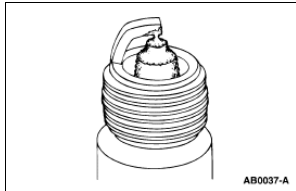
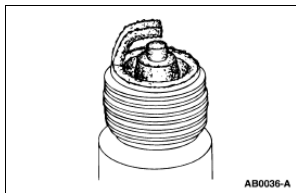


Spark Plug Inspection

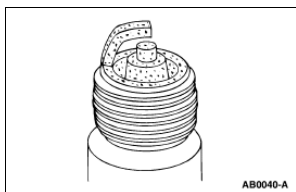
1. Inspect the spark plug for a bridged gap.
 - Check for deposit build-up closing the gap between the electrodes. Deposits are caused by oil or carbon fouling.
 - Clean the spark plug.



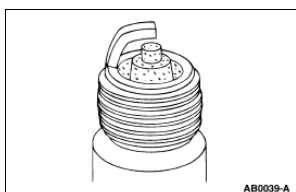
2. Check for oil fouling.
 - Check for wet, black deposits on the insulator shell bore electrodes, caused by excessive oil entering the combustion chamber through worn rings and pistons, excessive valve-to-guide clearance or worn or loose bearings.
 - Correct the oil leak concern.
 - Install a new spark plug.



3. Inspect for carbon fouling. Look for black, dry, fluffy carbon deposits on the insulator tips, exposed shell surfaces and electrodes, caused by a spark plug with an incorrect heat range, dirty air cleaner, too rich a fuel mixture or excessive idling.
 - Clean the spark plug.



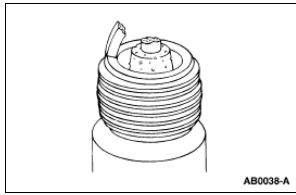
4. Inspect for normal burning.
 - Check for light tan or gray deposits on the firing tip.



5. Inspect for pre-ignition, identified by melted electrodes and a possibly damaged insulator. Metallic deposits on the insulator indicate engine damage. This may be caused by incorrect ignition timing, wrong type of fuel or the unauthorized installation of a heli-coil insert in place of the spark plug

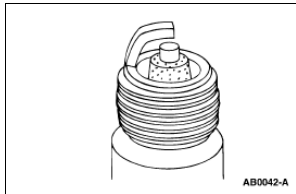
threads.

- Install a new spark plug.



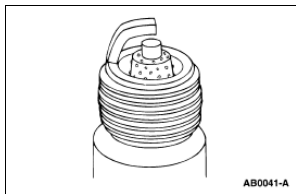
6. Inspect for overheating, identified by a white or light gray spots and with bluish-burnt appearance of electrodes. This is caused by engine overheating, wrong type of fuel, loose spark plugs, spark plugs with an incorrect heat range, low fuel pump pressure or incorrect ignition timing.

- Install a new spark plug.



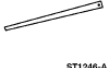
7. Inspect for fused deposits, identified by melted or spotty deposits resembling bubbles or blisters. These are caused by sudden acceleration.

- Clean the spark plug.

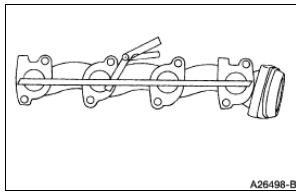


Exhaust Manifold Inspection

Special Tool(s)

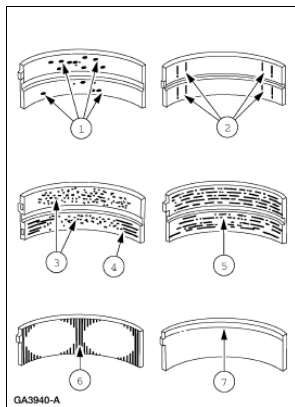
 ST1246-A	Straight Edge 303-D039 (D83L-4201-A) or equivalent
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1. Place a straight edge across the exhaust manifold flanges and check for warping with a feeler gauge.



Bearing Inspection

1. Inspect bearings for the following defects. Possible causes are shown:
 1. Cratering fatigue failure.
 2. Spot polishing incorrect seating.
 3. Imbedded dirt engine oil.
 4. Scratching dirty engine oil.
 5. Base exposed poor lubrication.
 6. Both edges worn journal damaged.
 7. One edge worn journal tapered or bearing not seated.



General Specifications

Item	Specification
Lubricants and Sealants	
Super Premium SAE 5W-30 Motor Oil XO-5W30-QSP or equivalent	WSS-M2C153-G
Metal Surface Cleaner F4AZ-19A536-RA or equivalent	WSE-M5B392-A
Silicone Gasket and Sealant F7AZ-19554-EA or equivalent	WSE-M4G323-A4
Silicone Brake Caliper Grease and Dielectric Compound D7AZ-19A331-A or equivalent	ESA-M1C171-A
Motorcraft Premium Engine Coolant VC-4-A (in Oregon VC-5, in Canada CXC-10) or equivalent ^a	ESE-M97B44-A (green color)
Motorcraft Premium Gold Engine Coolant VC-7-A (in Oregon VC-7-B) or equivalent ^{a b}	WSS-M97B51-A1 (yellow color)
Engine 4.0L SOHC	
Displacement liters (cubic inch)	4.0L (244)
Number of cylinders	6
Bore mm (inch)	100.4 (3.953)
Stroke mm (inch)	84.4 (3.31)
Firing order	1-4-2-5-3-6
Minimum oil pressure at 2,000 rpm (engine at normal operating temperature) kPa (psi)	103 (15)
Oil capacity liters/quarts	3.8 (4) with filter
Cylinder Head and Valve Train	
Cylinder head gasket surface flatness mm (inch)	0.08 (0.003) Total
Combustion chamber volume (cc)	65.197 ± 2.068-2.018
Valve arrangement (front to rear)	LH=I-E-I-E-I-E RH=E-I-E-I-E-I
Valve guide bore diameter mm (inch)	7.00-7.018 (0.276)
Valve stem diameter intake mm (inch)	6.965-6.98 (0.274-0.275)
Valve stem diameter exhaust mm (inch)	6.95-6.965 (0.274)
Valve stem-to-guide clearance exhaust mm (inch)	0.035-0.068 (0.001-0.003)
Valve stem-to-guide clearance intake mm (inch)	0.020-0.053 (0.001-0.002)
Valve head diameter intake mm (inch)	45.9-46.1 (1.807-1.815)
Valve head diameter exhaust mm (inch)	38.9-39.1 (1.531-1.539)
Valve face runout	0.03 (0.001)
Valve face angle (degrees)	45°
Valve seat width (exhaust and intake) mm (inch)	1.556-2.404 (0.06-0.094) 1.273-2.121 (0.05-0.083)

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Valve seat runout (TIR maximum) mm (inch)	0.059 (0.002)
Valve seat angle (degrees)	45°
Valve spring free length intake mm (inch)	43.1 (1.7)
Valve spring free length exhaust mm (inch)	43.1 (1.7)
Valve spring squareness	
Valve spring compression pressure intake (at specified height) (lb)	275-305 Nm at 35.9-36.7 mm (202.84-224.968 lb-ft at 1.413-1.445 inch)
Valve spring compression pressure exhaust (at specified height) (lb)	275-305 Nm at 35.9-36.7 mm (202.84-224.968 lb-ft at 1.413-1.445 inch)
Valve spring installed height intake mm (inch)	39.86-40.86 (1.569-1.601)
Valve spring installed height exhaust mm (inch)	39.86-40.68 (1.569-1.601)
Valve spring installed pressure	
Roller follower ratio	
Camshaft	
Theoretical valve lift @ 0 lash	
Lobe lift intake mm (inch)	6.584 (0.259)
Lobe lift exhaust mm (inch)	6.584 (0.259)
Allowable lobe lift loss mm (inch)	0.127 (0.005)
Journal diameter mm (inch)	27.935-27.96 (1.099-1.101)
Journal bore inside diameter mm (inch)	28.0-28.03 (1.102-1.104)
Journal to bearing clearance mm (inch) ^a	0.04-0.095 (0.002-0.004)
Runout mm (inch)	0.05 (0.002)
End play mm (inch)	0.075-0.185 (0.0003-0.007)
Cylinder Block	
Cylinder bore diameter mm (inch)	100.4 (3.953)
Cylinder bore maximum taper mm (inch)	0.025 (0.001)
Cylinder bore maximum out-of-round mm (inch)	0.025 (0.001)
Main bearing bore inside diameter mm (inch)	60.634-60.620 (2.387-2.387)
Head gasket surface flatness mm (inch)	0.1 (0.004) overall
Head gasket surface finish (RMS)	60-150
Crankshaft	
Main bearing journal diameter mm (inch)	56.980-57.0 (2.243-2.244)
Main bearing journal maximum taper mm (inch)	0.008 (0.0003)
Main bearing journal maximum out-of-round mm (inch)	0.008 (0.0003)
Main bearing journal-to-cylinder block clearance mm (inch)	
Connecting rod journal diameter mm (inch)	53.98-54.0 (2.125-2.126)
Connecting rod journal maximum taper mm (inch)	0.008 (0.0003)
Connecting rod journal maximum out-of-round mm (inch)	0.008 (0.0003)
Crankshaft maximum end play mm (inch)	0.05-0.32 (0.002-0.0126)
Piston and Connecting Rod	
Piston diameter coded STD mm (inch)	100.380-100.400 (3.952-3.9528)
Piston diameter coded 0.5 mm (inch)	100.880-100.900 (3.972)
Piston diameter coded 1.0 mm (inch)	101.350-101.370 (3.990-3.991)
Piston-to-cylinder bore clearance mm (inch)	0.030-0.060 (0.0012-0.002)

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Piston top ring end gap mm (inch)	0.200-0.450 (0.008-0.018)
Piston bottom ring end gap mm (inch)	0.450-0.700 (0.018-0.028)
Piston top ring groove width mm (inch)	1.64-1.66 (0.0645-0.0654)
Piston bottom ring groove width mm (inch)	1.79-1.81 (0.0705-0.0713)
Piston oil ring groove width mm (inch)	3.5-3.53 (0.1378-0.1399)
Piston top ring width mm (inch)	1.578-1.598 (0.062-0.063)
Piston bottom ring width mm (inch)	1.728-1.74 (0.068-0.069)
Piston top ring-to-groove clearance mm (inch)	0.050-0.082 (0.002-0.0003)
Piston bottom ring-to-groove clearance mm (inch)	0.050-0.082 (0.002-0.003)
Piston pin bore diameter (red) mm (inch)	24.007-24.010 (0.945)
Piston pin bore diameter (blue) mm (inch)	24.010-24.013 (0.945)
Piston pin diameter (red) mm (inch)	23.994-23.997 (0.9446-0.9447)
Piston pin diameter (blue) mm (inch)	23.997-24.000 (0.9447-0.9449)
Piston pin length mm (inch)	72.0-72.8 (2.835-2.866)
Piston pin-to-piston pin fit mm (inch)	0.01-0.016 (0.0004-0.0006)
Piston pin-to-connecting rod clearance mm (inch)	Press Fit -0.018 to -0.042 (-0.0007 to -0.0017)
Connecting rod pin bore diameter mm (inch)	23.958-23.976 (0.943-0.944)
Connecting rod length mm (inch)	145.965-146.035 (5.746-5.749)
Connecting rod maximum allowed bend mm (inch)	0.0125 (0.00049) per 25.4 mm (1.000)
Connecting rod maximum allowed twist mm (inch)	0.038 (0.0015) per 25.4 mm (1.000)
Connecting rod bearing bore diameter mm (inch)	56.82-56.84 (2.237)
Connecting rod bearing-to-crankshaft clearance mm (inch)	0.013-0.048 (0.005-0.002)
Connecting rod side clearance (assembled to crankshaft) mm (inch)	0.092-0.268 (0.0036-0.0106)

^a Use the same type of coolant that was drained from the cooling system. Do not mix coolant types.

^b The addition of Motorcraft Cooling System Stop Leak Pellets, VC-6, darkens Motorcraft Premium Gold Engine Coolant from yellow to golden tan.

^a Tighten camshaft bearing cap bolts to 15 Nm (11 lb-ft) when measuring journal clearance.

Torque Specifications

Description	Nm	lb-ft	lb-in
A/C compressor manifold bolt	20	15	
A/C line bracket nut	20	15	
Accelerator control splash shield bolts	4		35
Balance shaft bolts	26-28	19-21	
Balance shaft chain guide	9-11		80-97
Balance shaft tensioner bolts	28-30	21-22	
Camshaft bearing cap bolts	(a)		
Camshaft sprocket bolt	85	63	
Cassette and sprocket to jackshaft bolt	a		
Cassette bolt, LH	a		
Cassette bolt, RH	a		
Connecting rod bolts	a		

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Crankshaft pulley bolts	a		
Cylinder head bolts	a		
Accessory bracket bolts	42	31	
Engine coolant temperature (ECT) sensor	10		89
Engine electrical connector	6		53
Engine front cover bolts	19	14	
Engine lifting eye bolts	28	21	
Electrical harness retainer bolt	10		89
Lower engine mount bracket nuts	80	59	
Fuel line bracket bolt	10		89
EGR valve tube fittings	34	25	
Exhaust manifold nuts	22	16	
Exhaust manifold to exhaust pipe bolts	40	30	
Flywheel bolts	a		
Front cassette bolt	19	14	
Front cylinder head bolts	a		
Fuel injection supply manifold bolts	23	17	
Generator bracket bolts	42	31	
Ground wire bolt	10		89
Heater hose bracket bolts	23	17	
Hydraulic camshaft tensioner, RH	a		
Hydraulic camshaft tensioner, LH	a		
Intake manifold bolts	10		89
Jackshaft chain guide bolts	19	14	
Jackshaft chain tensioner bolts	9		80
Jackshaft rear sprocket bolt	a		
Jackshaft front sprocket bolt	a		
Jackshaft thrust plate bolts	11	8	
Knock sensor bolt	25	18	
Ladder frame bolts and nuts (outside)	10		89
Ladder frame bolts (inside)	a		
Ladder frame Torx® bolts	8		71
Ladder frame inserts	3		27
Main bearing cap bolts	97	72	
Oil bypass filter	13	10	
Oil filter adapter bolt	57	42	
Oil level indicator tube bracket bolt	25	18	
Oil pan bolts	9		80
Oil pan drain plug	25	18	
Oil pressure sensor	11-16	9-11	
Oil pump bolts	19	14	
Oil pump drive assembly	19	14	
Oil pump screen cover and tube bolts	10		89
Powertrain control module (PCM) bolt	6		53

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Powertrain control module (PCM) ground wire nut	10		89
Power steering pressure line nut	18	13	
Rear cassette bolt	18	13	
Spark plug	20	15	
Thermostat housing bolts	11	8	
Transmission cooler line bracket bolt	47	35	
Transmission to engine bolts	47	35	
Torque converter to flywheel nuts	47	35	
Upper engine mount bracket nuts	110	81	
Lower engine mount bracket bolts	80	59	
Valve cover bolts	10		89
Vapor management valve (VMV) hose bracket	15	11	
Water pump bolts	10		89
Water temperature indicator sender unit	10		89
Wiring harness retainer nuts	10		89

^a Refer to the procedure.

Engine

The 4.0L SOHC engine consists of the following:

- single overhead camshafts
- sequential multiport fuel injection (SFI)
- distributorless ignition system
- aluminum cylinder heads
- cast iron, 60-degree V cylinder block
- balance shaft (4x4 vehicles)
- jackshaft
- unique engine timing configuration

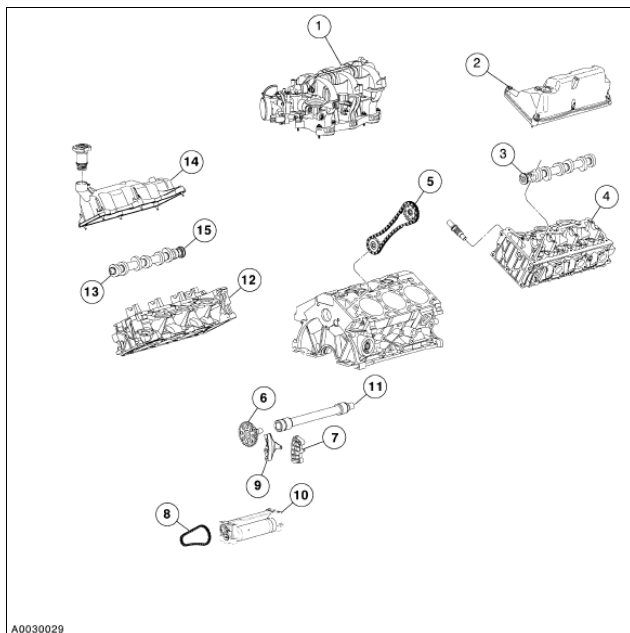
For quick identification, refer to the vehicle control information decal mounted under the hood.

- For additional information, refer to [Section 100-01](#) .

An engine identification label is attached to the engine. The label:

- identifies the symbol code for determining parts usage. For additional information, refer to [Section 100-01](#) .

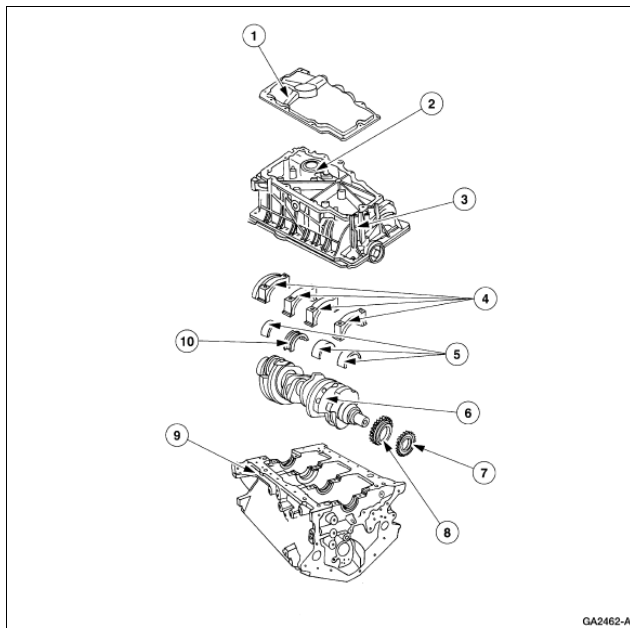
Upper End 4.0L SOHC Engine



Item	Part Number	Description
1	9424	Intake manifold
2	6582	Valve cover, LH
3	6250	Camshaft
4	6049	Cylinder head
5	6M289	LH cassette
6	6M270	Jackshaft chain assembly

7	6K254	Jackshaft chain guide
8	6A364	Balance shaft chain (4x4 Only)
9	6M271	Jackshaft chain tensioner
10	6A311	Balance shaft (4x4 Only)
11	6M262	Jackshaft
12	6049	Cylinder head
13	6250	Camshaft
14	6582	Valve cover, RH
15	6M290	RH cassette

Lower End 4.0L SOHC Engine



Item	Part Number	Description
1	6675	Oil pan
2	6617	Tube assembly oil pickup
3	6F092	Ladder frame
4		Main bearing caps
5	6333	Crankshaft main bearing
6	6303	Crankshaft
7	6306	Jackshaft sprocket
8	6K350	Balance shaft sprocket
9	6010	Cylinder block
10	6337	Crankshaft thrust main bearing