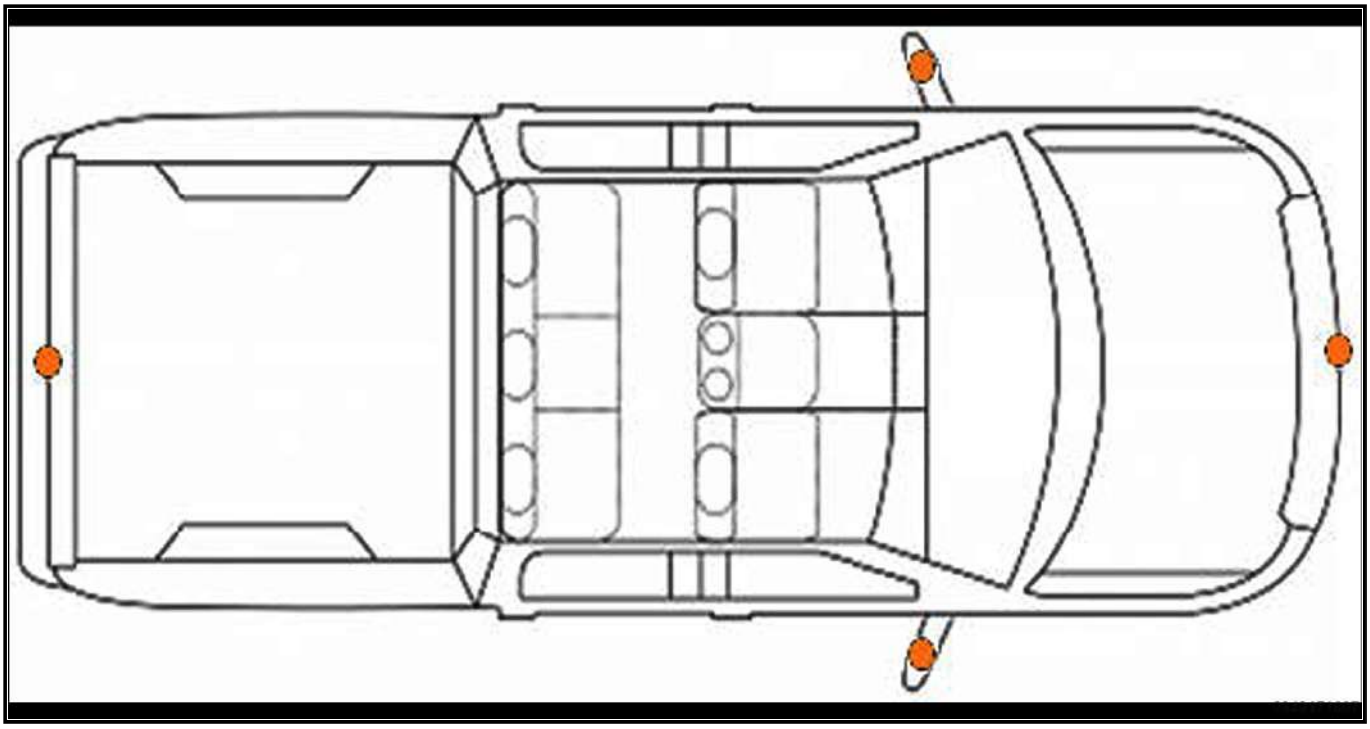


THEORY OF OPERATION

The Central Vision Processing Module (CVPM) generates the view in the Surround View Camera (SVC) system display according to inputs received from the four external cameras and driver touch screen inputs. The SVC system uses several different types of inputs and outputs from the Body Control Module (BCM), CVPM, and Radio. The CVPM combines the video feeds together and outputs it to the display screen. The CVPM on this model processes four cameras.

The CVPM receives:

- Power from a fuse protected relay within the interior Power Distribution Center (PDC)
- signals from all four cameras
- the reverse gear status
- the steering angle signal
- the vehicle speed signal
- the door ajar switch status for all 4 doors and the tailgate.

The CVPM uses these signals to process and determine dynamic grid line images. The CVPM uses the Controller Area Network-Interior High Speed (CAN-IHS) network to send each of the images to the radio for display.

For an in-depth explanation of the Central Vision Processing Module (CVPM). Refer to **MODULE, CENTRAL VISION PROCESSING (CVPM), DESCRIPTION** .

For an in depth explanation of the Surround View Camera system. Refer to **DESCRIPTION** .

WHEN MONITORED

This diagnostic runs continuously when the following condition is met:

- With the ignition on.

SET CONDITION

- The Central Vision Processing Module (CVPM) detected that the camera voltage is out of range.

DEFAULT ACTION

- The camera video image is blanked out on video screen.

POSSIBLE CAUSES

Possible Causes
CVPM SUPPLY VOLTAGE OUT OF RANGE

- The PCM acquires the brake booster differential depression information from the ABS module.
- The PCM receives the brake pedal status and generates a brake position variable based on the inputs. The variables are:

Brake Pedal Status - Input signal to the PCM:	PCM Variable generated - Brake Pedal Position:
Pedal Released	HIGH
Pedal Pressed	LOW
Not Active	ERROR

STARTER MOTOR

STARTER MOTOR

Refer to **COMPONENT INDEX**.

The Starter motor is only used once per ignition cycle. After the initial start the Motor Generator Unit (MGU) is responsible for all engine restarts during stop events in that ignition cycle.

STOP/START BUTTON

STOP/START BUTTON

Refer to **COMPONENT INDEX**.

The Electric Stop/Start button is a driver select feature that permits the driver to inhibit the Electric Stop/Start feature from performing Electric Stop/Start autostop and autostart events. The button, which is located on the interface of the ICS switch bank, generates a signal that is transmitted to the BCM. The signal displays the Electric Stop/Start status from the customer disable button. This is primarily used for feedback return to illuminate the Electric Stop/Start button Light Emitting Diode (LED). When the Electric Stop/Start system is ON, there is no LED indication shown. When the Electric Stop/Start system is off or inhibited, the LED is constantly illuminated.

The PCM follows OBDII regulations for inhibited Electric Stop/Start to prevent failure in order to determine if the Electric Stop/Start button is stuck. The button diagnostics will compare the state of two input switches. In the event that there is a disagreement between the states of the two switches, the PCM logic concludes that one of the switches has failed. Because this type of diagnostic cannot determine which switch is failed (and therefore the true state of the button press), the PCM assumes that the driver of the vehicle will not be able to inhibit the Electric Stop/Start system which, in turn, the PCM will set the appropriate DTCs. Until a fault has been validated, either switch input is accepted as a request to inhibit, thus not requiring both inputs to be set. The PCM will allow the Electric Stop/Start button a calibrated limit of soft fails before the PCM matures those soft fails to hard fails. The Stop/Start Button is serviced with the shifter assembly.

TRANSMISSION CONTROL MODULE (TCM)

TRANSMISSION CONTROL MODULE (TCM)

Refer to **COMPONENT INDEX**.

The TCM determines if the following conditions are met to perform an Electric Stop/Start autostop event:

- The TCM receives a CAN-C bus message from the PCM that indicates that there is an Electric Stop/Start autostop event pending and that the engine itself is ready for the Electric Stop/Start autostop event.
- The TCM receives a Electronic Stability Program (ESP) or an Electronic Stability Control (ESC) derived CAN-C bus message from the ABS module which indicates the vehicles speed threshold over a calibrated frame of time.
- The TCM determines that the transmission is not in **R** everse or that the there is not a TCM SNA error. The TCM needs to see that either a forward gear is engaged or that the transmission is in **N** eutral.

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
5750	357 (2.64)	2224	350 (3.71)	2074
5875	348 (2.59)	2168	342 (3.62)	2022
6000	341 (2.53)	2116	334 (3.54)	1973
6125	333 (2.48)	2066	327 (3.47)	1927
6250	326 (2.43)	2020	320 (3.40)	1884
6375	320 (2.39)	1979	314 (3.34)	1846
6500	315 (2.35)	1943	309 (3.28)	1813
6625	310 (2.32)	1913	304 (3.23)	1785
6750	307 (2.29)	1890	301 (3.20)	1764
6875	305 (2.28)	1875	299 (3.17)	1750
7000	304 (2.27)	1870	298 (3.17)	1745
7125 Or More	304 (2.27)	1874	298 (3.17)	1745

U.S. EPA ASM EMISSION STANDARDS - 1975-76 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	774 (3.92)	4990	761 (5.45)	4980
1875	729 (3.70)	4990	717 (5.14)	4906
2000	688 (3.49)	4919	676 (4.85)	4838
2125	650 (3.31)	4853	638 (4.58)	4776
2250	615 (3.13)	4792	604 (4.34)	4720
2375	583 (2.98)	4736	573 (4.12)	4668
2500	554 (2.83)	4685	544 (3.91)	4620
2625	528 (2.70)	4639	518 (3.73)	4577
2750	503 (2.58)	4596	495 (3.56)	4374
2875	481 (2.47)	4484	473 (3.41)	4176
3000	461 (2.37)	4290	453 (3.27)	3996
3125	443 (2.28)	4114	435 (3.14)	3832
3250	426 (2.20)	3952	419 (3.02)	3681
3375	411 (2.12)	3804	404 (2.91)	3544
3500	397 (2.05)	3669	390 (2.82)	3418
3625	384 (1.99)	3544	377 (2.73)	3302
3750	372 (1.93)	3429	365 (2.64)	3195
3875	361 (1.87)	3323	355 (2.57)	3096
4000	351 (1.82)	3224	345 (2.49)	3003
4125	341 (1.77)	3131	335 (2.43)	2917
4250	332 (1.73)	3044	326 (2.36)	2836
4375	323 (1.68)	2961	318 (2.31)	2759
4500	315 (1.64)	2883	310 (2.25)	2686
4625	308 (1.61)	2807	302 (2.19)	2616
4750	300 (1.57)	2735	295 (2.14)	2549
4875	293 (1.53)	2665	288 (2.09)	2483
5000	286 (1.50)	2597	281 (2.04)	2420
5125	279 (1.46)	2530	274 (2.00)	2359
5250	272 (1.43)	2466	267 (1.95)	2298
5375	266 (1.40)	2403	261 (1.90)	2240

- The circuit voltage for one or more of the encoder signals is between 4.76 - 5.01 volts for more than 3 seconds.

DEFAULT ACTION

- Service telltale lamp will be illuminated and on-screen message to service 4WD system will be displayed.
- T-CASE SHIFTING: No shifting is allowed.
- FRONT AXLE DISCONNECT (FAD) ACTUATOR: FAD Actuator will remain in the current position.
- REAR AXLE LOCKER ACTUATOR: Normal Operation.
- T-CASE FRONT DRIVE CLUTCH: Will stay locked if in 4WD, or will continue to function normally if in 4WD Auto.

POSSIBLE CAUSES

Possible Causes
ENCODER SIGNAL 0 CIRCUIT OPEN OR HIGH RESISTANCE
ENCODER SIGNAL 1 CIRCUIT OPEN OR HIGH RESISTANCE
ENCODER SIGNAL 2 CIRCUIT OPEN OR HIGH RESISTANCE
ENCODER SIGNAL 3 CIRCUIT OPEN OR HIGH RESISTANCE
ENCODER SIGNAL 0 CIRCUIT SHORTED TO VOLTAGE
ENCODER SIGNAL 1 CIRCUIT SHORTED TO VOLTAGE
ENCODER SIGNAL 2 CIRCUIT SHORTED TO VOLTAGE
ENCODER SIGNAL 3 CIRCUIT SHORTED TO VOLTAGE
ENCODER SIGNAL 0 CIRCUIT SHORTED TO ANOTHER CIRCUIT
ENCODER SIGNAL 1 CIRCUIT SHORTED TO ANOTHER CIRCUIT
ENCODER SIGNAL 2 CIRCUIT SHORTED TO ANOTHER CIRCUIT
ENCODER SIGNAL 3 CIRCUIT SHORTED TO ANOTHER CIRCUIT
SHIFT MOTOR
DTCM

Always perform the PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE before proceeding. Refer to PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE .

DIAGNOSTIC TEST

1. **READ AND RECORD DTCS AND ENVIRONMENTAL DATA - ERASE DTCS AND CHECK FOR THE DTC TO RETURN**
    1. With the scan tool, read DTCs in all Electronic Control Units (ECUs) and record on the repair order.
    2. With the scan tool, run a Vehicle Scan Report or record the Environmental Data.
    3. With the scan tool, erase DTCs.
    4. Turn the ignition off for at least 10.0 seconds.
    5. Turn the ignition on.
    6. Using the recorded Environmental Data and the When Monitored Conditions, operate the vehicle in the conditions that set the DTC.
    7. With the scan tool, read DTCs.

    Did the DTC return?

    Yes

    - Go To 2

10. With the scan tool, read BCM DTCs.

    Did the DTC return?

    Yes

    - Replace the Body Control Module (BCM) in accordance with the Service Information. Refer to **MODULE, BODY CONTROL (BCM), REMOVAL AND INSTALLATION** .
    - Perform the BODY VERIFICATION TEST. Refer to **BODY VERIFICATION TEST** .

    No

    - Perform the BODY VERIFICATION TEST. Refer to **BODY VERIFICATION TEST** .
    - Test complete.

U1433-23-IMPLAUSIBLE IGNITION SWITCH STATUS MESSAGE RECEIVED-SIGNAL STUCK LOW

WIRING DIAGRAM

For a complete STARTING SYSTEM wiring diagram, **Refer to the appropriate system wiring diagram** .

THEORY OF OPERATION

The Body Control Module (BCM) monitors the hardwired Ignition Run/Start Control Output circuit from the Radio Frequency (RF Hub) Module and compares that signal to the ignition switch status message received from the RF Hub Module over the Controller Area Network (CAN) Bus.

WHEN MONITORED

This diagnostic runs continuously when the following conditions are met:

- The ignition is on for at least five seconds.
- The battery voltage is between 10.0 and 16.0 volts.

SET CONDITION

- When the Body Control Module (BCM) detects the input of the hardwired Ignition Run/Start Control Output circuit from the Radio Frequency (RF Hub) Module does not match the CAN Bus message from the RF Hub Module for greater than 10 seconds.

POSSIBLE CAUSES

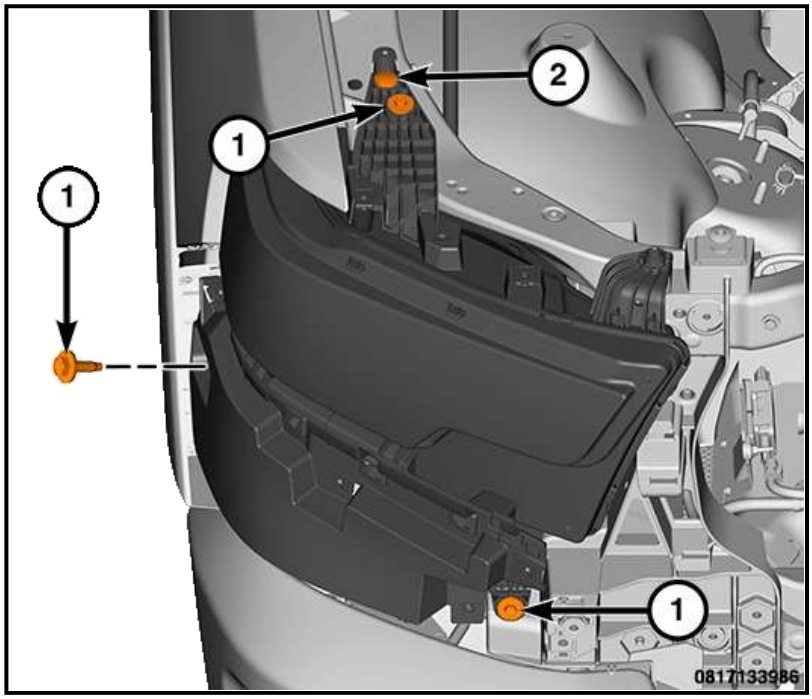
Possible Causes
IGNITION RUN/START CONTROL OUTPUT CIRCUIT OPEN
IGNITION RUN/START CONTROL OUTPUT CIRCUIT SHORTED TO GROUND
RADIO FREQUENCY (RF HUB) MODULE
BODY CONTROL MODULE (BCM)

Always perform the PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE before proceeding. Refer to PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE .

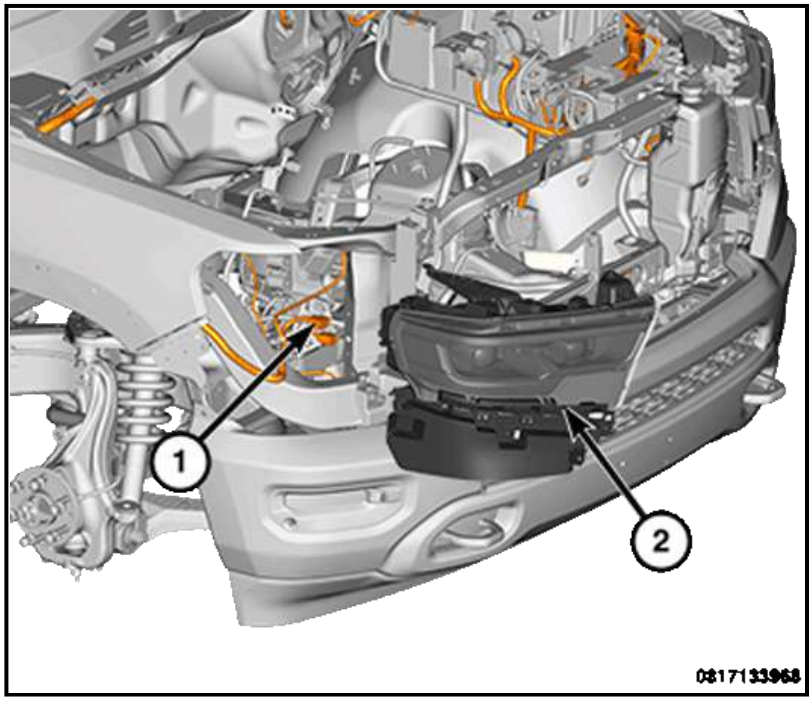
DIAGNOSTIC TEST

1. **READ AND RECORD DTCS AND ENVIRONMENTAL DATA - ERASE DTCS AND CHECK FOR THE DTC TO RETURN**
    1. With the scan tool, read DTCs in all Electronic Control Units (ECUs) and record on the repair order.

2. Remove the grille. Refer to **GRILLE, REMOVAL AND INSTALLATION** **GRILLE, FENDER, REMOVAL AND INSTALLATION** **GRILLE, LOWER, REMOVAL AND INSTALLATION** .



3. Remove the headlamp unit fasteners (1 and 2).



4. Remove the headlamp unit (2) and disconnect the wire harness connectors (1).

INSTALLATION

1. Connect the wire harness connectors and install the headlamp unit.
2. Install the fasteners and tighten securely.
3. Install the grille. Refer to **GRILLE, REMOVAL AND INSTALLATION** **GRILLE, FENDER, REMOVAL AND INSTALLATION** **GRILLE, LOWER, REMOVAL AND INSTALLATION** .
4. Connect the negative battery cable(s). Refer to **STANDARD PROCEDURE 3.0L & 5.7L [EXH, EZH]** or **STANDARD PROCEDURE 3.6L & 5.7L [ERG, EZL]** or **STANDARD PROCEDURE 6.2L** .

HEADLAMP BULBS

THEORY OF OPERATION

NOTE: The Integrated Trailer Brake Module (ITBM) Pulse Width Modulating (PWM) output is present if a trailer is connected or not connected.

The Integrated Trailer Brake Module (ITBM) communicates with the vehicle through the high speed CAN C bus. The ITBM monitors the Brake Pedal Status, Vehicle Speed and Electronic Stability Control (ESC) status via CAN message. It also outputs the Trailer Status, Gain Setting, and Trailer Brake Output Power to the vehicle. The ITBM connects to the electric trailer brakes through the 7-Way connector and controls the brake force through a Pulse Width Modulating (PWM) duty cycle. The ITBM PWM duty cycle output is present continuously.

The ITBM controls the PWM output to the trailer brakes in three ways. The first occurs while the brake pedal becomes active and vehicle speed is greater than 0 km/h (0 mph). The second is the manual lever on the ITBM that can be controlled by the driver. If both the manual lever and the brake pedal are active simultaneously, the greater of the two, in terms of PWM output, will prevail. The third is that it will become active during an ESC trailer sway event.

WHEN MONITORED

This diagnostic runs continuously when the following conditions are met:

- Continuously.
- No under voltage DTCs.
- Trailer connected to the vehicle's Trailer Tow harness connector.

SET CONDITION

- Integrated Trailer Brake Module (ITBM) is sensing a short on the Tow Brake Switch Decrease or Increase circuits.

DEFAULT ACTION

- Automatic braking and manual lever braking (squeeze switch) disabled.
- Malfunction Indicator Lamp (MIL) lamp illuminated.
- Electronic Vehicle Instrument Center (EVIC) displays "Service Trailer Brakes".

POSSIBLE CAUSES

Possible Causes
MANUAL TRAILER BRAKE LEVER (SQUEEZE SWITCH)
VEHICLE TRAILER TOW WIRING/CONNECTOR
TRAILER TOW BRAKE SIGNAL 1 CIRCUIT SHORTED TO GROUND
TRAILER TOW BRAKE SIGNAL 2 CIRCUIT SHORTED TO GROUND
INTEGRATED TRAILER BRAKE MODULE (ITBM)

Always perform the PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE before proceeding. Refer to PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE .

DIAGNOSTIC TEST

1. **READ AND RECORD DTCS AND ENVIRONMENTAL DATA - ERASE DTCS AND CHECK FOR DTC TO RETURN**

   NOTE: The appropriate trailer or a trailer simulator must be present and connected for the results of this test to be valid.

bulb in the load test tool to that of a direct connection across Battery.

Is the load test bulb illuminated and bright?

Yes

- Go To 4

No

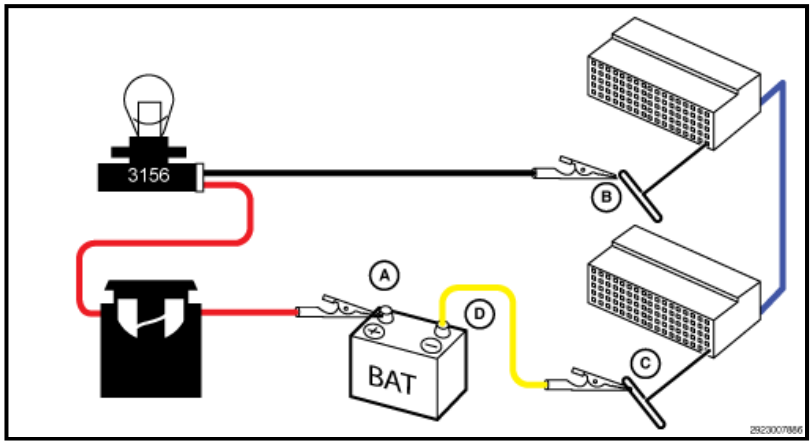
- Repair the Glow Plug 6 (A216) Control circuit for an open or high resistance.
- Perform the POWERTRAIN VERIFICATION TEST. Refer to **PCM VERIFICATION TEST** .

4. **ISOLATE AND LOAD TEST THE (A29) FUSED B+ CIRCUIT TO CHECK FOR HIGH RESISTANCE**

NOTE: **Read the CIRCUIT LOAD TESTING PROCEDURE for information on building a simple load test tool and for additional load testing information and alternative methods of load testing or voltage drop testing a circuit. Refer to CIRCUIT LOAD TESTING PROCEDURES .**

CAUTION: **Do not load test any circuits with components still connected to the circuit.**

1. Load test the (A29) Fused B+ circuit. **Note:** refer to the example illustration.



NOTE: **The bulb on the load test tool should be illuminated and bright if there is no resistance in the circuit. Compare the brightness of the bulb in the load test tool to that of a direct connection across Battery.**

Is the load test bulb illuminated and bright?

Yes

- Go To 5

No

- Repair the (A29) Fused B+ circuit for an open or high resistance.
- Perform the POWERTRAIN VERIFICATION TEST. Refer to **PCM VERIFICATION TEST** .

5. **CHECK THE GLOW PLUG 1 FOR PROPER OPERATION**

- DEF Injector and Injector connectors.
- DEF Heater Line.
- DEF Supply Pump Assembly.

NOTE: **Diesel exhaust fluid will form white deposits around leaky fittings.**

Were any leaks found?

Yes

- Repair or replace the faulty component in accordance with the Service Information.
- Then, go back to the beginning of the Diagnostic Tree for this DTC (P2BA9-00) and start over.

No

- Go To 4

4. **CHECK THE DEF QUALITY**
   1. Turn the ignition off.
   2. Test the qualify of the Diesel Exhaust Fluid. Refer to **DIESEL EXHAUST FLUID EMISSIONS, DIAGNOSIS AND TESTING** .

   Were there any problems found with the quality of the Diesel Exhaust Fluid?

   Yes

   - Drain and refill the DEF tank with the correct application Diesel Exhaust Fluid.
   - IMPORTANT: THE SCR HEALING PROCEDURE (TEST STEP 7) MUST NOW BE PERFORMED.
   - Go To 8

   No

   - Go To 5

5. **CHECK THE DEF VOLUME FROM THE INJECTOR**
   1. Turn ignition off.
   2. Remove the DEF Injector from the decomposition tube.

   NOTE: **Leave the DEF Injector harness connector attached to the DEF Injector.**

   3. Place the DEF Injector in a container to capture the fluid sprayed.
   4. Turn the ignition on.
   5. Using the scan tool, begin the Diesel Exhaust Fluid Injector Quantity Test.

   NOTE: **This Test is broken up into three parts: 1-Air Bleed/Build Pressure (about 30 seconds/then empty the container), 2-Main Volume Test (a little over one minute), 3-DEF Purge (to remove excess fluid from the lines after the test). The entire procedure will run for 2-3 minutes before timing out. The amount of flow may fluctuate throughout the test, therefore the test must be allowed to run completely in order for the results to be accurate. The fluid should spray out as a mist. There should be no dripping from the holes in the DEF Injector at any time during the duration of the test procedure.**

5. **ISOLATE AND CHECK THE ASD RELAY (K51) CONTROL CIRCUIT FOR A SHORT TO ANOTHER CIRCUIT AT THE PCM HARNESS CONNECTOR**
    1. The ignition must be off when performing a resistance check to find a short between circuits.
    2. Isolate the circuit by disconnecting the Electronic Control Unit (ECU) and every component harness connector containing the circuit being tested. At this time leave all in-line connectors connected. **Note:** Use the wiring diagram as a guide to follow the path of the circuit.
    3. Connect one lead of the DVOM to the circuit being tested at the ECU harness connector.
    4. With the other lead of the DVOM probe all other circuits at the ECU harness connector.
    1. If it is necessary to probe a terminal at a PCM harness connector, connect the (special tool #10436, Adapter, GPEC Diagnostic) to the appropriate PCM harness connector.

    NOTE: **With the circuit isolated there should be no continuity between the circuit being tested and any other circuit.**

    Is there continuity between the circuit being tested and any other circuit?

    Yes

    - Repair the short between the circuits that have continuity. Use the wiring diagram as a guide to trace the circuits and look for any in-line connectors to help isolate the location of the short.
    - Perform the POWERTRAIN VERIFICATION TEST. Refer to **POWERTRAIN VERIFICATION TEST** .

    No

    - Go To 8
6. **ISOLATE AND CHECK THE ASD RELAY (K51) CONTROL CIRCUIT FOR A SHORT TO GROUND**
    1. The ignition must be off when checking a circuit for continuity to ground.
    2. Isolate the circuit by disconnecting the Electronic Control Unit (ECU) and every component harness connector containing the circuit being tested. **Note:** Use the wiring diagram as a guide to follow the path of the circuit.
    3. Connect the negative lead of the DVOM to a known good ground.
    4. With the positive lead of the DVOM, probe the circuit being tested at the component harness connector and check for continuity between the circuit and ground.

    CAUTION: **Do not probe the PCM harness connectors. Probing the PCM harness connectors will damage the PCM terminals resulting in poor terminal to pin connection. Install the GPEC Diagnostic Adaptor to perform the diagnosis.**

    1. If it is necessary to probe a terminal at a PCM harness connector, connect the (special tool #10436, Adapter, GPEC Diagnostic) to the appropriate PCM harness connector.

    NOTE: **There should be no continuity between ground and the circuit being tested.**

    Is there continuity between ground and the circuit being tested?

    Yes

    - Repair the circuit for a short to ground. Use the wiring diagram as a guide to trace the circuit and look for any in-line connectors to help isolate the location of the short.

- Replace and program the Powertrain Control Module (PCM) in accordance with the Service Information. Refer to **MODULE, POWERTRAIN CONTROL (PCM), REMOVAL AND INSTALLATION** .
- Perform the POWERTRAIN VERIFICATION TEST. Refer to **POWERTRAIN VERIFICATION TEST** .

No

- The wiring or poor connection problem has been repaired.
- Perform the POWERTRAIN VERIFICATION TEST. Refer to **POWERTRAIN VERIFICATION TEST** .

P0520-ENGINE OIL PRESSURE SENSOR CIRCUIT

For a complete INTAKE AIR SYSTEM wiring diagram, **refer to the appropriate wiring information** .

THEORY OF OPERATION

This diagnostic is run to verify the Engine Oil Pressure (EOP) Sensor has a valid zero pressure point (offset check). The oil pressure offset reading is essentially the voltage output of the sensor at atmospheric pressure.

Two assumptions are made for this rationality:

1. The engine oil pressure will always bleed down to atmospheric pressure within a certain time period after the engine has stopped.
2. The EOP Sensor will have a stable output voltage after ignition on and before the vehicle starts to crank.

After a calibrated amount of engine off time to allow the EOP Sensor to stabilize (bleed down to atmospheric pressure) the EOP Sensor offset test will be performed at the next ignition on. A reading of the EOP Sensor output is taken when the ignition is turned to the "on" position before engine cranking. A delay time of approximately 20ms is required before the sensor is powered up and can output a valid reading.

At atmospheric pressure a "good" pressure sensor will output a voltage within an upper and lower voltage limit. The lower threshold is greater than zero volts so a circuit check can be performed on the device. The reason there is a span between the limits is because there is a small amount of air behind the diaphragm that varies in volume based on atmospheric pressure. The PCM will determine that the sensor is invalid and a failure will set if the sensor voltage is beyond normal parameters for a calibrated amount of time.

WHEN MONITORED

This diagnostic runs when the following conditions are met:

- Battery voltage is above 11.0 volts.
- Barometric pressure is above 22.2 hg.
- With the ignition on and the engine speed at 0 rpm.
    - After the ignition has been off for a minimum of three minutes previously.

SET CONDITION

- The Powertrain Control Module (PCM) detects an oil pressure reading that is below 0.29 volts (less than 0 psi), or greater than 0.78 volts (more than 7.1 psi), indicating a sensor that is stuck or drifted out of range.

DEFAULT ACTION

- The MIL will illuminate.

POSSIBLE CAUSES

9. With the scan tool, erase DTCs.
10. Test drive or operate the vehicle in accordance with the when monitored and set conditions.
11. With the scan tool, read DTCs.

    Did the DTC return?

    Yes

    - Replace and program the Powertrain Control Module (PCM) in accordance with the Service Information. Refer to **MODULE, POWERTRAIN CONTROL (PCM), REMOVAL AND INSTALLATION** .
    - Perform the POWERTRAIN VERIFICATION TEST. Refer to **POWERTRAIN VERIFICATION TEST** .

    No

    - The wiring or poor connection problem has been repaired.
    - Perform the POWERTRAIN VERIFICATION TEST. Refer to **POWERTRAIN VERIFICATION TEST** .

P0140-O2 SENSOR 1/2 NO ACTIVITY DETECTED

For a complete CATALYST MONITOR SYSTEM wiring diagram, **refer to the appropriate wiring information** .

THEORY OF OPERATION

The Downstream Oxygen (O2) Sensor no activity diagnostic monitor is intended to diagnose a Downstream O2 Sensor that is not moving or is stuck in a voltage window. This diagnostic is intended to verify the Downstream O2 Sensors ability to respond to fuel adaption deviations during the Catalyst Monitor test. To pass this monitor, the sensor must output a voltage greater than a high calibrated voltage and less than a low calibrated voltage within a calibrated time period. The test includes a non-intrusive monitor and an intrusive fueling monitor. The intrusive monitor will only run if the non-intrusive test does not pass within the calibrated time period.

The intrusive fueling routine is used to 'jolt' the fuel feedback system to force the monitor to pass. A test failure occurs if the voltage pass values are not achieved after the total accumulated test time.

WHEN MONITORED

This diagnostic runs when the following conditions are met:

- With the engine RPM between 1024 and 2496.
- Vehicle speed between 32 and 112 km/h (20 and 70mph).
- Calculated engine load between 30% and 80%.
- O2 sensor 1/2 voltage less than 1.2 volts.

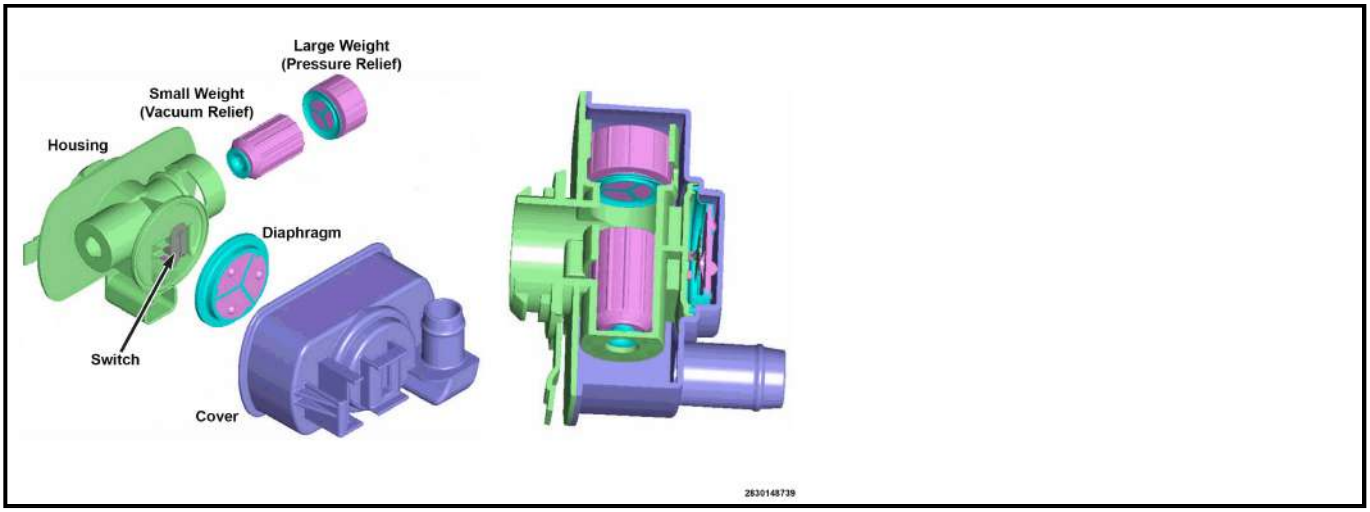
SET CONDITION

- The Oxygen Sensor 1/2 signal switches from lean to rich less than 16 times within 20 seconds during monitoring.

DEFAULT ACTION

- The MIL will illuminate.

POSSIBLE CAUSES



WHEN MONITORED

This diagnostic runs when the following conditions are met:

- After engine start up and the ESIM Switch did not close during a previous ignition off event that was valid. Must be a cold start and the following are true:
  - The difference between the ECT and AAT inputs is less than 10B°C (19B°F).
  - Fuel Level between 12% and 88%.
  - Manifold vacuum greater than a calculated minimum value.
  - Ambient temperature between 4B°C and 35B°C (40B°F and 95B°F).

SET CONDITION

- The Powertrain Control Module (PCM) initiates an intrusive test to determine the leak size. This DTCs sets when the ESIM Switch did not close during the test period.

DEFAULT ACTION

- The MIL will illuminate.

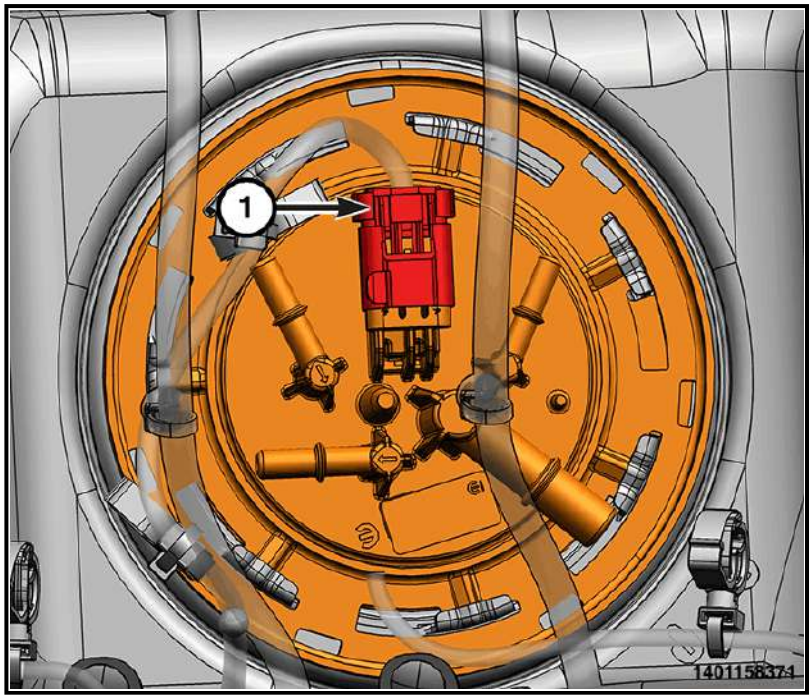
POSSIBLE CAUSES

Possible Causes
EVAP PURGE SOLENOID VACUUM SUPPLY
EVAP PURGE TUBE OBSTRUCTION
OBSTRUCTION IN THE VENT HOSE OR FILTER
ESIM ORIENTATION OR INSTALLED INCORRECTLY
LARGE EVAPORATIVE EMISSION LEAK
ESIM SIGNAL CIRCUIT OPEN
ESIM GROUND CIRCUIT OPEN
EVAPORATIVE SYSTEM INTEGRITY MONITOR (ESIM) SWITCH STUCK OPEN
EVAP PURGE SOLENOID
POWERTRAIN CONTROL MODULE (PCM)

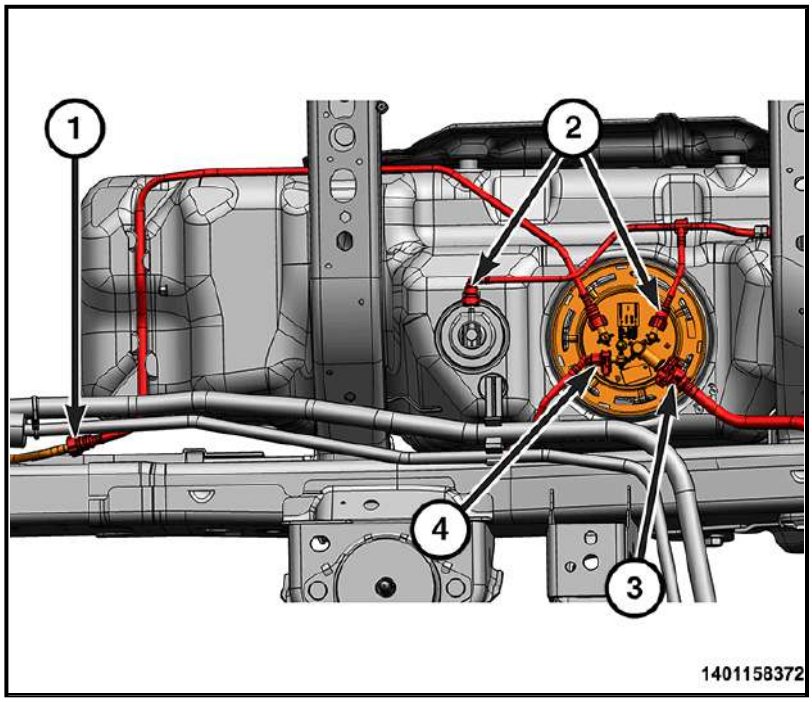
Always perform the PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE before proceeding. Refer to PRE-DIAGNOSTIC TROUBLESHOOTING PROCEDURE .

DIAGNOSTIC TEST

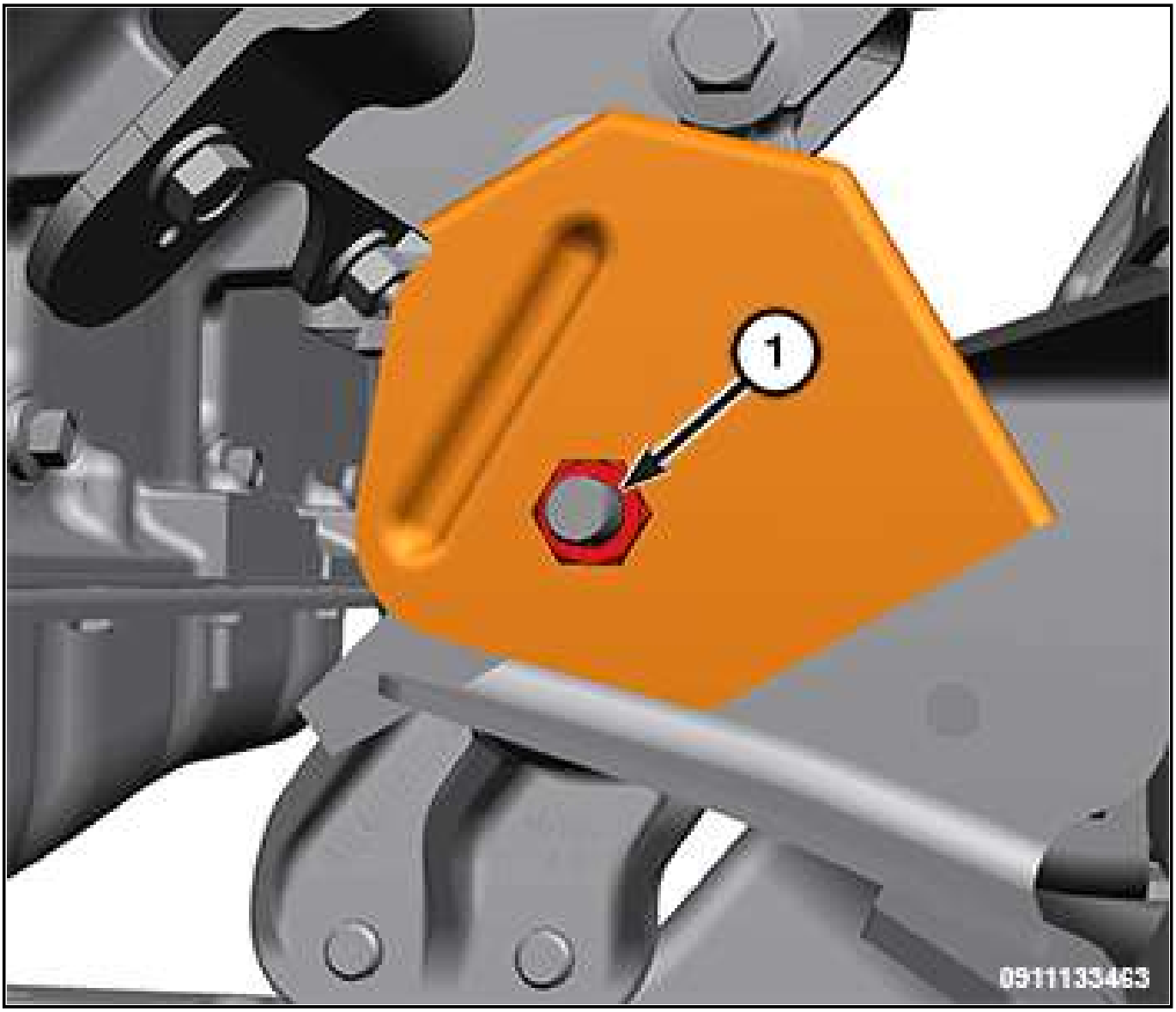
1. **CHECK FOR ANY SERVICE BULLETINS THAT APPLY**



6. Connect the fuel pump module wire harness connector (1).



7. Connect the fuel filler vent line quick-connect fitting (3) to the fuel pump module.
8. Connect the fuel supply line quick-connect fitting (4).
9. Connect the fuel vent line quick-connect fittings (2).
10. Connect the return fuel line quick-connect fitting (1) at the front of fuel tank.



10. Install the right side engine mount isolator heat shield and tighten the nut (1) to the proper specification. Refer to **TORQUE SPECIFICATIONS** .