SPECIFICATIONS

SEAT MEMORY CONTROL MODULE SCAN TOOL INFORMATION

Seat Position Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Driver Seat Back Switch	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the seat recline switch is pressed, the scan tool displays the direction for which the switch is pressed.
Driver Seat Back Direction Command	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the seat recline switch is pressed or when a memory recall occurs, the scan tool displays the direction the memory control module is commanding the seat recline motor.
Driver Seat Back Position	Varies	The scan tool displays 0-65,535 counts. The hall effect sensor provides a determined number of pulse signals with each rotation of the motor that the scan tool displays as counts. High count values indicate that the seat back is in the forward position, while low count values indicate that the seat back is in the rearward position.
Driver Seat Cushion Front Vertical Direction Command	Inactive	The scan tool displays Inactive, Up or Down. When the seat front vertical switch is pressed or when a memory recall occurs, the scan tool displays the direction the memory control module is commanding the seat front vertical motor.
Driver Seat Cushion Front Vertical Position	Varies	The scan tool displays 0-65,535 counts. The hall effect sensor provides a determined number of pulse signals with each rotation of the motor that the scan tool displays as counts. High count values indicate that the seat front vertical is in the up position, while low count values indicate that the seat front vertical is in the down position.
Driver Seat Cushion Front Vertical Switch	Inactive	The scan tool displays Inactive, Up or Down. When the seat front vertical switch is pressed, the scan tool should display the direction for which the switch is pressed.
Driver Seat Cushion Rear Vertical Direction Command	Inactive	The scan tool displays Inactive, Up or Down. When the seat rear vertical switch is pressed or when a memory recall occurs, the scan tool displays the direction the memory control module is commanding the seat rear vertical motor.

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Parameter	Expected Value	Definition
Driver Seat Cushion Rear Vertical Position	Varies	The scan tool displays 0-65,535 counts. The hall effect sensor provides a determined number of pulse signals with each rotation of the motor that the scan tool displays as counts. High count values indicate that the seat rear vertical is in the up position, while low count values indicate that the seat rear vertical is in the down position.
Driver Seat Cushion Rear Vertical Switch	Inactive	The scan tool displays Inactive, Up or Down. When the seat rear vertical switch is pressed, the scan tool should display the direction for which the switch is pressed.
Driver Seat Horizontal Direction Command	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the seat horizontal switch is pressed or when a memory recall occurs, the scan tool displays the direction the memory control module is commanding the seat horizontal motor.
Driver Seat Horizontal Position	Varies	The scan tool displays 0-65,535 counts. The hall effect sensor provides a determined number of pulse signals with each rotation of the motor that the scan tool displays as counts. High count values indicate that the seat horizontal position is forward, while low count values indicate that the seat horizontal position is rearward.
Driver Seat Horizontal Switch	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the seat horizontal switch is pressed, the scan tool should display the direction for which the switch is pressed.
Driver Seat Lumbar Support Horizontal Switch	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the seat lumbar horizontal switch is pressed, the scan tool should display the direction for which the switch is pressed.
Driver Seat Lumbar Support Horizontal Direction Command	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the seat lumbar horizontal switch is pressed, the scan tool displays the direction the memory control module is commanding the seat lumbar horizontal motor.
Driver Seat Lumbar Support Vertical Switch	Inactive	The scan tool displays Inactive, Up, or Down. When the seat lumbar vertical switch is pressed, the scan tool should display the direction for which the switch is pressed.
Driver Seat Lumbar Support Vertical Direction Command	Inactive	The scan tool displays Inactive, Up, or Down. When the seat lumbar vertical switch is pressed, the scan tool displays the direction the memory control module is commanding the seat lumbar vertical motor.
Driver Seat Memory Recall Switches	Inactive	The scan tool displays Inactive, Memory 1, Memory 2, or Exit. When a memory function switch is pressed, the scan tool should momentarily

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Parameter	Expected Value	Definition
		display the function selected.
Driver Seat Memory Set Switch	Inactive	The scan tool displays Inactive/Active. When the memory SET switch is pressed, the scan tool should display Active.
Driver Seat Bulkhead Limit Switch	Inactive	The scan tool displays Inactive/Active. When the seat is moved rearward and the seat back comes in contact with the bulkhead limit switch, the scan tool should display Active.
Driver Seat Back Unlock Switch	Inactive	The scan tool displays Inactive/Active. When the seat back is folded forward, the seat back unlock switch is closed to voltage and the scan tool should display Active.
Driver Seat Back Side Bolster Direction	Inactive	The scan tool displays Inactive, Inflate, or Deflate. When the seat back side bolster switch is pressed, the scan tool displays the function the memory control module is commanding the seat lumbar/bolster pump.
Driver Seat Back Side Bolster Switch	Inactive	The scan tool displays Inactive, Inflate, or Deflate. When the seat back side bolster switch is pressed, the scan tool should display the function for which the switch is pressed.
Seat Massage Switch	Inactive	The scan tool displays Inactive/Active. When the seat massage switch s pressed, the scan tool should display Active.

Mirror Memory Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Mirror Select Switch	None	The scan tool displays None, Driver Door, or Passenger Door. The scan tool displays the current state of the mirror select switch.
Mirror Direction Switch	Inactive	The scan tool displays Inactive/Up/Down/Left /Right/Folding/Extending. The scan tool displays the current state of the power mirror switch as pressed.
Driver Mirror Direction Command	Inactive	The scan tool displays Inactive/Up/Down/Left /Right. When the power mirror switch is being used or when a memory recall occurs, the scan tool displays the direction the memory control module is commanding the driver mirror motors.
Driver Mirror Vertical Position	Varies	The scan tool displays 0-5 V. The voltage displayed represents the position of the driver vertical motor. High voltage values indicate the mirror position is up, while low count values indicate the mirror position is down.
Driver Mirror Horizontal Position	Varies	The scan tool displays 0-5 V. The voltage displayed represents the position of the driver horizontal motor. High voltage values indicate the

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Parameter	Expected Value	Definition
		mirror position is to the right or in, while low count values indicate the mirror position is to the left or out.
Passenger Mirror Direction Command	Inactive	The scan tool displays Inactive/Up/Down/Left /Right. When the power mirror switch is being used or when a memory recall occurs, the scan tool displays the direction the memory control module is commanding the passenger mirror motors.
Passenger Mirror Vertical Position	Varies	The scan tool displays 0-5 V. The voltage displayed represents the position of the passenger vertical motor. High voltage values indicate the mirror position is up, while low count values indicate the mirror position is down.
Passenger Mirror Horizontal Position	Varies	The scan tool displays 0-5 V. The voltage displayed represents the position of the passenger horizontal motor. High voltage values indicate the mirror position is to the right or in, while low count values indicate the mirror position is to the left or out.

Steering Column Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Steering Column Direction Switch	Varies	The scan tool displays Inactive, Forward, Rearward, Up, or Down. When the steering column switch is pressed, the scan tool should display the direction for which the switch is pressed.
Steering Column Vertical Position	Varies	The scan tool displays 0-5 V. The voltage displayed is an input to the seat memory control module from the steering column vertical position sensor. Higher voltage readings indicates the steering wheel position is up while lower voltage readings indicate the steering wheel position is down.
Steering Column Horizontal Position	Off	The scan tool displays 0-5 V. The voltage displayed is an input to the seat memory control module from the steering column vertical position sensor. Higher voltage readings indicates the steering wheel position is forward toward the front of the vehicle or away from the driver while lower voltage readings indicate the steering wheel position is rearward toward the driver.

Adjustable Pedals Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		

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Parameter	Expected Value	Definition
Adjustable Pedal Control Switch	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the adjustable pedal switch is pressed, the scan tool should display the direction for which the switch is pressed.
Adjustable Pedals Direction Command	Inactive	The scan tool displays Inactive, Forward, or Rearward. When the adjustable pedal switch is pressed or when a memory recall occurs, the scan tool displays the direction the seat memory control module is commanding the adjustable pedal motor.
Adjustable Pedals Horizontal Position	Varies	The scan tool displays 0-5 V. The voltage displayed is an input to the seat memory control module from the adjustable pedal position sensor. Higher voltage readings indicates the pedals are forward toward the front of the vehicle or away from the driver while lower voltage readings indicate the pedals are rearward toward the driver.

Seat Memory Scan Tool Control Functions

Control Functions	Description
Driver Seat Back Horizontal Movement	This output control is used to command the driver seat back recline position Forward and Rearward.
Driver Seat Cushion Front Vertical Movement	This output control is used to command the driver seat cushion front vertical position Up and Down.
Driver Seat Cushion Rear Vertical Movement	This output control is used to command the driver seat cushion rear vertical position Up and Down.
Driver Seat Horizontal Movement	This output control is used to command the driver seat horizontal position Forward and Rearward.
Driver Seat Back Side Bolster Movement	This output control is used to command the driver seat back side bolster support to Inflate or Deflate.
Driver Seat Lumbar Support Horizontal Movement	This output control is used to command the driver seat lumbar horizontal position Forward and Rearward.
Driver Seat Lumbar Support Vertical Movement	This output control is used to command the lumbar vertical position Up and Down.

Mirror Memory Scan Tool Control Functions

Control Functions	Description
Driver Mirror Fold	This output control is used to command the driver mirror to fold and unfold.
Driver Mirror Movement	This output control is used to command the driver mirror up and down or left and right.
Passenger Mirror Fold	This output control is used to command the passenger mirror to fold and unfold.
Passenger Mirror Movement	This output control is used to command the passenger mirror up and down or left and right.

Adjustable Steering Column Scan Tool Control Functions

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Control Functions	Description
Steering Column Tilt Up Command	This output control is used to command the steering column to the up position.
Steering Column Tilt Down Command	This output control is used to command the steering column to the down position.
Steering Column Telescope Forward Command	This output control is used to command the steering column to the forward position.
Steering Column Telescope Rearward Command	This output control is used to command the steering column to the rearward position.

Adjustable Pedals Scan Tool Control Functions

Control Functions	Description
Adjustable Pedals Forward/Rearward	This output control is used to command the adjustable pedal position forward and rearward.

Seat Cushion Haptic Motors Scan Tool Control Functions

Control Functions	Description
Driver Seat Cushion Left Rear Haptic Movement	This output control is used to Enable and Disable the driver seat cushion left rear haptic motor function.
Driver Seat Cushion Right Rear Haptic Movement	This output control is used to Enable and Disable the driver seat cushion right rear haptic motor function.

ELECTRONIC BRAKE CONTROL MODULE SCAN TOOL INFORMATION

The Electronic Brake Control Module (EBCM) scan tool data parameters list contains all ABS related parameters that are available on the scan tool. The list is arranged in alphabetical order. A given parameter may appear in any one of the data lists.

Electronic Brake Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON			
ABS Pump Motor Voltage	-	0 V	The scan tool displays the commanded pump motor voltage.
Acceleration Sensor Longitudinal Signal	-	Varies	The scan tool displays 0-5 V depending on the vehicle's longitudinal acceleration.
Antilock Braking System	-	OK	The scan tool displays OK or Malfunction. Malfunction is displayed if there is an ABS malfunction.
Brake Booster Vacuum Sensor	-	Varies	The scan tool displays kPa (psi) This is the current vacuum.
Brake Booster Vacuum Sensor Supply	-	0 V	The scan tool displays 0-5 V depending on the brake booster vacuum sensor supply voltage.

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Parameter	System State	Expected Value	Description
Brake Fluid Level Sensor	-	OK	The scan tool displays OK when the brake fluid is at correct level and Low when the brake fluid is low.
Brake Pedal Position Sensor	Brake pedal released	Inactive	The scan tool displays Inactive or Active depending on the state of the brake pedal.
	Brake pedal applied	Active	
Brake Pressure Sensor	Brake pedal released	0-1 V	The scan tool displays 0-5 V depending on the applied hydraulic brake pressure.
	Brake pedal applied	1-5 V	
Brake Pressure Sensor	Brake pedal released	2000-3000 kPa	The scan tool displays the actual pressure applied to the brake pedal.
Delivered Torque	-	Varies	The scan tool displays 0-100% depending on the how much torque the engine is delivering.
Dynamic Rear Proportioning Status	-	OK	The scan tool displays OK or Malfunction. Malfunction is displayed if the EBCM disables the dynamic rear proportioning due to a fault.
Lateral Acceleration Signal	-	Varies	The scan tool displays 0-5 V depending on the vehicle's lateral acceleration.
Left Front Inlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the left front inlet solenoid valve is commanded ON.
Left Front Outlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the left front outlet solenoid valve is commanded ON.
Left Front Wheel Speed Sensor	-	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the left front wheel speed sensor.
Left Rear Inlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the left rear inlet solenoid valve is commanded ON.
Left Rear Outlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the left rear outlet solenoid valve is commanded ON.
Left Rear Wheel Speed Sensor	-	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the left rear wheel speed sensor.
Panic Brake Assist Status	-	OK	The scan tool displays OK or Malfunction. Malfunction is displayed if the EBCM disables the panic brake assist due to a fault.
Pump Motor Relay Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the pump motor is commanded ON.

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Parameter	System State	Expected Value	Description
Primary Isolation Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the isolation solenoid valve is commanded ON.
Primary Prime Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the prime solenoid valve is commanded ON.
Requested Torque	-	Varies	The scan tool displays 0-100% depending on the how much torque is requested.
Right Front Inlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the right front inlet solenoid valve is commanded ON.
Right Front Outlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the right front outlet solenoid valve is commanded ON.
Right Front Wheel Speed Sensor	-	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the right front wheel speed sensor.
Right Rear Inlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the right rear inlet solenoid valve is commanded ON.
Right Rear Outlet Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the right rear outlet solenoid valve is commanded ON.
Right Rear Wheel Speed Sensor	-	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the right rear wheel speed sensor.
Secondary Isolation Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the isolation solenoid valve is commanded ON.
Secondary Prime Solenoid Valve Feedback	-	Inactive	The scan tool displays Inactive or Active. Active is displayed when the prime solenoid valve is commanded ON.
Steering Column Position	Steering wheel in straight position	-5 to +5Â°	The scan tool displays Â°. This is the current position of the steering angle sensor.
	Steering wheel turned left until stop	450-550Â°	
	Steering wheel turned right until stop	-550 to -450Â°	
System Voltage	-	11-14 V	The scan tool displays V. This is the current battery voltage.
Traction Control Switch	Traction control switch released	Inactive	The scan tool displays Inactive or Active depending on the traction control switch status.

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Parameter	System State	Expected Value	Description
Traction Control System	Traction control switch pressed	Active	The scan tool displays OK or Malfunction. Malfunction is displayed if there is a traction control malfunction.
	-	OK	
Vehicle Stability System	-	OK	The scan tool displays OK or Malfunction. Malfunction is displayed if there is a stability control malfunction.
Vehicle Stability Enhancement System Relay Feedback	-	Active	The scan tool displays Inactive or Active. Inactive is displayed when stability control is disabled.
Vehicle Stability Enhancement System Switch	Traction control switch released	Inactive	The scan tool displays Inactive or Active depending on the traction control switch status.
	Traction control switch pressed	Active	
Yaw Rate Signal	-	Varies	The scan tool displays 0-5 V depending on the vehicle's yaw rate.

Electronic Brake Control Module Scan Tool Output Controls

Output Control	Description
ABS Left Front Solenoid Valves	Commands the solenoid valves ON or OFF.
ABS Left Rear Solenoid Valves	Commands the solenoid valves ON or OFF.
ABS Pump Motor	Commands the ABS pump motor Increase or Decrease.
ABS Right Front Solenoid Valves	Commands the solenoid valves ON or OFF.
ABS Right Rear Solenoid Valves	Commands the solenoid valves ON or OFF.
Automated Brake Bleed	This is used in order to bleed ABS hydraulics.
Brake Booster Electric Vacuum Pump	Commands the brake booster electric vacuum pump motor ON or OFF.
Traction Control Left Front Solenoid Valves	Commands the solenoid valves ON or OFF.
Traction Control Left Rear Solenoid Valves	Commands the solenoid valves ON or OFF.
Traction Control Right Front Solenoid Valves	Commands the solenoid valves ON or OFF.
Traction Control Right Rear Solenoid Valves	Commands the solenoid valves ON or OFF.

ENGINE SPEED POWER TAKE-OFF CONTROL MODULE SCAN TOOL INFORMATION

The scan tool data lists contain all of the power take-off (PTO) related parameters that are available on the scan

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tool. The parameters in the list are arranged in alphabetical order. The data list column indicates the location of the parameter within the scan tool menu selections.

Use the scan tool data lists as directed by a diagnostic table or in order to supplement the diagnostic procedures. Begin all of the diagnostic procedures with Diagnostic System Check - Vehicle .

Use the scan tool data lists only after the following is determined:

- There is no published DTC procedure or published symptom procedure for the customer concern.
- The DTC or symptom procedure indicated by the diagnostic system check does not resolve the customer concern.

Engine Speed Power Take-Off Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature/Vehicle is in Park or Neutral/PTO Disengaged			
Engine Speed	-	Varies	The scan tool displays 0 to 9,999 RPM. The engine control module (ECM) monitors the crankshaft position (CKP) signal circuit in order to determine the engine RPM.
Ignition 1 Signal	-	Varies	The scan tool displays Volts. This is the voltage at the B+ input of the PTOM.
PTO Disengage Reason	-	Last reason why PTO was disengaged	The scan tool displays the last reason why the PTO was disengaged. Refer to the Scan Tool Data Definitions (Disengage or Inhibit Reasons) for descriptions.
PTO Indicator	-	Off	The scan tool displays On or Off. The PTOM monitors the signal circuit of the PTO switch. A closed switch is displayed as On.
PTO Inhibit Reason	-	Reason why PTO is currently inhibited	The scan tool displays the last reason why the PTO system was inhibited. Refer to the Scan Tool Data Definitions (Disengage or Inhibit Reasons) for descriptions.
PTO In Cab Switch	-	PTO Off	The scan tool displays PTO Off, PTO On, Set 1, Set 2, No Action, Invalid, or Indeterminate. The PTOM monitors the signal circuit of the PTO switch.
PTO In Cab Switch A	-	Numeric	The scan tool displays %. The PTOM monitors the mode select A circuit and displays the current percentage.
PTO In Cab Switch B	-	Numeric	The scan tool displays %. The PTOM monitors the mode select B circuit and displays the current percentage.
PTO In Cab Switch C	-	Numeric	The scan tool displays %. The PTOM monitors the mode select C circuit and displays the current percentage.
PTO Option	-	Disable	The scan tool displays Enhanced, Disable, Preset, Variable, Mobile, or Fast Idle. This is

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Parameter	System State	Expected Value	Description
			the current state of the PTO system.
PTO Remote Accelerator Sensor (If Equipped)	-	Numeric	The scan tool displays %. If equipped, the ECM sends a serial data message to the PTO module regarding the status of the PTO remote accelerator sensor.
PTO Remote Switch Status	-	PTO Off	The scan tool displays PTO Off, PTO On, Set 1, Set 2, No Action, Invalid, or Indeterminate. The PTOM monitors the signal circuit of the PTO remote switch.
PTO Status	-	No	The scan tool displays Disabled, Standby Disabled, Standby Pending, PTO Standby, PTO Active, Reserved, PTO Set, PTO Coast, Reserved, PTO Accelerate, Shutdown, or No Action. This is the current status of the PTO system.
Requested Engine Speed	-	Varies	The scan tool displays the requested RPM.
Vehicle Speed	-	Varies	The scan tool displays 0 to 150 km/h (93.2 mph). The ECM monitors the vehicle speed sensor signal circuit in order to calculate the vehicle speed for display. The ECM sends a serial data message to the PTOM regarding the current vehicle speed.

Engine Speed Power Take-Off Control Module Scan Tool Output Controls

Output Control	Description
Clear PTO Reasons	The scan tool clears the PTO Disengagement and Inhibit reasons stored in the PTO module.
Engine Shutdown	The scan tool commands the PTO module to shut down the engine.
PTO Indicator	The scan tool commands the PTO module to illuminate the PTO indicator on and off.
PTO Relay	The scan tool commands the PTO module to enable and disable the PTO relay.

FRONT VIEW CAMERA MODULE SCAN TOOL INFORMATION

Front View Camera Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine OFF/Lane Departure Warning ON			
System Voltage	-	Varies	The scan tool displays the system voltage depending of the current battery voltage.
System Power Mode	-	Varies	The scan tool displays Off, Accessory, Running, Cranking or Undefined. This is the state of the ignition switch.
Power Mode Controlled by Backup Device	-	Varies	The scan tool displays Off, Accessory, Running or Cranking depending of the current power mode.
Frontview Camera System Status	-	Varies	The scan tool displays Normal, Malfunction or Undefined depending on

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Parameter	System State	Expected Value	Description
			the state of the lane departure warning system.
Frontview Camera Calibration Status	-	Varies	The scan tool displays Not Calibrated, Calibrated, Dynamically Calibrated or Undefined. This is the current state of the calibration.
Frontview Camera Learn Mode Status	-	Varies %	The scan tool displays varies percentage between 0-100% depending on the state of the frontview camera learn mode.
Lane Departure Warning Status	-	Varies	The scan tool displays Off, Disabled, Not Ready to Assist, Ready to Assist, Malfunction, Unknown or Undefined depending on the state of the lane departure warning system.
Lane Departure Warning Switch Status	-	On	The scan tool displays On or Off depending on the state of the lane departure warning switch.
Lane Departure Warning Indicator Status	-	Varies	The scan tool displays Off, On, Malfunction, Unknown or Undefined depending on the state of the lane departure warning system.
Forward Collision Alert Function Status	-	Varies	The scan tool displays Off, On, Malfunction, Unknown or Undefined depending on the state of the lane departure warning system.
Intelligent Light Ranging Status	-	Varies	The scan tool displays Off, Disabled, Malfunction, Enabled, Unknown or Undefined depending on the state of the intelligent light ranging system.
Automatic High Beam Activation Status	-	Varies	The scan tool displays Disabled, Enabled or Undefined depending on the state of the automatic high beam assist system.
Following Distance Indicator Status	-	Varies	The scan tool displays Off, Disabled, Not Ready to Assist, Ready to Assist or Undefined depending on the state of the following distance indicator status.
Frontview Camera Disable History 1-4	-	Varies	The scan tool displays Empty, Lane Departure Warning Indicator Malfunction, Lane Departure Warning Switch Malfunction, Sensors Obstructed, Accelerator Pedal Position Out of Range, Driven Wheel Speed Signal Invalid, Non-Driven Wheel Speed Invalid, Brake Pedal Moderate Travel Signal Invalid, Brake Pedal Initial Travel Position Achieved, Lost Communication with Steering Wheel Angle Sensor Module, Invalid Data Received From Steering Wheel Angle Sensor

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Parameter	System State	Expected Value	Description
			Module, Forward Collision Alert Switch Malfunction, Clutch Pedal Position (CPP) Sensor Performance, Transmission Gear Engaged, Acceleration Sensor Longitudinal Signal, Invalid Data Received From Yaw Rate Sensor Module, Power Mode Controlled by Backup Device, System Power Mode, Overvoltage, Undervoltage or Undefined depending on the history data of the frontview camera disable history.

Front View Camera Module Scan Tool Output Controls

Output Control	Description
Clear Disable History Data	The frontview camera control module clears all disable history buffers when commanded from the scan tool.
Forward Collision Alert Switch	The frontview camera control module switches the forward collision alert system to Near, Medium or Far when commanded from the scan tool.
High Beams	The frontview camera control module switches the high beams On or Off when commanded from the scan tool.
Lane Departure Warning Indicator	The frontview camera control module switches the lane departure warning indicator On or Off when commanded from the scan tool.
Lane Departure Warning Switch	The frontview camera control module switches the lane departure warning system On or Off when commanded from the scan tool.
Vehicle Direction Camera Learn	The frontview camera control module initializes the service point calibration of the frontview camera and switches into the learn mode when commanded from the scan tool.

FUEL PUMP POWER CONTROL MODULE SCAN TOOL INFORMATION

Refer to **K20 Engine Control Module: Scan Tool Information (L5P)** **K20 Engine Control Module: Scan Tool Information (Except Diesel)** .

GLOW PLUG CONTROL MODULE SCAN TOOL INFORMATION

Glow Plug Control Module Scan Tool Information

Parameter	System State	Expected Value	Description
This is a comprehensive list. Not all parameters listed are available for all applications. **Base Operating Conditions:** Engine Idling/Radiator Hose Hot/Park or Neutral/Closed Loop/Accessories Off.			
Accessory and Battery Voltage Input Levels	-	Agree	This parameter displays Disagree if the voltage difference between Voltage IGN 0 and B+ are too high.
Control Module Voltage Signal	-	13-15 V	This parameter displays the control module voltage signal.
Cylinder 1, 2, 3, 4, 5, 6, 7, or 8 Glow Plug	-	10-15 A for 4 cyl. 19-21 A for V8	This parameter indicates the current of the individual glow plug circuits as calculated by the control module. The scan tool will display a higher value for more current, and

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Parameter	System State	Expected Value	Description
			a lower value for less current.
Cylinder 1, 2, 3, 4, 5, 6, 7, or 8 Glow Plug Control Circuit High Voltage Test Status	-	OK	This parameter displays the diagnostic state of the output driver for the glow plug circuits. The scan tool will display OK if the circuits are operating correctly. The scan tool will display Malfunction if the control module detects that the glow plug voltage is too high.
Cylinder 1, 2, 3, 4, 5, 6, 7, or 8 Glow Plug Control Circuit Low Voltage Test Status	-	OK	This parameter displays the diagnostic state of the output driver for the glow plug circuits. The scan tool will display OK if the circuits are operating correctly. The scan tool will display Malfunction if the control module detects that the glow plug voltage is too low.
Cylinder 1, 2, 3, 4, 5, 6, 7, or 8 Glow Plug Control Circuit Open Test Status	-	OK	This parameter displays the diagnostic state of the output driver for the glow plug circuits. The scan tool will display OK if the circuits are operating correctly. The scan tool will display Malfunction if the control module detects that the glow plug voltage is open.
Cylinder 1, 2, 3, 4, 5, 6, 7, or 8 Glow Plug Resistance	-	1.3-1.5 Ω for 4 cyl. 0.5-1.0 Ω for V8	This parameter indicates the resistance of the individual glow plug circuits as calculated by the control module. The scan tool will display a higher value for more resistance, and a lower value for less resistance.
Cylinder 1, 2, 3, 4, 5, 6, 7, or 8 Glow Plug Resistance Status	-	OK	This parameter displays the state of the Glow Plug Over Resistance Status.
Engine Controls Ignition Relay and Battery Voltage Input Levels	-	Disagree	This parameter displays Disagree if the glow plug control module voltage difference between internal/external battery voltage is too high.
Glow Plug Command Signal	-	Off	This parameter displays the commanded state of the glow plugs. The scan tool will display On or Off.
Glow Plug Control Module Supply Voltage	-	OK	This parameter displays the diagnostic state of the output driver for the glow plug circuits. The scan tool will display OK if the Glow Plug Control Module temperature is within specifications. The scan tool will displays Overtemperature if the Glow Plug Control Module temperature is above specifications.
Glow Plug Control Module Temperature	-	OK	This parameter displays the state of the Glow Plug Control Module temperature.

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Parameter	System State	Expected Value	Description
			The scan tool will display OK if the circuit is operating correctly. The scan tool will display Yes if the circuit is shorted to ground.
Glow Plug Driver Open	-	No	This parameter displays Yes if a glow plug driver switch is malfunctioning or open.
Glow Plug Driver Shorted	-	No	This parameter displays the diagnostic state of the output driver for the glow plug circuits. The scan tool will display No if the circuit is operating correctly. The scan tool will display Yes if there is a short on the circuit.
Glow Plugs	-	7-14 V	This parameter displays the voltage supply to the glow plugs as measured by the control module. The scan tool will display a higher value at high voltages, or a lower value at lower voltages.
Ignition 1 Signal	-	On	This parameter displays On if the glow plug control module is receiving an Ignition 1 signal.
Ignition 1 Signal	-	13-15 V	This parameter displays the voltage measured at the Ignition 1 circuit of the control module. Voltage is applied to the control module when the ignition switch is in the Ignition 1 position.
Ignition Accessory Signal	-	13-15 V	This parameter displays the ignition accessory signal voltage to the glow plug control module.
Intake Air Heater	-	11-13.2 V	This parameter displays the status of the intake air heater as commanded by the control module.
Intake Air Heater Command	-	0%	This parameter displays duty cycle of the intake air heater as commanded by the control module.
Intake Air Heater Command Signal	-	Off	This parameter displays On if the heater is commanded ON by the control module.
Intake Air Heater Control Circuit 1 Command Status	-	OK	This parameter will display OK if the circuit is good, or Malfunction if a short to ground, short to B+ or open circuit is present.
Intake Air Heater Current	-	OK	This parameter displays the intake air heater current out of range or OK.
Intake Air Heater Current Signal Circuit Status	-	OK	This parameter displays the intake air heater current signal circuit status. Malfunction is displayed when a short to battery is detected.
Intake Air Heater Element Status	-	OK	This parameter displays the status of the intake air heater element.

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Parameter	System State	Expected Value	Description
Intake Air Heater Feedback Signal	-	On/Off	This parameter displays the status of the intake air heater switch.
Intake Air Heater Feedback Circuit Status	-	OK	This parameter will display OK if the circuit is good, or Malfunction if a short to ground, short to B+ or open circuit is present.
Intake Air Heater Ground Status	-	OK	This parameter displays the status of the intake air heater ground. The scan tool displays Open when the ground is open.
Intake Air Heater Resistance	-	Varies	This parameter displays either the last known resistance value stored in the ECM, or the current resistance while the intake air heater is commanded ON.
Intake Air Heater Resistance Status	-	OK	This parameter will display OK if the circuit is good, or Malfunction if a short to ground, short to B+ or open circuit is present.
Intake Air Heater Temperature Signal Circuit Status	-	OK	This parameter will display OK if the circuit is good, or Malfunction if a short to ground, short to B+ or open circuit is present.
Intake Air Heater Temperature Status	-	OK	This parameter displays the current status of the intake air heater temperature. The scan tool displays Overtemperature if a malfunction is detected.
Intake Air Heater Voltage Signal Circuit Status	-	OK	This parameter displays the intake air heater voltage signal circuit status. The scan tool displays Malfunction when the intake air heater is commanded OFF and intake air heater voltage signal is not 0 V.
Intake Air Heater Voltage Status	-	OK	This parameter will display OK if the circuit is good, or Malfunction if a short to ground, short to B+ or open circuit is present.
Intake Air Temperature Status	-	OK	This parameter displays the diagnostic state of the output driver for the IAH. The scan tool will display OK if the circuits are operating correctly. The scan tool will display Fault if the control module detects that the IAH temperature is too high.
NOx Sensor 1 Supply Voltage	-	13-15 V	This parameter displays the NOx Sensor 1 supply voltage.
NOx Sensor 1 Supply Voltage Circuit High Voltage Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 supply voltage circuit. The parameter displays Malfunction if the NOx Sensor 1 supply voltage circuit is shorted to voltage.

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Parameter	System State	Expected Value	Description
NOx Sensor 1 Supply Voltage Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 supply voltage circuit. The parameter displays Malfunction if the NOx Sensor 1 supply voltage circuit is shorted to ground.
NOx Sensor 2 Supply Voltage	-	13-15 V	This parameter displays the NOx Sensor 2 supply voltage.
NOx Sensor 2 Supply Voltage Circuit High Voltage Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 supply voltage circuit. The parameter displays Malfunction if the NOx Sensor 2 supply voltage circuit is shorted to voltage.
NOx Sensor 2 Supply Voltage Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 supply voltage circuit. The parameter displays Malfunction if the NOx Sensor 2 supply voltage circuit is shorted to ground.
Reductant Heater 1 Command	-	On/Off	This parameter displays the status of Reductant Heater 1.
Reductant Heater 1 Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Reductant Heater 1 control circuit. The parameter displays Malfunction if the Reductant Heater 1 control circuit shorted to voltage.
Reductant Heater 1 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Reductant Heater 1 control circuit. The parameter displays Malfunction if the Reductant Heater 1 control circuit shorted to ground.
Reductant Heater 1 Control Circuit Open Test Status	-	OK	This parameter displays the state of the Reductant Heater 1 control circuit. The parameter displays Malfunction if the Reductant Heater 1 control circuit is opened.
Reductant Heater 1 Current	-	6.0-7.0 A	This parameter displays the Reductant Heater 1 current feedback in Amps.
Reductant Heater 2 Command	-	On/Off	This parameter displays the status of Reductant Heater 2.
Reductant Heater 2 Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Reductant Heater 2 control circuit. The parameter displays Malfunction if the Reductant Heater 2 control circuit shorted to voltage.
Reductant Heater 2 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Reductant Heater 2 control circuit. The parameter displays Malfunction if the Reductant Heater 2 control circuit shorted to ground.

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Parameter	System State	Expected Value	Description
Reductant Heater 2 Control Circuit Open Test Status	-	OK	This parameter displays the state of the Reductant Heater 2 control circuit. The parameter displays Malfunction if the Reductant Heater 2 control circuit is opened.
Reductant Heater 2 Current	-	3.0-5.0 A	This parameter displays the Reductant Heater 2 current feedback in Amps.
Reductant Heater 3 Command	-	On/Off	This parameter displays the status of Reductant Heater 3.
Reductant Heater 3 Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Reductant Heater 3 control circuit. The parameter displays Malfunction if the Reductant Heater 3 control circuit shorted to voltage.
Reductant Heater 3 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Reductant Heater 3 control circuit. The parameter displays Malfunction if the Reductant Heater 3 control circuit shorted to ground.
Reductant Heater 3 Control Circuit Open Test Status	-	OK	This parameter displays the state of the Reductant Heater 3 control circuit. The parameter displays Malfunction if the Reductant Heater 3 control circuit is opened.
Reductant Heater 3 Current	-	0.5-1.0 A	This parameter displays the Reductant Heater 3 current feedback in Amps.

Special Functions

Parameter	Description
This is a comprehensive list. Not all output controls listed are available for all applications.	
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Injector Flow Identifier	This function allows the Injector Flow Identifier to be manually entered into a controller.
Glow Plug	This function commands the Glow Plugs ON/OFF.
Intake Air Heater	This function commands the Intake Air Heater ON/OFF.

HEATING, VENTILATION AND AIR CONDITIONING CONTROL MODULE SCAN TOOL INFORMATION

Heating Ventilation and Air Conditioning Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/ Vehicle in Service Mode			
A/C Button/Switch	A/C Button released	Inactive	The scan tool displays Active or Inactive depending on the state of the A/C switch.
	A/C Button pressed	Active	

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Parameter	System State	Expected Value	Description
A/C Compressor Refrigerant Solenoid Valve Command	-	0-100%	The scan tool displays % depending on the command for compressor displacement. The value increases stepwise from 0-100% depending on the command/request.
A/C Indicator	A/C Off	Off	The scan tool displays On or Off depending on the state of the A/C mode.
	A/C On	On	
A/C Evaporator Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the A/C evaporator temperature sensor.
A/C Request Signal	A/C Off	Inactive	The scan tool displays Active or Inactive depending on the state of the A/C mode.
	A/C On	Active	
Air Inlet Door Actuator Command	-	Varies	The scan tool displays Counts. This is the desired position of the actuator.
Air Inlet Door Actuator Direction	-	Stop	The scan toll displays Stop, Outside Air, Increase, Recirculation, Decrease or Not Used depending on the state of the recirculation door. During the movement of the door, the scan tool shows Increase or Decrease depending on the movement direction.
Air Inlet Door Actuator Learn Status	-	Complete	The scan tool displays Not Running, In Progress, Complete, or Failed depending on the actuator calibration status.
Air Inlet Door Actuator Position	-	Varies	The scan tool displays Counts. This is the actual position of the actuator.
Air Quality Sensor / Odor (AQS) Button/Switch	Button released	Inactive	The scan tool displays Active or Inactive depending on the state of the A/C switch.
	Button pressed	Active	
Air Quality / Odor (AQS) Sensor	-	Varies	The scan tool displays counts. The value increases with the increasing of the pollution of the ambient air.
Air Quality Sensor / Odor (AQS) Indicator	AQS Off	Off	The scan tool displays On or Off depending on the state of the AQS indicator command
	AQS On	On	
Air Recirculation Button/Switch	Button released	Inactive	The scan tool displays Active or Inactive depending on the state of the air recirculation mode switch.
	Button pressed	Active	
Air Recirculation Door Actuator Command	-	Varies	The scan tool displays Counts. This is the desired position of the actuator.
Air Recirculation Door Actuator Direction	-	Stop	The scan toll displays Stop, Outside Air, Increase, Recirculation, Decrease or Not Used depending on the state of the recirculation door. During the movement of the door, the scan tool shows Increase or Decrease depending on the movement direction.

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Parameter	System State	Expected Value	Description
Air Recirculation Door Actuator Learn Status	-	Complete	The scan tool displays Not Running, In Progress, Complete, or Failed depending on the actuator calibration status.
Air Recirculation Door Actuator Position	-	Varies	The scan tool displays Counts. This is the actual position of the actuator.
Air Recirculation Indicator	Recirculation Off	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Recirculation On	On	
Air Recirculation LED	Recirculation Off	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Recirculation On	On	
Air Recirculation Mode Switch	Air recirculation switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the air recirculation mode switch.
	Air recirculation switch pressed	Active	
Auto HVAC Button/ Switch	Auto HVAC button released	Inactive	The scan tool displays On or Off depending on the state of the Auto HVAC button.
	Auto HVAC button pressed	Active	
Auto HVAC Indicator	Auto mode is deactivated	Off	The scan tool displays On or Off depending on the state of the Auto mode command.
	Auto mode is activated	On	
Auto HVAC Switch	Auto HVAC switch released	Inactive	The scan tool displays On or Off depending on the state of the Auto HVAC switch.
	Auto HVAC switch pressed	Active	
Auto Recirculation Button/ Switch	-	Inactive	The scan tool displays Up, Down, or Inactive depending on the state of the switch.
Auto Recirculation Indicator	Auto Recirculation is deactivated	Off	The scan tool displays On or Off depending on the state of the Auto Recirculation indicator command.
	Auto Recirculation is activated	On	
Auxiliary Blower Motor Button/Switch	-	Varies	The scan tool displays AUTO, OFF, 1, 2, 3, 4, or 5 depending on the position of the auxiliary blower motor switch.
Auxiliary Blower Motor Speed	-	0-100%	The scan tool displays % depending on the feedback. The value increases stepwise from 0-100% depending on the feedback.
Auxiliary Blower Motor Speed Command	-	0-100%	The scan tool displays % depending on the command. The value increases stepwise from 0-100% depending on the

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Parameter	System State	Expected Value	Description
			command/request.
Auxiliary Blower Motor Speed Indicator	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.
Auxiliary Blower Motor Switch - Rotary	-	Varies	The scan tool displays AUTO, OFF, 1, 2, 3, 4, or 5 depending on the position of the auxiliary blower motor switch.
Auxiliary Coolant Pump	-	Varies	The scan tool displays Active or Inactive depending on the requested state of the coolant pump.
Auxiliary Coolant Pump Relay Command	-	Varies	The scan tool displays Active or Inactive depending on the requested state of the relay.
Auxiliary Coolant Pump Speed Command Duty Cycle	-	0-100%	The scan tool displays % depending on the command. The value increases stepwise from 0-100% depending on the command/request.
Auxiliary Coolant Pump Speed Feedback Duty Cycle	-	0-100%	The scan tool displays % depending on the feedback. The value increases stepwise from 0-100% depending on the feedback.
Auxiliary Heater Coolant Pump Fault Status	-	Normal	The scan tool displays Normal, High/Low Current, Flow Restricted, Overvoltage, Over temperature, or Circuit Open/ Shorted indicating the status of the coolant pump.
Auxiliary Heater Output Status	-	OK	The scan tool displays OK, or Malfunction indicating the status of the auxiliary heater.
Auxiliary Mode Door Actuator Command	-	Varies	The scan tool displays Counts. This is the desired position of the rear mode actuator.
Auxiliary Mode Door Actuator Direction	-	Stop	The scan toll displays Stop, Increase, or Decrease depending on the state of therear mode actuator. During the movement of the door, the scan tool shows Increase or Decrease depending on the movement direction.
Auxiliary Mode Door Actuator Learn Status	-	Complete	The scan tool displays Not Running, In Progress, Complete, or Failed depending on the actuator calibration status.
Auxiliary Mode Door Actuator Position	-	Varies	The scan tool displays Counts. This is the actual position of the rear mode actuator.
Auxiliary Mode Switch Indicator	Auxiliary Mode Switch inactive	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Auxiliary Mode Switch active	On	

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Parameter	System State	Expected Value	Description
Auxiliary Mode Switch Position - Knob	-	Varies	The scan tool displays Auto, Floor, Bi-level or Panel depending on the position of the switch.
Auxiliary Mode Switch Position - Toggle	-	Varies	The scan tool displays Auto, Floor, Bi-level or Panel depending on the position of the switch.
Base Model Part Number	-	Varies	Displays the currently installed part number of module.
Battery Voltage	-	Varies	The scan tool displays V. This is the current battery voltage.
Bi-Level Button/ Switch	Bi-Level Switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Bi-Level Switch pressed	Active	
Bi-Level Indicator	Bi-Level mode selected	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Bi-Level mode deselected	On	
Blower Motor Speed	-	0-100%	The scan tool displays % depending on the state of the selected blower motor speed. The value increases stepwise from 0-100% depending on the selected speed.
Blower Motor Speed 1 Indicator	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.
Blower Motor Speed 2 Indicator	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.
Blower Motor Speed 3 Indicator	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.
Blower Motor Speed 4 Indicator	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.
Blower Motor Speed 5 Indicator	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.
Blower Motor Speed 6 Indicator	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.
Blower Motor Speed Command	-	0-100%	The scan tool displays % depending on the state of the selected blower motor speed. The value increases stepwise from 0-100% depending on the selected speed.
Blower Motor Switch-Toggle	-	Inactive	The scan tool displays Up, Down or Inactive depending on the state of the

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Parameter	System State	Expected Value	Description
			blower motor switch.
Date Programmed	-	Varies	The scan tool displays the date the module was last programmed.
Desired Left Temperature	-	Varies	The scan tool displays Â°C (Â°F). This is the currently selected temperature setting.
Desired Rear Temperature	-	Varies	The scan tool displays Â°C (Â°F). This is the currently selected temperature setting.
Desired Right Temperature	-	Varies	The scan tool displays Â°C (Â°F). This is the currently selected temperature setting.
Diagnostic Data Identifier	-	Varies	The scan tool displays the 4 character alphanumeric device ID.
End Model Part Number	-	Varies	The scan tool displays the end software module part number.
Enhanced Defrost Button/ Switch	Enhanced defrost switch released	Inactive	The scan tool displays On or Off depending on the state of the switch.
	Enhanced defrost switch pressed	Active	
Enhanced Defrost Indicator	Enhanced defrost mode is deactivated	Off	The scan tool displays On or Off depending on the state of the enhanced defrost mode.
	Enhanced defrost mode is activated	On	
Floor Mode Button/ Switch	Floor mode switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Floor mode switch pressed	Active	
Floor Mode Indicator	Floor mode Not selected	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Floor mode selected	On	
Fresh Air Button/Switch	Fresh air switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Fresh air switch pressed	Active	
Fresh Air Indicator	Fresh air not selected	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Fresh air selected	On	
Front Defog Button/Switch	Front defog switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Front defog switch pressed	Active	
Front Defog Indicator	Front defog not selected	Off	The scan tool displays On or Off depending on the state of the indicator

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Parameter	System State	Expected Value	Description
	Front defog selected	On	command.
Front Defrost Button/ Switch	Defrost switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Defrost switch pressed	Active	
Front Defrost Indicator	Front defrost not selected	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Front defrost selected	On	
Front HVAC System Status	-	Varies	The scan tool displays Comfort, ECO, or Fan Only depending on the selected operating mode of the HVAC system.
Front HVAC System Status Indicator	-	Varies	The scan tool displays: Link Active, AQS Active, Front Off Active, Fan Blower Minus Active, Fan Blower Plus Active, Knob Fan Active, Knob Temp Active, FR Fahrenheit Active, FR Celsius Active, FL Fahrenheit Active, FL Celsius Active, Front Fan 6 Active, Front Fan 5 Active, Front Fan 4 Active, Front Fan 3 Active, Front Fan 2 Active, Front Fan 1 Active, FL Active, Rear Enable Active, Extended Defrost Active, Heat Mode Active, Bi-level Active, Floor Active, Vent Active, Defog Active, Rear Defrost Active, Automatic Active, Fresh Active, Recirculation Active, or A/C Active depending on the current operating mode of the HVAC system.
Heat Mode Button/Switch	Heat switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Heat switch pressed	Active	
Heat Mode Indicator	Heat not selected	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Heat selected	On	
Heater Core Coolant Temperature Sensor	-	-40 to +215Â°C (-40 to +419Â°F)	The scan tool displays Â°C (Â°F). This is the temperature of the coolant at the inlet of the coolant heater
Heating Element 1 Duty Cycle Command	-	Varies	The scan tool displays % from 0-100, depending on the state of the command.
High Voltage Heater Pump Status	-	Varies	The scan tool displays % from 0-100, depending on the feedback.
HVAC Indicator Commanded Status	-	Varies	The scan tool displays On or Off depending on the state of the indicator command.

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Parameter	System State	Expected Value	Description
HVAC Actuators Supply Voltage	-	Active	The scan tool displays Active or Inactive. Inactive is displayed if there is a malfunction at the actuators supply voltage circuit.
HVAC Control Switch Activations - Extended	-	Inactive	The scan tool displays Active or Inactive. Active is displayed when a switch is pressed.
HVAC Heater Coolant Pump Speed Command Duty Cycle	-	Varies	The scan tool displays % from 0-100, depending on the state of the command.
HVAC Heater Coolant Pump Speed Feedback Duty Cycle	-	Varies	The scan tool displays % from 0-100, depending on the feedback.
HVAC Mode Status	-	Varies	The scan tool displays: Peak Performance Mode, Normal, Economy Mode, Blower Only Mode, or Heater Economy Mode indicating the currently selected mode.
Hybrid/EV Battery Pack Coolant Pump Command	-	Varies	The scan tool displays % from 0-100, depending on the state of the command.
Hybrid/EV Battery Pack Coolant Pump Speed	-	Varies	The scan tool displays % from 0-100, depending on the feedback.
Hydrocarbon Air Quality Sensor	-	Varies	The scan tool displays counts. The value increases with the increasing of the pollution of the ambient air.
Ignition Voltage	-	11-14 V	The scan tool displays the current Ignition voltage.
Instrument Panel Vents Button/Switch	Instrument Panel Vent switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Instrument Panel Vent switch pressed	Active	
Instrument Panel Vents Indicator	Panel Vents not selected	Off	The scan tool displays On or Off depending on the state of the indicator command.
	Panel Vents selected	On	
Left / Single Solar Sensor	-	Varies	The scan tool displays W/m^2 . This is the current sun heat intensity.
Left Temperature Button/ Switch	-	Inactive	The scan tool displays Up, Down, or Inactive depending on the state of the temperature switch.
Left Temperature Door Actuator Command	-	Varies	The scan tool displays Counts. This is the desired position of the actuator.

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Parameter	System State	Expected Value	Description
Left Temperature Door Actuator Direction	-	Varies	The scan tool displays stop, increase, or decrease. This is the current direction of the actuator.
Left Temperature Door Actuator Learn Status	-	Complete	The scan tool displays Not Running, In Progress, Complete, or Failed depending on the actuator calibration status.
Left Temperature Door Actuator Position	-	Varies	The scan tool displays Counts. This is the actual position of the actuator.
Left Temperature Knob Position	-	Varies	The scan tool displays Increase or Decrease when the left temperature knob is rotated.
Lower Left Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the duct temperature sensor.
Lower Rear Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the duct temperature sensor.
Lower Right Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the duct temperature sensor.
Manufacturing Enable Counter	-	0	The scan toll displays 0-255 counts. This counter typically decrements 1 count per ignition cycle. 0 indicates a locked ECU.
Manufacturing Traceability Data	-	Varies	This parameter displays the diagnostic module traceability number, which may be up to 16 digits long. This information may be used in certain situations to identify the manufacturer of the component.
Mode Door Actuator Command	-	Varies	The scan tool displays Counts. This is the desired position of the actuator.
Mode Door Actuator Direction	-	Stop	The scan tool displays stop, increase, or decrease. This is the current direction of the actuator.
Mode Door Actuator Learn Status	-	Complete	The scan tool displays Not Running, In Progress, Complete, or Failed depending on the actuator calibration status.
Mode Door Actuator Position	-	Varies	The scan tool displays Counts. This is the actual position of the actuator.
Mode Switch - Toggle	-	Inactive	The scan tool displays Up, Down, or Inactive depending on the state of the mode switch.
Mode Switch Knob Position	-	Varies	The scan tool displays: Rear, Sync, Floor/Vent/Defrost (Tri-Level) , Vent/Defrost, Front Defrost, Foot/Defrost 3 (Blend+), Foot/Defrost 2 (Blend), Foot/Defrost 1 (Floor +), Foot (Floor),

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Parameter	System State	Expected Value	Description
			Bi-level 3 (Bi-level +), Bi-level 2 (Bi-level), Bi-level 1 (Panel +), Face (Panel), or AUTO depending on the position of the switch.
MULTI-ZONE Button/ Switch	MULTI-ZONE switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	MULTI-ZONE switch pressed	Active	
MULTI-ZONE Indicator	MULTI-ZONE not selected	Off	The scan tool displays On or Off depending on the state of the indicator command.
	MULTI-ZONE selected	On	
Outside Air Temperature Sensor Voltage	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the outside air temperature sensor.
Passenger Compartment Air Temperature (Filtered)	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the stored temperature of the passenger compartment air temperature sensor.
Passenger Compartment Air Temperature (Unfiltered)	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the passenger compartment air temperature sensor.
Passenger Compartment Humidity	-	3-100%	The scan tool displays %. This is the current relative humidity level at the windshield temperature and inside moisture sensor.
Passenger Compartment Humidity Sensor Temperature	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the humidity sensing element temperature sensor.
Rear Defogger Button/ Switch	Rear Defogger switch released	Inactive	The scan tool displays Active or Inactive depending on the state of the switch.
	Rear Defogger switch pressed	Active	
Rear Defogger Deactivation Reason	-	Varies	The scan tool displays: Auto Start Active, Rear Defrost Inhibited, Load Shed Active, Convertible Top Down, or Battery State of Charge Low. This is the reason the defogger has been disabled.
Rear Defogger Indicator	Rear defogger is deactivated	Off	The scan tool displays On or Off depending on the state of the rear defogger.
	Rear defogger is activated	On	
Rear Defogger Status	Rear defogger is deactivated	Off	The scan tool displays On or Off depending on the state of the rear defogger command.
	Vehicle ON/ Rear defogger is	On	

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Parameter	System State	Expected Value	Description
	activated		
Rear In Vehicle Temperature Sensor (Filtered)	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the stored temperature of the rear passenger compartment air temperature sensor.
Rear In Vehicle Temperature Sensor (Unfiltered)	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the rear passenger compartment air temperature sensor.
Rear Temperature Button/Switch	-	Inactive	The scan tool displays Up, Down or Inactive depending on the state of the temperature switch.
Rear Temperature Door Actuator Command	-	Varies	The scan tool displays Counts. This is the desired position of the mode actuator.
Rear Temperature Door Actuator Direction	-	Stop	The scan tool displays stop, increase, or decrease. This is the current direction of the actuator.
Rear Temperature Door Actuator Learn Status	-	Complete	The scan tool displays Not Running, In Progress, Complete, or Failed depending on the actuator calibration status.
Rear Temperature Door Actuator Position	-	Varies	The scan tool displays Counts. This is the actual position of the actuator.
Rear Temperature Knob Position	-	Varies	The scan tool displays Increase or Decrease when the rear temperature knob is rotated.
Repair Shop Code or Tester Serial Number	-	Varies	This number may be used in certain situations to identify the supplier, control module and diagnostic capability of the component.
Right Solar Load	-	Varies	The scan tool displays W/m^2 . This is the current sun heat intensity.
Right Solar Sensor	-	Varies	The scan tool displays W/m^2 . This is the current sun heat intensity.
Right Temperature Button/ Switch	-	Inactive	The scan tool displays Up, Down or Inactive depending on the state of the temperature switch.
Right Temperature Door Actuator Command	-	Varies	The scan tool displays Counts. This is the desired position of the mode actuator.
Right Temperature Door Actuator Direction	-	Stop	The scan tool displays stop, increase, or decrease. This is the current direction of the actuator.
Right Temperature Door Actuator Learn Status	-	Complete	The scan tool displays Not Running, In Progress, Complete, or Failed depending on the actuator calibration status.
Right Temperature Door Actuator Position	-	Varies	The scan tool displays Counts. This is the actual position of the actuator.

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Parameter	System State	Expected Value	Description
Right Temperature Knob Position	-	Varies	The scan tool displays Increase or Decrease when the right temperature knob is rotated.
Security Code Accepted	-	Yes	The scan tool displays Yes or No depending on the current security code status.
Security Code Lockout	-	Security Code Accepted	The scan tool displays Tool Learn Delay Active, Vehicle Assembly Mode Flag, Security Code Lockout Active, Security Code Programmed, Security Code Accepted depending on the current security code status.
Security Code Lockout Active	-	Inactive	When active, the scan tool displays a timer which prohibits programming the security code when a certain number of attempts have been exceeded. The security code is a method of verifying that the module has not been swapped with a module from another vehicle
Security Code Programmed	-	Yes	The scan tool displays Yes or No depending on the current security code status.
Security Code Programming Counter	-	Varies	This parameter indicates the number of times the security code has been programmed. The security code is a method of verifying that the module has not been swapped with a module from another vehicle.
Security Code Reset Counter	-	Varies	This parameter indicates the number of times the security code has been reset. The security code is a method of verifying that the module has not been swapped with a module from another vehicle.
Software Module 1 Identifier	-	Varies	The scan tool displays the software calibration part number 1.
Software Module 2 Identifier	-	Varies	The scan tool displays the software calibration part number 2.
Software Module 3 Identifier	-	Varies	The scan tool displays the software calibration part number 3.
Sun Azimuth	-	0-90Â°	The scan tool displays degrees. This is the current angle in the horizontal plane between the sun and the vehicle driving direction.
Sun Elevation	-	0-360Â°	The scan tool displays degrees. This is the current angle in the vertical sun height.

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Parameter	System State	Expected Value	Description
Sunload / Sun Intensity	-	0-1200 W/m^2	The scan tool displays W/m^2 . This is the current sun heat intensity.
Upper Left Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the upper left duct temperature sensor.
Upper Rear Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the rear upper duct temperature sensor.
Upper Right Duct Air Temperature Sensor	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the upper right duct temperature sensor.
Vehicle Identification Number (VIN)	-	Varies	The scan tool displays the learned vehicle identification number.
Windshield Temperature	-	-40 to +80Â°C (-40 to +176Â°F)	The scan tool displays Â°C (Â°F). This is the current temperature at the windshield temperature sensor.

Heating Ventilation and Air Conditioning Control Module Scan Tool Output Controls

Output Control	Description
A/C Compressor Clutch Enable	This control function enables or disables the A/C Compressor Clutch. The scan tool displays Engaged or Disengaged depending on the state of the A/C compressor clutch.
A/C Compressor Valave Control	This control function increases or decreases the command to the A/C Compressor Solenoid in %. The scan tool displays amperage in % depending on the state of the command for increased/decreased compressor displacement.
Aero Shutter Enable	This control function commands the state of the Aero Shutter between Active and Not Active.
Air Inlet Door Actuator Control	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Air Recirculation Door Actuator Direction	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Auxiliary Blower Motor Speed	This control function commands the auxiliary blower motor speed from 0 to 100% and back again.
Auxiliary Coolant Pump Speed	The HVAC control module enables or disables the coolant pump, and varies the pump speed when commanded from the scan tool.
Auxiliary Heater Output Enable	This control function increases or decreases the command to the Auxiliary Heater in %. The scan tool displays amperage in % depending on the state of the command.
Auxiliary Mode Door Actuator Control	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or

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Output Control	Description
	Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Blower Motor Speed/ Command	This control function commands the blower motor speed from 0 to 100% and back again.
Heater Core Pump Relay Control Circuit	This control function commands the heater core pump relay On and Off.
Illuminate All Indicators	The HVAC control module illuminates all the indicators when commanded from the scan tool.
Left Temperature Door Actuator Control	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Mode Door Position Control	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Rear Defogger	This control function enables or disables the Rear Defogger. The scan tool displays Active or Not Active depending on the state of the rear defogger command.
Rear Temperature Door Actuator Control	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Right Temperature Door Actuator Control	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.
Single Zone Temperature Actuator Direction	This control function commands the door position to increase or decrease. During the movement of the door, the scan tool shows Increase or Decrease dependant on the movement direction. When the position of the door is reached, the scan tool displays Stop.

Heating Ventilation and Air Conditioning Control Module Configuration/Reset Functions

Output Control	Description
HVAC Afterblow Configuration	This control function enables or disables the afterblow configuration. When enabled, the Afterblow mode operates the blower motor after the engine has been turned off and the air conditioning has been used. This operation of the blower motor aids in drying the evaporator core
HVAC Actuators Learn	The HVAC control module executes the Motor Learn Routine when commanded. The actuators are commanded to their extreme travel available at both ends. These values are then used for future reference when determining door position.
Reset Source ID	Resets the communication IDs between modules

HUMAN MACHINE INTERFACE CONTROL MODULE SCAN TOOL INFORMATION

Human Machine Interface Control Module Scan Tool Data Parameters

Parameter	Expected Value	Definition

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Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Battery Voltage	Varies	The scan tool displays volts. This is the voltage at the input to the human machine interface control module.
System Power Mode	Run	The scan tool displays Off, Accessory, Run or Crank Request. This is the vehicle power mode status as received by the human machine interface control module via high speed GMLAN.
Date From GPS	Varies	The scan tool displays the current date (Month, Day, and Year) acquired from the GPS satellites.
Time From GPS	Varies	The scan tool displays the current time acquired from the GPS satellites in 24 hour format HHMMSS
Human Machine Interface Control Module Microphone 1	Not Present	The scan tool displays Present or Not Present. Calibration indication that a primary microphone is present and connected to the human machine interface control module. The microphone input is ported to the MOST buss to the amplifier (for volume compensation, when required) instead of directly wired microphone to the amplifier.
Human Machine Interface Control Module Microphone 2	Not Present	The scan tool displays Present or Not Present. Calibration indication that a secondary microphone is present and connected to the human machine interface control module. The microphone input is ported to the MOST buss to the amplifier (for volume compensation, when required) instead of directly wired microphone to the amplifier.
Human Machine Interface Control Module Powers GPS	Not Present	The scan tool displays Present or Not Present. Calibration Indication that a GPS antenna input is primary to the human machine interface control module and powered by the human machine interface control module instead of shared with another vehicle location module.
Rearview Camera	Varies based on vehicle equipment	The scan tool displays Present or Not Present. Calibration indication that the system is calibrated for rear view camera operation.
Rearview Camera Display	Inactive	The scan tool displays Active or Inactive. Indication that rear camera views are actively being displayed.
Front Touch Screen	Varies based on vehicle equipment	The scan tool displays Present or Not Present. Calibration indication that the system is calibrated for front touch screen operation.
USB Receptacle 1	Varies based on vehicle equipment	The scan tool displays Present or Not Present. Calibration indication that a USB receptacle is connected to the human machine interface control module USB port 1. Does not indicate if a device is connected to the USB receptacle.
USB Receptacle 2	Varies based on vehicle equipment	The scan tool displays Present or Not Present. Calibration indication that a USB receptacle is connected to the human machine interface control module USB port 2. Does not indicate if a device is

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Parameter	Expected Value	Definition
		connected to the USB receptacle.
Memory Card Receptacle	Varies based on vehicle equipment	The scan tool displays Present or Not Present. Calibration indication that a SD Card receptacle input is present. Does not indicate the receptacle is occupied with digital media.
USB Hub 1	Varies based on vehicle equipment	The scan tool displays Present or Not Present. Calibration indication that a hub device is connected to the human machine interface control module USB port 1.
USB Hub 2	Varies based on vehicle equipment	The scan tool displays Present or Not Present. Calibration indication that a hub device is connected to the human machine interface control module USB port 2.
USB Hub 1 Number of Ports	Varies based on vehicle equipment	The scan tool displays the number of receptacles (USB and/or memory card receptacles) present in the hub device connected to the human machine interface control module USB port 1.
USB Hub 2 Number of Ports	Varies based on vehicle equipment	The scan tool displays the number of receptacles (USB and/or memory card receptacles) present in the hub device connected to the human machine interface control module USB port 1.
Valet Mode	Inactive	The scan tool displays Active or Inactive. Actual indication that Valet Parking Mode which limits vehicle features (speed limiting, no disc eject, trunk lock, etc.), is active or inactive.
Human Machine Interface Control Module Theft Protection Armed	VIN Learned	The scan tool displays VIN Learned or No VIN Learned. Actual indication if the human machine interface control module has learned a VIN.
Human Machine Interface Control Module Theft Protection Locked	Inactive	The scan tool displays Active or Inactive. Actual indication the human machine interface control module is in theft protection (limited functionality) mode.
Cooling Fan Speed	Varies	The scan tool displays OFF, or displays the current cooling fan speed expressed in stages from 1 to 6. Higher stages indicate increased speed of the cooling fan..
Control Module Temperature Sensor 1	Varies	The scan tool displays the actual value of the human machine interface control module circuit board temperature sensor 1.
Control Module Temperature Sensor 2	Varies	The scan tool displays the actual value of the human machine interface control module circuit board temperature sensor 2.
End Model Part Number	Varies	The scan tool displays the end software module part number.
Boot Software Part Number	Varies	The scan tool displays the boot software ID number.
Calibration Part Number 1	Varies	The scan tool displays the software calibration part number 1.

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Parameter	Expected Value	Definition
Calibration Part Number 2	Varies	The scan tool displays the software calibration part number 2.
Calibration Part Number 3	Varies	The scan tool displays the software calibration part number 3.
Calibration Part Number 4	Varies	The scan tool displays the software calibration part number 4.
Calibration Part Number 5	Varies	The scan tool displays the software calibration part number 5.
Calibration Part Number 6	Varies	The scan tool displays the software calibration part number 6.
Calibration Part Number 7	Varies	The scan tool displays the software calibration part number 7.
Calibration Part Number 8	Varies	The scan tool displays the software calibration part number 8.
Calibration Part Number 9	Varies	The scan tool displays the software calibration part number 9.
Calibration Part Number 10	Varies	The scan tool displays the software calibration part number 10.
Calibration Part Number 11	Varies	The scan tool displays the software calibration part number 11.
Software Module 11 Identifier Alpha Code	Varies	The scan tool displays a two character software identifier.
Calibration Part Number 12	Varies	The scan tool displays the software calibration part number 12.
Software Module 12 Identifier Alpha Code	Varies	The scan tool displays a two character software identifier.
Calibration Part Number 13	Varies	The scan tool displays the software calibration part number 13.
Calibration Part Number 14	Varies	The scan tool displays the software calibration part number 14.
Software Module 14 Identifier Alpha Code	Varies	The scan tool displays a two character software identifier.
Calibration Part Number 15	Varies	The scan tool displays the software calibration part number 15.
Calibration Part Number 16	Varies	The scan tool displays the software calibration part number 16.
Calibration Part Number 17	Varies	The scan tool displays the software calibration part number 17.
Calibration Part Number 18	Varies	The scan tool displays the software calibration part number 18.
Calibration Part Number 19	Varies	The scan tool displays the software calibration part number 19.
Software Freeze Date	Varies	The scan tool displays the software date in DD.MM.YYYY format.
Hardware Production Date	Varies	The scan tool displays the ECU hardware production date in DD.MM.YYYY format.

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Parameter	Expected Value	Definition
Manufacturer Enable Counter	0	The scan tool displays the counter value. This counter is used for manufacturing purposes only.
VIN Digits 2-17	Varies	The scan tool displays the learned VIN digits 2-17.
Diagnostic Data Identifier	Varies	The scan tool displays the 4 character alphanumeric device ID.

Wireless Access Data Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Number of Paired Bluetooth Devices Present	Varies	Number of paired (authenticated) devices detected and present but may or may not be connected.
Bluetooth Device Connection Status	Varies	The scan tool displays Connected or Not Connected. The parameter indicates if a Bluetooth device is currently connected to the system.
Bluetooth Device Hands Free Call Status	Varies	The scan tool displays Call Active or Inactive. Indicates if the currently connected Bluetooth device is actively in a hands free phone call.
Bluetooth Device Audio Streaming Status	Varies	The scan tool displays Active or Inactive. Indicates if the currently connected Bluetooth device is actively streaming audio.
Bluetooth Device Internet Connection Status	Varies	The scan tool displays Active or Inactive. Indicates if the currently connected Bluetooth device is actively connected to the Internet via the device's internet connection.
Bluetooth Device Supports Hands Free	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports the Bluetooth Hands Free profile.
Bluetooth Device Supports Phone Book Access	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports the Bluetooth Phone Book Access profile.
Bluetooth Device Supports Text Message Access	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports the Bluetooth Text Message Access profile.
Bluetooth Device Supports Serial Port	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports the Bluetooth Serial Port profile.
Bluetooth Device Supports Navigation	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports the Bluetooth Portable Navigation profile.
Bluetooth Device Supports Audio Streaming using Audio Video Remote Control Profile 1.0	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports the Bluetooth Audio Streaming AVRCP (Audio/Video Remote Control Profile) 1.0. The Audio/Video Remote Control Profile is a Bluetooth profile that allows Bluetooth devices to control media playback on remote devices. It is typically used with A2DP devices for next/previous track selection and pause/play functions.

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Parameter	Expected Value	Definition
Bluetooth Device Supports Audio Streaming using Audio Video Remote Control Profile 1.3	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports the Bluetooth Audio Streaming AVRCP (Audio/Video Remote Control Profile) 1.3. The Audio/Video Remote Control Profile is a Bluetooth profile that allows Bluetooth devices to control media playback on remote devices. It is typically used with A2DP devices for next/previous track selection and pause/play functions.
Bluetooth Device Supports Internet Access - Dial-Up Network	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports internet access only though the device's dial-up network.
Bluetooth Device Supports Internet Access - Personal Area Network	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports internet access only though the device's personal area network.
Bluetooth Device Supports Internet Access - Dial-Up/Personal Area Network	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device supports internet access though the device's dial-up or personal area network.
Bluetooth Device Class - Phone	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device class is identified as a phone.
Bluetooth Device Class - Audio/Video	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device class is identified as an audio and/or video device.
Bluetooth Device Class - Computer	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device class is identified as a computing device.
Bluetooth Device Class - LAN or Network Access Point	Varies	The scan tool displays Yes or No. Indicates if the currently connected Bluetooth device class is identified as a Local Area Network (LAN) or Network Access Point (NAP) device.
WLAN Link Quality	Counts	The scan tool displays the connection quality in counts, with higher numbers indicating a better connection.
App 1 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 1
App 1 Version	Varies	The scan tool displays the version number for the installed internet application number 1
App 2 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 2
App 2 Version	Varies	The scan tool displays the version number for the installed internet application number 2
App 3 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 3
App 3 Version	Varies	The scan tool displays the version number for the installed internet application number 3
App 4 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 4

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Parameter	Expected Value	Definition
App 4 Version	Varies	The scan tool displays the version number for the installed internet application number 4
App 5 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 5
App 5 Version	Varies	The scan tool displays the version number for the installed internet application number 5
App 6 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 6
App 6 Version	Varies	The scan tool displays the version number for the installed internet application number 6
App 7 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 7
App 7 Version	Varies	The scan tool displays the version number for the installed internet application number 7
App 8 Identifier	Varies	The scan tool displays the numeric identifier for the installed internet application number 8
App 8 Version	Varies	The scan tool displays the version number for the installed internet application number 8

Human Machine Interface Scan Tool Output Controls

Scan Tool Output Control	Description
Info Display Test	This output control will command the test of the Info Display.
Speech Recognition	This output control will command the various Speech Recognition prompts.
Cooling Fan	This output control will command the speed of the Cooling Fan.
Control Module Reset	This output control will command the reset of the Control Module.

HYBRID POWERTRAIN CONTROL MODULE SCAN TOOL INFORMATION

The hybrid powertrain control module is a non-serviceable module within the generator control module. The Hybrid Powertrain Control Module Scan Tool Data Parameters list contains hybrid controls-related parameters. The list is arranged in alphabetical order. A given parameter may appear in any one of the data lists, and in some cases may appear more than once, or in more than one data list in order to group certain related parameters together.

Use the Hybrid Powertrain Control Module Scan Tool Data Parameters list only after the following is determined:

- The **Diagnostic System Check - Vehicle** is completed.
- On-board diagnostics are functioning properly

The scan tool values from a properly running vehicle may be used for comparison with the vehicle you are diagnosing. The Hybrid Powertrain Control Module Scan Tool Data Parameters list represents values that would be seen on a normally running vehicle.

NOTE: **A scan tool that displays faulty data should not be used. The scan tool concern should be reported to the manufacturer. Use of a faulty scan tool can result in misdiagnosis and unnecessary parts replacement.**

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Only the parameters listed below are referenced in this service manual for use in diagnosis. If all values are within the typical range described below, refer to **Symptoms - Hybrid Controls** for diagnosis.

Hybrid Powertrain Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Closed Throttle/Park or Neutral/Accessories OFF, Engine On, normal operating temperature, unless otherwise noted			
5V Reference 2	Volts	5	This parameter displays the voltage of the 5V reference circuit for the brake pedal position sensor.
5V Reference 3	Volts	5	This parameter displays the voltage of the 5V reference circuit for the 14V power module input current sensor and drive motor 3-phase current sensors.
14V Power Module High Voltage Circuit Current	RPM	Varies	This parameter displays the speed of the hybrid battery cooling fan motor.
14V Power Module Input Power	Watts	Varies	This parameter displays the difference in power (power loss) between the input power and the output power of the 14V Power Module. The 14V power module converts high voltage to intermediate or low voltage in order to support the various electrical system loads. The power loss is determined based upon High Voltage current and voltage, Low Voltage current and voltage, and Intermediate Voltage current and voltage measurements from the 14V power module internal sensors.
14V Power Module Status	Normal ; Out Of Range ; Low Power Mode ; Shutdown Mode ; Default ; Unknown	Normal	This parameter displays the control status of the 14V power module as controlled in the hybrid powertrain control module. The 14V power module converts high voltage to intermediate or low voltage in order to support the various electrical system loads.
Autostart Inhibit Reason - Autostart/Autostop Malfunction	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Autostart/Autostop Malfunction.
Autostart Inhibit Reason - Autostart Not Commanded	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Start Not Commanded.

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Parameter	System State	Expected Value	Description
Autostart Inhibit Reason - Control Function Active	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: control function AutoStop Override.
Autostart Inhibit Reason - Crank Aborted	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Crank Aborted.
Autostart Inhibit Reason - Driver Exited Vehicle	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Driver Left Vehicle.
Autostart Inhibit Reason - ECM Malfunction	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: ECM System Failure.
Autostart Inhibit Reason - ECM Request	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: ECM Request.
Autostart Inhibit Reason - Engine Coolant Temperature Out of Range	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Engine Coolant Temperature.
Autostart Inhibit Reason - Hood Ajar	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Hood Open.
Autostart Inhibit Reason - Hybrid/EV Battery Pack Contactor Open	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: HV Battery Contactor Status.
Autostart Inhibit Reason - Hybrid/EV Battery Pack Power Low	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: HV Battery Power Limits.
Autostart Inhibit Reason - Hybrid/EV Battery Pack State of Charge Low	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: HV Battery State of Charge.
Autostart Inhibit Reason - Hybrid/EV Battery Pack Voltage Low	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: HV Battery Module Voltage.
Autostart Inhibit Reason - Hybrid/EV Power Conditions	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Hybrid Power Conditions.
Autostart Inhibit Reason - Hybrid/EV Propulsion System Inactive	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: HV Propulsion

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Parameter	System State	Expected Value	Description
			System.
Autostart Inhibit Reason - Run/Crank Not Active	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Run/Crank Not Active.
Autostart Inhibit Reason - System Malfunction	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Hybrid System Failure.
Autostart Inhibit Reason - Transmission Range	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Transmission Range.
Autostart Reason - A/C Request	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: AC System active.
Autostart Reason - Acceleration Request	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Driveability.
Autostart Reason - Accelerator Pedal Pressed	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Accelerator Pedal Position.
Autostart Reason - Auxiliary Transmission Fluid Pump Not Available	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Auxiliary Transmission Pump.
Autostart Reason - Brake Booster Weak Vacuum	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Brake Vacuum Pressure.
Autostart Reason - Brake Pedal Released	Yes / No	Yes	This parameter displays the status of an Autostart due to the following reason: Brake Pedal Position.
AAutostart Reason - Control Function Active	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: control function AutoStart Override.
Autostart Reason - Drive Motor Inverter Temperature High	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Electric Motor Inverter Temperature.
Autostart Reason - Drive Motor Temperature High	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Electric Motor Temperature.

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Parameter	System State	Expected Value	Description
Autostart Reason - Driver Exited Vehicle	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: The driver has exited the vehicle.
Autostart Reason - ECM Request	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: ECM Request.
Autostart Reason - Engine Coolant Temperature Out of Range	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Engine Coolant Temperature.
Autostart Reason - Hood Ajar	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Hood Open.
Autostart Reason - Hybrid/EV Battery Module Voltage Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: HV Battery Module Voltage
Autostart Reason - Hybrid/EV Battery Pack Power Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: HV Battery Power Limits.
Autostart Reason - Hybrid/EV Battery Pack State of Charge Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: HV Battery State of Charge.
Autostart Reason - Hybrid/EV Battery Pack Temperature	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: HV Battery Pack Temperature.
Autostart Reason - Hybrid/EV Battery Pack Voltage Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: HV Battery Pack Voltage Level.
Autostart Reason - Hybrid/EV Propulsion System Inactive	Yes / No	Yes	This parameter displays the status of an Autostart due to the following reason: HV Propulsion System.
Autostart Reason - Ignition Switch Start	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Key Forced AutoStart Request.
Autostart Reason - Inclination	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Vehicle Grade.
Autostart Reason - Invalid Data Received	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Data Validity.

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Parameter	System State	Expected Value	Description
AAutostart Reason - Low-Voltage Battery Discharge Current High	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: 12V Battery Discharge Current.
Autostart Reason - Low-Voltage Battery State of Charge Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: 12V Battery SOC.
Autostart Reason - Low-Voltage Battery State of Function Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: 12V Battery SOF Voltage.
Autostart Reason - Low-Voltage Battery State of Health Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: 12V Battery SOH.
Autostart Reason - Low-Voltage Battery Voltage Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: 12V Battery Voltage.
Autostart Reason - Maximum Autostop Time Exceeded	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Max AutoStop Time.
Autostart Reason - Minimum Engine Run Time Not Met	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Minimum Run Time Not Met.
Autostart Reason - Reduced Engine Power Active	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Reduced Power.
Autostart Reason - Remote Vehicle Start Request	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Remote Start.
Autostart Reason - System Malfunction	Yes / No	No	This parameter displays the status of an Autostart Inhibit due to the following reason: Hybrid System Failure.
Autostart Reason - System Optimization	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: System Optimization.
Autostart Reason - System Voltage Low	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: System Voltage Low.

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Parameter	System State	Expected Value	Description
Autostart Reason - TCM Demand	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: TCM Override.
Autostart Reason - Transmission Fluid Temperature Out of Range	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Transmission Temperature.
Autostart Reason - Transmission in Reverse	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Reverse Grade.
Autostart Reason - Transmission Range	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Transmission Range.
Autostart Reason - Vehicle Speed Too High	Yes / No	No	This parameter displays the status of an Autostart due to the following reason: Vehicle Speed Too High.
Autostop Disable Reason - A/C Request	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: AC System.
Autostop Disable Reason - Acceleration Request	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Driveability.
Autostop Disable Reason - Accelerator Pedal Pressed	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Accelerator Pedal Position.
Autostop Disable Reason - Auxiliary Transmission Fluid Pump Not Available	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Auxiliary Transmission Pump.
Autostop Disable Reason - Brake Booster Weak Vacuum	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Brake Vacuum Pressure.
Autostop Disable Reason - Brake Pedal Released	Yes / No	Yes	This parameter displays the status of an Autostop Disable due to the following reason: Brake Pedal Position.
Autostop Disable Reason - Control Function Active	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: control function AutoStart Override.
Autostop Disable Reason - Drive Motor Inverter Temperature High	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Electric Motor Inverter Temperature.

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Parameter	System State	Expected Value	Description
Autostop Disable Reason - Drive Motor Temperature High	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Electric Motor Temperature.
Autostop Disable Reason - Driver Exited Vehicle	Yes / No	No	This parameter displays the status of an Autostop due to the following reason: The driver has exited the vehicle.
Autostop Disable Reason - ECM Request	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: ECM Request.
Autostop Disable Reason - Engine Coolant Temperature Out of Range	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Engine Coolant Temperature.
Autostop Disable Reason - Engine Speed High	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Engine Speed.
Autostop Disable Reason - Generator Load High	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Maximum Generator Load requested.
Autostop Disable Reason - Hood Ajar	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Hood Open.
Autostop Disable Reason - Hybrid/EV Battery Module Voltage Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: HV Battery Module Voltage.
Autostop Disable Reason - Hybrid/EV Battery Pack Power Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: HV Battery Power Limits.
Autostop Disable Reason - Hybrid/EV Battery Pack State of Charge Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: HV Battery State of Charge
Autostop Disable Reason - Hybrid/EV Battery Pack Temperature	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: HV Battery Pack Temperature.
Autostop Disable Reason - Hybrid/EV Battery Pack Voltage Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: HV Battery Pack Voltage.
Autostop Disable Reason - Hybrid/EV Propulsion System Inactive	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: HV Propulsion

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Parameter	System State	Expected Value	Description
			System.
Autostop Disable Reason - Idle Boost Mode Active	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Idle Boost Mode.
Autostop Disable Reason - Ignition Switch Start	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Key Forced AutoStart Request.
Autostop Disable Reason - Intake Manifold Weak Vacuum	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Intake Manifold Pressure.
Autostop Disable Reason - Invalid Data Received	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Data Validity.
Autostop Disable Reason - Low-Voltage Battery Discharge Current High	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: 12V Battery Discharge Current.
Autostop Disable Reason - Low-Voltage Battery State of Charge Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: 12V Battery SOC.
Autostop Disable Reason - Low-Voltage Battery State of Function Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: 12V Battery SOF Voltage.
Autostop Disable Reason - Low-Voltage Battery State of Health Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: 12V Battery SOH.
Autostop Disable Reason - Low-Voltage Battery Temperature Out of Range	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: 12V Battery Temperature.
Autostop Disable Reason - Low-Voltage Battery Voltage Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: 12V Battery Voltage.
Autostop Disable Reason - Maximum Vehicle Stop Time Exceeded	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Too Much Time Since Vehicle Stop.
Autostop Disable Reason - Minimum Engine Run Time Not Met	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Minimum Run Time Not Met.

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Parameter	System State	Expected Value	Description
Autostop Disable Reason - Reduced Engine Power Active	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Reduced Power.
Autostop Disable Reason - Remote Vehicle Start Request	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Remote Start.
Autostop Disable Reason - Run/Crank Not Active	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Run/Crank Not Active.
Autostop Disable Reason - Starter System Malfunction	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Starting System.
Autostop Disable Reason - System Malfunction	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: System Fault.
Autostop Disable Reason - System Optimization	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: System Optimization.
Autostop Disable Reason - System Voltage Low	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: System Voltage Low.
Autostop Disable Reason - TCM Request	Yes / No	Yes	This parameter displays the status of an Autostop Disable due to the following reason: TCM Override.
AAutostop Disable Reason - Transmission Fluid Temperature Out of Range	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Transmission Temperature.
Autostop Disable Reason - Transmission in Reverse	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Reverse Grade.
Autostop Disable Reason - Transmission Range	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Transmission Range.
Autostop Disable Reason - Vehicle Inclination	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Vehicle Grade.
Autostop Disable Reason - Vehicle Speed Threshold Not Reached	Yes / No	Yes	This parameter displays the status of an Autostop Disable due to the following reason: Vehicle Speed Threshold Not Reached.
Autostop Disable Reason - Vehicle Speed Too High	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Vehicle Speed

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Parameter	System State	Expected Value	Description
			Too High.
Autostop Disable Reason - Wheel Slip Detected	Yes / No	No	This parameter displays the status of an Autostop Disable due to the following reason: Wheel Slip.
Brake Pedal Position Sensor	%	Varies	This parameter displays the brake pedal position as a percentage.
Brake Pedal Position Sensor	Volts	Varies	This parameter displays the brake pedal position voltage.
Brake Pedal Position Sensor Learned Released Position	%	Varies	This parameter displays the brake pedal position sensor learned released position as a percentage.
Brake Pedal Position Sensor Learned Released Position	Volts	Varies	This parameter displays the brake pedal position sensor learned released position voltage.
Brake Pedal Position Sensor Signal	Released / Applied	Released	This parameter displays the status of the application of the brake pedal switch input to the controller.
Calculated Drive Motor Rotor Temperature	Â°C (Â°F)	Varies	This parameter displays the calculated temperature of the Drive Motor rotor.
Contactor Open Reason History 1	None ; Normal Function ; DTC Present ; Control Function Active Invalid	Normal Function	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage contactor or prevented the high voltage contactor from closing.
Contactor Open Reason History 2	None ; Normal Function ; DTC Present ; Control Function Active Invalid	-	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage contactor or prevented the high voltage contactor from closing.
Contactor Open Reason History 3	None ; Normal Function ; DTC Present ; Control Function Active Invalid	-	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage contactor or prevented the high voltage contactor from closing.
Contactor Open Reason History 4	None ; Normal Function ; DTC Present ; Control Function Active Invalid	-	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage contactor or prevented the high voltage contactor from closing.
Contactor Open Reason History 5	None ; Normal Function ; DTC Present ; Control Function Active	-	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage

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Parameter	System State	Expected Value	Description
	Invalid		contactor or prevented the high voltage contactor from closing.
Contactor Open Reason History 6	None ; Normal Function ; DTC Present ; Control Function Active Invalid	-	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage contactor or prevented the high voltage contactor from closing.
Contactor Open Reason History 7	None ; Normal Function ; DTC Present ; Control Function Active Invalid	-	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage contactor or prevented the high voltage contactor from closing.
Contactor Open Reason History 8	None ; Normal Function ; DTC Present ; Control Function Active Invalid	-	This parameter displays one of the last eight reasons that hybrid powertrain control module has either opened the high voltage contactor or prevented the high voltage contactor from closing.
Crank Abort	Active / Inactive	Inactive	This parameter displays the status of the internal combustion engine crank request of the ECM. The hybrid control module monitors the ECM for this data in order to determine whether to enable or disable ICE cranking.
Crank Request	Yes / No	No	This parameter displays the status of the internal combustion engine (ICE) crank request of the ECM. The hybrid control module (HCM) monitors the ECM for this data in order to determine whether to enable or disable ICE cranking.
Distance with MIL On	km / miles	Varies	This parameter displays the distance With Malfunction Indicator Lamp On.
Drive Motor Belt Maximum Detected Slip	%	Varies	This parameter displays the maximum percent of belt slip detected for the drive motor accessory drive belt.
Drive Motor Belt Minimum Detected Slip	%	Varies	This parameter displays the minimum percent of belt slip detected for the drive motor accessory drive belt.
Drive Motor Belt Slip	%	-	This parameter displays the percent of belt slip detected for the drive motor accessory drive belt. A value

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Parameter	System State	Expected Value	Description
			of zero indicates that no slip is present. +100% indicates that the starter generator motor is turning and the internal combustion engine (ICE) is not.
Drive Motor Control Module Negative Supply Isolation Voltage	Volts	Within 15V of Drive Motor Control Module Positive Supply Isolation Voltage	This parameter displays the Negative Supply Isolation Voltage used for troubleshooting a loss of isolation.
Drive Motor Control Module Positive Supply Isolation Voltage	Volts	Within 15V of Drive Motor Control Module Negative Supply Isolation Voltage	This parameter displays the Positive Supply Isolation Voltage used for troubleshooting a loss of isolation.
Drive Motor Coolant Pump Feedback Duty Cycle	%	Varies	This parameter displays the duty cycle of the Drive Motor Coolant Pump.
Drive Motor Coolant Pump Relay Command	Off / On	On	This parameter displays the Commanded State and the Status of the Drive Motor Coolant Pump Relay.
Drive Motor Coolant Pump Relay Control Circuit High Voltage Test Status	OK , Not Run , Malfunction	OK	This parameter displays the Commanded State and the Status of the Drive Motor Coolant Pump Relay.
Drive Motor Coolant Pump Relay Control Circuit Low Voltage Test Status	OK , Not Run , Malfunction	-	This parameter displays the Commanded State and the Status of the Drive Motor Coolant Pump Relay.
Drive Motor Coolant Pump Relay Control Circuit Open Test Status	OK , Not Run , Malfunction	OK	This parameter displays the Commanded State and the Status of the Drive Motor Coolant Pump Relay.
Drive Motor Coolant Pump Speed Feedback	RPM	Varies	This parameter displays the actual speed of the Drive Motor Coolant Pump.
Drive Motor Coolant Temperature	Â°C (Â°F)	Varies	This parameter displays the temperature of the drive motor coolant.
Drive Motor Current	Amps	Varies	This parameter displays the DC current consumed by the starter generator.
Drive Motor Inverter Status	Power Stage Inactive; Power Stage Active; Power Stage On: Shutdown Pending; Power Stage On:	Active	This parameter displays the actual state of the Drive Motor Inverter.

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Parameter	System State	Expected Value	Description
	Active Discharge; Reserved ; High Voltage Required		
Drive Motor Inverter Supply Voltage Circuit	Volts	86	This parameter displays the voltage on the DC bus at the drive motor inverter.
Drive Motor Inverter Temperature Sensor 1	Â°C (Â°F)	Varies	This parameter displays the temperature of the Drive Motor Inverter.
Drive Motor Inverter Temperature Sensor 2	Â°C (Â°F)	Varies	This parameter displays the temperature of the Drive Motor Inverter.
Drive Motor Inverter Temperature Sensor 3	Â°C (Â°F)	Varies	This parameter displays the temperature of the Drive Motor Inverter.
Drive Motor Phase U Current	Amps	Varies	This parameter displays the Phase U current of the Drive Motor.
Drive Motor Phase V Current	Amps	Varies	This parameter displays the Phase V current of the Drive Motor.
Drive Motor Phase W Current	Amps	Varies	This parameter displays the Phase W current of the Drive Motor.
Drive Motor Speed	RPM	1800	This parameter displays the torque commanded by the hybrid powertrain control module to the starter generator.
Drive Motor Torque	Y (lb ft)	Varies	This parameter displays the torque value for the drive motor.
Drive Motor Torque Command	Y (lb ft)	Varies	This parameter displays the commanded torque value requested by the drive motor control module.
ECT Sensor	Â°C (Â°F)	Varies	This parameter displays the undefaulted engine coolant temperature measured by the sensor.
Engine Run Time	Seconds	Varies	This parameter displays the time that the engine has been running. The value of this parameter displays shall freeze if an engine stall occurs and shall be reset.
Engine Torque	Y (lb ft)	Varies	This parameter displays actual engine torque as determined by the ECM. This display is only active when the engine is running.
Hybrid/EV Battery Pack State Of Charge	%	50	This parameter displays the hybrid battery State Of Charge as calculated by the hybrid powertrain control module. The parameter display range is 0-100%.

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Parameter	System State	Expected Value	Description
IAT Sensor	Â°C (Â°F)	Varies	This parameter displays the temperature of the internal combustion engine (ICE) intake air as determined by the ECM. The parameter display range is -40Â°C to +215Â°C (-40Â°F to +419Â°F).
ICE Backup Start Counter	Counts	Varies	This parameter displays the number of backup starts commanded. (A backup start uses the low voltage starter due to a fault with the high voltage starting system.) This parameter displays value will not reset until a code clear is issued to the controller (either a natural code clear as defined by the diagnostic or a mode $04). If a backup start event has not taken place (either initially or after a code clear), This parameter displays shall default to zero.
ICE Start Status	No Start Attempted; Hybrid/EV Motor; Starter Motor ; Tandem Start; Start Not Complete	No Start Attempted	This parameter displays the status of internal combustion engine (ICE) starting attempts. If an ICE start has completed, this parameter will indicate which starting machine was used for the start. This parameter will also indicate if no ICE start has been attempted or if an ICE start has failed. This parameter information is only valid for the current ignition key cycle. No Start Attempted indicates that no attempt has been made to start the ICE, either via a key crank or an autostart, during the current ignition key cycle. Hybrid/EV Motor indicates that the starter generator was used to start the ICE. Starter Motor indicates that the conventional ICE starter motor was used to start the ICE. Tandem Start indicates that a combination of the starter generator and conventional starter motor was used to start the ICE. Start Not Complete indicates that an ICE start was attempted, but

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Parameter	System State	Expected Value	Description
			failed.
ICE Status	Engine Stalled , Stop , Running , Start , Off , Silent Start, Invalid	Running	This parameter displays the current status of the internal combustion engine (ICE) as determined by the ECM. The hybrid powertrain control module monitors the ECM for this data in order to determine ICE status.
Ignition 1 Signal	Volts	14.5	Run/Crank Voltage
Ignition Input Accessory	Active / Inactive	Active	This parameter displays that the accessory hardwire power input to the hybrid powertrain control module.
Ignition Input Off/On /Start	Active / Inactive	Active	This parameter displays that the ignition hardwire power input to the hybrid powertrain control module.
Maximum Hybrid/EV Battery Module Temperature	Â°C (Â°F)	Varies	This parameter displays the temperature of the hybrid battery module with the highest temperature.
Minimum Hybrid/EV Battery Module Temperature	Â°C (Â°F)	Varies	This parameter displays the temperature of the hybrid battery module with the lowest temperature.
Power Mode	Off ; Accessory ; Run ; Crank Request	Run	This parameter displays system power mode status as determined by ignition switch inputs to the power mode master. System power mode status should match the ignition switch position.
Requested Engine Torque	(lb ft)	Varies	This parameter displays commanded engine torque as determined by the ECM. This display is only active when the engine is running.
Torque Delivered Signal	Y (lb ft)	Varies	This parameter displays the Engine Actual Steady State Torque.
Transmission Fluid Pressure Accumulator Solenoid Valve Command	Off / On	Off	This parameter displays the state of the control circuit for the auxiliary transmission fluid pump relay control circuit.
Transmission Fluid Pressure Accumulator Solenoid Valve Control Circuit High Voltage Test Status	Failed , Indeterminate , Passed	-	This parameter displays the state of the control circuit for the auxiliary transmission fluid pump relay control circuit.

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Parameter	System State	Expected Value	Description
Transmission Fluid Pressure Accumulator Solenoid Valve Control Circuit Low Voltage Test Status	Failed , Indeterminate , Passed	-	This parameter displays the state of the control circuit for the auxiliary transmission fluid pump relay control circuit.
Transmission Fluid Pressure Accumulator Solenoid Valve Control Circuit Open Test Status	Failed , Indeterminate , Passed	-	This parameter displays the state of the control circuit for the auxiliary transmission fluid pump relay control circuit.
Vehicle Speed Sensor	km/h (mph)	0	This parameter displays the vehicle speed calculated from the transmission output speed.

Hybrid Powertrain Control Module Scan Tool Output Controls

Output Control	Description
Autostart/Autostop	**NOTE:** • **The hood must remain closed while commanding either Autostart or Autostop with the scan tool. Opening the hood while commanding Autostop or Autostart will cause an engine stall, start/stall, vehicle disable condition. The disable condition will remain active until the hood is closed.** • **The Autostart command will not function**

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Output Control	Description
	when the gear selector is in Reverse, Drive, or Manual. Shift the gear selector to Park or Neutral in order to command an Autostart. • The hybrid powertrain control module controls the Autostop and Autostart hybrid operation modes. • When operating in the Autostop mode, the following control limits apply: • Ignition ON. • The internal combustion engine (ICE) must be running. • The drive motor battery state of charge must be greater than 25%. • The engine coolant temperature (ECT) must be between 68Â°C (154Â°F) and 109Â°C (228Â°F). • When operating in the Autostart mode, the following control limits apply: Ignition ON
Clear Secured High Voltage DTCs	**NOTE:** **Perform the high voltage disable procedure and repair or replace damaged high voltage components as specified in the applicable diagnostic prior using this control.**

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Output Control	Description
	• The hybrid powertrain control module monitors for a high voltage present condition after the high voltage contactor relays have been opened. When high voltage is present this DTC will set. • The hybrid powertrain control module clears the DTC Information for the high voltage present DTC. • The following control limits apply: • Vehicle must be ON. • The hybrid powertrain control module must monitor that high voltage is not currently present. • Communication DTCs must not be present. • Turn the vehicle OFF and wait 5 minutes after performing this Output Control.
Drive Motor Coolant Pump Relay	This control function is used to override the state of the electric motor A coolant pump relay output by turning the relay ON and OFF.
Drive Motor Speed	This control function is used to override the state of electric motor in a hybrid/electric vehicle. The drive motor belt must be removed first in order for this to operate.
ICE Only Mode	This control function allows the 14V power module to charge the 12 volt battery, but disables hybrid functions. "Normal Car" is defined in which the engine only provides the propulsion to drive the vehicle while the operation of hybrid subsystem is limited to charging the 12V. Disabled features include hybrid deceleration fuel cutoff, hybrid regeneration, and ICE autostop.
OnBoard Jump Assist Counter Reset	This control function is used to allow a service technician to reset the Jump Assist parameter counter.
Transmission Fluid Pressure Accumulator Solenoid Valve	This control function is used to override the state of the transmission surge accumulator solenoid output.

HYBRID POWERTRAIN CONTROL MODULE 2 SCAN TOOL INFORMATION

Hybrid Powertrain Control Module 2 Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Vehicle in Run			
Actively Tested Isolation Resistance of Complete Vehicle	-	Varies	Vehicles equipped with high voltage storage and propulsion capability are designed with both the positive and negative high voltage circuits isolated from the vehicle chassis. This parameter displays the status of the Hybrid/EV battery pack isolation diagnostic test performed during the scan tool high voltage disable control function, as applicable.
Airbag Deployed	-	No	This parameter displays if the contactors are commanded open because an air bag has deployed.

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Parameter	System State	Expected Value	Description
Ambient Air Temperature	-	Varies	This parameter displays the temperature of the air surrounding the vehicle.
Average Hybrid/EV Battery Pack Temperature	-	Varies	This parameter displays the average temperature for all of the Hybrid/EV battery pack module sensors.
Battery Interface Control Modules Over Voltage Fault Status	-	No	This parameter displays the status of the Battery Interface Control Module hybrid/EV battery cell overvoltage diagnostic circuit.
Crash Event Detected	-	No	This parameter displays if the contactors are commanded open due to a vehicle crash event being detected.
Crash Event Lockout	-	No	This parameter displays if the contactors are prevented from closing due to a vehicle crash event being detected. Refer to **Clear Secured High Voltage DTCs** procedure whenever YES is displayed.
Discharge Fault Lockout	-	No	This parameter displays if the system is commanding contactors open due to a failure of the discharge circuit.
Discharging	-	No	This parameter displays if the system is inhibiting contactor closure because the high voltage system is currently in the process of discharging the capacitors on the high voltage bus. Discharging usually occurs immediately following opening of the high voltage contactors.
Distance Since DTC Cleared	-	Varies	This parameter displays the distance in miles or kilometers since OBD diagnostic trouble codes (DTCs) have been cleared using the service tool.
Distance Since First Malfunction	-	Varies	This parameter displays the distance in miles or kilometers since OBD diagnostic trouble codes (DTCs) have first set.
Distance Since Last Malfunction	-	Varies	This parameter displays the distance in miles or kilometers since OBD diagnostic trouble codes (DTCs) have last set.

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Parameter	System State	Expected Value	Description
Distance with MIL On	-	Varies	This parameter displays the accumulated distance in miles or kilometers driven with the malfunction indicator lamp (MIL) on.
Drive Motor 1 Control Module Negative Supply Isolation Voltage	HV Enabled	Half of Hybrid/EV Battery Pack Voltage	This parameter displays the voltage measured between the HV bus passive isolation circuit and the vehicle chassis. Refer to **Hybrid/EV System High Voltage Isolation Description** .
Drive Motor 1 Control Module Positive Supply Isolation Voltage	HV Enabled	Half of Hybrid/EV Battery Pack Voltage	This parameter displays the voltage measured between the HV bus passive isolation circuit and the vehicle chassis. Refer to **Hybrid/EV System High Voltage Isolation Description** .
High Voltage Battery Under Temperature Detected	-	No	This parameter displays if the Hybrid/EV Battery Pack is too cold.
High Voltage Inverter Voltage	HV Enabled	Near Hybrid/EV Battery Pack Voltage	This parameter displays the high voltage as currently monitored by the hybrid/EV powertrain control module 1 internal to the K59 Starter/Generator Control Module.
	HV Not Enabled	Less than 3V	
High Voltage System Being Serviced Lockout	-	Varies	This parameter displays if the system is commanding contactors open due to the scan tool high voltage disable function, as applicable.
High Voltage System Isolation Test Status	HV Enabled	Not Running	Vehicles equipped with high voltage storage and propulsion capability are designed with both the positive and negative high voltage circuits isolated from the vehicle chassis. This parameter displays the status of the Hybrid/EV battery pack isolation diagnostic test. This test may run at accessory wake up or immediately following key-off. The status will clear whenever DTCs are cleared.
	HV Not Enabled	Running /Complete	
Hood Ajar Switch	-	Varies	This parameter displays the position the hood latch switch in percent.
Hood Position	-	Varies	This parameter displays the position of the hood as determined by the hood latch switch.
Hybrid Battery Contactor Emergency Open	-	None	This parameter displays the last reason the Hybrid/EV Battery Pack

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Parameter	System State	Expected Value	Description
Request Reason History			high voltage contactors were commanded open due to a system detected condition or fault.
Hybrid/EV Battery (1 to 24)	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the voltage of the applicable battery cell group. The Hybrid/EV Battery Section schematics in Energy Storage identify the battery module section and voltage sense circuit terminal locations appropriate to each cell group.
Hybrid/EV Battery (1 to 4)	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the value of the temperature sensors within the applicable battery module.
Hybrid/EV Battery Interface Control Module Voltage (1 or 2)	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the total voltage of the cell groups within the applicable battery module.
Hybrid/EV Battery Negative Contactor Command	HV Enabled	Closed	This parameter displays the Hybrid Powertrain Control Module 2 Commanded state of the contactor (relay) on the (-) side of the Hybrid/EV Battery pack.
	HV Not Enabled	Open	
Hybrid/EV Battery Pack Coolant Fan Duty Cycle Command	-	Varies	This parameter displays the commanded percentage air flow for the Hybrid/EV battery pack cooling fan.
Hybrid/EV Battery Pack Cooling Fan Speed	-	Varies	This parameter displays the actual speed of the Hybrid/EV battery pack cooling fan motor shaft.
Hybrid/EV Battery Pack Current	-	Varies	This parameter displays the amount of current in amps flowing in or out of the Hybrid/EV battery pack.
Hybrid/EV Battery Pack Maximum Charge Power Limit	-	Varies	This parameter displays the electric power in kW allowed by the Hybrid Powertrain Control Module 2 in order to charge the Hybrid/EV battery pack.
Hybrid/EV Battery Pack Maximum Discharge Current Limit	-	Varies	This parameter displays the electric power in amps available from the Hybrid/EV battery pack as

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Parameter	System State	Expected Value	Description
			determined by the Hybrid Powertrain Control Module 2.
Hybrid/EV Battery Pack Maximum Discharge Power Limit	-	Varies	This parameter displays the electric power in kW available from the Hybrid/EV battery pack as determined by the Hybrid Powertrain Control Module 2.
Hybrid/EV Battery Pack Maximum Voltage	-	Varies	This parameter displays the total Hybrid/EV battery pack maximum voltage measured during the current ignition cycle.
Hybrid/EV Battery Pack Minimum State of Charge Limit	-	Varies	This parameter displays the minimum permissible Hybrid/EV battery pack state of charge in percent. The Hybrid/EV system will not discharge the battery pack below this limit.
Hybrid/EV Battery Pack Minimum Voltage	-	Varies	This parameter displays the total Hybrid/EV battery pack minimum voltage measured during the current ignition cycle.
Hybrid/EV Battery Pack Negative Isolation Voltage	HV Enabled	Half of Hybrid/EV Battery Pack Voltage	This parameter displays the voltage measured between the HV bus active isolation circuit and the vehicle chassis. Refer to **Hybrid/EV System High Voltage Isolation Description** .
Hybrid/EV Battery Pack Positive Isolation Voltage	HV Enabled	Half of Hybrid/EV Battery Pack Voltage	This parameter displays the voltage measured between the HV bus active isolation circuit and the vehicle chassis. Refer to **Hybrid/EV System High Voltage Isolation Description** .
Hybrid/EV Battery Pack Precharge Contactor Command	HV Enable Initiated	Closed	This parameter displays the Hybrid Powertrain Control Module 2 Commanded state of the operation of the Hybrid/EV Battery pack precharge contactor relay. Precharge occurs in the milliseconds prior to closing the main (-) bus contactor. By routing the high voltage through a resistor, precharge prevents voltage spikes from occurring whenever high voltage is enabled.
	HV Fully Enabled or HV Not Enabled	Open	
Hybrid/EV Battery Pack Resistance	-	Varies	This parameter displays the Hybrid/EV battery pack resistance value in ohms.

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Parameter	System State	Expected Value	Description
Hybrid/EV Battery Pack Voltage	-	Varies	This parameter displays the electrical potential of the Hybrid/EV battery pack as monitored by the hybrid/EV powertrain control module 2 sense circuits.
Hybrid/EV Battery Positive Contactor Command	HV Enabled	Closed	This parameter displays the Hybrid Powertrain Control Module 2 Commanded state of the contactor (relay) on the (+) side of the Hybrid/EV Battery pack.
	HV Not Enabled	Open	
Hybrid/EV Battery System Precharge Current Too High	-	No	Precharge occurs in the milliseconds prior to closing the main (+) bus contactor. By routing the high voltage through a resistor, precharge prevents voltage spikes from occurring whenever high voltage is enabled. This parameter displays if the contactors are commanded open because of excessive Precharge current.
Hybrid/EV Battery System Precharge Time Too Short	-	No	Precharge occurs in the milliseconds prior to closing the main (+) bus contactor. By routing high voltage through a resistor, precharge prevents voltage spikes from occurring whenever high voltage is enabled. The time required to precharge is based upon the system voltage and capacitance. This parameter displays if the contactors are commanded open because the time required to precharge was too fast.
Hybrid/EV Battery System Precharge Time Too Long	-	No	Precharge occurs in the milliseconds prior to closing the main (+) bus contactor. By routing the high voltage through a resistor, precharge prevents voltage spikes from occurring whenever high voltage is enabled. The time required to precharge is based upon the system voltage and capacitance. This parameter displays if the contactors are commanded open because the time required to precharge was too slow.
Hybrid/EV Battery Temperature Sensor with Maximum Value	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter

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Parameter	System State	Expected Value	Description
			displays the index-number of the battery module sensor that is reporting the maximum temperature value.
Hybrid/EV Battery Temperature Sensor with Minimum Value	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the index-number of the battery module sensor that is reporting the minimum temperature value.
Hybrid/EV Battery Voltage Sensors Average	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the average voltage of the cells.
Hybrid/EV Battery Voltage Sensor with Maximum Value	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the index-number of the battery module cell group voltage sensor that is reporting the highest voltage.
Hybrid/EV Battery Voltage Sensor with Minimum Value	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the index-number of the battery module cell group voltage sensor that is reporting the lowest voltage.
Hybrid/EV Powertrain Control Module Request	-	No	This parameter displays if the hybrid/EV powertrain control module (1) is requesting the contactors to be open.
Ignition 1 Signal	-	Varies	This parameter displays the voltage monitored at the control module terminal connected to the Ignition 1 circuit.
Isolation Test Resistance	-	Varies	Vehicles equipped with high voltage storage and propulsion capability are designed with both the positive and negative high voltage circuits isolated from the vehicle chassis. This parameter displays the amount of isolation observed when the Hybrid/EV battery pack last performed its isolation diagnostic test. This test may run at accessory wake up or immediately following

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Parameter	System State	Expected Value	Description
			key-off. The value will be set to zero whenever DTCs are cleared.
Maximum Hybrid/EV Battery Module Temperature	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the temperature of the battery module sensor reporting the highest temperature.
Maximum Hybrid/EV Battery Module Voltage	-	Varies	The Hybrid/EV battery pack contains many individual hybrid battery cells or modules. This parameter displays the maximum voltage measured at any of the cell groups.
Minimum Hybrid/EV Battery Module Temperature	-	Varies	The Hybrid/EV battery pack contains many individual battery cells or modules. This parameter displays the temperature of the battery module sensor reporting the lowest temperature.
Minimum Hybrid/EV Battery Module Voltage	-	Varies	The Hybrid/EV battery pack contains many individual hybrid battery cells or modules. This parameter displays the minimum voltage measured at any of the cell groups.
Over/Under Voltage Lockout	-	No	This parameter displays if the system is commanding contactors open due to high or low voltage.
Overtemperature	-	No	This parameter displays if the system is commanding contactors open to protect them from overheating. The contactors will overheat if cycled too many times within a short amount of time.
Shutdown Mode	-	No	Shutdown Mode is the semi-operational state while a control module is turning off. Shutdown mode allows time for house-keeping tasks such as writing data to stored memory. This parameter displays if the module is in the process of shutting down.
State of Charge	-	Varies	This parameter displays the percentage available capacity remaining in a Hybrid/EV battery pack.

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Parameter	System State	Expected Value	Description
Stuck Open	-	No	This parameter displays the contactors are commanded open because the module has detected one or more of the high voltage contactors will not close.
Sum of all Hybrid/EV Battery Section Voltages	-	Varies	The Hybrid/EV battery pack contains many individual hybrid battery cells or modules. This parameter displays the electrical potential of the Hybrid/EV battery pack as monitored by the summed total of the cell group voltages.
Warm-Ups Since DTC Cleared	-	Varies	This parameter displays the number of OBD defined warm-up cycles since the last time codes were cleared with a scan tool or, when applicable, with a 12V battery disconnect. A warm-up cycle occurs after the propulsion system has been active for 1000 consecutive seconds with run/crank ignition active.

Hybrid Powertrain Control Module 2 Configuration/Reset Functions

Functions	Description
Fuel Economy Reset	This reset function is used to reset the learned Lifetime fuel economy displayed to the operator of the vehicle.

Hybrid Powertrain Control Module 2 Scan Tool Output Controls

Output Control	Description
Clear Secured High Voltage DTCs	• This output control is used to clear a latched high voltage (HV) lockout state. • The hybrid powertrain control modules 1 and 2 monitor for high voltage safety conditions such as airbag deploy events and certain HV system faults. • If these conditions are present either module may set a DTC and prevent HV enabling until after this Output Control is exercised. **NOTE:** **Performing a scan tool DTC Clear may clear the diagnostic that set the HV lockout state, but**

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Output Control	Description
	will not reset the lockout. • Always refer to **Clear Secured High Voltage DTCs** procedure in Hybrid/Energy Storage service information for the proper sequence of procedures required to reset a HV lockout state.
Hybrid/EV Battery Contactors	This output control is used to energize the high voltage contactors for diagnostic purposes. Refer to the applicable high voltage contactor diagnostic trouble code for setup and usage instructions.
Hybrid/EV Battery Pack Active Isolation Test	• Vehicles equipped with high voltage storage and propulsion capability are designed with both the positive and negative high voltage circuits isolated from the vehicle chassis. • This output control commands the hybrid powertrain control module 2 to measure the isolation of the hybrid/EV battery pack • The following control limits apply: • All high voltage contactors are open • The vehicle power mode is OFF Depress and hold the brake pedal while the vehicle power mode is OFF to wake up the modules prior to enabling this output control.
Hybrid/EV Battery Pack Cooling Fan	This output control is used to vary the hybrid/EV battery pack cooling fan motor between 10% and 90%.

INFLATABLE RESTRAINT PASSENGER PRESENCE SYSTEM SCAN TOOL INFORMATION

Passenger Presence Module Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Base Model Part Number	Varies, 8 Digit Number	The scan tool displays the part number of the PPS module which is stored in non volatile memory.
Battery Voltage	Volts	The scan tool will display battery voltage.
Calibration Part Number	Varies, 8 Digit Number	The scan tool displays the part number of the calibration file in the PPS module.
End Model Part Number	Varies, 8 Digit Number	The scan tool displays the part number of the PPS module in production.
Manufacturer's Traceability Number	Varies, 16 Digit Number	The scan tool displays the 16 digit traceability number in the PPS module.
Passenger Air Bag Enable/Disable Request by Passenger Presence Module	Disable	The scan tool displays the Passenger Air Bag Enable/Disable Request by Passenger Presence Module.
Passenger Presence Module Primary Key	Hex Value	The scan tool indicates the primary key Hex value.
Passenger Presence System Reporting DTC(s)	Yes/No	The PPS module will report if there are DTCs set in the passenger presence module.

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Parameter	Expected Value	Definition
Passenger Seat Occupancy Status	Empty Seat	The scan tool displays Undefined, Empty Seat, Occupied, or Invalid. This is the state of the passenger seat if it is occupied or empty and monitored by the passenger presence system.
Power Mode	Off / Accessory / Run / Crank Request	The scan tool will display the power mode of the vehicle.
Primary Key Status	Valid/Invalid	The scan tool displays Valid if the primary key matches what is stored to memory in the PPS module.
Received Primary Key	Hex Value	The scan tool displays a Hex value indicating the PPS module received primary key data.
Software Part Number	Varies, 8 Digit Number	The scan tool displays the software part number in the PPS module.

INFLATABLE RESTRAINT SENSING AND DIAGNOSTIC MODULE SCAN TOOL INFORMATION

NOTE: **Some parameters and values in the table below may not apply to every vehicle.**

Sensing and Diagnostic Module Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
2nd Row Left Seat Belt Reminder Sensor Pad Enable Status	Disabled/Enabled	The scan tool displays if the left rear seat belt reminder sensor pad is enabled to the SDM.
2nd Row Left Seat Belt Reminder Sensor Pad Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the left rear seat belt reminder sensor pad has been learned by the SDM.
2nd Row Left Seat Belt Status	Buckled/Unbuckled	The scan tool displays Buckled or Unbuckled. This is the state of the left rear seat belt switch when the seat belt is buckled or unbuckled.
2nd Row Middle Seat Belt Reminder Sensor Pad Enable Status	Disabled/Enabled	The scan tool displays if the rear middle seat belt reminder sensor pad is enabled to the SDM.
2nd Row Middle Seat Belt Reminder Sensor Pad Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the rear middle seat belt reminder sensor pad has been learned by the SDM.
2nd Row Middle Seat Belt Status	Buckled/Unbuckled	The scan tool displays Buckled or Unbuckled. This is the state of the middle rear seat belt switch when the seat belt is buckled or unbuckled.
2nd Row Middle Seat Belt Reminder Sensor Pad Enable Status	Disabled/Enabled	The scan tool displays if the rear right seat belt reminder sensor pad is enabled to the SDM.

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Parameter	Expected Value	Definition
2nd Row Middle Seat Belt Reminder Sensor Pad Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the rear right seat belt reminder sensor pad has been learned by the SDM.
2nd Row Right Seat Belt Status	Buckled/Unbuckled	The scan tool displays Buckled or Unbuckled. This is the state of the right rear seat belt switch when the seat belt is buckled or unbuckled.
Air Bag Malfunction Indicator	On/Off/Flashes	The scan tool will display On or Flashes if there is a problem with the SIR system. Any problems within the SIR system will illuminate the air bag indicator. The indicator will either flash or stay on.
Base Model Part Number	Varies, 8 Digit Number	The scan tool displays the part number of the SDM which is stored in non volatile memory.
Calibration Part Number	Varies, 8 Digit Number	The scan tool displays the part number of the calibration file in the SDM.
Deployment Loop 1-18 Enable Status	Enabled/Disabled	The scan tool displays Enabled or Disabled. This is the status of the air bag or pretensioner.
Deployment Loop 1-18 Learn Status	Learned/Not Learned	The scan tool displays Learned or Not learned. Learned is displayed if the SDM has defined the number loop programmed from an air bag or pretensioner.
Deployment Loop 1-18 Resistance	1.44-4.25 Ohms	The scan tool displays the resistance of the learned loop of the air bag or pretensioner when connected to the SDM.
Deployment Loop 1-18 Type	Varies	The scan tool displays the name of the air bag or pretensioner associated with the loop type 1-18.
Driver Seat Belt Reminder Indicator	On/Off	The scan tool displays On if this indicator is on. If the indicator is on it means the seat belt has not been buckled.
Driver Seat Belt Sensor Enable Status	Enabled/Disabled	The scan tool displays if the seat belt sensor in the seat belt buckle is enabled to the SDM.
Driver Seat Belt Sensor Learn Status	Learned/Not learned	The scan tool displays Learned or Not Learned. Learned is displayed if the driver seat belt sensor has been learned by the SDM.
Driver Seat Belt Status	Buckled/Unbuckled	The scan tool displays Buckled or Unbuckled. This is the state of the driver seat belt switch when the seat belt is buckled or unbuckled.
Driver Seat Position Sensor	Rearward/Forward	The scan tool will display if the driver seat is forward or rearward of the sensor set position.
Driver Seat Position Sensor Enable Status	Enabled/Disabled	The scan tool displays if the seat position sensor is enabled to the SDM.
Driver Seat Position Sensor Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the driver seat position sensor has been learned by the

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Parameter	Expected Value	Definition
		SDM.
End Model Part Number	Varies, 8 Digit Number	The scan tool displays the part number of the SDM in production.
Impact Sensor 1-8 Enable Status	Enabled/Disabled	The scan tool displays Enabled or Disabled This is the status of the impact sensor.
Impact Sensor 1-8 Learn Status	Learned/Not Learned	The scan tool displays Learned or Not learned. Learned is displayed if the SDM has learned and has assigned a number to that impact sensor.
Impact Sensor 1-8 Type	Equipped/Not Equipped	The scan tool displays the name of the impact sensor associated with the type 1-8.
Inflatable Restraint Sensing and Diagnostic Module Primary Key	Hex Value	The scan tool indicates the primary key Hex value.
Manufacturer's Traceability Number	Varies, 16 Digit Number	The scan tool displays the 16 digit traceability number in the SDM.
Module Setup	Incomplete/Complete	The scan tool indicates if the SDM is set up.
Passenger Air Bag Disabled Switch	On/Off	The scan tool displays Off when the customer manually turns the passenger airbag off with this switch.
Passenger Air Bag Off Indicator	On/Off	The scan tool displays Off when the passenger indicator is not illuminated. This indicator is off when the disable switch is in the off position or no one is sitting in the passenger seat.
Passenger Air Bag On Indicator	On/Off	The scan tool displays On when the passenger indicator is illuminated. This indicator is on when the disable switch is in the on position and someone is sitting in the passenger seat.
Passenger Air Bag Status	Enabled/Disabled	The scan tool displays if the passenger air bag is enabled to the SDM.
Passenger Air Bag Disable Indicator Enable Status	Enabled/Disabled	The scan tool displays if the passenger air bag disable indicator is enabled to the SDM.
Passenger Air Bag Disable Indicator Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the SDM has learned the status of the passenger air bag disable indicator.
Passenger Air Bag Disable Switch Enable Status	Enabled/Disabled	The scan tool displays if the passenger air bag disable switch is enabled to the SDM.
Passenger Air Bag Disable Switch Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the SDM has learned the status of the passenger air bag disable switch.
Passenger Air Bag Enable Indicator Enable Status	Enabled/Disabled	The scan tool displays if the passenger air bag enable indicator is enabled to the SDM.

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Parameter	Expected Value	Definition
Passenger Air Bag Enable Indicator Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the SDM has learned the status of the passenger air bag enable indicator.
Passenger Classification	00-07	The scan tool will display what type of individual is sitting in the passenger seat.
Passenger Presence Detection System Enable Status	Enabled/Disabled	The scan tool displays if the passenger presence system is enabled to the SDM.
Passenger Presence Detection System Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the SDM has learned the passenger presence system.
Passenger Presence Detection System Reporting DTC(s)	Yes/No	The SDM will report if there are DTCs set in the passenger presence module.
Passenger Seat Belt Reminder Indicator	On/Off	The scan tool displays On if this indicator is on. If the indicator is on it means the seat belt has not been buckled.
Passenger Seat Belt Reminder Indicator Enable Status	Disabled/Enabled	The scan tool displays if the passenger seat belt reminder indicator is enabled to the SDM.
Passenger Seat Belt Reminder Indicator Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the passenger seat belt reminder indicator has been learned by the SDM.
Passenger Seat Belt Reminder Sensor Pad Enable Status	Disabled/Enabled	The scan tool displays if the passenger seat belt reminder sensor pad is enabled to the SDM.
Passenger Seat Belt Reminder Sensor Pad Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the passenger seat belt reminder sensor pad has been learned by the SDM.
Passenger Seat Belt Sensor Enable Status	Enabled/Disabled	The scan tool displays if the seat position sensor is enabled to the SDM.
Passenger Seat Belt Sensor Learn Status	Learned/Not learned	The scan tool displays Learned or Not Learned. Learned is displayed if the passenger seat belt sensor has been learned by the SDM.
Passenger Seat Belt Status	Buckled/Unbuckled	The scan tool displays Buckled or Unbuckled. This is the state of the passenger seat belt switch when the seat belt is buckled or unbuckled.
Passenger Seat Occupancy Status	Empty Seat/Occupied	The scan tool displays Occupied if someone is sitting in the passenger seat.
Passenger Seat Position Sensor	Rearward/Forward	The scan tool will display if the passenger seat is forward or rearward of the sensor set position.

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Parameter	Expected Value	Definition
Passenger Seat Position Sensor Enable Status	Disabled/Enabled	The scan tool displays if the passenger seat position sensor pad is enabled to the SDM.
Passenger Seat Position Sensor Learn Status	Learned/Not Learned	The scan tool displays Learned or Not Learned. Learned is displayed if the passenger seat position sensor has been learned by the SDM.
Power Mode	Off/Accessory/Run/Crank Request	The scan tool will display the power mode of the vehicle.
Primary Key Status	Valid/Invalid	The scan tool displays Valid if the primary key matches what is stored to memory in the SDM.
Primary Key Status Last Ignition Cycle	Invalid/Valid	The SDM checks to see if the primary key data received is valid.
Received Primary Key	Hex Value	The scan tool displays a Hex value indicating the SDM received primary key data.
Rollover Sensor Enable Status	Disabled/Enabled	The scan tool displays if the rollover sensor is enabled to the SDM.
Rollover Sensor Learn Status	Learn/Unlearn	The scan tool displays Learned or Not Learned. Learned is displayed if the rollover sensor has been learned by the SDM.
Security Code Accepted	Yes/No	The SDM either accepts the security code or it does not. The scan tool displays Yes if the security code has been accepted by the SDM.
Security Code Lockout	Yes/No	The scan tool displays Yes if the SDM has been locked out because of the security code not being accepted.
Security Code Lockout Active Timer	Random Value	The SDM uses a timer before the security code is locked in the SDM.
Security Code Programmed	Yes/No	The scan tool displays Yes if the SDM has been programmed with the security code.
Security Code Programming Counter	Random Value	The SDM uses a counter for the value of the security code programming.
Security Code Reset Counter	Random Value	The SDM uses a counter to reset the value of the security code.
Software Part Number	Varies, 8 Digit Number	The scan tool displays the software part number in the SDM.
Vehicle Identification Number	Varies, 17 Digit Number	The VIN number of the vehicle programmed into the SDM.
VIN Programmed	Yes/No	The scan tool displays Yes if the VIN has been programmed into the SDM.
VIN Programming Counter	Random Value	The SDM uses this counter while programming the VIN.

INSTRUMENT CLUSTER SCAN TOOL INFORMATION

Instrument Cluster Scan Tool Data Parameters

Parameter	Expected Value	Description

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Parameter	Expected Value	Description
Operating Conditions: Ignition ON		
Battery Voltage	12-14 V	The scan tool displays Volts. This is the current battery voltage signal.
Key in Ignition Status	Active/Inactive	The scan tool displays Active or Inactive. This is the state of the key in ignition switch.
Driver Information Center Switch	Varies	The scan tool displays Volts. This is the current driver information center switch input voltage.
Driver Information Center Switch	Inactive	The scan tool displays either Inactive, Up, Down, or Menu. This is the state of the driver information center switch.
Reset Switch	Active/Inactive	The scan tool displays Active or Inactive. This is the state of the reset switch.
Ambient Air Temperature	15Â°C	The scan tool displays outside temperature in Â°C.
Washer Fluid Level Switch	Open	The scan tool displays either Open, Closed, or Not Available.
Odometer Lock Status	Active/Inactive	The scan tool displays Active or Inactive depending on the state of the odometer.
Engine Speed	0 RPM	The scan tool displays the filtered value of engine speed.
Vehicle Speed	0 km/h	The scan tool displays the filtered vehicle speed value.
Fuel Level Sensor	-	The scan tool displays the filtered value of the fuel level.
Engine Coolant Temperature	-	The scan tool displays the filtered value of the engine coolant temperature.
Engine Oil Pressure	-	The scan tool displays the filtered value of the engine oil pressure.
Head-Up Display Dimming Level	percentage	The scan tool displays the current dimming intensity level.
Head-Up Display Switch	Head-Up Display Movement, Head Up Page Switch, Head-Up Display Dimming Level	The scan tool displays the current HUD button being pushed.
Steering Wheel Control Switches	Left, Select, Right , Volume UP, Volume Down	The scan tool displays the current steering wheel controls button being pushed.

Instrument Cluster Scan Tool Output Controls

Output Control	Description
Instrument Cluster Gauge Sweep	This function is used to command the gauges to sweep from minimum to maximum.
Driver Information Center Dimming	This function is used to command the dimming of the driver information display to Increase or Decrease by 10%.
Instrument Panel Dimmer Switch	This function is used to command the dimming of the instrument cluster to Increase or Decrease by 10%.

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Output Control	Description
Driver Information Center Segments	This function is used to command the driver information center segments ON and OFF.
All Indicators	This function is used to command all the indicators ON or OFF.
Driver Information Center Options	This function is used to command the driver information center buttons using the scan tool.
CAN Bus Configuration Learn	This function is used to Reset the source ID for low speed CAN Bus communications.
Head Up Display Dimming Level	This function is used to command the dimming of the head up display to Increase or Decrease.
Head Up Display Pattern Check	This function is used to command the head up display to display a striped test pattern.

PARKING ASSIST CONTROL MODULE SCAN TOOL INFORMATION

NOTE: **Due to software and hardware variations, not all information may be applicable.**

Parking Assist Control Module Scan Tool Data Parameters - Identification Information

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine OFF/Parking Assist ON			
Vehicle Identification Number (VIN)	-	Varies	The scan tool displays the Vehicle Identification Number
Diagnostic Data Identifier	-	Varies	The scan tool displays the Diagnostic Data Identifier
XML Configuration Compatibility Identifier	-	Varies	The scan tool displays the XML Configuration Compatibility Identifier
XML Data File Part Number	-	Varies	The scan tool displays the XML Data File Part Number
XML Data File Alpha Code	-	Varies	The scan tool displays the XML Data File Alpha Code
Module Diagnostic Address	-	Varies	The scan tool displays the Module Diagnostic Address
Manufacturer's Traceability Number	-	Varies	The scan tool displays the Manufacturer's Traceability Number
Software Part Number	-	Varies	The scan tool displays the Software Part Number
Calibration Part Number 2	-	Varies	The scan tool displays the Calibration Part Number 2
End Model Part Number	-	Varies	The scan tool displays the End Model Part Number
Base Model Part Number	-	Varies	The scan tool displays the Base Model Part Number
Software Module 1 Identifier Alpha Code	-	Varies	The scan tool displays the Software Module 1 Identifier Alpha Code
End Model Part Number Alpha Code	-	Varies	The scan tool displays the End Model Part Number Alpha Code

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Parameter	System State	Expected Value	Description
Base Model Part Number Alpha Code	-	Varies	The scan tool displays the Base Model Part Number Alpha Code
GMLAN Identification Data - Bus 1 Type	-	Varies	The scan tool displays the GMLAN Identification Data - Bus 1 Type
GMLAN Identification Data - Data Dictionary 1 Version	-	Varies	The scan tool displays the GMLAN Identification Data - Data Dictionary 1 Version
GMLAN Identification Data - GMLAN Kernel 1 Version	-	Varies	The scan tool displays the GMLAN Identification Data - GMLAN Kernel 1 Version
Date Programmed	-	Varies	The scan tool displays the date the module was programmed

Parking Assist Control Module Scan Tool Data Parameters - Park Assist System Data

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine OFF/Parking Assist ON			
Power Mode	-	Run	The scan tool displays Off, Accessory, Run or Crank. This is the state of the ignition switch.
Battery Voltage	-	11-14 V	The scan tool displays V. This is the current battery voltage.
Parking Assist System Status	-	Enable	The scan tool displays Disable, Enable, Inhibited or Failed. This is the state of the parking assist system.
Parking Assist Chime	-	Varies	The scan tool displays On or Off. On is displayed if there is an object within the measuring range of the object sensors.
Parking Assist Sensors	-	ON	The scan tool displays On or Off.
Calculated Transmission Range	Transmission in reverse	Park	The scan tool displays Park, Reverse, Neutral, Drive or Unknown depending on the state of the commanded gear.
Parking Assist Switch	-	Active/Inactive	The scan tool displays Active or Inactive depending on the state of the parking assist switch.
Advanced Parking Assist Switch	-	Active/Inactive	The scan tool displays Active or Inactive depending on the state of the advanced parking assist switch.
Parking Assist Sensors Reference Voltage	-	7.3-12.1 V	The scan tool displays V. This is the amount of voltage being sent to the object sensors.
Parking Assist Switch LED	-	Varies	The scan tool displays On or Off depending on the state of the parking assist switch LED.

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Parameter	System State	Expected Value	Description
Right Side Object Detection Indicator	-	Varies	The scan tool displays a blank, On or Off depending on the state of the right side object detection indicator command status.
Left Side Object Detection Indicator	-	Varies	The scan tool displays a blank, On or Off depending on the state of the left side object detection indicator command status.
Advanced Parking Assist Status	-	Standby	The scan tool displays Standby, Active, or Inactive depending on the state of the advanced parking assist.

Parking Assist Control Module Scan Tool Data Parameters - Parking Assist Sensor Data

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine OFF/Parking Assist ON			
Parking Assist Sensors	-	ON	The scan tool displays On or Off.
Parking Assist Sensors Reference Voltage	-	7.3-12.1 V	The scan tool displays V. This is the voltage being sent to the object sensors.
Left Front Advanced Parking Assist Side Object Sensor	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Left Front Outer Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Left Front Inner Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Right Front Advanced Parking Assist Side Object Sensor	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Right Front Outer Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Right Front Inner Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Left Rear Advanced Parking Assist Side Object Sensor	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Left Rear Outer Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Left Rear Inner Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Right Rear Advanced Parking Assist Side Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor

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Parameter	System State	Expected Value	Description
Sensor			and the nearest object.
Right Rear Outer Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.
Right Rear Inner Object Sensor Distance to Object	-	32767 mm	The scan tool displays mm. This is the distance between the parking assist sensor and the nearest object.

Parking Assist Control Module Scan Tool Data Parameters - Parking Assist Disable History 1-4 Data

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine OFF/Parking Assist ON			
Parking Assist Disable History 1	-	Varies	The scan tool displays None, Manual Disable, Park Brake Applied, Trailer or Other Attached Object, Excessive Speed in Reverse, No or Invalid Sensor Signals, Sensor Disturbance, Sensors Dirty, Sound Signal Return Time Not Plausible. This is the state of the park assist disable history.
Parking Assist Disable History 2	-	Varies	The scan tool displays None, Manual Disable, Park Brake Applied, Trailer or Other Attached Object, Excessive Speed in Reverse, No or Invalid Sensor Signals, Sensor Disturbance, Sensors Dirty, Sound Signal Return Time Not Plausible. This is the state of the park assist disable history.
Parking Assist Disable History 3	-	Varies	The scan tool displays None, Manual Disable, Park Brake Applied, Trailer or Other Attached Object, Excessive Speed in Reverse, No or Invalid Sensor Signals, Sensor Disturbance, Sensors Dirty, Sound Signal Return Time Not Plausible. This is the state of the park assist disable history.
Parking Assist Disable History 4	-	Varies	The scan tool displays None, Manual Disable, Park Brake Applied, Trailer or Other Attached Object, Excessive Speed in Reverse, No or Invalid Sensor Signals, Sensor Disturbance, Sensors Dirty, Sound Signal Return Time Not Plausible. This is the state of the park assist disable history.

Parking Assist Control Module Scan Tool Data Parameters - Parking Assist Disable History 5-7 Data

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine OFF/Parking Assist ON			
Parking Assist Disable History 5	-	Varies	The scan tool displays None, Manual Disable, Park Brake Applied, Trailer or Other Attached Object, Excessive Speed in Reverse, No or Invalid Sensor Signals, Sensor Disturbance, Sensors Dirty, Sound

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Parameter	System State	Expected Value	Description
			Signal Return Time Not Plausible. This is the state of the park assist disable history.
Parking Assist Disable History 6	-	Varies	The scan tool displays None, Manual Disable, Park Brake Applied, Trailer or Other Attached Object, Excessive Speed in Reverse, No or Invalid Sensor Signals, Sensor Disturbance, Sensors Dirty, Sound Signal Return Time Not Plausible. This is the state of the park assist disable history.
Parking Assist Disable History 7	-	Varies	The scan tool displays None, Manual Disable, Park Brake Applied, Trailer or Other Attached Object, Excessive Speed in Reverse, No or Invalid Sensor Signals, Sensor Disturbance, Sensors Dirty, Sound Signal Return Time Not Plausible. This is the state of the park assist disable history.

Parking Assist Control Module Scan Tool Output Controls

Output Control	Description
Park Assist Switch LED	The parking assist control module illuminates the advanced park assist LED of the when commanded from the scan tool.
Clear Disable History Data	The parking assist control module clears the Parking Assist Disable History data when commanded from the scan tool.
Clear Side Object Detection Disable History	The parking assist control module clears the Side Object Detection Disable History data when commanded from the scan tool.
CAN Bus Configuration Learn	The parking assist control module learns the CAN Bus configuration when commanded from the scan tool.
Parking Assist Sensor Learn	The parking assist control module learns the Parking Assist Sensor configuration when commanded from the scan tool.

POWER STEERING CONTROL MODULE SCAN TOOL INFORMATION (LIGHT DUTY)

Power Steering Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON			
Ignition Cycle Counter	-	Varies	This displays the number of ignition cycles.
Calculated System Temperature	-	Varies	This displays Â° C. This is the current system temperature.
Steering Wheel Angle	-	Varies	This displays Degrees. This displays the current steering wheel angle in degrees.
Steering Wheel Input Torque	-	Varies	This displays . This displays the current steering input torque in .

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Parameter	System State	Expected Value	Description
Power Steering Motor Overload Protection Counter	-	Varies	This displays counts. This displays the Electric Power Steering Motor Overload Protection Incidents counter.
Power Steering Control Module SPS Calibration Status	-	True/False	Indicates the completion status of the Electric Power Steering calibration.
Power Steering Control Module Center Procedure	-	True/False	Indicates the completion status of the Electric Power Steering centering procedure.
Engine Speed	-	0 RPM	This displays RPM. This is the current engine speed from the ECM.
Vehicle Speed	-	0 Km/h (0 MPH)	This displays km/h (mph). This is the current vehicle speed.
Motor Feedback Current	-	Varies	This displays amps (A). This displays the Electric Power Steering Motor Current Feedback.
Delivered Torque	-	Varies	This displays . This displays the current value of the Output Torque of the Electric Power Steering.
Power Mode	-	OFF/Accessory/Run/Crank Request	This displays system power mode.
Battery Voltage	-	Varies	This displays Volts. This is the current battery voltage.

Power Steering Control Module Scan Tool Output Controls

Output Control	Description
Clear Driver-Specific Steering Angles	Command to reset the steering rack end of travel limit position as determined by software.
Clear Softstops	Command to reset the steering gear soft end stops as determined by software.
Temporarily Turn Off Active Pull Compensation Function	Command to disable the Active Pull Compensation feature during the key cycle. The power steering control module will return to normal operation with the feature enabled upon exiting the procedure.
Clear Active Pull Compensation Learned Limits	Command to reset the Active Pull Compensation learned values.
Temporarily Turn Off Smooth Road Shake Compensation Function	Command to disable the Smooth Road Shake Compensation feature during the key cycle. The power steering control module will return to normal operation with the feature enabled upon exiting the procedure.

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Output Control	Description
Disable All System Outputs	Command to disable all system outputs of the power steering control module.

POWER STEERING CONTROL MODULE SCAN TOOL INFORMATION (HEAVY DUTY)

Power Steering Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON			
Ignition Cycle Counter	-	Varies	This displays the number of ignition cycles.
ECU Internal Temperature	-	Varies	This displays Â° C. This is the current internal temperature of the ECU
Steering Wheel Angle	-	Varies	This displays Degrees. This displays the current steering wheel angle in degrees.
EPS Motor Overload Protection Counter	-	Varies	This displays counts. This displays the Electric Power Steering Motor Overload Protection Incidents counter.
EPS System Status	-	True/False	Indicates the status of Vehicle Speed Validity, AHA Calibration, and AHA Setup Procedure.
Engine Speed	-	0 RPM	This displays RPM. This is the current engine speed from the ECM.
Vehicle Speed Low Resolution	-	0 Km/h (0 MPH)	This displays km/h (mph). This is the current vehicle speed.
Vehicle Speed Medium Resolution	-	0 Km/h (0 MPH)	This displays km/h (mph). This is the current vehicle speed.
Driver Mode Control State	-	No Actcion/Performance Mode 1-7	This displays the current drive mode.
Steering Wheel Angle Gradient	-	Varies	This displays degrees/sec. This is the rate at which the steering angle is changing.
AHA Coil Current Commanded	-	Varies	This displays the amount of current commanded by the AHA coil..
AHA Coil Current Measured	-	Varies	This displays the actual measured current of the AHA coil.

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Parameter	System State	Expected Value	Description
AHA Right Hydraulic Pressure	-	Varies	This is the current pressure (Bar) of the right side of the AHA system.
AHA Left Hydraulic Pressure	-	Varies	This is the current pressure (Bar) of the left side of the AHA system.
AHA Differential Hydraulic Pressure	-	Varies	This is the current pressure (Bar) of the differential in the AHA system.
AHA Pull Hydraulic Pressure Compensation Value	-	Varies	This displays the AHA pull hydraulic pressure compensation value (Bar).
Time Since Ignition On	-	Varies	This displays the time (ms) since the ignition was switched to ON.
System Power Mode	-	OFF/ACC/RUN/Crank Request	This displays the current power mode.
Battery Voltage	-	Varies	This displays the current battery voltage.
Engine Running Status	-	True/False	This displays the engine running status.
AHA System Status	-	Disable/Off/Operate/Warm Initialization	This displays the current status of the AHA system

Power Steering Control Module Scan Tool Output Controls

Output Control	Description
Cancel All Active Device Controls	Command to cancel any active device controls.
Steering Assist Control	Command to enable or disable Power Assist and to change Power Assist Mode.
Reset Adaptive Data	Command to reset adaptive parameters to default/unlearned values. The AHA ECU shall reset both short and long term pull compensation values.
Clear End of Line Gear Parameters	Command to clear the end of line gear parameters to their default values.
Pressure Sensor Trim	Command to trim the pressure sensor. Set Trim shall set the pressure trim value to the current Pressure 1 sensor input and Pressure 2 sensor input and set the pressure trim performed flag to indicate that a trim has been performed.
AHA Device Controls	Ignition cycle values while this command is active shall not be permanently stored. Values will only be retained for one ignition cycle.
System Basic Functions	Command to disable all device outputs of the AHA ECU.

RADIO SCAN TOOL INFORMATION (WITHOUT IOB)

Radio Scan Tool Data Parameters

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Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Battery Voltage	Varies	The scan tool displays volts. This is the voltage at the input to the radio via high speed GMLAN.
System Power Mode	Run	The scan tool displays Off, Accessory, Run or Crank Request. This is the vehicle power mode status as received by the radio.
Date	Varies	The scan tool displays the current date set in the radio.
Time	Varies	The scan tool displays the current time set in the radio in 24 hour format HHMMSS
Radio Band	Varies	The scan tool displays AM, AM High Definition, FM, FM High Definition, Digital Audio broadcast, or XM. This is the broadcast radio band currently selected.
Audio Source Status	Varies	This parameter displays the currently selected audio source
Current FM Frequency	Varies	When tuned to an FM station, the scan tool displays the currently selected frequency in MHz
Current AM Frequency	Varies	When tuned to an AM station, the scan tool displays the currently selected frequency in kHz
Volume Control	Varies	The scan tools displays the current volume setting in counts.
Mute Status	Off	The scan tool displays On or Off. This is the currently selected audio mute mode.
Surround Sound	Varies	The scan tool displays On or Off. This is the currently selected surround sound mode.
Equalizer Preset	Varies	The scan tool displays the currently selected preset equalizer mode
Radio Power Button	On	The scan tool displays On or Off. This is the currently selected radio power mode.
Remote CD	Varies based on vehicle equipment	The scan tool displays Present or Not Present. This parameter displays present when the infotainment system is equipped with the remote cd player.
Rear Seat Entertainment	Varies based on vehicle equipment	The scan tool displays Present or Not Present. This parameter displays present when the infotainment system is equipped with the rear seat entertainment system.
Remote Enable Circuit	On	The scan tool displays On or Off. This is the current state of the remote enable output as commanded by the radio.
Front 3.5 mm AUX Input	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a device is connected to the front auxiliary input jack.
Rear 3.5 mm AUX Input	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a device is connected to the rear auxiliary input jack.
Front USB Receptacle	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a front USB receptacle is present.

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Parameter	Expected Value	Definition
Rear USB Receptacle	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a rear USB receptacle is present.
Front SD Card Receptacle	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a front SD card receptacle is present.
Rear SD Card Receptacle	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a rear SD card receptacle is present.
Radio Theft Lock Status	Unlocked	The scan tool displays Locked or Unlocked. This is the state of the theft lock system.
Theft Lock Armed	VIN Learned	The scan tool displays VIN Learned or No VIN. This is the state of the VIN programming in the radio.
Test Bench Mode	Inactive	The scan tool displays Active or Inactive. This is the state of the test bench mode.
Valet Mode	Inactive	The scan tool displays Active or Inactive. This is the state of the valet mode.
XM Subscription Status	Varies	This parameter displays the country and type of XM service.
High Definition Signal	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a high definition signal is being received.
Digital Audio Signal	Varies	The scan tool displays Present or Not Present. This parameter displays Present when a digital audio signal is being received.
Alternative Frequency Status	Varies	The scan tool displays Active or Inactive. This parameter displays Active if the radio is using an alternative frequency for a radio station broadcasting simultaneously from two different stations.
Last Working MOST ID of Node 1 (Master)	Radio	The scan tool displays the name of the ECU in the MOST BUS Node 1 position that was assigned when the MOST BUS was operational without any faults.
Last Working MOST ID of Node 2	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 2 position that was assigned when the MOST BUS was operational without any faults.
Last Working MOST ID of Node 3	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 3 position that was assigned when the MOST BUS was operational without any faults.
Last Working MOST ID of Node 4	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 4 position that was assigned when the MOST BUS was operational without any faults.
Last Working MOST ID of Node 5	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 5 position that was assigned when the MOST BUS was operational without any faults.
Last Working MOST ID of Node 6	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 6 position that was assigned when the MOST BUS was operational without any faults.

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Parameter	Expected Value	Definition
Last Working MOST ID of Node 7	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 7 position that was assigned when the MOST BUS was operational without any faults.
Last Working MOST ID of Node 8	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 8 position that was assigned when the MOST BUS was operational without any faults.
Last Working MOST ID of Node 9	Varies based on vehicle equipment	The scan tool displays the name of the ECU in the MOST BUS Node 9 position that was assigned when the MOST BUS was operational without any faults.
Surrogate MOST Master Node Upstream Position	Numeric	This parameter becomes available when DTC U0028 is current. The number identified is the device furthest upstream from the radio communicating on the MOST BUS when a communication fault is present.
Number of MOST Communication Breaks	Numeric	The number displayed increments each time the MOST BUS cannot communicate successfully.
Number of MOST Configuration Status Messages	Numeric	The number displayed increments each time a MOST BUS configuration status message is sent. A configuration status message is sent when the MOST BUS is initiated, including during or following a communication break.
Number of Short Term MOST Communication Breaks	Numeric	The number displayed increments each time the MOST BUS was temporarily unable to communicate successfully.
Diagnostic Data Identifier	Varies	The scan tool displays the 4 character alphanumeric device ID.
VIN Digits 2-17	Varies	The scan tool displays the learned VIN digits 2-17.
Manufacturer Enable Counter	0	The scan tool displays the counter value. This counter is used for manufacturing purposes only.
Boot Software Part Number	Varies	The scan tool displays the boot software ID number.
Diagnostic Data Identifier	Varies	Identifies a supplier and system specific data stream used by diagnostic testers to interpret a diagnostic data stream.
Calibration Part Number 1	Varies	The scan tool displays the software module ID 1.
Calibration Part Number 2	Varies	The scan tool displays the software module ID 2.
Calibration Part Number 3	Varies	The scan tool displays the software module ID 3.
Calibration Part Number 4	Varies	The scan tool displays the software module ID 4.
Calibration Part Number 5	Varies	The scan tool displays the software module ID 5.
Calibration Part Number 6	Varies	The scan tool displays the software module ID 6.
Calibration Part Number 7	Varies	The scan tool displays the software module ID 7.
Calibration Part Number 8	Varies	The scan tool displays the software module ID 8.
Calibration Part Number 9	Varies	The scan tool displays the software module ID 9.
Calibration Part Number 10	Varies	The scan tool displays the software module ID 10.
End Model Part Number	Varies	The scan tool displays the end model part number.
XM Electronic Serial Number	Varies	Identifies the integrated XM module serial number, if equipped.

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Parameter	Expected Value	Definition
HD Decoder Electronic Serial Number	Varies	Identifies the integrated HD decoder serial number, if equipped.
XM Firmware Version and Date	Varies	Identifies the XM module software version and release date, if equipped.
HD Decoder System Version	Varies	Identifies the HD decoder software version, if equipped.

Radio Scan Tool Output Controls

Scan Tool Output Control	Description
Active AM/FM Antenna	This output control will command the Active AM/FM Antenna ON and OFF.
Satellite Antenna	This output control will command the Satellite Antenna ON and OFF.
Digital Audio Broadcast Antenna Power	This output control will command the Digital Audio Broadcast Antenna ON and OFF.
MOST Communication Enable Circuit	This output control will command the MOST Communication Enable Circuit ON and OFF.
MOST Bus Diagnostic Starting Point	This output control will initiate the MOST Bus Diagnostic Starting Point Display.
Erase Valet Mode Code	This output control will command the Erase Valet Mode Code function.
Control Module Reset	This output control will command the reset of the Control Module.

RADIO SCAN TOOL INFORMATION (WITH IOB)

Radio Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Battery Voltage	Varies	The scan tool displays volts. This is the voltage at the input to the radio.
System Power Mode	Run	The scan tool displays Off, Accessory, Run or Crank Request. This is the current power mode of the radio.
Valet Mode	Inactive	Indicates if the system is in Valet mode.
Radio Theft Armed	Learned VIN	The scan tool displays Learned VIN or No VIN. This is the state of the VIN programming in the radio.
Radio Theft Locked	Inactive	The scan tool displays Active or Inactive. This is the state of the theft lock system. Active indicates the radio is locked. Inactive indicates the theft lock system is armed and the radio is unlocked.
Test Bench Mode	Inactive	The scan tool displays Active or Inactive. This parameter indicates if the radio is in bench or user mode.
Radio Power Button	Varies	Indicates if the Radio Power button is in the ON or OFF state.

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Parameter	Expected Value	Definition
End Model Part Number	Varies	End Model Part Number is the part number for the hardware of the control module with software and calibrations.
Base Model Part Number	Varies	Base Model Part Number is the part number for the hardware without software and calibrations.
Boot Software Part Number	Varies	The scan tool displays the boot software ID number.
Calibration Part Number 1	Varies	The scan tool displays the software module ID 1.
Calibration Part Number 2	Varies	The scan tool displays the software module ID 2.
Calibration Part Number 3	Varies	The scan tool displays the software module ID 3.
Calibration Part Number 4	Varies	The scan tool displays the software module ID 4.
Calibration Part Number 5	Varies	The scan tool displays the software module ID 5.
Calibration Part Number 6	Varies	The scan tool displays the software module ID 6.
Calibration Part Number 7	Varies	The scan tool displays the software module ID 7.
Calibration Part Number 8	Varies	The scan tool displays the software module ID 8.
Calibration Part Number 9	Varies	The scan tool displays the software module ID 9.
Calibration Part Number 10	Varies	The scan tool displays the software module ID 10.
Vin Digits 2-17	Varies	The scan tool displays the learned VIN digits 2-17.

Radio Scan Tool Output Controls

Scan Tool Output Control	Description
Left Front Speaker	This output control is used to command the speaker ON and OFF. Commanding the speaker ON will generate a test tone to be generated through the selected loudspeaker.
Left Rear Speaker	This output control is used to command the speaker ON and OFF. Commanding the speaker ON will generate a test tone to be generated through the selected loudspeaker.
Right Front Speaker	This output control is used to command the speaker ON and OFF. Commanding the speaker ON will generate a test tone to be generated through the selected loudspeaker.
Right Rear Speaker	This output control is used to command the speaker ON and OFF. Commanding the speaker ON will generate a test tone to be generated through the selected loudspeaker.
Chime Function Test	This output command is used to command the chime ON and OFF.
Rear Camera Display Control	This output control will command the rear camera display ON and OFF. Commending the rear camera on will display the rear camera image on the info display screen.
Rear Park Assist Steering Wheel Position Control	This output control will command the rear park assist steering wheel position ON and OFF. Commanding the rear park assist steering wheel position ON will display the steering wheel position guide lines on the info display screen.

SUSPENSION CONTROL MODULE SCAN TOOL INFORMATION

The electronic suspension control module scan tool data parameters list contains all suspension control related parameters that are available on the scan tool. The list is arranged in alphabetical order. A given parameter may

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appear in any one of the data lists.

Suspension Control Module Scan Tool Data Parameters

Parameter	Expected Value	Description
Operating Conditions: Ignition ON		
Battery Voltage	11-14 V	The scan tool displays V. This is the current battery voltage.
Left Front Suspension Position Sensor	.25-4.75 V	The scan tool displays V. This is the signal from the left front suspension position sensor.
Right Front Suspension Position Sensor	.25-4.75 V	The scan tool displays V. This is the signal from the Right front suspension position sensor.
Left Rear Suspension Position Sensor	.25-4.75 V	The scan tool displays V. This is the signal from the left rear suspension position sensor.
Right Rear Suspension Position Sensor	.25-4.75 V	The scan tool displays V. This is the signal from the right rear suspension position sensor.
Suspension Position Sensor 5 V Reference	4.8-5.2 V	The scan tool displays V. This is the suspension position sensor supply voltage.
Suspension System Mode	Comfort/Sport /Norma	The scan tool displays the suspension mode.

Suspension Control Module Scan Tool Output Controls

Output Control	Description
Left Front Shock Absorber Actuator	Commands the current applied to the left front actuator Increase or Decrease.
Left Rear Shock Absorber Actuator	Commands the current applied to the left rear actuator Increase or Decrease.
Right Front Shock Absorber Actuator	Commands the current applied to the right front actuator Increase or Decrease.
Right Rear Shock Absorber Actuator	Commands the current applied to the right rear actuator Increase or Decrease.

TELEMATICS COMMUNICATION INTERFACE CONTROL MODULE SCAN TOOL INFORMATION

Telematics Communication Interface Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON			
GPS Data			
• Dead Reckoning Calibration Status	-	Calibrated or Not Calibrated	Indicates the dead reckoning calibration status.
• Position Calibration Method	-	Varies	Indicates the method used to determine current location. (0) GPS, (1) Wheel Speed Dead Reckoning only, (2) Combined Wheel Speed and GPS, (3) Gyro only, (4) Combined Gyro and GPS, (5) No Fix

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Parameter	System State	Expected Value	Description
• Month	-	MM	This displays the current month.
• Day	-	DD	This displays the current day of the month.
• Year	-	YY	This displays the current year.
• Hour	-	HH	This displays the GPS current hour (24 hour format - GMT).
• Minute	-	MM	This displays the GPS current minute.
• Second	-	SS	This displays the GPS current second.
• Number of Satellites Tracked	-	Varies	The scan tool displays the number of satellites being tracked by the telematics communication interface control module.
Signal Strength Data			
• GSM Signal Strength	-	Varies	The scan tool displays 0-127. This is the telematics communication interface control module signal strength.
• Current Public Land Mobile Network	-	Varies	Identifies the cellular communications network currently in use by the telematics communication interface control module. Each network has a unique decimal number assigned to it for identification.
Bluetooth Data			
• Bluetooth	-	Enabled	Indicates if the Bluetooth system is enabled or disabled.
• Bluetooth Link Status	-	Varies	Indicates the current link status. (0) Unconnected, (1) Connected / Idle, (2) Call active, (3) 3-way calling active
• Bluetooth Link Quality	-	Varies	The scan tool displays a decimal value between 0 and 255.
• Bluetooth Phone to Telematics Communication Interface Control Module Authentication Status	-	Active or Inactive	Displays the bluetooth phone to telematics communication interface control module authentication status.
• Bluetooth Phone to Telematics Communication Interface Control Module Communication	-	Active or Inactive	Displays the bluetooth phone to telematics communication interface control module status.

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Parameter	System State	Expected Value	Description
Status			
• Bluetooth Phone Voice Recognition Status	-	Active or Inactive	Displays the bluetooth phone to voice recognition status.
WLAN Device Data			
Off-Board Navigation	-	Enabled or Disabled	Indicates if Off-Board Navigation is enabled or disabled
Wireless LAN	-	Enabled or Disabled	Indicates the capability of the wireless communication of the Telematics Communication Interface Control Module
Number of WLAN Devices	-	Varies	Indicates the number of Wireless devices present
Active WLAN 2.4GHz Chennel	-	Varies	Indicates the active Wireless channel being used on the 2.4 GHz frequency
WLAN Link Status	-	Radio System - Never, Remembered but Not Associated or Associated	Indicates the link status of the Telematics Communication Interface Control Module and Infotainment system
GSM Signal Strength	-	Varies	State for Received Signal Strength Indicator
Mobile Communication Standard	-	2G, 3G, 4G or 4G LTE	State for Cellular Data Connection. Indicates the currently used data rate speed
WLAN Password	-	Varies	Indicates the Telematics Communication Interface Control Module Wireless Password
WLAN SSID (Service Set Identifier)	-	Varies	Indicates the Telematics Communication Interface Control Module Wireless Service Name
WLAN Encryption - WPA (Wi-Fi Protected Access)	-	Active or Inactive	Indicates if the WLAN Encryption - WPA (Wi-Fi Protected Access) is Active or Inactive
WLAN Encryption - WPA2 (Wi-Fi Protected Access II)	-	Active or Inactive	Indicates if the WLAN Encryption - WPA2 (Wi-Fi Protected Access II) is Active or Inactive
WLAN Encryption - AES (Advanced Encryption Standard)	-	Active or Inactive	Indicates if the WLAN Encryption - AES (Advanced Encryption Standard) is Active or Inactive
WLAN Encryption - TKIP (Temporal Key Intergrity Protocol)	-	Active or Inactive	Indicates if the WLAN Encryption - TKIP (Temporal Key Integrity Protocol) is Active or Inactive

Telematics Communication Interface Control Module Scan Tool Output Controls

Output Control	Description

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Output Control	Description
B1000 Information	This shows the data recorded when DTC B1000 was set in the telematics communication interface control module.
Green Indicator	The telematics communication interface control module illuminates the green LED when ON is selected.
Phone Call Test	When ON is selected, telematics communication interface control module commands OnStar to connect to the OnStar Center.
Red Indicator	The telematics communication interface control module illuminates the red LED when ON is selected.
Preferred Roaming List Update	The telematics communication interface control module performs a preferred roaming list (PRL) update when this is selected.
Remote Vehicle Speed Limiting Reset	This function resets the speed limiting feature.

TRAILER BRAKE CONTROL MODULE SCAN TOOL INFORMATION

Fuel Pump with Trailer Brake Control Module (TBCM) Scan Tool Data List

Scan Tool Parameter	System State	Expected Value	Definition
Operating Conditions: Ignition is ON, engine OFF, and vehicle is stationary			
ABS Active	-	No	The scan tool displays Yes/No. The scan tool displays No when ABS is not active.
Brake Apply Pressure Status	-	Valid	The scan tool displays Invalid or Valid. The scan tool displays Valid when the ignition is ON, and the brake apply sensor is not faulted.
Battery Voltage Signal	-	Varies	The scan tool displays 0-18 Volts. The scan tool displays approximately 12 Volts when the ignition is ON.
Brake Switch Status	-	Off	The scan tool displays On/Off. The scan tool indicates Off when the brake is not applied.
Electric Trailer Brakes Detected	-	No	The scan tool displays Yes or No. The scan tool displays Yes when the vehicle is connected to a trailer equipped with electric brakes.
HS Communication	-	Yes	The scan tool displays Yes or No.
Ignition Run/Crank	-	Active	The scan tool will display Active or Inactive. The scan tool will display Active when the signal received from the ECM Run/Crank position.
Master Cylinder Pressure Sensor Input	-	Varies	The scan tool will display brake fluid pressure. The scan tool will display kPa or psi signal received from the trailer brake control module.

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Scan Tool Parameter	System State	Expected Value	Definition
Manual Apply Switch	-	Varies	The scan tool displays percent of manual apply lever travel. The scan tool displays 0-100%.
Manual Apply Switch 5 V Reference	-	Varies	The scan tool displays Volts. This is the reference voltage of the manual apply switch.
Manual Apply Switch	-	Varies	The scan tool displays Volts. This is the voltage of the manual apply lever.
Manual Apply Sw. Pos. Error	-	Varies	The scan tool displays percent of error between the manual apply and redundant manual apply signals. The scan tool displays 0-100%. A proper functioning switch should have a value less than 20 %
Redundant Manual Apply Sw.	-	Varies	The scan tool displays percent of manual apply lever travel using a redundant signal track. The scan tool displays 0-100%
Redundant Manual Apply Sw.	-	Varies	The scan tool displays volts. This is the voltage of the manual apply switch.
TBCM Diagnostic Fault	-	No	The scan tool will display Yes or No if a fault is detected. The scan tool will display the Yes if a fault signal is received from the trailer brake control module.
TBCM Relay Feedback	-	0	The scan tool displays a numeric value.
TBCM Relay Feedback Signal (unfiltered)	-	Varies	The scan tool displays Volts. This is the unfiltered feedback signal of the TBCM relay.
TBCM Relay Feedback Signal (filtered)	-	Varies	The scan tool displays Volts. This is the filtered feedback signal of the TBCM relay.
TBCM Relay Feedback Signal	-	Varies	The scan tool displays volts. This is the voltage of the relay feedback signal.
TBCM Cmd. Duty Cycle	-	Varies	The scan tool displays percent of battery voltage output commanded to the trailer brakes and depends on battery voltage and user gain setting. Approximately 100% will be indicated when user gain is set to 10.0 and the manual apply lever is fully applied with the engine running.

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Scan Tool Parameter	System State	Expected Value	Definition
Trailer Brake Control	-	Disabled	The scan tool will display Enabled/Disabled. The scan tool will display the signal received from the trailer brake control module.
Trailer Stop Lamp Signal	-	Off	The scan tool will display Not Requested or Off, Requested depending on the state of the brake switch, and manual apply lever. Requested will be displayed if the brake switch is active or On if the manual apply lever is applied.
Trailer Brake Relay Cmd.	-	12 Volts	The scan tool displays 0-18 Volts. The scan tool displays voltage commanded to the trailer brakes when a trailer with electric brakes is connected and depends on battery voltage and user gain setting. Approximately 12-14 volts will be indicated when user gain is set to 10.0 and the manual apply lever is fully applied with the engine running.
Trailer Brake Relay Status	-	Enabled	The scan tool will display Disabled or Enabled. Enabled will be displayed whenever there are no faults present in the trailer brake control module.
Trailer Connection Detected	-	No	The scan tool displays Yes or No. The scan tool displays Yes when a trailer with electric trailer brakes is connected.
Trailer Disconnect Detected	-	No	The scan tool will display Yes or No depending on the trailer connections. Yes will be displayed if a trailer connection is made to a trailer equipped with electric trailer brakes, and a disconnect occurs within the same ignition cycle.
User Gain Switch	-	Varies	The scan tool displays percent of full gain setting. The scan tool displays 0-100%. Each full gain setting represents an increment of approximately 10 percent of full gain setting. Approximately 40% will be indicated with a gain setting of 4.0, 65% will be indicated with a gain setting of 6.5, etc.
User Gain Switch	-	Varies	The scan tool displays volts. This is the voltage of the full gain setting.

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Scan Tool Parameter	System State	Expected Value	Definition
User Gain Switch 5 V Reference	-	Varies	The scan tool displays volts. This is the reference voltage of the user gain switch.
Vehicle Speed	-	km/h or mph	The scan tool displays 0-327 km/h (0-204 mph). The scan tool displays 0 km/h (0 mph) when the vehicle is not moving or is moving at speeds less than or equal to 0 km/h (0 mph).

Scan Tool Parameters for Electronic Locking Differential (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature / Vehicle is in Park or Neutral			
5V Reference 1	-	Volts	The scan tool displays Volts. This is the Reference Voltage.
Differential Lock Switch Voltage	-	Volts	The scan tool displays Volts. This is the Front/Both Axle Differential Lock Switch.
Front Axle Differential Lock Actuator High Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Front Differential Lock Actuator High Side Feedback Voltage.
Front Axle Differential Lock Actuator Low Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Front Differential Lock Actuator Low Side Feedback Voltage.
Front Axle Differential Lock High Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Front Axle Differential Lock.
Front Axle Differential Lock Indicator Command	-	On/Off	The scan tool displays On/Off. This is the state of the Front/Both Axle Differential Lock indicator.
Front Axle Differential Lock Low Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Front Axle Differential Lock.
Front Axle Differential Lock Switch Status	-	On/Off	The scan tool displays On/Off. This is the state of the Front Axle

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Parameter	System State	Expected Value	Description
			Differential Lock Switch.
Front Axle Differential Status	-	Open/Locked Engaged/Disengaged	The scan tool displays varies states. This is the state of the Front Axle Differential Lock.
Ignition 1 Signal	-	Volts	The scan tool displays Volts. This is the state of voltage of power input to control module.
Rear Axle Differential Lock Actuator High Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Rear Differential Lock Actuator High Side Feedback Voltage.
Rear Axle Differential Lock Actuator Low Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Rear Differential Lock Actuator Low Side Feedback Voltage.
Rear Axle Differential Lock High Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock.
Rear Axle Differential Lock Indicator Command	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock Indicator.
Rear Axle Differential Lock Low Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock.
Rear Axle Differential Lock Switch Status	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock Switch.
Rear Axle Differential Status	-	Open/Locked Engaged/Disengaged	The scan tool displays varies states. This is the state of the Rear Axle Differential Lock.

Scan Tool Output Controls for Electronic Locking Differential (If Equipped)

Output Control	Description
Front Axle Differential Lock High Control Relay	This output control is used to turn the front axle differential lock high control relay on and off.

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Output Control	Description
Front Axle Differential Lock Indicator	This output control is used to turn the front axle differential lock indicator on and off.
Front Axle Differential Lock Low Control Relay	This output control is used to turn the front axle differential lock low control relay on and off.
Rear Axle Differential Lock High Control Relay	This output control is used to turn the rear axle differential lock high control relay on and off.
Rear Axle Differential Lock Indicator	This output control is used to turn the rear axle differential lock indicator on and off.
Rear Axle Differential Lock Low Control Relay	This output control is used to turn the rear axle differential lock low control relay on and off.

TRANSFER CASE CONTROL MODULE SCAN TOOL INFORMATION (NQH)

Scan Tool Data Parameters

Parameter	Expected Value	Expected Value	Description
Operating Conditions: Ignition ON, engine OFF, Park or Neutral, and transfer case in 2WD, unless otherwise noted.			
2WD High Range Indicator Command	ON or OFF	ON	This parameter displays ON when the transfer case control module commands the 2WD High indicator light ON.
2WD High Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 2WD High range indicator control circuit. The 2WD High range indicator control circuit is made up of the indicator dimming control circuit and the 2WD High indicator control circuit. A short to battery on the 2WD High indicator control circuit will cause this parameter to display Malfunction.
2WD High Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 2WD High range indicator control circuit. The 2WD High range indicator control circuit is made up of the indicator dimming control circuit and the 2WD High indicator control circuit. A short to ground on the 2WD High indicator control circuit will cause this parameter to display Malfunction.
2WD High Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 2WD High range indicator control circuit. The 2WD High range indicator control circuit is made up of the indicator dimming control circuit and the 2WD High indicator control circuit.

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Parameter	Expected Value	Expected Value	Description
			An open on the 2WD High indicator control circuit will cause this parameter to display Malfunction.
4WD Automatic Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the Auto 4WD indicator ON.
4WD Automatic Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD automatic range indicator control circuit. The 4WD automatic range indicator control circuit is made up of the indicator dimming control circuit and the AWD indicator control circuit. A short to battery on the AWD indicator control circuit will cause this parameter to display Malfunction.
4WD Automatic Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD automatic range indicator control circuit. The 4WD automatic range indicator control circuit is made up of the indicator dimming control circuit and the AWD indicator control circuit. A short to ground on the AWD indicator control circuit will cause this parameter to display Malfunction.
4WD Automatic Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD automatic range indicator control circuit. The 4WD automatic range indicator control circuit is made up of the indicator dimming control circuit and the AWD indicator control circuit. An open on the AWD indicator control circuit will cause this parameter to display Malfunction.
4WD High Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the 4WD High indicator light ON.
4WD High Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD High range indicator control circuit. The 4WD High range indicator control circuit is made up of the indicator dimming control circuit and the 4WD High indicator control circuit. A short to battery on the 4WD High indicator control circuit will cause this parameter to display Malfunction.
4WD High Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD High range indicator control circuit. The 4WD High range indicator control circuit is made up of the indicator dimming control

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Parameter	Expected Value	Expected Value	Description
			circuit and the 4WD High indicator control circuit. A short to ground on the 4WD High indicator control circuit will cause this parameter to display Malfunction.
4WD High Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD High range indicator control circuit. The 4WD High range indicator control circuit is made up of the indicator dimming control circuit and the 4WD High indicator control circuit. An open on the 4WD High indicator control circuit will cause this parameter to display Malfunction.
4WD Low Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the 4WD Low indicator light ON.
4WD Low Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD Low range indicator control circuit. The 4WD Low range indicator control circuit is made up of the indicator dimming control circuit and the 4WD Low indicator control circuit. A short to battery on the 4WD Low indicator control circuit will cause this parameter to display Malfunction.
4WD Low Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD Low range indicator control circuit. The 4WD Low range indicator control circuit is made up of the indicator dimming control circuit and the 4WD Low indicator control circuit. A short to ground on the 4WD Low indicator control circuit will cause this parameter to display Malfunction.
4WD Low Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD Low range indicator control circuit. The 4WD low range indicator control circuit is made up of the indicator dimming control circuit and the 4WD Low indicator control circuit. An open on the 4WD Low indicator control circuit will cause this parameter to display Malfunction.
Brake Pedal Position Sensor Signal	Active/Released	Released	The scan tool displays Inactive or Active depending on the state of the brake pedal.
Calculated Transfer Case Clutch Temperature	Â°C/Â°F	Varies	This parameter displays the estimated clutch temperature.

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Parameter	Expected Value	Expected Value	Description
Control Module Voltage	0.0 to 25.5 V	Battery Voltage	This parameter displays the voltage measured by the transfer case control module at the battery positive voltage circuit.
Current Transmission Gear	Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6	Park or Neutral	This parameter displays the current estimated gear the transmission is in. The scan tool displays Park, Reverse, and Neutral when ignition ON and engine OFF. The scan tool displays Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6 when engine ON.
Display Dimming	0 to 100%	Varies	This parameter displays the interior dimming display level being supplied by the body control module to the transfer case shift control switch.
Engine Run Time	hh:mm:ss	Varies	This parameter displays the time since Engine Start.
Engine Speed	RPM	Varies	This parameter displays engine RPM.
Front Axle Engagement Actuator Command	Engaged or Disengaged	Disengaged	This parameter displays either Engaged or Disengaged. Engaged when the body control module is commanding Auto 4WD, 4WD, or 4WD Low ranges, and Disengaged when the body control module is commanding Neutral, or 2WD ranges.
Front Axle Engagement Actuator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the front axle engagement actuator control circuit. A short to battery on the front axle engagement actuator control circuit will cause this parameter to display Malfunction.
Front Axle Engagement Actuator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the front axle engagement actuator control circuit. A short to ground on the front axle engagement actuator control circuit will cause this parameter to display Malfunction.
Front Axle Engagement Actuator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the front axle engagement actuator control circuit. An open/high resistance condition on the front axle engagement actuator control circuit will cause this parameter to display Malfunction.
Front Axle Feedback Switch	Engaged or Disengaged	Disengaged	This parameter displays the actual status of the front axle. The parameter will display Engaged when the system is in Auto 4WD, 4WD, or 4WD Low modes, and Disengaged when the system is in Neutral, or 2WD High or Neutral mode.

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Parameter	Expected Value	Expected Value	Description
Ignition 1 Signal	ON or OFF	ON	This parameter displays the status of the run/crank ignition 1 voltage circuit to the transfer case control module.
Ignition Accessory Signal	ON or OFF	ON	This parameter displays the status of the ignition accessory signal circuit to the transfer case control module.
Left Front Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the left front wheel speed sensor.
Left Rear Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the left rear wheel speed sensor.
Non-Driven Wheel Speed	Varies	km/h/MPH	This parameter displays the non-drive wheel speed in kilometers or miles per hour.
Power Mode	OFF, Accessory, Run or Crank Request	Run	This parameter displays the status of the ignition switch.
Range Actuator Command	-100 to +100%	0%	This parameter displays the pulse width modulated voltage signal being supplied by the transfer case control module to the transfer case encoder motor on circuit A or circuit B. The scan tool displays negative values when turning counter-clockwise or positive values when turning clockwise. This parameter will display 0% after a range shift.
Range Actuator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range actuator control circuit B. A short to battery on the range actuator control circuit A or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range actuator control circuit B. A short to ground on the range actuator control circuit A or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range

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Parameter	Expected Value	Expected Value	Description
			actuator control circuit B. An open on the range actuator control circuit A or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Control Circuit Shorted Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range actuator control circuit B. A short to ground, short to battery or short together on the range actuator control circuit A and/or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Current	-15.0 to +36.0 A	0.0 A	This parameter displays the current drawn by the range actuator from the transfer case control module on either the range actuator control circuit A or the range actuator control circuit B. Typical values display 0.0 to 12.0 A. This parameter will display 0.0 A after shifting ranges.
Range Actuator Direction	Invalid, Stationary, Clockwise or Counter-clockwise	Stationary	This parameter displays what direction the transfer case range actuator is actually turning.
Range Actuator Direction Command	Invalid, Stationary, Clockwise or Counter-clockwise	Stationary	This parameter displays what direction the transfer case control module is commanding the range actuator to turn. This parameter will display Stationary after a range change.
Range Actuator Learn Status	Not Learned, Passed, Failed, Aborted, or In Progress	Passed	This parameter displays the status of the last range actuator learn attempt.
Range Actuator Lock Command	Disengaged or Engaged	Disengaged	This parameter displays the commanded status of the range actuator lock. The lock will be engaged in Auto 4WD, 4WD High, or 4WD Low, and Disengaged in 2WD High and Neutral.
Range Actuator Lock Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator lock control circuit. The range actuator lock control circuit is made up of the battery positive voltage circuit and the transfer case lock solenoid control circuit. A short to battery on the transfer case lock solenoid control circuit will cause this parameter to display Malfunction.

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Parameter	Expected Value	Expected Value	Description
Range Actuator Lock Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator lock control circuit. The range actuator lock control circuit is made up of the battery positive voltage circuit and the transfer case lock solenoid control circuit. A short to ground on the transfer case lock solenoid control circuit will cause this parameter to display Malfunction.
Range Actuator Lock Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator lock control circuit. The range actuator lock control circuit is made up of the battery positive voltage circuit and the transfer case lock solenoid control circuit. An open on the transfer case lock solenoid control circuit will cause this parameter to display Malfunction.
Range Actuator Position	2WD, 4WD High-2WD 4WD High/Locked, 4WD High-Neutral, Neutral, Neutral-4WD Low, or 4WD Low	2WD	This parameter displays the actual position of the transfer case according to the range actuator position sensor.
Range Actuator Position Sensor	-150 to 210Â°	35Â°	This parameter displays the position of the range actuator position sensor in degrees. Typical scan tool displays: • 2WD High = 20-50Â° • 4WD Auto = 30-210Â° • 4WD High = 110-210Â° • 4WD Low = -150 to -55Â° • Neutral = -10 to +10Â°
Range Actuator Position Sensor	0.35-4.6 V	Varies	This parameter displays the voltage being returned from the range actuator position sensor. The range actuator position sensor is also known as the incremental position sensor.
Range Actuator Position Sensor Direction Signal	Volts	Varies	Range Actuator Direction Signal A/D - 8 Volt Reference
Range Actuator Position Sensor Low Reference Command	ON or OFF	OFF	This parameter displays the commanded status of the range actuator position sensor low reference circuit.
Range Actuator Position Sensor Supply Voltage Command	ON or OFF	OFF	This parameter displays the commanded status of the range actuator position sensor supply voltage circuit.

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Parameter	Expected Value	Expected Value	Description
Requested Transfer Case Clutch Torque	Y	Varies	This parameter displays the commanded torque to be held by the transfer case clutch.
Right Front Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the right front wheel speed sensor.
Right Rear Front Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the right rear wheel speed sensor.
Sensor Reference Voltage 1	4.8-5.2 V	5.0 V	This parameter displays the voltage being supplied by the transfer case control module to the transfer case range position switch.
Sensor Reference Voltage 2	7.75-8.25 V	8.0 V	This parameter displays the voltage being supplied by the transfer case control module to the range actuator position sensor. The range actuator position sensor is also known as the incremental position sensor.
Sensor Reference Voltage 3	4.8-5.2 V	5.0 V	This parameter displays the voltage being supplied by the transfer case control module to the transfer case range selector switch.
Service 4WD Indicator Command	ON or OFF	OFF	This parameter displays ON anytime a DTC sets.
Software Part Number	Current Software Release	-	This parameter displays the numbers or characters assigned to the current version of software used in the transfer case control module. The scan tool displays an alphanumeric value.
Steering Wheel Angle	Steering wheel in straight position	-5 to +5Â°	The scan tool displays Â°. This is the current position of the steering angle sensor.
	Steering wheel turned left until stop	450-550Â°	
	Steering wheel turned right until stop	-550 to -450Â°	
Transfer Case Clutch Torque	Y	0.0	This parameter displays the estimated torque being held by the transfer case clutch.
Transfer Case Commanded Position	2WD, 4WD High/Locked, 4WD Low, Neutral or None	2WD	This parameter displays the current range commanded by the driver.
Transfer Case Neutral Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the Neutral indicator light ON.
Transfer Case Neutral Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the transfer case neutral range indicator control circuit. The transfer case neutral range indicator control circuit is made up of the indicator dimming control circuit and the

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Parameter	Expected Value	Expected Value	Description
			neutral indicator control circuit. A short to battery on the neutral indicator control circuit will cause this parameter to display Malfunction.
Transfer Case Neutral Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the transfer case neutral range indicator control circuit. The transfer case neutral range indicator control circuit is made up of the indicator dimming control circuit and the neutral indicator control circuit. A short to ground on the neutral indicator control circuit will cause this parameter to display Malfunction.
Transfer Case Neutral Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the transfer case neutral range indicator control circuit. The transfer case neutral range indicator control circuit is made up of the indicator dimming control circuit and the neutral indicator control circuit. An open on the neutral indicator control circuit will cause this parameter to display Malfunction.
Transfer Case Output Shafts Slip Speed	0-8,192 RPM	Varies	This parameter displays the difference between the rotational speeds of the transfer case front and rear output shafts.
Transfer Case Range	Invalid, Neutral, 2WD, 4WD/AWD Automatic, 4WD High/Locked, 4WD Low, 4WD Unlocked	2WD	This parameter displays the current mode the transfer case is in, as indicated by the transfer case range position switch.
Transfer Case Range Position Sensor	Â°	35Â°	This parameter displays the position of the rotational position sensor in degrees.
Transfer Case Range Position Sensor	190-210 Hz	199 Hz	This parameter displays the frequency of the current being supplied to the range position sensor.
Transfer Case Range Position Sensor	0-100%	24% (Â±5%)	This parameter displays the position of the range position sensor in percent. Typical scan tool values: • 2WD = 24% • 4WD High = 5% • 4WD Low = 95% • Neutral = 5%
Transfer Case Range Selection Switch	0.0-5.0 V	2.0 V (Â±0.2 V)	This parameter displays the voltage being returned from the transfer case range selection switch.

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Parameter	Expected Value	Expected Value	Description
			Typical scan tool displays: • 2WD = 2.0 V • 4WD High/Locked = 3.0 V • 4WD Low = 1.5 V • Neutral = 2.5 V
Transfer Case Range Selection Switch State	2WD, 4WD High/Locked, 4WD Low, Neutral or None	2WD	This parameter displays the current range commanded by the transfer case range selection switch. This parameter displays the transfer case shift control switch mode currently selected by the driver.
Transmission Fluid Temperature	Â°C (Â°F)	Varies	This parameter displays the transmission fluid temperature in degrees Celsius or Fahrenheit.
Transmission Gear	Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6	Park or Neutral	This parameter displays the current commanded gear the transmission is in. The scan tool displays Park, Reverse and Neutral when ignition ON and engine OFF. The scan tool displays Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6 when engine ON.
Transmission OSS	RPM	Varies	This parameter displays transmission output shaft speed in revolutions per minute.
Variation Allowed Between Transfer Case Range Position Sensor and Range Actuator Position Sensor	Â°	Varies	This parameter displays the allowed variation between transfer case range position sensor and the range actuator position sensor.
Variation Between Transfer Case Range Position Sensor and Range Actuator Position Sensor	Â°	Varies	This parameter displays the actual variation between transfer case range position sensor and the range actuator position sensor.
Vehicle Speed	0-327 km/h (0-204 MPH)	Varies	This parameter displays vehicle speed in kilometers or miles per hour.
Vehicle Stability Control Request	%	Varies	Vehicle stability enhancement system coupling request value
Vehicle Identification Number	-	Varies	A unique 17 character vehicle identifier

Scan Tool Output Controls

Output Control	Description
NOTE: **Transmission must be in transmission**	

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Output Control	Description
neutral for any of these output controls to operate. Refer to the scan tool manual for complete scan tool operating instructions.	
2WD High Range Indicator	This function allows the technician to command the 2WD High range indicator, within the transfer case control switch, ON or OFF.
4WD Automatic Range Indicator	This function allows the technician to command the 4WD Auto range indicator light, within the transfer case control switch, ON or OFF.
4WD High Range Indicator	This function allows the technician to command the 4WD High range indicator, within the transfer case control switch, ON or OFF.
4WD Low Range Indicator	This function allows the technician to command the 4WD Low range indicator, within the transfer case control switch, ON or OFF.
Front Axle Engagement Actuator	**NOTE:** **Transmission must be in transmission Neutral for this output control to operate.** This function allows the technician to command the front axle to engage or disengage.
Range Actuator (if equipped)	This function is intended to activate the range actuator control circuits. The range actuator control circuits can be commanded OFF or ON, in either the clockwise or counter-clockwise direction, to ensure all portions of the control module driver are operational. This device control can be operated with the actuator connected to verify actuator operation, or disconnected for circuit testing. The activation of this control must ensure the range actuator lock is activated as well to ensure actuator movement when the range actuator is plugged in. If the device control is activated with the range actuator plugged in, the range actuator shall return to the nearest legal range position after return to normal control.
Range Actuator Lock	**NOTE:** **You may need to perform an ignition OFF in order to recover.** This function allows the technician to command the range actuator lock to engage or disengage.

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Output Control	Description
Range Actuator Learn	**NOTE:** **This does not work in 2WD High.** This function allows the technician to command the transfer case control module to relearn the clutch status after the range actuator, control module, or transfer case has been replaced.
Transfer Case Clutch Engagement	This function is used to override the clutch capacity command of the all wheel drive clutch output.
Transfer Case Range	This device control is used to override the transfer case range position.
Transfer Case Neutral Range Indicator	This function allows the technician to command the transfer case neutral range indicator, within the transfer case control switch, ON or OFF.

TRANSFER CASE CONTROL MODULE SCAN TOOL INFORMATION (NQF)

Scan Tool Data Parameters

Parameter	Expected Value	Expected Value	Description
Operating Conditions: Ignition ON, engine OFF, Park or Neutral, and transfer case in 2WD, unless otherwise noted.			
2WD High Range Indicator Command	ON or OFF	ON	This parameter displays ON when the transfer case control module commands the 2WD High indicator light ON.
2WD High Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 2WD High range indicator control circuit. The 2WD High range indicator control circuit is made up of the indicator dimming control circuit and the 2WD High indicator control circuit. A short to battery on the 2WD High indicator control circuit will cause this parameter to display Malfunction.
2WD High Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 2WD High range indicator control circuit. The 2WD High range indicator control circuit is made up of the indicator dimming control circuit and the 2WD High indicator control circuit. A short to ground on the 2WD High indicator control circuit will cause this parameter to display Malfunction.
2WD High Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 2WD High range indicator control circuit. The 2WD High range indicator control circuit is made up of the indicator dimming control circuit and the 2WD High indicator control circuit. An open on the 2WD High indicator control

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Parameter	Expected Value	Expected Value	Description
			circuit will cause this parameter to display Malfunction.
4WD Automatic Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the Auto 4WD indicator ON.
4WD Automatic Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD automatic range indicator control circuit. The 4WD automatic range indicator control circuit is made up of the indicator dimming control circuit and the AWD indicator control circuit. A short to battery on the AWD indicator control circuit will cause this parameter to display Malfunction.
4WD Automatic Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD automatic range indicator control circuit. The 4WD automatic range indicator control circuit is made up of the indicator dimming control circuit and the AWD indicator control circuit. A short to ground on the AWD indicator control circuit will cause this parameter to display Malfunction.
4WD Automatic Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD automatic range indicator control circuit. The 4WD automatic range indicator control circuit is made up of the indicator dimming control circuit and the AWD indicator control circuit. An open on the AWD indicator control circuit will cause this parameter to display Malfunction.
4WD High Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the 4WD High indicator light ON.
4WD High Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD High range indicator control circuit. The 4WD High range indicator control circuit is made up of the indicator dimming control circuit and the 4WD High indicator control circuit. A short to battery on the 4WD High indicator control circuit will cause this parameter to display Malfunction.
4WD High Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD High range indicator control circuit. The 4WD High range indicator control circuit is made up of the indicator dimming control circuit and the 4WD High indicator control

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Parameter	Expected Value	Expected Value	Description
			circuit. A short to ground on the 4WD High indicator control circuit will cause this parameter to display Malfunction.
4WD High Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD High range indicator control circuit. The 4WD High range indicator control circuit is made up of the indicator dimming control circuit and the 4WD High indicator control circuit. An open on the 4WD High indicator control circuit will cause this parameter to display Malfunction.
4WD Low Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the 4WD Low indicator light ON.
4WD Low Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD Low range indicator control circuit. The 4WD Low range indicator control circuit is made up of the indicator dimming control circuit and the 4WD Low indicator control circuit. A short to battery on the 4WD Low indicator control circuit will cause this parameter to display Malfunction.
4WD Low Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD Low range indicator control circuit. The 4WD Low range indicator control circuit is made up of the indicator dimming control circuit and the 4WD Low indicator control circuit. A short to ground on the 4WD Low indicator control circuit will cause this parameter to display Malfunction.
4WD Low Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the 4WD Low range indicator control circuit. The 4WD low range indicator control circuit is made up of the indicator dimming control circuit and the 4WD Low indicator control circuit. An open on the 4WD Low indicator control circuit will cause this parameter to display Malfunction.
Brake Pedal Position Sensor Signal	Active/Released	Released	The scan tool displays Inactive or Active depending on the state of the brake pedal.
Calculated Transfer Case Clutch Temperature	Â°C/Â°F	Varies	This parameter displays the estimated clutch temperature.

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Parameter	Expected Value	Expected Value	Description
Control Module Voltage	0.0 to 25.5 V	Battery Voltage	This parameter displays the voltage measured by the transfer case control module at the battery positive voltage circuit.
Current Transmission Gear	Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6	Park or Neutral	This parameter displays the current estimated gear the transmission is in. The scan tool displays Park, Reverse, and Neutral when ignition ON and engine OFF. The scan tool displays Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6 when engine ON.
Display Dimming	0 to 100%	Varies	This parameter displays the interior dimming display level being supplied by the body control module to the transfer case shift control switch.
Engine Run Time	hh:mm:ss	Varies	This parameter displays the time since Engine Start.
Engine Speed	RPM	Varies	This parameter displays engine RPM.
Front Axle Engagement Actuator Command	Engaged or Disengaged	Disengaged	This parameter displays either Engaged or Disengaged. Engaged when the body control module is commanding Auto 4WD, 4WD, or 4WD Low ranges, and Disengaged when the body control module is commanding Neutral, or 2WD ranges.
Front Axle Engagement Actuator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the front axle engagement actuator control circuit. A short to battery on the front axle engagement actuator control circuit will cause this parameter to display Malfunction.
Front Axle Engagement Actuator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the front axle engagement actuator control circuit. A short to ground on the front axle engagement actuator control circuit will cause this parameter to display Malfunction.
Front Axle Engagement Actuator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the front axle engagement actuator control circuit. An open/high resistance condition on the front axle engagement actuator control circuit will cause this parameter to display Malfunction.
Front Axle Feedback Switch	Engaged or Disengaged	Disengaged	This parameter displays the actual status of the front axle. The parameter will display Engaged when the system is in Auto 4WD, 4WD, or 4WD Low modes, and Disengaged when the system is in Neutral, or 2WD High or Neutral mode.

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Parameter	Expected Value	Expected Value	Description
Ignition 1 Signal	ON or OFF	ON	This parameter displays the status of the run/crank ignition 1 voltage circuit to the transfer case control module.
Ignition Accessory Signal	ON or OFF	ON	This parameter displays the status of the ignition accessory signal circuit to the transfer case control module.
Left Front Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the left front wheel speed sensor.
Left Rear Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the left rear wheel speed sensor.
Non-Driven Wheel Speed	Varies	km/h/MPH	This parameter displays the non-drive wheel speed in kilometers or miles per hour.
Power Mode	OFF, Accessory, Run or Crank Request	Run	This parameter displays the status of the ignition switch.
Range Actuator Command	-100 to +100%	0%	This parameter displays the pulse width modulated voltage signal being supplied by the transfer case control module to the transfer case encoder motor on circuit A or circuit B. The scan tool displays negative values when turning counter-clockwise or positive values when turning clockwise. This parameter will display 0% after a range shift.
Range Actuator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range actuator control circuit B. A short to battery on the range actuator control circuit A or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range actuator control circuit B. A short to ground on the range actuator control circuit A or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range

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Parameter	Expected Value	Expected Value	Description
			actuator control circuit B. An open on the range actuator control circuit A or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Control Circuit Shorted Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator control circuit. The range actuator control circuit is made up of the range actuator control circuit A and the range actuator control circuit B. A short to ground, short to battery or short together on the range actuator control circuit A and/or the range actuator control circuit B will cause this parameter to display Malfunction.
Range Actuator Current	-15.0 to +36.0 A	0.0 A	This parameter displays the current drawn by the range actuator from the transfer case control module on either the range actuator control circuit A or the range actuator control circuit B. Typical values display 0.0 to 12.0 A. This parameter will display 0.0 A after shifting ranges.
Range Actuator Direction	Invalid, Stationary, Clockwise or Counter-clockwise	Stationary	This parameter displays what direction the transfer case range actuator is actually turning.
Range Actuator Direction Command	Invalid, Stationary, Clockwise or Counter-clockwise	Stationary	This parameter displays what direction the transfer case control module is commanding the range actuator to turn. This parameter will display Stationary after a range change.
Range Actuator Learn Status	Not Learned, Passed, Failed, Aborted, or In Progress	Passed	This parameter displays the status of the last range actuator learn attempt.
Range Actuator Lock Command	Disengaged or Engaged	Disengaged	This parameter displays the commanded status of the range actuator lock. The lock will be engaged in Auto 4WD, 4WD High, or 4WD Low, and Disengaged in 2WD High and Neutral.
Range Actuator Lock Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator lock control circuit. The range actuator lock control circuit is made up of the battery positive voltage circuit and the transfer case lock solenoid control circuit. A short to battery on the transfer case lock solenoid control circuit will cause this parameter to display Malfunction.

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Parameter	Expected Value	Expected Value	Description
Range Actuator Lock Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator lock control circuit. The range actuator lock control circuit is made up of the battery positive voltage circuit and the transfer case lock solenoid control circuit. A short to ground on the transfer case lock solenoid control circuit will cause this parameter to display Malfunction.
Range Actuator Lock Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the range actuator lock control circuit. The range actuator lock control circuit is made up of the battery positive voltage circuit and the transfer case lock solenoid control circuit. An open on the transfer case lock solenoid control circuit will cause this parameter to display Malfunction.
Range Actuator Position	2WD, 4WD High-2WD 4WD High/Locked, 4WD High-Neutral, Neutral, Neutral-4WD Low, or 4WD Low	2WD	This parameter displays the actual position of the transfer case according to the range actuator position sensor.
Range Actuator Position Sensor	-150 to 210Â°	35Â°	This parameter displays the position of the range actuator position sensor in degrees. Typical scan tool displays: • 2WD High = 20-50Â° • 4WD Auto = 30-210Â° • 4WD High = 110-2100Â° • 4WD Low = -150 to -55Â° • Neutral = -10 to +10Â°
Range Actuator Position Sensor	0.35-4.6 V	Varies	This parameter displays the voltage being returned from the range actuator position sensor. The range actuator position sensor is also known as the incremental position sensor.
Range Actuator Position Sensor Direction Signal	Volts	Varies	Range Actuator Direction Signal A/D - 8 Volt Reference
Range Actuator Position Sensor Low Reference Command	ON or OFF	OFF	This parameter displays the commanded status of the range actuator position sensor low reference circuit.
Range Actuator Position Sensor Supply Voltage Command	ON or OFF	OFF	This parameter displays the commanded status of the range actuator position sensor supply voltage circuit.

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Parameter	Expected Value	Expected Value	Description
Requested Transfer Case Clutch Torque	Y	Varies	This parameter displays the commanded torque to be held by the transfer case clutch.
Right Front Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the right front wheel speed sensor.
Right Rear Front Wheel Speed Sensor	Varies	0 km/h (0 MPH)	The scan tool displays km/h (MPH) depending on the current speed of the right rear wheel speed sensor.
Sensor Reference Voltage 1	4.8-5.2 V	5.0 V	This parameter displays the voltage being supplied by the transfer case control module to the transfer case range position switch.
Sensor Reference Voltage 2	7.75-8.25 V	8.0 V	This parameter displays the voltage being supplied by the transfer case control module to the range actuator position sensor. The range actuator position sensor is also known as the incremental position sensor.
Sensor Reference Voltage 3	4.8-5.2 V	5.0 V	This parameter displays the voltage being supplied by the transfer case control module to the transfer case range selector switch.
Service 4WD Indicator Command	ON or OFF	OFF	This parameter displays ON anytime a DTC sets.
Software Part Number	Current Software Release	-	This parameter displays the numbers or characters assigned to the current version of software used in the transfer case control module. The scan tool displays an alphanumeric value.
Steering Wheel Angle	Steering wheel in straight position	-5 to +5Â°	The scan tool displays Â°. This is the current position of the steering angle sensor.
	Steering wheel turned left until stop	450-550Â°	
	Steering wheel turned right until stop	-550 to -450Â°	
Transfer Case Clutch Torque	Y	0.0	This parameter displays the estimated torque being held by the transfer case clutch.
Transfer Case Commanded Position	2WD, 4WD High/Locked, 4WD Low, Neutral or None	2WD	This parameter displays the current range commanded by the driver.
Transfer Case Neutral Range Indicator Command	ON or OFF	OFF	This parameter displays ON when the transfer case control module commands the Neutral indicator light ON.
Transfer Case Neutral Range Indicator Control Circuit High Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the transfer case neutral range indicator control circuit. The transfer case neutral range indicator control circuit is made up of the indicator dimming control circuit and the

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Parameter	Expected Value	Expected Value	Description
			neutral indicator control circuit. A short to battery on the neutral indicator control circuit will cause this parameter to display Malfunction.
Transfer Case Neutral Range Indicator Control Circuit Low Voltage Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the transfer case neutral range indicator control circuit. The transfer case neutral range indicator control circuit is made up of the indicator dimming control circuit and the neutral indicator control circuit. A short to ground on the neutral indicator control circuit will cause this parameter to display Malfunction.
Transfer Case Neutral Range Indicator Control Circuit Open Test Status	Not Run, OK or Malfunction	OK	This parameter monitors the status of the transfer case neutral range indicator control circuit. The transfer case neutral range indicator control circuit is made up of the indicator dimming control circuit and the neutral indicator control circuit. An open on the neutral indicator control circuit will cause this parameter to display Malfunction.
Transfer Case Output Shafts Slip Speed	0-8,192 RPM	Varies	This parameter displays the difference between the rotational speeds of the transfer case front and rear output shafts.
Transfer Case Range	Invalid, Neutral, 2WD, 4WD/AWD Automatic, 4WD High/Locked, 4WD Low, 4WD Unlocked	2WD	This parameter displays the current mode the transfer case is in, as indicated by the transfer case range position switch.
Transfer Case Range Position Sensor	Â°	35Â°	This parameter displays the position of the rotational position sensor in degrees.
Transfer Case Range Position Sensor	190-210 Hz	199 Hz	This parameter displays the frequency of the current being supplied to the range position sensor.
Transfer Case Range Position Sensor	0-100%	24% (Â±5%)	This parameter displays the position of the range position sensor in percent. Typical scan tool values: • 2WD = 24% • 4WD High = 5% • 4WD Low = 95% • Neutral = 5%
Transfer Case Range Selection Switch	0.0-5.0 V	2.0 V (Â±0.2 V)	This parameter displays the voltage being returned from the transfer case range selection switch.

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Parameter	Expected Value	Expected Value	Description
			Typical scan tool displays: • 2WD = 2.0 V • 4WD High/Locked = 3.0 V • 4WD Low = 1.5 V • Neutral = 2.5 V
Transfer Case Range Selection Switch State	2WD, 4WD High/Locked, 4WD Low, Neutral or None	2WD	This parameter displays the current range commanded by the transfer case range selection switch. This parameter displays the transfer case shift control switch mode currently selected by the driver.
Transmission Fluid Temperature	Â°C (Â°F)	Varies	This parameter displays the transmission fluid temperature in degrees Celsius or Fahrenheit.
Transmission Gear	Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6	Park or Neutral	This parameter displays the current commanded gear the transmission is in. The scan tool displays Park, Reverse and Neutral when ignition ON and engine OFF. The scan tool displays Park, Reverse, Neutral, 1, 2, 3, 4, 5, and 6 when engine ON.
Transmission OSS	RPM	Varies	This parameter displays transmission output shaft speed in revolutions per minute.
Variation Allowed Between Transfer Case Range Position Sensor and Range Actuator Position Sensor	Â°	Varies	This parameter displays the allowed variation between transfer case range position sensor and the range actuator position sensor.
Variation Between Transfer Case Range Position Sensor and Range Actuator Position Sensor	Â°	Varies	This parameter displays the actual variation between transfer case range position sensor and the range actuator position sensor.
Vehicle Speed	0-327 km/h (0-204 MPH)	Varies	This parameter displays vehicle speed in kilometers or miles per hour.
Vehicle Stability Control Request	%	Varies	Vehicle stability enhancement system coupling request value
Vehicle Identification Number	-	Varies	A unique 17 character vehicle identifier

Scan Tool Output Controls

Output Control	Description
NOTE: **Transmission must be in transmission**	

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Output Control	Description
neutral for any of these output controls to operate. Refer to the scan tool manual for complete scan tool operating instructions.	
2WD High Range Indicator	This function allows the technician to command the 2WD High range indicator, within the transfer case control switch, ON or OFF.
4WD Automatic Range Indicator	This function allows the technician to command the 4WD Auto range indicator light, within the transfer case control switch, ON or OFF.
4WD High Range Indicator	This function allows the technician to command the 4WD High range indicator, within the transfer case control switch, ON or OFF.
4WD Low Range Indicator	This function allows the technician to command the 4WD Low range indicator, within the transfer case control switch, ON or OFF.
Front Axle Engagement Actuator	**NOTE:** **Transmission must be in transmission Neutral for this output control to operate.** This function allows the technician to command the front axle to engage or disengage.
Range Actuator (if equipped)	This function is intended to activate the range actuator control circuits. The range actuator control circuits can be commanded OFF or ON, in either the clockwise or counter-clockwise direction, to ensure all portions of the control module driver are operational. This device control can be operated with the actuator connected to verify actuator operation, or disconnected for circuit testing. The activation of this control must ensure the range actuator lock is activated as well to ensure actuator movement when the range actuator is plugged in. If the device control is activated with the range actuator plugged in, the range actuator shall return to the nearest legal range position after return to normal control.
Range Actuator Lock	**NOTE:** **You may need to perform an ignition OFF in order to recover.** This function allows the technician to command the range actuator lock to engage or disengage.

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Output Control	Description
Range Actuator Learn	**NOTE:** **This does not work in 2WD High.** This function allows the technician to command the transfer case control module to relearn the clutch status after the range actuator, control module, or transfer case has been replaced.
Transfer Case Clutch Engagement	This function is used to override the clutch capacity command of the all wheel drive clutch output.
Transfer Case Range	This device control is used to override the transfer case range position.
Transfer Case Neutral Range Indicator	This function allows the technician to command the transfer case neutral range indicator, within the transfer case control switch, ON or OFF.

TRANSMISSION CONTROL MODULE SCAN TOOL INFORMATION (6L80, 6L90)

The Transmission Control Module Scan Tool Data List contains all transmission related parameters that are available on the scan tool. The list is arranged in alphabetical order. A given parameter may appear in any one of the data lists, and in some cases may appear more than once, or in more than one data list in order to group certain related parameters together.

The values below represent a typical display recorded from a properly functioning system.

Only the parameters listed below are used/referenced in this manual for diagnosis. If a scan tool displays other parameters, those values are not recommended by General Motors for use in diagnosis.

If all values are within the expected value described below, refer to **Symptoms - Automatic Transmission** for diagnosis.

The scan tool values from a properly functioning transmission may be used for comparison with the transmission you are diagnosing. The values below represent a typical display recorded from a properly functioning system.

Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Engine at idle with the upper radiator hose hot and in closed loop operation, closed throttle, transmission in Park, accessories OFF, brake pedal not applied.			
1-2 Shift Time	Varies	Seconds	This parameter displays the actual time of the last adaptable 1-2 shift. The shift time is based on the gear ratio change after the commanded 1-2 shift.
2-3 Shift Time	Varies	Seconds	This parameter displays the actual time of the last adaptable 2-3 shift. The shift time is based on the gear ratio change after the commanded 2-3 shift.

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Parameter	System State	Expected Value	Description
3-4 Shift Time	Varies	Seconds	This parameter displays the actual time of the last adaptable 3-4 shift. The shift time is based on the gear ratio change after the commanded 3-4 shift.
4-5 Shift Time	Varies	Seconds	This parameter displays the actual time of the last adaptable 4-5 shift. The actual shift time is obtained by measuring the time required for the input shaft to decelerate from the previous ratio to the current ratio.
5-6 Shift Time	Varies	Seconds	This parameter displays the actual time of the last 5-6 shift. The shift time is base on the gear ratio change after the commanded 5-6 shift.
Brake Switch	Released	Applied/Released	This parameter displays the status of the brake switch circuit input. Applied indicates a zero voltage input, brake pedal applied. Released indicates a voltage input, brake pedal released. The scan tool displays Applied or Released.
Calc. Throttle Position	Varies	%	This parameter displays a calculated value, which is determined by the accelerator pedal position and the actual throttle position, used to optimize transmission controls. It represents the driver's intended request for torque or acceleration. The range is 0-100 percent, where 0 percent represents an idle or coast request and 100 percent represents a request for wide open throttle (WOT).
Commanded Gear	1	1, 2, 3, 4 or 1, 2, 3, 4, 5 or Park/Neutral, Reverse, 1, 2, 3, 4, 5	This parameter displays the current commanded state of the shift solenoid valves. The scan tool displays 1, 2, 3, 4 or 5
Driver Shift Control	Inactive	Active/Inactive	This parameter displays Active or Inactive. The scan tool displays Active when the gear selector is in the sport (S) position, which enables TAP shift. The scan tool displays Inactive when the gear selector is not in the S position, TAP shift disabled.
Driver Shift Request	None	Upshift/ Downshift/ None/ Invalid	This parameter displays the current request from the TAP Shift System. This parameter will display up shift, downshift or invalid depending on

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Parameter	System State	Expected Value	Description
			the amount of voltage measured at the remote shift selector input and also will display none when there is no request.
ECT	Varies	Â°C (Â°F)	This parameter displays the input signal from the engine coolant temperature (ECT) sensor. ECT is high at 151Â°C (304Â°F) when the signal voltage is low (0 V). ECT is low at -40Â°C (-40Â°F) when the signal voltage is high (5 V).
Engine Speed	Varies	RPM	This parameter displays the rotational speed of the engine expressed as revolutions per minute.
Engine Torque	Varies	Y (lb ft)	This parameter displays a calculated value based on engine load, throttle position, mass air flow, and other engine inputs. This parameter is accurate to within 20 N.m 15 lb ft of actual measured engine torque.
Gear Ratio	Varies	Ratio	This parameter displays the actual transmission gear ratio. The scan tool displays the gear ratio calculated from the automatic transmission input shaft speed sensor (AT ISS) and the automatic transmission output shaft speed sensor (AT OSS) inputs.
High Side Driver 1	Enabled	Enabled/Disabled	This parameter displays the High Side Driver 1 status on the scan tool. When the High Side Driver 1 is commanded OFF this displays Disabled, when the High Side Driver 1 is commanded ON this displays Enabled.
High Side Driver 1 CKT Status	OK or Indeterminate	OK, Open/Short to Volts, Short to GND, Indeterminate	This parameter displays the High Side Driver 1 circuit status on the scan tool. If the voltage is low when the solenoid is commanded OFF, the scan tool will display Open/Short to GND. If the voltage is high when the solenoid is commanded ON, the scan tool will display Short to Volts. If no circuit fault is present the scan tool will display OK.
Ignition Voltage	12 to 14 volts	Volts	This parameter displays the system voltage measured at the ignition feed.

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Parameter	System State	Expected Value	Description
IMS	Park	Park-Drive 1, Open, Invalid	This parameter displays PARK, PARK/REVERSE, REVERSE, REVERSE/NEUTRAL, NEUTRAL, NEUTRAL/DRIVE 4, DRIVE 4, DRIVE 4/DRIVE 3, DRIVE 3, DRIVE 3/DRIVE 2, DRIVE 2, DRIVE 2/DRIVE 1, DRIVE 1 or INVALID. The IMS Range display represents a decoded status of the four inputs from the IMS. The combination of IMS inputs are used to determine what position the manual valve is in at any time.
IMS A/B/C/P	LOW/HI/HI/LOW	HI or LOW	This parameter displays the status of the four A/B/C/P inputs from the automatic transmission internal mode switch. HI indicates an ignition voltage signal and LOW indicates a 0 voltage signal. The scan tool will display HI/LOW, HI/LOW, HI/LOW, HI/LOW.
ISS/OSS Supply Voltage	OK	OK, Out of Range	This parameter displays OK, Out of Range.
Last Shift Time	Varies	Seconds	This parameter displays the actual time of the last up shift. This value is only accurate if the shift was adaptable.
PC Sol. 2 CKT Status	OK or Indeterminate	OK, Open/Short to GND, Short to Volts, Indeterminate	This parameter displays OK, Open/Short to GND, Short to Volts.
PC Sol. 2 Pressure Comm	No	Yes/No	This parameter displays Yes or No. Yes, solenoid pressure is commanded. No, solenoid pressure is not commanded.
PC Sol. 3 CKT Status	OK or Indeterminate	OK, Open/Short to GND, Short to Volts, Indeterminate	This parameter displays OK, Open/Short to GND, Short to Volts.
PC Sol. 3 Pressure Comm	Yes	Yes/No	This parameter displays Yes or No. Yes, solenoid pressure is commanded. No, solenoid pressure is not commanded.
PC Sol. 4 CKT Status	OK or Indeterminate	OK, Open/Short to GND, Short to Volts, Indeterminate	This parameter displays OK, Open/Short to GND, Short to Volts.
PC Sol. 4 Pressure Comm	No	Yes/No	This parameter displays Yes or No. Yes, solenoid pressure is commanded. No, solenoid pressure is not commanded.

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Parameter	System State	Expected Value	Description
PC Sol. 5 CKT Status	OK or Indeterminate	OK, Open/Short to GND, Short to Volts, Indeterminate	This parameter displays OK, Open/Short to GND, Short to Volts.
PC Sol. 5 Pressure Comm	No	Yes/No	This parameter displays Yes or No. Yes, solenoid pressure is commanded. No, solenoid pressure is not commanded.
Shift Sol. 1 CKT Status	OK or Indeterminate	OK, Open/Short to GND, Short to Volts, Indeterminate	This parameter displays OK, Open/Short to GND, Short to Volts, or Indeterminate.
Shift Solenoid 1	ON	On/Off	This parameter displays the commanded state of the reverse, 1st shift solenoid valve (S1). The scan tool displays On/Off.
Shift Sol. 2 CKT Status	OK or Indeterminate	OK, Open/Short to GND, Short to Volts, Indeterminate	This parameter displays OK, Open/Short to GND, Short to Volts, or Indeterminate.
Shift Solenoid 2	ON	On/Off	This parameter displays the commanded state of the 2-3, 3-4 shift solenoid valve (S2). The scan tool displays On/Off.
TCC PC Sol. Pressure Comm	No	Yes/No	This parameter displays Yes or No. Yes, solenoid pressure is commanded. No, solenoid pressure is not commanded.
TCC Slip Speed	Varies	RPM	This parameter displays the difference between transmission input speed and engine speed. A negative value indicates that the engine speed is less than the input speed, deceleration. A positive value indicates that the engine speed is greater than the input speed, acceleration. A value of zero indicates that the engine speed is equal to the input speed, TCC applied.
TCM Temperature	Varies	Â°C (Â°F)	This parameter displays results in Â°C (Â°F).
TFP Switch 1	HI	HI/LOW	This parameter displays the state of the first clutch oil pressure switch. The scan tool displays HI/LOW.
TFP Switch 3	LOW	HI/LOW	This parameter displays state of the 3rd clutch oil pressure switch. The scan tool displays HI/LOW.
TFP Switch 4	LOW	HI/LOW	This parameter displays state of the 4th clutch oil pressure switch. The scan tool displays HI/LOW.

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Parameter	System State	Expected Value	Description
TFP Switch 5	LOW	HI/LOW	This parameter displays state of the fifth clutch oil pressure switch. The scan tool displays HI/LOW.
Tow/Haul Mode (If equipped)	Inactive	Active/Inactive	This parameter displays ACTIVE when the transmission is operating in the tow/haul mode. In this mode the transmission control module (TCM) extends the length of time between upshifts and elevates transmission line pressure. Shift quality and TCC scheduling are also affected during tow/haul mode operation. The scan tool displays ACTIVE or INACTIVE.
Trans. Fluid Temp.	Varies	Â°C (Â°F)	This parameter displays the input signal of the transmission fluid temperature sensor. Transmission fluid temperature is high 151Â°C (304Â°F) when signal voltage is low, 0 V, and transmission fluid temperature is low -40Â°C (-40Â°F) when signal voltage is high, 5 V.
Transmission ISS	Varies	RPM	This parameter displays the rotational speed of the transmission input shaft. The scan tool displays input shaft speed is revolutions per minute.
Transmission OSS	0	RPM	This parameter displays the rotational speed of the transmission output shaft expressed as revolutions per minute.

Scan Tool Output Controls

Output Control	Description
High Side Driver 1	• The TCM commands the driver for the solenoid voltage supply ON and OFF. • When the ignition is ON, and the engine is OFF, there are no limits to this control. • High side drivers may not be commanded ON and OFF with the scan tool if the engine is running.
Line PC Solenoid	• The scan tool is used to request pressure in increments of 200 kPa (30 psi) from 200-2000 kPa (30-290 psi). The TCM will then command the line PC solenoid to achieve the requested increment. • When the ignition is ON, and the engine is OFF, the pressure request may be controlled within calibrated limits. There is a limit to the output control of 200 kPa (290 psi) when the engine is OFF. If the

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Output Control	Description
	request is above specified amount, the message "Request override current out of range" will display. • When the engine is running, the following control limits apply: • When the transmission range is Park or Neutral, the pressure request may be controlled within calibrated limits. The engine speed must be less than 1,500 RPM. If the engine speed is greater than 1,500 RPM, the message "TR in park/neutral and engine speed over 1,500 RPM" appears on the scan tool display. • When the transmission range is not Park or Neutral, the requested pressure can only be controlled equal to or greater than the pressure determined by the TCM. The TCM does not allow a pressure to be selected that may cause damage to the transmission. If the requested pressure is less than allowed by the TCM, the message "Requested pressure for the Line PC Solenoid is too low" appears on the scan tool display. • Transmission range DTCs must not be active. If a transmission range DTC is active, the message "Engine running with transmission DTC present" appears on the scan tool display.
PC Solenoid 2 Command	• The TCM commands the pressure control solenoid in order to apply or release the clutches. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the TCM. • When the engine is running, the following control limits apply: • The transmission range must be in Park or Neutral. If the transmission range is not Park or Neutral, the message "Engine running and transmission range is not Park/Neutral" appears on the scan tool display. • The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the TCM. • Transmission range DTCs must not be active. If a transmission range DTC is active, the message "Engine running with transmission DTC present" appears on the scan tool display.
PC Solenoid 3 Command	
PC Solenoid 4 Command	
PC Solenoid 5 Command	
Service Clean Procedure	• The scan tool is used to start and stop the transmission cleaning procedure algorithm. • The following control limits apply: • The engine must be running. The message "Engine not Running" will appear on the scan tool if this control is attempted without the engine running. • There cannot be active transmission DTCs. The message "Transmission Fault present" will appear on the scan tool if

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Output Control	Description
	this control is attempted with transmission DTCs active. • The transmission range must be Park or Neutral. The message "Transmission not in PARK or NEUTRAL" will appear on the scan tool if this control is attempted with the transmission in any range other than Park or Neutral. • The vehicle speed cannot exceed 8 km/h (5 mph). The message "Vehicle Speed too high" will appear on the scan tool if this control is attempted with a vehicle speed greater than 8 km/h (5 mph). • The engine speed cannot exceed 2500 RPM. The message "Engine Speed too high" will appear on the scan tool if this control is attempted with an engine speed greater than 2500 RPM. • The transmission oil temperature must be at a normal operating temperature. The message "Transmission oil temperature out of range" will appear on the scan tool if this control is attempted without a transmission oil temperature between 70-110Â°C (158-230Â°F).
Reset Transmission Adapts	• The scan tool is used to start and stop the transmission Fast Learn Adapt algorithm. • The following control limits apply: • The engine must be running. The message "Engine not Running" will appear on the scan tool if this control is attempted without the engine running. • There cannot be active transmission DTCs. The message "Transmission Fault present" will appear on the scan tool if this control is attempted with transmission DTCs active.
Shift Solenoid 1 Shift Solenoid 2	• The TCM commands Shift Solenoid 1 and Shift Solenoid 2 ON and OFF. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the TCM. • When the engine is running, the following control limits apply: • The transmission range must be in Park or Neutral. If the transmission range is not Park or Neutral, the message "Engine running and transmission range is not Park/Neutral" appears on the scan tool display. • The solenoid remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid state is determined by the TCM. • Transmission range DTCs must not be active. If a transmission range DTC is active, the message "Engine running with transmission DTC present" appears on the scan tool display.

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TRANSMISSION CONTROL MODULE SCAN TOOL INFORMATION (ALLISON)

Scan Tool Data Parameters

Parameter	Expected Value	Description
Operating Conditions: Engine is at Idle, Upper Radiator Hose is Hot, Closed Throttle, Gear is in PARK, and Accessories are OFF.		
Calculated Engine Torque	Y (lb ft)	Displays a range of 0-9,999 lb ft. This parameter indicates the calculated engine torque provided by the ECM via GM LAN. This parameter is a calculated value based on engine load, throttle position, mass air flow, and other engine and transmission inputs. This parameter is accurate to within 15 lb ft of actual measured engine torque.
Calculated Throttle Position	%	Displays a range of 0-100%. This parameter indicates the percent throttle provided by the ECM via GM LAN. In the cases where the transmission ISS is not supplied by the ECM and the TCM loses communication with the ECM, the TCM will calculate the throttle position based on converter slip speed. In all other instances, the Calculated Throttle Position will default to a value that is TCM calibration dependent.
Current Gear	0-7	Displays 0, 1, 2, 3, 4, 5, 6, or 7. This parameter indicates the current transmission range attained as determined by the gear ratio.
Driver Demanded Engine Torque	Nm (lb ft)	Displays a range of 0-13,557 Nm (0-9,999 lb ft). This parameter indicates the amount of torque that is requested by the throttle position and driving conditions.
Driver Shift Control Mode	Inactive/Active	Displays Active or Inactive. This parameter indicates if the shift selector is in the manual mode position.
Driver Shift Request	Upshift / Downshift None / Invalid	Displays Upshift, Downshift, None, Invalid. This parameter displays the current request from the Tap Up/Tap Down switch system provided by the BCM via GM LAN. This parameter will display Upshift, Downshift, None, or Invalid depending on the amount of voltage measured.
Engine Run Time	Hr:Min:Sec	Displays a range of 0:00:00-18:12:15 hr/min/sec. This parameter measures the length of time the engine has been in operation during the present ignition cycle.
Gear Command	0-8	Displays a range of 0-8. This parameter indicates the commanded gear state from the TCM. When the vehicle is in the Neutral position this parameter displays 0. When the vehicle shift lever is placed in Drive, this parameter displays 1 while the vehicle is in first

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Parameter	Expected Value	Description
		gear and changes accordingly as the vehicle shifts through 2, 3, 4, 5, and 6 This parameter displays 7 when reverse is commanded and 8 when the shift selector is in the park position.
Gear Ratio	Ratio	Displays a range of 0.000 to 8.00:1. This parameter is the actual gear ratio of the current commanded gear. The gear ratio is calculated by dividing the turbine speed by the output speed.
Ignition Voltage	V	Displays a range of 0.0-25.5 V. This parameter indicates the voltage level on the ignition input to the TCM. The normal ignition voltage is approximately 13.8 V, but may vary between 11-16 V.
Line Pressure Control Solenoid Valve Pressure Command	kPa (psi)	Displays a range of 1,600 kPa (0-232 psi). This parameter indicates the line pressure control solenoid valve commanded pressure. When the line pressure control solenoid valve is commanded ON, pressure from the line pressure control solenoid valve is directed to the line pressure regulator valve, which lowers the line pressure.
Pressure Control Solenoid Valve 1	kPa (psi)	Displays a range of 1,600 kPa (0-232 psi). This parameter is the commanded pressure of pressure control solenoid valve 1 which is directed through one or more of the shift valves to apply a clutch.
Pressure Control Solenoid Valve 2 Pressure Command	kPa (psi)	Displays a range of 1,600 kPa (0-232 psi). This parameter is the commanded pressure of pressure control solenoid valve 2 which is directed through the one or more of the shift valves to apply a clutch.
Requested Torque	Nm (lb ft)	Displays a range of 13,557 Nm (0-9,999 lb ft). This parameter indicates the amount of torque required by the driver.
Shift Solenoid Valve 1	On/Off	Displays On or Off. This parameter is the commanded state of the shift solenoid valve 1. On represents a commanded energized state, current is flowing through the solenoid valve. Off represents a non-commanded state, current is not flowing through the solenoid valve.
Shift Solenoid Valve 1 Debris Cleaning Command	Numeric Value	Displays a range of 0-255. This parameter indicates the number of times shift valve 1 did not stroke or destroke within a calibration dependent length of time after shift solenoid valve 1 was commanded ON or OFF.
Shift Solenoid Valve 1 Debris Cleaning Command	Disabled/Exhausted /Pressurized	This parameter indicates the override commanded state of shift solenoid valve 1 when debris cleaning of shift valve 1 is commanded.

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Parameter	Expected Value	Description
Shift Solenoid Valve 2	On/Off	Displays ON or OFF. This parameter is the commanded state of shift solenoid valve 2. On represents a commanded energized state, current is flowing through the solenoid valve. Off represents a non-commanded state, current is not flowing through the solenoid valve.
Shift Solenoid Valve 2 Debris Cleaning Command	Numeric Value	Displays a range of 0-255. This parameter indicates the number of times shift valve 2 did not stroke or destroke within a calibration dependent length of time after shift solenoid valve 2 was commanded ON or OFF.
Shift Solenoid Valve 2 Debris Cleaning Command	Disabled/Exhausted /Pressurized	This parameter indicates the override commanded state of shift solenoid valve 2 when debris cleaning of shift valve 2 is commanded.
Shift Solenoid Valve 3	On/Off	Displays ON or OFF. This parameter is the commanded state of the shift solenoid valve 3. On represents a commanded energized state, current is flowing through the solenoid valve. Off represents a non-commanded state, current is not flowing through the solenoid valve.
Shift Solenoid Valve 3 Debris Cleaning Command	Numeric Value	Displays a range of 0-255. This parameter indicates the number of times shift valve 3 did not stroke or destroke within a calibration dependent length of time after shift solenoid valve 3 was commanded ON or OFF.
Shift Solenoid Valve 3 Debris Cleaning Command	Disabled/Exhausted /Pressurized	This parameter indicates the override commanded state of shift solenoid valve 3 when debris cleaning of shift valve 3 is commanded.
TCC Pressure Control Solenoid Valve Command	kPa (psi)	Displays a range of 0-160 psi. This parameter indicates the commanded TCC pressure.
TCC Slip Speed	RPM	Displays -4,080 to +4,079 RPM. This parameter is the difference between the engine speed and transmission turbine speed. A negative value indicates the engine speed is less than the turbine speed, deceleration. A positive value indicates the engine speed is greater than the turbine speed.
Transmission Fluid Pressure Switch 1	On/Off	Displays ON or OFF. This parameter indicates the state of transmission fluid pressure switch 1 of the transmission fluid pressure switch, also known as the pressure switch manifold. ON represents a 0 voltage signal indicating that shift valve 1 is in the stroked position and OFF represents a reference voltage signal indicating shift valve 1 is in the destroked position.
Transmission Fluid Pressure Switch 2	On/Off	Displays ON or OFF. This parameter indicates the state of transmission fluid pressure switch 2 of the transmission fluid pressure switch, also

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Parameter	Expected Value	Description
		known as the pressure switch manifold. ON represents a 0 voltage signal indicating that shift valve 2 is in the stroked position and OFF represents a reference voltage signal indicating shift valve 2 is in the destroked position.
Transmission Fluid Pressure Switch 3	On/Off	Displays ON or OFF. This parameter indicates the state of transmission fluid pressure switch 3 of the transmission fluid pressure switch, also known as the ressure switch manifold. ON represents a 0 voltage signal indicating that shift valve 3 is in the stroked position and OFF represents a reference voltage signal indicating shift valve 3 is in the destroked position.
Transmission Fluid Pressure Switch 4	On/Off	Displays ON or OFF. This parameter indicates the state of transmission fluid pressure switch 4 of the transmission fluid pressure switch, also known as the pressure switch manifold. ON represents a 0 voltage signal indicating that the selector valve is in reverse and OFF represents a reference voltage signal indicating the selector valve is in neutral or a forward range.
Tow/Haul Mode	Inactive/Active	Displays Active/Inactive. This parameter indicates whether the driver has placed the vehicle in the Tow/Haul mode. When this parameter is active, the TCM modifies the shift strategy by raising the shift points and applying the TCC in lower ranges.
TP Angle	Percent	Displays a range of 0-100 percent. The TP angle is computed by the ECM, from throttle position voltage. The TP angle should display 0 percent at idle and 100 percent at wide open throttle (WOT).
Transmission Range Switch	Park, Reverse, Neutral, Drive, 5,4,3,2,1	Displays a range of Park, Reverse, Neutral, Drive, 5, 4, 3, 2, 1. The transmission range switch indicates the transmission range selected by the driver.
Transmission Range Switch A/B/C/P	On/Off	Displays ON/OFF, ON/OFF, ON/OFF, ON/OFF. These parameters are four inputs from the internal mode switch assembly. ON represents a 5-volt reference voltage signal. OFF represents a 0 voltage signal.
Transmission Fluid Temperature	Â°C (Â°F)	Displays -40Â°C to +158Â°C (-40Â°F to +316Â°F). This parameter is the input signal of the transmission fluid temperature sensor. The transmission fluid temperature is high when the signal voltage is low, and the transmission fluid temperature is low when the signal voltage is high.

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Parameter	Expected Value	Description
Transmission Hot Mode	On/Off	Displays ON or OFF. When ON, the TCM changes the shift pattern which will increase engine speed to increase cooler flow.
Transmission ISS	RPM	Displays 0-8,192 RPM. This parameter measures the rotational speed of the torque converter, same as the engine speed, expressed as revolutions per minute (RPM). In some cases, parameter data is provided by the ECM via the GMLAN.
Transmission OSS	RPM	Displays 0-8,192 RPM. This parameter measures the rotational speed of the transmission output shaft expressed as RPM. On four-wheel drive applications, the transfer case output shaft speed is measured.
Turbine Speed	RPM	Displays 0-8,192 RPM. This parameter indicates the rotational speed of the torque converter turbine shaft expressed as RPM.

Scan Tool Output Controls

Output Control	Description
Shift Solenoid Valve 1, 2, and 3	• The TCM commands the shift solenoid valve ON and OFF. The scan tool shift solenoid valve parameter should match the commanded state. The scan tool Commanded Gear parameter should correspond with the shift solenoid valve combination. Refer to **Solenoid and Clutch Chart (PCS1, PCS2, SS1, SS2, and SS3)** **Solenoid and Clutch Chart (TCC PCS)** . • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid valve remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid valve state is determined by the TCM. • When the engine is running, control of Shift Solenoid Valve 1, 2, and 3 is not allowed.
Clear TAP (Transmission Adaptive Pressures)	• Allows the TCM to reset the TAP cells to the original base value on individual shifts. • There are no limits to using this output control. It may be performed with the engine running or when the ignition is ON, and the engine is OFF.
Transmission Adaptive Pressure Reset	• Allows the TCM to reset the TAP cells to the original base value for all shifts. • There are no limits to using this output control. It may be performed with the engine running or when the ignition is ON, and the engine is OFF.

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Output Control	Description
Pressure Control Solenoid Valve 1 and 2	The TCM commands current to Pressure Control Solenoid Valve 1 and 2 in order to control clutch pressure. For Pressure Control Solenoid Valve 1, as the amperage increases, the clutch pressure decreases. As the amperage decreases, the clutch pressure increases. For Pressure Control Solenoid Valve 2, as the amperage increases, the clutch pressure increases. As the amperage decreases, the clutch pressure decreases. The amperage range is 0.00-1.00 A.
Shift Transmission Gear	• The TCM commands upshifts and downshifts. The scan tool Commanded Gear parameter should correspond with the shift solenoid valve combination. Refer to **Solenoid and Clutch Chart (PCS1, PCS2, SS1, SS2, and SS3)** **Solenoid and Clutch Chart (TCC PCS)** . • When the engine is running, the following control limits apply: • The TCM does not allow a shift if it causes the engine RPM to exceed a calibrated limit. If a gear is requested and the engine speed is too high, the message "Engine speed too high" appears on the scan tool display. • The TCM does not allow a downshift if the vehicle speed exceeds a calibrated limit. If a downshift is requested and the vehicle speed is too high, the message "Eng. is on and veh. speed too hi for downshift" appears on the scan tool display. • The TCM does not allow an upshift that is greater than the current selected transmission range, PRNDL. For example, 3rd gear is not allowed if the transmission range is D2. If an upshift is requested that is greater than the current selected transmission range, the message "Eng. running and gear request is greater than the current TR" appears on the scan tool display.
TCC Pressure Control Solenoid Valve	• The TCM commands the duty cycle of the TCC pressure control solenoid valve. The duty cycle is represented by a percentage of ON, energized, time. Approximately 90-100 percent duty cycle represents an ON, energized, commanded state. Zero percent represents an OFF, non-energized, commanded state. The scan tool TCC Duty Cycle parameter should match the commanded state. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid valve remains ON, 90-100 percent duty cycle, until commanded OFF, zero percent duty cycle, and vice versa. When the output control is exited, the solenoid valve duty cycle is determined by the TCM. • When the engine is running, the following control limits apply: • If the transmission range is Park, and the transmission is in hot mode, the TCC control solenoid valve may not be commanded OFF. If the solenoid valve is requested OFF, the message "TCC OFF command disabled in Hot Mode" appears on the scan tool display. • The TCC control solenoid valve may not be commanded OFF

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Output Control	Description
	for more than a calibrated amount of time. If the solenoid valve is commanded OFF, for a certain amount of time, the message "TCC OFF time has been exceeded" appears on the scan tool display.
Transmission Adaptive Values Learn	Transmission adaptive values learn is a procedure for which a series of test are run to allow the transmission control module (TCM) to learn individual clutch characteristics. Once the clutch data is learned, transmission adaptive values learn translates it to the adaptive data cells, which the TCM uses for clutch control during range shifts. Refer to **FastLearn Procedure** .
Preselect All TAP Cells (Transmission Adaptive Pressures)	• Allows the TCM to reset, the TAP cells to the original base value on individual shifts. • There are no limits to using this output control. It may be performed with the engine running or when the ignition is ON, and the engine is OFF.
Line Pressure Control Solenoid Valve	• The TCM commands the Line Pressure Control Solenoid Valve ON and OFF. • When the ignition is ON, and the engine is OFF, there are no limits to this control. The solenoid valve remains ON until commanded OFF, and vice versa. When the output control is exited, the solenoid valve state is determined by the TCM. • When the engine is running, control of the line pressure control solenoid valve is not allowed.

TRANSMISSION CONTROL MODULE SCAN TOOL INFORMATION (8L90)

The Transmission Control Module Scan Tool Data List contains all transmission related parameters that are available on the scan tool. A given parameter may appear in any one of the data lists, and in some cases may appear more than once, or in more than one data list in order to group certain related parameters together.

The values below represent a typical display recorded from a properly functioning system.

Only the parameters listed below are used/referenced in this manual for diagnosis. If a scan tool displays other parameters, those values are not recommended by General Motors for use in diagnosis.

If all values are within the expected value described below, refer to **Symptoms - Automatic Transmission** , . If A DTC is set refer to **Diagnostic Trouble Code (DTC) List - Vehicle** .

The scan tool values from a properly functioning transmission may be used for comparison with the transmission you are diagnosing. The values below represent a typical display recorded from a properly functioning system.

Scan Tool Data Parameters

Parameter	System State	Expected Value	Description
Operating Conditions: Engine at idle with the upper radiator hose hot and in closed loop operation, closed throttle, transmission in park, accessories OFF, brake pedal not applied.			

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Parameter	System State	Expected Value	Description
9V Reference 1 Circuit Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
9V Reference 2 Circuit Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
Calculated Line Pressure	Varies	kPa/PSI	Indicates a calculated line pressure value based on various engine and transmission input data.
Calculated Throttle Position	Varies	%	Indicates a calculated value based on accelerator pedal position and throttle position. Zero percent indicates idle position and 100 percent indicates wide open throttle.
Control Module Voltage	ON	ON/OFF	Indicates the transmission control module has received the control module voltage.
Driver Shift Control Mode	Varies	Inactive/Active	Indicates to the transmission control module the driver has taken control of transmission shifting by placing the gear shift lever in manual mode. Transmission control module will allow manual shifting within limits.
Driver Shift Request	Varies	Inactive/Upshift/ Downshift	Indicates to the transmission control module the driver has request an upshift or downshift.
Engine Coolant Temperature	Varies	Â°C (Â°F)	Indicates to the transmission control module the temperature of the engine coolant temperature, sent from the engine control module.
Engine Speed	Varies	RPM	Indicates the rotational speed of the engine crankshaft in revolutions per minute.
Engine Torque	Varies	N.m	Indicates a calculated value based on various engine input and output data values.
Gear Command	Varies	1-8	Indicates the current gear range the transmission control module has commanded.

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Parameter	System State	Expected Value	Description
Gear Ratio	Varies	**GR10** 1st = 4.696 2nd = 2.985 3rd = 2.156 4th = 1.779 5th = 1.526 6th = 1.278 7th = 1.000 8th = 0.854 9th = 0.689 10th = 0.636 Rev. = 4.911	Indicates a calculated value based on the RPM values of the ISS, Intermediate SS and OSS.
High Side Driver 1 or 2 Circuit High Voltage Test Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
High Side Driver 1 or 2 Circuit Low Voltage Test Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
High Side Driver 1 or 2 Circuit Open Test Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
High Side Driver 1 or 2 Command	Varies	Disabled/Enabled	Indicates the commanded state of the transmission control module high side drivers.
Ignition 1 Signal	ON	ON/OFF	Indicates the transmission control module has received the ignition 1 signal.
Ignition Accessory Signal	ON	ON/OFF	Indicates the transmission control module has received the ignition accessory voltage signal.
Ignition Voltage	Varies	Volts	Indicates the available ignition voltage to the transmission control module.
Internal Mode Switch A	Varies	Voltage	Indicates the voltage value on the hall effect switch A signal circuit to the transmission control module.
Internal Mode Switch A Status	Varies	Valid/Invalid	Indicates the voltage value on the hall effect switch A signal circuit to the transmission control module is valid or invalid.

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Parameter	System State	Expected Value	Description
Internal Mode Switch A/B/C/P/S	Varies	High/Low	Indicates the current state of each IMS hall effect switch when, the gear shift lever is in each gear range position.
Internal Mode Switch B	Varies	Voltage	Indicates the voltage value on the hall effect switch B signal circuit to the transmission control module.
Internal Mode Switch B Status	Varies	Valid/Invalid	Indicates the voltage value on the hall effect switch B signal circuit to the transmission control module is valid or invalid.
Internal Mode Switch C	Varies	Voltage	Indicates the voltage value on the hall effect switch C signal circuit to the transmission control module.
Internal Mode Switch C Status	Varies	Valid/Invalid	Indicates the voltage value on the hall effect switch C signal circuit to the transmission control module is valid or invalid.
Internal Mode Switch (IMS)	Varies	Park, Reverse, Neutral, Drive, Manual Mode	Indicates to the transmission control module the position of the gear shift lever.
Internal Mode Switch P	Varies	Voltage	Indicates the voltage value on the hall effect switch P signal circuit to the transmission control module.
Internal Mode Switch P Status	Varies	Valid/Invalid	Indicates the voltage value on the hall effect switch P signal circuit to the transmission control module is valid or invalid.
Internal Mode Switch S	Varies	Voltage	Indicates the voltage value on the hall effect switch S signal circuit to the transmission control module.
Internal Mode Switch S Status	Varies	Valid/Invalid	Indicates the voltage value on the hall effect switch S signal circuit to the transmission control module is valid or invalid.
ISS/OSS Supply Voltage	Varies	OK	Indicates the ISS/OSS voltage supply is in the specified range of 8.3-9.7 volts.
Power Mode	Varies	OFF/Accessory/Run	Indicates to the transmission control module the present position of the ignition switch.
TCC Slip Speed	Varies	RPM	Indicates the RPM difference between the torque converter impeller and the torque converter

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Parameter	System State	Expected Value	Description
			turbine when the converter clutch is applied.
Transmission Control Solenoid Valve 1-9	Varies	OFF/ON	Indicates if the transmission control module has commanded a transmission control solenoid either ON or OFF.
Transmission Control Solenoid Valve 1-9 Control Circuit High Voltage Test Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
Transmission Control Solenoid Valve 1-9 Control Circuit Low Voltage Test Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
Transmission Control Solenoid Valve 1-9 Control Circuit Open Test Status	Varies	Not Run/OK/Malfunction	Indicates if the transmission control module has run a diagnostic circuit test and/or displays the present electrical condition of the circuit.
Transmission Control Solenoid Valve 1-9 Current	Varies	Amperage	Indicates the commanded amperage flowing through the solenoid at any given time.
Transmission Fluid Temperature	Varies	Â°C (Â°F)	Indicates the temperature of the transmission fluid in the transmission oil pan.
Transmission Hot Mode	NO	No/Yes	Indicates if the transmission control module has commanded hot mode operation.
Transmission Intermediate Speed Sensor	Varies	RPM	Indicates the rotational speed of the transmission carrier/output internal gear assembly in revolutions per minute.
Transmission ISS	Varies	RPM	Indicates the rotational speed of the transmission input shaft in revolutions per minute.
Transmission OSS	Varies	RPM	Indicates the rotational speed of the transmission output shaft in revolutions per minute.
Transmission Range	Varies	Park/Reverse/Neutral/Drive /Manual Mode	Indicates to the transmission control module the current gear position of the internal mode switch.
Up and Downshift Switch 2	Varies	Inactive/Upshift/ Downshift/None	Indicates to the transmission control module the driver has request an upshift or downshift from the second additional set of

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Parameter	System State	Expected Value	Description
			switches, if equipped.

Scan Tool Output Control Functions

Parameter	System State	Expected Value	Description
Configure/Reset Function	-	-	A service fast learn procedure to be perform for any internal component repair/replacement, solenoid/valve body replacement, complete transmission replacement or transmission control module replacement.
High Side Driver 1 Command	Varies	Disabled/Enable	Allows you to command the high side driver 1 ON or OFF.
High Side Driver 2 Command	Varies	Disabled/Enable	Allows you to command the high side driver 2 ON or OFF.
Shift Transmission Gear	Varies	1-8	Allows you to upshift the transmission from 1st gear to 8th gear and downshift from 8th to 1st gear. Be aware the transmission control module has limits to the gear selection, protect the engine and transmission.
Transmission Control Solenoid Valve 1-7	Varies	0-1.2 Amps	Allow you to command the transmission solenoids 1-7 electrical current from 0-1.2 amps.
Transmission Control Solenoid Valve 8 and 9	Varies	OFF/ON	Allows you to command solenoid valve 8 and 9 OFF or ON.

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SPECIFICATIONS

K20 ENGINE CONTROL MODULE: SCAN TOOL INFORMATION (L5P)

Engine Control Module Scan Tool Data

Parameter	System State	Expected Value	Description
This is a comprehensive list. Not all parameters listed are available for all applications. **Base Operating Conditions:** Engine Idling/Radiator Hose Hot/Park or Neutral/Closed Loop/Accessories OFF			
5-V Reference 1-5 Circuit Status	-	OK	This parameter will display OK if the circuit is good or Malfunction if a short to ground, short to B+ or open circuit is present.
A/C Compressor Clutch Relay Command	A/C On	On	This parameter displays the commanded state of the air conditioning (A/C) compressor output.
A/C Compressor Clutch Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the air conditioning (A/C) clutch relay control circuit. It can display OK, Malfunction or Not Run. The parameter displays Malfunction if the A/C clutch relay control circuit is shorted to voltage.
A/C Compressor Clutch Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the air conditioning (A/C) clutch relay control circuit. It can display OK, Malfunction or Not Run. The parameter displays Malfunction if the A/C clutch relay control circuit is shorted to ground.
A/C Compressor Clutch Relay Control Circuit Open Test Status	-	OK	This parameter displays the state of the air conditioning (A/C) clutch relay control circuit. It can display OK, Malfunction or Not Run. The parameter displays Malfunction if the A/C clutch relay control circuit is opened.
A/C Disable - A/C Pressure Out of Range	A/C ON	No	This parameter indicates if the A/C compressor was disengaged due to pressure out of range.

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Parameter	System State	Expected Value	Description
A/C Disengage History 1-8	-	Varies	This parameter indicates the last 8 A/C disengage history reasons. These events might include: • Refrigerant Pressure Too High • Engine Speed • Battery Voltage Out of Range • Engine Stall Prevention • Engine Speed Unstable • Wide Open Throttle • Vehicle Launch Acceleration • Engine Coolant Temperature Too High • Driver Motor Control Module Coolant • Temperature Too High • Transmission Fluid Temperature Too High • Maximum Accelerator Pedal Position • Air Bag Deployed • Hybrid Battery Pack State of Charge Too Low • Air Conditioning Relay Malfunction
A/C High Side Pressure Sensor	A/C OFF	1.43 Volts	The scan tool displays 0-5 volts. The voltage applied to the ECM input for the A/C refrigerant pressure sensor.
	A/C ON	2.39 Volts	
A/C High Side Pressure Sensor	A/C OFF	500-2,220 kPa (72-310 psi)	The scan tool displays 0-3450 kPa (0-500 psi). The voltage applied to the ECM input from the A/C refrigerant pressure sensor is converted to a pressure value.
	A/C ON	300-1,220 kPa (43-170 psi)	
A/C OFF for WOT	A/C ON/WOT	No	The scan tool displays Yes/No. The state of the A/C request related to wide open throttle.
	A/C ON/Not WOT	Yes	
A/C Request Signal	A/C ON	Yes	The scan tool displays Yes/No.

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Parameter	System State	Expected Value	Description
	A/C OFF	No	The HVAC module receives an input request when the HVAC module is turned On.
Accelerator Pedal Position	Accelerator pedal not actuated	0%	This parameter displays the angle of the accelerator pedal as calculated by the control module using the signals from the accelerator pedal position sensors. The accelerator pedal position (APP) indicated angle is a range of values indicating a low percentage when the accelerator pedal is not depressed to a high percentage when the accelerator pedal is fully depressed.
	Accelerator pedal fully actuated	100%	
Ambient Air Temperature	-	Varies	Outside temperature at any given altitude expressed in degrees
Ambient Humidity	-	Varies	Outside humidity at any given altitude expressed in a percentage.
APP Sensor 1	Accelerator pedal not actuated	0.7-1.2 Volts	This parameter displays the voltage signal sent to the control module from APP sensor 1 of the APP sensor assembly. APP sensor 1 is a range of values indicating a low voltage when the accelerator pedal is not depressed to a high voltage when the accelerator pedal is fully depressed.
	Accelerator pedal fully actuated	4.2-4.5 Volts	
APP Sensor 1 and 2	-	Agree	This parameter displays Disagree if the control module detects the signal voltage from APP sensor 1 is not in correct relationship to APP sensor 2. The scan tool displays Agree under the normal operating conditions.
APP Sensor 1 Circuit Status	-	OK	APP Sensor 1 Out of Range indicates that the sensed accelerator pedal position 1 sensor value is currently out of range or that a Malfunction has been detected based upon the sensed accelerator pedal position 1 sensor value being out of range
APP Sensor 1 Learned Released Position	-	Volts	This Parameter indicates the accelerator pedal sensor 1 signal at its minimum learned position (pedal released) as a percentage of its reference voltage. (The minimum learned position is

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Parameter	System State	Expected Value	Description
			automatically updated periodically as determined by the engine control module (ECM).
APP Sensor 1 Position	Accelerator pedal not actuated	0.0%	This parameter displays the angle of the APP sensor 1 as calculated by the control module using the signal from the APP sensor 1. APP sensor 1 is a range of values indicating a low percentage when the accelerator pedal is not depressed to a high percentage when the accelerator pedal is fully depressed.
	Accelerator pedal fully actuated	100%	
APP Sensor 2	Accelerator pedal at rest position	0.3-0.5 Volts	This parameter displays the voltage signal sent to the control module from APP sensor 2 of the APP sensor assembly. APP sensor 2 is a range of values indicating a low voltage when the accelerator pedal is not depressed to a high voltage when the accelerator pedal is fully depressed.
	Accelerator pedal at WOT	2.0-2.5 Volts	
APP Sensor 2 Circuit Status	-	OK	APP Sensor 2 Out of Range indicates that the sensed accelerator pedal position 2 sensor value is currently out of range or that a malfunction has been detected based upon the sensed accelerator pedal position 2 sensor value being out of range
APP Sensor 2 Learned Released Position	-	Volts	This Parameter indicates the accelerator pedal sensor 2 signal at its minimum learned position (pedal released) as a percentage of its reference voltage. (The minimum learned position is automatically updated periodically as determined by the engine control module (ECM).
APP Sensor 2 Position	Accelerator pedal at rest position	0.0%	This parameter displays the angle of the APP sensor 2 as calculated by the control module using the signal from the APP sensor 2. APP sensor 2 is a range of values indicating a low percentage when the accelerator pedal is not depressed to a high percentage when the accelerator pedal is fully depressed.
	Accelerator pedal at WOT	100%	

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Parameter	System State	Expected Value	Description
APP Sensors	-	%	This Parameter contains the accelerator pedal position resulting directly from the settling of differences of the accelerator pedal position sensors (prior to any compensation to determine driver intent).
Average Reductant Consumption	-	g/km	This parameter displays the average reductant consumption in gallons per kilometer.
BARO Sensor 1-2	-	Varies with altitude	This parameter displays the barometric pressure in kPa.
BARO Sensor 1-2	-	Varies with altitude	This parameter displays the barometric pressure in volts.
Base Injector Fuel Rate	-	Varies	This parameter displays the base calculated rate fuel delivered. The rate is calculated in cubic millimeters.
Boost System Monitor Complete	-	Yes	The scan tool displays Yes when the Boost System Monitor is Complete. If the scan tool displays No this could indicate a malfunction in the Boost System Monitor circuit.
Boost System Monitor Complete This Ignition Cycle	-	Yes/No	The scan tool displays Yes when the Boost System Monitor Complete This Ignition Cycle is completed.
Boost System Monitor Enabled	-	Yes	The scan tool displays Yes when the Boost System Monitor is Enabled. If the scan tool displays No this could indicate a malfunction in the Boost System Monitor circuit.
Boost System Monitor Enabled This Ignition Cycle	-	Yes/No	The scan tool displays Yes when the Boost System Monitor is Enabled during an ignition cycle.
Brake Pedal Position Circuit Signal	Released	Applied/Released	This parameter displays the status of the brake pedal position circuit.
Brake Pedal Position Sensor	-	Volts	This parameter displays the brake pedal position sensor in volts.
Brake Pedal Position Sensor	-	%	This parameter displays the brake pedal position sensor in percentage applied.
Brake Pedal Position Sensor Learned Released Position	-	Volts	This parameter displays the brake pedal learned released position in volts.

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Parameter	System State	Expected Value	Description
Brake Pedal Position Sensor Signal	Released	Applied / Released	This parameter displays the status of the brake pedal as determined by the ECM.
Calculated Catalyst Temperature	-	Â°C (Â°F)	The parameter displays the calculated catalyst temperature in both Celsius and Fahrenheit.
Calculated DPF Flow	-	kPa/(liter/s)	This parameter displays the filtered flow resistance of the DPF.
Calculated Soot Mass Causing DPF Pressure Differential	-	g	This parameter displays the calculated soot mass causing a DPF pressure differential.
Calibration History Buffer	-	Locked/Unlocked	This parameter displays when the calibration buffer has been locked against further updates due to detection of a non-production calibration.
Calibration Verification Number History 1 - 10	-	#	This parameter displays the history of calibration verification from 1-10.
Camshaft Position Active Counter	-	Counts	This parameter displays an incrementing counter when the control module receives a signal from the camshaft position sensor.
Catalyst Monitor Complete	-	Yes	This parameter indicates the status of the Catalyst. The scan tool displays Yes when the diagnostic is complete. And No if the diagnostic has Not ran or a malfunction is detected in the Catalyst.
Catalyst Monitor Complete This Ignition Cycle	-	Yes/No	This parameter indicates the status of the catalyst monitor diagnostic. Catalyst Monitor Test Running indicates Yes or No when the catalyst monitor diagnostic is actively running a test
Catalyst Monitor Enabled	-	Yes/No	The scan tool displays Yes when the Catalyst Monitor is Enabled. If the scan tool displays No this could indicate a malfunction in the Catalyst Monitor circuit.
Catalyst Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter indicates the status of the catalyst monitor diagnostic. Catalyst Monitor Test Running indicates Yes or No when the catalyst monitor diagnostic is actively running a test

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Parameter	System State	Expected Value	Description
Change Engine Oil Indicator Command	-	Off	Engine Oil Change Indication On indicates that the change engine oil indication is being requested On in order to inform the driver that the engine oil needs to be changed.
Charge Air Cooler Temperature	-	Varies	This parameter displays the charge air cooler temperature measured by a sensor located first in the charge air cooler stream.
Component Monitor Complete	-	Yes/No	This parameter displays Yes when the Component Monitor is Complete. The engine control module looks at many input and output components to make this determination. If a malfunction is detected the scan tool will display No.
Component Monitor Enabled	-	Yes/No	This parameter displays Yes when Component Monitor is Enabled. And No when it is not Enabled.
Compression Test	-	Not Running	This parameter displays the status of the engine compression test.
Control Module Voltage Signal	-	B+	This parameter displays the voltage of the power input to the engine control module. Since battery voltage is not directly measured by engine control module, switched battery voltage from the Run/Crank input to the engine control module is displayed.
Cooling Fan Command	-	%	This parameter displays the cooling fan duty cycle.
Cooling Fan Control Circuit 1-2 High Voltage Test Status	-	OK	This parameter displays the state of the cooling fan control circuit. The parameter displays Malfunction if the cooling fan control circuit is shorted to voltage.
Cooling Fan Control Circuit 1-2 Low Voltage Test Status	-	OK	This parameter displays the state of the cooling fan control circuit. The parameter displays Malfunction if the cooling fan control circuit is shorted to ground.
Cooling Fan Control Circuit 1-2 Open Test Status	-	OK	This parameter displays the state of the cooling fan control circuit.

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Parameter	System State	Expected Value	Description
			The parameter displays Malfunction if the cooling fan control circuit is opened.
Cooling Motor Fan Command	-	%	This parameter displays the cooling fan duty cycle.
Crank Request Signal	-	Yes	This parameter displays the state of the crank request input to the control module from the ignition switch. The scan tool will display Yes when the ignition switch is in the Crank position. The scan tool will display No when the ignition switch is in any other position.
Crankshaft Position Active Counter	-	Counts	This parameter displays an incrementing counter when the control module receives a signal from the crankshaft position sensor (CKP).
Crankshaft Position Variation Learn Status Engine Speed Range 1	-	Not Learned	This parameter displays the progress for the crank wheel adaption learning at 900-1450 rpm.
Crankshaft Position Variation Learn Status Engine Speed Range 2	-	Not Learned	This parameter displays the progress for the crank wheel adaption learning at 1451-1900 rpm.
Cruise Control	-	Inactive	This parameter displays the status of the cruise control system as determined by the control module. The scan tool will display Active when the cruise control system is in control of vehicle speed. The scan tool will display Inactive when the cruise control system is not operating.
Cruise Control	-	Disabled	This parameter displays the status of the cruise control system as determined by the control module. The scan tool will display Enabled when the cruise control system is in control of vehicle speed. The scan tool will display Disabled when the cruise control system is not operating.
Cruise Control Cancel Switch	-	Inactive	This parameter displays the status of the cruise control cancel switch
Cruise Control Inhibit Reason	-	None	The parameter displays the reason the cruise control system cannot

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Parameter	System State	Expected Value	Description
			engage.
Cruise Control On/Off Switch	-	Off	This parameter displays the state of the On/Off switch input to the control module . The scan tool will display On when the cruise On/Off switch is ON. The scan tool will display Off when the cruise ON/OFF switch is OFF.
Cruise Control Resume/Acceleration Switch	-	Inactive	This parameter displays the state of the Resume/Accel switch input to the control module When the cruise control switch is in the On position and the Resume/Accel switch is activated, the scan tool displays On. When the Resume/Accel switch is released the scan tool displays Off.
Cruise Control Set/Coast Switch	-	Inactive	This parameter displays the state of the Set/Coast switch input to the control module from the cruise control system. When the cruise control switch is in the on position and the Set/Coast switch is activated, the scan tool displays Active. When the Set/Coast switch is released the scan tool displays Inactive.
Cruise Control Disengage 1-8 History	Cruise ON	Reason for Cruise Disengagement	These parameters indicate the last 8 reasons the ECM disengaged the cruise control. Reason 1 contains the most recent reason. The reasons may include the following: Brake Pedal Initialize, Cancel, Clutch, Coast Disengage, Coast Speed Low, TAC Inhibit, Accel Rate, Decel Rate, High Speed, Illegal Mode, Low Speed, None, Cruise Sw OFF, Over Set Speed, S/C On Speed Hi, ECM Inhibit, Simul S/C-R/A, TCS, Under Set Speed, DLC Override, Memory DTC, Eng Run Time, Engine Speed, DTC Set, RPM Limit, First Gear, APP Override, Low Voltage, D Whl Spd Low, D Whl Spd Hi, Cruise S/S, Cruise Sw Data, ECT Overtemp, VSES, Trans. DTC, BPP Data, BPP DTC, Park Brake, ACC Inhibit,

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Parameter	System State	Expected Value	Description
			ACC Brake DTC, ACC Option, ACC Brake Inop, PTO Active.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Balancing Rate	-	Varies	These parameters display the adjustment in fuel volume for each cylinder as calculated by the control module. The scan tool will display a negative balancing rate if the fuel volume is lowered. The scan tool will display a positive balancing rate if the fuel volume is increased.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Compression Test Time After TDC	-	Varies	This parameter displays the captured time it takes for the crankshaft to travel from Top Dead Center (TDC) to a calculated distance in degrees. The ECM stores the value from the latest performed engine compression test. A longer travel time indicates a bad cylinder.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Compression Test Time Before TDC	-	Varies	This parameter displays the captured time it takes for the crankshaft to travel a calculated distance in degrees before it reaches Top Dead Center (TDC). The ECM stores the value from the latest performed engine compression test. A shorter travel time indicates a bad cylinder.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Current Misfire Counter	-	Counts	This parameter displays the number of misfires detected for cylinder's 1-8 within the current 100 engine cycle test interval. The set of misfire counters for the individual cylinders are maintained such that if a single misfire is detected over an engine cycle.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 History Misfire Counter	-	Count	This parameter displays the number of misfires detected for cylinder's 1-8 since a misfire failure has been reported.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Injection Timing	-	Â°	This parameter displays the start point of the main injection in degrees crank shaft (Â°CS) relative to Top Dead Center (TDC) of cylinder's 1-8.

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Parameter	System State	Expected Value	Description
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Injector Command	-	ms	This parameter displays the total injection time of cylinder's 1-8. Total injection time includes all pilot injections, main injections and post injections.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Injector Control Circuit Status	-	OK	This parameter displays the status of the fuel injector's 1-8 output malfunction for Short circuit from injector high side to ground or system voltage, Short circuit from injector low side to injector low side, Short circuit from injector low side to ground or system voltage, Short circuit from injector high side to low side and Injector open circuit.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Injector Flow Identifier	-	Varies	This parameter is used to correct the injected quantity of each injector When injectors are replaced or exchanged, the Injector Quantity adjustment values of the replaced or exchanged injectors have to be entered into the ECM to ensure acceptable engine performance regarding emissions
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Pilot Injection Command	-	On/Off	This parameter displays the pilot injection status information for the injectors.
Cylinder 1, 2, 3, 4, 5, 6, 7 or 8 Post Injection Command	-	ms	This parameter displays the 2nd fuel injection time for Cylinder's 1-8.
Deceleration Fuel Cut-Off	-	Inactive	Decel Fuel Cut Off Active indicates that the conditions to enable deceleration fuel cut-off (DFCO) are active and that torque is being reduced by turning off one or more fuel injectors
Desired Boost Pressure	-	Varies	This parameter displays the Turbocharger Boost pressure as commanded by the control module. This parameter shows the turbocharger boost pressure in kPa.
Desired Cooling Fan Speed	-	RPM	This parameter displays the desired fan speed for engine driven fan systems.

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Parameter	System State	Expected Value	Description
Desired EGR Position	-	%	This parameter displays the position of the exhaust gas recirculation (EGR) valve commanded by the control module. The scan tool will display 0 percent when the control module is commanding the EGR valve closed. The scan tool will display a higher percentage when the EGR valve is commanded open.
Desired Fuel Pressure Regulator 1 Current	-	mA	This parameter displays the desired current for the fuel pressure control metering unit
Desired Fuel Rail Pressure	-	MPa/PSI	This parameter displays the desired fuel rail pressure as calculated by the control module. This value is calculated based on engine speed, engine load, and sensor inputs. The scan tool will display a higher value at higher engine speeds and loads, and a lower value at idle.
Desired Idle Speed	-	600-825 RPM	This parameter displays the engine idle speed in RPM as commanded by the control module. The control module compensates for various engine loads in order to maintain the desired engine speed at idle. This parameter is not valid unless the engine is running.
Desired Intake Air Flow Valve Position	-	%	This parameter will display the position of the intake air flow valve as a percentage.
Desired Turbocharger Vane Position	-	Varies	This parameter displays the position of the turbocharger vane position sensor as the turbocharger vane position is commanded by the control module. The scan tool will display 0 percent when the control module is commanding the vanes open. The scan tool will display a higher percentage when the vanes are commanded closed.
Distance Since DTC Cleared	-	km/miles	This parameter displays the distance accumulated since an emission diagnostic trouble code

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Parameter	System State	Expected Value	Description
			was cleared. The scan tool will display increasing distance as the vehicle is driven.
Distance Since First Malfunction	-	km/miles	This parameter displays the distance accumulated since first malfunction was captured. This parameter is only meaningful within the context of a failure record or freeze frame.
Distance Since Last DPF Regeneration	-	Varies	This parameter will display the amount of vehicle travel after a DPF regeneration. This parameter will be displayed in km/miles.
Distance Since Last Malfunction	-	km/miles	This parameter displays the distance accumulated since last malfunction was captured. This parameter is only meaningful within the context of a failure record or freeze frame.
Distance This Driving Cycle	-	km/miles	This parameter displays the distance a vehicle has traveled in the current driving cycle.
Distance Traveled	-	km/miles	This parameter displays the distance driven since the last electrically erasable programmable read only memory (EEPROM) initialization.
DPF Differential Pressure	-	kPa	This parameter displays the pressure difference between the first and second DPF pressure sensors.
DPF Differential Pressure (Corrected)	-	kPa	This parameter displays the adapted value of the DPF differential pressure sensor.
DPF Differential Pressure Sensor	-	Volts	This parameter will display the voltage differential between the front and rear pressures at the DPF as calculated by the ECM. This will be displayed in volts. As the DPF becomes restricted the differential pressure increases and the voltage will get higher.
DPF Indicator Command	-	Off	This parameter will display the status of the IPC mounted DPF status light. This parameter will display On/Off.

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Parameter	System State	Expected Value	Description
DPF Monitor Complete	-	Yes	This parameter displays the status of the DPF monitor, the parameter displays Yes when the monitor is complete.
DPF Monitor Complete This Ignition Cycle	-	Yes	This parameter displays Yes if completion status during the current driving / monitoring cycle of the DPF Monitor is complete.
DPF Monitor Enabled	-	Yes	This parameter displays Yes if the enabling conditions are complete.
DPF Monitor Enabled This Ignition Cycle	-	Yes	This parameter displays Yes if the enabled status during the current driving / monitoring cycle of the DPF Monitor is complete.
DPF Pressure Differential Due to Soot	-	kPa	This parameter will display the difference between the front and rear pressures at the DPF as calculated by the ECM due to soot.
DPF Regeneration Inhibit Reason	-	None	This parameter displays the regeneration interruption reason for normal regeneration.
DPF Regeneration Reason	-	None	This parameter displays the regeneration demand and completion status.
DPF Regeneration Status	-	Inactive/Active	This parameter displays the status of the Diesel Particulate regeneration activity.
DPF Regenerations Completed	-	Counts	This parameter displays the number of successful regenerations.
DPF Soot Accumulation	-	g	This parameter displays the mass of soot in the Diesel Particle Filter measured in grams
DPF Soot Mass Correction	-	g	This parameter contains the total correction to the soot mass caused by CRT (Continuous Regeneration Trap) effect.
Drag control Status	-	Active/Inactive	EDC Active (Drag Active) control mode is indicated when the requested torque signal is above the driver requested value while the traction control system signal input is active.
Driver Demanded Engine Torque	-	%	This parameter displays the requested torque output of the engine by the driver.

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Parameter	System State	Expected Value	Description
Drop Throttle Detected while Traction Control Active	-	No	Drop Throttle Control Mode is indicated when this parameter displays Yes.
Drop Throttle Status	-	Inactive	This parameter provides an indication when the controller software determines a condition is present where the vehicle operator has abruptly released the accelerator pedal (drop-throttle) after a period of acceleration.
ECM Authentication Status	-	Valid	Authentication Status indicates the result of the comparison between the last received immobilizer response and the expected response calculated by the engine control module (ECM).
ECM Challenge Status	-	Valid	This parameter displays the condition of the ECM code challenge to the BCM.
ECM Requested Particulate Matter Mass Concentration Measurement	-	No	This parameter indicates the ECM has requested a measurement of particulate matter mass from the particulate matter sensor.
ECM Requested Particulate Matter Sensor Initialization	-	No	This parameter displays Yes when the particulate matter sensor is initialized by the ECM.
ECM Response Source	-	Normal Start	This parameter displays ECM response source.
ECT Sensor	-	85-105Â°C/185-220Â°F	This parameter displays the temperature of the engine coolant based on the input from the engine coolant temperature (ECT) sensor. When the coolant temperature is low, the scan tool will display a low temperature. When the coolant temperature is high, the scan tool will display a high temperature.
EGR/Camshaft Position Monitor Complete	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor. The parameter will display Yes when the EGR/Camshaft Position Monitor is complete.
EGR/Camshaft Position Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor for this Ignition Cycle. The parameter will display Yes

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Parameter	System State	Expected Value	Description
			when the EGR/Camshaft Position Monitor is complete this Ignition Cycle.
EGR/Camshaft Position Monitor Enabled	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor. The parameter will display Yes when the EGR/Camshaft Position Monitor is Enabled.
EGR/Camshaft Position Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor for this Ignition Cycle. The parameter will display Yes when the EGR/Camshaft Position Monitor is Enabled this Ignition Cycle.
EGR Command	-	%	This parameter displays the commanded duty cycle for the exhaust gas recirculation (EGR) output.
EGR Control Circuit 1 High Voltage Status	-	OK	This parameter displays the state of the EGR Control circuit 1. The parameter displays Malfunction if the EGR Control circuit 1 is shorted to voltage.
EGR Control Circuit 1 Low Voltage Status	-	OK	This parameter displays the state of the EGR Control circuit 1. The parameter displays Malfunction if the EGR Control circuit 1 is shorted to ground.
EGR Control Circuit 2 High Voltage Status	-	OK	This parameter displays the state of the EGR Control circuit 2. The parameter displays Malfunction if the EGR Control circuit 2 is shorted to voltage.
EGR Control Circuit 2 Low Voltage Status	-	OK	This parameter displays the state of the EGR Control circuit 2. The parameter displays Malfunction if the EGR Control circuit 2 is shorted to ground.
EGR Control Circuit Open Test Status	-	OK	This parameter displays the state of the EGR Control circuit. The parameter displays Malfunction if the EGR Control circuit is open.
EGR Control Circuit Shorted Test Status	-	OK	This parameter displays the state of the EGR Control circuit. The parameter displays Malfunction if the EGR Control circuit is

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Parameter	System State	Expected Value	Description
			shorted.
EGR Control Driver Overcurrent	-	No	This parameter displays the state of the EGR Control circuit. The parameter displays Yes if the EGR Control Driver Overcurrent is detected.
EGR Control Driver Overtemperature	-	No	This parameter displays the state of the EGR Control circuit. The parameter displays Yes if Over Temperature is Detected and that the driver circuit has been shut OFF.
EGR Control Driver Temperature Dependent Overcurrent	-	No	This parameter displays the state of the EGR Control circuit. The parameter displays Yes if Temperature Dependent over Current Detected and that the driver circuit has been shut OFF.
EGR Control Driver Undervoltage	-	No	This parameter displays the state of the EGR Control circuit. The parameter displays Yes when the Under Voltage Detected indicates that the entire system voltage is low.
EGR Cooler Bypass Valve Command	-	%	This parameter displays the commanded duty cycle for the Exhaust Gas Recirculation Cooler Bypass Valve actuator output.
EGR Cooler Bypass Valve Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the EGR Cooler Bypass Valve Control circuit. The parameter displays Malfunction if the EGR Cooler Bypass Valve Control circuit is shorted to voltage.
EGR Cooler Bypass Valve Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the EGR Cooler Bypass Valve Control circuit. The parameter displays Malfunction if the EGR Cooler Bypass Valve Control circuit is shorted to ground.
EGR Cooler Bypass Valve Control Circuit Open Test Status	-	OK	This parameter displays the state of the EGR Cooler Bypass Valve Control circuit. The parameter displays Malfunction if the EGR Cooler Bypass Valve Control circuit is open.
EGR Cooler Bypass Valve Control Driver Overcurrent	-	No	This parameter displays the state of the EGR Cooler Bypass Valve

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Parameter	System State	Expected Value	Description
			Control circuit. The parameter displays Yes if the EGR Cooler Bypass Valve Control Driver Overcurrent is detected.
EGR Cooler Bypass Valve Control Driver Overtemperature	-	No	This parameter displays the state of the EGR Cooler Bypass Valve Control circuit. The parameter displays Yes if Over Temperature is Detected and that the driver circuit has been shut OFF.
EGR Cooler Bypass Valve Control Driver Temperature Dependant Overcurrent	-	No	This parameter displays the state of the EGR Cooler Bypass Valve Control circuit. The parameter displays Yes if Temperature Dependent over Current Detected and that the driver circuit has been shut OFF.
EGR Cooler Bypass Valve Control Driver Undervoltage	-	No	This parameter displays the state of the EGR Cooler Bypass Valve Control circuit. The parameter displays Yes when the Under Voltage Detected indicates that the entire system voltage is low.
EGR Cooler Temperature Sensor 1	-	Â°C (Â°F)	This parameter will display the exhaust temperature entering the EGR Cooler. The EGR Temp Sensor 1 temperature will be warmer than the EGR Temp Sensor 2.
EGR Cooler Temperature Sensor 2	-	Â°C (Â°F)	This parameter will display the exhaust temperature exiting the EGR Cooler. The EGR Temp Sensor 2 temperature will be cooler than the EGR Temp Sensor 1.
EGR Learned Minimum Position	-	Volts	This parameter displays the learned minimum position of the EGR valve as calculated by the control module. The scan tool will display a low value if the current closed EGR position is the same as the last ignition cycle. The scan tool will display a higher value if the EGR valve has closed at a new position.
EGR Learned Minimum Position This Ignition Cycle	-	%	This parameter displays the Exhaust Gas Recirculation Sensor Learned Minimum Position.

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Parameter	System State	Expected Value	Description
EGR Position Sensor	-	%	This parameter displays the EGR valve position as calculated by the control module based on an input from the EGR valve position sensor. The scan tool will display a lower value when the EGR valve is closed, and a higher value when the EGR valve is open.
EGR Position Sensor	-	1.75 Volts	This parameter displays the voltage signal received from the EGR valve position sensor by the control module. The scan tool will display a lower value when the EGR valve is closed, and a higher value when the EGR valve is open.
EGR Position Variance	-	%	This parameter displays the EGR position variance from the last learned position.
EGR System Malfunction Warning Indicator Command	-	Off	This parameter indicates when the EGR system malfunction warming indicator is commanded ON.
Electric Power management Inhibit reason	-	None	This parameter displays the reason of the Regulated Voltage Control (RVC) override command. RVC lowers system operating voltage to reduce system electrical load and improve fuel economy performance.
Engine Calibration Monitoring	-	Not Present	This parameter displays Present when Incorrect Engine Calibration Detected.
Engine Calibration Part Number History 1-10	-	#	This parameter displays the part number of the 10 most recent calibrations.
Engine Calibration Part Number History 1-10 Counter	-	Counts	This parameter displays the current count of engine calibrations.
Engine Controls Ignition Relay Command	-	On	This parameter displays the state of the control circuit for engine control module power relay as commanded by the engine control module.
Engine Controls Ignition Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Engine Controls Ignition Relay control circuit. The

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Parameter	System State	Expected Value	Description
			parameter displays Malfunction if the Engine Controls Ignition Relay control circuit is shorted to voltage.
Engine Controls Ignition Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Engine Controls Ignition Relay control circuit. The parameter displays Malfunction if the Engine Controls Ignition Relay control circuit is shorted to ground.
Engine Controls Ignition Relay Control Circuit Open Test Status	-	OK	This parameter displays the state of the Engine Controls Ignition Relay control circuit. The parameter displays Malfunction if the Engine Controls Ignition Relay control circuit is open.
Engine Controls Ignition Relay Feedback Signal	-	12.0-14.9 V	This parameter displays the voltage available at the Engine Controls Ignition Relay pin of the engine control module.
Engine Load	-	Varies	This parameter displays the engine load in percent based on inputs to the control module from various engine sensors. The scan tool will display a low percentage when the engine is at idle with little or no load. The scan tool will display a high percentage when the engine is running at a high RPM under a heavy load.
Engine Off Time	-	0:00:00 Seconds - Varies	This parameter displays the amount of time that has elapsed since the engine was last cycled OFF.
Engine Oil Absolute Pressure Sensor	-	kPa/PSI	This parameter displays the absolute pressure of the engine oil in kPa and psi.
Engine Oil Level Switch	-	OK/Low	This parameter displays the status of the engine oil level switch as determined by the control module. The control module uses this information to turn on the low engine oil lamp if the engine oil level remains approximately 1 quart low for a sufficient amount of time. The scan tool will display Low when the engine oil level is low. The scan tool will display

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Parameter	System State	Expected Value	Description
			OK when the engine oil level is correct.
Engine Oil Life Remaining	-	Varies	This parameter displays the amount engine oil life remaining before requiring an oil change based on calculations by the control module. The scan tool will display lower values as the engine oil life approaches 0 miles.
Engine Oil Pressure	-	kPa/PSI	This parameter displays the pressure of the engine oil as calculated by the control module using a signal from the engine oil pressure (EOP) sensor. The scan tool will display oil pressure when the engine is running. The engine oil pressure sensor has a range of values indicating a low value when the oil pressure is low to a high value when the oil pressure is high.
Engine Oil Pressure Control Solenoid Valve Command	-	High Pressure/Low Pressure	This parameter displays the current command of the oil pressure solenoid valve.
Engine Oil Pressure Control Solenoid Valve Control Circuit High Voltage Test Status	-	OK	This parameter displays the status of the output driver for the engine oil pressure control solenoid circuit. The parameter displays Malfunction if the engine oil pressure control solenoid circuit is shorted to voltage.
Engine Oil Pressure Control Solenoid Valve Control Circuit Low Voltage Test Status	-	OK	This parameter displays the status of the output driver for the engine oil pressure control solenoid circuit. The parameter displays Malfunction if the engine oil pressure control solenoid circuit is shorted to ground.
Engine Oil Pressure Control Solenoid Valve Control Circuit Open Voltage Test Status	-	OK	This parameter displays the status of the output driver for the engine oil pressure control solenoid circuit. The parameter displays Malfunction if the engine oil pressure control solenoid circuit is open.
Engine Oil Pressure Sensor	-	Volts	This parameter displays the actual engine oil pressure measured by a sensor in volts.

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Parameter	System State	Expected Value	Description
Engine Oil Pressure Switch	-	OK	This parameter displays the state of the EOP as determined by the control module. The control module monitors the engine oil pressure (EOP) switch to determine if the EOP is sufficient. The scan tool will display low when the EOP is below a predetermined value.
Engine Run Time	-	Varies	This parameter displays the time elapsed since the engine was started. The scan tool will display the time in hours, minutes and seconds. The engine run time will reset to zero when the engine stops running.
Engine Run Time Since Last DPF Regeneration	-	Varies	This parameter displays the total of time since the last regeneration. This parameter will be displayed in hours, minutes and seconds.
Engine Serial Number	-	#	This parameter displays the current engine serial number.
Engine Speed	-	600-800 RPM	This parameter displays the speed of the crankshaft as determined by the ECM using an input from the CKP sensor. The scan tool will display a high value at high engine speeds and a low value at low engine speeds.
Engine Torque	-	Varies	This parameter displays the estimated amount of torque that is delivered from the engine. The scan tool displays engine torque in Y (lb-ft). The ECM sends the engine torque information to the TCM via the high speed GMLAN serial data line.
Exhaust Aftertreatment Fuel Injection System	-	Inactive	This parameter displays the state of the Exhaust Aftertreatment Fuel Injection System command.
Exhaust Aftertreatment Fuel Injector Command	-	%	This parameter displays the state of the Exhaust Aftertreatment Fuel Injection System command in percentage.
Exhaust Aftertreatment Fuel Injector Control Circuit Command	-	Off	This parameter displays the state of the Exhaust Aftertreatment Fuel Injection Control Circuit command.

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Parameter	System State	Expected Value	Description
Exhaust Aftertreatment Fuel Injector Control Circuit High Voltage Test Status	-	OK	This parameter displays the status of the exhaust aftertreatment fuel injector control circuit. The parameter displays Malfunction if the exhaust aftertreatment fuel injector circuit is shorted to voltage.
Exhaust Aftertreatment Fuel Injector Control Circuit Low Voltage Test Status	-	OK	This parameter displays the status of the exhaust aftertreatment fuel injector control circuit. The parameter displays Malfunction if the exhaust aftertreatment fuel injector control circuit is shorted to ground.
Exhaust Aftertreatment Fuel Injector Control Circuit Open Test Status	-	OK	This parameter displays the status of the exhaust aftertreatment fuel injector control circuit. The parameter displays Malfunction if the exhaust aftertreatment fuel injector control circuit is open.
Exhaust Aftertreatment Fuel Injector Control Circuit Shorted Test Status	-	OK	This parameter displays the status of the exhaust aftertreatment fuel injector control circuit. The parameter displays Malfunction if the exhaust aftertreatment fuel injector control circuit is shorted.
Exhaust Aftertreatment Fuel Injector Control Driver Overtemperature	-	No	This parameter displays if the Exhaust Aftertreatment Fuel Injector Control Driver (low side) has reached an overtemperature condition.
Exhaust Aftertreatment Fuel Injector High Control Circuit High Voltage Test Status	-	OK	This parameter displays the status of the exhaust aftertreatment fuel injector high control circuit. The parameter displays Malfunction if the exhaust aftertreatment fuel injector high control circuit is shorted to voltage.
Exhaust Aftertreatment Fuel Injector High Control Circuit Low Voltage Test Status	-	OK	This parameter displays the status of the exhaust aftertreatment fuel injector high control circuit. The parameter displays Malfunction if the exhaust aftertreatment fuel injector high control circuit is shorted to ground.
Exhaust Aftertreatment Fuel Injector High Control Driver Overtemperature	-	No	This parameter displays if the Exhaust Aftertreatment Fuel Injector High Control Driver (high side) has reached an

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Parameter	System State	Expected Value	Description
			overtemperature condition.
Exhaust Aftertreatment Monitor Complete	-	No	This parameter displays the state of Exhaust Aftertreatment Monitor. The parameter displays Yes when the Exhaust Aftertreatment Monitor is complete.
Exhaust Aftertreatment Monitor Complete This Ignition Cycle	-	No	This parameter displays the state of Exhaust Aftertreatment Monitor Complete This Ignition Cycle. The parameter displays Yes when the Exhaust Aftertreatment Monitor is Complete This Ignition Cycle.
Exhaust Aftertreatment Monitor Enabled	-	No	This parameter displays the status of the Exhaust Aftertreatment Monitor. The parameter will display Yes when the Exhaust Aftertreatment Monitor is Enabled.
Exhaust Aftertreatment Monitor Enabled This Ignition Cycle	-	No	This parameter displays the status of the Exhaust Aftertreatment Monitor Enabled This Ignition Cycle. The parameter will display Yes when the Exhaust Aftertreatment Monitor is Enabled This Ignition Cycle.
Exhaust Brake Switch	-	Off	This parameter displays the status of the Exhaust Brake Switch. The parameter will display On when the Exhaust Brake Switch is enabled.
Exhaust Gas Sensor Monitor Complete	-	Yes/No	This parameter displays the state of Exhaust Gas Sensor Monitor. The parameter displays Yes when the Exhaust Gas Sensor Monitor is complete.
Exhaust Gas Sensor Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays the state of Exhaust Gas Sensor Monitor Complete This Ignition Cycle. The parameter displays Yes when the Exhaust Gas Sensor Monitor is Complete This Ignition Cycle.
Exhaust Gas Sensor Monitor Enabled	-	Yes/No	This parameter displays the status of the Exhaust Gas Sensor Monitor. The parameter will display Yes when the Exhaust Gas Sensor Monitor is Enabled.

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Parameter	System State	Expected Value	Description
Exhaust Gas Sensor Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the status of the Exhaust Gas Sensor Monitor Enabled This Ignition Cycle. The parameter will display Yes when the Exhaust Gas Sensor Monitor is Enabled This Ignition Cycle.
Exhaust Gas Temperature Sensor 1, 2, 3, 4, or 5	-	Â°C (Â°F)	This parameter will display the exhaust temperature before the DPF. When the exhaust temperature is low, the scan tool will display a low temperature. When the exhaust temperature is high, the scan tool will display a high temperature.
Extended Travel Brake Pedal Position Signal	-	Released	This parameter displays the status of the Extended Travel Brake Pedal Position sensor.
Frozen Reductant - Diagnostic Inhibit	-	No	This parameter displays Yes if the reductant diagnostic is inoperative due to frozen reductant.
Frozen Reductant - Injection Inhibit	-	No	This parameter displays Yes if the reductant injection is inoperative due to frozen reductant.
Frozen Reductant - Refill Recognition Inhibit	-	No	This parameter displays Yes if the reductant refill monitor is inoperative due to frozen reductant.
Fuel Consumed Since Last DPF Regeneration	-	Liters/Gallons	This parameter displays the amount of fuel consumed since the last DPF regeneration.
Fuel Consumed Since Last DPF Replacement	-	Liters	This parameter displays the amount of Fuel Consumed Since Last DPF Replacement.
Fuel Consumption Rate	-	L/H	This parameter displays the amount of fuel consumed by engine per unit of time in liters per hour. NOTE: Engine Fuel Rate shall indicate zero L/H when the engine is not running.
Fuel Filter Life Remaining	-	%	This parameter displays the fuel filter life remaining before requiring an fuel filter change. This number is calculated by the control module based on many inputs and is displayed as a percent. The lower the percentage, the sooner the next fuel filter

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Parameter	System State	Expected Value	Description
			change will be required.
Fuel Filter Pressure Switch	-	OK	This parameter displays the status of the fuel filter pressure switch.
Fuel Heater Relay Command	-	Off	This parameter displays the status of the fuel relay heater command.
Fuel Heater Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the status of the output driver for the fuel heater relay control circuit. The parameter displays Malfunction if the fuel heater relay control circuit is shorted to voltage.
Fuel Heater Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the status of the output driver for the fuel heater relay control circuit. The parameter displays Malfunction if the fuel heater relay control circuit is shorted to ground.
Fuel Heater Relay Control Circuit Open Test Status	-	OK	This parameter displays the status of the output driver for the fuel heater relay control circuit. The parameter displays Malfunction if the fuel heater relay control circuit is open.
Fuel Level Sensor	-	Volts	This parameter displays the voltage from the sensor used to monitor the fuel level inside the fuel tank.
Fuel Pressure Regulator 1 Command	-	%	This parameter displays the Fuel Pressure Regulator 1 duty cycle as commanded by the engine control module.
Fuel Pressure Regulator 1 Control Circuit Command	-	On/Off	This parameter displays the current command of the fuel pressure regulator 1.
Fuel Pressure Regulator 1 Control Circuit High Voltage Test Status	-	OK	This parameter displays the status of the output driver for the Fuel Pressure Regulator 1 Control Circuit High. The parameter displays Malfunction if the Fuel Pressure Regulator 1 Control Circuit High is shorted to voltage.
Fuel Pressure Regulator 1 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the status of the output driver for the Fuel Pressure Regulator 1 Control Circuit High. The parameter displays Malfunction if the Fuel Pressure Regulator 1 Control Circuit High is shorted to ground.

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Parameter	System State	Expected Value	Description
Fuel Pressure Regulator 1 Control Circuit Open Test Status	-	OK	This parameter displays the status of the output driver for the Fuel Pressure Regulator 1 Control Circuit High. The parameter displays Malfunction if the Fuel Pressure Regulator 1 Control Circuit High is open.
Fuel Pressure Regulator 1 Control Circuit Shorted Test Status	-	OK	This parameter displays the status of the output driver for the Fuel Pressure Regulator 1 Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 1 Circuit is shorted.
Fuel Pressure Regulator 1 Control Driver Overtemperature	-	No	This parameter displays the state of the Fuel Pressure Regulator 1 Control Driver circuit. The parameter displays Yes if the Fuel Pressure Regulator 1 Control Driver Overtemperature is detected.
Fuel Pressure Regulator 1 Current	-	mA	This parameter displays the actual current for the Fuel Pressure Regulator 1.
Fuel Pressure Regulator 1 High Control Circuit Command	-	On	This parameter displays the status of the Fuel Pressure Regulator 1 High Control Circuit Command. The parameter displays ON when the Fuel Pressure Regulator 1 High Control Circuit is Commanded ON by the engine control module.
Fuel Pressure Regulator 1 High Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 1 High Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 1 High Control Circuit is shorted to voltage.
Fuel Pressure Regulator 1 High Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 1 High Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 1 High Control Circuit is shorted to ground.
Fuel Pressure Regulator 1 High Control Driver Overtemperature	-	No	This parameter displays the state of the Fuel Pressure Regulator 1 High Control Driver circuit. The parameter displays Yes if the Fuel

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Parameter	System State	Expected Value	Description
			Pressure Regulator 1 High Control Driver Overtemperature is detected.
Fuel Pressure Regulator 2 Command	-	%	This parameter displays the Fuel Rail Pressure Regulator 2 duty cycle.
Fuel Pressure Regulator 2 Control Circuit Command	-	On	This parameter displays the current command of the fuel pressure regulator 2.
Fuel Pressure Regulator 2 Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 2 Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 2 Control Circuit is shorted to voltage.
Fuel Pressure Regulator 2 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 2 Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 2 Control Circuit is shorted to ground.
Fuel Pressure Regulator 2 Control Circuit Open Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 2 Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 2 Control Circuit is open.
Fuel Pressure Regulator 2 Control Circuit Shorted Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 2 Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 2 Control Circuit is shorted.
Fuel Pressure Regulator 2 Control Driver Overtemperature	-	No	This parameter displays the state of the Fuel Pressure Regulator 2 High Control Driver circuit. The parameter displays Yes if the Fuel Pressure Regulator 2 High Control Driver Overtemperature is detected.
Fuel Pressure Regulator 2 High Control Circuit Command	-	On/Off	This parameter displays the status of the Fuel Pressure Regulator 2 High Control Circuit Command. The parameter displays On when the Fuel Pressure Regulator 2 High Control Circuit is Commanded ON by the engine control module.

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Parameter	System State	Expected Value	Description
Fuel Pressure Regulator 2 High Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 2 High Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 2 High Control Circuit is shorted to voltage.
Fuel Pressure Regulator 2 High Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pressure Regulator 2 High Control Circuit. The parameter displays Malfunction if the Fuel Pressure Regulator 2 High Control Circuit is shorted to ground.
Fuel Pressure Regulator 2 High Control Driver Overtemperature	-	No	This parameter displays the state of the Fuel Pressure Regulator 2 High Control Driver circuit. The parameter displays Yes if the Fuel Pressure Regulator 2 High Control Driver Overtemperature is detected.
Fuel Pump Relay Command	-	On	This parameter displays the commanded state of the fuel pump relay control circuit. The fuel pump relay should be On when the scan tool indicates the Fuel Pump Relay Command is ON. The fuel pump relay should be Off when the scan tool indicates the Fuel Pump Relay Command is OFF.
Fuel Pump Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pump Relay Control Circuit. The parameter displays Malfunction if the Fuel Pump Relay Control Circuit is shorted to voltage.
Fuel Pump Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Fuel Pump Relay Control Circuit. The parameter displays Malfunction if the Fuel Pump Relay Control Circuit is shorted to ground.
Fuel Pump Relay Control Circuit Open Test Status	-	OK	This parameter displays the state of the Fuel Pump Relay Control Circuit. The parameter displays Malfunction if the Fuel Pump Relay Control Circuit is open.

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Parameter	System State	Expected Value	Description
Fuel Rail Pressure Sensor	-	35-40 MPa (5076-5801 psi)	This parameter displays the fuel rail pressure as calculated by the control module. This value is calculated based on engine speed, engine load, and sensor inputs. The scan tool will display a higher value at higher engine speeds and loads, and a lower value at idle.
Fuel Rail Pressure Sensor	-	Volts	This parameter displays the voltage signal sent to the control module from the sensor used to measure the fuel rail pressure. The scan tool will display a low voltage at idle and high voltage when pressure demands are high.
Fuel Rail Temperature Sensor	-	Â°C (Â°F)	This parameter displays the current fuel rail temperature.
Fuel System Monitor Complete	-	Yes	This parameter displays the status of the Fuel System Monitor. The scan tool displays Yes when test is completed.
Fuel System Monitor Complete This Ignition Cycle	-	Yes	This parameter displays the state of the Fuel System Monitor Complete This Ignition Cycle. The parameter displays Yes when the Fuel System Monitor is Complete This Ignition Cycle.
Fuel System Monitor Enabled	-	Yes	This parameter displays the status of the Fuel System Monitor. The parameter will display Yes when the Fuel System Monitor is Enabled.
Fuel System Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the status of the Fuel System Monitor Enabled This Ignition Cycle. The parameter will display Yes when the Fuel System Monitor is Enabled This Ignition Cycle.
Fuel Tank Rated Capacity	-	Liters	This parameter displays the capacity of the fuel tank in liters or gallons. The rated capacity displayed by the scan tool will vary with vehicle type.
Fuel Temperature Sensor	-	Â°C (Â°F)	This parameter displays the current fuel temperature as calculated by the control module based on input from the fuel temperature sensor. The scan tool

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Parameter	System State	Expected Value	Description
			will display a higher value at higher fuel temperatures. The scan tool will display a lower value at lower fuel temperatures.
Fuel Trim	-	Mm3/stk	This parameter displays the Fuel Mass Observer (FMO) correction value.
Fuel Trim	-	Allowed	This parameter displays the status of the Fuel Mass Observer (FMO) system.
Fuel Trim Enabled	-	Yes	This parameter indicates that the fuel mass observer functionality is enabled.
Fuel Trim Learn	-	Enabled	This parameter displays the status of the Fuel Mass Observer (FMO) system.
Fuel Used Since Last DPF Regeneration	-	Liters/Gallons	This parameter will display the amount of fuel used since last regeneration of the exhaust particulate filter.
Generator F-Terminal Signal	-	0-100%	This parameter indicates the generator field duty cycle as commanded by the voltage regulator or control module. The scan tool will display a higher value for a higher commanded generator output, and a lower value for a lower commanded generator output.
Generator L-Terminal Circuit High Voltage Test Status	-	OK	This parameter displays the diagnostic state of the Generator L-Terminal circuit. The scan tool will display OK, Incomplete, Short B+/Open, Short Gnd. The scan tool will display OK if the circuit is operating correctly.
Generator L-Terminal Circuit Low Voltage Test Status	-	OK	This parameter displays the diagnostic state of the Generator L-Terminal circuit. The scan tool will display OK, Incomplete, Short B+/Open, Short Gnd. The scan tool will display OK if the circuit is operating correctly.
Generator L-Terminal Circuit Open Test Status	-	OK	This parameter displays the diagnostic state of the Generator L-Terminal circuit. The scan tool will display OK, Incomplete, Short B+/Open, Short Gnd. The

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Parameter	System State	Expected Value	Description
			scan tool will display OK if the circuit is operating correctly.
Generator L-Terminal Command	-	0-100%	This parameter displays the control modules commanded state of the voltage regulator on the generator.
Generator L-Terminal Signal Command	-	On/Off	This parameter displays the signal command of the Generator L-Terminal.
Glow Plug Command	-	On/Off	This parameter displays the voltage supply to the glow plugs as measured by the control module. The scan tool will display a higher value at high voltages, or a lower value at lower voltages.
High Idle Speed	-	Enabled/Disabled	This parameter displays the current state of the High Idle Speed.
HO2S 1	-	Lambda	This parameter displays the actual lambda signal measured by wide range oxygen sensor 1 bank 1.
H02S 1 Heater Command	-	On/Off	This parameter displays the current command of the oxygen sensor heater control.
H02S 1 Heater Command	-	%	This parameter displays the current command of the oxygen sensor heater control in percentage.
H02S 1 Heater Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the oxygen sensor heater control circuit. The parameter displays Malfunction if the oxygen sensor heater control circuit is shorted to voltage.
H02S 1 Heater Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the oxygen sensor heater control circuit. The parameter displays Malfunction if the oxygen sensor heater control circuit is shorted to ground.
H02S 1 Heater Control Circuit Open Test Status	-	OK	This parameter displays the state of the oxygen sensor heater control circuit. The parameter displays Malfunction if the oxygen sensor heater control circuit is open.

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Parameter	System State	Expected Value	Description
H02S 1 Module Signal	-	Volts	This parameter displays the current voltage of the oxygen sensor heater module signal circuit.
IAT Sensor 1	-	Â°C (Â°F)	This parameter displays the temperature of the air entering the engine as calculated by the control module based on the input from the intake air temperature (IAT) sensor. The scan tool will display a low value when the air temperature is low, and a high value when the air temperature is high.
IAT Sensor 2	-	Â°C (Â°F)	This parameter displays the temperature of the air entering the engine as calculated by the control module based on the input from the intake air temperature (IAT) sensor 2. The scan tool will display a low value when the air temperature is low, and a high value when the air temperature is high.
IAT Sensor 2	-	Hz	This parameter displays the frequency of the humidity sensors' intake air temperature (IAT) sensor input to the engine control module.
IAT Sensor 3	-	Â°C (Â°F)	This parameter displays the temperature of the air entering the engine as calculated by the control module based on the input from the intake air temperature (IAT) sensor 3. The scan tool will display a low value when the air temperature is low, and a high value when the air temperature is high.
Ignition 1 Signal	-	On/Off	This parameter displays On when the control module detects B+ voltage at the ignition 1 input terminal.
Ignition Accessory Signal	-	Off	This parameter displays the state of the ignition 0 input to the control module from the ignition switch. The scan tool will display On when the ignition switch is in the ignition accessory position.

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Parameter	System State	Expected Value	Description
			The scan tool will display Off when the ignition switch is in any other position.
Ignition Cycles with Malfunction Since 1st Malfunction	-	Counts	This parameter displays the number of ignition cycles with a malfunction detected since the first ignition cycle with a malfunction detected.
Ignition Cycles without Completed Test Since 1st Malfunction	-	Counts	This parameter displays the number of ignition cycles without a pass or a malfunction reported since the first ignition cycle with a malfunction reported.
Ignition Cycles without Malfunction Since Last Malfunction	-	Counts	This parameter displays the number of ignition cycles with a pass reported and no malfunctions reported since the first ignition cycle with a malfunction reported.
Immobilizer Auto Learn Counter	-	Counts	This parameter displays the number of auto learn cycles that have been successfully completed within the immobilizer system.
Immobilizer Automatic Learn Timer	-	hh:mm:ss	This parameter indicates that either the auto learn timer (used in the auto learn procedure to enable VTD password learning) or the seed and key timer (used in the seed and key procedure to enable VTD password learning) is active.
Immobilizer Password Learn	-	Disabled	This indicates learning of the Immobilizer password received from the platform electronics is enabled. Immobilizer password learning is first enabled in assembly plant (prior to the manufacturer's enable counter being set to zero) may be re-enabled using 1 of 2 procedures.
Immobilizer Password Learn Scan Tool Delay	-	Active/Inactive	Scan Tool Learn Delay Active indicates that the security code has been accepted but the scan tool learn delay is active and will not allow learning enabled, programming security code, or resetting security code.
Immobilizer Security Code Accepted	-	Yes	This parameter displays if the Immobilizer Security code was accepted by the ECM.

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Parameter	System State	Expected Value	Description
Immobilizer Security Code Function	-	Present	This parameter displays if the immobilizer security code was supported by the ECM.
Immobilizer Security Code Lockout	-	Inactive	This parameter displays if the Immobilizer Security code is locked out of the ECM.
Immobilizer Security Code Programmed	-	Yes	This parameter displays if the Immobilizer Security code is currently being programmed in the ECM.
Immobilizer Security Information Programmed	-	Yes	This parameter displays if the Immobilizer Security code has been programmed in the ECM.
Immobilizer System Status	-	Varies	This parameter displays the Immobilizer System status in the BCM.
Immobilizer Valid Response Received Time	-	ms	This parameter displays the actual time observed for a valid immobilizer response.
Induction System Leak Indication	-	:1	This parameter contains the ratio of desired intake air flow and the actual intake air flow as determined by the mass air flow (MAF) sensor.
Injector Timing	-	Â°	Indicates the current timing of the main injection pulse as calculated by the control module. The scan tool will display a higher value for a main injection event farther from top dead center (TDC). The Scan tool will display a lower value for a main injection event closer to TDC.
Inspection/Maintenance Drive Cycle Complete	-	No	Inspection/Maintenance Drive Cycle Complete means that all required components of the standard drive cycle have completed.
Inspection/Maintenance Drive Cycle Idle Time Complete	-	No	Inspection/Maintenance Drive Cycle Idle Time Complete indicates that the engine idle time requirement is complete.
Inspection/Maintenance Drive Cycle Idle Timer	-	hh:mm:ss	This parameter displays the Inspection/Maintenance Drive Cycle Idle Timer.
Inspection/Maintenance Drive Cycle Propulsion System Active Time	-	No	This parameter displays the Inspection/Maintenance Drive Cycle Propulsion System Active

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Parameter	System State	Expected Value	Description
Complete			Time Complete. The parameter displays Yes when the Inspection/Maintenance Drive Cycle Propulsion System Active Time is Complete.
Inspection/Maintenance Drive Cycle Propulsion System Active Timer	-	hh:mm:ss	This parameter displays the total accumulated time in which the propulsion system has been active after the 1st time the engine is started.
Inspection/Maintenance Drive Cycle Vehicle Speed Time Complete	-	No	This parameter displays Yes when the Vehicle Speed Time Complete indicates that the vehicle has been above 25 mph for five minutes.
Inspection/Maintenance Drive Cycle Vehicle Speed Timer	-	hh:mm:ss	This parameter displays the total accumulated time in which the vehicle speed has been greater than 25 mph after the 1st time the engine is started.
Intake Air Flow Valve Control Circuit 1 High Voltage Test Status	-	OK	This parameter displays the status of the Intake Air Flow Valve Control Circuit 1 output driver. The scan tool will display OK if the circuit is operating correctly or Not Run if a diagnosis has not been made. The scan tool will display Malfunction if there is a short to voltage in the circuit.
Intake Air Flow Valve Control Circuit 1 Low Voltage Test Status	-	OK	This parameter displays the status of the Intake Air Flow Valve Control Circuit 1 output driver. The scan tool will display OK if the circuit is operating correctly or Not Run if a diagnosis has not been made. The scan tool will display Malfunction if there is a short to ground in the circuit.
Intake Air Flow Valve Control Circuit 2 High Voltage Test Status	-	OK	This parameter displays the status of the Intake Air Flow Valve Control Circuit 2 output driver. The scan tool will display OK if the circuit is operating correctly or Not Run if a diagnosis has not been made. The scan tool will display Malfunction if there is a short to voltage in the circuit.
Intake Air Flow Valve Control Circuit 2 Low Voltage Test Status	-	OK	This parameter displays the status of the Intake Air Flow Valve Control Circuit 2 output driver.

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Parameter	System State	Expected Value	Description
			The scan tool will display OK if the circuit is operating correctly or Not Run if a diagnosis has not been made. The scan tool will display Malfunction if there is a short to ground in the circuit.
Intake Air Flow Valve Control Circuit Open Test Status	-	OK	This parameter displays the status of the Intake Air Flow Valve Control Circuit. The scan tool will display OK if the circuit is operating correctly or Not Run if a diagnosis has not been made. The scan tool will display Malfunction if there is an open in the circuit.
Intake Air Flow Valve Control Circuit Shorted Test Status	-	OK	This parameter displays the status of the Intake Air Flow Valve Control Circuit. The scan tool will display OK if the circuit is operating correctly or Not Run if a diagnosis has not been made. The scan tool will display Malfunction if there is a short in the circuit.
Intake Air Flow Valve Control Driver Overcurrent	-	No	This parameter displays the status of the Intake Air Flow Valve Control driver. The scan tool will display Yes when an overcurrent is detected.
Intake Air Flow Valve Control Driver Overtemperature	-	No	This parameter displays the status of the Intake Air Flow Valve Control driver. The scan tool will display Yes when overtemperature is detected.
Intake Air Flow Valve Control Driver Temperature Dependent Overcurrent	-	No	This parameter displays the status of the Intake Air Flow Valve Control driver. The scan tool will display Yes when Temperature Dependent Overcurrent is detected.
Intake Air Flow Valve Control Driver Undervoltage	-	No	This parameter displays the status of the Intake Air Flow Valve Control driver. The scan tool will display Yes when Undervoltage is detected.
Intake Air Flow Valve Learned Closed Position	-	%	This parameter displays the minimum position learned for Intake Air Flow Valve position sensor when the Intake Air Flow

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Parameter	System State	Expected Value	Description
			Valve is closed.
Intake Air Flow Valve Motor Command	-	%	This parameter displays the commanded duty cycle for the Intake Airflow Valve output.
Intake Air Flow Valve Position	-	%	This parameter displays the position determined from Intake Air Flow Valve position sensor (corrected based upon its learned minimum position).
Intake Air Flow Valve Position Sensor	-	Volts	This parameter displays the Intake Air Flow Valve position sensor voltage input.
Intake Air Heater Command	-	On/Off	This parameter displays the current status of the Intake Air Heater.
Intake Air Heater Command	-	%	This parameter displays the current status of the Intake Air Heater in percentage.
Intake Air Humidity Sensor	-	%	This parameter displays the percentage of humidity at the intake air sensor.
Intake Manifold Pressure	-	kPa	This parameter displays the engine intake manifold vacuum pressure calculated as the difference between ambient air pressure (barometric pressure) and intake manifold absolute pressure (MAP).
Intake Manifold Runner Control Valve Command	-	%	This parameter displays the current command in percentage of the intake manifold runner control valve.
Intake Manifold Runner Control Valve Diagnostic Test Status	-	Varies	This parameter displays the current phase of the intake manifold runner control valve diagnostic test.
Intake Manifold Runner Control Valve Feedback Signal	-	%	This parameter displays the current command in percentage of the intake manifold runner control valve feedback signal.
Intake Manifold Runner Control Valve Position	-	Open, Intermediate, Closed	This parameter displays the current position of the intake manifold runner control valve.
Low Engine Oil Level Indicator Command	-	Off	This parameter displays the Engine Oil Level Low Indicator Command. The scan tool displays ON in order to inform the driver of a low engine oil level

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Parameter	System State	Expected Value	Description
			condition.
Low Engine Oil Pressure Indicator Command	-	Off	This parameter displays the Low Engine Oil Indicator Command. The scan tool displays ON in order to inform the driver of a low engine oil pressure condition.
MAF Sensor	Engine Idling	6-20 g/s	This parameter indicates the quantity calculated by the control module based on a signal from the MAF sensor. The scan tool will display a high value at high engine speeds, and a low value at low engine speeds.
	Engine speed at 2,500 RPM	130-150 g/s	
MAF Sensor	-	2300-3100 Hz	This parameter indicates the frequency signal received from the MAF sensor by the control module. The scan tool will display a high value at high engine speeds, and a low value at low engine speeds.
Main-Injection	-	Inactive	Main Injection Active indicates that main injection is active.
MAP Sensor	-	0.95-1.06 Volts	This parameter indicates the voltage signal received by the control module from the MAP sensor. The scan tool displays a low voltage at idle, and a high voltage at wide open throttle. Barometric pressure and altitude can affect these values.
MAP Sensor	-	kPa/PSI	This parameter displays the actual engine intake manifold absolute pressure (MAP).
MIL Command	-	Off	This parameter displays the commanded state of the malfunction indicator lamp (MIL) control circuit by the engine control module.
MIL Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the MIL control circuit. The parameter displays Malfunction if the MIL control circuit is shorted to voltage.
MIL Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the MIL control circuit. The parameter displays Malfunction if the MIL control circuit is shorted to ground.

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Parameter	System State	Expected Value	Description
MIL Control Circuit Open Test Status	-	OK	This parameter displays the state of the MIL control circuit. The parameter displays Malfunction if the MIL control circuit is open.
MIL Requested	-	No	This parameter displays the commanded state of the malfunction indicator lamp (MIL) control circuit by the engine control module.
MIL Requested by DTC	-	No	This parameter indicates the reason the control module illuminated the MIL. The scan tool will display Yes when the MIL is requested as a result of an A or B type DTC. The scan tool will display No if the MIL is illuminated for another reason, such as transmission DTCs.
Misfire Monitor Complete	-	No	This parameter displays the status of the Misfire Monitor. The parameter will display Yes when the Misfire Monitor is Complete.
Misfire Monitor Complete This Ignition Cycle	-	Varies	This parameter displays the diagnostic monitor enable status during the current driving/monitoring cycle.
Misfire Monitor Enabled	-	No	This parameter displays the status of the Misfire Monitor. The parameter will display Yes when the Misfire Monitor is Enabled.
Misfire Monitor Enabled This Ignition Cycle	-	Varies	This parameter displays the diagnostic monitor enable status during the current driving/monitoring cycle.
NOx Catalyst Efficiency	-	%	This parameter displays the actual average Selective Catalyst Reduction (SCR) efficiency for urea quality determination.
NOx Catalyst Efficiency Gross Error Test	-	%	This parameter displays the actual average Selective Catalyst Reduction (SCR) efficiency for urea quality determination during the gross error test.
NOx Catalyst Reductant-Load Adaptive Value	-	#	This parameter displays the phrase of the Pressure Control Valve (PCV) test results.

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Parameter	System State	Expected Value	Description
NOx Catalyst Reductant-Load Variance	-	g	This parameter displays the absolute difference between the targeted and estimated load in the SCR system in terms of grams.
NOx Catalyst System Malfunction Warning Indicator Command	-	1-7	This parameter displays the Non-Tamper SCR warning command.
NOx Sensor 1 Heater Circuit Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 Heater Circuit. The parameter displays Malfunction if the NOx Sensor 1 Heater Circuit is open.
NOx Sensor 1 Heater Circuit Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 Heater Circuit . The parameter displays Malfunction if the NOx Sensor 1 Heater Circuit is shorted.
NOx Sensor 1 Heater Command	-	Off	This parameter displays the state of the control circuit for NOx Sensor 1 Heater as commanded by the engine control module.
NOx Sensor 1 Heater Mode	-	Varies	This parameter displays the status of the NOx Sensor 1 Heater.
NOx Sensor 1 Heater Operation	-	Allowed	This parameter displays the state of the NOx Sensor 1 Heater Operation. The parameter displays Allowed when commanded by the engine control module.
NOx Sensor 1 Heater Resistance	-	Ω	This parameter displays the resistance value of the NOx sensor 1 heater.
NOx Sensor 1 NOx Concentration	-	ppm	This parameter displays the concentration of NOx in the exhaust gas.
NOx Sensor 1 NOx Signal Circuit Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 NOx Signal Circuit. The parameter displays Malfunction if the NOx Sensor 1 NOx Signal circuit is open.
NOx Sensor 1 NOx Signal Circuit Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 NOx Signal Circuit. The parameter displays Malfunction if the NOx Sensor 1 NOx Signal circuit is shorted.
NOx Sensor 1 Oxygen Concentration	-	%	This parameter displays the concentration of Oxygen in the exhaust gas from NOx sensor 1.

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Parameter	System State	Expected Value	Description
NOx Sensor 1 Oxygen Signal Circuit 1 Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 Oxygen Signal Circuit 1. The parameter displays Malfunction if the NOx Sensor 1 Oxygen Signal Circuit 1 is open.
NOx Sensor 1 Oxygen Signal Circuit 1 Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 Oxygen Signal Circuit 1. The parameter displays Malfunction if the NOx Sensor 1 Oxygen Signal Circuit 1 is shorted.
NOx Sensor 1 Oxygen Signal Circuit 2 Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 Oxygen Signal Circuit 2. The parameter displays Malfunction if the NOx Sensor 1 Oxygen Signal Circuit 2 is open.
NOx Sensor 1 Oxygen Signal Circuit 2 Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 1 Oxygen Signal Circuit 2. The parameter displays Malfunction if the NOx Sensor 1 Oxygen Signal Circuit 2 is shorted.
NOx Sensor 2 Heater Circuit Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 Heater Circuit 2. The parameter displays Malfunction if the NOx Sensor 2 Heater Circuit is open.
NOx Sensor 2 Heater Circuit Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 Heater Circuit 2. The parameter displays Malfunction if the NOx Sensor 2 Heater Circuit is shorted.
NOx Sensor 2 Heater Command	-	Off	This parameter displays the state of the control circuit for NOx Sensor 2 Heater as commanded by the engine control module.
NOx Sensor 2 Heater Mode	-	Varies	This parameter displays the status of the NOx Sensor 2 Heater.
NOx Sensor 2 Heater Operation	-	Allowed	This parameter displays the state of the NOx Sensor 2 Heater Operation. The parameter displays Allowed when commanded by the engine control module.
NOx Sensor 2 Heater Resistance	-	Ω	This parameter displays the resistance value of the NOx sensor 1 heater.

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Parameter	System State	Expected Value	Description
NOx Sensor 2 NOx Concentration	-	ppm	This parameter displays the concentration of NOx in the exhaust gas from NOx sensor 2.
NOx Sensor 2 NOx Signal Circuit Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 NOx Signal Circuit . The parameter displays Malfunction if the NOx Sensor 2 NOx Signal Circuit is open.
NOx Sensor 2 NOx Signal Circuit Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 NOx Signal Circuit . The parameter displays Malfunction if the NOx Sensor 2 NOx Signal Circuit is shorted.
NOx Sensor 2 Oxygen Concentration	-	%	This parameter displays the concentration of Oxygen in the exhaust gas from NOx sensor 2.
NOx Sensor 2 Oxygen Signal Circuit 1 Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 Oxygen Signal Circuit 1. The parameter displays Malfunction if the NOx Sensor 2 Oxygen Signal Circuit 1 is open.
NOx Sensor 2 Oxygen Signal Circuit 1 Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 Oxygen Signal Circuit 1. The parameter displays Malfunction if the NOx Sensor 2 Oxygen Signal Circuit 1 is shorted.
NOx Sensor 2 Oxygen Signal Circuit 2 Open Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 Oxygen Signal Circuit 2. The parameter displays Malfunction if the NOx Sensor 2 Oxygen Signal Circuit 2 is open.
NOx Sensor 2 Oxygen Signal Circuit 2 Shorted Test Status	-	OK	This parameter displays the state of the NOx Sensor 2 Oxygen Signal Circuit 2. The parameter displays Malfunction if the NOx Sensor 2 Oxygen Signal Circuit 2 is shorted.
Number of Completed DPF Regenerations	-	Counts	This parameter displays the number of successful DPF regenerations.
Number of DTC(s)	-	Counts	This parameter displays the number of emission related DTCs stored in the ECM.

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Parameter	System State	Expected Value	Description
Park/Neutral Position Switch	-	Park/Neutral/In Gear	This parameter indicates the range selection of the automatic transmission as calculated by the control module based on input from the park/neutral position (PNP) switch. The scan tool will display, In Gear, Park, or Neutral depending on the PNP switch position.
Particulate Matter Sensor	-	Mg/m3	This parameter displays the mass concentration of exhaust particulate matter measured by the particulate matter sensor.
Particulate Matter Sensor	-	uA	This parameter displays the measured current from the sensing element of the particulate matter sensor.
Particulate Matter Sensor Control Unit Communication Status	-	Ready	This parameter displays the communication status of the particulate matter sensor control unit.
Particulate Matter Sensor Identifier	-	#	This parameter displays the value sent from the sensor control unit to engine control module to provide sensor build information in order for the software to compensate for sensor variations.
Particulate Matter Sensor Measurement	-	Active	This parameter displays the status of the particular matter sensor.
Particulate Matter Sensor Operation	-	Allowed	This parameter displays if the exhaust temperature dew point is reached to allow the particulate matter sensor to operate.
Particulate Matter Sensor Regeneration	-	Inactive	This parameter displays Active when the particulate matter sensor is regenerating.
Particulate Matter Sensor Status	-	Ready	This parameter displays the status of the particulate matter sensor.
Particulate Matter Sensor Temperature	-	Â°C (Â°F)	This parameter displays the current temperature of the particulate matter sensor in Celsius and Fahrenheit.
Pilot Injection	-	Inactive	Pilot Injection Active indicates that pilot injections are active.
Positive Crankcase Ventilation Heater Command	-	On/Off	This parameter displays the current command of the positive crankcase ventilation heater.

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Parameter	System State	Expected Value	Description
Positive Crankcase Ventilation Heater Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the positive crankcase heater control circuit. The parameter displays Malfunction if the positive crankcase heater control circuit is shorted to voltage.
Positive Crankcase Ventilation Heater Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the positive crankcase heater control circuit. The parameter displays Malfunction if the positive crankcase heater control circuit is shorted to ground.
Positive Crankcase Ventilation Heater Control Circuit Open Test Status	-	OK	This parameter displays the state of the positive crankcase heater control circuit. The parameter displays Malfunction if the positive crankcase heater control circuit is open.
Post Injection	-	Inactive	Post Injection Active indicates that post injections is active
Power Mode	-	Off	This parameter displays the state of the System Power Mode. This signal is based upon the state of the system power mode received over serial communication from the vehicle electronics.
Radiator Coolant Temperature Sensor	-	Â°C (Â°F)	This parameter displays the radiator coolant temperature measured by a sensor located in the coolant outlet of the radiator.
Reduced Engine Power	-	Inactive	This parameter will display the fuel system status as commanded by the ECM.
Reduced Engine Power History	-	Varies	This parameter displays the last reason that the engine control module has illuminated the Reduced Engine Power (REP) indication.
Reductant Absolute Pressure	-	kPa	This parameter displays the absolute pressure of the reductant.
Reductant Fluid Quality Gross Error Test Diagnostics	-	Varies	This parameter displays the phases of the Selective Catalyst Reduction (SCR) service quality check procedure.
Reductant Fluid Quality Test	-	Completed with success	This parameter displays the phases of the SCR (Selective Catalyst Reduction) service quality check procedure.

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Parameter	System State	Expected Value	Description
Reductant Fluid Quality Test Diagnostic	-	Varies	This parameter displays the phases of the Selective Catalyst Reduction (SCR) service quality check procedure.
Reductant Fluid Quality Warning Indicator Command	-	None	This parameter displays the NOx reductant quality warning.
Reductant Heater 1 Request	-	Off	This parameter displays the commanded state of the Reductant Heater 1. The Reductant Heater 1 should be On when the scan tool indicates the Reductant Heater 1 Command is ON.
Reductant Heater 2 Request	-	Off	This parameter displays the commanded state of the Reductant Heater 2. The Reductant Heater 2 should be On when the scan tool indicates the Reductant Heater 2 Command is ON.
Reductant Heater 3 Request	-	Off	This parameter displays the commanded state of the Reductant Heater 3. The Reductant Heater 3 should be On when the scan tool indicates the Reductant Heater 3 Command is ON.
Reductant Injection Control Extreme Pressure Test	-	Passed	This parameter displays the test status of the NOx reductant dosing system extreme pressure test.
Reductant Injection Control Low Pressure Test	-	Passed	This parameter displays the test status of the NOx reductant dosing system low pressure test.
Reductant Injection Control Overpressure Test Status	-	Passed	This parameter displays the test status of the NOx reductant closing system overpressure test.
Reductant Injection Control Pressure Build-Up Test Status	-	Passed	This parameter displays the test status of the NOx reductant dosing system test.
Reductant Injection Inhibit Reason	-	None	This parameter displays the reasons why the NOx Reductant system has been inhibited from operation.
Reductant Injector Command	-	%	This parameter displays the commanded duty cycle for the NOx reductant dosing valve output.
Reductant Injector Control Circuit Status	-	No Malfunction Present	This parameter displays the status of the Reductant Injection Control Circuit output.

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Parameter	System State	Expected Value	Description
Reductant Level	-	%	This parameter displays the total Reductant level as a percentage of the rated capacity of the tank.
Reductant Level Sensor 1	-	Inactive	This parameter displays the individual Reductant Level Switch states. Active indicates that the level switch is detecting fluid in regards to its position in the reductant reservoir.
Reductant Level Sensor 1 Circuit Status	-	No Malfunction	This parameter displays the circuit status of each reductant level sensor.
Reductant Level Sensor 2	-	Inactive	This parameter displays the individual Reductant Level Switch states. Active indicates that the level switch is detecting fluid in regards to its position in the reductant reservoir.
Reductant Level Sensor 2 Circuit Status	-	No Malfunction	This parameter displays the circuit status of each reductant level sensor.
Reductant Level Sensor 3	-	Inactive	This parameter displays the individual Reductant Level Switch states. Active indicates that the level switch is detecting fluid in regards to its position in the reductant reservoir.
Reductant Level Sensor 3 Circuit Status	-	No Malfunction	This parameter displays the circuit status of each reductant level sensor.
Reductant Level Warning Indicator Command	-	None	This parameter displays the engine control module (ECM) requested reductant fluid level warning indicator state.
Redundant Odometer Memory	-	Present/Not Present	This parameter displays if there is a reductant odometer reading present in the control module.
Reductant Pressure	-	kPa	This parameter displays the engine Reductant pressure from the sensor.
Reductant Pump Command	-	%	This parameter displays the commanded duty cycle for the NOx reductant pump output.
Reductant Pump Control Circuit Status	-	No Malfunction Present	This parameter displays the status of the Reductant Pump Control Circuit.

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Parameter	System State	Expected Value	Description
Reductant Purge Solenoid Valve Command	-	On/Off	This parameter displays the commanded state of the reductant line purge solenoid valve. The scan tool displays On when the reductant line purge solenoid valve is commanded ON.
Reductant Purge Solenoid Valve Control Circuit Status	-	No Malfunction Present	This parameter displays the status of the Reductant Purge Solenoid Valve Control Circuit.
Reductant Range	-	km/miles	This parameter displays the Distance that can be driven before the Reductant tank needs to be refilled.
Reductant System Adaption Diagnostic	-	Varies	This parameter displays the status of the Selective Catalyst Reduction (SCR) adaption check diagnosis.
Reductant System Malfunction Warning Indicator Command	-	None	This parameter displays the NOx Reductant System Malfunction warning.
Reductant System Malfunction Warning Service Bay Test	-	Varies	This parameter displays a malfunction warning for the reductant system during a service bay test.
Reductant Tank Level	-	Varies	This parameter displays the current reductant tank fluid level.
Reductant Temperature	-	Â°C (Â°F)	This parameter displays the Reductant temperature measured by a sensor that is located within the holding tank.
Remaining Reductant in Tank	-	g	This parameter displays the current reductant remaining in the holding tank.
Remaining Fuel in Tank	-	%	This parameter displays the total fuel level as a percentage of the rated capacity of the fuel tank.
Remaining Fuel in Tank	-	Liters	This parameter displays the actual total fuel volume contained in the fuel tank.
Remote Vehicle Start Disable History 1-8	-	Reason for RVS Disable	These parameters display the last eight reasons the control module disabled remote vehicle start (RVS).
Remote Vehicle Start Request Signal	-	Off	Remote Vehicle Start Request indicates the state of the request received over serial communication from the remote vehicle start (RVS) system to start

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Parameter	System State	Expected Value	Description
			the vehicle in remote mode.
Replicated Transmission OSS Signal	-	RPM	This parameter displays the Replicated Transmission Output Speed (Replicated TOS) received from the Transmission Control Module.
Soot Mass Correction	-	#	This parameter displays the soot mass correction value caused by Continuous Regenerating Trap (CRT) effect.
Specific Humidity	-	%	This parameter displays the current specific humidity in percentage.
Start-Up Charge Air Cooler Temperature	-	Â°C (Â°F)	This parameter displays the current start-up charge air cooler temperature.
Start-Up ECT	-	Â°C (Â°F)	This parameter Indicates the engine coolant temperature at engine start up as calculated by the control module based on the signal from the ECT sensor. The scan tool will display a higher value on a warmer engine, and a lower value on a colder engine.
Start-Up Exhaust Gas Temperature Sensor 1, 2, 3, or 4	-	Â°C (Â°F)	This parameter displays the current start-up exhaust gas temperature for sensor 4.
Start-Up Fuel Temperature	-	Â°C (Â°F)	This parameter Indicates the fuel temperature at engine start up as calculated by the control module based on the signal from the fuel temperature sensor. The scan tool will display a higher value on a warmer fuel, and a lower value on a colder fuel.
Start-Up IAT Sensor 1-3	-	Â°C (Â°F)	This parameter indicates the intake air temperature at engine start up as calculated by the control module based on the signal from the IAT sensor. The scan tool will display a higher value during warmer under hood temperatures, and a lower value during colder under hood temperatures.
Start-Up Particulate Matter Sensor Temperature	-	Â°C (Â°F)	This parameter displays the start-up particulate matter temperature in Celsius and Fahrenheit.

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Parameter	System State	Expected Value	Description
Starter Relay Command	-	Off	The scan tool displays ON/OFF. The scan tool displays Off until the ignition is placed into the CRANK position, then it reads On.
Starter Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the starter relay control circuit. The parameter displays Malfunction if the starter relay control circuit is shorted to voltage. This parameter may not change if the scan tool is used to command the relay control circuit ON.
Starter Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the starter relay control circuit. The parameter displays Malfunction if the starter relay control circuit is shorted to ground. This parameter may not change if the scan tool is used to command the relay control circuit ON.
Starter Relay Control Circuit Open Test Status	-	OK	This parameter displays the state of the starter relay control circuit. The parameter displays Malfunction if the starter relay control circuit is open. This parameter may not change if the scan tool is used to command the relay control circuit ON.
TCC Control	-	Disengaged	This parameter displays the current state of the TCC.
Torque Delivered Signal	-	Â	This parameter displays the engine torque based upon the airflow through the engine and the torque losses due to fuel shutoff. Since this is a steady state engine torque, it does not include the inertial component of engine torque.
Total Fuel Consumed	-	Liters	This parameter displays the fuel consumed in the current drive cycle in liters.
Total Misfire	-	Counts	This parameter displays the total number of cylinder firing events that the control module detected as misfires for the last 200 crankshaft revolution sample

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Parameter	System State	Expected Value	Description
			period.
Traction Control Status	-	Inactive	This parameter displays Active if the electronic brake and traction control module (EBTCM) is commanding traction control.
Traction Control Torque Delivered Signal	-	%	This parameter displays the estimated engine torque delivered by the powertrain, as a percentage of maximum engine torque that is provided to the ABS/TCS module.
Traction Control Torque Request Signal	-	%	This parameter displays the engine torque requested by the traction control system, as a percentage of maximum engine torque.
Turbocharger Vane Learned Closed Position	-	%	This is the learned position of the blades that control the airflow into the turbo charger. This parameter displays the learned closed position.
Turbocharger Van Learned Closed Position	-	Volts	This parameter displays the minimum position learned for Turbo Charger Vane position sensor when the Turbo Charger Vanes are closed.
Turbocharger Vane Learned Open Position	-	%	This is the learned position of blades that control the airflow into the turbo charger. This parameter displays the learned open position.
Turbocharger Vane Learned Open Position	-	Volts	This parameter displays the minimum position learned for Turbo Charger Vane position sensor when the Turbo Charger Vanes are open.
Turbocharger Vane Position Learn Status	-	Learned	This parameter indicates the status of the control module in learning the turbocharger vane position. The scan tool will display No if the turbocharger vane position has not been learned since the last DTC clear.
Turbocharger Vane Position Sensor	-	%	This parameter displays the current commanded state of the turbocharger vane position control solenoid valve by the control module. The scan tool will display

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Parameter	System State	Expected Value	Description
			a higher value as the solenoid is commanded open. The scan tool will display a lower value as the solenoid is commanded closed.
Turbocharger Vane Position Sensor	-	Volts	This parameter displays the voltage signal sent to the control module from the sensor. The scan tool will display a higher value as the solenoid is commanded open. The scan tool will display a lower value as the solenoid is commanded closed.
Turbocharger Vane Position Solenoid Valve Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Turbocharger Vane Position Solenoid Valve circuit. The parameter displays Malfunction if the Turbocharger Vane Position Solenoid valve circuit is shorted to voltage.
Turbocharger Vane Position Solenoid Valve Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Turbocharger Vane Position Solenoid Valve circuit. The parameter displays Malfunction if the Turbocharger Vane Position Solenoid valve circuit is shorted to ground.
Turbocharger Vane Position Solenoid Valve Circuit Open Test Status	-	OK	This parameter displays the state of the Turbocharger Vane Position Solenoid Valve circuit. The parameter displays Malfunction if the Turbocharger Vane Position Solenoid valve circuit is open.
Turbocharger Vane Position Solenoid Valve Circuit Shorted Test Status	-	OK	This parameter displays the state of the Turbocharger Vane Position Solenoid Valve Circuit. The parameter displays Malfunction if the Turbocharger Vane Position Solenoid valve circuit is shorted.
Turbocharger Vane Position Solenoid Valve Command	-	%	This parameter displays the commanded duty cycle for the solenoid on variable geometry turbocharger.
Turbocharger Vane Position Solenoid Valve Control Circuit Command	-	Off	This parameter displays the commanded state of the turbocharger solenoid valve.
Turbocharger Vane Position Solenoid Valve Control Driver Overtemperature	-	No	This parameter displays the state of the turbocharger vane position solenoid valve control driver.

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Parameter	System State	Expected Value	Description
Turbocharger Vane Position Solenoid Valve High Control Circuit Command	-	Off	This parameter displays the commanded state of the turbocharger solenoid valve high control circuit.
Turbocharger Vane Position Solenoid Valve High Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the Turbocharger Vane Position Solenoid Valve high control circuit. The parameter displays Malfunction if the Turbocharger Vane Position Solenoid valve high control circuit is shorted to voltage.
Turbocharger Vane Position Solenoid Valve High Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the Turbocharger Vane Position Solenoid Valve high control circuit. The parameter displays Malfunction if the Turbocharger Vane Position Solenoid valve high control circuit is shorted to ground.
Turbocharger Vane Position Solenoid Valve High Control Circuit Open Test Status	-	OK	This parameter displays the state of the Turbocharger Vane Position Solenoid Valve high control circuit. The parameter displays Malfunction if the Turbocharger Vane Position Solenoid valve high control circuit is open.
Vehicle Speed Output Circuit 2 High Voltage Test Status	-	OK	This parameter displays the state of the Vehicle Speed Output circuit 2 control circuit. The parameter displays Malfunction if the Vehicle Speed Output circuit 2 control circuit is shorted to voltage.
Vehicle Speed Output Circuit 2 Low Voltage Test Status	-	OK	This parameter displays the state of the Vehicle Speed Output circuit 2 control circuit. The parameter displays Malfunction if the Vehicle Speed Output Circuit 2 control circuit is shorted to ground.
Vehicle Speed Output Circuit 2 Open Test Status	-	OK	This parameter displays the state of the Vehicle Speed Output circuit 2 control circuit. The parameter displays Malfunction if the Vehicle Speed Output circuit 2 control circuit is open.

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Parameter	System State	Expected Value	Description
Vehicle Speed Sensor	-	km/h/MPH	This parameter indicates the vehicle speed as calculated by the control module based on a signal from the vehicle speed sensor (VSS). The scan tool will display a higher value at higher vehicle speeds, and a lower value at lower vehicle speeds.
Wait to Start Indicator Command	-	On/Off	The wait to start indicator illuminates with the ignition ON and the engine OFF. The wait to start indicator will not illuminate during post-start glow plug operation.
Wait to Start Indicator Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the wait to start indicator control circuit. The parameter displays Malfunction if the wait to start indicator control circuit is shorted to voltage.
Wait to Start Indicator Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the wait to start indicator control circuit. The parameter displays Malfunction if the wait to start indicator control circuit is shorted to ground.
Wait to Start Indicator Control Circuit Open Test Status	-	OK	This parameter displays the state of the wait to start indicator control circuit. The parameter displays Malfunction if the wait to start indicator control circuit is open.
Warm-ups Since DTC Cleared	-	Counts	This parameter indicates the number of warm up cycles that have occurred Since DTCs were cleared. The scan tool will display a higher counts as more warm up cycles have occurred since the DTCs were cleared.
Warm-ups without Emission Malfunctions	-	Counts	This parameter indicates the number of warm up cycles that have occurred without an emission fault present. The scan tool will display a 0 if a malfunction has occurred. The scan tool will display a higher count if a number of warm up cycles have occurred without an emission malfunction.

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Parameter	System State	Expected Value	Description
Warm-ups without Non-emission Malfunctions	-	Counts	This parameter indicates the number of warm up cycles that have occurred without a non-emission fault present. The scan tool will display a 0 if a malfunction has occurred. The scan tool will display a higher count if a number of warm up cycles have occurred without a non-emission malfunction.
Water in Fuel	-	No	This parameter indicates if there is water in the fuel.
Water in Fuel Indicator Command	-	Off	This parameter indicates if water in the fuel indicator is On or Off.
Water in Fuel Sensor	-	Volts	This parameter displays the water in fuel sensor voltage input.

Output Control

Parameter	Description
This is a comprehensive list. Not all output controls listed are available for all applications.	
A/C Compressor Clutch Relay	This device control is used to override the state of the air conditioning compressor output.
Catalyst Reset	This device control is used to reset learned values in case of a diesel oxidation catalyst replacement. The engine must be OFF and Ignition ON.
Cooling Fan Motor	This device control is used to override the state of cooling fan duty cycle control output.
Crankshaft Position Reluctor Wheel Learn	This device control is used to reset the crank wheel adaptation values in case of an ECU or crank wheel replacement.
Cylinder 1-4 Fuel Injector Correction Value Reset	This device control is to be used to reset the NVC and ZFC values to zero if one or more of the fuel injectors have been replaced.
Cylinder 1-4 Injector Flow Identifier	This device control contains the data that the Engine Control Module will need in order to do proper Injector Fuel Quantity adjustments. If a new ECM is being installed, this data shall be read from the old ECM and transferred to the new ECM. If an injector is replaced, the injector code must be downloaded to the ECM
Cylinder Balance Rate Monitor	This device control is used to enable or disable Cylinder Fuel Balancing.
Cylinder Power Balance	This device control disables each fuel injector at any engine or vehicle speed. The device control will not change unless changed or cancelled by the scan tool.
DPF Pressure Sensor Reset	This device control is used to reset learned values in case of a diesel particulate filter pressure sensor replacement.
DPF Regeneration Enable	This function enables a DPF Regeneration when the vehicle meets the conditions for running. This function will by-pass the normal soot model, so the next time the vehicle is under the conditions for an active regeneration to take place, the ECM will go ahead and initiate the

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Parameter	Description
	regeneration event. This device control is used to Force the Diesel Particulate Filter to perform regeneration. The Device Control sets an indication in the ECU that the controller shall perform regeneration, the next time the driving condition are met. The Regeneration shall be performed even if the tool is no longer connected to the vehicle.
DPF Regeneration Inhibit	This device control is used to inhibit the Diesel Particulate Filter to perform regeneration, even if the driving conditions are met. The inhibit function shall only work when the tool is connected to the vehicle.
DPF Reset	This device control is used to reset learned values in case of a diesel particulate filter replacement.
DPF Service Regeneration	This device control enables a DPF Regeneration. The engine coolant must be greater than 70-115Â°C (158-239Â°F). Vehicle must be in Park. Ambient temperature must be greater than -30Â°C (-22Â°F). Brake pedal and accelerator must be in the released position. The scan tool will display all inhibit reasons. The scan tool must remain connected until test is complete. This function takes approximately 35 minutes to complete. During this procedure the RPM will slowly increase to 2,500 RPM and remain there for approximately 25 minutes.
EGR	This device control is used to verify functionality of the Exhaust Gas Recirculation Valve by allowing the Exhaust Gas Recirculation Valve output to be commanded to a specific duty cycle.
EGR Cooler Bypass Valve	This device control is used to verify functionality of the Exhaust Gas Recirculation (EGR) Cooler Bypass Valve system by allowing the EGR Cooler Bypass Valve output to be commanded to a specific position
EGR Valve	This device control is used to verify functionality of the Exhaust Gas Recirculation (EGR) system by allowing the Exhaust Gas Recirculation output to be commanded to a specific lift.
Engine Compression Quick Test	This device control is used to initiate the semi-automatic compression test on Diesel engines.
Engine Oil Life Reset	This device control contains the engine oil remaining life determined from a calibration based upon the effective engine revolutions and the distance driven since the last oil change. This device control may be used to reset the engine oil remaining life to 100% after an oil change or to any other value when replacing an engine control module.
Engine Oil Pressure Control Solenoid Valve	This device control is used to override the state of the variable displacement oil pump. When the variable displacement oil pump is turned ON, the oil pump will be commanded to a low pressure state.
Engine Speed	This device control is used to override the idle engine speed.
Exhaust Aftertreatment Data Reset	This device control is used to reset the exhaust aftertreatment fuel injector OEM data in case of a replacement.
Exhaust Gas Temperature Sensor Reset	This device control is used to reset the SCR (Selective Catalytic Reduction) Temperature Sensor data in case of a replacement.
Fuel Filter Life Reset	This device control resets the fuel filter life remaining to 100%.
Fuel Heater Relay	This device control is used to override the state of the Fuel Filter Heater output.

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Parameter	Description
Fuel Injector Correction Value Preset	This device control resets all injector NVC and ZFC values to the default value. This device control is to be used if the old ECM values cannot be transferred to the new ECM after replacement.
Fuel Pressure Regulator 1	This device control is intended for use on a Direct Injection (DI) high pressure fuel supply system to activate the fuel pressure regulator 1 at ignition ON, engine OFF. Both the low side and high side of the regulator are controlled together. Commanding the regulator to ON will modulate the high side driver to a calibratible "maximum" duty cycle. (Note: As this is an electrical circuit test, a regulator solenoid commanded to ON does not necessarily equate to the regulator state at maximum fuel pressure.)
Fuel Pressure Regulator 2	This device control is intended for use on a Direct Injection (DI) high pressure fuel supply system to activate the fuel pressure regulator 2 at ignition ON, engine OFF. Both the low side and high side of the regulator are controlled together. Commanding the regulator to ON will modulate the high side driver to a calibratible "maximum" duty cycle. (Note: As this is an electrical circuit test, a regulator solenoid commanded to ON does not necessarily equate to the regulator state at maximum fuel pressure.)
Fuel Pump Relay	This device control is used to override the state of the fuel pump output.
Fuel Rail Pressure	This device control is intended for use on a Direct Injection (DI) high pressure fuel supply system to override the commanded fuel high pressure output from the powertrain controller.
Fuel Trim Enable	This device control is used to deactivate the Fuel Mass Observer (FMO).
Fuel Trim Reset	This device control is used to reset the Fuel Mass Observer data in case of a replacement.
Generator L-Terminal	The commanded states are ON and OFF. Selecting OFF commands the ECM to turn OFF the generator and stop generating an output voltage.
HO2S Heater Sensor 1	This device control is used to override the duty cycle of the oxygen sensor heaters.
Intake Air Flow Valve Motor	This function increases or decreases the position of the IAF valve.
Intake Air Flow Valve Position	This parameter displays the actual position of the intake air flow valve.
Intake Manifold Runner Control Valve	This device control is used to override the state of the intake manifold runner control output.
Malfunction Indicator Lamp (MIL)	This device control is used to either turn the Malfunction Indicator Lamp (MIL) on or off.
Misfire Graphic	This device control produces a misfire graphic while the engine is running.
NOx Catalyst Reductant Loading Reset	This device control is used to reset the adaptive values for the SCR (Selective Catalytic Reduction) data.
NOx Catalyst Reset	This device control is used to reset the Selective Catalytic Reduction (SCR) data in case of a replacement.
NOx Sensor 1 Heater- Engine Running	This device control is used to control the duty cycle of the NOx Sensor 1 Heater with the engine running. The Duty Cycle is fixed at a predetermined value and is controlled for a predetermined amount of time.
NOx Sensor 1 Reset	This device control is used to reset the NOx Sensor 1 data in case of a replacement. The engine must be Off and the Ignition On.

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Parameter	Description
NOx Sensor 2 Heater- Engine Running	This device control is used to control the duty cycle of the NOx Sensor 2 Heater with the engine running. The Duty Cycle is fixed at a predetermined value and is controlled for a predetermined amount of time.
NOx Sensor 2 Reset	This device control is used to reset the NOx Sensor 2 data in case of a replacement. The engine must be OFF and the Ignition ON.
Particulate Matter Sensor Service Regeneration	This device control is used to force a particulate matter sensor measurement cycle, consisting of a particulate sensor probe regeneration and subsequent soot accumulation measurement. The system will return to normal control after one measurement cycle is successfully completed. One full measurement cycle can take 15 minutes or more to complete depending up the particulate filter state of health.
Pilot Injection Balance Procedure	This device control disables each fuel injector pilot injection. Device Control can be changed at any engine or vehicle speed. The device control will not change unless changed or cancelled by the scan tool.
Positive Crankcase Ventilation Heater	This device control is used to turn the crankcase ventilation heater output ON or OFF.
Programming History	This device control is used to view the history buffer entries for the primary calibration part in the controller.
Reductant Fluid Quality Test	This device control is used to force a Selective Catalyst Reduction (SCR) Service Quality Check.
Reductant Fluid Tank Level Reset	This device control is used to Reset the Reductant Fluid Tank Level.
Reductant Heater 1	This device control is used to override the state of the Reductant Heater 1. The scan tool disables the test when the following control limits are exceeded. • Reductant System DTC is set. • The exhaust temperature is too low. • Ignition voltage is too low. • Ignition voltage is too high.
Reductant Heater 2	This device control is used to override the state of the Reductant Heater 2.
Reductant Heater 3	This device control is used to override the state of the Reductant Heater 3.
Reductant Injection Quantity Test	This device control is used to inject a specific amount of reductant from the reductant injector. A system purge will be required once the test is complete.
Reductant Injector	This device control is used to verify functionality of the NOx Reductant Injector by allowing NOx Reductant Injector output to be commanded to a specific duty cycle.
Reductant Injector Reset	This device control is used to reset the Reductant Injector variables after the Injector is replaced.
Reductant Pump	This device control is used to verify functionality of the NOx Reductant Pump by allowing NOx Reductant Pump output to be commanded to a specific duty cycle.
Reductant Purge	This device control is used to purge the reductant lines of fluid.
Reductant Purge Valve	This device control is used to command the state of the NOx Reductant Line Purge valve.

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Parameter	Description
Reductant System Data Reset	This device control is used to reset the ECM data in case of a replacement.
Reductant System Leak Test	This device control is used to pressurize the reductant system in order to perform a visual inspection for leaks. A system purge will be required once the test is complete.
Reductant System Malfunction Warning Service Bay Test	This device control triggers the Selective Catalytic Reduction (SCR) Tamper Service Bay Test.
Reductant System Reset	This device control is used to reset the Reductant Module data in case of a replacement.
Remote Vehicle Start Disable History Reset	This device control is used to trigger the reset of the last eight reasons that powertrain has disabled remote vehicle start (RVS).
Starter Relay	This device control is used to override the state of the Starter Relay output. Fuel is disabled to prevent the engine from starting if the starter relay output is commanded On.
Total Fuel Consumed Reset	This device control contains the after treatment related data parameter that needs to be transferred in case of an ECM replacement.
Turbocharger Learn	This device control is used when the Turbocharger assembly, Vane position control solenoid valve, Vane position sensor is replaced, or repairs that disturb turbocharger components.
Turbocharger Vane Position	This device control adjusts the turbocharger vane position in 5 percent increments from 0-100 percent. The device control will be aborted if engine speed is above idle or if the coolant temperature is too cold.
Turbocharger Vane Position Solenoid Valve	This device control cycles the turbocharger vane position solenoid to 100 percent boost and back to 0 percent boost. The device control is limited to engine speeds less than 1,500 RPM and will be disabled if DTC P0047 or P0048 are set.
Wait to Start Indicator	This device control is used to turn the Glow Plug (Wait to start) Lamp ON/OFF.

K20 ENGINE CONTROL MODULE: SCAN TOOL INFORMATION (EXCEPT DIESEL)

Engine Control Module Scan Tool Data

Parameter	System State	Expected Value	Description
This is a comprehensive list. Not all parameters listed are available for all applications. **Base Operating Conditions:** Engine Idling/Radiator Hose Hot/Park or Neutral/Closed Loop/Accessories OFF			
4WD Low Signal	-	Enabled/Disabled /Invalid	This parameter displays the status of the four wheel drive system.
5-V Reference 1	-	5 Volts	This parameter displays the voltage sensed on the 5-volt reference 1 circuit at the control module. The scan tool will display a higher value at higher voltage. The scan tool will display a lower value at lower voltage.
5-V Reference 1-4	-	5 Volts	This parameter displays the voltage sensed on the 5-volt reference circuit at the control module. The scan tool

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Parameter	System State	Expected Value	Description
			will display a higher value at higher voltage. The scan tool will display a lower value at lower voltage.
5-V Reference 1-4 Circuit Status	-	OK	This parameter will display OK if the circuit is good or Malfunction if a short to ground, short to B+ or open circuit is present.
A/C Compressor Clutch Relay Command	-	Off	This parameter displays the current command of the A/C compressor clutch relay.
A/C Compressor Clutch Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the A/C compressor clutch relay control circuit. The parameter displays Malfunction if the A/C compressor clutch relay control circuit is shorted to voltage.
A/C Compressor Clutch Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the A/C compressor clutch relay control circuit. The parameter displays Malfunction if the A/C compressor clutch relay control circuit is shorted to ground.
A/C Compressor Clutch Relay Control Circuit Open Test Status	-	OK	This parameter displays the state of the A/C compressor clutch relay control circuit. The parameter displays Malfunction if the A/C compressor clutch relay control circuit is open.
A/C Disable - A/C Pressure Out of Range	-	No	This parameter displays YES if the A/C is disabled due to A/C pressure out of range.
A/C Disengage History 1-8	-	Varies	This parameter displays one of the last eight reasons that powertrain has disengaged the air conditioning compressor.
A/C High side Pressure Sensor	A/C OFF	1.43 Volts	This parameter displays 0-5 volts. The voltage applied to the ECM input for the A/C refrigerant pressure sensor.
	A/C ON	2.39 Volts	
A/C High side Pressure Sensor	A/C OFF	500-2,220 kPa (72-319 psi)	This parameter displays 0-3450 kPa (0-500 psi). The voltage applied to the ECM input from the A/C refrigerant pressure sensor is converted to a pressure value.
	A/C ON	300-1,220 kPa (43-174 psi)	
A/C Off for WOT	-	No	This parameter displays if the A/C compressor is disabled due to a wide open throttle.

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Parameter	System State	Expected Value	Description
A/C Request Signal	-	Yes	This parameter displays YES if the A/C is requested on.
Accelerator Pedal Position	-	0%	This parameter displays the accelerator pedal position in percentage.
Accelerator Pedal Position When Engine Overspeed Detected	-	%	This parameter displays the accelerator pedal position in percentage when the engine overspeed was detected.
Air/Fuel Equivalence Ratio Command	-	1.0	This parameter contains the commanded equivalence ratio. The equivalence ratio should be reported as 1.0 when the vehicle is in closed loop.
Ambient Air Temperature	-	Varies Â°C/Â°F	This parameter displays the outside temperature at any given altitude expressed in degrees.
Ambient Air Temperature When Recommended Maximum Fuel Alcohol Content Exceeded	-	Â°C (Â°F)	This parameter displays the estimated ambient air temperature at the most recent time that the recommended ethanol concentration was exceeded.
Ambient Humidity	-	Varies	This parameter displays the current ambient humidity in percentage.
APP Sensors	-	Varies	This parameter displays the average of the APP sensors as calculated by the throttle actuator control (TAC) module. The APP average is a range of values indicating a low number when the accelerator pedal is not depressed to a high number when the accelerator pedal is fully depressed. This value is listed in counts.
APP Sensor 1 and 2	Accelerator pedal not actuated	0.7-1.2 Volts	This parameter displays the voltage signal sent to the control module from APP sensor 1 of the APP sensor assembly. APP sensor 1 is a range of values indicating a low voltage when the accelerator pedal is not depressed to a high voltage when the accelerator pedal is fully depressed.
	Accelerator pedal fully actuated	4.2-4.5 Volts	
APP Sensor 1 and 2	-	Agree	This parameter displays the results of a control module test that compares the signals from the APP sensors 1 and 2 . The scan tool will display Agree or Disagree. Agree indicates that APP sensor 1 and APP sensor 2 voltages correspond to the same

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Parameter	System State	Expected Value	Description
			accelerator pedal position. Disagree indicates that APP sensor 1 and APP sensor 2 voltages correspond to different accelerator pedal positions.
APP Sensor 1-2 Circuit Status	-	OK	This parameter displays that the sensed accelerator pedal position 1 or 2 sensor value is currently out of range or that a Malfunction has been detected based upon the sensed accelerator pedal position 1 or 2 sensor value being out of range
APP Sensor 1-2 Learned Applied Position	-	%	This parameter displays the learned maximum (fully applied) accelerator pedal position.
APP Sensor 1-2 Learned Released Position	-	Volts	This parameter displays the accelerator pedal sensor 1 or 2 signal at its minimum learned position (pedal released) as a percentage of its reference voltage.
APP Sensor 1-2 Position	Accelerator pedal not actuated	0%	This parameter displays the angle of the APP sensor 1 as calculated by the control module using the signal from the APP sensor 1. APP sensor 1 is a range of values indicating a low percentage when the accelerator pedal is not depressed to a high percentage when the accelerator pedal is fully depressed.
APP Sensor 1-3	Accelerator pedal not actuated	0.7-0.2 Volts	This parameter displays the voltage signal sent to the control module from APP sensor 1 of the APP sensor assembly. APP sensor 1 is a range of values indicating a low voltage when the accelerator pedal is not depressed to a high voltage when the accelerator pedal is fully depressed.
APP Sensor 1 Indicated Position	Accelerator pedal not actuated	0%	This parameter displays the angle of the APP sensor 1 as calculated by the control module using the signal from the APP sensor 1. APP sensor 1 is a range of values indicating a low percentage when the accelerator pedal is not depressed to a high percentage when the accelerator pedal is fully depressed.
	Accelerator pedal fully actuated	100%	
APP Sensor 2	Accelerator pedal not actuated	0.3-0.5 Volts	This parameter displays the voltage signal sent to the control module from APP sensor 2 of the APP sensor

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Parameter	System State	Expected Value	Description
	Accelerator pedal fully actuated	2.2-2.5 Volts	assembly. APP sensor 2 is a range of values indicating a low voltage when the accelerator pedal is not depressed to a high voltage when the accelerator pedal is fully depressed.
APP Sensor 2 Position	Accelerator pedal not actuated	0%	This parameter displays the angle of the APP sensor 2 as calculated by the control module using the signal from the APP sensor 2. APP sensor 2 is a range of values indicating a low percentage when the accelerator pedal is not depressed to a high percentage when the accelerator pedal is fully depressed.
	Accelerator pedal fully actuated	100%	
APP Sensor 1 and 2	-	Agree	This parameter displays the results of a control module test that compares the signals from the APP sensors 1 and 2 . The scan tool will display Agree or Disagree. Agree indicates that APP sensor 1 and APP sensor 2 voltages correspond to the same accelerator pedal position. Disagree indicates that APP sensor 1 and APP sensor 2 voltages correspond to different accelerator pedal positions.
BARO	-	Varies with altitude	This parameter displays the barometric pressure as calculated by the control module using the signal from the MAP sensor measured when the ignition is turned ON with the engine not running. The control module will update the barometric pressure during wide-open throttle (WOT) conditions.
BARO Sensor	-	Volts	This parameter displays the barometric pressure sensor in volts.
Brake Pedal Position Circuit Signal	-	Closed	This parameter displays the state of the brake pedal position switch as determined by the brake pedal switch. The scan tool will display Open when the brake pedal is depressed, and Closed when the brake pedal is not depressed.
Brake Pedal Position Sensor	-	Volts	This parameter displays the brake pedal position as indicated by the analog sensor as a percentage of its reference voltage.

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Parameter	System State	Expected Value	Description
Brake Pedal Position Sensor	-	%	This parameter displays the displacement of the brake pedal, where 0% corresponds to the brake pedal being released and 100% corresponds to the brake pedal being fully applied.
Brake Pedal Position Sensor Fully Released Learn Status	-	Complete	This parameter displays the brake pedal fully released learn position status.
Brake Pedal Position Sensor Learned Released Position	-	Volts	This parameter displays the position learned for the brake pedal position sensor when the brake pedal is fully released.
Brake Pedal Position Sensor Signal	-	Released	This parameter displays the status of the brake pedal as determined by the ECM.
Brake Pedal Position Signal	-	Released	This parameter displays the state of the brake pedal position switch as determined by the brake pedal switch. The scan tool will display Applied when the brake pedal is depressed, and Released when the brake pedal is not depressed.
Calculated Air Flow	-	Varies g/s	This parameter displays the air flow as calculated by the control module.
Calculated BARO	-	Varies kPa	This parameter displays the barometric pressure as calculated by the control module.
Calculated Catalyst Temperature Bank 1 or 2	-	Varies Â°C/Â°F	This parameter displays the catalyst temperature in bank 1 or 2 as calculated by the control module.
Calculated Engine Oil Temperature	-	Varies Â°C/Â°F	This parameter displays the estimated (modeled) engine oil temperature (as a function of engine coolant temperature and other parameters).
Camshaft Position	-	Varies Â°	This parameter displays the position of the intake camshaft for bank 1 in terms of degrees of camshaft rotation (advance) from the park position (a value of zero represents the park position).
Camshaft Position Active Counter	-	Counts	This parameter displays a rolling count of the number of primary cam position sensor pulses. A change in the value of this parameter indicates primary camshaft position sensor activity

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Parameter	System State	Expected Value	Description
Camshaft Position Actuator Solenoid Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the camshaft position actuator solenoid control circuit. The parameter displays Malfunction if the camshaft position signal circuit is shorted to voltage.
Camshaft Position Actuator Solenoid Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the camshaft position actuator solenoid control circuit. The parameter displays Malfunction if the camshaft position signal circuit is shorted to ground.
Camshaft Position Actuator Solenoid Control Circuit Open Test Status	-	OK	This parameter displays the state of the camshaft position actuator solenoid control signal circuit. The parameter displays Malfunction if the camshaft position signal circuit is open.
Camshaft Position Command	-	Percentage	This parameter displays the commanded duty cycle from the engine control module for the intake camshaft phase of the Throttle Position for bank 1.
Camshaft Position Sensor	-	Engine Idle Speed	This parameter displays the engine speed as calculated by the control module using the signal from the CMP sensor.
Camshaft Position Variance	-	degrees	This parameter displays the absolute difference between the desired and actual positions of the intake camshaft for bank 1 in terms of degrees of camshaft rotation.
Catalyst Monitor Complete	-	Yes/No	This parameter indicates the status of the Catalyst. The scan tool displays YES when the diagnostic is complete. And NO if the diagnostic has Not ran or a malfunction is detected in the Catalyst.
Catalyst Monitor Complete This Ignition Cycle	-	Yes/No	This parameter indicates the status of the catalyst monitor diagnostic. Catalyst Monitor Test Running indicates YES or NO when the catalyst monitor diagnostic is actively running a test.
Catalyst Monitor Enabled	-	Yes/No	The scan tool displays YES when the Catalyst Monitor is Enabled. If the scan tool displays NO this could indicate a malfunction in the Catalyst

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Parameter	System State	Expected Value	Description
			Monitor circuit.
Catalyst Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter indicates the status of the catalyst monitor diagnostic. Catalyst Monitor Test Running indicates YES or NO when the catalyst monitor diagnostic is actively running a test.
Catalyst Monitor Not At Idle Test Conditions Met	-	Yes/No	This parameter indicates if the off idle conditions for the catalyst monitor diagnostic have been met.
Catalyst Monitor Test Counter Bank 1 or 2	-	Counts	This parameter contains the number of iterations of the catalyst monitor diagnostic test that have been performed since a code clear for bank 1 or 2.
Catalyst Monitor Test Result Bank 1 or 2	-	No Decision	This parameter indicates the status of the catalyst monitor diagnostic for bank 1 or 2. Multiple tests may run before the diagnostic reports a Passed or Failed result.
Catalyst Monitor Test State	-	Inactive	This parameter indicates the current state of the catalyst monitor test.
Change Engine Oil Indicator Command	-	No	This parameter displays the state of the change engine oil lamp control circuit as commanded by the control module.
Clutch Pedal Starter Inhibit Switch	-	Off	This parameter displays the current state of the clutch pedal starter inhibit switch.
Clutch Pedal Switch	-	Applied	This parameter displays the current state of the clutch pedal.
Cold Startup	-	Yes/No	This parameter displays whether the engine meets the conditions for a cold startup during the present ignition cycle. The scan tool displays YES when the conditions for a cold startup are met during this ignition cycle. The scan tool displays NO when the conditions for a cold startup are not met during the present ignition cycle. Conditions for a cold startup require the coolant temperature and the intake air temperature to be below a predetermined temperature and within a certain range of each other. These conditions must occur after the engine was warmed up to a specific

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Parameter	System State	Expected Value	Description
			temperature during the previous ignition cycle.
Component Monitor Complete	-	Yes/No	This parameter displays Yes when the Component Monitor is Complete. The engine control module looks at many input and output components to make this determination. If a malfunction is detected the scan tool will display NO.
Component Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays Yes when the Component Monitor has completed this ignition cycle. The engine control module looks at many input and output components to make this determination. If a malfunction is detected the scan tool will display NO.
Component Monitor Enabled	-	Yes/No	This parameter displays Yes when Component Monitor is Enabled. And No when it is not Enabled.
Component Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays Yes when Component Monitor is Enabled this ignition cycle. And No when it is not Enabled this ignition cycle.
Cooling Fan Command	-	%	This parameter displays the cooling fan duty cycle.
Cooling Fan Relay 1, Relay 2, or Relay 2 and 3 Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the cooling fan control circuit. The parameter displays Malfunction if the cooling fan control circuit is shorted to voltage.
Cooling Fan Relay 1, Relay 2, or Relay 2 and 3 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the cooling fan control circuit. The parameter displays Malfunction if the cooling fan control circuit is shorted to ground.
Cooling Fan Relay 1, Relay 2, or Relay 2 and 3 Control Circuit Open Test Status	-	OK	This parameter displays the state of the cooling fan control circuit. The parameter displays Malfunction if the cooling fan control circuit is open.
Cooling Fan Relay 1, Relay 2, or Relay 2 and 3 Command	-	On/Off	This parameter displays the current cooling fan relay 1 command.
Cooling Fan Speed	-	RPM	This parameter displays the current fan speed in RPMs.
CPP Learned Apply Position	-	V	This parameter displays the position learned for the clutch pedal position sensor when the clutch pedal is fully

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Parameter	System State	Expected Value	Description
			applied during the associated learn procedure.
CPP Learned Release Position	-	V	This parameter displays the position learned for the clutch pedal position sensor when the clutch pedal is released.
CPP Sensor	-	V	This parameter displays the clutch pedal position sensor analog input as a percentage of its reference voltage.
CPP Sensor	-	%	This parameter displays the position learned for the clutch pedal position sensor when the clutch pedal is fully applied during the associated learn procedure.
Crank Request Signal	-	No	This parameter displays the state of the crank request input to the control module from the ignition switch. The scan tool will display Yes when the ignition switch is in the Crank position. The scan tool will display No when the ignition switch is in any other position.
Crankshaft Position Active Counter	-	Incrementing	This parameter displays an incrementing counter when the control module receives a signal from the crankshaft position (CKP) sensor.
Crankshaft Position Signal Output Circuit High Voltage Test Status	-	OK	This parameter displays the state of the crankshaft position signal output circuit. The parameter displays Malfunction if the crankshaft position signal output circuit is shorted to voltage.
Crankshaft Position Signal Output Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the crankshaft position signal output circuit. The parameter displays Malfunction if the crankshaft position signal output circuit is shorted to ground.
Crankshaft Position Signal Output Circuit Open Test Status	-	OK	This parameter displays the state of the crankshaft position signal output circuit. The parameter displays Malfunction if the crankshaft position signal output circuit is open.
Crankshaft Position Variation Learn	-	Learn in Progress / Learning Not Enabled	This parameter displays the crankshaft position variation learn status. The scan tool shows Learn in Progress until the learn is completed.

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Parameter	System State	Expected Value	Description
			The ECM learns the new variation values at each ignition cycle.
Crankshaft Position Variation Learn Attempts	-	Counts	This parameter displays the crankshaft position variation learn attempts. The ECM learns the new variation values at each ignition cycle.
Crankshaft Position Variation Learn Required Engine Speed	-	In Range / Out Of Range	This parameter displays if the crankshaft position variation learn has reached the required engine speed.
Crankshaft Position Variation Learn Status	-	Complete / Not Complete	This parameter displays the status of the crank angle sensing error learn algorithm.
Crankshaft Position Resync Counter	-	Varies	This parameter displays the number of times the control module has to synchronize the CKP sensor.
Crankshaft Position Sensor	-	Engine Idle Speed	This parameter displays the engine speed as calculated by the control module using the signal from the CKP sensor.
Cruise Control	-	Inactive	This parameter displays the status of the cruise control system as determined by the control module. The scan tool will display Yes when the cruise control system is in control of vehicle speed. The scan tool will display No when the cruise control system is not operating.
Cruise Control Cancel Switch	-	Active	This parameter displays the status of the cruise control cancel switch as determined by the control module. The scan tool will display Active when the cruise control cancel switch is on. The scan tool will display Inactive when the cruise control cancel switch is off.
Cruise Control Inhibit Reason	-	Varies	The parameter displays the reason the cruise control system cannot engage.
Cruise Control On/Off Switch	-	Off	This parameter displays the state of the On/Off switch input to the control module . The scan tool will display On when the cruise On/Off switch is On. The scan tool will display Off when the cruise On/Off switch is Off.

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Parameter	System State	Expected Value	Description
Cruise Control Resume/Acceleration Switch	-	Inactive	This parameter displays the state of the Resume/Accel switch input to the control module When the cruise control switch is in the On position and the Resume/Accel switch is activated, the scan tool displays Active. When the Resume/Accel switch is released the scan tool displays Inactive.
Cruise Control Set/Coast Switch	-	Inactive	This parameter displays the state of the Set/Coast switch input to the control module from the cruise control system. When the cruise control switch is in the on position and the Set/Coast switch is activated, the scan tool displays Active. When the Set/Coast switch is released the scan tool displays Inactive.
Cruise Disengage 1-8 History	Cruise ON	None	The Scan tool displays the last 8 cruise control disengages in order from 1 to 8. There are 20 possible causes for the cruise control to disengage.
Cruise Resume/Acceleration Switch	-	Invalid	This parameter displays the state of the Resume/Accel switch input to the control module When the cruise control switch is in the ON position and the Resume/Accel switch is activated, the scan tool displays ON. When the Resume/Accel switch is released the scan tool displays OFF.
Current Gear	-	#	This parameter contains the current measured, or 'active' forward gear in the transmission as interpreted or determined in the Engine Control Module.
Current Gear When Engine Overspeed Detected	-	#	This parameter contains the transmission actual gear observed upon initial detection of an overspeed condition. This value will be updated upon each subsequent overspeed condition.
Cycles of Misfire Data	-	Incrementing 0-100	This parameter displays the number of cylinder firing events recorded by the control module
Cyl. 1,4,6,7 Deactivation Solenoid Valve Command	-	Off	This parameter displays On when V4 mode is commanded or Off when V8 mode is commanded.

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Parameter	System State	Expected Value	Description
Cyl. 1 - 8 Deactivation Solenoid Command	-	Cyl. On/Cyl. Off	This parameter displays Cyl. On when V4 mode is commanded or Cyl. Off when V8 mode is commanded.
Cyl. Deactivation Disable - Disable 1-8 History	-	Varies	This parameter shows the reason the Active Fuel Management system changed from V4 mode to V8 mode, for the last 8 occurrences. • Ignition Voltage • Engine Oil Pressure • Engine Oil Temperature • ECT • Engine Speed • Transmission Gear • Transmission Range • Transmission Shifting • Control Function Active • Minimum Time On All Cylinders • Maximum Deactivation Time Exceeded • Oil Aeration • Deceleration Fuel Cut-Off • Injector Stable Time • Heater Performance • MAP Sensor DTC • Brake Booster Pressure Sensor DTC • TAC System DTC • Engine Oil Pressure Sensor DTC • ECT Sensor DTC • IAT Sensor DTC • VSS DTC • Cylinder Deactivation Solenoid Valve DTC • Misfire DTC • Crankshaft Position Sensor DTC • Camshaft Position Sensor DTC • Engine Controls Ignition Relay

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Parameter	System State	Expected Value	Description
			DTC • Torque Reduction • Axle Torque Limiting • Engine Overtemperature Protection Active • Catalyst Overtemperature Protection • Piston Protection • Hot Coolant Mode • Engine Overspeed Protection Active • A/C Compressor Clutch On • HO2S 2 Test • 4WD Low Engaged • Vehicle Speed Too Low • Acceleration Request • Catalyst Temperature Low • Cylinder Deactivation System DTC • Calculated Torque • 4WD Low State Invalid • Minimum Time After TAC DTC • Hybrid/EV Powertrain Control Module Request • Fuel Alcohol Content Learn In Progress • Fuel Alcohol Content Too High • Maximum Throttle Exceeded
Cylinder Deactivation Performance Test	-	OK	This parameter displays OK if all the Active Fuel Management enabling conditions are met. The parameter displays Fault if one or more enabling conditions are out of range.
Cylinder Deactivation System Command	-	All Cylinder	This parameter displays several signals associated with the status of the Active Fuel Management system.
Cylinder Deactivation Cycles	-	Counts	This parameter displays the number of times the engine switches between V8 mode, and V4 mode during each ignition cycle. The counter will reset to zero and increment again, if the

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Parameter	System State	Expected Value	Description
			count reaches 255 during the current ignition cycle.
Cylinder 1, 4, 6, 7 Current Misfire Counter	-	Counts	This parameter displays the number of misfires detected for cylinder's 1-8 within the current 100 engine cycle test interval. The set of misfire counters for the individual cylinders are maintained such that if a single misfire is detected over an engine cycle.
Cylinder 1, 4, 6, 7 Deactivation Solenoid Valve Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the deactivation solenoid valve control circuit. The parameter displays Malfunction if the deactivation solenoid valve control circuit is shorted to voltage.
Cylinder 1, 4, 6, 7 Deactivation Solenoid Valve Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the deactivation solenoid valve control circuit. The parameter displays Malfunction if the deactivation solenoid valve control circuit is shorted to ground.
Cylinder 1-8 History Misfire Counter	-	Counts	This parameter displays the number of misfires detected for cylinder's 1-8 since a misfire failure has been reported.
Cylinder 1-8 Injector Control Circuit Status	-	OK	This parameter displays the status of the fuel injector's 1-8 output malfunction for Short circuit from injector high side to ground or system voltage, Short circuit from injector low side to injector low side, Short circuit from injector low side to ground or system voltage, Short circuit from injector high side to low side and Injector open circuit.
Cylinder 1-8 Injector Disabled - Misfire Detected	-	No	This parameter displays when an injector is disabled in a specific engine cylinder due to a misfire being detected.
Cylinder 1-8 Knock Detected	-	No	This parameter indicates if a knock has been detected over a calibratable sample period.
Cylinder Deactivation Cycles	-	Counts	This parameter displays the number of times the engine switches between V8 mode, and V4 mode during each ignition cycle.

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Parameter	System State	Expected Value	Description
Cylinder Deactivation Inhibit Reason	-	Yes/No	This parameter displays Yes if one of the following Deactivation Inhibit Reasons is detected. • Engine Coolant • Temperature Out of Range • Engine Oil Temperature Out of Range • Engine Oil Pressure Out of Range • Ignition Voltage Out of Range • Accelerator Pedal Position High • Accelerator Pedal Position Increase High • Brake Vacuum Pressure Low • Engine Manifold Vacuum Pressure Low • Engine Oil Aeration Present • Maximum Deactivation Time Exceeded • Minimum Time with All Cylinders Activated Not Met • All Cylinders Activated via Device Control • Transmission Gear Shift in Progress • Transmission Range Incorrect • Transmission Gear Incorrect • Engine Speed Out of Range • Tip In Bump Active • Vehicle Speed Too Low • In 4WD Low State • POSD Intrusive Active • AC Clutch Being Engaged • Heater Performance • Fuel Shut-Off Stability Timer Active • Decel Fuel Cutoff Active • Maximum Throttle Exceeded • Ethanol Concentration Too High

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Parameter	System State	Expected Value	Description
			• Ethanol Learn In Progress • ETC Disable Time • Catalyst Temperature Low • Displacement on Demand Solenoid Driver Fault • Vehicle Speed Fault • Intake Air Temperature Sensor Fault • Engine Coolant Temperature Sensor Fault • Engine Oil Pressure Sensor Fault • Electronic Throttle Control Reduced Engine Power Active • Brake Vacuum Pressure Sensor Fault • Manifold Absolute Pressure Sensor Fault • Catalyst Converter Overtemperature Protection Active • Engine Metal Overtemperature Protection Active • Axle Torque Limiting Active (Obsolete) • Brake Torque Management Active (Obsolete) • Powertrain Relay Fault • Cam Sensor Fault • Crank Sensor Fault • Engine Misfire Detected • Invalid 4WD Low State • Torque Model Inaccurate Fault • Cylinder Deactivation System Fault • Engine Overspeed Protection Active • Hot Coolant Mode Active • Piston Protection Active
Cylinder Deactivation Performance Test	-	OK	This parameter displays OK if all the Active Fuel Management enabling conditions are met. The parameter

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Parameter	System State	Expected Value	Description
			displays Malfunction if one or more enabling conditions are out of range.
Cylinder Deactivation Performance Test	-	OK	This parameter displays if the commanded cylinder deactivation failed. This indicates that one or more cylinders failed to deactivate when commanded to do so by displacement by demand.
Cylinder Deactivation System Command	-	All Cylinder	This parameter displays several signals associated with the status of the Active Fuel Management system.
Deceleration Fuel Cut-Off	-	Inactive	This parameter displays the status of the operating mode used to turn OFF the fuel injectors during certain deceleration conditions. When the scan tool displays Active, the control module has turned OFF the fuel injectors. When the scan tool displays Inactive, the fuel system is operating normally.
Desired Camshaft Position	-	0 degrees	This parameter displays the set point for the position of the intake camshaft for bank 1 in terms of degrees of camshaft rotation (advance) from the park position.
Desired Fuel Rail Pressure	-	MPa / PSI	This parameter displays the desired fuel rail pressure at the engine.
Desired Idle Speed	-	RPM	This parameter displays the desired idle engine speed after the application of all limits and corrections.
Desired Intake Camshaft Position	-	Â°	This parameter displays the set point for the position of the intake camshaft for bank 1 in terms of degrees of camshaft rotation (advance) from the park position.
Desired Throttle Position	-	%	This parameter displays the desired throttle position used to control the throttle motor, which is determined from the arbitration of the various requests for the authority to control the throttle, including remedial actions.
Distance Since DTC Cleared	-	km / miles	This parameter displays the distance accumulated since an emission diagnostic trouble code was cleared. The scan tool will display increasing distance as the vehicle is driven.

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Parameter	System State	Expected Value	Description
Distance Since First Malfunction	-	Varies	This parameter displays the distance accumulated when the emission diagnostic trouble code first failed.
Distance Since Last Malfunction	-	km / miles	The parameter displays the distance driven since the last engine controls malfunction.
Distance Since Last Oil Level Warning	-	km / miles	This parameter displays the distance driven since the last oil level warning.
Distance Since Last Oil Pressure Warning	-	km / miles	This parameter displays the distance driven since the last oil pressure warning.
Distance Since Recommended Maximum Fuel Alcohol Content Exceeded	-	km / miles	This parameter displays the accumulated distance driven since the most recent time that the recommended ethanol concentration was exceeded.
Distance with Cylinder Activated	-	km/miles	This parameter displays the accumulated distance driven with all of the engine's cylinders activated during the current Ignition key cycle.
Distance with Cylinder Deactivated	-	km/miles	This parameter displays the accumulated distance driven with the engine's cylinders deactivated during the current Ignition key cycle.
Drag Control Status	-	Active / Inactive	This parameter displays Active when the requested torque signal is above the driver requested value while the traction control system signal input is active.
Driver Requested Axle Torque	-	Â	This parameter displays a (desired) output value after comparing engine load as an input to the hybrid control processor and engine control module. **NOTE:** **Comparing this parameter to the Engine Torque Actual parameter can be useful in diagnosing a concern. The values**

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Parameter	System State	Expected Value	Description
			between these 2 parameter should be similar.
Drop-Throttle Detected while Traction Control Active	-	No	This parameter displays if a drop-throttle was detected while the traction control was active.
Drop-Throttle Status	-	Inactive	This parameter displays the status of a drop-throttle.
Engine Controls Ignition Relay Feedback Signal	-	Battery Voltage	This parameter displays the voltage signal sent to the control module from the engine control ignition relay. The scan tool will display battery voltage when the engine is running. The scan tool will display no voltage when the relay is OFF.
ECM Challenge Status	-	Valid	This parameter shows the immobilizer system status of the ECM challenge. This indicates whether the currently calculated ECM challenge is valid.
ECM in Immobilizer Fail Enable	-	No	This parameter displays whether or not the engine control module (ECM) is in failure enable mode for the vehicle theft deterrent (VTD) system.
ECT Sensor	-	Varies Â°C/Â°F	This parameter displays the temperature of the engine coolant based on the input from the engine coolant temperature (ECT) sensor. When the coolant temperature is low, the scan tool will display a low temperature. When the coolant temperature is high, the scan tool will display a high temperature.
EGR/Camshaft Position Monitor Complete	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor. The parameter will display Yes when the EGR/Camshaft Position Monitor is complete.
EGR/Camshaft Position Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor for this Ignition Cycle. The parameter will display Yes when the EGR/Camshaft Position Monitor is complete this Ignition Cycle.

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Parameter	System State	Expected Value	Description
EGR/Camshaft Position Monitor Enabled	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor. The parameter will display Yes when the EGR/Camshaft Position Monitor is Enabled.
EGR/Camshaft Position Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the status of the EGR/Camshaft Position Monitor for this Ignition Cycle. The parameter will display Yes when the EGR/Camshaft Position Monitor is Enabled this Ignition Cycle.
Electric Power Management Inhibit Reason	-	None	This parameter displays the reason of the Regulated Voltage Control (RVC) override command. RVC lowers system operating voltage to reduce system electrical load and improve fuel economy performance.
Engine Controls Ignition Relay Command	-	On/Off	This parameter displays the state of the control circuit for the engine control module power relay as commanded by the engine control module.
Engine Controls Ignition Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the engine controls ignition relay control circuit. The parameter displays Malfunction if the engine controls ignition relay control circuit is shorted to voltage.
Engine Controls Ignition Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the engine controls ignition relay control circuit. The parameter displays Malfunction if the engine controls ignition relay control circuit is shorted to grounded.
Engine Controls Ignition Relay Control Circuit Open Test Status	-	OK	This parameter displays the state of the engine controls ignition relay control circuit. The parameter displays Malfunction if the engine controls ignition relay control circuit is open.
Engine Controls Ignition Relay Feedback Signal	-	Battery Voltage	This parameter displays the voltage of the powertrain relay feedback to the controller.
Engine Load	-	25-30%	This parameter displays the engine load in percent based on inputs to the control module from various engine sensors. The scan tool will display a low percentage when the engine is at

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Parameter	System State	Expected Value	Description
			idle with little or no load. The scan tool will display a high percentage when the engine is running at a high RPM under a heavy load.
Engine Load During Misfire History 1 - 5	-	%	This parameter displays the specific engine speed and load in which the engine was operating for one of the last five misfire events immediately prior to Misfire Test Failed This Key On (TFTKO) = True.
Engine Off Time	-	hh:mm:ss	This parameter displays the time elapsed since the engine turned OFF. The scan tool will display the time in hours, minutes and seconds. The engine OFF time will reset to zero when the engine starts.
Engine Oil Level Switch	-	OK	This parameter displays the state of the engine oil pressure (EOP) as determined by the control module. The control module monitors the EOP switch to determine if the EOP is sufficient. The scan tool will display low when the EOP is below a predetermined value.
Engine Oil Life Remaining	-	%	This parameter displays the amount engine oil life remaining before requiring an oil change based on calculations by the control module. The scan tool will display lower values as the engine oil life approaches 0 miles.
Engine Oil Pressure Sensor	-	kPa/PSI	This parameter displays the actual engine oil pressure measured by a sensor.
Engine Oil Pressure Switch	-	OK	This parameter displays the state of the engine oil pressure (EOP) as determined by the control module. The control module monitors the EOP switch to determine if the EOP is sufficient. The scan tool will display low when the EOP is below a predetermined value.
Engine Oil Temperature Sensor	-	Varies Â°C/Â°F	This parameter displays the engine oil temperature.
Engine Oil Temperature When Engine Overspeed Detected	-	Varies Â°C/Â°F	This parameter displays the engine oil temperature when the engine overspeed was detected.

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Parameter	System State	Expected Value	Description
Engine Overspeed	-	Not Present	This parameter displays if an engine overspeed is detected. The scan tool will display Present when an engine overspeed is detected.
Engine Run Time	-	hh:mm:ss	This parameter displays the time elapsed since the engine was started. The scan tool will display the time in hours, minutes and seconds. The engine run time will reset to zero when the engine stops running.
Engine Serial Number	-	#	This parameter displays the engine serial number.
Engine Shutdown Counter	-	Counts	This parameter displays the engine shutdown counts for specific reasons including excessive idle, high coolant temperature, low coolant level, or low oil level.
Engine Speed	-	600 RPM	This parameter displays the speed of the crankshaft as determined by the control module using an input from the CKP sensor. The scan tool will display a high value at high engine speeds and a low value at low engine speeds.
Engine Speed During Misfire History 1 - 5	-	RPM	This parameter displays the speed of the crankshaft as determined by the control module using an input from the CKP sensor at the time of engine misfire.
Engine Speed When Engine Overspeed Detected	-	RPM	This parameter displays the speed of the crankshaft as determined by the control module using an input from the CKP sensor at the time of engine overspeed.
EVAP Malfunction History	-	Varies	This parameter contains the result of the most recently completed evaporative emissions diagnostic test.
EVAP Monitor Complete	-	Yes/No	This parameter displays if the most recent evaporative emissions diagnostic test is complete.
EVAP Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays if the most recent evaporative emissions diagnostic test has completed this ignition cycle.
EVAP Monitor Enabled	-	Yes/No	This parameter displays if the evaporative emissions diagnostic test is enabled.

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Parameter	System State	Expected Value	Description
EVAP Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays if the evaporative emissions diagnostic test is enabled this ignition cycle.
EVAP Purge Solenoid Valve Command	-	%	This parameter displays the on-time or duty cycle of the EVAP purge solenoid commanded by the control module expressed as a percent. The scan tool will display a high percentage when the control module is commanding the EVAP purge solenoid to be open a large amount . The scan tool will display a low percentage when the control module is commanding the EVAP purge solenoid to be open a small amount. The scan tool will display 0 when the control module is commanding the EVAP purge solenoid closed.
EVAP Purge Solenoid Valve Control Circuit High Voltage Test Status	-	OK	This parameter displays the EVAP purge solenoid valve control circuit. The parameter displays Malfunction if the EVAP purge solenoid valve circuit is shorted to voltage.
EVAP Purge Solenoid Valve Control Circuit Low Voltage Test Status	-	OK	This parameter displays the EVAP purge solenoid valve control circuit. The parameter displays Malfunction if the EVAP purge solenoid valve circuit is shorted to ground.
EVAP Purge Solenoid Valve Control Circuit Open Test Status	-	OK	This parameter displays the EVAP purge solenoid valve control circuit. The parameter displays Malfunction if the EVAP purge solenoid valve circuit is open.
EVAP Vent Solenoid Valve Command	-	Venting	This parameter displays the state of the EVAP vent solenoid commanded by the control module. The scan tool will display venting when the control module is commanding the EVAP vent solenoid to be open. The scan tool will display a not venting when the control module is commanding the EVAP vent solenoid to be closed.
EVAP Vent Solenoid Valve Control Circuit High Voltage Test Status	-	OK	This parameter displays the EVAP vent solenoid valve control circuit. The parameter displays Malfunction if the EVAP vent solenoid valve circuit is shorted to voltage.

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Parameter	System State	Expected Value	Description
EVAP Vent Solenoid Valve Control Circuit Low Voltage Test Status	-	OK	This parameter displays the EVAP vent solenoid valve control circuit. The parameter displays Malfunction if the EVAP vent solenoid valve circuit is shorted to ground.
EVAP Vent Solenoid Valve Control Circuit Open Test Status	-	OK	This parameter displays the EVAP vent solenoid valve control circuit. The parameter displays Malfunction if the EVAP vent solenoid valve circuit is open.
Extended Travel Brake Pedal Position Circuit Signal	-	Applied / Released	This parameter displays that no failures have been detected in the determination of the Brake Pedal Moderate Travel Achieved signal within the platform brake sensing module as received over serial communication.
Extended Travel Brake Pedal Position Signal	-	Applied, Released, Invalid	This parameter displays the undefaulted determination of brake pedal travel beyond a moderate/extended travel threshold by the platform brake sensing module and is received over serial communication.
Extended Travel Brake Pedal Switch	-	Applied / Released	This parameter displays that no failures have been detected in the determination of the Brake Pedal Moderate Travel Achieved signal within the platform brake sensing module as received over serial communication.
Freeze Frame DTC	-	#	This parameter displays the diagnostic trouble code (DTC) that caused the freeze frame to be stored.
Fuel Alcohol Content	-	%	This parameter indicates the percentage of alcohol contained in ethanol or methanol fuels.
Fuel Alcohol Content When Recommended Maximum Fuel Alcohol Content Exceeded	-	%	This parameter displays the actual fuel alcohol percentage at the most recent time that the recommended ethanol concentration was exceeded.
Fuel Composition Learn	-	Active / Inactive	This parameter indicates if the fuel composition learn status is active.
Fuel Composition Sensor	-	Hz	This parameter displays the frequency of the fuel composition sensor.
Fuel Composition Sensor	-	Ms	This parameter displays the fuel composition sensor on time.

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Parameter	System State	Expected Value	Description
Fuel Consumed Since Recommended Maximum Fuel Alcohol Content Exceeded	-	Liters	This parameter displays the amount of fuel consumed since the most recent time that the recommended ethanol concentration was exceeded.
Fuel Control Loop Status	-	Closed	This parameter displays the fuel system loop status.
Fuel Economy	-	L/h	This parameter displays the instantaneous fuel consumption rate of the engine in liters per hour.
Fuel Enrichment - Hot Catalyst	-	Yes/No	This parameter displays Yes when fuel is being added to cool the catalytic converter.
Fuel Enrichment - Hot Coolant	-	Active / Inactive	This parameter displays Active when the conditions to enable hot coolant enrichment are active and that a richer than stoichiometric air/fuel ratio is being commanded in order to help cool the engine when a system malfunction is causing the engine to run at extreme temperatures.
Fuel Level Sensor	-	0-5 Volts	This parameter displays the voltage signal received by the control module from the fuel level sensor.
Fuel Level Sensor Left Tank	-	0-5 Volts	This parameter displays the voltage signal received by the control module from the fuel level sensor for the left tank.
Fuel Level Sensor Right Tank	-	0-5 Volts	This parameter displays the voltage signal received by the control module from the fuel level sensor for the right tank.
Fuel Pressure Regulator 1 Control Circuit Command	-	On/Off	This parameter displays the commanded state of the fuel pressure regulator 1 low side output.
Fuel Pressure Regulator 1 Control Circuit High Voltage Test Status	-	OK	This parameter displays the diagnostic state of the fuel pressure regulator control circuit as determined by the control module. The scan tool will display OK, Malfunction or Not Run. The scan tool will display OK if the circuit is operating correctly.
Fuel Pressure Regulator 1 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the diagnostic state of the fuel pressure regulator control circuit as determined by the control module. The scan tool will display OK, Malfunction or Not Run. The scan

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Parameter	System State	Expected Value	Description
			tool will display OK if the circuit is operating correctly.
Fuel Pressure Regulator 1 Control Circuit Open Test Status	-	OK	This parameter displays the diagnostic state of the fuel pressure regulator control circuit as determined by the control module. The scan tool will display OK, Malfunction or Not Run. The scan tool will display OK if the circuit is operating correctly.
Fuel Pressure Regulator 1 High Control Circuit Command	-	%	This parameter displays the commanded duty cycle for the fuel pressure regulator 1 solenoid output.
Fuel Pressure Regulator 1 High Control Circuit Command	-	On/Off	This parameter displays the commanded state of the fuel pressure regulator 1 high side output.
Fuel Pressure Regulator 1 High Control Circuit High Voltage Test Status	-	OK, Malfunction, Not Run	This parameter displays the state of the fuel pressure regulator circuit voltage. The parameter displays Malfunction if the fuel pressure regulator circuit voltage is shorted to voltage.
Fuel Pressure Regulator 1 High Control Circuit Low Voltage Test Status	-	OK, Malfunction, Not Run	This parameter displays the state of the fuel pressure regulator circuit voltage. The parameter displays Malfunction if the fuel pressure regulator circuit voltage is shorted to ground.
Fuel Pressure Regulator 1 High Control Circuit Open Test Status	-	OK, Malfunction, Not Run	This parameter displays the state of the fuel pressure regulator circuit voltage. The parameter displays Malfunction if the fuel pressure regulator circuit voltage is open.
Fuel Pressure Sensor	-	kPa / PSI	This parameter displays fuel rail pressure at the engine when the reading is referenced to atmosphere (gauge pressure).
Fuel Pump Enable Circuit High Voltage Test Status	-	OK	This parameter displays the state of the fuel pump enable circuit voltage. The parameter displays Malfunction if the fuel pump enable circuit voltage is shorted to voltage.
Fuel Pump Enable Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the fuel pump enable circuit voltage. The parameter displays Malfunction if the fuel pump enable circuit voltage is shorted to grounded.

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Parameter	System State	Expected Value	Description
Fuel Pump Enable Circuit Open Test Status	-	OK	This parameter displays the state of the fuel pump enable circuit voltage. The parameter displays Malfunction if the fuel pump enable circuit voltage is open.
Fuel Pump Enabled Command	-	On	This parameter displays the commanded state of the Fuel Pump control circuit. The fuel pump should be On when the scan tool indicates the Fuel Pump Enable command is On. The fuel pump should be OFF when the scan tool indicates the Fuel Pump Enable +-*+Command is Off.
Fuel Rail Pressure Sensor	-	Volts	This parameter displays the fuel rail pressure analog input as a percentage of its reference voltage.
Fuel System Monitor Complete	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
Fuel System Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
Fuel System Monitor Enabled	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
Fuel System Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
Fuel Tank Pressure Sensor	-	1.5 Volts	This parameter displays the voltage signal sent to the control module from the sensor used to monitor the pressure inside the fuel tank. The scan tool will display a low voltage when the pressure in the fuel tank is high. The scan tool will display a high voltage when the pressure in the fuel tank is low or in a vacuum.

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Parameter	System State	Expected Value	Description
Fuel Tank Pressure Sensor	-	0 inches H2O (0 mm Hg)	This parameter displays the fuel tank pressure as calculated based on a signal sent to the control module from the fuel tank pressure (FTP) sensor. The scan tool will display a low value when the pressure in the fuel tank is low or a vacuum. The scan tool will display a high value when the pressure in the fuel tank is high.
Fuel Tank Rated Capacity	-	Varies	This parameter displays the rated maximum quantity of fuel the fuel tank will hold. This is calibrated in the control module to match the vehicle. See Owner's Manual-Capacities and Specifications.
Fuel Trim Cylinder Balance Test Bank 1 or 2	-	Active/Inactive	This parameter displays the current state of the AFIM. A value of "Active" indicates that the monitor is currently performing an evaluation of the specified bank. A value of "Inactive" indicates that the monitor is NOT currently performing an evaluation of the specified bank.
Fuel Trim Cylinder Balance Test Counter Bank 1 or 2	-	Counts	This parameter displays the number of Air Fuel Imbalance Monitor tests that have been performed since a code clear or NVM reset for bank 1 or 2.
Fuel Trim Learn	-	Enabled	This parameter indicates if the control module is adjusting long term fuel trim in response to the short term fuel trim. The scan tool displays Enabled or Disabled. When conditions are appropriate for enabling long term fuel trim corrections, the scan tool displays Enabled.
Fuel Trim Memory Cell	-	#	This parameter displays the index of the entry within the array of long term fuel corrections that is active based upon the current operating conditions (MAP, engine speed, purge duty cycle, A/C compressor state, and transmission range).
Fuel Trim System Test State	-	Monitoring	This parameter indicates the status of the Fuel Trim System Test. The scan tool will display Disabled, Enabled, Monitoring, or Run Purge Test.

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Parameter	System State	Expected Value	Description
Fuel Volatility	-	Varies	This parameter indicates the rate the fuel can be vaporized in the cylinder as calculated by the control module. The scan tool displays Low, Moderate, or High. The scan tool will display High when the fuel volatility is high. The scan tool will display Low when the fuel volatility is low.
Generator F-Terminal Signal	-	%	This parameter displays the filtered generator F-terminal duty cycle.
Generator Indicator Command	-	On/Off	This parameter displays signals associated with the status of the generator.
Generator L-Terminal Circuit High Voltage Test Status	-	OK	This parameter displays the state of the generator l-terminal circuit voltage. The parameter displays Malfunction if the generator l-terminal circuit voltage is shorted to voltage.
Generator L-Terminal Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the generator l-terminal circuit voltage. The parameter displays Malfunction if the generator l-terminal circuit voltage is shorted to ground.
Generator L-Terminal Circuit Open Test Status	-	OK	This parameter displays the state of the generator l-terminal circuit voltage. The parameter displays Malfunction if the generator l-terminal circuit voltage is open.
Generator L-Terminal Command	-	%	This parameter displays the commanded state of generator L-terminal duty cycle in percentage.
Generator L-Terminal Signal Command	-	On/Off	This parameter displays the commanded state of the generator L-terminal output
Heated Catalyst Monitor Complete	-	Yes	This parameter indicates the status of the heated catalyst. The scan tool displays Yes when the diagnostic is complete. And No if the diagnostic has not ran or a malfunction is detected in the heated catalyst.
Heated Catalyst Monitor Enabled	-	Yes	This parameter indicates the status of the heated catalyst monitor diagnostic. Catalyst Monitor Test Running indicates Yes or No when the heated catalyst monitor

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Parameter	System State	Expected Value	Description
			diagnostic is actively running a test.
HO2S Bank 1 or 2 Sensor 1 or Sensor 2	-	Volts	This parameter indicates the heated oxygen sensor (HO2S) bank 1 or bank 2, sensor 1 output voltage as measured by the control module. The scan tool value fluctuates constantly while operating in Closed Loop. The scan tool will display a higher value during rich running conditions, and a lower value during leaner running conditions.
HO2S Heater Bank 1 or 2 Sensor 1 or 2	-	mA	This parameter displays the current through the control module when the bank 1 or bank 2, sensor 1 HO2S heater is commanded ON by the control module. HO2S Heater Bank 1 Sen. 1 is a range of values indicating a low current when the heater circuit resistance is high to a high current when the heater circuit resistance is low.
HO2S Heater Command Bank 1 - 2 Sensor 1 - 2	-	0-99%	This parameter displays the commanded state of the Bank 1 Sensor 2 heater by the control module. The scan tool will display a higher value as the heater command is increased, and a lower value if the heater is not commanded ON.
HO2S Heater Command Bank 1 - 2 Sensor 1 - 2	-	On/Off	This parameter displays the commanded state of the Bank 1 Sensor 2 heater by the control module. The scan tool will display ON if the heater is commanded on.
HO2S Heater Control Circuit High Voltage Test Status Bank 1 - 2 Sensor 1 - 2	-	OK	This parameter displays the state of the HO2S heater control circuit. The parameter displays Malfunction if the HO2S heater control circuit is shorted to voltage.
HO2S Heater Control Circuit Low Voltage Test Status Bank 1 - 2 Sensor 1 - 2	-	OK	This parameter displays the state of the HO2S heater control circuit. The parameter displays Malfunction if the HO2S heater control circuit is shorted to ground.
HO2S Heater Control Circuit Open Test Status Bank 1 - 2 Sensor 1 - 2	-	OK	This parameter displays the state of the HO2S heater control circuit. The parameter displays Malfunction if the HO2S heater control circuit is shorted to open.

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Parameter	System State	Expected Value	Description
HO2S Heater Monitor Complete	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
HO2S Heater Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
HO2S Heater Monitor Enabled	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
HO2S Heater Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the enable and completion status during the current driving / monitoring cycle of each continuous legislated emission related monitor and non-continuous legislated emission related monitor.
IAT Sensor	-	Varies Â°C/Â°F	This parameter displays the temperature of the air entering the engine as calculated by the control module based on the input from the intake air temperature (IAT) sensor. The scan tool will display a low value when the air temperature is low, and a high value when the air temperature is high.
Ignition Accessory Signal	-	On	This parameter displays the state of the ignition 0 input to the control module from the ignition switch. The scan tool will display ON when the ignition switch is in the ignition accessory position. The scan tool will display OFF when the ignition switch is in any other position.
Ignition Coil 1 - 8 Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the ignition coil control circuit voltage. The parameter displays Malfunction if the ignition coil control circuit voltage is shorted to voltage.

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Parameter	System State	Expected Value	Description
Ignition Coil 1 - 8 Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the ignition coil control circuit voltage. The parameter displays Malfunction if the ignition coil control circuit voltage is shorted to ground.
Ignition Coil 1 - 8 Control Circuit Open Test Status	-	OK	This parameter displays the state of the ignition coil control circuit voltage. The parameter displays Malfunction if the ignition coil control circuit voltage is open.
Ignition Coil Supply Voltage Bank 1 - 2	-	On/Off	This parameter displays indicates that the feedback hardwire input to the controller for the ignition module power supply is active on the bank containing cylinder 1 or 2.
Ignition Cycles Since Recommended Maximum Fuel Alcohol Content Exceeded	-	Counts	This parameter displays the number of ignitions cycles since the most recent time that the recommended ethanol concentration was exceeded.
Ignition Cycles with Malfunction Since 1st Malfunction	-	Counts	This parameter displays the number of ignition cycles with a failure reported since the first ignition cycle with a failure reported.
Ignition Cycles without Completed Test Since 1st Malfunction	-	Counts	This parameter displays the number of ignition cycles without a pass or a failure reported since the first ignition cycle with a failure reported.
Ignition Cycles without Malfunction Since Last Malfunction	-	Counts	This parameter displays the number of ignition cycles with a pass reported and no failures reported since the first ignition cycle with a failure reported.
Ignition Timing	-	Â°	This parameter displays the final spark advance in terms of crankshaft angle.
Ignition 1 Signal	-	Battery Voltage	This parameter displays the voltage measured at the ignition 1 circuit of the control module. Voltage is applied to the control module when the ignition switch is in the ignition 1 position. The scan tool will display a low value when the voltage is low. The scan tool will display a high value, such as battery voltage, when the voltage is higher.
Immobilizer Auto Learn Counter	-	Counts	The scan tool displays the count value when using the 30-minute

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Parameter	System State	Expected Value	Description
			reprogramming procedure. Three 10-minute cycles, or three counts, are required to complete the 30-minute auto learn reprogramming procedure.
Immobilizer Automatic Learn Timer	-	hh:mm:ss	This parameter indicates that either the auto learn timer (used in the auto learn procedure to enable VTD password learning) or the seed and key timer (used in the seed and key procedure to enable VTD password learning) is active.
Immobilizer Automatic Learn Timer	-	Inactive	This parameter indicates that either the auto learn timer (used in the auto learn procedure to enable immobilizer password learning) or the seed and key timer (used in the seed and key procedure to enable immobilizer password learning) is active.
Immobilizer Fuel Disable	-	Inactive	This parameter indicates the immobilizer system has disabled fuel.
Immobilizer Fuel Disable Until Ignition Off	-	Inactive	The parameter indicates the immobilizer system has disabled fuel for the remainder of the ignition cycle.
Immobilizer Fuel Enable	-	Yes	This parameter indicates the immobilizer system has enabled fuel.
Immobilizer Password Learn	-	Yes/No	This parameter indicates that the security password has been learned.
Immobilizer Password Learn Scan Tool Delay	-	Active / Inactive	This parameter indicates that the security code has been accepted but the scan tool delay is active.
Immobilizer Security Code Accepted	-	Yes/No	This parameter indicates that the received immobilizer system security code is correct.
Immobilizer Security Code Function	-	Present / Not Present	This parameter indicates if the ECU supports the immobilizer security code strategy
Immobilizer Security Code Lockout	-	Active / Inactive	This parameter displays Active or Inactive. Security Code Lockout Active indicates that the security code has not passed and lockout is active.
Immobilizer Security Code Lockout Active Timer	-	ms	This parameter displays the time elapsed since the immobilizer security code lockout has been activated either due to a battery

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Parameter	System State	Expected Value	Description
			disconnect or an incorrect immobilizer security code being entered.
Immobilizer Security Code Programmed	-	Yes/No	This parameter indicates if the immobilizer system security code has been programmed.
Immobilizer Security Code Programming Counter	-	Counts	This parameter displays the number of times a new immobilizer security code has been programmed through secure access.
Immobilizer Security Code Reset Counter	-	Counts	This parameter displays the number of times the immobilizer security code has been reset to the default value through secure access.
Immobilizer System Status	-	Varies	This parameter displays the current state of the immobilizer algorithm.
Immobilizer Valid Response Received Time	-	ms	This parameter displays the actual time observed for a valid immobilizer response.
Initialized Fuel Alcohol Content	-	%	This parameter displays the initialized fuel composition to be used as a starting point for the fuel composition algorithm.
Injector Duty Cycle Bank 1 or 2	-	ms	This parameter displays the fuel injector pulse width (on-time) commanded to each cylinder on bank 1 or 2.
Inspection/Maintenance Drive Cycle Complete	-	Yes/No	This parameter displays that all required components of the standard drive cycle have completed.
Inspection/Maintenance Drive Cycle Idle Time Complete	-	Yes/No	This parameter displays that the internal combustion engine (ICE) idle time requirement is complete.
Inspection/Maintenance Drive Cycle Idle Timer	-	hh:mm:ss	This parameter displays the accumulated amount of contiguous time after the first internal combustion engine (ICE) start in which both pedal position and vehicle speed are zero.
Inspection/Maintenance Drive Cycle Propulsion System Active Time Complete	-	Yes/No	This parameter displays that the vehicle propulsion system has been active for the required amount of time.
Inspection/Maintenance Drive Cycle Vehicle Speed Time Complete	-	Yes/No	This parameter displays that the vehicle speed or load has been above a calibratable threshold for five minutes.

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Parameter	System State	Expected Value	Description
Inspection/Maintenance Drive Cycle Vehicle Speed Timer	-	hh:mm:ss	This parameter displays the total accumulated time in which the vehicle speed has been > 25 mph or the load has been above a calibratable threshold after the 1st time the internal combustion engine (ICE) is started each key on.
Intake Air Humidity Sensor	-	%	This parameter displays the raw duty cycle signal from the relative humidity sensor electronics, which represents the relative humidity of the intake air.
Intake Camshaft Position	-	Â°	This parameter displays the position of the intake camshaft for bank 1 in terms of degrees of camshaft rotation (advance) from the park position (a value of zero represents the park position).
Intake Camshaft Position Active Counter	-	Counts	This parameter displays a rolling count of the number of intake cam position sensor pulses for bank 1.
Intake Camshaft Position Actuator Solenoid Valve Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the camshaft position actuator solenoid control circuit voltage. The parameter displays Malfunction if the camshaft position actuator solenoid control circuit voltage is shorted to voltage.
Intake Camshaft Position Actuator Solenoid Valve Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the camshaft position actuator solenoid control circuit voltage. The parameter displays Malfunction if the camshaft position actuator solenoid control circuit voltage is shorted to ground.
Intake Camshaft Position Actuator Solenoid Valve Control Circuit Open Test Status	-	OK	This parameter displays the state of the camshaft position actuator solenoid control circuit voltage. The parameter displays Malfunction if the camshaft position actuator solenoid control circuit voltage is open.
Intake Camshaft Position Command	-	%	This parameter displays the commanded duty cycle for the intake cam phase output for bank 1.
Intake Camshaft Position Variance	-	Â°	This parameter displays the absolute difference between the desired and actual positions of the intake

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Parameter	System State	Expected Value	Description
			camshaft for bank 1 in terms of degrees of camshaft rotation.
Intake Manifold Pressure	-	70-75 kPa / 10-11 PSI	This parameter displays the pressure difference between the MAP and the barometric pressure (BARO) as calculated by the control module. The scan tool will display a higher value during high vacuum conditions, such as idle or deceleration. The scan tool will display a lower value during low vacuum conditions, such as wide open throttle or low load cruising.
Knock Retard	-	Â°	This parameter indicates the amount of spark advance the control module removes from the ignition control (IC) spark advance in response to the signal from the knock sensors. The scan tool displays a high value for a large amount of spark retard, and a low value for a small amount of spark retard.
Long Term Fuel Trim Bank 1 or Bank 2	-	0% Â± 10%	This parameter is calculated by the control module based on the Short Term FT value. The Long Term FT bank 1 is used for the long term correction of the fuel delivery in bank or bank 2. The scan tool will a high value for a large amount of long term fuel correction, and 0 percent for no long term fuel trim correction. The scan tool will display a negative value when fuel system is running too rich and fuel is being removed from the combustion event. The scan tool will display a positive value if the fuel system is running lean and fuel is being added to the combustion event.
Long Term Fuel Trim Average Bank 1 or Bank 2	-	1%	This parameter is calculated by the control module based on an intrusive test by the control module. The Long Term FT test average used for the long term correction of the fuel delivery in each bank. The scan tool will a high value for a large amount of long term fuel correction, and 0 percent for no long term fuel trim correction. The scan tool will display

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Parameter	System State	Expected Value	Description
			a negative value when fuel system is running too rich and fuel is being removed from the combustion event. The scan tool will display a positive value if the fuel system is running lean and fuel is being added to the combustion event.
Long Term Fuel Trim Average Bank 1 or Bank 2 without Purge	-	%	This parameter is calculated by the control module based on the Short Term FT value. The Long Term FT bank 1 is used for the long term correction of the fuel delivery in bank 1. The scan tool will display a high value for a large amount of long term fuel correction, and 0 percent for no long term fuel trim correction. The scan tool will display a negative value when fuel system is running too rich and fuel is being removed from the combustion event. The scan tool will display a positive value if the fuel system is running lean and fuel is being added to the combustion event.
Long Term Fuel Trim Test Average Bank 1	-	%	This parameter displays the filtered long term closed loop fuel correction for bank 1 (accumulated while the excess purge vapor test is inhibited), which is filtered using a first-order lag filter, also known as an exponentially weighted moving average (EWMA). This value is compared to thresholds to determine if the fuel adjustment system diagnostic is passing or failing or if an excess purge vapor test should be executed.
Long Term Fuel Trim Test Average Bank 2	-	%	This parameter displays the filtered long term closed loop fuel correction for bank 2 (accumulated while the excess purge vapor test is inhibited), which is filtered using a first-order lag filter, also known as an exponentially weighted moving average (EWMA). This value is compared to thresholds to determine if the fuel adjustment system diagnostic is passing or failing or if an excess purge vapor test should be

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Parameter	System State	Expected Value	Description
			executed.
Long Term Fuel Trim Test Average without Purge Bank 1	-	%	This parameter displays the filtered non purge long term closed loop fuel correction for bank 1 (accumulated while purge is off), which is filtered using a first-order lag filter, also known as an exponentially weighted moving average (EWMA). This value is compared to thresholds to determine if the fuel adjustment system diagnostic is passing, failing, or indeterminate during normal purge-off operation as well as during the intrusive excess purge vapor test.
Long Term Fuel Trim Test Average without Purge Bank 2	-	%	This parameter displays the filtered non purge long term closed loop fuel correction for bank 2 (accumulated while purge is off), which is filtered using a first-order lag filter, also known as an exponentially weighted moving average (EWMA). This value is compared to thresholds to determine if the fuel adjustment system diagnostic is passing, failing, or indeterminate during normal purge-off operation as well as during the intrusive excess purge vapor test.
Low Engine Oil Level Indicator Command	-	On/Off	This parameter displays that the low engine oil level indication is being requested on over serial communication in order to inform the driver of a low engine oil level condition.
Low Engine Oil Pressure Indicator Command	-	On/Off	This parameter displays that the change engine oil indication is being requested on over serial communication in order to inform the driver that the engine oil needs to be changed. This signal is based upon either the engine oil life algorithm or the engine oil condition sensor.
MAF Performance Test	-	OK	This parameter displays the status of the mass air flow (MAF) performance test by the control module. The scan tool will display OK if no Malfunction is found. The scan tool will display Malfunction if the control module detects a

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Parameter	System State	Expected Value	Description
			Malfunction during the test.
MAF Sensor	Engine Idling	3.4-6.5 g/s	This parameter indicates the quantity calculated by the control module based on a signal from the MAF sensor. The scan tool will display a high value at high engine speeds, and a low value at low engine speeds.
MAF Sensor	-	1510-3224 Hz	This parameter indicates the frequency signal received from the MAF sensor by the control module. The scan tool will display a high value at high engine speeds, and a low value at low engine speeds.
MAF Sensor Supply Voltage Command	-	On/Off	This parameter displays the commanded state of the mass air flow sensor supply voltage output.
MAF Sensor Supply Voltage Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the mass air flow supply voltage control circuit. The parameter displays Malfunction if the mass air flow supply voltage control circuit is shorted to voltage.
MAF Sensor Supply Voltage Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the mass air flow supply voltage control circuit. The parameter displays Malfunction if the mass air flow supply voltage control circuit is shorted to ground.
MAF Sensor Supply Voltage Control Circuit Open Test Status	-	OK	This parameter displays the state of the mass air flow supply voltage control circuit. The parameter displays Malfunction if the mass air flow supply voltage control circuit is open.
MAF When Engine Overspeed Detected	-	g/s	This parameter indicates the quantity calculated by the control module based on a signal from the MAF sensor at the time an overspeed was detected.
MAP Performance Test 1	-	OK	This parameter displays the status of the MAP performance test 1 by the control module. The scan tool will display OK if no Malfunction is found. The scan tool will display Malfunction if the control module detects a Malfunction during the test.
MAP Performance Test 2	-	OK	This parameter displays the status of the MAP performance test 2 by the

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Parameter	System State	Expected Value	Description
			control module. The scan tool will display OK if no Malfunction is found. The scan tool will display Malfunction if the control module detects a Malfunction during the test.
MAP Sensor	-	30-38 kPa / 4-6 PSI	This parameter indicates the manifold absolute pressure inside the engine as calculated by the control module based on the signal from the MAP sensor. The scan tool will display a higher value wide open throttle, and a lower value at idle.
MAP Sensor	-	0.75-1.40 Volts	This parameter indicates the voltage signal received by the control module from the MAP sensor. The scan tool displays a low voltage at idle, and a high voltage at wide open throttle. Barometric pressure and altitude can effect these values.
Maximum Engine Speed When Engine Overspeed Detected	-	RPM	This parameter displays the engine peak speed when the overspeed condition was observed.
Malfunction Indicator Lamp (MIL) Command	-	Off	This parameter displays the commanded state of the MIL control circuit. The MIL should be ON when the scan tool indicates the MIL Command is ON. The malfunction indicator lamp should be OFF when the scan tool indicates the MIL Command is OFF. The control module will command the MIL ON when the ignition is ON with the engine OFF in order to perform a bulb check.
MIL Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the malfunction indicator lamp voltage control circuit. The parameter displays Malfunction if the malfunction indicator lamp voltage control circuit is shorted to voltage.
MIL Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the malfunction indicator lamp voltage control circuit. The parameter displays Malfunction if the malfunction indicator lamp voltage control circuit is shorted to ground.

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Parameter	System State	Expected Value	Description
MIL Control Circuit Open Test Status	-	OK	This parameter displays the state of the malfunction indicator lamp voltage control circuit. The parameter displays Malfunction if the malfunction indicator lamp voltage control circuit is open.
MIL Requested	-	Yes/No	This parameter displays the commanded state of the malfunction indicator lamp (MIL) output.
MIL Requested by DTC	-	No	This parameter indicates the reason the control module illuminated the MIL. The scan tool will display YES when the MIL is requested as a result of an A or B type DTC. The scan tool will display NO if the MIL is illuminated for another reason, such as transmission DTCs.
Misfire Diagnostic Engine Load	-	%	This parameter displays the engine load used within the misfire diagnostic (calculated as the ratio of the mass of air predicted to be in the cylinder two firing events into the future to the maximum possible mass of air in the cylinder based on the current ambient air pressure and charge temperature).
Misfire Diagnostic Engine Speed	-	RPM	This parameter displays the engine speed used within the misfire diagnostic. This engine speed is the maximum engine speed observed over the previous engine cycle.
Misfire Monitor Complete	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.
Misfire Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.

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Parameter	System State	Expected Value	Description
Misfire Monitor Enabled	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.
Misfire Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.
O2S/HO2S Monitor Complete	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.
O2S/HO2S Monitor Complete This Ignition Cycle	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.
O2S/HO2S Monitor Enabled	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.
O2S/HO2S Monitor Enabled This Ignition Cycle	-	Yes/No	This parameter displays the status of the catalyst monitor diagnostic. Multiple tests may run before the diagnostic reports a Pass or Fail. When a determination has been made, the diagnostic is complete for the current trip and will not attempt any further tests.

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Parameter	System State	Expected Value	Description
Oil Level Warning Counter City	-	Counts	This parameter displays a rolling count of oil level debounce events for the city calibration.
Oil Level Warning Counter Country Road	-	Counts	This parameter displays a rolling count of oil level debounce events for the country road calibration.
Oil Level Warning Counter Highway	-	Counts	This parameter displays a rolling count of oil level debounce events for the highway calibration.
Output Shaft Speed Sensor	-	0.00 RPM	This parameter displays the transmission output speed measured by the transmission output speed (TOS) sensor.
Park/Neutral Position Switch	-	Park	This parameter indicates the range selection of the automatic transmission as calculated by the control module based on input from the PNP switch. The scan tool will display, In Gear, Park, or Neutral depending on the PNP switch position.
Power Enrichment	-	Inactive	This parameter indicates if the control module has detected conditions appropriate to operate in Power Enrichment mode. The scan tool will display Active if the mode is in operation, and Inactive if the mode is not in operation. The control module enters Open Loop operation and increases injector pulse width when in power enrichment mode.
Power Mode	-	Off/Accessory /Run/Crank	This parameter displays the state of the system power mode. This signal is based upon the state of the system power mode received over serial communication from the platform electronics.
Recommended Maximum Fuel Alcohol Content Exceeded	-	No	This parameter displays that the fuel alcohol percentage has exceeded the recommended value for vehicle conditions.
Recommended Maximum Fuel Alcohol Content When Recommended Maximum Fuel Alcohol Content Exceeded	-	%	This parameter displays the recommended fuel alcohol percentage for vehicle conditions at the most recent time that the recommended ethanol concentration was exceeded.

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Parameter	System State	Expected Value	Description
Reduced Engine Power	-	Inactive	This parameter indicates if the control module has detected that a TAC system Malfunction has occurred. The scan tool will display Active if the mode is in operation, and Inactive if the mode is not in operation. The control module limits engine power when this mode is Active.
Reduced Engine Power History	-	Varies	This parameter displays the last reason that powertrain has illuminated the Reduced Engine Power (REP) indication.
Refueling Events Since Recommended Maximum Fuel Alcohol Content Exceeded	-	Counts	This parameter displays the number of times the vehicle has been refueled since the most recent time that the recommended ethanol concentration was exceeded.
Remaining Fuel in Tank	-	%	This parameter displays the total fuel level as a percentage of the rated capacity of the fuel tank(s).
Remaining Fuel in Tank	-	Liters	This parameter displays the total fuel volume contained in the fuel tank(s).
Remote Vehicle Start Disable History 1-8	-	Varies	This parameter displays one of the last eight reasons that powertrain has disabled remote vehicle start (RVS).
Remote Vehicle Start Request Signal	-	Off	This parameter displays the state of the remote vehicle start request signal. The scan tool displays ON when a remote start signal is requested.
Reverse Inhibit Solenoid Actuator Command	-	Allowed/Inhibit	Reverse Inhibit Active indicates that the driver is inhibited from shifting into reverse.
Reverse Inhibit Solenoid Actuator Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the reverse inhibit solenoid actuator control circuit. The parameter displays Malfunction if the reverse inhibit solenoid actuator control circuit is shorted to voltage.
Reverse Inhibit Solenoid Actuator Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the reverse inhibit solenoid actuator control circuit. The parameter displays Malfunction if the reverse inhibit solenoid actuator control circuit is shorted to ground.

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Parameter	System State	Expected Value	Description
Reverse Inhibit Solenoid Actuator Control Circuit Open Test Status	-	OK	This parameter displays the state of the reverse inhibit solenoid actuator control circuit. The parameter displays Malfunction if the reverse inhibit solenoid actuator control circuit is open.
Secondary Air Injection Monitor Complete	-	Yes	This parameter displays the status of the secondary air injection monitor. The parameter will display Yes when the secondary air injection monitor is complete.
Secondary Air Injection Monitor Enabled	-	Yes	The scan tool displays Yes when the secondary air injection monitor is enabled. If the scan tool displays No, this could indicate a malfunction in the secondary air injection monitor circuit.
Short Term Fuel Trim Bank 1 or Bank 2	-	0% Â± 10%	This parameter displays the short term correction to fuel delivery for bank 1 or bank 2 by the control module in response to the amount of time the oxygen sensor voltage spends above or below the 450 mV threshold. The scan tool will display 0 percent if no adjustments are required. The scan tool will display a higher positive value if fuel has to be added, and a higher negative value if fuel has to be removed.
Skip Shift Indicator Command	-	Off	This parameter indicates that the transmission skip shift indicator is being requested On over serial communication in order to inform the driver that shifting up to one of the next highest hears is inhibited.
Skip Shift Solenoid Actuator Command	-	Disabled	This parameter indicates that the skip shift solenoid is commanded On, inhibiting the driver from shifting up to one of the next highest gears.
Skip Shift Solenoid Actuator Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the skip shift solenoid actuator control circuit. The parameter displays Malfunction if the skip shift solenoid actuator control circuit is shorted to voltage.
Skip Shift Solenoid Actuator Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the skip shift solenoid actuator control circuit. The parameter displays Malfunction if the skip shift

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Parameter	System State	Expected Value	Description
			solenoid actuator control circuit is shorted to ground.
Skip Shift Solenoid Actuator Control Circuit Open Test Status	-	OK	This parameter displays the state of the skip shift solenoid actuator control circuit. The parameter displays Malfunction if the skip shift solenoid actuator control circuit is open.
Specific Humidity	-	%	This parameter displays the ratio of water vapor to dry air shown in a percentage.
Short Term Fuel Trim Test Average Bank 1 or Bank 2	-	3%	This parameter is calculated by the control module based on an intrusive test by the control module. The Short Term FT Test Average used for the short term correction of the fuel delivery in each bank. The scan tool will display a high value for a large amount of short term fuel correction, and 0% for no short term fuel trim correction. The scan tool will display a negative value when fuel system is running too rich and fuel is being removed from the combustion event. The scan tool will display a positive value if the fuel system is running lean and fuel is being added to the combustion event.
Start Up ECT	-	Varies Â°C/Â°F	This parameter Indicates the engine coolant temperature at engine start up as calculated by the control module based on the signal from the ECT sensor. The scan tool will display a higher value on a warmer engine, and a lower value on a colder engine.
Start Up IAT	-	Varies Â°C/Â°F	This parameter Indicates the intake air temperature at engine start up as calculated by the control module based on the signal from the IAT sensor. The scan tool will display a higher value during warmer under hood temperatures, and a lower value during colder under hood temperatures.
Starter Relay Command	-	Off	This parameter displays the current starter relay command. The scan tool displays ON when the starter relay is commanded on.

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Parameter	System State	Expected Value	Description
Starter Relay Control Circuit High Voltage Test Status	-	OK	This parameter displays the state of the starter relay control circuit. The parameter displays Malfunction if the starter relay control circuit is shorted to voltage.
Starter Relay Control Circuit Low Voltage Test Status	-	OK	This parameter displays the state of the starter relay control circuit. The parameter displays Malfunction if the starter relay control circuit is shorted to ground.
Starter Relay Control Circuit Open Test Status	-	OK	This parameter displays the state of the starter relay control circuit. The parameter displays Malfunction if the starter relay control circuit is shorted to open.
TAC Forced Engine Shutdown	-	No	This parameter indicates the status of TAC control by the control module. The scan tool will display YES if the engine has been shut down due to a throttle control Malfunction. The scan tool will display NO if the engine has not been shut down by a throttle control Malfunction.
TAC Motor	-	Enabled	This parameter indicates the status of the TAC motor driver by the ECM. The scan tool will display Enabled if TAC motor operation is allowed. The scan tool will display disabled if the TAC motor is disabled.
TAC Motor Command	-	15-25%	This parameter indicates the required duty cycle to maintain a desired throttle position. The scan tool will display a higher value if more effort is required to move the throttle to the desired position, such as physical resistance. The scan tool will display a lower value if less effort is required to move the throttle to the desired position.
TCC/Cruise Control Brake Pedal Switch	-	Applied / Released	This parameter displays the status of the brake pedal system
Throttle Body Idle Air Flow Compensation	-	%	This parameter displays the percent compensation of the learned airflow variation algorithm. This value indicates the current amount of airflow compensation in response to engine intake airflow restrictions.

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Parameter	System State	Expected Value	Description
Throttle Position	-	%	This displays the throttle position resulting directly from the arbitration of the (corrected) throttle position sensors.
Throttle Position Performance Test	-	OK	This parameter displays the status of the Throttle Position performance test by the control module. The scan tool will display OK if no Malfunction is found. The scan tool will display Malfunction if the control module detects a Malfunction during the test.
Throttle Position Sensor 1	-	4.1-4.5 Volts	This parameter displays the voltage signal sent to the control module from Throttle Position sensor 1 of the throttle assembly. The Throttle Position sensor 1 is a range of values indicating a high voltage when the throttle is closed to a low voltage when the throttle plate is fully open.
Throttle Position Sensor 1 Position	-	8%	This parameter displays the angle of the throttle position (Throttle Position) sensor 1 as calculated by the control module using the signal from the Throttle Position sensor 1. The Throttle Position sensor 1 is a range of values indicating a low percentage when the throttle is closed to a high percentage when the throttle is fully open.
Throttle Position Sensor 1 Learned Minimum	-	0-0.6 Volts	This parameter displays the learned minimum value of throttle position (Throttle Position) sensor 1 as recorded by the control module during the last learn procedure.
Throttle Position Sensor 2	-	0.5-0.8 Volts	This parameter displays the voltage signal sent to the control module from Throttle Position sensor 2 of the throttle assembly. The Throttle Position sensor 2 is a range of values indicating a low voltage when the throttle is closed to a high voltage when the throttle plate is fully open.
Throttle Position Sensor 2 Position	-	4%	This parameter displays the angle of the Throttle Position sensor 2 as calculated by the control module using the signal from the Throttle Position sensor 2. The Throttle Position sensor 2 is a range of values

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Parameter	System State	Expected Value	Description
			indicating a low percentage when the throttle is closed to a high percentage when the throttle is fully open.
Throttle Position Sensor 2 Learned Minimum	-	5.0-3.7 Volts	This parameter displays the learned minimum value of throttle position (Throttle Position) sensor 2 as recorded by the control module during the last learn procedure.
Throttle Position Sensors 1 and 2	-	Agree	This parameter displays the results of a control module test that compares the signals from the Throttle Position sensors 1 and 2 . The scan tool will display Agree or Disagree. Agree indicates that Throttle Position sensor 1 and Throttle Position sensor 2 voltages correspond to the same throttle position. Disagree indicates that Throttle Position sensor 1 and Throttle Position sensor 2 voltages correspond to different throttle positions.
Tire Size	-	Rev/km	This parameter displays the vehicle tire circumference in centimeters.
Torque Delivered Signal	-	Varies lbs ft	This parameter displays the PWM signal which indicates the percent of available torque the engine is delivering to the drive wheels. The EBTCM monitors the Traction Control Torque signal to ensure that the PCM is responding properly to the Traction Control Desired Torque signal.
Torque Management Ignition Timing Retard	-	0Â°	This parameter indicates how much the ignition spark timing is being retarded to control torque by the control module. The scan tool will display a higher value under extreme torque control conditions such as spinning wheels. The scan tool will display a lower value under low torque control conditions such as light driving.
Torque Management Spark Retard	-	0Â°	This parameter indicates how much the ignition spark timing is being retarded to control torque by the control module. The scan tool will display a higher value under extreme torque control conditions such as spinning wheels. The scan tool will

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Parameter	System State	Expected Value	Description
			display a lower value under low torque control conditions such as light driving.
Torque Request Inhibit Fuel	-	No	This parameter displays the reason the ECM would be causing the transmission torque request to be limited, and if the condition is currently present.
Torque Request Inhibit - Ignition Timing	-	No	This parameter indicates if the transmission torque request is limited due to ignition timing.
Torque Request Inhibit Minimum Idle Inhibit	-	No	This parameter displays the reason the ECM would be causing the transmission torque request to be limited, and if the condition is currently present.
Torque Request Inhibit Minimum Torque	-	No	This parameter displays the reason the ECM would be causing the transmission torque request to be limited, and if the condition is currently present.
Torque Request Inhibit Spark	-	No	This parameter displays the reason the ECM would be causing the transmission torque request to be limited, and if the condition is currently present.
Torque Request Inhibit Spark Advance	-	No	This parameter displays the reason the ECM would be causing the transmission torque request to be limited, and if the condition is currently present.
Torque Request Inhibit TAC	-	No	This parameter displays the reason the ECM would be causing the transmission torque request to be limited, and if the condition is currently present.
Torque Request Inhibit TAC Limit	-	No	This parameter displays the reason the ECM would be causing the transmission torque request to be limited, and if the condition is currently present.
Total Engine Overspeed Time	-	ms	This parameter displays the total duration of the engine overspeed time in milliseconds.
Total Knock Retard	-	0Â°	This parameter indicates how much ignition spark timing is being retarded due to all control systems monitored by the control module.

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Parameter	System State	Expected Value	Description
			The scan tool will display a high value during extreme conditions such as high temperatures and antilock braking. The scan tool will display a lower value during lighter driving conditions.
Total Misfire	-	0	This parameter displays the number of possible misfires during the last 200 cylinder firing events detected on all cylinders as calculated by the control module. The misfires are calculated based on engine crankshaft rotation speed variations. The scan tool displays an incrementing counter.
Traction Control Status	-	Inactive	This parameter displays when the traction control system (TCS) is activated.
Transfer Case Gear Ratio (If Equipped)	-	1	This parameter displays the estimated transfer case ratio for applications that are equipped with a transfer case capable of providing range selection (e.g., four wheel drive low).
Transfer Case OSS	-	RPM	This parameter displays the transfer case output speed (the speed at the output of the transfer case) determined from the speed measured by the transfer case speed sensor (TCSS).
Upshift Indicator Command	-	Off	This parameter indicates that the transmission upshift indication is being requested On over serial communication in order to recommend that the driver shift up to a higher gear to improve fuel economy.
Vehicle Speed Output Circuit 2 High Voltage Test Status	-	OK	This parameter displays the state of the vehicle speed output circuit 2. The parameter displays Malfunction if the vehicle speed output circuit 2 is shorted to voltage.
Vehicle Speed Output Circuit 2 Low Voltage Test Status	-	OK	This parameter displays the state of the vehicle speed output circuit 2. The parameter displays Malfunction if the vehicle speed output circuit 2 is shorted to ground.

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Parameter	System State	Expected Value	Description
Vehicle Speed Output Circuit 2 Open Test Status	-	OK	This parameter displays the state of the vehicle speed output circuit 2. The parameter displays Malfunction if the vehicle speed output circuit 2 is open.
Vehicle Speed Sensor	-	0 km/h / MPH	This parameter indicates the vehicle speed as calculated by the control module based on a signal from the vehicle speed sensor (VSS). The scan tool will display a higher value at higher vehicle speeds, and a lower value at lower vehicle speeds.
Vehicle Speed When Engine Overspeed Detected	-	km/h / MPH	This parameter displays the peak engine speed observed during all overspeed conditions.
VIN Programming Counter	-	Counts	This parameter displays the number of times the VIN has been programmed.
Warm-ups Since DTC Cleared	-	#	This parameter indicates the number of warm up cycles that have occurred Since DTCs were cleared. The scan tool will display a higher counts as more warm up cycles have occurred since the DTCs were cleared.
Warm-ups Without Emission Malfunctions	-	#	This parameter indicates the number of warm up cycles that have occurred without an emission Malfunction present. The scan tool will display a 0 if a Malfunction has occurred. The scan tool will display a higher count if a number of warm up cycles have occurred without an emission Malfunction.
Warm-ups Without Non-Emission Malfunctions	-	#	This parameter indicates the number of warm up cycles that have occurred without a non-emission Malfunction present. The scan tool will display a 0 if a Malfunction has occurred. The scan tool will display a higher count if a number of warm up cycles have occurred without a non-emission Malfunction.
Wide Open Throttle	-	No	This parameter indicates the throttle status commanded by the control module. The scan tool will display YES if the vehicle throttle is commanded to wide open. The scan tool will display NO if the vehicle throttle is commanded to an amount

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Parameter	System State	Expected Value	Description
			less than 100%.

Output Control

Parameter	Description
This is a comprehensive list. Not all output controls listed are available for all applications.	
A/C Compressor Clutch Relay	This device control is used to override the state of the air conditioning compressor output.
A/C Relay	The engine must be running and the ECM must receive an A/C request from the HVAC control module in order to enable the output control. The ECM de-energizes the A/C compressor clutch relay when you select OFF. The relay remains de-energized until you select ON.
Ambient Air Temperature Reset	This device control resets the environmental temperature (ENVT) model. This device control is to be used to force the ENVT model to update for service of different monitors.
Brake Pedal Position Sensor Learn	This device control is used to reset the brake pedal fully released learned position to its initialized value after a brake system repair.
CAC Coolant Pump	This function activates the charge air cooler (CAC) coolant pump relay. The normal commanded state is OFF. When commanded ON or OFF, the engine control module (ECM) turns the relay ON or OFF. The system remains in the commanded state until cancelled by the scan tool.
Clutch Pedal Position Learn	This device control is used to trigger the procedure to learn the clutch pedal fully applied position.
Cooling Fan Relay 1, Relays 2 and 3, Relays 1, 2 and 3	This device control is used to override the state of the cooling fan control output.
Crankshaft Position Reluctor Wheel Learn	This device control is used to reset the crank wheel adaptation values in case of an ECM or crank wheel replacement.
Crankshaft Position Variation Learn	This device control is used to activate the crankshaft position variation learn algorithm which calculates the reference pulse correction factors for the misfire diagnostic.
Cylinder 1, 3, 4, 6, 7	This device control is used to deactivate one of the engine's cylinders with the engine running by commanding the appropriate displacement on demand solenoid output on.
Cylinder Deactivation System	This device control is used to deactivate half of the engine's cylinders by commanding all of the displacement on demand solenoid outputs on.
Cylinder Power Balance	This device control is used to override the state of the fuel injector outputs. This device control is used to disable injectors in order to cut off fuel to the associated cylinders.
Depressurize Fuel System	When the low pressure fuel pump is used in conjunction with a separate high pressure fuel pump for direct injection (DI) engines, this device control can be used to reduce the high fuel pressure to a low working level.
Engine Controls Ignition Relay	This device control is used to override the state of the powertrain relay.
Engine Oil Life Reset	This device control may be used to reset the engine oil remaining life to 100% after an oil change or to any other value when replacing a control module.

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Parameter	Description
Engine Oil Pressure Control Solenoid Valve	This device control is used to override the state of the variable displacement oil pump. When the variable displacement oil pump is turned on, the oil pump will be commanded to a low pressure state.
Engine Serial Number	This device control displays the engine serial number.
Engine Speed	This device control is used to override the idle engine speed.
Engine Speed Control	Activates the idle air control (IAC) valve to change engine RPM. The normal commanded state is NONE. To enable the RPM control, all instruction on the scan tool must be completed. The system will Increase or Decrease the engine speed. The SET STEP VALUE changes the engine speed by increments of 25 RPM, 100 RPM, and 500 RPM. The system remains in the commanded state until cancelled by the tool.
EVAP Purge/Seal	This control enables 2 functions. One function increases or decreases the amount of purge by changing the duty cycle of the purge valve and commanding the vent ON (non-venting). The normal commanded state of both valves is NONE. The system will Increase or Decrease the amount of EVAP purge valve opening by 10 percent increments within a range of 0-100 percent. The second function seals the system after using the purge function to obtain a specific amount of fuel tank pressure (FTP). When activated the purge valve is commanded to 0 percent and the vent valve is commanded ON (non-venting). Both functions remain in the commanded state until cancelled by the tool or the FTP exceeds 24 mm Hg (12 in H2O).
EVAP Purge Solenoid	Activates the EVAP Purge Valve. The normal commanded state is OFF. The system will Increase or Decrease the amount of EVAP purge valve opening by 10 percent increments within a range of 0-100 percent. The system remains in the commanded state until cancelled by the tool or the fuel tank pressure exceeds 24 mm Hg (12 in H2O).
EVAP Purge Solenoid Valve	This device control is used to verify functionality of the fuel vapor purge system by allowing the canister purge output to be commanded to a specific duty cycle.
EVAP Service Test	Activates the on-board EVAP diagnostic test.
EVAP Test	This device control is used to activate the evaporative emissions service bay test.
EVAP Vent Solenoid	Activates the EVAP vent solenoid. The normal commanded state is OFF. When commanded ON, the vent valve switches to non-venting. The system remains in the commanded state unless one of the following conditions occurs: • Cancelled by the tool • Purge is greater than 0 percent, and the fuel tank pressure exceeds 24 mm Hg (12 in H2O).
EVAP Vent Solenoid Valve	This device control is used to either open or close the canister vent.
Fuel Composition Reset	This device control is used to reset the learned ethanol content of the fuel to a default calibration value.
Fuel Control Loop Status	This device control is used to enable or disable closed loop fuel.
Fuel Injector Balance	This device control is used to override the state of the fuel injector outputs. This device control is used to trigger a single injector to be commanded on for a short duration in order to test the flow of the injector to the associated cylinders.

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Parameter	Description
Fuel Pump Enable	This device control is used to override the state of the fuel pump output discrete hardwire between the ECM and the fuel pump control module (FPCM) or the fuel pump driver module.
Fuel Pump Relay	Controls the fuel pump relay. The normal commanded state is NONE. When commanded ON/OFF, the PCM turns the fuel pump ON/OFF. If the engine is running, and the fuel pump is commanded OFF, the engine will stall. The system remains in the commanded state until cancelled by the scan tool.
Fuel Pump Speed	This device control is used to override the normal control of the fuel pump output. The device control is a service diagnostic aid that is used to determine if the fuel pump system is functioning properly.
Fuel Rail Pressure Relief Valve Reset	This device control is used to trigger a reset of the learned offset value for the high pressure fuel pump relief valve.
Fuel System Pressure Test	This device control is used to charge the fuel rail on a high pressure direct injection system before completing the assembly of the engine in order to check for fuel leaks. This feature will allow the technician to inspect the fuel system for leaks after servicing the fuel system or after any other service procedure that required disconnection or removal of fuel system components. The starter relay is commanded on to crank the engine. Spark (SIDI) and fuel injection are inhibited to prevent the engine from starting. The high pressure fuel pump/regulator(s) are controlled to ensure maximum fuel system pressure is achieved while the engine is cranking and fuel pressure maintained after the engine stops rotating.
Fuel System Reset	This device control is used to trigger a reset of the fuel set-point adaptation (FSA) learning adaptive map.
Fuel Trim Enable	This device control is used to enable or disable fuel trim learning.
Fuel Trim Reset	This device control is used to reset the learned fuel trim values to their initial values.
Generator L-Terminal	This device control is used to override the state of the generator L terminal output.
High Pressure Fuel Pump Learn	This device control is used to start (trigger) and run the high fuel pressure learn process in order to fine tune the high pressure fuel pump after a high pressure component replacement.
HO2S Heater Bank 1 or 2 Sensor 1 or 2	This device control is used to override the duty cycle of the oxygen sensor heaters.
HO2S Heater Bank 1 Sensor 1 Command	Activates the HO2S bank 1 sensor 1 heater. The commanded states include ON and OFF. The normal commanded state is OFF. Commanding the HO2S bank 1 sensor 1 heater ON turns on the heater driver. The system remains in the commanded state until cancelled by the tool.
HO2S Heater Bank 1 Sensor 2 Command	Activates the HO2S bank 1 sensor 2 heater. The commanded states include ON and OFF. The normal commanded state is OFF. Commanding the HO2S bank 1 sensor 2 heater ON turns on the heater driver. The system remains in the commanded state until cancelled by the tool.
HO2S Heater Bank 2 Sensor 1 Command	Activates the HO2S bank 2 sensor 1 heater. The commanded states include ON and OFF. The normal commanded state is OFF. Commanding the HO2S bank 2 sensor 1 heater ON turns on the heater driver. The system remains in the commanded state until cancelled by the tool.
HO2S Heater Learn	This device control is used to trigger a service bay procedure to learn the oxygen sensor heater resistance following a sensor replacement in service.

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Parameter	Description
HO2S Reset	This device control is used to trigger a reset of the oxygen sensor drift compensation value, in case of an oxygen sensor replacement.
HO2S Test	This device control is used to trigger a service bay procedure to execute the oxygen sensor response test following a sensor replacement in service.
Idle Ignition Timing	This device control is used to disable the portion of the spark control algorithm that adjusts spark angle to correct the difference between commanded idle engine speed and actual idle engine speed.
Idle Learn	This device control is used to reset the learned airflow adaptive values to their initial values.
Ignition Timing Retard	This device control is used to retard the spark angle from the software calculated spark angle. For example, if the software calculated spark angle was 15 degrees advanced and this device control requested a 3 degree retard, the commanded spark angle that would be delivered would be 12 degrees advanced.
Intake Camshaft Position Actuator	This device control is used to override the state of the intake cam phase output. The commanded camshaft position is expressed in terms of degrees of camshaft rotation (advance for intake camshafts) from the park position (a camshaft position of zero represents the park position).
Intake Camshaft Position Actuator Solenoid Valve	This device control is used to override the state of the intake cam phase solenoid output.
MAF Sensor Supply Voltage	This device control is used to override the state of the mass air flow sensor supply voltage output.
Malfunction Indicator Lamp (MIL)	This device control is used to either turn the malfunction indicator lamp (MIL) on or off.
Misfire Graphic	Graphs the accumulated misfires occurring in each cylinder. The scan tool allows for a reset of the misfire graph.
Remote Vehicle Start Disable History Reset	This device control is used to trigger the reset of the last eight reasons that powertrain has disabled remote vehicle start (RVS).
Reverse Inhibit	This device control is used to override the state of the Reverse Inhibit output.
RVS Disable History Reset	This output control is used to trigger the reset of the last 8 reasons the ECM has disabled remote vehicle start (RVS).
Skip Shift Solenoid	Activates the Skip Shift Solenoid
Starter Relay	This device control is used to override the state of the starter relay output. Fuel and spark are disabled to prevent the engine from starting if the starter relay output is commanded on.
Throttle Position	This device control is used to override the commanded throttle position.
Throttle Sweep	This device control is used to automatically command the throttle blade from 0% to 100% and then back to 0%
Tire Size Selection	This function is used for correcting vehicle speed and odometer calculations when tire size is changed.

K38A CHASSIS CONTROL MODULE - AUXILIARY: SCAN TOOL INFORMATION

Fuel Pump with Trailer Brake Control Module (TBCM) Scan Tool Data List

Scan Tool Parameter	System State	Expected Value	Definition
Operating Conditions: Ignition is ON, engine OFF, and vehicle is stationary			

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Scan Tool Parameter	System State	Expected Value	Definition
ABS Active	-	No	The scan tool displays Yes/No. The scan tool displays No when ABS is not active.
Brake Apply Pressure Status	-	Valid	The scan tool displays Invalid or Valid. The scan tool displays Valid when the ignition is ON, and the brake apply sensor is not faulted.
Battery Voltage Signal	-	Varies	The scan tool displays 0-18 Volts. The scan tool displays approximately 12 Volts when the ignition is ON.
Brake Switch Status	-	Off	The scan tool displays On/Off. The scan tool indicates Off when the brake is not applied.
Electric Trailer Brakes Detected	-	No	The scan tool displays Yes or No. The scan tool displays Yes when the vehicle is connected to a trailer equipped with electric brakes.
HS Communication	-	Yes	The scan tool displays Yes or No.
Ignition Run/Crank	-	Active	The scan tool will display Active or Inactive. The scan tool will display Active when the signal received from the ECM Run/Crank position.
Master Cylinder Pressure Sensor Input	-	Varies	The scan tool will display brake fluid pressure. The scan tool will display kPa or psi signal received from the trailer brake control module.
Manual Apply Switch	-	Varies	The scan tool displays percent of manual apply lever travel. The scan tool displays 0-100%.
Manual Apply Switch 5 V Reference	-	Varies	The scan tool displays Volts. This is the reference voltage of the manual apply switch.
Manual Apply Switch	-	Varies	The scan tool displays Volts. This is the voltage of the manual apply lever.
Manual Apply Sw. Pos. Error	-	Varies	The scan tool displays percent of error between the manual apply and redundant manual apply signals. The scan tool displays 0-100%. A proper functioning switch should have a value less than 20 %
Redundant Manual Apply Sw.	-	Varies	The scan tool displays percent of manual apply lever travel using a redundant signal track. The scan tool displays 0-100%

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Scan Tool Parameter	System State	Expected Value	Definition
Redundant Manual Apply Sw.	-	Varies	The scan tool displays volts. This is the voltage of the manual apply switch.
TBCM Diagnostic Fault	-	No	The scan tool will display Yes or No if a fault is detected. The scan tool will display the Yes if a fault signal is received from the trailer brake control module.
TBCM Relay Feedback	-	0	The scan tool displays a numeric value.
TBCM Relay Feedback Signal (unfiltered)	-	Varies	The scan tool displays Volts. This is the unfiltered feedback signal of the TBCM relay.
TBCM Relay Feedback Signal (filtered)	-	Varies	The scan tool displays Volts. This is the filtered feedback signal of the TBCM relay.
TBCM Relay Feedback Signal	-	Varies	The scan tool displays volts. This is the voltage of the relay feedback signal.
TBCM Cmd. Duty Cycle	-	Varies	The scan tool displays percent of battery voltage output commanded to the trailer brakes and depends on battery voltage and user gain setting. Approximately 100% will be indicated when user gain is set to 10.0 and the manual apply lever is fully applied with the engine running.
Trailer Brake Control	-	Disabled	The scan tool will display Enabled/Disabled. The scan tool will display the signal received from the trailer brake control module.
Trailer Stop Lamp Signal	-	Off	The scan tool will display Not Requested or Off, Requested depending on the state of the brake switch, and manual apply lever. Requested will be displayed if the brake switch is active or On if the manual apply lever is applied.
Trailer Brake Relay Cmd.	-	12 Volts	The scan tool displays 0-18 Volts. The scan tool displays voltage commanded to the trailer brakes when a trailer with electric brakes is connected and depends on battery voltage and user gain setting. Approximately 12-14 volts will be indicated when user gain is set to 10.0 and the manual apply lever is

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Scan Tool Parameter	System State	Expected Value	Definition
			fully applied with the engine running.
Trailer Brake Relay Status	-	Enabled	The scan tool will display Disabled or Enabled. Enabled will be displayed whenever there are no faults present in the trailer brake control module.
Trailer Connection Detected	-	No	The scan tool displays Yes or No. The scan tool displays Yes when a trailer with electric trailer brakes is connected.
Trailer Disconnect Detected	-	No	The scan tool will display Yes or No depending on the trailer connections. Yes will be displayed if a trailer connection is made to a trailer equipped with electric trailer brakes, and a disconnect occurs within the same ignition cycle.
User Gain Switch	-	Varies	The scan tool displays percent of full gain setting. The scan tool displays 0-100%. Each full gain setting represents an increment of approximately 10 percent of full gain setting. Approximately 40% will be indicated with a gain setting of 4.0, 65% will be indicated with a gain setting of 6.5, etc.
User Gain Switch	-	Varies	The scan tool displays volts. This is the voltage of the full gain setting.
User Gain Switch 5 V Reference	-	Varies	The scan tool displays volts. This is the reference voltage of the user gain switch.
Vehicle Speed	-	km/h or mph	The scan tool displays 0-327 km/h (0-204 mph). The scan tool displays 0 km/h (0 mph) when the vehicle is not moving or is moving at speeds less than or equal to 0 km/h (0 mph).

Scan Tool Parameters for Electronic Locking Differential (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature / Vehicle is in Park or Neutral			
5V Reference 1	-	Volts	The scan tool displays Volts. This is the Reference Voltage.

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Parameter	System State	Expected Value	Description
Differential Lock Switch Voltage	-	Volts	The scan tool displays Volts. This is the Front/Both Axle Differential Lock Switch.
Front Axle Differential Lock Actuator High Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Front Differential Lock Actuator High Side Feedback Voltage.
Front Axle Differential Lock Actuator Low Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Front Differential Lock Actuator Low Side Feedback Voltage.
Front Axle Differential Lock High Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Front Axle Differential Lock.
Front Axle Differential Lock Indicator Command	-	On/Off	The scan tool displays On/Off. This is the state of the Front/Both Axle Differential Lock indicator.
Front Axle Differential Lock Low Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Front Axle Differential Lock.
Front Axle Differential Lock Switch Status	-	On/Off	The scan tool displays On/Off. This is the state of the Front Axle Differential Lock Switch.
Front Axle Differential Status	-	Open/Locked Engaged/Disengaged	The scan tool displays varies states. This is the state of the Front Axle Differential Lock.
Ignition 1 Signal	-	Volts	The scan tool displays Volts. This is the state of voltage of power input to control module.
Rear Axle Differential Lock Actuator High Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Rear Differential Lock Actuator High Side Feedback Voltage.

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Parameter	System State	Expected Value	Description
Rear Axle Differential Lock Actuator Low Control Relay Feedback	-	Volts	The scan tool displays Volts. This is the Rear Differential Lock Actuator Low Side Feedback Voltage.
Rear Axle Differential Lock High Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock.
Rear Axle Differential Lock Indicator Command	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock Indicator.
Rear Axle Differential Lock Low Control Relay Command	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock.
Rear Axle Differential Lock Switch Status	-	On/Off	The scan tool displays On/Off. This is the state of the Rear Axle Differential Lock Switch.
Rear Axle Differential Status	-	Open/Locked Engaged/Disengaged	The scan tool displays varies states. This is the state of the Rear Axle Differential Lock.

Scan Tool Output Controls for Electronic Locking Differential (If Equipped)

Output Control	Description
Front Axle Differential Lock High Control Relay	This output control is used to turn the front axle differential lock high control relay on and off.
Front Axle Differential Lock Indicator	This output control is used to turn the front axle differential lock indicator on and off.
Front Axle Differential Lock Low Control Relay	This output control is used to turn the front axle differential lock low control relay on and off.
Rear Axle Differential Lock High Control Relay	This output control is used to turn the rear axle differential lock high control relay on and off.
Rear Axle Differential Lock Indicator	This output control is used to turn the rear axle differential lock indicator on and off.
Rear Axle Differential Lock Low Control Relay	This output control is used to turn the rear axle differential lock low control relay on and off.

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ASSIST STEP CONTROL MODULE SCAN TOOL INFORMATION

Scan Tool Data Parameters

Parameter	Expected Value	Description
Operating Conditions: Ignition ON		
Battery Voltage	Varies	Current voltage of battery.
Assist Step System Status	Normal	Scan tool displays Unknown, Enabled, Disabled, or Extended.
Driver Door Ajar Switch	Door Closed	Scan tool displays Door Closed or Door Open.
Passenger Door Ajar Switch	Door Closed	Scan tool displays Door Closed or Door Open.
Left Rear Door Ajar Switch	Door Closed	Scan tool displays Door Closed or Door Open.
Right Rear Door Ajar Switch	Door Closed	Scan tool displays Door Closed or Door Open.
Left Assist Step Learn Status	Yes	Scan tool displays Learned if the left step learn has been completed.
Left Assist Step Position	Count Value	Scan tool displays the current left step position count.
Right Assist Step Learn Status	Yes	Scan tool displays Learned if the right step learn has been completed.
Right Assist Step Position	Count Value	Scan tool displays the current right step position count.
Right Assist Step Command	Retract Completed	Scan tool displays Unknown, Extend Completed, Retract Completed, Extending, Retracting, Error, Object Detected, or Timeout.
Left Assist Step Command	Retract Completed	Scan tool displays Unknown, Extend Completed, Retract Completed, Extending, Retracting, Error, Object Detected, or Timeout.
Assist Step Disable Switch	Inactive	Displays Active if switch is pressed.
Left Assist Step Kick Switch	Inactive	Displays Active if switch is pressed.
Right Assist Step Kick Switch	Inactive	Displays Active if switch is pressed.

Scan Tool Output Controls

Output Control	Description
Left Assist Step Motor	Allows scan tool control of left assist step.
Right Assist Step Motor	Allows scan tool control of right assist step.

AUDIO AMPLIFIER SCAN TOOL INFORMATION

Amplifier Scan Tool Data Parameters

Parameter	Expected Value	Definition
Operating Conditions: Ignition ON		
Power Mode	Run	The scan tool displays Off, Accessory, Run or Crank Request. This is the vehicle power mode status as received via serial data.
Active Noise Cancellation	On	The scan tool displays On or Off. This indicates if the Active Noise Cancellation feature is available and capable of operating.

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Parameter	Expected Value	Definition
Engine Speed Signal	Normal	The scan tool displays Normal or Malfunction. This is the status of the dedicated engine speed signal circuit.
Battery Voltage	Varies	The scan tool displays volts. This is the voltage at the input to the amplifier.
Vehicle Speed	0 km/h	The scan tool displays the vehicle speed received by the amplifier in km/h or mph.
Engine Speed	0 RPM	The scan tool displays the current engine speed received by the amplifier in RPM .
Calculated System Temperature	Varies	The scan tool displays the calculated temperature of the amplifier in Â°C or Â°F.
Active Noise Cancellation Speaker Output	OK	The scan tool displays OK or Malfunction. This is the status of the amplifier speaker outputs.
Cylinder Deactivation System Command	Varies	The scan tool displays 8 Cylinder Active, Transitioning from 8 to 4, 4 Cylinder Active, Transitioning from 4 to 8, or Malfunction. This is the status of the cylinder deactivation mode as received via serial data. Malfunction is displayed when this data is not being received, or when the engine is not running.
Microphone Status	Normal	The scan tool displays Normal, Clipped, or Malfunction.
Microphone 1 Input Level	Varies	The scan tool displays counts from 0 to 65,535. This is the sound level currently being received by the microphone 1, with higher numbers indicating louder sounds.
Microphone 2 Input Level	Varies	The scan tool displays counts from 0 to 65,535. This is the sound level currently being received by the microphone 2, with higher numbers indicating louder sounds.
Microphone 3 Input Level	Varies	The scan tool displays counts from 0 to 65,535. This is the sound level currently being received by the microphone 3, with higher numbers indicating louder sounds.
Door Status	Varies	The scan tool displays All Closed or One or More Open. This is the current status of the vehicle access door latches as received via serial data.
Folding Top Status	Varies	The scan tool displays Closed, Open, Malfunction, or Normal. This is the current position of the vehicle folding top (if equipped) as received via serial data.
Calibration Part Number 1	Varies	The scan tool displays the software calibration part number 1.
Calibration Part Number 2	Varies	The scan tool displays the software calibration part number 2.
Calibration Part Number 3	Varies	The scan tool displays the software calibration part number 3.
Calibration Part Number 4	Varies	The scan tool displays the software calibration part number 4.

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Parameter	Expected Value	Definition
Calibration Part Number 5	Varies	The scan tool displays the software calibration part number 5.
Calibration Part Number 6	Varies	The scan tool displays the software calibration part number 6.
Calibration Part Number 7	Varies	The scan tool displays the software calibration part number 7.
Calibration Part Number 8	Varies	The scan tool displays the software calibration part number 8.
Calibration Part Number 9	Varies	The scan tool displays the software calibration part number 9.
Calibration Part Number 10	Varies	The scan tool displays the software calibration part number 10.
End Model Part Number	Varies	The scan tool displays the end software module part number.
Diagnostic Data Identifier	Varies	Identifies a supplier and system specific data stream used by diagnostic testers to interpret a diagnostic data stream.

BODY CONTROL MODULE SCAN TOOL INFORMATION

Body Control Module Scan Tool Data Parameters

Parameter	System State	Expected Value	Definition
Operating Conditions: Ignition ON, Vehicle in Park, All Doors Closed			
5 V Ignition Switch	-	Accessory / Key Out	The scan tool displays Off, Accessory, Run, or Crank. This parameter displays the ignition switch mode.
Accent Lighting 1 Command	-	Varies	This parameter displays the interior lighting ambient 1 command as a percentage.
Accent Lighting 2 Command	-	Varies	This parameter displays the interior lighting ambient 2 command as a percentage.
Accessory	-	Active	The scan tool displays Active or Inactive.
Accessory Power Mode Indicator Command	-	Varies	This parameter displays ignition switch accessory LED PWM command as a percentage.
Accessory Relay Command	-	Active	The scan tool displays Active or Inactive.
Accessory/Retained Accessory Power Relay Command	-	Active	The scan tool displays Active or Inactive. This parameter displays the retained accessory power relay status.
All Doors Lock Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the door lock status.
Ambient Light Sensor	-	Varies	The scan tool displays volts. This parameter displays the ambient light sensor signal voltage.

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Parameter	System State	Expected Value	Definition
Ambient Light Status	-	Night	The scan tool displays Unknown, Night, or Day. This parameter displays the ambient light level status.
Automatic Headlamps Disable Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the headlamp disable switch status.
Automatic Transmission Manual Shift Switch	-	Off	The scan tool displays Off or On. This parameter displays the transmission tap up tap down switch status.
Backup Lamps Relay Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the backup lamps relay status.
Battery Current Sensor	-	Varies	The scan tool displays the battery current in amperes.
Battery Low at Start	-	Inactive	The scan tool displays Active or Inactive. This parameter displays Active when the battery level is low when the vehicle starts.
Battery Reconnect Detected	-	No	The scan tool displays No or Yes when a battery disconnect/reconnect event has been detected.
Battery Voltage	-	Varies	The scan tool displays the current battery voltage.
BCM-Controlled Charging Voltage	-	Active	The scan tool displays Active or Inactive.
BCM-Requested Charging Voltage Reduction	-	Inactive	The scan tool displays Active or Inactive. This parameter displays Active when the BCM has detected a low battery voltage condition.
Boot Software Part Number	-	Varies	The scan tool displays the boot software part number.
Brake Lamp Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the brake lamp command status.
Brake Pedal Applied	-	Inactive	The scan tool displays Active or Inactive.
Brake Pedal Initial Travel Position Achieved	-	No	The scan tool displays No or Yes.
Brake Pedal Position Sensor	-	Varies	This displays Counts. This numeric value is the current brake pedal position.
Brake Pedal Position Sensor High Voltage During Learn	-	No	The scan tool displays No or Yes.
Brake Pedal Position Sensor Learn	-	No	The scan tool displays No or Yes. This parameter displays Yes when the brake pedal position sensor has learned.
Brake Pedal Position Sensor Learned Home Position	-	Yes	The scan tool displays No or Yes. This parameter displays Yes when the brake pedal position sensor has learned the

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Parameter	System State	Expected Value	Definition
			home position.
Brake Pedal Position Sensor Learned Released Position	-	Yes	The scan tool displays No or Yes. This parameter displays Yes when the brake pedal position sensor has learned the released position.
Brake Pedal Position Sensor Learned Released Position	-	Varies	The scan tool displays volts.
Brake Pedal Position Sensor Learned Released Position	-	Varies	The scan tool displays percentage.
Brake Pedal Position Sensor Low Voltage During Learn	-	No	The scan tool displays No or Yes.
Brake Pedal Position Sensor Move During Learn	-	No	The scan tool displays No or Yes. This parameter displays the brake pedal sensor learn status.
Brake Pedal Position Sensor Pulled Up from Home Position	-	No	The scan tool displays No or Yes.
Brake Pedal Position Sensor Reference	-	Varies	The scan tool displays the brake pedal position as voltage value. This parameter displays the current brake pedal position sensor reference.
Brake Pedal Pulled Up from Home Position	-	No	The scan tool displays No or Yes.
Brake Pedal Pulled Up from Released Position	-	No	The scan tool displays No or Yes.
Brake Transmission Shift Interlock Solenoid Actuator	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the remote start diagnostic status history.
Brake Transmission Shift Interlock Solenoid Actuator Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the last remote start diagnostic status history.
Calculated Brake Pedal Position	-	Varies	The scan tool displays volts.
Calculated Brake Pedal Position	-	Varies	The scan tool displays percentage.
Calibration Part Number 1-20	-	Varies	The scan tool displays the software module calibration part number.
Center Brake Lamp Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the center brake lamp status.
Center Stop Lamp Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the center stop lamp status.
Central Door Lock Switch on Center Console/Passenger Door Lock Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the driver door lock switch status.

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Parameter	System State	Expected Value	Definition
Child Security Lock Indicator Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the child security lock indicator command status.
Child Security Lock Motors Command	-	Inactive	The scan tool displays Active or Inactive.
Child Security Lock/Window Lockout Switch	-	Inactive	The scan tool displays Active or Inactive.
Child Security Lock/Window Lockout Switch Indicator Command	-	Inactive	The scan tool displays Active or Inactive.
Content Theft Deterrent Alarm Status	-	Disarmed	The scan tool displays Off, Armed, or Disarmed. This parameter displays the content theft alarm status.
Content Theft Deterrent Disarmed Until Vehicle Closed	-	No	The scan tool displays No or Yes. This parameter displays the content theft deterrent system status.
Content Theft Deterrent Mode	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history.
Content Theft Deterrent Trigger History 1-3	-	None	The scan tool displays None, Driver door, Passenger door, Left rear door, Right rear door, Rear closure, Midgate, Tonneau Cover, Hood, Ignition Voltage, Intrusion, Inclination, Telematics enhanced service alarm, Battery reconnect detected, Unauthorized PWM change, Security Indicates Tamper, or Glass Breakage. This parameter displays the content theft deterrent trigger history status.
Courtesy Lamps Duty Cycle Command	-	Varies	This parameter displays the interior lights dimming command as a percentage.
Crank Abort	-	Inactive	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history.
Cruise Charging Set Level	-	Varies	This parameter displays cruise charging set level.
Cruise Control Switch Status	-	OFF	The scan tool displays CANCEL, OFF, ON, RESUME, SET or ERROR. This parameter displays the cruise control switch status.
Current Content Theft Deterrent Trigger	-	None	The scan tool displays None, Driver door, Passenger door, Left rear door, Right rear door, Rear closure, Midgate, Tonneau Cover, Hood, Ignition Voltage, Intrusion, Inclination, Telematics enhanced service alarm, Battery reconnect detected,

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Parameter	System State	Expected Value	Definition
			Unauthorized PWM change, Security Indicates Tamper, Glass Breakage. This parameter displays the content theft deterrent current alarm trigger.
Current Driver	-	1-8	This parameter displays the current driver in vehicle.
Disable Battery Saver Relay Command	-	Inactive	The scan tool displays Active or Inactive.
Dome Lamp Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the dome lamp switch status.
Door Lock Switch	-	Inactive	The scan tool displays Active or Inactive.
Driver Door Ajar Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the driver door Ajar switch status.
Driver Door Key Unlock Switch	-	Inactive	The scan tool displays Active or Inactive.
Driver Door Lock Switch	-	Inactive	The scan tool displays Active or Inactive.
Driver Door Unlatch Command	-	Inactive	The scan tool displays Active or Inactive.
Driver Door Unlock Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the driver door unlock command status.
Driver Seat Heating Switch	-	Inactive	The scan tool displays Active or Inactive.
Driver Seat Heating/Venting /Cooling Mode	-	Off	The scan tool displays On or Off.
Driver Seat Ventilation Switch	-	Inactive	The scan tool displays Active or Inactive.
Driver Window Learned	-	Yes	The scan tool displays No or Yes.
Driver Window Main Control Down Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the driver window main control down switch input status.
Driver Window Main Control Express Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the driver window switch express input status.
Driver Window Main Control Up Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the driver window switch UP input status.
Driver Window Motor Mode	-	Local Switch Overridden	The scan tool displays Down, Express Down, Express, Up, Error, Inhibit, or Local Switch Overridden. This parameter displays the driver window motor mode status.
Driver Window Motor Reversing Status	-	No	The scan tool displays No or Yes.

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Parameter	System State	Expected Value	Definition
Driver Window Motor Sensing System Fault Status	-	No	The scan tool displays No or Yes.
Driver Window Motor Undervoltage Status	-	No	The scan tool displays No or Yes.
Enable Battery Saver Relay Command	-	Inactive	The scan tool displays Active or Inactive.
End Model Part Number	-	Varies	This parameter displays the end model part number.
Engine Stalled	-	Inactive	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history.
Environment Identification	-	Unknown	The parameter displays the vehicle environment identification successful status.
Front Fog Lamps Relay Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the front fog lamp relay status.
Front Fog Lamps Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the front fog lamp switch status.
Front Passenger Window Main Control Down Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the front passenger window down switch status.
Front Passenger Window Main Control Express Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the passenger window switch express input status.
Front Passenger Window Main Control Up Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the passenger window switch UP input status.
Front Tire Pressure on Placard	-	Varies	The scan tool displays kPa or PSI. This parameter displays the specified tire pressure placard information programmed in the BCM for tire pressure monitoring.
Fuel Economy Mode Inhibited - Low Charging Voltage	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the fuel economy mode status.
Generator Regulator Setpoint	-	Varies	The scan tool displays percentage.
Glove Box Unlatch Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the instrument panel compartment release switch status.
Hazard Lamps Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the hazard lamps switch status.
Hazard Lamps Switch Backlight Command	-	Varies	The scan tool displays percentage. This parameter displays hazard switch backlight level PWM command status.

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Parameter	System State	Expected Value	Definition
Headlamps On Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the headlamp on switch status.
Headlamps Flash Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the headlamps flash to pass switch status.
Headlamp Washer Relay Command	-	Inactive	The scan tool displays Active or Inactive.
High Beam Select Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the high beam switch status.
High Beam Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the high beam command status.
Hood Ajar Switch	-	Inactive	This parameter display the remote start diagnostic status history or the last remote start diagnostic status history.
Hood Ajar Switch Signal 1	-	Inactive	This parameter display the remote start diagnostic status history or the last remote start diagnostic status history.
Hood Position	-	CLOSED	The scan tool displays CLOSED, AJAR, or OPENED. This parameter displays the hood position.
Horn Relay Command	-	Inactive	The scan tool displays Active or Inactive.
Horn Switch	-	Inactive	The scan tool displays Active or Inactive.
Idle Boost Level 2-3 Counter	-	Varies	This parameter displays the state of the idle boost level as counts.
Idle Charging Set Level	-	Varies	This parameter displays idle charging set level.
Ignition Mode Switch Dimming Command	-	Varies	The scan tool displays percentage.
Ignition Switch Reference	-	Varies	This parameter displays the ignition switch voltage reference.
Ignition Switch Signal Voltage	-	Varies	This parameter displays the ignition switch signal voltage.
Ignition Switch Status	-	Inactive	This parameter displays the ignition switch status.
Immobilizer Allows Engine To Start	-	Unknown	The scan tool displays Unknown, Incorrect, Not Allowed, or Valid. This parameter displays the immobilizer status.
Immobilizer Automatic Learn Timer	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the automatic learn timer status.
Immobilizer Environment Device 1-4	-	Unknown	The scan tool displays Incorrect, Correct, Not Received, Not Programmed or Unknown. This parameter displays the immobilizer source status.

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Parameter	System State	Expected Value	Definition
Immobilizer Password Learn	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the password learn status.
Immobilizer Password Learn Scan Tool Delay	-	Varies	This parameter displays the auto learn timer status.
Immobilizer Security Code Accepted	-	No	The scan tool displays No or Yes.
Immobilizer Security Code Lockout	-	No	The scan tool displays No or Yes.
Immobilizer Security Code Programmed	-	Yes	The scan tool displays No or Yes.
In Park Switch Status	-	On	The scan tool displays On or Off. This parameter displays the park switch status.
Inadvertent Load Command	-	Active	The scan tool displays Active or Inactive.
Indicator Dimming Duty Cycle Command	-	Varies	The scan tool displays percentage. This parameter displays indicator lighting PWM command status.
Interior/Courtesy Lighting Master Switch	-	Door	The scan tool displays Door or other lighting switch status.
Interior Trunk Lid/Liftgate Window Unlatch Switch	-	Inactive	The scan tool displays Active or Inactive.
Key Capture Solenoid Actuator	-	Active	The scan tool display Active or Inactive. This parameter displays column lock input status.
Key Fob 1-4 Battery Status	-	OK	The scan tool displays OK or other key fob battery status. This parameter displays the key fob battery status.
Key Fob 1-4 Function	-	Undefined	The scan tool displays Inactive, Lock, Unlock Driver Door, All Door Unlock, Release Rear Closure, Actuate Left Sliding Door, Actuate Right Sliding door, Panic Alarm, Release Fuel door, Actuate Power Windows, Actuate Folding Top, Start Engine, Stop Engine, Programmed, Locator Alarm, Close Liftgate, Open Liftgate, Stop Liftgate While Closing, Stop Liftgate While opening, Deadlock All Doors, Stop Liftgate Motion, Start Liftgate Motion, Stop Left Sliding Door Motion, Stop Right Sliding Door Motion, Comfort open, or Comfort close. This parameter displays the key fob function status.
Key Fob in Vehicle	-	Inactive	This parameter displays the current key fob in the vehicle.
Key In Cylinder Switch	-	Active	The scan tool displays Active or Inactive.

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Parameter	System State	Expected Value	Definition
Key In Cylinder Switch/Key Fob in Vehicle	-	Yes	The scan tool displays No or Yes.
Key in Ignition Status	-	Inactive	The scan tool displays Key Out or Key In. This parameter displays the key in ignition status.
Key Part Number	-	Varies	This parameter displays the key part number.
Key Type	-	Master Key	The scan tool displays Unknown, Master Key, Valet Key, Fleet Key, or Unconfigured. This parameter displays the key type.
Last Door Lock Function	-	All Doors Lock	The scan tool displays NO Action, PC UNDB Lock, PC Unlock, Unlock, Unlock Driver, Unlock Passenger, Unlock Left Rear, Unlock Right Rear, Unlock Cargo Liftgate, Unlock Driver Side, Unlock Passenger Side, Unlock Non Driver, Unlock All, Lock All, DBL Lock, or UNDBL Lock.
LED Backlight Dimming Command	-	Varies	The scan tool displays as a percentage. This parameter displays LED backlight dimming PWM command status.
Left Brake Lamp Command	-	Varies	The scan tool displays percentage. This parameter displays left brake lamp command status.
Left Dedicated Daytime Running Lamp Command	-	Varies	The scan tool displays percentage. This parameter displays left dedicated daytime running lamp command status.
Left Front Tire Pressure	-	Varies	This parameter displays left front tire pressure in PSI.
Left Front Tire Pressure Sensor Identification	-	Varies	This parameter displays left front tire pressure sensor ID.
Left Front Tire Pressure Sensor Location Learned	-	Yes	The scan tool displays No or Yes. This parameter display tire pressure monitor system learned status.
Left Front Tire Pressure Sensor Mode	-	Learn Mode - Pressure Triggered	The scan tool parameter displays Learn Mode, Undefined, Remeasure Data Mode, Rolling Mode, Enter Off Mode, Exit Off Mode, or Learn Mode Pressure Triggered.
Left Front Tire Pressure Status	-	Normal	The scan tool displays Unknown, Normal, Very Low Pressure, Low, Weak Signal, or High.
Left Front Turn Signal Bulb Out Feedback	-	Inactive	The scan tool displays Active or Inactive.
Left Front Turn Signal/Hazard Lamp Command	-	Inactive	The scan tool displays Active or Inactive.

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Parameter	System State	Expected Value	Definition
Left Low Beam/Daytime Running Lamp Command	-	Varies	The scan tool displays percentage. This parameter displays left low beam/daytime running lamp status.
Left Park Lamps Command	-	Varies	The scan tool displays percentage. This parameter displays rear exterior lighting status.
Left Rear Child Security Lock Switch	-	Inactive	This parameter displays Active or Inactive.
Left Rear Door Ajar Switch	-	Inactive	This parameter displays Active or Inactive. This parameter displays the left rear door ajar switch status.
Left Rear Tire Pressure	-	Varies	This parameter displays left rear tire pressure in PSI.
Left Rear Tire Pressure Sensor Identification	-	Varies	This parameter displays left rear tire pressure sensor ID.
Left Rear Tire Pressure Sensor Location Learned	-	Yes	The scan tool displays No or Yes. This parameter displays tire pressure monitor system learned status.
Left Rear Tire Pressure Sensor Mode	-	Stationary	The scan tool displays Learn Mode, Undefined, Remeasure Data Mode, Rolling Mode, Enter Off Mode, Exit Off Mode, or Learn Mode Pressure Triggered.
Left Rear Tire Pressure Status	-	Normal	The scan tool displays Unknown, Normal, Very Low Pressure, Low, Weak Signal, or High.
Left Rear Turn Signal Bulb Out Feedback	-	Inactive	The scan tool displays Active or Inactive. The parameter displays turn lamp outage status.
Left Rear Turn Signal/Hazard Lamp Command	-	Inactive	The scan tool displays Active or Inactive.
Left Rear Window Learned	-	Yes	The scan tool displays No or Yes.
Left Rear Window Main Control Down Switch	-	Inactive	The scan tool display Active or Inactive. This parameter displays driver window switch inputs.
Left Rear Window Main Control Express Switch	-	Inactive	The scan tool display Active or Inactive. This parameter displays driver window switch inputs.
Left Rear Window Main Control Up Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays driver window switch inputs.
Left Rear Window Motor Mode	-	Local Switch Overridden	The scan tool displays Down, Express, Up, Inhibit, or Local Switch Overridden.
Left Rear Window Switch at Door	-	Inactive	The scan tool displays Active or Inactive.
Left Stop Lamp Command	-	Varies	The scan tool display percentage.

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Parameter	System State	Expected Value	Definition
Left Turn Signal Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the left turn signal switch status.
License Plate Lamps Command	-	Inactive	The scan tool displays Active or Inactive.
Load Reduction Level 2-3 Counter	-	Varies	The scan tool display as counts.
Low Beam Relay Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the headlamp low beam relay status.
Manufacturers Enable Counter	-	Varies	This parameter tool displays various counter values.
Master Keys Learned	-	Varies	This parameter displays the total number of master keys learned.
Module Diagnostic Address	-	Varies	This parameter displays module diagnostic address.
Number of Key Fobs In Vehicle	-	1	This parameter displays the number of fobs located in the vehicle.
Odometer	-	Varies	This parameter displays the vehicle mileage.
Outside Rear View Mirror Courtesy Lamp Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays front exterior lighting status.
Park Brake Switch	-	Active	The scan tool displays Active or Inactive. This parameter displays front exterior lighting status.
Park Lamps Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays Active when the parklamp switch is activated.
Passenger Door Ajar Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the passenger door ajar switch status.
Passenger Door Lock Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the passenger door lock switch status.
Passenger Door Unlock Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the passenger door unlock switch status.
Passenger Door(s) Unlatch Command	-	Inactive	The scan tool displays Active or Inactive.
Passenger Door(s) Unlock Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the passenger door unlock status.
Passenger Seat Heating Switch	-	Inactive	The scan tool displays Active or Inactive.

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Parameter	System State	Expected Value	Definition
Passenger Seat Heating/Venting/Cooling Mode	-	Off	The scan tool displays On or Off.
Passenger Seat Ventilation Switch	-	Inactive	The scan tool displays Active or Inactive.
Passenger Window Learned	-	Yes	The scan tool displays No or Yes. This parameter displays the passenger window learned status.
Passenger Window Motor Mode	-	Local Switch Overridden	The scan tool displays Down, Express, Up, Inhibit, or Local Switch Overridden.
Passenger Window Switch at Door	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the passenger window switch status.
Pickup Bed Cargo Lamp Command	-	Varies	The scan tool displays percentage. This parameter displays pickup bed cargo lamp command status.
Previous Key Type	-	Unknown	This parameter displays previous driver identification device type.
Primary Key Status	-	Yes	The scan tool displays No or Yes.
Push Button Ignition Switch	-	Inactive	The scan tool displays Active or Inactive.
Push Button Ignition Switch Voltage	-	Varies	This parameter displays the push button ignition switch voltage.
Rain Sensor	-	Inactive	The scan tool displays Active or Inactive.
Rear Closure Ajar Switch	-	Active	The scan tool displays Active or Inactive.
Rear Closure Cylinder Lock Switch	-	Inactive	The scan tool displays Active or Inactive.
Rear Closure Cylinder Unlock Switch	-	Inactive	The scan tool displays Active or Inactive.
Rear Tire Pressure on Placard	-	Varies	This parameter displays the rear tire pressure in kPa or PSI. This parameter displays the specified tire pressure placard information programmed in the BCM for tire pressure monitoring.
Regulated Voltage Control Mode	-	Voltage	The scan tool displays voltage.
Remote Vehicle Start Attempts Exhausted	-	Varies	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history or remaining start attempts.
Remote Vehicle Start Crank Time	-	Inactive	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history.
Remote Vehicle Start Disabled by Driver	-	Inactive	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history.
Remote Vehicle Start Source	-	Ignition Switch Start	The scan tool displays Ignition Switch Start or Remote Vehicle Start.

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Parameter	System State	Expected Value	Definition
Remote Vehicle Starts Exhausted	-	Varies	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history or remaining remote starts.
Right Brake Lamp Command	-	Varies	The scan tool display percentage. This parameter displays right brake lamp PWM command status.
Right Dedicated Daytime Running Lamp Command	-	Varies	The scan tool display percentage. This parameter displays right dedicated DRL PWM command status.
Right Front Tire Pressure	-	Varies	This parameter displays right front tire pressure in PSI.
Right Front Tire Pressure Sensor Identification	-	Varies	This parameter displays right front tire pressure sensor ID.
Right Front Tire Pressure Sensor Location Learned	-	Yes	The scan tool displays No or Yes.
Right Front Tire Pressure Sensor Mode	-	Stationary	The scan tool displays Learn Mode, Undefined, Remeasure Data Mode, Rolling Mode, Enter Off Mode, Exit Off Mode or Learn Mode Pressure Triggered.
Right Front Tire Pressure Status	-	Normal	The scan tool displays Unknown, Normal, Very Low Pressure, Low, Weak Signal, or High.
Right Front Turn Signal Bulb Out Feedback	-	Inactive	The scan tool displays Active or Inactive.
Right Front Turn Signal/Hazard Lamp Command	-	Inactive	The scan tool displays Active or Inactive.
Right Low Beam/Daytime Running Lamp Command	-	Varies	The scan tool displays percentage. This parameter displays right low beam/daytime running lamp status.
Right Park Lamps Command	-	Varies	The scan tool displays percentage. This parameter displays rear exterior lighting status.
Right Rear Child Security Lock Switch	-	Inactive	The scan tool displays Active or Inactive.
Right Rear Door Ajar Switch	-	Inactive	The scan tool displays Active or Inactive.
Right Rear Tire Pressure	-	Varies	This parameter displays right rear tire pressure in PSI.
Right Rear Tire Pressure Sensor Identification	-	Varies	This parameter displays right rear tire pressure sensor ID.
Right Rear Tire Pressure Sensor Location Learned	-	Yes	The scan tool displays No or Yes.
Right Rear Tire Pressure Sensor Mode	-	Learn Mode - Pressure Triggered	The scan tool displays Learn Mode, Undefined, Remeasure Data Mode, Rolling Mode, Enter Off Mode, Exit Off Mode, or Learn Mode Pressure Triggered.

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Parameter	System State	Expected Value	Definition
			This parameter displays the pressure sensor mode status.
Right Rear Tire Pressure Status	-	Normal	The scan tool displays Unknown, Normal, Very Low Pressure, Low, Weak Signal or High. This parameter displays the right rear tire pressure status.
Right Rear Turn Signal Bulb Out Feedback	-	Inactive	The scan tool displays Active or Inactive.
Right Rear Turn Signal/Hazard Lamp Command	-	Inactive	The scan tool displays Active or Inactive.
Right Rear Window Main Control Down Switch	-	Inactive	The scan tool displays Active or Inactive.
Right Rear Window Main Control Express Switch	-	Inactive	The scan tool displays Active or Inactive.
Right Rear Window Main Control Up Switch	-	Inactive	The scan tool displays Active or Inactive.
Right Rear Window Motor Mode	-	Local Switch Overridden	The scan tool displays Down, Express, Up, Inhibit, or Local Switch Overridden.
Right Rear Window Switch at Door	-	Inactive	The scan tool displays Active or Inactive.
Right Stop Lamp Command	-	Varies	The scan tool displays percentage.
Right Turn Signal Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the right turn signal switch status.
Run Abort	-	Inactive	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history.
Run Relay Command	-	Active	The scan tool displays Active or Inactive.
Run/Crank	-	Inactive	The scan tool displays Active or Inactive.
Run/Crank Relay Command	-	Active	The scan tool displays Active or Inactive.
Run/Crank Power Mode Indicator Command	-	Varies	The scan tool displays percentage. This parameter displays ignition switch run LED PWM command status.
Secondary Key Status	-	No	The scan tool displays No or Yes.
Security Indicator Command	-	Varies	The scan tool displays percentage. This parameter displays security LED PWM command status.
Selected Front Tire Type	-	Standard Load	The scan tool displays No Tire Type, Metric Standard Load, Metric Extra Load, Load Range C, Load Range D, or Load Range E. This parameter displays the front tire type.
Selected Rear Tire Type	-	Standard Load	The scan tool displays No Tire Type, Metric Standard Load, Metric Extra Load, Load Range C, Load Range D, or Load Range E. This parameter displays the rear

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Parameter	System State	Expected Value	Definition
			tire type.
Start-Up State of Charge	-	Varies	The scan tool displays percentage. This parameter displays startup state of charge status.
State of Charge	-	Varies	The scan tool displays percentage. This parameter displays state of charge status.
Sunroof Enabled	-	Active	The scan tool displays Active or Inactive.
Sunroof Motor Overtemperature	-	Inactive	The scan tool displays Active or Inactive.
Sunroof Not Learned	-	Inactive	The scan tool displays Active or Inactive.
Sunroof Position	-	Closed	The scan tool displays Closed, Open, Venting, Comfort Open, Closing, Opening. This parameter displays the current sunroof position.
Sunroof Remote Command	-	Inactive	The scan tool displays Sunroof Secure Close, Venting, Close, or Open. This parameter displays the last sunroof remote command.
Sunroof Slide Switch	-	Inactive	The scan tool displays Inactive, Express Open, Open, Express Close, Close, Short to Ground, Short to Battery, or Stuck. This parameter displays the sunroof slide switch status.
Sunroof Tilt Switch	-	Inactive	The scan tool displays Inactive, Open, Close, Short to Ground, Short to Battery or Stuck. This parameter displays the sunroof tilt switch status. When the switch experiences a malfunction Short to Ground, Short to Battery or Stuck will be displayed.
Sunroof/Sunshade Motor Overtemperature	-	Inactive	The scan tool displays Active or Inactive.
Sunroof/Sunshade Switch	-	Inactive	The scan tool displays Inactive, Express Open, Open, Express Close, Close, Short to Ground, Short to Battery, or Stuck. This parameter displays the sunroof or sunshade switch status.
Sunshade Enabled	-	Active	The scan tool displays Active or Inactive.
Sunshade Not Learned	-	Inactive	The scan tool displays Active or Inactive.
Sunshade Position	-	Closed	The scan tool displays Ajar, Closed, Opened, Closing, or Opening. This parameter displays the sunshade position status.
Sunshade Remote Command	-	Inactive	The scan tool displays Close or Open. This parameter displays the last sunshade remote command.
Tamper Status	-	No	The scan tool displays No or Yes.

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Parameter	System State	Expected Value	Definition
Telematics Enhanced Service Override Active	-	No	The scan tool displays No or Yes. This parameter displays vehicle theft deterrent system status.
Total Keys Learned	-	Varies	This parameter displays the number of keys learned.
Traction Control Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays Active when the traction control switch is active.
Transponder Authentication	-	Initializing	The scan tool displays Inactive, Initializing, ID Received, Password Received, Data Reception Complete, or Data Transmission Complete. This parameter displays the transponder key communication status.
Transponder Key Status	-	OK	The scan tool displays OK, LIN Bus Initialization Malfunction, Antenna Initialization Malfunction, Password Error, No Valid Key Detected, LIN Bus Communication Malfunction, or Antenna Malfunction. This parameter displays the transponder key communication error status.
Trunk Lamp Command	-	Varies	The scan tool displays as percentage.
Trunk Lid/Liftgate Window Exterior Unlatch Switch	-	Inactive	The scan tool displays Active or Inactive.
Trunk Lid/Liftgate Window Unlatch Command	-	Inactive	The scan tool displays Active or Inactive.
Valet Keys Learned	-	Varies	This parameter displays the number of valet keys learned.
Valet Mode Status	-	Inactive	This parameter displays the remote start diagnostic status history or the last remote start diagnostic status history.
Valet switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays Active when the valet switch is on.
Vehicle Identification Number (VIN)	-	Varies	This parameter displays the vehicle identification number.
Window Lockout Switch	-	Inactive	The scan tool displays Active or Inactive.
Window Lockout Switch Indicator Command	-	Inactive	The scan tool displays Active or Inactive.
Windshield Washer Relay Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the windshield washer relay status.
Windshield Washer Switch	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the windshield washer switch status.

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Parameter	System State	Expected Value	Definition
Windshield Wiper Park Switch	-	Active	The scan tool displays Active or Inactive.
Windshield Wiper High Speed Relay Command	-	Inactive	The scan tool displays Active or Inactive.
Windshield Wiper High Speed Switch	-	Inactive	The scan tool displays Active or Inactive.
Windshield Wiper Motor Relay Command	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the windshield wiper relay status.
Windshield Wiper Stalled During Sweep	-	Inactive	The scan tool displays Active or Inactive.
Windshield Wiper Stalled in Park Position	-	Inactive	The scan tool displays Active or Inactive. This parameter displays the windshield wiper stalled status.
Windshield Wiper Switch	-	Off	The scan tool displays Off, Delay 1, Delay 2, Delay 3, Delay 4, Delay 5, or Low. This parameter displays the windshield wiper switch status.

Body Control Module Scan Tool Output Controls

Scan Tool Output Control	Description
Accent Lighting 1	The BCM activates the accent lighting when you select On. The value should be 100%. All accent lighting should illuminate until commanded Off.
Accent Lighting 2	The BCM activates the accent lighting when you select On. The value should be 100%. All accent lighting should illuminate until commanded Off.
Accessory Power Mode Indicator	The BCM activates the accessory indicator when you select On. The value should be 100%. The yellow LED accessory indicator on start button should illuminate until commanded Off.
Accessory Power Relay	The BCM actuates the accessory power relay when you select On. The accessory power relay should turn on allowing specific vehicle functions to operate.
Accessory/Retained Accessory Power Relay	The BCM actuates the retained accessory power relay when you select On. The retained accessory power relay should turn on allowing specific vehicle functions to operate.
All Doors Lock	The BCM activates all doors lock when you select Lock. All doors should lock.
All Doors Lock/Unlock	The BCM activates all doors lock/unlock when you select Lock/Unlock.
Auxiliary Ignition Run Relay	The BCM controls the Ignition Run Coil Control circuit to turn it On and Off.
Backup Lamps	The BCM actuates the backup lamps relay when you select On. The backup lamps should illuminate until commanded Off. Engine must be running.
Battery Saver Relay	The BCM activates the battery saver relay when you select Enable. This command sets the low power mode relay in the state in which it does not supply power to the non-essential parts of the vehicle. This is used to prevent the battery from being depleted when the vehicle is not used for a long period of time.
Brake Pedal Position Sensor Learn	The BCM activates the brake pedal position sensor learn when you select Learn. The brake pedal position sensor learn procedure should start.

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Scan Tool Output Control	Description
Brake Transmission Shift Interlock Solenoid Actuator	The BCM activates the transmission shift interlock solenoid actuator when you select On.
Brake Transmission Shift Interlock Indicator	The BCM activates the transmission range indicator when you select On. The transmission range indicator at the shifter should illuminate until commanded Off.
Center Brake Lamp	The BCM activates the center brake lamp when you select On. The center brake lamp should illuminate until commanded Off.
Center Stop Lamp	The BCM activates the center stop lamp when you select On. The center stop lamp should illuminate until commanded Off.
Child Security Lock Indicator	The BCM activates the child security lock indicator when you select On. The child security lock indicator should illuminate until commanded Off.
Child Security Lock Motors	The BCM actuates the child security door motor when you select Lock. The child security doors should lock.
Child Security Lock/Window Lockout Switch Indicator	The BCM activates the child security lock/window lockout switch indicator when you select On. The child security lock/window lockout switch indicator should illuminate until commanded Off.
Clear Driver Window Learned Values	When you select Clear the clear driver window learn procedure should start.
Clear Passenger Window Learned Values	When you select Clear the clear left rear window learn procedure should start.
Courtesy Lamps	The BCM activates the courtesy lamps when you select On. The value should be 100%. The courtesy lamps should illuminate until commanded Off.
Driver Door Unlatch	The BCM activates the output circuit to unlatch the driver door with a passive entry passive start when you select Unlatch. There is NO door handle on this type of vehicle to open the door. Instead, there is a pad that you press to unlatch the door.
Driver Door Unlock	The BCM pulses the driver door unlock motor when you select Unlock. The driver door should unlock.
Driver Window Motor	The BCM activates the driver window motor when you select Up/Down /Stop/Express Up/Express Down. The driver window should follow the appropriate command.
Driver Window Motor Mode	The BCM activates the driver window motor when you select Up/Down /Stop/Express Up/Express Down. The driver window should follow the appropriate command.
Front Fog Lamps	The BCM actuates the front fog lamps relay when you select On. The front fog lamps relay should turn on.
Generator Regulator Setpoint	The BCM changes the output of the generator.
Hazard Lamps Switch Backlight	The BCM activates the hazard lamps switch when you select On. The value should be 100%. The hazard lamps switch backlight should illuminate until commanded Off.
High Beams	The BCM activates the high beam command when you select On. The high beam lights should illuminate. The headlamps have to be on.
Horn Relay	The BCM activates the horn when you select On. The horn should sound.

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Scan Tool Output Control	Description
Inadvertent Load	The BCM activates the inadvertent load command when you select On. (It is an electronic request to shut down an electrical or electronic device that is drawing power from the battery at a time when there should be no activity, usually after the key has been removed from the ignition for a period of time.)
Incandescent Dimming	The BCM activates the incandescent light dimming when you select On. The values should be 100%. The incandescent light dimming should illuminate until commanded Off.
Indicator Dimming	The BCM activates the indicator dimming when you select On. The values should be 100%. The indicator should illuminate until commanded Off.
LED Backlight Dimming	The BCM activates the LED backlight dimming when you select On. The values should be 100%. The LED backlight dimming for control switches should illuminate until commanded Off.
Left Brake Lamp	The BCM activates the left brake lamp when you select On. The values should be 100%. The left brake lamp should illuminate until commanded Off.
Left Dedicated Daytime Running Lamp	The BCM activates the left dedicated daytime running lamp when you select ON. The value changes to 100%. The left daytime running lamp should illuminate.
Left Front Park Lamp	The BCM activates the left front park lamp when you select ON with a value of 100%. The left front park lamp should illuminate.
Left Front Park Lamp/Daytime Running Lamp	The BCM activates the left front park lamp/daytime running lamp when you select ON with a value of 100%. The left front park lamp/daytime running lamp should illuminate.
Left Front Turn Signal Lamp	The BCM activates the left front turn signal lamp when you select On. The left front turn signal lamp should illuminate until commanded Off.
Left Headlamp Lamp Low Beam	The BCM activates the left headlamp low beam when you select On. The values should be 100%. The left headlamp low beam should illuminate until commanded Off.
Left Park Lamps	The BCM activates the left park lamps when you select ON with a value of 100%. The left park lamps should illuminate.
Left Rear Park Lamp	The BCM activates the left rear park lamp when you select ON with a value of 100%. The left rear park lamp should illuminate.
Left Rear Stop/Park Lamp	The BCM activates the left rear stop/park lamp when you select ON with a value of 100%. The left rear stop/park lamp should illuminate.
Left Rear Turn Signal Lamp	The BCM activates the left rear turn signal lamp when you select On. The left rear turn signal lamp should illuminate until commanded Off.
Left Rear Turn Signal/Stop Lamp	The BCM activates the left rear turn signal/stop lamp when you select On. The left rear turn signal/stop lamp should illuminate until commanded Off.
Left Rear Window Motor	The BCM activates the left rear window motor when you select Up/Down /Stop/Express Down. The left rear window should follow the appropriate command.
Left Stop Lamp	The BCM activates the left stop lamp when you select ON with a value of 100%. The left stop lamp should illuminate.
Left Trailer Turn Signal Lamp	The BCM activates the left trailer turn signal lamp when you select ON with a value of 100%. The left trailer turn signal lamp should illuminate.
License Plate Lamps	The BCM activates the license plate lamps when you select On. The license plate lights should turn on until commanded Off.

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Scan Tool Output Control	Description
Liftgate Unlatch	The BCM actuates the rear compartment lid release actuator when you select Unlatch. The trunk or liftgate should open.
LIN Bus Device Identification Data	When you select Update the LIN Bus Device part number and calibration part number should be updated.
Low Beam Lamps	The BCM activates the low beam lamps when you select On. The low beam lamps should turn on.
Low Beam Relay	The BCM activates the low beams when you select On. The low beam lights should turn on.
Outside Rear View Mirror Courtesy Lamp	The BCM activates the outside rear view mirror courtesy lamp when you select On. The outside rear view mirror courtesy lamp (at the bottom) should illuminate.
Passenger Door(s) Unlatch	The BCM activates the output circuit to unlatch the passenger door with a passive entry passive start when you select Unlatch. There is NO door handle on this type of vehicle to open the door. Instead, there is a pad that you press to unlatch the door.
Passenger Door(s) Unlock	The BCM pulses the passenger door unlock motor when you select Unlock. The passenger door should unlock.
Passenger Window Motor	The BCM activates the passenger window motor when you select Up/Down /Stop/Express Up/Express Down. The passenger window should follow the appropriate command.
Pickup Bed Cargo Lamp	The BCM activates the pickup bed cargo lamp when you select On. The values should be 100%. The pickup bed cargo lamp should illuminate until commanded Off.
Rear Fog Lamp(s) Relay	The BCM activates the rear fog lamps when you select On. The rear fog lamps should turn on.
Right Brake Lamp	The BCM activates the right brake lamp when you select On. The value should be 100%. The right brake lamp should illuminate until commanded Off.
Right Dedicated Daytime Running Lamp	The BCM activates the right dedicated daytime running lamp when you select On. The value should be 100%. The right daytime running lamp should illuminate.
Right Front Park Lamp	The BCM activates the right front park lamp when you select ON with a value of 100%. The right front park lamp should illuminate.
Right Front Park Lamp/Daytime Running Lamp	The BCM activates the right front park lamp/daytime running lamp when you select ON with a value of 100%. The right front park lamp/daytime running lamp should illuminate.
Right Front Turn Signal Lamp	The BCM activates the right front turn signal lamp when you select On. The right front turn signal/hazard lamp should illuminate.
Right Headlamp Low Beam	The BCM activates the right headlamp low beam when you select On. The right headlamp low beam should illuminate.
Right Park Lamps	The BCM activates the right park lamps when you select ON with a value of 100%. The right park lamps should illuminate.
Right Rear Park Lamp	The BCM activates the right rear park lamp when you select ON with a value of 100%. The right rear park lamp should illuminate.
Right Rear Stop/Park Lamp	The BCM activates the right rear stop/park lamp when you select ON with a value of 100%. The right rear stop/park lamp should illuminate.

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Scan Tool Output Control	Description
Right Rear Turn Signal Lamp	The BCM activates the right rear turn signal/hazard lamp when you select On. The right rear turn signal lamp should illuminate until commanded Off.
Right Rear Turn Signal/Stop Lamp	The BCM activates the right rear turn signal/stop lamp when you select On. The right rear turn signal/stop lamp should illuminate until commanded Off.
Right Rear Window Motor	The BCM activates the right rear window motor when you select Up/Down /Stop/Express Down. The right rear window should follow the appropriate command.
Right Stop Lamp	The BCM activates the right stop lamp when you select ON with a value of 100%. The right stop lamp should illuminate.
Right Trailer Turn Signal Lamp	The BCM activates the right trailer turn signal lamp when you select ON with a value of 100%. The right trailer turn signal lamp should illuminate.
Run Relay	The BCM actuates the run relay when you select On. The run relay should turn on.
Run/Crank Relay	The BCM actuates the run/crank relay when you select On. The run/crank relay should turn on.
Run/Start Power Mode Indicator	The BCM activates the run/start lamp when you select On. The value should be 100%. The green LED on engine start/stop button should illuminate until commanded Off.
Security Indicator	The BCM activates the security indicator command when you select On. The security indicator at center of dash (or at DRL sensor) should illuminate until commanded Off.
Stop Lamps	The BCM activates the stop lamps when you select ON with a value of 100%. The stop lamps should illuminate.
Tire Pressure Sensors Learn	The BCM activates the tire pressure sensor learn procedure when you select Learn.
Tire Type/Pressure Selection	When you select OK, you can change tire type and load range.
Trailer Backup Lamps	The BCM activates the trailer backup lamps when you select ON with a value of 100%. The trailer backup lamps should illuminate.
Trailer Park Lamps	The BCM activates the trailer park lamps when you select ON with a value of 100%. The trailer park lamps should illuminate.
Transmission Range Indicator	The BCM activates the transmission range indicator when you select On. The transmission range indicator at the shifter should illuminate until commanded Off.
Trunk Lamp	The BCM activates the trunk lamp when you select On. The value should be 100%. The trunk lamp should illuminate until commanded Off.
Trunk Lid Unlatch	The BCM activates the trunk lid unlatch when you select On. The trunk lid should unlatch.
Window Lockout Switch Indicator	The BCM activates the window lockout switch indicator when you select On. The window lockout switch indicator should illuminate until commanded Off.
Windshield Washer Relay	The BCM actuates the windshield washer relay when you select On. The windshield washer relay should turn on.
Windshield Wiper High Speed Relay	The BCM actuates the windshield wiper high speed relay when you select On. The windshield wiper high speed relay should turn on.
Windshield Wiper Motor Relay	The BCM actuates the windshield wiper motor relay when you select On. The windshield wiper motor relay should turn on.

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CHASSIS CONTROL MODULE SCAN TOOL INFORMATION

Chassis Control Module (CCM) Scan Tool Data Parameters for Fuel System

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature/Vehicle is in Park or Neutral			
Desired Fuel Pressure	-	306.8 kPa (44.5 psi)	This displays kPa (psi). This is the desired fuel pressure.
Fuel Pump Command	-	On	The scan tool displays On or Off. This is the current state of the fuel pump command.
Fuel Pump Signal Command	-	Varies	This displays %. This is the commanded fuel pump signal measured in percentage.
Fuel Pressure Sensor	-	296.4-310.3 kPa (43-45 psi)	This displays kPa (psi). This is the current pressure at the fuel pressure sensor.
Fuel Pressure Sensor	-	2.00-3.00 Volts	This voltage can vary depending on the engine application, engine load, operating conditions and other factors. This display is in Volts. This is the fuel pressure sensor voltage.
Ignition 1 Signal	-	Varies	This displays Volts. This is the current ignition 1 signal.
LT Fuel Pump Trim	-	Varies	This displays a numeric value. This is the long term (LT) fuel pump trim.
ST Fuel Pump Trim	-	Varies	This displays a numeric value. This is the short term (ST) fuel pump trim.

Chassis Control Module (CCM) Scan Tool Output Controls for Fuel System

Output Control	Description
Fuel Pressure Control	This output control is used to control the fuel pressure.
Fuel Pump	This output control is used to command the fuel pump ON and OFF.
Fuel Pump Trim Reset	This output control is used to reset the fuel pump trim.

CCM Scan Tool Parameters for Active Grille Air Shutters (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature / Vehicle is in Park or Neutral			

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Parameter	System State	Expected Value	Description
Active Grille Air Shutter Position Command (Single Shutter System)	-	Varies	This displays %. This is the commanded active grille air shutter position.
Active Grille Air Shutter Position (Single Shutter System)	-	Varies	This displays %. This is the actual active grille air shutter position.
Active Grille Air Shutter 1 Position Command (Dual Shutter System)	-	Varies	This displays %. This is the commanded active grille air shutter position.
Active Grille Air Shutter 1 Position (Dual Shutter System)	-	Varies	This displays %. This is the actual active grille air shutter position.
Active Grille Air Shutter 2 Position Command (Dual Shutter System)	-	Varies	This displays %. This is the commanded active grille air shutter position.
Active Grille Air Shutter 2 Position (Dual Shutter System)	-	Varies	This displays %. This is the actual active grille air shutter position.

CCM Scan Tool Output Controls for Active Grille Air Shutters (If Equipped)

Output Control	Description
Active Grille Air Shutter System (Single Shutter System)	This output control is used to perform the Active Grille Air Shutter Actuator test. It is used to cycle the active grille air shutter open and closed. The test result will display pass or fail based on the ability of the louvers to cycle open and closed.
Active Grille Air Shutter 1 (Dual Shutter System)	This output control is used to perform the Active Grille Air Shutter Actuator test. It is used to cycle the active grille air shutter open and closed. The test result will display pass or fail based on the ability of the louvers to cycle open and closed.
Active Grille Air Shutter 2 (Dual Shutter System)	This output control is used to perform the Active Grille Air Shutter Actuator test. It is used to cycle the active grille air shutter open and closed. The test result will display pass or fail based on the ability of the louvers to cycle open and closed.

CCM Scan Tool Parameters for Active Engine Mounts (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature / Vehicle is in Park or Neutral			
Engine Mount Actuator Output 1	-	On/Off	The scan tool will display On/Off. This is the engine mount actuator commanded state.
Engine Mount Actuator Output 2	-	On/Off	The scan tool will display On/Off. This is the engine mount actuator commanded state.
Engine Mount Actuator Control Circuit 1 Status (2014 model year only)	-	Passed	The scan tool displays Passed/Short to Battery/Short to Ground/Open This is the

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Parameter	System State	Expected Value	Description
			engine mount actuator control circuit 1 condition.
Engine Mount Actuator Control Circuit 2 Status (2014 model year only)	-	Passed	The scan tool displays Passed/Short to Battery/Short to Ground/Open This is the engine mount actuator control circuit 2 condition.

CCM Scan Tool Output Controls for Active Engine Mounts (If Equipped)

Output Control	Description
Engine Mount Actuator Output 1	This output control is used to turn the engine mount actuator 1 On and Off.
Engine Mount Actuator Output 2	This output control is used to turn the engine mount actuator 2 On and Off.

CCM Scan Tool Parameters for Exhaust Flow Control Valves (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature / Vehicle is in Park or Neutral			
Exhaust Flow Control Valve Command	-	Open/Closed	Exhaust Flow Valve Commanded State
Exhaust Flow Control Valve Command	-	%	Exhaust Flow Valve Commanded Duty Cycle (0%-100%)
Exhaust Flow Control Valve Performance Mode	-	Active/Inactive	Exhaust Flow Valve Control Status
Exhaust Flow Control Valve Rumble Mode	-	Active/Inactive	Exhaust Flow Valve Control Status
Exhaust Flow Control Valve	-	Active/Inactive	Exhaust Flow Valve Control Status
Cylinder Deactivation Exhaust Flow Valve Command	-	Open/Closed/Disabled	Exhaust Flow Valve Commanded State
Cylinder Deactivation Exhaust Flow Control Valve	-	Active/Inactive	Exhaust Flow Valve Control Status
Cylinder Deactivation Exhaust Flow Control Valve 1 Position	-	Open range is 4 - 28 degrees Closed range is 64 - 93 degrees	Cylinder Deactivation Exhaust Flow Control Valve 1 actual position in degrees
Cylinder Deactivation Exhaust Flow Control Valve 2 Position	-	Open range is 4 - 28 degrees Closed range is 64 - 93 degrees	Cylinder Deactivation Exhaust Flow Control Valve 2 actual position in degrees

CCM Scan Tool Output Controls for Exhaust Flow Control Actuators (If Equipped)

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Output Control	Description
Exhaust Flow Control Valve Command	This output control is used to cycle the exhaust flow control valve open and closed.
Cylinder Deactivation Exhaust Flow Valve Command	This output control is used to cycle the cylinder deactivation exhaust flow control valve open and closed.

CCM Scan Tool Parameters for Trailer Brake Control System (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature / Vehicle is in Park or Neutral			
ABS Active Signal	-	OK	The scan tool displays Ok/Not Ok. The scan tool displays Ok when no problems are found with the ABS Active Signal serial data message from the electronic brake control module to the chassis control module.
Antilock Braking System	-	Inactive	The scan tool displays Active/Inactive. The scan tool displays Inactive when the ABS system is not functioning.
Automatic Brake Control Gain Request From EBCM	-	0-100%	The scan tool displays a number between 0-100%.
Automatic Brake Request From EBCM	-	No	The scan tool displays Yes/No. This is a request from the EBCM to apply the trailer brakes.
Automatic-Brake Torque	-	Nm	The scan tool displays a numerical value.
Automatic-Brake Torque Signal	-	Ok	The scan tool displays Ok/Not Ok. The scan tool displays Ok when no problems are found with the Automatic Brake Torque Signal serial data message to the chassis control module.
Automatic Braking Active Signal	-	Ok	The scan tool displays Ok/Not OK. The scan tool displays OK when no problems are found with the Automatic Braking Active Signal serial data message to the chassis control module.
Automatic Braking Event	-	Not Detected	The scan tool displays Detected/Not Detected. This parameter represents a command to apply the trailer brakes from the adaptive cruise control system.

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Parameter	System State	Expected Value	Description
Brake Master Cylinder Pressure Sensor	-	Varies	The scan tool will display brake fluid pressure in the master cylinder. The scan tool will display a kPa or psi signal received from the chassis control module.
Brake Pressure Signal	-	OK	The scan tool will display Ok/Not Ok. The scan tool will display a serial data message received from the chassis control module.
Brake Request from EBCM	-	Ok	The scan tool displays Ok/Not Ok. The scan tool displays Ok when no problems are found with the Brake Request signal serial data message from the electronic brake control module to the chassis control module.
Desired Trailer Brake Control Duty Cycle	-	0-100%	The scan tool displays a number between 0-100%. This number represents a duty cycle request signal from the chassis control module to the trailer brake power module.
Deviation Between Manual Trailer Brake Apply Request Signal 1 and 2	-	Varies	The scan tools displays a percentage difference between the Apply Request Signal 2 and Redundant Request Signal 1.
Driver Initiated Brake Event	-	Not Detected	The scan tool displays Detected/Not Detected. The scan tool detects when the driver has applied the trailer brakes.
Induced Voltage by Trailer Brake Coil	-	0-20 V	The scan tool displays a voltage. This number represents the actual voltage supplied by the trailer brake power module to the trailer brakes.
Manual Trailer Brake Apply Request Signal 1	-	Varies	The scan tool displays a percentage. This represents a brake apply signal between the chassis control module and the trailer brake power module.
Manual Trailer Brake Apply Request Signal 2	-	Varies	The scan tool displays a percentage. This represents a brake apply signal between the chassis control module and the trailer brake power module.
Stop Lamp Signal	-	Not Requested	The scan tool displays Requested/Not Requested. This is

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Parameter	System State	Expected Value	Description
			the brake pedal position sensor signal from the BCM to the chassis control module.
Trailer Brake Automatic Control State	-	Normal	The scan tool displays Normal/Active/Temporarily Inhibited/Temporarily Limited/Permanently Failed/Communication Failed/Disabled by Calibration. This represents the operational state of the chassis control module.
Trailer Brake Control Duty Cycle	-	0-100%	The scan tool displays a percentage. This is the pulse width modulated output signal from the trailer brake power module to the trailer brakes.
Trailer Brake Control Output Circuit	-	Okay	The scan tool displays Unknown/Short to Battery/Short to Ground/Okay. This represents the state of health of the output circuit from the trailer brake power module to the trailer brakes.
Trailer Brake Control Output Circuit	-	0-20 V	The scan tool displays a voltage. This represents the voltage supplied by the trailer brake power module to the trailer brakes.
Trailer Brake Power Control Module	-	De-Energized	The scan tool displays Energized/De-Energized. This represents the state of the trailer brake power module.
Trailer Brake Power Control Module Battery Voltage	-	Varies	The scan tool displays a voltage. This represents the battery voltage supplied to the trailer brake power module.
Trailer Brake Type	-	Undefined	The scan tool displays Undefined when a trailer is not connected to the vehicle. The scan tool displays Electromagnetic Brakes or Electrohydraulic Brakes when a trailer is connected to the vehicle. The type displayed is based on what is detected by the chassis control module.
Trailer Brake User Gain	-	Varies	The scan tool displays percent of full gain setting. The scan tool

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Parameter	System State	Expected Value	Description
			displays 0-100%. Each full gain setting represents an increment of approximately 10 percent of full gain setting. Approximately 40% will be indicated with a gain setting of 4.0, 65% will be indicated with a gain setting of 6.5, etc.
Trailer Brake User Gain Switch	-	Varies	The scan tool displays percent of full gain setting. The scan tool displays 0-100%. Each full gain setting represents an increment of approximately 10 percent of full gain setting. Approximately 40% will be indicated with a gain setting of 4.0, 65% will be indicated with a gain setting of 6.5, etc.
Vehicle Speed	-	Varies	The scan tool displays 0-327 km/h (0-204 mph). The scan tool displays 0 km/h (0 mph) when the vehicle is not moving. This is the vehicle speed serial data message from the ECM.
Vehicle Stability Enhancement System Signal	-	Ok	The scan tool displays Ok/Not Ok. The scan tool displays Ok when no problems are found with the Vehicle Stability Enhancement System signal to the chassis control module.
Wheel Speed Signal	-	Ok	The scan tool displays Ok/Not Ok. The scan tool displays Ok when no problems are found with the Wheel Speed signal from the EBCM to the chassis control module.

Chassis Control Module (CCM) Scan Tool Output Controls for Trailer Brake Control System (If Equipped)

Output Control	Description
Trailer Brake Control Signal	This output control is used to turn the trailer brake power control module on and off.
Trailer Brake Duty Cycle	This output control is used to control the trailer brake apply signal from trailer brake power control module.

CCM Scan Tool Parameters for Vehicle Level Control (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON			

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Parameter	System State	Expected Value	Description
Left Rear Vehicle Level Position Sensor	-	.25-4.75 Volts	This displays Volts. This is the level position sensor voltage.
Right Rear Vehicle Level Position Sensor	-	.25-4.75 Volts	This displays Volts. This is the level position sensor voltage.
Vehicle Level Control Compressor Over Temperature	-	No	This displays Yes or No. This will display Yes if the compressor is overheated.
Excessive Compressor Activity	-	No	This displays Yes or No. This will display Yes if the compressor activity is excessive.
Vehicle Level Control Status	-	Normal	This displays Normal/Uneven Surface or Hoisted/Overloaded /Failed.
Vehicle Level Control Compressor	-	Varies	This displays On or Off. This will display if the compressor is on or off.
Vehicle Level Control Exhaust Valve	-	Varies	This displays Open or Closed. This will display if the exhaust valve is open or closed.
Vehicle Level Control Pressure Sensor	-	.4-4.8 Volts	This displays Volts. This is the level control pressure sensor voltage.
Vehicle Leveling Sensors Supply Voltage	-	4.9-5.1 Volts	This displays Volts. This is the leveling sensors supply voltage.
Vehicle Level Control Pressure Sensor Supply Voltage	-	4.9-5.1 Volts	This displays Volts. This is the level control pressure sensor supply voltage.
Vehicle Level Trim Height Status	-	Learned/Not Learned	This displays if the level trim height status

CCM Scan Tool Output Controls for Vehicle Level Control (If Equipped)

Output Control	Description
Suspension Position Sensor Trim Height	This output control is used to learn the trim height.
Vehicle Level Control Compressor Relay	This output control is used to command the compressor ON and OFF.
Vehicle Level Control Exhaust Valve	This output control is used to command the exhaust valve ON and OFF.

CCM Scan Tool Parameters for Transmission Cooling Fan (If Equipped)

Parameter	System State	Expected Value	Description
Operating Conditions: Ignition ON/Engine Idling at Normal Operating Temperature / Vehicle is in Park or Neutral			

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Parameter	System State	Expected Value	Description
Transmission Cooling Fan Circuit High Voltage Test Status	-	OK	Malfunction/Not Run/OK
Transmission Cooling Fan Circuit Open Test Status	-	OK	Malfunction/Not Run/OK
Transmission Cooling Fan Circuit Low Voltage Status	-	OK	Malfunction/Not Run/OK
Transmission Cooling Fan Command	-	Yes/No	The scan tool displays Yes/No. This shows if the transmission cooling fan is being commanded ON.
Transmission Cooling Fan Duty Cycle	-	0 - 100%	The scan tool displays a percentage. This is the transmission cooling fan ON duty cycle.

CCM Scan Tool Output Controls for Transmission Cooling Fan (If Equipped)

Output Control	Description
Transmission Cooling Fan Duty Cycle	This output control is used to control the transmission cooling fan.

CNG CONTROL MODULE SCAN TOOL INFORMATION

The Compressed Natural Gas Control Module Scan Tool Data list contains all engine-related parameters that are available on the scan tool. The list is arranged in alphabetical order.

Use the Compressed Natural Gas Control Module Scan Tool Data list only after the following is determined:

- The **Diagnostic System Check - Vehicle** is completed.
- No DTCs are set
- The on-board diagnostics are functioning properly

The scan tool values from a properly running engine may be used for comparison with the engine you are diagnosing. The Compressed Natural Gas Control Module Scan Tool Data list represents values that would be seen on a normally running engine.

NOTE: **A scan tool that displays faulty data should not be used. The scan tool concern should be reported to the manufacturer. Use of a faulty scan tool can result in misdiagnosis and unnecessary parts replacement.**

Only the parameters listed below are referenced in this service manual for use in diagnosis.

Compressed Natural Gas Control Module Scan Tool Data

Parameter	System State	Expected Value	Description
Base Operating Conditions: Engine Idling/Radiator Hose Hot/Park or Neutral/Closed Loop/Accessories OFF			
CNG Fuel Level	-	%	This parameter displays the amount of fuel remaining in the CNG fuel tank as

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Parameter	System State	Expected Value	Description
			measured in percentage.
CNG Fuel Rail Pressure	-	kPa/PSI	This parameter displays the CNG fuel rail pressure based on input from the fuel rail pressure temperature sensor.
CNG Fuel Rail Temperature Sensor	-	Â°C/Â°F	This parameter displays the CNG fuel rail temperature based on input from the fuel rail pressure temperature sensor.
CNG Injector Pulse Width	-	ms	This parameter indicates the average commanded ON time for the CNG injector pulse width.
Control Module Voltage Signal	-	V	This parameter displays the voltage signal sent to the CNG module.
ECT Sensor	-	85-105Â°C (185-220Â°F)	This parameter displays the temperature of the engine coolant based on the input from the engine coolant temperature (ECT) sensor.
Engine Speed	-	RPM	This parameter displays the speed of the crankshaft as determined by the control module using an input from the CKP sensor. The scan tool will display a high value at high engine speeds and a low value at low engine speeds.
Fuel Mode	-	Gasoline/CNG	This parameter displays the type of fuel currently being utilized by the vehicle.
MAP Sensor	-	30-38 kPa	This parameter displays the manifold absolute pressure (MAP) inside the engine as calculated by the engine control module based on the signal from the MAP sensor. The scan tool will display a higher value wide open throttle, and a lower value at idle.
Number of DTCs	-	Varies	This parameter displays the number of DTCs stored in the CNG module.

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