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2001 JEEP Cherokee/Liberty OEM Service and Repair Workshop Manual

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5.	Long Range Front Camera (LRCF)
6.	Central ADAS Decision Module (CADM)
7.	Instrument Panel Cluster (IPC)
8.	Steering Wheel Sensor Module (SWSM)
9.	Electronic Power Steering (EPS) Module
-	Auxiliary Switch Bank Module (ASBM)

Lane centering driver-assistance system that helps the driver guide the vehicle along the center line of controlled access roads when the Adaptive Cruise Control (ACC+) system is engaged. The following are properties of the Lane Centering system:

- The usage of a forward-facing camera wired directly to the CADM to identify road edges, visible lane markings, and to track lane boundaries.
- The usage of a radar to monitor stationary objects and traffic flow to determine the forward path, and positioning of a forward vehicle.
- Provides a steering torque to keep the vehicle in the center of the lane.
- Active at vehicle speeds between 60 km/h (37 mph) and 180 km/h (112 mph).
- Allows the driver to manually override the system by applying torque into the steering wheel at any time or by activating the left or right turn signal indicators.
- Provides alerts to the driver when the system becomes disengaged or requires driver intervention. Depending on the condition, the alerts may be in the form of:
    - Haptic feedback using vibration in the drivers seat.
    - Haptic feedback using steering wheel vibration.
    - Audible alerts.
    - Visual indications using the driver assist screen on the IPC.

The driver is required to remain engaged in the task of driving the vehicle at all times. The Lane Centering system determines driver engagement by using a combination of capacitive sensing by the SWSM plus steering wheel torque sensing by the EPS in order to determine whether at least one of the drivers hands is in contact with the steering wheel. If the driver removes both hands from the steering wheel, an initial visual warning is issued to engage the driver. If the driver keeps their hands off the steering wheel continuously, the Lane Centering system escalates the visual warning level. If the driver does not assume control of the vehicle, the Lane Centering system will further escalate efforts to engage the driver via invasive alerts (i.e. audible, visual, haptic notifications). If the driver re-engages during the warning phase, the Lane Centering system will

At night, the LRCF will detect the lane markings with lighting conditions provided by standard, productions low beam headlamps, with or without additional sources of road illumination, and where environmental conditions provide good visibility in excess of 30 meters.

The LRCF is able to compensate for sudden changes in lighting conditions such as during tunnel entry or exist.

The CADM implements data integrity and plausibility checks for the video data over Low Voltage Differential Signaling (LVDS).

Field of View

The effective horizontal field of view of the LRCF is a minimum of 36 degrees.

The effective vertical field of view of the LRCF is a minimum of 20 degrees.

Mid Range Radar Front Left (MRRFL) and Mid Range Radar Front Right (MRRFR)

Component Index

The MRRFL and MRRFR are used, along with all the radars and the LRCF, by the CADM through the private/serial CAN FD-SB1 and FD-SB2 bus for gathering road information for lane assessment and path planning.

For servicing (Refer to Electrical/8B - Driver Assist/RADARS/Removal and Installation).

Security Gateway (SGW) Module

Component Index

The SGW is used in this system to provide enhanced security and to gate telematic signals for CADM to utilize.

Steering Wheel Sensor Module (SWSM)

Component Index

The SWSM activates a hands On Sensor to determine if the driver has their hands on the steering wheel. The SWSM receives the sensor input then uses its own internal algorithm to determine if the hands are off or on the steering wheel. The SWSM transmits this determination in a signal to the CADM. The CADM uses this signal and/or the EPS torque sensing signal in order to determine the final hands on / hands off state.

- Driver relative seat movement is less than allowable threshold.

The opposite of these states are considered by the Driver Model to be criteria not being met.

There are conditions that can cause the Driver Model to not be able to determine the criteria which can lead to the system not operating properly or at all. Examples include bit are not limited to:

- If the DMC is blinded or covered.
- If the system is calibrating.
- If there is a fault in any relevant component used by the system.

Drivers seat movement - Seat recline and seat track movement are monitored by the CADM through signals received from the BCM using the CAN-FD bus. The threshold for allowable driver adjusted seat recline or seat track movements is tunable and has an initial value of 30% full range of the seat travel sensor capacity.

Body Control Module (BCM)

Component Index

The BCM is responsible for gating bus signals between the following networks:

- CAN-IHS to CAN-FD3
- CAN-FD3 to CAN-IHS
- CAN-FD2 to CAN-IHS
- CAN-FD2 to CAN-FD3

Central ADAS Decision Modules (CADM/CADM2)

Component Index

The CADM receives and monitors signals from the SWSM for capacitive based hands on steering wheel detection. The CADM also receives signals from the EPS system for torque based hands on steering wheel detection.

The CADM receives steering wheel, turn signal, cruise control and highway assist plus related switch commands from the BCM using the CAN-FD bus.

The CADM monitors the accelerator pedal position and gas pedal values from the PCM.

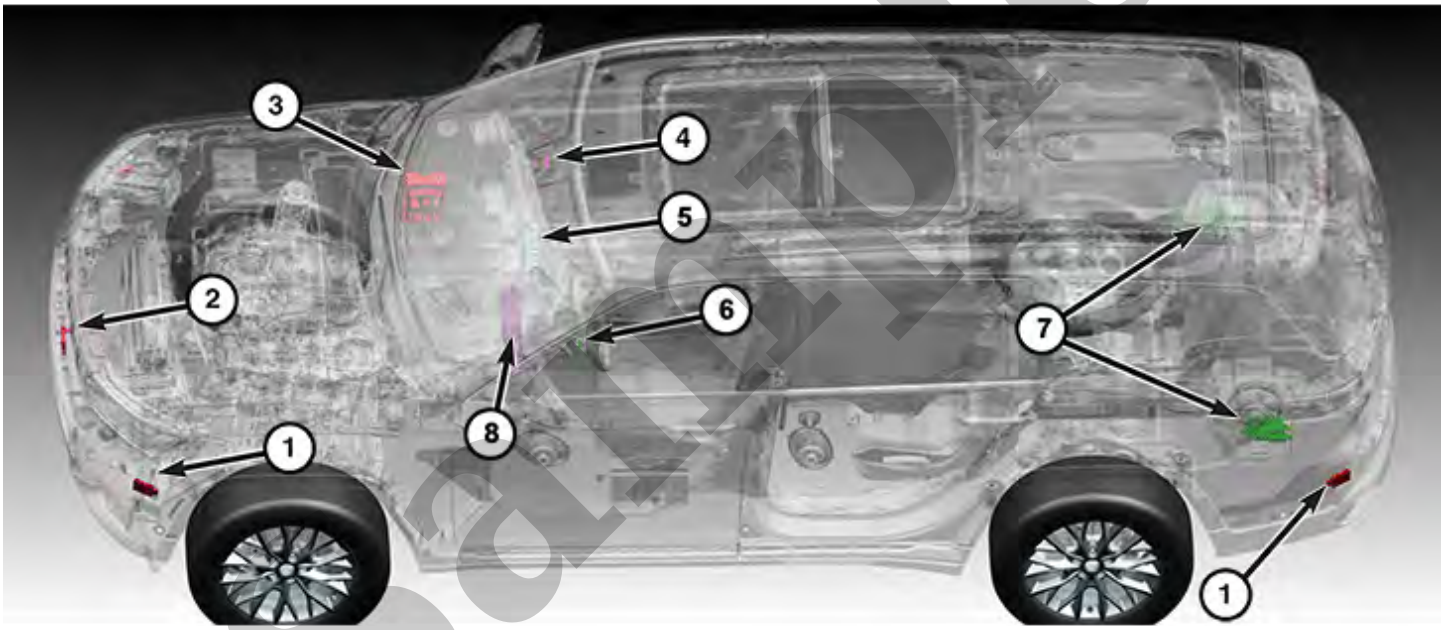
The CADM receives the vehicle speed signal from the BSM.

Driver Monitoring System Module (DMSM)

Component Index

Enhanced Active Lane Management

ENHANCED ACTIVE LANE MANAGEMENT



Component Index

1.	Mid Range Radars • Mid Range Radar Front Right (MRRFR) • Mid Range Radar Front Left (MRRFL) • Mid Range Radar Rear Left (MRRRL) • Mid Range Radar Rear Right (MRRRR)
2.	Long Range Radar Front (LRRF)

- Engine type
- Gear box type and variant
- Engine Stop Start (ESS) equipped
- Market area
- Vehicle shape configuration
- Vehicle line configuration
- Country code
- Which side if the drivers side of the vehicle
- Final ratio
- Steering ratio rack and pinion type
- Wheelbase
- Drive type variant
- Air suspension equipped
- Rear suspension configuration

The CADM is able to predict the vehicles path using inputs from the following inputs:

- Vehicle speed from the Brake System Controller (BSM via vehicle speed sensors
- EPS steering angle values
- EPS motor torque
- Steering speed value, counterclockwise positive from the EPS
- Yaw information and status from the Occupant Restraint Controller (ORC)
- CVPAM
- GNMM

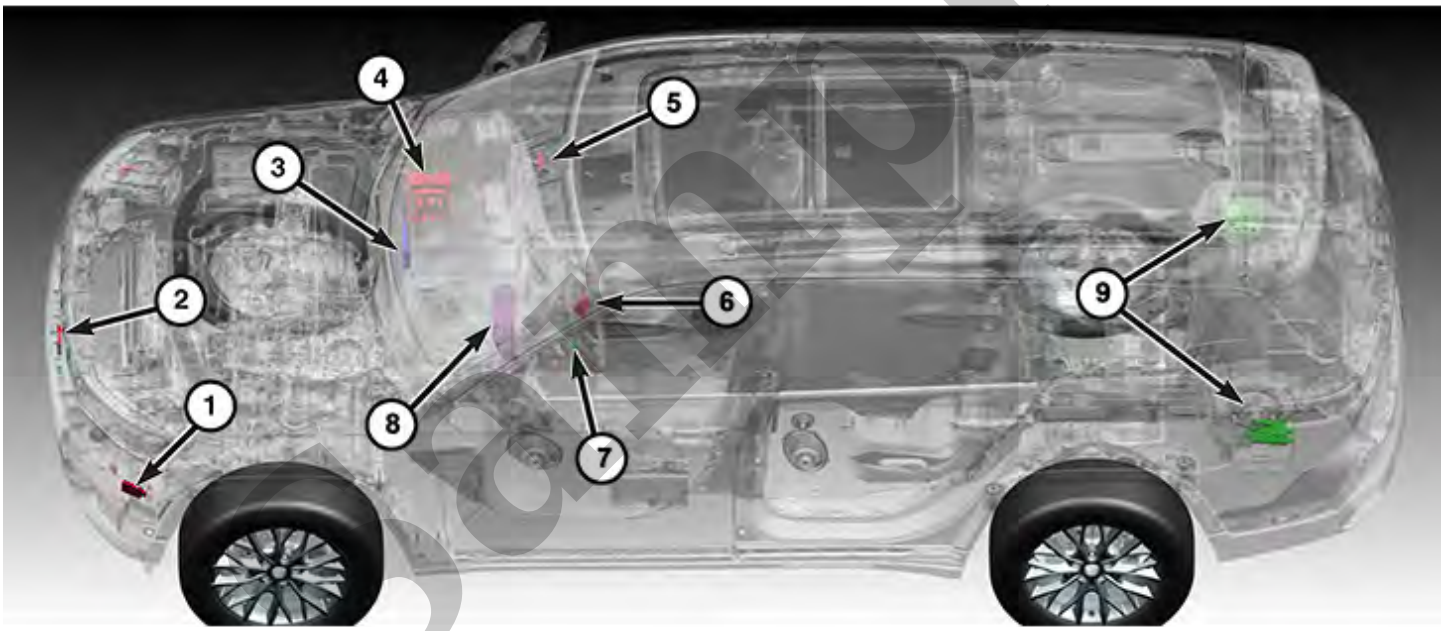
The CADM enters a lane change state when it receives a left or right side indicator active message from the BCM. The CADM then uses received information to determine if the lane change is feasible:

- All radar sensors are available and no blinded.
- CVPAM indicates the right and left CVPAM sensors are active.
- Sensing is not obstructed by road and traffic conditions.
- Fast moving vehicle approaching from behind is not detected in the host lane or the two adjacent lanes.
- The lane or shoulder adjacent to the desired lane has no traffic travelling slower than the host vehicles relative speed.
- The desired lane change is legally permitted.
- The lane adjacent to the desired lane is becoming an exit only lane or will end within a calibrated time.
- The desired lane is predicted to be free from object for the purposes of a safe lane change.
- The BCM does not indicate turn lamp faults during the current ignition cycle.

Enhanced Adaptive Cruise Control With Stop And Go

ENHANCED ADAPTIVE CRUISE CONTROL WITH STOP AND GO

DESCRIPTION



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The following is a list of the major components either system will use during its operation:

Component Index

1.	Mid Range Radars • Mid Range Radar Front Right (MRRFR) • Mid Range Radar Front Left (MRRFL)
2.	Long Range Radar Front (LRRF)

The CADM calculates the vehicle speed to be displayed on the IPC to determine system availability and set speed. The CADM concerts a vehicle speed signal that is sent on the CAN bus from the BSCM to the vehicle speed that will be displayed on the digital speedometer on the IPC.

The CADM also provides the IPC with ACC status and message display requests to be used for the vehicle driver.

The CADM utilizes the following input signals to support the ACC system.

- 12 Volt battery signal from the BCM.
- LRRF for radar data (Radar Info) collection and the LRCF for object data (Camera Data) information.
- Steering wheel angle signals from the EPS.
- Current country from the DSM.
- Wheel spin and speed data from the BSCM.
- Accelerator position from the PCM.
- Air suspension levels from the Air Suspension Control Module (ASCM).
- Vehicle odometer values from the IPC.
- Yaw and latitude readings from the Occupant Restraint Controller (ORC).
- Seat belt buckled/unbuckled from the ORC.
- Door ajar switch state from the BCM.
- Wiper state and wiper speed from the BCM.
- External temperature from the BCM.

Cruise Control Switch

Component Index

The cruise control switch contains the ACC control buttons. When these buttons are pressed, the cruise control switch sends a LIN bus message to the BCM with the pushed button value.

Instrument Panel Cluster (IPC)

Component Index

The CADM provides the IPC with ACC status and message display popup requests to be used for the vehicle driver. The CADM also supplies the vehicle speed to be displayed during ACC operation.

Long Range Camera Front (LRCF)

Component Index

3.	Instrument Panel Cluster (IPC)
4.	Driver Door Module (DDM) and Passenger Door Module (PDM)
5.	Central ADAS Decision Module 2 (CADM2)
6.	Mid Range Radar Rear Left (MRRRL) and Mid Range Rear Right (MRRRR)
-	Central ADAS Decision Module (CADM)

The BSM system, when enabled, monitors the rear blind zones on both sides of the vehicle using the MRRRL and the MRRRR. Both of these radars are hardwired directly to the CADM. If a vehicle is detected in one of the blind spot zones, the driver will be notified by a blind spot Light Emitting Diode (LED) indicator lamp that illuminates an icon on the outside rear view mirror on the side of the vehicle where the object is detected. The system can also be configured to emit an audible chime through the IPC in the Customer Programmable menu options.

There are three operating modes for the BSM system:

- OFF: All visual and audible alerts related to objects of interest in the blind sport zone are suppressed.
- ON with blind spot indicator only
- ON with blind spot indicator and chimes

The RCP feature is active when the ignition is in the "RUN" position and the **R** everse gear is engaged. A warning is issued when an object is detected when the host vehicle is either stationary or moving and the radars detect a valid target with a valid crossing trajectory and time to crossing.

The RCP detection system monitors the rear detection zones for vehicles that are moving toward the sides of the vehicle with a minimum speed of 13 km/h (8 mph).

Lane Change Assist Feature - The lane change assist feature is activated when the turn signal indicator is activated. The CADM enables a chime alert algorithm to be used during the lane change. If during lane change an object is detected, the customer is warned by a directional visual alert and a directional chime. The directional warnings are prompted to the same side of the vehicle in which the object is detected.

OPERATION

When the vehicle speed exceeds 10 km/h (6 mph) and the either radar detects an object within 24 km/h (15 mph) of the vehicle speed passing through the monitored zone from the rear of the vehicle, the CADM will request a blind spot LED indicator request to the DDM or PDM. The DDM or PDM controls the indicator lamp through a Pulse Width Modulated (PWM) circuit to the mirror on the side of the vehicle that the object is detected. If the driver attempts to enter the zone where the object has been detected and with the turn signal activated, the CADM will send out two additional requests to alert the driver.

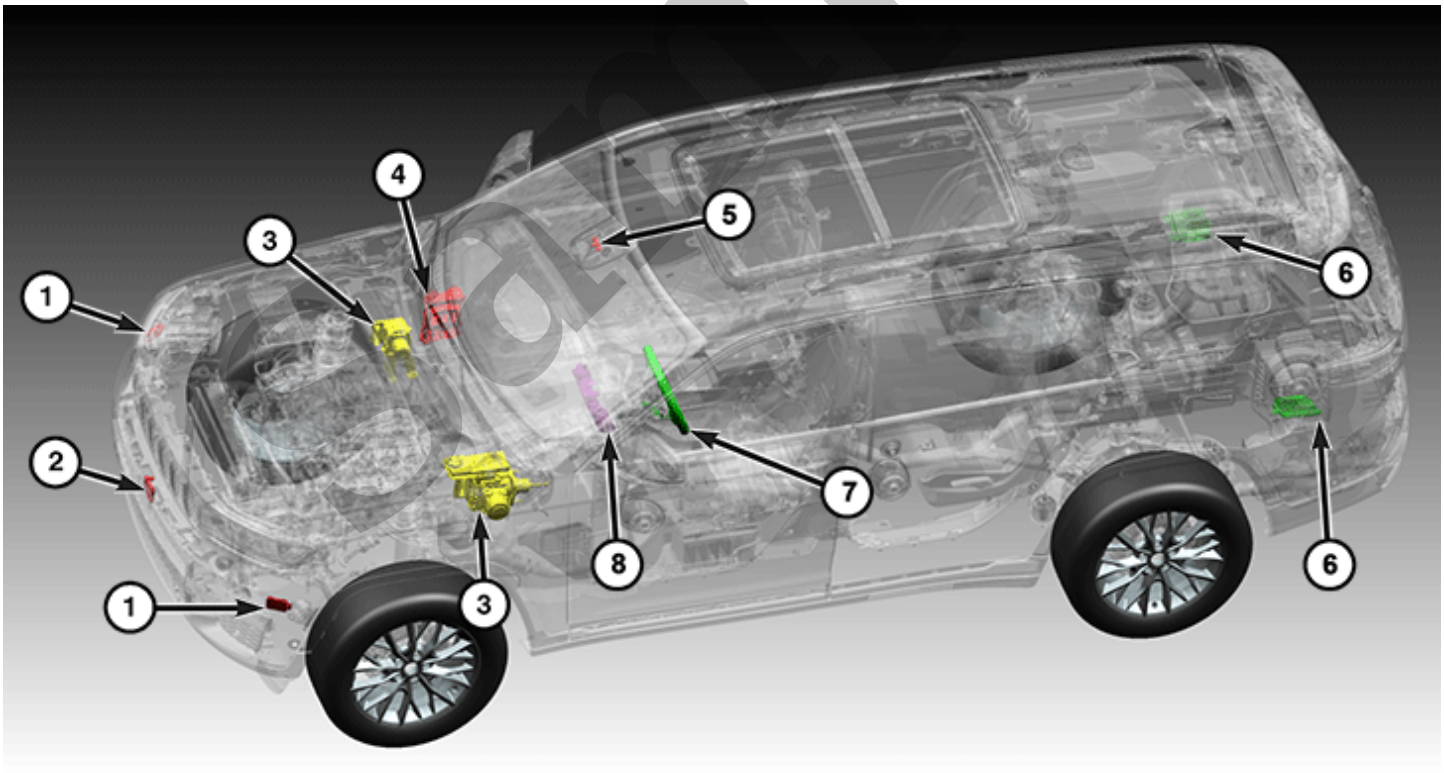
Enhanced Forward Collision Warning

ENHANCED FORWARD COLLISION WARNING

DESCRIPTION

NOTE

The Forward Collision Warning (FCW) system will use mitigated braking to avoid accidents but will not completely stop the vehicle in all scenarios if an impact is imminent - its purpose is to warn and assist.



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Component Index