1973 AUDI FOX 4 CYLINDER

GENERAL SPECIFICATIONS										
Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1973	89.70	1470	2-Bbl.	90 @ 6000	94 @ 4000	8.2-1	3.01	76.5	3.15	80

ENGINE IDENTIFICATION

Engine number is located on right side of engine block below the third spark plug. Letters ZD indicate manual transmission and ZE indicate automatic transmission.

ENGINE NOTES

1973 AUDI FOX — REPLACEMENT OIL SCRAPER RINGS — The following oil scraper rings are available for engines with high oil consumption. Note that two different types are manufactured: one type for early version Mahle pistons and one type for all KS and late version Mahle pistons. These differences must be noted because these two classes of pistons have different diameters for the bottom oil ring.

Early Version Mahle Pistons

Cylinder Bore	Audi Part No.
3.01" (76.50 mm)	056 107 321 B
3.02" (76.75 mm)	056 107 323 B
3.03" (77.00 mm)	056 107 325 B
3.05" (77.50 mm)	056 107 327 B

All KS & Late Version Mahle Pistons

Cylinder Bore	Audi Part No.
3.01" (76.50 mm)	056 107 321 C
3.02" (76.75 mm)	056 107 323 C
3.03" (77.00 mm)	056 107 325 C
3.05" (77.50 mm)	056 107 327 C

1973 AUDI FOX — NEW CYLINDER HEAD BOLTS & GASKET — All Fox models are now equipped with a new type of cylinder head bolt (Part No. 056 103 385 A), which is stamped "12.9". The torque values remain 54 ft. lbs. (7.5 mkg) cold and 61 ft. lbs. (8.5 mkg) warm. Also a new head gasket (Part No. 056 103 383 D), made of thicker lining of soft material, is used in conjunction with the new head bolts. These new parts may also be used to remedy cylinder head gasket leaks (use both bolts and gaskets, never separately).

1973 AUDI FOX — PLATE FOR CYLINDER HEAD COVER — From Chassis No. 32 037 204, two plates (Part No. 056 103 591) are used in production to install the cylinder head cover. These plates replace eight mounting washers normally used. These plates may also be used in earlier vehicles, especially in cases of cylinder head cover leakage.

ENGINE REMOVAL

1) Remove hood and disconnect battery ground cable. Remove air cleaner by taking off cover and removing mounting bolt and vent hose. Disconnect accelerator linkage and idle cutoff wire at carburetor.

2) Disconnect wires at number one terminal of coil, oil pressure switch, temperature transmitter and ignition leads at distributor. On manual transmission models, disconnect clutch cable.

3) Disconnect fuel line at fuel pump and alternator wire at alternator. Drain coolant system and disconnect radiator and heater hoses.

NOTE — Radiator removal is not necessary on automatic transmission models.

4) On manual transmission models, remove grille mounting screws, inner radiator trim mounting bolts and thermostat switch wire. Remove radiator trim pieces, radiator and blower motor.

5) Disconnect exhaust pipe at manifold and loosen transmission mounting bracket. Loosen upper and lower engine mounts on both sides of engine. Remove front engine mount.

NOTE — Front engine stop shell has two slots and it must be installed so that it rests on engine mount without tension when engine is completely installed.

6) Disconnect mounting bolts at engine block and disconnect starter leads. Remove starter, transmission and engine bolts. On manual transmission vehicle, remove flywheel guard. On automatic transmission vehicle, remove torque converter guard and disconnect hose at vacuum unit.

7) On automatic transmission vehicle, remove three torque-to-drive shell bolts through starter opening. Pull vacuum hose through eyelet on cylinder head. Using suitable engine sling (Tool No. 10-207), lift engine slightly and remove engine mounts.

8) Support transmission with floor stand or jack. Carefully separate engine and transmission. On automatic transmission vehicle, lift engine straight up and out of vehicle. On manual transmission vehicle, while lifting engine, rotate engine counterclockwise.

9) Install a suitable retaining strap (Tool No. 32-200) to prevent torque converter from falling out of transmission. Prior to reinstallation of engine, place grease on engine block at several locations to prevent connecting plate from falling from engine during installation. To install engine, reverse removal procedures.

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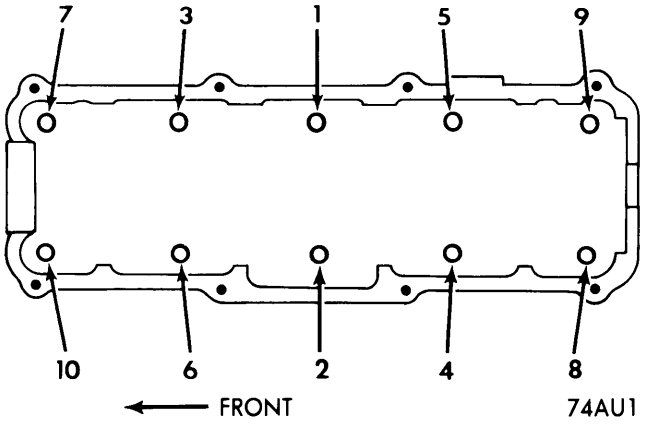
CYLINDER HEAD

1) Disconnect battery ground cable. Drain coolant system and disconnect hoses which are connected to cylinder head. Disconnect exhaust pipe and electrical wires. Disengage accelerator linkage and disconnect it at its holder. Loosen alternator tensioner and remove camshaft drive belt and "V" belt.

2) With engine cool, loosen head bolts from outside to inside (see illustration). To install, place head gasket with word "top" facing cylinder head. Position head on gasket and install head bolts. Tighten head bolts, in steps, in order shown in illustration. Reinstall remaining components and retime camshaft. Retighten head bolts after 300 miles.



CYLINDER HEAD TIGHTENING SEQUENCE

VALVES

Engine & 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)
1470 cc							
Int.	1.338 (34.0)	45°	45°	.078 (2.0)	.314 (7.98)	.001-.002 (.025-.050)	.....
Exh.	1.212 (30.8)	45°	45°	.094 (2.4)	.313 (7.95)	.001-.002 (.025-.050)	.....

VALVE ARRANGEMENT

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

VALVE GUIDE SERVICING

1) Check guides for wear with suitable tool (Tool No. 10-216). If reject end of tool can be inserted, replace valve guide. Using suitable tool (Tool No. 10-206), warm cylinder head to 176-210°F and press guide out top of cylinder head.

2) Press new guide in from top of cylinder head until it measures 2.23" from top of cylinder head to top of guide. Using suitable reamer (Tool No. 10-215), ream guide to proper size. Reface valve seat and valve.

VALVE STEM OIL SEALS

Install spring retainer using suitable tool (Tool No. 10-218). Place seal on suitable tool (Tool No. 10-204). Guide seal onto valve guide and bring it to final position by applying heavy pressure. Remove tool and check seal for correct position.

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE (LBS.) Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1470 cc			
Outer	.....	.....	96-106@.88 (43.5-48.0@22.3)
Inner	.....	.....	46-51@.72 (21.0-23.0@18.3)

VALVE SPRINGS

With tappets removed, install suitable valve spring compressor (Tool No. 10-210). Compress springs and remove valve keepers and collar. Lift out valve springs. To install, reverse removal procedure.

MECHANICAL VALVE LIFTER ASSEMBLY

With camshaft and tappet discs removed, lift out tappets. Inspect for wear or damage, replace as necessary. Oil tappet lightly and replace in original position.

VALVE CLEARANCE ADJUSTMENT

1) Adjust valve clearances in firing number order (1-3-4-2). Rotate camshaft until number four cylinder valves overlap and measure number one cylinder valve clearances. Clearance is measured with engine warm. With a feeler gauge, measure clearance of each cylinder in turn and note clearance. If clearance is within .002" of specifications no adjustment is necessary.

2) Determine thickness of tappet disc installed. Using tappet clearance previously noted, calculate required thickness of disc needed to achieve proper tappet clearance. Tappet discs are available in .05 mm (.0019") steps, starting with 3.0 mm (.1181") and going to 4.25 mm (.1673"). Thickness is stamped on bottom side of tappet disc.

3) Special tools (Tool No. 10-208 and 10-209 or VW546) are required to remove tappet clearance discs. Rotate camshaft so cams of one cylinder overlap and cams of cylinder to be changed no longer rest on tappets. Rotate tappet until

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openings are at 90° angles to camshaft. Install Tool No. 10-209 or VW546 to depress tappets. Using Tool No. 10-208, grasp tappet disc through opening in side of tappet and rotate out from under camshaft. Install proper disc and remove tappet depressing tool. Repeat procedure until all tappets are adjusted.

Valve Clearance Adjustment

Valve	Hot In. (mm)	Cold In. (mm)
Int.	.008-.012 (.20-.30)	.006-.010 (.15-.25)
Exh.	.016-.020 (.40-.50)	.014-.018 (.35-.45)

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
1470 cc	.0012 (.03)	①	.0004-.0009 (.010-.025)	No.1	.012-.018 (.30-.45)	.0008-.002 (.02-.05)
				No.2	.012-.018 (.30-.45)	
				No.3	.010-.016 (.25-.40)	

① — Push fit at 140°F.

OIL PAN

1) Drain engine oil. Disconnect primary throttle vacuum line at "T" adapter of power assist brake unit and pull it out of cylinder head (automatic transmission).

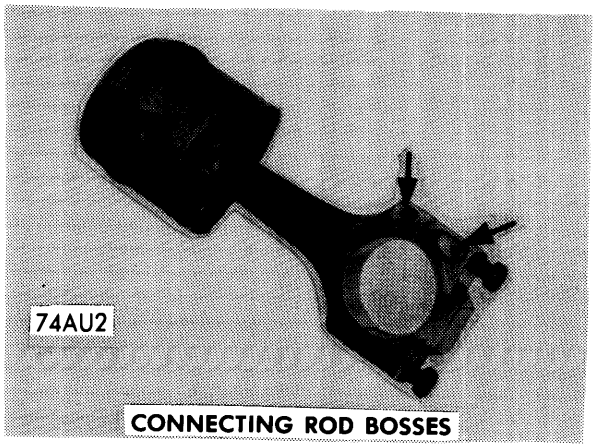
2) Using suitable tool (Tool No. 10-222), engage hook in cylinder head eyelet. Apply supporting tension to engine. Loosen auxiliary frame mounting bolts in steps. Remove left and right lower engine mount nuts. Lower auxiliary frame.

3) Remove oil pan bolts using suitable tool (Tool No. US 1052), and remove oil pan. When installing oil pan, gasket is installed dry. Tighten oil pan bolts in a crosswise pattern in steps.

PISTON & ROD ASSEMBLY

1) Before removing connecting rods, mark rod and cap for proper reinstallation. Remove rod bolts and caps and carefully push piston and rod assembly out top of cylinder.

2) On reassembly of piston and rod assemblies, cast bosses on rod and cap, as well as locating projections of bearing inserts face toward intermediate shaft. All connecting rods must be of same weight class. Weight class numbers are stamped on bottom of connecting rod caps. Using a suitable ring compresser, install piston and rod assemblies with arrow on crown of piston facing forward.



CONNECTING ROD BOSSES

FITTING PISTONS

1) Measure cylinder at three points, .394" from top and bottom, plus center of cylinder bore. Measurements should be at thrust face and 90° to thrust face. Wear limit is .0015", if this is exceeded oversize pistons must be installed.

2) Measure pistons at .630" from bottom of piston skirt and 90 degrees to pin axis. If piston-to-cylinder clearance exceeds .003", oversize pistons must be installed.

3) Place piston rings squarely in top of cylinder bore (above ring ridge) and measure end gap, replace as necessary. Measure side clearance of rings in piston grooves, replace rings or piston if clearance exceeds .0393". Install rings on piston with end gaps 120° and oil ring gap facing to rear. Install rings on pistons with word "TOP" facing upward.

NOTE — Engine blocks are stamp coded above water pump as to size of pistons installed.

Piston & Cylinder Diameters

Stamp Code	Piston In. (mm)	Cylinder In. (mm)
Standard		
651	3.0110 (76.48)	3.0122 (76.51)
652	3.0114 (76.49)	3.0126 (76.52)
653	3.0118 (76.50)	3.0130 (75.53)
Oversize		
676	3.0209 (76.73)	3.0220 (76.76)
677	3.0213 (76.74)	3.0224 (76.77)
678	3.0217 (76.75)	3.0228 (76.78)
701	3.0307 (76.98)	3.0319 (77.01)
702	3.0311 (76.99)	3.0323 (77.02)
703	3.0315 (77.00)	3.0327 (77.03)
751	3.0504 (77.48)	3.0516 (77.51)
752	3.0508 (77.49)	3.0520 (77.52)
753	3.0512 (77.50)	3.0524 (77.53)

PISTON PINS

Remove circlip with a pair of needle nose pliers. Heat piston to approximately 140°F and drive out wrist pin. To install reverse removal procedures. Always install piston on connecting rod so arrow will be facing forward when placed in cylinder.

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CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam. In. (mm)	Clearance In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
1470 cc	2.124 (53.95)	.001-.003 (.030-.083)	No.3	.003-.007 (.07-.17)	1.809 (45.95)	.001-.003 (.030-.083)	.0098 (.25)

MAIN & CONNECTING ROD BEARINGS

1) Measure crankshaft end play at number three thrust bearing before removing main bearing caps. Main bearing caps are numbered one to five and must return to original positions upon reassembly. Measure end play of connecting rods. Remove rod and main bearing caps and check bearing clearance using Plastigage method.

2) Measure crankshaft journals with a micrometer to determine if crankshaft is out-of-round. Maximum out-of-round is .0012". Install main bearing inserts with oil grooves in cylinder block. Lubricate bearings and install caps, torquing bolts to specifications.

Crankshaft Journal Diameters

Size	Main Bearing In. (mm)	Connecting Rod In. (mm)
Std.	2.124 (53.95)	1.809 (45.95)
1st US	2.114 (53.70)	1.799 (45.70)
2nd US	2.104 (53.45)	1.789 (45.45)
3rd US	2.094 (53.20)	1.779 (45.20)

REAR MAIN BEARING OIL SEAL

Rear main bearing oil seal may be replaced with engine in vehicle, if transmission and flywheel are removed. Carefully pry oil seal from crankcase. Install suitable tool (Tool No. 10-205) on crankshaft. Slide seal over tool, by hand, as far as possible. Then remove tool. Press seal in, up to stop, with suitable tool (Tool No. 10-220), by tightening both bolts alternately.

FRONT MAIN BEARING OIL SEAL

1) Front main bearing oil seal may be replaced with engine in vehicle. Remove license plate, radiator grille and camshaft belt guard. Rotate crankshaft to TDC. Use a screwdriver to lock crankshaft from turning (through opening in transmission case). Remove pulley bolt. Loosen camshaft belt tensioner and alternator adjuster. Remove both belts.

2) Pry seal out of flange using suitable tool (Tool No. 10-219). Do not place tool between seal and crankshaft, rather inner edge of support ring by cutting dust lip with sharp edge of tool. Using suitable tool (Tool No. 10-203), place seal over guide sleeve of tool. Press seal in until it is flush with flange. To install remaining components, reverse removal procedure and check valve timing.

INTERMEDIATE SHAFT OIL SEAL

Press seal out of flange. Using suitable tool (Tool No. 10-203), press new seal into flange until it is flush.

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm) ①	Lobe Lift In. (mm)
1470 cc	1.0212-1.0220 (25.94-25.96)	.....	②

① – End play .006" (.15 mm).
② – Base-to-Lobe 1.901" (48.29 mm).

TIMING BELT

1) Remove radiator grille. Loosen alternator mounting bolts and remove "V" belt. Remove camshaft belt guard. Loosen mounting nut of camshaft belt tensioner arm and remove tension from belt. Slide belt forward off camshaft sprocket.

2) Install new belt and adjust tensioner arm until belt can be turned 90° with thumb and index finger at a point midway between camshaft sprocket and intermediate sprocket. Check valve timing.

CAMSHAFT

CAUTION – Do not remove camshaft unless tool No. 10-200 is used.

1) Bolt tool No. 10-200 to cylinder head. Tighten spindle until bracket of tool rests on camshaft. Remove camshaft bearing bolts and caps. Remove tension from tool spindle. Remove tool and camshaft.

2) To install camshaft, reverse removal procedure beginning with number five bearing first, as it controls end play of camshaft. Bearing caps are numbered one through five and must be installed in proper order.

VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1470cc	3°	47°	43°	7°

VALVE TIMING

1) Rotate engine until crankshaft is at TDC of number four cylinder; fourth cylinder valves should be overlapping. Two methods of setting timing are available.

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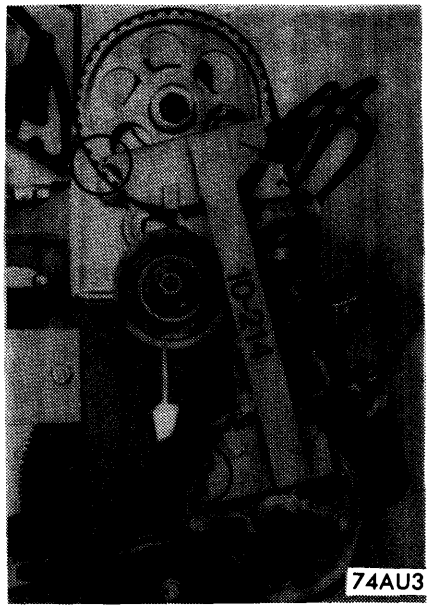
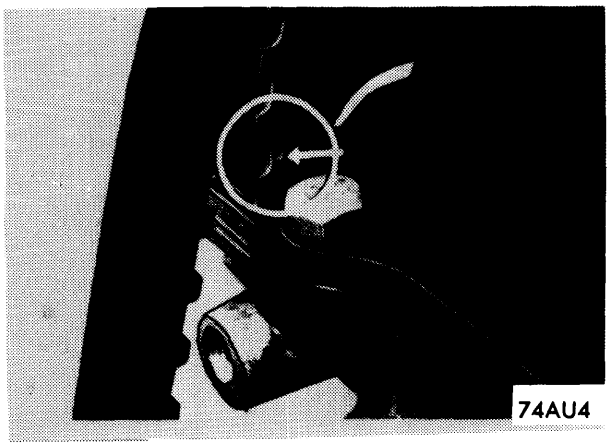
2) Using tool No. 10-214, align punch marks on camshaft and intermediate shaft sprockets with marks on timing tool. Holding at TDC, install camshaft belt and adjust tension.

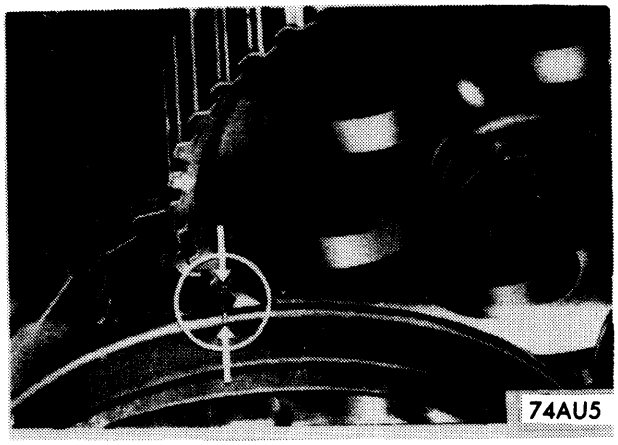


CAMSHAFT TIMING MARKS (WITH TOOL NO. 10-214)

3) On engines having a timing notch on crankshaft pulley, proceed as follows: Turn camshaft sprocket until punch mark on rear of camshaft sprocket is aligned with rocker cover gasket on left side of engine. Turn crankshaft pulley and intermediate shaft sprocket until notch on pulley is aligned with punch mark on intermediate shaft sprocket. Slide camshaft belt in place and adjust tension



CAMSHAFT TIMING MARK



CRANKSHAFT & INTERMEDIATE SHAFT TIMING MARKS

ENGINE OILING

Crankcase Capacity – 6.3 pts.
Oil Filter – Replace every 3000 miles.
Normal Oil Pressure – 14.22 psi @ idle, 99.56 psi @ 5000 RPM.

ENGINE OILING SYSTEM

Oiling system is a pressure feed system. A gear type oil pump lifts oil from oil pan and pressure feeds it to crankshaft journals, camshaft bearings and intermediate shaft. Other parts of system receive oil mist or splash for lubrication.

OIL PUMP

Remove oil pan and two oil pump mounting bolts. Pull pump straight down and out of engine. Remove two pump cover bolts and separate cover from pump body. Withdraw pump drive shaft and gears. Bend up metal edges and remove filter screen. To assemble, reverse disassembly procedure.

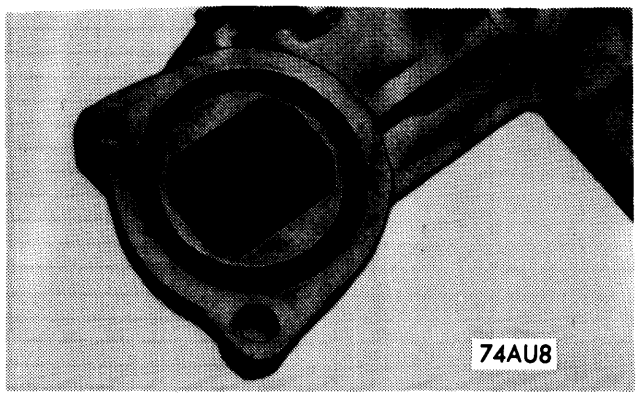
ENGINE COOLING

Cooling System Capacity – 6.5 pts.

WATER PUMP

1) Drain coolant and remove alternator. Remove camshaft belt guard, hose clamps and pump hoses. Remove water pump mounting bolts and lift out pump by turning slightly.

2) Remove pulley and pump body mounting screws. Separate pump assembly from housing. To reassemble, reverse diassembly procedure using new gasket and pump-to-block seal.



WATER PUMP-TO-BLOCK SEAL

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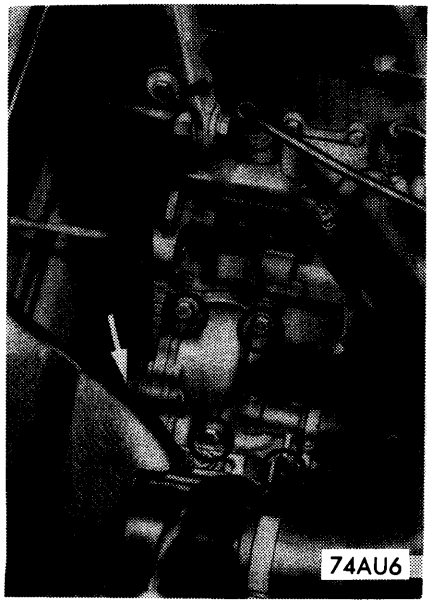
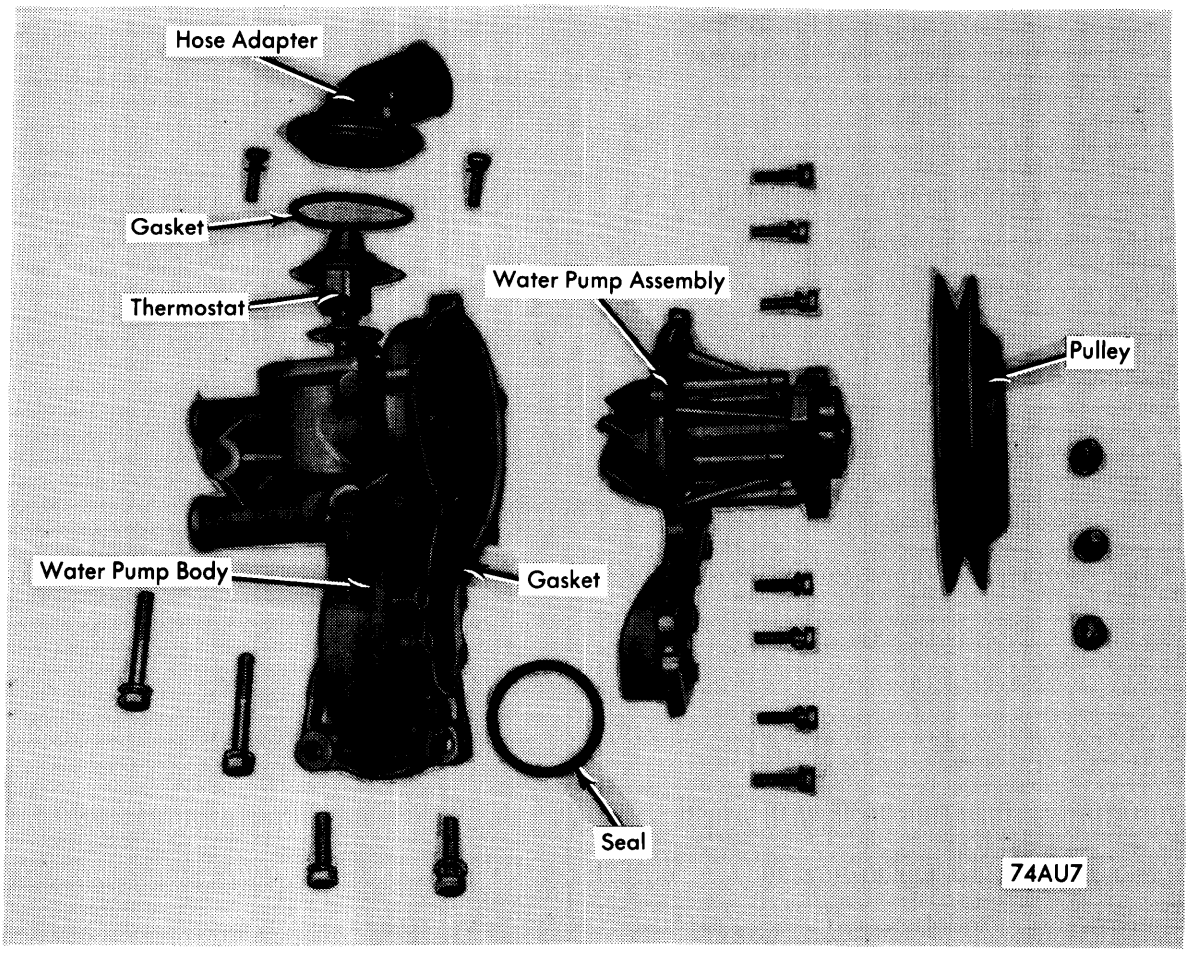
ENGINE COOLING (Cont.)



WATER PUMP MOUNTING BOLTS

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head (Cold)	54 (7.5)
Main Bearing Caps	47 (6.5)
Flywheel	36 (5.0)
Intermediate Shaft Sprocket	58 (8.0)
Connecting Rod Caps	25-33 (3.5-4.5)
Crankshaft Pulley	58 (8.0)
Oil Pan	6 (0.8)
Exhaust Manifold	18 (2.5)
Intake Manifold	18 (2.5)
Camshaft Bearing Caps	13-16 (1.8-2.2)
Camshaft Sprocket	58 (8.0)
Oil Pressure Switch	9 (1.2)



WATER PUMP & THERMOSTAT ASSEMBLY