GENERAL INFORMATION

ENGINE MODELS

Engine model	Displacement mL	Specification
4G64-L-56/57	2,351	Single overhead camshaft, 16-valve
4G63-L-5A/5B	1,997	

GENERAL SPECIFICATIONS

Description			Specification	
			4G64-L-56/57	4G63-L-5A/5B
Type			In-line OHV, SOHC	
Number of cylinders			4	
Combustion chamber			Pent roof type	
Total displacement cm^3			2,351	1,997
Cylinder bore mm			86.5	85
Piston stroke mm			100	88
Compression ratio			9.5	9.5
Valve timing	Intake valve	Opens (BTDC)	18°	18°
		Closes (ABDC)	53°	53°
	Exhaust valve	Opens (BBDC)	50°	50°
		Closes (ATDC)	18°	18°
Lubrication system			Pressure feed, full-flow filtration	
Oil pump type			Involute gear type	

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TORQUE SPECIFICATIONS

Dress Component torque specification can be found in the body of the manual

Item	Specification	
	Nm	ft.lbs
Crankshaft pulley bolts	24.5	18
Spark plugs **14mm**	27	20
Spark plugs **12mm** (New Head Implemented Mid-2014)	17	12
Exhaust manifold		
8mm Prevailing Torque Nuts	20	15
10mm Prevailing Torque Nuts	27	20
Water Pump		
Water pump pulley bolts	8.9	7
Water pump bolts	13.8	10
Thermostat housing bolts	23.6	18
Timing belt		
Auto-tensioner bolts	23.6	18
Camshaft sprocket bolt	88.3	65
Counterbalance shaft sprocket bolt	45.1	34
Crankshaft bolt	117.7	87
Engine support bracket bolt	48	36
Idler pulley bolt	35.3	26
Oil pump sprocket nut	54	40
Tensioner "B" bolt	19	14
Tensioner arm bolt	22	16
Tensioner pulley bolt	49	36
Timing belt cover bolts (Bolt, washer assembly)	11	8
Timing belt cover bolts (Flange bolt and nut)	11	8
General		
Engine hanger bolt	19	14
Oil pressure switch	10	7
Water temp gauge	30	22
Water outlet fitting bolts	20	15
Rocker arms and camshaft		
Rocker arms and rocker arm shaft bolts	32	23
Rocker cover bolts	4	3
Thrust screw	19	14
Cylinder head and valves		
Cylinder head bolts	↻78Nm → ↺0Nm	↻58ft.lbs → ↺0ft.lbs
	↻20Nm +↻90° +↻90°	↻15ft.lbs +↻90° +↻90°

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PSI 2.0/2.4L MOBILE ENGINE MAINTENANCE REQUIREMENTS

Perform the following maintenance on the engine at the hours indicated and at equivalent hour intervals thereafter.

	Interval Hours										
	Daily	200	400	800	1000	1250	1500	1750	2000	3000	5000
General Maintenance Section											
Visual check for fluid leaks	X										
Check engine oil level	X										
Check coolant level	X										
Change engine oil and filter (Severe duty [5])	**Every 150 hours or 120 days of operation**										
Change engine oil and filter (Standard duty [5])	**Every 250 hours or 120 days of operation**										
Check LPG system for leaks	Prior to any service or maintenance activity										
Inspect accessory drive belts for cracks, breaks, splits or glazing[1]					X						
Inspect electrical system wiring for cuts, abrasions or corrosion									X		
Inspect all vacuum lines and fittings for cracks, breaks or hardening									X		
Engine Coolant Section											
Clean debris from radiator core	**Every 100 hours or 60 days of operation**										
Change Coolant[2 & 4]											X
Inspect coolant hoses for cracks, swelling or deterioration[1]					X						
Engine Ignition System											
Replace spark plugs - Standard Duty									X		
Replace spark plugs - Severe Duty[3]					X						
Inspect battery case for damage					X						
Base Engine System											
Replace camshaft belt											X
Replace balance shaft belt											X
Replace Idler and tensioner pulley (Camshaft & Balance shaft belts)											X
Inspect PCV system					X						
Fuel System Maintenance											
Inspect air cleaner	**Every 200 hours, or every 100 hours in dusty environment**										
Replace filter element	**Every 400 hours, or every 200 hours in dusty environment**										
Replace fuel filter			X								
Inspect Shut-off Valve for leaks and closing									X		
Leak check fuel lines									X		
Check air induction for leaks									X		
Check manifold for vacuum leaks									X		
Drain LPG Vaporizer oil build up	**Every 150 hours or 120 days of operation**										
Engine Exhaust System											
Inspect exhaust manifold for leaks									X		
Inspect exhaust piping for leaks									X		
Check HEGO sensor(s) connector and wires for burns, cuts or damage									X		
Inspect catalyst for mechanical damage									X		

The Maintenance schedule represents manufacturers recommended maintenance intervals to maintain proper engine/equipment function. Specified state and federal regulations may require equipment operators to conduct comprehensive engine/equipment inspections at more periodic intervals than those specified above.

Special Notes Section

Note 1 = Item should be checked yearly, replace as needed

Note 2 = PSI requires the use of coolant meeting GM specification GM6277M. When used, this coolant change interval is 5,000 hours or 5 years (whichever occurs first). Changing of coolant types (typically indicated by color) and mixing of coolants is not allowed as this can result in a loss of coolant protection during the engine life. Consult the OEM for the correct replacement interval if you use coolant other than GM6277M

Note 3 = Severe duty applications are units that receive high load, full throttle operation for the majority of its operational life.

Note 4 = 5,000 hour or 5 years whichever occurs first

Note 5 = Oil life is highly dependent on oil quality, operating enviroment, and engine use.

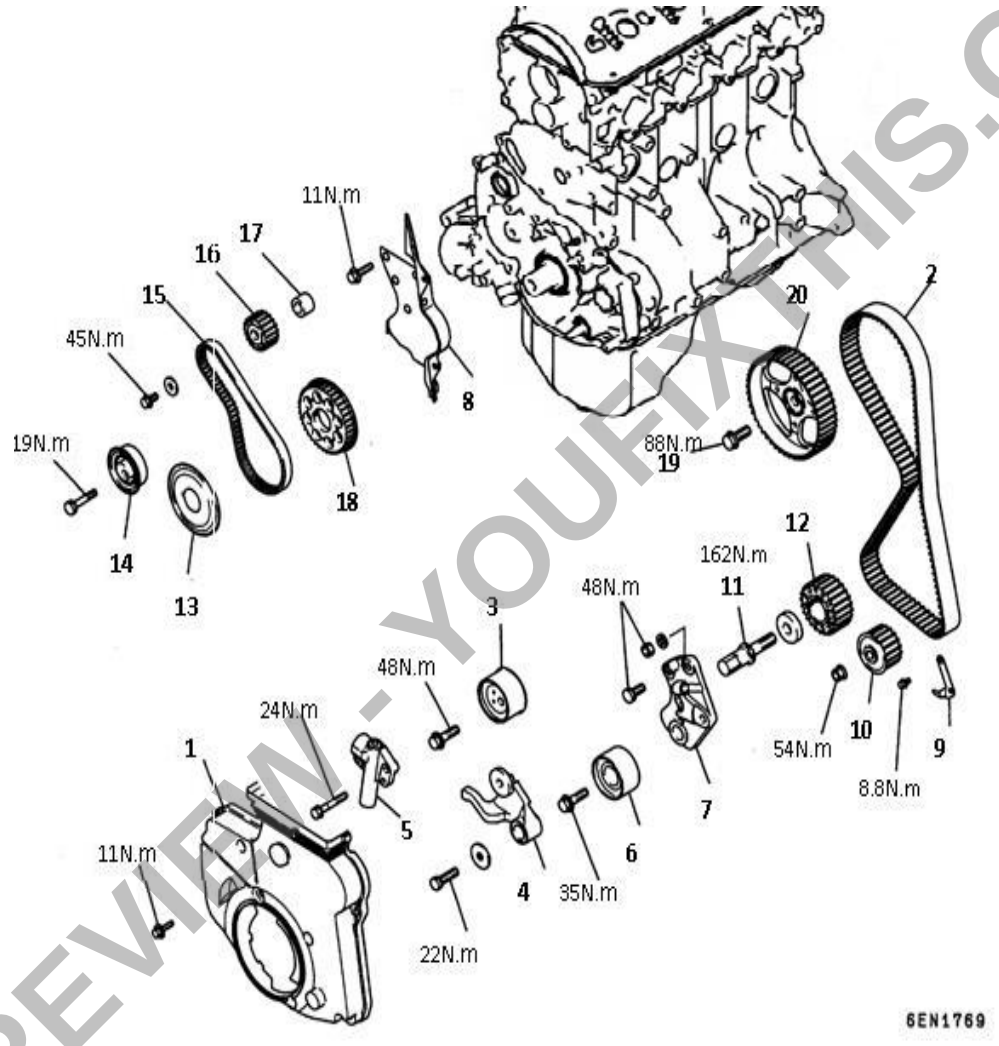
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TIMING BELT

REMOVAL AND INSTALLATION

ATTENTION: USE ONLY THE PSI LONG LIFE CAMSHAFT AND BALANCE SHAFT BELTS. THE PROCEDURES OUTLINED BELOW APPLY TO THESE BELTS ONLY. THE USE OF A NON- PSI LONG LIFE BELT IS NOT PERMITTED OR RECOMMENDED

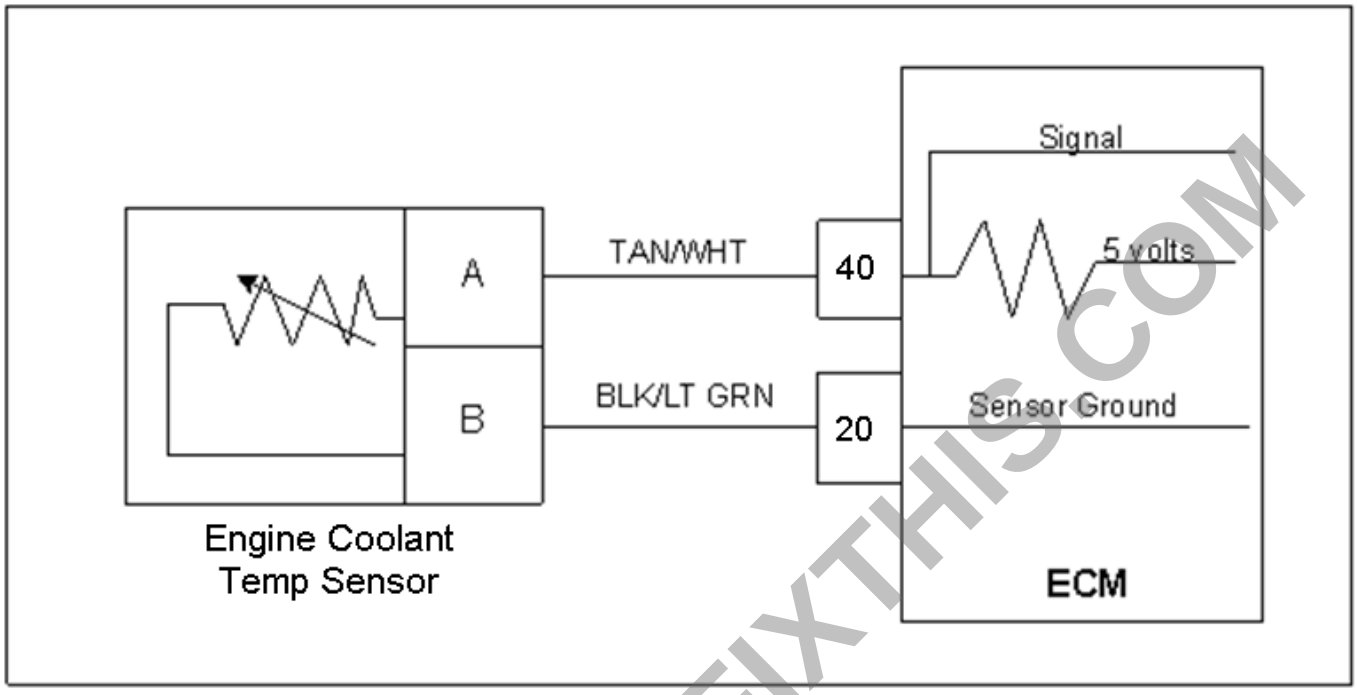


1. Timing belt front lower cover
2. Timing belt
3. Tensioner pulley
4. Tensioner arm
5. Auto-tensioner
6. Idler pulley
7. Tensioner pulley bracket
8. Timing belt rear cover
9. Timing belt indicator
10. Oil pump sprocket
11. Crankshaft bolt
12. Crankshaft sprocket
13. Flange
14. Tensioner "B"
15. Timing belt "B"
16. Counterbalance shaft sprocket
17. Spacer
18. Crankshaft sprocket "B"
19. Camshaft sprocket bolt
20. Camshaft sprocket

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DTC 116-ECT Higher Than Expected 1 (SPN 110:FMI 15)



Conditions for Setting the DTC

- Engine Coolant Temperature
- Check Condition-Engine Running
- Fault Condition-Engine Coolant Temperature reading or estimate greater than 215 degrees F. for greater than 5 seconds
- MIL-On
- Power derate (level 2)
- Adaptive-Disabled during active fault

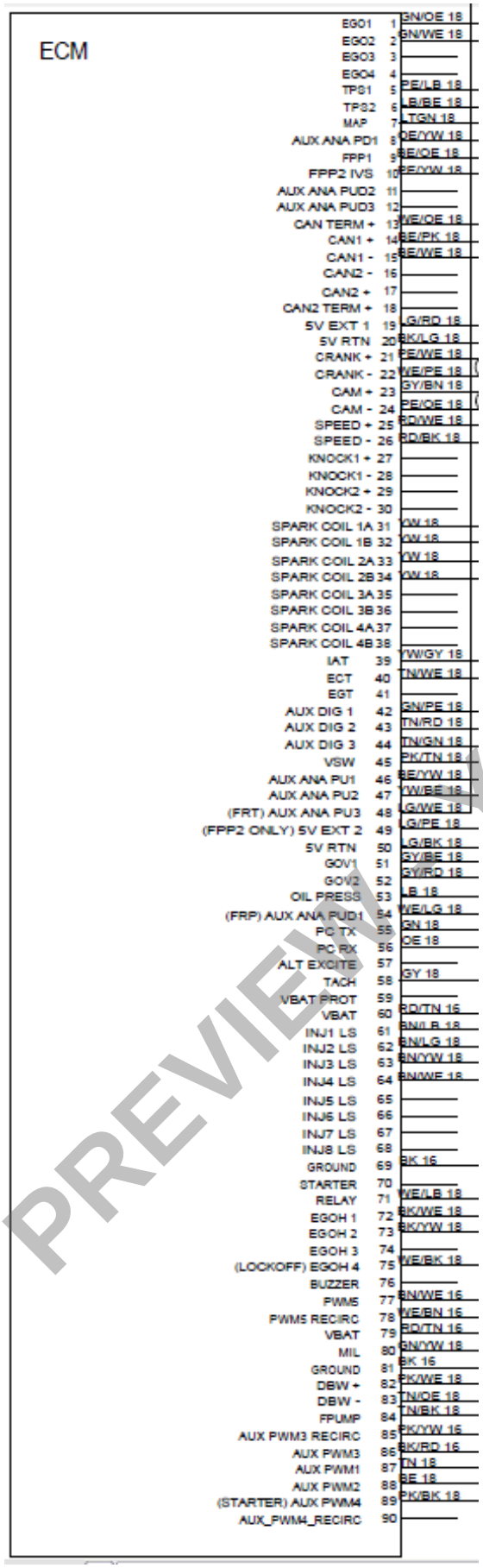
Circuit Description

The ECT (Engine Coolant Temperature) sensor is a temperature sensitive resistor located in the engine coolant sensor that is located in the coolant passage. The ECT is used for engine airflow calculation, fuel enrichment, and ignition timing control and to enable certain other temperature dependant operations. This code set is designed to help prevent engine damage from overheating. The ECM provides a voltage divider circuit so when the sensor reading is cool the sensor reads higher voltage, and lower when warm. This fault will set when the coolant exceeds 215 degrees F. for more than 5 seconds. Power derate level two will be enforced during this fault limiting the maximum throttle position to 20%. There is a 15 second run time delay before the ECM will enable this fault, meaning the fault will not be active for 15 seconds which the engine is running. NOTE: ECT higher than expected faults temperatures are sometimes changed at the OEM's request. The specific temperature is calibration specific. The values shown above are the standard generic values.

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ECM Header Connectors



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SERVICE SPECIFICATIONS

Item		Standard value	Limit
Timing belt			
Auto-tensioner rod projection length mm		12	-
Auto-tensioner rod pushed-in amount [When pushed with a force of 98 - 196 N] mm		1.0 or less	-
camshaft			
Camshaft cam height mm	Intake	37.39	Min36.89
	Exhaust	36.83	Min36.33
Camshaft journal outside diameter mm		45	-
Cylinder head and valves			
Cylinder head flatness of gasket surface mm		Less than 0.03	0.2
Cylinder head grinding limit of gasket surface mm (Total resurfacing depth of cylinder head and cylinder block)		-	0.2
Cylinder head overall height mm		119.9~ 120.1	-
Cylinder head bolt shank length mm		97.4	99.4
Valve thickness of valve head (margin) mm	Intake	1.0	Min 0.5
	Exhaust	1.2	Min 0.7
Valve overall height mm	Intake	112.30	Min111.80
	Exhaust	114.11	Min113.61
Valve stem outside diameter mm		6.0	-
Valve thickness to valve guide clearance mm	Intake	0.02 - 0.05	0.10
	Exhaust	0.03 - 0.07	0.15
Valve face angle mm		45° - 45.5°	-
Valve spring free length mm		54.75	53.75
Valve spring load/installed height N / mm		235±19/44.2	-
Valve spring out-of-squareness		2° or less	
Valve seat valve contact width mm		0.9 - 1.3	-
Valve guide inside diameter mm		6.0	-
Valve guide projection from cylinder head upper surface mm		14.0	-
Valve stem projection mm		49.3	49.8
Oil pan and oil pump			
Item	**Standard value**	**Limit**	**Item**
Oil pump side clearance mm	Drive gear	0.08 - 0.14	-
	Driven gear	0.06 - 0.12	-

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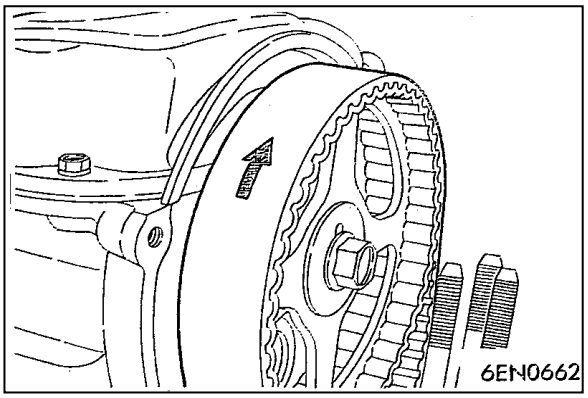
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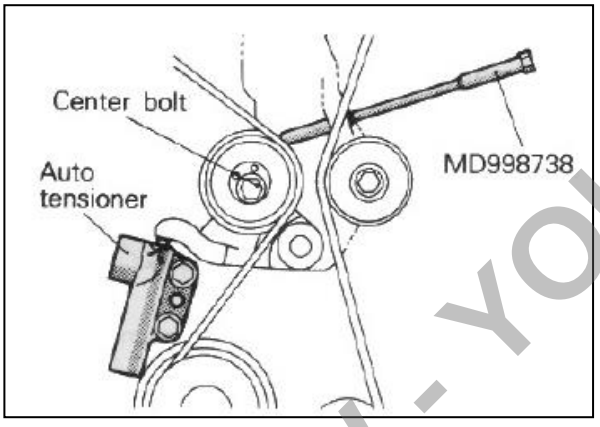
Item	Specification	
	(Nm)	ft.lbs
Oil pan and oil pump		
Drain plug	44	33
Flange bolt	36.3	27
Front case bolts	24.5	18
Oil filter bracket bolts	18.6	14
Oil filter	18.6	14
Oil pan bolts	6.9	5
Oil pump cover bolts	15.7	12
Oil pump cover screws	9.8	8
Oil screen bolts	18.6	14
Plug	23.5	18
Relief plug	44	33
Piston and connecting rod		
Connecting rod cap nuts	↻20Nm → +↻90° to 100°	↻15ft.lbs→ +↻90° to 100°
Crankshaft and cylinder block		
Bearing cap bolts	↻24.5Nm →+↻90° to 100°	↻18ft.lbs→ +↻90° to 100°
Bell housing cover bolts	8.8	
Oil seal case bolts	10.8	
Rear plate bolts	10.8	
Flexplate	8.8	
Flexplate	122-135	90-100

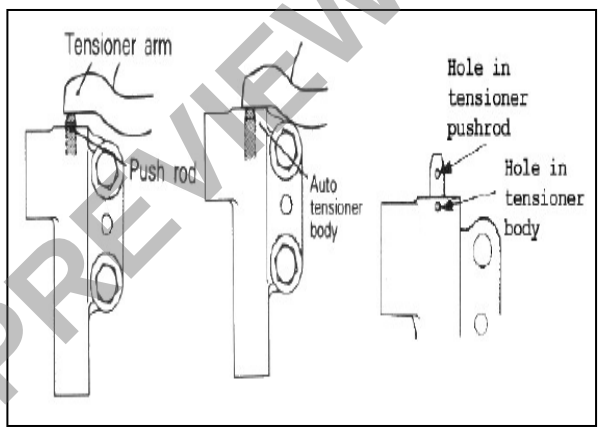
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NOTE: WHEN REPLACING CAMSHAFT AND BALANCE SHAFT BELTS (5,000 HOURS) IT IS RECOMMENDED TO REPLACE THE IDLER PULLEY AND TENSIONER PULLEY







REMOVAL SERVICE POINTS

<<A>> TIMING BELT REMOVAL

1. Mark the belt running direction.

NOTE:

(1) REPLACE CAMSHAFT BELT AND BALANCE SHAFT BELT UNLESS OPERATING HOURS ON THE PARTS ARE LESS THAN 100 HOURS. IN THE EVENT YOU REUSE THE PARTS YOU WILL NEED TO DOCUMENT BELT DIRECTION OF TRAVEL PRIOR TO DISASSEBMLY, THEN REINSTALL THE BELTS IN THE SAME DIRECTION.

(2) If there is oil or water on any part, check the front case oil seals, camshaft oil seal, and water pump for leaks.

3. If available use special tool Set screw (not needed) to release tension on the timing belt. Rotate Set screw until it makes contact with the tensioner arm. Continue to rotate Set screw slowly until tension on the timing belt has been released.

4. At this time you can insert a metal wire (1.4 mm in diameter) or a 1/16" allen wrench in the auto tensioner. This is done by aligning the set hole in the auto tensioner push rod with the set hole in the auto tensioner body. Rotating the Set screw (not needed) to move the tensioner arm up or down will aid in lining up the two set holes.

4. Remove the auto tensioner by loosening the two bolts that secure it to the engine

5. Loosen the tensioner pulley bolt, and then remove the timing belt.

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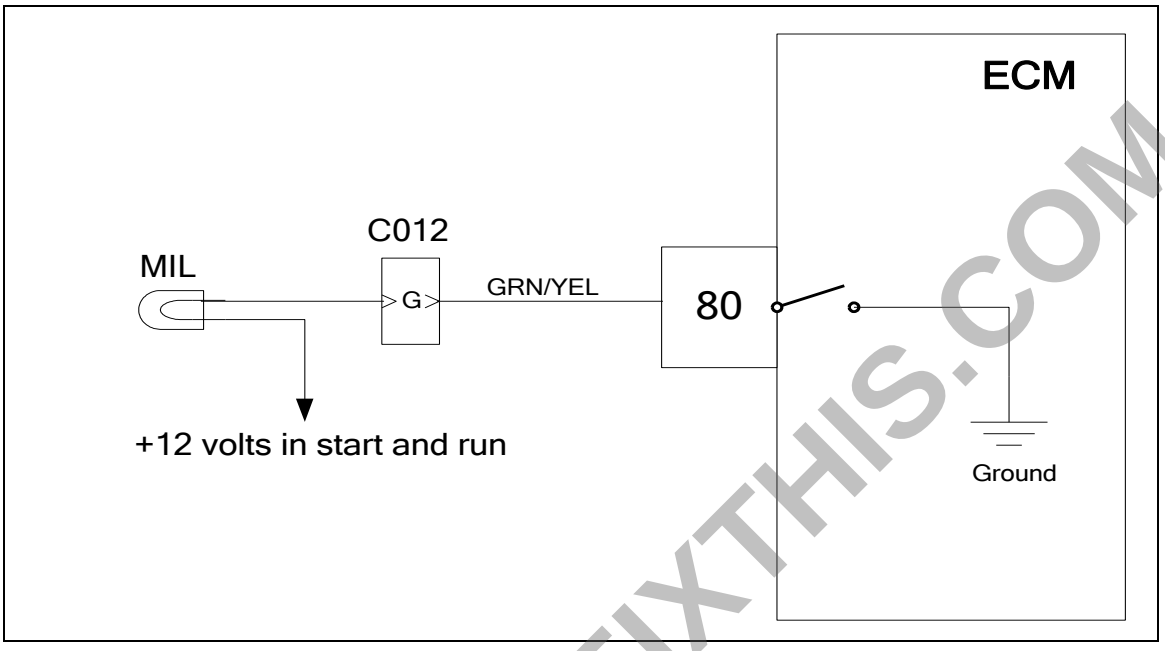
DIAGNOSTIC TROUBLE CODE (DTC) CHART – **SORTED BY DTC # (2 of 4)**

Description	DTC Set 2 SPN-2	DTC Set 2 FMI-2	Description	DTC Set 2 SPN-2	DTC Set 2 FMI-2
DTC 601: Microprocessor failure - FLASH	628	13	DTC 1175: MegaJector voltage supply low	520260	4
DTC 604: Microprocessor failure - RAM	630	12	DTC 1176: MegaJector internal actuator fault detection	520260	12
DTC 606: Microprocessor failure - COP	629	31	DTC 1177: MegaJector internal circuitry fault detection	520260	12
DTC 615: Start relay coil open	1321	5	DTC 1178: MegaJector internal comm fault detection	520260	12
DTC 616: Start relay ground short	1321	4	DTC 1182: Fuel impurity level high	520401	0
DTC 617: Start relay coil short to power	1321	3	DTC 1183: MegaJector autozero / lockoff failure	520803	31
DTC 627: Fuel pump relay coil open	1348	5	DTC 1311: Cylinder 1 misfire detected	1323	11
DTC 628: Fuel-pump high-side open or short to ground	1347	5	DTC 1312: Cylinder 2 misfire detected	1324	11
DTC 628: Fuel pump relay control ground short	1348	4	DTC 1313: Cylinder 3 misfire detected	1325	11
DTC 629: Fuel-pump high-side short to power	1347	6	DTC 1314: Cylinder 4 misfire detected	1326	11
DTC 629: Fuel pump relay coil short to power	1348	3	DTC 1315: Cylinder 5 misfire detected	1327	11
DTC 642: Sensor supply voltage 1 low	1079	4	DTC 1316: Cylinder 6 misfire detected	1328	11
DTC 643: Sensor supply voltage 1 high	1079	3	DTC 1317: Cylinder 7 misfire detected	1329	11
DTC 650: MIL open	1213	5	DTC 1318: Cylinder 8 misfire detected	1330	11
DTC 652: Sensor supply voltage 2 low	1080	4	DTC 1411: EMWT1 voltage high	441	3
DTC 653: Sensor supply voltage 2 high	1080	3	DTC 1412: EMWT2 voltage high	442	3
DTC 685: Power relay coil open	1485	5	DTC 1413: EMWT1 voltage low	441	4
DTC 686: Power relay ground short	1485	4	DTC 1414: EMWT2 voltage low	442	4
DTC 687: Power relay coil short to power	1485	3	DTC 1415: EMWT1 higher than expected stage 1	441	15
DTC 916: Shift actuator feedback out-of-range	520226	3	DTC 1416: EMWT2 higher than expected stage 1	442	15
DTC 919: Shift unable to reach desired gear	520226	7	DTC 1417: EMWT1 higher than expected stage 2	441	0
DTC 920: Shift actuator or drive circuit failed	520226	31	DTC 1418: EMWT2 higher than expected stage 2	442	0
DTC 1111: RPM above fuel rev limit level	515	16	DTC 1419: ERWT1 voltage high	443	3
DTC 1112: RPM above spark rev limit level	515	0	DTC 1420: ERWT2 voltage high	444	3
DTC 1121: FPP1/2 simultaneous voltages out-of-range (redundan	91	31	DTC 1421: ERWT1 voltage low	443	4
DTC 1122: FPP1/2 do not match each other or IVS (redundancy lo	520250	31	DTC 1422: ERWT2 voltage low	444	4
DTC 1131: WGP voltage high	1192	3	DTC 1423: ERWT1 higher than expected stage 1	443	15
DTC 1132: WGP voltage low	1192	4	DTC 1424: ERWT2 higher than expected stage 1	444	15
DTC 1151: Closed-loop LPG high	520206	0	DTC 1425: ERWT1 higher than expected stage 2	443	0
DTC 1152: Closed-loop LPG low	520206	1	DTC 1426: ERWT2 higher than expected stage 2	444	0
DTC 1153: Closed-loop NG high	520207	0	DTC 1511: AUX analog Pull-Up 1 high voltage	520216	3
DTC 1154: Closed-loop NG low	520207	1	DTC 1512: AUX analog Pull-Up 1 low voltage	520216	4
DTC 1155: Closed-loop gasoline bank1 high	520204	0	DTC 1513: AUX analog Pull-Up 2 high voltage	520217	3
DTC 1156: Closed-loop gasoline bank1 low	520204	1	DTC 1514: AUX analog Pull-Up 2 low voltage	520217	4
DTC 1157: Closed-loop gasoline bank2 high	520205	0	DTC 1515: AUX analog Pull-Down 1 high voltage	520215	3
DTC 1158: Closed-loop gasoline bank2 low	520205	1	DTC 1516: AUX analog Pull-Down 1 low voltage	520215	4
DTC 1161: Adaptive-learn LPG high	520202	0	DTC 1517: AUX analog Pull-Up 3 high voltage	520218	3
DTC 1162: Adaptive-learn LPG low	520202	1	DTC 1518: AUX analog Pull-Up 3 low voltage	520218	4
DTC 1163: Adaptive-learn NG high	520203	0	DTC 1521: CHT higher than expected stage 1	110	16
DTC 1164: Adaptive-learn NG low	520203	1	DTC 1522: CHT higher than expected stage 2	110	0
DTC 1165: Catalyst inactive on LPG	520213	10	DTC 1531: Gov1/2/3 interlock failure	520270	31
DTC 1166: Catalyst inactive on NG	520214	10	DTC 1541: AUX analog Pull-Up/Down 1 high voltage	520219	3
DTC 1171: MegaJector delivery pressure higher than expected	520260	0	DTC 1542: AUX analog Pull-Up/Down 1 low voltage	520219	4
DTC 1172: MegaJector delivery pressure lower than expected	520260	1	DTC 1543: AUX analog Pull-Up/Down 2 high voltage	520220	3
DTC 1173: MegaJector comm lost	520260	31	DTC 1544: AUX analog Pull-Up/Down 2 low voltage	520220	4
DTC 1174: MegaJector voltage supply high	520260	3	DTC 1545: AUX analog Pull-Up/Down 3 high voltage	520221	3

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OBD System Check/MIL (Malfunction Indicator Lamp)

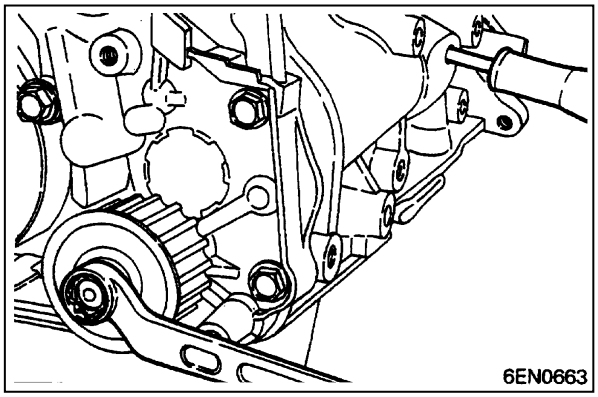


Circuit Description

The fuel system is equipped with OBD (On-Board Diagnostics). The system has a dash mounted MIL (Malfunction Indicator Lamp). The MIL serves as notification of an engine or fuel system related problem. The MIL also has the ability to flash DTC codes in what is referred to as the blink code mode. It will display DTCs that have been stored due to a possible system malfunction. The following DTC charts in this manual will instruct the technician to perform the OBD system check. This simply means to verify the operation of the MIL. The lamp should illuminate when the key is in the ON position, and the engine is not running. This feature verifies that the lamp is in proper working order. If the lamp does not illuminate with the vehicle key ON and engine OFF, repair it as soon as possible. Once the engine is in start or run mode, the lamp should go off. If the lamp stays on while the engine is in the start or run mode, a current diagnostic trouble code may be set or a problem may exist with the MIL electrical wiring. The electrical schematic above shows the MIL power source supplied to the lamp. The ECM completes the circuit to ground to turn the lamp ON.

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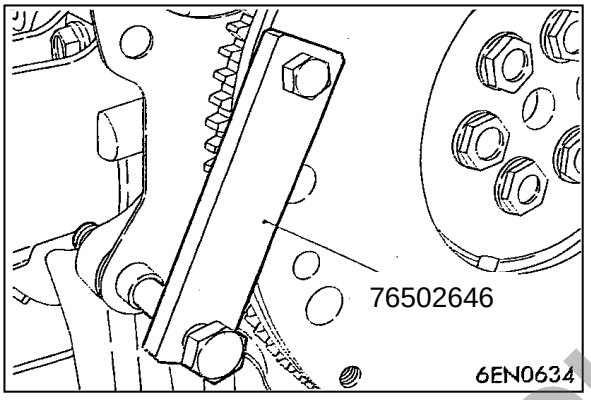


<<B>> OIL PUMP SPROCKET REMOVAL

1. Remove the plug on the left side of the cylinder block.

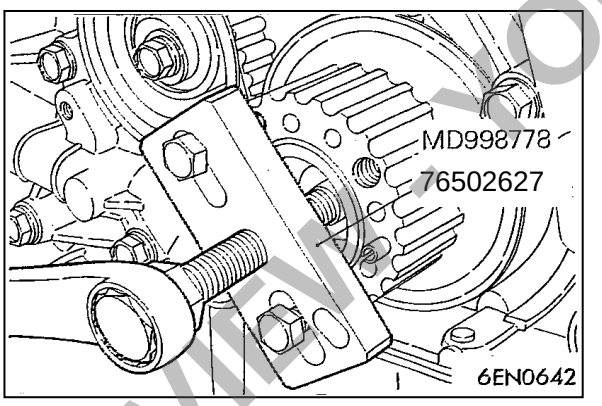
2. Insert a Phillips screwdriver (shank diameter 8 mm) through the plug hole to block the left counterbalance shaft.

3. Loosen the nut and then remove the oil pump sprocket.



<<C>> CRANKSHAFT BOLT LOOSENING

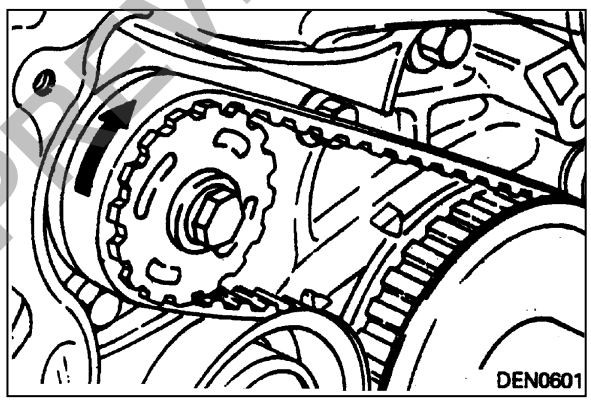
1. Removal the crankshaft bolt and washer.



<<D>>CRANKSHAFT SPROCKET REMOVAL

1. Set special tool Crankshaft sprocket puller (76502627) as shown in the illustration.

2. Screw in the center bolt of the special tool to remove the crankshaft sprocket.



<<E>> Balance Shaft Belt REMOVAL

1. Mark the belt running direction for reinstallation.

NOTE: (1) REPLACE CAMSHAFT BELT AND BALANCE SHAFT BELT UNLESS OPERATING HOURS ON THE PARTS ARE LESS THAN 100 HOURS. IN THE EVENT YOU REUSE THE PARTS YOU WILL NEED TO DOCUMENT BELT DIRECTION OF TRAVEL PRIOR TO DISASSEBMLY, THEN REINSTALL THE BELTS IN THE SAME DIRECTION.

2. Loosen the tensioner "B" bolt, and then remove the timing belt "B."

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DIAGNOSTIC TROUBLE CODE (DTC) CHART – SORTED BY DTC # (3 of 4)

Description	DTC Set 2 SPN-2	FMI-2	Description	DTC Set 2 SPN-2	FMI-2
DTC 1546: AUX analog Pull-Up/Down 3 low voltage	520221	4	DTC 1662: PWM6 short to power	925	3
DTC 1547: AUX analog Pull-Up/Down 4 high voltage	713	3	DTC 1663: PWM7 open / ground short	926	5
DTC 1548: AUX analog Pull-Up/Down 4 low voltage	713	4	DTC 1664: PWM7 short to power	926	3
DTC 1551: AUX digital 1 high voltage	520222	3	DTC 1665: PWM8 open / ground short	2646	5
DTC 1552: AUX digital 1 low voltage	520222	4	DTC 1666: PWM8 short to power	2646	3
DTC 1553: AUX digital 2 high voltage	520223	3	DTC 1669: PWM9 open / ground short	2647	5
DTC 1554: AUX digital 2 low voltage	520223	4	DTC 1670: PWM9 short to power	2647	3
DTC 1555: AUX digital 3 high voltage	520224	3	DTC 2111: Unable to reach lower TPS	51	7
DTC 1555: Water Intrusion Detection	520224	3	DTC 2112: Unable to reach higher TPS	51	7
DTC 1556: AUX digital 3 low voltage	520224	4	DTC 2115: FPP1 higher than IVS	91	0
DTC 1561: AUX analog Pull-Down 2 high voltage	0	3	DTC 2116: FPP2 higher than IVS	29	0
DTC 1561: AUX analog Pull-Down 3 high voltage	0	3	DTC 2120: FPP1 invalid voltage and FPP2 disagrees with IVS	520250	31
DTC 1561: AUX analog Pull-Down 2 low voltage	0	4	DTC 2121: FPP1-2 lower than expected	91	18
DTC 1561: AUX analog Pull-Down 3 low voltage	0	4	DTC 2122: FPP1 voltage high	91	3
DTC 1611: Sensor supply voltage 1 and 2 out-of-range	1079	31	DTC 2123: FPP1 voltage low	91	4
DTC 1612: Microprocessor failure - RTI 1	629	31	DTC 2125: FPP2 invalid voltage and FPP1 disagrees with IVS	520250	31
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DTC 1625: J1939 shutdown request	1384	31	DTC 2229: BP pressure high	108	0
DTC 1626: CAN-J1939 Tx fault	639	12	DTC 2300: Spark coil 1 primary open or short to ground	1268	5
DTC 1627: CAN-J1939 Rx fault	639	12	DTC 2301: Spark coil 1 primary shorted	1268	6
DTC 1628: J1939 CAN address / engine-number conflict	639	13	DTC 2303: Spark coil 2 primary open or short to ground	1269	5
DTC 1629: J1939 TSC1 message receipt loss	639	9	DTC 2304: Spark coil 2 primary shorted	1269	6
DTC 1630: J1939 ETC message receipt loss	91	2	DTC 2306: Spark coil 3 primary open or short to ground	1270	5
DTC 1632: PWM1-Gauge1 short to power	697	6	DTC 2307: Spark coil 3 primary shorted	1270	6
DTC 1633: PWM2-Gauge2 open / ground short	698	5	DTC 2309: Spark coil 4 primary open or short to ground	1271	5
DTC 1634: PWM2-Gauge2 short to power	698	6	DTC 2310: Spark coil 4 primary shorted	1271	6
DTC 1635: PWM3-Gauge3 open / ground short	699	5	DTC 2312: Spark coil 5 primary open or short to ground	1272	5
DTC 1636: PWM3-Gauge3 short to power	699	6	DTC 2313: Spark coil 5 primary shorted	1272	6
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DTC 1639: PWM5 open / ground short	520230	5	DTC 2318: Spark coil 7 primary open or short to ground	1274	5
DTC 1640: PWM5 short to power	520230	6	DTC 2319: Spark coil 7 primary shorted	1274	6
DTC 1641: Buzzer control ground short	920	4	DTC 2321: Spark coil 8 primary open or short to ground	1275	5
DTC 1642: Buzzer open	920	5	DTC 2322: Spark coil 8 primary shorted	1275	6
DTC 1643: Buzzer control short to power	920	3	DTC 2324: Spark coil 9 primary open or short to ground	1276	5
DTC 1644: MIL control ground short	1213	4	DTC 2325: Spark coil 9 primary shorted	1276	6
DTC 1645: MIL control short to power	1213	3	DTC 2327: Spark coil 10 primary open or short to ground	1277	5
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DTC 1661: PWM6 open / ground short	925	5	DTC 2428: EGT temperature high	173	0

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PSI 2.0/2.4L ENGINE

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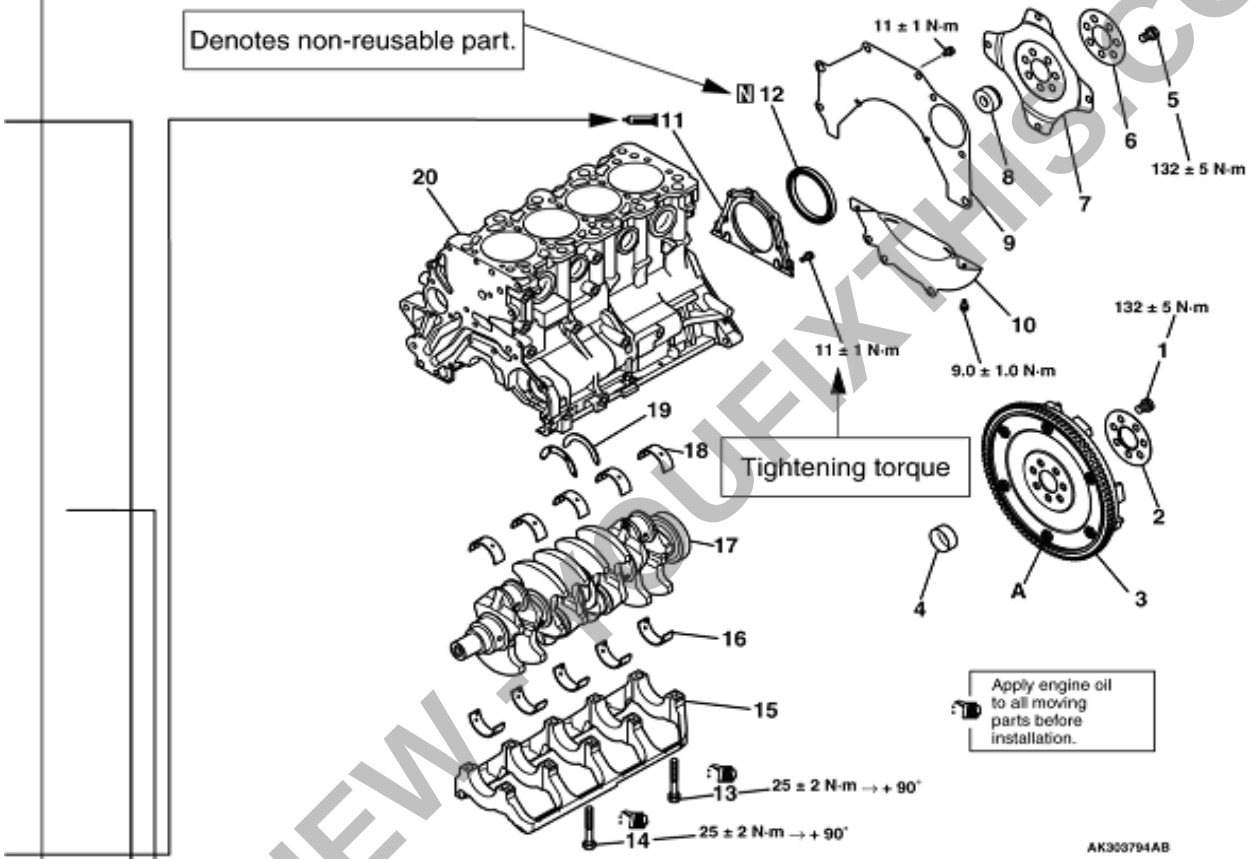
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EXAMPLE ONLY – REFER TO CORRECT SECTION IN THE MANUAL FOR ACTUAL ASSEMLBY AND TORQUE SPECS.

Section title

CRANKSHAFT AND CYLINDER BLOCK

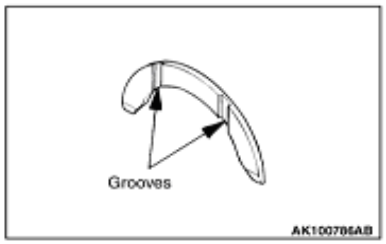
REMOVAL AND INSTALLATION



Removal steps
1. Flywheel bolt
2. Adapter plate
3. Flywheel
4. Crankshaft bushing
5. Drive plate bolt
6. Adapter plate
7. Drive plate
8. Crankshaft bushing
9. Rear plate
10. Bell housing cover
>>E<< 11. Oil seal case
>>D<< 12. Oil seal

INSTALLATION SERVICE POINTS

>>A<< THRUST BEARING INSTALLATION



The alphabetical character in this category of heading matches that of the relevant removal steps, installation steps, disassembly steps, or reassembly steps.

Procedures and cautions for removal, installation, disassembly, and reassembly are explained under this category of heading.

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NO START

Checks	Action
Engine Mechanical Checks	**Important:** The LPG Fuel system is more sensitive to intake manifold leakage than the gasoline fuel system. Check for the following: • Vacuum leaks. • Improper valve timing. • Low compression. • Improper valve clearance. • Worn rocker arms. • Broken or weak valve springs. Worn camshaft lobes.
Exhaust System Checks	Check the exhaust system for a possible restriction: • Inspect the exhaust system for damaged or collapsed pipes: • Inspect the muffler for signs of heat distress or for possible internal failure. • Check for possible plugged catalytic converter. Refer to *Restricted Exhaust System Diagnosis*.

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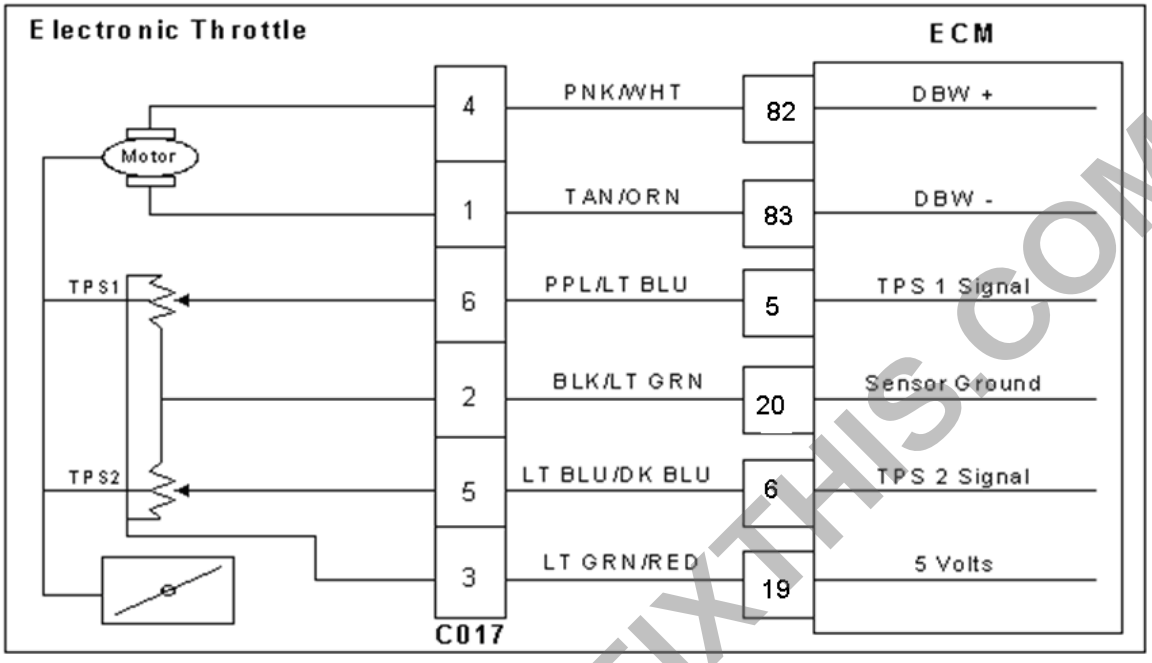
DTC 134-EGO 1 Open/Inactive

Step	Action	Value(s)	Yes	No
1	Did you perform the On-Board (OBD) System Check?	-	Go to Step (2)	Go to OBD System Check Section
2	• Key ON, Engine Running • DST (Diagnostic Scan Tool) connected in System Data Mode • Run engine to full operating temperature and then idle for a minimum of 2 minutes Does DST display EGO 1 voltage fixed between 0.4 and 0.5 volts after at least 2 minutes of idle run time?		Go to Step (3)	Intermittent problem. See Electrical Section Intermittent Electrical Diagnosis
3	• Key OFF • Disconnect EGO 1 connector C005 • Key ON • Using a DVOM check for voltage between EGO 1 connector pins C and D (Check must be made within 30 seconds or before power relay shuts down) Do you have voltage?		Go to Step (8)	Go To Step (4)
4	• Key OFF • Using a DVOM check for voltage between EGO 1 connector pin C and engine ground • Key ON (Check must be made within 30 seconds or before power relay shuts down) Do you have voltage?	System Voltage	Go to Step (5)	Repair system power relay open circuit
5	• Disconnect ECM connector C001 • Using a DVOM check for continuity between EGO 1 connector pin D and ECM connector pin 72 Do you have continuity?		Go to Step (6)	Repair open heater ground circuit
6	• Inspect wire harness connector C005 pins B and D and C001 pins 1 and 72 for damage, corrosion or contamination Did You find a problem?		Correct the problem as required see Electrical Section wire harness repair	Go to Step (7)
7	• Replace ECM Is the replacement complete?		Go to Step (11)	-

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DTC 1111-Fuel Rev Limit (SPN 515:FMI 16)



Conditions for Setting the DTC

- Fuel Rev Limit
- Check Condition-Engine Running
- Fault Condition-Engine rpm greater than set limit
- MIL-ON during active fault

Circuit Description

This fault will set anytime the engine rpm exceeds the specified speed settings in the calibration. This is generally set at 3000 rpms. The MIL command is ON during this active fault

Diagnostic Aid

Always check for other stored DTC codes before using the following DTC chart for this code set. Repair any existing codes starting with the lowest numerical code first.

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