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Sensor End Diagnostics (3-Wire)

1. Connect the Electronic Service Tool (EST) to the EST connector.
2. Turn the ignition switch to ON. Leave engine off.
3. Start MasterDiagnostics® software.
4. Run Continuous Monitor session. (This session lists all engine sensors.)

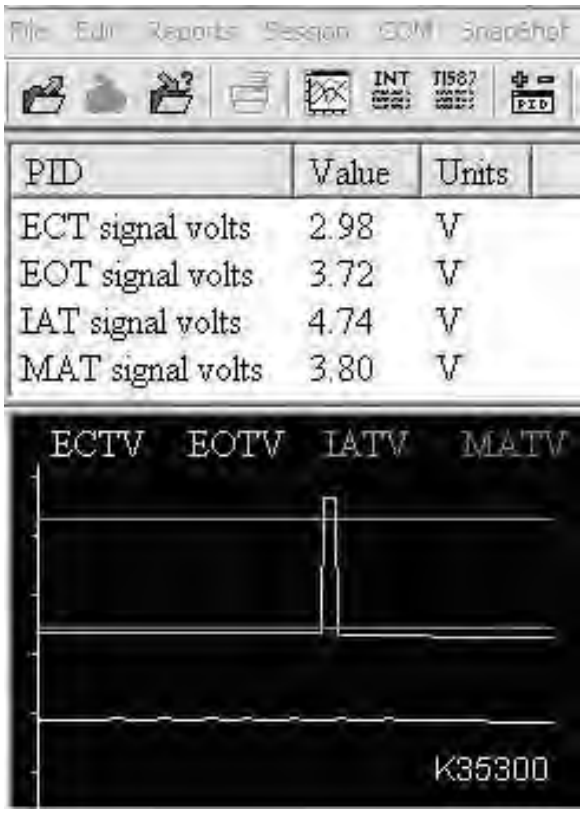

Figure 132 Sensor voltage

5. Monitor the sensor voltage and verify an active Diagnostic Trouble Code (DTC) is present.

   NOTE: If sensor signal circuit is shorted or open, the Parameter Identifier (PID) value reads NA or Error.

   - If the DTC is inactive, monitor the PID while wiggling the connector and all wires at suspected locations.

     If the circuit is interrupted, the signal spikes. Isolate the fault and repair.

   - If the DTC is active, continue to the next step.

6. Disconnect the sensor. Inspect the connector for damaged pins. Repair as necessary.

Alert Levels of DPF Soot Loading

There are four levels indicating the DPF is accumulating a level of soot and needs to be cleaned, each with an increasing urgency for action.

Levels	Conditions	Action
Regeneration lamp on solid	Exhaust regeneration required	Drive on highway at highway speeds so the system can auto-regenerate. OR Start a parked regeneration to prevent loss of power.
Regeneration lamp flashing	DPF is full	Pull vehicle safely off roadway and start a parked regeneration to prevent loss of power.
Regeneration lamp flashing WEL solid Audio alarm beeps five times every minute	DPF is full engine performance is limited	Pull vehicle safely off roadway and start a parked regeneration to prevent engine stopping.
Regeneration lamp flashing Engine STOP lamp on solid Audio alarm beeps continuously	DPF is overfull engine may shutdown soon	Pull vehicle safely off roadway turn on flashers, place warning devices and stop engine, do not use parked regeneration. Call for service.
When the High Exhaust System Temperature lamp is illuminated, the exhaust is above 400° C (750° F) and a regeneration could be in process.		

DTC 3348 - AMT - EBP too high during EGR test

DTC sets when EBP does not meet expected response during the EGR portion of the AMS test.

Pin-point AMS Fault

1. Check for other active or inactive EBP, MAP, VGT, or EGR DTCs. Repair any fault before continuing with this procedure.
2. Check for biased sensor. Verify BAP, MAP and EBP are within KOEO specification. See Key-On Engine-Off for the applicable engine horsepower in “Performance Specifications” section of this manual.
3. Check EGR operation. Monitor EGRP PID, Run KOEO Output State HIGH and LOW. See EGR Actuator (page 258) in this section.
4. Check intake and exhaust system for leaks.

AMS Operation

The AMS test checks the operation of the VGT and EGR by actuating each component open and closed while monitoring the effect it has on exhaust back pressure using the EBP sensor. The test sequence is carried out as follows.

The ECM monitors the BAP sensor as a baseline for zeroing the MAP and EBP signals.

VGT portion

The ECM commands the EGR valve to close, then increases engine idle speed to 950 rpm. The VGT vanes are commanded to open and EBP is allowed to stabilize (EBP is expected to drop). The VGT vanes are then commanded to close and EBP is allowed to stabilize (EBP is expected to increase). If pressure results do not match expected values for either condition, DTC 3345 sets, the engine returns to 700 rpm, and the test completes without running the EGR portion.

NOTE: Although commanding the EGR to close, it may be stuck partially open and cause EBP values to be lower than expected. This would cause the VGT portion of the test to fail. If this is suspected, the operation of the EGR valve should be visually inspected while doing the Output State tests.

If the VGT portion of the test completes without fault, no DTC sets, and the test continues for the EGR portion.

EGR portion

The EGR valve and VGT vanes are still closed, the ECM increases engine idle speed to 1200 rpm and EBP is allowed to stabilize (EBP is expected to increase). The EGR is then commanded open and EBP is allowed to stabilize (EBP is expected to drop). The EGR is then commanded closed and EBP is allowed to stabilize (EBP is expected to increase). If pressure results do not match expected values for either position, DTC 3346 sets, the engine returns to 700 rpm, and the test is complete.

ATA Operation

EST Connector

The fuse protected B+ signal is supplied to the EST connector through Pin B and ground is through Pin A. American Trucking Association High (ATAH) signal runs from ECM Pin C-25 and EST connector Pin F. American Trucking Association Low (ATAL) signal runs from ECM Pin C-10 and EST connector Pin G.

Electronic Gauge Cluster (EGC)

There are two types of EGC modules, one uses Controller Area Network (CAN) communication and the other uses ATA communication. The following information is sent through data communication:

- Warn Engine Lamp (WEL)
- Malfunction Indicator Lamp (MIL)
- Coolant level lamp
- Wait to start lamp
- Oil/Water Lamp (OWL)
- Speedometer
- Tachometer
- Odometer/hourmeter
- Change oil message
- Oil pressure gauge
- Engine oil temperature gauge
- Engine coolant temperature gauge

Fault Detection/Management

There are no engine DTCs for ATA communication faults. See *Chassis Electrical Circuit Diagram Manual* and *Electrical System Troubleshooting Guide*.

Repair Information

The ATA circuits use a twisted wire pair. All repairs must maintain one complete twist per inch along the entire length of the circuit. This circuit is polarized, one positive and one negative. Reversing the polarity of this circuit will disrupt communication.

CKP Sensor (Crankshaft Position)

DTC	SPN	FMI	Condition
1144	8021	8	CKP signal noise detected
1146	8064	12	CKP signal inactive
1147	8064	2	CKP incorrect signal signature
4553	8022	12	CKP signal inactive
4554	8022	7	CKP loss of sync
4555	8064	8	CKP signal noise detected
4556	8022	8	CKP period too short
4611	8021	13	CKP signature one tooth off

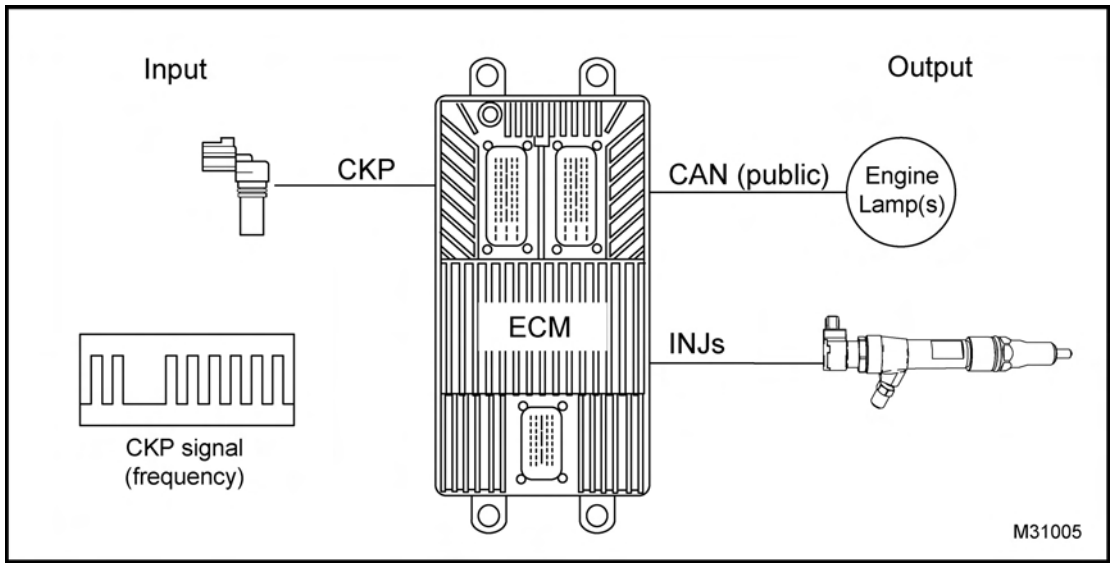

Figure 145 Function diagram for the CKP sensor

The CKP sensor function diagram includes the following:

- Crankshaft Position (CKP) sensor
- Electronic Control Module (ECM)
- Fuel injectors (INJ)
- Warn Engine Lamp (WEL)

Function

The CKP sensor provides the ECM with a crankshaft speed and position signals. The ECM uses this signal with the Camshaft Position (CMP) signal to calculate crankshaft speed and position.

Sensor Location

The CKP sensor is installed in the lower front right side of the crankcase.

Tools

- Electronic Service Tool (EST) with MasterDiagnostics® software
- EZ-Tech® Interface Kit
- Digital Multimeter (DMM)
- 180-Pin Breakout Box
- Terminal Test Adapter Kit

EBP Sensor (Exhaust Back Pressure)

DTC	SPN	FMI	Condition
3341	1209	4	EBP signal out-of-range LOW
3342	1209	3	EBP signal out-of-range HIGH

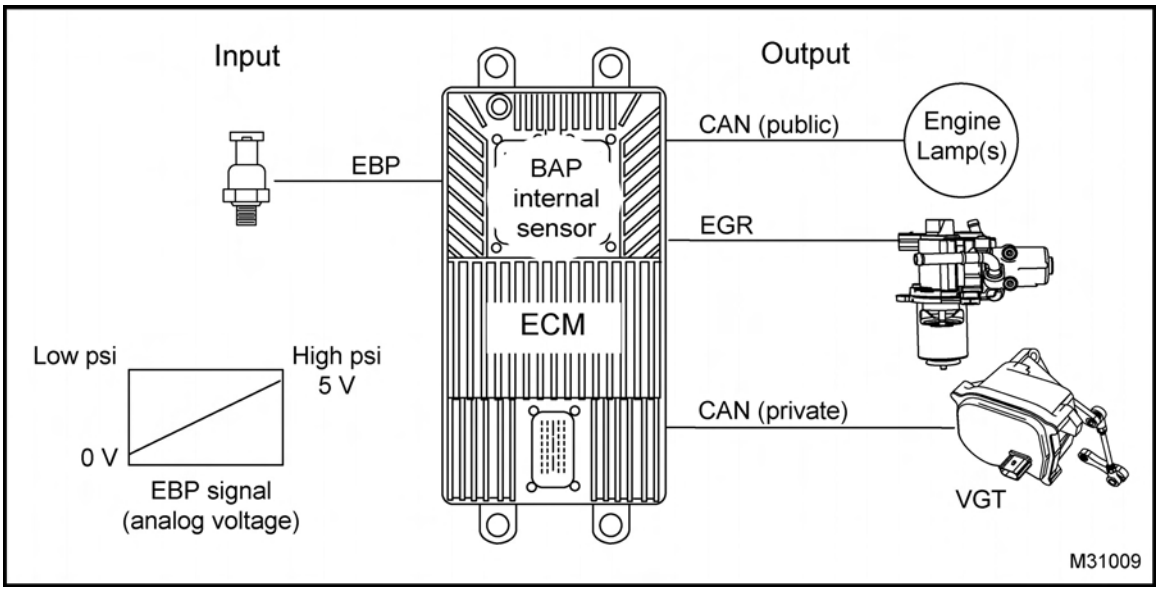

Figure 151 Function diagram for the EBP sensor

The EBP sensor function diagram includes the following:

- Exhaust Back Pressure (EBP) sensor
- Electronic Control Module (ECM) with integrated Barometric Absolute Pressure (BAP) sensor
- Variable Geometry Turbocharger (VGT)
- Exhaust Gas Recirculation (EGR) valve
- Malfunction Indicator Lamp (MIL)

Function

The EBP sensor measures exhaust back pressure. The ECM uses the EBP signals to control the VGT and EGR systems.

Sensor Location

The EBP sensor is installed in a bracket mounted above and behind the right valve cover.

Tools

- Electronic Service Tool (EST) with MasterDiagnostics® software
- EZ-Tech® Interface Kit
- Digital Multimeter (DMM)
- 3-Banana Plug Harness
- 180-Pin Breakout Box
- Pressure Sensor Breakout Harness
- Terminal Test Adapter Kit

ECL Pin-point Diagnostics

DTC	Condition	Possible Causes
1236	ECL in-range circuit fault	• ECL circuit OPEN or short to GND or PWR • Failed switch

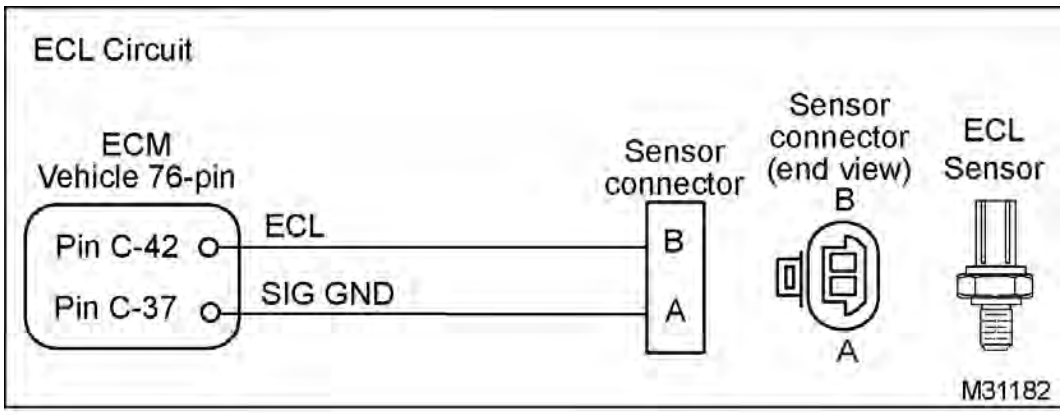

Figure 157 ECL circuit diagram

Connector Voltage Check

Disconnect ECL switch. Turn ignition switch to ON. Use DMM to measure voltage.

Test Point	Spec	Comment
A to GND	0 V	If > 0.25 V, check for short to PWR.
B to GND	4.6 V to 5 V	If < 4.5 V, check for OPEN or short to GND. Do Harness Resistance Check (page 222).

Connector Resistance Check to GND

Turn ignition switch to OFF. Connect breakout harness. Leave switch disconnected. Use DMM to measure resistance.

Test Point	Spec	Comment
A to GND	< 5 Ω	If > 5 Ω, check for OPEN circuit.
B to GND	> 1 kΩ	If < 1 kΩ, check for short to GND.

DTC 4519 - Fuel Injector Driver Circuit Performance Bank B

Pin-point ECM Self-Diagnostic Fault

1. Clear DTC, cycle ignition switch.
2. If DTC is still active, replace ECM.

DTC 5382 - ECM over temperature

Pin-point ECM Self-Diagnostic Fault

1. Correct any abnormal condition of ECM overheating.
2. If DTC sets in cool conditions, then replace ECM.

DTC 5618 - SPI-BUS error 1

Pin-point ECM Self-Diagnostic Fault

1. Clear DTC, cycle ignition switch.
2. If DTC is still active, replace ECM.

DTC 5619 - SPI-BUS error 2

Pin-point ECM Self-Diagnostic Fault

1. Clear DTC, cycle ignition switch.
2. If DTC is still active, replace ECM.

DTC 5627 - Checksum program

Pin-point ECM Self-Diagnostic Fault

1. Clear DTC, cycle ignition switch.
2. If DTC is still active, replace ECM.

DTC 5628 - Checksum dataset

Pin-point ECM Self-Diagnostic Fault

1. Clear DTC, cycle ignition switch.
2. If DTC is still active, replace ECM.

DTC 5633 - CPU Load above maximum

Pin-point ECM Self-Diagnostic Fault

1. Clear DTC, cycle ignition switch.
2. If DTC is still active, replace ECM.

Voltage Check at Relay - Output State Test

Connect breakout harness between relay and relay socket. Connect EFAN and turn the ignition switch to ON. Use DMM to measure voltage.

Test Point	Spec	Comment
30 to GND	B+	If < B+, check power circuit to relay switch for OPEN or short to GND, or blown fuse.
86 to GND	B+	If < B+, check power circuit to relay coil for OPEN or short to GND, or blown fuse.
Run Output State Test HIGH.		
85 to GND	B+	If < B+, check EFAN control circuit for short to GND. Do Harness Resistance Check (page 241).
Run Output State Test LOW.		
85 to GND	0.06 V to 2 V	If > 2 V, check EFAN control circuit for OPEN. Do Harness Resistance Check (page 241).
87 to GND	B+	If < B+, replace relay.

Harness Resistance Check

Turn ignition switch to OFF. Connect breakout box and relay harness. Leave ECM and relay disconnected.

Test Point	Spec	Comment
C-58 to 85	< 5 Ω	If > 5 Ω, check for OPEN circuit between ECM and relay terminal.
87 to A (fan)	< 5 Ω	If > 5 Ω, check for OPEN circuit between relay terminal and A (fan).
30 to C-1, 3 and 5	< 5 Ω	If > 5 Ω, check ACT PWR for OPEN in circuit.
30 to GND	> 1 kΩ	If < 1 kΩ, check ACT PWR for short to GND.
86 to C-1, 3 and 5	< 5 Ω	If > 5 Ω, check ACT PWR for OPEN in circuit.
86 to GND	> 1 kΩ	If < 1 kΩ, check ACT PWR for short to GND.
See truck *Chassis Electrical Circuit Diagram Manual* and *Electrical System Troubleshooting Guide* for fuse information.		

EFAN Circuit Operation

The default state of the EFAN is ON. B+ is needed to turn the fan off.

ECM Pin C-58 controls the EFAN to shut off by supplying a ground path to the EFAN relay coil Pin 85. ACT PWR powers the other side of the relay coil, Pin 86. ACT PWR is sent through the relay switch, which deactivates the EFAN.

EFT Pin-point Diagnostics

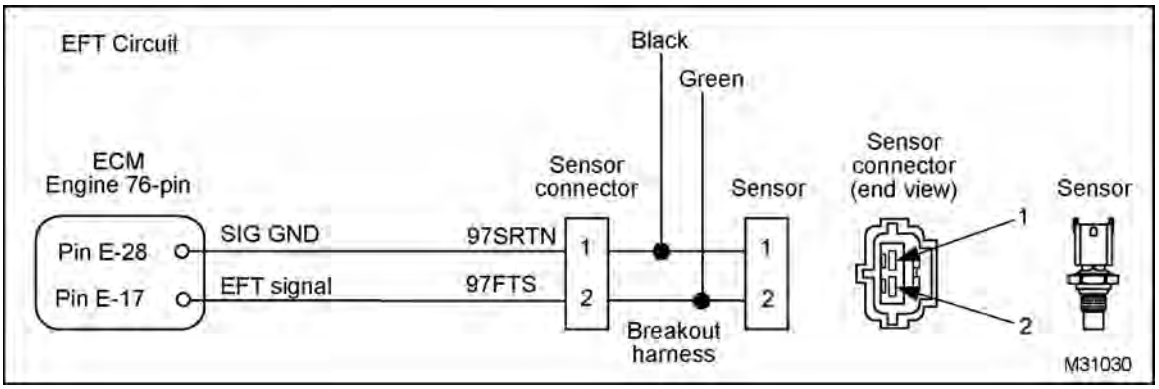

Figure 171 EFT circuit diagram

Connector Voltage Check

Connect breakout harness. Leave sensor disconnected. Turn ignition switch to ON. Use DMM to measure voltage.

Test Point	Spec	Comment
1 to GND	0 V	If > 0.25 V, check for short to PWR.
2 to GND	4.6 V to 5 V	If < 4.5 V, check for OPEN or short to GND. Do Harness Resistance Check (page 251).

Connector Resistance Check to GND

Turn ignition switch to OFF. Connect breakout harness. Leave sensor disconnected. Use DMM to measure resistance.

Test Point	Spec	Comment
1 to GND	< 5 Ω	If > 5 Ω, check for OPEN circuit.
2 to GND	> 1 kΩ	If < 1 kΩ, check for short to GND.

Harness Resistance Check

Turn ignition switch to OFF. Connect breakout box and breakout harness. Leave ECM and sensor disconnected. Use DMM to measure resistance.

Test Point	Spec	Comment
1 to E-28	< 5 Ω	If > 5 Ω, check for OPEN circuit.
2 to E-17	< 5 Ω	If > 5 Ω, check for OPEN circuit.

3. Monitor sensor voltage. Verify an active Diagnostic Trouble Code (DTC) for the sensor.
   - If DTC is inactive, monitor the Parameter Identifier (PID) while wiggling the connector and all wires at suspected location. If the circuit is interrupted, the PID spikes and the DTC goes active.
   - If DTC is active, proceed to the next step.
4. Disconnect engine harness from sensor.

NOTE: Inspect connectors for damaged pins, corrosion, or loose pins. Repair if necessary.

5. Connect breakout harness to engine harness. Leave sensor disconnected.

Tools

- Electronic Service Tool (EST) with MasterDiagnostics® software
- EZ-Tech® Interface Kit
- Digital Multimeter (DMM)
- 3-Banana Plug Harness
- 180-Pin Breakout Box
- Exhaust Temperature Breakout Harness
- Terminal Test Adapter Kit

EGT2 Sensor End Diagnostics

DTC	Condition	Possible Causes
1741	EGT2 signal out-of-range LOW	• EGT2 signal circuit short to GND • Failed sensor
1742	EGT2 signal out-of-range HIGH	• EGT2 signal OPEN or short to PWR • SIG GND circuit OPEN • Failed sensor
2673	EGT2 not warming along with engine	• EGT2 biased circuit or sensor • EGT2 sensor outside of exhaust system
2674	EGT2 reading off compared to EGT1 and EGT3	• EGT2 biased circuit or sensor • EGT2 sensor outside of exhaust system
2681	EGT2 reading off compared to EGT1 and EGT3	• EGT2 biased circuit or sensor • EGT2 sensor outside of exhaust system

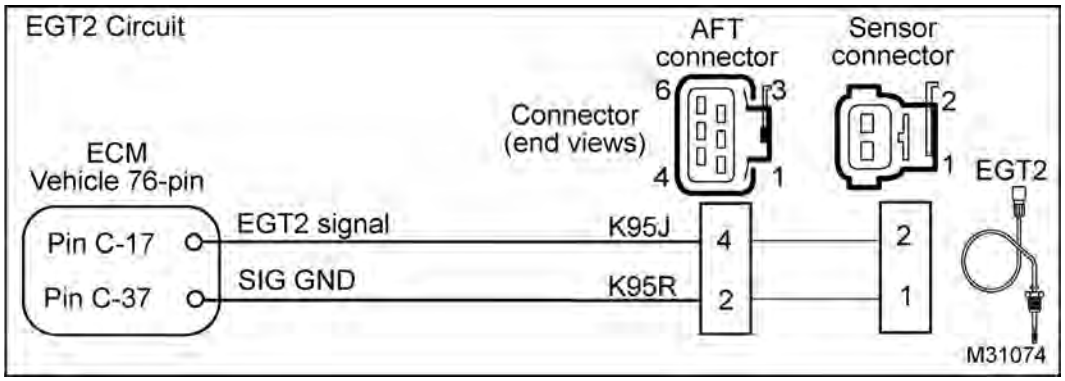

Figure 182 EGT2 circuit diagram

EOP Sensor End Diagnostics

DTC	Condition	Possible Causes
1211	EOP signal out-of-range LOW	• EOP signal circuit OPEN or short to GND • VREF circuit OPEN • Failed sensor
1212	EOP signal out-of-range HIGH	• EOP signal circuit short to PWR • Failed sensor

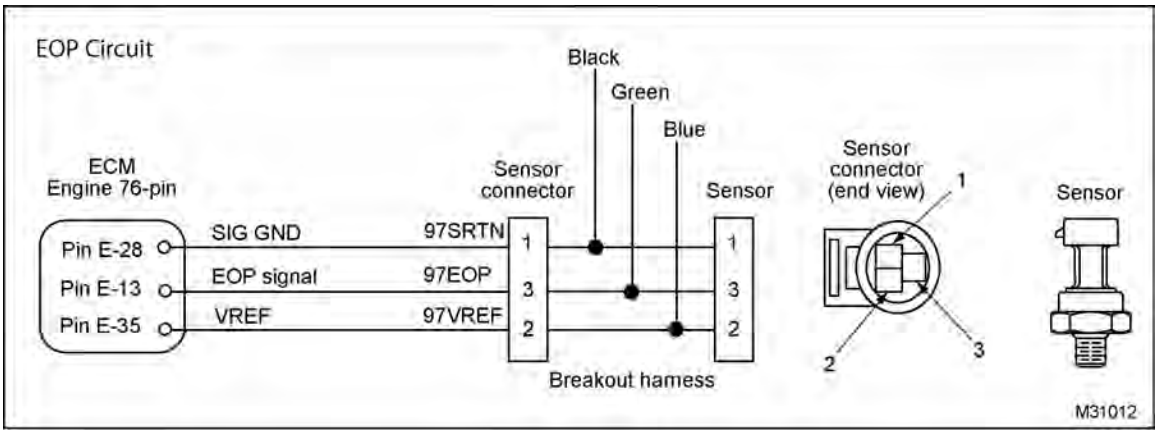

Figure 188 EOP circuit diagram

WARNING: To prevent personal injury or death, stay clear of rotating part (belts and fan) and hot engine surfaces.

1. Using EST, open the D_ContinuousMonitor.ssn.
2. Verify sensor voltage is within Key-On Engine Off (KOEO) specification. See “Performance Specifications” section of this manual.
3. Monitor sensor voltage. Verify an active Diagnostic Trouble Code (DTC) for the sensor.
   - If DTC is inactive, monitor the Parameter Identifier (PID) while wiggling the connector and all wires at suspected location. If the circuit is interrupted, the PID spikes and the DTC goes active.
   - If DTC is active, proceed to the next step.
4. Disconnect engine harness from sensor.

NOTE: Inspect connectors for damaged pins, corrosion, or loose pins. Repair if necessary.

5. Connect breakout harness to engine harness. Leave sensor disconnected.

2-way Warning – No engine shut down available.

- ECT - Engine overheat warning
- EOP - Low engine oil pressure warning

3-way Warning – No engine shut down available.

- ECT - Engine overheat warning
- EOP - Low engine oil pressure warning
- ECL - Low engine coolant level warning

3-way Protection – Engine shut down is available if critical condition is detected.

- ECT, EOP, ECL - Same as 3-way Warning
- ECT - Engine overheat critical protection
- EOP - Low engine oil pressure critical protection
- ECL - Low engine coolant level critical protection

Warning – Temperature above specific threshold will sound a buzzer, illuminate the OWL and set a DTC.

Critical – Temperature above specific threshold shuts down the engine and sets a DTC.

Event log – This feature logs occurrences of the event according to the engine hours and odometer readings.

EWPS Programmable Parameters

ENG-PROT-MODE

- 0 = Standard Warning
- 1 = 3-way Warning
- 2 = 3-way Protection
- 3 = 2-way Warning

ECT-WARNING – Specifies temperature threshold where the OWL and warning buzzer turns on.

ECT-CRITICAL – Specifies temperature threshold where an engine shut down is commanded.

PROT-ENG SPD1 – Specifies at what RPM a specified oil pressure (OIL-PRES-CRIT-SPD1) should be detected.

PROT-ENG SPD2 – Specifies at what RPM a specified oil pressure (OIL-PRES-CRIT-SPD2) should be detected.

PROT-ENG SPD3 – Specifies at what RPM a specified oil pressure (OIL-PRES-CRIT-SPD3) should be detected.

OIL-PRES-WARN-SPD1 – Specifies the minimum oil pressure with engine speed greater than (PROT-ENG-SPD1). Failure to meet set point turns on the OWL and warning buzzer.

OIL-PRES-WARN-SPD2 – Specifies the minimum oil pressure with engine speed greater than (PROT-ENG-SPD1) but less than (PROT-ENG-SPD2). Failure to meet setpoint turns on the OWL and warning buzzer.

OIL-PRES-WARN-SPD3 – Specifies the minimum oil pressure with engine speed greater than (PROT-ENG-SPD2) but less than (PROT-ENG-SPD3). Failure to meet setpoint turns on the OWL and warning buzzer.

OIL-PRES-CRIT-SPD1 – Specifies the minimum oil pressure with engine speed greater than (PROT-ENG-SPD1). Failure to meet setpoint commands an engine shut down.

OIL-PRES-CRIT-SPD2 – Specifies the minimum oil pressure with engine speed greater than (PROT-ENG-SPD1) but less than (PROT-ENG-SPD2). Failure to meet setpoint commands an engine shut down.

OIL-PRES-CRIT-SPD3 – Specifies the minimum oil pressure with engine speed greater then (PROT-ENG-SPD2) but less then (PROT-ENG-SPD3). Failure to meet set point will command an engine shut down.

Tools

- Electronic Service Tool (EST) with MasterDiagnostics® software
- EZ-Tech® Interface Kit
- Digital Multimeter (DMM)
- 3-Banana Plug Harness
- FRP Breakout Harness
- 180-Pin Breakout Box
- Terminal Test Adapter Kit

FRP Sensor End Diagnostics

DTC	Condition	Possible Causes
1124	FRP signal out-of-range LOW	• FRP signal circuit short to GND • Failed sensor
1125	FRP signal out-of-range HIGH	• FRP signal circuit short to PWR • SIG GND circuit OPEN • Failed sensor
1328	FRP signal constant	• FRP signal too stable, should be fluctuating • FRP circuit fault, or failed sensor
2327	FRP abnormal rate of change	• Set when FRP changes more then 40 MPa (5800 psi) within 0.1 second • FRP sensor • FRP intermittent circuit fault
2332	FRP above KOEO Spec	• SIG GND circuit OPEN • Biased circuit/sensor • Failed sensor

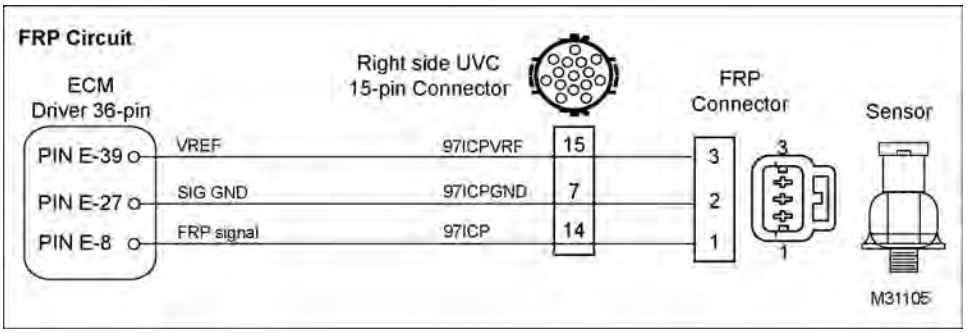

Figure 200 FRP circuit diagram

Tools

- Electronic Service Tool (EST) with MasterDiagnostics® software
- EZ-Tech® Interface Kit
- Digital Multimeter (DMM)
- 180-Pin Breakout Box
- 4-Pin Actuator Breakout Harness
- Terminal Test Adapter Kit

FVCV Pin-point Diagnostics

DTC	Condition	Possible Causes
1272	FVCV short to B+, over temperature	• FVCV circuit short to PWR • Failed valve
1273	FVCV short circuit	• FVCV circuit short to GND • Failed valve
1274	FVCV open circuit	• FVCV circuit OPEN • Failed valve
1275	FVCV current exceeds maximum limit	• FVCV circuit short to PWR • Failed valve

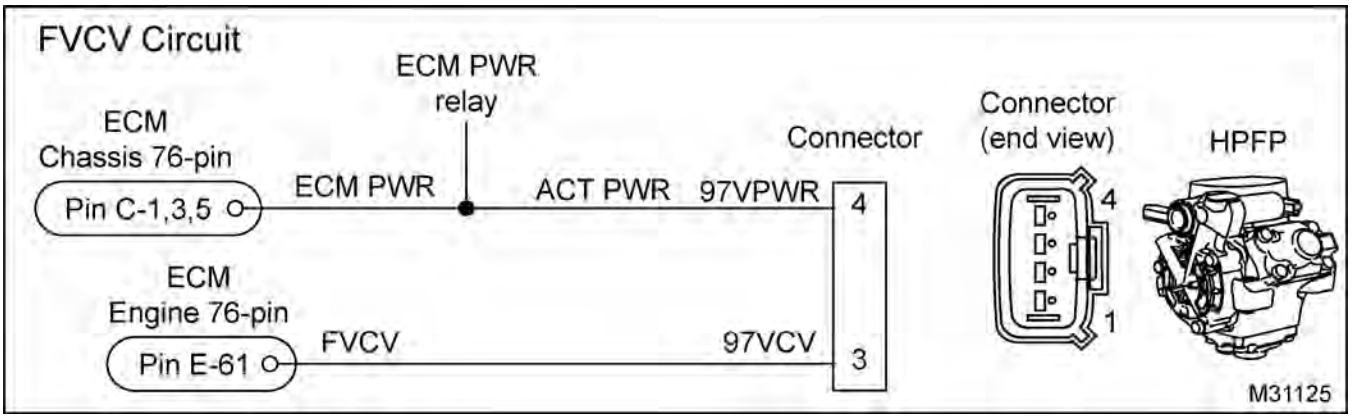

Figure 204 FVCV circuit diagram

IAT Sensor End Diagnostics

DTC	Condition	Possible Causes
1154	IAT signal out-of-range LOW	• IAT signal circuit short to GND • Failed sensor
1155	IAT signal out-of-range HIGH	• IAT signal OPEN or short to PWR • SIG GND circuit OPEN • Failed sensor

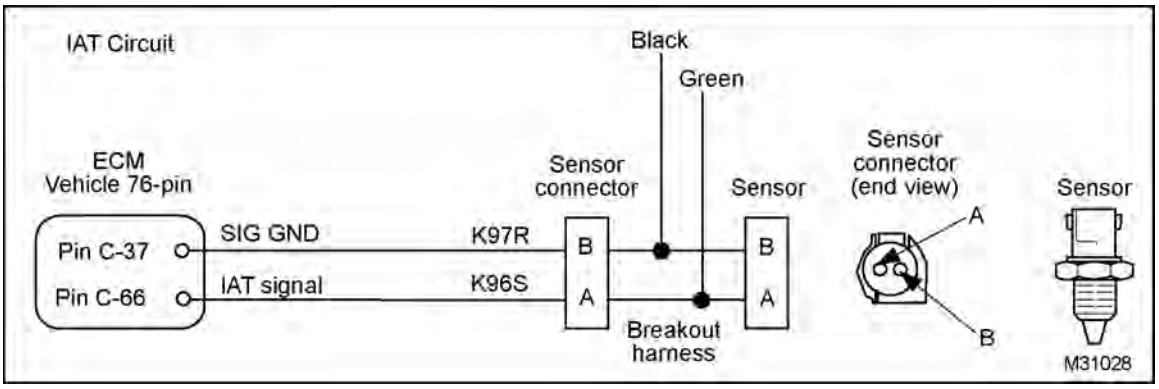

Figure 210 IAT circuit diagram

WARNING: To prevent personal injury or death, stay clear of rotating parts (belts and fan) and hot engine surfaces.

1. Using EST, open the D_ContinuousMonitor.ssn.
2. Monitor sensor voltage. Verify an active Diagnostic Trouble Code (DTC) for the sensor.
   - If DTC is inactive, monitor the Parameter Identifier (PID) while wiggling the connector and all wires at suspected location. If the circuit is interrupted, the PID spikes and the DTC goes active.
   - If DTC is active, proceed to the next step.
3. Disconnect engine harness from sensor.

NOTE: Inspect connectors for damaged pins, corrosion, or loose pins. Repair if necessary.

4. Connect breakout harness to engine harness. Leave sensor disconnected.

Injector 4 Check

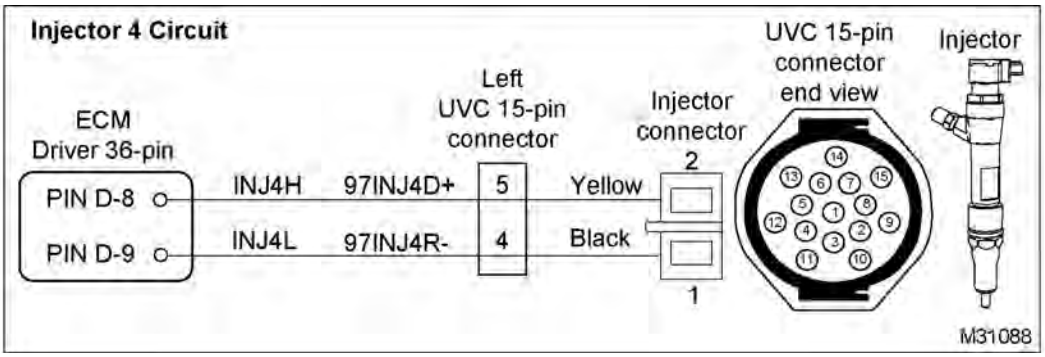

Figure 216 Injector 4 circuit diagram

Injector 4 - Resistance Through Valve Cover to Engine GND Check

WARNING: To prevent personal injury or death, shut engine down before doing voltage checks for injectors. When the engine is running, injector circuits have high voltage and amperage.

CAUTION: To prevent engine damage, turn ignition switch to OFF before disconnecting connectors. Failure to turn ignition switch to OFF will cause a voltage spike and damage to electrical components.

Turn ignition switch to OFF. Connect breakout harness to the left UVC. Use DMM to measure resistance.

Test Point	Spec	Comment
4 to GND	> 1 kΩ	If < 1 kΩ, check circuit for short to GND or injector coil for internal short.
5 to GND	> 1 kΩ	

Injector 4 - Coil Resistance Check

Turn ignition switch to OFF. Connect breakout harness to the left UVC. Use DMM to measure resistance.

Test Point	Spec	Comment
4 to 5	195 kΩ to 205 kΩ	If not within specification, check UVC harness for OPEN or short circuit. If harness is okay, replace injector.

Injector 4 - Harness Resistance Check

Turn ignition switch to OFF. Connect breakout box and jumper to engine harness. Leave ECM and UVC disconnected. Use DMM to measure resistance.

Test Point	Spec	Comment
D-8 to 5	< 5 Ω	If > 5 Ω, check for OPEN circuit.
D-8 to GND	> 1 kΩ	If < 1 kΩ, check for short to GND.
D-9 to 4	< 5 Ω	If > 5 Ω, check for OPEN circuit.
D-9 to GND	> 1 kΩ	If < 1 kΩ, check for short to GND.

The ITV function diagram includes the following:

- Intake Throttle Valve (ITV)
  - Intake Throttle Valve High (ITVH) circuit
  - Intake Throttle Valve Low (ITVL) circuit
  - Intake Throttle Valve Position (ITVP) sensor
- Electronic Control Module (ECM)
- Malfunction Indicator Lamp (MIL)
- Warn Engine Lamp (WEL)
- Exhaust Gas Differential Pressure (EGDP) sensor
- Exhaust Gas Temperature 1 (EGT1) sensor
- Exhaust Gas Temperature 2 (EGT2) sensor
- Exhaust Gas Temperature 3 (EGT3) sensor

Function

The ITV is a variable position actuator that restricts intake air flow to help heat the exhaust aftertreatment during regeneration.

Component Location

The ITV is mounted on the EGR valve elbow housing on the top front of the engine.

Tools

- Electronic Service Tool (EST) with MasterDiagnostics® software
- EZ-Tech® Interface Kit
- Digital Multimeter (DMM)
- 3-Banana Plug Harness
- 180-Pin Breakout Box
- ITV Breakout Harness
- Terminal Test Adapter Kit

MAP Pin-point Diagnostics

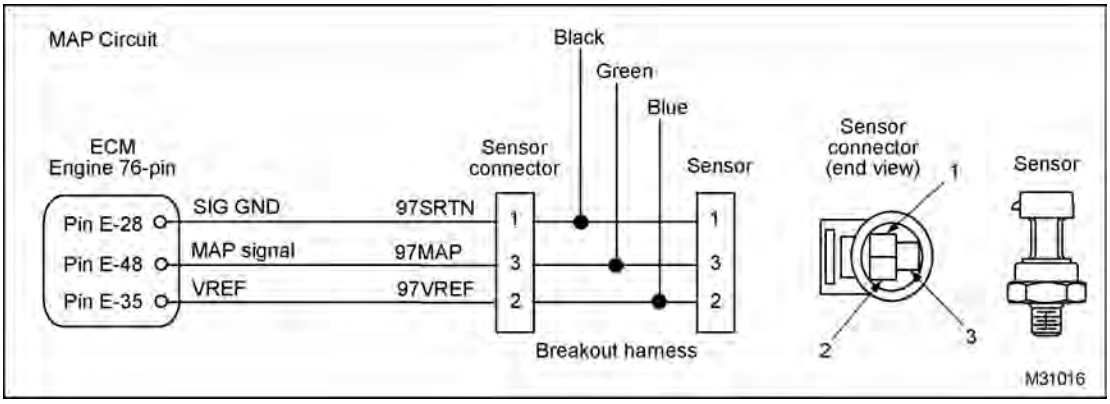

Figure 227 MAP circuit diagram

Connector Voltage Check

Connect breakout harness. Leave sensor disconnected. Turn ignition switch to ON. Use DMM to measure voltage.

Test Point	Spec	Comment
1 to GND	0 V	If > 0.25 V, check for short to PWR.
2 to GND	5 V	If > 5.5 V, check VREF for short to PWR. If < 4.5 V, check VREF for OPEN or short to GND. Do Harness Resistance Check (page 352).
3 to GND	0 V	If > 0.25 V, check for short to PWR. Do Harness Resistance Check (page 352).

Connector Resistance Check to GND

Turn ignition switch to OFF. Connect breakout harness. Leave sensor disconnected. Use DMM to measure resistance.

Test Point	Spec	Comment
1 to GND	< 5 Ω	If > 5 Ω, check for OPEN circuit.
2 to GND	> 1 kΩ	If < 1 kΩ, check for short to GND.
3 to GND	> 1 kΩ	If < 1 kΩ, check for short to GND.

Tachometer Pin-point Diagnostics

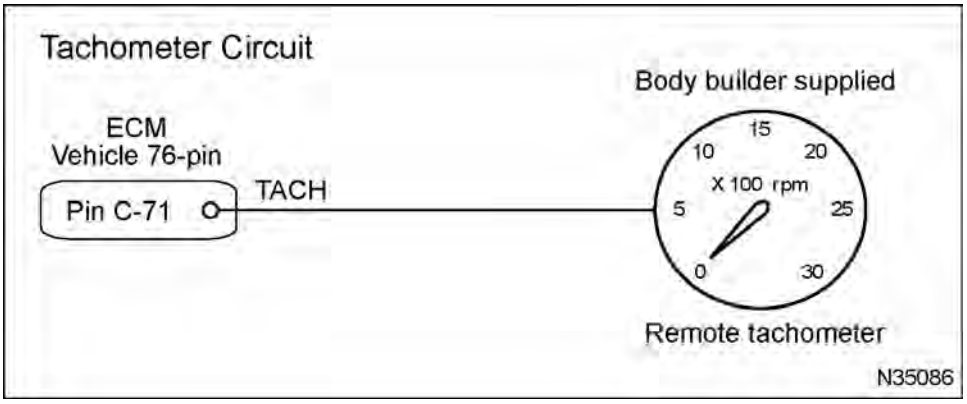

Figure 233 Tachometer circuit diagram

Circuit End Voltage Check

NOTE: If the tachometer is not working on the EGC, see truck *Chassis Electrical Circuit Diagram Manual* and *Electrical System Troubleshooting Guide*.

Disconnect component from the body builder blunt cut off circuit. Turn the ignition switch to ON. Use DMM to measure voltage.

Test Point	Spec	Comment
TACH to GND	B+	If < B+, check for OPEN circuit
Start engine. Set DMM to ACV - RPM 2 to measure engine speed signal.		
TACH to GND	Low idle = 140 Hz at 700 RPM High idle = 590 Hz at 2950 RPM	If no signal, do Harness Resistance Check (page 361).

Harness Resistance Check

Connect breakout box, leave ECM and TACH component disconnected. Use DMM to measure resistance.

Test Point	Spec	Comment
C-71 to TACH	< 5 Ω	If > 5 Ω , check for OPEN circuit
C-71 to GND	> 1 kΩ	If < 1 kΩ, check for short to GND

VREF Voltage Check (cont.)

EFP 2 to GND	5 V ± 0.5 V	See above note
EOP 2 to GND	5 V ± 0.5 V	See above note
MAP 2 to GND	5 V ± 0.5 V	See above note
ITVP G to GND	5 V ± 0.5 V	See above note
EGRP 1 to GND	5 V ± 0.5 V	See above note
FRP 15-pin 15 to GND	5 V ± 0.5 V	If this sensor caused VREF to go below specification, see above note. Check under valve cover harness for a short to GND or an internal shorted sensor.
Body builder blunt cut wire VREF to GND	5 V ± 0.5 V	See above note