Fuel System

GENERAL

SPECIFICATIONS IFTC0010

Items	Specifications
Fuel tank	
Capacity	35 lit. (9.2 U.S. gal., 7.7 Imp.gal.)
Fuel filter	High pressure type
Fuel pump	Electrical, in-tank type
Throttle body	
Throttle position sensor (TP Sensor)	Variable resister type
Resistance	0.7 - 3.0 kΩ
Output voltage at idle	0.1 - 0.875V
Input sensors	
Manifold absolute pressure (MAP) sensor	
Type	Piezo-Resistivity type
Output voltage	0 - 5V
Knock sensor	Piezoelectric type
Intake Air Temperature sensor (IAT Sensor)	Thermistor type
Resistance	2.0 - 3.0 kΩ at 20°C (68°F)
EVAP Canister Purge solenoid valve	Duty type
Resistance	26Ω
Engine coolant temperature sensor (ECT Sensor)	Thermistor type
Resistance	1.0 - 4.0kΩ at 20°C (68°F) 0.24 - 0.40kΩ at 80°C (176°F)
Oxygen sensor (O2S)	Zirconia sensor (Heated)
Output voltage (V)	0 - 1V
Vehicle speed sensor	Reed switch type
Camshaft position sensor (CMP Sensor)	Hall effect sensor
Output voltage (V)	0 - 5V
Crankshaft position sensor (CKP Sensor)	Magnetic inductive type
Output frequency (Hz)	Idle rpm : 750 - 950Hz 3000 rpm : 2700 - 3300Hz
Output actuators	
Injector	
Type	Electromagnetic type
Number	4
Coil resistance (Ω)	15.9 ± 0.35Ω
Fuel pressure regulator	
Regulator pressure	350 kPa (3.5 kg/cm², 49.8 psi)
Idle speed control actuator (ISC Actuator)	
Type	Double coil type
Control frequency (Hz)	100Hz

SERVICE STANDARD

Items		Standard value
Basic ignition timing		BTDC 8° ± 5°
Curb idle speed (rpm)	Normal	850 ± 100
	Electrical load	900 ± 100
	A/con ON	900 ± 100
	Electrical load & A/con ON	1000 ± 100

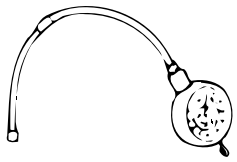
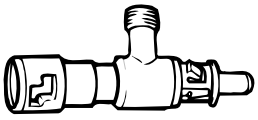
SEALANT

Engine coolant temperature sensor assembly Engine coolant temperature sender	LOCTITE 962T or equivalent Three bond No.2310 or equivalent

TIGHTENING TORQUE

Items	Nm	Kg·cm	lb·ft
Delivery pipe installation bolts	10 - 15	100 - 150	7 - 11
Oxygen sensor	50 - 60	500 - 600	37 - 44
Crankshaft position sensor installation bolts	9 - 11	90 - 110	7 - 8
Knock sensor installation bolt	16 - 25	160 - 250	12 - 18
Engine coolant temperature sensor	15 - 20	150 - 200	11 - 15
Throttle position sensor installation bolts	1.5 - 2.5	15 - 25	1.1 - 1.8
Throttle body to surge tank bolts	15 - 20	150 - 200	11 - 15

SPECIAL TOOLS EFTC0030

Tool (Number and name)	Illustration	Application
09353-24100 Fuel pressure gauge & hose	 C5324100	Connection of fuel pressure gauge to delivery pipe for measurement of fuel pressure.
09353-02000 Quick connector remover	 C5302000	Remover of quick connector in delivery pipe and return pipe.
09353-02100 Fuel pressure gauge adaptor	 C5302100	Use with fuel pressure gauge when measuring the fuel pressure.

BASIC TROUBLESHOOTING EFDA0050

When checking for engine trouble, it is important to start with an inspection of the basic systems. If one of the following conditions exists; (A) engine start failure, (B) unstable idling or (C) poor acceleration, begin by checking the following basic systems:

1. Power supply
   - Battery
   - Fusible link
   - Fuse

2. Body ground
3. Fuel supply
   - Fuel line
   - Fuel filter
   - Fuel pump

4. Ignition system
   - Spark plug
   - High-tension cable
   - Ignition coil

5. Emission control system
   - PCV system
   - Vacuum leak

6. Others
   - Ignition timing
   - Idle speed

Trouble with the MFI system is often caused by poor contact of the harness connectors. It is important to check all harness connectors and verify that they are securely connected.

TROUBLESHOOTING GUIDE CHART IFDA0070

Main Symptoms / Sub-Symptoms / Check points	STARTING							Poor Idling					Poor Driving	
	Unable to start			Difficult to start										
	Engine does not turn over	Starter runs but engine does not turn over	Incomplete combustion	Engine turns over	Always	When the engine is cold	When the engine is hot	Incorrect fast idle	High idle speed	Low idle speed	Rough idling	Engine hesitates or accelerates poorly	Surging	Knocking
Starter	2	2		1										
Park/Neutral SW [A/T] or Clutch start SW [M/T]	3													
Flywheel [M/T] or Drive plate [A/T]		4												
Mass air flow sensor circuit			3							3	10	7		
Idle speed control actuator			4		3	3	3	3	3	2	7			2
Fuel pressure regulator			5		5	5	5				4	11	1	
ECT sensor circuit			6		4	1	1	2	2	1	2	8	6	
Compression			7		8						8	5		
Piston rings			8		9						9			
Ignition timing					10						11	14		
Timing mark			9								12			
Injectors			10		13	8	8		7	4	13	15	4	
ECM			11		14	9	9	4	8	5	14	16	5	
A/C circuit				2					6					
Connecting rod bearing				3										
Crankshaft bearing				4										
Fuel quality					1	2	2				1	3	3	
Spark plugs					2						3	4	2	
Fuel pump					6	6	6				5	12		
Fuel lines					7	7	7				6	13		
Ignition circuit			2		11									3
Intake air temp. sensor circuit					12	4	4		4			9		1
Accelerator pedal link								1	1					
TP Sensor circuit									5			6		
Cylinder head											15			
Clutch [M/T]												1		
Brakes not releasing properly												2		
Oxygen sensor circuit												10		
Crankshaft position sensor		3												
Battery voltage		1	1											

IFDA007A

Main Symptoms / Sub-Symptoms / Check points	Engine Stalls				Others		
	Soon after starting	After accelerator pedal is depressed	After accelerator pedal is released	During A/C ON	Excessive fuel consumption	Engine overheats	Engine too cool
Fuel quality	1						
Fuel pressure regulator	2	4			2		
Fuel pump	3						
Fuel lines	4	5					
ISC actuator	5		1	2			
MAP sensor circuit	6	1	2		13		
ECT sensor circuit	7				11		
Injectors	8	6			10		
ECM	9	7	3	3	17		
TP Sensor circuit		2			12		
Spark plug		3			6	8	
A/C circuit				1	14		
Fuel leakage					1		
Accelerator pedal link					3		
Clutch [M/T]					4		
Brakes drag when pedal released					5		
Compression					7		
Piston ring					8		
Ignition timing					9		
Oxygen sensor circuit					15		
Intake air temp. sensor circuit					16		
Coolant leakage						1	
Cooling fan						2	1
Thermo switch						3	
Radiator and radiator cap						4	2
Thermostat						5	
Timing belt						6	
Engine coolant pump						7	
Oil pump						9	
Cylinder head						10	
Cylinder block						11	
ECT sender						12	3
Crankshaft position sensor	11	8	4	4			

IFDA007B

NOTE

The number herein means the check order.

SERVICE ADJUSTMENT PROCEDURES EFTC0090

IDLE SPEED

NOTE

Before adjusting, check that the spark plugs, injectors, idle speed control actuator (ISC actuator), compression etc. are normal.

CHECK CONDITIONS

- Engine coolant temperature is 80 to 95°C (176 to 205°F).
- Lights, electric cooling fan and all accessories are off.
- Transaxle is in neutral ("P" or "N" range for A/T vehicles).
- Steering wheel is in a straight forward position (Vehicles with power steering).

1. Install a tachometer to the primary coil side or connect the scan tool to the data link connector.
2. Start and run the engine at curb idle speed.
3. Run the engine for more than 5 seconds at an engine speed of 2,000 to 3,000 rpm.
   Then, run the engine at idle for 2 minutes.
4. Read the idling rpm.

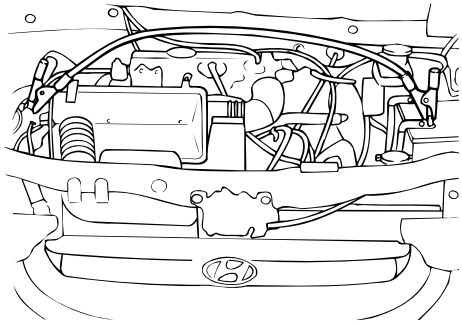
Idle speed	850 ± 100 rpm

FUEL PUMP OPERATING CHECK EFTC0110

1. Turn the ignition switch OFF.
2. Apply battery voltage to the fuel pump drive connector to check that the pump operates.

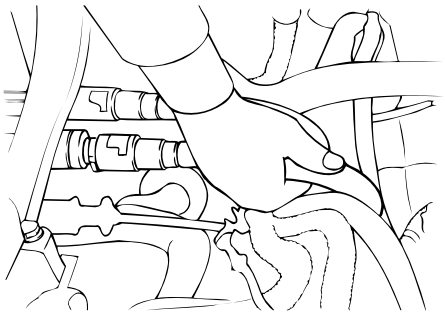
NOTE

The fuel pump is an in-tank type and its operation is hard to hear without removing the fuel tank cap.



T7FL005A

3. Pinch the hose to check that fuel pressure is felt.



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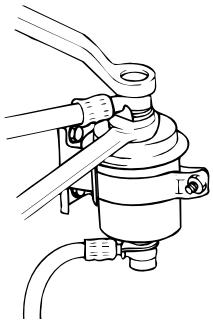
FUEL PRESSURE TEST EFTC0130

1. Reduce the internal pressure of the fuel pipes and hoses by the following procedures.
   - Disconnect the fuel pump harness connector.
   - Start the engine and after it stops by itself, turn the ignition switch to the OFF position.
   - Disconnect the battery negative (-) terminal.
   - Connect the fuel pump harness connector.

2. Remove the upper eye bolt while holding the fuel filter nut securely.

   ⚠ ***CAUTION***

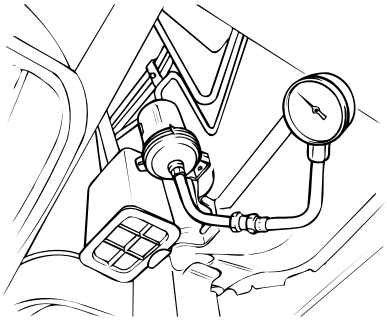
   Cover the hose connection with a shop towel to prevent splashing of fuel caused by fuel residual pressure in the fuel line.



EFTC013A

3. Using the fuel pressure gauge adapter (09353-24000, 09353-24100, 09353-24200), install the fuel-pressure gauge to the fuel filter. Tighten the bolt to the specified torque.

Tightening Torque
Fuel pressure gauge to fuel filter :
25 - 35 Nm (250 - 350 kg·cm, 18 - 26 lb·ft)



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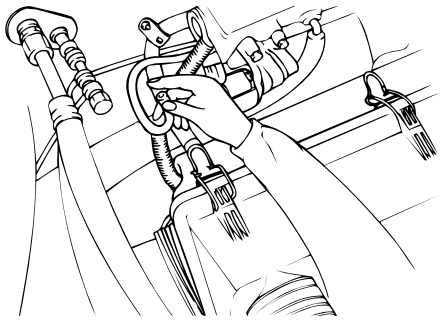
4. Connect the battery's negative (-) terminal.

5. Apply battery voltage to the terminal for the pump drive and activate the fuel pump: then, with fuel pressure applied, check that there is no fuel leakage from the pressure gauge or connection part.

6. Start the engine and let it idle.

7. Disconnect the vacuum hose from the pressure regulator, and plug the hose end. Measure the fuel pressure.

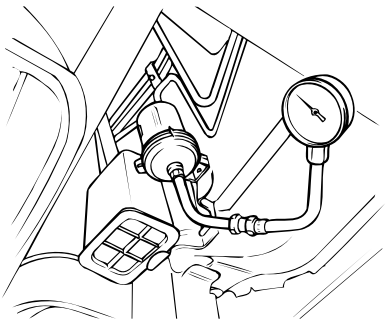
Standard valve : 300 kPa (3.06 kg/cm², 44.37 psi)



T7FL009A

8. Measure the fuel pressure when the vacuum hose is connected to the pressure regulator.

Standard valve : Approx. 255 kPa (2.57 kg/cm², 37 psi)



T7FL008A

9. If the results of the measurements made in steps (6) and (7) are not within the standard valve, use the below table to determine the probable cause, and make the necessary repairs.

Condition	Probable cause	Remedy
Fuel pressure too low	a. Clogged fuel filter. b. Fuel leak on the return side, caused by poor seating of the fuel-pressure regulator. c. Low discharge pressure of the fuel pump	a. Replace fuel filter. b. Replace fuel pressure regulator. c. Check the in-tank fuel hose for leakage or replace the fuel pump.
Fuel pressure too high	a. Sticking fuel-pressure regulator. b. Clogged or bent fuel return hose or pipe.	a. Replace fuel pressure regulator. b. Repair or replace hose or pipe.
There is no difference in fuel pressure when the vacuum hose is connected and when it is not.	a. Clogging, or damaged vacuum hose or the nipple. b. Sticking or poor seating of the fuel pressure regulator.	a. Repair or replace the vacuum hose or the nipple b. Repair or replace hose or pipe.

10. Stop the engine and check for a change in the fuel pressure gauge reading, which should hold for approximately 5 minutes. If the gauge indication drops, observe the rate of drop. Determine and remove the causes according to the following table.

Condition	Probable cause	Remedy
Fuel pressure drops slowly after engine is stopped	a. Injector leakage	a. Replace injector
Fuel pressure drops immediately after engine is stopped	a. The check valve within the fuel pump is open	a. Replace fuel pump

11. Reduce the pressure in the fuel line.
12. Disconnect the hose and the gauge.

CAUTION

Cover on the hose connection with a shop towel to prevent splashing of fuel caused by fuel residual pressure in the fuel line.

13. Replace the O-ring of the end of the hose.
14. Connect the fuel hose to the delivery pipe and tighten with the specified torque.
15. Check for fuel leakage.

MFI SYSTEM INSPECTION IFTD0150

If the MFI system components (sensors, ECM, injector, etc.) fail, interruption to the fuel supply or failure to supply the proper amount of fuel for various engine operating conditions will result. The following situations may be encountered.

1. Engine is hard to start or does not start at all.
2. Unstable idle.
3. Poor driveability

If any of the above conditions are noted, first perform a routine diagnosis that includes basic engine checks (ignition system malfunction, incorrect engine adjustment, etc.). Then, inspect the MFI system components with the HI-SCAN.

NOTE

- *Before removing or installing any part, read the diagnostic trouble codes and then disconnect the battery negative (-) terminal.*
- *Before disconnecting the cable from battery terminal, turn the ignition switch to OFF. Removal or connection of the battery cable during engine operation or while the ignition switch is ON could cause damage to the ECM.*
- *The control harnesses between the ECM and heated oxygen sensor are shielded with the shielded ground wires to the body in order to prevent the influence of ignition noises and radio interference. When the shielded wire is faulty, the control harness must be replaced.*
- *When checking the generator for the charging state, do not disconnect the battery '+' terminal to prevent the ECM from damage due to the voltage.*
- *When charging the battery with the external charger, disconnect the vehicle side battery terminals to prevent damage to the ECM.*

MALFUNCTION INDICATOR LAMP (MIL) (IF INSTALLED)

[EOBD]

A malfunction indicator lamp illuminates to notify the driver that there is a problem with the vehicle. However, the MIL will go off automatically after 3 subsequent sequential driving cycles without the same malfunction. Immediately after the ignition switch is turn on (ON position - do not start), the MIL will illuminate continuously to indicate that the MIL operates normally.

Faults with the following items will illuminate the MIL

- Catalyst
- Fuel system
- Manifold absolute pressure sensor (MAP sensor)
- Intake Air Temperature Sensor
- Engine Coolant Temperature Sensor
- Throttle Position Sensor
- Upstream Oxygen Sensor
- Downstream Oxygen Sensor Heater
- Downstream Oxygen Sensor
- Upstream Oxygen Sensor Heater
- Injector
- Misfire
- Crankshaft Position Sensor
- Camshaft Position Sensor
- Evaporative Emission Control System
- Vehicle Speed Sensor
- Idle Control Valve
- Power Supply
- ECM
- MT/AT Encoding
- Acceleration Sensor
- MIL-on Request Signal
- Power Stage

[EXCEPT EOBD]

A malfunction indicator lamp illuminates to notify the driver that there is a problem with the vehicle. However, the MIL will go off automatically after 3 subsequent sequential driving cycles without the same malfunction. Immediately after the ignition switch is turn on (ON position - do not start), the MIL will illuminate continuously to indicate that the MIL operates normally.

Faults with the following items will illuminate the MIL

- Oxygen sensor (O2S)
- Manifold absolute pressure sensor (MAP sensor)
- Throttle position sensor (TP Sensor)
- Engine coolant temperature sensor (ECT Sensor)
- Idle speed control actuator (ISC Actuator)
- Injectors
- ECM

INSPECTION

1. After turning ON the ignition key, ensure that the light illuminates for about 5 seconds and then goes out.

2. If the light does not illuminate, check for an open circuit in the harness, a blown fuse or a blown bulb.

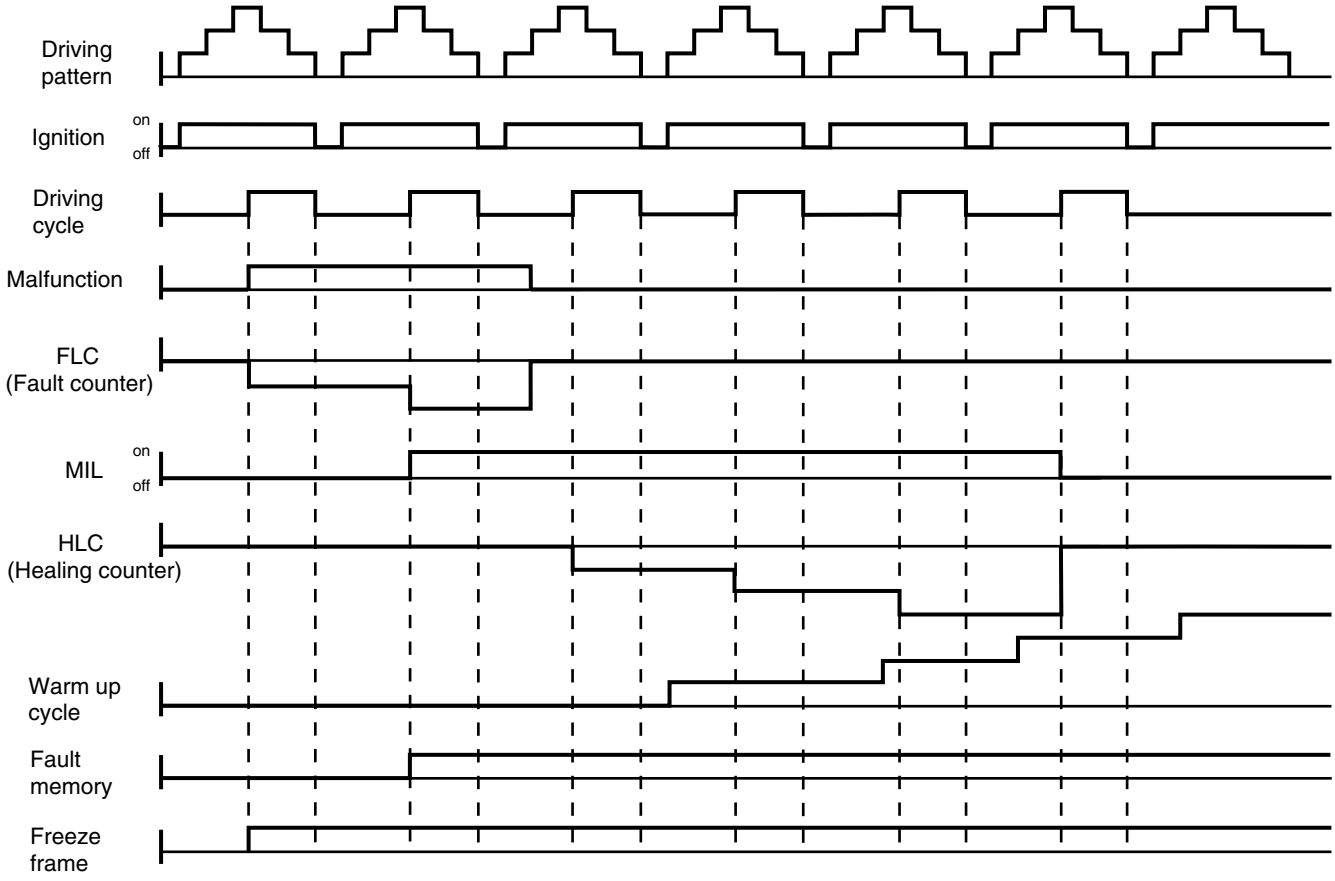
SELF-DIAGNOSIS

The ECM monitors the input/output signals (some signals at all times and the others under specified conditions). When the ECM detects an irregularity, it records the diagnostic trouble code, and outputs the signal to the Data Link connector. The diagnosis results can be read with the HI-SCAN. Diagnostic trouble codes (DTC) will remain in the ECM as long as battery power is maintained. The diagnostic trouble codes will, however, be erased when the battery terminal or the engine control module (ECM) connector is disconnected or by HI-CAN.

NOTE

If a sensor connector is disconnected with the ignition switch turned on, the diagnostic trouble code (DTC) is recorded. In this case, disconnect the battery negative terminal (-) for 15 seconds or more, and the diagnosis memory will be erased.

THE RELATION BETWEEN DTC AND DRIVING PATTERN IN EOBD SYSTEM (IF INSTALLED) EFTC0170



EFDA017A

1. When the same malfunction is detected and maintained during two sequential driving cycles, the MIL will automatically illuminate.
2. The MIL will go off automatically if no fault is detected after 3 sequential driving cycles.
3. A Diagnostic Trouble Code(DTC) is recorded in ECM memory when a malfunction is detected after two sequential driving cycles. The MIL will illuminate when the malfunction is detected on the second driving cycle.
   If a misfire is detected, a DTC will be recorded, and the MIL will illuminate, immediately after a fault is first detected.
4. A diagnostic Trouble Code(DTC) will automatically erase from ECM memory if the same malfunction is not detected for 40 driving cycles.

NOTE

- *A "warm-up cycle" means sufficient vehicle operation such that the coolant temperature has risen by at least 40 degrees Fahrenheit from engine starting and reaches a minimum temperature of 160 degress Fahrenheit.*
- *A "driving cycle" consists of engine startup, vehicle operation beyond the beginning of closed loop operation.*

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES EFTD0190

[EOBD, BOSCH EMS]

DTC NO.	DESCRIPTION	MIL
P0030	O2 Sensor Heater - Heater Control Circuit Malfunction (Bank 1 / Sensor 1)	O
P0031	O2 Sensor Heater Circuit Low (Bank 1 / Sensor 1)	O
P0032	O2 Sensor Heater Circuit High (Bank 1 / Sensor 1)	O
P0036	O2 Sensor Heater - Heater Control Circuit Malfunction (Bank 1 / Sensor 2)	O
P0037	O2 Sensor Heater Circuit Low (Bank 1 / Sensor 2)	O
P0038	O2 Sensor Heater Circuit High (Bank 1 / Sensor 2)	O
P0106	Manifold Absolute Pressure (MAP) Sensor Circuit Rationality	O
P0107	Manifold Absolute Pressure (MAP) Sensor Circuit Low Input	O
P0108	Manifold Absolute Pressure (MAP) Sensor Circuit High Input	O
P0112	Intake Air Temperature (IAT) Sensor Circuit Low Input	O
P0113	Intake Air Temperature (IAT) Sensor Circuit High Input	O
P0116	Engine Coolant Temperature (ETC) Sensor Circuit Range / Performance	O
P0117	Engine Coolant Temperature (ETC) Sensor Circuit Low Input	O
P0118	Engine Coolant Temperature (ETC) Sensor Circuit High Input	O
P0121	Throttle Position Sensor (TPS) Circuit Range / Performance Problem	O
P0122	Throttle Position Sensor (TPS) Circuit Low Input	O
P0123	Throttle Position Sensor (TPS) Circuit High Input	O
P0130	O2 Sensor Circuit Malfunction (Bank 1 / Sensor 1)	O
P0131	O2 Sensor Circuit Malfunction Low Input (Bank 1 / Sensor 1)	O
P0132	O2 Sensor Circuit High Input (Bank 1 / Sensor 1)	O
P0133	O2 Sensor Circuit Slow Response (Bank 1 / Sensor 1)	O
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 / Sensor 1)	O
P0136	O2 Sensor Circuit Malfunction (Bank 1 / Sensor 2)	O
P0137	O2 Sensor Circuit Low Input (Bank 1 / Sensor 2)	O
P0138	O2 Sensor Circuit High Input (Bank 1 / Sensor 2)	O
P0140	O2 Sensor Circuit No Activity Detected (Bank 1 / Sensor 2)	O
P0261	Cylinder 1 - Ingector Circuit Low	O
P0262	Cylinder 1 - Ingector Circuit High	O
P0264	Cylinder 2 - Ingector Circuit Low	O
P0265	Cylinder 2 - Ingector Circuit High	O
P0267	Cylinder 3 - Ingector Circuit Low	O
P0268	Cylinder 3 - Ingector Circuit High	O
P0270	Cylinder 4 - Ingector Circuit Low	O
P0271	Cylinder 4 - Ingector Circuit High	O
P0300	Multiple Cylinder Misfire Detected	O

DTC NO.	DESCRIPTION	MIL
P0301	Cylinder 1 - Misfire detected	O
P0302	Cylinder 2 - Misfire detected	O
P0303	Cylinder 3 - Misfire detected	O
P0304	Cylinder 4 - Misfire detected	O
P0325	Knock Sensor 1 Circuit Malfunction (Bank 1)	X
P0335	Crankshaft Position (CKP) Sensor Circuit Malfunction	O
P0336	Crankshaft Position (CKP) Sensor Circuit Range Random	O
P0340	Camshaft Position (CMP) Sensor Circuit Malfunction	O
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	O
P0444	Evap. Emission Control System - Purge Control Valve Circuit Open	O
P0445	Evap. Emission Control System - Purge Control Valve Circuit Shorted	O
P0501	Vehicle Speed Sensor (VSS) Range / Performance	O
P0506	Idle Control System - RPM Lower Than Expected	O
P0507	Idle Control System - RPM Higher Than Expected	O
P0562	System Voltage Low	O
P0563	System Voltage High	O
P0605	Internal Control Module Read Only Memory (ROM)	O
P0650	Malfunction Indicator Lamp(MIL) Control Circuit	X
P1307	Acceleration Sensor Circuit Rationality	O
P1308	Acceleration Sensor Circuit Low	O
P1309	Acceleration Sensor Circuit High	O
P1505	Idle Air Actuator Signal Low of Coil #1	O
P1506	Idle Air Actuator Signal High of Coil #1	O
P1507	Idle Air Actuator Signal Low of Coil #2	O
P1508	Idle Air Actuator Signal High of Coil #2	O
P1586	Encoding Signal Circuit Not Rational	O
P1690	Smartra Error	X
P1691	Immobilizer Antena Error	X
P1693	Immobilizer Transponder Error	X
P1694	Immobilizer ECM Siganl Error	X
P1695	Immobilizer EEPROM Error	X
P1696	Immobilizer Mismatch / Overtrial Error	X
P2187	System Too Lean At Idle - Addition	O
P2188	System Too Rich At Idle - Addition	O
P2191	System Too Lean At Idle - Multiple	O
P2192	System Too Rich At Idle - Multiple	O

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES EFTD0210

[MEXICO, BOSCH EMS]

DTC NO.	DESCRIPTION	MIL
P0031	O2 Sensor Heater Circuit Low (Bank 1 / Sensor 1)	X
P0032	O2 Sensor Heater Circuit High (Bank 1 / Sensor 1)	X
P0107	Manifold Absolute Pressure (MAP) Sensor Circuit Low Input	O
P0108	Manifold Absolute Pressure (MAP) Sensor Circuit High Input	O
P0112	Intake Air Temperature (IAT) Sensor Circuit Low Input	X
P0113	Intake Air Temperature (IAT) Sensor Circuit High Input	X
P0117	Engine Coolant Temperature (ETC) Sensor Circuit Low Input	O
P0118	Engine Coolant Temperature (ETC) Sensor Circuit High Input	O
P0122	Throttle Position Sensor (TPS) Circuit Low Input	O
P0123	Throttle Position Sensor (TPS) Circuit High Input	O
P0131	O2 Sensor Circuit Malfunction Low Input (Bank 1 / Sensor 1)	X
P0132	O2 Sensor Circuit High Input (Bank 1 / Sensor 1)	X
P0133	O2 Sensor Circuit Slow Response (Bank 1 / Sensor 1)	X
P0261	Cylinder 1 - Injector Circuit Low	O
P0262	Cylinder 1 - Injector Circuit High	O
P0264	Cylinder 2 - Injector Circuit Low	O
P0265	Cylinder 2 - Injector Circuit High	O
P0267	Cylinder 3 - Injector Circuit Low	O
P0268	Cylinder 3 - Injector Circuit High	O
P0270	Cylinder 4 - Injector Circuit Low	O
P0271	Cylinder 4 - Injector Circuit High	O
P0325	Knock Sensor 1 Circuit Malfunction (Bank 1)	X
P0335	Crankshaft Position (CKP) Sensor Circuit Malfunction	X
P0336	Crankshaft Position (CKP) Sensor Circuit Range Random	X
P0340	Camshaft Position (CMP) Sensor Circuit Malfunction	X
P0501	Vehicle Speed Sensor (VSS) Range / Performance	X
P0506	Idle Control System - RPM Lower Than Expected	X
P0507	Idle Control System - RPM Higher Than Expected	X
P0562	System Voltage Low	X
P0563	System Voltage High	X
P0605	Internal Control Module Read Only Memory (ROM)	X
P1505	Idle Air Actuator Signal Low of Coil #1	O
P1506	Idle Air Actuator Signal High of Coil #1	O
P1507	Idle Air Actuator Signal Low of Coil #2	O
P1508	Idle Air Actuator Signal High of Coil #2	O

DTC NO.	DESCRIPTION	MIL
P1586	Encoding Signal Circuit Not Rational	X
P1690	Smartra Error	X
P1691	Immobilizer Antena Error	X
P1693	Immobilizer Transponder Error	X
P1694	Immobilizer ECM Siganl Error	X
P1695	Immobilizer EEPROM Error	X
P1696	Immobilizer Mismatch / Overtrial Error	X
P2187	System Too Lean At Idle - Addition	X
P2188	System Too Rich At Idle - Addition	X
P2191	System Too Lean At Idle - Multiple	X
P2192	System Too Rich At Idle - Multiple	X

INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES IFTD0220

[NON-EOBO, HMC EMS]

DTC NO.	DESCRIPTION	MIL
P0031	O2 Sensor Heater Circuit Low (Bank 1 / Sensor 1)	X
P0032	O2 Sensor Heater Circuit High (Bank 1 / Sensor 1)	X
P0107	Manifold Absolute Pressure (MAP) Sensor Circuit Low Input	O
P0108	Manifold Absolute Pressure (MAP) Sensor Circuit High Input	O
P0112	Intake Air Temperature (IAT) Sensor Circuit Low Input	X
P0113	Intake Air Temperature (IAT) Sensor Circuit High Input	X
P0117	Engine Coolant Temperature (ETC) Sensor Circuit Low Input	O
P0118	Engine Coolant Temperature (ETC) Sensor Circuit High Input	O
P0122	Throttle Position Sensor (TPS) Circuit Low Input	O
P0123	Throttle Position Sensor (TPS) Circuit High Input	O
P0131	O2 Sensor Circuit Malfunction Low Input (Bank 1 / Sensor 1)	X
P0132	O2 Sensor Circuit High Input (Bank 1 / Sensor 1)	X
P0133	O2 Sensor Circuit Slow Response (Bank 1 / Sensor 1)	X
P0261	Cylinder 1 - Injector Circuit Low	O
P0262	Cylinder 1 - Injector Circuit High	O
P0264	Cylinder 2 - Injector Circuit Low	O
P0265	Cylinder 2 - Injector Circuit High	O
P0267	Cylinder 3 - Injector Circuit Low	O
P0268	Cylinder 3 - Injector Circuit High	O
P0270	Cylinder 4 - Injector Circuit Low	O
P0271	Cylinder 4 - Injector Circuit High	O
P0325	Knock Sensor 1 Circuit Malfunction (Bank 1)	X
P0335	Crankshaft Position (CKP) Sensor Circuit Malfunction	X
P0340	Camshaft Position (CMP) Sensor Circuit Malfunction	X
P0501	Vehicle Speed Sensor (VSS) Range / Performance	X
P1505	Idle Air Actuator Signal Low of Coil #1	O
P1506	Idle Air Actuator Signal High of Coil #1	O
P1507	Idle Air Actuator Signal Low of Coil #2	O
P1508	Idle Air Actuator Signal High of Coil #2	O
P1586	Encoding Signal Circuit Not Rational	X
P1690	Smartra Error	X
P1691	Immobilizer Antena Error	X
P1693	Immobilizer Transponder Error	X
P1694	Immobilizer ECM Siganl Error	X
P1695	Immobilizer EEPROM Error	X
P1696	Immobilizer Mismatch / Overtrial Error	X

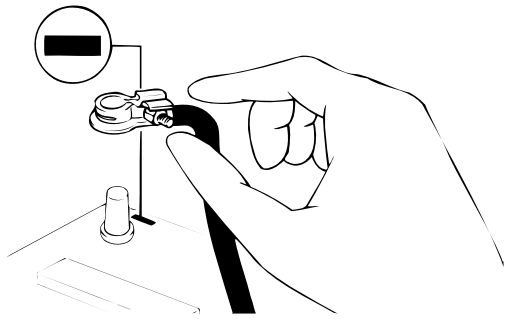
INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODES IFTD0221

[INDIA, HEC EMS]

DTC NO.	DESCRIPTION	MIL
P0031	O2 Sensor Heater Circuit Low (Bank 1 / Sensor 1)	X
P0032	O2 Sensor Heater Circuit High (Bank 1 / Sensor 1)	X
P0107	Manifold Absolute Pressure (MAP) Sensor Circuit Low Input	O
P0108	Manifold Absolute Pressure (MAP) Sensor Circuit High Input	O
P0112	Intake Air Temperature (IAT) Sensor Circuit Low Input	X
P0113	Intake Air Temperature (IAT) Sensor Circuit High Input	X
P0117	Engine Coolant Temperature (ETC) Sensor Circuit Low Input	O
P0118	Engine Coolant Temperature (ETC) Sensor Circuit High Input	O
P0122	Throttle Position Sensor (TPS) Circuit Low Input	O
P0123	Throttle Position Sensor (TPS) Circuit High Input	O
P0131	O2 Sensor Circuit Malfunction Low Input (Bank 1 / Sensor 1)	X
P0132	O2 Sensor Circuit High Input (Bank 1 / Sensor 1)	X
P0133	O2 Sensor Circuit Slow Response (Bank 1 / Sensor 1)	X
P0261	Cylinder 1 - Injector Circuit Low	O
P0262	Cylinder 1 - Injector Circuit High	O
P0264	Cylinder 2 - Injector Circuit Low	O
P0265	Cylinder 2 - Injector Circuit High	O
P0267	Cylinder 3 - Injector Circuit Low	O
P0268	Cylinder 3 - Injector Circuit High	O
P0270	Cylinder 4 - Injector Circuit Low	O
P0271	Cylinder 4 - Injector Circuit High	O
P0325	Knock Sensor 1 Circuit Malfunction (Bank 1)	X
P0335	Crankshaft Position (CKP) Sensor Circuit Malfunction	X
P0340	Camshaft Position (CMP) Sensor Circuit Malfunction	X
P0501	Vehicle Speed Sensor (VSS) Range / Performance	X
P1505	Idle Air Actuator Signal Low of Coil #1	O
P1506	Idle Air Actuator Signal High of Coil #1	O
P1507	Idle Air Actuator Signal Low of Coil #2	O
P1508	Idle Air Actuator Signal High of Coil #2	O
P1586	Encoding Signal Circuit Not Rational	X

FUEL FILTER REPLACEMENT EFTC0230

1. Reduce the internal pressure of the fuel lines and hoses by completing the following operations.
   - Disconnect the fuel pump harness connector.
   - Start the engine. Allow it to stop by itself, then turn the ignition switch OFF.
   - Disconnect the battery negative (-) terminal.
   - Connect the fuel pump harness connector.



EFDA023A

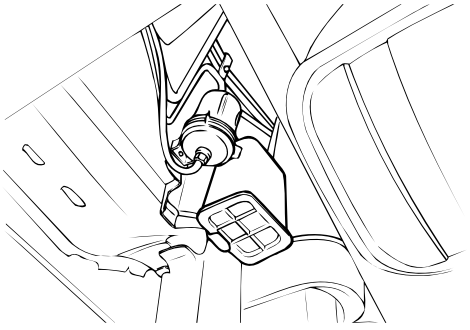
2. Remove the eye bolts while holding the fuel filter nuts securely.

   CAUTION

   Cover the fuel filter with a shop towel to avoid residual gasoline from splashing.

3. Remove the fuel filter mounting bolts, then remove the fuel filter from the fuel filter clamp.

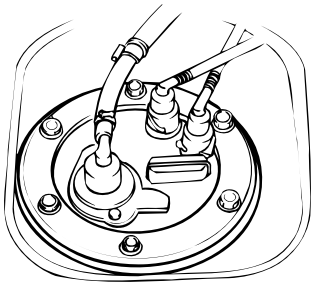
4. After replacing the fuel filter, check for fuel leaks.



T7FL003A

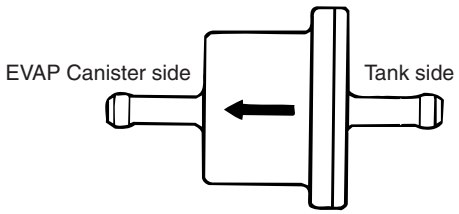
OVERFILL LIMITER (TWO-WAY VALVE) REPLACEMENT EFTC0250

1. Disconnect the vapor hoses, and then remove the overfill limiter.



T7FL020A

2. Connect the overfill limiter in the correct direction.

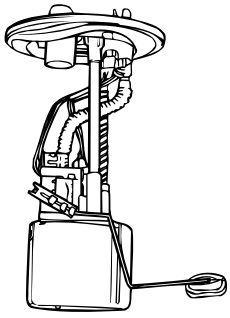


EFDA025B

FUEL SENDER REPLACEMENT EFTC0270

1. Remove the fuel tank cap to lower the fuel tank's internal pressure.

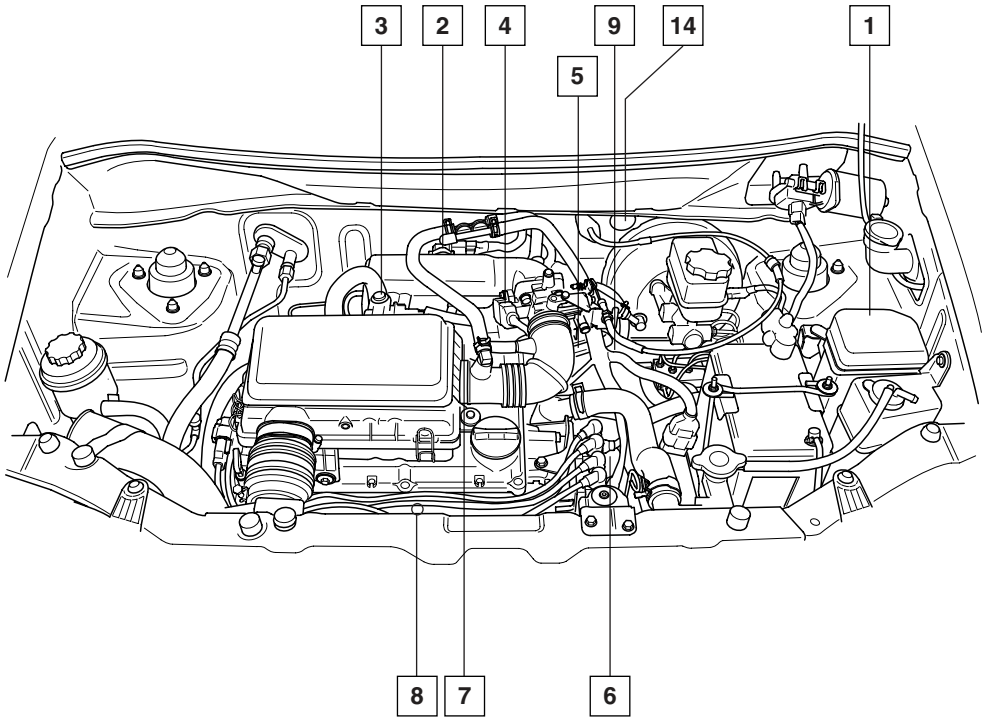
2. Remove the fuel sender installation screws, then remove the fuel sender from the fuel tank.



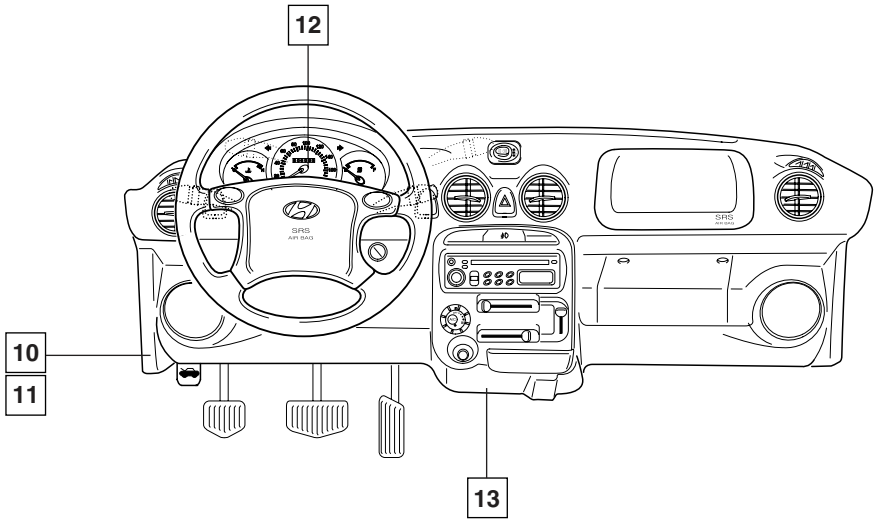
T7FL004A

MFI CONTROL SYSTEM

LOCATION OF MFI COMPONENTS IFTD7010



IFTD005A

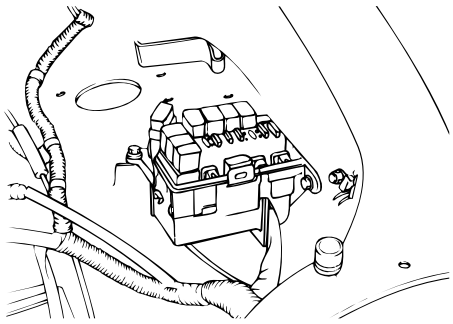


TFTD005B

1	Air conditioning relay	8	Oxygen sensor
2	MAP & IAT sensor	9	Transaxle range(TR) switch
3	Idle speed control actuator (ISC Actuator)	10	MFI control relay
4	TPS	11	Data link connector
5	ECT sensor	12	Vehicle speed sensor
6	CMP sensor	13	ECM
7	Injector	14	Purge control solenoid valve (PCSV)

EFTD701A

1



T7FL010B

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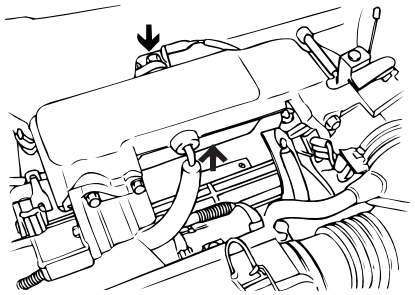
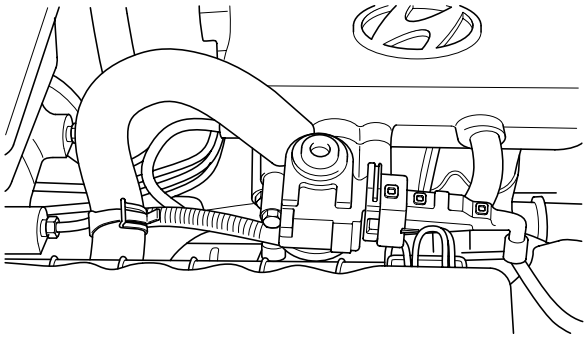


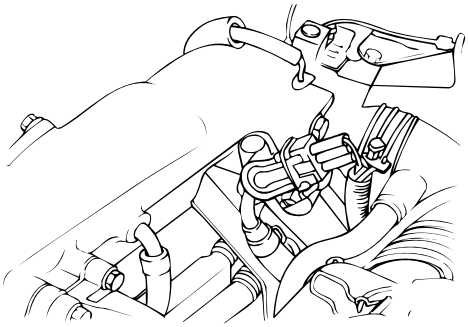
T8EC009A

3



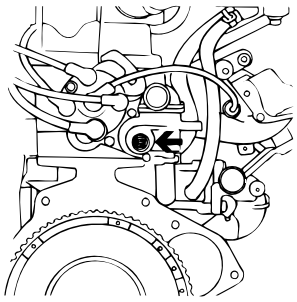
IFTC723G

4



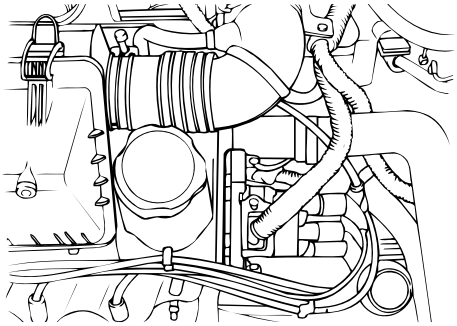
T7FL010D

5



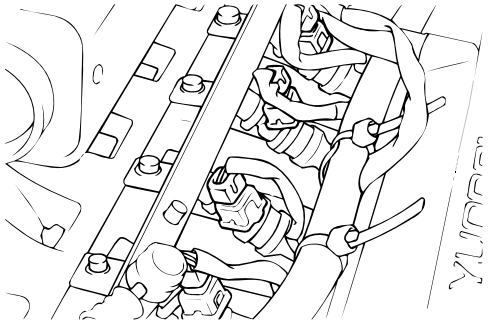
T8EC010A

6



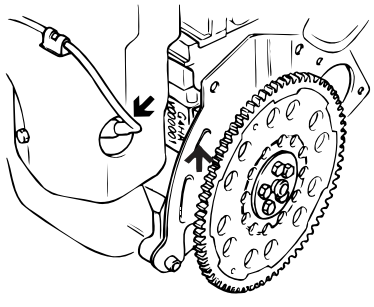
T7FL010E

7



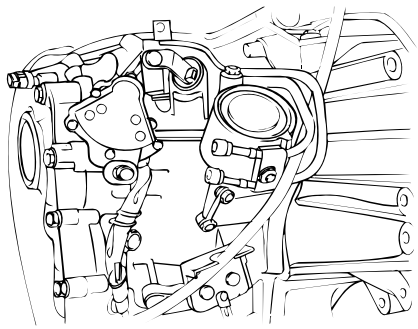
T7FL010F

8



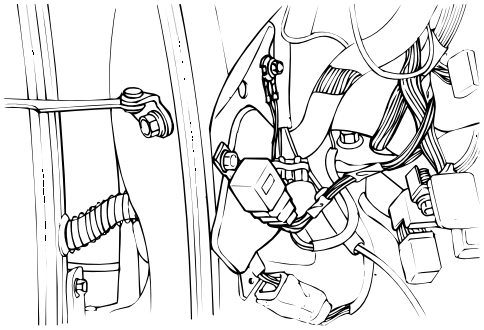
T8EC007A

9



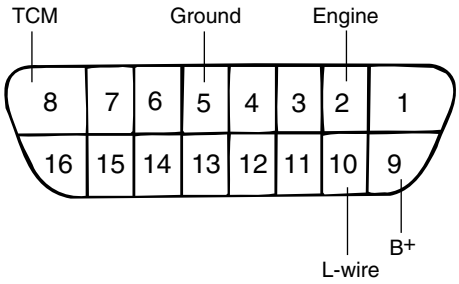
T7FL010G

10



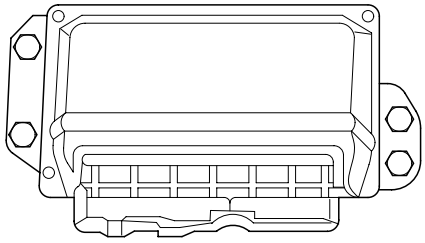
T7FL010H

11



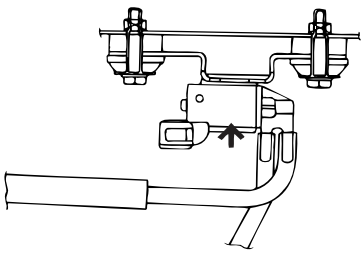
IFTC701C

13



EFDA301H

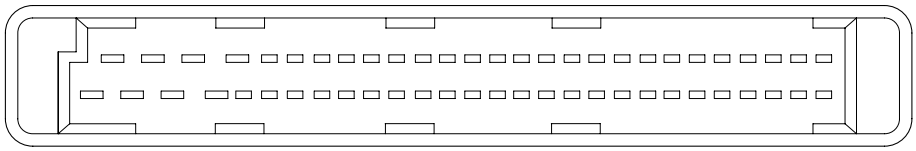
14



T8EC003A

[HEI ECU]

ECM CONNECTER PIN ARRANGEMENT



ECM PIN NUMBER CONFIGURATION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55

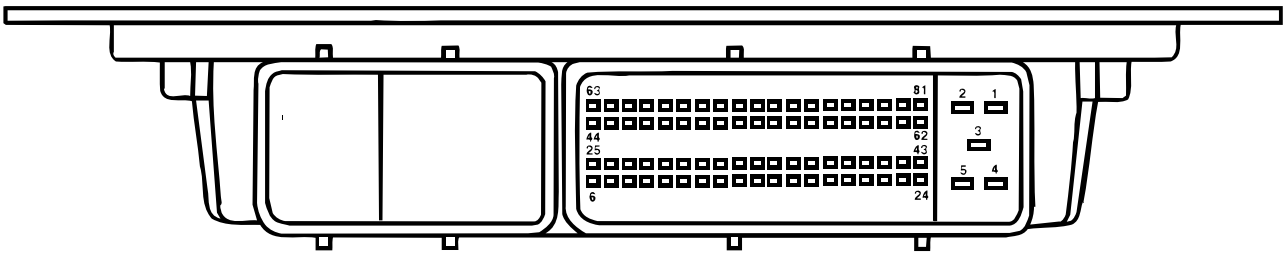
ECM HARNESS PIN NUMBER CONFIGURATION

27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28

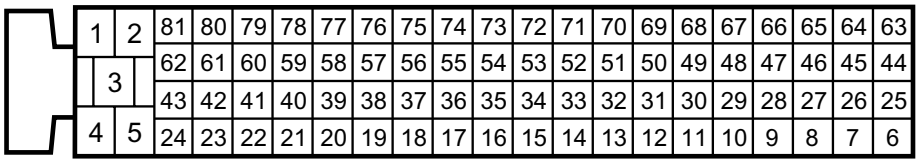
IFTC301Q

[BOSCH ECU]

ECM PIN NUMBER CONFIGURATION



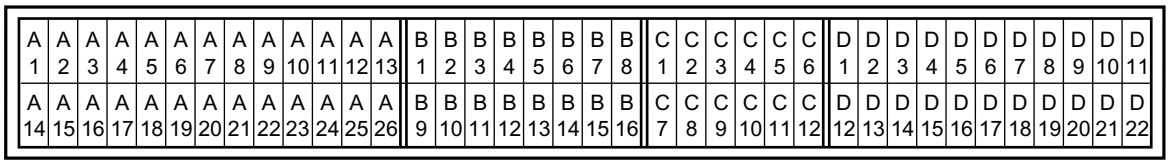
ECM HARNESS PIN NUMBER CONFIGURATION



EFDA301Q

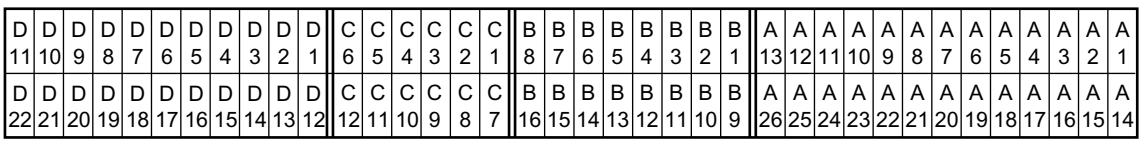
[HEI ECU]

ECM PIN NUMBER CONFIGURATION



C01-1 **C01-2** **C01-3** **C04-4**

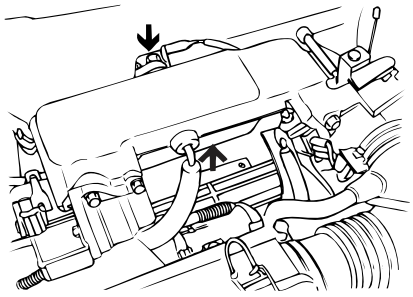
ECM HARNESS PIN NUMBER CONFIGURATION



C01-4 **C01-3** **C01-2** **C04-1**

EFTC301Q

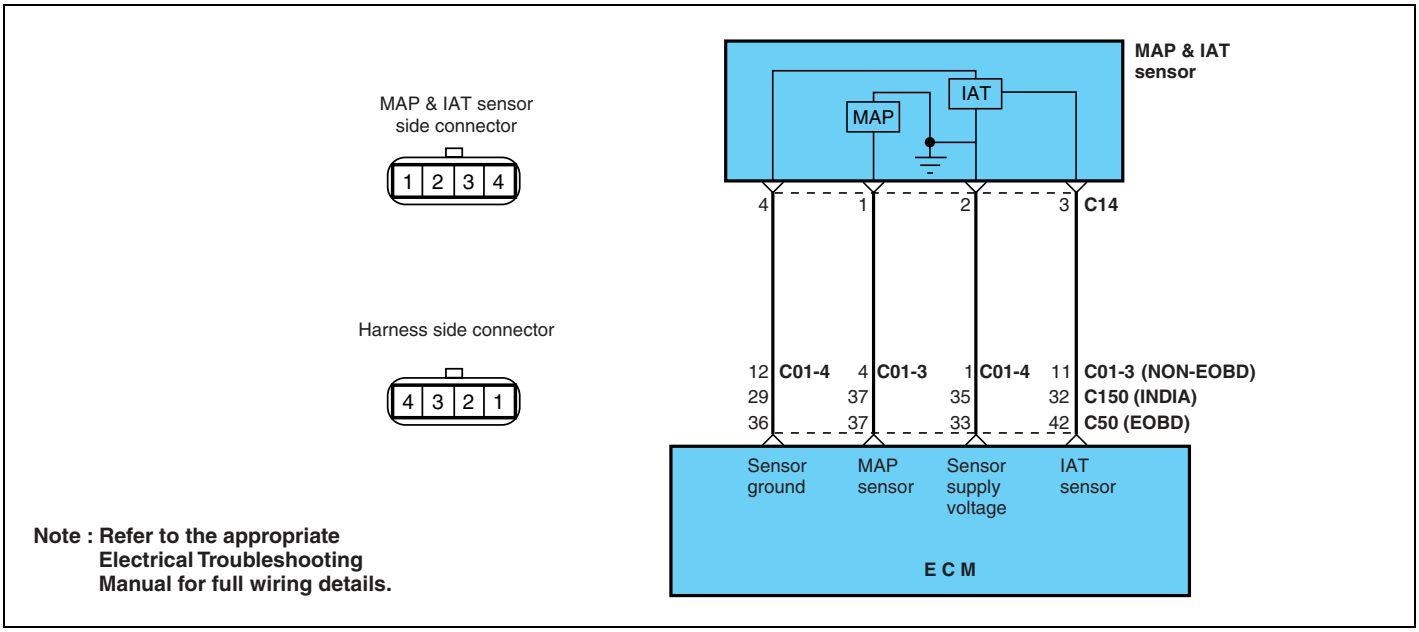
MANIFOLD ABSOLUTE PRESSURE SENSOR (MAP SENSOR) IFTD7070



T8EC009A

The manifold absolute pressure (MAP) sensor is a pressure sensitive variable resistor. It measures changes in the intake manifold pressure which result from engine load and speed changes, and converts this to a voltage output. The MAP sensor is also used to measure barometric pressure at start up, and under certain conditions, allows the ECM to automatically adjust for different altitudes. The ECM supplies 5 volts to the MAP sensor and monitors the voltage on a signal line. The sensor provides a path to ground through its variable resistor. The MAP sensor input affects fuel delivery and ignition timing controls in the ECM.

CIRCUIT DIAGRAM



IFTD707A

TROUBLESHOOTING HINTS

The MIL (Malfunction Indicator Lamp) is ON or the DTC (Diagnostic Trouble Code) is displayed on the HI-SCAN under the following conditions;

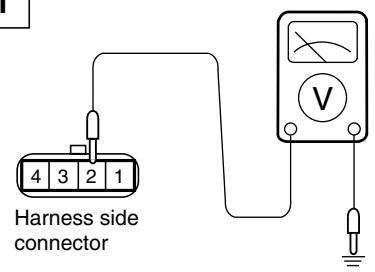
1. When the manifold pressure is 118mb or lower for 0.1 second after turning the ignition key ON.
2. When the manifold pressure is 118mb or lower while the RPM is below 1980rpm.
3. When the manifold pressure is 986mb or higher and the rpm is 2400rpm or more while the accelerator pedal is released (such as when a vehicle is moving down on a sloping road).

USING HI-SCAN

Check item	Data display	Check conditions	Engine state	Test specification
MAP sensor	Intake manifold pressure	• Engine coolant temperature: 80 to 95° (176 to 205°F) • Lamps, electric cooling fan, accessory units: ALL OFF • Transaxle: Neutral (P range for vehicle with A/T) • Steering wheel: Neutral	IG. KEY "ON"	850 - 1024 mb
			Idle	260 - 400 mb

HARNESS INSPECTION PROCEDURES

1



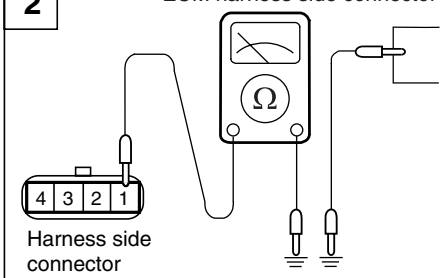
Measure the power supply voltage.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage (V) : 4.8 - 5.2V

OK ⇨ **2**

NG ⇨ Repair the harness.

EFTC707B

2



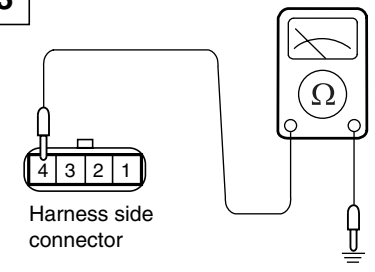
Check for an open-circuit, or a short-circuit to ground between the engine control module and the MAP sensor.
- o MAP sensor circuit : Disconnected
- o Engine control module connector : Disconnected

OK ⇨ **3**

NG ⇨ Repair the harness.

EFTC707C

3



Check for continuity of the ground circuit.
- o Connector : Disconnected

OK ⇨ **END!**

NG ⇨ Repair the harness.

EFTC707D

SENSOR INSPECTION

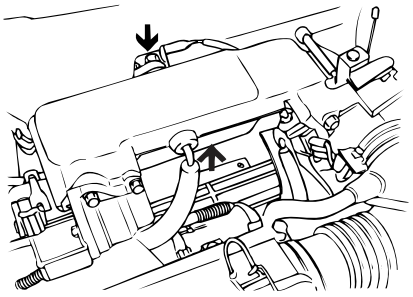
1. Measure the voltage between terminals 1 and 4 of the MAP sensor connectors.
   Terminal 1 : MAP sensor output
   Terminal 4 : MAP sensor ground

Engine state	Test specification
Ignition SW. ON.	4 - 5V
At idle	0.5 - 2.0V

2. If the voltage deviates from the standard value, replace the MAP sensor assembly.

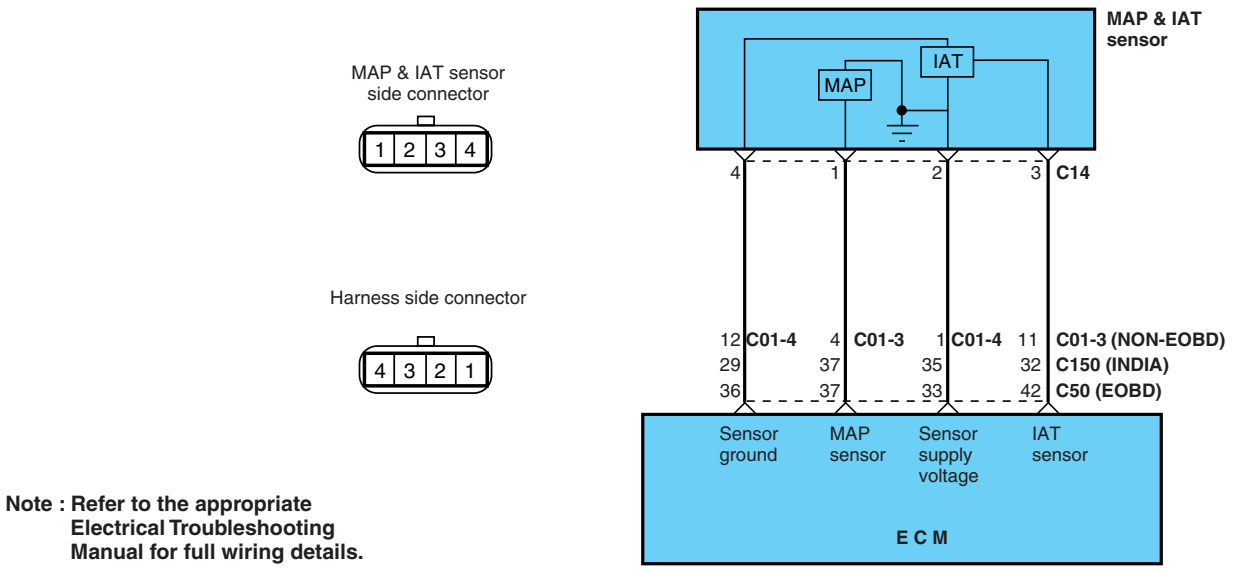
INTAKE AIR TEMPERATURE SENSOR (IAT SENSOR) IFTD7090

The intake air temperature sensor (IAT Sensor), built in to the MAP sensor, is a resistor-based sensor detect the intake air temperature. According to the intake air temperature information from the sensor, the ECM will control the necessary amount of fuel injection.



T8EC009A

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD707A

TROUBLESHOOTING HINTS

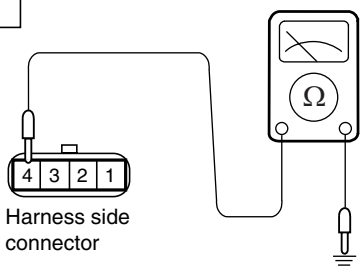
The MIL is ON or the DTC is displayed on the HI-SCAN under the following condition;

- When the intake air temperature is detected below -40°C or higher than 120°C.

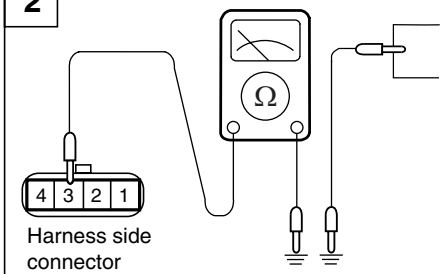
USING HI-SCAN

Check item	Data display	Check conditions	Engine state	Test specification
Intake air temperature sensor	Air temperature	Ignition switch : ON or engine running	When -20°C (-40°F)	-20°C
			When 0°C (32°F)	0°C
			When 20°C (68°F)	20°C
			When 40°C (104°F)	40°C
			When 80°C (176°F)	80°C

HARNESS INSPECTION PROCEDURES

1 	Check for continuity of the ground circuit. o Connector disconnected	**OK** ⇨	2
		NG ⇨	Repair the harness.

IFTC709B

2 ECM harness side connector 	Check for an open-circuit, or a short-circuit to ground between the engine control module and the IAT sensor. o ECM connector : Disconnected o IAT sensor connector : Disconnected	**OK** ⇨	**END!**
		NG ⇨	Repair the harness.

IFTC709C

SENSOR INSPECTION

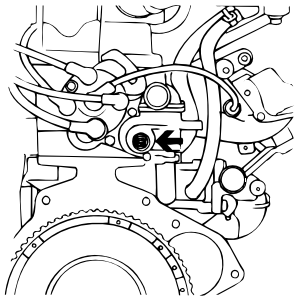
1. Using a multimeter, measure the IAT sensor resistance between terminals 3 and 4.

IG.SW.ON	**Temperature °C (°F)**	**Output voltage (kΩ)**
	0 (32)	4.5 - 7.5Ω
	20 (68)	2.0 - 3.0Ω
	40 (104)	0.7 - 1.6Ω
	80 (176)	0.2 - 0.4Ω

2. If the resistance deviates from the standard value, replace the intake air temperature sensor assembly.

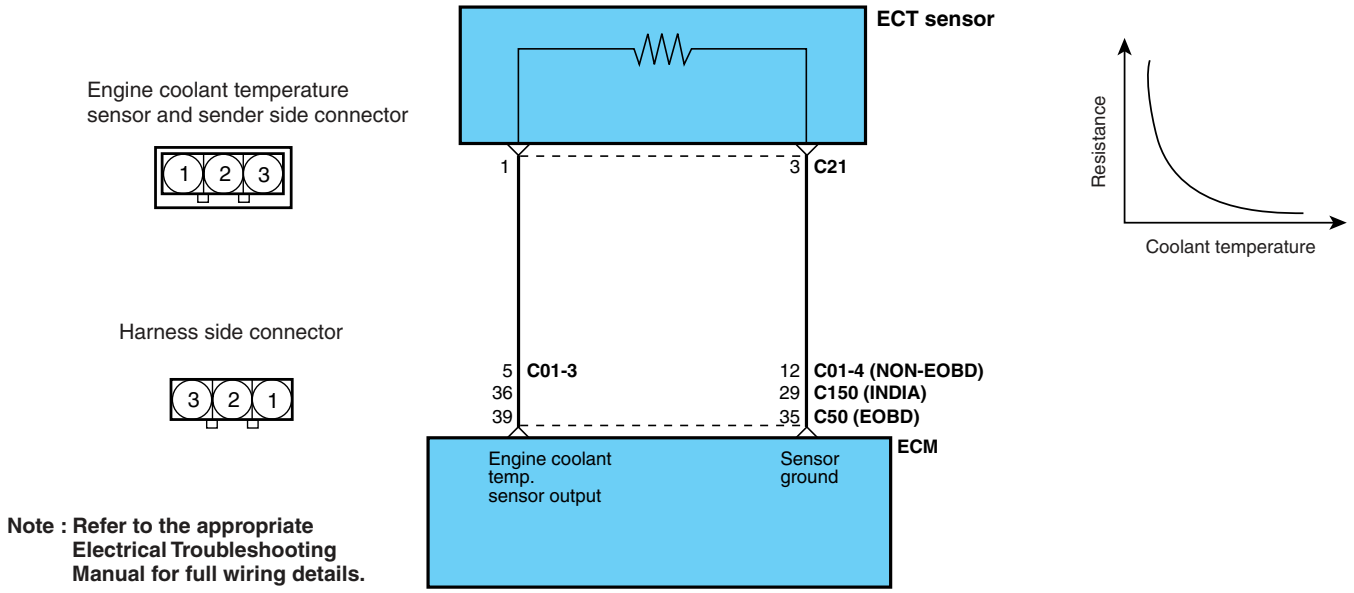
ENGINE COOLANT TEMPERATURE SENSOR (ECT SENSOR) IFTD7110

The engine coolant temperature sensor, located in the engine coolant passage of the cylinder head. It detects the engine coolant temperature and relays signals to the ECM. It employs a thermistor which is sensitive to changes in temperature. The electric resistance of a thermistor decreases in response to temperature rise. The ECM judges engine coolant temperature by the sensor output voltage and provides optimum fuel enrichment when the engine is cold.



T8EC010A

CIRCUIT DIAGRAM



IFTD711A

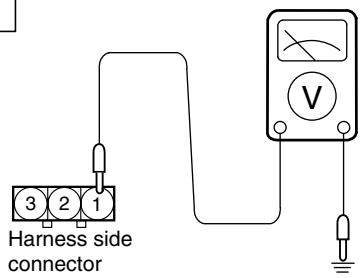
USING HI-SCAN

Check item	Data display	Check conditions	Engine state	Test specification
Engine coolant temperature sensor	Sensor temperature	Ignition switch : ON or engine running	When -20°C (-40°F)	-20°C
			When 0°C (32°F)	0°C
			When 20°C (68°F)	20°C
			When 40°C (104°F)	40°C
			When 80°C (176°F)	80°C

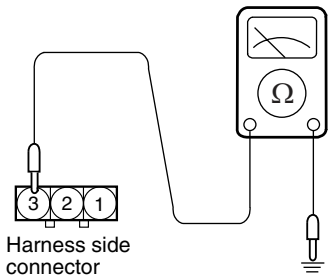
USING VOLTMETER

Check item	Engine state	Test specification
Engine coolant temperature sensor output voltage	When 0°C	4.05V
	When 20°C	3.44V
	When 40°C	2.72V
	When 80°C	1.25V

HARNESS INSPECTION PROCEDURES

1 	Measure the power supply voltage. o Connector : Disconnected o Ignition switch : ON o Voltage : 4.8 - 5.2V	OK ⇒	2
		NG ⇒	Repair the harness.

IFTC711B

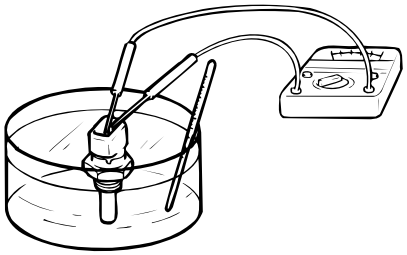
2 	Check for continuity of the ground circuit. o Connector : Disconnected	OK ⇒	END!
		NG ⇒	Repair the harness.

IFTC711C

SENSOR INSPECTION

1. Remove the engine coolant temperature sensor from the intake manifold.
2. With the temperature sensing portion of the engine coolant temperature sensor immersed in hot water, check resistance.

Temperature °C (°F)	Output voltage (kΩ)
-30 (-22)	22.22 - 31.78
-10 (14)	8.16 - 10.74
0 (32)	5.18 - 6.60
20 (68)	2.27 - 2.73
40 (104)	1.059 - 1.281
60 (140)	0.538 - 0.650
80 (176)	0.298 - 0.322
90 (194)	0.219 - 0.243



EFDA711C

3. If the resistance deviates from the standard value greatly, replace the sensor.

INSTALLATION

1. Apply sealant LOCTITE 962T or equivalent to threaded portion.
2. Install engine coolant temperature sensor and tighten it to specified torque.

Tightening torque
Engine coolant temperature sensor :
15-20Nm (150-200 kg·cm, 11-15 lb·ft)

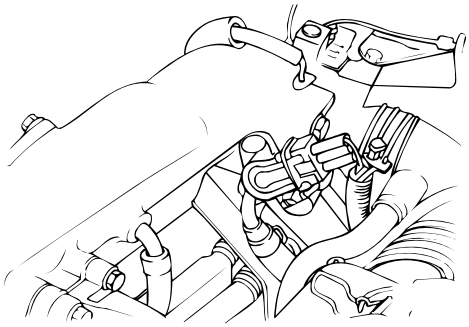
3. Connect the harness connector securely.

TROUBLESHOOTING HINTS

1. If the fast idle speed is not enough or the engine gives off dark smoke during the engine warm-up operation, the engine coolant temperature sensor might be the causes.
2. If the thermostat opening state is abnormal which causes over cooling, the DTC for the engine coolant temperature can be displayed on Hi-SCAN.

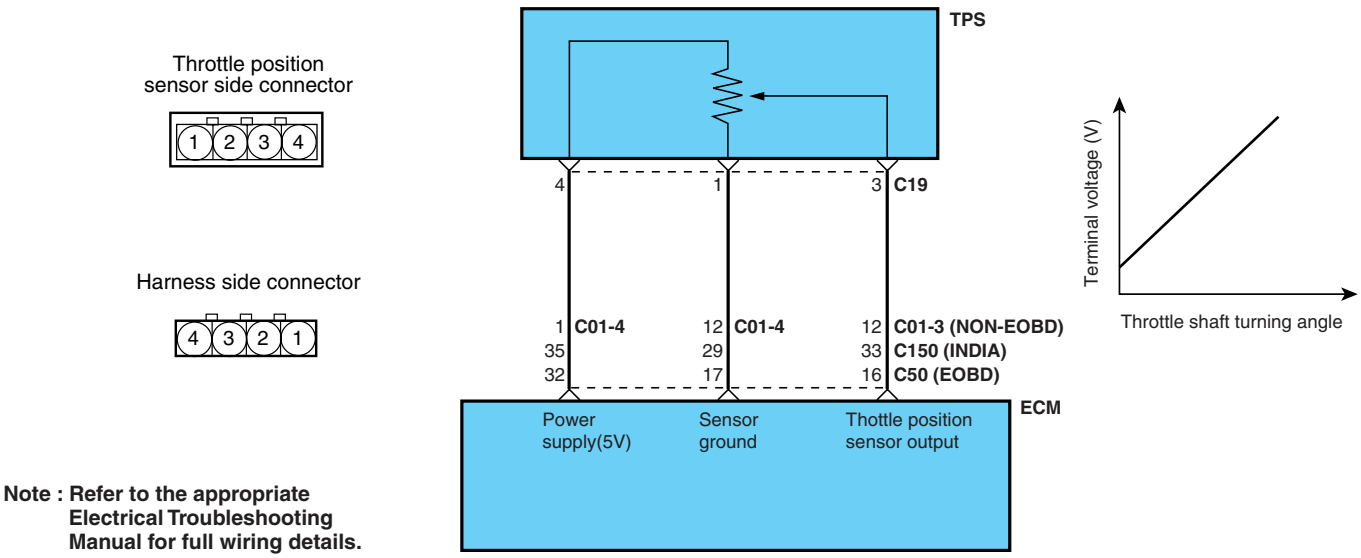
THROTTLE POSITION SENSOR (TPS) IFTD7130

The TP Sensor is a rotating type variable resistor that rotates with the throttle body's throttle shaft to sense the throttle valve angle. As the throttle shaft rotates, the throttle angle of the TP Sensor changes and the ECM detects the throttle valve opening based on the TPS output voltage.



T7FL010D

CIRCUIT DIAGRAM



IFTD713A

TROUBLESHOOTING HINTS

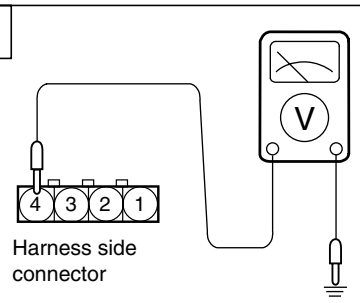
1. The TPS signal is important for the control of an automatic transaxles. Shift shock and other trouble may occur if the sensor is faulty.
2. If the idle condition or acceleration is abnormal, check the TPS connector. (When the TPS connector is not connected properly, the current data on HI-SCAN can show that the idle state remains off, although the accelerater pedal is released. This results in the improper idle or acceleration.)
3. Input voltage from throttle position sensor is below 0.1V or above 4.7V when ignition switch is turned on.

USING VOLTMETER

Check item	Check condition	Test specification
Throttle position sensor output voltage	At idle rpm	0.1 - 0.875V
	Wide open throttle	4.25 - 4.8V

HARNESS INSPECTION PROCEDURES

1



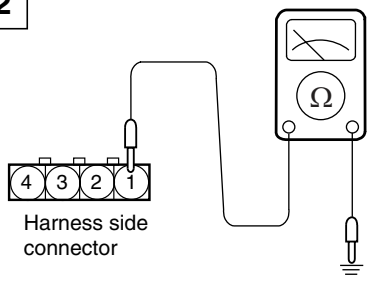
Measure the power supply voltage of the throttle position sensor.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage : 4.8 - 5.2V

OK ⇒ **2**

NG ⇒ Repair the harness.

IFTC713B

2



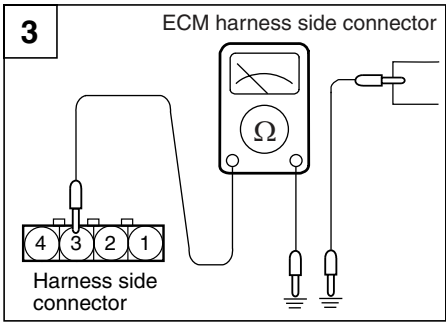
Check for continuity of the ground circuit.
- o Connector : Disconnected

OK ⇒ **3**

NG ⇒ Repair the harness.

IFTC713C

3



Check for an open-circuit, or a short-circuit to ground between the engine control module and the throttle position sensor.
- o Throttle position sensor connector: Disconnected
- o Engine control module connector: Disconnected

OK ⇒ **END!**

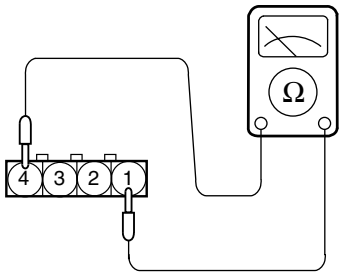
NG ⇒ Repair the harness.

IFTC713D

SENSOR INSPECTION

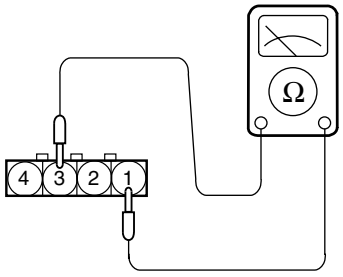
1. Disconnect the throttle position sensor connector.
2. Measure the resistance between terminals 1 (sensor ground) and terminal 4 (sensor power).

Standard value : 0.7 - 3.0 kΩ



IFTC713E

3. Connect an analog ohmmeter between terminals 1 (sensor ground) and terminal 3 (sensor output).



IFTC713F

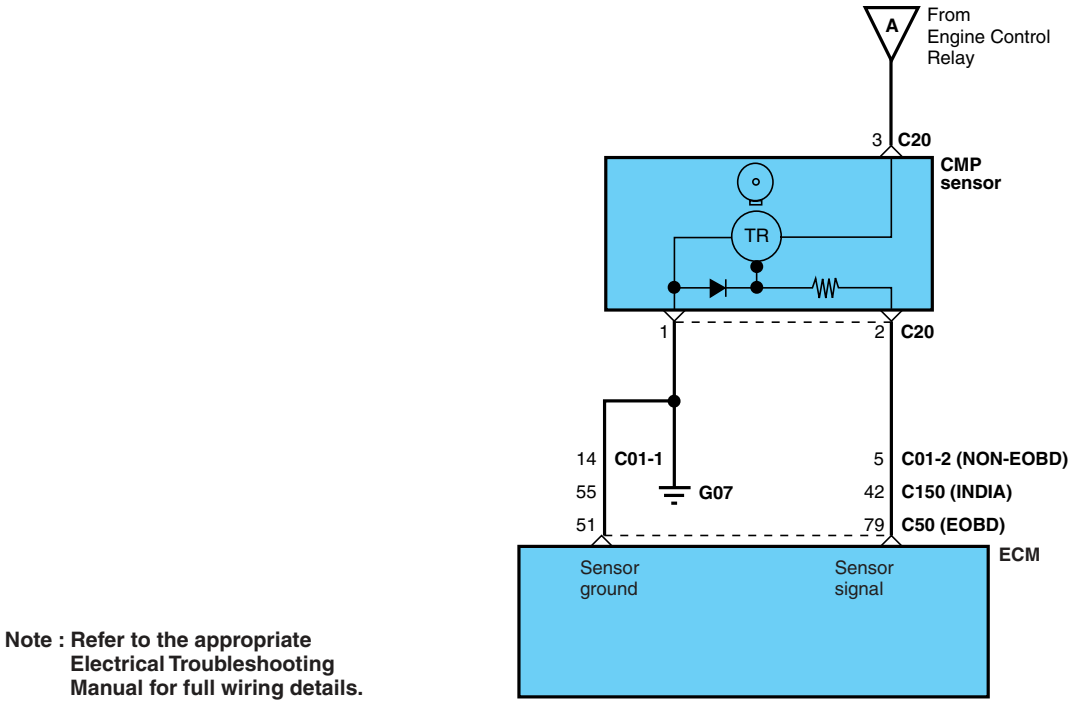
4. Operate the throttle valve slowly from the idle position to the fuel open position, and check that the resistance changes smoothly in proportion with the throttle valve opening angle.
5. If the resistance is out of specification, or fails to change smoothly, replace the throttle position sensor.

Tightening torque
Throttle position sensor :

1.5-2.5Nm (15-25kg·cm, 1.1-1.8 lb·ft)

CAMSHAFT POSITION SENSOR (CMP SENSOR) IFTD7150

The camshaft position sensor (CMP Sensor) senses the TDC point of No.1 cylinder on its compression stroke. Its signal is fed to the ECM to be used to determine the sequence of fuel injection.



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

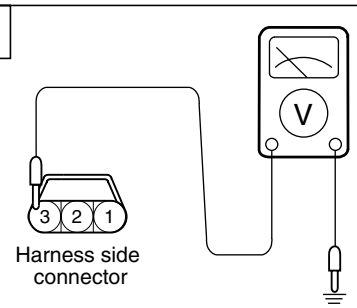
IFTD715A

USING VOLTMETER

Check item	Check condition	Test specification
Camshaft position sensor output voltage	At idle rpm	0 - 5V
	3000 rpm	0 - 5V

HARNESS INSPECTION PROCEDURES

1



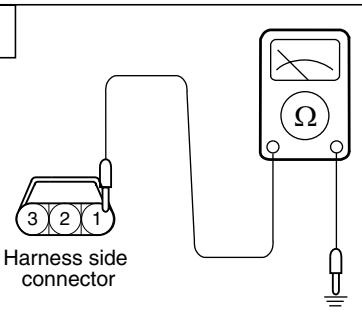
Measure the power supply voltage.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage (V) : Battery voltage

OK ⇒ **2**

NG ⇒ Repair the harness

IFTC715B

2



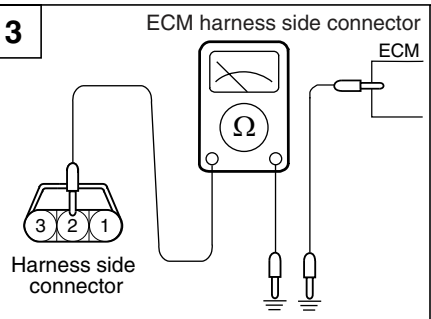
Check for continuity of the ground circuit.
- o Connector : Disconnected

OK ⇒ **3**

NG ⇒ Repair the harness

IFTC715C

3



Check for an open-circuit, or a short-circuit to ground between the engine control module and the camshaft position sensor.
- o Camshaft position sensor connector: Disconnected
- o Engine control module connector: Disconnected

OK ⇒ **END!**

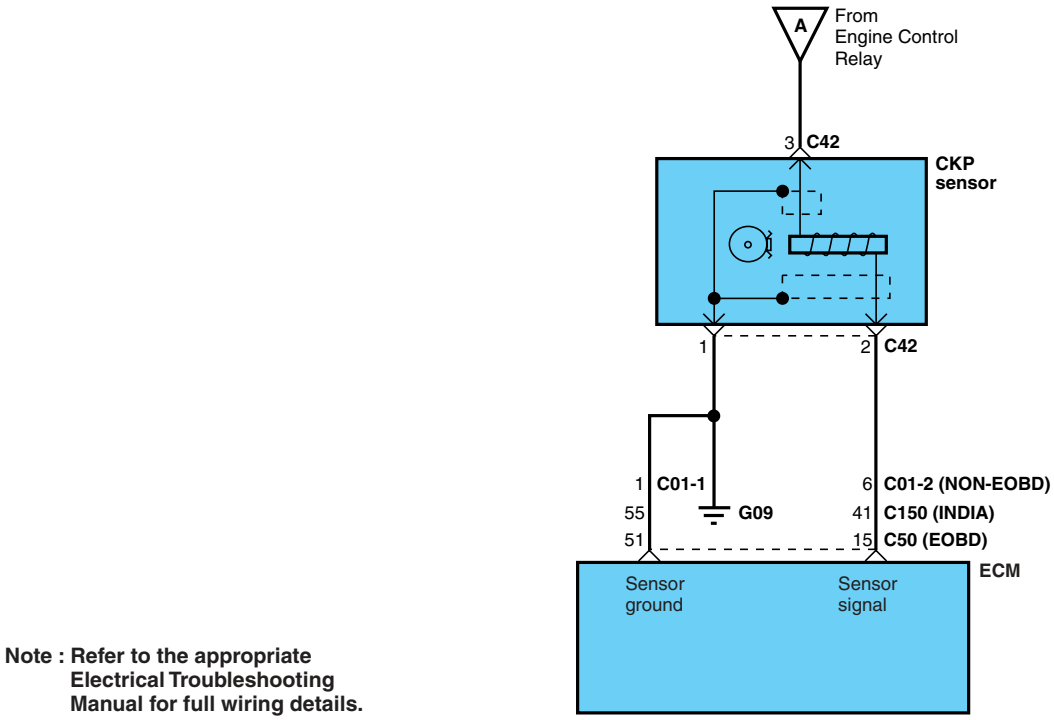
NG ⇒ Repair the harness.

IFTC715D

CRANKSHAFT POSITION SENSOR (CKP SENSOR) IFTD7170

The crankshaft position sensor, consisted of a magnet and coil, is located next to flywheel. The voltage signal from this crankshaft position sensor is relayed to the ECM to indicate engine RPM and the position of the crankshaft.

CIRCUIT DIAGRAM

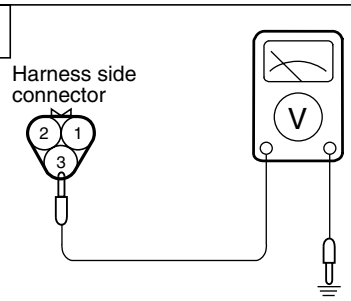


Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD717A

HARNESS INSPECTION PROCEDURE

1



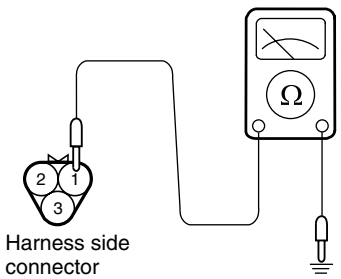
Measure the power supply voltage.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage (V) : Battery voltage

OK ⇨ **2**

NG ⇨ Repair the harness

EFTC717B

2

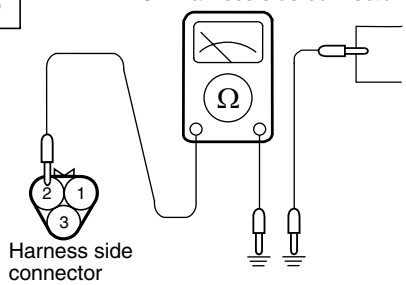


Check for continuity of the ground circuit.
- o Connector : Disconnected

OK ⇨ **3**

NG ⇨ Repair the harness

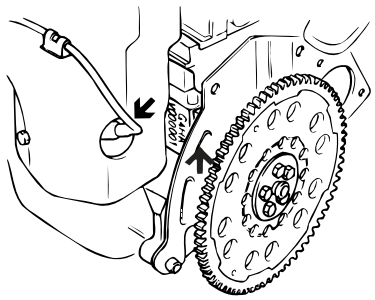
EFTC717C

3		Check for an open-circuit, or a short-circuit to ground between the engine control module and the crankshaft position sensor. o Crankshaft position sensor connector: Disconnected	**OK** ⇨ **END!** **NG** ⇨ Repair the harness.

IFTC717D

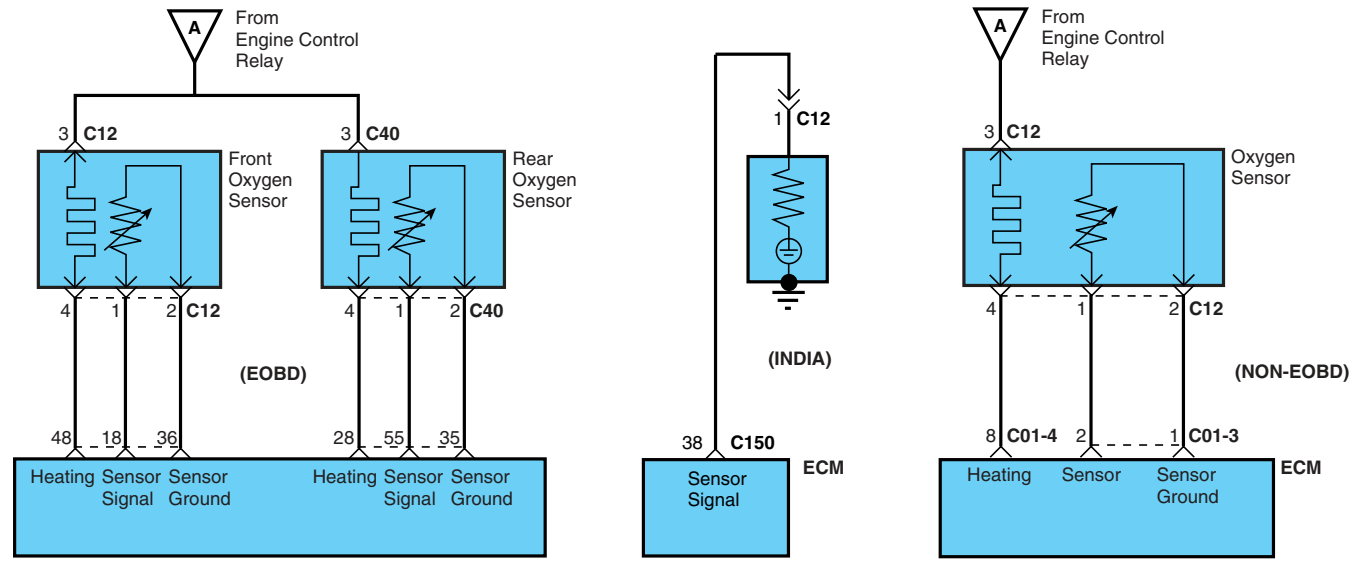
OXYGEN SENSOR IFTD7190

The heated oxygen sensor senses the oxygen concentration in the exhaust gas, then converts it into a voltage and then sends this to the ECM. The oxygen sensor gives an output of about 800mV when the air fuel ratio is richer than the theoretical ratio and output of about 100mV when the ratio is leaner (high oxygen concentration in exhaust gas.) The ECM controls fuel injection based on this signal so that the air fuel ratio is maintained at the theoretical ratio.



T8EC007A

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD719A

TROUBLESHOOTING HINTS

1. If the oxygen sensor is defective, abnormally high emissions may occur.
2. If the oxygen sensor check is normal but the sensor output voltage is out of specification, check for the following items related to the air fuel ratio control system:
   - Faulty injector.
   - Air leaks in the intake manifold.
   - Faulty MAP sensor, purge valve and engine coolant temperature sensor.
   - Wiring connection problem.

USING VOLTMETER/HI-SCAN

Check item	Check condition	Engine condition	Test specification
Oxygen sensor output voltage	Warm-up	When decelerating suddenly from 4,000 rpm	A. 200mV or lower
		When engine is suddenly raced	B. 600-1,000mV

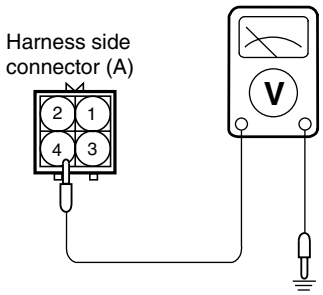
NOTE

If you release the accelerator pedal suddenly after engine running about 4000 rpm, fuel supply will stop for short period and the O_2 sensor service data in the HI-SCAN will display values in the A range.

When you suddenly press on the acclerator pedal down, the O_2sansor service data in the Hi-SCAN will display voltage in the B range.
When you let the engine idle again, the voltage will fluctuate between ranges A and B. In this case, the O_2 sensor can be determined as good.

HARNESS INSPECTION PROCEDURE (EXCEPT INDIA)

1



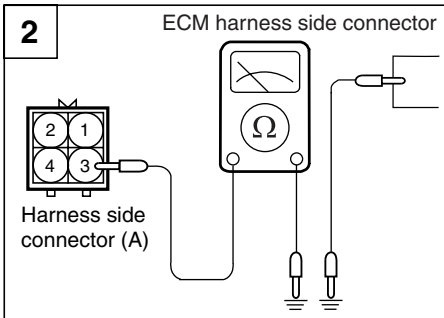
Measure the power supply voltage of the heated oxygen sensor.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage (V) : Battery voltage

OK ⇒ **2**

NG ⇒ Repair the harness.

EFKD208B

2



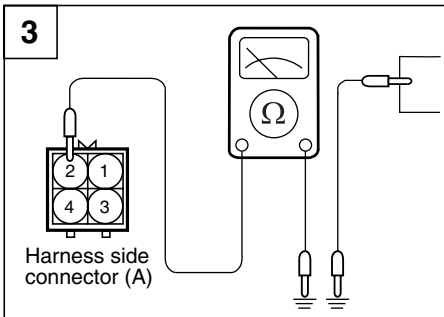
Check for an open-circuit, or a short-circuit to ground between the engine control module and the heated oxygen sensor.
- o Heated oxygen sensor connector: Disconnected
- o ECM connector : Disconnected

OK ⇒ **3**

NG ⇒ Repair the harness.

EFKD208C

3



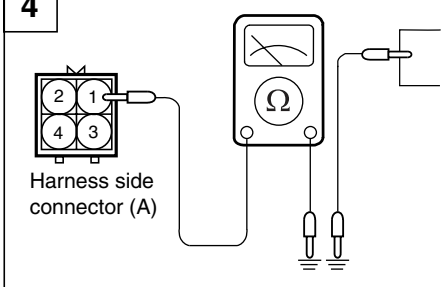
Check for continuity to ground circuit.
- o Connector : Disconnected

OK ⇒ **4**

NG ⇒ Repair the harness.

EFKD208D

4



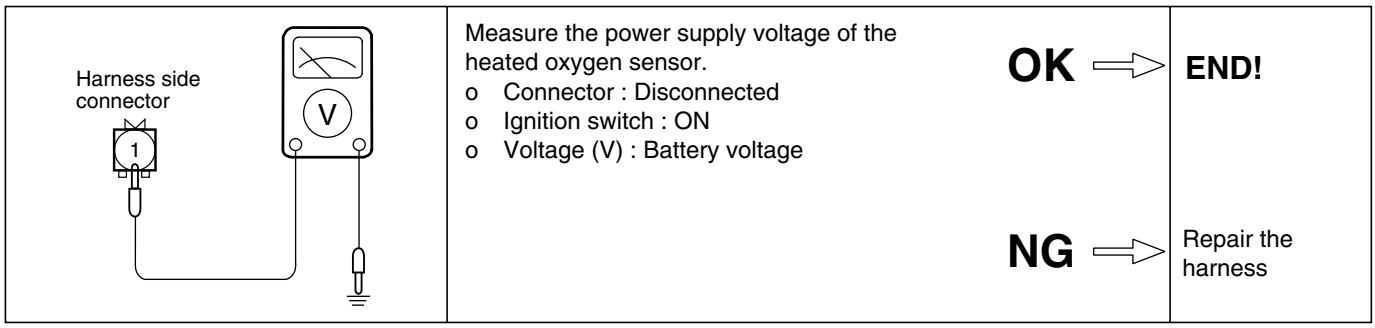
Check for an open circuit, or a short circuit to ground between the ECM and oxygen sensor.
- o Oxygen sensor connector : Disconnected
- o ECM connector : Disconnected

OK ⇒ **END!**

NG ⇒ Repair the harness.

EFKD208E

HARNESS INSPECTION PROCEDURE (INDIA)



IFTC719B

SENSOR INSPECTION

NOTE

1. *Before checking, warm up the engine until the engine coolant temperature reaches 80 to 95°C (176 to 205°F).*
2. *Use an accurate digital voltmeter.*

Replace the oxygen sensor if there is a malfunction.

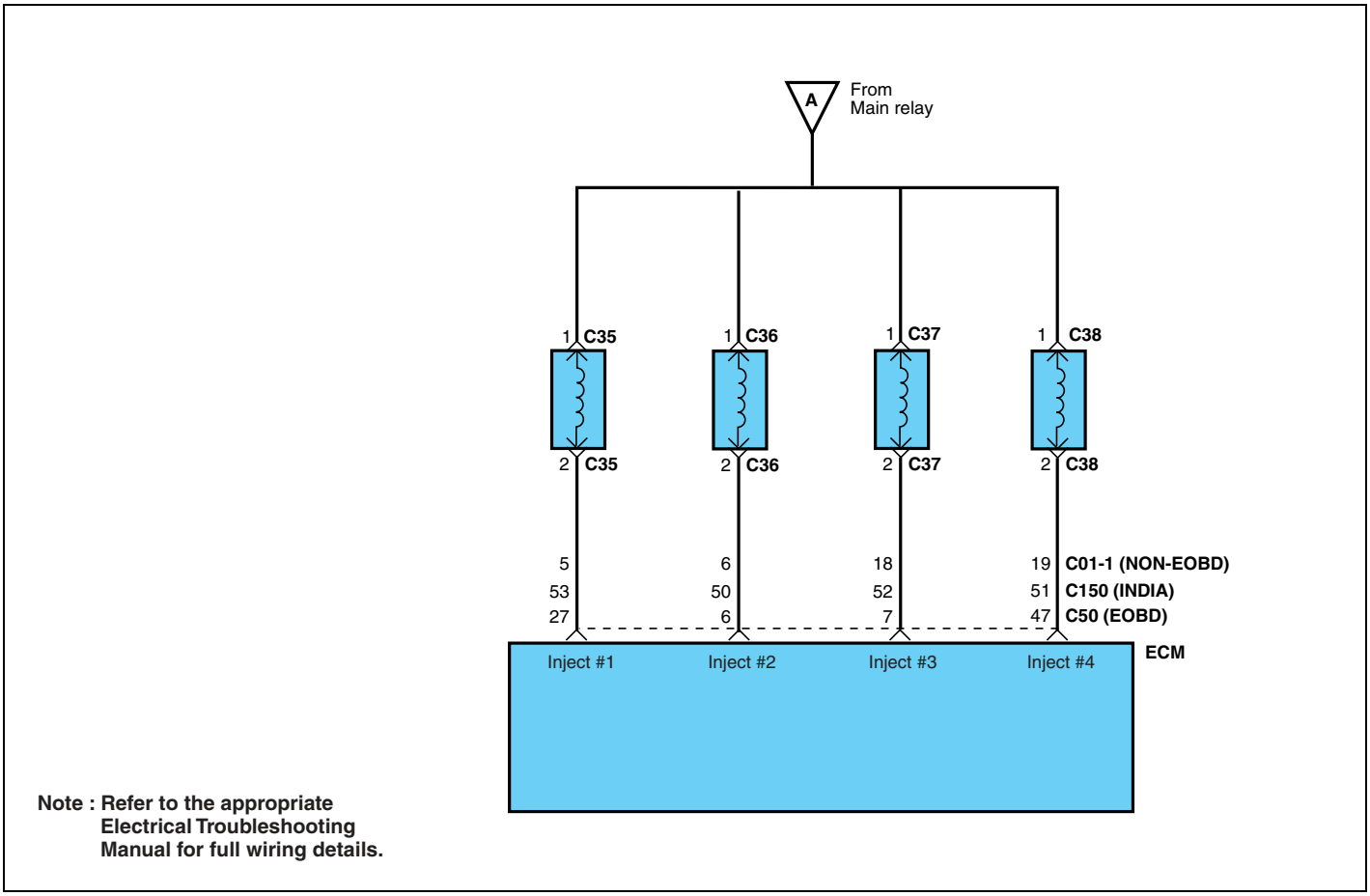
Tightening torque
Heated oxygen sensor :

50-60 Nm (500-600 kg·cm, 37-44 lb·ft)

INJECTORS EFTD7210

The injectors inject fuel according to a signals from the ECM. The volume of fuel injected by the injector is determined by the time for which the solenoid valve is energized.

CIRCUIT DIAGRAM



IFTD721A

TROUBLESHOOTING HINTS

1. If the engine is difficult to start when it is hot, check low for fuel pressure and injector leaks.
2. If the injector does not operate when the engine is cranked, then check the following:
   - Faulty power supply circuit to the ECM or faulty ground circuit.
   - Faulty MFI control relay.
   - Faulty crankshaft position sensor or camshaft position sensor.
3. If engine idle remains unchanged when fuel injection to the cylinders are is cut one after another, check for the following items about such cylinder:
   - Injector and harness.
   - Spark plug and high tension cable.
   - Compression pressure.
4. If the injection system is OK but the injector drive time is out of specification, check for the following items:
   - Poor combustion in the cylinder (faulty spark plug, ignition coil, compression pressure, etc.)
5. The MIL is on or the DTC is displayed on the HI-SCAN under the following condition.
   - When the injector itself is faulty

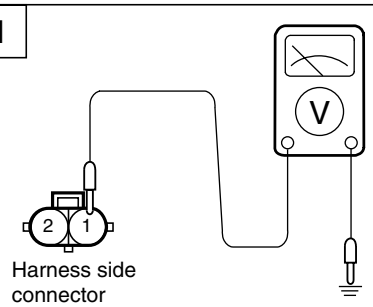
USING HI-SCAN

Check item	Data display	Check conditions	Engine state	Test specification
Injector	Drive time	• Engine coolant temperature: 80 to 95°C (176 to 205°F) • Lamps, electric cooling fan, accessory units: ALL OFF • Transaxle : Neutral (P range for vehicle with A/T) • Steering wheel : Neutral	Idle rpm	1.5 - 4.5 ms
			2000 rpm	
			3000 rpm	
			Racing	Increasing

Check item	Check condition	HI-SCAN display	Type
Injector • Actuator test	IG. S/W ON (Do not start)	01. No.1 Injector	Activate
		02. No.2 Injector	Activate
		03. No.3 Injector	Activate
		04. No.4 Injector	Activate

HARNESS INSPECTION PROCEDURES

1



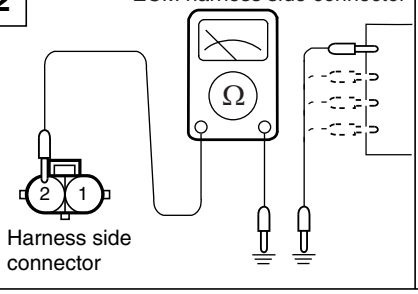
Measure the power supply voltage of the injector.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage (V) : Battery voltage

OK ⇒ **2**

NG ⇒ Repair the harness.

EFTC721B

2



Check for an open-circuit, or a short-circuit to ground between the engine control module and the injector.
- o ECM connector : Disconnected
- o Injector connector : Disconnected

OK ⇒ **END!**

NG ⇒ Repair the harness.

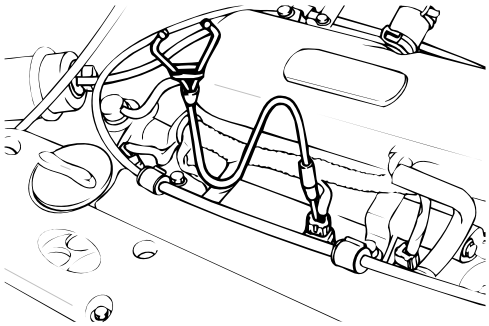
IFTC721C

INJECTOR INSPECTION

OPERATION CHECK

Using a HI-SCAN:

- Activate the fuel injectors in sequence.
- Check the operating time of the injectors.



EFDA721C

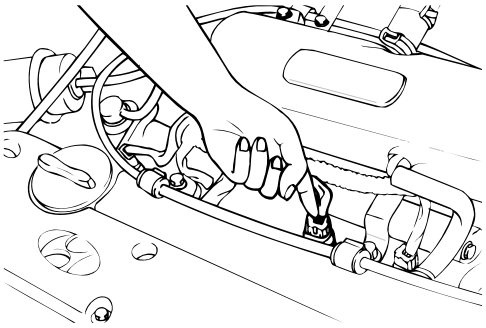
OPERATION SOUND CHECK

1. Using a stethoscope, check the injectors for a clicking sound at idle. Check that the sound is produced at shorter intervals as the engine speed increases.

   NOTE

   Ensure that the sound from an adjacent injector is not being transmitted along the delivery pipe to an inoperative injector.

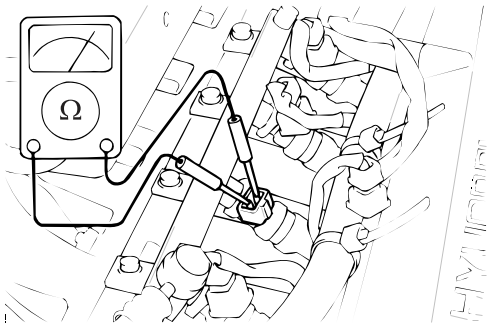
2. If a stethoscope is not available, check the injector operation with your finger.
   If no vibrations are felt, check the wiring connector, injector, or injection signal from ECM.



EFDA721D

Resistance Measurement Between Terminals

1. Disconnect the connector at the injector and measure the resistance between the two terminals.



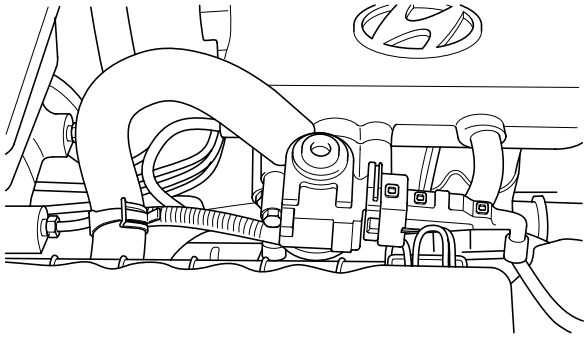
EFDA721E

Standard value : 15.9 ± 0.35 Ω [at 20°C (68°F)]

2. Re-connect the connector to the injector.

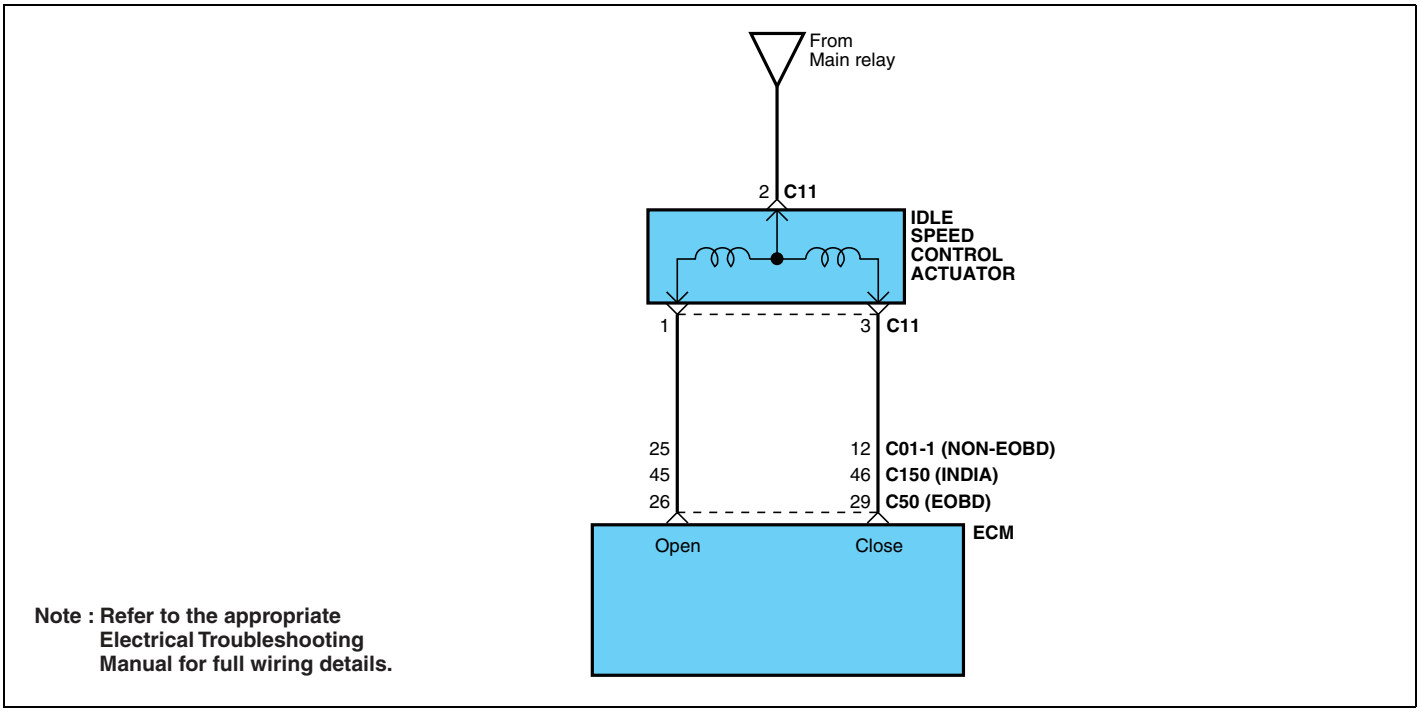
IDLE SPEED CONTROL ACTUATOR (ISC ACTUATOR) IFTD7230

The idle speed actuator is a double coil type driven by separate driver stages in the ECM. Depending on the pulse duty factor, the equilibrium of the magnetic forces of the two coils will result in different angles of the motor. A by-pass hose line is positioned, in parallel to the throttle valve where the idle speed actuator is inserted.



IFTC723G

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD723A

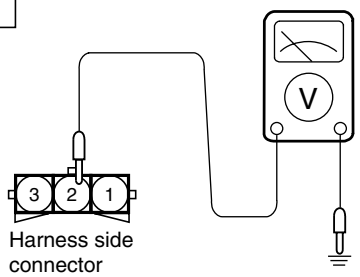
TROUBLESHOOTING HINTS

Open or short circuit is observed in idle air control system when ignition switch is turned on.

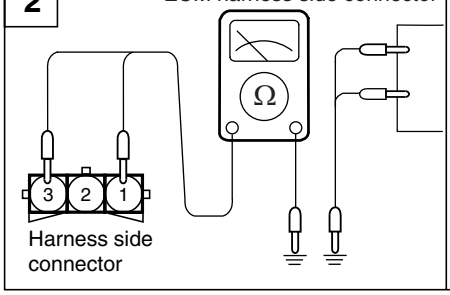
USING HI-SCAN

Check item	Check condition	Engine condition	Test specification
Idle speed control actuator • Actuator test	IGN S/W ON (Do not start)	ISCV	Activate

HARNESS INSPECTION PROCEDURE

1 	Measure the power supply voltage of the injector. o Connector : Disconnected o Ignition switch : ON o Voltage (V) : Battery voltage	**OK** ⇨	2
		NG ⇨	Repair the harness.

EFTC723B

2 ECM harness side connector 	Check for an open-circuit, or a short-circuit to ground between the ECM and the idle speed control actuator. o ECM connector : Disconnected o Idle speed actuator connector: Disconnected	**OK** ⇨	**END!**
		NG ⇨	Repair the harness.

IFTC723C

ACTUATOR INSPECTION

RESISTANCE MEASUREMENT BETWEEN TERMINALS

1. Disconnect the connector at the idle speed control actuator.
2. Measure the resistance between terminals.

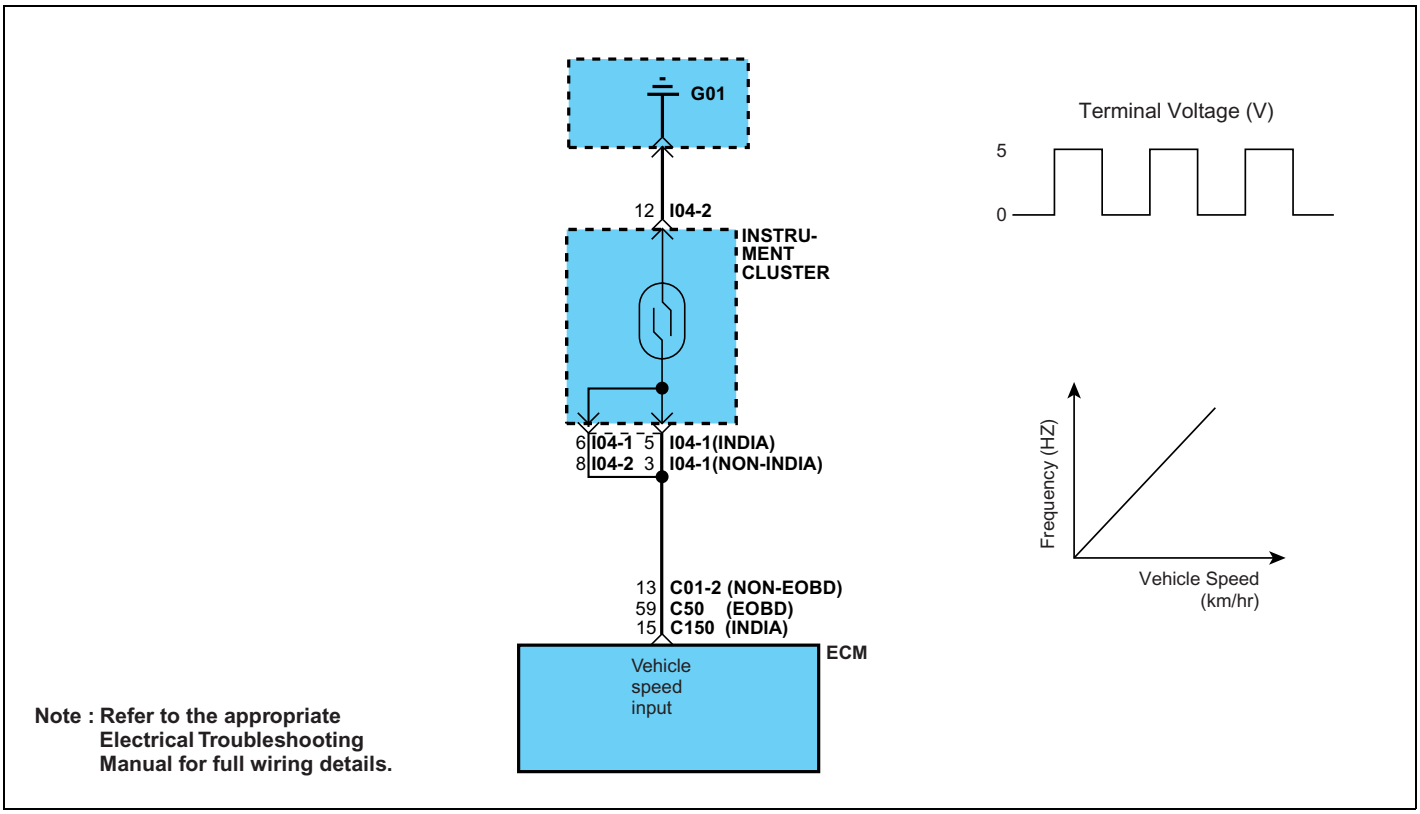
Standard value
Terminal 1 and 2 : 12 - 18Ω
Terminal 2 and 3 : 12 - 16Ω [at 20°C (68°F)]

3. Connect the connector to the idle speed control actuator.

VEHICLE SPEED SENSOR IFTD7250

The vehicle speed sensor is a reed switch that is built into the speedometer. The sensor converts the transaxle gear revolutions into a pulse signal which is sent to the ECM.

CIRCUIT DIAGRAM

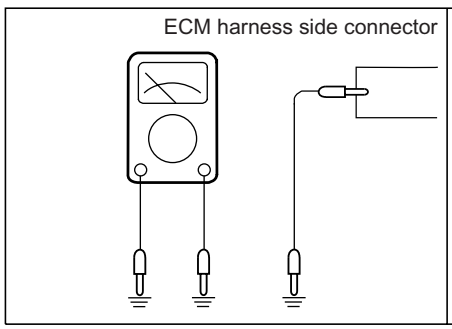


IFTD725A

TROUBLESHOOTING HINTS

If there is an open or short circuit in the vehicle speed sensor signal circuit, the engine may stall when the vehicle decelerates to a stop.

HARNESS INSPECTION PROCEDURES



Check the vehicle speed sensor output circuit for continuity
- o Engine control module connector: Disconnected
- o Move the vehicle or turn the speedometer cable

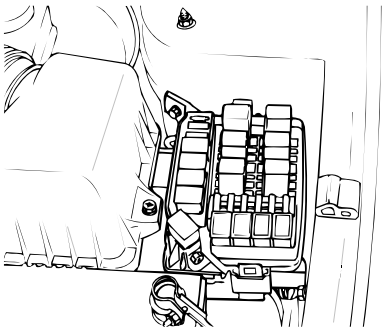
OK ⇨ **END!**

NG ⇨ Repair the harness.

IFTC725B

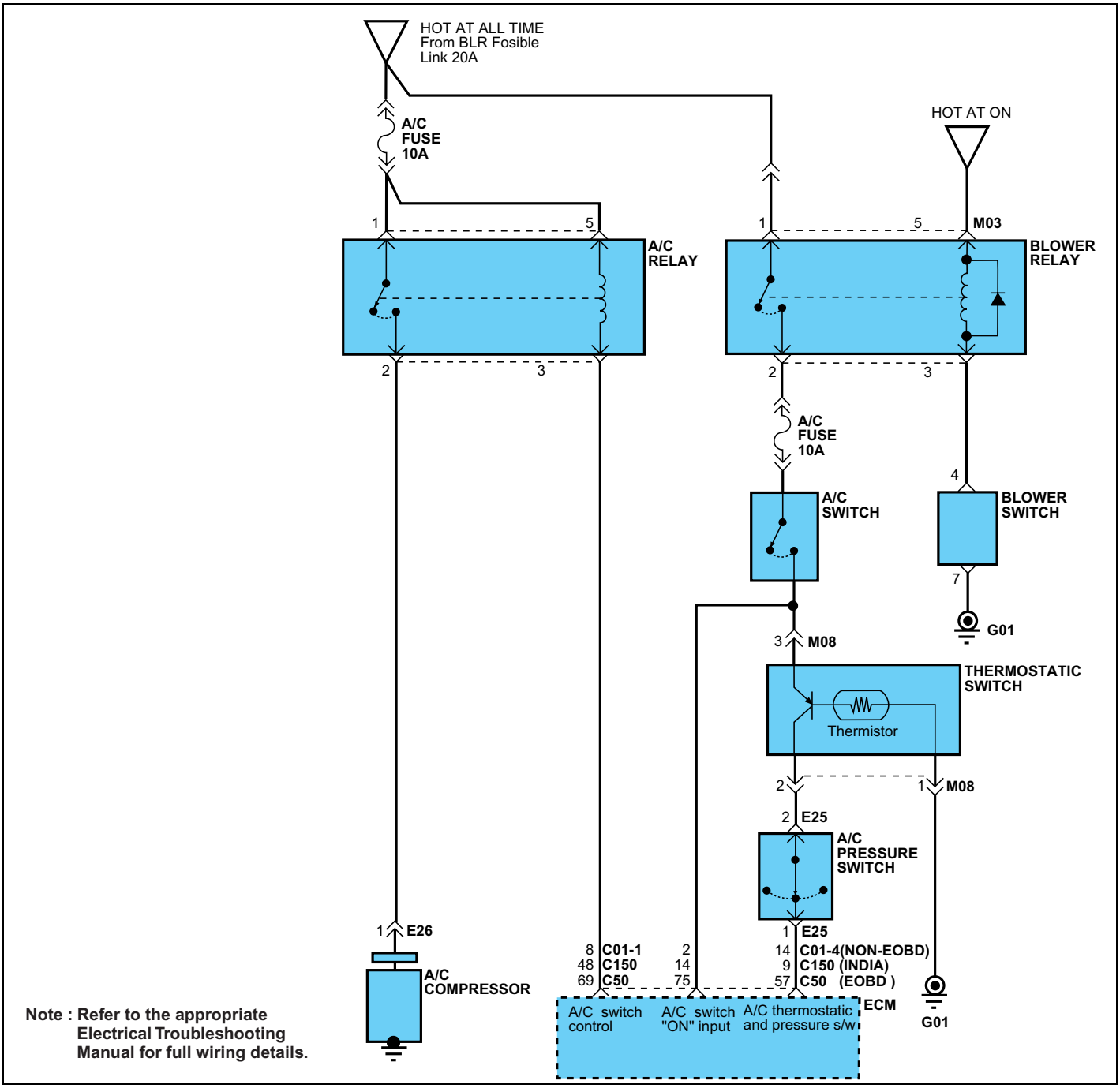
AIR CONDITIONING SWITCH AND RELAY IFTD7350

The air conditioning switch applied battery voltage to the ECM when the air conditioning switch is turned on.
When the air conditioning ON signal is input, the ECM drives the ISC Actuator and turns ON the ignition power transistor. Then, the air conditioning power relay coil is energized to turn on the relay switch, which activates the compressor magnetic clutch.



EFDA735A

CIRCUIT DIAGRAM



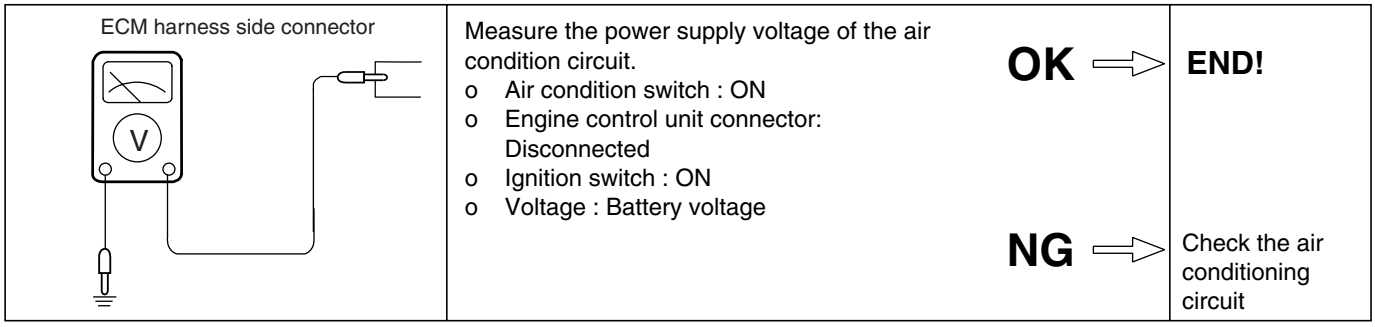
Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD735A

USING HI-SCAN

Check item	Data Display	Check condition	Air conditioning switch	Normal indicator
Air conditioning switch	Switch state (ON/OFF)	Engine: Idling (air compressor is running when air conditioning switch is ON)	OFF	OFF
			ON	ON
Air conditioning compressor	Air conditioning compressor	Engine: Idling after warm-up	OFF	OFF (compressor clutch non-activation)
			ON	ON

HARNESS INSPECTION PROCEDURE



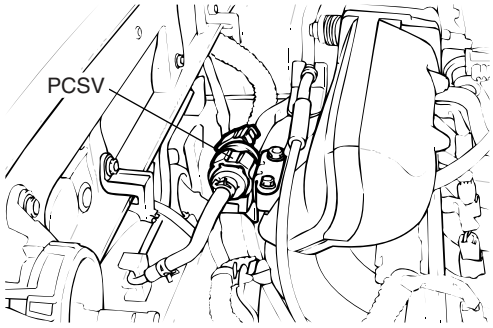
IFTC735B

AIR CONDITIONING INSPECTION

Refer to GROUP-HA service adjustment procedures.

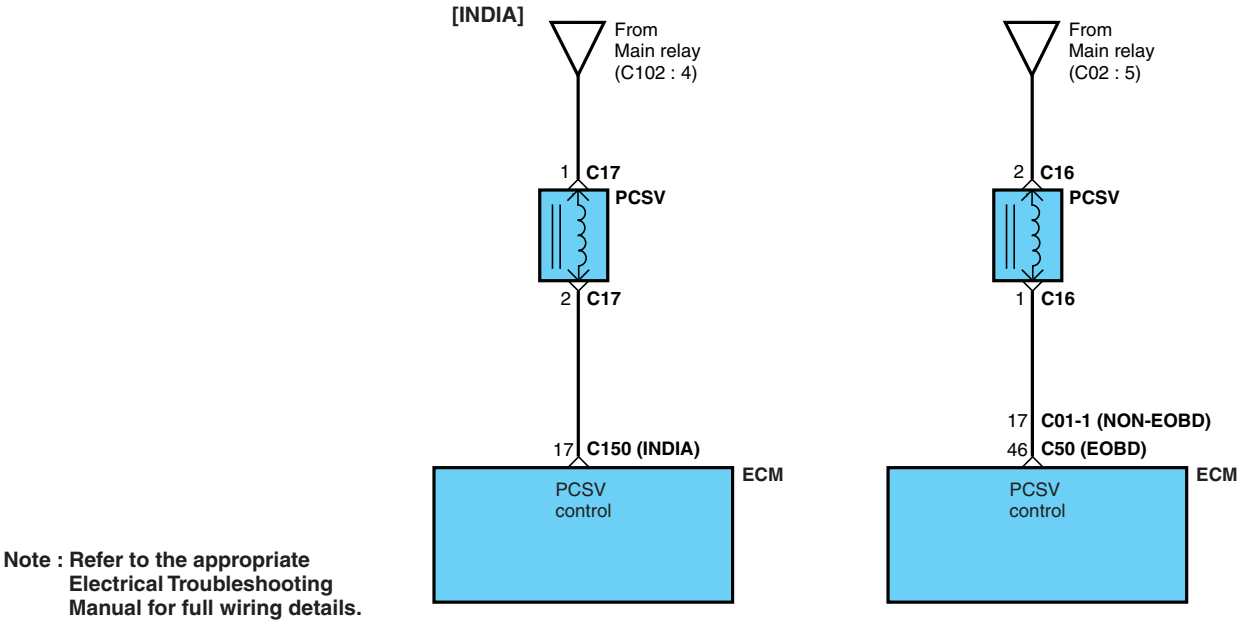
EVAPORATIVE EMISSION CANISTER PURGE SOLENOID VALVE IFTD7370

The evaporative emission canister purge solenoid valve is a duty control type, which controls the flow of purge air from the evaporative emission canister.



EEDA204A

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

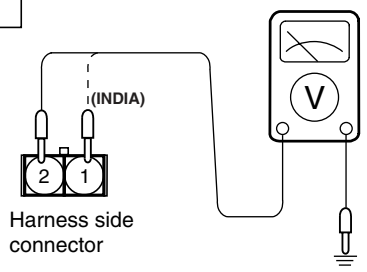
IFTD737A

USING HI-SCAN

Check item	Check condition	HI-SCAN display	Type
Evaporative emission canister purge solenoid valve • Actuator test	Start the engine	PURGE VALVE	Activate

HARNESS INSPECTION PROCEDURE

1



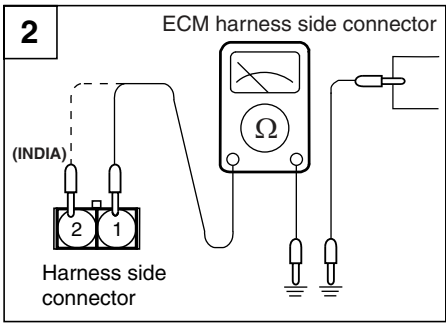
Measure the power supply voltage.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage : Battery voltage

OK ⇒ **2**

NG ⇒ Repair the harness.

IFTC737B

2



Check for an open-circuit, or a short-circuit to ground between the evaporative emission canister purge solenoid valve and the engine control module.
- o Engine control module connector : Disconnected
- o Evaporative emission canister purge solenoid valve connector : Disconnected

OK ⇒ **END!**

NG ⇒ Repair the harness.

IFTC737C

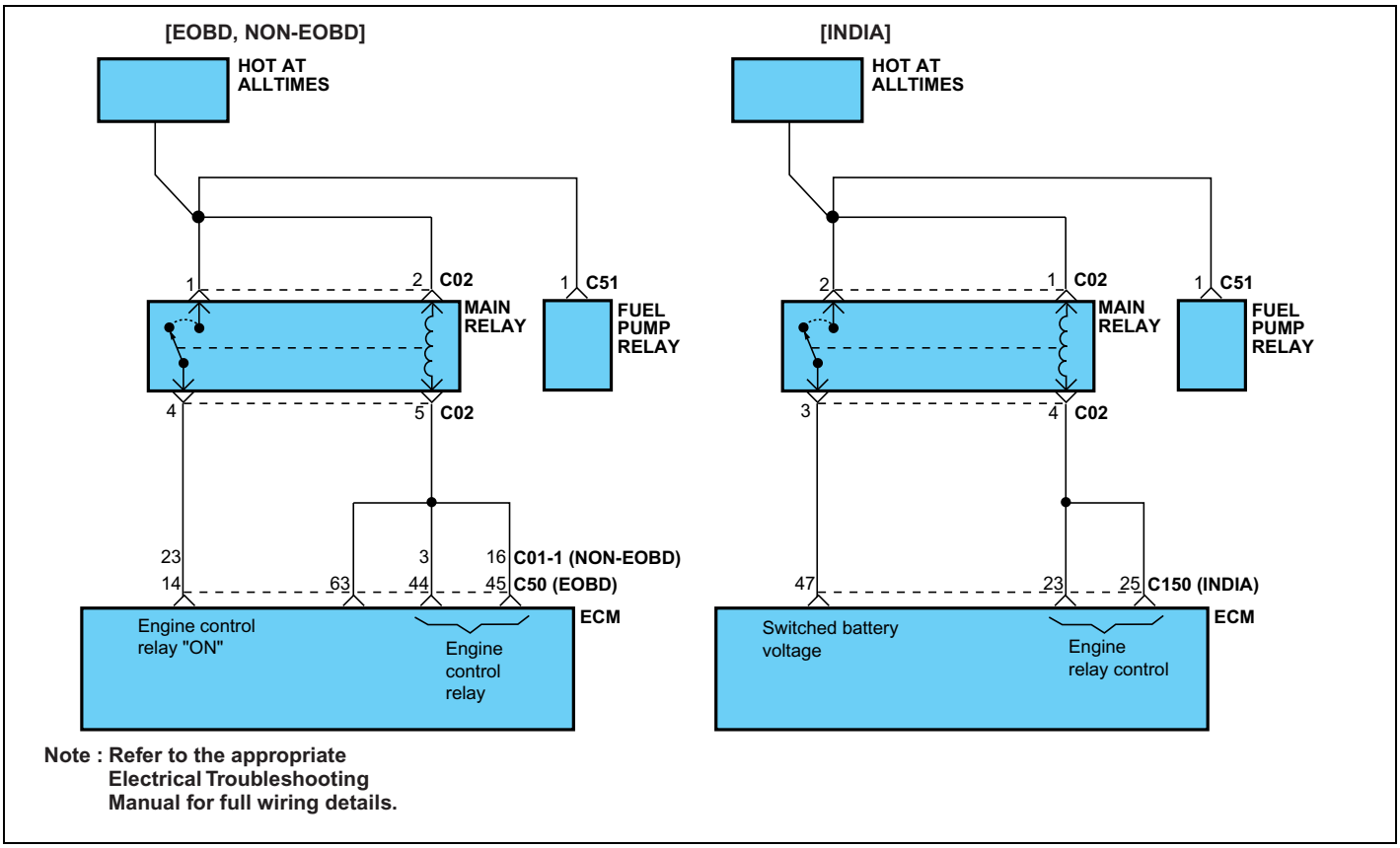
ACTUATOR INSPECTION

Refer to GROUP EC-Evaporative Emission System.

MFI CONTROL RELAY IFTD7390

When the ignition switch is on, battery power is supplied to the ECM, the injectors, the MAP sensor, etc. While the ignition switch is turned on, current flows from the ignition switch through the current relay coil to ground.

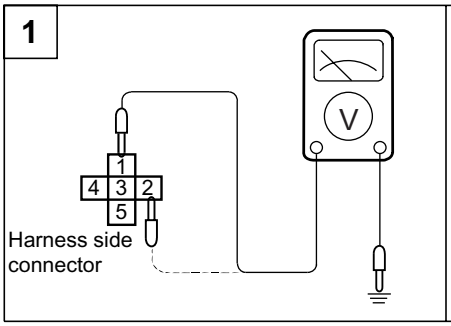
CIRCUIT DIAGRAM



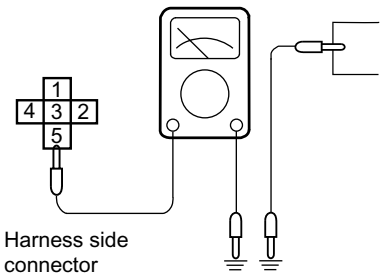
Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD739A

HARNESS INSPECTION PROCEDURES

1 	Measure the power supply voltage of the MFI control relay. o MFI control relay connector : Disconnected o Voltage (V) : Battery voltage	**OK** ⇨	**2**
		NG ⇨	Repair the harness.

IFTC739B

2		Check for open-circuit or short-circuit to ground between the engine control module and the MFI contro relay. o ECM connector : Disconnected o MFI control relay : Disconnected	**OK** ⇨ **END!** **NG** ⇨ Repair the harness.

IFTC739C

MFI CONTROL RELAY INSPECTION

1. Check continuity of relay contacts between terminals 1 (+) and 4 (-).

Relay coil (between terminal 1 & 4)	Continuity
When de-energized	No
When energized	Yes

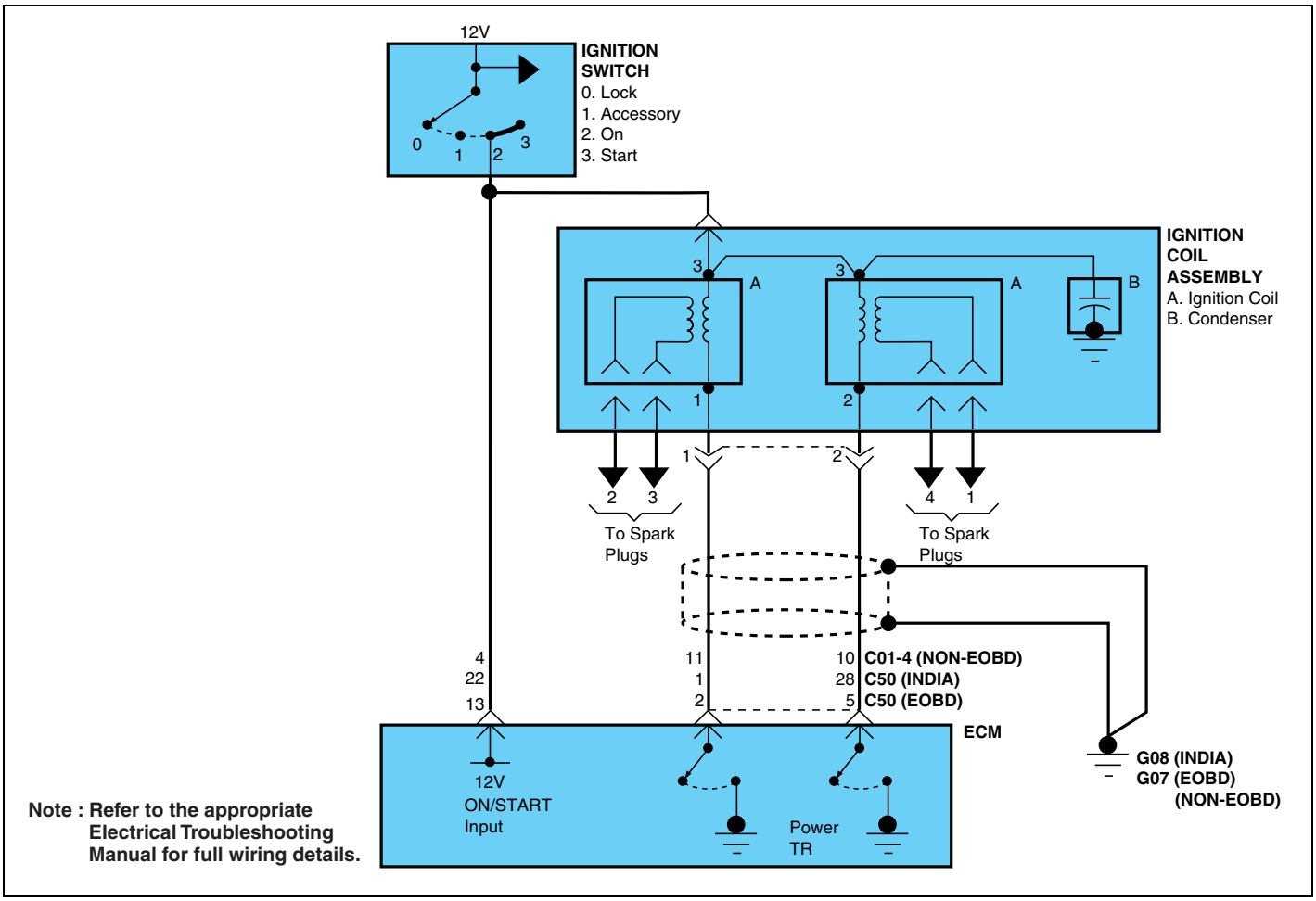
2. If faulty, replace the MFI control relay.

Tightening torque
MFI control relay :
7-11 Nm (70-110 kg·cm, 5.2-8.1 lb·ft)

IGNITION COIL IFTD7410

When the ignition power transistor is turned ON by a signal from the ECM, the ECM sends a signal to the ignition coil, then the primary current is shut off and a high voltage is induced in the secondary coil.

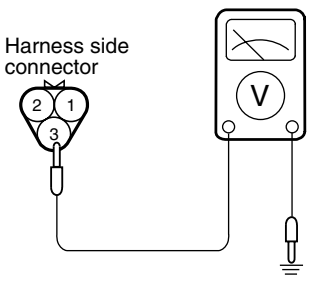
CIRCUIT DIAGRAM



IFTD741A

HARNESS INSPECTION PROCEDURE

1



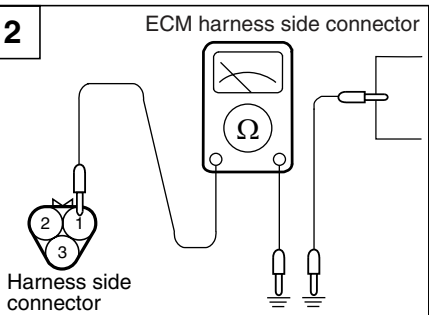
Measure the power supply voltage of the ignition coil.
- o Connector : Disconnected
- o Ignition switch : ON
- o Voltage(V) : Battery voltage

OK ⇨ **2**

NG ⇨ Repair the harness

IFTC741B

2



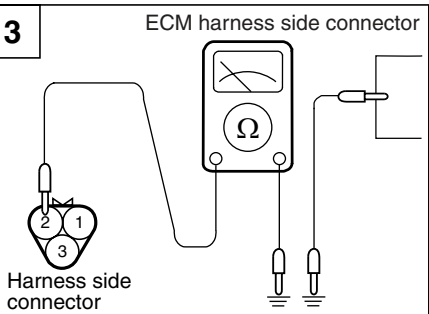
Check for an open-circuit, or a short-circuit to ground between the ignition coil and the engine control module.
- o Engine control module connector : Disconnected
- o Power transistor connector : Disconnected

OK ⇨ **3**

NG ⇨ Repair the harness.

IFTC741C

3



Check for an open-circuit, or a short-circuit to ground between the ignition coil and the engine control module.
- o Engine control module connector : Disconnected
- o Power transistor connector : Disconnected

OK ⇨ **END!**

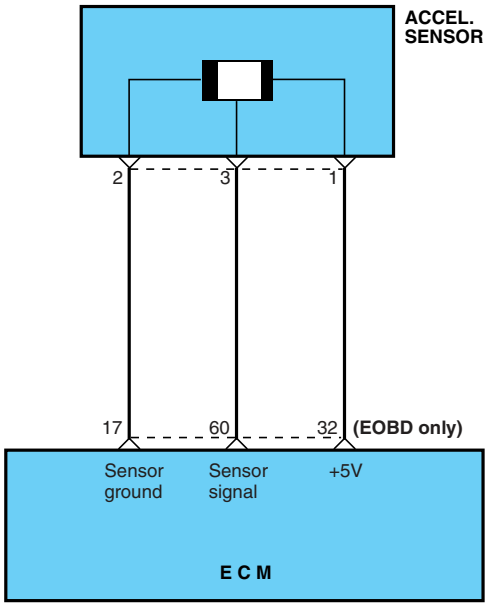
NG ⇨ Repair the harness.

IFTD741D

ACCELERATION SENSOR IFTD7450

The acceleration sensor is used to sense rough road conditions. The sensor's signal is used by the Engine Control Module (ECM) to prevent wrongful misfire detection.

CIRCUIT DIAGRAM



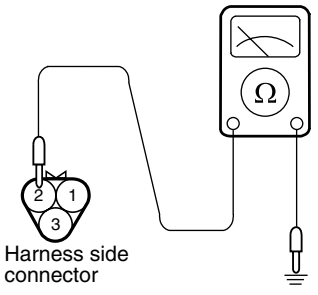
Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD745A

USING VOLTMETER

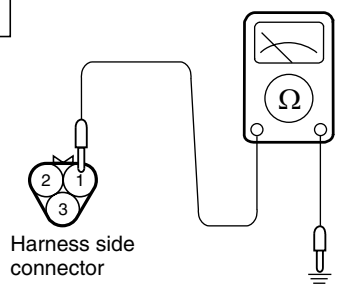
Check item	Check condition	Test specification
Acceleration sensor output voltage.	While idling	2.3 - 2.7V
	While driving	0.5 - 4.5V

HARNESS INSPECTION PROCEDURE

1 	Check for continuity of the ground circuit. o Connector : Disconnected	OK ⇨	2
		NG ⇨	Repair the harness

EFTC745B

2



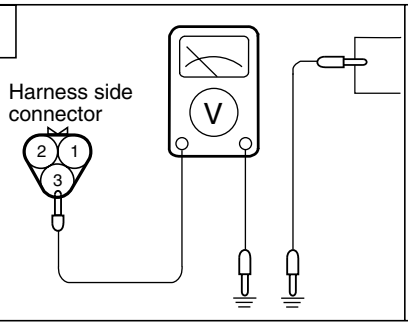
Measure the power supply voltage
- o Acceleration sensor connector : Disconnected
- o Voltage : 5V

OK ⇨ **3**

NG ⇨ Repair the harness

EFTC745C

3



Check for an open-circuit, or a short-circuit to ground between the engine module and the acceleration sensor.
- o Acceleration sensor connector : Disconnected
- o Engine control module connector : Disconnected

OK ⇨ **END!**

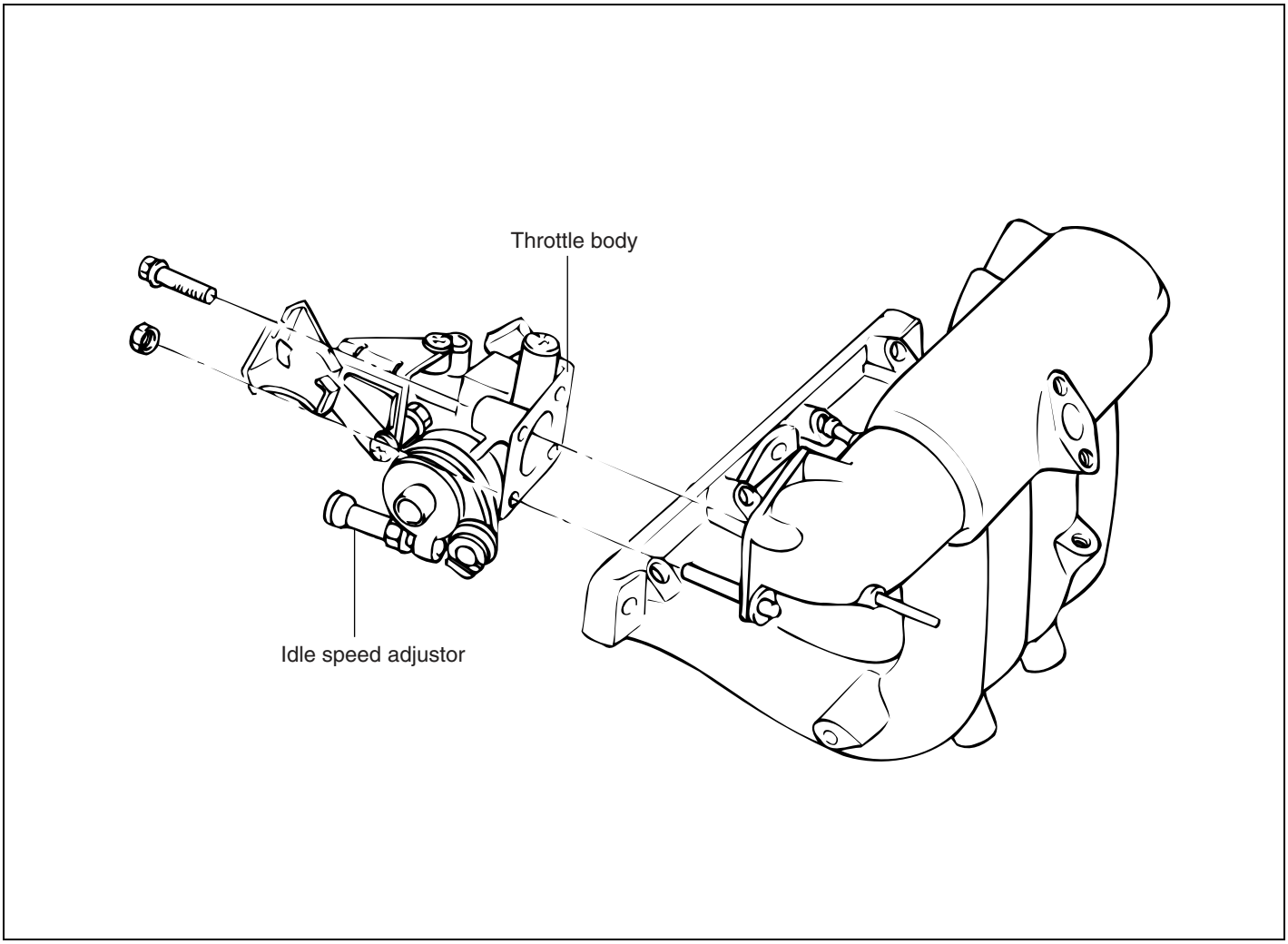
NG ⇨ Repair the harness.

EFTC745D

FUEL DELIVERY SYSTEM

THROTTLE BODY

COMPONENTS EFTC8090



T7FL015A

REMOVAL EFTC8110

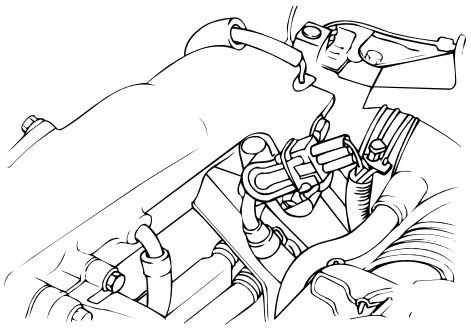
CAUTION

The throttle valve must not be removed.

Remove the throttle position sensor.

NOTE

Except when necessary for replacement, the throttle position sensor must not be removed.



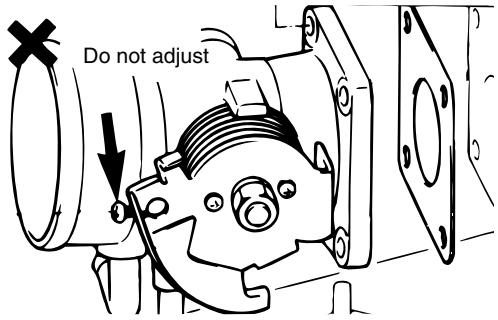
T7FL010D

INSPECTION EFDA8130

1. Check the throttle body for cracks.
2. Check for restriction in the vacuum port or passage.
3. Check for interference when moving the accelerator cable.

CAUTION

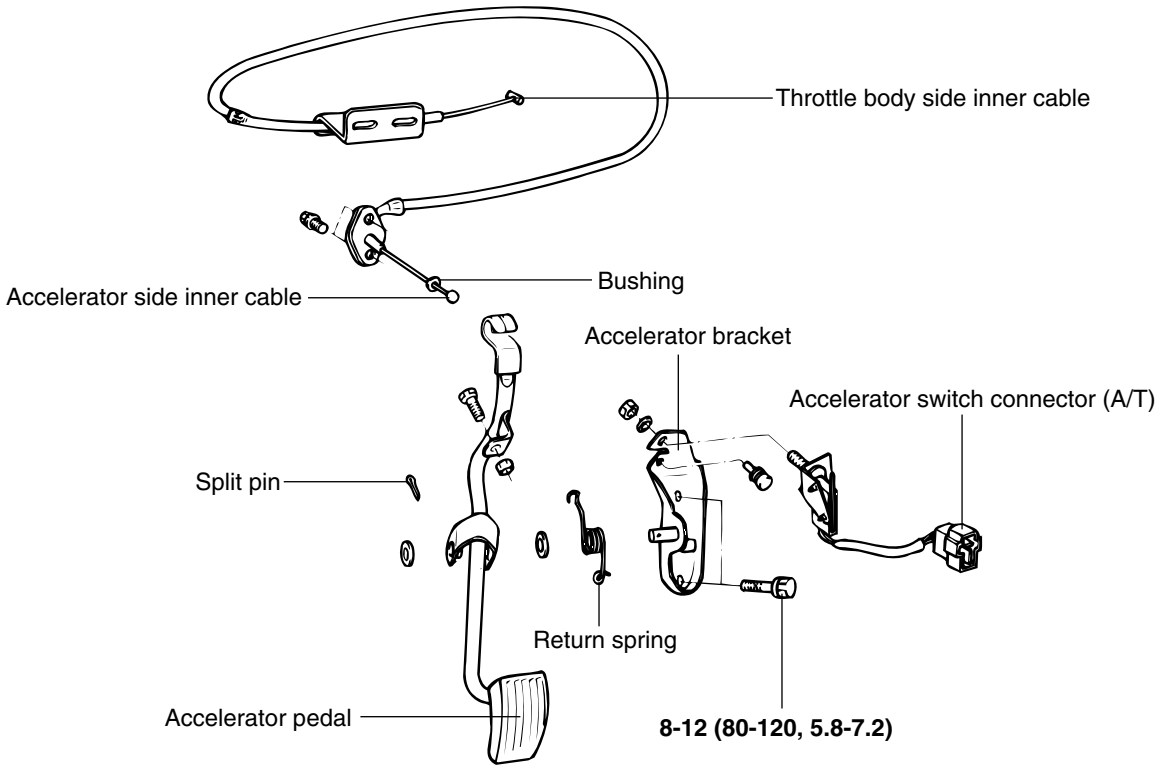
- ***Throttle valve set screw was adjusted in the production line with the air volume (0.516 ± 5% g/sec) during idling. So please DO NOT ADJUST IT voluntarily.***
- ***When the idle rpm is out of specification, check the relevant sensors and their input or output value first.***
- ***The throttle body does not need to be cleaned because carbon in throttle body does not affect the system's operation at all.***



EFDA813A

ACCELERATOR PEDAL

COMPONENTS EFTC8310

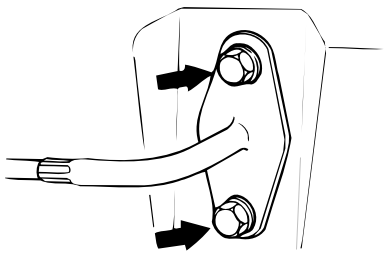


TORQUE : Nm (kg·cm, lb·ft)

EFDA831A

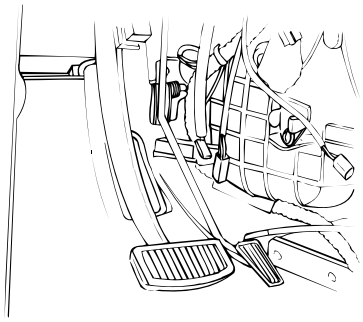
REMOVAL IFTC8330

1. Remove the bushing and inner cable of the accelerator arm side.



EFDA833A

2. After disconnecting the accelerator switch connector (At only), loosen the bolts of the accelerator arm bracket and remove.



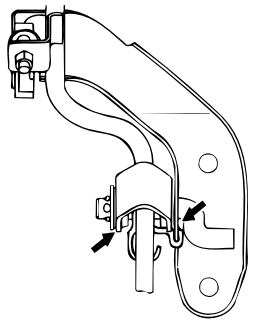
T7FL024A

INSPECTION EFDA8350

1. Check the inner and outer cable for damage.
2. Check the cable for smooth movement.
3. Check the accelerator arm for deformation.
4. Check the return spring for deterioration.
5. Check the connection of the bushing to end metal fitting.
6. Check that the accelerator switch operates properly.

INSTALLATION EFTC8370

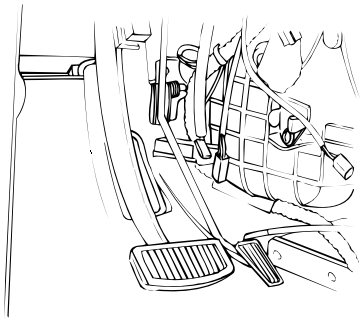
1. When installing the return spring and accelerator arm, apply multi-purpose grease around each moving point of the accelerator arm.



EFDA837A

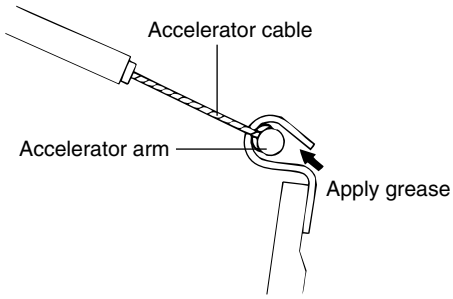
2. Apply sealant to the bolt mounting hole, and tighten the accelerator arm bracket.

Tightening torque
Accelerator arm bracket bolts :
8-12Nm (80-120 kg·cm, 5.8-7.2 lb·ft)



T7FL024A

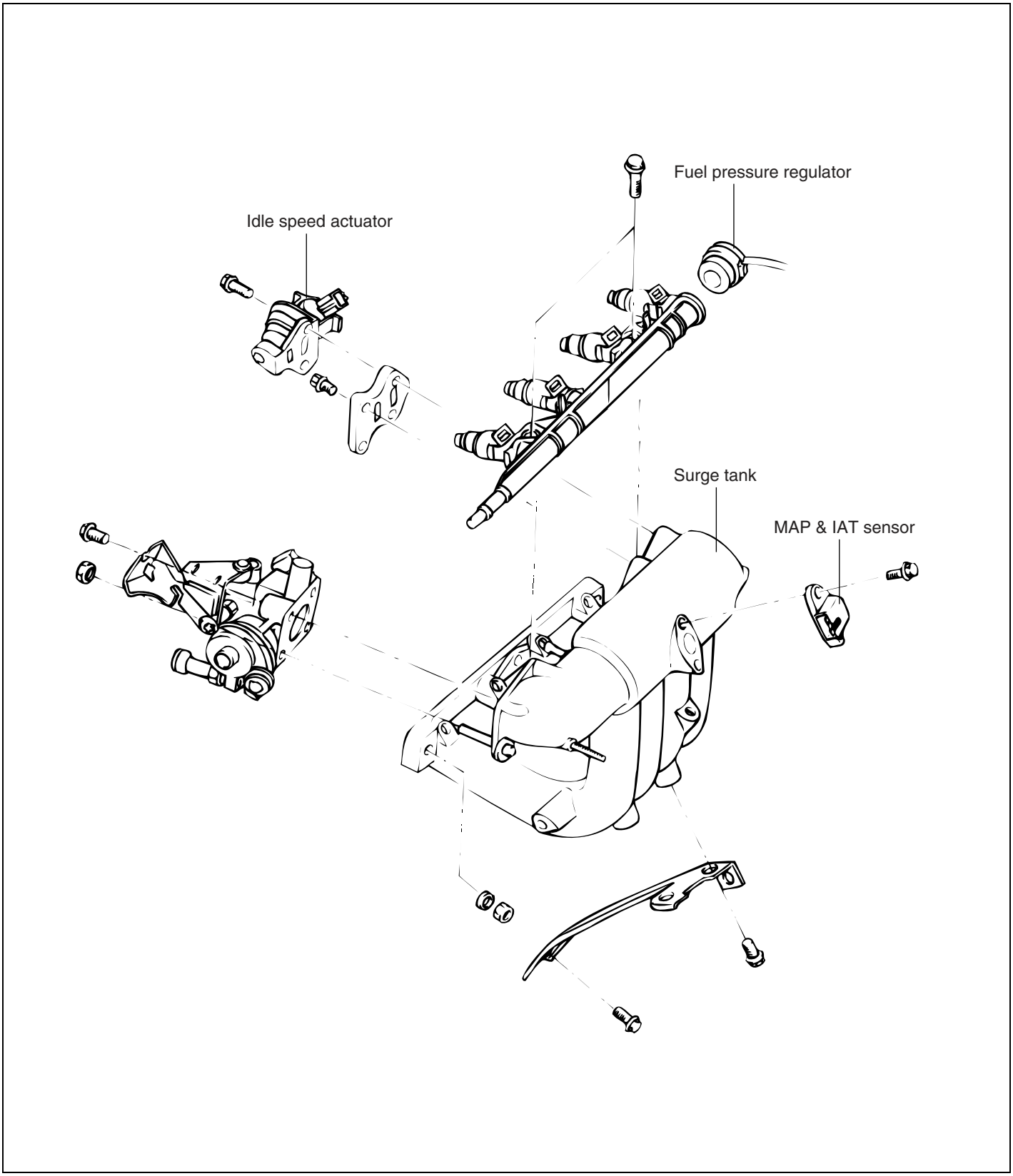
3. Securely install the resin bushing of the accelerator cable on the end of the accelerator arm.
4. Apply multipurpose grease around the cable end.



EFDA837C

FUEL INJECTOR

COMPONENTS IFTC8010



IFTC801A

REMOVAL EFTC8030

1. Release residual pressure from the fuel line to prevent fuel from spilling.

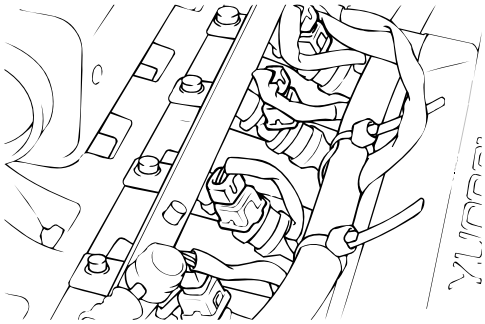
CAUTION

Cover the hose connection with rags to prevent splashing of fuel that could be caused by residual pressure in the fuel line.

2. Remove the delivery pipe with the fuel injectors.

CAUTION

- ***Be careful not to drop any injectors when removing the delivery pipe.***
- ***Be aware that fuel may flow out when removing the injector.***



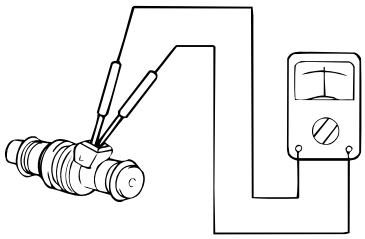
T7FL010F

INSPECTION EFDA8050

1. Measure the resistance of the injectors between the terminals using an ohmmeter.

Resistance : 15.9 ± 0.35Ω [at 20°C (68°F)]

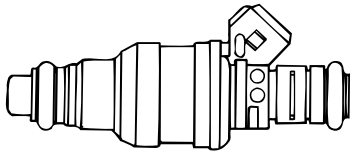
2. If the resistance is not within specifications, replace the injector.



EFDA805A

INSTALLATION EFDA8070

1. Install a new grommet and O-ring to the injector.
2. Apply a coating of solvent, spindle oil or gasoline to the O-ring of the injector.

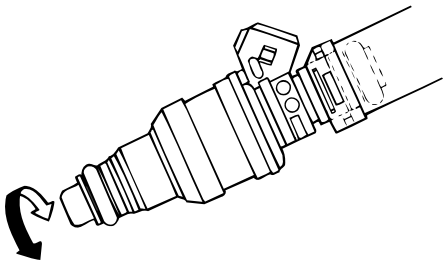


EFDA807A

3. While turning the injector to the left and right, fit it on to the delivery pipe.
4. Be sure the injector turns smoothly.

NOTE

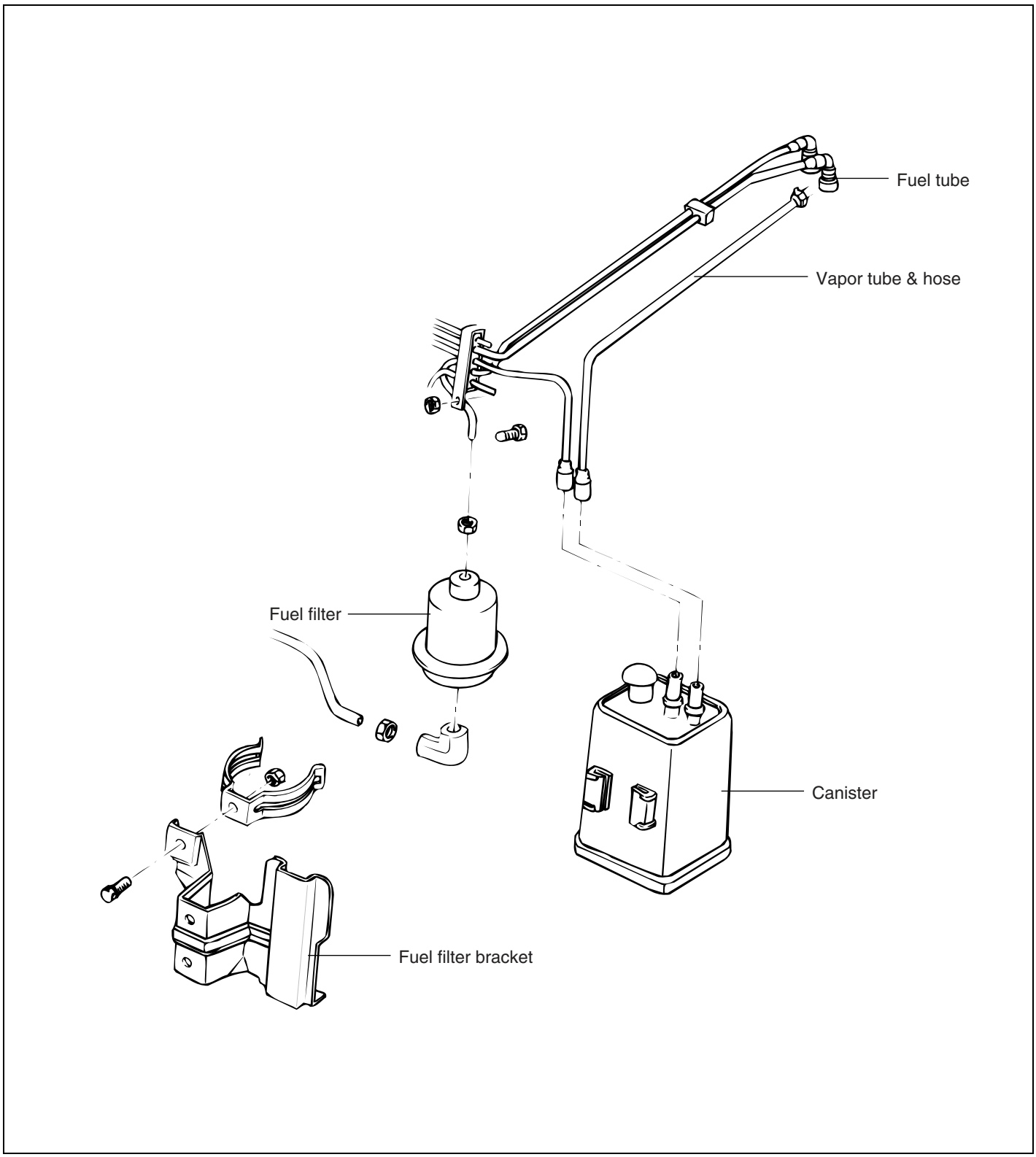
If it does turn smoothly, the O-ring may be jammed: Remove the injector and re-insert it into the delivery pipe and recheck.



EFDA807B

FUEL LINE AND VAPOR LINE

COMPONENTS EFTC8220



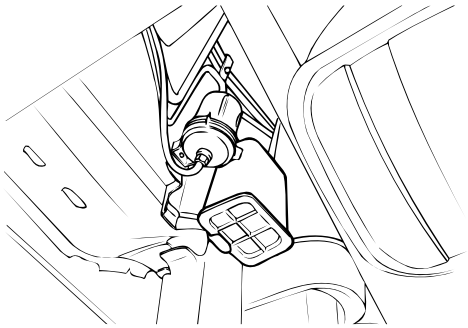
T7FL022A

REMOVAL EFTC8230

1. Remove the upper eye bolt while holding the fuel filter nut securely and remove the high pressure fuel hose.

CAUTION

- ***Be sure to reduce the fuel pressure before disconnecting the fuel line and hose, otherwise fuel will spill out.***
- ***Cover the hose connection with a shop towel to prevent splashing of fuel that could be caused by residual pressure in the fuel line.***

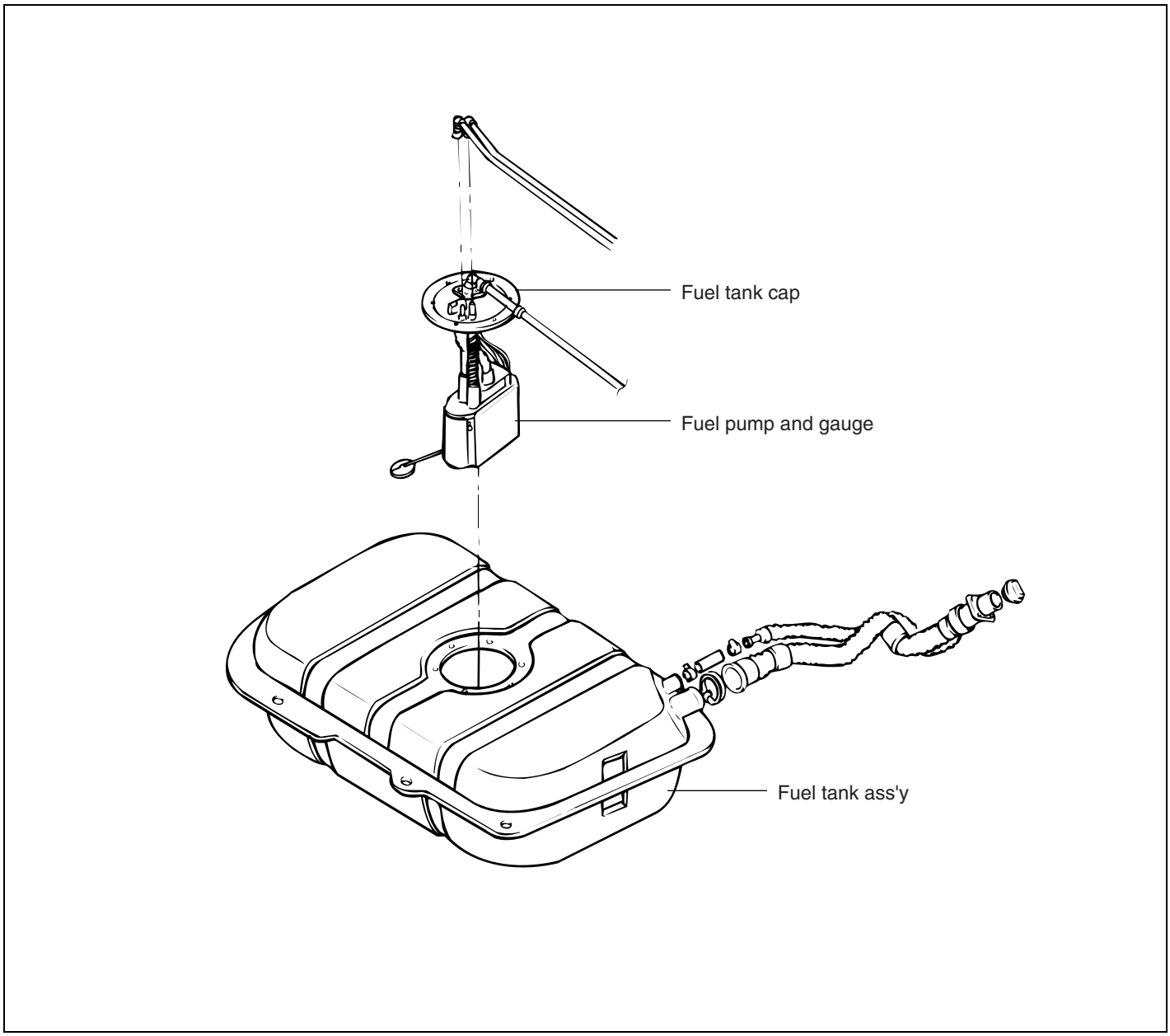


T7FL003A

2. Remove the lower eye bolt while holding the fuel filter nut assembly.
3. Remove the fuel filter mounting bolts, then remove the fuel filter from the bracket.
4. Remove the fuel return hose and line.
5. Remove the fuel vapor hose and line.

FUEL TANK

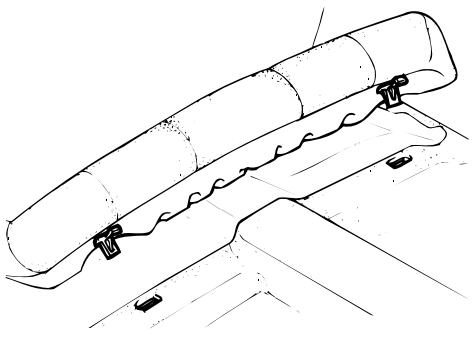
COMPONENTS EFTC8150



T7FL017A

REMOVAL EFTC8170

1. Press the two taps under the rear seat and raise the seat, then detach the inspection panel of the fuel pump.

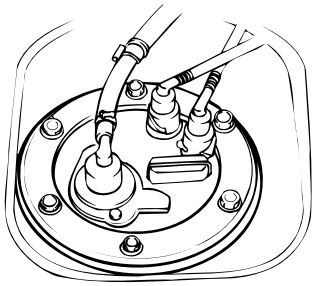


EFDA013A

2. To reduce the internal pressure of the fuel lines and hoses, first start the engine with the fuel pump disconnected and wait until it stops by itself.

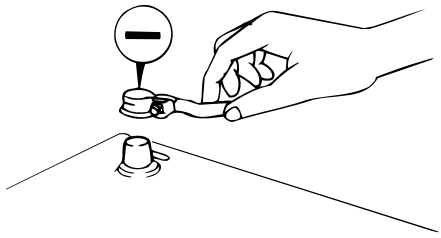
NOTE

Be sure to reduce the fuel pressure before disconnecting the fuel main pipe and hose otherwise fuel will spill out.



T7FL020A

3. Disconnect the battery cable from the negative terminal of the battery.



EFDA817B

4. Disconnect the high pressure hose from the fuel filter output side, and disconnect the tap for static electricity.

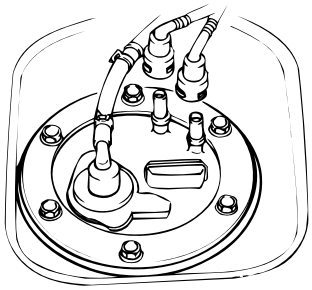
CAUTION

Cover the hose connection with a shop tower to prevent splashing of fuel that could be caused by residual pressure in the fuel line.

5. Lift up the vehicle.

6. Detach the fuel filler hose and leveling hose.

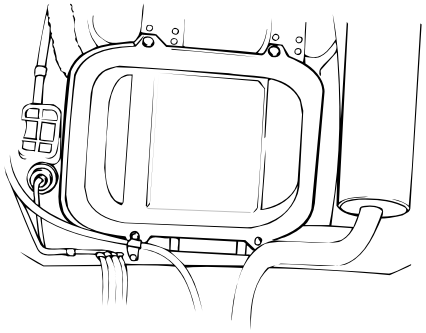
7. Support the fuel tank with a jack.



T7FL019A

8. Remove the fuel tank bands.

9. Remove the fuel tank.

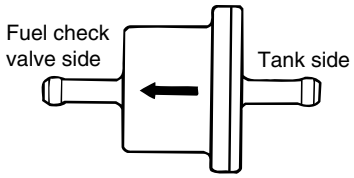


T7FL021A

INSPECTION EFDA8190

1. Check the hoses and the pipes for cracks or damage.
2. Check the fuel tank cap for proper operation.
3. Check the fuel tank for deformation, corrosion or cracking.
4. Check the inside of the fuel tank for dirt or foreign material.
5. Check the in-tank fuel filter for damage or restriction.
6. Test the two-way valve for proper operation.

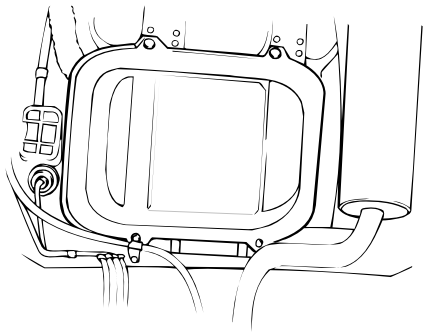
7. To check the two-way valve, lightly blow into the inlet and outlet. If air passes through after slight resistance, then the valve is good.



EFDA819A

INSTALLATION IFTC8210

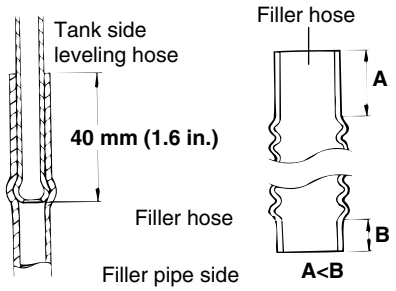
1. Confirm that the pad is fully bonded to the fuel tank, and install the fuel tank by tightening the self-locking nuts.



T7FL021A

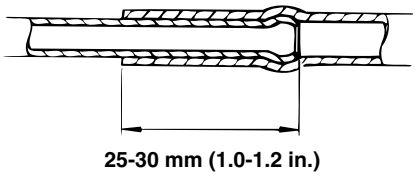
2. Connect the leveling hose to the tank and at the filler neck by approximately 40mm (1.6 in.).

3. When connecting the filler hose, the end with the shorter straight pipe should be connected to the tank side.



EFDA821A

4. Connect the vapor hose. When attaching the vapor hose to the line, be sure that the hose is attached as shown in the illustration.



EFDA821B

5. Connect the high pressure hose to the fuel pump. Be careful that the fuel hose does not twist.

6. Connect the electrical fuel pump connector.

TROUBLESHOOTING FOR DTC

DIAGNOSTIC ITEM IFTD5020

DTC	Diagnostic item
P0106	Manifold Absolute Pressure (MAP) Sensor Circuit Rationality
P0107	Manifold Absolute Pressure (MAP) Sensor Circuit Low Input
P0108	Manifold Absolute Pressure (MAP) Sensor Circuit High Input

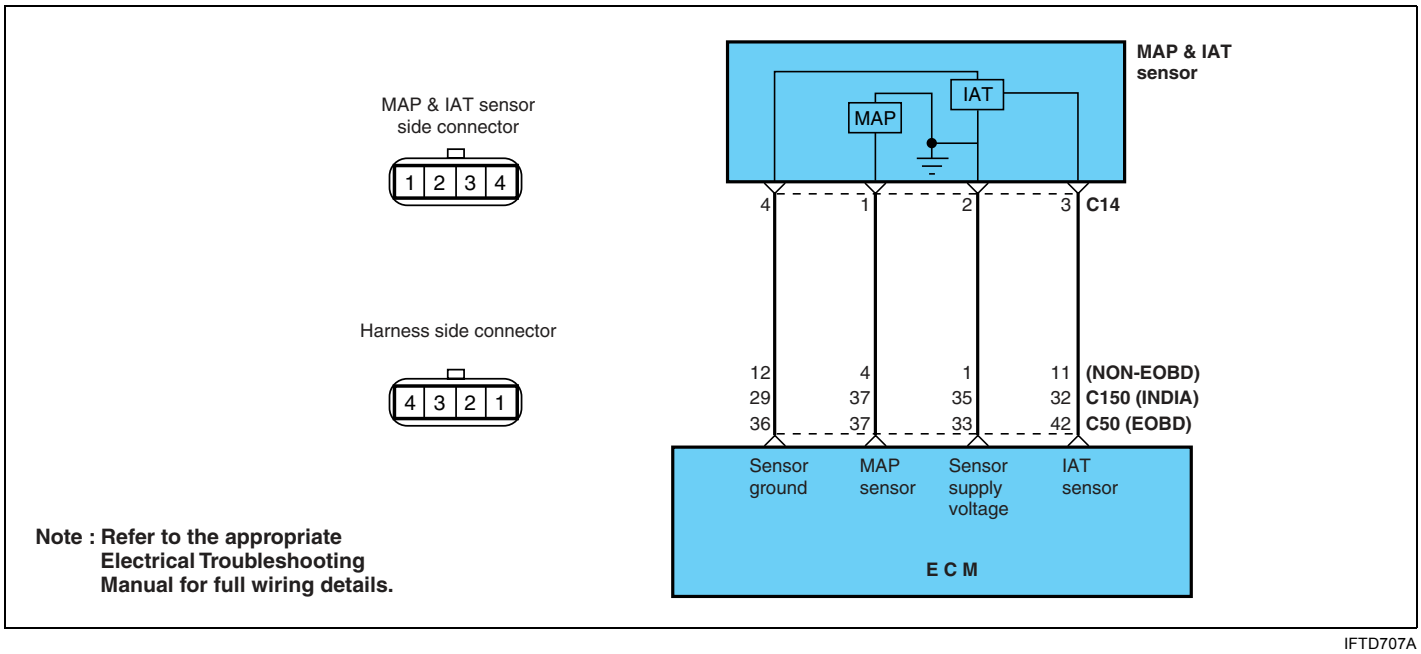
DESCRIPTION

The MAP sensor is essentially a strain gauge used to measure the pressure in the surge tank. Inside the sensor is a metal diaphragm with a small wire attached. The diaphragm flexes according to changes in pressure. When the diaphragm flexes, the wire attached to it stretches, changing the resistance of the wire. The Engine control Module (ECM) applies five volts to the MAP sensor and measures the voltage drop across the sensor. Sensor output is in volts and as pressure decreases, the voltage drop across the sensor increases. Since the MAP sensor is used as an air flow sensor, the sensor signal is an important input. The ECM uses the information to determine fuel amount and ignition timing.

FAILURE CONDITIONS

The MAP sensor outputs a voltage which corresponds to the pressure in the surge tank. The ECM checks whether this voltage is within a specified range. The ECM will set P0107 if the MAP sensor output voltage has continued to be 4.5V or higher — corresponding to a surge tank pressure of 114kPa (17psi) or higher — for 4 sec. and P0108 if the MAP sensor output voltage has continued to be 1.95V or lower — corresponding to a surge tank pressure of 50kPa (7.4psi) or lower — for 4 sec.

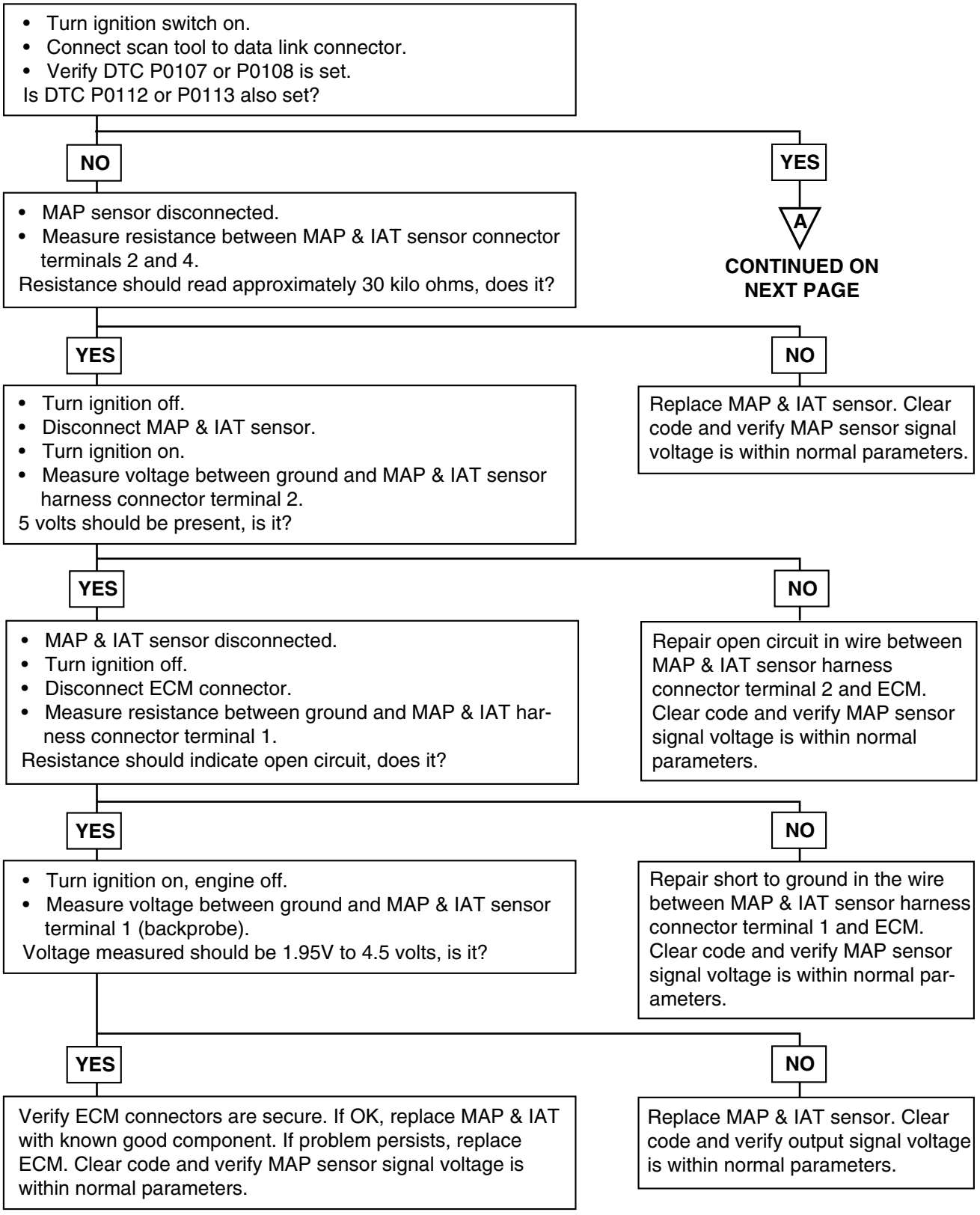
CIRCUIT DIAGRAM



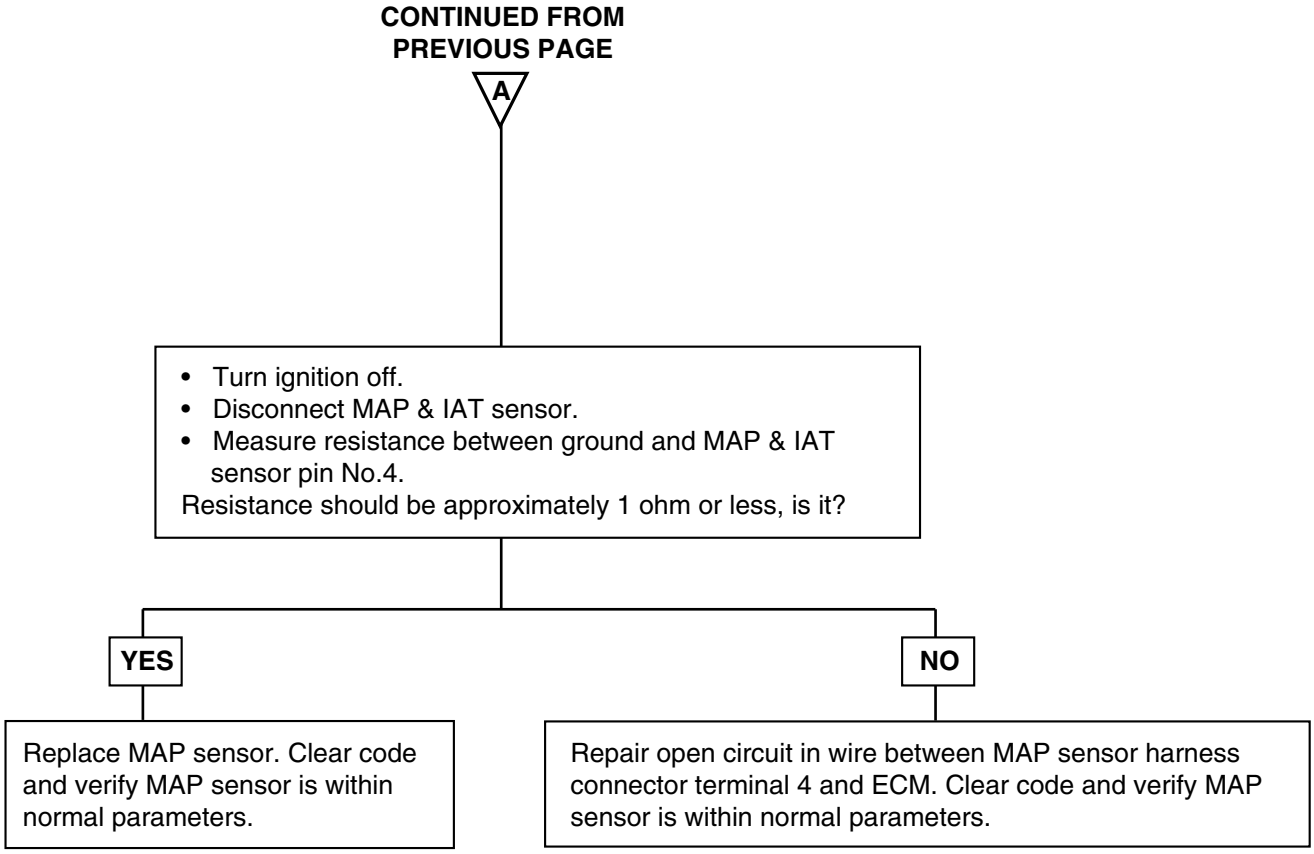
Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD707A

TEST PROCEDURE



IFDA502B


CONTINUED FROM PREVIOUS PAGE
A
• Turn ignition off.
• Disconnect MAP & IAT sensor.
• Measure resistance between ground and MAP & IAT sensor pin No.4.
Resistance should be approximately 1 ohm or less, is it?
YES
NO
Replace MAP sensor. Clear code and verify MAP sensor is within normal parameters.
Repair open circuit in wire between MAP sensor harness connector terminal 4 and ECM. Clear code and verify MAP sensor is within normal parameters.

IFDA502C

IFTD5060

DTC	Diagnostic item
P0112 P0113	Intake Air Temperature Low Input In take Air Temperature High Input

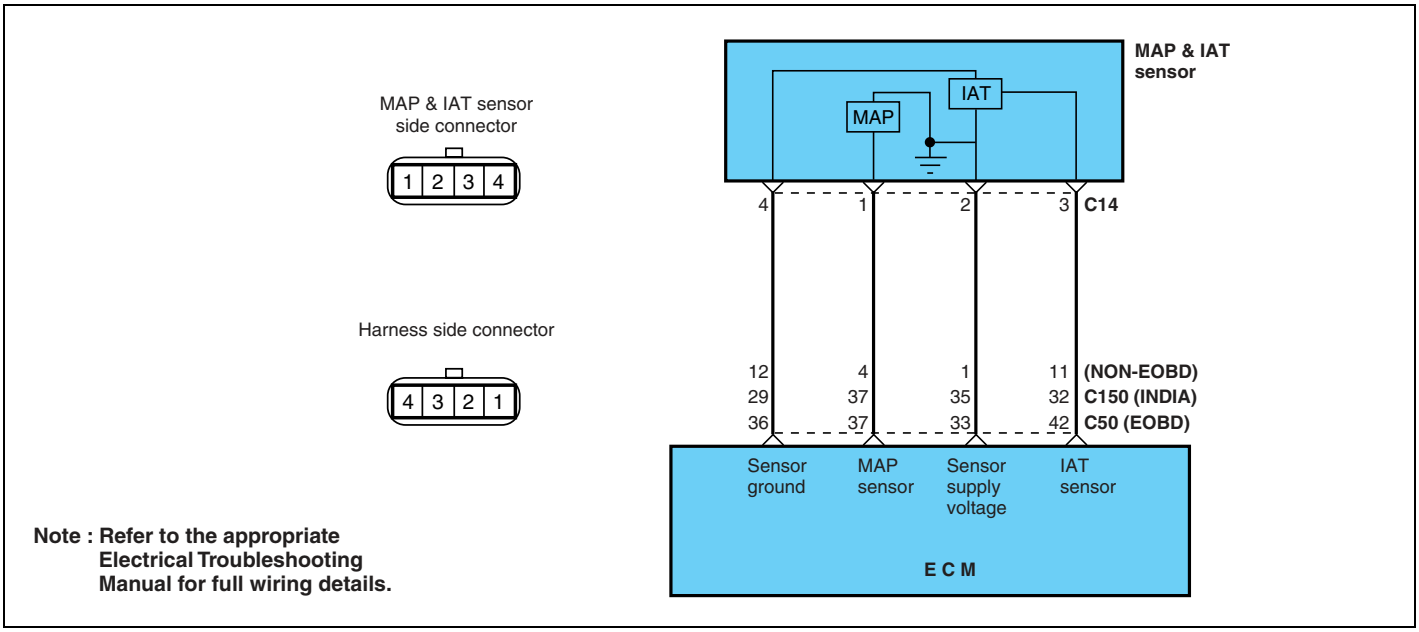
DESCRIPTION

The Intake air temperature (IAT) sensor is built in to the MAP sensor. The IAT sensor is a variable resistor whose resistance changes as the temperature of the air flowing through the air intake changes. The Engine Control Module (ECM) uses the IAT sensor input to adjust fuel injector pulse width. When the temperature sensed is cold, the ECM enriches fuel mixture by increasing injector pulse width; as the air warms, the injector pulse width time is shortened.

FAILURE CONDITIONS

The ECM will set P0112 and the Malfunction Indicator Lamp(MIL) will turn ON if the IAT sensor indicates a temperature lower than -49°F (-45°C) for 0.2 seconds during two driving cycles. This check is made after the engine has run for 4 minutes and 10 seconds and then idles for 30 seconds (with no fuel cut-off during a coast-down). This code indicates a lower than expected temperature is being read by the IAT sensor or ECM after the engine has been warmed up.

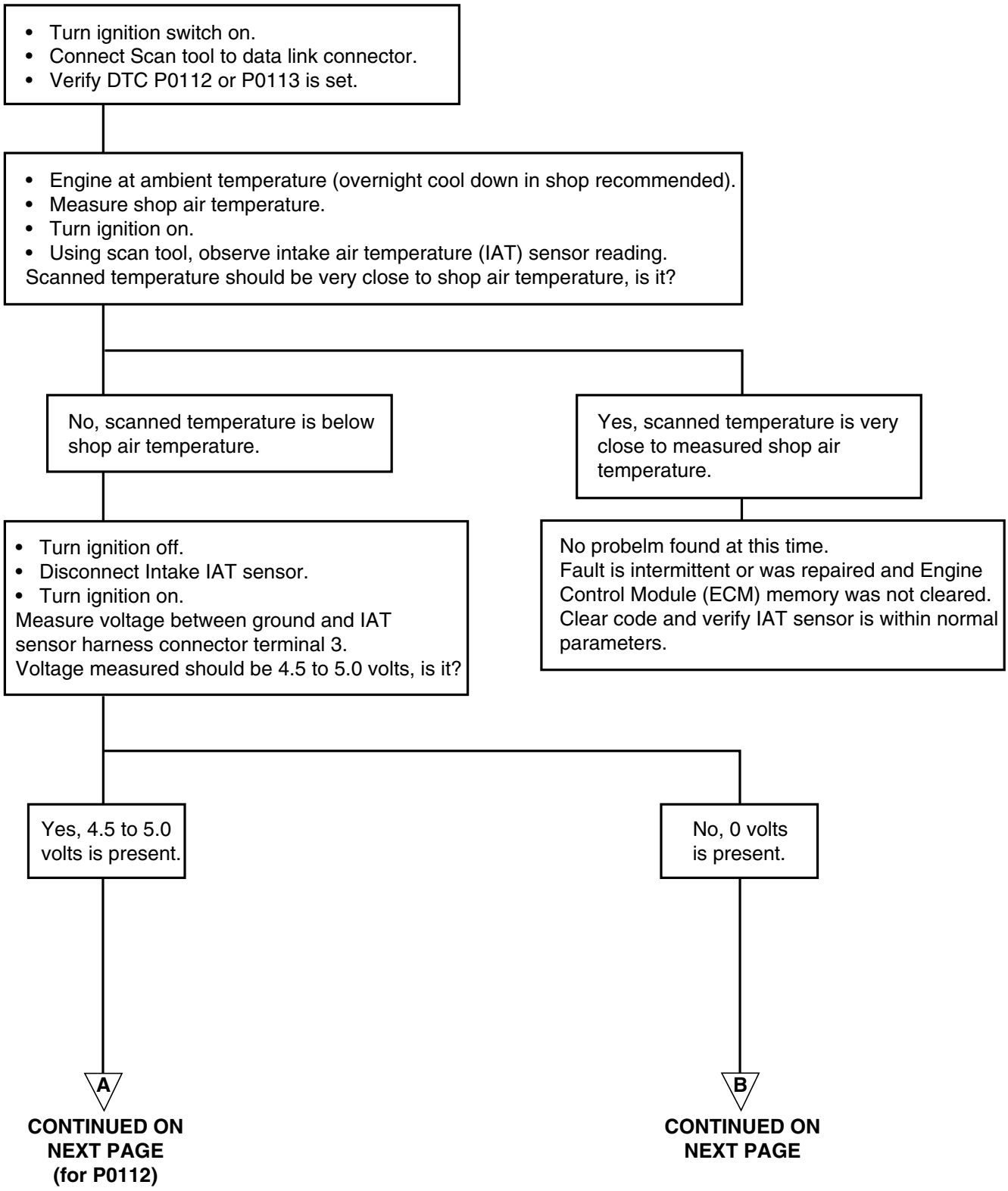
CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD707A

TEST PROCEDURE



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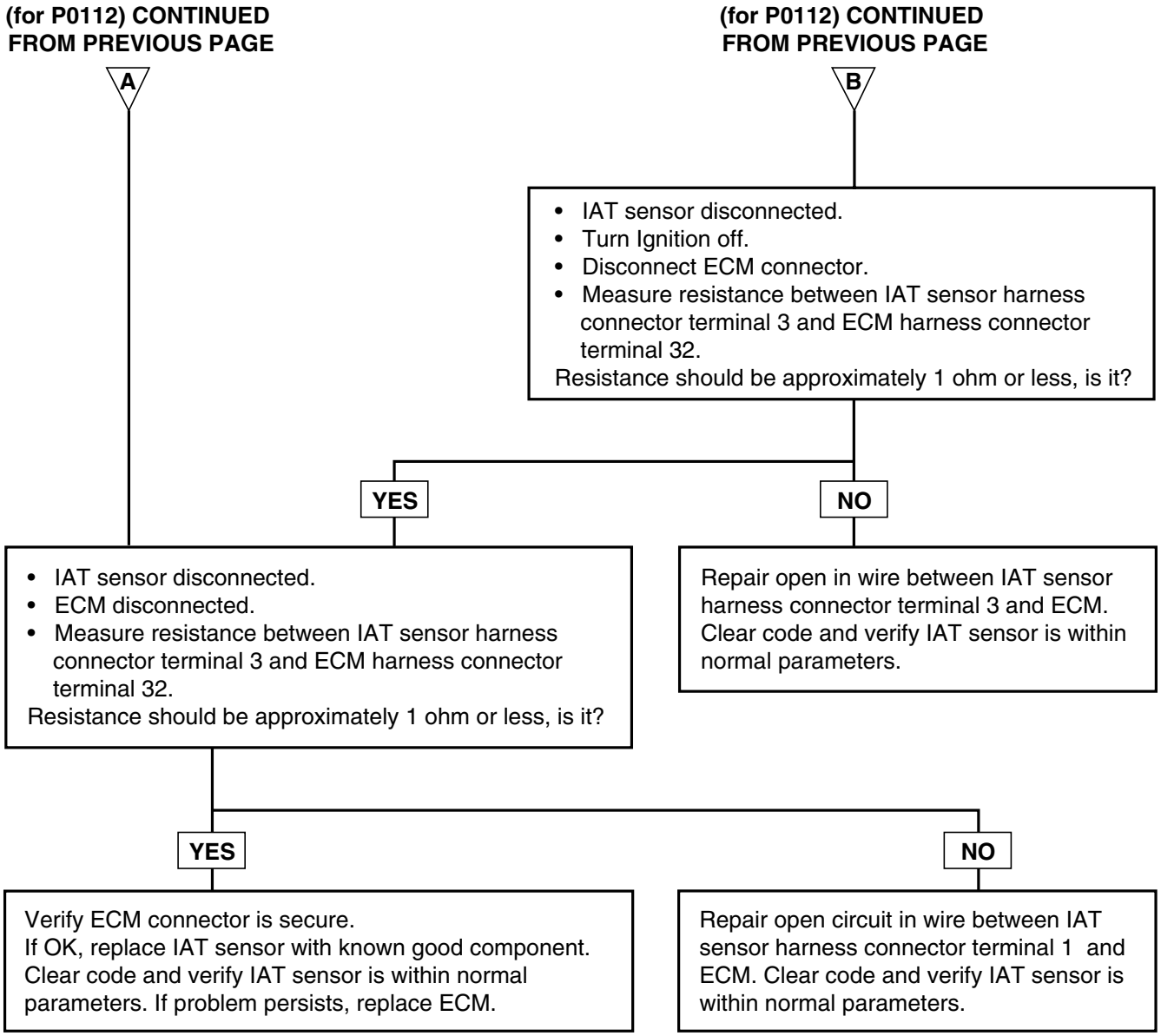
IFDA506B


(for P0112) CONTINUED
FROM PREVIOUS PAGE
A
(for P0112) CONTINUED
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B
• IAT sensor disconnected.
• Turn Ignition off.
• Disconnect ECM connector.
• Measure resistance between IAT sensor harness connector terminal 3 and ECM harness connector terminal 32.
Resistance should be approximately 1 ohm or less, is it?
YES
NO
• IAT sensor disconnected.
• ECM disconnected.
• Measure resistance between IAT sensor harness connector terminal 3 and ECM harness connector terminal 32.
Resistance should be approximately 1 ohm or less, is it?
Repair open in wire between IAT sensor harness connector terminal 3 and ECM. Clear code and verify IAT sensor is within normal parameters.
YES
NO
Verify ECM connector is secure.
If OK, replace IAT sensor with known good component. Clear code and verify IAT sensor is within normal parameters. If problem persists, replace ECM.
Repair open circuit in wire between IAT sensor harness connector terminal 1 and ECM. Clear code and verify IAT sensor is within normal parameters.

IFDA506C

IFTD5110

DTC	Diagnostic item
P0116	Engine Coolant Temperature Circuit Range / Performance
P0117	Engine Coolant Temperature Circuit Low Input
P0118	Engine Coolant Temperature Circuit High Input

DESCRIPTION

The Engine Coolant Temperature (ECT) sensor is located in the coolant passage of the cylinder head. The ECT sensor is a variable resistor whose resistance changes as the temperature of the engine coolant flowing past the sensor changes. When coolant temperature is low, sensor resistance is high; when coolant temperature is high, sensor resistance is low.

The Engine Control Module (ECM) checks ECT sensor voltage and uses the information to adjust fuel injector pulse width and ignition timing. When the temperature sensed is very cold, the ECM enriches the fuel mixture and advances ignition timing. As coolant temperature rises, the ECM reduces the amount of enrichment and timing advance.

FAILURE CONDITIONS

The ECM will set P0116 and the Malfunction Indicator Lamp(MIL) (If installed) will turn on if the ECT sensor's actual performance curve falls more than 68°F (20°C) below the ECM's model curve (based on fuel delivery, ambient air temperature and engine running time) for 0.2 seconds during two driving cycles. This code indicates uncharacteristic engine temperature performance being read by the ECT sensor or ECM.

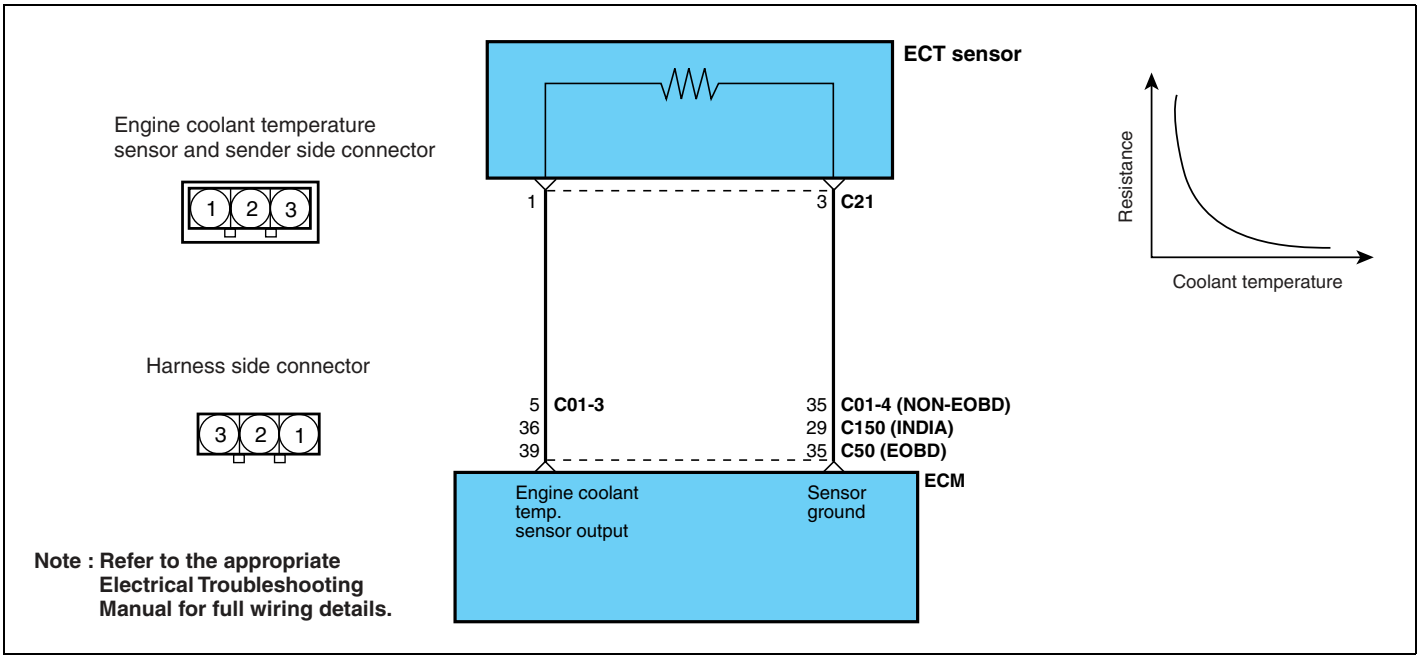
The ECM will set P0117 and the Malfunction Indicator Lamp(MIL) (If installed) will turn on if the ECT sensor reports a temperature below -49°F (-45°C) for 0.2 seconds during two driving cycles. The ECM will set P0118 and the Malfunction Indicator Lamp(MIL) (If installed) will turn on if the ECT sensor reports a temperature above 284°F (140°C) for 0.2 seconds during two driving cycles.

NOTE

The ECT sensor resistance varies with temperature as follows:

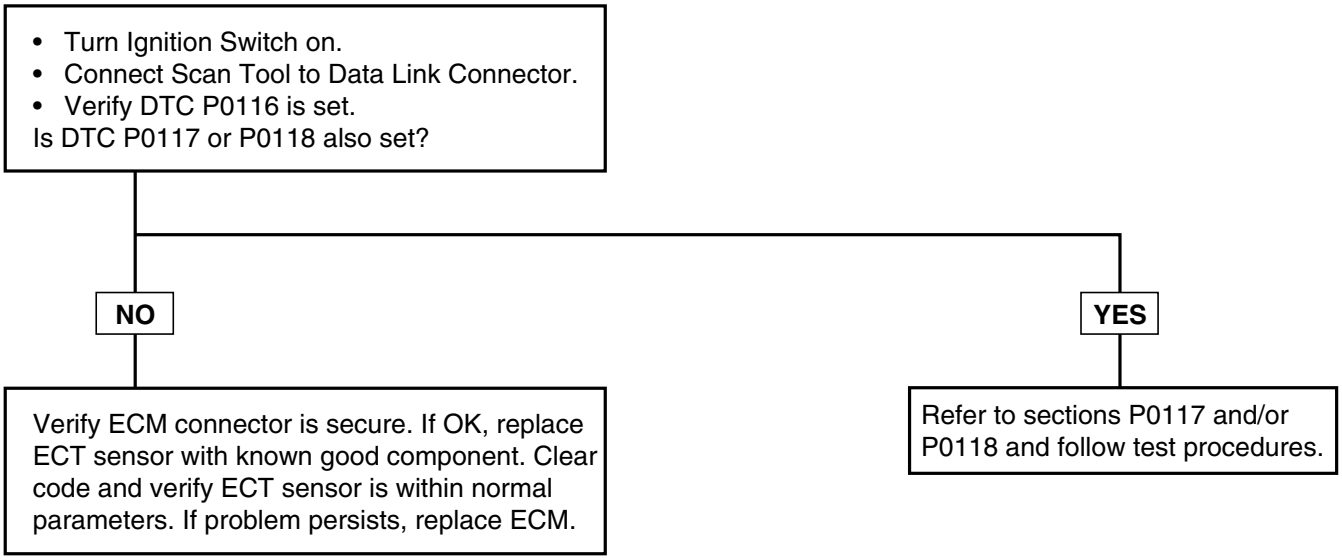
- 5900 ohms @ 32°F (0°C).
- 2500 ohms @ 68°F (20°C).
- 300 ohms @ 176°F (80°C).

CIRCUIT DIAGRAM

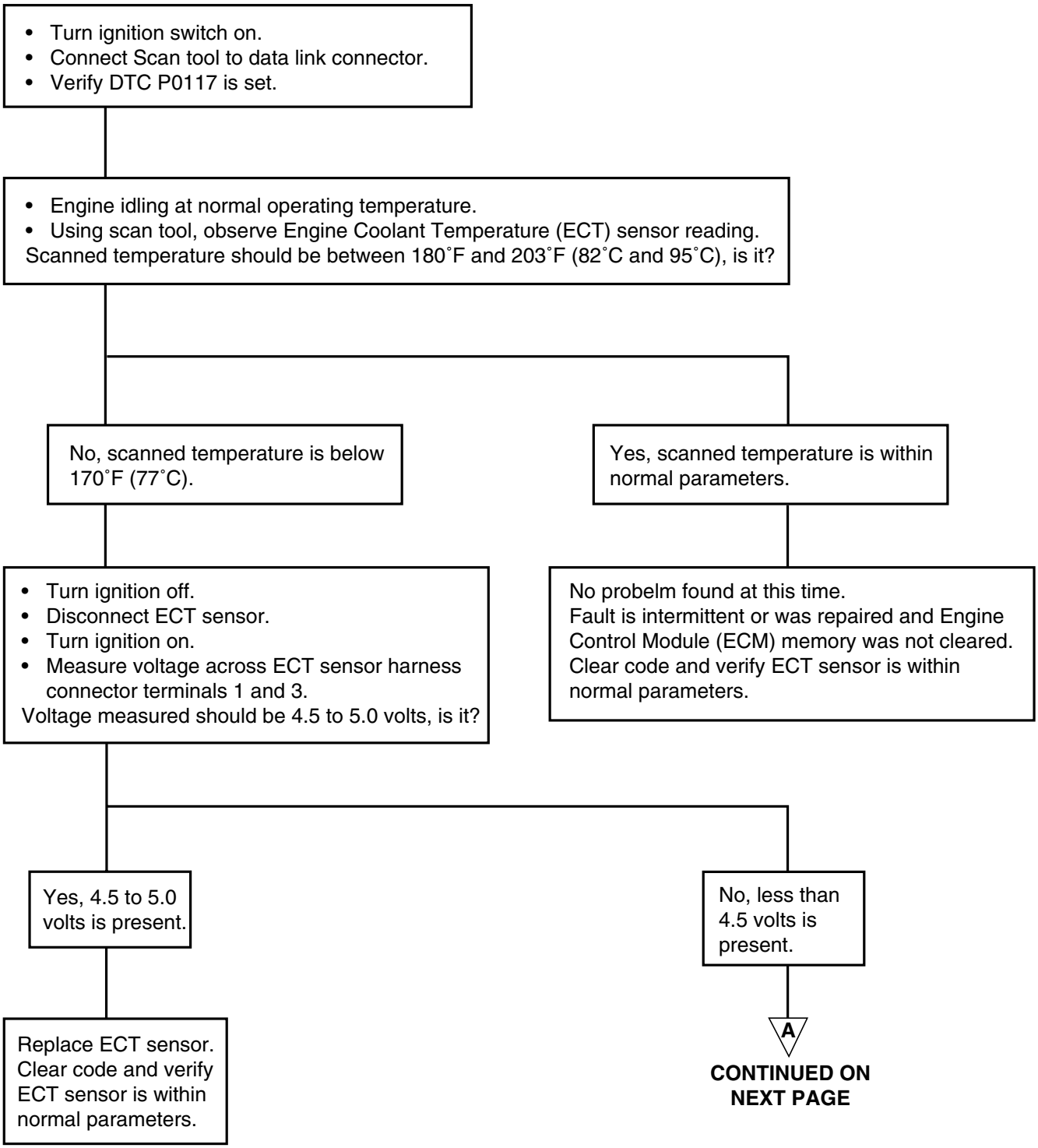


IFTD711A

TEST PROCEDURE



EFDA511B


• Turn ignition switch on.
• Connect Scan tool to data link connector.
• Verify DTC P0117 is set.
• Engine idling at normal operating temperature.
• Using scan tool, observe Engine Coolant Temperature (ECT) sensor reading.
Scanned temperature should be between 180˚F and 203˚F (82˚C and 95˚C), is it?
No, scanned temperature is below 170˚F (77˚C).
Yes, scanned temperature is within normal parameters.
• Turn ignition off.
• Disconnect ECT sensor.
• Turn ignition on.
• Measure voltage across ECT sensor harness connector terminals 1 and 3.
Voltage measured should be 4.5 to 5.0 volts, is it?
No probelm found at this time.
Fault is intermittent or was repaired and Engine Control Module (ECM) memory was not cleared.
Clear code and verify ECT sensor is within normal parameters.
Yes, 4.5 to 5.0 volts is present.
No, less than 4.5 volts is present.
Replace ECT sensor.
Clear code and verify ECT sensor is within normal parameters.
A
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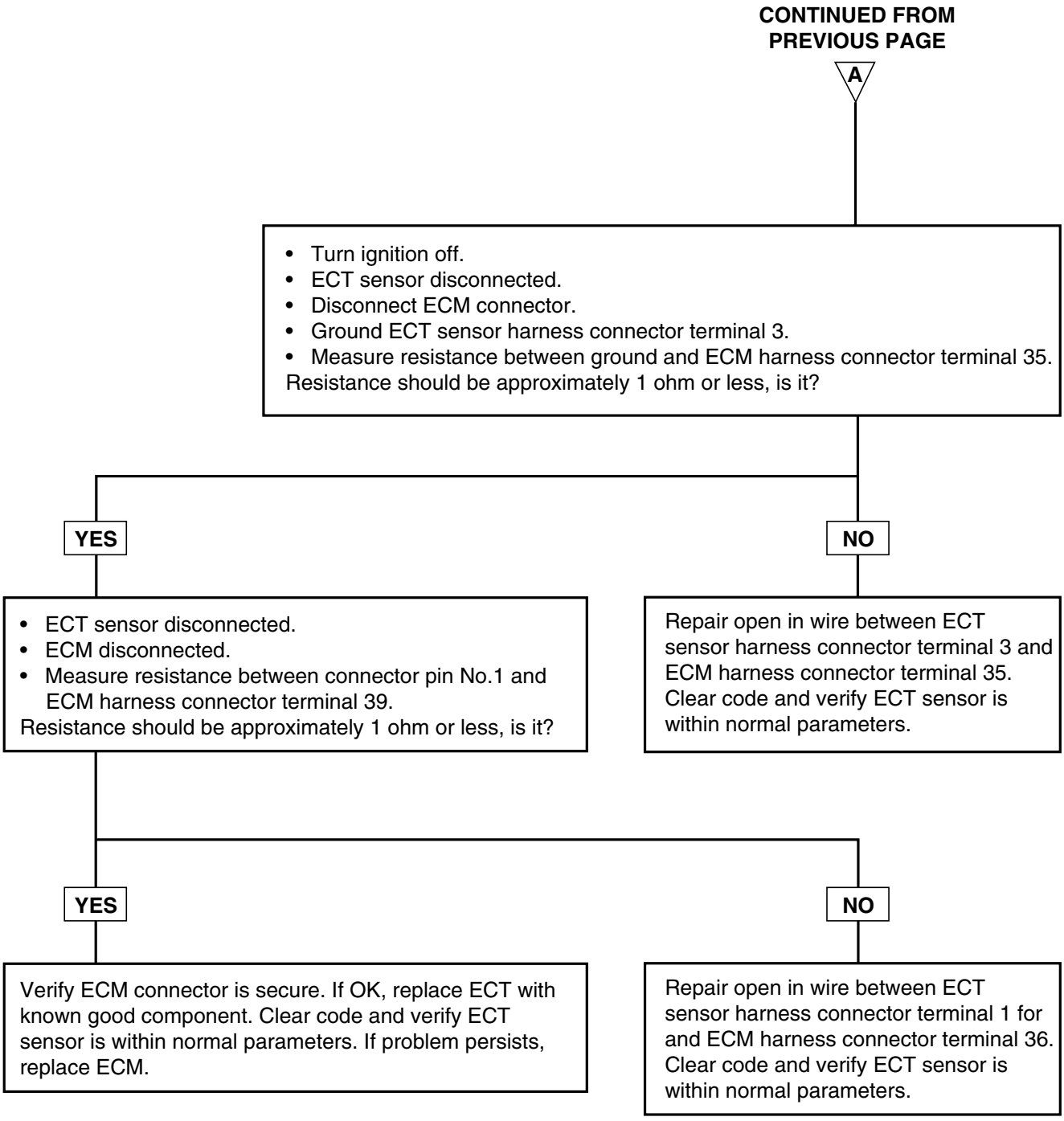
EFTC511C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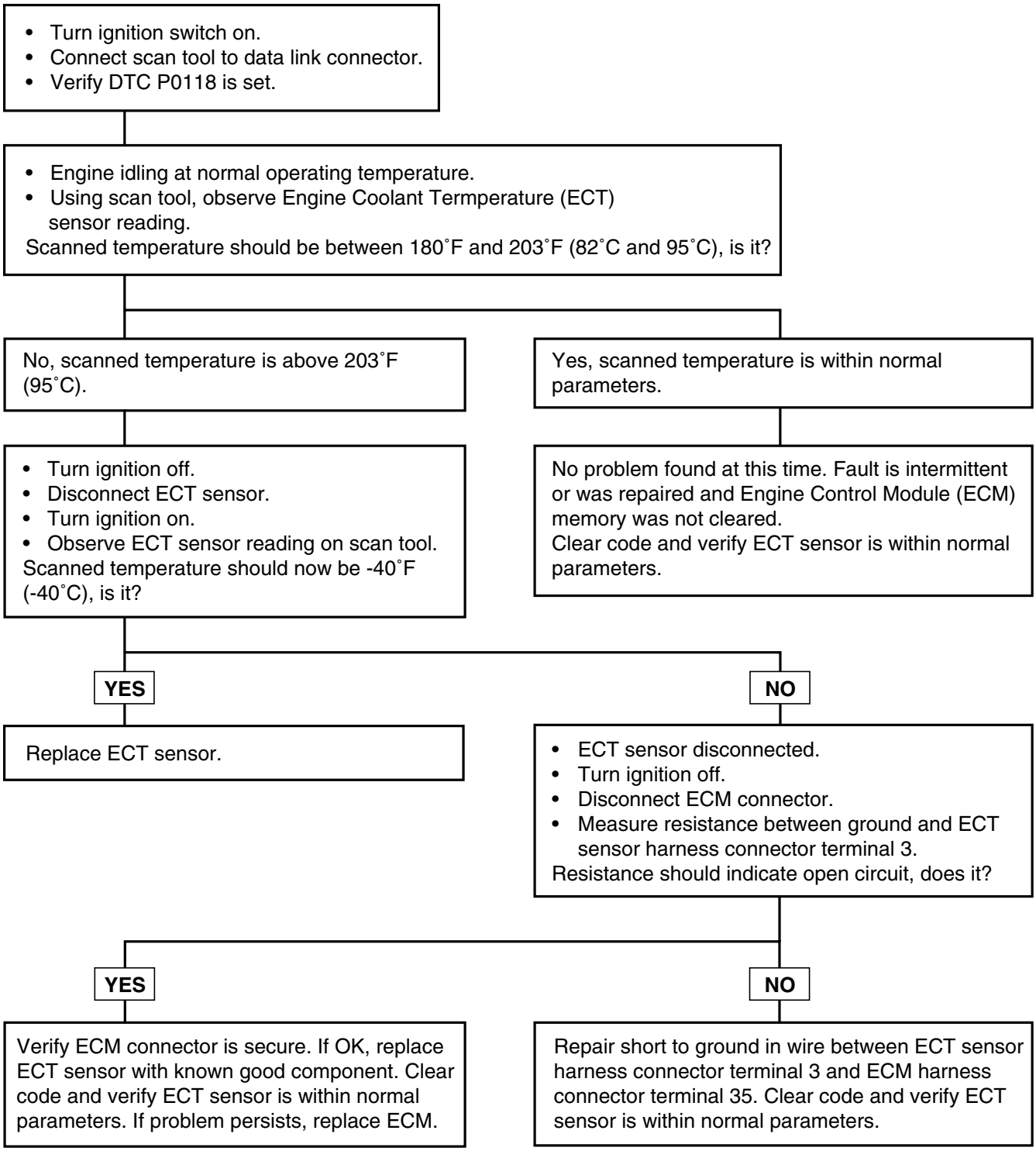
A
• Turn ignition off.
• ECT sensor disconnected.
• Disconnect ECM connector.
• Ground ECT sensor harness connector terminal 3.
• Measure resistance between ground and ECM harness connector terminal 35.
Resistance should be approximately 1 ohm or less, is it?
YES
NO
• ECT sensor disconnected.
• ECM disconnected.
• Measure resistance between connector pin No.1 and ECM harness connector terminal 39.
Resistance should be approximately 1 ohm or less, is it?
Repair open in wire between ECT sensor harness connector terminal 3 and ECM harness connector terminal 35. Clear code and verify ECT sensor is within normal parameters.
YES
NO
Verify ECM connector is secure. If OK, replace ECT with known good component. Clear code and verify ECT sensor is within normal parameters. If problem persists, replace ECM.
Repair open in wire between ECT sensor harness connector terminal 1 for and ECM harness connector terminal 36. Clear code and verify ECT sensor is within normal parameters.

IFTC511D


• Turn ignition switch on.
• Connect scan tool to data link connector.
• Verify DTC P0118 is set.
• Engine idling at normal operating temperature.
• Using scan tool, observe Engine Coolant Termperature (ECT) sensor reading.
Scanned temperature should be between 180˚F and 203˚F (82˚C and 95˚C), is it?
No, scanned temperature is above 203˚F (95˚C).
Yes, scanned temperature is within normal parameters.
• Turn ignition off.
• Disconnect ECT sensor.
• Turn ignition on.
• Observe ECT sensor reading on scan tool.
Scanned temperature should now be -40˚F (-40˚C), is it?
No problem found at this time. Fault is intermittent or was repaired and Engine Control Module (ECM) memory was not cleared.
Clear code and verify ECT sensor is within normal parameters.
YES
NO
Replace ECT sensor.
• ECT sensor disconnected.
• Turn ignition off.
• Disconnect ECM connector.
• Measure resistance between ground and ECT sensor harness connector terminal 3.
Resistance should indicate open circuit, does it?
YES
NO
Verify ECM connector is secure. If OK, replace ECT sensor with known good component. Clear code and verify ECT sensor is within normal parameters. If problem persists, replace ECM.
Repair short to ground in wire between ECT sensor harness connector terminal 3 and ECM harness connector terminal 35. Clear code and verify ECT sensor is within normal parameters.

IFTC511E

IFTD5160

DTC	Diagnostic item
P0121	TPS Circuit Range / Performance Problem
P0122	TPS Circuit Low Input
P0123	TPS Circuit High Input

DESCRIPTION

The Throttle Position sensor mounts on the side of the throttle body and is connected to the throttle valve shaft. The TPS is a variable resistor (potentiometer) whose resistance changes according to throttle valve shaft position. During acceleration, the TPS resistance decreases; during deceleration, the TPS resistance increases.

The Engine Control Module (ECM) applies a reference voltage to the TPS and then measures the voltage that is present on the TPS signal circuit. The ECM uses the TPS signal to adjust timing and injector pulse width. The TPS signal along with the MAP sensor signal is used by the ECM to calculate engine load.

FAILURE CONDITIONS

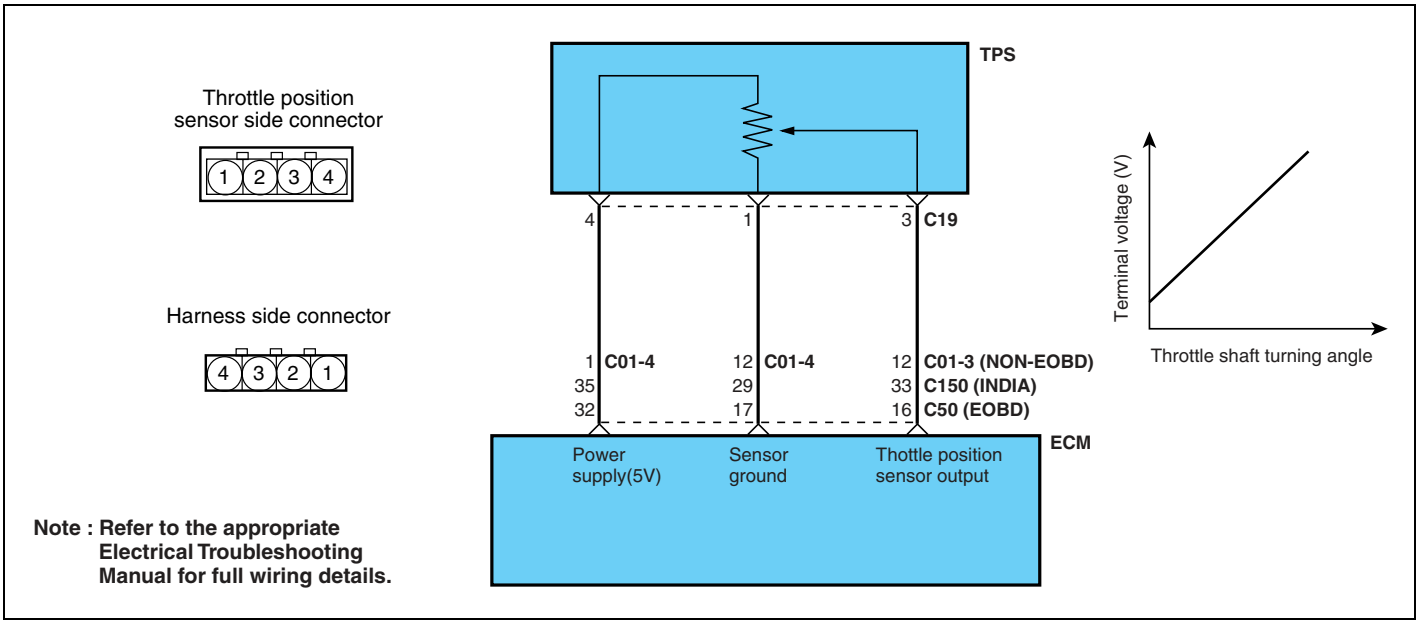
The ECM will set P0121 and the Malfunction Indicator Lamp(MIL) will turn on if the engine load indicated by the Throttle Position (TP) sensor and the MAP sensor are different. This code indicates that the throttle position and air flow readings by the TP and MAF sensor, or ECM, do not result in the expected engine load value.

The ECM will set P0122 and the Malfunction Indicator Lamp(MIL) will turn on if the throttle angle is reported as less than 2.1 degrees for more than 0.2 seconds during 2-driving cycles. This code indicates an unusually low throttle position angle being read by the TP sensor or ECM.
The ECM will set P0123 and the Malfunction Indicator Lamp(MIL) will turn on if the throttle angle is reported as greater than 105.4 degrees for 0.2 seconds during 2-driving cycles. This code indicates an unusually high throttle position angle being read by the TP sensor or ECM.

NOTE

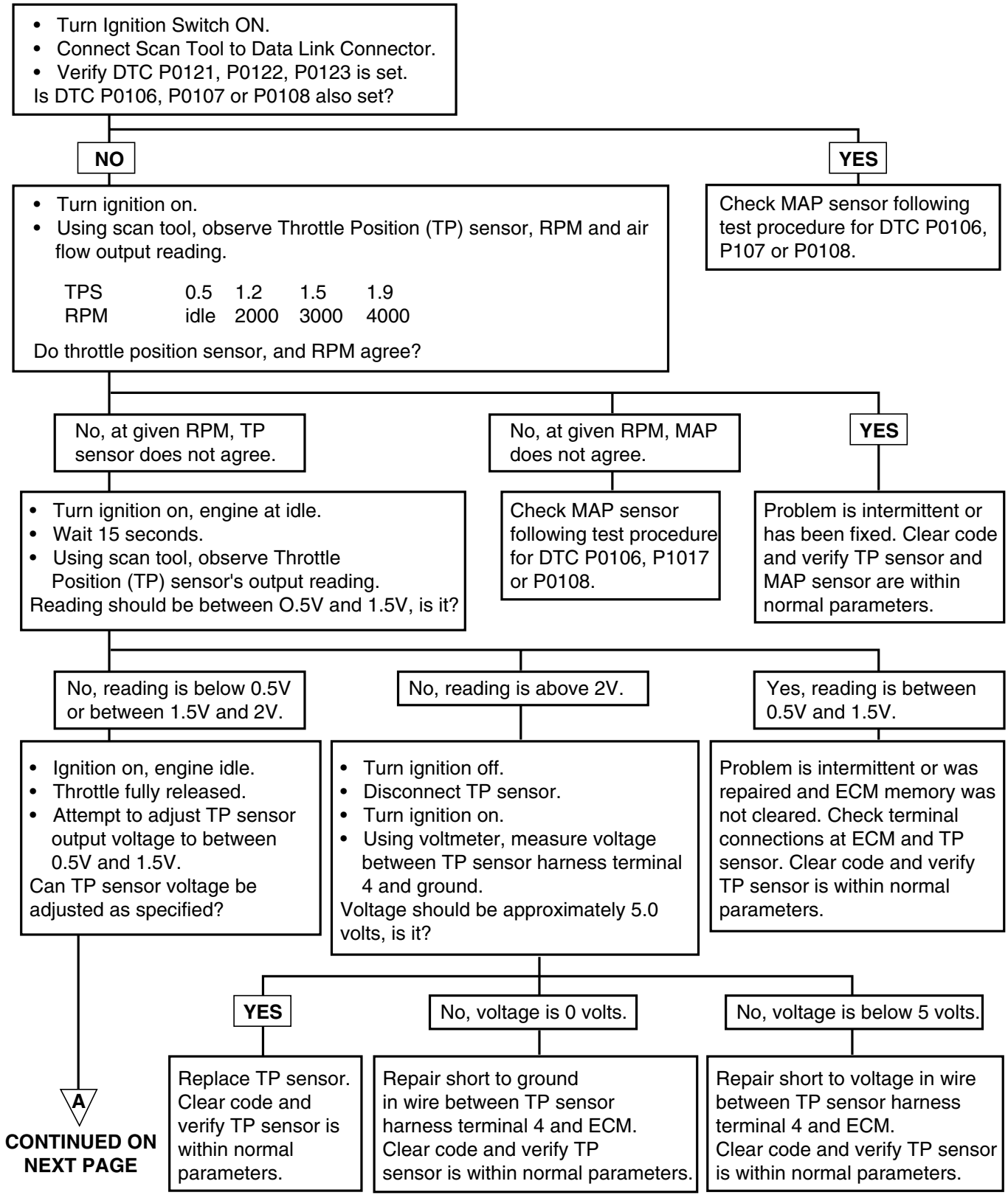
The standard resistance value between terminals 4 and 3 of the throttle position sensor is 1600-2500 ohms.

CIRCUIT DIAGRAM

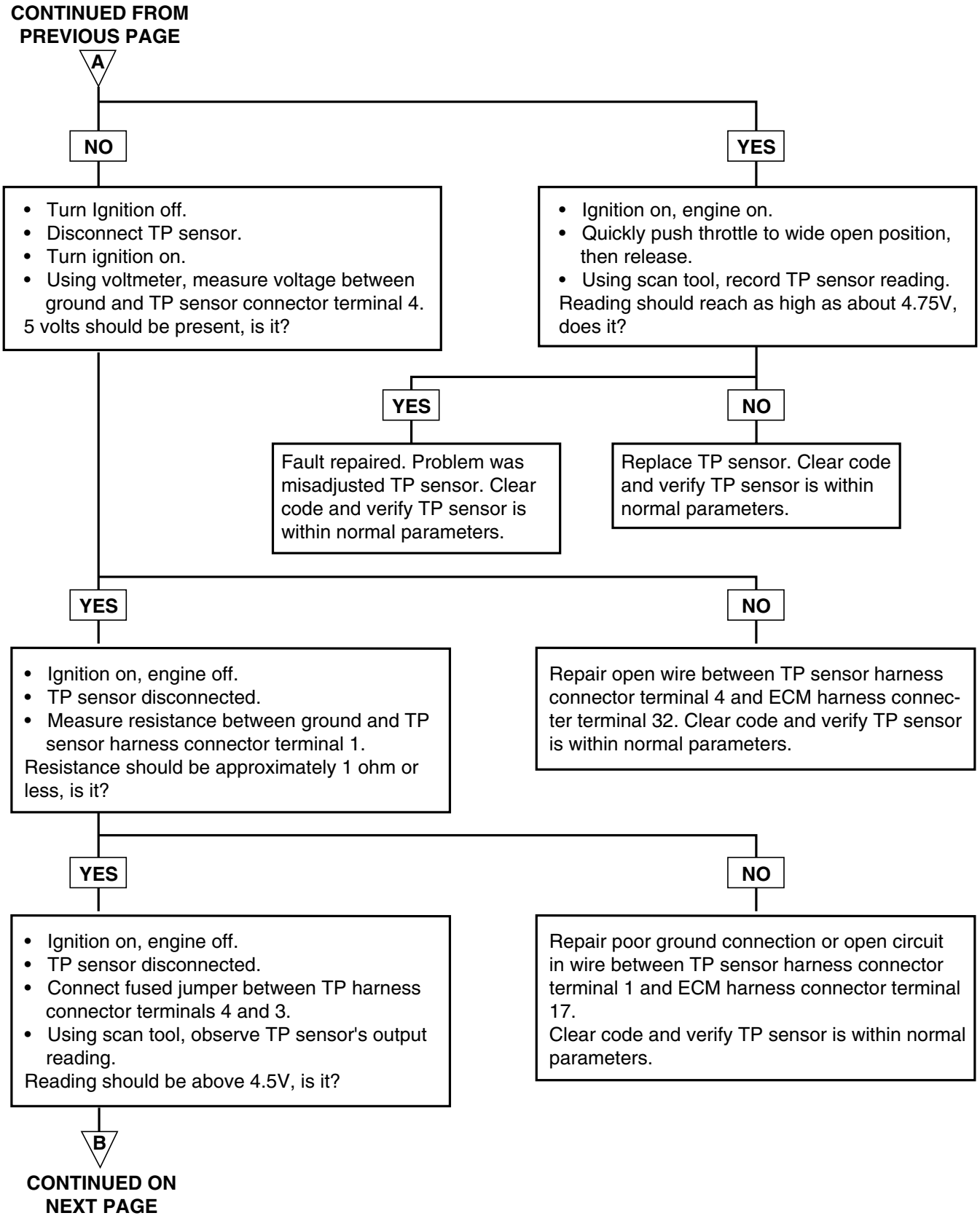


IFTD713A

TEST PROCEDURE



IFTC516B


CONTINUED FROM PREVIOUS PAGE
A
NO
YES
• Turn Ignition off.
• Disconnect TP sensor.
• Turn ignition on.
• Using voltmeter, measure voltage between ground and TP sensor connector terminal 4.
5 volts should be present, is it?
• Ignition on, engine on.
• Quickly push throttle to wide open position, then release.
• Using scan tool, record TP sensor reading.
Reading should reach as high as about 4.75V, does it?
YES
NO
Fault repaired. Problem was misadjusted TP sensor. Clear code and verify TP sensor is within normal parameters.
Replace TP sensor. Clear code and verify TP sensor is within normal parameters.
YES
NO
• Ignition on, engine off.
• TP sensor disconnected.
• Measure resistance between ground and TP sensor harness connector terminal 1.
Resistance should be approximately 1 ohm or less, is it?
Repair open wire between TP sensor harness connector terminal 4 and ECM harness connecter terminal 32. Clear code and verify TP sensor is within normal parameters.
YES
NO
• Ignition on, engine off.
• TP sensor disconnected.
• Connect fused jumper between TP harness connector terminals 4 and 3.
• Using scan tool, observe TP sensor's output reading.
Reading should be above 4.5V, is it?
Repair poor ground connection or open circuit in wire between TP sensor harness connector terminal 1 and ECM harness connector terminal 17.
Clear code and verify TP sensor is within normal parameters.
B
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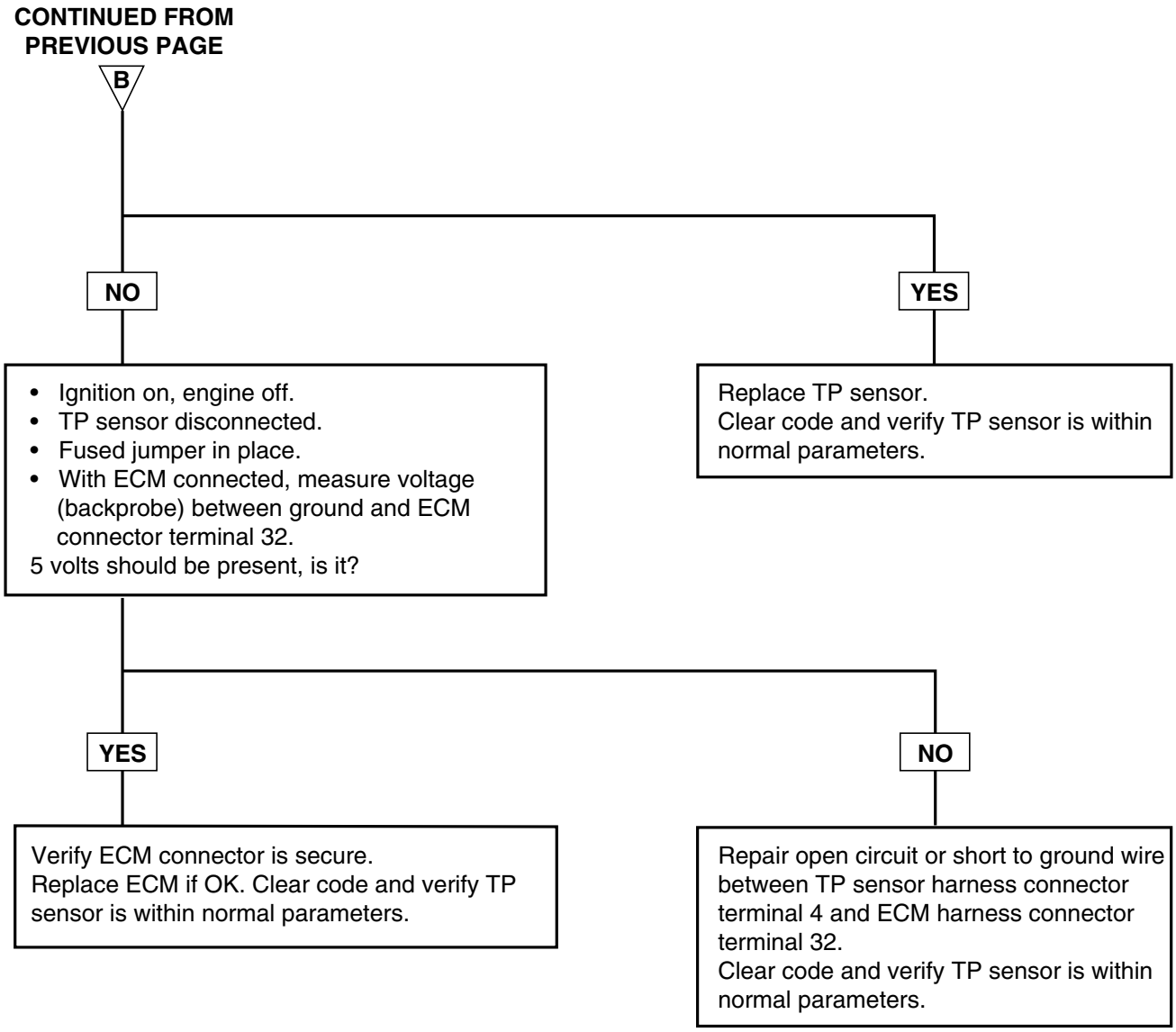
IFDA516C


CONTINUED FROM PREVIOUS PAGE
B
NO
YES
• Ignition on, engine off.
• TP sensor disconnected.
• Fused jumper in place.
• With ECM connected, measure voltage (backprobe) between ground and ECM connector terminal 32.
5 volts should be present, is it?
Replace TP sensor.
Clear code and verify TP sensor is within normal parameters.
YES
NO
Verify ECM connector is secure.
Replace ECM if OK. Clear code and verify TP sensor is within normal parameters.
Repair open circuit or short to ground wire between TP sensor harness connector terminal 4 and ECM harness connector terminal 32.
Clear code and verify TP sensor is within normal parameters.

IFDA516D

IFTD5210

DTC	Diagnostic item
P0130	Oxygen Sensor Circuit Malfunction (Bank1, Sensor1)

DESCRIPTION

The Engine Control Module (ECM) uses oxygen sensor signals to maintain the air fuel mixture at the ratio resulting in optimum fuel economy and reduced emissions. The amount of oxygen in the exhaust gases indicates, to the oxygen sensor, whether the air fuel mixture being supplied to the engine cylinders is rich or lean.

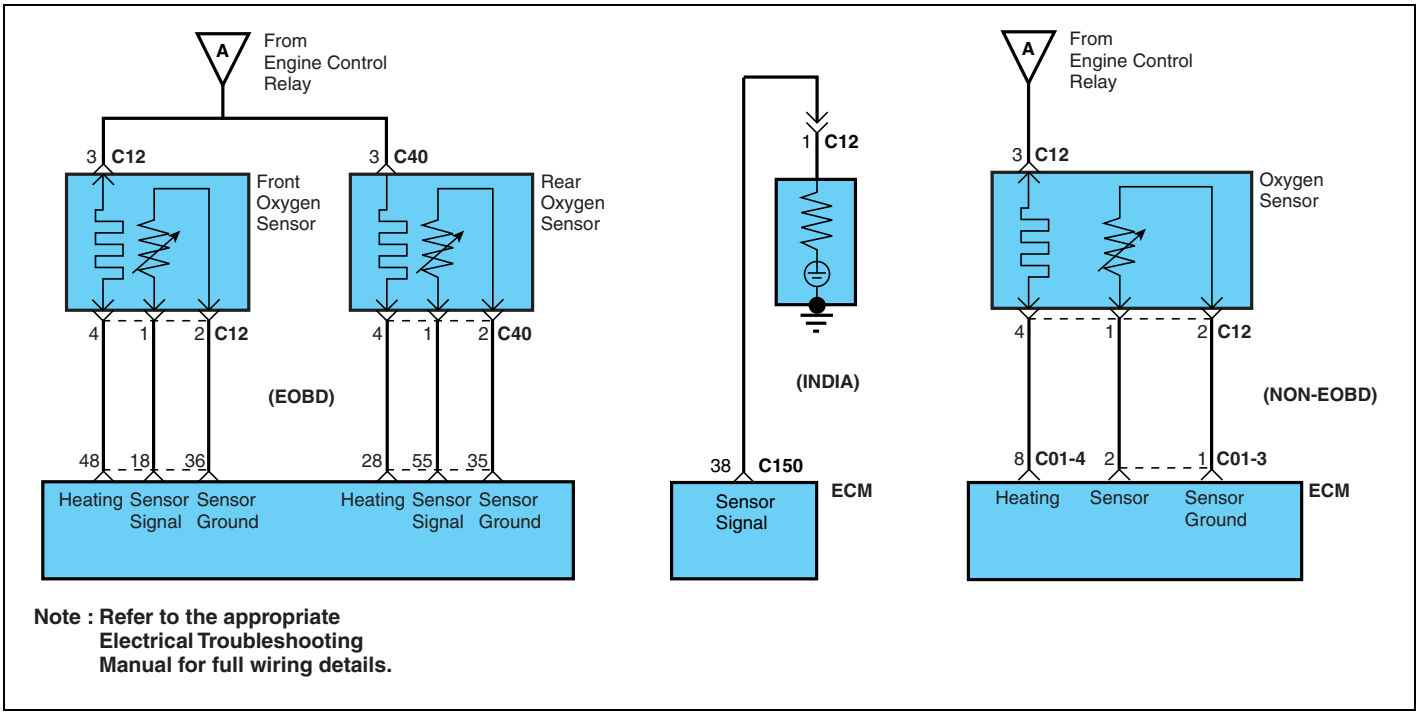
A normal oxygen sensor signal will constantly fluctuate above and below 500 mV, with the front oxygen sensor signal frequency of at least 5Hz at 2500 RPM.

FAILURE CONDITIONS

(FOR P0130)

After the engine runs, the ECM checks the oxygen sensor once per driving cycle for 5 sec. If during two driving cycles the oxygen sensor's output is not between 0 millivolts and +380 millivolts the ECM will set a code. This code indicates uncharacteristic operation of the front oxygen sensor being read by the ECM.

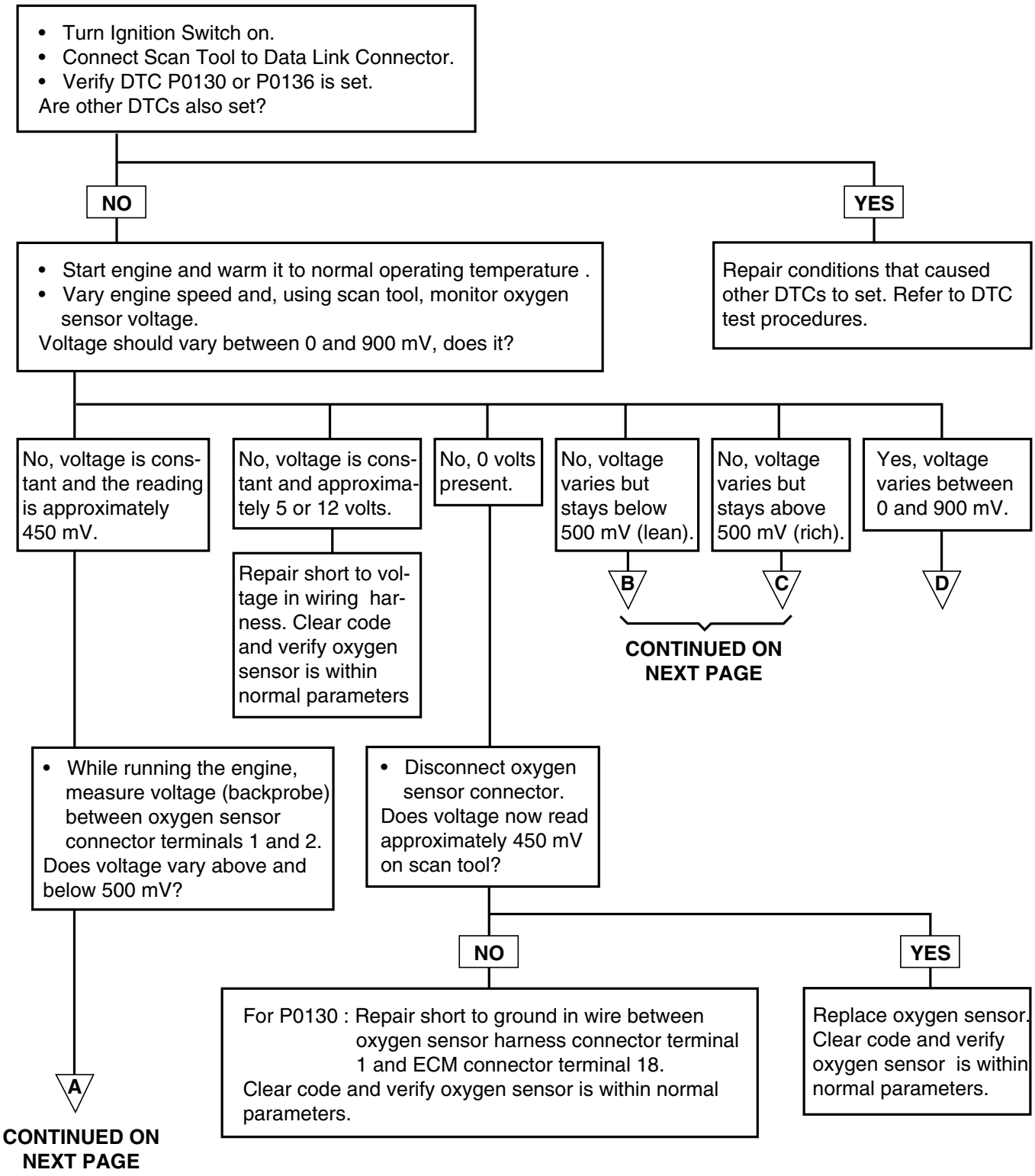
CIRCUIT DIAGRAM



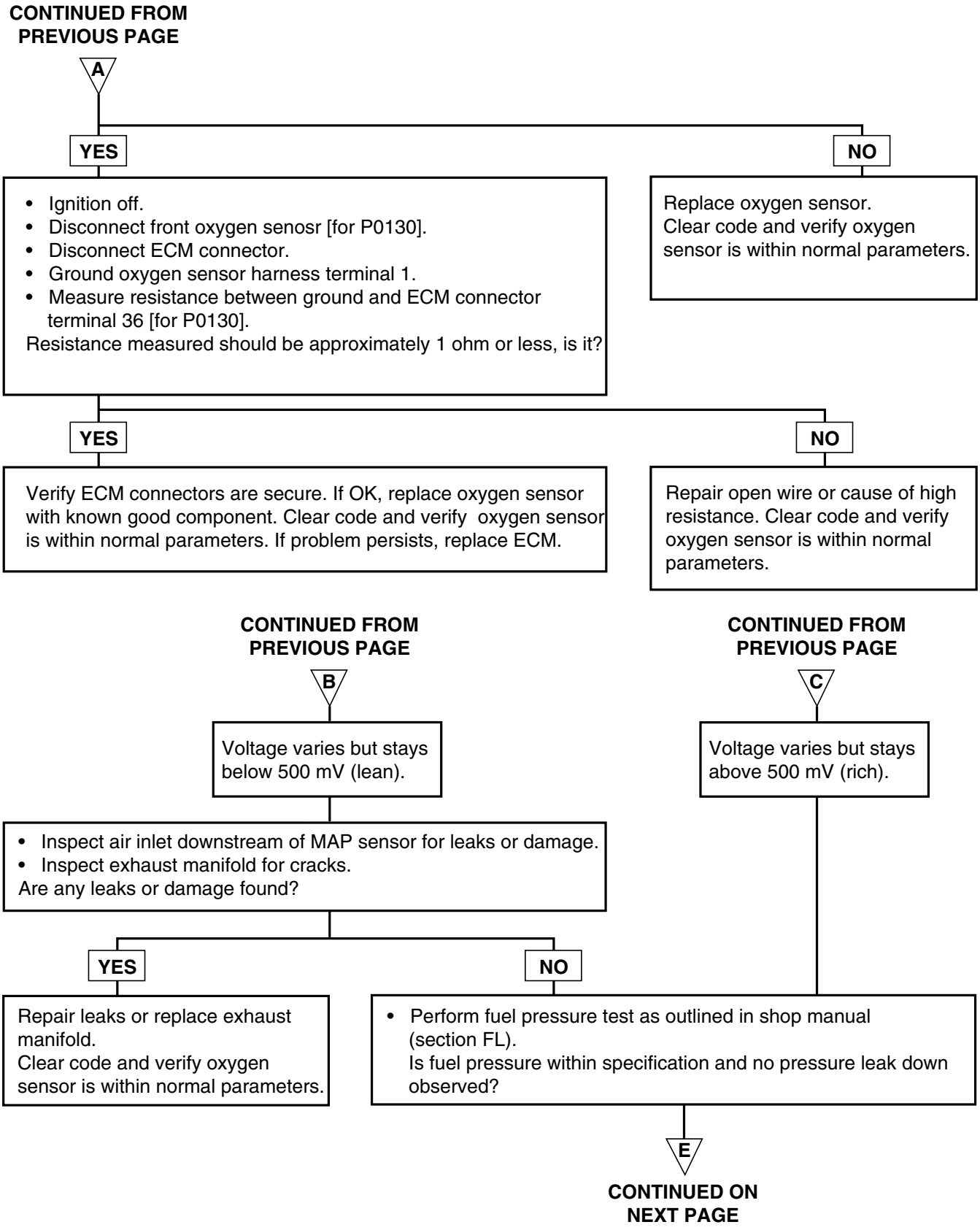
Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD719A

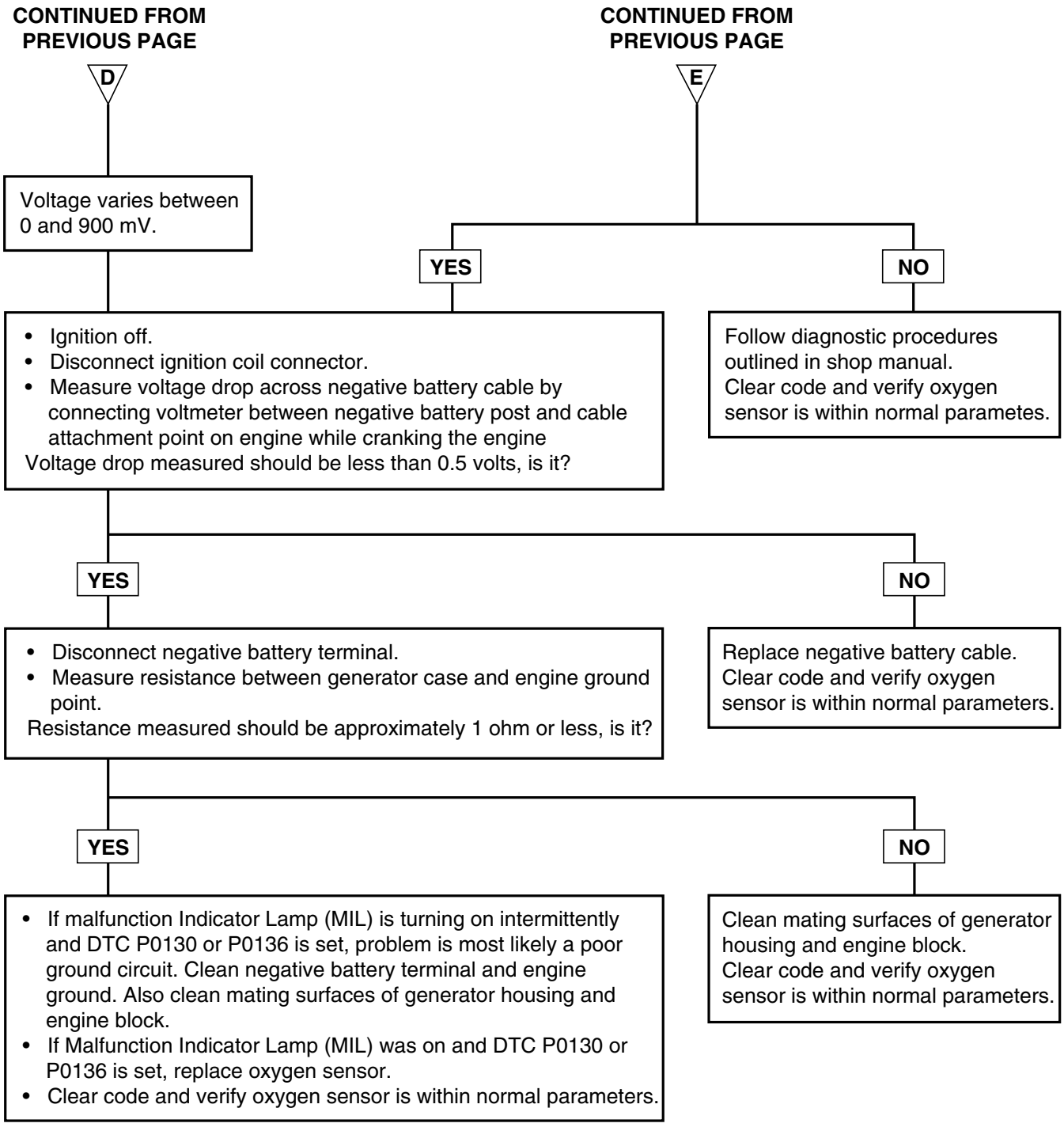
TEST PROCEDURE



IFDA521B


CONTINUED FROM PREVIOUS PAGE
A
YES
NO
• Ignition off.
• Disconnect front oxygen senosr [for P0130].
• Disconnect ECM connector.
• Ground oxygen sensor harness terminal 1.
• Measure resistance between ground and ECM connector terminal 36 [for P0130].
Resistance measured should be approximately 1 ohm or less, is it?
Replace oxygen sensor.
Clear code and verify oxygen sensor is within normal parameters.
YES
NO
Verify ECM connectors are secure. If OK, replace oxygen sensor with known good component. Clear code and verify oxygen sensor is within normal parameters. If problem persists, replace ECM.
Repair open wire or cause of high resistance. Clear code and verify oxygen sensor is within normal parameters.
CONTINUED FROM PREVIOUS PAGE
B
Voltage varies but stays below 500 mV (lean).
CONTINUED FROM PREVIOUS PAGE
C
Voltage varies but stays above 500 mV (rich).
• Inspect air inlet downstream of MAP sensor for leaks or damage.
• Inspect exhaust manifold for cracks.
Are any leaks or damage found?
YES
NO
Repair leaks or replace exhaust manifold.
Clear code and verify oxygen sensor is within normal parameters.
• Perform fuel pressure test as outlined in shop manual (section FL).
Is fuel pressure within specification and no pressure leak down observed?
E
CONTINUED ON NEXT PAGE

IFDA521C


CONTINUED FROM PREVIOUS PAGE
D
CONTINUED FROM PREVIOUS PAGE
E
Voltage varies between 0 and 900 mV.
YES
NO
• Ignition off.
• Disconnect ignition coil connector.
• Measure voltage drop across negative battery cable by connecting voltmeter between negative battery post and cable attachment point on engine while cranking the engine
Voltage drop measured should be less than 0.5 volts, is it?
Follow diagnostic procedures outlined in shop manual.
Clear code and verify oxygen sensor is within normal parametes.
YES
NO
• Disconnect negative battery terminal.
• Measure resistance between generator case and engine ground point.
Resistance measured should be approximately 1 ohm or less, is it?
Replace negative battery cable.
Clear code and verify oxygen sensor is within normal parameters.
YES
NO
• If malfunction Indicator Lamp (MIL) is turning on intermittently and DTC P0130 or P0136 is set, problem is most likely a poor ground circuit. Clean negative battery terminal and engine ground. Also clean mating surfaces of generator housing and engine block.
• If Malfunction Indicator Lamp (MIL) was on and DTC P0130 or P0136 is set, replace oxygen sensor.
• Clear code and verify oxygen sensor is within normal parameters.
Clean mating surfaces of generator housing and engine block.
Clear code and verify oxygen sensor is within normal parameters.

EFDA521D

IFTD5260

DTC	Diagnostic item
P0131	Oxygen Sensor Circuit Low Input (Bank1, Sensor1)

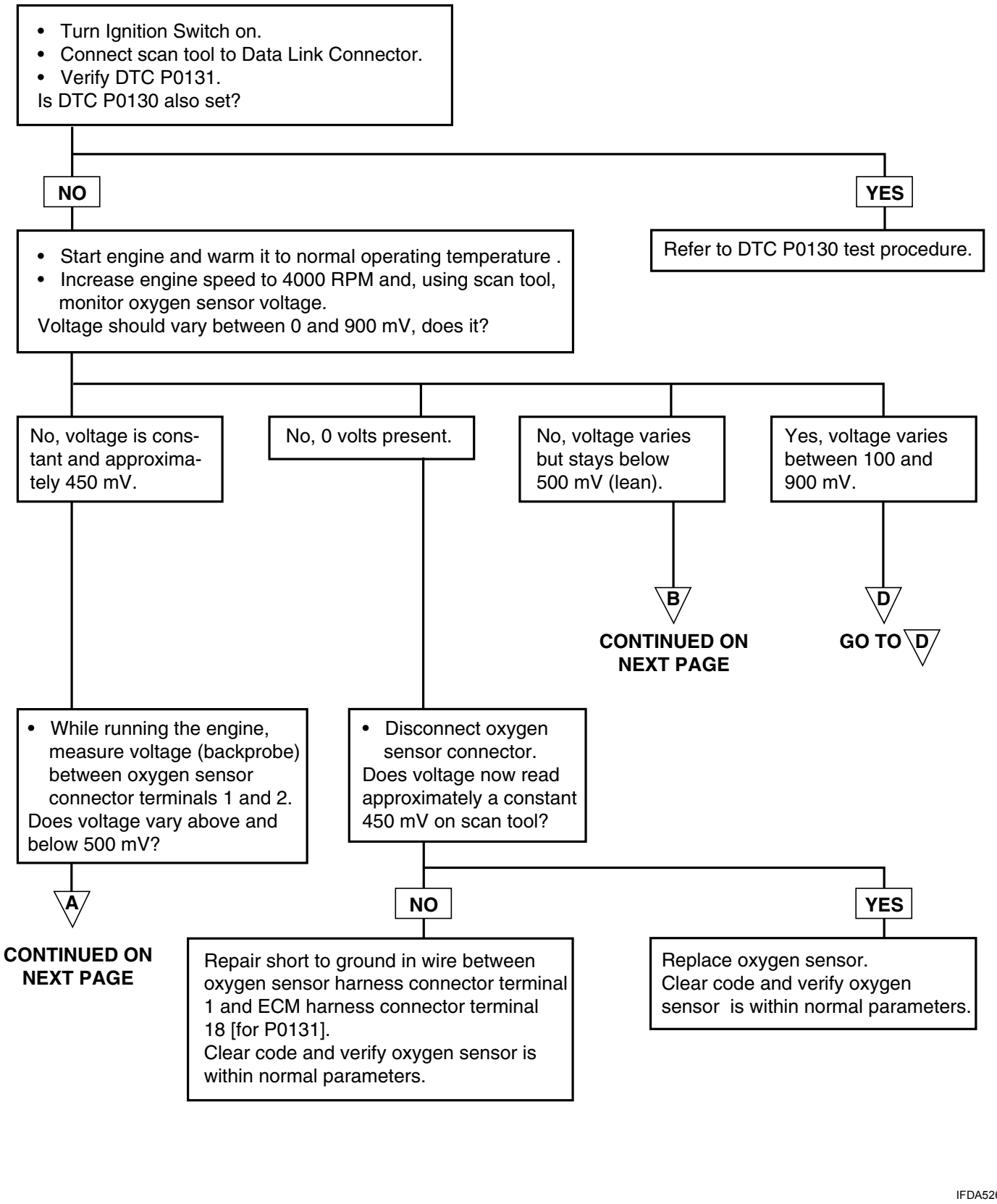
DESCRIPTION

Refer to DTC P0130.

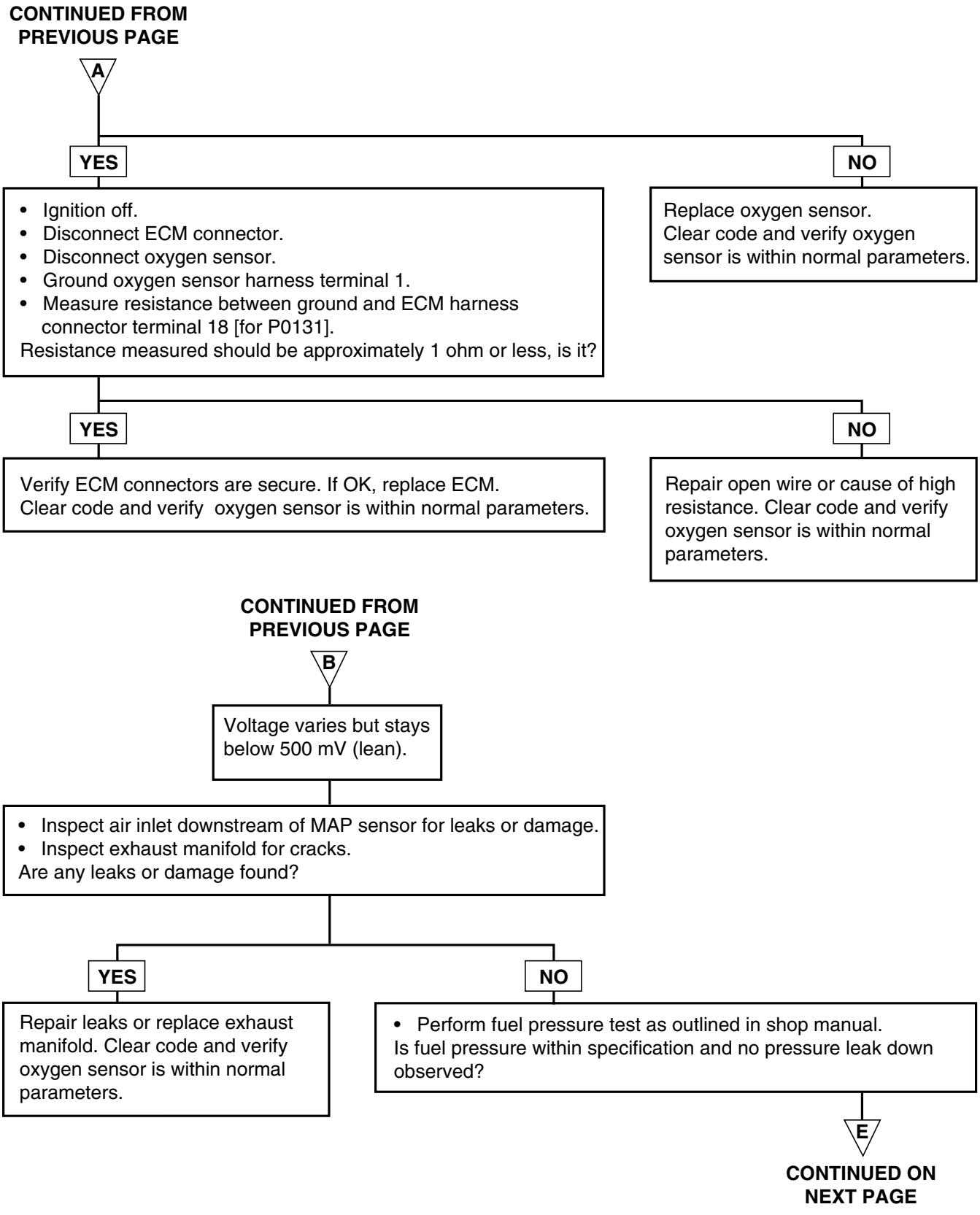
FAILURE CONDITIONS

After the Front Oxygen Sensor Heater is on for 3 minutes, the ECM continuously measures the front oxygen sensor's output in 0.5 second intervals. If during two driving cycles the front oxygen sensor's output falls below 50 millivolts for 0.5 seconds, the ECM will set P0131. This code indicates an unusually lean fuel air mixture being read by the front oxygen sensor or ECM.

TEST PROCEDURE



IFDA526B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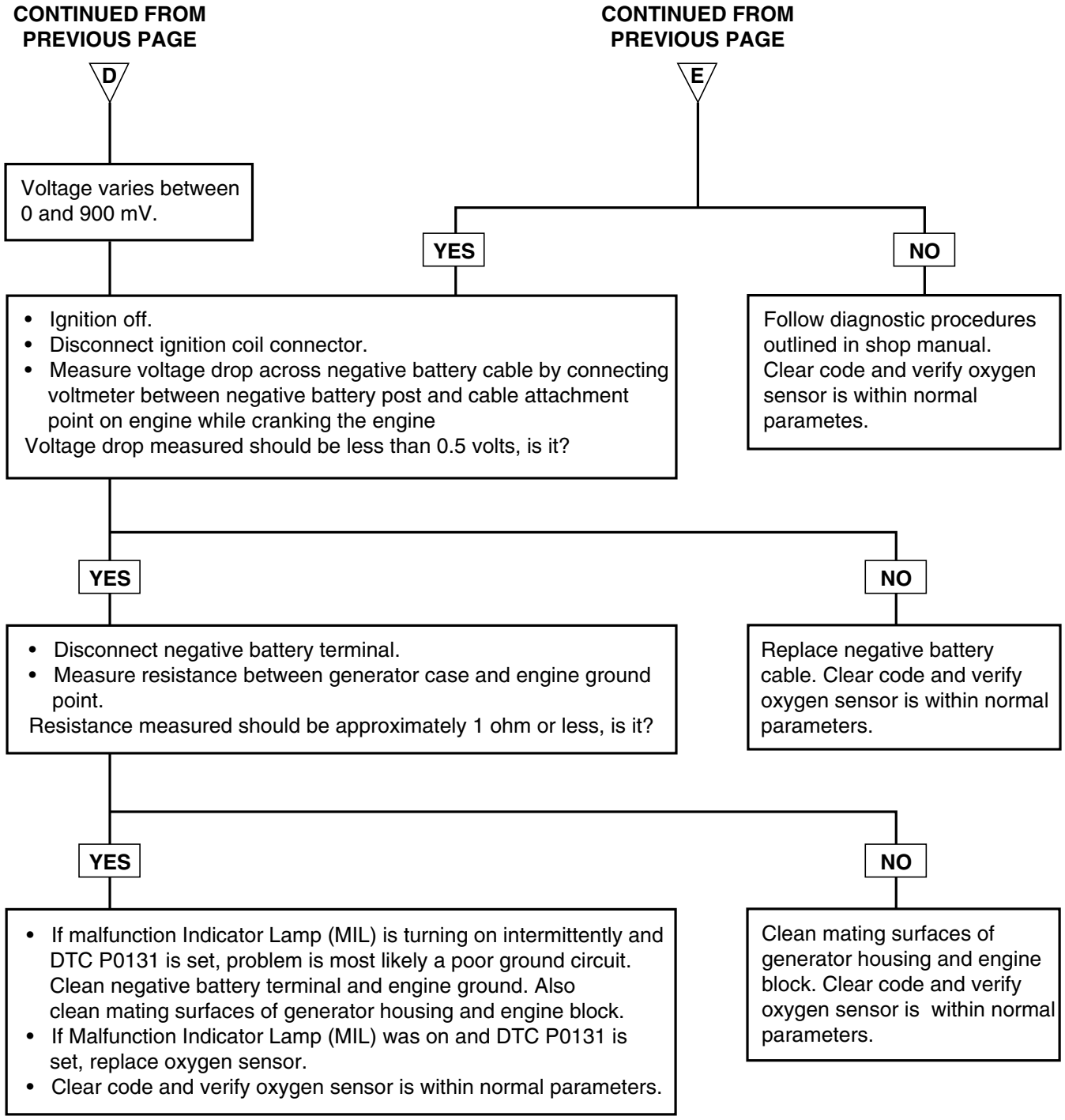
A
YES
NO
• Ignition off.
• Disconnect ECM connector.
• Disconnect oxygen sensor.
• Ground oxygen sensor harness terminal 1.
• Measure resistance between ground and ECM harness connector terminal 18 [for P0131].
Resistance measured should be approximately 1 ohm or less, is it?
Replace oxygen sensor.
Clear code and verify oxygen sensor is within normal parameters.
YES
NO
Verify ECM connectors are secure. If OK, replace ECM.
Clear code and verify oxygen sensor is within normal parameters.
Repair open wire or cause of high resistance. Clear code and verify oxygen sensor is within normal parameters.
CONTINUED FROM PREVIOUS PAGE
B
Voltage varies but stays below 500 mV (lean).
• Inspect air inlet downstream of MAP sensor for leaks or damage.
• Inspect exhaust manifold for cracks.
Are any leaks or damage found?
YES
NO
Repair leaks or replace exhaust manifold. Clear code and verify oxygen sensor is within normal parameters.
• Perform fuel pressure test as outlined in shop manual.
Is fuel pressure within specification and no pressure leak down observed?
E
CONTINUED ON NEXT PAGE

IFDA526C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D
Voltage varies between 0 and 900 mV.
CONTINUED FROM PREVIOUS PAGE
E
YES
NO
• Ignition off.
• Disconnect ignition coil connector.
• Measure voltage drop across negative battery cable by connecting voltmeter between negative battery post and cable attachment point on engine while cranking the engine
Voltage drop measured should be less than 0.5 volts, is it?
Follow diagnostic procedures outlined in shop manual. Clear code and verify oxygen sensor is within normal parametes.
YES
NO
• Disconnect negative battery terminal.
• Measure resistance between generator case and engine ground point.
Resistance measured should be approximately 1 ohm or less, is it?
Replace negative battery cable. Clear code and verify oxygen sensor is within normal parameters.
YES
NO
• If malfunction Indicator Lamp (MIL) is turning on intermittently and DTC P0131 is set, problem is most likely a poor ground circuit. Clean negative battery terminal and engine ground. Also clean mating surfaces of generator housing and engine block.
• If Malfunction Indicator Lamp (MIL) was on and DTC P0131 is set, replace oxygen sensor.
• Clear code and verify oxygen sensor is within normal parameters.
Clean mating surfaces of generator housing and engine block. Clear code and verify oxygen sensor is within normal parameters.

EFDA526D

IFTD5310

DTC	Diagnostic item
P0132	Oxygen Sensor Circuit High Input (Bank1, Sensor1)

DESCRIPTION

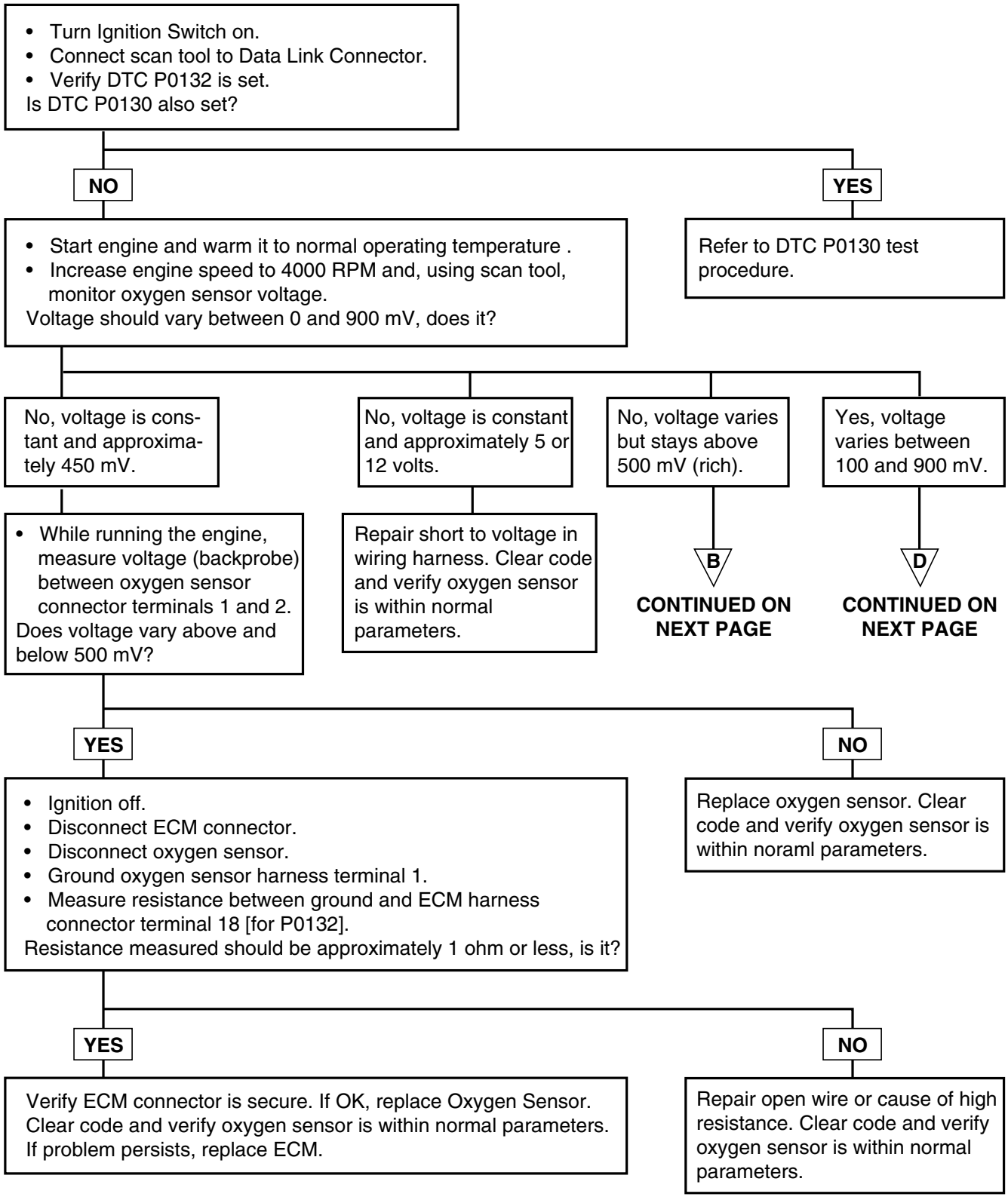
Refer to DTC P0130.

FAILURE CONDITIONS

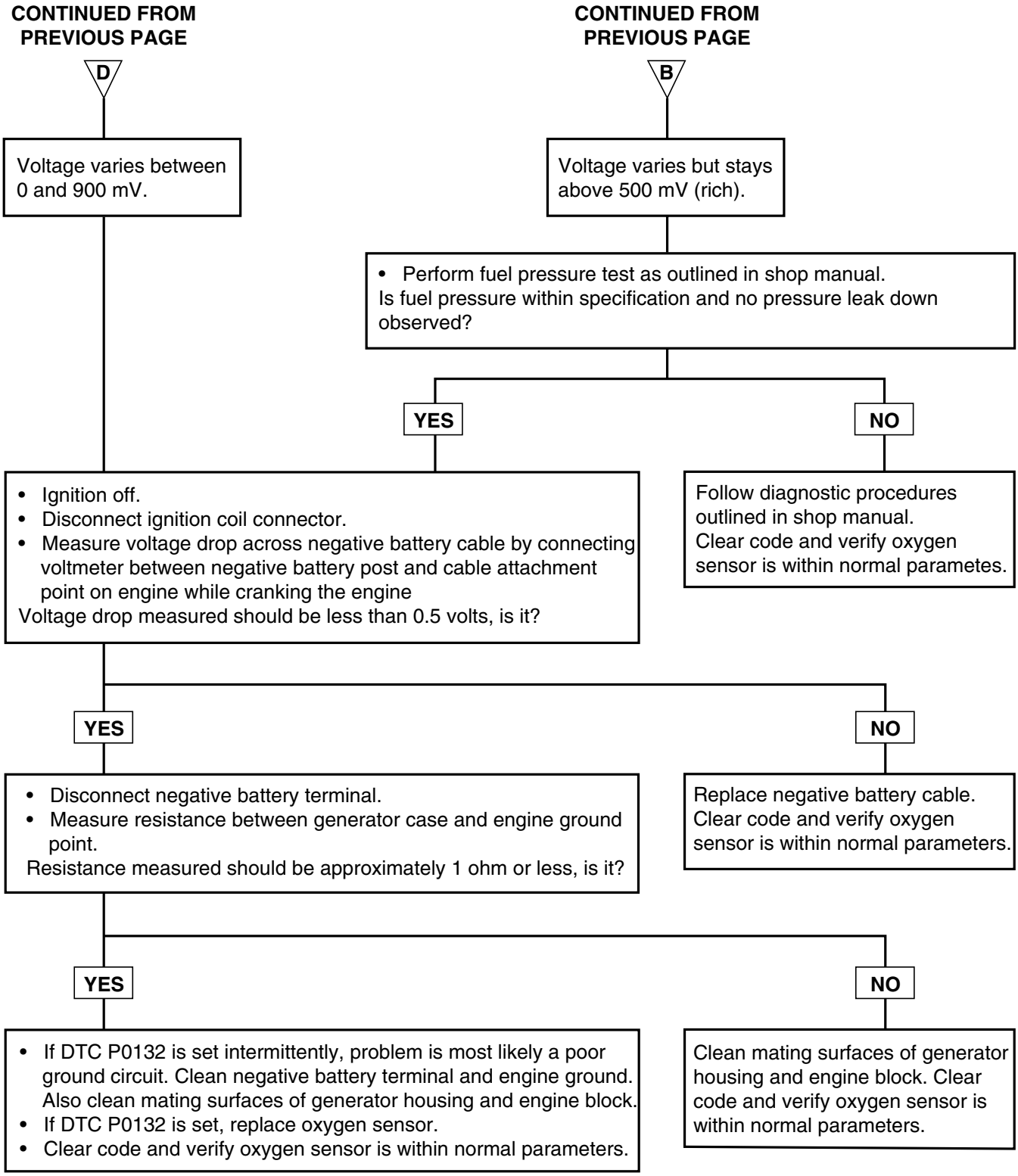
(FOR P0132)

After the Front Oxygen Sensor Heater has been on for 3 minutes, the ECM continuously measures the front oxygen sensor's output in 0.5 second intervals. If during two driving cycles the front oxygen sensor's output exceeds 1.058 volts for 0.5 seconds, the ECM will set P0132. This code indicates an extremely rich air fuel mixture being read by the front oxygen sensor or ECM.

TEST PROCEDURE



IFDA531B


CONTINUED FROM PREVIOUS PAGE
D
Voltage varies between 0 and 900 mV.
CONTINUED FROM PREVIOUS PAGE
B
Voltage varies but stays above 500 mV (rich).
• Perform fuel pressure test as outlined in shop manual.
Is fuel pressure within specification and no pressure leak down observed?
YES
NO
• Ignition off.
• Disconnect ignition coil connector.
• Measure voltage drop across negative battery cable by connecting voltmeter between negative battery post and cable attachment point on engine while cranking the engine
Voltage drop measured should be less than 0.5 volts, is it?
Follow diagnostic procedures outlined in shop manual.
Clear code and verify oxygen sensor is within normal parametes.
YES
NO
• Disconnect negative battery terminal.
• Measure resistance between generator case and engine ground point.
Resistance measured should be approximately 1 ohm or less, is it?
Replace negative battery cable.
Clear code and verify oxygen sensor is within normal parameters.
YES
NO
• If DTC P0132 is set intermittently, problem is most likely a poor ground circuit. Clean negative battery terminal and engine ground. Also clean mating surfaces of generator housing and engine block.
• If DTC P0132 is set, replace oxygen sensor.
• Clear code and verify oxygen sensor is within normal parameters.
Clean mating surfaces of generator housing and engine block. Clear code and verify oxygen sensor is within normal parameters.

IFDA531C

IFTC5360

DTC	Diagnostic item
P0133	Oxygen Sensor Circuit Slow Response (Bank1, Sensor1)
P0134	Oxygen Sensor Circuit Inactive (Bank1, Sensor1)

DESCRIPTION

Refer to DTC P0130 & P0136.

FAILURE CONDITIONS[FOR P0133]

(FOR P0133)

The ECM will set P0133 if the ECM does not sense the following conditions during two driving cycles:

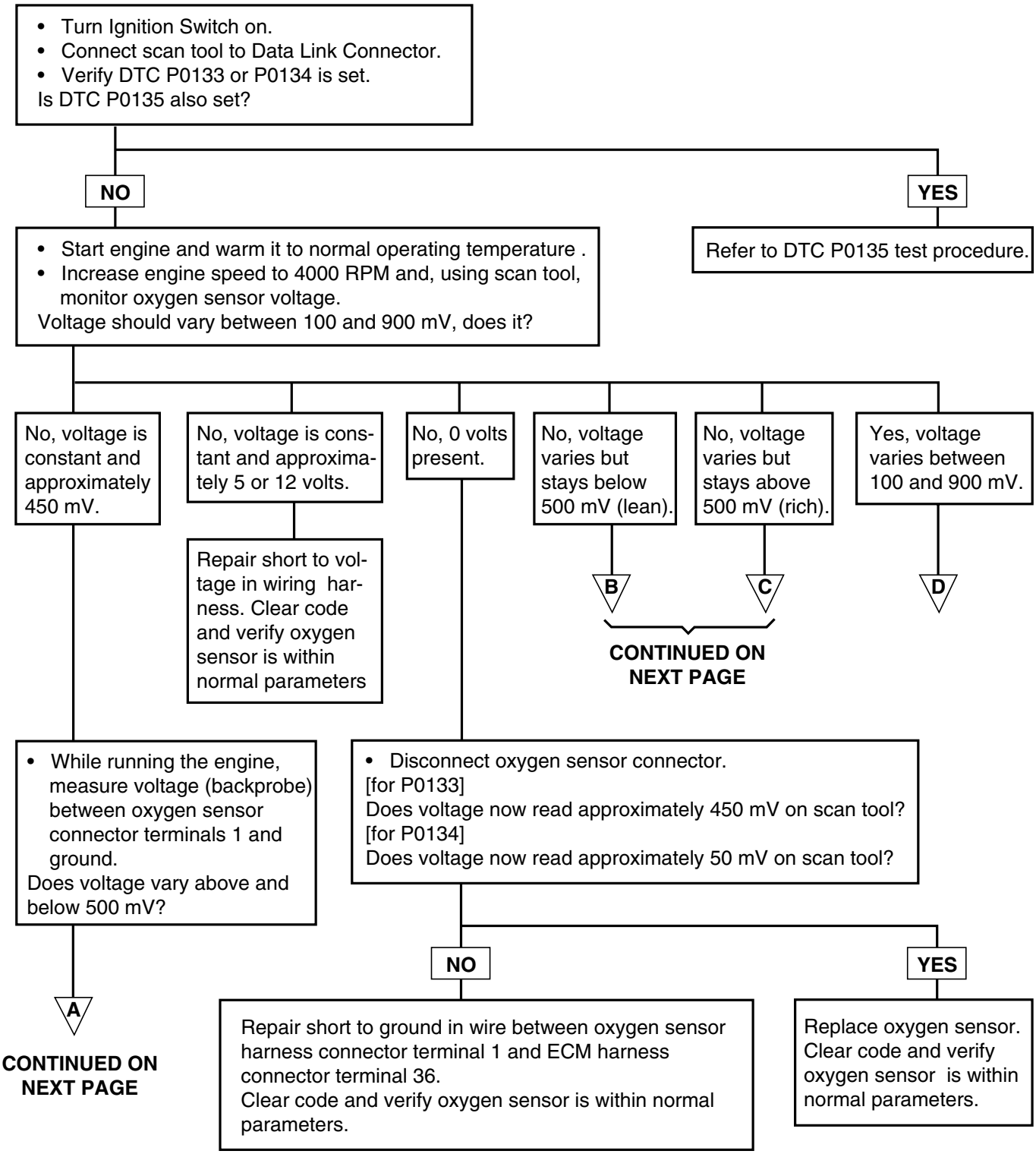
1. Over a period of 2 minutes, the ECM must sense a fuel compensation factor greater 85% or less than 95%:
2. The ECM must make some correction in the air/fuel ratio when:
   - Engine RPM is between 1600 and 3200 RPM.
   - Engine load range is between 1.35 and 3.4 milliseconds.
   - Catalyst temperature is above 372°C (702°F).
   - System is in closed loop.

This code indicates the engine air fuel ratio is not being adjusted by the front oxygen sensor signal or the ECM as expected to do so, or not adjusted as often as expected to do so once the engine is warmed or under normal engine use.

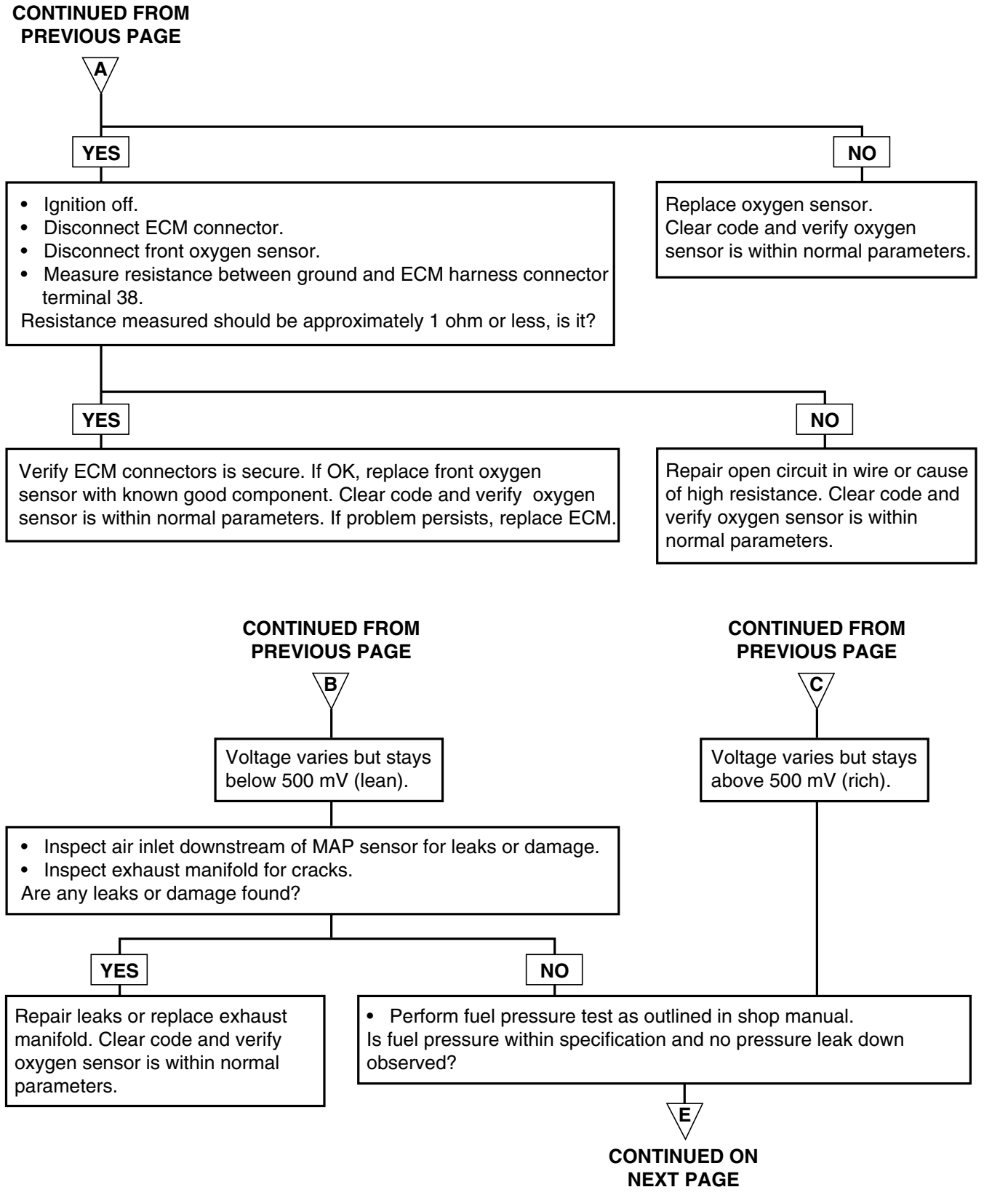
(FOR P0134)

After the engine runs for 3 minutes, the ECM checks the front oxygen sensor. If during 2 driving cycles the front oxygen sensor's output voltage is not between 400 and 600 millivolts for 5 seconds, the ECM will set a code. This code indicates the front oxygen sensor is not active within the expected range once the engine has been warmed.

TEST PROCEDURE



IFDA536B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A
YES
NO
• Ignition off.
• Disconnect ECM connector.
• Disconnect front oxygen sensor.
• Measure resistance between ground and ECM harness connector terminal 38.
Resistance measured should be approximately 1 ohm or less, is it?
Replace oxygen sensor. Clear code and verify oxygen sensor is within normal parameters.
YES
NO
Verify ECM connectors is secure. If OK, replace front oxygen sensor with known good component. Clear code and verify oxygen sensor is within normal parameters. If problem persists, replace ECM.
Repair open circuit in wire or cause of high resistance. Clear code and verify oxygen sensor is within normal parameters.
CONTINUED FROM PREVIOUS PAGE
B
Voltage varies but stays below 500 mV (lean).
CONTINUED FROM PREVIOUS PAGE
C
Voltage varies but stays above 500 mV (rich).
• Inspect air inlet downstream of MAP sensor for leaks or damage.
• Inspect exhaust manifold for cracks.
Are any leaks or damage found?
YES
NO
Repair leaks or replace exhaust manifold. Clear code and verify oxygen sensor is within normal parameters.
• Perform fuel pressure test as outlined in shop manual.
Is fuel pressure within specification and no pressure leak down observed?
E
CONTINUED ON NEXT PAGE

IFTC536C

CONTINUED FROM PREVIOUS PAGE

D

Voltage varies between 100 and 900 mV.

YES

- Ignition off.
- Disconnect ignition coil connector.
- Measure voltage drop across negative battery cable by connecting voltmeter between negative battery post and cable attachment point on engine while cranking the engine

Voltage drop measured should be less than 0.5 volts, is it?

YES

- Disconnect negative battery terminal.
- Measure resistance between generator case and engine ground point.

Resistance measured should be approximately 1 ohm or less, is it?

YES

- If DTC P0133 is set intermittently, problem is most likely a poor ground circuit. Clean negative battery terminal and engine ground. Also clean mating surfaces of generator housing and engine block.
- If DTC P0133 or P0134 is set, replace oxygen sensor.
- Clear code and verify oxygen sensor is within normal parameters.

CONTINUED FROM PREVIOUS PAGE

E

NO

Follow diagnostic procedures outlined in shop manual. Clear code and verify oxygen sensor is within normal parametes.

NO

Replace negative battery cable. Clear code and verify oxygen sensor is within normal parameters.

NO

Clean mating surfaces of generator housing and engine block. Clear code and verify oxygen sensor is within normal parameters.

IFDA536D

IFTD5410

DTC	Diagnostic item
P0261	Cylinder 1 - Injector Circuit Low
P0262	Cylinder 1 - Injector Circuit High
P0264	Cylinder 2 - Injector Circuit Low
P0265	Cylinder 2 - Injector Circuit High
P0267	Cylinder 3 - Injector Circuit Low
P0268	Cylinder 3 - Injector Circuit High
P0270	Cylinder 4 - Injector Circuit Low
P0271	Cylinder 4 - Injector Circuit High

DESCRIPTION

The fuel injectors are solenoid operated valves. When a fuel injector solenoid is energized (pulsed) the injector needle valve opens, allowing pressurized fuel to pass through the injector and mix with air entering the engine.

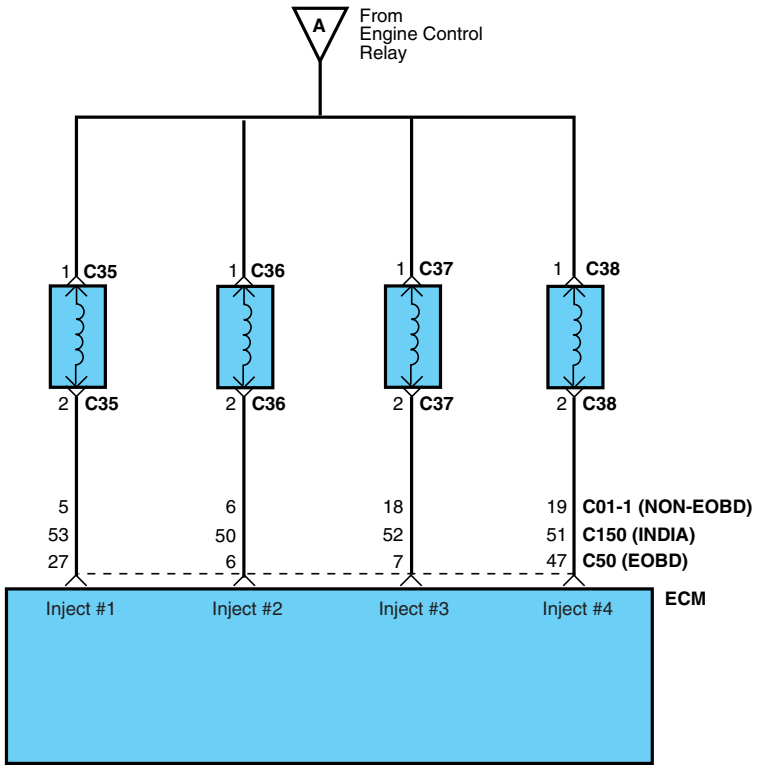
The Engine Control Module (ECM) controls injector timing and pulse width. The ECM pulses the fuel injectors based on information provided by its network of engine sensors. The ECM uses the crankshaft position sensor to determine when to pulse the injectors. Engine coolant temperature, intake air temperature, air flow, and throttle position data are all used by the ECM to calculate injector pulse width.

The ECM also uses its network of sensors to determine whether all injectors should be pulsed at the same time (simultaneous injection) or each injector should be pulsed individually (sequential injection). Sequential injection is almost always used during normal engine operation. Simultaneous injection may be used when the engine is being cranked.

FAILURE CONDITIONS

The ECM will set a code and the MIL will turn on (If installed) if an open circuit or short to ground is detected in the fuel injector circuit during two driving cycles.

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD721A

TEST PROCEDURE

- Turn ignition switch on.
- Connect scan tool to data link connector.
- Verify DTC P0201, P0202 P203 or P0204 is set.

- Engine idling at normal operating temperature.
- Disconnect the fuel injectors, one at a time, and note the drop in engine speed for each one.

Engine speed should drop the same amount for each fuel injector, does it?

NO

- Turn ignition off.
- Disconnect fuel injector connector related to DTC.
- Turn ignition on.
- Measure voltage between ground and fuel injector harness connector terminal 1.

Battery voltage should be present, is it?

YES

- Disconnect fuel injector related to DTC.
- Turn ignition off.
- Disconnect ECM connector.
- Ground fuel injector harness connector terminal 2. Measure resistance between ground and ECM connector harness terminal 27 [for P0201], terminal 6 [for P0202], terminal 7 [for P0203] or terminal 47 [for P0204].

Resistance measured should be approximately 1 ohm or less, is it?

YES

- Ignition off.
- Disconnect fuel injector related to DTC.
- Disconnect ECM connector.
- Measure resistance between ground and fuel injector harness connector terminal 2.

Resistance should indicate open circuit, does it?

A

CONTINUED ON NEXT PAGE

YES

Problem is intermittent or was repaired and Engine Control Module (ECM) memory was not cleared.
Clear code and verify fuel injector is within normal parameters.

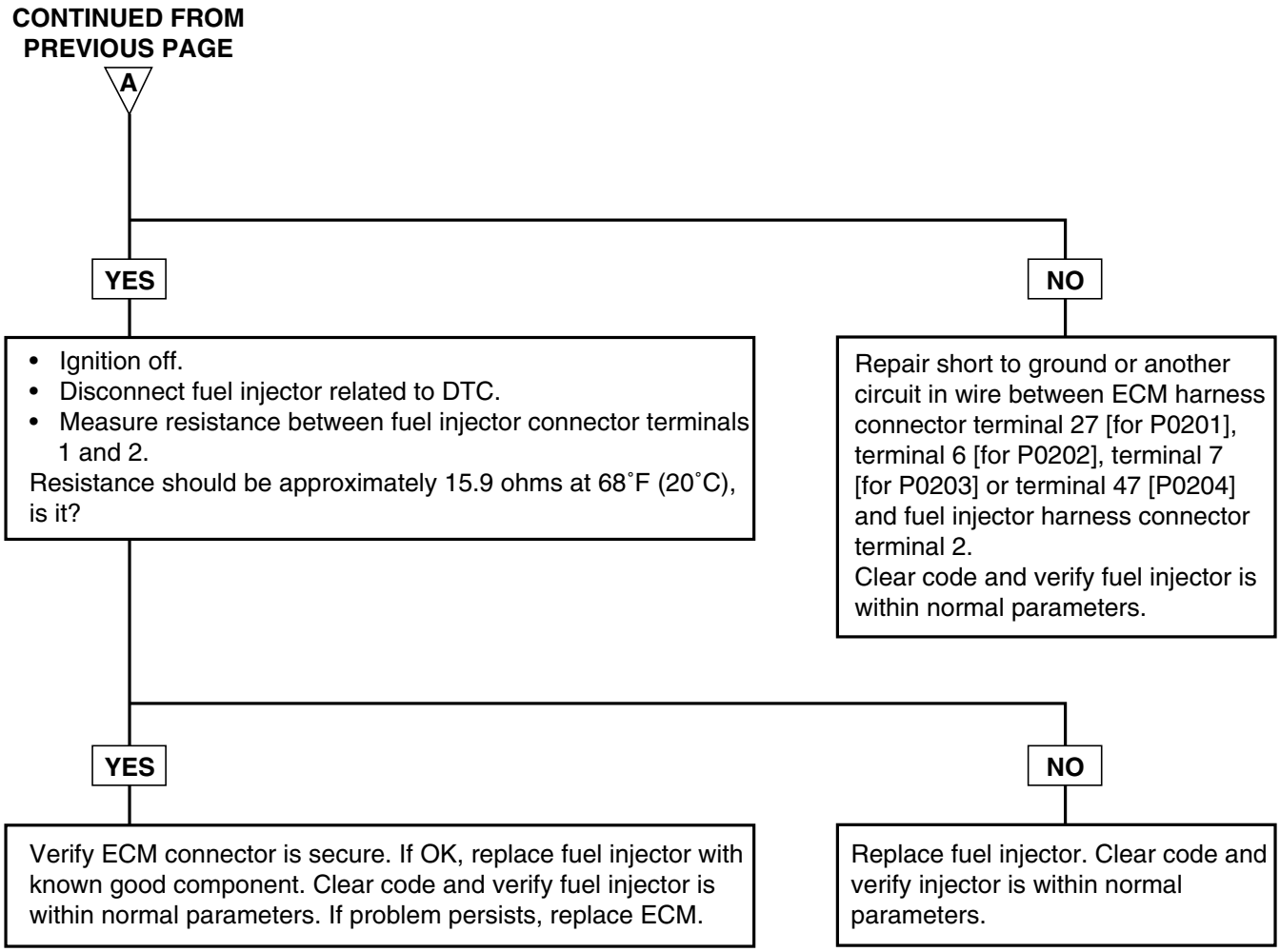
NO

Repair open in wire between Main Relay harness connector terminal 4 and fuel injector harness connector terminal 1.
Clear code and verify fuel injector is within normal parameters.

NO

Repair open circuit in wire between ECM harness connector terminal 27 [for P0201], terminal 6 [for P0202], terminal 7 [for P0203] or terminal 47 [for P0204] and fuel injector harness connector terminal 2.
Clear code and verify fuel injector is within normal parameters.

IFDA541B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A
YES
NO
• Ignition off.
• Disconnect fuel injector related to DTC.
• Measure resistance between fuel injector connector terminals 1 and 2.
Resistance should be approximately 15.9 ohms at 68˚F (20˚C), is it?
Repair short to ground or another circuit in wire between ECM harness connector terminal 27 [for P0201], terminal 6 [for P0202], terminal 7 [for P0203] or terminal 47 [P0204] and fuel injector harness connector terminal 2.
Clear code and verify fuel injector is within normal parameters.
YES
NO
Verify ECM connector is secure. If OK, replace fuel injector with known good component. Clear code and verify fuel injector is within normal parameters. If problem persists, replace ECM.
Replace fuel injector. Clear code and verify injector is within normal parameters.

IFDA541C

IFTD5460

DTC	Diagnostic item
P0300	Random Misfire Detected

DESCRIPTION

With the ignition switch at ON or START, voltage is applied to the ignition coil. The ignition coil consists of two coils. High tension leads go to each cylinder from the ignition coil. The ignition coil fires two spark plugs on every power stroke (the cylinder under compression and the cylinder on the exhaust stroke). Coil number one fires cylinders 1 and 4. Coil number two fires cylinders 2 and 3.

The Engine Control Module (ECM) provides a switching circuit to ground for energizing the primary ignition coils. The ECM uses the crankshaft position sensor signal to time the energizing of the coil. When a primary ignition coil is energized and de-energized, the secondary coil produces a high voltage spike across the attached spark plugs.

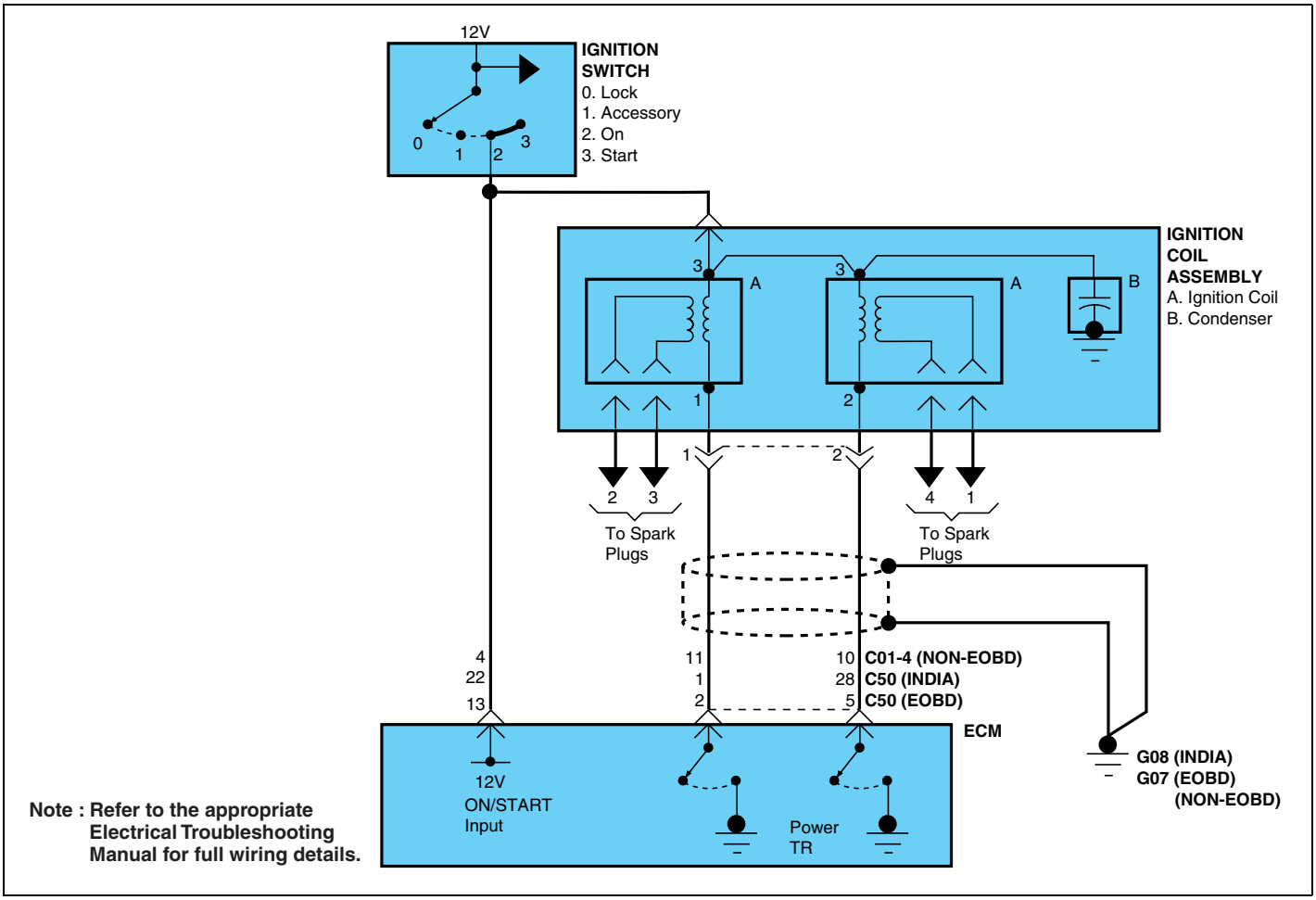
FAILURE CONDITIONS

The ECM will set P0300 and the MIL will turn on (If applicable) if 2 misfires per 100 revolutions are detected during two driving cycles. The misfire rate is measured every 200 revolutions when the following conditions are met:

- Speed change is less than 1000 rpm per second.
- Engine speed is between 600 and 4000 RPM.
- Engine load is greater than 2 milliseconds.
- No fuel cut-off.
- Starter is not engaged.
- Vehicle on smooth road (acceleration sensor reports less than 0.3 g acceleration).

If the misfire rate increases to between 5%-25% per 200 revolutions, there is danger of catalyst damage and the MIL will flash and on. The catalyst temperature could exceed 3542°F (1950°C) if the misfire rate increases enough. This code indicates a problem with cylinder ignition being read by the ECM.

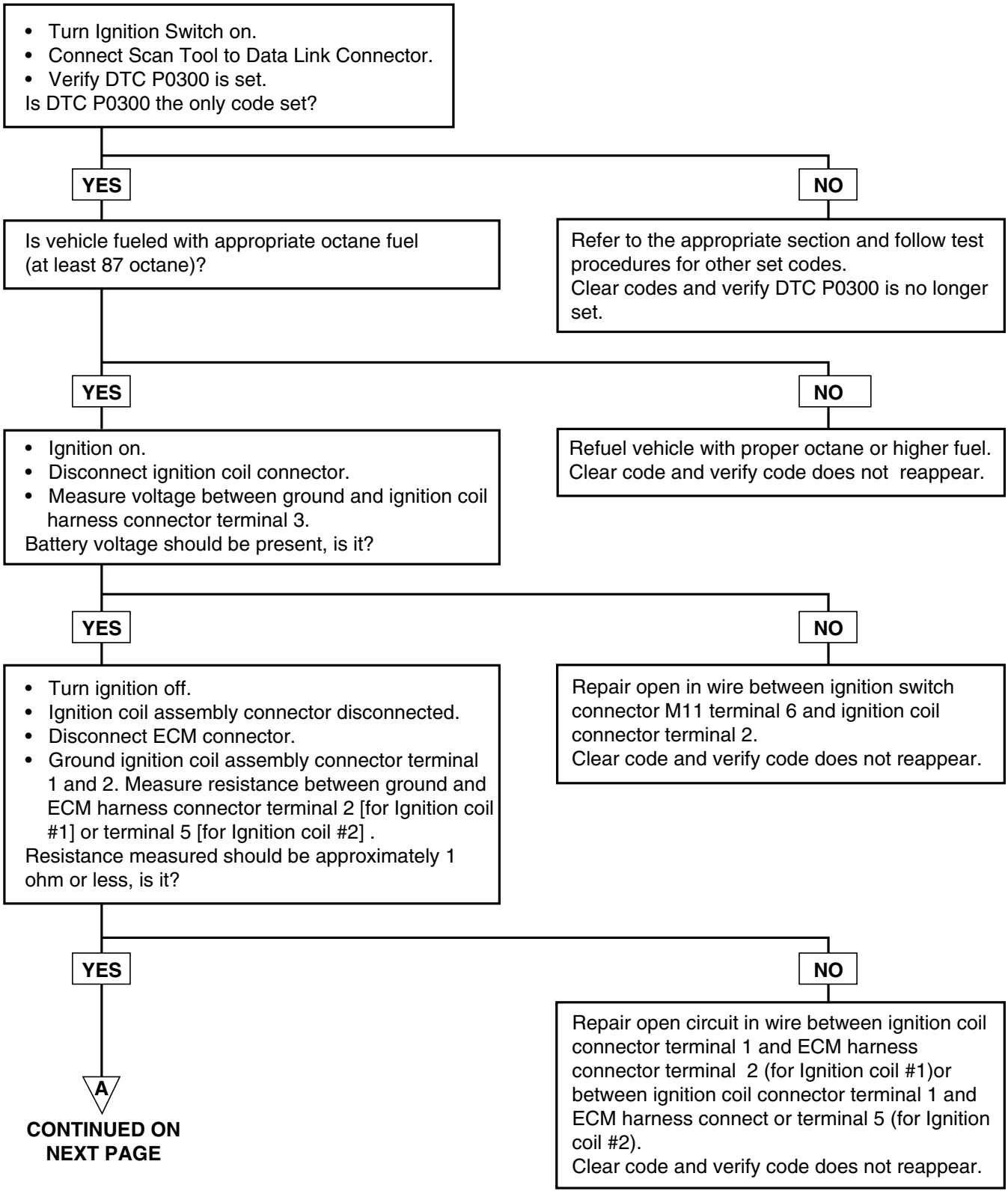
CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD741A

TEST PROCEDURE



IFDA546B

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A

- Ignition coil connector disconnected.
- Reconnect ECM connector.
- Ignition in start.
- Measure voltage between ground and ignition coil harness connector terminal 1. Note voltage.
- Measure voltage between ground and ignition coil harness connector terminal 2. Note voltage.

Voltage should vary between 0.02 and 0.2 volts, does it?

YES

- Ignition off.
- Disconnect ignition coil connector.
- Disconnect spark plug wires from ignition coil.
- Measure resistance between ignition coil connector terminals 1 and 2. Note primary coil resistance.
- Measure resistance between ignition coil spark plug connector terminals 1 and 4 and between spark plug connector terminals 2 and 3. Note secondary coil resistance.

Primary coil resistance should be approximately 1.0 ohm. Secondary coil resistance should be between 10.3 kilo ohms and 13.9 kilo ohms. Are resistances within specifiecation?

NO

Verify ECM connector is secure. If OK, replace ECM. Clear codes and verify code does not reappear.

YES

Inspect the following components/systems.

- Spark plugs and spark plug wires needing replacement.
- Fuel injectors for clogging or wiring damage.
- Obstructions to the MAP sensor.
- Acceleration sensor wiring, connection.
- Canister purge valve for normal operation.
- Vacuum hoses for leaks.

Are all components undamaged and within specification?

NO

Replace ignition coil(s). Clear code and verify code does not reappear.

YES

- Verify fuel pressure according to procedure outlined in shop manual.
- Check engine oil for improper level or contamination (fuel in oil).

Is fuel pressure and oil level within specifications?

NO

Repair or replace damaged or out of specification components. Clear codes and verify code does not reappear.

YES

Verify ECM connector is secure. If OK, replace ECM. Clear code and verify code does not reappear.

NO

Repair out of specification components. Clear codes and verify code does not reappear.

IFDA546C

IFTD5510

DTC	Diagnostic item
P0301	Cylinder 1 Misfire Detected
P0302	Cylinder 2 Misfire Detected
P0303	Cylinder 3 Misfire Detected
P0304	Cylinder 4 Misfire Detected

DESCRIPTION

Refer to DTC P0300.

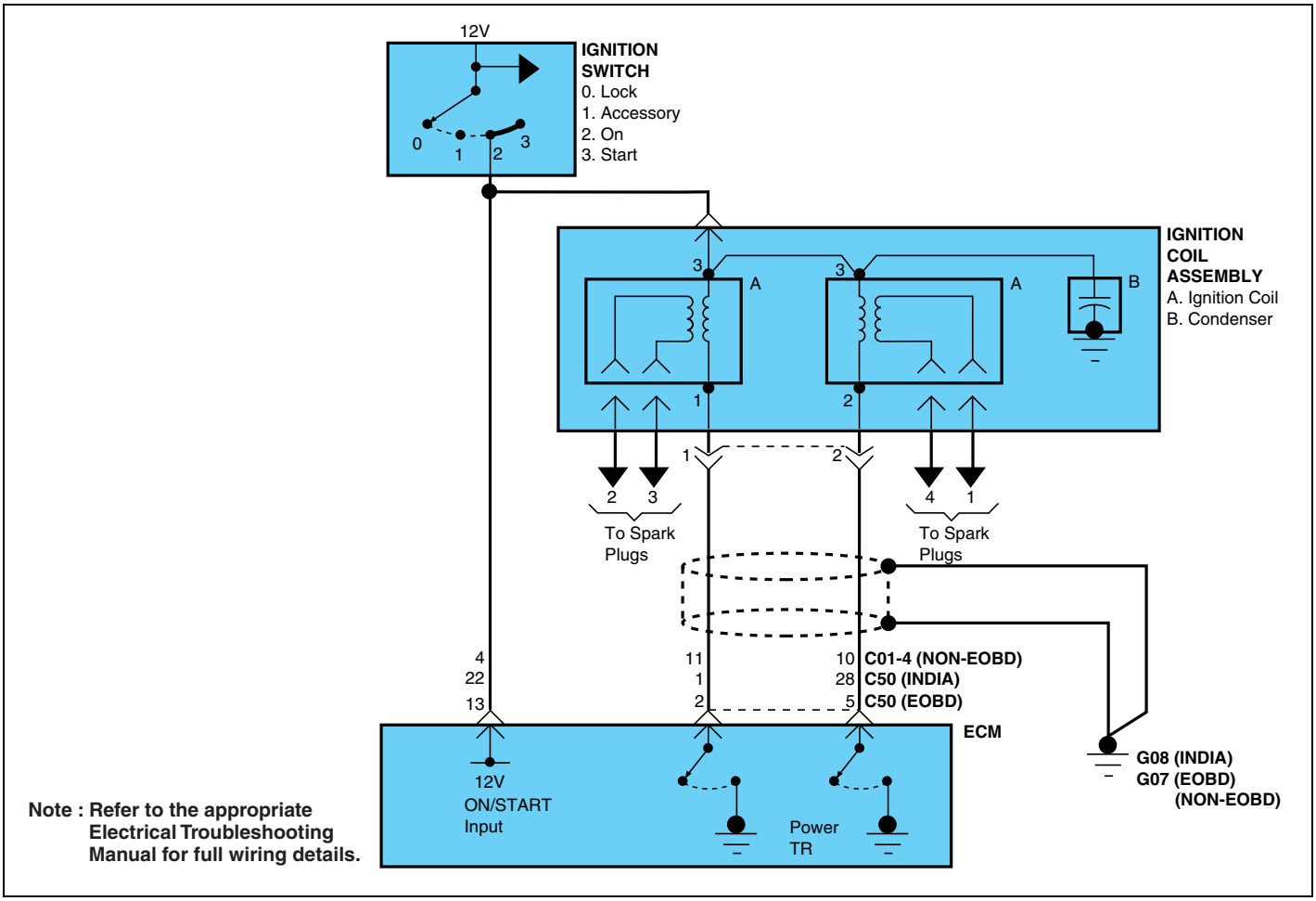
FAILURE CONDITIONS

The ECM will set P0301, P0302, P0303 or P0304 and MIL will turn on (If installed) if 2 misfires per 100 revolutions are detected during two driving cycles. The misfire rate is measured every 200 revolutions when the following conditions are met:

- Speed change is less than 1000 rpm per second.
- Engine speed is between 600 and 4000 RPM.
- Engine load is greater than 2 milliseconds.
- No fuel cut-off.
- Starter is not engaged.
- Vehicle on smooth road (acceleration sensor reports less than 0.3 g acceleration).

If the misfire rate increases to between 5%-25% per 200 revolutions, there is danger of catalyst damage and the MIL will flash and on. The catalyst temperature could exceed 3542°F (1950°C) if the misfire rate increases enough. This code indicates a problem with cylinder ignition being read by the ECM.

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD741A

TEST PROCEDURE

- Turn Ignition Switch on.
- Connect scan tool to Data Link Connector.
- Verify DTC P0301, P0302, P0303 or P0304 is set.

Is DTC P0201 or P0300 also set?
Is DTC P0202 or P0300 also set?
Is DTC P0203 or P0300 also set?
Is DTC P0204 or P0300 also set?

NO

Is vehicle fueled with appropriate octane fuel (at least 87 octane)?

YES

Perform DTC P0201 and/or DTC P0300 test procedures.
Perform DTC P0202 and/or DTC P0300 test procedures.
Perform DTC P0203 and/or DTC P0300 test procedures.
Perform DTC P0204 and/or DTC P0300 test procedures.

YES

- Ignition off.
- Disconnect ignition coil connector (s).
- Disconnect spark plug wires from ignition coil.
- Measure resistance between ignition coil connector terminals 1 and 2. Note primary coil resistance.
- Measure resistance between ignition coil spark plug connector terminals 1 and 4 and between spark plug connector terminal 2 and 3. Note secondary coil resistance.

Primary coil resistance should be approximately 1.0 ohm. Secondary coil resistance should be between 10.3 kilo ohms and 13.9 kilo ohms. Are resistances within specification?

NO

Refuel vehicle with 87 octane or higher fuel. Clear code and verify code does not reappear.

YES

- Ignition off.
- Inspect spark plugs, cables and connections.
- Inspect acceleration sensor wiring and connection (If installed).

Are spark plugs, cables, acceleration sensor and connections undamaged or within specifications?

NO

Replace ignition coil. Clear code and verify code does not reappear.

YES

- Ignition off.
- Check fuel injector for clogging.
- Inspect acceleration sensor wiring and connection.

Is fuel injector OK?

NO

Repair or replace parts. Clear code and verify code does not reappear.

YES

Verify ECM connector is secure. If OK, replace ECM. Clear code and verify code does not reappear.

NO

Clean or replace fuel injector. Clear code and verify code does not reappear.

IFDA551B

IFTD5610

DTC	Diagnostic item
P0335 P0336	Crankshaft Position Sensor Circuit Malfunction Crankshaft Position Sensor Circuit Out of Range

DESCRIPTION

The Crankshaft Position (CKP) sensor consists of a magnet and coil located next to the flywheel. The sensing wheel teeth are used by the CKP sensor to generate a signal. The voltage signal from CKP sensor allows the Engine Control Module (ECM) to determine engine RPM and crankshaft position.

FAILURE CONDITIONS

(FOR P0335)

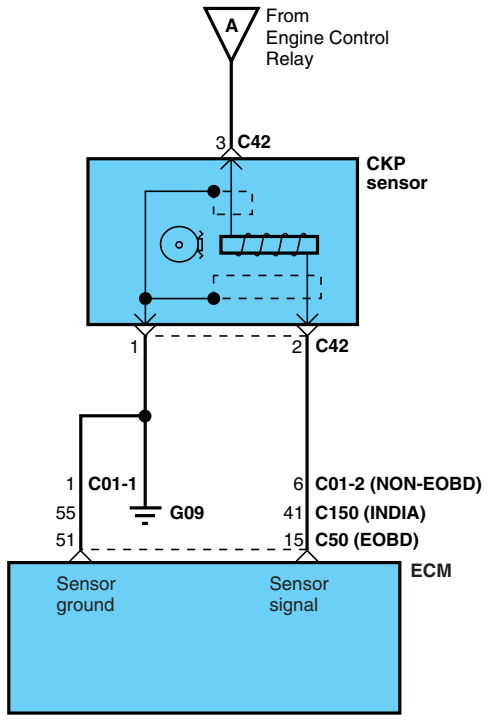
The ECM will set P0335 and the MIL will turn on (If installed) if the CKP signal voltage remains at 0.0 volts with the starter engaged for 4 seconds or 8 revolutions and the Camshaft Position (CMP) sensor signal indicating engine rotation This check is made every time the engine starts.

This code indicates no crankshaft signal is being read by the CKP sensor or the ECM while a CMP sensor signal verifies engine rotation.

(FOR P0336)

The ECM will set P0336 and the MIL will turn on (If installed) immediately if the CKP sensor signal does not indicate the two missing teeth in exactly the same position on the tone wheel during two successive engine revolutions. This check is made for 5 seconds when the engine is running above 2000 RPM. This code indicates a problem with the crankshaft being read by the CKP sensor or ECM.

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD717A

TEST PROCEDURE

- Turn ignition switch on.
- Connect scan tool to data link connector.
- Verify DTC P0335 or P0336 is set.

- Turn ignition switch off.
- Disconnect Crankshaft Position (CKP) sensor.
- Measure resistance between CKP sensor connector terminals 2 and 1.

The resistance should be between 486 and 594 ohms at 68˚F (20˚C), is it?

YES

- Ignition off.
- CKP sensor disconnected.
- ECM connector disconnected.
- Measure resistance between ground and both CKP sensor harness connector terminals 2 and 1.

The resistance between both terminals and ground should indicate an open circuit, does it?

NO

Replace CKP sensor.
Clear code and verify CKP sensor is within normal parameters.

YES

- Ignition off.
- CKP sensor disconnected.
- ECM connector disconnected.
- Ground CKP sensor harness connector terminals 1 and 2. Measure resistance between ground and ECM harness connector terminals 15 and 51.
  Note resistance value.

Resistance measured should be approximately 1 ohm or less, is it?

NO

Repair short to ground in wire between CKP sensor harness terminal 1 and ECM harness connector terminal 51 or between CKP terminal 2 and ECM terminal 15.
Clear code and verify code does not reappear.

YES

Verify ECM connector is secure. If OK, replace CKP sensor with known good component. Clear code and verify code does not reappear.
If problem persists, replace ECM.

NO

Repair open circuit in wire between CKP sensor harness terminal 1 and ECM harness connector terminal 51 or between CKP terminal 2 and ECM terminal 15. Clear code and verify code does not reappear.

IFDA561B

IFTD5660

DTC	Diagnostic item
P0340	Camshaft Position (CMP) Sensor Circuit Malfunction

DESCRIPTION

The Camshaft Position (CMP) sensor senses the Top Dead Center (TDC) point of the #1 cylinder in the compression stroke. The CMP sensor signal allows the Engine Control Module (ECM) to determine the fuel injector sequence starting point.

FAILURE CONDITIONS

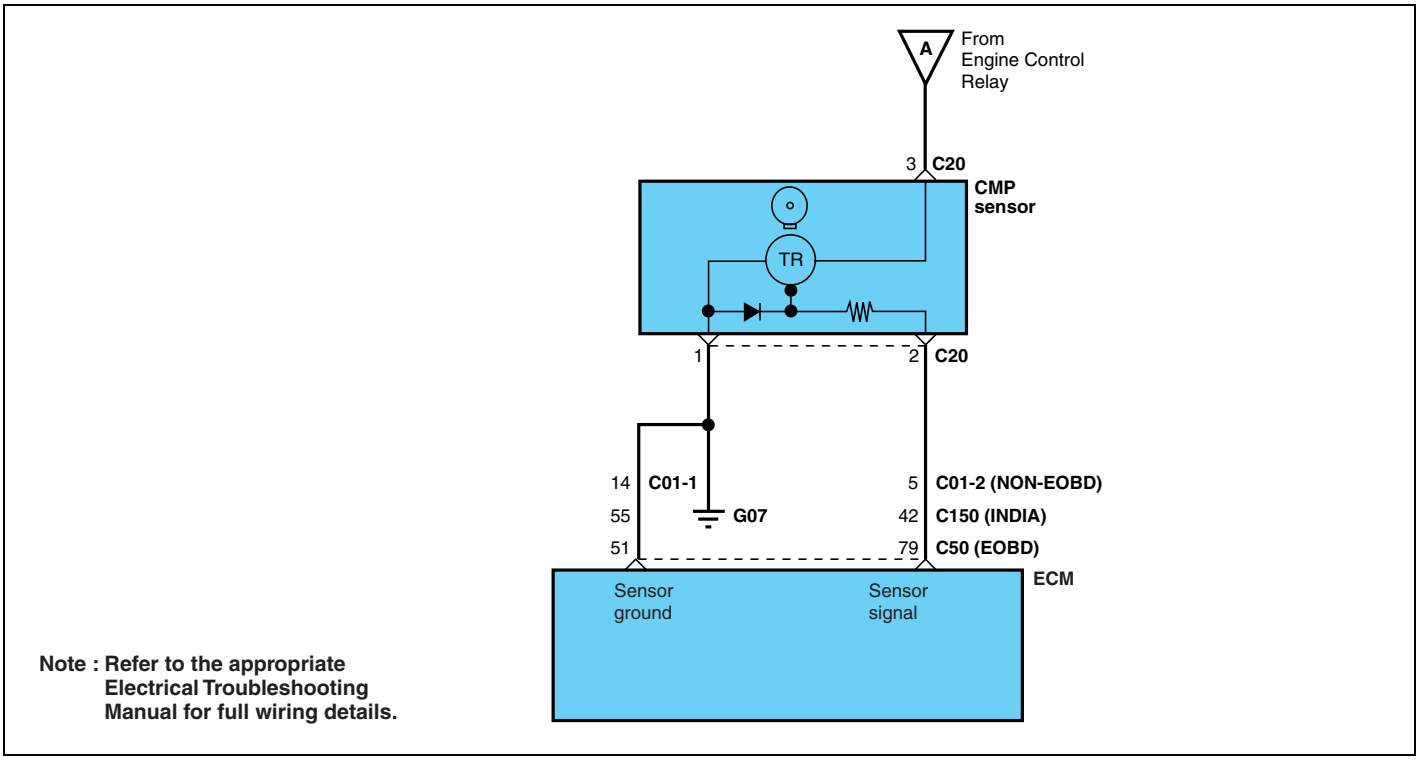
(FOR P0342)

The ECM will set P0342 and the Malfunction Indicator Lamp (MIL) will turn on (If installed) if during two driving cycles there is more than one CMP sensor signal during two engine revolutions when the engine speed is above 600 RPM. This code indicates unexpected camshaft position readings by the CMP sensor or ECM when the engine is rotating.

(FOR P0343)

The ECM will set P0343 and the Malfunction Indicator Lamp (MIL) will turn on if during two driving cycles there is no CMP sensor signal within 200 engine revolutions when the engine speed is above 600 RPM. This code indicates unexpected camshaft position readings by the CMP sensor or ECM when the engine is rotating.

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD715A

TEST PROCEDURE

- Turn ignition switch on.
- Connect Scan Tool to Data Link Connector.
- Verify DTC P0342 or P0343 is set.

- Camshaft Position (CMP) sensor connected.
- Ignition on.
- Measure voltage between ground and CMP sensor harness connector terminal 3.

Battery voltage should be measured, is it?

YES

- CMP sensor connected.
- Ignition on and engine running.
- Measure voltage between CMP sensor harness connector terminals 1 and 2 with the engine running between 700 to 3000 RPM.

The voltage should vary between 0 and 5 volts, does it?

YES

- Ignition off.
- Disconnect CMP sensor.
- Ground CMP sensor harness connector terminal 2.
- Measure resistance between ground and ECM harness connector terminal 79.

Resistance measured should be approximately 1 ohm or less, is it?

YES

- Ignition off.
- CMP sensor disconnected.
- Disconnect ECM connector.
- Measure resistance between ground and CMP sensor harness connector terminal 2.

Resistance should indicate an open circuit, does it?

A

CONTINUED ON NEXT PAGE

NO

Repair open circuit in wire between CMP sensor harness connector terminal 3 and main relay connector terminal 5.
Clear code and verify CMP sensor signal is within normal parameters.

NO

Replace CMP sensor.
Clear code and verify CMP sensor signal is within normal parameters.

NO

Repair open circuit in wire between CMP sensor harness connector terminal 2 and ECM connector terminal 79.
Clear code and verify CMP sensor signal is within normal parameters.

IFDA566B

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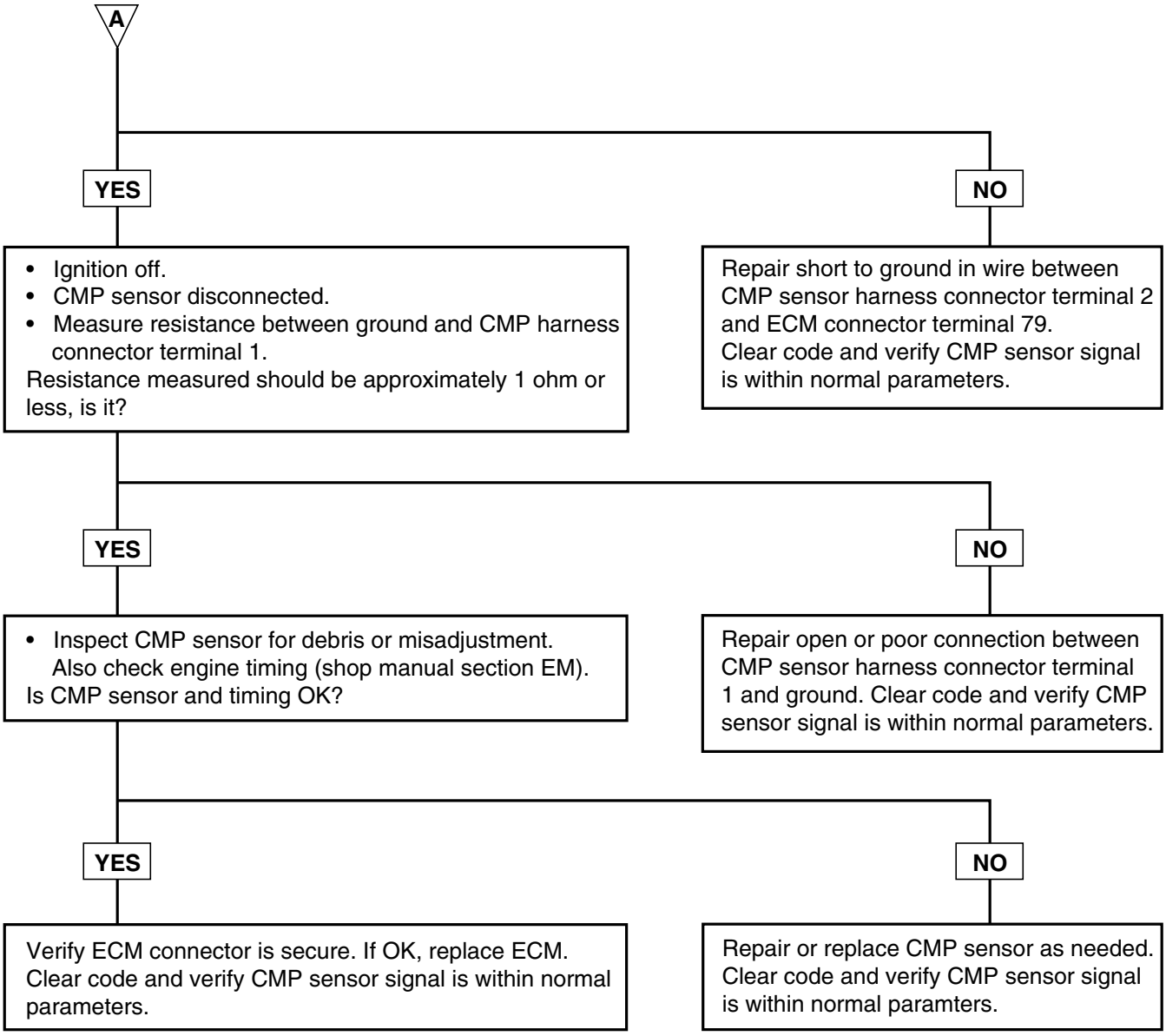


IFDA566C

IFTD5710

DTC	Diagnostic item
P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DESCRIPTION

The catalyst's efficiency is demonstrated in its ability to oxidize CO and HC emissions. The Engine Control Module (ECM) compares the output signals of the front and rear oxygen sensors to determine whether the output of the rear sensor is beginning to match the output of the front oxygen sensor. As the catalyst wears, the rear oxygen sensor's signal trace begins to match the front oxygen sensor's signal trace. That is because the catalyst becomes saturated with oxygen and cannot use the oxygen to convert HC and CO into H2O and CO2 with the same efficiency as when it was new. A completely worn catalyst shows a 100% match between front and rear sensor outputs.

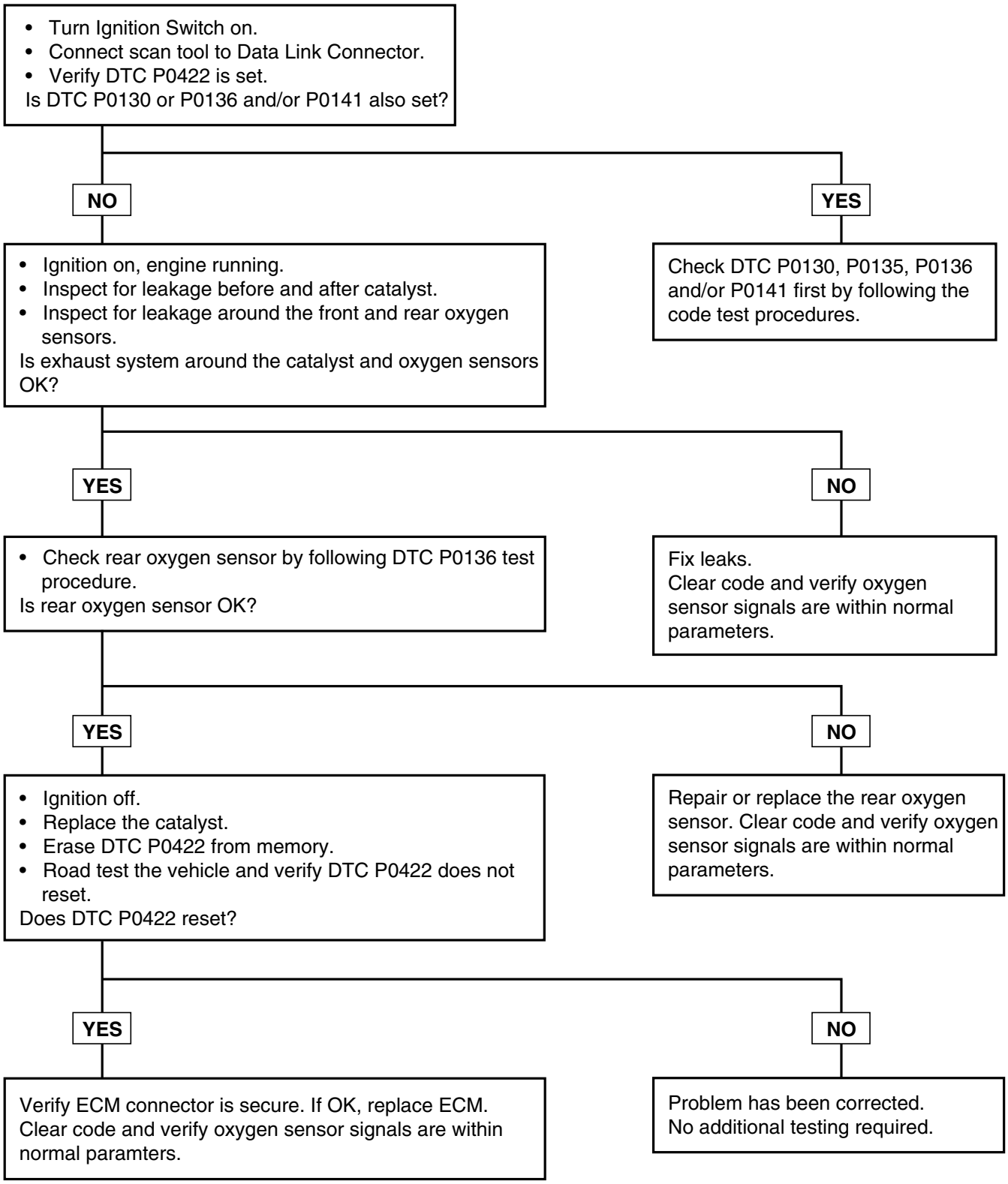
FAILURE CONDITION

The efficiency of the catalytic converter is measured by comparing the activity of the front and rear oxygen sensors. The ECM will set a code and the Malfunction Indicator Lamp (MIL) will turn on (if installed) if the front and rear oxygen sensor signals match more than 60% of the time in two of four 170 second monitoring periods during two driving cycles. The measurements are taken when the following conditions are met:

1. The ECM is operating in closed loop.
2. The engine speed is between 1800 and 3200 PRM.
3. The catalyst temperature is above 702°F (372°C).
4. The canister purge function is greater than 0.9.
5. The vehicle is not shifting gears.
6. The engine load is between 1.4 milliseconds and 4.5 milliseconds.

This code indicates that the catalytic converter has been found to have a low efficiency according to the readings of the front and rear oxygen sensors.

TEST PROCEDURE



EFDA571B

IFTD5760

DTC	Diagnostic item
P0444	Evap. Emission Control System - PCSV Circuit Open
P0445	Evap. Emission Control System - PCSV Circuit Shorted

DESCRIPTION

The purge control solenoid valve is part of the evaporative emission control system. The solenoid controls purge air from the evaporative emission canister.

FAILURE CONDITIONS

The ECM will set P0444 and the MIL will turn on if an open circuit is detected in the driver stage of the purge control solenoid circuit during two driving cycles.

The ECM will set P0445 and the MIL will turn on if a short circuit is detected in the driver stage of the purge control solenoid circuit during two driving cycles.

TEST PROCEDURE

- Turn ignition switch on.
- Connect scan tool to data link connector.
- Verify DTC P0444 or P0445 is set.

- Turn ignition off.
- Disconnect purge control solenoid valve connector.
- Turn ignition on.
- Measure voltage between ground and purge control solenoid valve harness connector terminal 2.

Battery voltage should be present, is it?

YES

- Purge control solenoid valve disconnected.
- Disconnect ECM connector.
- Turn ignition off.
- Ground purge control solenoid valve harness connector terminal 1.
- Measure resistance between ground and ECM harness connector terminal 46.

Resistance measured should be approximatley 1 ohm or less, is it?

YES

- Ignition off.
- Purge control solenoid valve disconnected.
- Disconnect ECM connector.
- Measure resistance between ground and purge control solenoid valve harness connector terminal 1.

Resistance should indicate an open circuit, does it?

YES

- Ignition off.
- Purge control solenoid valve disconnected.
- Measure resistance between the purge control solenoid valve connector terminals 2 and 1.

Resistance should be approximately 26 ohms, is it?

YES

Verify ECM connector is secure. If OK, replace purge control solenoid valve with known good component. Clear code and verify purge control solenoid valve is within normal parameters. If problem persists, replace ECM.

NO

Repair open or short to ground in wire between Main relay connector terminal 5 and purge control solenoid valve connector terminal 2. Clear code and verify code does not reappear.

NO

Repair open in wire between ECM connector terminal 46 and purge control solenoid valve connector terminal 1. Clear code and verify code does not reappear.

NO

Repair short to ground or another circuit in the between ECM connector terminal 46 and purge control solenoid valve connector terminal 1. Clear code and verify code does not reappear.

NO

Replace purge control solenoid valve. Clear code and verify purge control solenoid valve is within normal parameters.

IFDA576B

EFTD5810

DTC	Diagnostic item
P0501	Vehicle Speed Sensor (VSS) Range / Performance

DESCRIPTION

The vehicle speed sensor is a reed switch that is built into the speedometer. The sensor converts the transaxle gear revolutions into a pulse signal which is sent to the ECM.

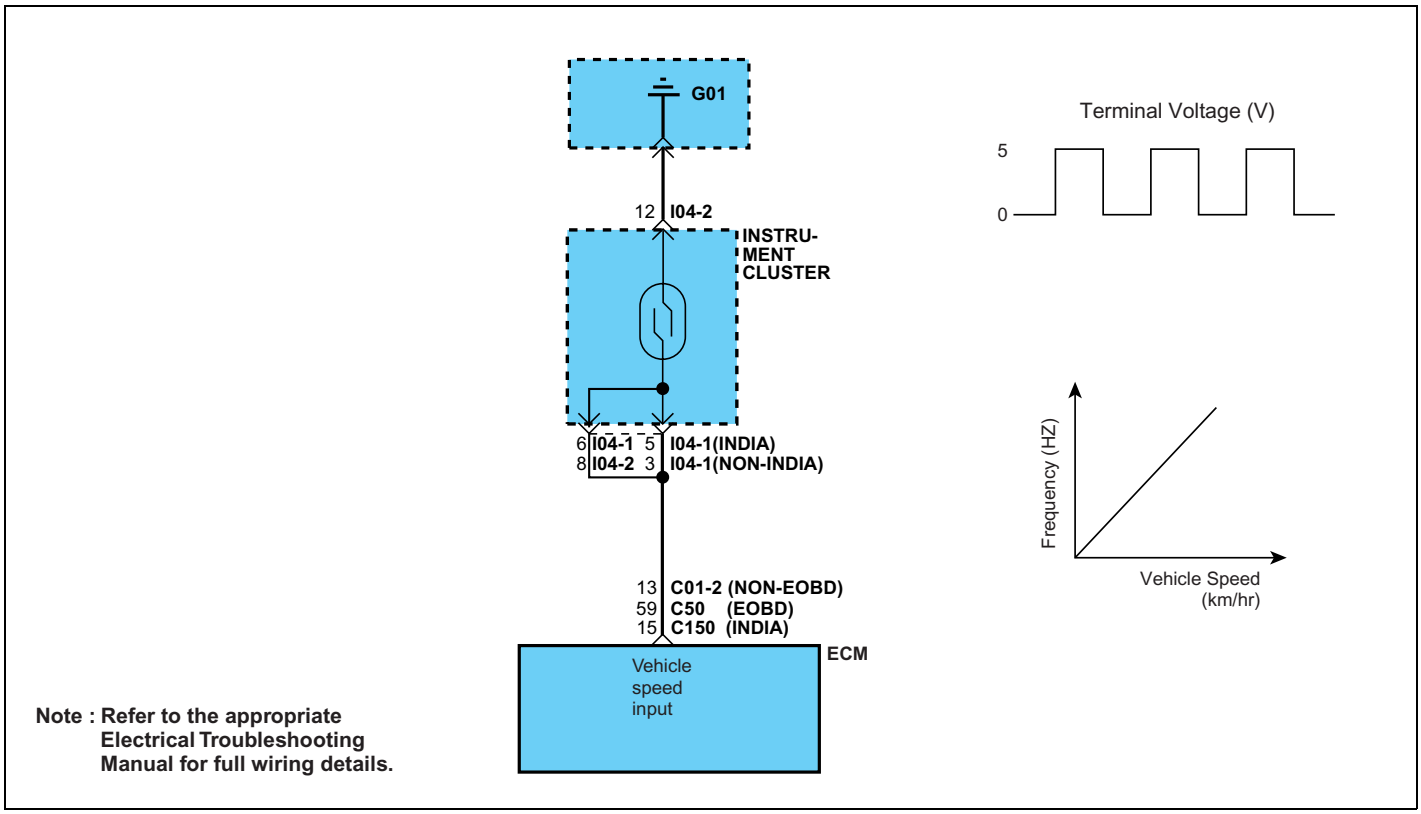
FAILURE CONDITIONS

The ECM will set a code and the Malfunction Indicator Lamp (MIL) will turn on if there is no vehicle speed sensor output signal for 20 seconds during two driving cycles when the following conditions are met:

1. Engine speed is greater than 2200 RPM.
2. Engine load is greater than 3.0 millisecond.

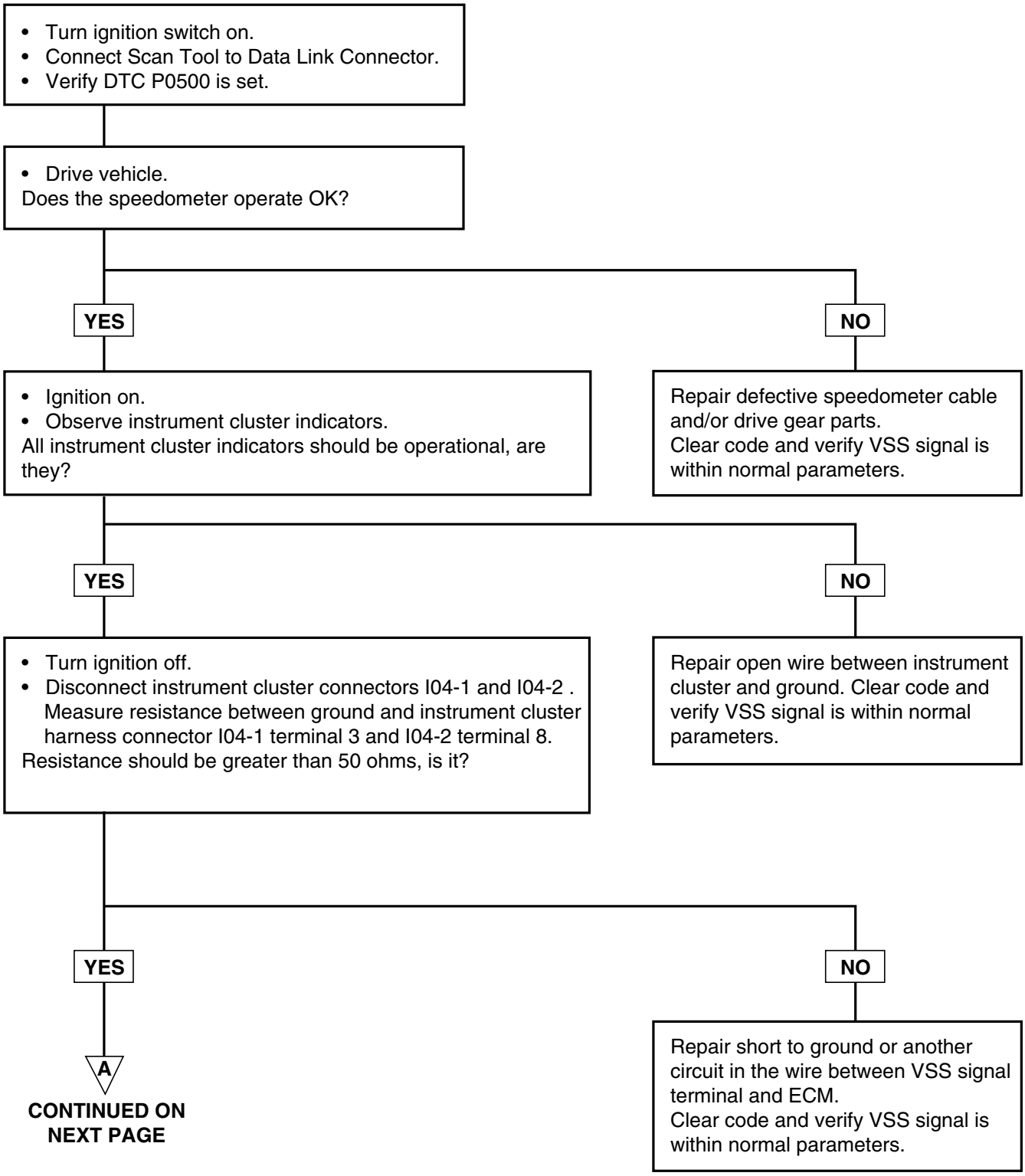
This code indicates no speed signal being read by vehicle speed sensor or ECM.

CIRCUIT DIAGRAM



IFTD725A

TEST PROCEDURE



EFTC581B

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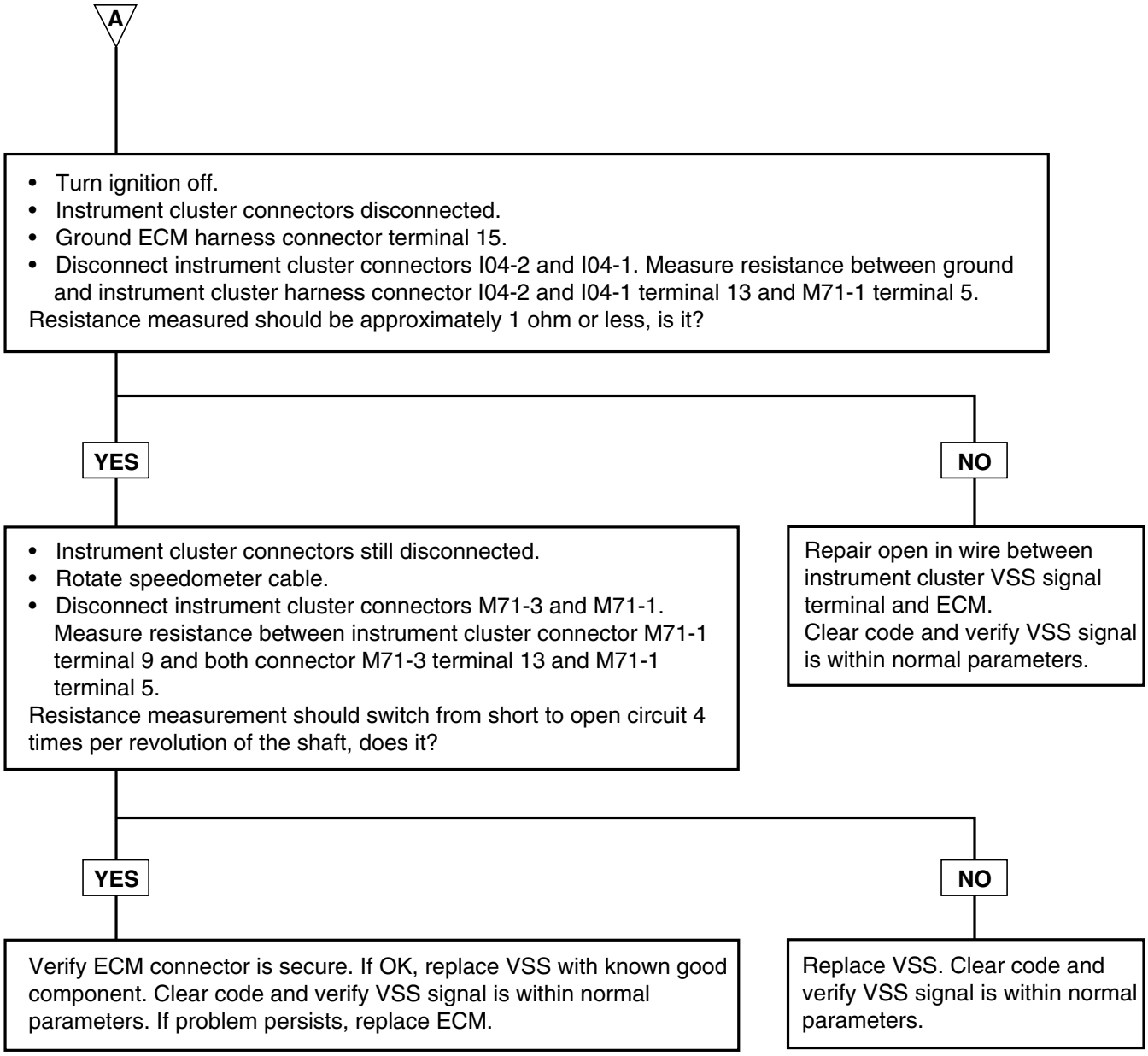


EFDA581C

EFTD5860

DTC	Diagnostic item
P0506 P0507	Idle Control System - Idle RPM Lower Than Expected Idle Control System - Idle PRM Higher Than Expected

DESCRIPTION

Refer to P1510, P1552.

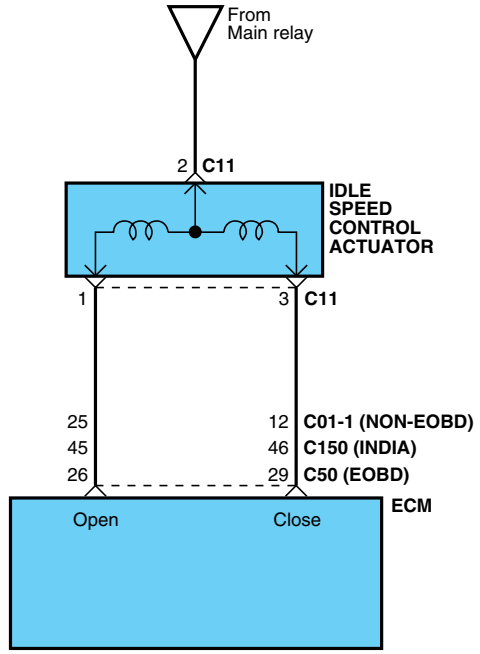
FAILURE CONDITIONS

The ECM will set P0506 or P0507 and the MIL will turn on if for 15 seconds the ISC actuator driver circuit values and engine idle speed are not in agreement with values stored in the ECM during two driving cycles when the following conditions are met:

1. The ISC actuator passes idle air at a rate above 4.1 g/s. [for P0506] or 1.7 g/s [for P0507].
2. Engine speed deviation is below 200 RPM.
3. Vehicle speed is zero.
4. Engine coolant temperature is above 167°F (75°C).

This code indicates the idle speed control actuator and the engine do not agree with the ECM on the idle speed value.

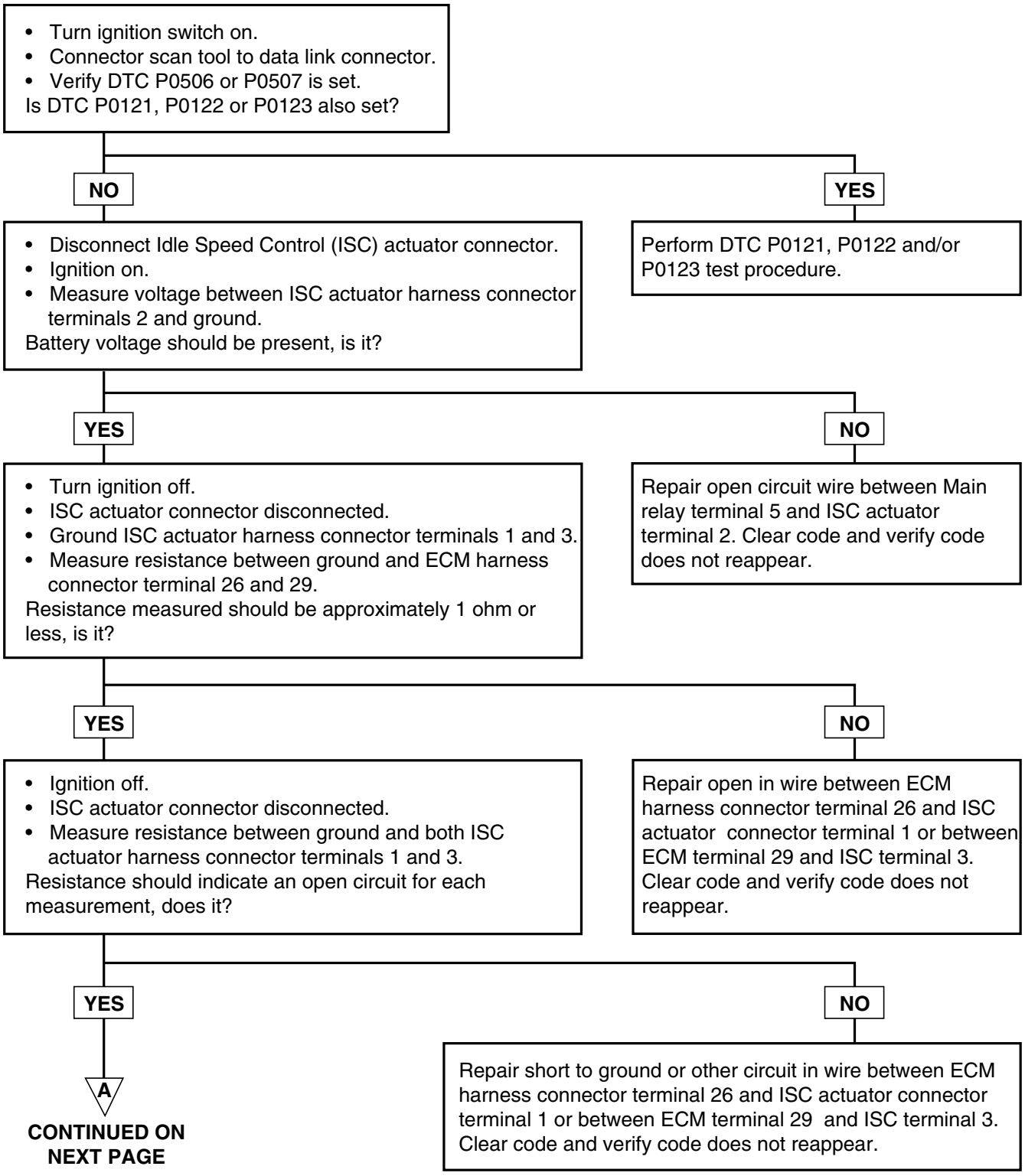
CIRCUIT DIAGRAM



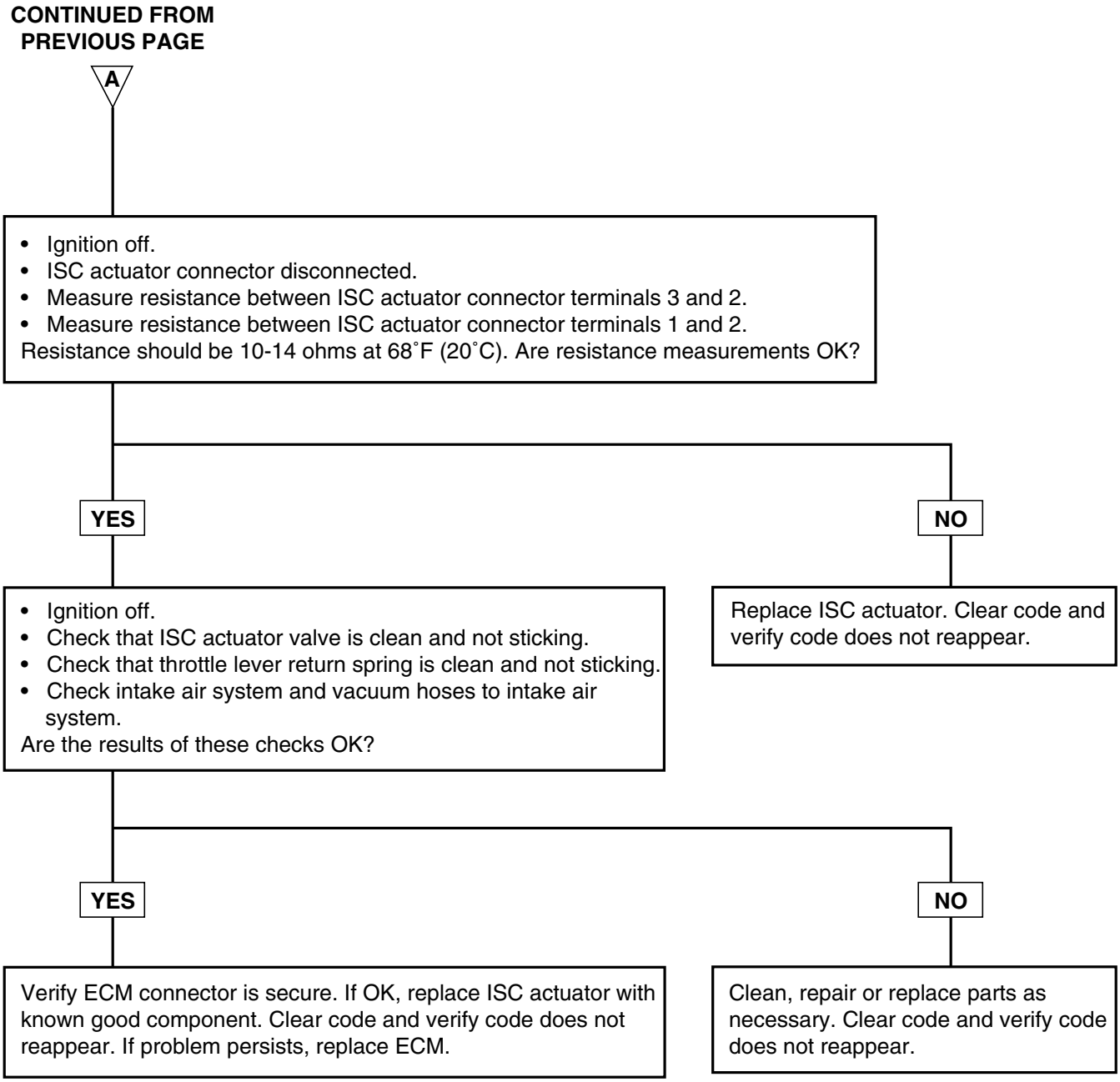
Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD723A

TEST PROCEDURE



EFDA586B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A
• Ignition off.
• ISC actuator connector disconnected.
• Measure resistance between ISC actuator connector terminals 3 and 2.
• Measure resistance between ISC actuator connector terminals 1 and 2.
Resistance should be 10-14 ohms at 68˚F (20˚C). Are resistance measurements OK?
YES
NO
• Ignition off.
• Check that ISC actuator valve is clean and not sticking.
• Check that throttle lever return spring is clean and not sticking.
• Check intake air system and vacuum hoses to intake air system.
Are the results of these checks OK?
Replace ISC actuator. Clear code and verify code does not reappear.
YES
NO
Verify ECM connector is secure. If OK, replace ISC actuator with known good component. Clear code and verify code does not reappear. If problem persists, replace ECM.
Clean, repair or replace parts as necessary. Clear code and verify code does not reappear.

EFDA586C

EFTD5910

DTC	Diagnostic item
P2187	System Too Lean At Idle - Addition
P2188	System Too Rich At Idle - Addition
P2191	System Too Lean At Idle - Multiple
P2192	System Too Rich At Idle - Multiple

DESCRIPTION

The air/fuel control system, in addition to a number of sensors, includes the following components and systems:

- Intake air system.
- Exhaust system.
- Evaporative emissions control system (includes purge control solenoid valve).
- Fuel injectors.
- Fuel pressure regulator.
- Fuel pump.

For the air/fuel ratio to be within limits, all of the sensors, components and systems associated with the air/fuel control system must function within normal parameters.

FAILURE CONDITIONS

(FOR SHORT-TERM FUEL TRIM)

The ECM will set a code and the Malfunction Indicator Lamp (MIL) will turn on if the short-term fuel trim value goes 10% to 15% rich [for P1123] or if the short-term fuel trim additive value is less than 0.4 milliseconds, or 10% to 15% lean [for P1124] for 30 seconds during two driving cycles when the following conditions are met:

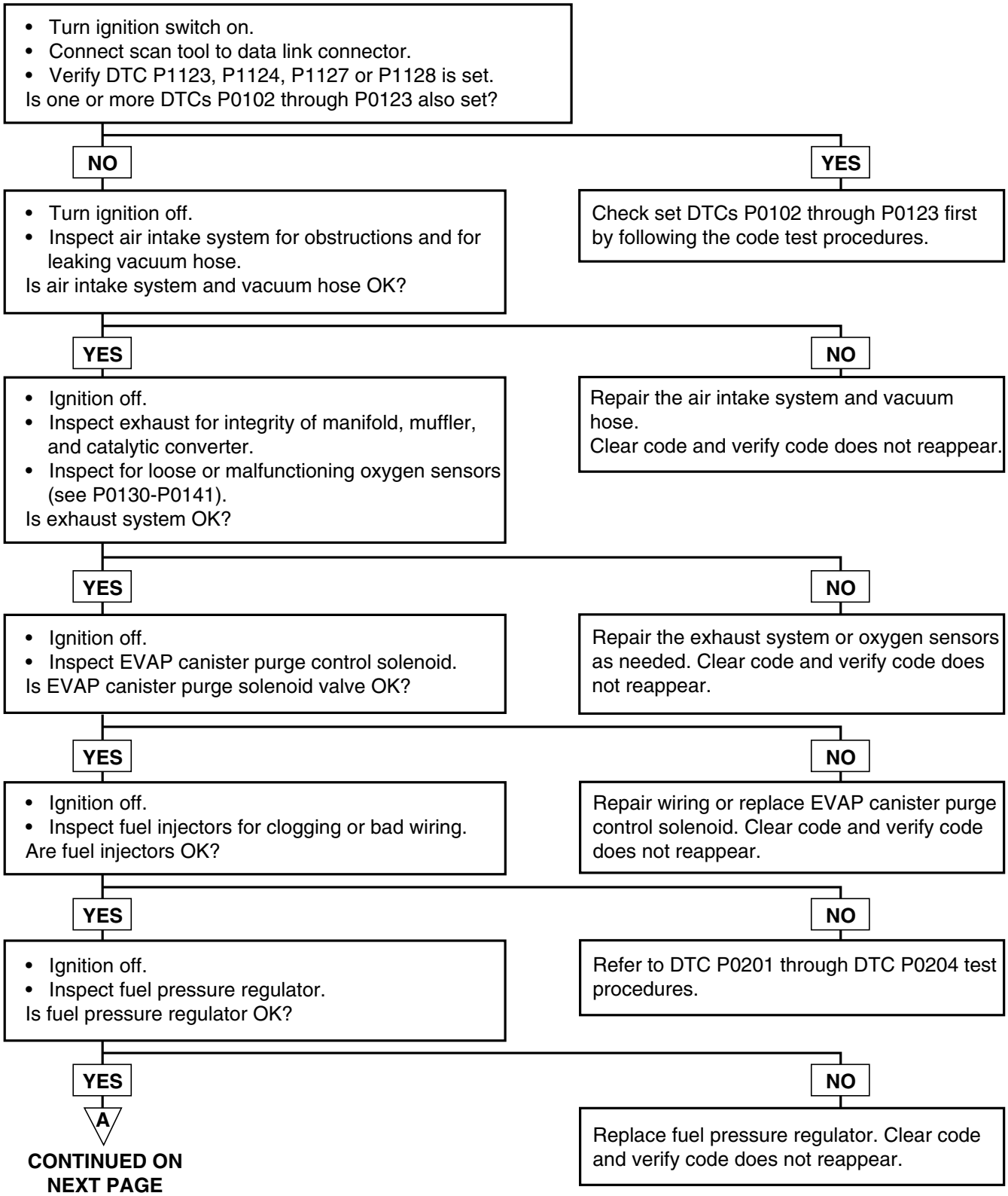
1. ECM is in closed loop operation.
2. Engine speed is below 1000 RPM.
3. Engine coolant temperature is above 158°F (70°C).
4. Canister purge system is not operating.
5. Mass air flow is less than 7.5 g/s [for P1123] or 5.5 g/s [for P1124].

(FOR LONG-TERM FUEL TRIM)

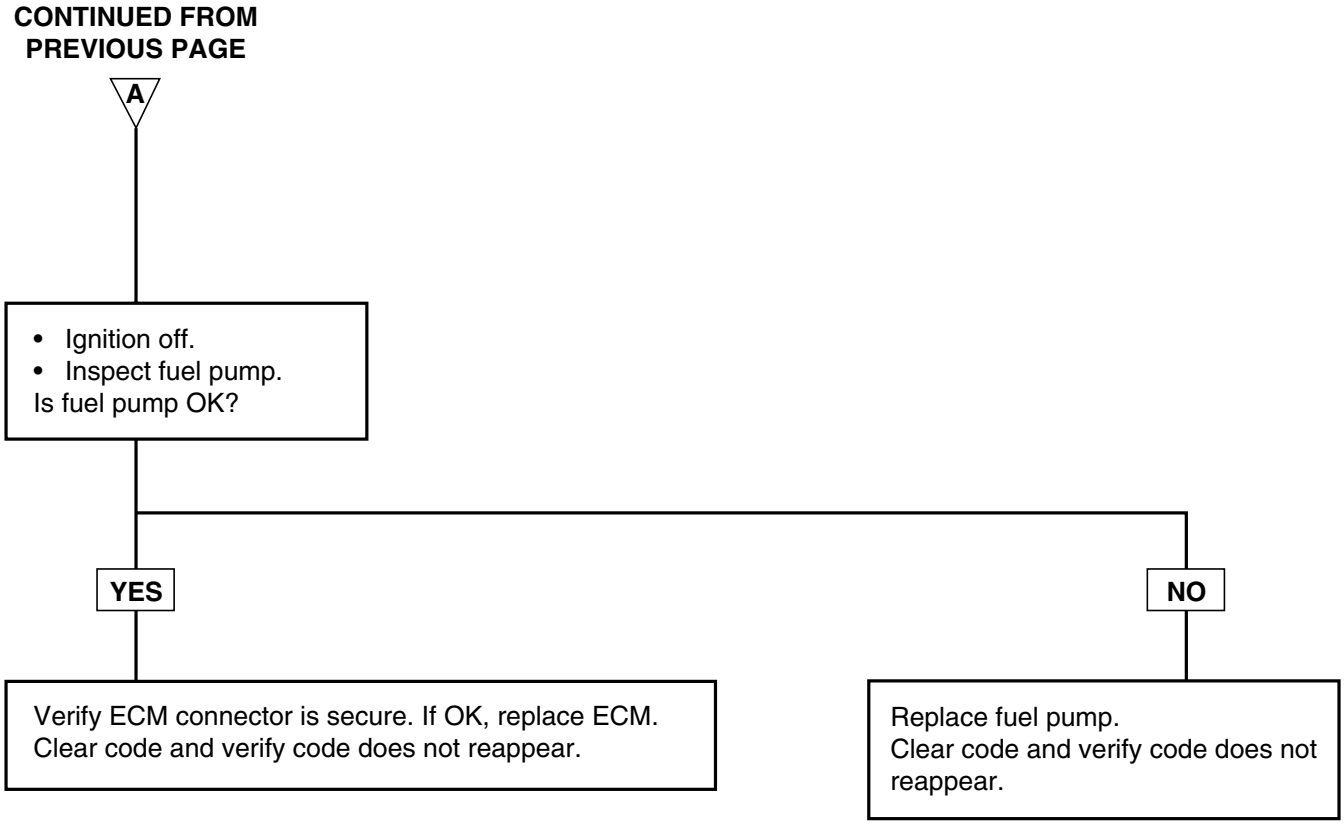
The ECM will set a code and the Malfunction Indicator Lamp (MIL) will turn on if the long-term multiplicative value is less than 77% for 30 seconds [for P1127] or if the long-term fuel trim value goes to 10% to 15% lean [for P1128] for 30 seconds during two driving cycles when the following conditions are met:

1. Engine load exceeds 1.8 milliseconds.
2. ECM is in closed loop operation [for P1127].
3. Engine coolant temperature is above 158°F (70°C).
4. Canister purge system is not operating.
5. Mass air flow is less than or 5.5 g/s.
6. Engine speed is below 1000 RPM [for P1128].

TEST PROCEDURE



EFDA591B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A
• Ignition off.
• Inspect fuel pump.
Is fuel pump OK?
YES
NO
Verify ECM connector is secure. If OK, replace ECM.
Clear code and verify code does not reappear.
Replace fuel pump.
Clear code and verify code does not reappear.

EFDA591C

EFTD5960

DTC	Diagnostic item
P1506 P1508	Idle Air Actuator Signal High of Coil #1 Idle Air Actuator Signal High of Coil #2

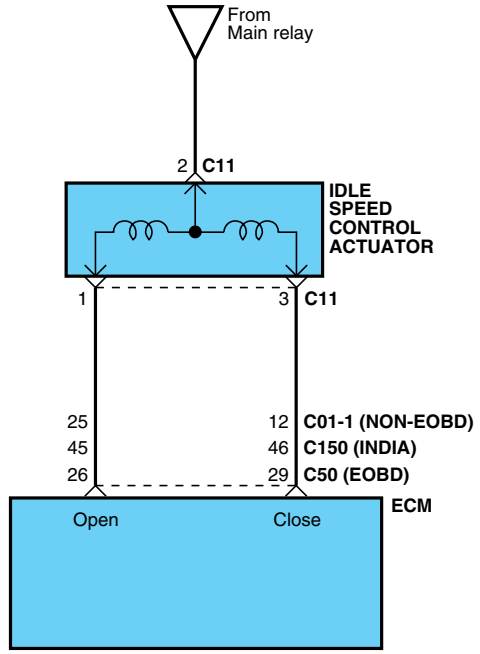
DESCRIPTION

The Idle Speed Control (ISC) actuator has two coils that are driven by separate ECM driver stages. Depending on the pulse duty factor, the equilibrium of the magnetic forces of the two coils will result in different directions for the magnetic forces of the two coils which will result in different positions for the actuator. In parallel to the throttle valve, a bypass hose line is arranged where the ISC actuator is inserted.

FAILURE CONDITION

The ECM will set a code and the MIL will turn on if ISC actuator's opening coil driver stage [for P1510] or closing coil driver stage [for P1552] is shorted to battery voltage during two driving cycles.

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD723A

TEST PROCEDURE

- Turn ignition switch on.
- Connector scan tool to data link connector.
- Verify DTC P1510 or P1552 is set.

- Disconnect Idle Speed Control (ISC) actuator connector.
- Ignition on.
- Measure voltage between ISC actuator harness connector terminals 2 and ground.

Battery voltage should be present, is it?

YES

- Ignition on.
- ISC actuator connector disconnected.
- Measure voltage between ground and ISC actuator harness connector terminal 3.
- Measure voltage between ground and ISC actuator harness connector terminal 1.

Both voltage measurements should be less than 0.5 volts, are they?

YES

- Ignition off.
- ISC actuator connector disconnected.
- Measure resistance between ISC actuator connector terminals 3 and 2.
- Measure resistance between ISC actuator connector terminals 2 and 1.

Resistance should be 10-14 ohms at 68˚F (20˚C).
Are resistance measurements OK?

YES

Verify ECM connector is secure.
If OK, replace ISC actuator with known good component.
Clear code and verify code does not reappear.
If problem persists, replace ECM.

NO

Replace ISC actuator. Clear code and verify code does not reappear.

NO

Repair open circuit in wire between ECM harness connector terminal 29 and ISC actuator connector terminal 3 or between ECM terminal 26 and ISC terminal 1.
Clear code and verify code does not reappear.

NO

Repair open wire between ECM control relay harness connector terminal 1 and ISC actuator harness connector terminal 2.
Clear code and verify code does not reappear.

EFDA596B

EFTD6010

DTC	Diagnostic item
P1505 P1507	Idle Air Actuator Signal Low of Coil #1 Idle Air Actuator Signal Low of Coil #2

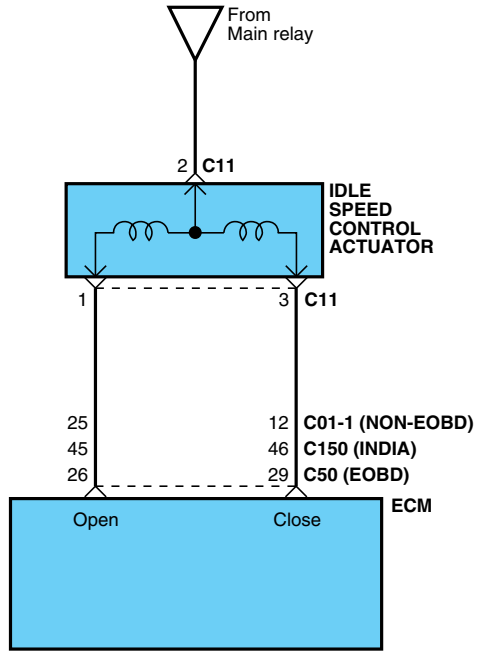
DESCRIPTION

Refer to P1510, P1552.

FAILURE CONDITIONS

The ECM will set a code and the MIL will turn on if ISC actuator's opening coil driver stage [for P1513] or closing coil driver stage [for P1553] is open or shorted to ground during two driving cycles.

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD723A

TEST PROCEDURE

- Turn ignition switch on.
- Connector scan tool to data link connector.
- Verify DTC P1513 or P1553 is set.

- Disconnect Idle Speed Control (ISC) actuator connector.
- Ignition on.
- Measure voltage between ISC actuator harness connector terminals 2 and ground.

Battery voltage should be present, is it?

YES

- Turn ignition off.
- ISC actuator connector disconnected.
- ECM connector disconnected..
- Ground ISC actuator harness connector terminal 3 [for P1513] or terminal 1 [for P1553].
- Measure resistance between ground and ECM harness connector terminal 29 [for P1513] or terminal 26 [for P1553].

Resistance measured should be approximately 1 ohm or less, is it?

NO

Repair open wire between ECM control relay harness connector terminal 3 and ISC actuator terminal 2. Clear code and verify code does not reappear.

YES

- Ignition off.
- ISC actuator connector disconnected.
- ECM connector disconnected.
- Measure resistance between ground and ISC actuator harness connector terminals 3 [for P1513] or terminal 1 [for P1553].

Resistance should indicate an open circuit, does it?

NO

Repair open in wire between ECM harness connector terminal 29 [for P1513] or terminal 26 [for P1553] and ISC actuator connector terminal 3 [for P1513] or terminal 1 [for P1553]. Clear code and verify code does not reappear.

YES

- Ignition off.
- ISC actuator connector disconnected.
- Measure resistance between ISC actuator connector terminal 3 and 2.
- Measure resistance between ISC actuator connector terminal 2 and 1.

Resistance should be 10-14 ohms at 68˚F (20˚C). Are resistance measurements OK?

NO

Repair short to ground in wire between ECM harness connector terminal 29 [for P1513] or terminal 26 [for P1553] and ISC actuator connector terminal 3 [for P1513] or terminal 1 [for P1553]. Clear code and verify code does not reappear.

YES

Verify ECM connector is secure. If OK, replace ISC actuator with known good component. Clear code and verify code not reappear. If problem persists, replace ECM.

NO

Replace ISC actuator. Clear code and verify code does not reappear.

EFDA601B

EFTD6060

DTC	Diagnostic item
P1307 P1308 P1309	Acceleration Sensor Circuit Rationality Acceleration Sensor Circuit Low Acceleration Sensor Circuit High

DESCRIPTION

The acceleration sensor is used to sense rough road conditions. The sensor's signal is used by the Engine Control Module (ECM) to prevent wrongful misfire detection.

FAILURE CONDITIONS

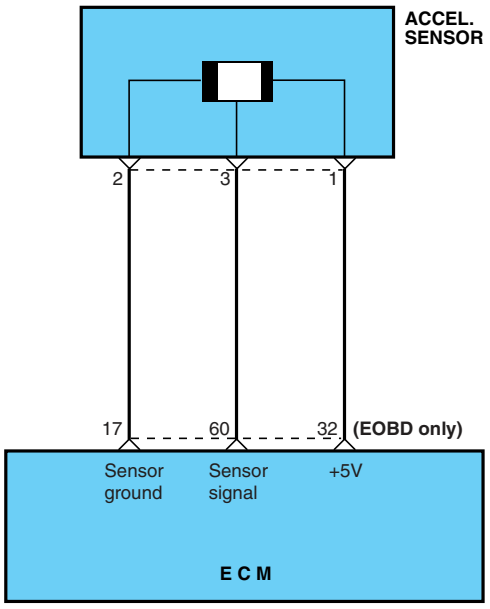
(FOR P1308, P1309)

The ECM will set a code and the MIL will turn on if the acceleration sensor signal is less than 1.5 or greater than 3.5 volts during two driving cycles. This code indicates an extremely rough or smooth road being sensed by the acceleration sensor or ECM.

(FOR P1307)

The ECM will set a code and the MIL will turn on if the acceleration sensor signal indicates an acceleration of 0.3g or greater when the vehicle speed is zero during two driving cycles. This code indicates some type of bump being read, with the car speed at zero, by the acceleration sensor or ECM.

CIRCUIT DIAGRAM



Note : Refer to the appropriate Electrical Troubleshooting Manual for full wiring details.

IFTD745A

TEST PROCEDURE

- Turn ignition switch on.
- Connect scan tool to data link connector.
- Verify DTC P1307, P1308 or P1309 is set.

- Disconnect acceleration sensor.
- Ignition on.
- Measure voltage between ground and acceleration sensor harness connector terminal 1.

Voltage should be approximately 5 volts, is it?

YES

- Turn ignition off.
- Acceleration sensor disconnected.
- Measure resistance between ground and acceleration sensor harness connector terminal 2.

Resistance measured should be approximately 1 ohm or less, is it?

YES

- Ignition off.
- Acceleration sensor disconnected.
- Disconnect ECM.
- Ground acceleration sensor harness connector terminal 3. Measure resistance between ground and ECM harness connector terminal 60.

Resistance measured should be approximately 1 ohm or less, is it?

YES

- Ignition off.
- Acceleration sensor disconnected.
- ECM disconnected.
- Measure resistance between ground and acceleration sensor harness connector terminal 3.

Resistance should indicate an open circuit, does it?

A

CONTINUED ON NEXT PAGE

NO

Repair open in wire between ECM connector terminal 32 and acceleration sensor terminal 1.
Clear code and verify acceleration sensor is within normal parameters.

NO

Repair open in wire between ECM connector terminal 17 and acceleration sensor terminal 2.
Clear code and verify acceleration sensor is within normal parameters.

NO

Repair open in wire between ECM connector terminal 60 and acceleration sensor terminal 3.
Clear code and verify acceleration sensor is within normal parameters.

EFDA606B

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A

YES

- Acceleration sensor disconnected.
- Ignition off.
- Measure resistance between acceleration sensor connector terminals 2 and 3.

Resistance should be approximately 21 kΩ, is it?

NO

Repair short to ground in wire between ECM connector terminal 60 and acceleration sensor terminal 3. Clear code and verify acceleration sensor is within normal parameters.

YES

- Reconnect acceleration sensor connector.
- Reconnect ECM connector.
- Ignition on and engine idling.
- Measure voltage between ground and acceleration sensor harness connector (backprobe) terminal 3.

Voltage should be between 2.3-2.7 volts, is it?

NO

Replace acceleration sensor. Clear code and verify acceleration sensor is within normal parameters.

YES

Verify ECM connector is secure. If OK, replace acceleration sensor with known good component. Clear code and verify acceleration sensor is within normal parameters. If problem persists, replace ECM.

NO

Replace acceleration sensor. Clear code and verify acceleration sensor is within normal parameters.

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