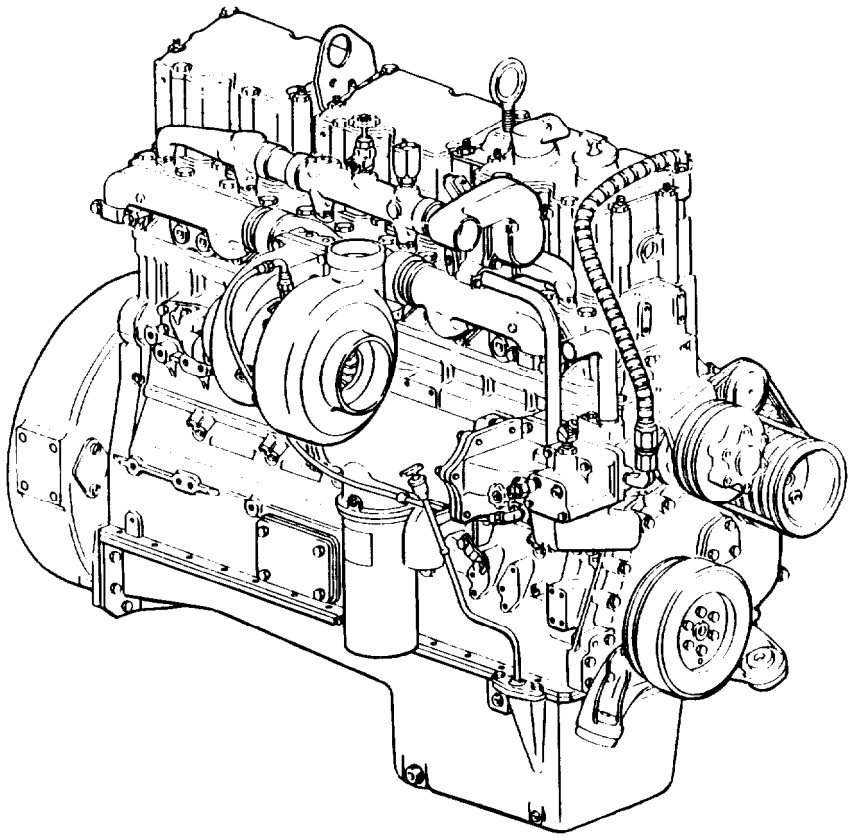
TM 5-2815-241-34&P

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)



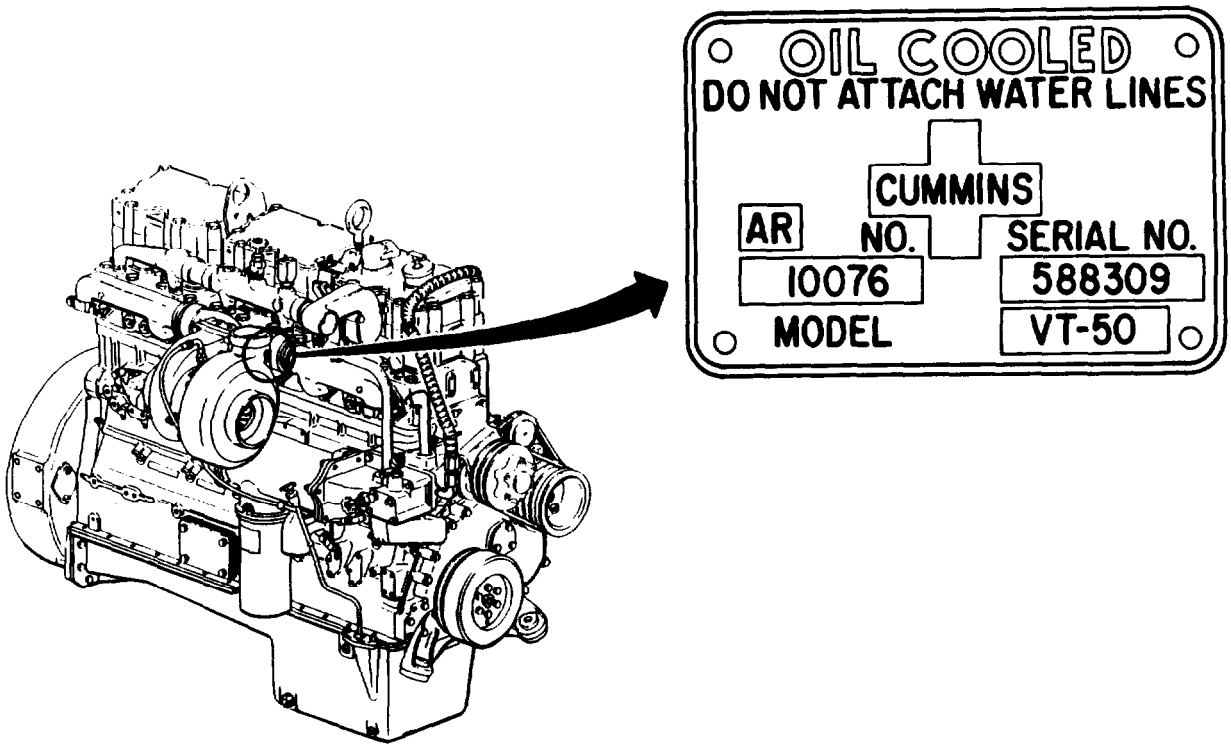
ENGINE, DIESEL NTC-290
PART NO. 515501C94
(NSN 2815-00-375-5958)

Approved for Public Release; Distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1987

LOCATION AND DESCRIPTION OF IDENTIFICATION PLATES - CONTINUED



EQUIPMENT DATA

Specific engine data for the NTC-290 diesel engine are listed here in tabular format.

ENGINE

Manufacturer	Cummins Engine Company, Inc
Model	NTC-290
Type	Four-stroke cycle, turbocharged diesel

PRELIMINARY STARTING PROCEDURES

WARNING

EXHAUST GAS CAN KILL YOU

Exhaust gas is without color or smell, but can kill you. Breathing exhaust gas produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure to exhaust fumes of fuel-burning internal combustion engines. Exhaust gases can become dangerously concentrated under conditions of no air movement. Precautions must be followed to ensure crew safety when the engine of any vehicle is operated for any purpose.

1. DO NOT operate vehicle engine inside building unless ample ventilation is available.
2. DO NOT idle engine for long periods without ventilator blower operating.
3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.
4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either is present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected crew to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, give artificial respiration.
5. FOR ARTIFICIAL RESPIRATION, REFER TO FM21-11.
6. BE AWARE; the field protective mask for chemical-biological-radiological (CBR) protection will not protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

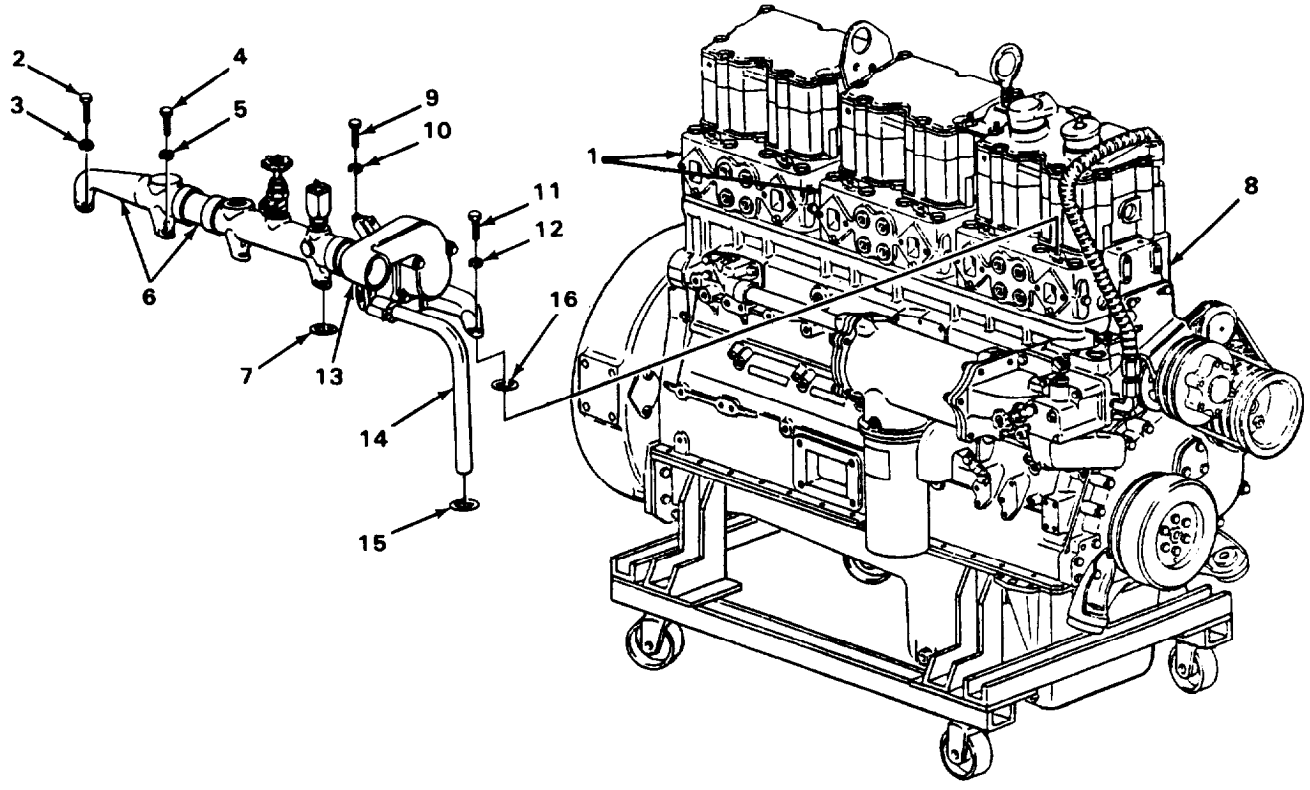
NOTE

Perform the following steps as they are applicable before starting engine in the engine test stand.

1. Make sure engine exhaust outlet is connected to a suitable shop exhaust system to evacuate the engine exhaust gases safely from the testing area.
2. Check air inlet piping to ensure it is attached correctly and tight.
3. Make sure all cooling system water hoses and clamps are attached correctly and are tight with no leaks.
4. Check all fuel lines and fittings to make sure they are attached correctly and are tight with no leaks.
5. Make sure all engine test stand gauges and controls are attached to engine properly and are tight.
6. Check engine oil level with oil level dipstick to make sure crankcase is full. Oil level should be between the H (high) and L (low) marks on dipstick.

WATER MANIFOLD ASSEMBLY REMOVAL - CONTINUED

LOCATION	ITEM	ACTION / **REMARKS**
6.	Water manifold front section (13), connectar tube (14), packing (15), and two gaskets (16)	Carefully pull up and take off. **Discard packing and gaskets.**



TASK ENDS HERE

CYLINDER HEAD FUEL LINE REMOVAL

INITIAL SETUP

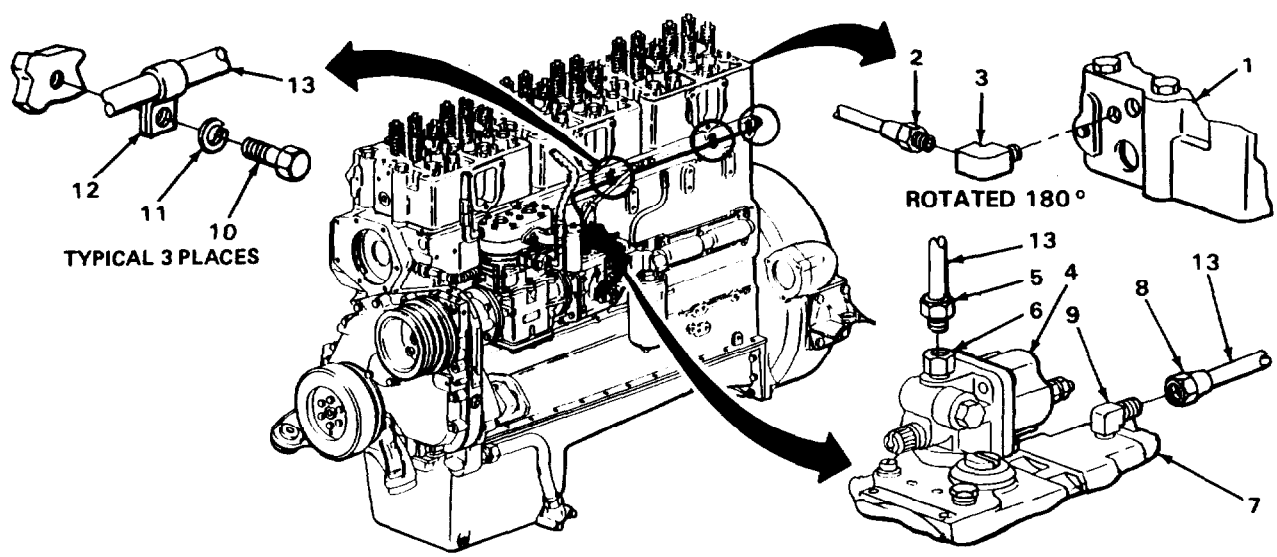
Tools

Handle, ratchet, 1/2-inch drive
Socket, 9/16-inch, 1/2-inch drive
Wrench, open-end, 1/2-inch

Tools - Continued

Wrench, open-end, 9/16-inch
Wrench, open-end, 5/8-inch

LOCATION	ITEM	ACTION **REMARKS**
1. Rear cylinder head (1)	Two fuel line nuts (2) and two fittings (3)	a. Using 1/2-inch open-end wrench, loosen and disconnect fuel line nuts. b. Using 5/8-inch open-end wrench, unscrew and take out fittings. **Install fittings on fuel line nuts to prevent loss.**
2. Fuel shutoff switch (4)	Fuel line nut (5) and fitting (6)	Using 5/8-inch and 1/2-inch open-end wrenches, loosen and disconnect.
3. Fuel pump (7)	Fuel line nut (8) and fitting (9)	Using 9/16-inch open-end wrench, loosen and disconnect fuel line nut.
4. Left side of cylinder block	Three screws (10), three lockwashers (11), three clamps (12), and two fuel lines (13)	Using 1/2-inch drive 9/16-inch socket and ratchet handle, unscrew and take off. **Discard lockwashers.** **Install three screws in cylinder block to prevent loss.**



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COMPRESSION RELEASE SHAFT REMOVAL

INITIAL SETUP

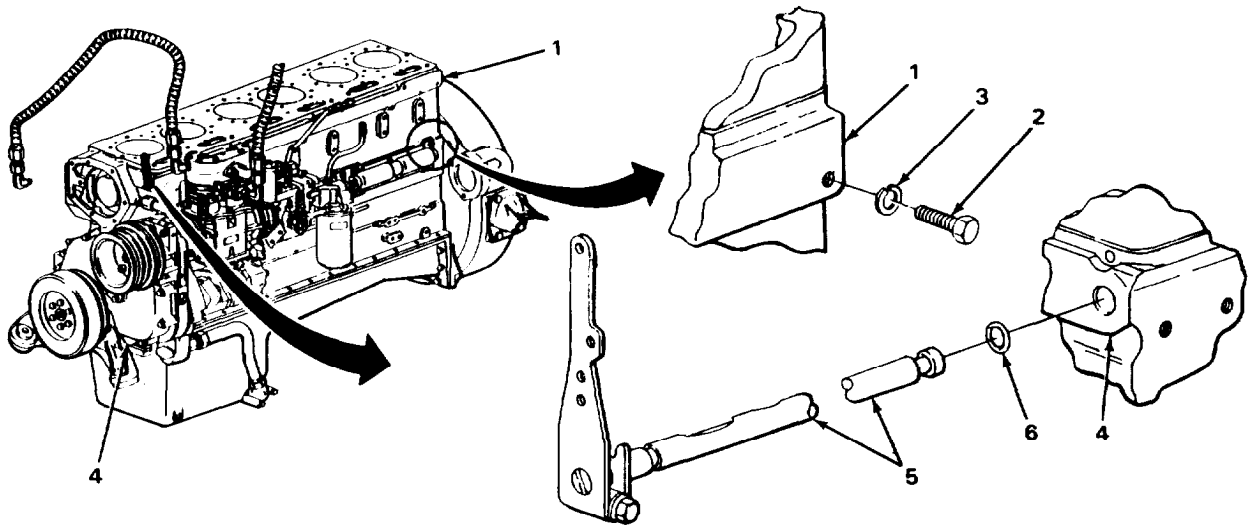
Tools

Wrench, box-end, 9/16-inch

Equipment Condition

Water pump removed (page 2-37).

LOCATION	ITEM	ACTION / REMARKS
1. Left rear of cylinder block (1)	Screw (2) and lockwasher (3)	Using 9/16-inch box-end wrench, unscrew and take out. Discard lockwasher.
2. Left front of cylinder block (4)	Compression release shaft (5) and packing (6)	Pull out. Discard packing.



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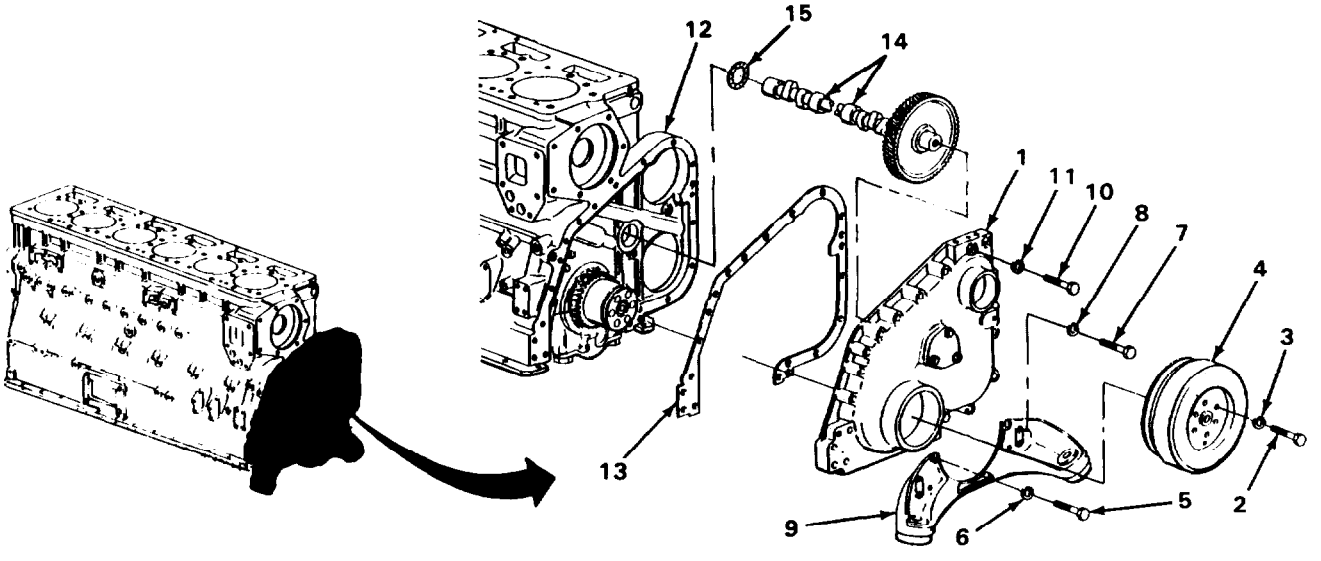
GEARCASE COVER REMOVAL - CONTINUED

LOCATION	ITEM	ACTION	**REMARKS**

CAUTION

When performing step 7, rotate camshaft while removing. Failure to do so may cause damage to camshaft and camshaft bearings.

7.	Camshaft with gear (14) and thrust washer (15)	Pull out.	



TASK ENDS HERE

CRANKSHAFT REMOVAL

INITIAL SETUP

Tools

Chisel, cold, 1/2-inch
Goggles, safety
Hammer, ball-peen, 16-ounce
Handle, hinged, 3/4-inch drive
Handle, ratchet, 1/2-inch drlve

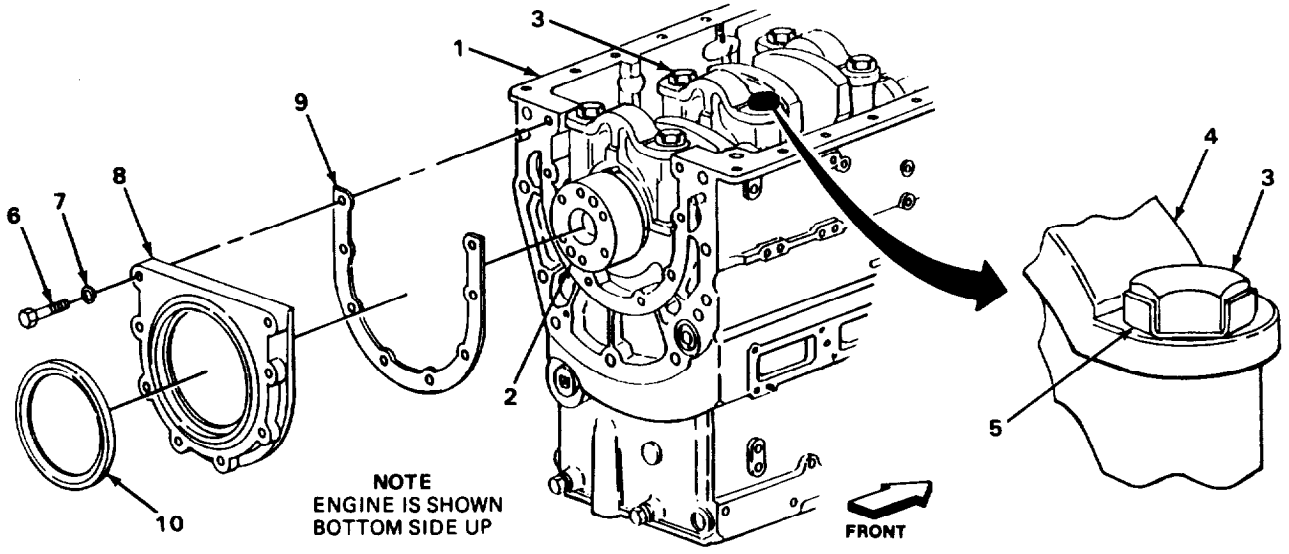
Tools - Continued

Screwdriver, flat-tip, 3/8-inch
Socket, 9/16-inch, 1/2-inch drive
Socket, 15/16-inch, 3/4-inch drive
Socket, 1 1/2-inch, 3/4-inch drive

TA 242369

CRANKSHAFT INSTALLATION - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
14.	Crankshaft (2)	Check dial indicator reading, while rotating crankshaft. Total reading should not exceed 0.005 inch (0.13 mm). **If total dial Indicator reading Is less than 0.005 Inch (0.13 mm), perform next step. If reading exceeds 0.005 Inch (0.13 mm), remove rear cover and clean mating surfaces. Perform steps 13 and 14 again.**
15.	Eight screws (6)	Using 1/2-inch drive 9/16-inch socket and 0 to 250 ft lb (0 to 350 N•m torque wrench, tighten to 24 to 29 ft lb (33.6 to 40.6 N•m).
16. Rear cover (8)	New seal (10)	Using seal mandrel and 16ounce ball-peen hammer, put in.



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CYLINDER HEAD INSTALLATION - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**

NOTE

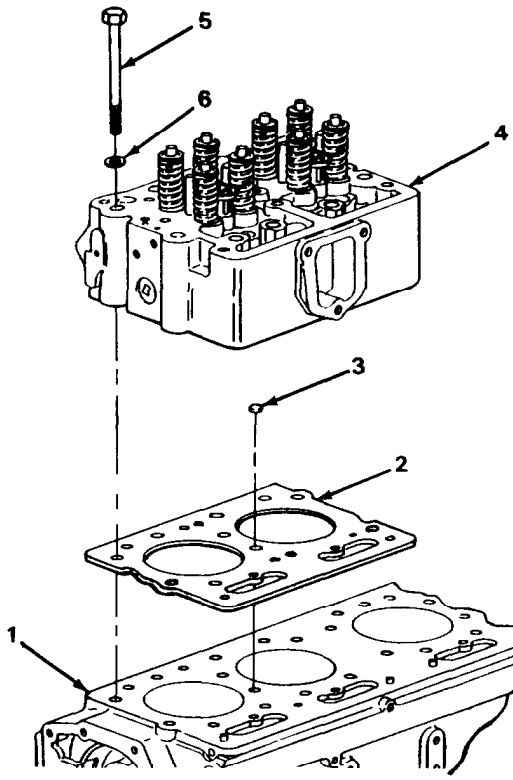
Before performing step 3, coat cylinder head screws with lubricating oil.

3. Cylinder head (4)	Twelve capscrews (5) and twelve new hardened washers (6)	Using 3/4-inch drive 1 1/16-inch socket and ratchet handle, screw in until snug. **Do not tighten.**

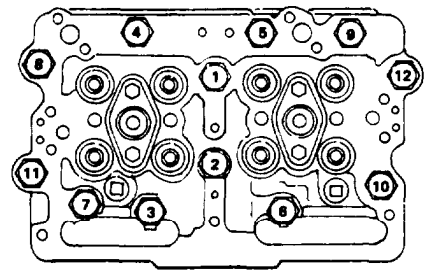
NOTE

When performing step 4, tighten capscrews in order shown in Cylinder Head Capscrew Tightening Sequence.

4.	Twelve cap screws (5)	Using 3/4-inch drive 1 1/16-inch socket and 0 to 600 ft lb (0 to 840 N•m) torque wrench, torque in steps sequence shown in Cylinder Head Torquing Sequence.



CYLINDER HEAD CAPSCREW TIGHTENING SEQUENCE



CYLINDER HEAD TORQUING SEQUENCE

STEP	TORQUE (lb-ft)
1	25
2	80-100
3	180-200
4	280-300

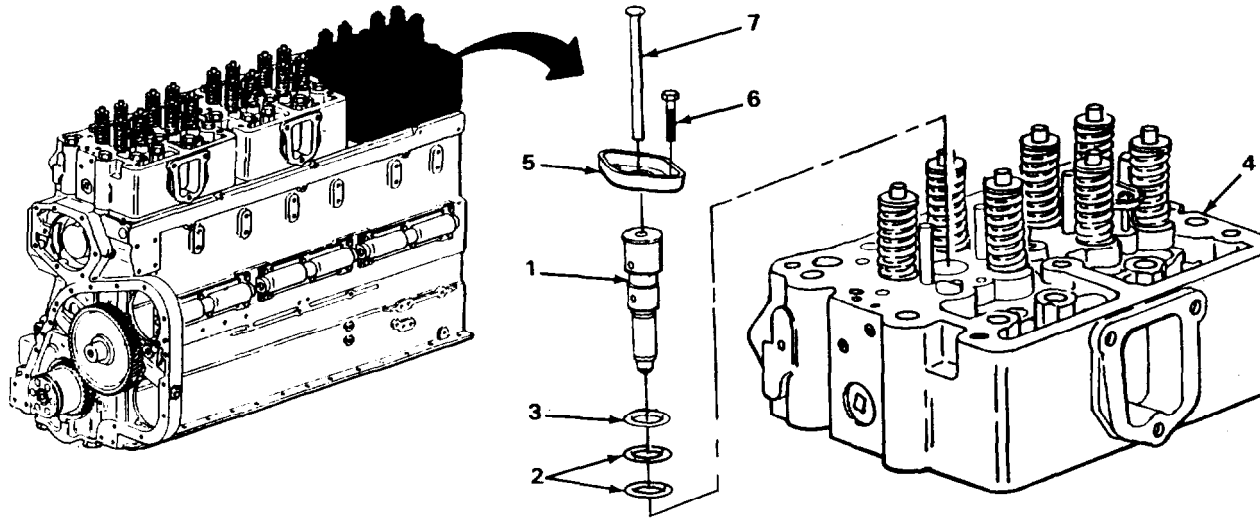
NOTE

Before performing step 5, coat packings with lubricating oil.

TA 242379

FUEL INJECTOR INSTALLATION - CONTINUED

LOCATION	ITEM	ACTION / **REMARKS**
3.	Fuel injector (1)	Using fuel injector puller, seat fuel injector.
4.	Fuel injector clamp (5) and two screws (6)	a. Using 1/2-inch drive 1/2-inch socket, 6-inch extension, and ratchet handle, screw in until screw just seats on fuel injector clamp. **Do not tighten.** b. Using 1/2-inch drive 1/2-inch socket, 6-inch extension, and 0 to 250 ft lb (0 to 350 N•m) torque wrench, torque two screws to 11 to 12 ft lb (15.4 to 16.8 N•m).
5.	Fuel injector link (7)	Put in.



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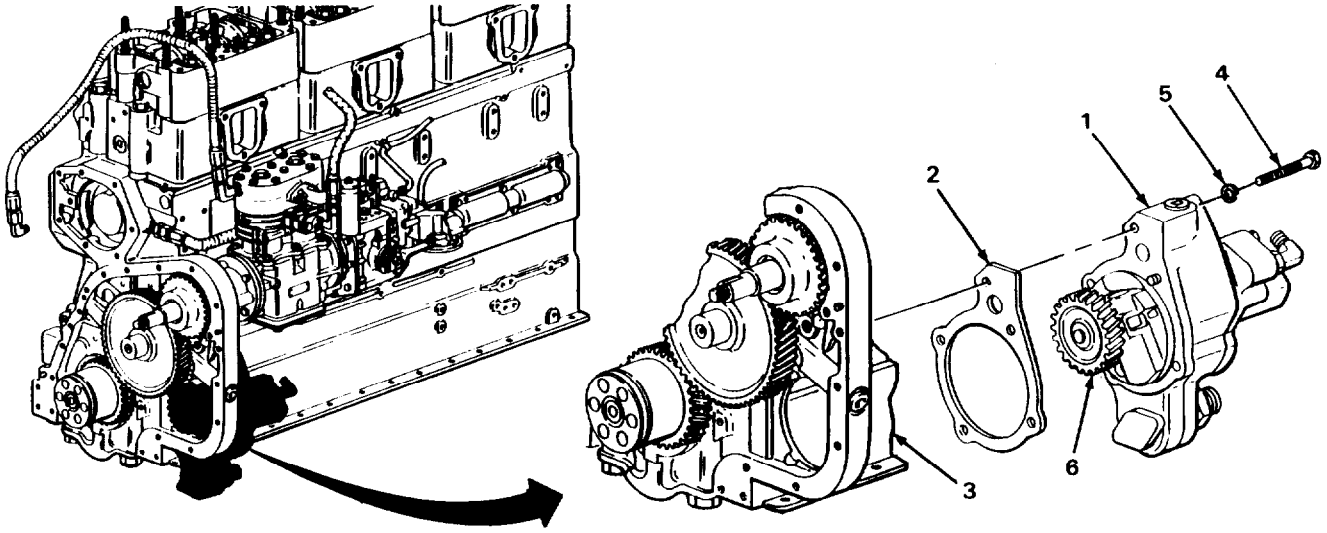
LUBRICATING OIL PUMP INSTALLATION - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
5. Cylinder block (3)	Oil pump gear (6)	a. Rotate gear in one direction as far as it will move. b. Set dial indicator to zero. c. Rotate gear in opposite direction and check dial indicator reading for backlash of 0.002 to 0.016 inch (0.051 to 0.40 mm).



TASK ENDS HERE

TA 242391

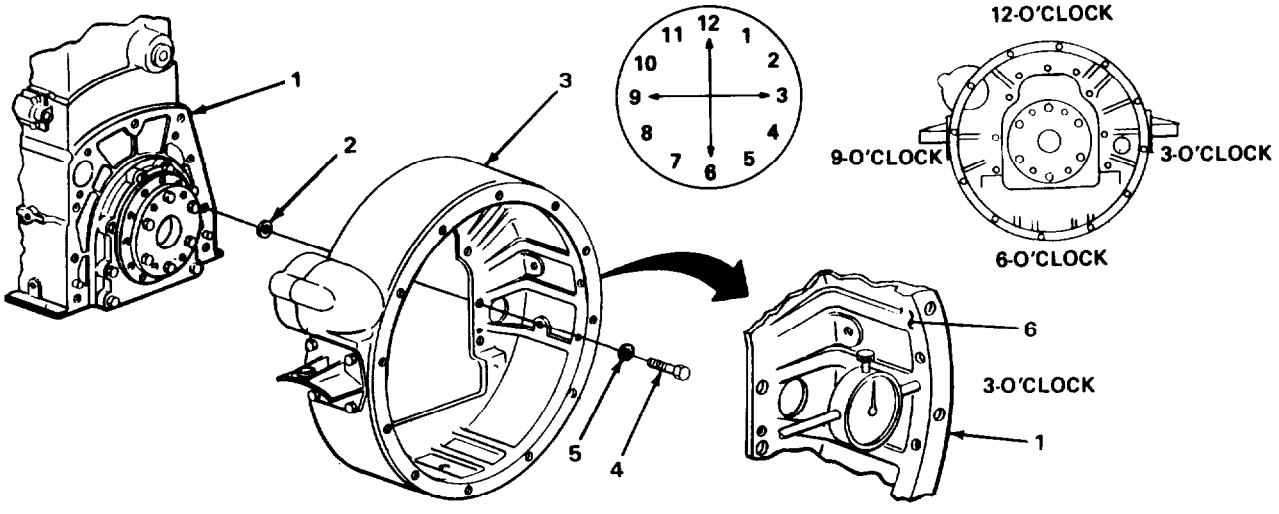
FLYWHEEL HOUSING INSTALLATION - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**

NOTE

Method used for mounting dial indicator is at discretion of using facility. Position dial indicator on crankshaft face and set contact point of dial indicator on inner bore of flywheel housing.

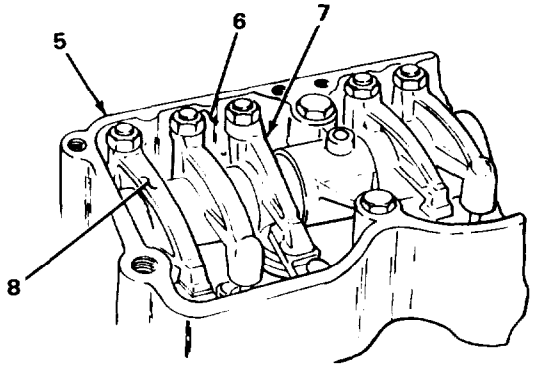
5. Flywheel housing (3)	Inner bore (6)	a. Using crankshaft barring tool, rotate crankshaft until dial indicator is at 9 o'clock position on flywheel housing. b. Set dial indicator to zero. c. Using crankshaft barring tool, rotate crankshaft until dial indicator is at 3 o'clock position on flywheel housing. d. Note that reading on dial indicator does not exceed 0.008 inch (0.20 mm). **If dial indicator reading meets or Is below specification, proceed to step 7. If dial Indicator reading exceeds specification, perform step 6.**
8. Cylinder block (1)	Flywheel housing (1)	Using plastic-faced hammer, move flywheel housing one-half of dial indicator reading towards 9 o'clock position.

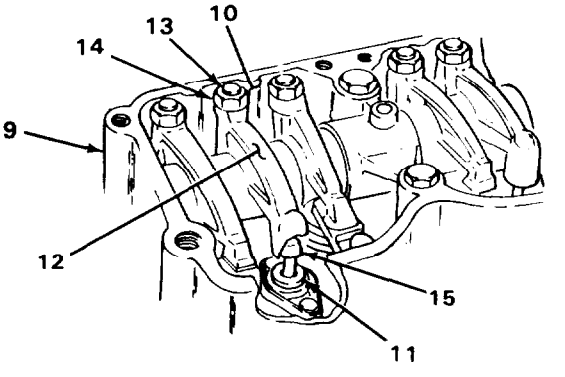


TA 242396

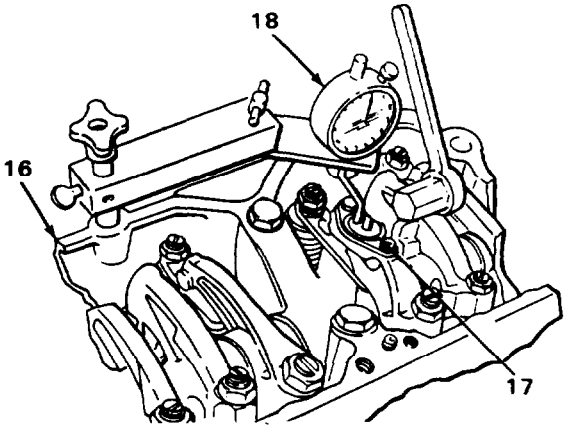
VALVE AND INJECTOR ADJUSTMENTS - CONTINUED

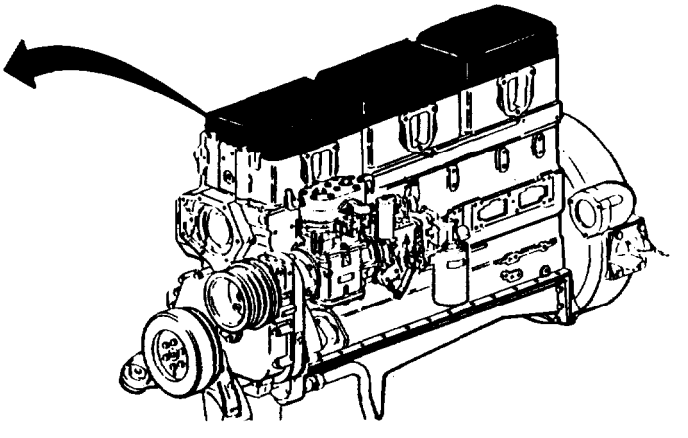
LOCATION	ITEM	ACTION **REMARKS**
8.	Injector rocker arm (12) adjusting screw (13), locknut (14) plunger (15)	a. Using 3/8-inch drive ST-669 adapter set and 1/4-inch drive 7/16-inch socket, loosen locknut and screw in adjusting screw until plunger contacts rocker arm cup. b. Advance adjusting screw 15 degrees to squeeze oil from rocker arm cup. c. Loosen adjusting screw one-half turn.





9. Rocker arm housing (16)	Injector plunger (17) and ST-1170 dial indicator (18)	Position ST-1170 dial indicator, position on top of injector plunger.





TA 242402

INTAKE MANIFOLD INSTALLATION

INITIAL SETUP

Tools

Extension, 6-inch, 1/2-inch drive
Socket, 9/16-inch, 1/2-inch drive
Wrench, open-end, l-inch (two required)
Wrench, torque, 0 to 50 ft lb (0 to 70 N•m), 1/2-inch drive

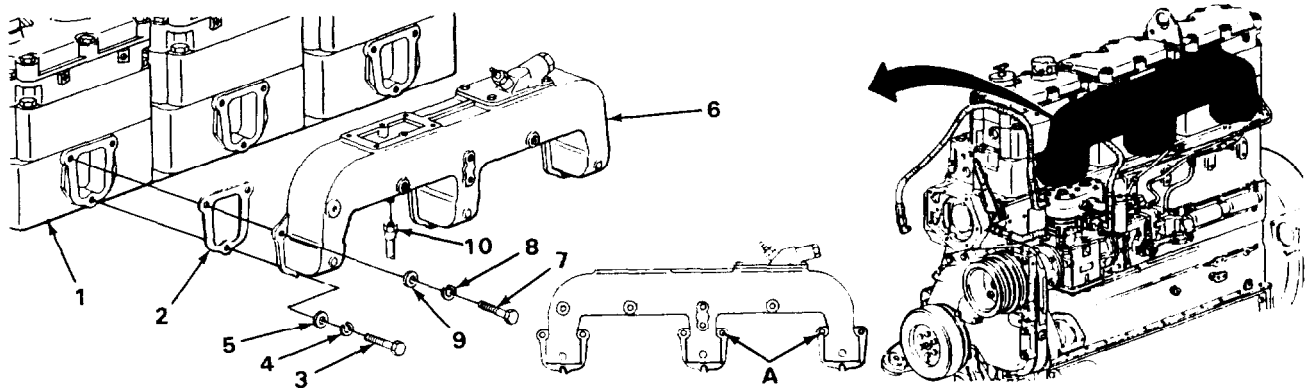
Materials/Parts

Gasket (three required)
Lockwasher (seven required)

Equipment Condition

Cylinder heads installed (page 2-68).

LOCATION	ITEM	ACTION **REMARKS**
1. Cylinder head (1)	Three new gaskets (2) three screws (3), three new lockwashers (4), and three flat washers (5)	Put one screw, lockwasher, and flat washer through gasket and into hole at bottom of each intake port.
2.	Intake manifold (6)	Put onto screws (3).
3.	Four screws (7), four new lockwashers (8), and four flat washers (9)	Screw in. **Do not put screws in holes marked A.**
	Seven screws (3 and 7)	Using 1/2-inch drive 9/16-inch socket, 6-inch extension and 0 to 50 ft lb (0 to 70 N•m) torque wrench, tighten to 20 to 25 ft lb (28 to 35 N•m).
5. Intake manifold (6)	Air compressor hose nuts (10)	Using two l-inch open-end wrenches, put on and tighten.

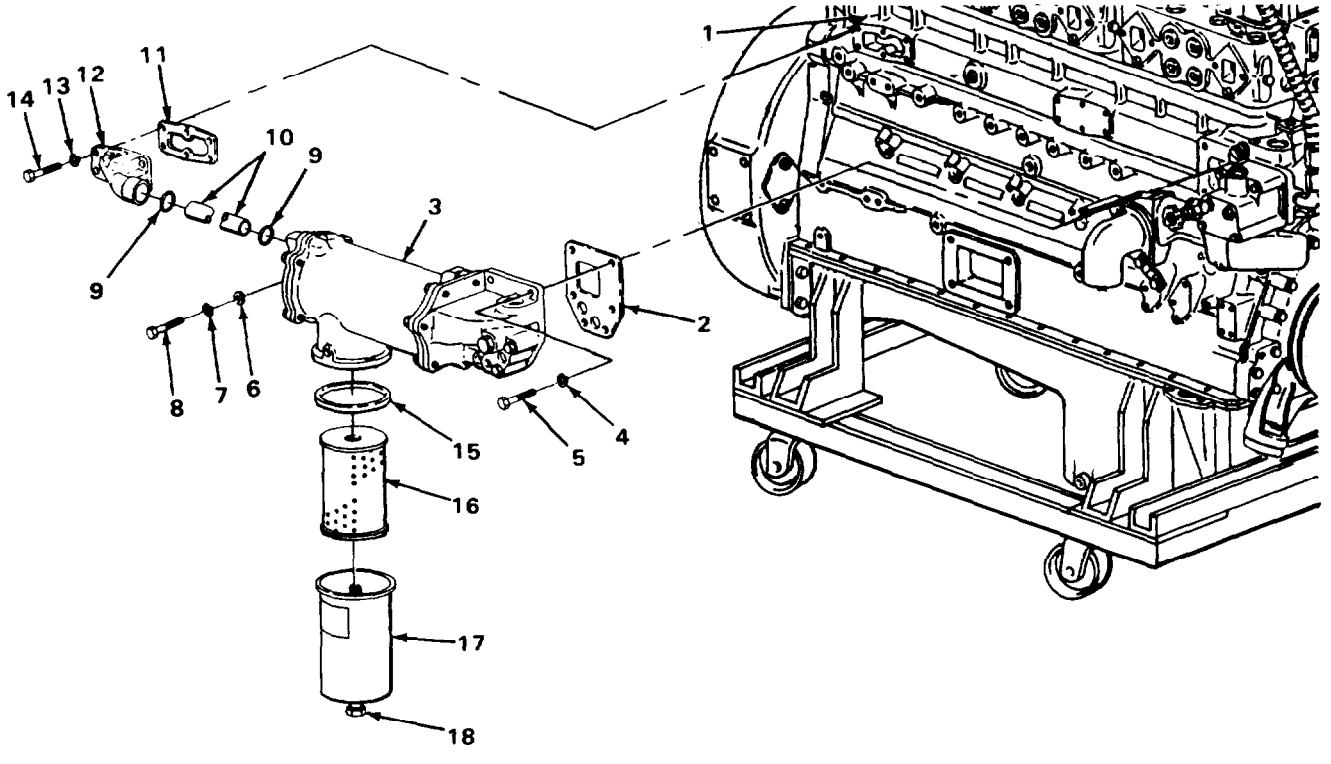


TASK ENDS HERE

TA 242411

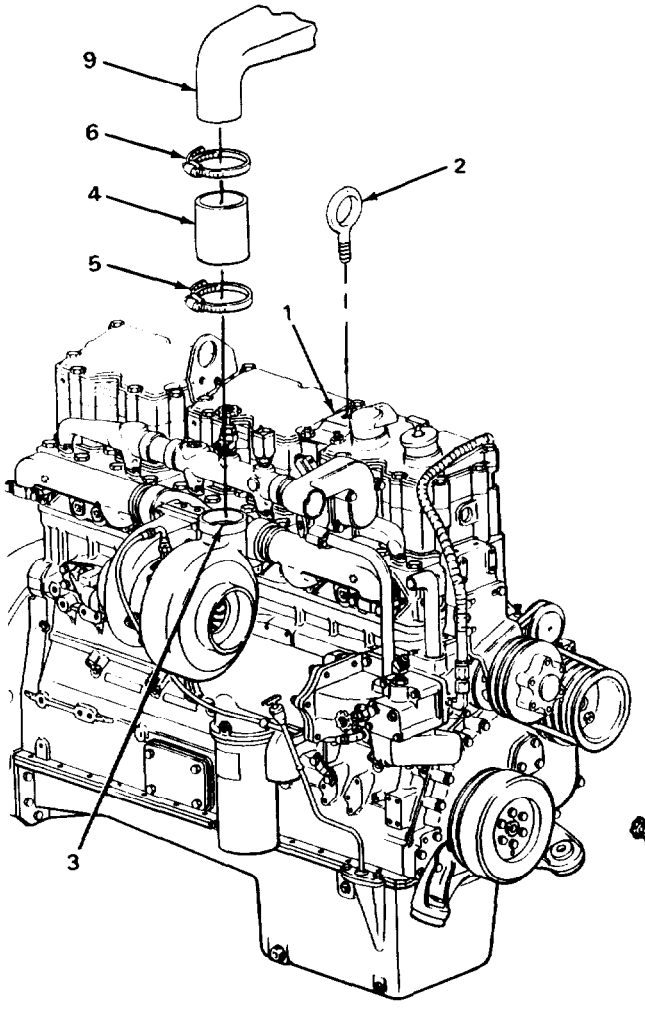
ENGINE OIL COOLER INSTALLATION - CONTINUED

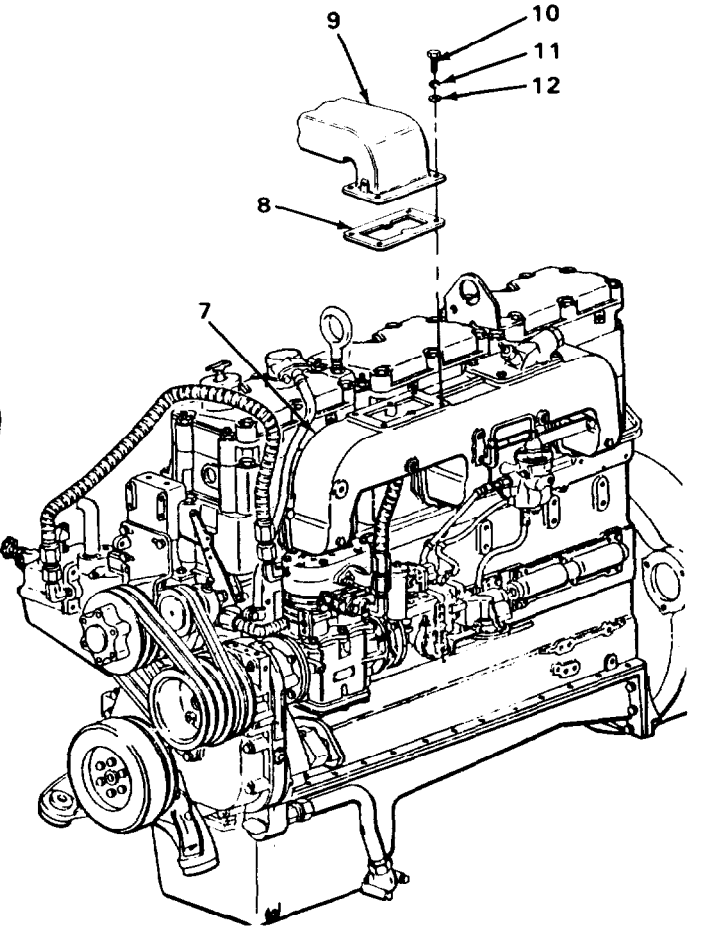
LOCATION	ITEM	ACTION **REMARKS**
4. Engine oil cooler (3)	New packing (15), new oil filter cartridge (16), oil filter shell (17), and oil filter screw (18)	a. Lubricate new packing with lubricating oil and position on engine oil cooler. b. Place oil filter cartridge in oil filter shell and position on engine oil cooler. c. Using 1/2-inch drive 9/16-inch socket and 0 to 150 ft lb (0 to 210 N•m) torque wrench, torque to 25 to 35 ft lb (33.9 to 47.4 N•m).



TASK ENDS HERE

TURBOCHARGER CROSSOVER TUBE INSTALLATION - CONTINUED





NOTE

FOLLOW-ON MAINTENANCE: Perform final testing, adjustments, and troubleshooting on engine test stand (page 2-412).

TASK ENDS HERE

CYLINDER BLOCK - CONTINUED

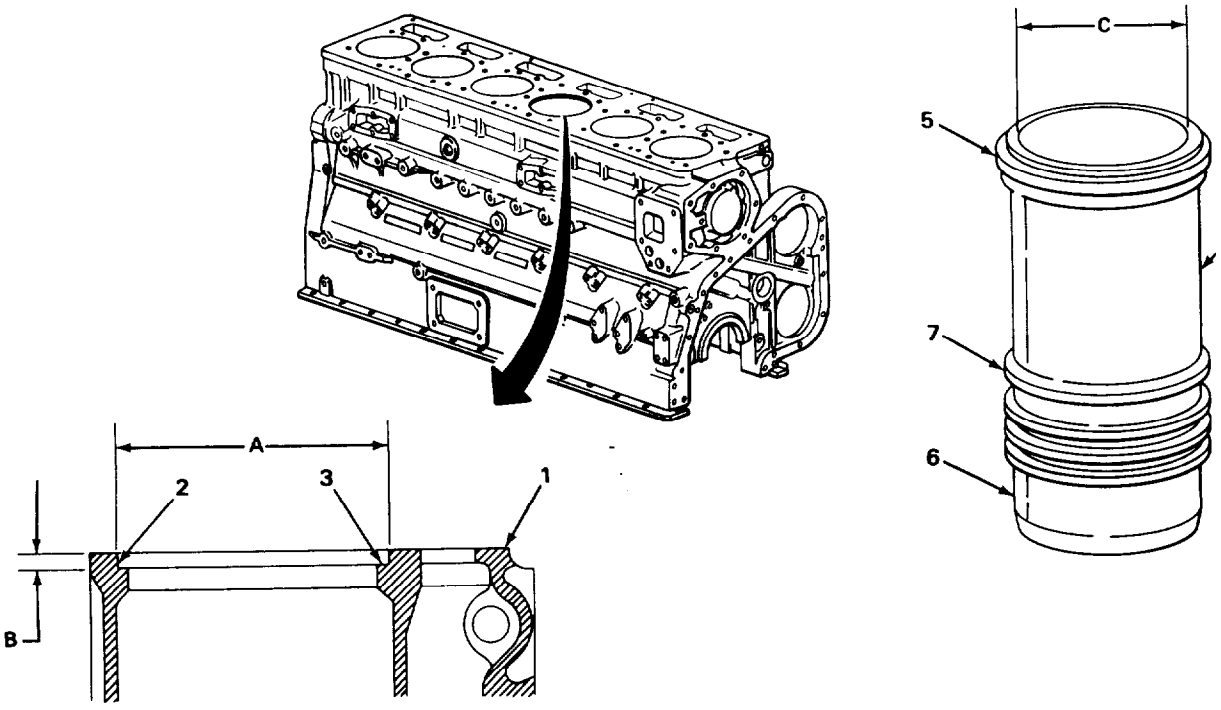
LOCATION	ITEM	ACTION / REMARKS
		d. Using dial bore gage, measure cylinder sleeve inside diameter, C. **If diameter is greater than 5.505 inch (139.83 mm), discard cylinder sleeve.**
		e. Inspect for scoring or vertical grooving on inside bore. **If scores or grooves cannot be removed during deglazing, discard cylinder sleeve.**
		f. Deglaze cylinder sleeves that have passed checks and inspections.

WARNING

Particles blown by compressed air are hazardous. Make certain the air stream is directed away from user and other personnel in the area. Compressed air used for cleaning purposes shall not exceed 30 psi (207 kPa). User must wear safety goggles or face shield to prevent personnel injury.

NOTE

After cylinder sleeves are deglazed, clean thoroughly with compressed air to remove all particles from cylinder sleeve. Coat bores with lubricating oil after cleaning.



TA 242431

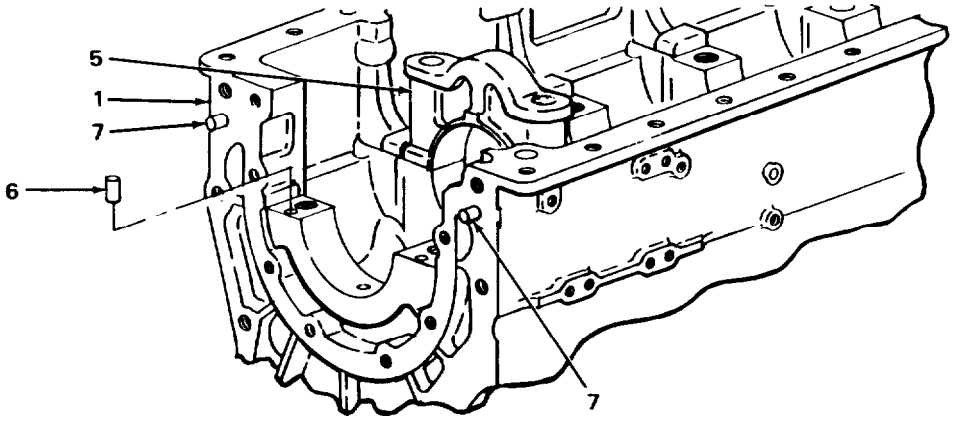
CYLINDER BLOCK - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
36. Cylinder block (1)	Main bearing cap (5)	Place in correct position in cylinder block. **Main bearing caps provide a 0.0015 to 0.0045 inch (0.04 to 0.11 mm) interference fit in cylinder block.**

NOTE

Steps 34 thru 36 apply to replacing the number 7 main bearing cap.

37.	Locating dowels (6)	Remove from block.
38.	Main bearing cap (5)	a. Using prussian blue on block surface, place main bearing cap in position, and locate dowel holes in main bearing cap. b. Remove main bearing cap. c. Install dowels in cylinder block and reinstall main bearing cap.
39.		Install all caps and tag cylinder block for main bearing bore reaming, steps 41 thru 50.
40.	Straight pins (7)	a. If nicked, using emery cloth remove all nicks. b. If out of round, using pin puller, remove. c. Using plastic-faced hammer, install new straight pins.



TA 242439

CYLINDER BLOCK - CONTINUED

LOCATION	ITEM	ACTION	**REMARKS**

NOTE

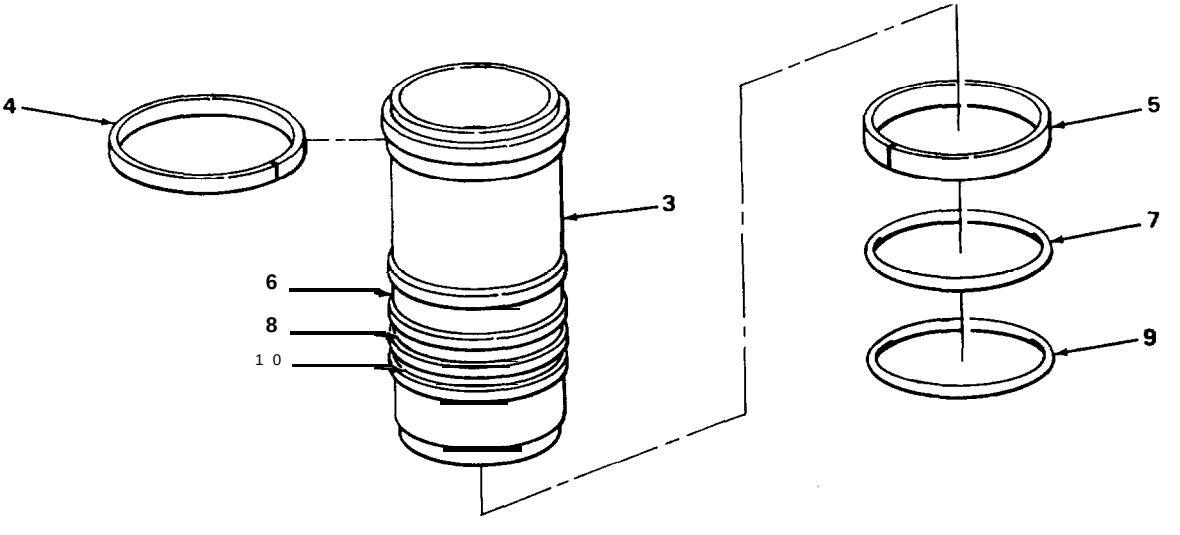
Before installing cylinder sleeves, check cylinder sleeve protrusion as described in step 20.

Be sure to install cylinder sleeves in their respective counterbores as tagged.

64.	Cylinder sleeve (3)	Shims or spacer (4)	Install onto cylinder sleeve.
65.		New gasket (5)	Install in gasket groove (6). **Be sure gasket is not twisted.**
66.		New packing (7)	Install in packing groove (8). **Be sure packing is not twisted.**
67.		New preformed packing (9)	Install in preformed packing groove (10). **Be sure preformed packing is not twisted.**

NOTE

Lubricate gasket, packing, and preformed packing just prior to installation. The packing and preformed packing will increase in size when they are in contact with lubricating oil for an extended period of time.



TA 242445

CYLINDER HEAD - CONTINUED

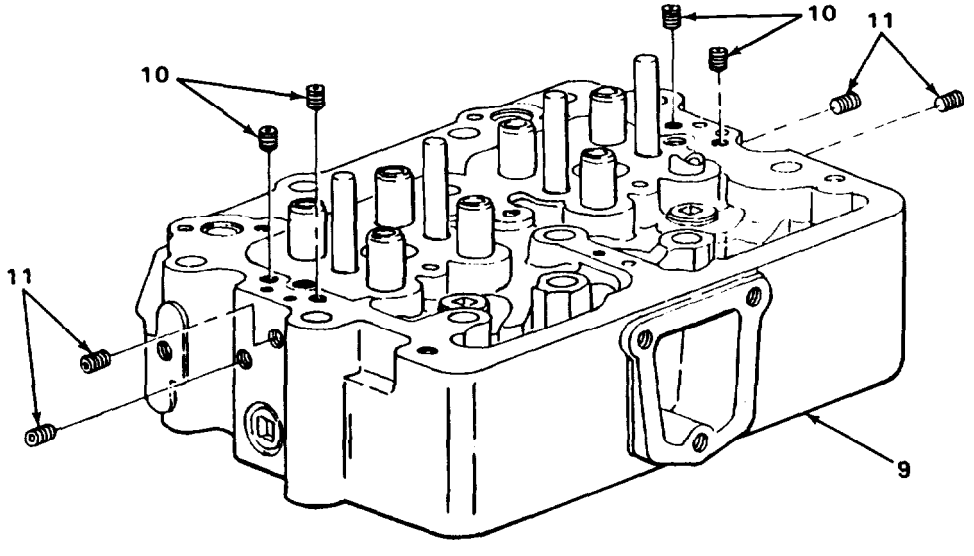
LOCATION	ITEM	ACTION / REMARKS

NOTE

All fuel passage pipe plugs in cylinder heads must be removed before cleaning. Do not discard pipe plugs. Hold plugs for reinstallation.

The number and location of pipe plugs may vary because of cylinder head location on cylinder block.

5. Cylinder head (9)	Four pipe plugs (10)	Using 5/32-inch hex key, loosen and remove.
6.	Four pipe plugs (11)	Using 3/16-inch hex key, loosen and remove.



CYLINDER HEAD - CONTINUED

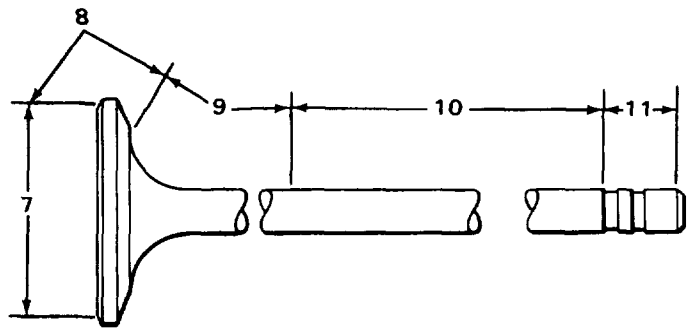
LOCATION	ITEM	ACTION **REMARKS**

NOTE

Welded valves which have two types of metal, may be magnetic tested. However, due to change of metal at weld, there will be magnetic leakage at this point. This will be indicated by a broad fuzzy pattern of magnetic particles.

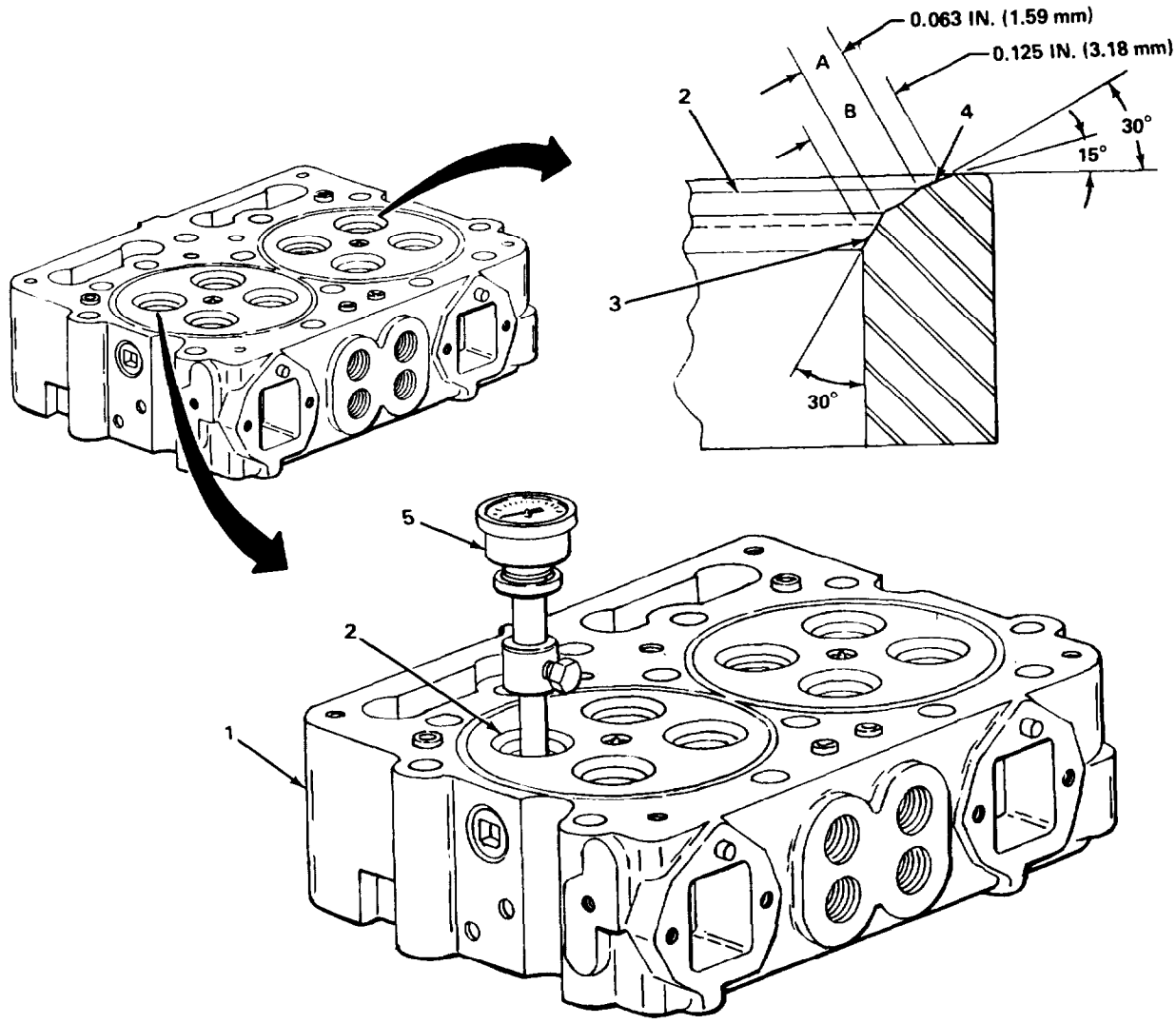
f . Using magnetic inspection method, inspect for magnetic indications.
If indications appear over 1/2 inch (12.70 mm) in length or more than five indications are spaced closer than 1/8 inch (3.18 mm) In area (7), discard valve.

g. If magnetic indications appear in areas (8), (9), (10), or (11), discard valve.



TA 242462

CYLINDER HEAD - CONTINUED



TA 242470

CYLINDER HEAD - CONTINUED

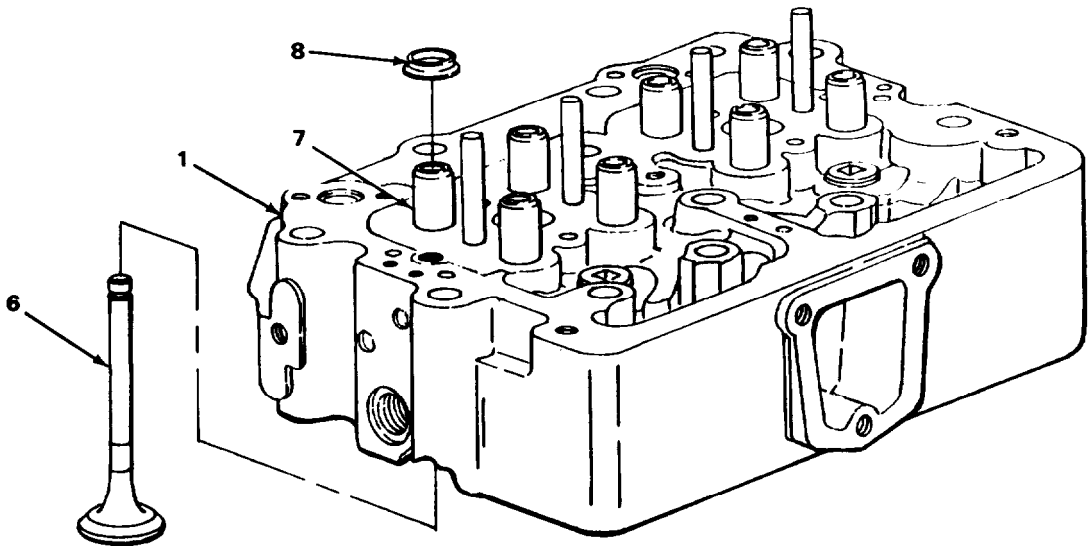
LOCATION	ITEM	ACTION / REMARKS

NOTE

Be sure to install valves in original locations as tagged in step 4.

Steps 54 thru 64 are typical for all cylinder head valve assemblies.

54.	Cylinder head (1)	Be sure cylinder head is clean. **If cylinder head needs cleaning, see General Maintenance Instructions, page 2-3.**
55. Cylinder head (1)	Valve (6)	Dip valve stem in clean lubricating oil and insert into valve guides (7).
56.	Cylinder head (1)	Place cylinder head, mating surface down, on wooden bench or other protective surface.
57. Valve guide (7)	Valve spring spacer (8)	If valve seat insert and valve have been refaced more than a total of 0.030 inch (0.76 mm), place a maximum of two valve spring spacers over valve guide (7).



TA 242479

VIBRATION DAMPER

This task covers:

Cleaning/Inspection

INITIAL SETUP

Tools

Mittens, cloth, heat-protective

Materials/Parts

Dye, leak-detection (item 7, appendix B)

Materials/Parts - Continued

Rags, wiping (item 14, appendix B)

Equipment Condition

Vibration damper removed (page 2-48).

LOCATION	ITEM	ACTION	REMARKS

CLEANING/INSPECTION

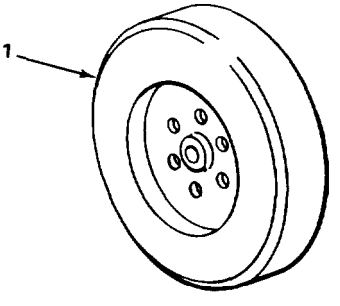
1. Vibration damper (1) Wipe clean with rag.

WARNING

Heat-protective cloth mittens must be worn to prevent serious injury to hands when handling heated parts.

2.

a. Coat with leak-detection dye.
b. Heat in oven to 200°F (93°C).
c. Inspect for any indications of leakage. **Discard if leaking.**



NOTE

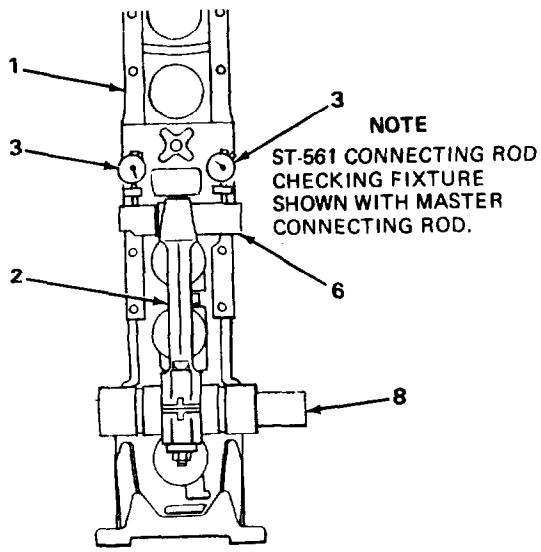
FOLLOW-ON MAINTENANCE: Install vibration damper (page 2-90).

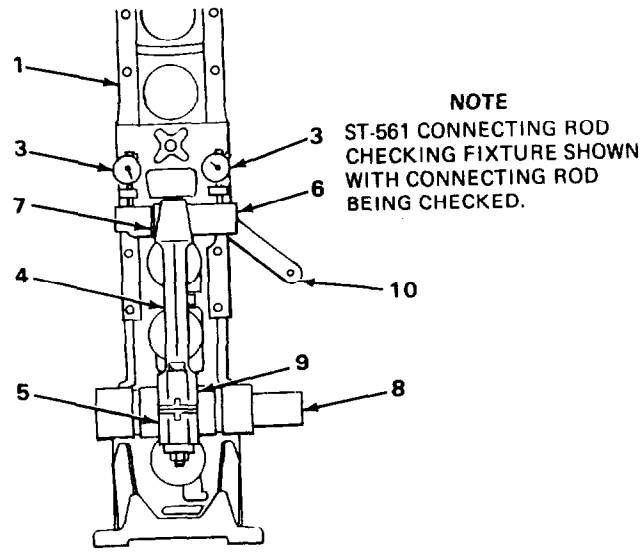
TASK ENDS HERE

TA 242486

PISTON AND CONNECTING ROD - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
		d. Remove from checking fixture (1), rotate 180° horizontally, and place back into checking fixture (1). e. Compare reading for length with recorded reading. Length must be within 0.001 inch (0.0254 mm). **If reading is greater than 0.001 inch (0.0254 mm), discard connecting rod.** f. Compare reading for alinement of bores with recorded reading. Total reading must not exceed 0.004 inch (0.10 mm) with piston pin bushing installed and bored to size, or 0.008 inch (0.20 mm) without piston pin bushing. **If reading exceeds these specifications, discard connecting rod.** g. Using thickness gage (10) between piston pin mandrel (6) and dial holding plate, check connecting rod twist. Twist must not exceed 0.010 inch (0.25 mm) with piston pin bushing installed and bored to size, or 0.020 inch (0.51 mm) without piston pin bushing. **If reading exceeds these specifications, discard connecting rod.**

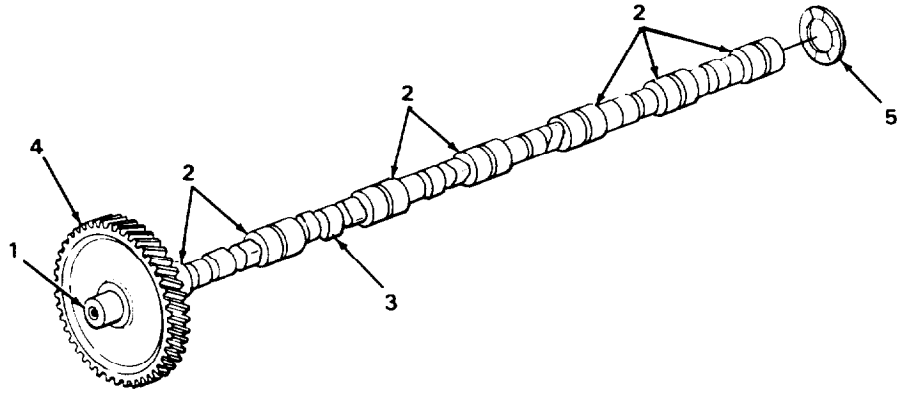




TA 242494

CAMSHAFT AND GEAR ASSEMBLY - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
INSPECTION		
1. Camshaft and gear assembly (1)	Bearing journals (2)	Using a 1-to 2-inch micrometer, measure diameter. **If diameter is less than 1.996 Inches (59.70 mm), replace camshaft. New camshaft bearing journals will be 1.997 to 1.998 inches (50.72 to 50.75 mm).**
2.	Camshaft (3)	Inspect for breaks, pits, scoring, or scuffing. Inspect for cracks or imperfections by visual and magnetic inspection methods. **If broken, cracked, pitted, scored, or scuffed, replace camshaft.**
3. Camshaft and gear assembly (1)	Camshaft gear (4)	Inspect for chips, cracks, visible wear, sharp fins, nicks, and burrs. **If chipped, cracked, worn, nicked, or sharp fins and burrs are observed, replace camshaft gear.**
4.	Thrust bearing (5)	Using a 0- to 1-inch micrometer, measure thickness. **If less than 0.083 inch (2.11 mm), replace thrust bearing.**
DISASSEMBLY		
5. Camshaft and gear assembly (1)	Thrust bearing (5)	Remove.



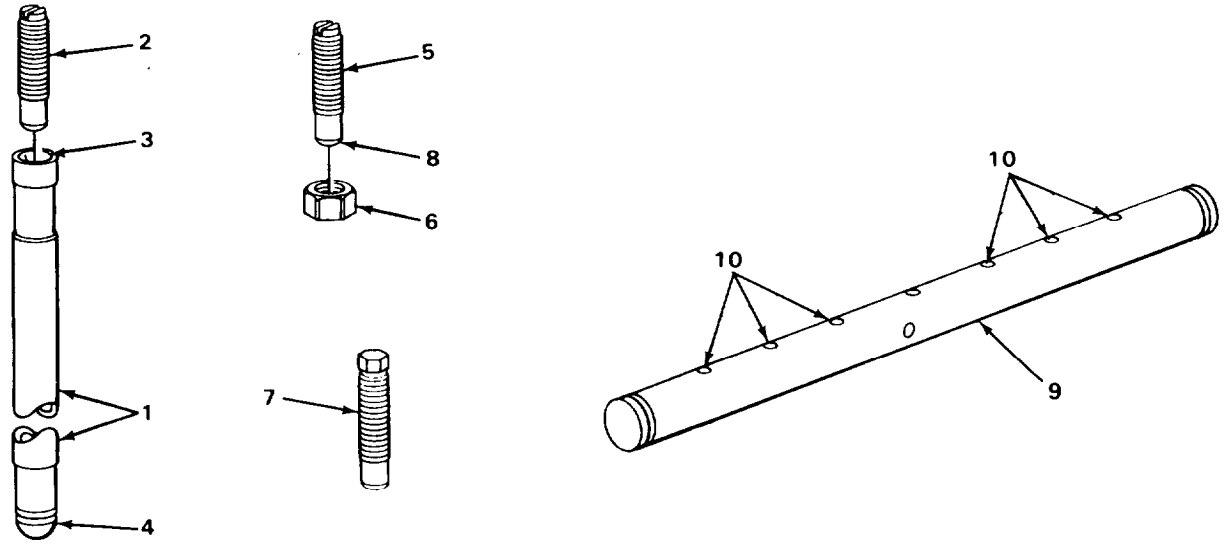
ROCKER ARM HOUSING AND PUSH ROD - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
19.	Six adjusting screws (5)	Using 1/4-inch radius gage, check ball end (8) for flat spots and roundness. **If out-of-round, or flat spots are noticed, replace.**

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear safety goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes, and do not breathe vapors. Do not use near open flame or excessive heat. Flashpoint for type #1 drycleaning solvent is 100°F (38°C) and for type #2 is 138°F (59°C). If you become dizzy while using solvent, get fresh air immediately, and get medical aid. If contact with eyes is made, wash your eyes with water, and get medical aid immediately. Failure to observe these precautions could cause serious injury or death to personnel.

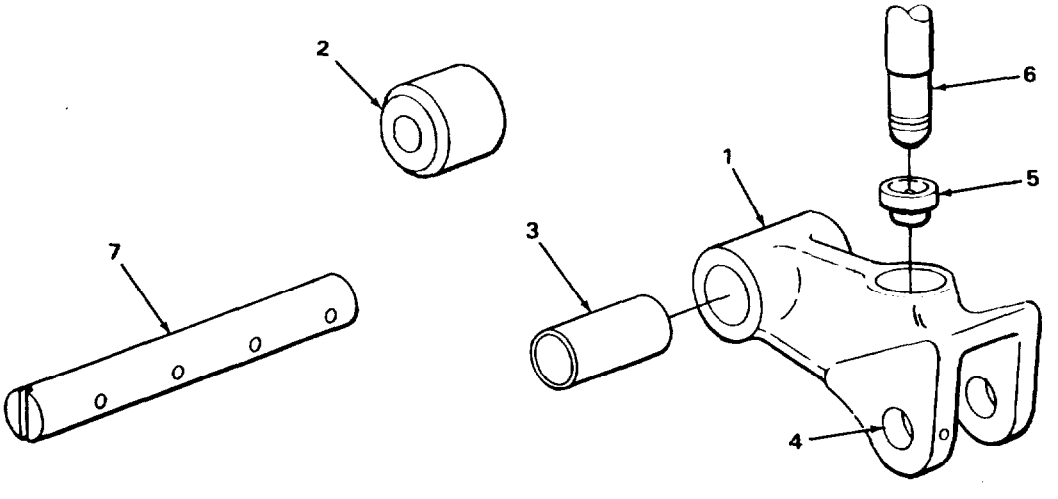
LOCATION	ITEM	ACTION / REMARKS
20.	Rocker arm shaft (9)	a. Using drycleaning solvent, clean oil passages (10). b. Using a 1- to 2-inch micrometer, measure outside diameter at several points for wear. Visually inspect for scratches. **If scratched, or outside diameter is less than 1.122 inch (28.50 mm), replace.**



TA 242506

CAM FOLLOWER ASSEMBLY - CONTINUED

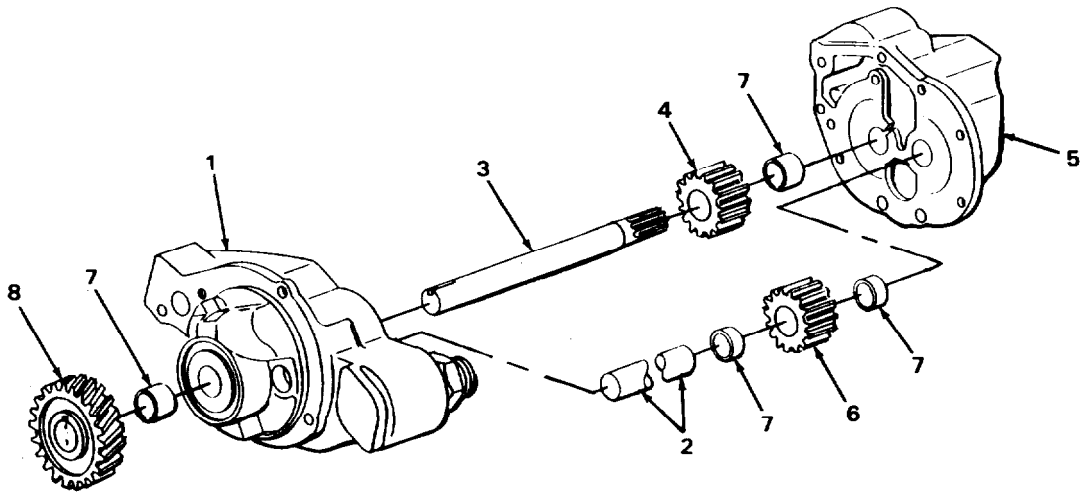
LOCATION	ITEM	ACTION / REMARKS
14. Cam follower lever (1)	Cam follower socket (5)	Inspect cam follower socket as follows: a. Coat new push rod ball end (6) with prussian blue. b. Place push rod ball end (6) into cam follower socket and rotate using hand pressure. c. Check cam follower socket wear area. **If cam follower socket wear area is not 80-percent blued, replace cam follower socket.** d. Using 16-ounce ball-peen hammer and 3/32-inch drive-pin punch, drive out. **Install new cam follower socket, see step 18.**
15.	Two cam follower shafts (7)	a. Using 0- to 1-inch micrometer, measure outside diameter of cam follower shafts. **If 0.748 inch (19.00 mm) or lass, replace.** b. Visually inspect around lockscrew end to make sure grooves are clean. Check for cracks, breaks, bends, galling, or surface imperfections. **If cracked, broken, galled, bent, or surface is damaged, replace.**



TA 242513

LUBRICATING OIL PUMP - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
		b. Using arbor press and ST-1158 bushing mandrel, press out bushing. **Discard.** c. Using arbor press and ST-1158 bushing mandrel, press in new bushing from flush to 0.020 inch (0.51 mm) below surface of gear, oil pump body, or adapter housing. d. Using boring machine, bore new bushing to size of 0.8767 to 0.8777 inch (22.268 to 22.293 mm).
16. Drive shaft (3)	Main drive gear (8)	Inspect for worn or broken teeth, pitting, or cracks. **If broken teeth, wear, pitting, or cracks exist, replace gear.**



TA 242518

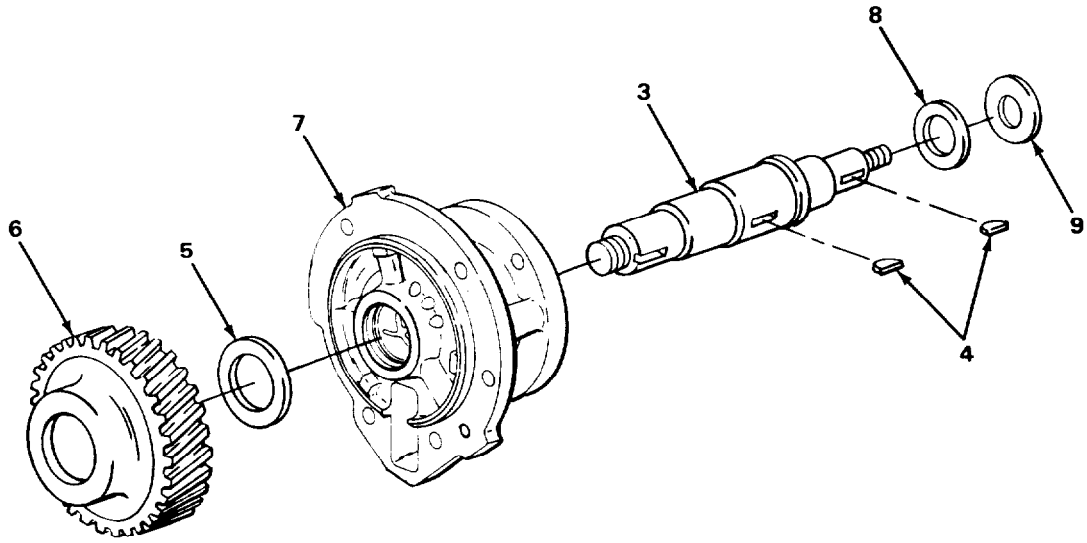
ACCESSORY DRIVE - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
ASSEMBLY		
10. Accessory drive shaft (3)	Two new keys (4)	Place in shaft.
11.	Thrust washer (5) and gear (6)	Using arbor press, put on until gear is against shoulder on accessory drive shaft.

CAUTION

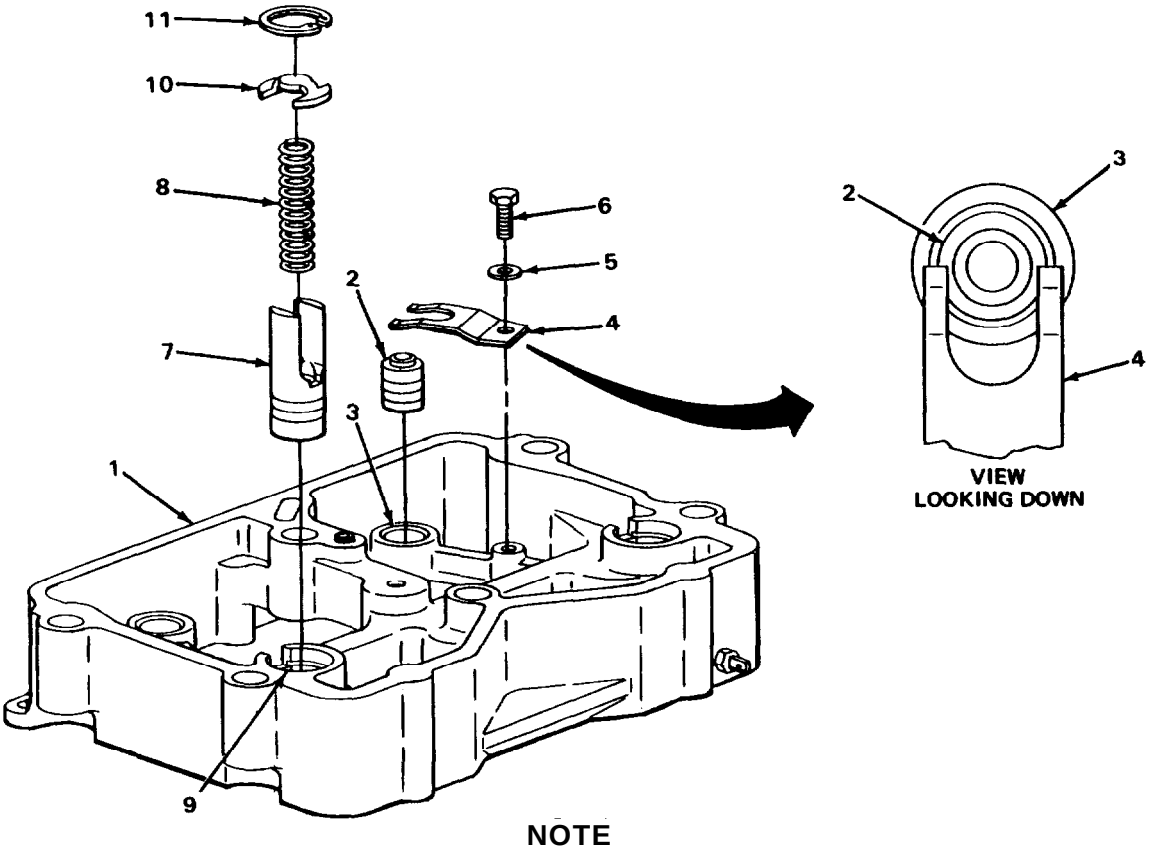
Grooved sides of thrust washers are to be installed away from the housing. Incorrect installation of these thrust washers will result in excessive wear and increased end play, which will cause failure of the accessory drive.

12. Accessory drive housing (7)	Accessory drive shaft (3)	Put in.
13. Accessory drive shaft (3)	Thrust washer (8) and washer (9)	Put on.



TA 242525

ENGINE COMPRESSION BRAKE HOUSING - CONTINUED



NOTE

FOLLOW-ON MAINTENANCE: Install engine compression brake housing (page 2-116).

TASK ENDS HERE

Section XIV. FUEL SYSTEM MAINTENANCE

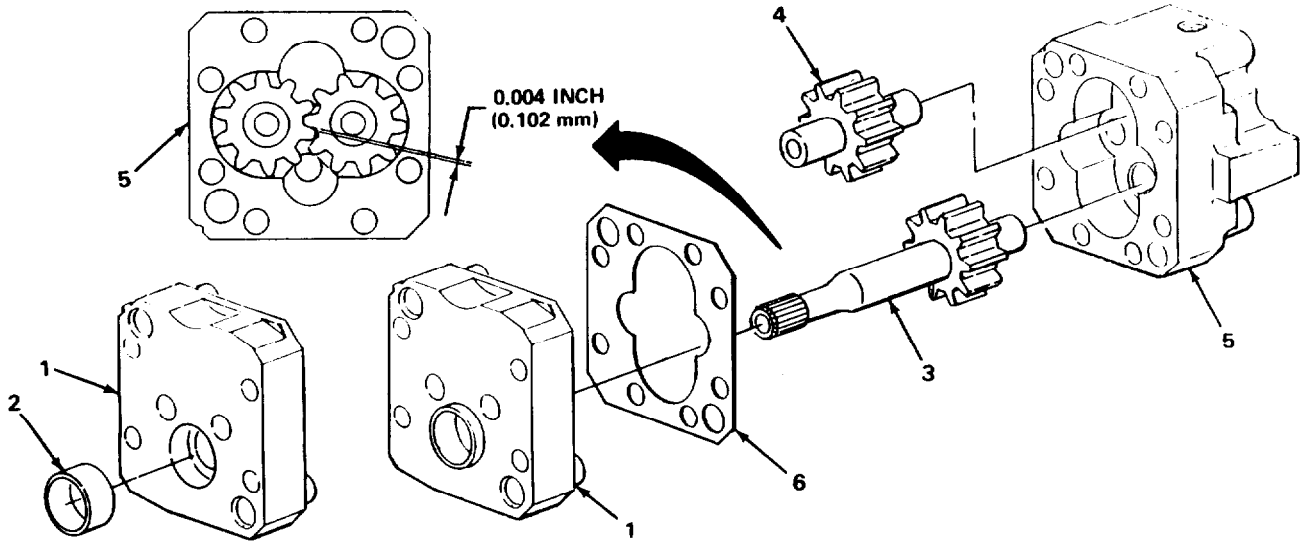
FUEL PUMP

This task covers:

a. Cleaning (page 2-291)
b. Disassembly (page 2-291)
c. Filter Screen Inspection (page 2-294)
d. Gear Pump Repair (page 2-295)
e. Pulsation Damper Repair (page 2-301)
f. Shutdown Valve Repair (page 2-304)
g. Front Cover Assembly Repair (page 2-308)
h. Fuel Pump Housing Repair (page 2-322)
i. Governor Plunger Repair (page 2-325)
j. Governor Spring Pack Repair (page 2-328)
k. Throttle Shaft Repair (page 2-329)
l. Fuel Pump Assembly (page 2-330)

FUEL PUMP - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
25. Gear pump housing (5)	Drive gear and shaft (3) and spur gear and idler shaft (4)	a. Lubricate gear pump housing, drive gear and shaft, and driven gear and shaft with lubricating oil. b. Clean prussian blue from gear pump housing end of driven gear and shaft, and position driven gear and shaft into gear pump housing. c. Position drive gear and shaft into gear pump housing. d. Using thickness gage, check gear backlash as shown. **Backlash must not exceed 0.004 inch (0.102 mm).**
26.	New gasket (6) and gear pump cover (1)	a. Install red, 0.002-inch (0.51 mm), or purple, 0.0015-inch (0.38 mm), new gasket as determined in step 24. b. Position gear pump cover on gear pump housing (5), making sure dowels and dowel holes are alined, and press together. c. Check that pump turns freely by finger pressure only.



TA 242537

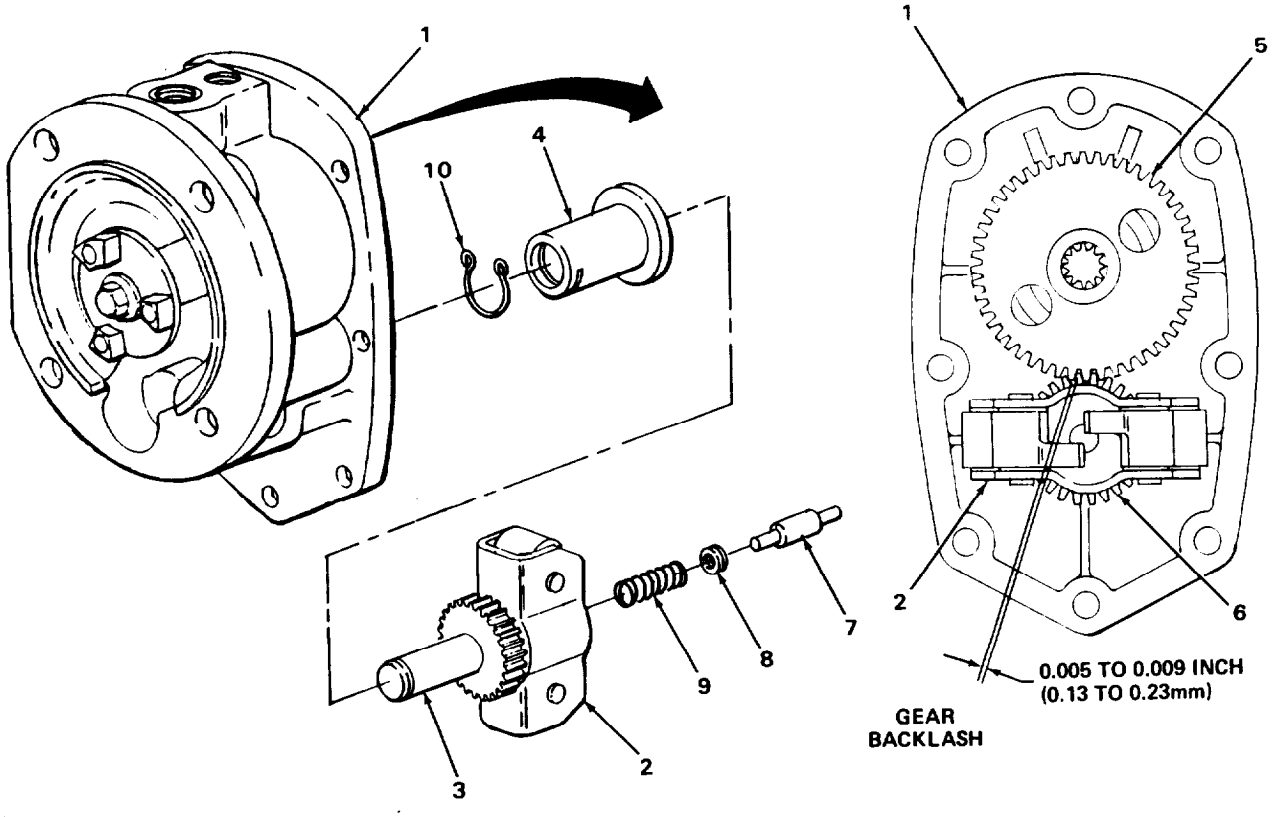
FUEL PUMP - CONTINUED

	LOCATION	ITEM	ACTION / REMARKS
64.	Front cover (1)	Weight carrier shaft (3)	Using ST-667 dowel puller, pull out.

NOTE

Perform step 65 only if bushing (4) remains in front cover when removing weight carrier and weight carrier shaft.

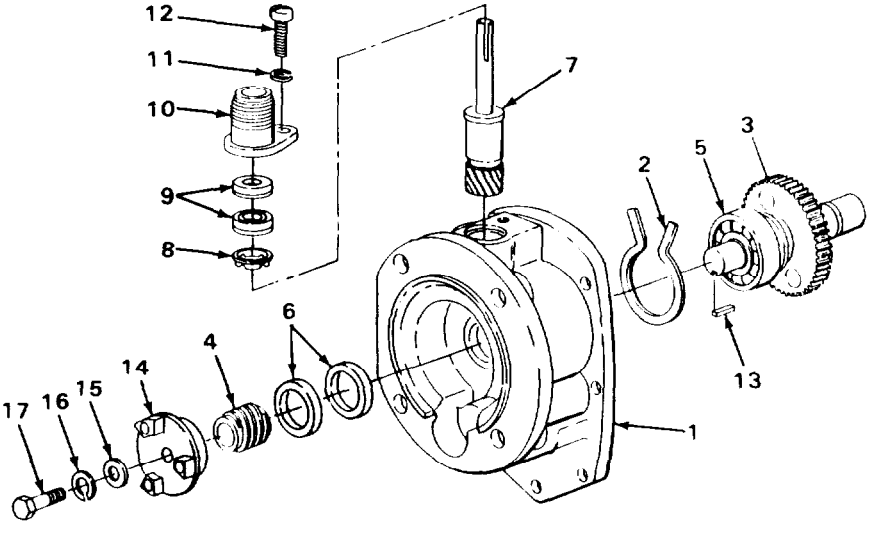
65.		Bushing (4)	Using ST-709 puller, pull bushing from front cover (1).
66.	Weight carrier (2)	Retaining ring (10) and bushing (4)	Using snapring pliers, take retaining ring off bushing.



TA 242543

FUEL PUMP - CONTINUED

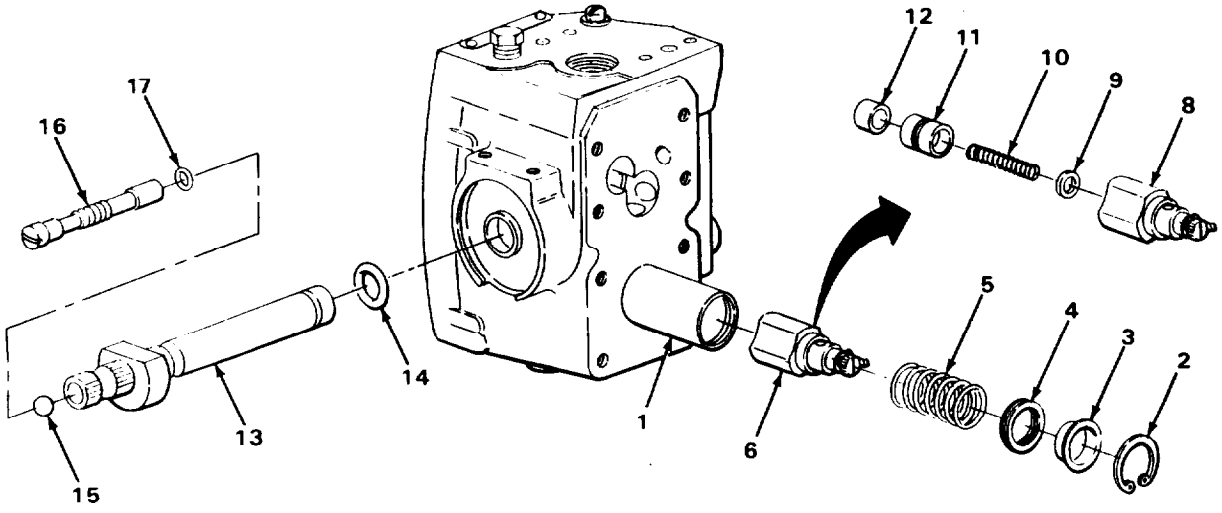
LOCATION	ITEM	ACTION / REMARKS
98.	New coupling key (13), tachometer drive gear (4), drive coupling (14), flat washer (15), new coupling lockwasher (16), and coupling screw (17)	a. Position new coupling key on drive shaft (3). b. Lubricate drive shaft (3) with extreme-pressure grease and, using arbor press and mandrel, press tachometer drive gear and drive coupling into place. **Make sure tachometer drive gear and tachometer gear teeth are alined.** c. Position new coupling lockwasher and flat washer on coupling screw. Using 1/2-inch drive 1/2-inch socket and ratchet handle, screw on and tighten. **Hold drive coupling or drive shaft in soft-jawed vise while tightening coupling screw.**



TA 242550

FUEL PUMP - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
THROTTLE SHAFT REPAIR		
129. Throttle shaft assembly (13)	Preformed packing (14) and ball (15)	a. Using center punch, 1/4-inch drill bit, and 3/8-inch electric drill, drill out ball. b. Take off packing. **Discard packing and ball.**
130.	Fuel adjusting screw (16)	Using 1/4-inch flat-tip screwdriver, unscrew and take out.
131. Fuel adjusting screw (16)	Preformed packing (17)	Take off. **Discard.**
	NOTE Throttle shafts vary with applications. Replace with same size and type if needed.	
132.	Throttle shaft assembly (13) and fuel adjusting screw (16)	Inspect for wear or damage. **Replace parts as necessary.**
133. Throttle shaft assembly (13)	Fuel adjusting screw (16), new preformed packing (17) and new preformed packing (14)	a. Lubricate with clean fuel oil and Install packing (17) on fuel adjusting screw. b. Screw in fuel adjusting screw about six turns. **Do not restrict throttle shaft fuel port.** c. Lubricate with clean fuel oil and install packing (14) on throttle shaft.



TA 242556

FUEL PUMP CALIBRATION - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**

WARNING

Fuel is flammable and can explode. To avoid serious injury or death, keep fuel away from open fire and keep extinguisher within easy reach when working with fuel. Smoking is prohibited while working with fuel.

CAUTION

Do not hold throttle in idle position any longer than necessary to complete test. Pump may overheat, since fuel flow is used to cool the pump.

NOTE

Pump must pick up fuel at 500 rpm without priming. If no fluid pickup is indicated at rotameter, check fuel filter for improper installation and motor switch for correct rotation, Make sure open suction valve, hose, and gear pump connections are tight.

Check rotameter for air in fuel flow. If air bubbles are present, work pump throttle lever from fuel full open to idle several times, to relieve trapped air in pump.

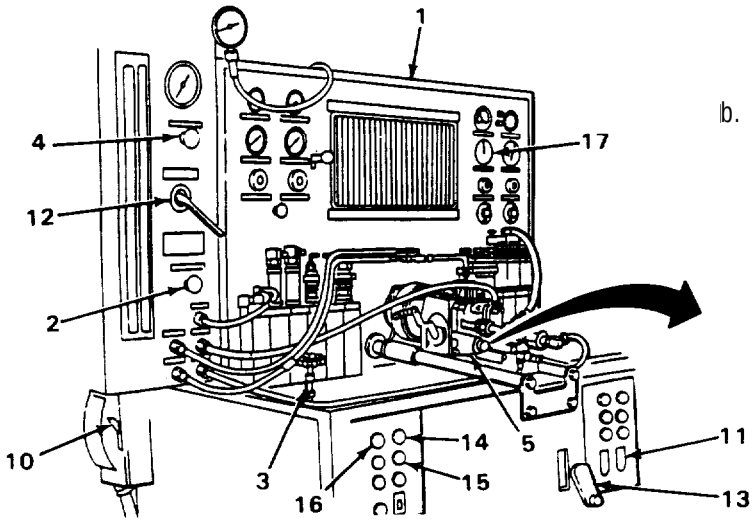
If air bubbling persists, it is an indication of an air leak in the system. Turn test stand off and check the line for loose connections between tank and pump, mating of gear pump housing, and full fuel supply tank.

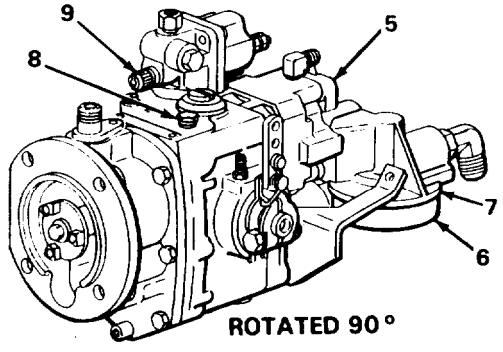
If pump is new or has been disassembled or reassembled, run pump slightly over rated speed for 5 minutes to allow bearings and seals to seat, and to purge air from system.

24. Test stand (1)

Speed control buttons (14 and 15)

a. Start test stand by depressing start button (18) until 2130 to 2150 rpm is indicated on test stand tachometer (17).
   Depress and release FAST (14) or SLOW (15) button to maintain 2130 to 2150 rpm.
b. At end of 5-minute period, reduce fuel pump speed to 500 rpm.

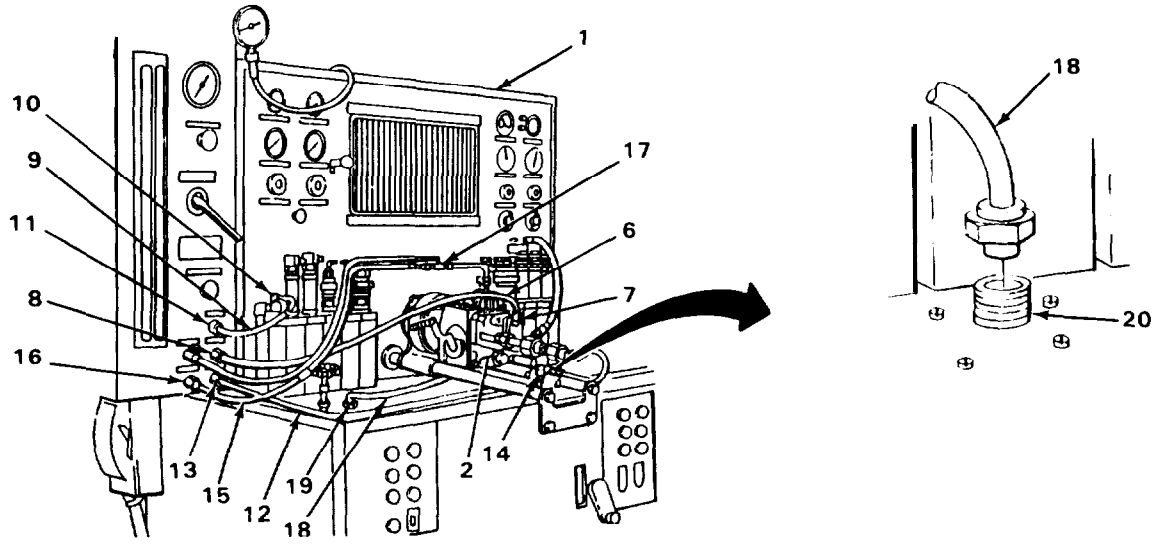




TA 242563

FUEL PUMP CALIBRATION - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
REMOVING PUMP FROM TEST STAND		
36. Test stand (1) and fuel pump (2)	1/4-inch (6.35 mm) flexible hose (6)	Remove flexible hose from small fitting (7) on fuel pump and auxiliary return fitting (8) on test stand.
37. Test stand (1)	Leakage accumulator hose (9)	Remove from no. 1 accumulator cam (10) and test stand leak test connector (11).
38.	Fuel suction hose (12)	Remove from test stand (I), fuel outlet connector (13) and test stand fuel return connector (14).
39.	Fuel input hose (15)	Remove from test stand (1), fuel input connector (16), and fuel pump discharge fitting (17).
40.	1/4-inch (6.35 mm) flexible hose (18)	Remove from test stand lube pressure (19) and test stand lube return (20).



TA 242570

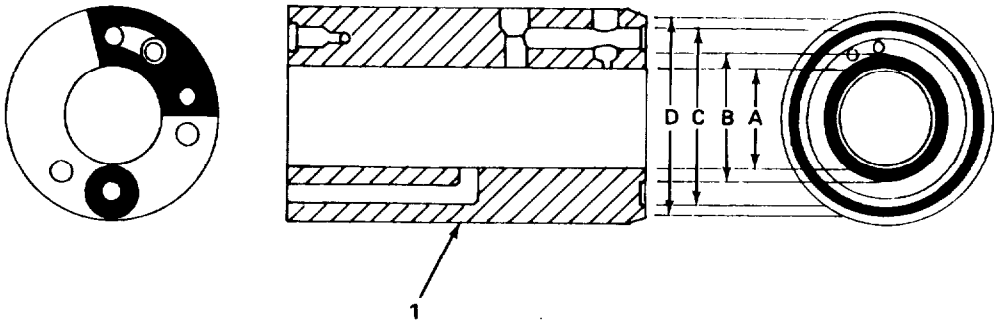
FUEL INJECTOR - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**

CAUTION

Do not use crocus cloth or wire brush on barrel contact area surfaces.

14.	Barrel (1)	Using lapping plate and cutting fluid, lap slightly to check barrel surfaces for mutilation and flatness in area shown by black area in illustration below. **After lapping slightly, If mutilation or unevenness exists, replace plunger and barrel.**



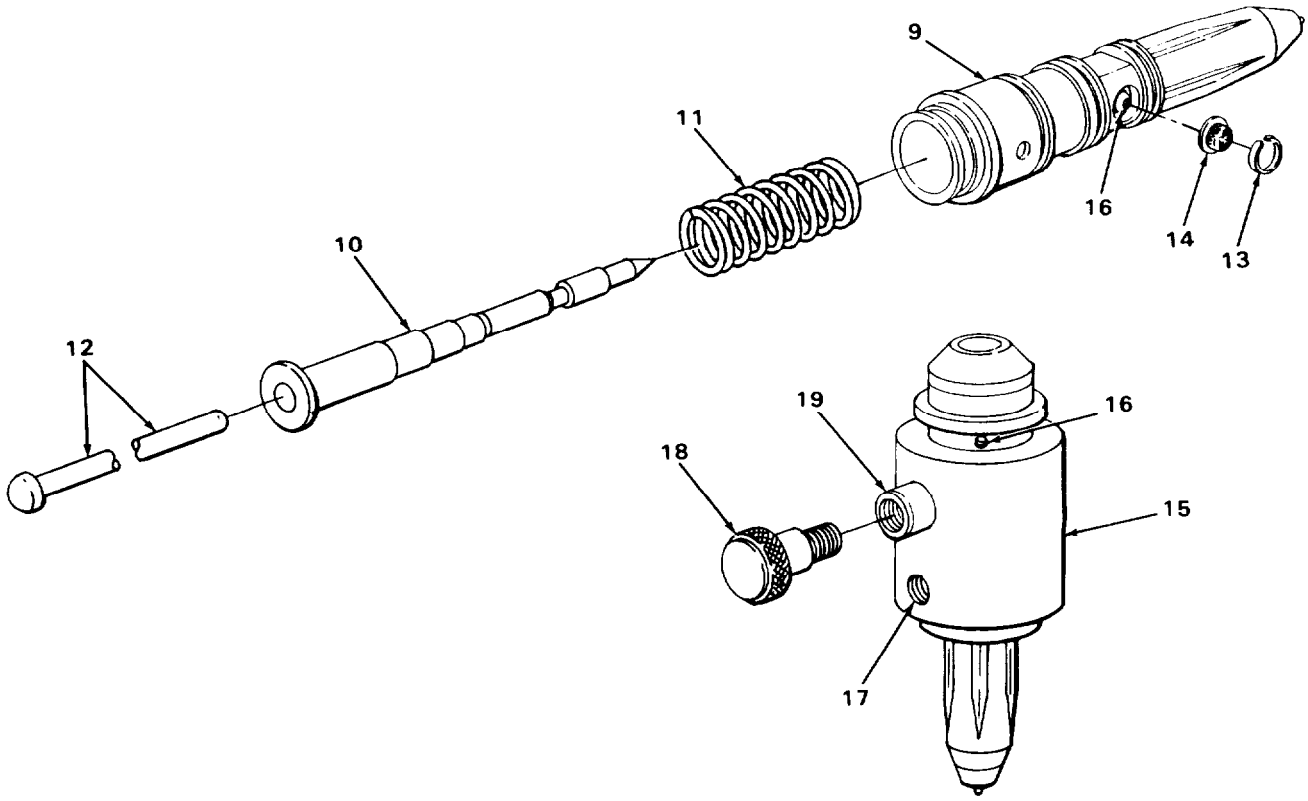
CUP CONTACT AREA OF BARREL

A-DIAMETER IN. (MM)	B-DIAMETER IN. (MM)	C-DIAMETER IN. (MM)	D-DIAMETER IN. (MM)
0.400 (10.16)	0.540 (13.72)	0.710 (18.03)	0.820 (20.83)

TA 242578

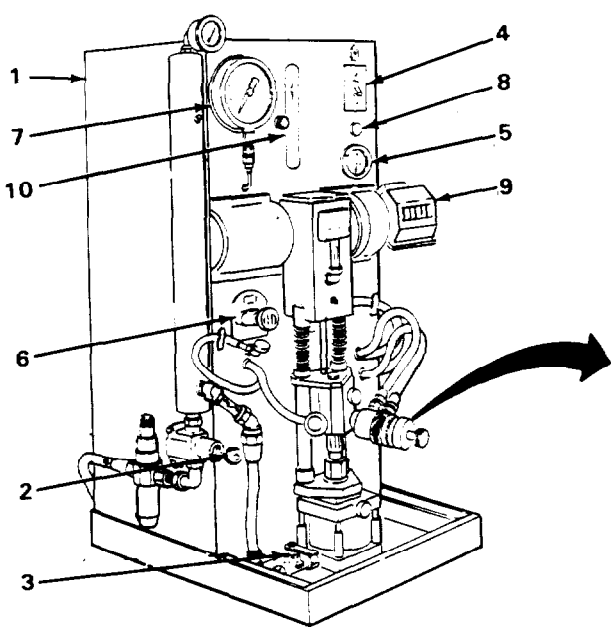
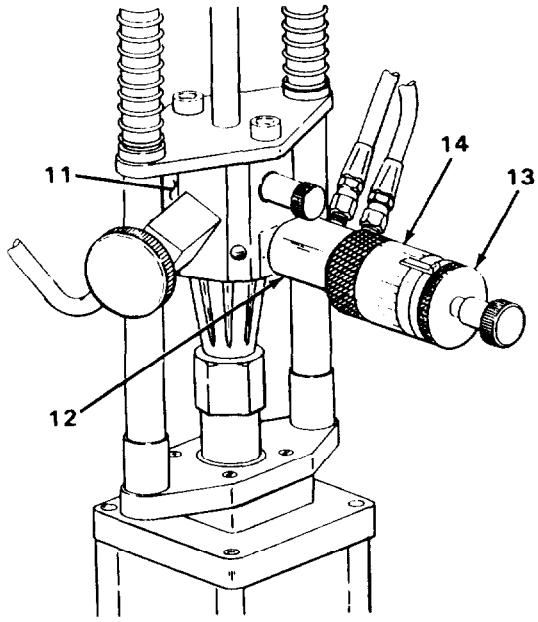
FUEL INJECTOR - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
43. Injector (9)	Plunger (10) and spring (11)	Take out.
44.	ST-1089 plunger extension (12)	Push in plunger and place into injector (9).
45.	Strainer element clip (13) and strainer element (14)	Take out if not previously removed.
46.	ST-708 burnishing tool adapter (15)	a. Aline injector orifice plug (16) with hole (17) on ST-708 burnishing tool adapter. b. Insert and tighten locating screw (18) in locating screw hole (19).



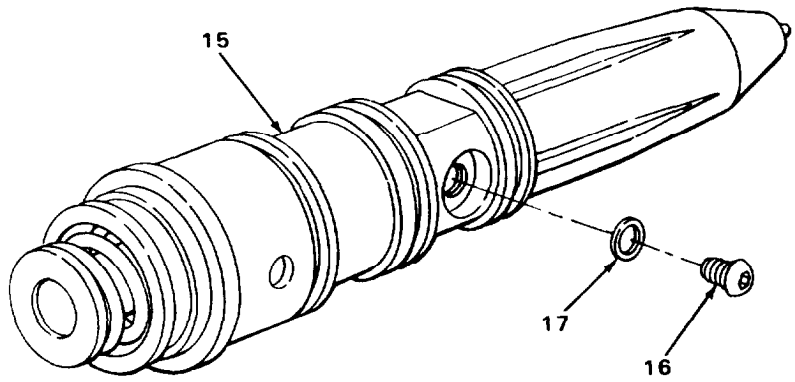
TA 242586

FUEL INJECTOR - CONTINUED

LOCATION	ITEM	ACTION / REMARKS
		
		
100. Injector (15)	Orifice plug (16) and gasket (17)	Using 5/64-inch hex key, remove orifice plug. **Discard gasket.**
101.	Orifice plug (16)	Using orifice size gage ST-1332, measure orifice plug at the base end, not the wrench end.

NOTE

Compare orifice plug inside diameter to table on page 2-380. Choose new orifice plug with inside diameter one size smaller than orifice plug removed.



TA 242593

TURBOCHARGER - CONTINUED

LOCATION	ITEM	ACTION / REMARKS

CAUTION

Do not use glassbeading or sandblasting cleaning methods on parts to remove nearby deposits of carbon or glazed carbon. Serious damage to parts will occur.

Do not use chemical or caustic solutions or solvents that may damage aluminum or aluminum alloy parts. Serious damage to parts will occur.

Do not use wire brushes or stiff-bristle brushes on turbocharger parts for cleaning. Wire or stiff-bristle brushes will cause serious damage to parts.

17.	All parts	a. Place all parts in parts cleaner for soaking. Keep parts separated and do not stack parts. b. Using a soft-bristle brush, brush heavy carbon and dirt deposits from parts. C. Pump parts cleaner fluid through oil passages to flush out loose particles of dirt or carbon. d. Drain off parts and steam clean thoroughly. Make sure oil passages are clean. **See General Maintenance instructions, page 2-3 for cleaning procedures.** e. Blow off excess water and dry parts thoroughly using moisture free compressed air.

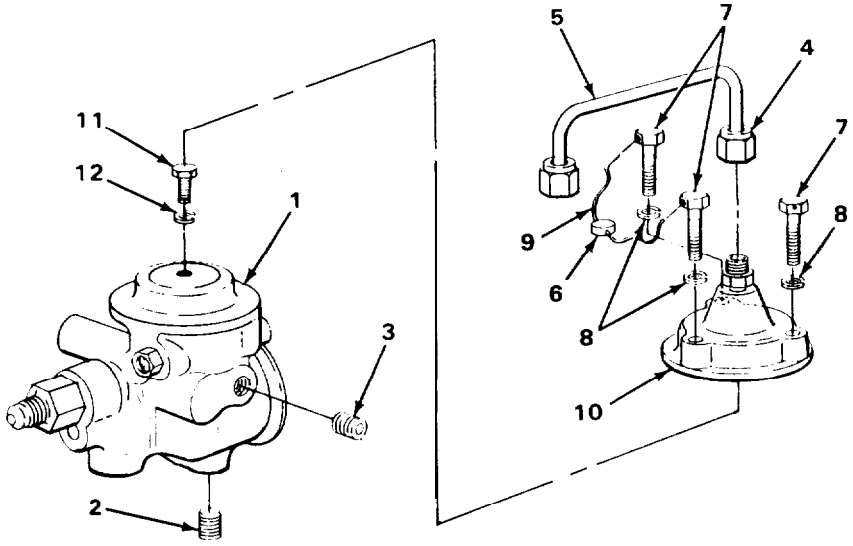
INSPECTION

CAUTION

Move parts to clean and dry area for inspection and assembly procedures. Do not stack or bump parts together. Damage to parts may occur.

ANEROID CONTROL VALVE - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
DISASSEMBLY		
1. Aneroid control valve (1)	Pipe plugs (2 and 3)	a. Using 3/16-inch hex wrench, unscrew and take out. b. Drain oil into drain pan.
2.	Tubing nut (4) and tubing (5)	Using 9/16-inch box-end wrench, loosen and take off.
3.	Lead seal (6) three screws (7) three lockwashers (8) and lock wire (9)	a. Using diagonal-cutting pliers, cut lock wire and take off. b. Using 7/16-inch box-end wrench, unscrew and take out. **Discard lockwashers and lock wire.**
4.	Bellows cover (10)	Using plastic-faced hammer, tap gently and take off.
5.	Screw (11) and lockwasher (12)	Using 7/16-inch box-end wrench, unscrew and take off. **Discard lockwasher.**



TA 242604

WATER PUMP - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
5.	Retaining ring (10) and inner bearing (11)	a. Using snapring pliers, take off retaining ring. b. Support inner bearing on inside race and using arbor press and mandrel, press out shaft (3).
6. Water pump body (1)	Carbon-faced seal (12) and rear oil seal (13)	Take out. **Discard.**
7.	Screw (14), clamp (15), water by-pass tube (16), and pre-formed packing (17)	a. Using 1/2-inch box-end wrench, unscrew and take out screw and clamp. b. Pull water by-pass tube from water pump body. c. Take off packing. **Discard.**

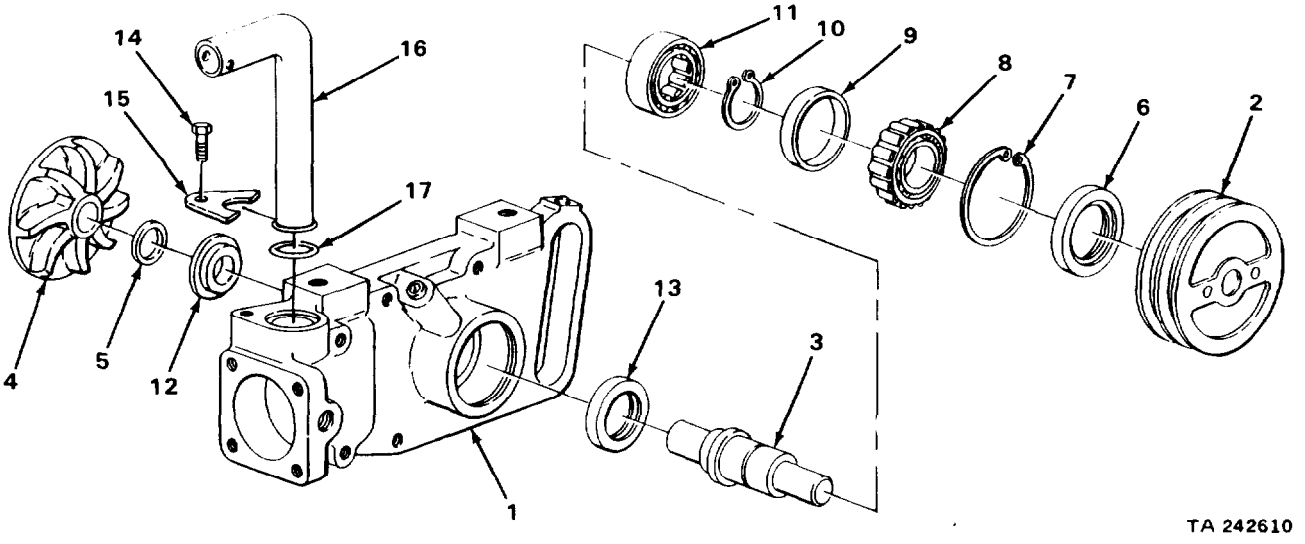
CLEANING

NOTE

For general cleaning procedures, see General Maintenance Instructions, page 2-3.

INSPECTION

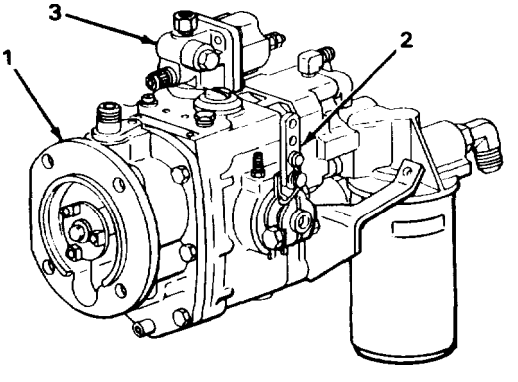
8.	Outer bearing (8) bearing spacer (9), and inner bearing (11)	a. Inspect inner bearing and outer bearing for wear, roughness, and damage. **Discard if worn, rough, or damaged.** b. Inspect bearing spacer for wear or damage. **Discard if worn or damaged.**



TA 242610

FINAL TESTING AND ADJUSTMENTS - CONTINUED

LOCATION	ITEM	ACTION **REMARKS**
13.	Engine mounted on engine test stand	a. Apply 12 volts to fuel shutdown valve (3) to open. b. Start engine (page 2-3). Allow to idle at approximately 800 rpm. **If engine gives no Indication of starting, see engine test stand troubleshooting, page 2-424.**
ENGINE TESTING		
14.	Engine mounted on engine test stand	a. Operate at 800 rpm for 5 to 10 minutes. b. Check oil pressure. **Shut down engine if not between 10 and 70 psi, and correct fault. See engine test stand troubleshooting, page 2-424.** c. Restart engine (page 2-3). d. Check water temperature. **Shut down engine If above 200°F (93°C) and correct fault. See engine test stand troubleshooting, page 2-424.** e. Restart engine (page 2-3). f. Check all filters, gaskets, connections, and hoses for leaks. **Shut down engine, repair or replace all leaking filters, gaskets, connections, and hoses.** g. Restart engine (page 2-3). h. Shut down engine. Check oil level. **Refill to high mark.**



TA 242615

TROUBLESHOOTING ON ENGINE TEST STAND – CONTINUED

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

10. ENGINE MISSES UNDER LOAD – CONTINUED.

Step 6. Check engine for excessive blowby and wetness in exhaust caused by broken or damaged rings.
Isolate damaged cylinder and replace broken or damaged rings.
Step 7. Perform engine compression test. Check for cylinder head gasket leakage.
Replace leaking head gasket.
Step 8. Check intake and exhaust gaskets for leakage.
Replace leaking gaskets.

11. ENGINE SURGES AT GOVERNED RPM.

Step 1. Check filter, gaskets, connections, and suction lines for air leaks.
Replace defective filter, leaking gaskets, connections, and suction lines.
Step 2. Perform engine compression test. Check for cylinder head gasket leakage.
Replace leaking gasket.

12. EXCESSIVE BLACK SMOKE AT IDLE.

Step 1. Remove injectors (page 2-34). Check for correct injector cup size (page 2-289).
Replace incorrect injector cups.
Step 2. Check for cracked injector cups (page 2-289).
Replace damaged injector cups.
Step 3. Check injector timing (page 2-106).
Reset injector timing.
Step 4. Check engine for excessive blowby and wetness in exhaust caused by broken or damaged rings.
Isolate damaged cylinders and replace broken or damaged rings.

13. EXCESSIVE BLACK SMOKE UNDER LOAD.

Step 1. Check for excessive exhaust back pressure.
Repair or replace defective turbocharger.
Step 2. Check all fuel lines for bends, breaks, or damage causing restriction.
Repair or replace restricted fuel lines.
Step 3. Remove injectors (page 2-34). Check for correct injector cup size (page 2-289).
Replace incorrect injector cups.
Step 4. Check for cracked injector cups (page 2-289).
Replace damaged injector cups.

SECTION VIII, PISTONS AND CONNECTING RODS – CONTINUED

PART OR LOCATION	NEW MINIMUM	NEW MAXIMUM	WORN LIMIT
Piston Ring (Gap in Ring Travel Area of Liner)			
Part No. 147670	0.023 (0.58)	0.033 (0.85)	*
Part No. 132880	0.019 (0.48)	0.029 (0.74)	*
Part No. 168680	0.028 (0.71)	0.038 (0.97)	*
Part No. 194610	0.010 (0.25)	0.020 (0.51)	*

* Add 0.003-inch (0.08 mm) ring gap to new maximum limit for 0.001 (0.03) wear in cylinder liner wall.

TORQUE LIMITS – FT LB (N•M)

PART OR LOCATION	MINIMUM	MAXIMUM
Connecting Rod Capscrews		
Step 1 Tighten to	70 (95)	75 (102)
Step 2 Advance to	*140 (190)	*150 (203)
Step 3 Loosen all		Completely
Step 4 Tighten to	25 (34)	30 (41)
Step 5 Advance to	70 (95)	75 (102)
Step 6 Advance to	*140 (190)	*150 (203)

* Torque to 100 ft lb (136 N•m) with lock plates.

SECTION IX, CAMSHAFT AND TIMING SYSTEM

WEAR LIMITS – INCH (MM)

PART OR LOCATION	NEW MINIMUM	NEW MAXIMUM	WORN LIMIT
Camshaft Journal Outside Diameter	1.997 (50.72)	1.998 (50.75)	1.996 (50.70)

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST-Continued

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description (CAGE) Part Number	(5) U/M
12	O		Oil: Lubricating, OE/HDO 30 (81349) MIL-L-2104C	
		9150-00-186-6681 9150-00-188-9858 9150-00-189-6729	1 -Quart Can Type 1 5-Gallon Can 55-Gallon Drum	qt gal gal
13	F	8010-00-652-3626	Paste: Prussian Blue (81349) MIL-P-30501	OZ
14	C	7920-00-205-1711	Rags: Wiping 50-Pound Bale (58536) A-A-2522	ea
15	C	9150-00-281-1893	Soap: Lubricating 1 Package Quantity, Stick, Package Type (24446) 181A8705POO1	OZ
16	O		Solvent: Dry Cleaning, Type II (81348) P-D-680	
		6850-00-281-1985 6850-00-285-8012	1-Gallon Can 55-Gallon Can	gal gal
17	O	9905-00-537-8954	Tags: Marker Box of 50 (81349) MIL-T-12755	ea
18	O	8030-00-889-3535	Tape: Antiseizing, Pipe-Joint Sealer 1/2-inch Wide, 260 inches Long (76381) 4B	ft
19	O	7510-00-473-9513	Tape: Pressure Sensitive, Adhesive e-inch Wide (81349) MIL-T-23397	ft
20	F	4910-00-779-6851	Oil: Test, Injector (33287) J-26400-5B	OZ
21	F	9505-00-684-4843	Wire: Locking 1-Pound Roll (72452) 1459-262	lb

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						0101-CRANKCASE, BLOCK, CYLINDRT HEAD		
2	1	XDHHH		89346	AR09911	BLOCK, CYLINDER	EA	1
2	2	PAFZZ	5305-00-942-2196	96906	MS18154-60	.SCREW, CAP, HEXAGON H	EA	4
2	3	PAHZZ	5310-00-261-340	96906	MS35338-8	.WASHER, LOCK	EA	4
2	4	PAFZZ	2815-00-404-2747	15434	158145	.COVER, ACCESS	EA	1
2	5	PAHZZ	2815-00-064-4398	15434	213740	.CYLINDER, SLEEVE	EA	6
2	5	XDHZZ		15434	202226	.SLEEVE, SALVAGE	EA	6
2	6	PAHZZ	5305-00-230-1939	15434	S118A	.SCREW	EA	12
2	7	PAHZZ	5310-00-159-6209	96906	MS122032	.WASHER, LOCK	EA	12
2	8	XDHZZ		89346	210895	.COVER WATER HEADER	EA	1
2	9	PAHZZ	5330-00-537-2382	15434	70089-1	.GASKET WATER HEADER COVER PART OF KIT P/N 3018762	EA	3
2	10	PAHZZ	5330-01-145-5377	15434	3007442	.PACKING, PREFORMED PART OF KIT P/N 3018762	EA	6
2	11	XDHZZ		89346	211475	.NOZZLE	EA	6
2	12	PAHZZ	5310-00-407-9566	96906	MS35338-45	.WASHER, LOCK	EA	6
2	13	XDHZZ		89346	S102A	.SCREW, CAP, HEXAGON HEAD	EA	6
2	14	PAHZZ	2930-00-799-0843	15434	132019	.COVER, WATER HEADER	EA	1
2	15	PAHZZ	4730-00-044-4715	15434	S962	.PLUG, PIPE	EA	1
2	16	XDHZZ		15434	191079	.SLEEVE, WATER, PASSAG	EA	V
2	17	PAHZZ	5315-00-014-1284	24617	141284	.PIN, STRAIGHT, HEADLE FLYWHEEL HOUSING	EA	2
2	18	PAHZZ	5315-00-014-1195	15434	658585	.PIN, STRAIGHR, HEADLE, CAM FOLLOWER TO BLOCK HOUSING	EA	6
2	19	PAHZZ	2815-00-484-8359	15434	42645	.CAP, MAIN BEARING NO.1, 3, 5	EA	3
2	19	PAHZZ	3130-00-408-9041	15434	42646	.CAP, PILLOW BLOCK NO. 2, 4, 6	EA	3
2	19	PAHZZ	2815-00-484-8360	15434	42647	.CAP, MAIN BEARING NO.7	EA	1
2	20	PAHZZ	5310-00-356-1447	15434	3009213	.LOCK, PLATE	EA	14
2	21	PAHZZ	5306-00-804-2468	15434	105953	.BOLT, MACHINE HEAD MAIN BEARING CAP	EA	14
2	22	PAHZZ	5315-00-532-9388	19207	5329388	.PIN, STRAIGHT, HEADLE MAIN BARING TO BLOCK	EA	2
2	23	PAHZZ	4730-00-018-9566	15434	S911B	.PLUG, PIPE	EA	2
2	24	PAHZZ	4730-00-801-8186	15434	S-915-A	.PLUG, PIPE	EA	2
2	25	PAHZZ	5365-01-150-6257	15434	210884	.PLUG, MACHINE THREAD .875 THREAD	EA	1
2	26	PAHZZ	2815-00-772-9434	15434	70653	.DOWEL, DIAMOND, GEAR COVER	EA	1

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						0104-PISTONS, CONNECTING RODS		
6	1	PAHZZ	2815-01-086-2704	15434	3014149	RING SET, PISTON	EA	6
6	2	PAHZZ	2815-00-962-5618	15434	132880	.RING, PISTON COMPRESSION	EA	2
6	3	PAHZZ	2815-00-994-4427	15434	147670	.RING, PISTON COMPRESSION	EA	1
6	4	PAHZZ	2815-00-994-4429	15434	194610	.RING, PISTON OIL	EA	1
6	5	PFHHH	2815-00-004-8291	15434	AR08190	PISTON ASSEMBLY	EA	6
6	6	PAHZZ	5365-00-282-5030	15434	61908	.RING, RETAINING	EA	2
6	7	PAHZZ	2815-00-480-4347	15434	181970	.PIN, PISTON	EA	1
6	8	XDFZZ		15434	203090	.PISTON	EA	1
6	9	PAHZZ	3120-014-087-3004	15434	214950	BEARING, HALF SLEEVE	EA	12
6	10	PAHZZ	2815-00-753-0660	15434	3015523	CONNECTING ROD, PIST	EA	6
6	22	PAHHH	5310-00-134-4171	15434	200861	.WASHER, FLAT	EA	2
6	12	PAHZZ	5310-00-222-7240	15434	69936	.NUT, PLAIN, HEXAGON	EA	2
6	13	PAHZZ	2815-00-132-0273	15434	187420	.BUSHING, POSTON PIN STANDARD	EA	1
6	13	XDFZZ		15434	152770	.BUSHING, HEAVY WALL	EA	1
6	14	PAHZZ	5306-00-041-0917	15434	9195-3	.BOLT, CONNECTING ROD	EA	2

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						0106(CONT)		
14	1	PAFZZ	2815-00-405-1798	33457	2S7225S	BREATHER ASSEMBLY ENGINE	EA	1

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 03-FUEL SYSTEM 0301- FUEL INJECTOR		
22	1	PAFHH	2910-01-150-2631	15434	3018323	NOZZLE,FUEL INJECTI	EA	6
22	2	PAFZZ	5305-01-060-5958	15434	165006	.SCREW,CAP,HEXAGON H CLAMP MTG	EA	2
22	3	PAFZZ	5340-00-134-3529	15434	191218	.CLAMP	EA	1
22	4	PAHZZ	2910-00-238-5435	15434	191916	.PLUNGER,DETENT	EA	1
22	5	PAHZZ	2910-00-237-0056	15434	AR40065	.PARTS KIT,FUEL INJE	EA	1
22	6	PAHZZ	2910-01-070-9710	15434	167157	..BALL CHECK,FUEL INJ	EA	1
22	7	PAHZZ	5360-00-132-0245	15434	166009	.SPRING INJECTOR	EA	1
22	8	PAHZZ	2910-01-105-6457	15434	185139	.ADAPTER,INJECTOR	EA	1
22	9	PAHZZ	5365-00-815-1137	15434	174299	.CLIP,FILTER SCREEN	EA	1
22	10	PAHZZ	2815-00-815-1114	15434	174298	.STRAINER,ELEMENT,SE	EA	1
22	11	PAHZZ	5330-00-924-7757	96906	MS9241-024	.PACKING,PREFORMED PART OF KIT P/N 3801330	EA	1
22	12	PAHZZ	5330-00-132-0276	15434	193736	.GASKET PART OF KIT P/N 3801330	EA	2
22	13	PAHZZ	5315-01-079-6506	15434	203426	.PIN,SPIRAL	EA	2
22	14	PAHZZ	2910-01-152-8531	15434	3012537	.CUP,INJECTOR	EA	1
22	15	PAHZZ	5340-01-079-4678	15434	185138	.RETAINER,CUP	EA	1

(1) ILLUSTRATION (a) FIG. NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						0302(CONT)		
26	1	PAFHH	2910-00-828-7126	15434	BM76340	.DAMPENER,FLUID PRES	EA	1
26	2	PAFZZ	5305-00-071-2241	96906	MS90725-10	..CAPSCREW	EA	2
26	3	PAFZZ	5310-00-159-6209	96906	MS122032	..WASHER,LOCK	EA	2
26	4	PAFZZ	5310-00-141-1795	88044	AN960-416	..WASHER	EA	2
26	5	PAHZZ	2910-00-829-5616	15434	153336	..HOUSING,FUEL PUMP	EA	1
26	6	PAHZZ	5330-00-809-2667	15434	100099	..PACKING,PREFORMED PART OF KIT P/N BM68356	EA	1
26	7	PAHZZ	2910-00-951-3536	15434	202897	..DISK,SOLID,PLAIN	EA	1
26	8	PAHZZ	5330-00-809-3276	15434	139988	..PACKING PART OF KIT P/N BM68356	EA	1
26	9	PAHZZ	5365-00-965-0870	15434	160514	..SPACER RING PART OF KIT P/N BM68356	EA	
26	10	PAHZZ	2910-00-829-5617	15434	153338	..COVER,ACCESS	EA	1
26	11	PAFZZ	5310-00-141-1795	88044	AN960-416	.WASHER	EA	1
26	12	PAFZZ	5310-00-484-1718	15434	181466	.WASHER,LOCK	EA	2
26	13	PAFZZ	5306-00-485-0790	15434	70790	.BOLT,MACHINE SOCKET HEAD	EA	2
26	14	PAFZZ	4730-01-078-9859	15434	203849	.ELBOW,TUBE TO BOSS	EA	1
26	15	PAHZZ	5330-00-252-8888	16954	691-10014	.GASKET PART OF KIT P/N BM68356	EA	1
26	16	PAFZZ	4730-00-803-8353	15434	116936	.ELBOW,CONNECTION	EA	1

(1) ILLUS-TRATION (a) FIG. NO.	(1) ILLUS-TRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION / USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 05-COOLING SYSTEM 0503-WATER MANIFOLD, HEADERS, THERMOSTATS AND HOUSING GASKET		
34	1	XDOZZ		15434	102231	HOUSING, THERMOSTAT	EA	1
34	2	PAOZZ	2930-0-732-5206	15434	145977	VALVE, TEMPERATURE R	EA	1
34	3	XDOZZ		15434	215172	CONNECTION, WATER, OU	EA	1

(1) ILLUS-TRATION (a) FIG. NO.	(1) ILLUS-TRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 22-BODY CHASSIS AND ACCESSORY ITEMS 2210-DATA PLATES AND INSTRUCTION HOLDERS		
38	1	PAOZZ	9905-00-733-7622	15434	105375	PLATES DESIGNAT	EA	2
38	2	PAOZZ	5305-00-804-6318	15434	S2286	SCREW	EA	4

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

FSCM	PART NUMBER	NATIONAL STOCK NUMBER	FIGURE NO.	ITEM NO.
96906	MS35338-8	5310-00-261-7340	11	5
96906	MS35338-8	5310-00-261-7340	13	15
96906	MS35338-8	5310-00-261-7340	16	4
96906	MS35338-8	5310-00-261-7340	16	35
96906	MS35338-8	5310-00-261-7340	17	12
96906	MS35338-8	5310-00-261-7340	18	5
96906	MS35338-8	5310-00-261-7340	24	4
96906	MS35338-8	5310-00-261-7340	28	37
96906	MS35338-8	5310-00-261-7340	35	1
96906	MS35338-8	5310-00-261-7340	36	2
96906	MS35691-5	5310-00-971-7989	33	2
96906	MS35756-12	5315-00-616-5522	20	15
96906	MS35756-18	5315-00-616-5527	7	8
96906	MS35756-18	5315-00-616-5527	20	20
96906	MS35756-34	5315-00-043-1787	17	2
96906	MS35842-13	4730-00-909-8627	36	12
96906	MS39230-1	4730-00-287-1649	28	30
96906	MS49005-6	4730-00-057-5555	2	27
96906	MS49005-6	4730-00-057-5555	16	5
96906	MS49005-6	4730-00-057-5555	16	12
96906	MS51092-1	5310-00-684-3463	10	25
96906	MS51887-5	4730-00-196-0837	28	35
96906	MS51967-14	5310-00-768-0318	13	24
96906	MS51967-20	5310-00-763-8920	36	45
96906	MS51968-14	5310-00-732-0560	12	3
96906	MS51968-14	5310-00-732-0560	12	8
96906	MS51968-14	5310-00-732-0560	12	14
96906	MS51968-14	5310-00-732-0560	12	25
96906	MS51968-14	5310-00-732-0560	12	29
96906	MS9021-116	5330-00-582-7484	23	2
96906	MS90725-10	5305-00-071-2241	24	23
96906	MS90725-10	5305-00-071-2241	26	2
96906	MS90725-10	5305-00-071-2241	27	20
96906	MS90725-10	5305-00-071-2241	28	3
96906	MS90725-115	5305-00-071-1769	13	26
96906	MS90725-34	5306-00-225-8499	17	31
96906	MS90725-36	5305-00-225-9081	17	29
96906	MS90725-58	5305-00-269-3209	13	10
96906	MS90726-113	5305-00-725-4183	37	13
96906	MS90726-31	5306-00-225-9086	10	35
15434	MS90726-64		4	9
96906	MS90726-67	5305-00-269-2811	36	46
96906	MS90727-114	5305-00-719-5235	37	10
96906	MS90727-83	5305-00-709-8282	17	13
96906	MS90727-87	5305-00-709-8523	13	16
96906	MS90727-91	5305-00-709-8542	8	14
96906	MS90727-94	5305-00-709-8537	8	6
96906	MS90728-114	5305-00-071-2070	5	5
96906	MS90728-59	5305-01-140-9118	17	3
96906	MS90728-62	5305-00-068-0511	16	2
96906	MS90728-62	5305-00-068-0511	16	44
96906	MS90728-62	5305-00-068-0511	35	3
96906	MS90728-62	5305-00-068-0511	36	5
96906	MS90728-64	5305-00-725-2317	18	4
96906	MS90728-64	5305-00-725-2317	36	9
96906	MS90728-66	5305-00-782-9489	11	3
96906	MS90728-66	5305-00-782-9489	28	36
96906	MS90728-70	5305-00-846-5703	16	19
96906	MS90728-70	5305-00-846-5703	36	1
96906	MS90728-87	5305-00-071-1788	20	22
96906	MS90728-90	5305-00-071-2056	24	17
96906	MS9241-024	5330-00-924-7757	22	11
80205	NAS620-5L	5310-00-727-8353	23	26
15434	NPN		28	34
15434	S-119-C	5305-01-165-3300	8	1
15434	S-119-C	5305-01-165-3300	17	11
15434	S-147-B	5306-00-136-9751	17	30
15434	S-910-B	4730-01-160-3579	16	13
15434	S-915-A	4730-00-801-8186	2	24
15434	S-915-A	4730-00-801-8186	13	14
15434	S-915-A	4730-00-801-8186	35	8
15434	S-915-A	4730-00-801-8186	36	3
15434	S101A	5305-00-424-3571	17	21
89346	S102A		2	13
15434	S110	5305-01-114-9279	35	11
15434	S110	5305-01-114-9279	36	16
15434	S118A	5305-00-230-1939	2	6
15434	S118A	5305-00-230-1939	29	9
15434	S129	5305-00-546-6698	10	38
15434	S1354	5305-00-804-6454	13	5
15434	S145	5305-01-203-6444	16	37
15434	S149A	5305-00-404-1390	36	49
15434	S155	5305-01-028-8869	19	10
15434	S159B	5305-00-493-3959	33	12
15434	S16073	3110-00-144-8519	36	28
15434	S16073	3110-00-144-8519	36	39
15434	S16206	5365-00-786-0102	33	10
15434	S16255	2815-00-815-0355	36	31
15434	S16255	2815-00-815-0355	36	40
15434	S189C	5305-00-509-8106	30	14
15434	S199B	5305-00-404-1388	16	46
15434	S200	5310-00-469-3998	5	13
15434	S222A	5310-00-164-1904	29	3
15434	S223	5310-00-521-8595	10	30
15434	S2286	5305-00-804-6318	29	25
15434	S2286	5305-00-804-6318	38	2
15434	S274		24	20
15434	S285	5310-00-470-6154	37	15
15434	S601	5310-00-134-4168	5	3
15434	S606	5310-00-410-6756	24	26
15434	S608	5310-01-200-1318	16	38
15434	S622	5310-00-562-6557	13	20
15434	S622	5310-00-562-6557	24	19
15434	S626	5310-00-562-6558	13	23
15434	S631	5310-00-562-6560	29	12
15434	S658	5310-00-109-7638	5	8
15434	S719	5340-00-276-5847	10	24
15434	S911B	4730-00-018-9566	2	23
15434	S911B	4730-00-018-9566	3	10
15434	S911B	4730-00-018-9566	16	17
15434	S911B	4730-00-018-9566	20	13
15434	S911B	4730-00-018-9566	28	15
15434	S911B	4730-00-018-9566	36	20
15434	S962	4730-00-044-4715	2	15
15434	S962	4730-00-044-4715	3	6
15434	S962	4730-00-044-4715	36	4
15434	S965E	5365-00-404-2934	3	4
15434	S995	4730-00-289-4770	3	5
15434	S995	4730-00-289-4770	17	9
15434	S995	4730-00-289-4770	35	6

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 6105 VALVES, CAMSHAFTS, AND TIMING SYSTEM	
				FIG. 7 CAMSHAFT	
1	XDHHH	15434	3023177	CAMSHAFT, SERVICE AS	1
2	PAFZZ	15434	68193	. PLUG, VENT	1
3	PAHZZ	15434	143450	. CAMSHAFT, ENGINE	1
4	PAHZZ	15434	9235-1	BEARING, WASHER, THRU	1
5	PFFZZ	15434	69550	KEY, MACHINE CAMSHAFT GEAR	1
6	PAFZZ	15434	156226	GEAR, CAMSHAFT	1
				END OF FIGURE	

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0105 VALVES, CAMSHAFTS, AND TIMING SYSTEM	
				FIG. 12 ROCKER ARMS AND HOUSING	
1	XDFFF	15434	AR03307	HOUSING AND ROCKER	3
2	PAFFF	15434	BM95161	. ROCKER ARM, ENGINE P EXHAUST	1
3	PAFZZ	96906	MS51968-14	.. NUT, PLAIN, HEXAGON	1
4	PAFZZ	15434	168306	. . SET SCREW	1
5	XDFFF	15434	169704	.. ARM AND BUSHING	1
6	PAFZZ	15434	140330	. .. BUSHING, SLEEVE	1
7	PAFFF	15434	AR-02308	. ROCKER, ARM, ENGINE P INJECTOR	2
8	PAFZZ	96906	MS51968-14	.. NUT, PLAIN, HEXAGON	1
9	XDFZZ	15434	199239	. . SCREW, INJECTOR ARM ADJUSTING	1
10	XDFFF	15434	218152	. . ARM	1
11	PAFZZ	15434	140330	. .. BUSHING, SLEEVE	1
12	PAFZZ	15434	194037	.. SEAT, BALL SOCKET	1
13	PAFFF	15434	AR51276	. ROCKER ARM, ENGINE P	2
14	PAFZZ	96906	MS51968-14	.. NUT, PLAIN, HEXAGON	1
15	PAFZZ	15434	168306	. . SET SCREW	1
16	XDFFF	15434	168805	.. ARM AND BUSHING	1
17	PAFZZ	15434	140330	. . . BUSHING, SLEEVE	1
18	XDFZZ	75078	2514	. WASHER, BEARING	18
19	PAFZZ	75078	2856	. STUD	10
19	PAFZZ	75078	1232	. STUD, SHOULDERED	8
20	XDFZZ	15434	199224	. NUT, ROCKER	18
21	PAFZZ	15434	011573	. CROSSHEAD, VALVE EXHAUST VALVE	2
22	XDFZZ	75078	2680	. LOCKPLATE	2
23	XDFZZ	15434	3045533	. GASKET, HOUSING	1
24	PAFFF	15434	BM95162	. ROCKER ARM, ENGINE P	1
25	PAFZZ	96906	MS51968-14	.. NUT, PLAIN, HEXAGON	1
26	PAFZZ	15434	168306	.. SETSCREW	1
27	PAFZZ	15434	140330	. . BUSHING, SLEEVE	1
28	PAFFF	15434	BM95160	. ROCKER ARM, ENGINE P	1
29	PAFZZ	96906	MS51968-14	. . NUT, PLAIN, HEXAGON	1
30	PAFZZ	15434	168306	.. SETSCREW	1
31	XDFFF	15434	168803	.. ARM AND BUSHING	1
32	PAFZZ	15434	140330	. .. BUSHING, SLEEVE	1
33	PAFZZ	15434	199225	. SCREW SHAFT LOCK	1
34	PAFZZ	15434	3000521	. PACKING, PREFORMED	2
35	PAFZZ	15434	3007242	. HOUSING, ROCKER ARM	1
36	PFFZZ	89346	187589	. GASKET HOUSING TO HEAD PART OF KIT P/N 3801330	1
37	PAFZZ	15434	3801433	. SHAFT, STRAIGHT	1

END OF FIGURE

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0112 ENGINE BRAKE	
				FIG. 21 ENGINE COMPRESSION BRAKE	
1	XDFFF	15434	2544	BRAKE, JACOBS ASSEMBLY	1
2	XDFZZ	15434	1484	. PISTON, SLAVE	2
3	XDFZZ	15434	1022	. SPRING, SLAVE PISTON	2
4	XDFZZ	15434	1289	. RETAINER SLAVE PISTON SPRING	2
5	XDFZZ	15434	1023	. RING, RETAINING	2
6	XDFZZ	15434	1492	. SCREW, CAP, HEXAGON HEAD SPRING RETAINER	2
7	XDFZZ	15434	1030	. WASHER, FLAT	2
8	XDFZZ	15434	1011	. SPRING MASTER PISTON	2
9	XDFZZ	15434	1017	. PISTON, MASTER	2
10	XDFZZ	15434	2689	. VALVE ASSEMBLY SOLENOID	1
11	XDFZZ	15434	2390	. HARNESS	1
12	XDFZZ	15434	1081	. SEAL, RING SOLENOID UPPER	1
13	XDFZZ	15434	1082	. SEAL, RING SOLENOID CENTER	1
14	XDFZZ	15434	1083	. SEAL, RING SOLENOID LOWER	1
15	XDFZZ	15434	1026	. NUT, PLAIN, HEXAGON ADJUSTING SCREW	2
16	XDFZZ	15434	1031	. SETSCREW	2
17	XDFZZ	15434	2299	. TERMINAL BUSHING LEADOUT	1
18	XDFZZ	15434	1200	. SPOOL ASSEMBLY CONTROL VALVE	2
19	XDFZZ	15434	1012	. SPRING, CONTROL VALVE	2
23	XDFZZ	15434	4136	. COVER, CONTROL VALVE	2
21	XDFZZ	15434	1265	. SCREW, CAP, HEXAGON HEAD AIR BLEED	2
				END OF FIGURE	

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0302 FUEL PUMPS	
				FIG. 26 DAMPER	
1	PAFHH	15434	BM76340	. DAMPENER, FLUID PRES	1
2	PAFZZ	96906	MS90725-10	.. SCREW, CAP, HEXAGON H	2
3	PAFZZ	96906	MS122032	.. WASHER, LOCK	2
4	PAFZZ	88044	AN960-416	.. WASHER, FLAT	2
5	PAHZZ	15434	153336	. . HOUSING, FUEL PUMP	1
6	PAHZZ	15434	100099	.. PACKING, PREFORMED PART OF KIT P/N BM68356	1
7	PAHZZ	15434	202897	.. DISK, SOLID, PLAIN	1
8	PAHZZ	15434	139988	. . PACKING, PREFORMED PART OF KIT P/N BM68356	1
9	PAHZZ	15434	160514	.. SPACER, RING PART OF KIT P/N BM68356	1
10	PAHZZ	15434	153338	. . COVER, ACCESS	1
11	PAFZZ	88044	AN960-416	. WASHER	2
12	PAFZZ	15434	181466	. WASHER, LOCK	2
13	PAFZZ	15434	70790	. BOLT, MACHINE, SDC	2
14	PAFZZ	15434	203849	. ELBOW, TUBE TO BOSS	1
15	PAHZZ	16954	691-10014	. GASKET PART OF KIT P/N DM68356	1
16	PAFZZ	15434	116936	. ELBOW, CONNECTION	1

END OF FIGURE

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0309 FUEL FILTERS	
				FIG. 31 FUEL PUMP FILTER	
1	PAOZZ	15434	157088	PLUG,MACHINE THREAD	1
2	PAOZZ	15434	154088	SEAL CAP PART OF KIT F/N BM68356	1
3	PAOZZ	15434	70700	SPRING,HELICAL,COMP	1
4	PAOZZ	15434	146483	FILTER ELEMENT,FLUI	1
5	PAOZZ	79396	33341	FILTER ELEMENT,FLUI	1

END OF FIGURE

(1) ITEM NO	(2) SMR CODE	(3) CAGEC	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				GROUP 0504 WATER PUWP	
				FIG. 36 WATER PUMP	
1	PAOZZ	96906	MS90728-70	SCREW,CAP ,HEXAGON H	2
2	PAOZZ	96906	MS35338-8	WASHER LOCK	15
3	PAOZZ	15434	S-915-A	PLUG,PIPE	1
4	PAOZZ	15434	S962	PLUG,PIPE	1
5	PAOZZ	96906	MS90728-62	SCREW, CAP ,HEXAGON H	3
6	XDOZZ	15434	210806	CONNECTION	1
7	XDOZZ	15434	210805	GASKET	1
8	PAOZZ	15434	108330	WASHER,FLAT	2
9	PAOZZ	96906	MS 90728-64	SCREW,CAP ,HEXAGON H	1
10	XDOZZ	15434	214476	BRACKET,CONNECTION	1
11	XDOZZ	15434	208132	GASKET	1
12	PAOZZ	96906	MS35842-13	CLAMP, HOSE	2
13	XDOZZ	15434	63495-D	HOSE	1
14	XDOZZ	15434	209600	PIPE, WATER BY-PASS..	1
15	PAOZZ	15434	43463-A	PACKING, ,PREFORMED PART OF KIT P/N 3801330 PART OF KIT P/N BM68356	2
16	PA000	15434	AR-045090	PUMP,COOLING SYSTEM	1
17	PAOZZ	15434	S911B	.PLUG ,PIPE	1
18	PFOZZ	15434	3033677	.PACKING WITH RETAIN	1
19	XD000	15434	AR08853	.IMPELLER	1
20	PAOZZ	15434	AR-12732	. .PACKING WITH RETAIN	1
21	XAOZZ	15434	208134	..IMPELLER,WATER PUMP	1
22	XAOZZ	15434	210238	.BODY,WATER PUMP	1
23	PAOZZ	15434	3038997	.SEAL,PLAIN PART OF KIT P/N 3018762.	1
24	XDOZZ	15434	208138	. SHAFT WATER PUMP	1
25	PAOZZ	15434	S16073	.BEARING BALL, ANNULA	2
26	PAOZZ	15434	112302	.RING, RETAINING	1
27	PAOZZ	15434	196844	. SPACER	1
28	PAOZZ	15434	S16255	.RING, BEARING RETAIN	1
29	PAOZZ	15434	3038998	.SEAL, PLAIN ENCASED	1
30	XDOZZ	15434	AR 08854	.PULLEY,WATER PUMP	1
31	XD000	15434	AR08851	IDLER, WATER PUMP	1
32	XDOZZ	15434	210860	.CAPSCKEW ,BUTTON HEA	1
33	PAOZZ	15434	61623	.WASHER,FLAT	1
34	XDOZZ	15434	208118	.PULLEY,IDLER	1
35	PAOZZ	15434	208119	. SHAFT, SHOULDERED	1
36	PAOZZ	15434	S16073	.BEARING,BALL,ANNULA	1
37	PAOZZ	15434	S16255	.RING,BEARING RETAIN	1
38	PAOZZ	15434	145506	.PACKING.PREFORMED	1
39	PAOZZ	15434	3038998	. SEAL ,PLAIN ENCASED	1
40	PAOZZ	15434	208120	.SPACER,SLEEVE	1
41	PAOZZ	15434	213082	.WASHER,FLAT	1
42	PAOZZ	96906	MS51967-20	.NUT,PLAIN,HEXAGON	1
43	PAOZZ	96906	MS90726-67	SCREW ,CAP ,HEXAGON H	5
44	XDOZZ	15434	137797	CAPSCREW	2
45	XDOZZ	15434	210804	CONNECTION, WATER TRANSFER	1
46	PAOZZ	15434	S149A	SCREW,CAP ,HEXAGON H	2
47	PAOZZ	15434	182706	SCREW,CAP, HEXAGUN H	1
48	PAOZZ	15434	130226	GASKET PART Of KIT P/N 3018762	1

END OF FIGURE

CROSS-RFFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM
5330-00-005-0407	36	18
	36	20
5305-00-005-0666	19	9
5330-00-005-0857	8	4
5330-00-005-0858	4	7
2815-00-005-7431	12	7
5330-00-006-2494	25	13
5305-00-006-8411	3	11
5360-00-009-9270	9	13
4730-00-011-3175	30	4
2815-00-011-7786	2	7
5315-30-012-0123	1	14
5315-00-014-1195	2	17
5315-00-014-1244	25	4
5315-00-014-1284	2	16
	5	14
5310-00-014-5850	24	27
4730-00-018-9566	2	27
	3	8
	16	16
	18	12
	20	13
	28	15
	36	17
5306-00-019-4227	24	3
5330-00-026-2931	20	6
5330-90-026-2933	29	14
5315-00-041-0915	10	13
5315-00-041-0916	10	6
5306-00-041-0917	6	14
5315-00-043-1787	17	2
4730-00-044-4715	2	45
	36	4
5306-00-050-1237	10	35
5340-00-050-1600	2	14
4730-00-057-5555	8	6
	8	20
5330-00-058-1767	2	3
5305-00-058-6604	36	47
5305-00-062-4378	9	3
5305-00-063-5043	28	16
5330-00-064-4399	2	5
5330-00-065-5544	27	18
5305-00-068-0511	16	2
	16	44
	35	3
	36	5
2815-00-070-2251	18	10
5305-00-071-1788	20	22
5305-00-071-2071	13	26
5305-00-071-2241	24	23
	26	2
	27	20
	28	3
2940-00-073-3316	16	28
5310-00-081-6034	8	13
	1C	29
	11	6
	16	34
	18	6
	28	39
5360-00-081-8487	23	26
5313-00-381-8500	4	2
5330-00-081-9289	33	4
5310-00-081-9292	20	17
5333-00-081-9299	30	9
4730-00-081-9618	2	15
5360-00-082-0124	27	3
5315-00-082-0448	23	28
5355-00-082-1189	30	2
5365-00-082-1193	28	41
5310-00-082-1888	30	8
5340-00-084-7787	30	10
2815-00-085-7434	9	9
3040-00-085-7439	33	5
3120-00-090-5504	4	16
5305-00-091-4009	5	12
5330-00-106-6370	36	48
5310-00-109-7638	5	11
5305-00-115-9526	13	10
5330-00-129-9349	3	6
4820-00-130-4820	23	32
2815-00-132-0240	9	9
5360-00-132-0245	22	7
5330-00-132-0247	22	11
5330-00-132-0248	16	27
5365-00-132-0273	6	13
5330-00-132-0274	30	6
5330-00-132-0276	22	13
2910-00-132-0769	27	5
5340-00-132-3203	19	12
5340-00-134-3529	22	3
5310-00-134-4168	5	3
5310-00-134-4165	18	11
5310-00-134-4171	6	11
5306-00-136-9751	17	30
5305-00-138-9848	30	13
5310-00-141-1795	24	25
	26	4
	26	11

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
15434	S200	5310-00-469-3998	5	13
15434	S222A		29	3
15434	S223	5310-00-521-8595	10	30
15434	S2286	5305-00-804-6318	38	2
15434	S274		24	20
15434	S601	5310-00-134-4168	5	3
15434	S603	5310-00-820-6653	5	10
15434	S604	5310-00-261-7340	2	24
			4	8
			8	12
			28	37
15434	S606	5310-00-410-6756	24	26
15434	S608	5310-01-200-1318	16	38
15434	S622	5310-30-562-6557	8	3
			13	20
			24	19
15434	S626	5310-00-562-6558	13	23
15434	S631	5310-00-562-6560	29	12
15434	S658	5310-00-109-7638	5	11
15434	S719	5340-00-276-5847	2	39
			10	24
15434	S911B	4730-00-018-9566	3	8
			16	16
			18	12
			20	13
			28	15
			36	17
15434	S962	4730-00-044-4715	2	45
			36	4
15434	S965E	5365-00-404-2934	3	2
15434	S995	4730-00-289-4770	3	3
			17	9
			35	6
91265	TS33-016	5330-00-951-3533	28	21
			30	17
15434	X-1		37	16
15434	011573		12	21
24617	0120217		30	12
80218	10003		13	17
15424	100099	5330-00-809-2667	26	6
15434	100192	3040-00-773-9369	24	12
15434	100193	3120-00-810-6032	23	10
15434	100215	3040-00-567-4354	25	8
15434	100478	5330-00-081-9289	33	4
15434	100670	3120-00-573-0391	2	36
15434	100764	5330-00-506-4866	24	16
15434	1011		21	8
15434	1012		21	19
15434	101322	2593-00-590-7378	11	1
15434	101468	3120-00-719-5719	25	2
15434	1017		21	9

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PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
15434	44387	3120-00-090-5504	4	16
89346	446002R1		1	11
15434	44678	2910-00-858-3522	27	13
72582	450517	5305-00-165-8157	16	45
89346	46522502		1	6
89346	47666901		1	9
19207	5329388	5315-00-532-9388	2	20
72962	590220940406	5315-00-907-0711	23	17
83259	600-001 1-4	5330-00-171-6600	28	17
15434	69408	5315-00-238-0882	2	38
			8	8
15434	61623	5310-00-276-2816	36	33
15434	63385	5365-00-082-1193	28	41
15434	63495-D		36	13
15434	63842	5310-00-134-4169	18	11
15434	64482	2815-00-603-7264	5	6
15434	65259-A	5365-01-147-0912	8	14
15434	65259-B	5365-01-147-0913	8	16
15434	65259-C	5365-00-507-3254	8	16
15434	66292	5310-00-197-5304	2	30
15434	67346		13	13
15434	67347-1		13	12
15434	67622	4730-01-128-4598	2	33
15434	67684	5310-00-262-2986	30	16
15434	67946	5365-00-197-9327	16	21
15434	67963	5330-00-171-7267	2	26
15434	68193	5340-00-434-2944	7	2
15434	68274	5360-00-664-5343	16	20
15434	68365	3120-00-566-0480	17	**18**
15434	68445	5315-00-281-7610	2	2
			2	40
15434	68512	5315-00-041-0915	10	13
15434	68513	5315-00-041-0916	10	6
15434	68549	5315-00-369-2588	23	9
15434	68585	5315-90-014-1195	2	17
15434	68586	3120-00-641-6646	10	37
15434	68606	5365-00-716-6580	25	5
16954	691-10014	5330-90-252-8888	26	15
15434	69519	5315-00-475-2574	17	14
15434	69521	3120-00-627-6697	17	23
			17	27
15434	69550		7	5
			20	20
15434	69699	5310-00-962-5610	**3**	10
15434	69736	5305-00-339-1415	10	19
15434	69793	5306-00-019-4227	24	3
15434	69901	4730-00-081-9618	2	15
15434	69936	5313-90-222-7240	6	12
15434	70089-1	5333-00-537-2382	2	11
15434	70295	4733-00-011-3175	30	4
15434	70349	5306-90-719-5467	13	18

CRESS-REFERENCE INDEXES

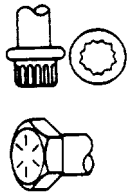
FIGURE AND ITEM NUMBER INDEX

FIG.	ITEM	STOCK NUMBER	CAGEC	PART NUMBER
18	11	5310-00-134-4169	15434	63842
18	12	4730-00-018-9566	15434	S911B
18	13	5365-01-160-1832	15434	112076
18	14		15434	202961
19	1	5330-00-659-3178	15434	3020943
19	2	2815-00-920-8356	15434	151489
19	3	5305-01-028-8869	15434	S155
19	4	5340-00-767-4012	15434	116982
19	5	2815-00-920-2073	15434	151478
19	6	5365-01-160-1832	15434	112076
19	7	2815-00-829-5227	15434	105199
19	8	2815-01-077-4463	15434	200566
19	9	5305-00-005-0666	15434	200908
19	10	5310-00-887-8325	15434	114638
19	11	3120-01-079-6527	15434	109594
19	12	5340-00-132-3203	15434	200919
20	1	5310-00-442-6899	15434	191517
20	2	5310-00-584-7796	96906	MS15795-824
20	3		15434	AR09607
20	4		15434	210926
20	5	2930-00-401-9531	15434	190397
20	6	5330-00-026-2931	15434	200809
20	7		15434	AR08366
20	8	3020-00-160-9092	15434	142689
20	9	3120-31-147-5275	15434	3026556
20	10		15434	AR08256
20	11	3120-00-792-9834	15434	116391
20	12		15434	199338
20	13	4730-00-018-9566	15434	S911B
20	14	3040-01-203-8549	15434	199969
20	15	5315-00-616-5522	96906	MS35756-12
20	16	5315-00-616-5527	96904	MS35756-18
20	17	5310-00-081-9292	15434	116390
20	18		15434	190769
20	19	5310-00-442-6899	15434	191517
20	20		15434	69550
20	21	5310-00-209-0965	96906	MS35338-47
20	22	5305-00-071-1788	96906	MS90728-81
21	1		15434	2544
21	2		15434	1484
21	3		15434	1022
21	4		15434	1289
21	5		15434	1023
21	6		15434	1492
21	7		15434	1030
21	8		15434	1011
21	9		15434	1017
21	10		15434	2689
21	11		15434	2390
21	12		15434	1081
21	13		15434	1082

APPENDIX E

TORQUE LIMITS

CAPSCREW MARKING

Current Usage	Much Used	Much Used	Used at Times	Used at Times
Quality of Material	Indeterminate	Minimum Commercial	Medium Commercial	Best Commercial
SAE Grade Number	1 or 2	5	6 OR 7	8
Capscrew Head Markings Manufacturer's marks may vary These are all SAE Grade 5 (3 line)				

TORQUE VALUES

CAUTION

If replacement capscrews are of a higher grade than originally supplied, use torque specifications for that placement. This will prevent equipment damage due to overtorquing.

Capscrew Body Size (Inches) - (Thread)	Torque Ft Lb (N•m)	Torque Ft Lb (N•m)	Torque Ft Lb (N•m)	Torque Ft Lb (N•m)
1/4 - 20	5 (7)	8 (11)	10 (14)	12 (16)
1/4 - 28	6 (8)	10 (14)		14 (19)
5/16 - 18	11 (15)	17 (23)	19 (26)	24 (33)
5/16 - 24	13 (18)	19 (26)		27 (37)
3/8 - 16	18 (24)	31 (42)	34 (46)	44 (60)
3/8 - 24	20 (27)	35 (47)		49 (66)
7/16 - 14	28 (38)	49 (66)	55 (75)	70 (95)
7/16 - 20	30 (41)	55 (75)		78 (106)
1/2 - 13	39 (53)	75 (102)	85 (115)	105 (142)
1/2 - 20	41 (56)	85 (115)		120 (163)
9/16 - 12	51 (69)	110 (149)	120 (163)	155 (210)
9/16 - 18	55 (75)	120 (163)		170 (231)
5/8 - 11	83 (113)	150 (203)	167 (226)	210 (285)
5/8 - 18	95 (129)	170 (231)		240 (325)
3/4 - 10	105 (142)	270 (366)	280 (360)	375 (508)
3/4 - 16	115 (156)	295 (400)		420 (569)
7/8 - 9	160 (217)	395 (536)	440 (597)	605 (820)
7/8 - 14	175 (237)	435 (590)		675 (915)
1 - 8	235 (319)	590 (800)	660 (895)	910 (1234)
1 - 14	250 (339)	660 (895)		990 (1342)

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