equipped with an Intelligent Battery Sensor (IBS), reconnect the IBS connector.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION - FRONT OUTBOARD

Fig 1: Remove/Install Front Outboard Sensor



Courtesy of CHRYSLER GROUP, LLC

NOTE:

In vehicles equipped with the optional Parallel and Perpendicular Park Assist option, the park assist sensors located in the outward facing ends of the front bumper fascia are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Engage the O-ring spacer (also known as the decoupling ring) around the circumference of the front outboard sensor (1b) membrane protrusion.

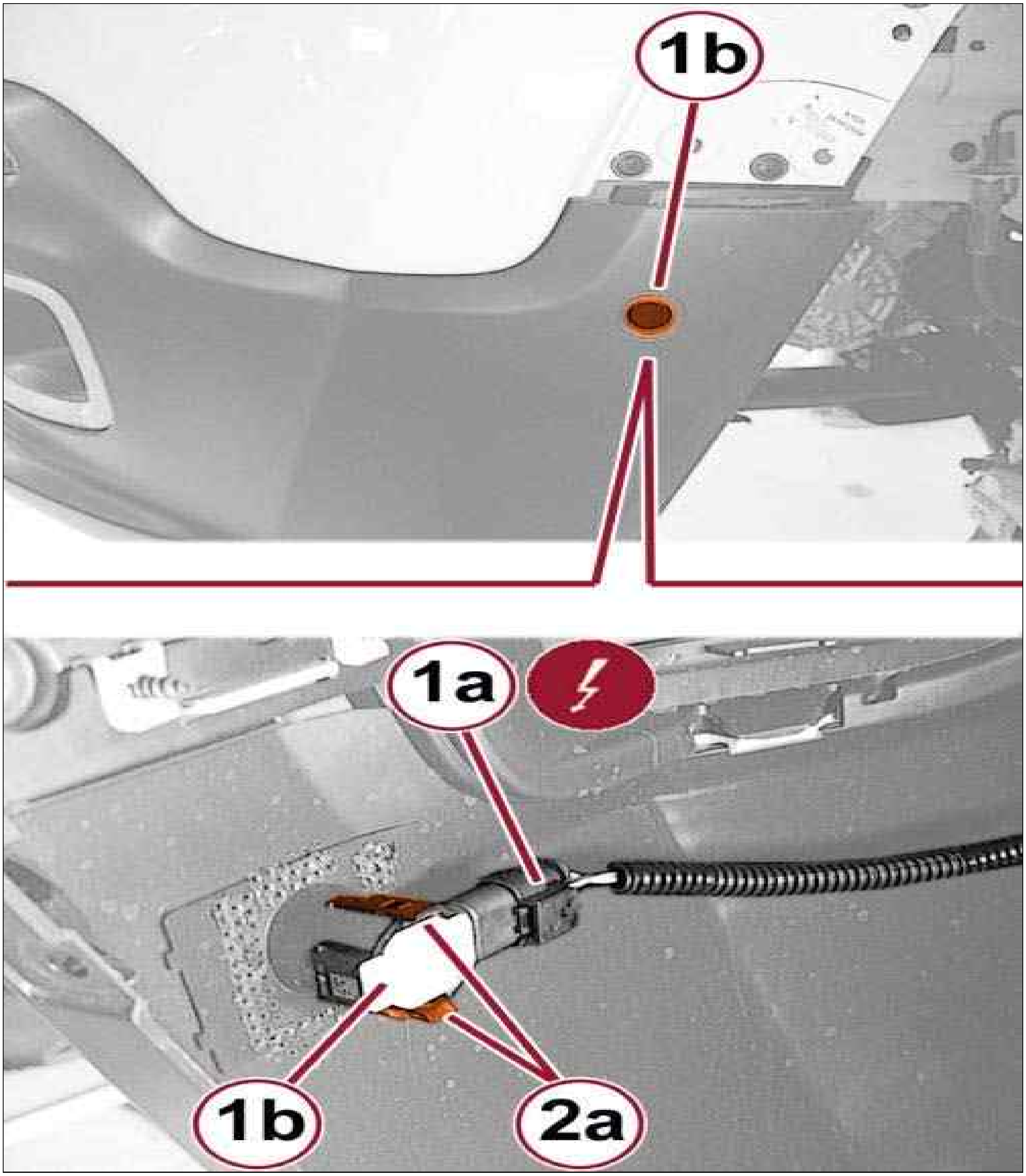
   NOTE:

   Production and all service replacement O-ring spacers are tapered. The wide side (base) of the O-ring should be seated against the sensor housing and the narrow side should be oriented toward the outer surface of the sensor membrane and the front fascia.

2. From the back of the front fascia, align and insert the sensor (1b) into the sensor bracket behind the front fascia until the bracket latch features (2a) are fully engaged over the latch tabs of the sensor.
3. Connect the wire harness connector (1a) to the park assist sensor connector receptacle.
4. Install the removed left or right front wheel and tire assembly.
5. Connect the negative cable to the battery. If equipped with an Intelligent Battery Sensor (IBS), reconnect the IBS connector.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION - FRONT OUTWARD FACING

Fig 1: Remove/Install Front Outward Facing Sensor



Courtesy of CHRYSLER GROUP, LLC

NOTE:

In vehicles equipped with the optional Parallel and Perpendicular Park Assist option, the park assist sensors located in the outward facing ends of the front bumper fascia are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Engage the O-ring spacer (also known as the decoupling ring) around the circumference of the front outward facing sensor (1b) membrane protrusion.

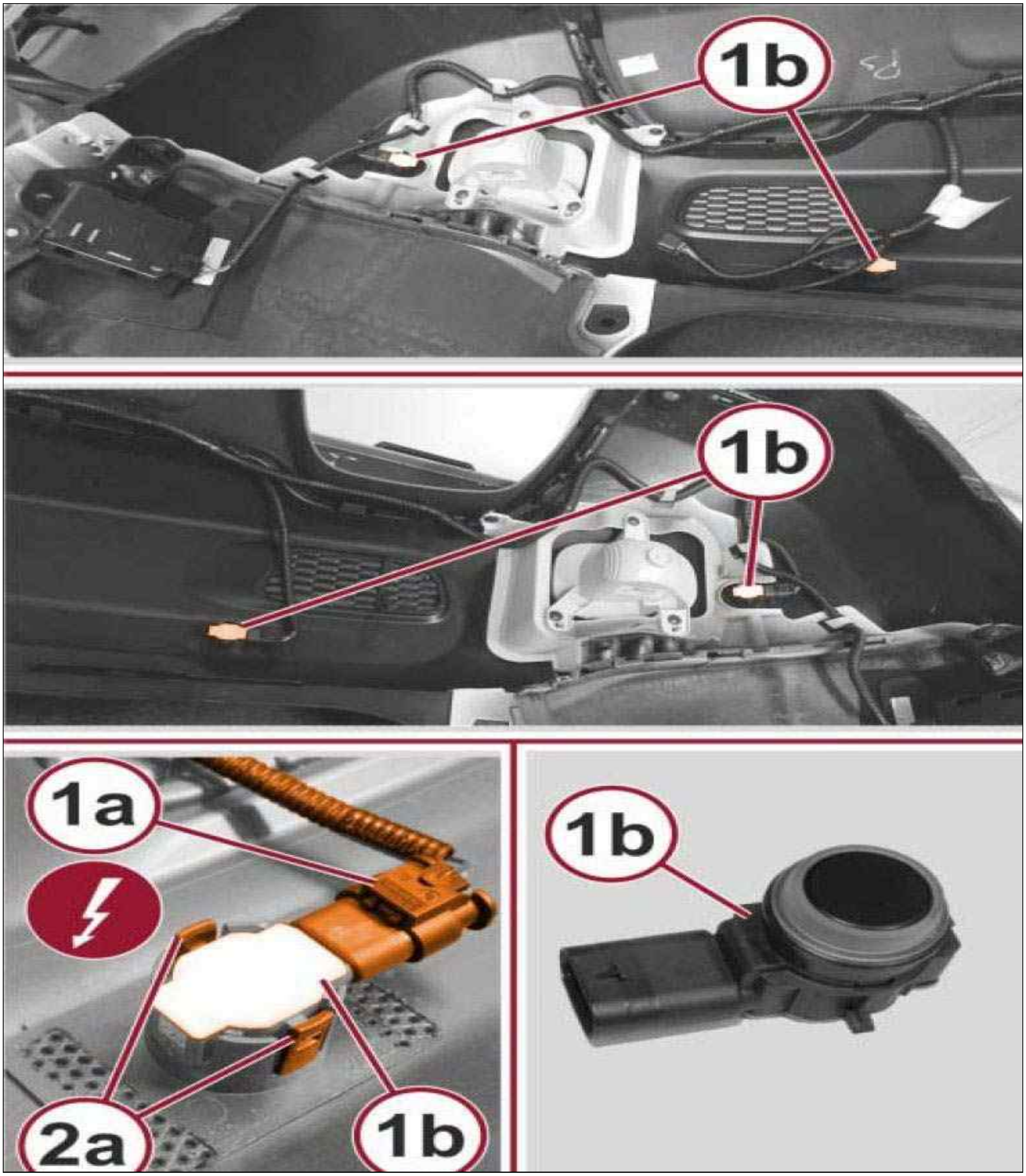
   NOTE:

   Production and all service replacement O-ring spacers are tapered. The wide side (base) of the O-ring should be seated against the sensor housing and the narrow side should be oriented toward the outer surface of the sensor membrane and the front fascia.

2. From the back of the front fascia, align and insert the sensor (1b) into the sensor bracket behind the front fascia until the bracket latch features (2a) are fully engaged over the latch tabs of the sensor.
3. Connect the wire harness connector (1a) to the park assist sensor connector receptacle.
4. Install the left or right front wheel and tire assembly.
5. Connect the negative cable to the battery. If equipped with an Intelligent Battery Sensor (IBS), reconnect the IBS connector.

SENSOR, PARK ASSIST > REMOVAL AND INSTALLATION > REMOVAL AND INSTALLATION > INSTALLATION - REAR

Fig 1: Remove/Install Rear Sensor



Courtesy of CHRYSLER GROUP, LLC

NOTE:

In vehicles equipped with the optional Parallel and Perpendicular Park Assist option, the park assist sensors located in the outward facing ends of the front bumper fascia are unique and must not be interchanged with any other forward or rearward facing park assist sensor.

1. Engage the O-ring spacer (also known as the decoupling ring) around the circumference of the sensor membrane protrusion.

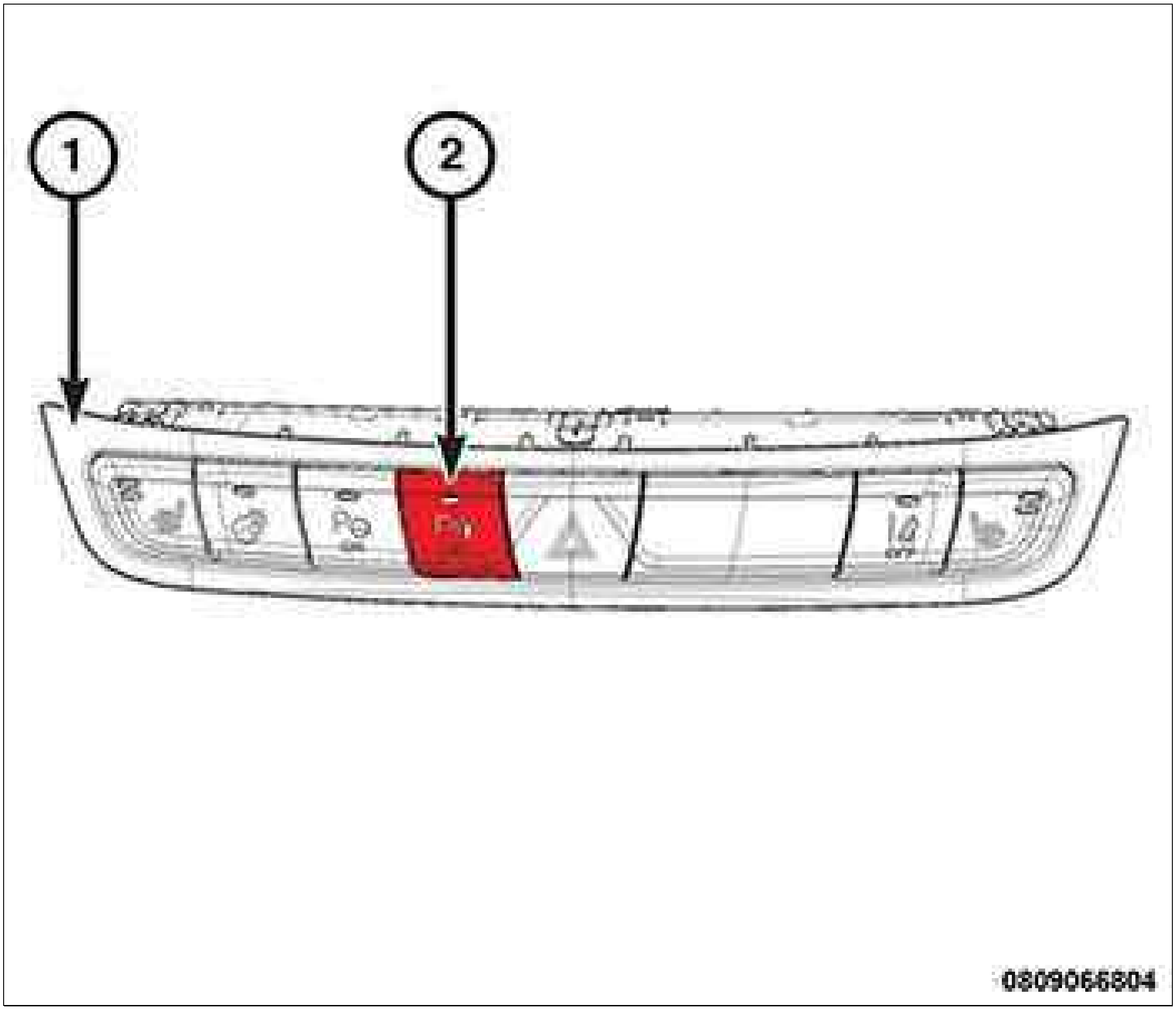
   NOTE:

   Production and all service replacement O-ring spacers are tapered. The wide side (base) of the O-ring should be seated against the sensor housing and the narrow side should be oriented toward the outer surface of the sensor membrane and the rear fascia.

2. From the back of the rear fascia, align and insert the sensor (1b) into the sensor bracket behind the rear fascia until the bracket latch features (2a) are fully engaged over the latch tabs of the sensor.
3. Connect the wire harness connector (1a) to the park assist sensor connector receptacle.
4. Connect the negative cable to the battery. If equipped with an Intelligent Battery Sensor (IBS), reconnect the IBS connector.

SWITCH, PARK ASSIST > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > DESCRIPTION

Fig 1: Park Assist Switch



Courtesy of CHRYSLER GROUP, LLC

The park assist Off switch (2) and the Parallel and Perpendicular Park Assist (PPPA) On switch are integral to the instrument panel switch pod (1), which is secured to the instrument panel center stack just below the Radio Receiver Module (RRM).

The park assist Off switch push button is clearly identified with a white International Control and Display Symbol graphic for **Parking Aid** and the text **OFF** . The PPPA On switch push button is clearly identified with white International Control and Display Symbol graphics for **Parking** and **Electric Power Steering** along with the text **ON** .

An amber Light Emitting Diode (LED) unit is illuminated behind a small clear plastic jewel-like lens in the park assist Off push button to give a visual indication whenever the park assist system has been manually disabled or if a system fault is monitored. Another amber LED unit is illuminated in the PPPA On push button whenever that system has been enabled. Both switches are only functional while the status of the ignition is On. The switch buttons also have panel lamps dimmer controlled illumination for night visibility.

All of the circuitry and components of the park assist Off switch and the PPPA On switch are contained within a molded black plastic instrument panel switch pod housing. A single connector receptacle is integral to the back of the switch pod housing. The switch is connected to the vehicle electrical system through a dedicated take out and connector of the instrument panel wire harness.

The park assist Off switch and the PPPA On switch cannot be adjusted or repaired and, if either switch is ineffective or damaged, the entire instrument panel switch pod unit must be replaced with a new unit.

SWITCH, PARK ASSIST > DESCRIPTION AND OPERATION > DESCRIPTION AND OPERATION > OPERATION

The status of the park assist Off switch and the Parallel and Perpendicular Park Assist (PPPA) On switch is continually monitored by the circuitry within the instrument panel switch pod. The switch pod receives battery voltage at all times on a fused battery feed circuit and has a path to ground at all times through the instrument panel wire harness. The inputs to and outputs from the switch pod consist of electronic message communication with the Body Control Module (BCM) over the single wire Local Interface Network (LIN) data bus.

Each time the park assist Off switch or PPPA On switch push button is depressed the switch pod circuitry sends an electronic **switch status** message input to the BCM over the LIN data bus. The BCM then relays an electronic **switch request** message to the Park Assist Module (PAM) over the Controller Area Network (CAN) data bus. The PAM responds to each **switch request** message by toggling the status of the appropriate park assist system feature from enabled to disabled, or from disabled to enabled, then sends an electronic **system status** message back to the BCM over the CAN data bus as confirmation.

The BCM responds to the system status message by sending a message to the switch pod over the LIN data bus to control the park assist Off switch or PPPA On switch Light Emitting Diode (LED) units so that they are illuminated only when appropriate while the status of the ignition is On, and are extinguished when the status of the ignition is anything except On. If the park assist system is disabled due to a monitored fault or failure, a press of the park assist Off push button will result in the LED flashing on and off for about 5 seconds, then lighting solid.

The hard wired circuits between components related to the park assist Off switch and the PPPA On switch may be diagnosed using conventional diagnostic tools and procedures. Refer to the appropriate SYSTEM WIRING DIAGRAMS article. However, conventional diagnostic methods will not prove conclusive in the diagnosis of the electronic controls and communication between modules and other devices that provide some features of the park assist system. The most reliable, efficient and accurate means to diagnose the park assist Off switch, the PPPA On switch or the electronic controls and communication related to park assist switch operation requires the use of a diagnostic scan tool. Refer to the appropriate Diagnostic & Testing article.