DESCRIPTION AND OPERATION

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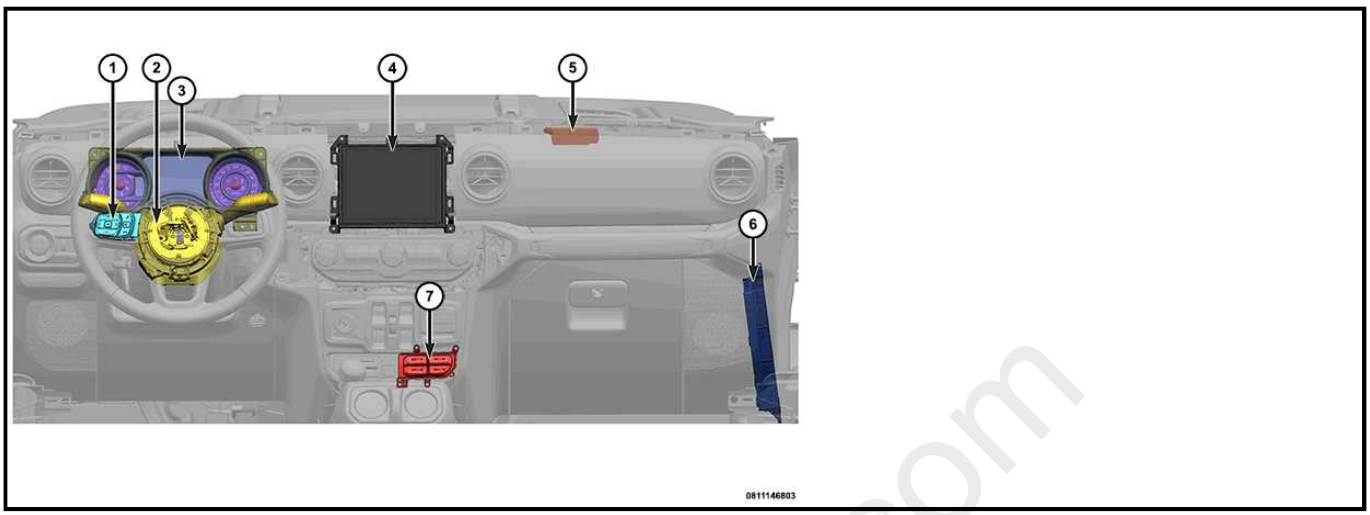
DESCRIPTION



The IPC system can be comprised of several different components. Those components are:

COMPONENT INDEX

1.	Refer to **ELECTRONIC VEHICLE INFORMATION CENTER (EVIC) SWITCH**.
2.	Refer to **STEERING COLUMN CONTROL MODULE (SCCM)** with Steering Wheel Switch.
3.	Refer to **INSTRUMENT PANEL CLUSTER (IPC)**.
4.	Refer to **RADIO**.
5.	Refer to **REMOTE COMPASS MODULE**.
6.	Refer to **BODY CONTROL MODULE (BCM)**.
7.	Refer to **AUXILIARY SWITCH BANK**.

OPERATION

The IPC for this vehicle is located in the instrument panel above the steering column opening. The IPC gauges and indicators are visible through an opening in the cluster bezel and are protected by a clear plastic cluster lens that is secured to the cluster housing by integral latch formations.

Each of the cluster hard indicators as well as the general cluster illumination is provided by dedicated Light Emitting Diode (LED) units soldered to the cluster electronic circuit board.

Several versions of the IPC are offered on this vehicle. These versions accommodate all of the variations of optional equipment and regulatory requirements for the various markets in which the vehicle is offered. The IPC utilizes integrated circuitry and information carried on both the Controller Area Network - Chassis (CAN-C) data bus networks along with several hard wired inputs to monitor other sensors and switches in the vehicle. In response to those inputs, the internal circuitry and programming of the IPC allow it to monitor many electronic functions and features of the vehicle.

The IPC contains 4 analog gauges for mid-line IPC (3.5 inch EVIC) and 2 analog gauges for the high-line IPC (7 inch color EVIC) and has provisions for up to 24 International Control and Display Symbol icon indicators that are all controlled by the IPC and standard on all models. The IPC lens and the IPC hood and mask unit are the only components of the IPC assembly that can be serviced separately.

The mid-line IPC (3.5 inch EVIC) includes the following analog gauges:

- **Engine Temperature Gauge**
- **Fuel Gauge**
- **Speedometer**
- **Tachometer**

The high-line IPC (7 inch color EVIC) includes following analog gauges:

- **Engine Temperature Gauge**
- **Speedometer**

For more information on the International Control and Display Symbol icons. Refer to **INTERNATIONAL VEHICLE CONTROL AND DISPLAY SYMBOLS, DESCRIPTION** .

SPEEDOMETER OPERATION - The purpose of the speedometer feature is to accurately inform the driver of the vehicle speed. The speedometers are biased high to meet the certain country accuracy requirements. However, the indicated speed will not exceed the maximum tolerance limitation from the countries where the vehicle is sold.

The IPC receives a CAN-C vehicle speed message from the ABS module. The IPC will then transmit the speedometer value, by use of an internal signal, to the IPC display screen.

ODOMETER OPERATION - The total odometer value is the total accumulated distance covered by the vehicle. Total odometer values increment every 1 kilometer and can not be reset. The IPC contains an odometer line arbitrator routine that checks various parameters before allowing the odometer to be updated. Once the IPC has retrieved the odometer information from memory, the odometer line arbitrator initiates writing information to the odometer line. If any warnings, faults or bus errors are detected, the IPC will display fault messages. If there are no warning or faults, the arbitrator will write to the odometer display.

The IPC receives left and right wheel speed sensor pulse values over the CAN-C bus. The IPC calculates the related travel distance of the vehicle as an average of the rear wheel counters, increments the total odometer value, and transmits this value on the CAN-C bus. This signal is then gated by the BCM and broadcast on the CAN-IHS bus.

TACHOMETER OPERATION - The Powertrain Control Module (PCM) sends an engine RPM message over the CAN-C bus to the IPC which contains the value for the IPC to filter and decode in order to drive the pointer.

FUEL GAUGE OPERATION - The fuel level feature is only active when the ignition is in the RUN or START position. The BCM will broadcast a CAN-C fuel voltage message which represents a valid fuel level read from the fuel sensor. This signal is acquired by the IPC, accumulated and averaged once per second. The averaged fuel voltage is then filtered and converted to a desired fuel voltage. This fuel voltage ends up being the value that the IPC uses to indicate the amount of fuel for the fuel gauge.

The IPC is able to determine the fuel tank type by another CAN-C message from the BCM with the configuration data. The IPC also will read, from the BCM, the fuel type, the wheel base and the rated fuel tank capacity. These parameters determine a unique fuel tank type to select the desired fuel array, which is an internal IPC logic, for the IPC to chose from when deciding the fuel level. Essentially, the fuel gauge output, or fuel level indicator, is determined by a ratio of total fuel volume and rated fuel tank capacity.

IPC Bottom Learn Strategy - The IPC leans the bottom of the fuel tank. The bottom learning algorithm is active after the engine is running and battery voltage is greater than 10.9 v. The bottom learn value is the fuel voltage that corresponds to the lowest readable fuel volume. It is initialized to the maximum bottom learn value and dynamically learns down to the physical bottom of the fuel tank or to the minimum learn value, whichever is higher. Dynamic bottom learn compensates for variations in fuel tank builds as well as deformations due to temperature and loading. This allows for a proper fuel gauge reading to the customer.

Low Fuel Detection - The IPC determines the low fuel threshold by using a distance to empty algorithm and the average fuel volume, or level. When the distance to empty is below 48 km (30 miles) and the average fuel volume is less than the low fuel threshold (which is defined as a 1/4 indication of the fuel gauge), the low fuel level status will be set to true and transmitted on the CAN-C signal. The low fuel level warning telltale will be turned on associated with a single warning chime and the "Fuel Low" text warning message will then display for five seconds on the IPC.

Loose Gas Cap Indication - The PCM transmits the indication of a loose fuel cap via the CAN bus to the IPC. The PCM estimates, using internal logics, a possible fuel cap loose condition. If the PCM detects a loose cap, the PCM sends a CAN-C bus signal to the IPC. The IPC manages this signal to inform the driver that there is a possible loose gas cap. When the PCM indicators indicate that the gas cap is now fastened, the indicator will no longer be sent by the PCM.

AUDIO AND VIDEO INDICATIONS ON THE IPC:

IPC Displays for radio data

The IPC allocates a region of its display to show audio and telematics information such as audio and phone call status information. The radio sends the translated text strings (in all supported languages) to the IPC display via a CAN bus message for both audio and phone media. When the IPC receives this information, the IPC begins a buffering process to receive the data string message from the radio. Once the radio is finished sending the display text message, the IPC blanks the existing display text and begins to display the next text.

The data for audio that is being sent to the IPC is duplicated from what is being presented to the customer on the radio display screen. Some of these items are current radio station, data during tuning, fast forward, seek and other common display items. The IPC manages the duplicated data display on the IPC display once it is received. This includes all forms of radio audio media and inputs to the radio such as Auxiliary, Bluetooth or Universal Serial Bus (USB).

IPC displays for phone call data

The radio populates a phone menu setting for displaying phone information on the IPC and will allow sending of the phone information to the IPC only if this feature is configured to be enabled. Once this feature is configured to be enabled, the radio has a phone menu setting for showing/not showing phone information in the IPC and it is selectable by the customer where a customer has the ability to turn ON or OFF displaying the phone information in the IPC. After the customer selects to show the phone information in the IPC, the IPC uses an area of its display to show the phone information using either an incoming call pop-up or the information will be in the same place as the audio information.

The IPC display has two types of icons: incoming call and other calls. This feature is only supported by radios that are actively showing the phone information on the radio display (Paired phones, active call, etc.). If there is an active call and a second incoming call comes in, the radio will send the required messages for an incoming call where the IPC clears the data for the active call and shows the pop up for the latest incoming call. If the user accepts the call, then the radio sends the required messages to the IPC to clear the incoming call pop up. The radio then sends messages for the latest active call status to where the IPC display shows the information in the audio screen and updates it to the latest active call information. If the user ignores the call, then the radio sends required messages to the IPC to clear the incoming call pop up. The radio then sends messages for previous active call status where the IPC display shows call information in the audio screen and updates to the previous active call status information.

Phone call information takes priority over the music mute feature for the IPC display.

If the phone menu option is not set to active in the radio for the IPC display, the incoming call popup is based on a CAN signal. The IPC displays incoming call pop-ups only when the option is set to active. The IPC always displays incoming call information independent of the radio phone menu setting for phone information in Audio menu. When the IPC receives a gated popup active message over the CAN bus, it will display incoming call text status, the callers name (if available) and the phone number. The incoming call remains on the screen until cleared by IPC logic (based on IPC display priorities), or the call is ignored, answered, or the call is ended. If radio has determined that a call is ignored, answered, or the call is ended, the radio sends a gated

message to the IPC indicating that the popup is not active. The IPC will not show the incoming call if the popup is not active.

If an incoming call pop-up was cleared by IPC, the IPC will show the phone information with corresponding other call icons. In this case, the IPC will not show pop-up information again until the next incoming call.

The BCM performs gateway services for multiple signals when any signal value changes to support this feature.

IPC Displays for the Navigation Screen

The radio sends periodic and spontaneous information in all supported languages to the IPC to display. After the customer selects, by use of the radio settings menu, to turn on the navigation turn by turn in the IPC, the IPC will use an area of the display to show the turn arrow, distance to the next turn, units, speed limits, and the name of the next turn destination or street name. The IPC uses a signal to populate the display for turn by turn navigation pop up information.

The BCM gates several messages from radio CAN-IHS to CAN-C and then sends these CAN-C messages to the IPC for display.

EVIC DISPLAYS AND MENUS

- Tire Pressure Monitoring (TPM) Status - The TPM system monitors the pressure of each of the four active road tires and warns the driver, when either a low tire pressure condition or a TPM system malfunctions exists, through the IPC. The Base TPM system only uses the TPM telltale, audible chime and non-positional text messages to indicate low pressure or system fault conditions. Along with using the TPM telltale and audible chime, The Premium TPM system uses a configurable vehicle information display to display the actual tire pressure values or dashes for each of the four active road tires in the correct vehicle position. Various text messages, as required, will also be displayed in the configurable vehicle information display. The IPC receives these messages from the TPM module. The IPC receives CAN bus configuration messages from the BCM to determine the type of TPM system installed on the vehicle, the placard pressure values, and other vehicle configuration data to support the TPM display messages on the IPC.
- Percent Oil Life Gauge

  - The IPC acquires oil life data from the PCM over the CAN-C bus to manage the oil life display to the customer. The PCM manages the oil life algorithm based on several coefficients:

    - Engine RPM
    - Engine oil temperature
    - Engine load
    - Percent content of ethanol in the fuel for gasoline engines

  The PCM monitors a CAN-C signal that indicates the miles traveled. When the PCM detects fuel is being delivered to the engine, the PCM calculates engine run time for oil life. With these signals being monitored, the PCM sends a CAN-C message for current oil percentage left, miles since last oil change, engine hours and calculated engine revolutions that have accumulated since the last oil life reset as determined by the PCM managed algorithm. Once the PCM reaches a calibrated threshold of about 5% for oil life left, the PCM sends a CAN-C bus message indicator of "Change Oil Soon" indicating that the time is near for an oil change. Once the percentage reaches 0%, the PCM then emits the CAN-C signal for "Change Oil Required", thus alerting the customer that the time is now for an oil change.

  When an engine oil change is completed, it is necessary to communicate this to the PCM to allow it to reset its algorithm. The reset via EVIC allows the oil change algorithm to be reset. Under key-ON and engine not running conditions, upon selection and acknowledgment of the reset menu item, the IPC will send a CAN-C signal to the PCM. Upon receipt of this message by the PCM, the algorithm will reset the oil left and respond back to the IPC via CAN-C with a message indicating a successful reset.

The IPC manages the indicator to the driver about oil life based on the CAN-C oil life values sent to it by the PCM.

In the event of PCM failure that requires replacement, the diagnostic scan tool can be used to restore oil life values to ensure powertrain protection. The PCM sends out critical oil life data via CAN-C to the BCM. The BCM will monitor and retain the oil life data it receives from the CAN signals. This information is used by the diagnostic scan tool to interrogate the BCM before PCM replacement, and restore oil life algorithm to its current values after PCM replacement. If for any reason the diagnostic scan tool is unable to receive valid oil life values, the diagnostic scan tool will send a command to reset the oil life algorithm to severe duty. The severe duty reset limits the current oil life cycle to 6437 km (4000 miles) or less.

- Oil Pressure Gauge - The oil pressure gauge is a virtual graphic gauge with pointer/bar indicator in the IPC display screen. The IPC uses an oil pressure CAN signal to drive the gauge. During an ESS event, the oil pressure value will be displayed as dashes until the ESS event is complete. For oil pressure warning indication, a request signal is received by the IPC to illuminate or extinguish the gauge. Oil pressure signals are received from the oil pressure sensor by way of the PCM over the CAN-C bus.
- Oil Temperature Gauge - The oil pressure gauge is a virtual graphic gauge with pointer/bar indicator in the IPC display screen. The IPC uses an oil temperature CAN signal to drive the gauge. For oil temperature warning indication, a request signal is received by the IPC to illuminate or extinguish the gauge. All of the oil temperature signals are received from the oil pressure sensor by way of the PCM over the CAN-C bus.
- Coolant Temperature Gauge - The engine coolant temperature gauge could be a physical analog gauge with a pointer indication, and/or a virtual graphic gauge with pointer/bar indication in the cluster driver information display screen. The IPC filters and decodes a CAN-C coolant temperature input from the PCM to display the coolant temperature value on the IPC display screen. If the coolant temperature value is greater than a calibrated normal value, the IPC will display either a "Engine Water Over Temp" message or a "Engine Water Critical Temp" message to the driver of the vehicle. The default value to turn on the warning telltale is 125 B°C (257 B°F) for the 3.6L engine. The IPC will also activate a slow continuous warning chime once the temperature reaches 128 B°C (262 B°F)
- Transmission Temperature Gauge - The transmission temperature submenu is only shown in the IPC if the vehicle is equipped with an automatic transmission and if the automatic transmission is a ZF 8Spd. When equipped, the Transmission Control Module (TCM) transmits a CAN-C signal to the IPC to indicate the transmission oil temperature. The IPC filters, decodes and continues to monitor this signal and use this signal to display a virtual transmission oil temperature gauge, and as required, a transmission oil temperature warning.
- Battery Voltage Gauge - The BCM acquires the battery voltage directly from the battery by way of the Intelligent Battery Sensor (IBS). The BCM then sends this value in a signal on the CAN-C network to the IPC for the IPC display.

- The "Drivetrain" submenu gives addition information about the front wheel angle value, sway-bar status, transfer case lock status, axle locker status, pitch angle value and roll angle value on vehicles equipped with a premium level IPC. The IPC receives CAN bus messages from the following devices:

- The Drivetrain Control Module (DTCM) sends CAN messages indicating the type of transfer case equipped and the state of both front and rear axle lockers.
- The SCCM sends CAN messages indicating the steering angle value. The steering wheel angle display has a maximum of 40 degrees to the left and right of zero. This involves 20 images for angles to the left of zero and 20 images for angles to the right of zero. The IPC displays one image for every two degrees from zero angle. Zero angle has one image which denotes the wheels pointing straight ahead.
- Auto Sway Bar System (ASBS) module sends CAN messages indicating the sway bar status
- The BCM sends CAN messages indicating the pitch and roll angle values. In the event that the trail speed exceeds the actual vehicle speed signal from the ABS module, the IPC will not show or simply grey out all angle graphics and display a text message indicating that the pitch and roll are only available at trail speed followed by a km/h or mph value to be reached before the display will resume its normal operation. The default threshold of trail sped is 40 km/h (25 MPH).

FUEL ECONOMY MENU

The fuel economy screen displays the following information:

- Average fuel consumption - Average fuel economy is a ratio of the covered distance to the number of gallons consumed from the beginning of a trip. After the average fuel economy is calculated for every key ON event, the IPC will send the information out on the CAN bus.
- Instantaneous fuel consumption - When the ignition status is RUN or START, the instantaneous fuel economy is calculated as a function of a fuel used input and a distance traveled input, which is recalculated once every 100 milliseconds. Once the instantaneous fuel economy is calculated as a function of fuel used and distance traveled, the IPC will send the information out on the CAN bus.
- Distance to empty/range

  - Distance to empty displays the distance the vehicle can travel before the vehicles fuel is consumed. Distance to empty is calculated by using the following formula:

    - Distance to empty = Fuel Economy multiplied by the current fuel level. The fuel economy is calculated by using an average of the average fuel economy and the instantaneous fuel economy. The current fuel level is calculated from a fuel voltage signal and the fuel capacity signal. If a low fuel signal becomes active, a message will appear above the distance to empty value indicating low fuel. The distance to empty value will be calculated and displayed until it reaches less than 10 miles. Once this has been achieved, the distance to empty will not display again until the distance to empty value increases to above 45 miles.

  The IPC will then broadcast the distance to empty value once calculated.

The BCM will broadcast the average and instantaneous fuel economy on the CAN-IHS bus. Average fuel consumption can be reset by the customer, however distance to empty and instantaneous fuel consumption can not be reset. Any reset of the fuel economy information will not affect the fuel economy seen in the trip displays as they are completely independent of one another.

TRIP MENU

- Trip A Submenu - Trip A elapsed time, distance, and average fuel economy values are displayed in this menu.
- Trip B Submenu - Trip B elapsed time, distance, and average fuel economy values are displayed in this menu.

ENGINE STOP START (ESS) MENU

- ESS Dynamic Messages - The PCM sends multiple signals to the IPC for ESS display messages. The PCM also sends the request to the IPC for the green telltale illumination requests during ESS stop events. There are over 30 ESS messages that the IPC can display to the customer. Refer to the owners manual for a full listing of messages.

AUDIO MENU - The IPC has a region of the display to show audio (Radio/Media Source) information on the IPC display. The radio sends the information that is being presented to the customer on the radio display over to the IPC over the CAN bus. The IPC displays the audio source information (AM, FM, USB, Bluetooth, AUX, CD, SD CARD, SATELLITE, DVD, DTV, APPS amongst other sources not listed) on the first line of the display region assigned to the audio information. Additional metadata information for the current audio source will be displayed on additional lines of the display.

SCREEN SETUP MENU - The screen setup menu will only display when speeds are below 8 km/h (5 mph). The IPC determines this based on a vehicle speed input from the ABS module. If the speed exceeds this limit, an EVIC screen display "SCREEN SETUP-NOT AVAILABLE-SPEED TOO HIGH" message will be prompted to the customer.

- Gear Display Screen Setup Sub Menu - The EVIC displays the transmission gear in full PRND, or single PRND style based on the driver selection using the steering wheel commands. This menu option exists only when equipped with an automatic transmission.
- Upper Left/Right Corner Screen Setup Sub Menu

  - EVIC displays an indication of the following based on the driver selection using the following steering wheel commands:

    - Compass - The compass feature provides the customer with current information about vehicle heading. The compass is visualized when the ignition is in either RUN or ACC states. The BCM determines whether or not a standalone compass module exists on the vehicle. Refer to the Remote Compass Module information below for functional service information.
    - Outside Temperature - The external temperature display feature provides a stable and accurate ambient temperature value to be displayed to the driver. The IPC and the radio carry out the logic to enable or disable the visualization of the temperature display. The BCM provides a filtered temperature signal to the IPC in either Celsius or Fahrenheit, determined by the customer selection in the programmable options menu. The IPC then displays the temperature.
    - Time - The radio, vehicle entertainment center and the IPC configure the time display behavior based on parameters broadcast on the CAN bus. The radio is the master for the vehicle date. The radio is required to keep accurate date information, provide additional features to support the date display, and to transmit the date over the CAN bus to the IPC, which displays the date. The radio allows the customer to manually set the date. The BCM gates multiple date and time bus signals from CAN-IHS to CAN-C in support of this feature.
    - Range (distance to empty)
    - Average Fuel Economy
    - Current Fuel Economy
    - Trip A
    - Trip B
    - Nothing
- Center Screen Setup Sub Menu

  - The EVIC will display in the center an indication of the following options based on the driver selection when using the steering wheel commands:

    - Compass
    - Outside Temperature
    - Time
    - Range
    - Average Fuel Economy
    - Current Fuel Economy
    - Trip A
    - Trip B
    - Audio Information
    - Speedometer - Note: If the Speedometer is selected as the center configurable option, it should not display when in the "Speedometer" menu
    - Menu Title
    - Nothing
- Current Gear Sub Menu - The EVIC displays the current gear next to the D in the PRNDL if current gear display is selected. Otherwise the current gear will not be displayed.
- Odometer Display Sub Menu - The Odometer Display sub menu will give the driver the option of hiding/displaying the odometer based on the selection using the driver selection the steering wheel

commands.

- Favorites Menu

  - The favorites submenu allows the driver to show or hide certain menus. When menus are hidden, the menu will not display in the scroll and the menu icon will not be shown in the scroll wheel. The following menus will able to shown/hidden based on the driver's preference:

    - Off-Road
    - Driver assist
    - Fuel Economy
    - Trip
    - Start/Stop
    - Audio

  If any of these menu options are selected to be shown, the IPC will set an internal variable and then will display a checkmark in the favorites list and then show the selected menu as part of the IPC menu structure.

- Restore to Defaults Screen Setup Sub Menu - The EVIC will display default configurable sections if the "Restore" defaults selection is requested by the driver using the steering wheel commands.
- Speed Warning - The radio has a menu setting for speed limit audio warning in the navigation menu where the user can turn off this feature or select a user offset from current speed limit to trigger an audio warning. The radio generates a one time audio response to say the actual speed limit once the vehicle speed exceeds the sum of the actual current speed limit and user offset. The audio response will not trigger again until the vehicle speed descends below the actual current speed limit. The setting item for the speed limit audio warning is defaulted to be OFF in the navigation menu until turned ON by the customer.
- Passenger Airbag (PAB) - When the PAB switch is enabled or disabled, the Occupant Restraint Controller (ORC) will send a CAN-C signal to the IPC to illuminate the proper enabled or disabled message to the display to the driver.

LOW BRAKE FLUID LEVEL INDICATION - The BCM acquires the brake fluid level information when the ignition is transitioned to RUN. If the signal deems that the brake fluid is low, the BCM transmits a low fluid signal to the IPC over the CAN-C bus.

MALFUNCTION INDICATOR LAMP (MIL) OR CHECK ENGINE LAMP - The IPC manages misfire, Electronic Throttle Control (ETC) and MIL illumination according to information received over the CAN-C bus from the PCM and the TCM.

AIR BAG WARNING LIGHT - The ORC transmits a signal to the IPC in order to:

- indicate the presence of a failure of the ORC airbag system - Solid indicator
- indicate temporary calibration of the ORC - Temporary flashing indicator
- indicate initialization of the ORC - Temporary solid indicator
- indicate normal working status of the ORC - No indicator
- terminate the IPC bulb check. After the indicator lamp bulb check is completed, the ORC can then request the indicator as necessary.

The IPC receives a CAN-C lamp request from the ORC to manage indication of the ORC system failure or calibration. The IPC interprets the signals from the ORC to provide the correct IPC output signals for warning the customer. The IPC diagnoses the airbag warning light requests and stores possible faults permanently until a repair is completed on the concern. In the event that the request is sent from the ORC and it is determined that this will be a stored code, the IPC will then illuminate the indicator to the customer. The IPC then transmits a signal back to the ORC indicating the airbag warning light state.

In the event of ORC calibration, the IPC will flash illuminate the indicator for temporary calibration or hold the indicator steady for ORC initialization. The IPC will deactivate the indicator once the IPC receives a CAN-C message from the ORC that states that the calibration is completed successfully.

SEAT BELT REMINDER WARNING LIGHT - In order for the IPC to correctly drive the seatbelt reminder indicator, the ORC communicates the status of the seatbelt buckle switches along with the front passenger presence status. The seatbelt reminder lamp is a dedicated indicator for this function and it indicates both driver and front passenger seatbelt buckle status using one ISO symbol.

The ORC acquires, validates, and then sends the change of seatbelt buckle status to the IPC. Whenever the seatbelt buckle changes from fastened to not fastened, the ORC receives this change and forwards this to the IPC. If the seatbelt is unbuckled and the ignition switch is moved to the "ON" or "START" position, the IPC will activate a slow audio signal and illuminate the visual indicator for a period of six seconds.

The Occupant Detection System (ODS) is also managed by the ORC. The ODS detects when a seat is occupied versus unoccupied. Like the seatbelt buckle status, the ORC acquires, validates, and then sends the change of occupant detection status to the IPC for illumination when required.

AUXILIARY SWITCH BANK

Refer to **COMPONENT INDEX**.

Four auxiliary switches located in the auxiliary switch bank of the instrument panel can be used to power various aftermarket products and solutions. The auxiliary switches can be programmed and configured via the UconnectB® settings. All switches can be configured for setting the switch type operation to latching or momentary, power source of either battery or ignition, and ability to hold last state across key cycles. The BCM stores the switch state and will transmit the last known switch state values to the ASBM when the BCM detects the ignition state has changed to RUN. If this feature to recall last known state is not enabled, the BCM will transmit the current ASBM switch states instead.

NOTE: **Holding last state conditions are met when switch type is set to latching and power source is set to ignition.**

The auxiliary switches manage the relays that power four blunt cut wires. These wires are located under the instrument panel in the passenger compartment and under the hood to the right, near the battery. In addition to the four auxiliary switch wires, a fused battery wire and ignition wire are also located in the interior, in the passenger side under the instrument panel.

A kit of splices and heat shrink tubing are provided with the auxiliary switches to aid in the connection/installation of customer electrical devices.

WIRE COLOR CHART

CIRCUIT FUNCTION	FUSE	WIRE COLOR	LOCATIONS
Aux Switch 1	40 Amp	Beige/Pink	Interior (passenger side under instrument panel) and Underhood (right side near battery)
Aux Switch 2	40 Amp	Green/Pink	Interior (passenger side under instrument panel) and Underhood (right side near battery)
Aux Switch 3	15 Amp	Orange/Pink	Interior (passenger side under instrument panel) and Underhood (right side near battery)
Aux Switch 4	15 Amp	Dark Blue/Pink	Interior (passenger side under instrument panel) and

			Underhood (right side near battery)
Battery	10 Amp	Red/White	Interior (passenger side under instrument panel)
Ignition	10 Amp	Pink/Orange	Interior (passenger side under instrument panel)

The ASBM is able to determine the current state of all its switches, pressed and active. The ASBM detects when a switch is being pressed and changes the LED indication status accordingly.

The ASBM receives its ignition state functionality by a Local Interface Network (LIN) signal from the BCM. The ASBM uses this signal to determine the ignition state. The ASBM also participates in the load shedding strategy. This is managed by BCM outputs to the ASBM. If battery voltage dips low, the BCM will turn off the ASBM outputs until proper battery power is restored.

Aux Off Road Switch Function

The BCM receives the request for the off road from the ASBM. The BCM uses this signal as an input to request "Off Road" as the active drive mode. The BCM then applies a global drive mode selection based on that input values from the switch. The BCM then sends a CAN-C message to the IPC to request a global drive mode status popup on the display screen as well as a LIN output to the ASBM to turn the LED indicator ON. The TCM manages the drive modes based on a CAN message request from the BCM indicating the customer selection.

Inputs

- ASBM configuration data from the BCM
- Ignition state from the BCM
- Aux enable from the BCM
- Aux switch type from the BCM
- Aux switch power mode from the BCM
- Aux switch cutoff from the BCM
- Aux switch enable last known state from the BCM
- Aux switch requests

Outputs

- Aux switch 1-4 ON to the BCM
- ASBM aux relay hardwired command
- Aux switch LED commands

BODY CONTROL MODULE (BCM)

Refer to **COMPONENT INDEX**.

The BCM is the configuration and the gateway master for this vehicle. The BCM also supports several of the IPC features by providing inputs from other components in the vehicle.

Inputs

- ASBM ON switch state
- Battery voltage
- Commanded ignition state
- Battery health and state of charge
- Engine speed

- ESS state
- Text display data from the radio
- Audio mode for the cabin/driver from the radio
- Phone pop active signal from the radio
- Radio compass direction from the radio
- Radio with gyro present from the radio
- Standalone compass signals for direction, calibration, faults and variance
- Compass variance and calibrations requests from the radio
- Clock/Date configuration data from the radio
- Steering wheel switch (EVIC) commands
- Brake fluid level sensor fluid level information
- Navigation data from the radio for gating to the IPC
- Oil life algorithm data from the PCM
- Vehicle speed - displayed signal from the IPC
- Vehicle speed signal is in MPH format from the IPC
- Request for oil level/oil pressure indicator lamp from the PCM for gating
- Engine RPM value from the PCM for gating
- Primary fuel sensor input
- Average fuel level from the IPC

Outputs

- Aux unavailable due to battery charging display request to the IPC
- ASBM configuration data to the ASBM
- Ignition state to the ASBM
- Aux enable to the ASBM
- Aux switch type to the ASBM
- Aux switch power mode to the ASBM
- Aux switch cutoff to the ASBM
- Aux switch enable last known state to the ABSM
- Text display data from the radio to the IPC
- Audio mode for the cabin/driver from the radio to the IPC
- Phone pop display active signal from the radio to the IPC
- Driver door ajar signal to the IPC
- Commanded ignition state to the IPC
- Vehicle configuration to the radio or IPC that includes:
    - Country code
    - Automatic transmission type
    - Adaptive Cruise Control (ACC) type equipped
    - Special sales code package
    - IPC ECU configurations
    - UREA/SCR present
    - Audio and telematics ECU configuration data
    - ECU configuration messages status
- Gated signal for distance traveled by left wheel and right wheel to the radio
- Gated signal for wheel pulse counter for all four wheels to the radio

- Gated signal for vehicle speed to the radio
- Compass mounting angle, orientation, vehicle in motion and remote compass module configuration signals to the compass module
- Clock/Date configuration data to the IPC
- Steering wheel switch command signals to the IPC
- Ambient temperature average to the IPC in Fahrenheit or Celsius
- Temperature units; Fahrenheit or Celsius to the IPC
- Display outside temperature present to the IPC
- Brake fluid low level indicator request to the IPC
- Gated navigation data to the IPC
- Gates the vehicle speed - displayed to the CAN-C bus
- Gates the vehicle speed signal is in MPH format to the CAN-C bus
- Battery system voltage value to the IPC
- Type of ACC system present to the IPC
- DASM present to the IPC
- Vehicle configuration of the tachometer type to the IPC
- Fuel voltage to the IPC

ELECTRONIC VEHICLE INFORMATION CENTER (EVIC) SWITCH

Refer to **COMPONENT INDEX**.

The EVIC steering wheel switch monitors voltage levels received from the steering wheel buttons corresponding to specific hardwired signals. Those signals are interfaced using discrete circuits and then the steering wheel switch sends the steering wheel button status on the LIN bus to the BCM. The BCM receives the pressed or released status of each steering wheel button from the steering wheel switch on LIN and then the BCM gateways each steering wheel signal onto the CAN-C. The BCM, as the LIN master, requests a button status from the steering wheel switch, as the LIN slave to determine the button pressed/not pressed status.

The EVIC display is part of the IPC assembly and is not serviced as a separate component. If the EVIC is inoperative, the IPC assembly must be replaced. Refer to **REMOVAL AND INSTALLATION**. If the EVIC function buttons are inoperative and require replacement, for the appropriate procedure. Refer to **SWITCH, EVIC CONTROL, REMOVAL AND INSTALLATION**.

INSTRUMENT PANEL CLUSTER (IPC)

Refer to **COMPONENT INDEX**.

The IPC circuitry operates on battery current received through a fused B(+) fuse on a non-switched fused B(+) circuit. This arrangement allows the IPC to remain functional regardless of the status of the ignition switch. The IPC circuitry is grounded through a ground circuit and take out of the instrument panel wire harness with an eyelet terminal connector that is secured by a ground screw to a ground location on the instrument panel structural support.

The IPC gauges, indicators, LED units, control switches as well as the electronic display unit are all integral components of the IPC and its electronic circuit board. If any part of the IPC is damaged or ineffective, the entire IPC assembly must be replaced.

The BCM stores and compares vehicle configuration data with the IPC as well as with other Electronic Control Units (ECU) in the vehicle. If a configuration mismatch is detected, the BCM sets a DTC. A configuration mismatch DTC will require the performance of a Restore BCM Configuration routine, or a Configuration Alignment routine using a diagnostic scan tool.

Inputs

- Internal IPC to display for data text display

- Internal IPC to display for phone popup display
- Internal IPC to display for audio repetition
- Driver door ajar status from the BCM
- Passenger door ajar status from the BCM
- Vehicle speed from the ABS module
- Engine RPM from the PCM
- Commanded ignition state from the BCM
- Accessory delay active input from the BCM
- Engine Start/Stop (ESS) present signal from the PCM
- Vehicle configuration from the BCM including:
    - Country code
    - Automatic transmission type
    - Adaptive Cruise Control (ACC) type equipped
    - Special sales code package
    - IPC ECU configurations
- Steering wheel switch commands
- Speed (speedometer) units; miles
- Display compass heading from the BCM or radio
- Compass direction from the BCM
- Ambient temperature average from the BCM in Fahrenheit or Celsius
- Temperature units; Fahrenheit or Celsius from the BCM
- Display outside temperature present from the BCM
- Loose gas cap message from the PCM
- Navigation data gated from the BCM
- Oil life algorithm data from the PCM
- Increasing speed constant (offset for speedometer biasing) from the BCM
- Speedometer tolerance percentage (gain for speedometer biasing) from the BCM
- Distance traveled by the left and right wheel signals from the ABS module
- Default fuel economy from the PCM
- Fuel consumption from the PCM
- Fuel type from the PCM
- Number of engine cylinders from the PCM
- Fuel level voltage from the BCM
- Fuel capacity from the BCM
- Request for oil level/oil pressure indicator lamp from the PCM
- Oil pressure indicator from the PCM
- Engine running state from the PCM
- ESS event messages, illumination requests and pop up requests from the PCM
- Engine displacement input from the PCM
- Request for oil temperature warning indicator lamp from the PCM. This can either be HIGH or CRITICAL
- Oil temperature input from the PCM
- Engine coolant temperature from the PCM
- Transmission fluid temperature from the TCM
- Excessive transmission fluid temperature from the TCM

- Type of transmission equipped, manual or automatic, from the BCM
- Automatic transmission type from the BCM
- Battery system voltage value from the BCM
- Transfer case status from the DTCM
- DTCM present message from the BCM
- Steering wheel angle, sensor status and polarity messages from the SCCM
- Axle locker status message from the DTCM
- Axle locker system present message from the BCM
- Body style configuration message from the BCM
- Sway bar status message from the ASBS module
- Pitch and roll angles messages from the BCM
- ASBS present message from the BCM
- Vehicle speed from the ABS module
- Type of ACC system present from the BCM
- DASM present from the BCM
- Multiple bus messages from the DASM involving the ACC system display on the IPC
- Engine RPM for indication from the PCM
- Vehicle configuration of the tachometer type from the BCM
- PCM MIL and warning indicator requests
- TCM MIL and warning indicator requests from the PCM
- PCM ETC indicator requests
- Seatbelt buckle status from the ORC (buckled or unbuckled)
- ODS status from the ORC (occupied or unoccupied)
- Reverse gear engaged/not engaged for manual transmission from the BCM
- PRND status from the BCM
- Seatbelt reminder present configuration from the BCM

Outputs

- Internal signals to the display area of the IPC
- Odometer reading to the BCM for gating
- Average fuel economy to the BCM
- Instantaneous fuel economy to the BCM
- All trip data information signals to the radio to be sent to the mobile application and or used in other features by the radio
- ESS display status to the PCM
- Averaged and extended averaged fuel level to the BCM

RADIO

Refer to **COMPONENT INDEX**.

The Radio sends spontaneous CAN messages to communicate information to the IPC display. The IPC uses these messages to display radio data in the area allocated for Audio/Video source information.

Inputs

- Audio and telematics ECU configuration from the BCM
- ECU configuration messages status from the BCM
- Gated signal for distance traveled by left wheel and right wheel from the BCM

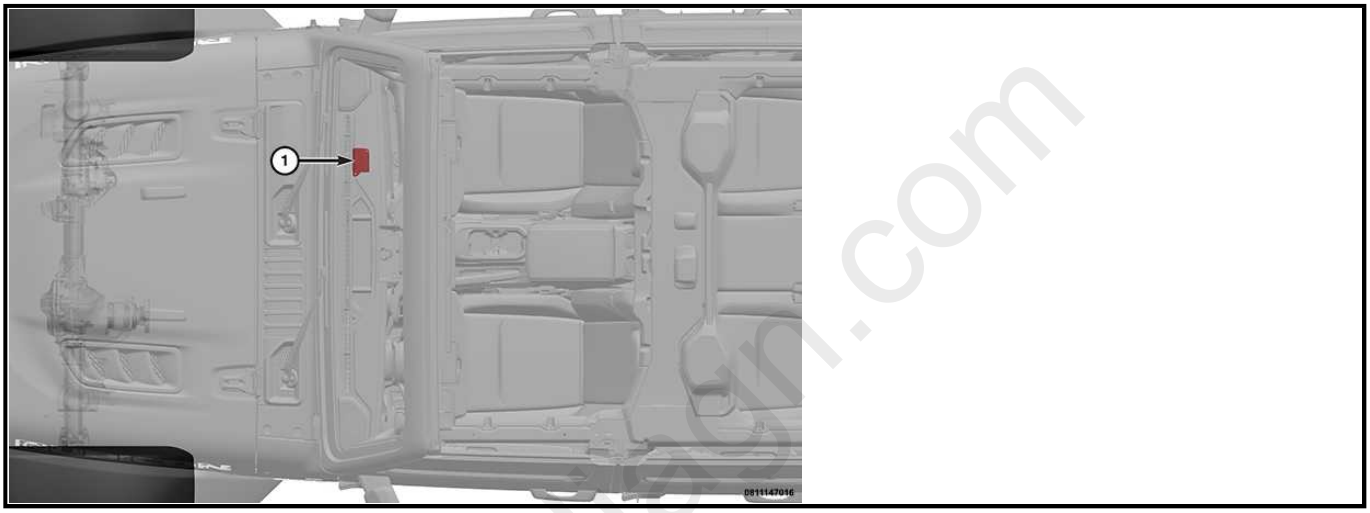
- Gated signal for wheel pulse counter for all four wheels from the BCM
- Gated signal for vehicle speed from the BCM
- Compass display from the BCM
- Gated messages for language, distance units and speed unit

Outputs

- Radio compass direction to the BCM
- Radio with gyro present to the BCM
- Display compass heading to the BCM or IPC
- LTM radio equipped - Compass variance, direction and calibration state to the BCM
- Navigation data information to the BCM

REMOTE COMPASS MODULE

Refer to **COMPONENT INDEX**.



The compass feature provides the customer with current information about vehicle heading. The compass is visualized when the ignition is in either RUN or ACC states. The BCM determines whether or not a standalone compass module exists on the vehicle.

Compass Heading Calculations - If a standalone compass module is present and the radio is equipped with gyro, the BCM will ignore the data coming from the compass module and only use the data from the gyro for heading direction. The BCM is responsible for sending the heading direction to the IPC.

The compass gathers the true north position using the earths magnetic field and applies the compass variance to determine the compass direction. The compass master provides hysteresis to prevent the display heading from switching back and forth repeatedly while driving along a switch point. As part of the hysteresis, the compass master will not change the heading until the heading angle exceeds or drops below the normal switch point by 2.5 degrees or more. An example of this is that the switch point between north and north east is 22.5 degrees/ When driving north along that line, the compass master will hold the heading "N" until the heading angle reaches 25 degrees, then it may update to "NE". Consequently, it will not change back to "N' until the heading angle drops below 20 degrees.

Compass data transfer - The BCM communicates with the compass over the LIN bus. The compass sends heading direction, variance value, calibration mode status, calibration request and the state of calibration faults to the BCM.

The BCM sends to the compass the status of the vehicle (whether it is moving or not), the mounting orientation, the mounting angle and the request for calibration or changing in the variance. The BCM then broadcasts and sends the compass direction to the IPC.

Compass Variance Setting - The compass can only increment its variance zone value one step at a time. This requires that the BCM sends several increment requests to the compass if the compass variance is more than one variance away. The compass default value for the variance is set to the North East United State setting, or zone-8.

The compass is able to have its calibration and variance value saved in non volatile memory, eliminating the need of compass recalibration or reset of the variance every time the power cycles or a battery disconnect occurs.

Manual Compass Calibration - The customer is able to calibrate the compass manually when the system is supported by the compass module. When the customer selects to calibrate the compass, the BCM sends a LIN command to the compass module to calibrate. The compass module will then return a LIN signal to the BCM indicating that calibration is complete. Once this signal is received by the BCM, the BCM sends a CAN-IHS message to the IPC with the new compass data calibration information.

STEERING COLUMN CONTROL MODULE (SCCM)

Refer to **COMPONENT INDEX**.

The SCCM sends CAN messages to the IPC indicating the steering angle value to support a menu display option in the IPC.

Inputs

- Steering wheel switch pass through for EVIC selections

Outputs

- Steering angle value to the IPC
- Steering wheel switch pass through for EVIC selections

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INSTRUMENT CLUSTER

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, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, 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.**

If all of the Instrument Panel Cluster (IPC) gauges and indicators are ineffective, be certain to check the IPC fused B(+) fuse and the IPC fused B(+) and ground circuits for shorts or opens. Refer to the appropriate wiring information. 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. The wiring information includes wiring diagrams, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds. For proper wire repair, and connector repair procedures. Refer to **STANDARD PROCEDURE** . Refer to **REMOVAL** , and Refer to **INSTALLATION** .

If an individual hard-wired gauge or indicator is ineffective, refer to the diagnosis and testing service information for that specific gauge or indicator. If an individual Controller Area Network (CAN) data bus message-controlled gauge or indicator is ineffective, perform the Self-Diagnostic Test.

CAUTION: **Instrument clusters used in this vehicle automatically configure themselves for compatibility with the features and optional equipment in the vehicle in which**

they are initially installed. The instrument cluster is programmed to do this by embedding the Vehicle Identification Number (VIN) and other information critical to proper cluster operation into electronic memory. This embedded information is learned through electronic messages received from other electronic modules in the vehicle over the Controller Area Network (CAN) data bus and through certain hard-wired inputs received when the cluster is connected to the vehicle electrically. Once configured, the instrument cluster memory may be irreparably damaged and certain irreversible configuration errors may occur if the cluster is connected electrically to another vehicle; or, if an electronic module from another vehicle is connected that provides data to the instrument cluster (including odometer values) that conflicts with that which was previously learned and stored. Therefore, the practice of exchanging (swapping) instrument clusters and other electronic modules in this vehicle with those removed from another vehicle must always be avoided. Failure to observe this caution may result in instrument cluster damage, which is not reimbursable under the terms of the product warranty. Service replacement instrument clusters are provided with the correct VIN and the certified odometer values embedded into cluster memory, but will otherwise be automatically configured for compatibility with the features and optional equipment in the vehicle in which they are initially installed.

NOTE: **Certain indicators in this instrument cluster are automatically configured. This feature allows those indicators to be activated or deactivated for compatibility with certain optional equipment. If the problem being diagnosed involves improper illumination of an indicator for equipment options the vehicle does not have, disconnect and isolate the battery negative cable. After about five minutes, reconnect the battery negative cable and turn the ignition switch to the ON position. The instrument cluster should automatically relearn the equipment in the vehicle and properly configure the indicators accordingly.**

SELF TEST

The self-diagnostic test will put the IPC into its test mode. In this mode the IPC can perform an actuator test that will confirm that the circuitry, the gauges and the indicators are capable of operating as designed. During the test the IPC circuitry will position each of the gauge needles at various calibration points, illuminate each of the segments in the Thin Film Transistor (TFT) display unit and turn all of the indicators ON and OFF again.

Successful completion of the self-diagnostic test will confirm that the IPC is operational. However, there may still be a problem with the Controller Area Network (CAN) data bus or another electronic control module that provides electronic message inputs to the IPC, or the inputs to one of these electronic control modules. Use a diagnostic scan tool to diagnose these components. Refer to the appropriate diagnostic information.

1. Begin the test with the ignition switch in the OFF position.
2. Depress the Electronic Vehicle Information Center (EVIC) **Down / Scroll** switch button on the left steering wheel spoke.
3. While still holding the **Down / Scroll** switch button depressed, turn the ignition switch to the ON position, but do not start the engine.
4. Release the **Down / Scroll** switch button.
5. The IPC will simultaneously begin to illuminate all of the operational segments in the TFT display unit and perform a bulb check of each operational Light Indicating Diode (LED) unit indicator. The TFT display segments and LED unit indicators remain illuminated as each gauge needle is swept to several calibration points and back. If a TFT display segment or an LED unit indicator fails to illuminate, or if a gauge needle fails to sweep through the calibration points and back during this test, the IPC must be replaced.
6. The self-diagnostic test is now complete. The IPC will automatically exit the self-diagnostic test mode and return to normal operation at the completion of the test. The self-diagnostic test will be aborted if the

ignition switch is turned to the OFF position, or if an electronic **vehicle speed** message indicating that the vehicle is moving is received over the CAN data bus during the test.

7. Repeat the test, if necessary.

STANDARD PROCEDURE

ENHANCED SEATBELT REMINDER PROGRAMMING

The seatbelt indicator also includes a programmable enhanced seatbelt reminder or BELTMINDER feature that is enabled when the vehicle is shipped from the factory. This BELTMINDER feature provides extended and modified visual seatbelt indicator and audible chime warning responses to an unbuckled front seat belt thought the Instrument Panel Cluster (IPC). The BELTMINDER feature may be disabled or enabled by the customer using the programming sequence that follows, or by the dealer using a diagnostic scan tool.

In order for the IPC to correctly drive the seatbelt reminder indicator, the ORC communicates the status of the seatbelt buckle switches (driver and front passenger) and the front passenger presence status. The seatbelt reminder warning light and audible feedback are a dedicated indicator for this function, and it indicates both driver and front passenger seatbelt buckle status using one ISO symbol. the first warning is only visual. if the seatbelt (s) are not buckled then the second and final warning is the visual indicator along with the slow 6 second audio chime. Both the indicator and chime functions are performed by the IPC.

CUSTOMER PROGRAMMING SEQUENCE

NOTE: **The following sequence of events must occur within 60 seconds of the ignition being placed in the ON position in order for the programming to be completed successfully.**

Perform the following procedure to modify the BELTMINDER feature:

1. With all doors closed and the ignition in any position except ON or START, buckle the driver side front seat belt.
2. Cycle the ignition to the ON position and wait for the seatbelt indicator reminder function to conclude (about six seconds).
3. Unbuckle and buckle the driver side front seat belt three or more times, ending with the belt buckled.
4. Cycle the ignition to any position except ON or START to toggle the BELTMINDER feature from its current setting (from active to inactive, or from inactive to active). A single chime tone will provide an audible confirmation that the programming sequence has been successfully completed.

REMOVAL AND INSTALLATION

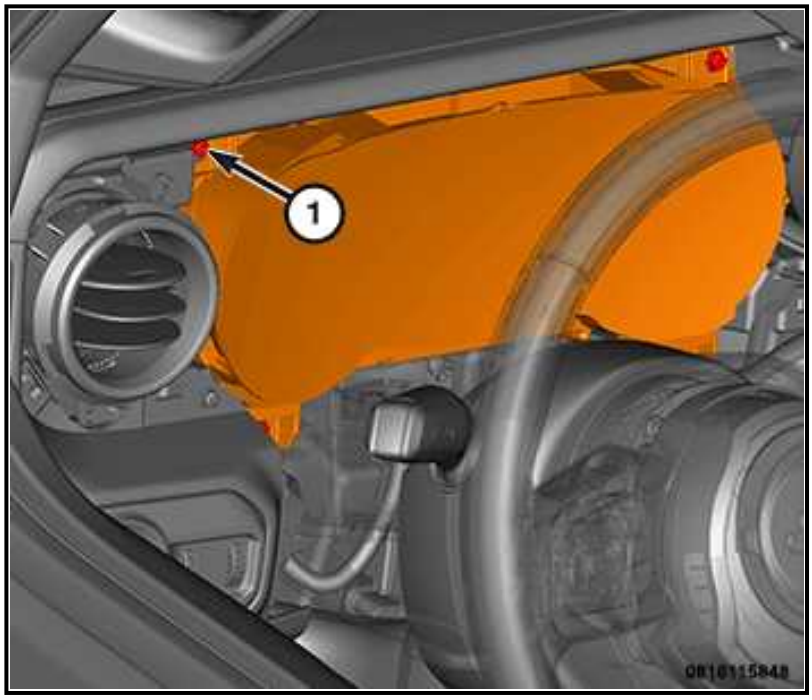
REMOVAL AND INSTALLATION

REMOVAL

1. Disconnect and isolate the negative battery cable(s). Refer to **CABLES, BATTERY** , or **CABLES, BATTERY** .
2. Remove the cluster bezel from the instrument panel. Refer to **BEZEL, INSTRUMENT CLUSTER, REMOVAL AND INSTALLATION** .

NOTE: **Removal of the gap hider is not required.**

3. Position the gap hider aside. Refer to **GAP HIDER, STEERING COLUMN SHROUD, REMOVAL AND INSTALLATION** .



4. Remove the fasteners (1) that secure the Instrument Panel Cluster (IPC) to the instrument panel armature.
5. Pull the top of the IPC rearward far enough to access and disconnect the instrument panel wire harness connectors from the back of the IPC housing.
6. Remove the IPC from the instrument panel.

INSTALLATION

1. Position the IPC close enough to the instrument panel to connect the wire harness connectors to the back of the IPC housing.
2. Position the IPC mounting tabs to the mounting holes in the instrument panel armature.
3. Install the fasteners that secure the mounting tabs of the IPC and tighten securely.
4. Install the gap hider. Refer to **GAP HIDER, STEERING COLUMN SHROUD, REMOVAL AND INSTALLATION** .
5. Install the IPC bezel onto the instrument panel. Refer to **BEZEL, INSTRUMENT CLUSTER, REMOVAL AND INSTALLATION** .
6. Connect the negative battery cable(s). Refer to **CABLES, BATTERY** , or **CABLES, BATTERY** .

NOTE: **Certain indicators in this IPC are automatically configured. This feature allows those indicators to be activated or deactivated for compatibility with certain optional equipment. If a problem is noted that involves improper illumination of an indicator, disconnect and isolate the battery negative cable. After about five minutes, connect the battery negative cable and cycle the ignition to the ON position. The IPC should automatically relearn the equipment in the vehicle and properly configure the indicators.**

POD, SWITCH

REMOVAL AND INSTALLATION

REMOVAL AND INSTALLATION

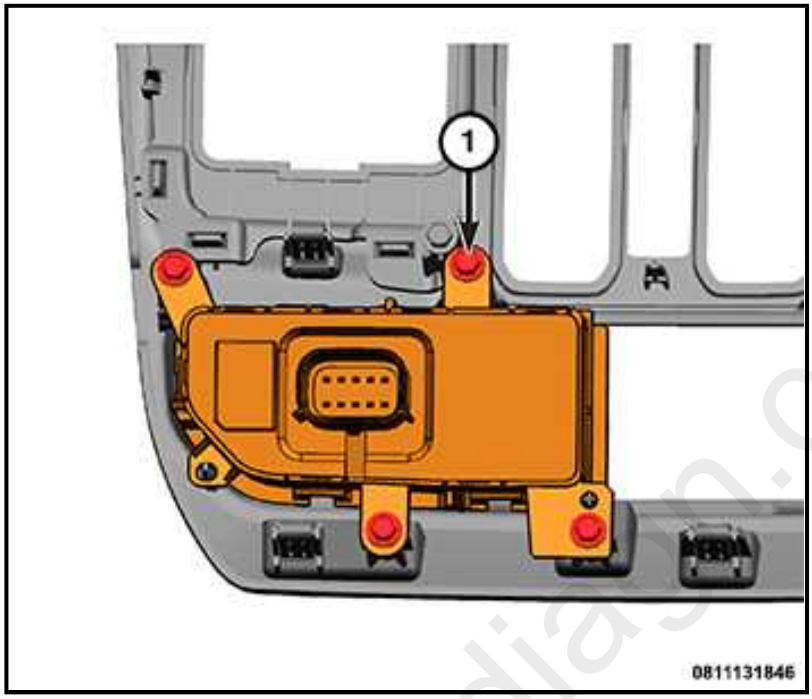
REMOVAL

WARNING: **Disable the airbag system before attempting any steering wheel, steering column or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable and wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service.**

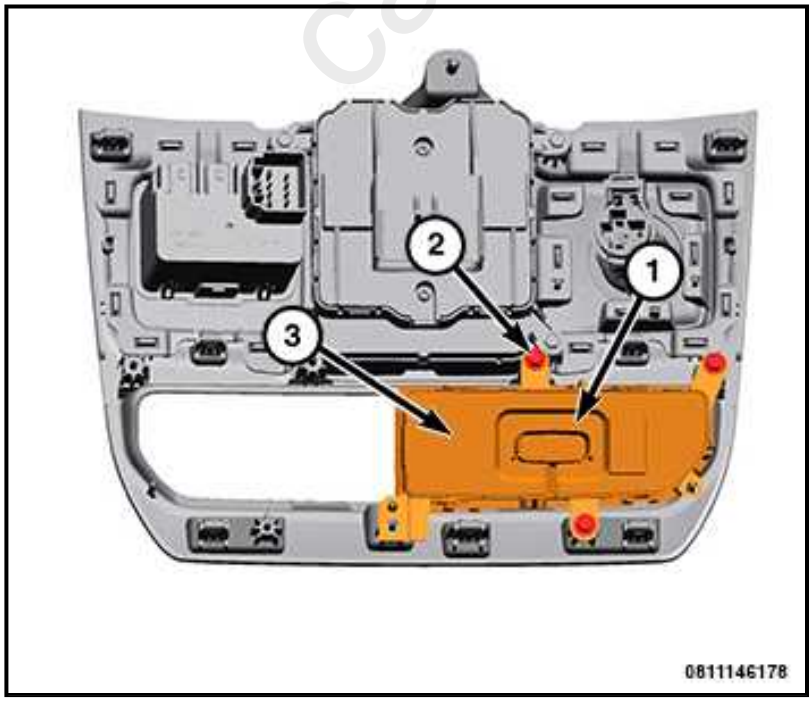
This is the only sure way to disable the airbag system. Failure to follow these instructions may result in accidental airbag deployment and possible serious or fatal injury.

NOTE: **Take the proper precautions to protect the face of the center bezel from cosmetic damage while performing this procedure.**

1. Disconnect and isolate the negative battery cable(s). Refer to **CABLES, BATTERY** , or **CABLES, BATTERY** .
2. Remove the lower instrument panel center trim (4) and place it on a workbench. Refer to **PANEL, INSTRUMENT PANEL TRIM, REMOVAL AND INSTALLATION** .
3. Disconnect the auxiliary switch bank and, if equipped, off road switch wire harness connectors.



4. Remove the fasteners (1) that secure the accessory switch bank to the lower instrument panel center trim and remove the switch bank.



5. If equipped, remove the fasteners (2) that secure the off road switch (3) to the lower instrument panel center trim and remove the switch.

INSTALLATION

NOTE: **Take the proper precautions to protect the face of the lower instrument panel center trim from cosmetic damage while performing this procedure.**

1. If equipped, position the off road switch to the back of the lower instrument panel center trim and install the fasteners that secure it to the lower instrument panel center trim and tighten securely.
2. Position the accessory switch bank to the lower instrument panel center trim and install the fasteners that secure the accessory switch bank to the lower instrument panel center trim and tighten securely.
3. Connect the auxiliary switch bank and, if equipped, off road switch wire harness connectors.
4. Install the lower instrument panel center trim. Refer to **PANEL, INSTRUMENT PANEL TRIM, REMOVAL AND INSTALLATION** .
5. Connect the negative battery cable(s). Refer to **CABLES, BATTERY** , or **CABLES, BATTERY** .

SWITCH, EVIC CONTROL

REMOVAL AND INSTALLATION

REMOVAL AND INSTALLATION

REMOVAL

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, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, 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.**

1. Disconnect and isolate the negative battery cable(s). Refer to **CABLES, BATTERY** , or **CABLES, BATTERY** .
2. Remove the remote radio switch Refer to **SWITCH, REMOTE RADIO, REMOVAL AND INSTALLATION** .

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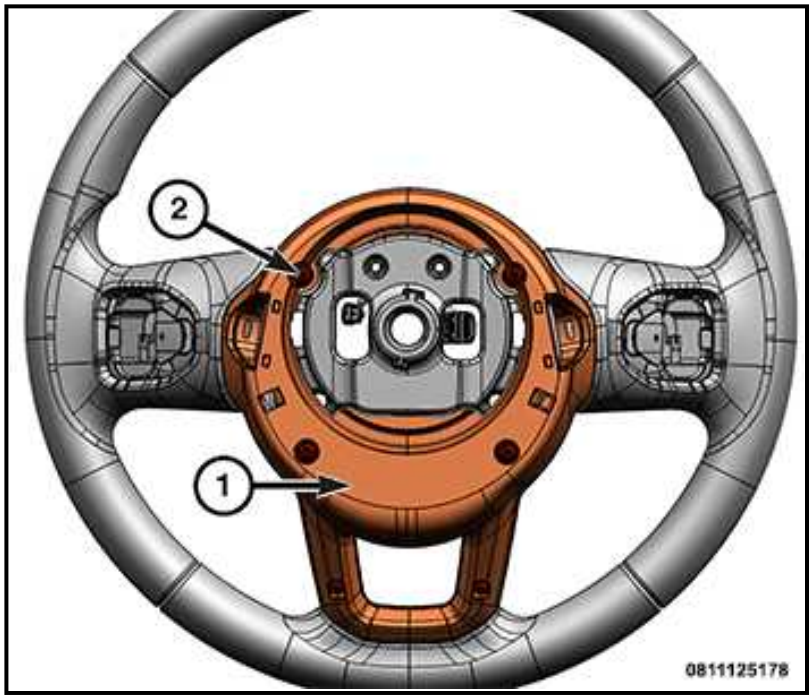
3. Remove the steering wheel. Refer to **WHEEL, STEERING, REMOVAL AND INSTALLATION** .



4. Remove the fasteners (2) securing the steering wheel back cover (1) to the steering wheel, then remove the steering wheel back cover from the steering wheel.
5. Pull the steering wheel bezel away from the steering wheel and disconnect the cruise control switch and Electronic Vehicle Information Center (EVIC) switch wire harness connectors, then remove the bezel with switches.

6. Remove the fasteners (1) securing the EVIC switch to the bezel and remove the EVIC switch (2) from the bezel.

INSTALLATION

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, airbag, seat belt tensioner, impact sensor or instrument panel component diagnosis or service. Disconnect and isolate the battery negative (ground) cable, 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.

1. Position the EVIC switch to the steering wheel bezel.
2. Install the fasteners securing the EVIC switch to the bezel and tighten securely.
3. Position the bezel to the steering wheel and connect the cruise control and EVIC switch wire harness connectors.
4. Install the fasteners securing the steering wheel back cover to steering wheel and tighten securely.
5. Install the steering wheel. Refer to **WHEEL, STEERING, REMOVAL AND INSTALLATION** .
6. Install the remote radio switch Refer to **SWITCH, REMOTE RADIO, REMOVAL AND INSTALLATION** .

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7. Connect the negative battery cable(s). Refer to **CABLES, BATTERY** , or **CABLES, BATTERY** .
