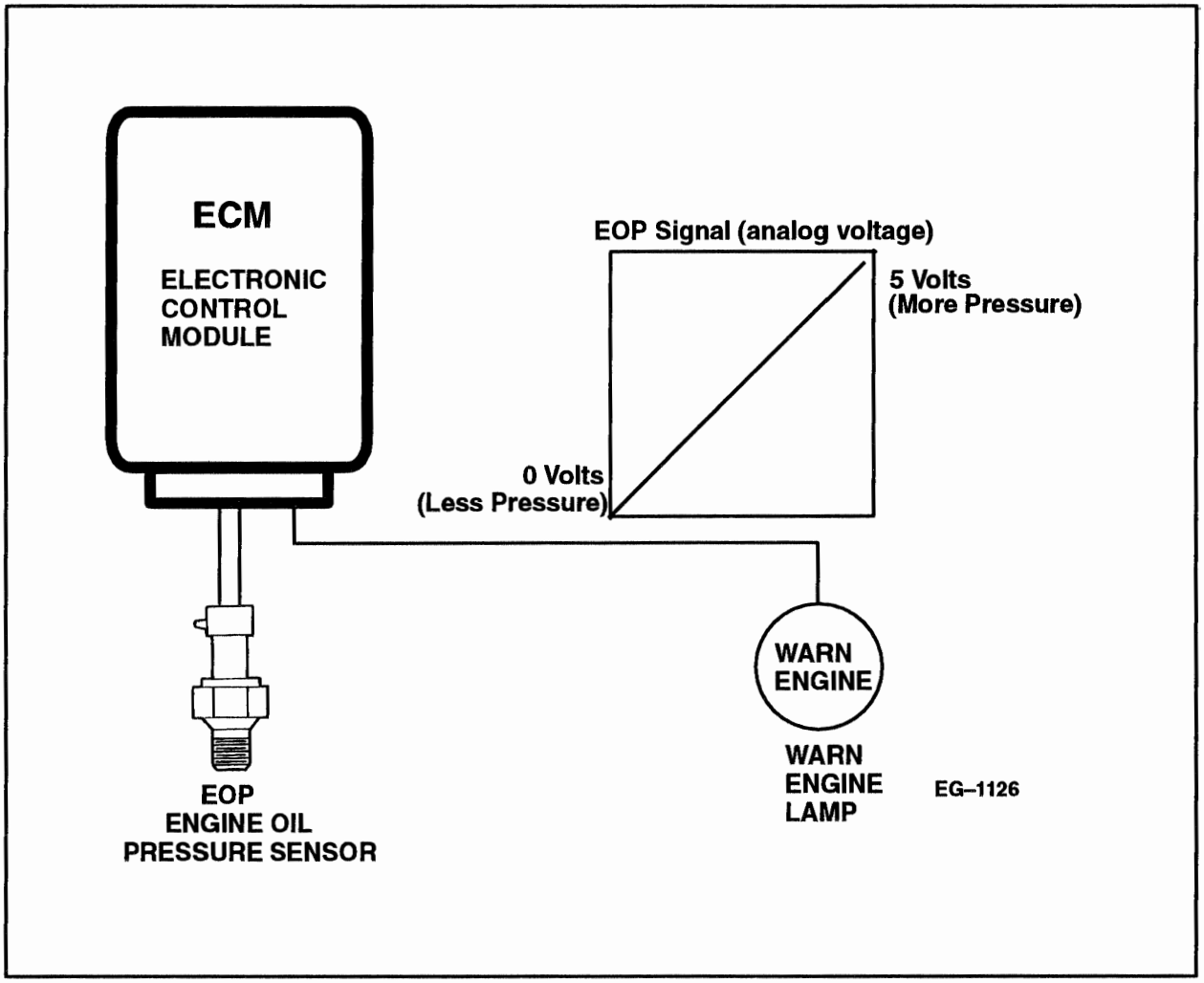
ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

ENGINE OIL PRESSURE SENSOR (EOP)

ENGINE OIL PRESSURE (EOP) SENSOR



SIGNAL FUNCTIONS

The Engine Oil Pressure (EOP) sensor is a variable capacitance sensor, that, when supplied with a 5 volt reference signal from the ECM produces a linear analog voltage signal that indicates engine oil pressure.

Engine Warning and Protection – An optional feature which, when enabled, will warn driver of low engine oil pressure condition and can be programmed to shut the engine down.

FAULT DETECTION/MANAGEMENT

An EOP signal that is detected out of range high or low by the ECM will cause the engine to ignore the EOP signal and disable Engine Warning and Protection.

NOTE: The EOP sensor only reads 0–38 psi.

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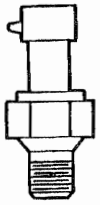
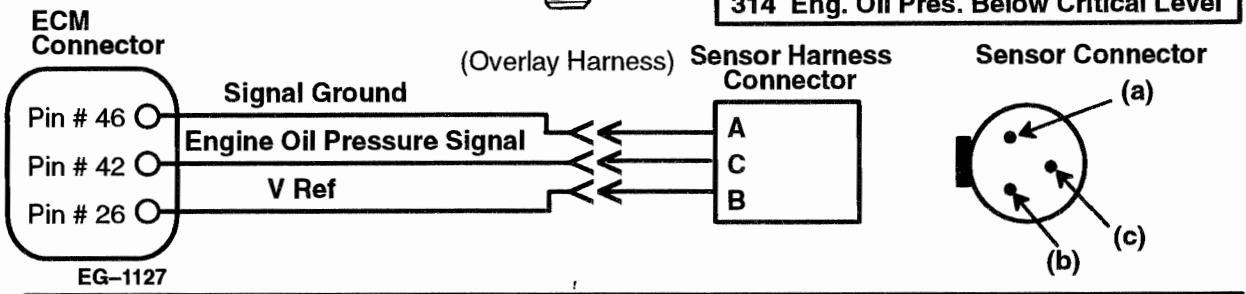


Fault Codes:

- 211 Out of Range Low
- 212 Out of Range High
- 313 Eng. Oil Pres. Below Warn Level
- 314 Eng. Oil Pres. Below Critical Level



After removing connector always check for damaged pins, corrosion, loose terminals etc.

Connector Checks to Chassis Ground

(Check with Sensor Connector Disconnected and Ignition key off, all accessories off)

Test Points	Spec.	Comments
A to Grd.	< 5 ohms	Resistance to chassis ground check with key off, if > than 5 ohms harness is open.
B to Grd.	> 1000 ohms	Resistance less than 1000 ohms indicates a short to ground.
C to Grd.	> 1000 ohms	Resistance less than 1000 ohms indicates a short to ground.

Connector Voltage Checks

(Check with sensor Connector Disconnected and Ignition Key On)

Test Points	Spec.	Comments
B to Grd.	5 volts ± .5	V Ref. check with key ON, if voltage not in spec. , see V Ref circuit
C to Grd.	0–.25 volts	If greater than 0.25 volts signal ground wire is shorted to V Ref of battery.

Harness Resistance Checks

(Check with breakout box installed on engine harness only)

Test Points	Spec.	Comments
#46 to A	< 5 ohms	Resistance from sensor connector to 60 pin connector – Signal ground
#26 to B	< 5 ohms	Resistance from sensor connector to 60 pin connector – V Ref
#42 to C	< 5 ohms	Resistance from sensor connector to 60 pin connector – EOP signal

Operational Signal Checks

(Check with breakout box installed in line with the ECM)

Test Points (+) #42 to (–) #46			
Voltage	PSI	kPA	Comments
1.39 v	5	34	
1.89 v	10	69	
2.9 v	20	138	
3.81 v	38	262	Maximum pressure sensor is capable of measuring

Fault Code Descriptions

Circuit Faults:

211 = Signal was less than .039 volts for more than 0.1 seconds.
212 = Signal voltage was greater than 4.9 volts for more than 0.1 seconds.

Oil Pressure Faults:

313 = Engine oil pressure < 5 psi (34 kPa) @700 RPM or 10 psi (69 kPa) @1400 RPM or 20 psi (138 kPa) @2000 RPM
314 = Engine oil pressure < 2 psi (14 kPa) @700 RPM or 5 psi (34 kPa) @1400 RPM or 12 psi (152 kPa) @2000 RPM

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ENGINE OIL PRESSURE SENSOR EXTENDED SYSTEM DESCRIPTION

FUNCTION

The Engine Oil Pressure sensor (EOP) is included in Navistar engine control system only when a vehicle is equipped with either the Engine Warning or optional Engine Shutdown engine monitoring system.

The ECM measures the EOP signal to monitor the oil pressure during engine operation. If the oil pressure drops below 5.0 PSI (34kPa) @ 700 RPM or 10.0 PSI (69 kPa) @ 1400 RPM or 20.0 PSI (138 kPa) @ 2000 RPM, the ECM will illuminate the OIL/WATER WARN light and sound the audible warning alarm. If the vehicle is equipped with the Engine Shut down system and the oil pressure drops to 2.0 PSI (14kPa) @ 700 RPM or 5.0 PSI (34 kPa) @ 1400 RPM or 12.0 PSI (152 kPa) @ 2000 RPM, the ECM will shut the engine off.

OPERATION

The Engine Oil Pressure sensor is a variable capacitance sensor. When pressure is applied to the sensor, the capacitance changes in relation to the pressure.

The ECM supplies a regulated 5 volt signal to terminal B of the EOP sensor from terminal 26 of the ECM. The EOP sensor is supplied a signal return (ground) at terminal A to terminal 46 of the ECM.

During engine operation, oil pressure acting on the sensor causes the sensor's capacitance to vary which changes the incoming 5 volt reference signal in relation to pressure. The sensor's oil pressure signal at terminal C is sent to terminal 42 of the ECM. This signal increases equally in proportion to an increase in pressure up to a maximum of 38 PSI (262 kPa).

ECM DIAGNOSTICS

The ECM continuously monitors the signal from the EOP sensor to ensure the signal is within the correct operating range. If the signal is lower or higher than required, the ECM will set a fault code. This fault code is retrieved using the Electronic Service Tool (EST) or by reading the flash code using the STI diagnostic switch. If the ignition key is shut off, the code will be stored as an inactive code.

During engine operation, the ECM also monitors the engine speed signal. It compares the expected oil pressure specification versus engine speed. If the ECM detects that the oil pressure is lower for a given engine speed, the ECM will set a fault code. If the pressure is lower than the "critical" level, the ECM will record a fault code. The VPM will automatically record this as a low oil pressure "Event" which is stored in the VPM memory and cannot be erased using the EST. This becomes a record of operation of the engine.

FLASH CODE *211*
ATA CODE PID 100 FMI 4
ENGINE OIL PRESS SIGNAL OUT OF RANGE LOW

An out of range low code will be set if the ECM detects a voltage less than .039 volts for more than 0.1 seconds. If this fault code is set the ECM will ignore the EOP signal and continue to operate normally. However, if the fault is Active, the ECM will turn on the Engine Warning light.

Code 211 may be caused by an open Vref feed, open signal circuit or a defective sensor.

FLASH CODE *212*
ATA CODE PID 100 FMI 3
ENGINE OIL PRESSURE SIGNAL OUT OF RANGE HIGH

An out of range high code will be set if the ECM detects a voltage more than 4.9 volts for more than 0.1 seconds. If this fault code is set, the ECM will ignore the EOP signal and continue to operate normally. If this fault is active, the ECM will illuminate the Engine Warning light.

Code 212 may be caused by an open signal return circuit, a short to a voltage source or a defective sensor.

FLASH CODE *313*
ATA CODE PID 100 FMI 1
ENGINE OIL PRESSURE BELOW WARNING LEVEL

Code 313 indicates that the oil pressure has dropped below the warning level. The specification for the warning level is 5.0 PSI (34kPa) @ 700 RPM or 10.0 PSI (69 kPa) @ 1400 RPM or 20.0 PSI (138 kPa) @ 2000 RPM.

Code 313 may be caused by a defective sensor sending an incorrect signal. To confirm this, compare actual oil pressure to the reading on the data list of the EST. Low oil pressure due to defective mechanical components will also set this code.

NOTE : IT MAY BE POSSIBLE TO SET THIS CODE AT START–UP, ESPECIALLY IF THE OIL WAS JUST CHANGED, OR AFTER A REBUILD UNTIL THE OIL SYSTEM IS PRIMED.

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ENGINE OIL PRESSURE SENSOR
EXTENDED SYSTEM DESCRIPTION
(Continued)

FLASH CODE *314*
ATA CODE 100 FMI 7
ENGINE OIL PRESSURE BELOW CRITICAL LEVEL

If flash code 314 is set, this indicates that the oil pressure has dropped below the critical level. The specification for the critical level is 2.0 PSI (14kPa) @ 700 RPM or 5.0 PSI (34 kPa) @ 1400 RPM or 12.0 PSI (152 kPa) @ 2000 RPM.

Code 314 may be caused by a defective sensor sending an incorrect signal. To confirm this, compare actual oil pressure to the reading on the data list of the EST. Low oil pressure due to defective mechanical components will also set this code.

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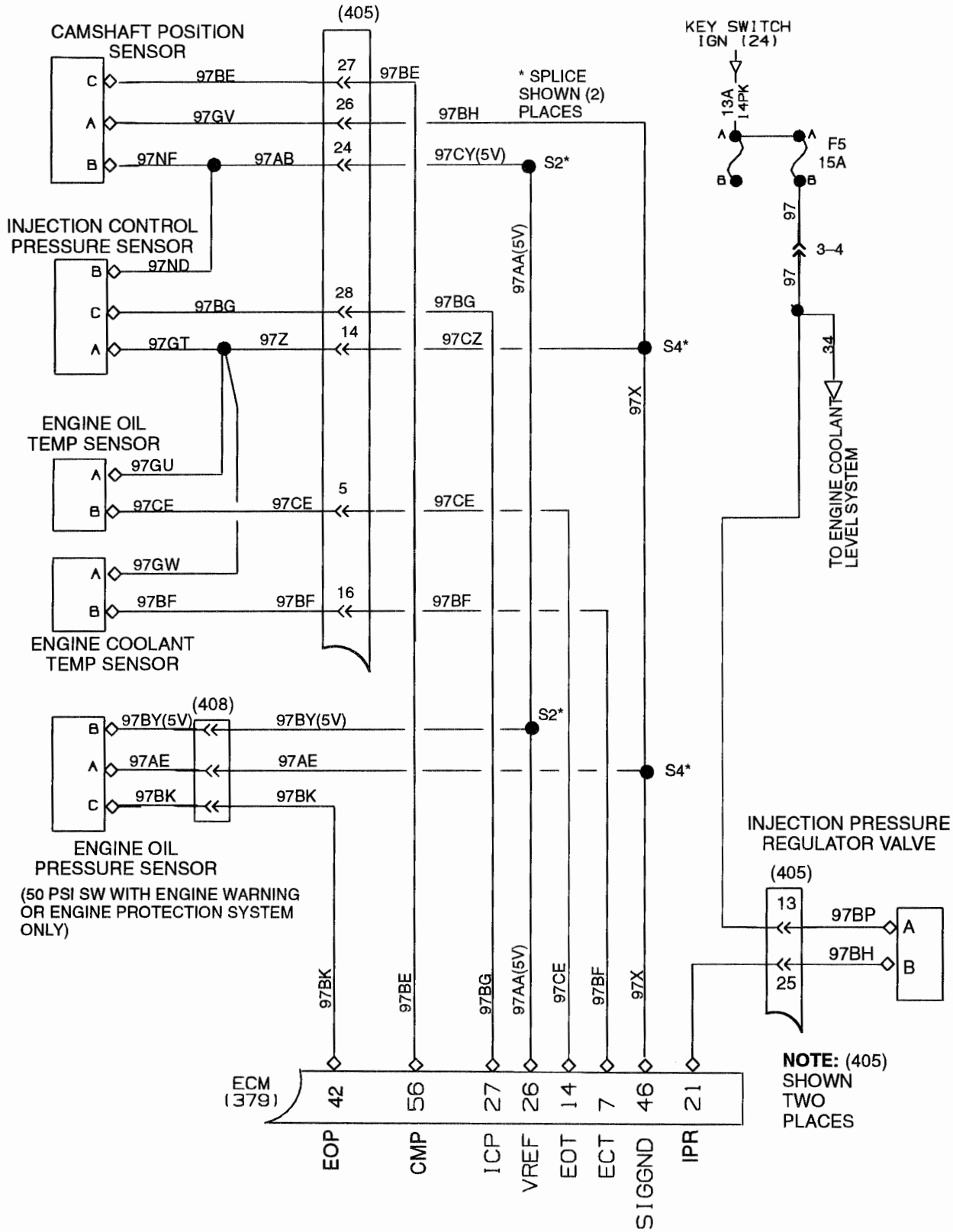
ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

ENGINE OIL PRESSURE SENSOR (EOP)

SENSOR CIRCUIT DIAGRAM



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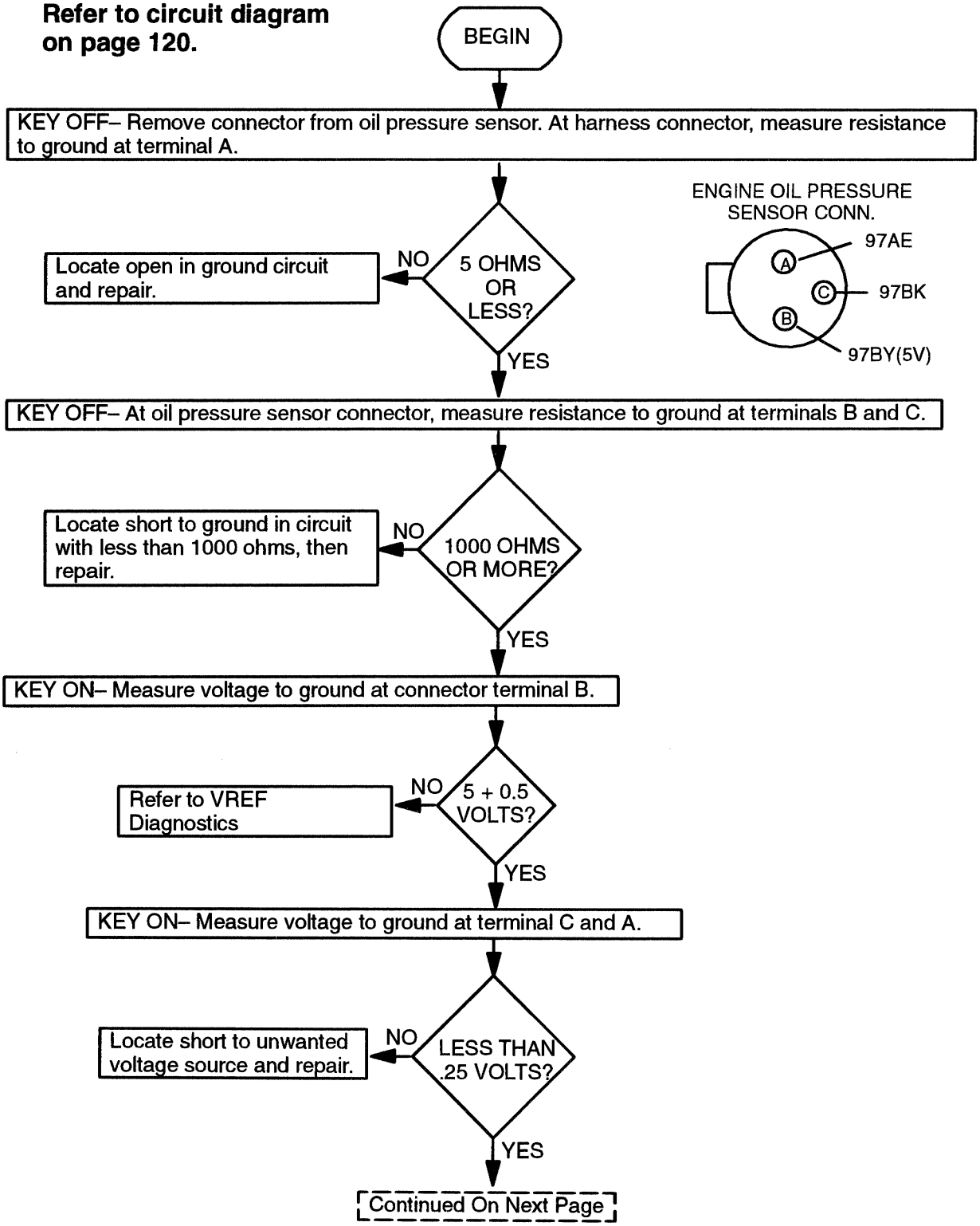
ENGINE OIL PRESSURE (EOP) SENSOR DIAGNOSTICS

Refer to circuit diagram on page 120.



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ELECTRONIC CONTROL SYSTEM DIAGNOSTICS

ENGINE OIL PRESSURE SENSOR (EOP)

ENGINE OIL PRESSURE (EOP) SENSOR DIAGNOSTICS (Continued)

YES

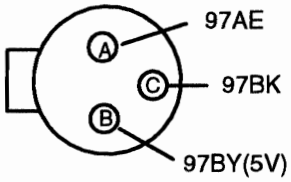
KEY OFF– Install breakout box at ECM connector (379). Measure resistance between ECM terminal 42 and EOP connector terminal C.

5 OHMS OR LESS?

NO → Locate open in signal circuit between ECM connector (379) and EOP connector and repair.

YES

ENGINE OIL PRESSURE SENSOR CONN.



Attach connector to EOP sensor. With key ON and engine running, measure voltage between breakout box terminals 42 and 46. Use table and compare readings with actual engine oil pressure.

VOLTAGE AGREES WITH TABLE

NO → Replace the engine oil pressure sensor.

YES

Refer to ECM diagnostics. VPM may not be programmed with Oil Pressure Monitoring.

VOLTS	PSI
1.39	5
1.89	10
2.90	20
3.81	38

ELECTRONIC CONTROL MODULE (ECM) (379)