

944 4-CYLINDER

ENGINE CODING

ENGINE IDENTIFICATION

Engine identification number is stamped on the left side of the engine block near the clutch housing.

ENGINE CODES

Application	Code
With Auto. Trans.	44/04
With Man. Trans.	44/02

ENGINE, MANIFOLDS & CYLINDER HEAD

ENGINE

NOTE: Removal and installation procedures were not available from manufacturer.

MANIFOLDS & CYLINDER HEAD

Removal

1) Disconnect battery ground. Unscrew cap on coolant expansion tank. Remove splash guard. Unscrew coolant drain plug on radiator, and drain coolant. Remove poly-rib belt. Remove drive belt cover. Turn engine to TDC at cylinder No. 1.

2) Remove distributor cap, unscrew distributor arm and remove protective cap. Remove mount for distributor cap. Relax belt tension, and pull camshaft belt off of camshaft sprocket. Unscrew 2 mounting bolts on rear drive belt cover.

3) Unscrew fuel lines. Remove plastic cover on fuel collection tube. Pull off wire plugs on fuel injectors, and lay wire harness aside. Unscrew aluminum plugs, coolant line and bolts. Remove camshaft housing from cylinder head. Make sure hydraulic valve lifters do not fall out and are not mixed up.

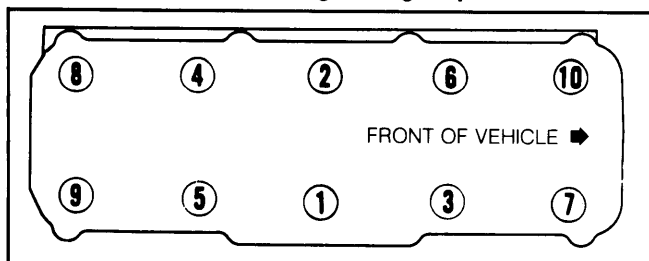
4) Remove air cleaner assembly. Unscrew bolt of intake brace. Remove intake distributor by dismantling holder on brake booster, hose on intake distributor, retaining clamp on accelerator cable and mounting bolts of intake distributor and cylinder head.

5) Unscrew bolts of the exhaust manifold-to-catalytic converter flange. Unscrew hose on heater regulating valve and 2 screws on neck for coolant circuit. Unscrew mounting nuts for cylinder head. Unscrew crosswise from outside to inside. Remove cylinder head.

Installation

1) Place cylinder head in position on cylinder block. Mount cylinder head on block. Install cylinder head nuts and tighten to specifications in 3 stages. See Fig. 1.

Fig. 1: Cylinder Head Nut Tightening Sequence



Loosen in reverse order.

2) Leave cylinder head in this pre-loaded state for 30 minutes. Unscrew all nuts, each separately, by 1/4 turn. Tighten to final torque of 61 ft. lbs. (85 N.m). Mount camshaft housing. Tighten bolts and aluminum plugs.

3) Install drive belt as described under Camshaft. To complete installation, reverse removal procedure. Adjust poly-rib belt as described under Camshaft.

CAMSHAFT

CAMSHAFT DRIVE BELT

Checking Adjustment

1) Remove splash guard, belt covers and poly-rib belt. Turn crankshaft clockwise, and observe condition of belt. Remove plug from mount for distributor cap. Turn crankshaft clockwise until TDC mark on camshaft sprocket aligns with cast mark on mount for distributor cap.

2) Check that TDC marks on flywheel and clutch housing are approximately aligned. Turn crankshaft counterclockwise by about 10° on crankshaft, which equals approximately 1.5 teeth to mark on camshaft sprocket. Prepare tension gauge (9201) for testing.

3) Pull out on lock pin on gauge, and completely push out gauge pin (opposite lock pin). Zero the telltale needle. Slide tension gauge onto belt. Push in measuring needle slowly, until lock pin can be heard to engage. Read value from dial gauge. Belt tension should be 2.4-3.0 dial value.

4) If adjustment is necessary, turn tensioner clockwise to tighten, or counterclockwise to loosen. Tighten mounting nut while counterholding. Turn engine 2 revolutions clockwise.

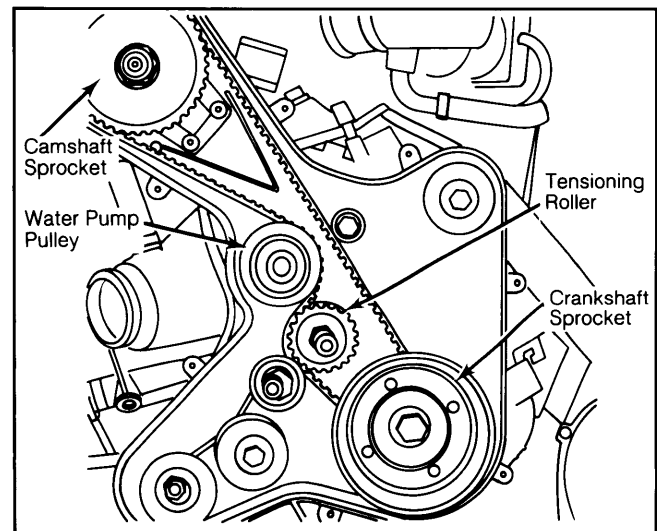
5) Align the TDC mark on the camshaft sprocket with cast mark in mount for the distributor cap. Turn engine counterclockwise from this position by approximately 10° on crankshaft. Recheck belt tension and adjust if necessary.

Removal

1) Disconnect battery ground. Remove poly-rib belt. Remove drive belt cover. Turn engine to TDC at cylinder No. 1.

2) Remove distributor cap, unscrew distributor arm and remove protective cap. Remove mount for

Fig. 2: Camshaft Drive Belt Positioning



Preload belt slightly by hand when installing.

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distributor cap. Relax belt tension and pull camshaft belt off of camshaft sprocket.

Installation

1) Turn engine to TDC for No. 1 cylinder. TDC marks on flywheel and cast clutch housing must be aligned. Align mark on camshaft sprocket with mark on rear drive belt cover. Install drive belt by placing drive belt on sprocket on crankshaft.

2) Place belt on tensioning roller, water pump pulley, and camshaft pulley. See Fig. 2. Preload belt slightly each time so belt can be pushed onto camshaft sprocket. Adjust belt as described under Checking Adjustment.

BALANCE SHAFT DRIVE BELT

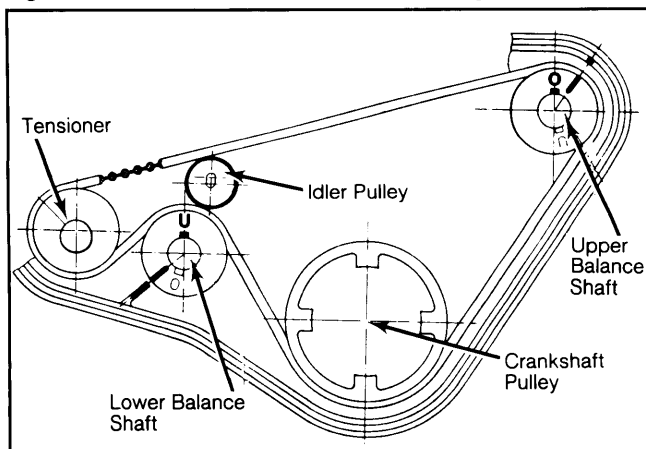
Adjustment

1) Remove splash guard. Loosen bolts of pressure rod slightly prior to unscrewing lock nuts. Remove poly-rib belt. Unscrew vent hose and take off drive belt cover. Loosen idler pulley so that pulley does not touch drive belt.

2) Remove plug from mount on distributor cap. Turn crankshaft clockwise until TDC mark on camshaft sprocket is aligned with cast mark in mount for distributor cap. TDC marks on flywheel and clutch cast housing must also be aligned. Check basic position of balance shaft sprockets.

3) Marks on sprockets should be aligned with marks on rear of rear drive belt cover. For upper shaft, align groove "O" with Woodruff key. For lower shaft, align groove "U" with Woodruff key. See Fig. 3. Prepare tension gauge 9201 for testing. Pull out lock pin on tension gauge and push out gauge pin opposite lock pin completely. Zero telltale needle.

Fig. 3: Balance Shaft Drive Belt Positioning



Marks on sprockets should align with marks on rear cover.

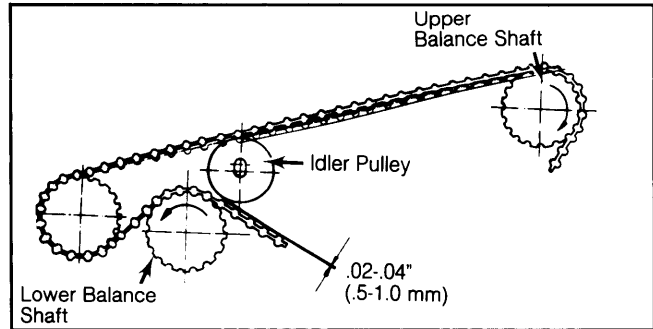
4) Slide tension gauge onto belt. Push in gauge needle until lock pin is heard to engage and read value from dial gauge. On engines without slotted guide roller, tension should be 4.0-4.6 dial value for new belts and 3.7-4.3 dial value for used belts.

5) On engines with slotted guide roller, tension should be 2.4-3.0 dial value for both new and used belts. If adjustment is necessary, turn tensioner clockwise to tighten. Turn tensioner counterclockwise to loosen.

6) Tighten tensioner nut. After adjusting drive belt tension, adjust idler pulley. On rollers without slot, turn roller counterclockwise to preload belt. Tighten nut.

7) On rollers with slot, use .02" (.5 mm) feeler gauge to maintain .02-.04" (.5-1.0 mm) clearance between guide roller and lower balance shaft. Push guide roller against belt until preload is achieved, and then tighten nut. See Fig. 4.

Fig. 4: Preload Clearance of Balance Shafts



Set clearance with preload at .04-.08" (1.0-2.0 mm).

8) If correct gap cannot be reached, turn idler pulley 180° and repeat adjustment. Tighten mounting nut. Install and adjust poly-rib belt.

NOTE: The tension gauge should not be turned or moved on belt during test procedures.

Installation

1) Turn crankshaft clockwise until TDC mark on camshaft sprocket is aligned with cast mark on mount for distributor cap. TDC marks on flywheel and cast clutch housing should be aligned.

2) Turn both balance shafts until marks of balance shaft sprockets align with rear drive belt cover. Install drive belt so that side of belt with color coded tooth faces out. Adjust belt tightness.

POLY-RIB BELT

Adjustment

1) Prepare tension gauge (9201) for testing. Pull out lock pin on tension gauge and push out gauge pin opposite lock pin completely. Zero telltale needle. Slide gauge carefully onto belt. Push in gauge needle until lock pin is heard to engage and read value from dial gauge.

2) Pull out lock pin and remove gauge. Poly-rib belt should have a tension of 9.2-9.8 dial value for both new and used belts. To adjust belt tension, slightly loosen bolts at end of adjusting rod. Loosen adjusting rod lock nuts and turn rod to obtain correct tightness of belt.

VALVES

VALVE ARRANGEMENT

I-E-I-E-I-E-I-E (Front-to-rear).

HYDRAULIC VALVE LIFTERS

Valve train uses bucket type hydraulic lifters. Cam lobes depress the lifters which are filled with engine oil under pressure through internal passages. With hydraulic lifters, no further valve clearance adjustment is necessary.

NOTE: Use caution to make sure lifters are always installed in original positions. DO NOT mix up lifter order.

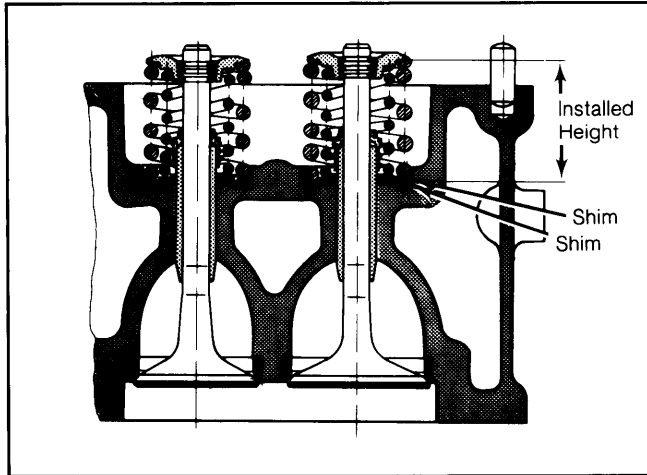
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VALVE SPRINGS

1) Valve springs may be removed using conventional overhead valve type compressor. Remove keepers and lift off retainer and springs.

2) To install, reverse removal procedure. Make sure to note the number of shims between valve springs and cylinder head and replace in same position.

Fig. 5: Measuring Installed Valve Spring Length



Correct distance with shims.

VALVE SPRING INSTALLED LENGTH

To check valve spring installed height, install tool (9138) with shims for applicable valve, spring retainer and keepers. Read distance from tool and correct, if required, by adding or removing shims.

VALVE SPRING LENGTHS

Application	In. (mm)
Intake Valve	1.61-1.65 (41.0-42.0)
Exhaust Valve	1.57-1.61 (40.0-41.0)

VALVE STEM OIL SEALS

With valve springs removed, pry off old seal using caution to prevent marring guide. Place plastic sleeve on valve stem, lubricate seal and push into place using "mushroom" type installing tool.

PISTON, PINS & RINGS

OIL PAN

Oil pan is of cast aluminum design with ribs for reinforcement and cooling. Pan attaches to upper crankcase section with gasket and cap screws. Manufacturer does not provide specific removal and replacement procedure.

PISTONS

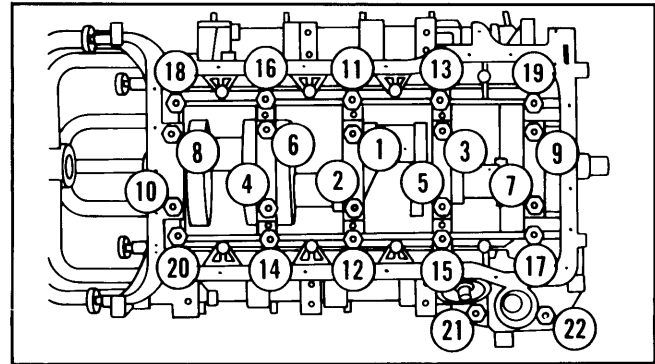
Light alloy pistons are iron and tin plated. Piston pin bore is offset by .0058" (1.500 mm). Piston crown has an arrow, which must face towards the pulley when installed. Valve pockets will be on the right side (exhaust) when looking forward.

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

CRANKCASE LOWER SECTION

Crankcase lower section is a frame type housing section providing saddles for main bearings. Sealing is necessary only in the area of the oil intake port. The lower section is attached to upper section with bolts. Tighten in sequence illustrated. See Fig. 6.

Fig. 6: Crankcase Lower Section Tightening Sequence



MAIN & CONNECTING ROD BEARINGS

Use Plastigage method for determining main and connecting rod clearances. Check crankshaft end play using dial indicator. Ensure that connecting rods are installed to piston correctly. The 12-point nuts may be used only once.

ENGINE OILING

CRANKCASE CAPACITY

Oil capacity is 5.8 qts. (5.5L) with filter change.

OIL FILTER

Oil filter is full-flow, spin-on replaceable type.

NORMAL OIL PRESSURE

Oil pressure at normal operating temperature and 5000 RPM should be 58 psi (4.08 kg/cm²).

ENGINE OILING SYSTEM

Engine utilizes a wet sump with an oil cooler located in a housing on the right side of the engine, using engine coolant as a heat exchanger. Cooler housing is also used as a mount for the oil filter and oil pressure sending unit.

Pressure relief valve is inside the housing. Oil pump is a crescent gear type. It is located in a separate housing, bolted to the front of the crankcase. A splined drive sleeve drives the oil pump by way of an axial connection with the inner gear.

The oil pump draws in oil from the oil pan through oil filter screen. The filter screen tube is mounted on the crankcase lower section and is sealed with a rubber ring. The oil continues to the oil pump through a suction bore in the crankcase upper and lower sections.

The sealing surface around the suction bore should be coated with Loctite 574. Oil delivered by the

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pump enters a short bore in the crankcase upper section. From there it reaches pressure relief valve arranged transverse to the bore and passes through a riser to inlet side of oil cooler.

The oil after being cooled passes through the oil filter and pressure sending unit, and reaches main bore by way of a cross bore. The main bearings are supplied by the main bore. Connecting rod bearings receive oil from inclined bores in crankshaft.

Oil for the rear bearing of the left upper balance shaft comes from the crankshaft thrust bearing (No. 3). Right balance shaft is supplied by a separate bore off of the main bore. An oil bore in each balance shaft supplies oil to the front flange bearings.

A gallery passes through the crankcase to the cylinder head and camshaft housing. Camshaft housing has branching bore to supply camshaft and lifters. A check valve is installed to prevent oil from flowing down cam supply bore when engine is shut off.

Manufacturer does not provide specific removal and installation procedure.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Main Bearing Carrier	
Step 1	14 (20)
Step 2	29 (40)
Step 3	55 (75)
Balance Shaft Cover Bolt	
Step 1	11 (15)
Step 2	14 (20)
Balance Shaft Cover Stud	
Step 1	11 (15)
Step 2	22 (30)
Bearing Housings-to-Crankcase	
Upper Section	14 (20)
Connecting Rod Bolts	41-44 (57-62)
Flywheel	65 (90)
Crankshaft Sprocket	160 (210)
Camshaft Housing	14 (20)
Camshaft Plugs (Aluminum)	29 (40)
Camshaft Sprocket	33 (45)
Balance Shaft Sprockets	33 (45)
Guide Roller-to-Water Pump Housing	33 (45)
Tensioner-to-Bearing Housing	33 (45)
Tensioner-to-Oil Pump Housing	33 (45)
Spark Plugs	18-22 (25-30)

ENGINE COOLING

COOLANT CAPACITY

Coolant capacity is about 8.5 qts. (8.0L).

THERMOSTAT

Thermostat opens at 181°F (83°C).

WATER PUMP

Water pump is mounted on front of crankcase. It is driven from the rear of camshaft toothed drive belt.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Year	Displacement		Fuel System	HP@RPM	Torque Ft. Lbs. @RPM	Compr. Ratio	Bore		Stroke	
	Cu. In.	cc					In.	mm	In.	mm
1982	151	2478	Fuel Inj.	143@5500	137@3000	9.5:1	3.94	100.0	3.11	78.9

VALVES

Engine Size & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
2478 cc							
Intake	1.77 (45.0)	45°	45°	....	.353 (8.97)	....	....
Exhaust	1.57 (40.0)	45°	45°	....	.352 (8.95)	....	....

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (Kg @ mm)	
		Valve Closed	Valve Open
2478 cc			
Outer	2.03 (51.5)	....	....
Inner	1.73 (44.0)	....	....

VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open ATDC	Close (ABDC)	Open (BBDC)	Close (BTDC)
2478 cc	1°	49°	43°	3°