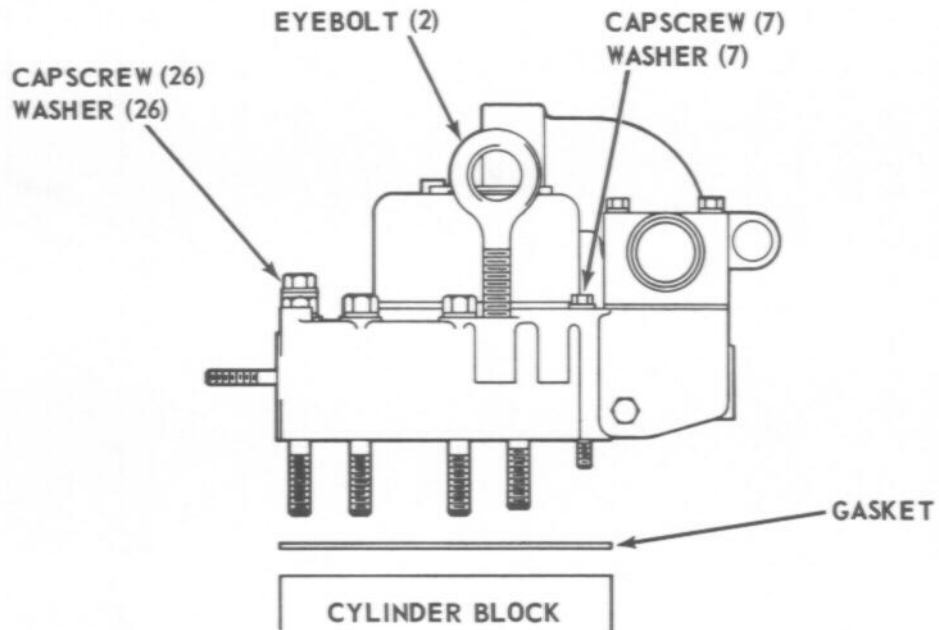


(10) Remove cylinder head as shown in figure 6-27.



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REMOVAL

- STEP 1. REMOVE CYLINDER HEAD CAPSCREWS AND WASHERS.
- STEP 2. CONNECT LIFTING DEVICE TO EYEBOLTS AND REMOVE CYLINDER HEAD FROM CYLINDER BLOCK.

NOTE

BE CERTAIN THAT FERRULES AND SEALS STICKING TO CYLINDER HEAD DO NOT FALL INTO CYLINDER BLOCK.

- STEP 3. REMOVE CYLINDER HEAD GASKET AND CLEAN SEALING SURFACE ON CYLINDER BLOCK.

INSTALLATION

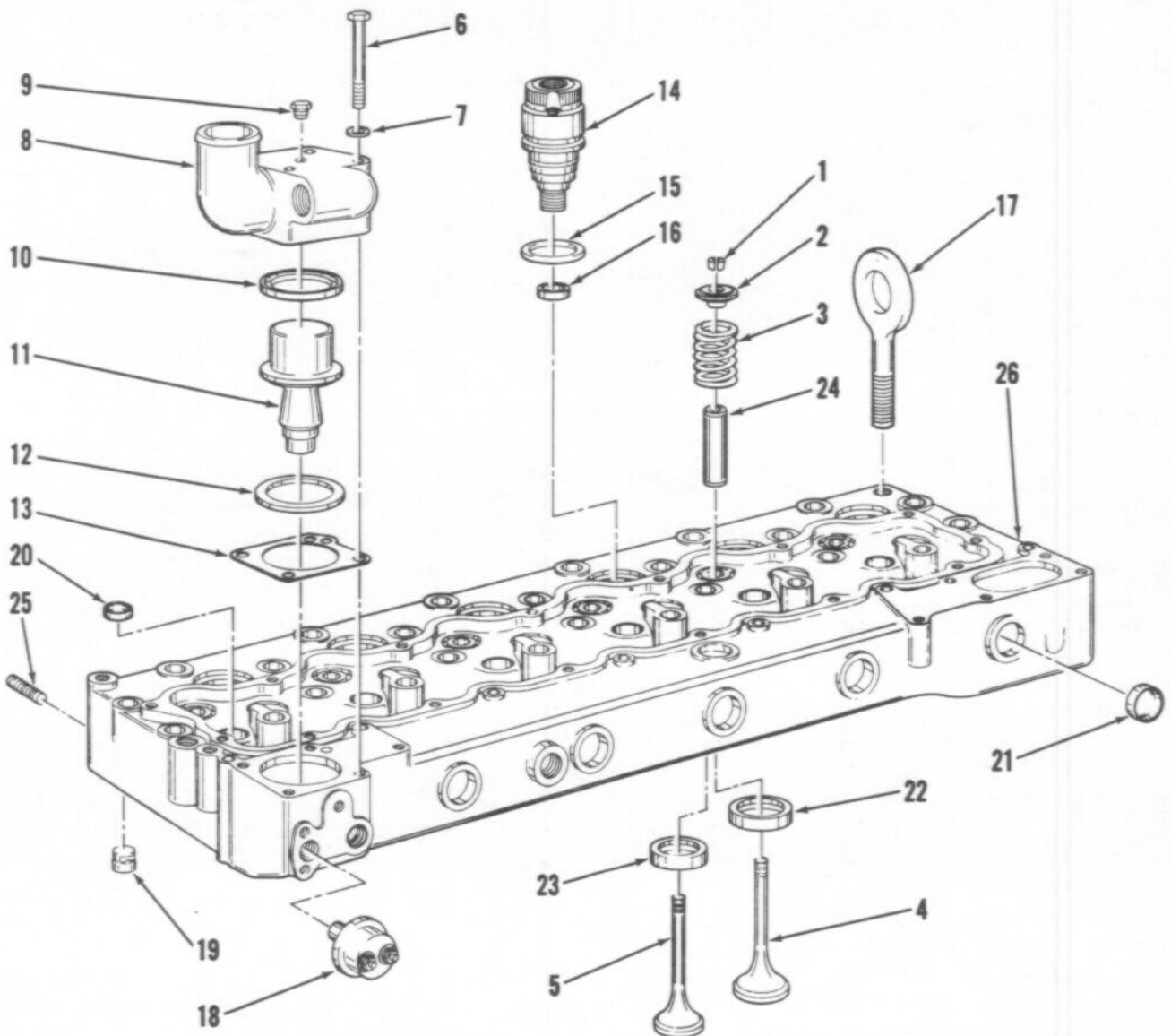
- STEP 1. INSTALL NEW GASKET ON CYLINDER BLOCK.
- STEP 2. CONNECT LIFTING DEVICE TO EYEBOLTS AND LOWER CYLINDER HEAD ONTO CYLINDER BLOCK.
- STEP 3. SECURE CYLINDER HEAD WITH CAPSCREWS AND WASHERS. REFER TO TABLE 5-4 FOR TORQUE DATA WHEN TIGHTENING CAPSCREWS.

NOTE

USE AN ANTISEIZE COMPOUND ON CYLINDER HEAD CAPSCREWS.

Figure 6-27. Cylinder head and valve mechanism; removal and installation.

b. *Disassembly.* Disassemble cylinder head and valve mechanism in numerical sequence shown in figure 6-28.



ME 4310-338-15/6-28

1. Retaining lock (24)
2. Rotocoil assembly (12)
3. Spring (12)
4. Inlet valve (6)
5. Exhaust valve (6)
6. Screw (4)
7. Washer (4)
8. Housing assembly
9. Plug
10. Seal
11. Temperature regulator
12. Washer
13. Gasket

14. Precombustion chamber (6)
15. O-ring (6)
16. Gasket (6)
17. Lifting eye (2)
18. Water temperature safety switch
19. Water director (18)
20. Plug (6)
21. Plug (8)
22. Insert (6)
23. Insert (6)
24. Bushing (12)
25. Stud (12)
26. Cylinder head

Figure 6-28. Cylinder Head and Valve Mechanism;
Disassembly and Reassembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard all gaskets, seals, and O-rings.

CAUTION

Do not use a wire brush or wheel when cleaning any part.

(2) Place valves, valve stems, valve bushings, retainers, and locks in solvent and soak for at least one hour. Use a stiff brush and remove all carbon, lacquer, or residue from parts.

(3) Be sure all scale is removed from cylinder head. Use solvent and a stiff brush.

(4) Inspect cylinder head for cracks, damaged threads, distortion, or any other defect.

(5) Inspect precombustion chambers and glow plugs for damaged threads, distortion, or any other defect.

(6) Inspect valves for cracks, pitting, distortion, excessive wear, or any other defect. Use a micrometer and check valve stem wear. Stem diameter should be 0.3712 to 0.3722 inches.

CAUTION

Use extreme care if valve seats are ground. Too much material can be removed quickly and inadvertently.

(7) Coat each valve face with a thin film of Prussian blue, then rotate each valve in associated valve seat. Remove valves and examine contact pattern on each valve and valve seat. A line of contact near top and around entire circumference of valve seat indicates line contact with valve. If necessary, grind valve seats using a valve seat grinding tool. After valve seats have been ground until they are smooth and concentric with valve guides, clean all parts thoroughly.

(8) If valves and valve seats have been ground for proper seating, the dimensional specifications shown in figure 6-29 must be met. If dimensions are unacceptable, valves and valve seat inserts must be replaced.

(9) Inspect valve guides for cracks, distortion, excessive wear, or any other defect. Check inside diameter of guides by inserting various pilots or gages through guides and measuring outside diameter of largest pilot that passes through each guide. This measurement represents the guide inside diameter which should be 0.3736 to 0.3756 inches. Acceptable valve stem clearance in each guide 0.0045 inches maximum.

(10) Inspect valve springs for damaged coils, cracks, distortion, or any other defect. Check spring force; compress each spring to a length of 1.766 inches.

Force required for compression should be 54.8 to 60.6 pounds. Refer to table 5-2 for spring free length.

(11) Inspect valve lifters for cracks, distortion, excessive wear, or any other defect. Measure diameter of each valve lifter. This measurement should be 1.3100 to 1.3110 inches.

(12) Inspect valve lifter bores in cylinder head for scoring, chips, excessive wear, or any other defect. Measure diameter of each bore. This measurement should be 1.3135 to 1.3155 inches.

(13) Inspect rocker arms, bearings, spring, and shaft. Check for cracks, distortion, excessive wear, or any other defect. Measure diameter of bearing bore on each rocker arm and diameter of shaft. The bearing bore should be 0.7260 to 0.7266 inches. The shaft diameter should be 0.7240 to 0.7250 inches. Measure clearance between shaft and bearings. Shaft-to-bearing clearance should be 0.008 inches maximum.

(14) Inspect all other parts for cracks, breaks, distortion, or any other defect.

(15) Inspect attaching hardware for damaged threads, distortion, cracks, breaks, or any other defect.

d. Reassembly. Reassemble cylinder head and valve mechanism in reverse numerical sequence shown in figure 6-28. Install new gaskets, seals, and O-rings.

(1) Lubricate valve stems and bushings prior to installation. Valve heads are marked on top for identification: i.e., EX for exhaust and IN for inlet.

(2) Install valve springs with painted end up and be sure bushing seals are in place. Tap retainer lightly as spring compressor is being removed to help seat locks properly.

(3) Install any new valve bushings using a bushing driver.

e. Installation.

(1) Install cylinder head as shown in figure 6-27.

(a) Rock head gently until it seats flat on head gasket.

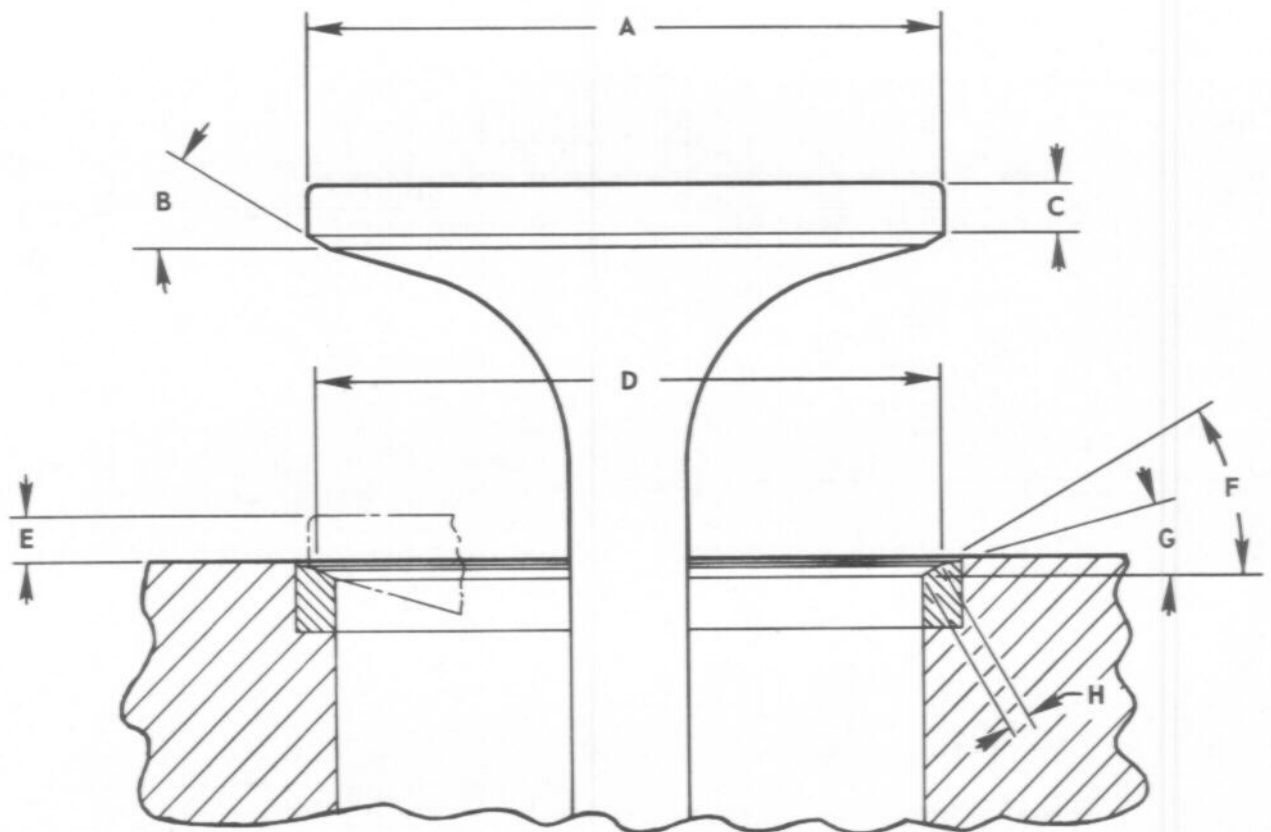
(b) Align opening in each water director with "V" mark on cylinder head.

(c) Cylinder head gasket must be clean and dry at time of installation.

(2) Install push rods and rocker arm assembly as shown in figure 6-26. Tighten capscrews to a torque value of 170 to 180 foot-pounds.

(3) Make preliminary valve clearance adjustment. Adjust clearance for each exhaust valve to 0.028 inches and each inlet valve to 0.015 inches. Refer to paragraph 3-117 for valve adjusting procedure.

(4) Each precombustion chamber must be installed so that the glow plug will be clear of fuel lines or other points of interference. To accomplish



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VALVE AND VALVE SEAT SPECIFICATIONS

A – VALVE HEAD DIAMETER. B – VALVE FACE ANGLE. C – MINIMUM VALVE LIP THICKNESS. D – OUTSIDE DIAMETER OF VALVE SEAT FACE. E – CLOSED VALVE PROJECTION. F – VALVE SEAT FACE ANGLE. G – ANGLE TO GRIND INSERT SEAT FACE TO REDUCE MAXIMUM SEAT DIAMETER. H – MAXIMUM PERMISSIBLE VALVE SEAT WIDTH.

	INLET	EXHAUST
A	2.025/2.015 INCHES	1.901/1.891 INCHES
B	29-1/4 DEGREES	29-1/4 DEGREES
C	0.057 INCHES	0.070 INCHES
D	1.984/1.934 INCHES	1.860/1.810 INCHES
E	0.138 INCHES	0.128 INCHES
F	30 DEGREES	30 DEGREES
G	15 DEGREES	15 DEGREES
H	0.095 INCHES	0.095 INCHES

Figure 6-29. Valve and valve seat dimensions.

this, the precombustion chamber gaskets are supplied in three different thicknesses. Proper positioning is achieved using the fixed chamber tightening torque

value and the variable gasket thickness. Install precombustion chamber as shown in figure 6-30.

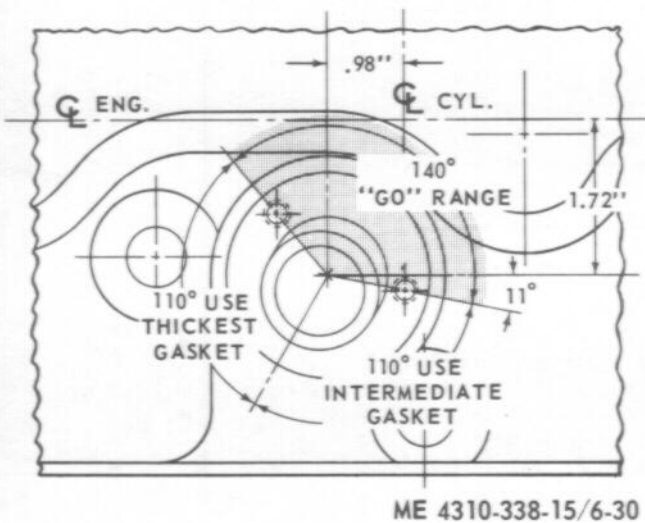


Figure 6-30. Precombustion chamber positioning.

- (5) Install glow plugs (para 3-119).
- (6) Connect wiring to water temperature safety switch and glow plugs.
- (7) Install water temperature sensing blub (fig. 3-34).
- (8) Install cold weather starting aid atomizer (fig. 3-32).

(9) Install fuel injection lines and valves (para 3-100 and para 3-94).

(10) Install cooling system hoses and tube assembly (para 3-71). Refill engine cooling system.

(11) Install turbocharger assembly and manifold (para 3-115 and 3-118).

(12) Check engine oil level and add oil as required. Refer to Lubrication Order (LO) 5-4310-338-12.

(13) Final valve clearance must be made with valve mechanism components heated to operating temperature. Refer to paragraph 2-9 and start engine. Allow engine to reach operating temperature, then stop engine (fig. 2-9).

(14) Retighten cylinder head capscrews as required (table 5-4).

(15) Make final valve clearance adjustment (para 3-117).

NOTE

Final valve clearance must be made within 20 minutes after the warmed up engine has been shut down.

- (16) Install valve cover (para 3-116).
- (17) Install housing roof and front doors (para -33).

Section XIII. OIL PAN AND OIL PUMP ASSEMBLY

6-28. General

The oil pan is fastened to the bottom of the engine and is the reservoir for the engine lubricating oil supply. The oil pump is mounted on the bottom face of the cylinder block at the front of the engine. The pump is a two-section, positive displacement, gear-type pump. One section scavenges oil from the rear of the engine and dumps it into the oil pan sump. The other section supplies lubrication, under pressure, to the basic engine through passages in the cylinder block, and to external components through oil lines. The pump is driven from the timing gear chain.

6-29. Oil Pan and Plate Assembly

a. Removal.

- (1) Drain all oil from oil pan.
- (2) Remove instrument panel assembly (para 3-45).
- (3) Remove oil pan, plate, and tubing by following

numerical sequence shown in figure 6-31.

b. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard gaskets and O-rings.

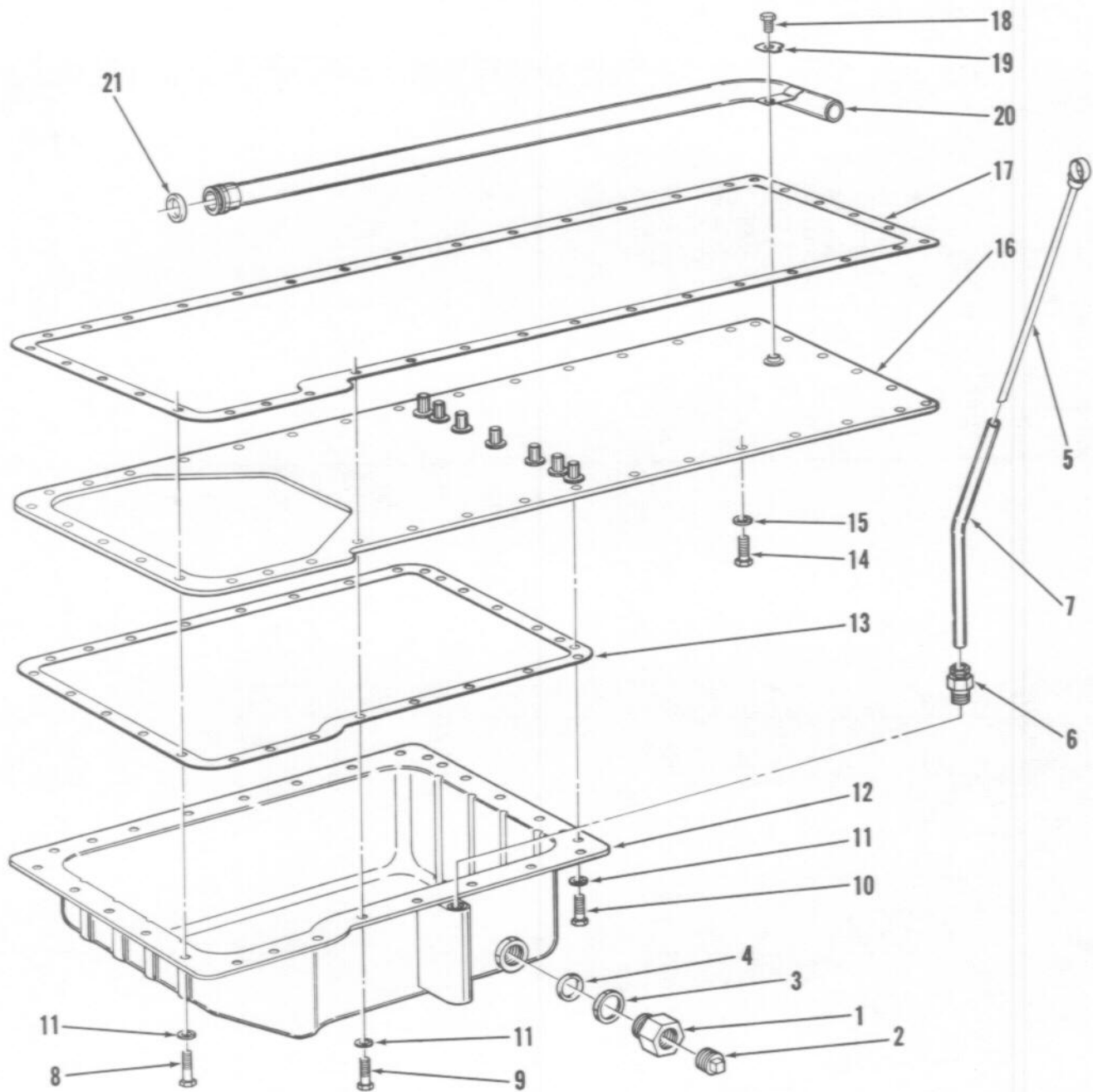
(2) Inspect oil pan and plate for cracks, distortion, damaged flanges, or any other defect.

(3) Inspect tubing for cracks, breaks, distortion, or any other defect.

(4) Inspect attaching hardware for damaged threads, cracks, breaks, distortion, or any other defect.

c. Installation.

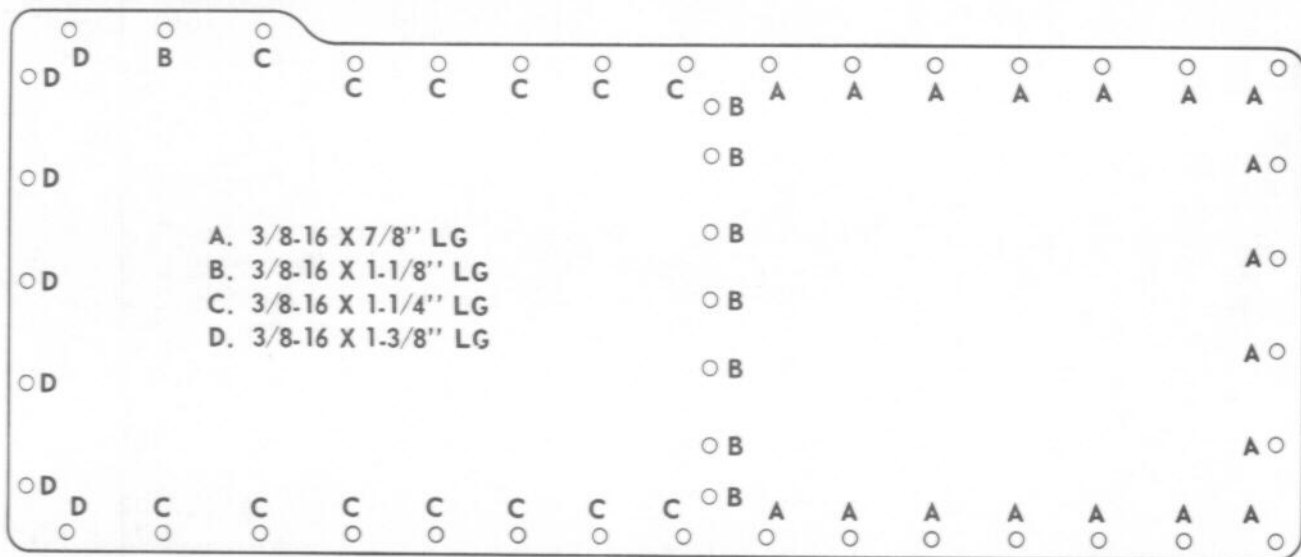
(1) Install oil pan, plate, and tubing by following reverse numerical sequence shown in figure 6-31, except do not attach capscrews that secure instrument panel. Install new gaskets and O-rings. See figure 6-32 for capscrew location chart.



ME 4310-338-15/6-31

- | | |
|---------------------|---------------------|
| 1. Drain plug | 12. Oil pan |
| 2. Plug | 13. Gasket |
| 3. Gasket | 14. Screw (14) |
| 4. O-Ring | 15. Lockwasher (14) |
| 5. Gage | 16. Plate |
| 6. Fitting | 17. Gasket |
| 7. Tube | 18. Screw |
| 8. Screw | 19. Lock |
| 9. Screw (13) | 20. Tube, scavenge |
| 10. Screw (8) | 21. O-Ring |
| 11. Lockwasher (28) | |

Figure 6-31. Oil pan, plate, and tubing; removal and installation.



ME 4310-338-15/6-32

Figure 6-32. Oil pan and plate capscrew location chart.

- (2) Install instrument panel assembly (para 3-45).
- (3) Replenish engine lubricating oil supply. Refer to Lubrication Order (LO) 5-4310-338-12 (fig. 3-1).

6-30. Oil Pump Assembly

a. Removal.

- (1) Remove engine oil pan and plate (para 6-29).
- (2) Remove oil pump assembly as shown in figure 6-33.

b. *Disassembly.* Disassemble oil pump group in numerical sequence shown in figure 6-34. Before completely disassembling oil pump, measure clearance between gears and covers. Clearance should be 0.002 to 0.004 inches.

NOTE

Do not remove internal gears from shafts unless gears or shafts are being replaced.

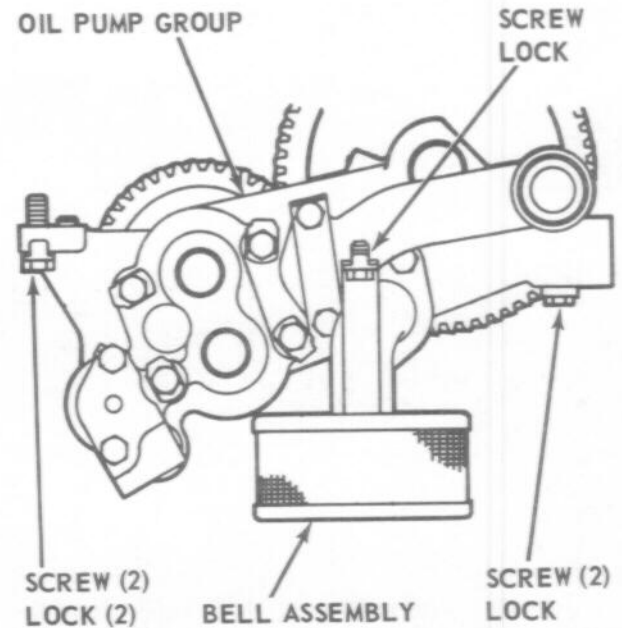
c. Cleaning, Inspection, and Repair.

- (1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard all gaskets and scavenge tube O-ring.
- (2) Inspect all gears for cracks, broken teeth, distortion, or any other defect.
- (3) Inspect shafts for knicks, cracks, distortion, or any other defect. Measure diameter of each shaft. Diameter of drive shaft and idler gear should be 0.8745 to 0.8749 inches. Diameter of drive idler gear shaft should be 1.1220 to 1.1230 inches.
- (4) Inspect bearings for cracks, scoring, excessive wear, or any other defect. Measure shaft-to-bearing clearances. Clearance for idler gear shafts should be 0.008 inches maximum. Clearance for drive shaft should be 0.005 inches maximum.
- (5) Inspect all other parts for cracks, breaks, distortion, excessive wear, or any other defect.
- (6) Inspect attaching hardware for damaged threads, cracks, distortion, or any other defect.

CAUTION

Maximum heating temperature for gears is 750 F.

d. *Reassembly.* Reassemble oil pump assembly in reverse numerical sequence shown in figure 6-34. Heat gears for installation. Install new gaskets.



ME 4310-338-15/6-33

REMOVAL

- STEP 1. REMOVE SCREW AND LOCK FROM BELL ASSEMBLY.
- STEP 2. REMOVE REMAINING SCREWS AND LOCKS. REMOVE OIL PUMP.

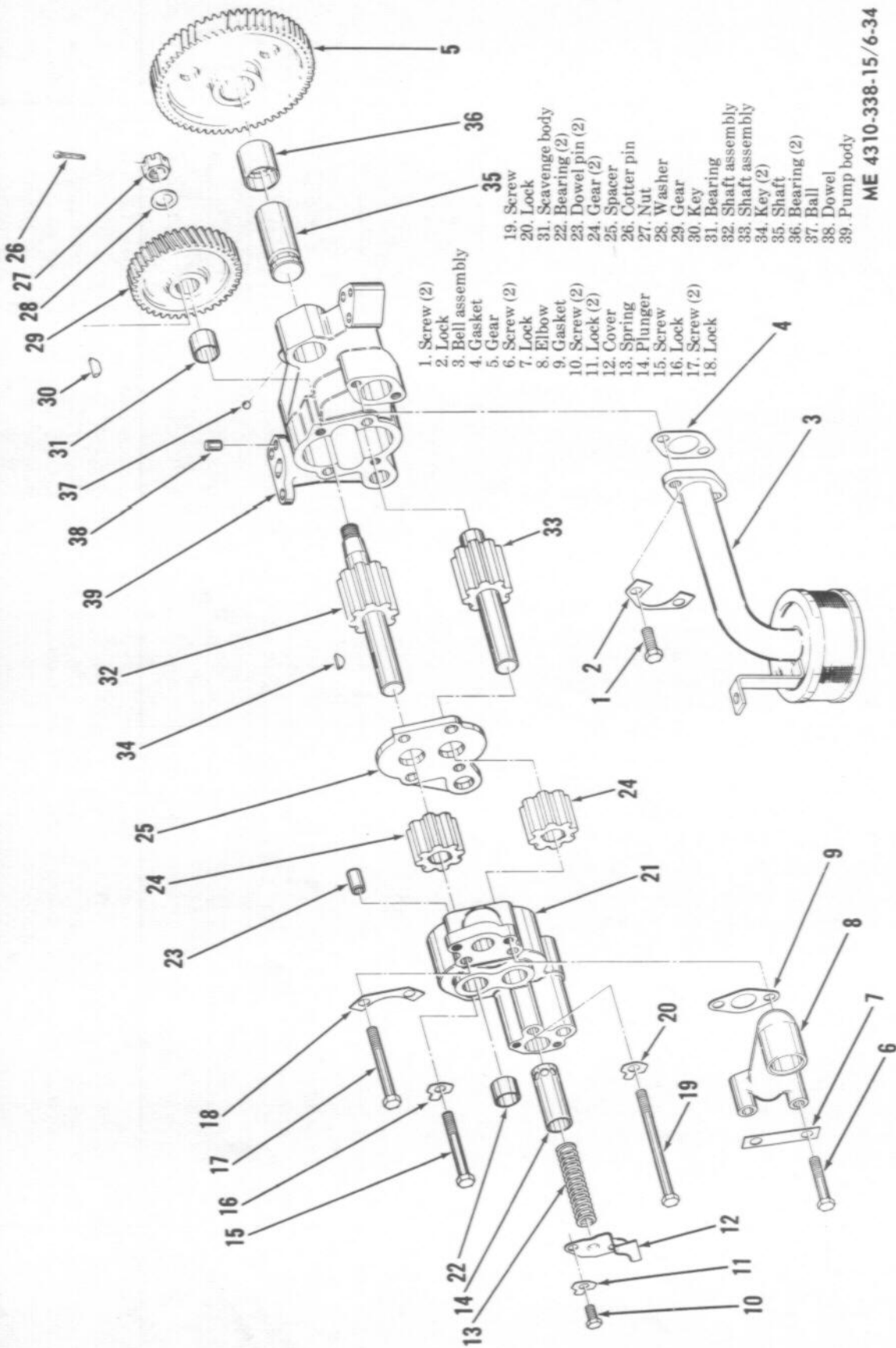
INSTALLATION

- STEP 1. PLACE OIL PUMP IN MOUNTING POSITION AND SECURE WITH SCREWS AND LOCKS. BE SURE GEARS ARE SEATED PROPERLY.
- STEP 2. SECURE BELL ASSEMBLY WITH SCREW AND LOCK.

Figure 6-33. Oil pump assembly; removal and installation.

e. Installation.

- (1) Install oil pump assembly as shown in figure 6-33.
- (2) Install engine oil pan and plate (para 6-29). Install new scavenge tube O-ring.



ME 4310-338-15/6-34

Figure 6-34. Oil pump assembly, disassembly and reassembly.

6-31. General

The engine flywheel is bolted to a flange on the rear of the crankshaft. A ring gear is shrink fitted onto the rim of the flywheel. The purpose of the flywheel is to provide an evenly rotating crankshaft speed and balance. The ring gear provides a place for starting motor engagement when cranking the engine. The compressor coupling pins and bushings are also attached to the flywheel. The flywheel is housed in the flywheel housing which is mounted on the rear end of the cylinder block. The flywheel housing also serves as the engine rear support.

6-32. Flywheel and Flywheel Housing

a. Removal.

(1) Remove engine assembly (para 5-13).

(2) Remove flywheel and flywheel housing as shown in figure 6-35. Discard crankshaft seal.

b. Disassembly. Disassemble flywheel housing in numerical sequence shown in figure 6-36.

NOTE

Do not remove ring gear from flywheel unless either is being replaced.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-

680. Dry parts thoroughly.

(2) Inspect ring gear for broken or damaged teeth, cracks, or any other defect.

(3) Inspect flywheel housing for cracks, breaks, damaged mounting holes, or any other defect.

(4) Inspect flywheel for elongated holes, cracks, distortion, or any other defect.

(5) Inspect coupling pins and bushings for wear, bending, or any other defect.

(6) Inspect attaching hardware for cracks, damaged threads, distortion, or any other defect.

d. Reassembly. Reassemble flywheel housing in reverse numerical sequence shown in figure 6-36.

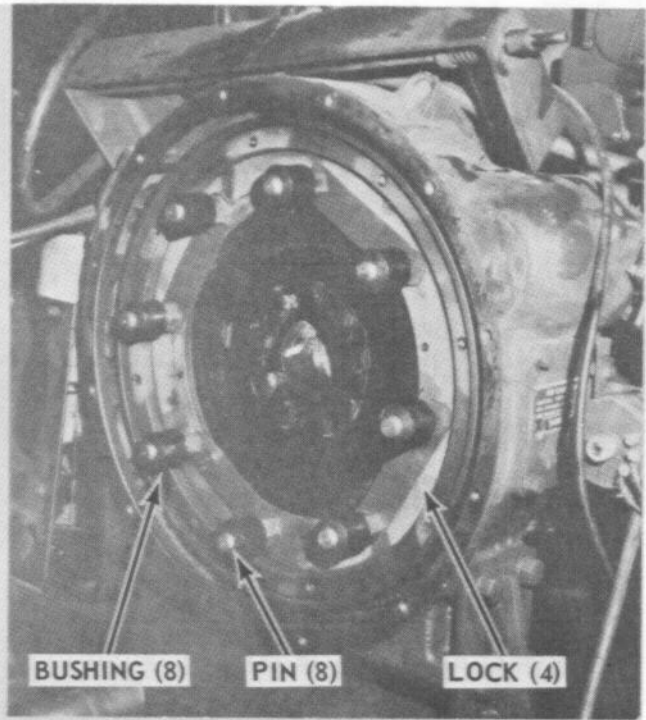
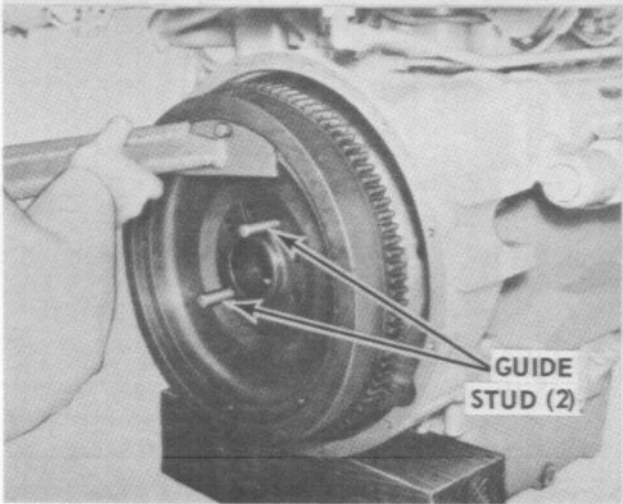
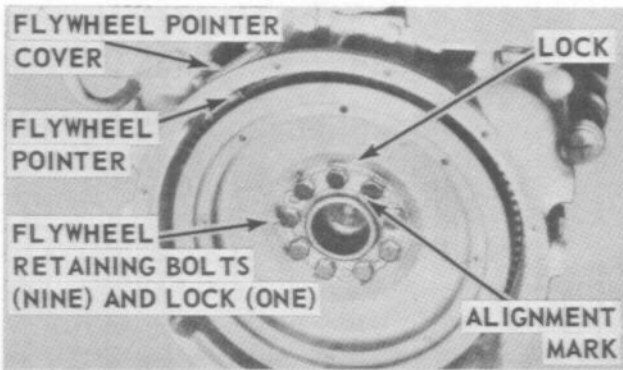
e. Installation.

(1) Install flywheel and flywheel housing as shown in figure 6-35. Align mark on flywheel with mark on crankshaft. Install new crankshaft seal as instructed in view C.

NOTE

If ring gear was removed, it must be heated and shrink fitted onto flywheel. Do not exceed 600°F. when heating ring gear. Install ring gear so that chamfered part of teeth face toward starter pinion opening in flywheel housing when flywheel is installed.

(2) Install engine assembly (para 5-13).



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REMOVAL

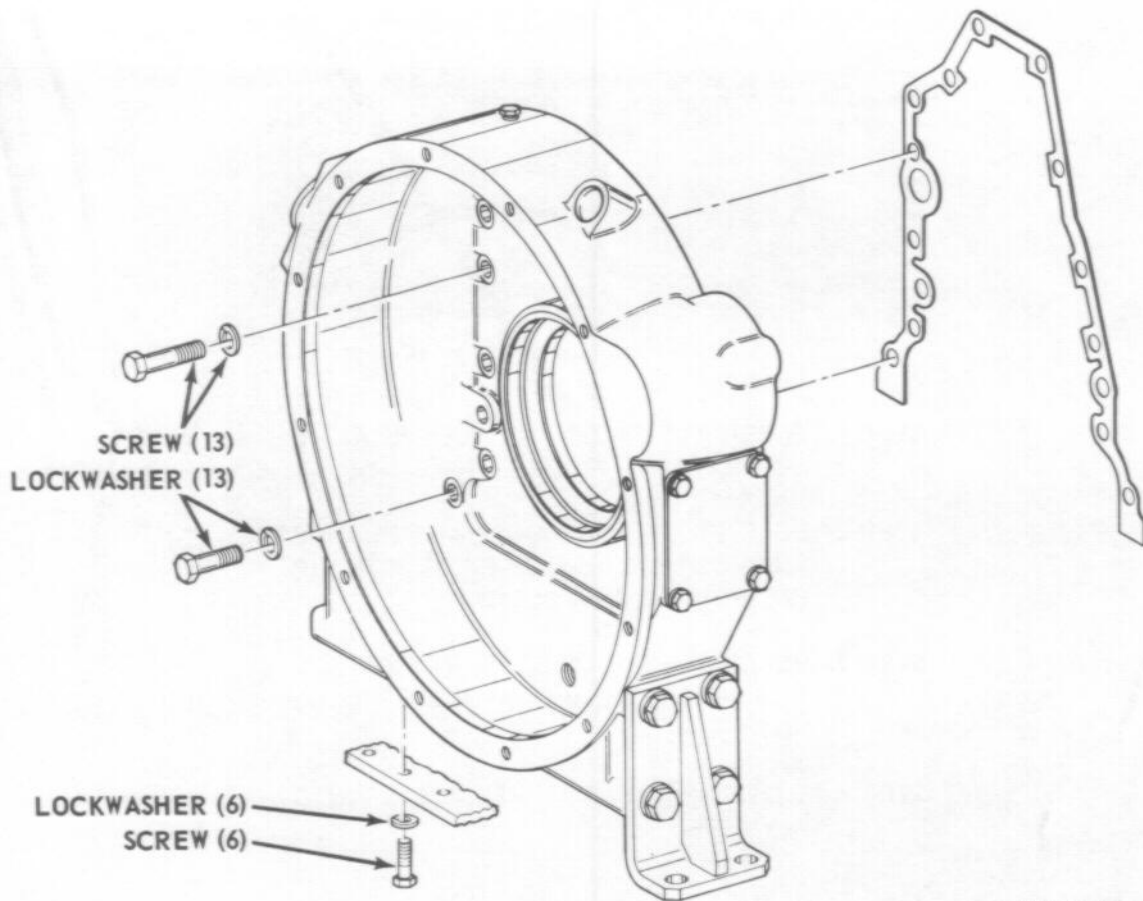
- STEP 1. ROTATE FLYWHEEL AND POSITION ALIGNMENT MARK AT TOP CENTER OF FLYWHEEL HOUSING.
- STEP 2. REMOVE BUSHINGS, COUPLING PINS, AND LOCKS.
- STEP 3. REMOVE TWO FLYWHEEL RETAINING SCREWS AND INSTALL TWO GUIDE STUDS AS SHOWN.
- STEP 4. INSTALL LIFTING BRACKET TO FLYWHEEL.
- STEP 5. SUPPORT WEIGHT OF FLYWHEEL ON LIFTING BRACKET AND REMOVE REMAINDER OF RETAINING SCREWS AND LOCK. SLIDE FLYWHEEL FROM HOUSING.

INSTALLATION

- STEP 1. ATTACH LIFTING BRACKET TO FLYWHEEL AND GUIDE STUDS TO HOUSING. SLIDE FLYWHEEL INTO MOUNTING POSITION.
- STEP 2. SUPPORT WEIGHT OF FLYWHEEL ON LIFTING BRACKET AND INSTALL LOCK AND RETAINING SCREWS. TIGHTEN SCREWS AND REMOVE LIFTING BRACKET.
- STEP 3. REMOVE TWO GUIDE STUDS. INSTALL AND TIGHTEN REMAINDER OF RETAINING SCREWS.
- STEP 4. INSTALL PINS, LOCKS, AND BUSHINGS.

A FLYWHEEL

Figure 6-35. Flywheel and flywheel housing, removal and installation (sheet 1 of 3).



ME 4310-338-15/6-35 (2)

REMOVAL

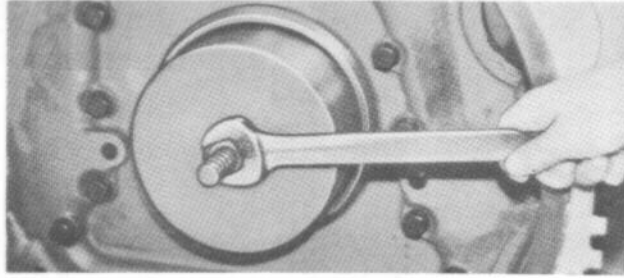
- STEP 1. REMOVE SIX SCREWS AND LOCKWASHERS WHICH SECURE OIL PAN PLATE AT FLYWHEEL HOUSING. SHIM BETWEEN OIL PAN PLATE AND CYLINDER BLOCK.
- STEP 2. CAREFULLY SEPARATE OIL PAN PLATE GASKET FROM FLYWHEEL HOUSING AND INSTALL SHIMS BETWEEN OIL PAN GASKET AND CYLINDER BLOCK.
- STEP 3. REMOVE TWO FLYWHEEL HOUSING RETAINING SCREWS AND LOCKWASHERS. INSTALL TWO 1/2-INCH GUIDE STUDS.
- STEP 4. REMOVE REST OF RETAINING SCREWS AND LOCKWASHERS. REMOVE FLYWHEEL HOUSING.

INSTALLATION

- STEP 1. INSTALL TWO 1/2-INCH GUIDE STUDS IN CYLINDER BLOCK.
- STEP 2. BE SURE SHIMS ARE PROPERLY INSTALLED BETWEEN OIL PAN PLATE, GASKET, AND CYLINDER BLOCK. SLIDE FLYWHEEL HOUSING ONTO GUIDE STUDS AND SEAT AGAINST CYLINDER BLOCK.
- STEP 3. INSTALL AND TIGHTEN RETAINING SCREWS AND LOCKWASHERS. REMOVE GUIDE STUDS; INSTALL AND TIGHTEN RETAINING SCREWS AND LOCKWASHERS.
- STEP 4. CAREFULLY REMOVE SHIMS AND BE SURE OIL PAN PLATE GASKET SEATS PROPERLY. INSTALL AND TIGHTEN SIX SCREWS AND LOCKWASHERS IN OIL PAN PLATE.

B FLYWHEEL HOUSING

Figure 6-35. Flywheel and flywheel housing, removal and installation (sheet 2 of 3).



ME 4310-338-15/6-35 ③

- STEP 1. FABRICATE PILOT AND SLEEVE AS ILLUSTRATED IN FIGURE 5-10.
- STEP 2. BOLT PILOT TO CRANKSHAFT FLANGE AND POSITION SEAL ON PILOT WITH LIP FACING CYLINDER BLOCK.
- STEP 3. PLACE SLEEVE ON STUD AND INSTALL A 3/4-INCH WASHER AND 3/4"-10 NC NUT.
- STEP 4. TIGHTEN NUT TO PRESS SEAL INTO FLYWHEEL HOUSING.
- STEP 5. REMOVE INSTALLATION TOOLS.

C INSTALLING CRANKSHAFT SEAL

Figure 6-35. Flywheel and flywheel housing, removal and installation (sheet 3 of 3).

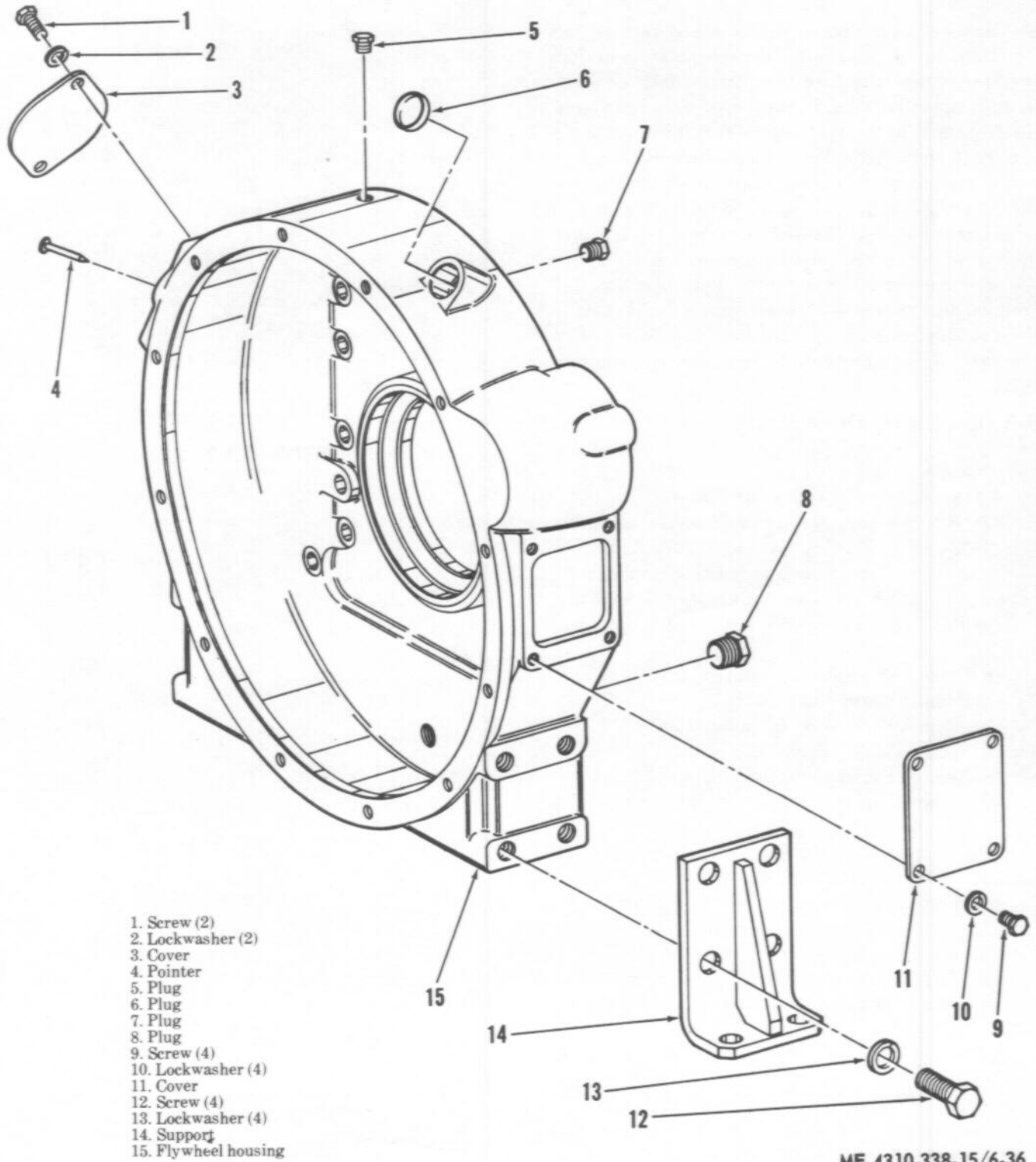


Figure 6-36. Flywheel housing; disassembly and reassembly.

Section XV. ACCESSORY DRIVE SHAFT ASSEMBLY

6-33. General

The accessory drive shaft drives the governor, fuel injection pump camshaft, service meter, and fuel transfer pump. The accessory drive shaft, enclosed in an adaptor housing, is supported by a bearing at the front and by a sleeve on the fuel injection pump camshaft at the rear. The adapter housing is bolted to the timing gear housing plate at the front. The fuel injection pump housing is bolted to the rear of the adaptor housing. The fuel transfer pump is driven by a gear machined on the accessory drive shaft; the service meter is driven by the fuel transfer pump. Coupled to the rear of the accessory drive shaft is the fuel injection pump camshaft and fastened to the rear of the camshaft is the governor rotating shaft.

6-3 . Accessory Drive Shaft

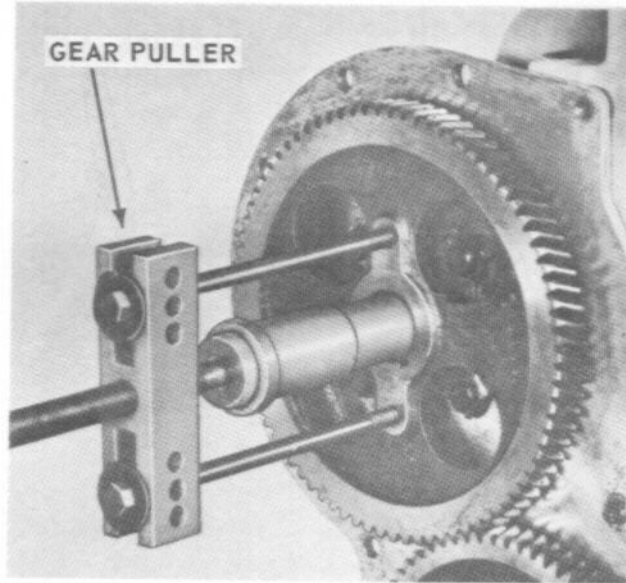
a. Removal.

- (1) Remove towbar (para 3-132).
- (2) Remove radiator and oil cooler assembly (para 3-73).
- (3) Remove side doors and housing components, as necessary, to provide access to engine (para 3-33).
- (4) Remove fan assembly and pulley (para 3-74 and 3-77).
- (5) Remove generator assembly (para 3-102).
- (6) Remove water pump assembly (para 3-76).
- (7) Remove crankshaft pulley and vibration damper (para 6-36).
- (8) Remove timing gear cover (para 6-37).
- (9) Remove fuel transfer pump and service meter (para 3-95 and 3-56).
- (10) Remove primary fuel filter (para 3-97) and final fuel filter (para 3-98).
- (11) Remove fuel pump starting tank (para 3-99).
- (12) Remove governor and fuel injection pump housing as a unit (para 6-17 and para 6-20).
- (13) Remove accessory drive shaft and housing by following numerical sequence shown in figure 6-37.

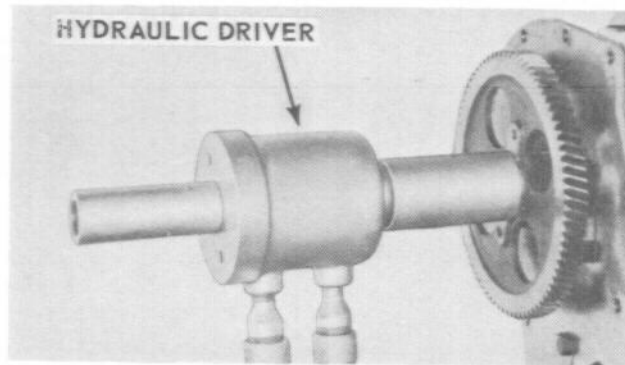
b. *Disassembly.* Disassemble accessory drive shaft and housing in numerical sequence shown in figure 6-38. Discard gaskets.

c. Cleaning, Inspection, and Repair.

- (1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.
- (2) Inspect bearing for grittiness, freedom of movement, cracks, or any other defect.



ACCESSORY DRIVE GEAR REMOVAL



ACCESSORY DRIVE GEAR INSTALLATION

ME 4310-338-15/6-37 ①

1. Tube assembly
2. Nut
3. Washer
4. Gear
5. Sleeve
6. Screw (4)
7. Lock (2)
8. Retainer
9. Housing assembly
10. Gasket
11. Plate (ref)

Figure 6-37. Accessory drive shaft and housing, removal and installation (sheet 1 of 2).

- (3) Inspect drive shaft for excessive wear, cracks, damaged or chipped teeth, distortion, or any other defect.
- (4) Inspect housing for cracks, breaks, distortion, or any other defect.

d. *Reassembly.* Reassemble accessory drive shaft and housing in reverse numerical sequence shown in figure 6-38. Install new gaskets.

e. *Installation.*

(1) Install accessory drive shaft and housing by following reverse numerical sequence shown in figure 6-37. Do not install gear at this time.

(2) Remove valve cover (para 3-116).

(3) Remove timing pointer cover from flywheel housing (fig. 3-103).

(4) Rotate crankshaft counterclockwise (as viewed from flywheel end) at least 60°. Continue rotating crankshaft counterclockwise until TC1-6 CYL mark on flywheel is aligned with timing pointer and both the inlet and exhaust valves of cylinder No. 1 are closed.

(5) Install timing plate on rear face of accessory drive housing as shown in figure 6-39. If timing plate can be installed, timing is correct; proceed to step 7. If timing plate cannot be installed, proceed to step 6 and adjust timing.

(6) Turn accessory drive shaft, using extension nut, until timing plate fits properly on accessory drive housing. When the plate fits, the drive shaft is properly timed.

(7) Remove timing plate. Install accessory drive gear as shown in figure 6-41. Align timing marks as shown in figure 6-42. Tighten retaining nut to 100 ± 10 foot-pounds.

(8) Install valve cover (para 3-116).

(9) Install timing pointer cover on flywheel housing.

(10) Install governor and fuel injection pump housing as a unit (para 6-17 and para 6-20).

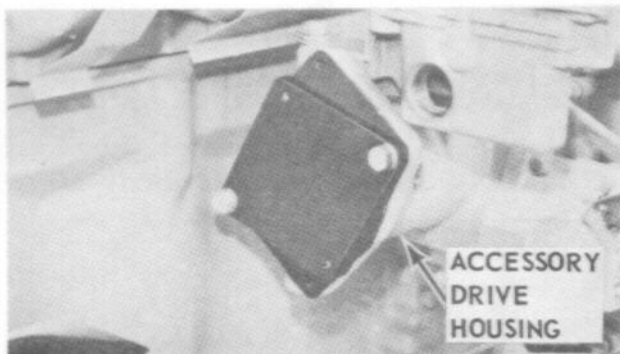
(11) Install fuel pump starting tank (para 3-99).

(12) Install primary fuel filter (para 3-97) and final fuel filter (para 3-98).

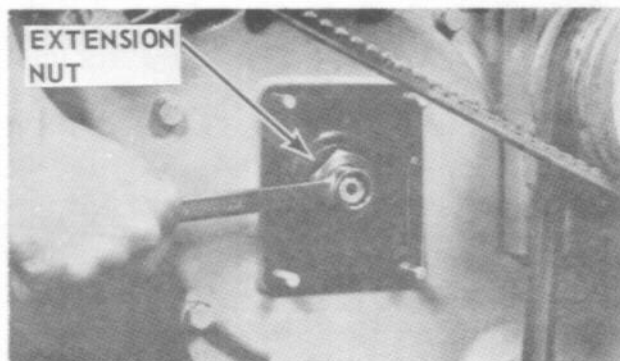
(13) Install fuel transfer pump and services meter (para 3-95 and 3-56).

(14) Install timing gear cover (para 6-37).

(15) Install crankshaft pulley and vibration damper (para 6-36).



TIMING FIXTURE PLATE INSTALLED



ROTATING THE ACCESSORY DRIVE SHAFT

ME 4310-338-15/6-39

Figure 6-39. Accessory drive shaft timing.

(16) Install water pump assembly (para 3-76).

(17) Install fan assembly and pulley (para 3-74 and 3-77).

(18) Install generator assembly (para 3-102).

(19) Install radiator and oil cooler assembly (para 3-73).

(20) Install housing components (para 3-33).

(21) Install tow bar (para 3-132).

f. *Adjustments.*

(1) Adjust fuel injection pump timing dimension (para 6-20).

(2) Adjust fuel rack setting on governor assembly (para 6-17).

Section XVI. CRANKSHAFT PULLEY AND DAMPER, TIMING GEAR COVER, AND TIMING GEARS

6-35. General

The crankshaft pulley is installed on the front end of the engine crankshaft and, by means of V-type drive belts, drives the generator and cooling fan pulleys. The timing gear train consists of five gears located at the front of the engine; the gears are protected

and sealed by the timing gear cover. The crankshaft gear is keyed and press fitted on the crankshaft. As the crankshaft rotates, the crankshaft gear drives the camshaft gear and the oil pump idler gear. The oil pump idler gear drives the oil pump. The camshaft gear drives the water pump and the accessory drive

idler gear; the idler gear drives the accessory drive gear. Timing of the gears is accomplished by matching alignment marks on the gears when the No. 1 piston is positioned at top center during the compression stroke. All timing gear bearings, except the accessory drive gear bearing, are pressure lubricated. Oil is supplied to the bearings through passages in the cylinder block. The accessory drive gear bearing is lubricated by oil draining from the accessory drive shaft housing.

6-36. Crankshaft Pulley and Vibration Damper

a. Removal.

(1) Remove radiator and oil cooler assembly (para 3-73).

(2) Remove drive belts (para 3-72).

(3) Remove crankshaft pulley and vibration damper as shown in figure 6-40.

b. Cleaning and Inspection.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.

(2) Inspect pulley and damper for cracks, breaks, distortion, or any other defect.

(3) Inspect attaching hardware for cracks, damaged threads, distortion, or any other defect.

c. Installation.

(1) Install crankshaft pulley and vibration damper as shown in figure 6-40.

(2) Install drive belts (para 3-72).

(3) Install radiator and oil cooler assembly (para 3-73).

6-37. Timing Gear Cover and Timing Gears

a. Removal and Disassembly.

(1) Remove engine assembly (para 5-13).

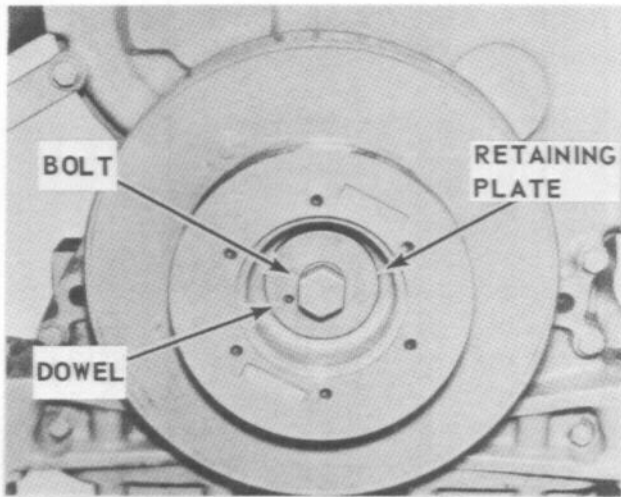
(2) Remove water pump assembly (para 3-76).

(3) Remove generator assembly (para 3-102).

(4) Remove crankshaft pulley and damper assembly (para 6-36).

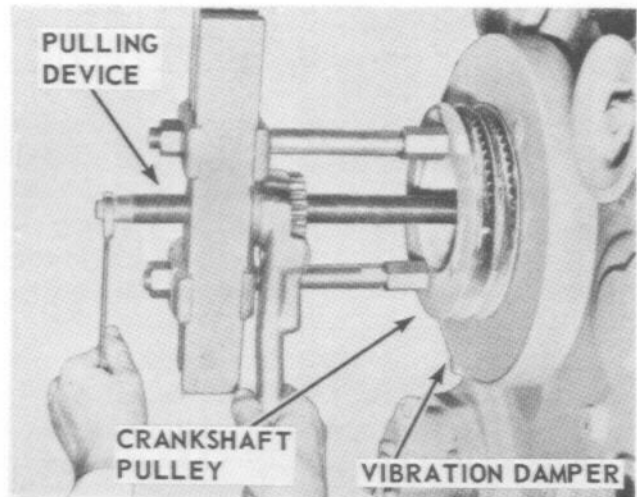
(5) Remove oil pan (para 6-29).

(6) Remove and disassemble engine timing gear cover by following numerical sequence shown in figure 6-41. Discard gasket and seal. Remove timing gears as shown.



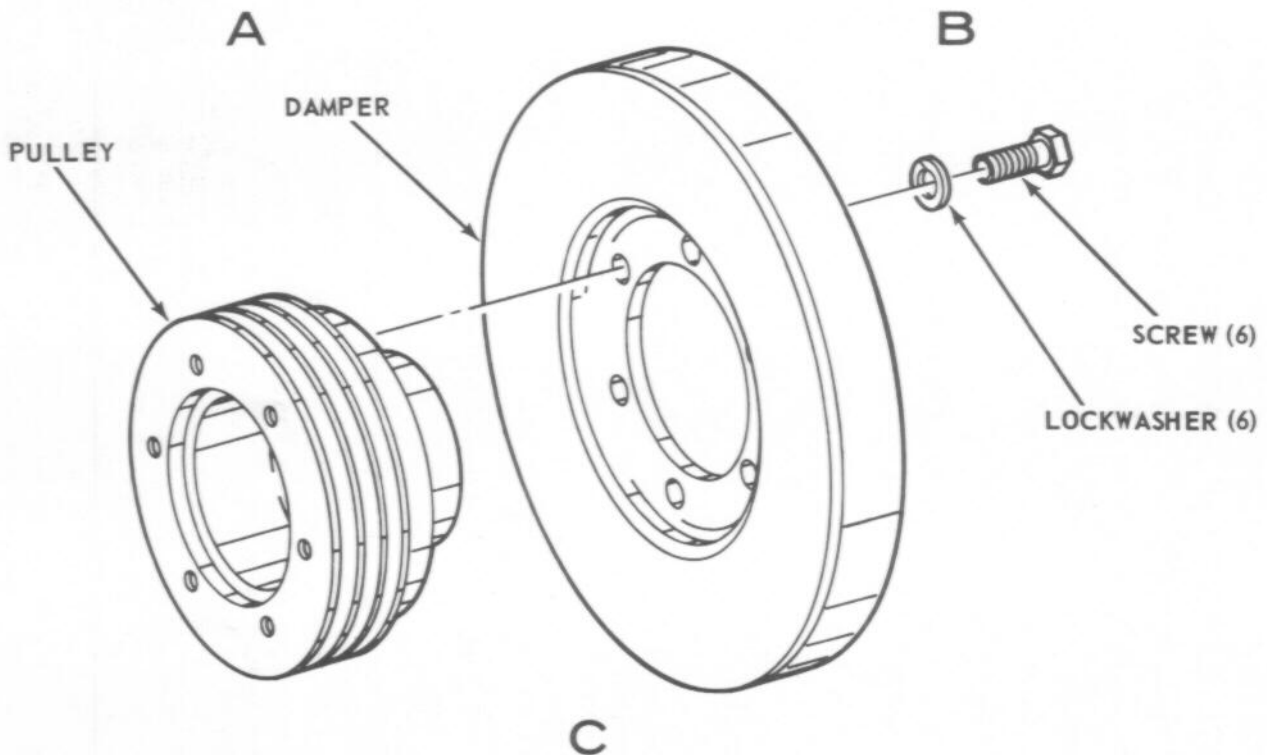
REMOVAL

- STEP 1. REMOVE BOLT AND RETAINING PLATE.
- STEP 2. USE A PULLING DEVICE AND REMOVE CRANKSHAFT PULLEY AND VIBRATION DAMPER.
- STEP 3. REMOVE SCREWS AND LOCKWASHERS AND SEPARATE PULLEY FROM DAMPER.



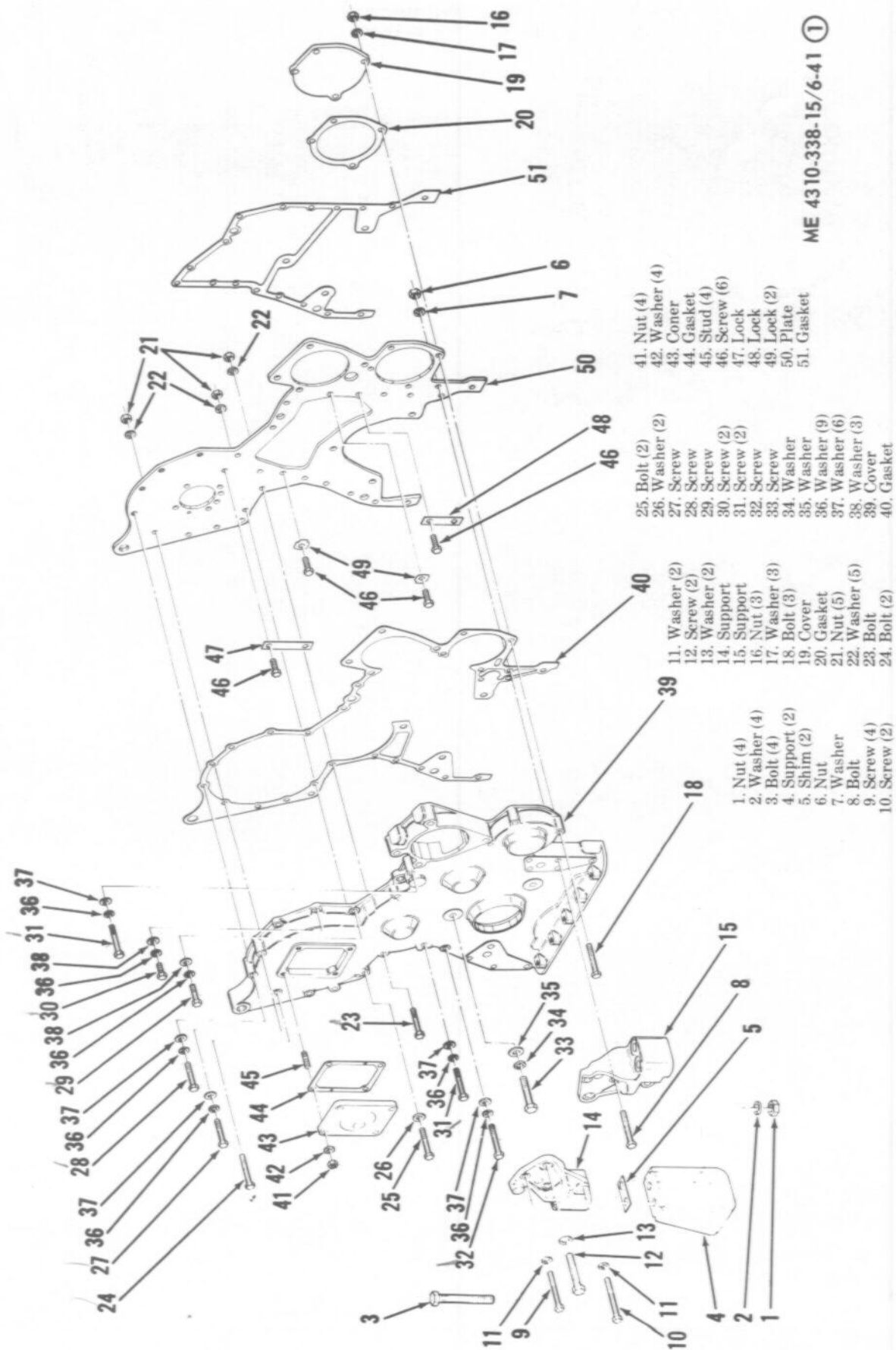
INSTALLATION

- STEP 1. SECURE PULLEY TO DAMPER USING SCREWS AND LOCKWASHERS.
- STEP 2. PRESS PULLEY AND DAMPER ONTO CRANKSHAFT.
- STEP 3. INSTALL RETAINING PLATE. SECURE PULLEY AND DAMPER WITH BOLT.



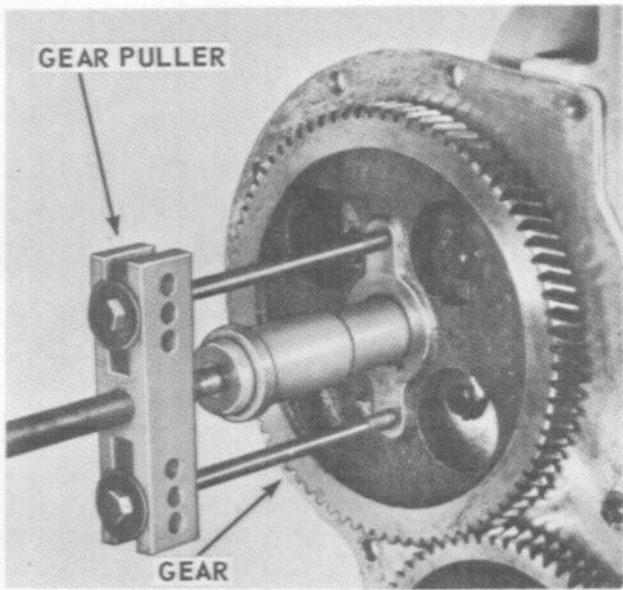
ME 4310-338-15/6-40

Figure 6-40. Crankshaft pulley and vibration damper: removal and installation.

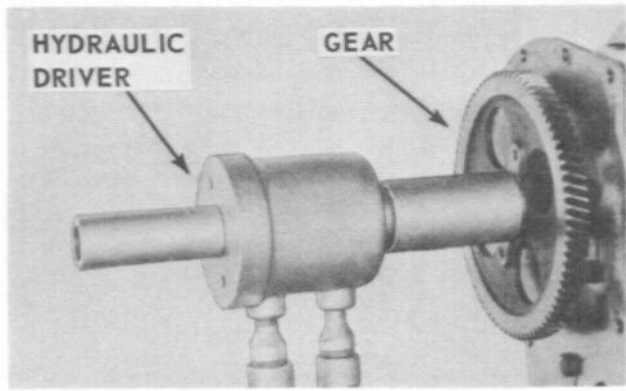


A TIMING GEAR COVER GROUP

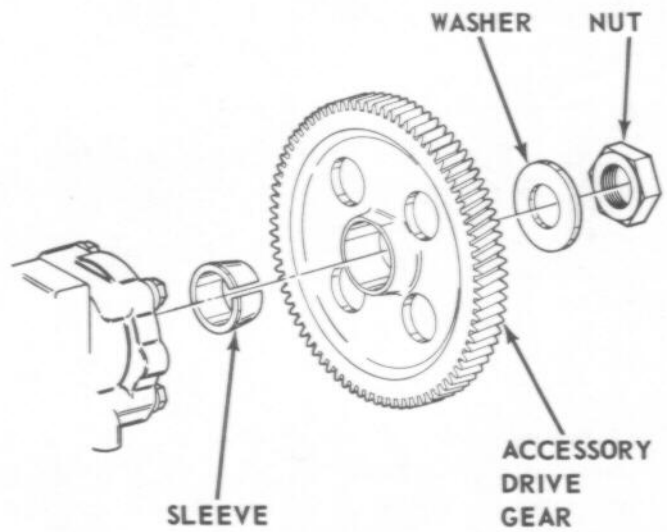
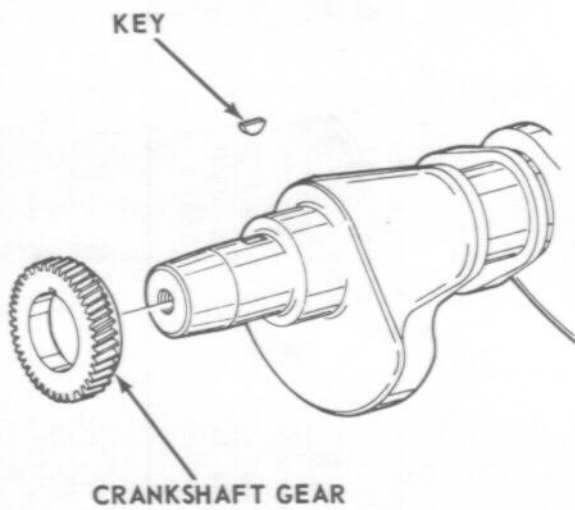
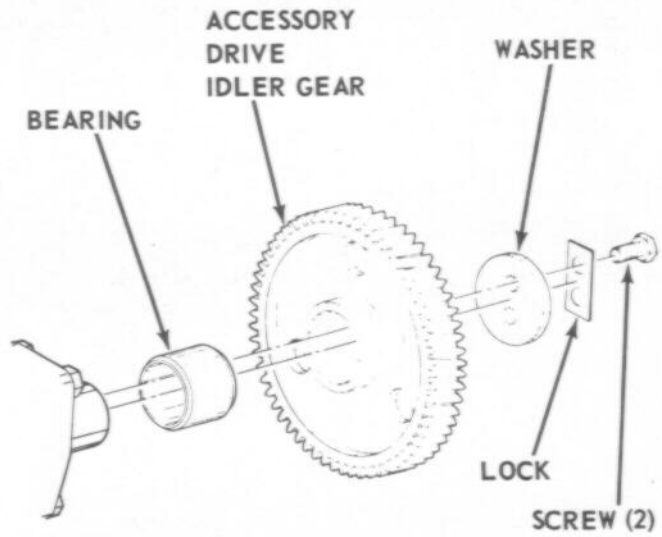
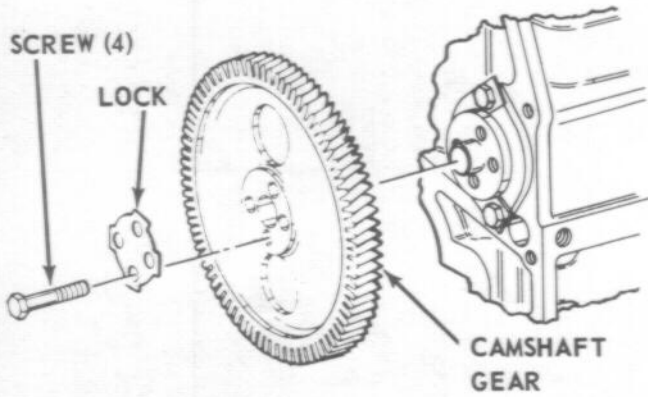
Figure 6-41. Timing gear cover and timing gears; removal and installation (sheet 1 of 2).



TYPICAL GEAR REMOVAL



TYPICAL GEAR INSTALLATION



B TIMING GEARS

ME 4310-338-15/6-41 (2)

Figure 6-41. Timing gear cover and timing gears, removal and installation (sheet 2 of 2).

b. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard all gaskets.

(2) Inspect timing gear cover parts for cracks, breaks, distortion, or any other defect. Replace as necessary.

(3) Inspect timing gears for cracks, broken or chipped teeth, distortion, or any other defect. Replace as necessary.

(4) Measure diameter of bearing bore in accessory drive idler gear. Diameter should be 1.376 to 1.381 inches.

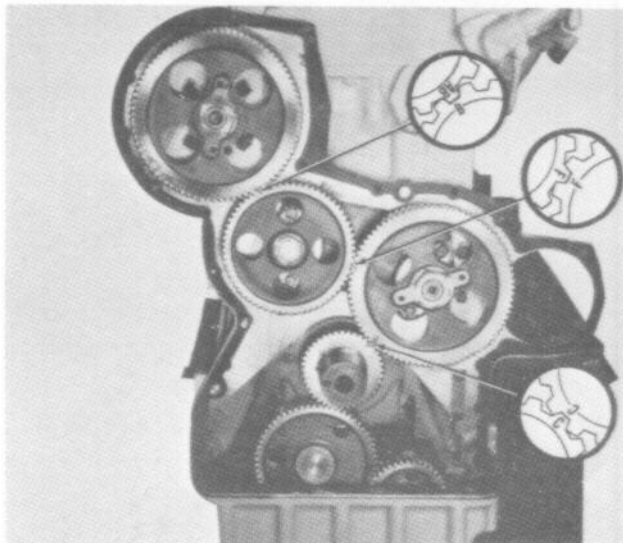
(5) Inspect attaching hardware for damaged threads, cracks, distortion, or any other defect.

d. Reassembly and Installation.

(1) Reassemble and install engine timing gear cover by following reverse numerical sequence shown in figure 6-41. Install new seal and gaskets. Install engine timing gears as shown.

(a) Position cylinder No. 1 piston at top center (para 3-117, steps a. through c.).

(b) Align gear timing marks as shown in figure 6-42.

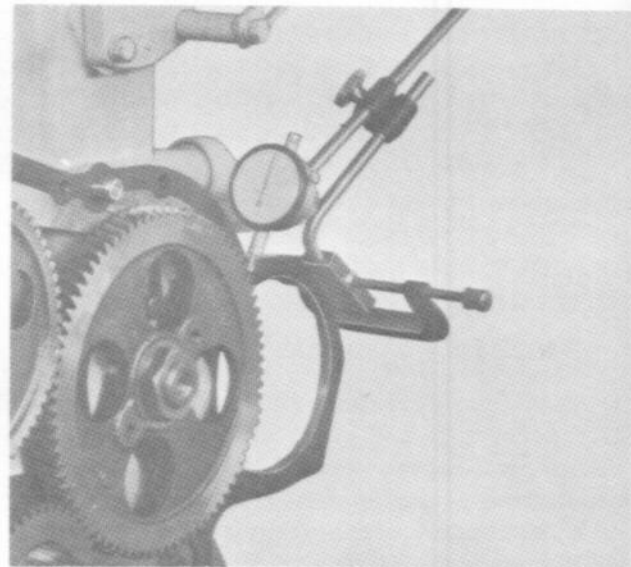


ME 4310-338-15/6-42

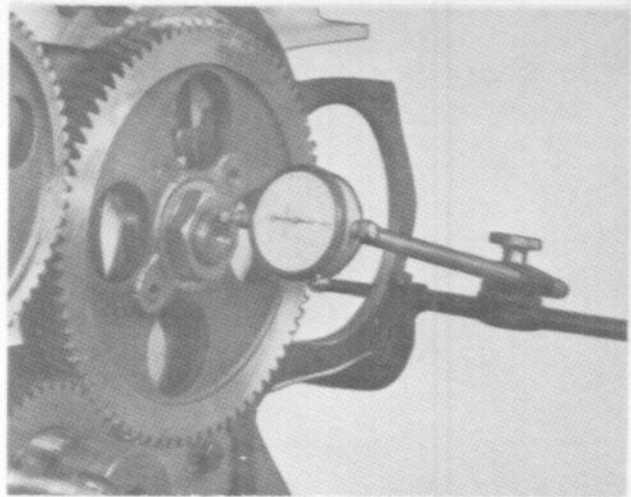
Figure 6-42. Timing gear alignment.

(c) Measure backlash between accessory drive idler gear and camshaft gear, and between camshaft gear and crankshaft gear. See figure 6-43. Correct measurements are listed in table 5-1. If dial reading is greater than that allowed, either the timing gears, main bearings, or camshaft bearings are badly worn. Timing gear wear can be compensated for by adjusting fuel injection timing. Worn main bearings or camshaft bearings must be replaced. If dial indicator reading is less than 0.001 inches, it is an indication of

incorrect installation or a burr or rough spot on one of the gears. In this case, take readings every 90° around gear to determine the cause. Correct problem by removing burr or reinstalling gear. Repeat backlash measurement.



A CHECKING GEAR BACKLASH



B CHECKING END CLEARANCE

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Figure 6-43. Typical timing gear backlash and end clearance checks.

(d) Measure accessory drive idler gear and clearance and camshaft gear end clearance. See figure 6-43. Correct clearances are listed in Table 5-1.

(e) Install washer on accessory drive gear with concave side toward gear.

(2) Install oil pan (para 6-29).

(3) Install crankshaft pulley and damper assembly (para 6-36).

(4) Install generator assembly (para 3-102).

(5) Install water pump assembly (para 3-76).

(6) Install engine assembly (para 5-13).

Section XVII. CRANKSHAFT AND MAIN BEARINGS

6-38. General

The crankshaft assembly consists of the crankshaft, gear, key, and plugs. The end thrust of the crankshaft is taken up by flanges on the lower half of the rear main bearing. An oil seal pressed into the timing gear housing cover prevents oil leakage at the front of the engine. An oil seal, pressed into the flywheel housing, bears against the crankshaft flange and prevents leakage at the rear of the engine. Counterweights are forged integrally with the crankshaft and are drilled to obtain shaft balance. The crankshaft timing gear is pressed on the front of the crankshaft. The main bearings and caps support the crankshaft in the cylinder block. The main bearings are of the steel-backed aluminum-lined type. Tabs which are punched outward on each bearing half fit into recesses in the cylinder block and bearing cap, securing the bearing and preventing it from rotating. This provides an uninterrupted bearing surface in the most highly-loaded area, improving the loading conditions and giving maximum resistance to fatigue failures. The pistons are connected to the crankshaft and, as the cylinders fire, rotate the crankshaft.

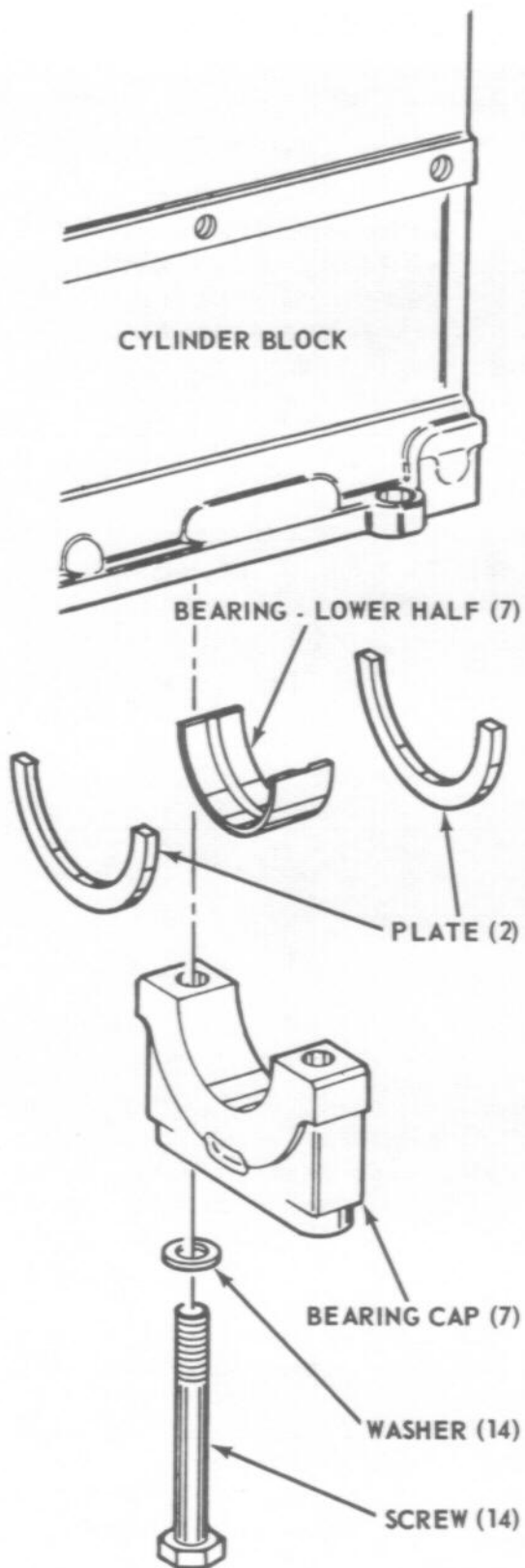
6-39. Crankshaft and Main Bearings

a. Removal.

- (1) Remove engine assembly (para 5-13).
- (2) Remove water pump assembly (para 3-76).
- (3) Remove timing gear cover (para 6-37).
- (4) Remove oil pan and plate (para 6-29).
- (5) Remove flywheel and flywheel housing (para 6-32).
- (6) Remove oil pump assembly (para 6-30).
- (7) Fabricate a bearing removal tool as shown in figure 5-8.
- (8) Remove main bearings and crankshaft assembly as shown in figure 6-44.

CAUTION

To protect bearing surfaces from galling, wrap each surface with a clean heavy cloth before attaching cables. When removing main bearing caps, cover cap studs with pieces of rubber hose (or the equivalent) to prevent nicking or scratching crankshaft.



REMOVAL

STEP 1. REMOVE SCREWS AND WASHERS FROM BEARING CAPS. REMOVE BEARING CAPS AND BEARING LOWER HALVES. REMOVE PLATES (REAR BEARING ONLY).

STEP 2. PLACE FABRICATED TOOL (FIGURE 5-8) IN OIL HOLE (VIEW B). ROLL BEARING UPPER HALF OUT BY ROTATING CRANKSHAFT. ROLL BEARING HALF OUT TAB END FIRST. REPEAT FOR EACH UPPER HALF.

STEP 3. REMOVE CRANKSHAFT. REMOVE GEAR AND KEY (VIEW C).

INSTALLATION

STEP 1. HEAT GEAR. INSTALL GEAR AND KEY ONTO CRANKSHAFT. INSTALL CRANKSHAFT SO THAT GEAR ALIGNS PROPERLY (FIGURE 6-44).

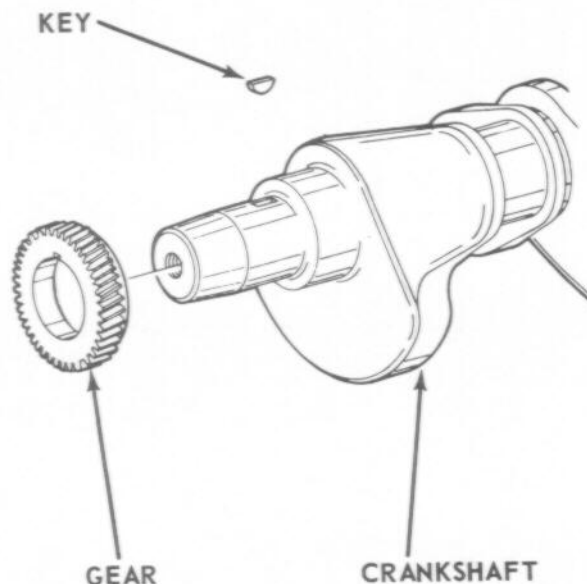
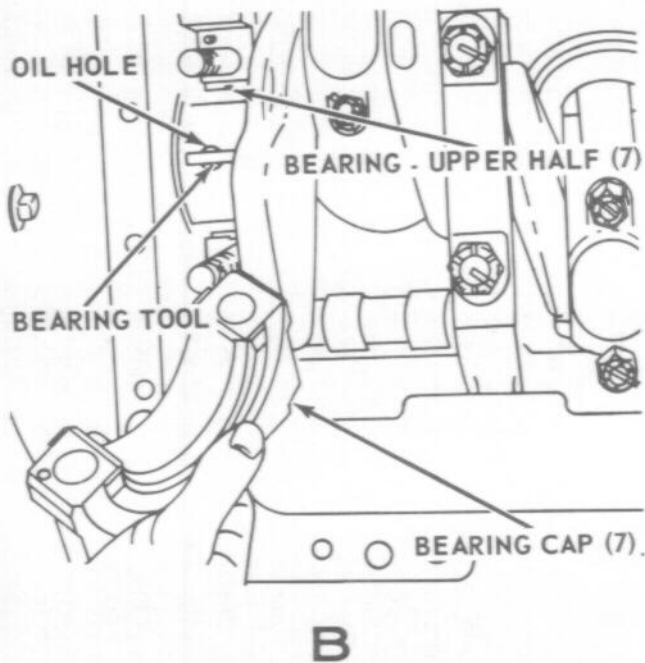
STEP 2. PLACE FABRICATED TOOL IN OIL HOLE OF BEARING UPPER HALF. ROLL BEARING UPPER HALF INTO POSITION BY ROTATING CRANKSHAFT. BE CERTAIN TAB IS ALIGNED WITH RECESS IN CYLINDER BLOCK. REMOVE TOOL AND REPEAT STEP FOR EACH UPPER HALF.

STEP 3. PLACE BEARING LOWER HALVES IN MOUNTING POSITION AND SECURE WITH BEARING CAPS, WASHERS, AND SCREWS. INSTALL PLATES WHEN INSTALLING REAR BEARING LOWER HALF.

A

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Figure 6-44. Main bearings and crankshaft, removal and installation (sheet 1 of 2).



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Figure 6-44. Main bearings and crankshaft, removal and installation (sheet 2 of 2).

(9) Lift crankshaft from engine by attaching a cable around bearing surfaces for number one and number five connecting rods. Tighten cable just enough to prevent crankshaft from moving when main bearing caps are removed.

b. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry all parts thoroughly. Be sure all oil holes are clean and clear of any obstructions.

(2) Inspect main bearings for cracks, excessive wear, burrs, high spots, distortion, or any other defect. A rough or abrasive bearing surface will cause excessive crankshaft wear. Replace bearings as a complete set.

NOTE

Abrasive materials may roll around between bearings and crankshaft journals causing scratches in the bearing without actually becoming embedded in the aluminum. Such scratches are not necessarily harmful and do not indicate that bearings should be replaced.

(3) Inspect crankshaft, for cracks, distortion, rough or abrasive journal surfaces, or any other defect.

NOTE

Rough, worn, or scored journal surfaces can be ground to 0.010, 0.020, or 0.030 inches undersized and used with matching main bearings.

(4) Measure diameter of main bearing journals on crankshaft. Standard size should measure 3.499 to 3.500 inches. Measure diameter of connecting rod journals. Standard size should measure 2.999 to 3.000 inches.

(5) Inspect oil seals for deterioration, cracks, distortion, or any other defect.

(6) Inspect attaching hardware for damaged threads, distortion, cracks, or any other damage.

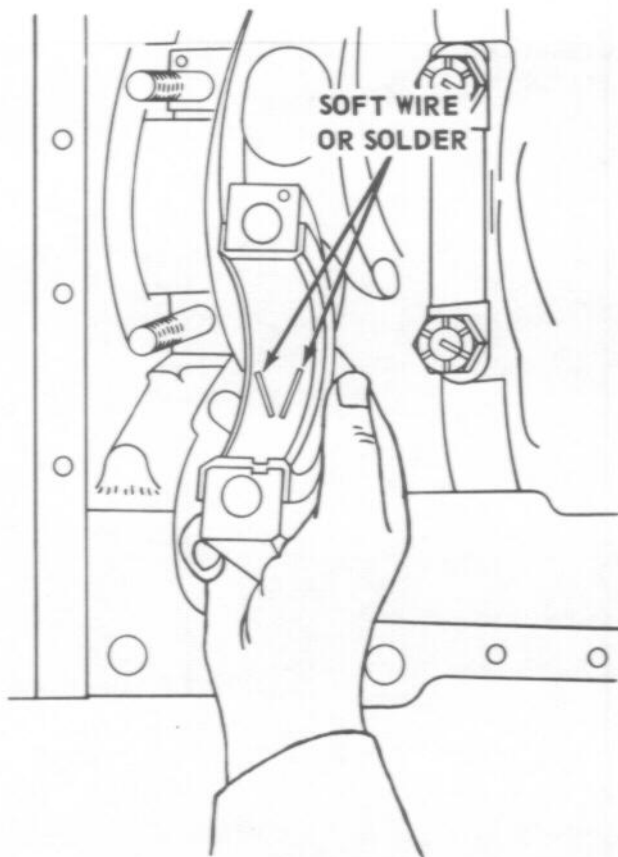
c. Installation.

(1) Install crankshaft assembly and main bearings as shown in figure 6-44. Use same procedure and precautions as when removing crankshaft. Before installing lower half of main bearings, perform step (2) below.

(2) Check main bearing clearance as follows:

(a) Cut two one-inch length of very soft wire or solder for each bearing.

(b) Place two pieces of wire on each bearing lower half as shown in figure 6-45. Coat wire lightly with grease to hold them in place.



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Figure 6-45. Main bearing clearance check.

(c) Hold crankshaft firmly against upper halves of main bearings and install lower halves of bearings and caps.

(d) Rotate crankshaft at least one revolution. Continue to hold crankshaft against upper halves of bearings. Remove caps and bearings.

(e) Measure thickness of wires to obtain main bearing clearance. Clearance should be 0.0030 to 0.0059 inches.

(3) Reinstall lower halves of bearings and caps as shown in figure 6-44.

(4) Measure crankshaft end clearance by pushing crankshaft as far as it will go to one end of cylinder block and measuring clearance between machined face of crankshaft flange and flange of lower half of rear main bearing. Clearance should be 0.0060 to 0.0180 inches.

(5) Install oil pump assembly (para 6-30).

(6) Install flywheel and flywheel housing (para 6-32).

(7) Install oil pan and plate (para 6-29).

(8) Install timing gear cover (para 6-37).

(9) Install water pump (para 3-76).

(10) Install engine assembly (para 6-13).

Section XVIII. CAMSHAFT AND BEARINGS

6-40. General

The camshaft is located on the upper left side of the cylinder block and is driven by the camshaft gear. The camshaft is supported in the block by bearings and positioned by a thrust washer secured to the cylinder block. The cams are forged integrally with the shaft. As the camshaft turns, the cams move push rods which actuate the inlet and exhaust valves at the timed sequence that effects proper engine operation.

6-41. Camshaft Assembly and Bearings

a. Removal.

- (1) Remove engine assembly (para 5-13).
- (2) Remove valve cover (para 3-116).
- (3) Remove timing gear cover (para 6-37).
- (4) Remove camshaft and gear as shown in figure 6-46. Removal of bearings is optional. If bearings are to be removed, perform preliminary steps (a) through (c).

(a) Remove oil pan and plate (para 6-29).

(b) Remove oil pump assembly (para 6-30).

(c) Remove flywheel and flywheel housing (para 6-32).

(5) Press gear from camshaft

b. Cleaning and Inspection.

(1) Clean all parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.

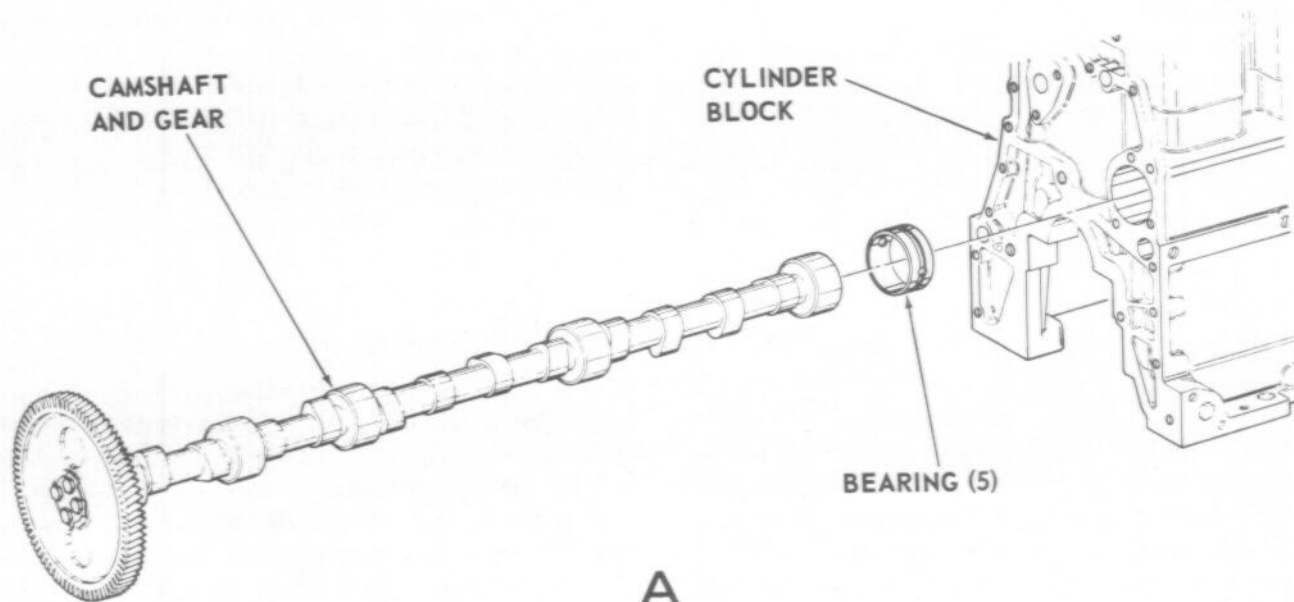
(2) Inspect camshaft for cracks, breaks, chipping, excessive wear, or any other defect.

(3) Measure bearing journal diameter. Measurement should be 2.3105 to 2.3115 inches.

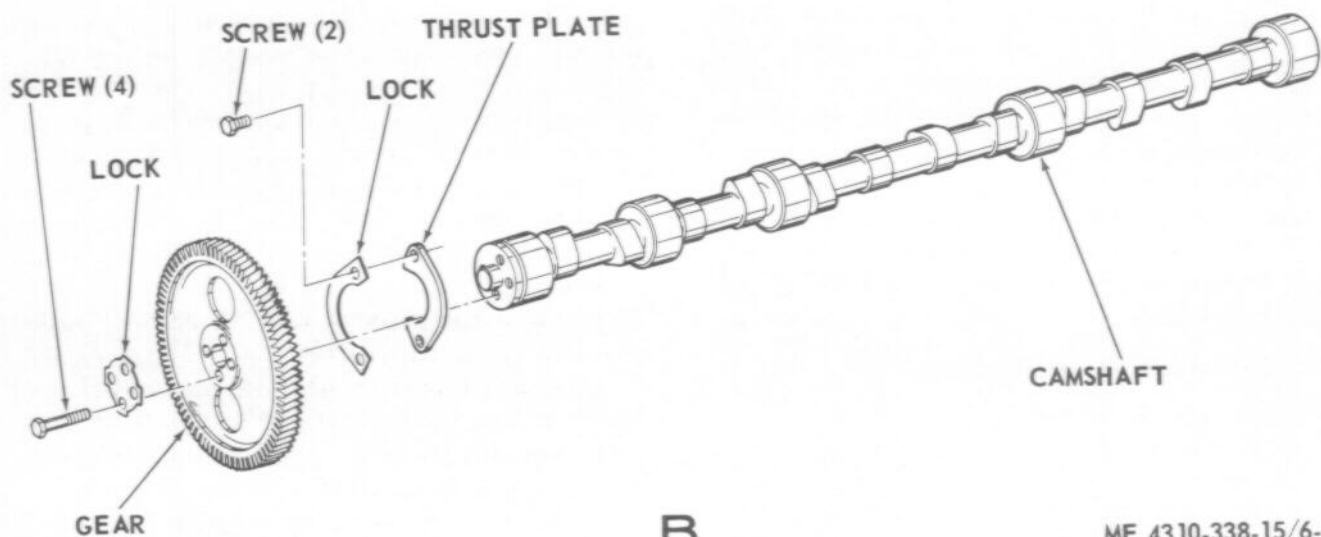
(4) Measure bearing clearance. Measurement should be 0.002 to 0.006 inches.

(5) Inspect bushings, bearings, and tappets for scoring, cracks, excessive wear, distortion, or any other defect.

(6) Inspect all other parts for wear, cracks, distortion, or any other defect.



A



B

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REMOVAL

- STEP 1. REMOVE SCREWS, LOCK, AND THRUST PLATE FROM END OF CAMSHAFT (VIEW B).
- STEP 2. REMOVE CAMSHAFT AND GEAR (VIEW A).
- STEP 3. REMOVE SCREWS AND LOCK. REMOVE GEAR FROM CAMSHAFT (VIEW B).
- STEP 4. PRESS BEARINGS OUT OF CYLINDER BLOCK.

INSTALLATION

- STEP 1. PRESS BEARINGS INTO POSITION IN CYLINDER BLOCK.
- STEP 2. CAREFULLY INSTALL CAMSHAFT AND SEAT IN BEARINGS.
- STEP 3. INSTALL THRUST PLATE AND SECURE WITH SCREWS AND LOCK (VIEW B).
- STEP 4. HEAT CAMSHAFT GEAR AND INSTALL ON CAMSHAFT. BE SURE GEAR IS PROPERLY ALIGNED (FIGURE 6-46). SECURE GEAR WITH SCREWS AND LOCK (VIEW B).

Figure 6-46. Camshaft and Bearings; Removal and Installation.

c. Installation.

(1) Install camshaft and bearings as shown in figure 6-46. Measure gear end clearance. Measurement should be 0.025 inches maximum. If bearings were removed, perform steps (a) through (c).

(a) Install oil pump assembly (para 6-30).

(b) Install flywheel and flywheel housing (para 6-32).

(c) Install oil pan and plate (para 6-29).

(2) Install timing gear cover (para 6-37).

(3) Install valve cover (para 3-116).

(4) Install engine assembly (para 5-13).

Section XIX. PISTONS AND CONNECTING RODS

6-42. General

This group consists of the pistons, piston rings, piston pins, retainers, and connecting rods. The connecting rods contain sleeve bearings at both the piston end and crankshaft end. Each piston has three rings; two compression rings and one oil ring. All rings are located above the piston pin bore. The top compression ring seats in a grooved iron band which is cast integral with the piston. Orifices in the engine block spray oil on the underside of the pistons, thereby cooling the pistons and lubricating the piston pins, cylinder walls and piston rings. Holes intersecting the center of the oil ring groove provide for the return of oil to the crankcase. The connecting rod bearings receive oil through drilled passages in the crankshaft between the main bearing journals and connecting rod journals.

6-43. Pistons and Connecting Rods

a. Removal.

(1) Remove engine assembly (para 5-13).

(2) Remove turbocharger assembly (para 3-115).

(3) Remove cylinder head assembly (para 6-27).

(4) Remove oil pan and plate (para 6-29).

(5) Remove piston and connecting rod assemblies as shown in figure 6-47. As each piston is removed, rotate crankshaft until that piston is at top dead center. Carefully remove each piston by pushing it out through top of cylinder block.

b. Disassembly. Disassemble pistons and connecting rods as shown in figure 6-48.

NOTE

Keep bearing halves together with their respective caps and connecting rods.

c. Cleaning and Inspection.

CAUTION

Do not use broken rings or carbon scrapers on ring lands since this practice can result in cutting sides of grooves. Be sure bottom of each ring groove is clean and oil return holes in oil ring grooves are open.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. If pistons have much carbon on them, soak pistons in cold water overnight and then let them dry (preferably in sunlight). Most of the carbon can then be removed with a hardwood stick.

(2) Inspect pistons for excessive wear, burned condition, cracks, distortion, galling, or any other defect.

(3) Inspect piston pins and rod bearings for scoring, galling, distortion, cracks, or any other defect. Measure diameter of piston pins. Diameter should be 1.6997 to 1.7000 inches. Measure pin clearance in rod bearing. Clearance should be 0.006 inches maximum.

(4) Inspect connecting rods for cracks, breaks, distortion, or any other defect.

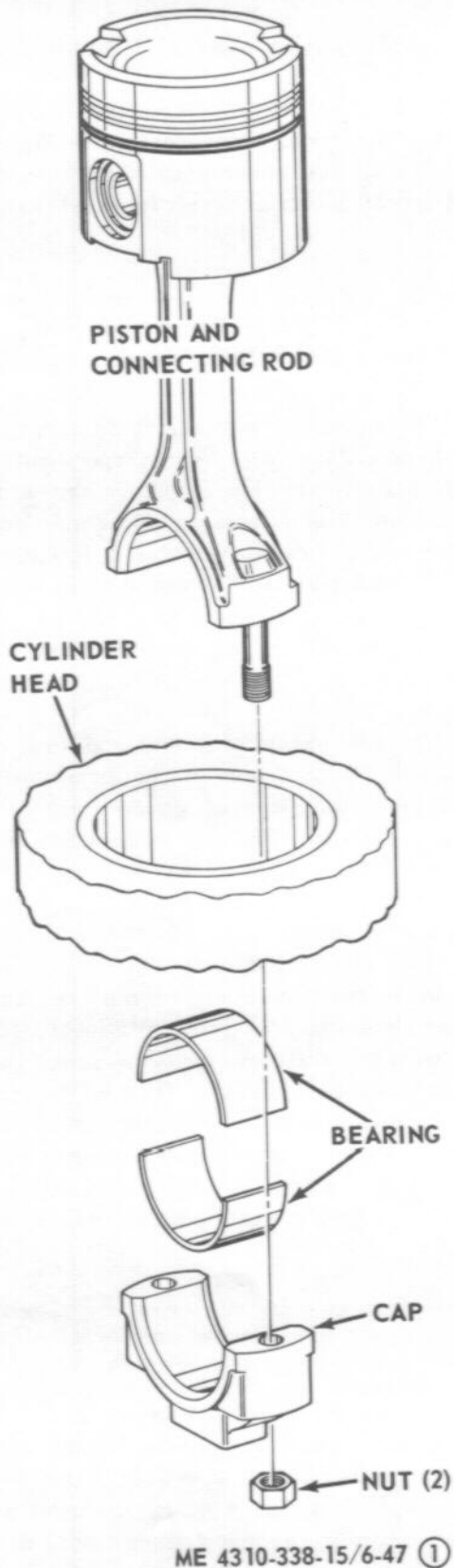
(5) Measure diameter of piston pin bearing bore. Diameter should be 1.7009 to 1.7015 inches. Measure center-to-center distance between connecting rod bearings. Distance should be 9.594 to 9.596 inches.

(6) Inspect connecting rod bearings for scoring, cracks, excessive wear, distortion, or any other defect. A rough or abrasive bearing surface will cause excessive crankshaft wear. Always replace bearings in sets.

NOTE

Abrasive materials may roll around between bearings and crankshaft journals causing scratches in the bearing without actually becoming embedded in the aluminum. Such scratches are not necessarily harmful and do not indicate that bearings should be replaced.

(7) Inspect rings for cracks, breaks, excessive wear, or any other defect. Measure end gap clearance for each ring. To measure clearance, insert a piston in cylinder bore in the inverted position. Insert each ring, one at a time, about two inches down in the cylinder bore and bring the bottom edge of the piston up against the ring to square the ring in the cylinder bore. Check gap with a feeler gage. Refer to Table 5-1 for gap clearances. If gap clearance for any ring is not as specified, the ring must be filed or honed to specification, or replaced.



A PISTON REMOVAL

Figure 6-47. Pistons and connecting rods, removal and installation, (sheet 1 of 2).



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B PISTON INSTALLATION

Figure 6-47. Pistons and connecting rods, removal and installation, (sheet 2 of 2).

(8) Inspect attaching hardware for cracks, damaged threads, distortion, or any other defect.

d. Reassembly. Reassemble pistons and connecting rods as shown in figure 6-48.

e. Installation.

(1) Install pistons and connecting rod assemblies as shown in figure 6-47.

(a) Lubricate all bearings, piston rings, and the liner walls with clean engine oil.

(b) Insert piston and connecting rod into each liner using a piston ring compressor tool.

(c) Install piston so that cylinder number stamped on side of connecting rod will be visible from inspection cover opening.

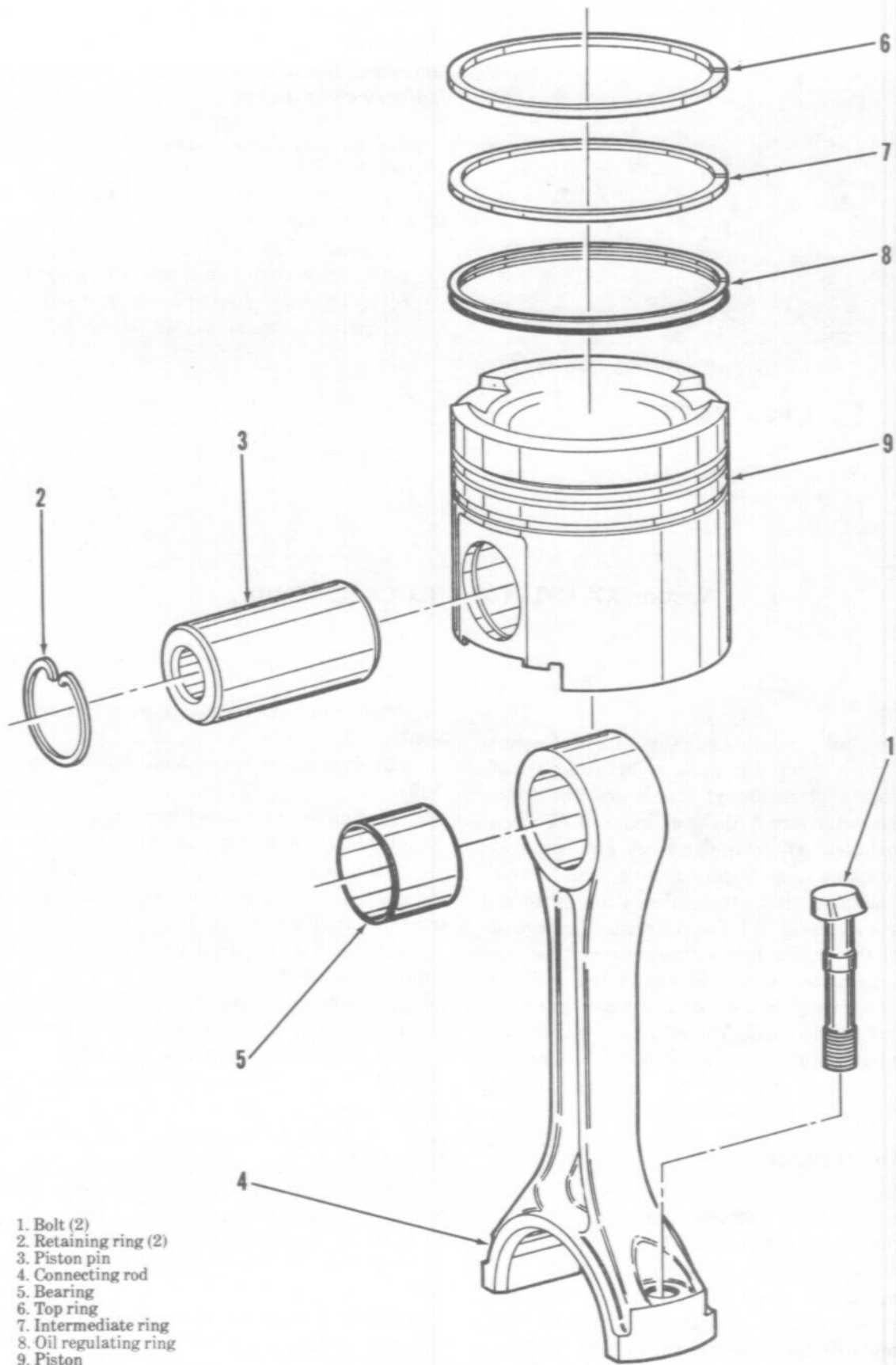
(d) Guide lower end of each connecting rod over crankshaft journal so as not to damage crankshaft bearing surface.

(2) Check connecting rod bearing clearance as follows:

(a) Cut one length of very soft wire or solder for each bearing. The length of each wire should be the same as width of bearing.

(b) Place a piece of wire or solder on each bearing lower half as shown in figure 6-45. Coat wire lightly with grease to hold it in place.

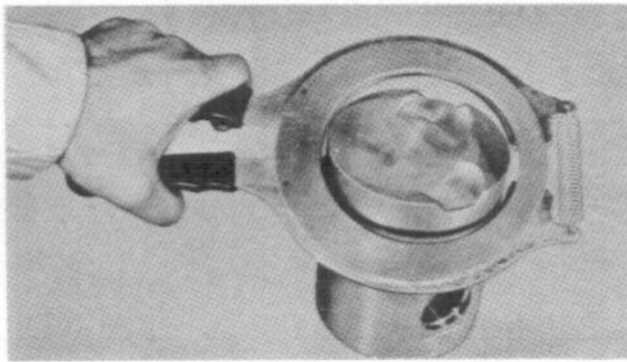
(c) Attach bearings and caps as shown in figure 6-47. Be sure cap nuts are tightened to proper torque.



- 1. Bolt (2)
- 2. Retaining ring (2)
- 3. Piston pin
- 4. Connecting rod
- 5. Bearing
- 6. Top ring
- 7. Intermediate ring
- 8. Oil regulating ring
- 9. Piston

A PISTON AND CONNECTING ROD ME 4310-338-15/6-48 ①

Figure 6-48. Pistons and connecting rods; disassembly and reassembly (sheet 1 of 2).



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B RING EXPANDER

Figure 6-48. Pistons and connecting rods, disassembly and reassembly, (sheet 2 of 2).

Section XX. CYLINDER BLOCK ASSEMBLY

6-44. General

The cylinder block assembly consists of a cast cylinder block, which forms the main structural part of the engine, and replaceable cylinder liners. The liners complete the water jacket of the cylinder block when they are installed. The cylinder block has passages that carry coolant to and around the cylinder liners and other passages that carry lubricating oil to all moving parts. Seals on the liners prevent leakage of coolant into the engine lubricating system. The flywheel housing attaches to the rear of the cylinder block and the timing gear cover and water pump to the front end of the block. The oil pan and plate attach to the bottom of the cylinder block. A compression gasket forms a tight seal between the cylinder block assembly and the cylinder head assembly.

6-45. Cylinder Block

a. Removal.

- (1) Remove engine assembly (para 5-13).
- (2) Remove fan pulley (para 3-77).
- (3) Remove water pump assembly (para 3-76).
- (4) Remove generator assembly (para 3-102).
- (5) Remove starting motor assembly (para 3-105).
- (6) Remove turbocharger assembly (para 3-115).
- (7) Remove oil filter and oil cooler assemblies (para 3-108 and 3-109).
- (8) Remove oil filler and crankcase breather assembly (para 3-110).

(d) Remove caps and bearings, one at a time, and measure thickness of wire. This measurement represents the bearing clearance. Clearance should 0.010 inches maximum.

NOTE

Excessive bearing clearance can also be an indication of crankshaft bearing surface being out-of-round.

(3) Complete installation of bearings and caps as shown in figure 6-47.

(4) Install oil pan and plate (para 6-29).

(5) Install cylinder head assembly (para 6-27).

(6) Install turbocharger assembly (para 3-115).

(7) Install engine assembly (para 5-13).

(9) Remove fuel transfer pump assembly (para 3-95).

(10) Remove primary fuel filter assembly (para 3-97).

(11) Remove final fuel filter assembly (para 3-98).

(12) Remove fuel pump starting tank (para 3-99).

(13) Remove governor assembly (para 6-17).

(14) Remove fuel injection pump housing assembly (para 6-20).

(15) Remove crankshaft pulley and vibration damper (para 6-36).

(16) Remove oil pan and plate (para 6-29).

(17) Remove timing gear cover (para 6-37).

(18) Remove timing gears (para 6-37).

(19) Remove accessory drive shaft and housing (para 6-34).

(20) Remove flywheel and flywheel housing (para 6-32).

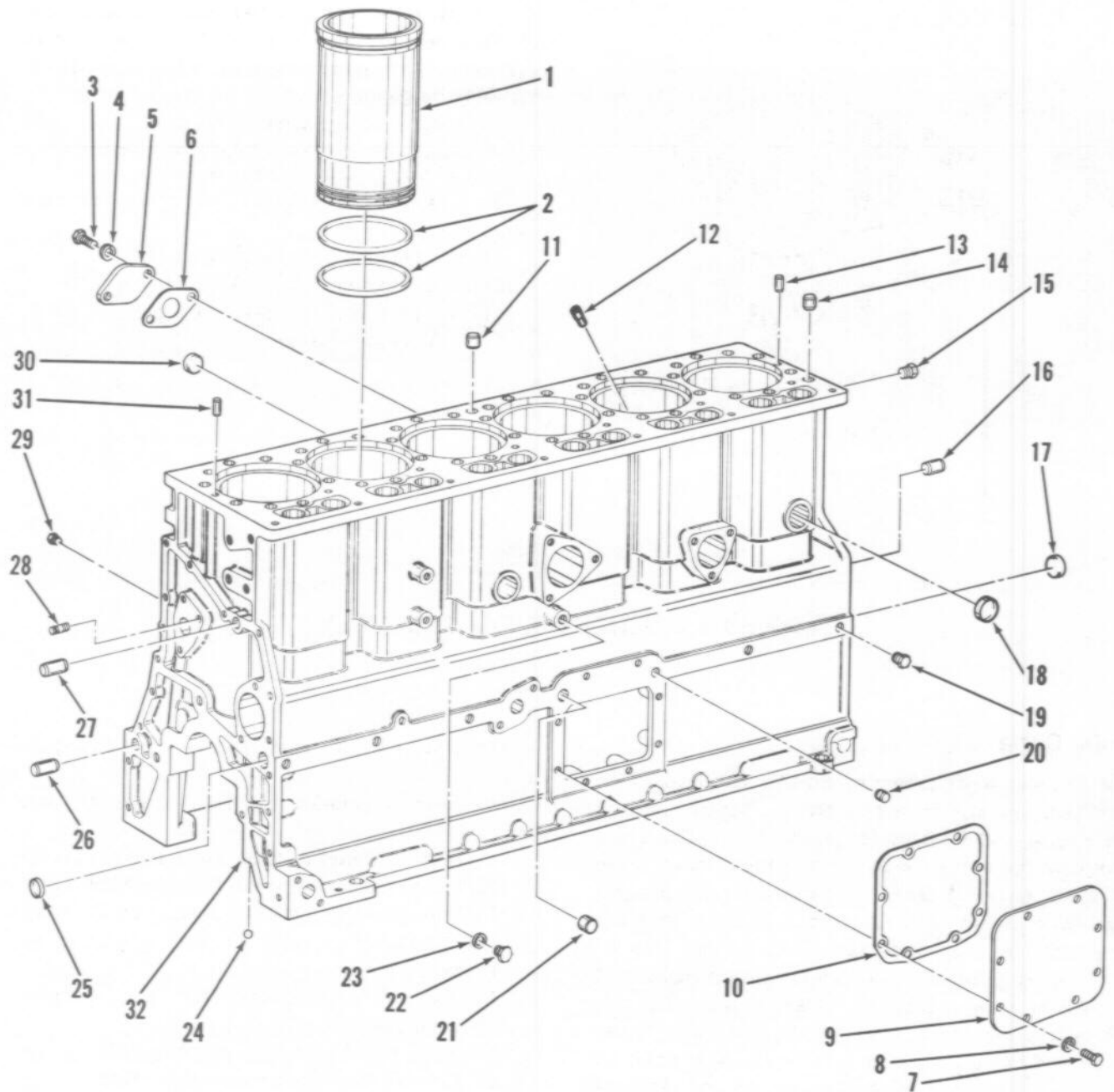
(21) Remove cylinder head assembly and valve operating mechanism (para 6-27).

(22) Remove camshaft assembly (para 6-41).

(23) Remove crankshaft and main bearings (para 6-39).

(24) Remove pistons, connecting rods, and bearings (para 6-43).

b. *Disassembly.* Disassemble cylinder block assembly in numerical sequence shown in figure 6-49. Use a hydraulic puller to remove cylinder liners as shown in figure 6-50.



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- | | |
|-----------------------|--------------------|
| 1. Cylinder liner (6) | 17. Plug |
| 2. O-Ring (12) | 18. Plug (2) |
| 3. Screw (2) | 19. Plug (5) |
| 4. Washer (2) | 20. Dowel pin |
| 5. Cover | 21. Dowel pin |
| 6. Gasket | 22. Plug |
| 7. Screw (8) | 23. Washer |
| 8. Washer (8) | 24. Ball |
| 9. Cover | 25. Plug |
| 10. Gasket | 26. Dowel pin |
| 11. Dowel pin | 27. Dowel pin |
| 12. Orifice (6) | 28. Stud |
| 13. Dowel pin (2) | 29. Plug |
| 14. Dowel pin | 30. Plug |
| 15. Plug | 31. Dowel pin |
| 16. Dowel pin (2) | 32. Cylinder block |

Figure 6-49. Cylinder block; disassembly and reassembly.

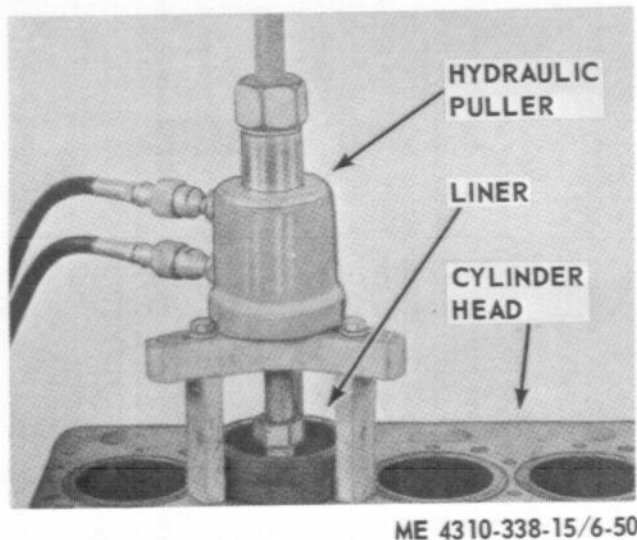


Figure 6-50. Cylinder liner removal.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard all gaskets and O-rings.

NOTE

Be sure all carbon and hardened deposits are removed.

(2) Inspect cylinder liners for cracks, scoring, distortion, excessive wear, or any other defect. Measure inside diameter of each liner. Diameter should be 4.750 to 4.752 inches for entire length of ring travel. Measure flange thickness. Measurement should be 0.4040 to 0.4056 inches.

(3) Inspect all covers for cracks, breaks, distortion, damaged sealing surfaces, or any other defect.

(4) Inspect cylinder block for cracks, breaks, distortion, leaking freeze plugs, or any other defect.

(5) Check cylinder bores for an out-of-round condition. Measure cylinder liner counterbore diameter. Diameter should be 0.400 to 0.402 inches. Measure main bearing bore diameter. Diameter should be 3.8155 to 3.8165 inches (original bore size).

NOTE

Main bearings must be installed to measure diameter of bearing bore.

(6) Inspect top of cylinder block for grooving or roughness.

(7) Inspect all plugs, studs, and attaching hardware. Check for damaged threads, cracks, breaks, distortion, excessive wear, or any other defect.

d. Reassembly.

CAUTION

To prevent coolant from leaking into engine lubricating system, ensure cylinder liner O-rings are not twisted when installed.

Reassemble cylinder block assembly in reverse numerical sequence shown in figure 6-49. Use new gaskets and O-rings. Lubricate cylinder liner O-rings with liquid soap to ease installation. Carefully lower each cylinder liner into block. Drive each liner into cylinder block until each bottoms, then hit block of wood several taps to assure liner is in. If last blow bottoms liner too hard, liner may bounce back slightly. Properly installed liners must extend 0.0020 to 0.0056 inches above top surface of block to ensure proper holding and sealing of liner against cylinder head gasket when cylinder head is tightened down.

e. Installation.

(1) Install crankshaft and main bearings (para 6-39).

(2) Install pistons, connecting rods, and bearings (para 6-43).

(3) Install camshaft assembly (para 6-41).

(4) Install cylinder head assembly and valve operating mechanism (para 6-27).

(5) Install flywheel and flywheel housing (para 6-32).

(6) Install accessory drive shaft and housing (para 6-34).

(7) Install timing gears (para 6-37).

(8) Install timing gear cover (para 6-37).

(9) Install oil pan and plate (para 6-29).

(10) Install crankshaft pulley and vibration damper (para 6-36).

(11) Install fuel injection pump housing assembly (para 6-20).

(12) Install governor assembly (para 6-17).

(13) Install fuel pump starting tank (para 3-99).

(14) Install final fuel filter assembly (para 3-98).

(15) Install primary fuel filter assembly (para 3-97).

(16) Install fuel transfer pump assembly (para 3-95).

(17) Install oil filler and crankcase breather assembly (para 3-110).

(18) Install oil filter and oil cooler assemblies (para 3-108 and 3-109).

(19) Install turbocharger assembly (para 3-115).

(20) Install starting motor assembly (para 3-105).

(21) Install generator assembly (para 3-102).

(22) Install water pump assembly (para 3-76).

(23) Install fan pulley (para 3-77).

(24) Install engine assembly (para 5-13).

CHAPTER 7

AIR COMPRESSOR REPAIR INSTRUCTIONS

Section I. THERMAL BYPASS VALVE ASSEMBLY

7-1. General

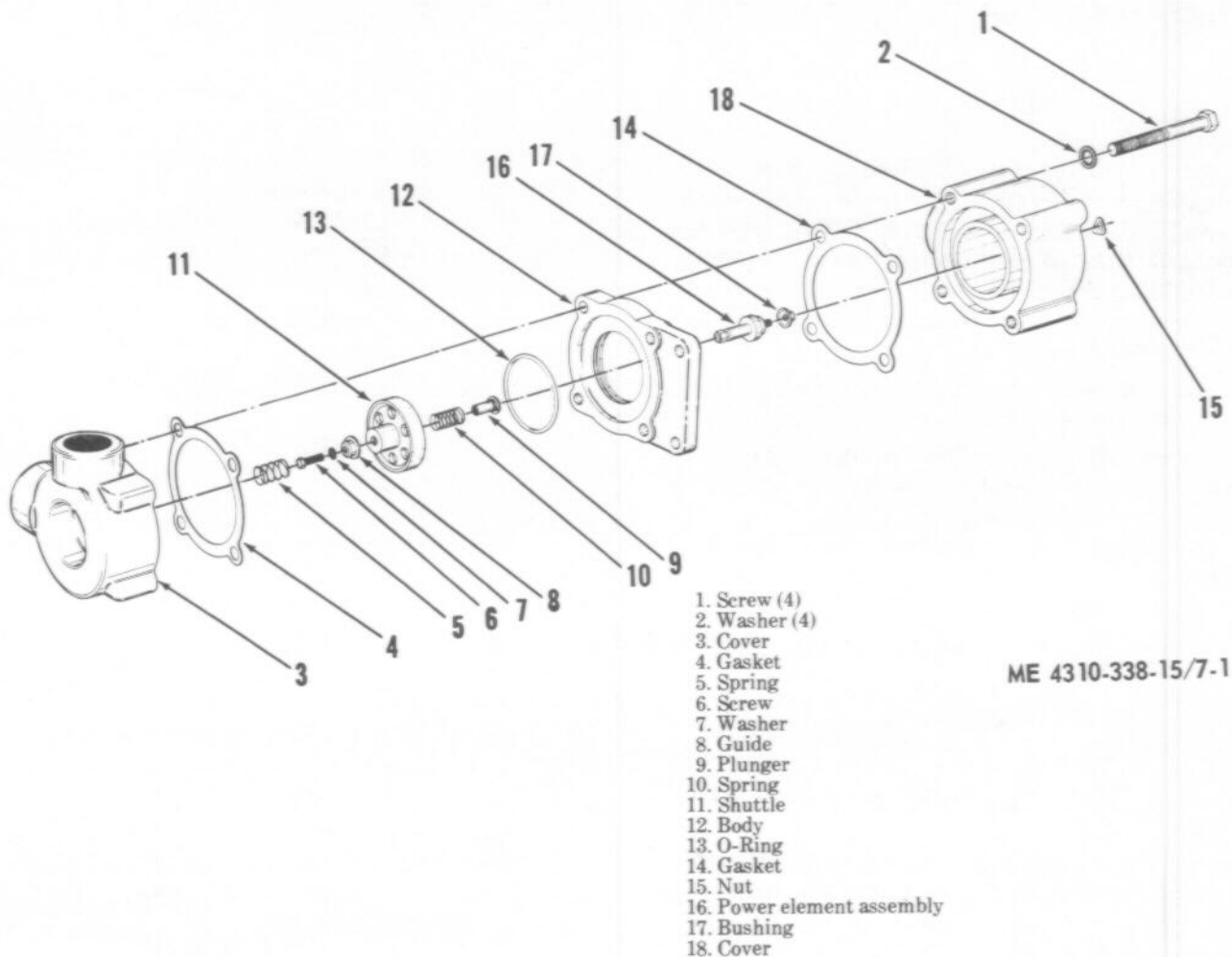
The thermal bypass valve assembly provides rapid warming of the compressor at initial startup by channeling the oil directly from the oil separator, through the oil filter, into the compressor (fig. 5-2). When the oil temperature reaches approximately 150°F., the bypass valve channels part or all of the oil through the oil cooler before it goes to the filter and compressor. Unless the compressor is operating

in extremely hot ambient temperatures, the thermal bypass valve will mix the hot oil from the separator and the cool oil from the cooler to maintain a relatively constant minimum operating temperature.

7-2. Thermal Bypass Valve Assembly

a. *Removal.* Remove thermal bypass valve assembly (para 3-85).

b. *Disassembly.* Disassemble thermal bypass valve assembly in numerical sequence shown in figure 7-1.



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Figure 7-1. Thermal bypass valve assembly; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard all gaskets and O-rings.

(2) Inspect covers and body for cracks, breaks, damaged threads, or any other defect.

(3) Inspect springs for cracks, breaks, distortion, or any other defect. Refer to Table 5-2 for spring free lengths.

(4) Inspect power element for distortion, jamming, or any other defect.

(5) Inspect all attaching hardware for damaged threads, distortion, or any other defect.

CAUTION

During reassembly, do not overtighten power element retaining nut. Overtightening can cause distortion, resulting in a malfunction.

d. Reassembly. Reassemble thermal bypass valve assembly in reverse numerical sequence shown in figure 7-1. Install new gaskets and O-rings.

e. Installation. Install thermal bypass valve assembly (para 3-85).

Section II. OIL COOLER ASSEMBLY

7-3. General

The compressor oil cooler assembly consists of a two-section lower tank connected to an upper tank by a series of open end vertical tubes. Radiator style fins are connected to the tubes. Hot oil from the oil separator enters one section of the lower tank and flows upward through one-half of the vertical tubes to the upper tank. The oil then flows downward through the other half of the tubes into the second section of the lower tank. From this section, the oil flows to the compressor via the oil filter. The fins on the tubes act as a heat sink, cooling the oil as air is drawn through the cooler by the engine driven fan.

7-4. Oil Cooler Assembly

a. Removal. Remove radiator and oil cooler assembly (para 3-73).

b. Disassembly. Disassemble radiator and oil cooler assembly in numerical sequence shown in figure 6-10.

c. Cleaning, Inspection, and Repair.

(1) Clean oil cooler using a cleaning solvent that is in accordance with Federal specification P-D-680. Flush interior of oil cooler using the same solvent. Dry oil cooler thoroughly.

(2) Inspect oil cooler for cracks, breaks, distortion, or any other defect.

(3) Plug outlet connection and fill oil cooler with clean oil (refer to LO 5-4310-338-12). Apply air pressure of from 4 to 10 PSI to inlet connection and check for leaks. Mark each leak detected.

(4) Remove air pressure and drain oil from cooler. Solder or braze all leaks detected and recheck by repeating step 3, above.

(5) Inspect attaching hardware for damaged threads, distortion, or any other defect.

d. Reassembly. Reassemble radiator and oil cooler assembly in reverse numerical sequence shown in figure 6-10.

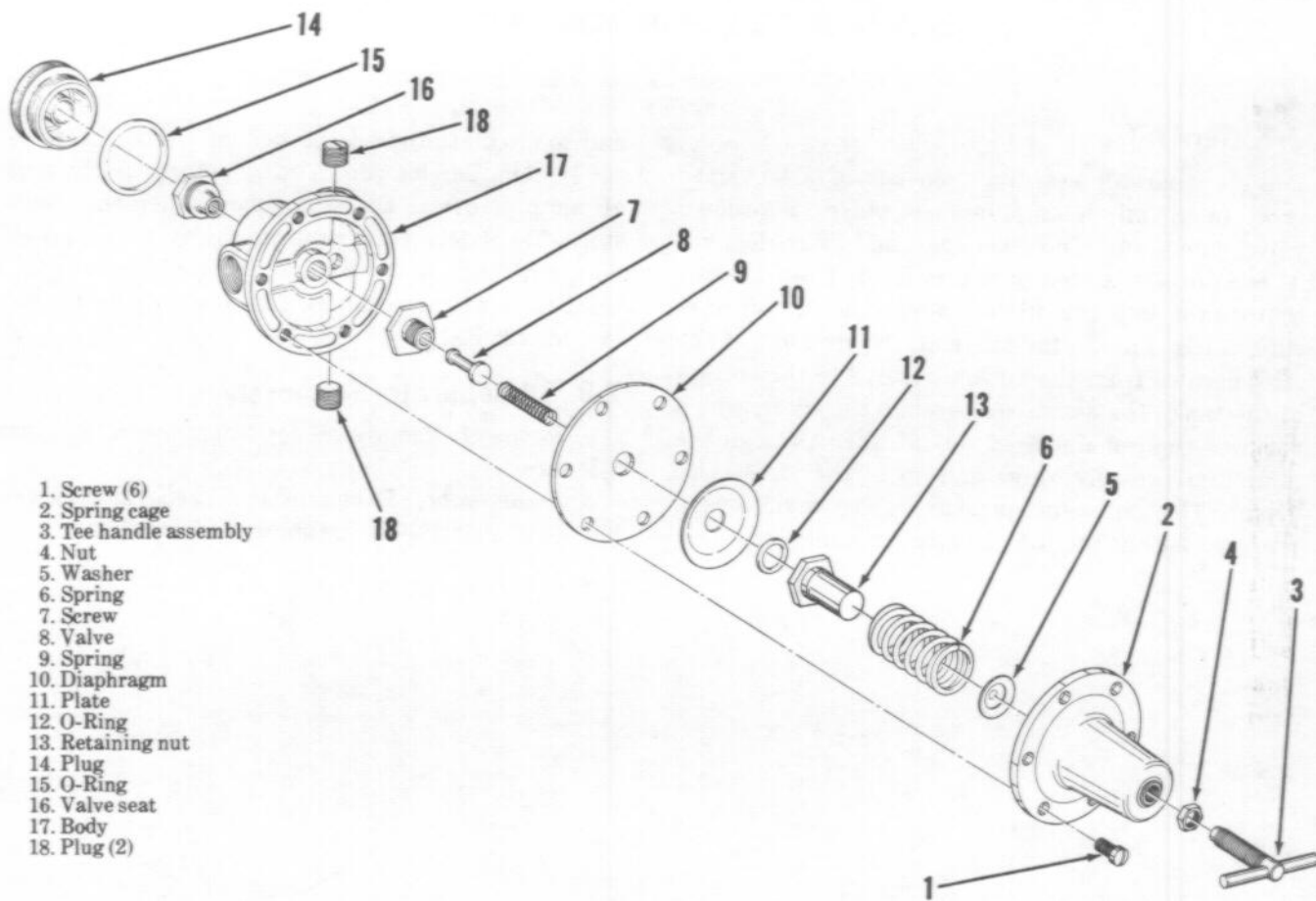
e. Installation. Install radiator and oil cooler assembly (para 3-73).

Section III. AIR PRESSURE REGULATOR ASSEMBLY

7-5. General

The air pressure regulator assembly controls the intake control valve opening and engine RPM to meet any air output demand within the capabilities of the Model 1M600RPV Rotary Air Compressor. When the compressor is running unloaded, the air pressure regulator also bleeds air into the stator to prevent a vacuum buildup and consequential blade chattering. Discharge air acting on a valve and spring in the regu-

lator causes the valve to open as air pressure reaches 100 PSI. As the valve opens, it allows air to enter the intake-control between the cover and diaphragm and forces the intake valve closed. As the intake valve closes, engine RPM decreases. As long as air pressure is held at 100 PSI, the intake valve remains closed and the engine RPM remains at low idle. When air is demanded again, the valve in the air pressure regulator closes, which allows the intake control valve to open and engine RPM to increase.



1. Screw (6)
2. Spring cage
3. Tee handle assembly
4. Nut
5. Washer
6. Spring
7. Screw
8. Valve
9. Spring
10. Diaphragm
11. Plate
12. O-Ring
13. Retaining nut
14. Plug
15. O-Ring
16. Valve seat
17. Body
18. Plug (2)

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Figure 7-2. Air pressure regulator assembly; disassembly and reassembly.

7-6. Air Pressure Regulator Assembly

a. Removal. Remove air pressure regulator assembly (para 3-89).

b. Disassembly. Disassemble air pressure regulator assembly in numerical sequence shown in figure 7-2.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Be sure to remove all sealant that was used during assembly. Discard O-ring and diaphragm.

(2) Inspect springs for defective coils, cracks, distortion, or any other defect.

(3) Inspect valve and seat for excessive wear,

distortion, cracks, or any other defect.

(4) Inspect all other parts for distortion, cracks, breaks, excessive wear, or any other defect.

(5) Inspect attaching hardware for damaged threads, distortion, cracks, or any other defect.

d. Reassembly. Reassemble air pressure regulator assembly in reverse numerical sequence shown in figure 7-2. Install a new O-ring and diaphragm. Use sealant when installing valve seat; also use sealant when assembling diaphragm and washer with screw and nut.

e. Installation. Install air pressure regulator assembly (para 3-89).

f. Adjustment. Adjust air pressure regulator assembly (fig. 3-71).

Section IV. OIL SEPARATOR ASSEMBLY

7-7. General

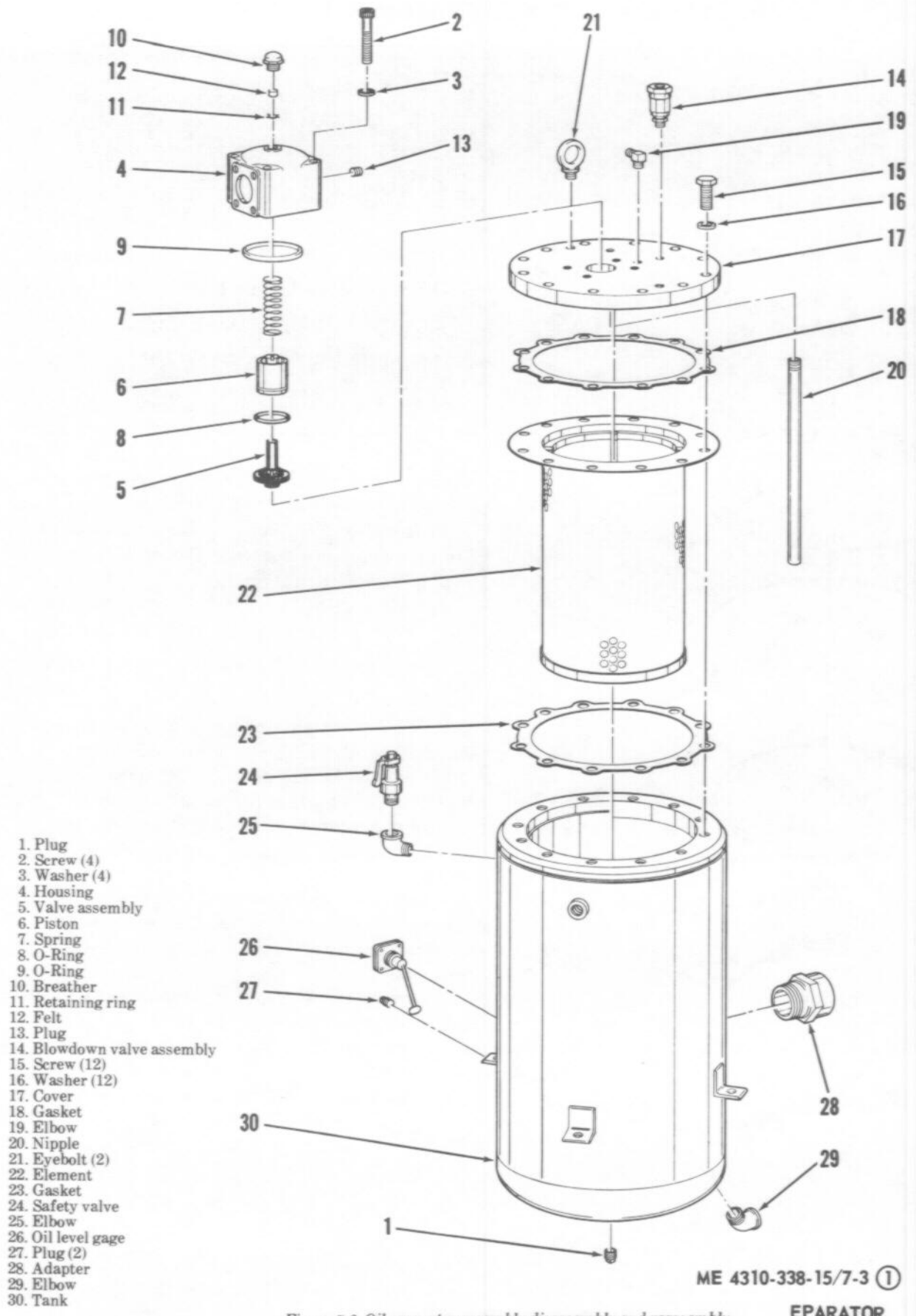
The oil separator assembly consists of a labyrinth type tank, minimum pressure valve, blowdown valve, safety valve, oil level gage, and filter element. A compressed air/oil mixture flows from the air compressor into the oil separator. The air/oil mixture swirls through the labyrinth where most of the oil separates from the air and returns to the bottom of the tank. The air passes through the filter, which removes the remainder of the oil, then through the minimum pressure valve and on to the air service valves. The minimum pressure valve maintains a pressure within the tank to effect air/oil separation

and to circulate the oil throughout the air compressor system. The blowdown valve automatically vents all air pressure to the atmosphere when the engine stops. The safety valve protects the system from abnormally high air pressure. This valve opens and vents the air to atmosphere if air pressure in the tank exceeds 125 PSI.

7-8. Oil Separator Assembly

a. *Removal.* Remove oil separator assembly (para 5-11).

b. *Disassembly.* Disassemble oil separator assembly in numerical sequence shown in figure 7-3.

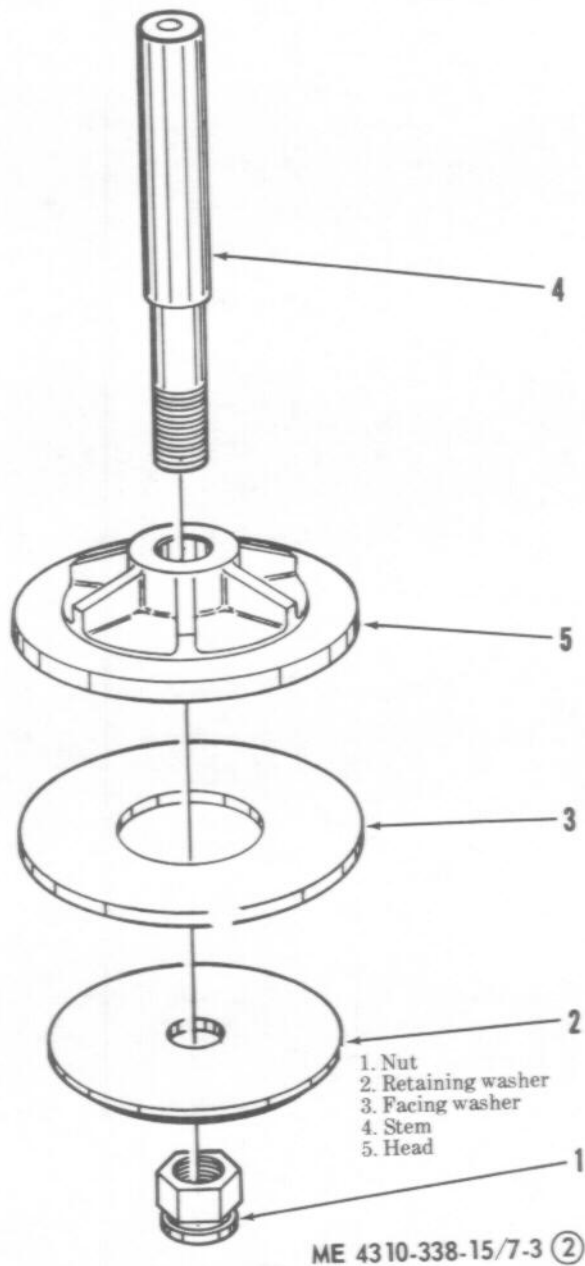


- 1. Plug
- 2. Screw (4)
- 3. Washer (4)
- 4. Housing
- 5. Valve assembly
- 6. Piston
- 7. Spring
- 8. O-Ring
- 9. O-Ring
- 10. Breather
- 11. Retaining ring
- 12. Felt
- 13. Plug
- 14. Blowdown valve assembly
- 15. Screw (12)
- 16. Washer (12)
- 17. Cover
- 18. Gasket
- 19. Elbow
- 20. Nipple
- 21. Eyebolt (2)
- 22. Element
- 23. Gasket
- 24. Safety valve
- 25. Elbow
- 26. Oil level gage
- 27. Plug (2)
- 28. Adapter
- 29. Elbow
- 30. Tank

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Figure 7-3. Oil separator assembly disassembly and reassembly
(sheet 1 of 2).

EPARATOR



B MINIMUM PRESSURE VALVE

Figure 7-3. Oil separator assembly, disassembly and reassembly (sheet 2 of 2).

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts, except element, using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard all gaskets and O-rings.

(2) Inspect element for holes, varnish, or any other defect.

(3) Inspect all springs for defective coils, distortion, or any other defect. Refer to Table 5-2 for spring free length.

(4) Inspect all minimum pressure valve parts for breaks, cracks, distortion, deterioration, or any other defect.

(5) Inspect oil level gage for cracks, breaks, or improper operation. Check for bending, distortion, or any other defect.

(6) Inspect all other parts (including blowdown valve) for cracks, breaks, distortion, or any other defect.

(7) Inspect attaching hardware for distortion, damaged threads, cracks, or any other defect.

d. Reassembly. Reassemble oil separator assembly in reverse numerical sequence shown in figure 7-3. Install new gaskets and O-rings.

e. Installation. Install oil separator assembly (para 5-11).

7-9. Oil Separator Element

a. Removal.

(1) Disconnect all air lines and piping as necessary for removal of cover (fig. 3-58 and 3-59).

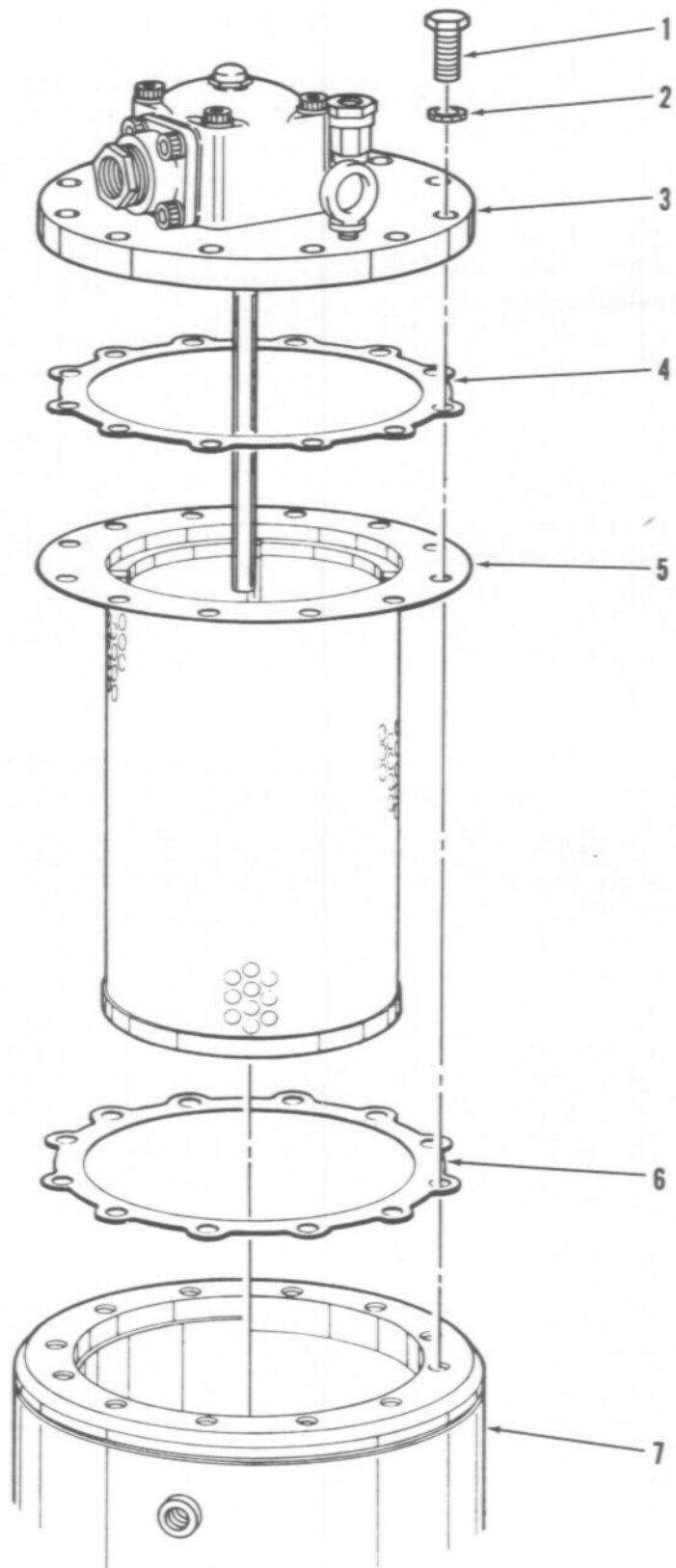
(2) Remove cover, gaskets, and element by following numerical sequence shown in figure 7-4. Air pressure regulator, moisture separator, and bracket can be removed as a unit when oil separator capscrews are removed.

b. Inspection. Inspect element for holes, varnishing, distortion, or any other defect. Inspect gaskets for deterioration.

c. Installation.

(1) Install element, gaskets, and cover by following reverse numerical sequence shown in figure 7-4. Attach moisture separator, air pressure regulator, and bracket to cover.

(2) Connect all air lines and piping (fig. 3-58 and 3-59).



- 1. Screw (12)
- 2. Lockwasher (12)
- 3. Cover
- 4. Gasket
- 5. Element
- 6. Gasket
- 7. Tank (ref)

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Figure 7-4. Oil separator element; removal and installation.

Section V. AIR COMPRESSOR ASSEMBLY

7-10. General

Basically, the air compressor assembly consists of the intake control, a cast single stage stator, rotor, rotor blades, end covers, flywheel housing adapter, and coupling. A valve in the intake control unit controls the amount of air that is taken into the compressor and shuts off the air input when a pressure of approximately 115 PSI is reached in the oil separator assembly. When the valve is closed, the compressor is running unloaded. The valve also closes when the compressor shuts down, thereby preventing any oil and air mixture from the rotor-stator from being vented to the atmosphere. When the compressor is running unloaded, a vacuum can develop within the stator and cause internal damage. To prevent this, the air pressure regulator valve causes the intake control valve to open slightly, which allows just enough air input to prevent a vacuum buildup. The compressor also incorporates spring loaded drain valves which prevent hydraulic locks within the stator. The rotor is mounted in the stator housing on a shaft which protrudes through the end covers and rotates on two roller bearings. Air and oil is drawn into the stator and compressed by the action of the rotor and blades. The compressed air/oil mixture is discharged into the oil separator where a labyrinth chamber and filter separate the oil from the air. The

air is then passed on to the service valves and the oil is recirculated into the compressor. The air compressor develops an air flow of 600 CFM at a discharge pressure of 100 PSI.

7-11. Air Compressor Assembly

a. Removal. Remove air compressor assembly (para 5-12).

b. Disassembly. Disassemble air compressor assembly in numerical sequence shown in figure 7-5.

NOTE

Do not disassemble drive end cover-rotor combination except to replace defective parts. If an inspection reveals that any of these parts are defective and need to be replaced, refer to paragraph c, below.

c. Drive End Cover-Rotor Disassembly.

NOTE

It is recommended that the drive end cover-rotor combination not be disassembled unless an inspection reveals defective parts that need replacing.

(1) Disassemble in numerical sequence shown in figure 7-6.

CAUTION

Since excessive heat causes softening of the metal, any inner race heated in the following manner must be discarded and the entire bearing replaced. Never heat inner race unless it is intended to replace entire bearing.

- | | | |
|-----------------------|---------------------|---------------------|
| 1. Nut | 34. Gasket | 67. Gasket |
| 2. Bolt | 35. Tube | 68. Screw (8) |
| 3. Lockwasher | 36. O-Ring (2) | 69. Lockwasher (8) |
| 4. Clamp | 37. Screw (4) | 70. Cover |
| 5. Screw (2) | 38. Screw (2) | 71. Gasket |
| 6. Lockwasher | 39. Lockwasher (6) | 72. Plug |
| 7. Guide | 40. Body | 73. Oil Seal |
| 8. Gasket | 41. Gasket | 74. Seal sleeve |
| 9. Bushing | 42. Elbow | 75. O-Ring |
| 10. O-Ring | 43. Plug | 76. Locking sleeve |
| 11. Screw (8) | 44. O-Ring | 77. O-ring |
| 12. Lockwasher (8) | 45. Spring | 78. Bearing ring |
| 13. Cover | 46. Ball | 79. End cover/rotor |
| 14. Push rod | 47. Screw (8) | 80. Blade |
| 15. Diaphragm | 48. Lockwasher (8) | 81. O-Ring |
| 16. Cylinder | 49. Cover | 82. Plug (4) |
| 17. Gasket | 50. Gasket | 83. O-Ring (4) |
| 18. Screw | 51. Screw (8) | 84. Spring (4) |
| 19. Lockwasher | 52. Seal washer (8) | 85. Valve (4) |
| 20. Piston | 53. End cover | 86. Valve |
| 21. Spring | 54. O-Ring | 87. O-Ring |
| 22. Stem | 55. Baring | 88. Ball |
| 23. Guide | 56. Plug | 89. Pin |
| 24. Spring | 57. Screw (2) | 90. Eye bolt |
| 25. Intake valve | 58. Lockwasher (2) | 91. Screw (2) |
| 26. Screw (5) | 59. Retainer | 92. Plate |
| 27. Lockwasher (5) | 60. Collet | 93. Stator |
| 28. Cover | 61. Coupling | |
| 29. Gasket | 62. Key | |
| 30. Screw (2) | 63. Collet | |
| 31. Screw (4) | 64. Secrew (8) | |
| 32. Lockwasher (6) | 65. Seal washer (8) | |
| 33. Intake connection | 66. Adapter | |

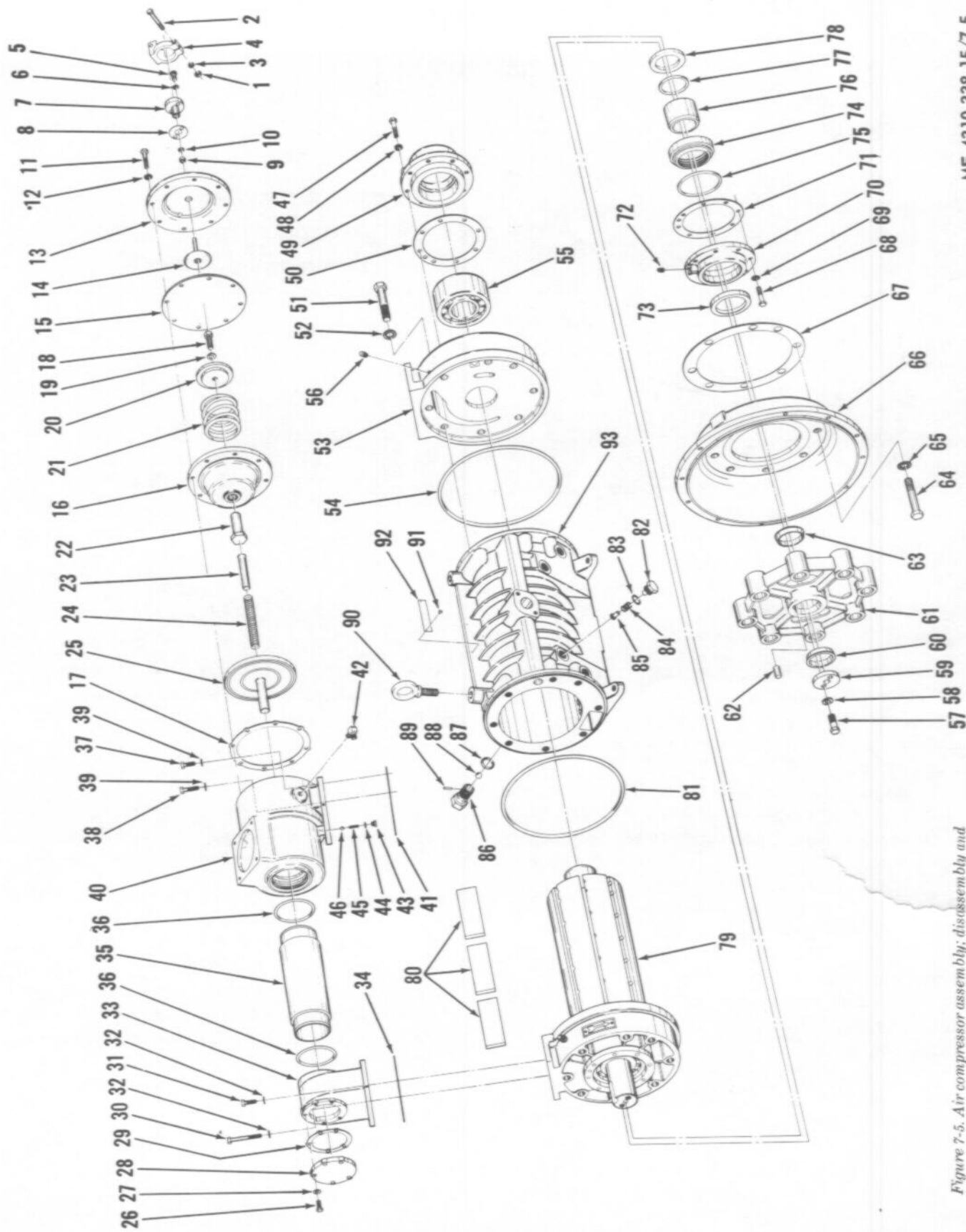


Figure 7-5. Air compressor assembly; disassembly and reassembly.

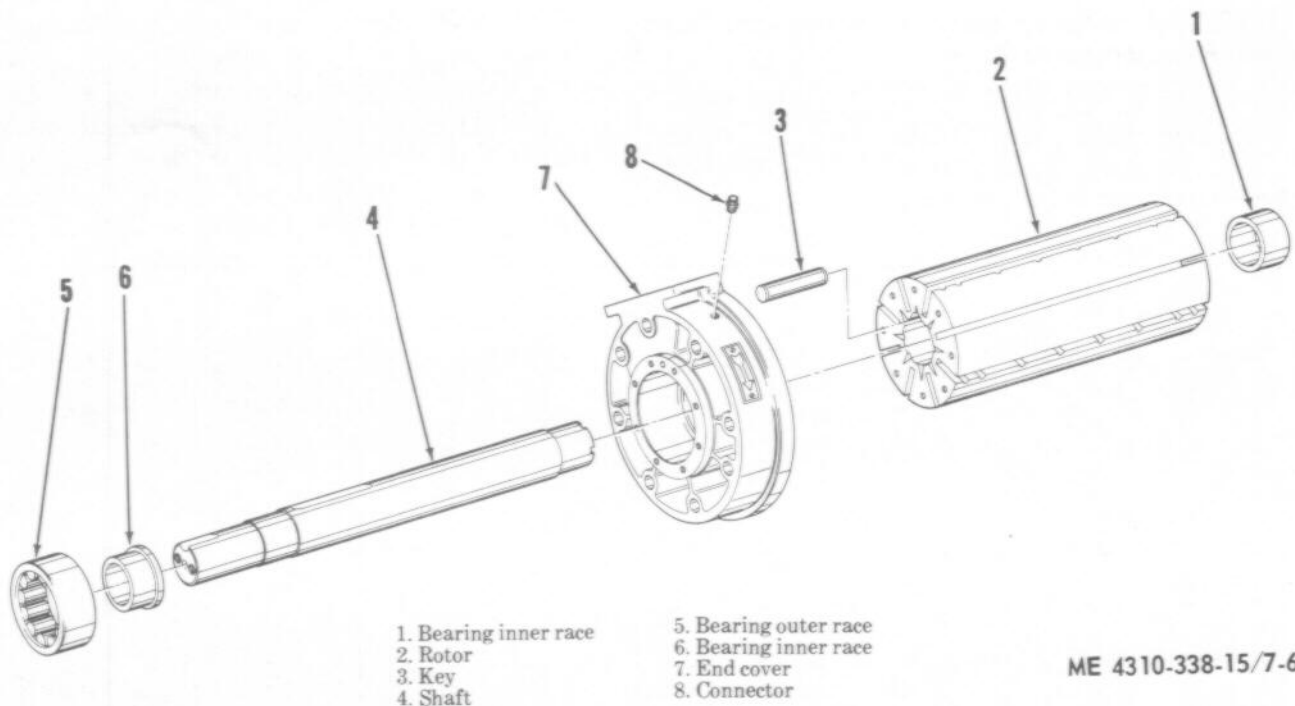


Figure 7-6. Drive end cover-rotor; disassembly and reassembly.

(2) Remove bearing inner races using a gear puller or the equivalent. If either inner race will not move, use a torch and heat race evenly. With heat applied, remove inner race as quickly as possible.

d. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard all gaskets and O-rings.

(2) Inspect all springs for defective coils, cracks, distortion, or any other defect. Refer to Table 5-2 for spring free length.

(3) Inspect intake control diaphragm for rupture, deterioration, or any other defect.

(4) Inspect intake control valve for cracks, distortion, condition of seat, excessive wear, or any other defect.

(5) Inspect rotor blades for cracks, breaks, chipping, excessive wear, or any other defect. If blades are worn on one side only, they can be turned over and reused.

(6) Inspect rotor and stator for cracks, gouges, excessive wear, raised metal, or any other defect.

(7) Inspect bearings for freedom of rotation, excessive wear, cracks, breaks, or any other defect.

(8) Inspect all other parts for cracks, breaks, distortion, or any other defect.

(9) Inspect attaching hardware for damaged

threads, distortion, cracks, or any other defect.

e. Reassembly. Reassemble air compressor assembly in reverse numerical sequence shown in figure 7-5, except rotor blades are installed after drive end cover-rotor assembly is installed. Install new gaskets and O-rings.

NOTE

If drive end cover-rotor assembly is disassembled, refer to paragraph *f*, below, for reassembly instruction.

f. Drive End Cover-Rotor Reassembly. Reassemble drive end cover-rotor assembly in reverse numerical sequence shown in figure 7-6.

CAUTION

Do not use a torch or any similar heating method on bearing inner races. Excessive or uneven heat will cause softening of the metal. To prevent galling the shaft, do not allow an inner race to cool before it is installed.

(1) When installing bearing inner races, submerge them in hot cooking oil and heat to 350° F. maximum.

(2) Install rotor with oil drain holes in blade slots positioned at leading edge of slots in accordance with rotor rotation.

g. Installation. Install air compressor assembly (para 5-12).

7-12. Air Compressor Rotor Blade Inspection and Replacement

a. Disassembly.

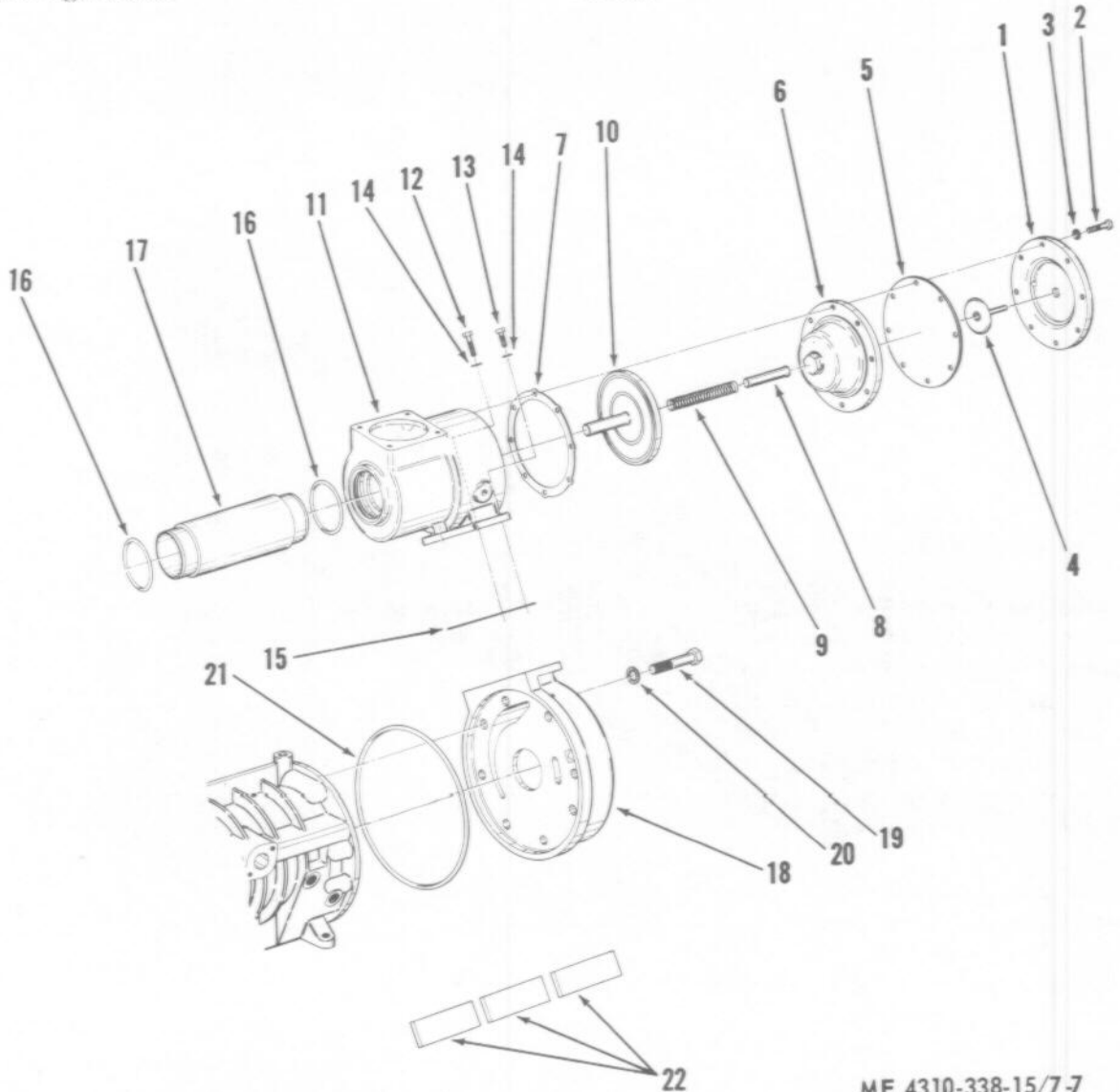
(1) Remove locknut and disconnect stop block from speed control arm.

(2) Remove engine air cleaner assembly and cap as shown in figure 3-99.

(3) Disconnect all air lines at intake-unloader fittings.

(4) Remove elbow on air intake opening.

(5) Remove parts in numerical sequence as shown in figure 7-7. Use a wire bent into a hook on one end to extract rotor blades from slots at top of rotor. To bring blades into position at top of rotor, engine must be rotated by repeatedly pressing start button.



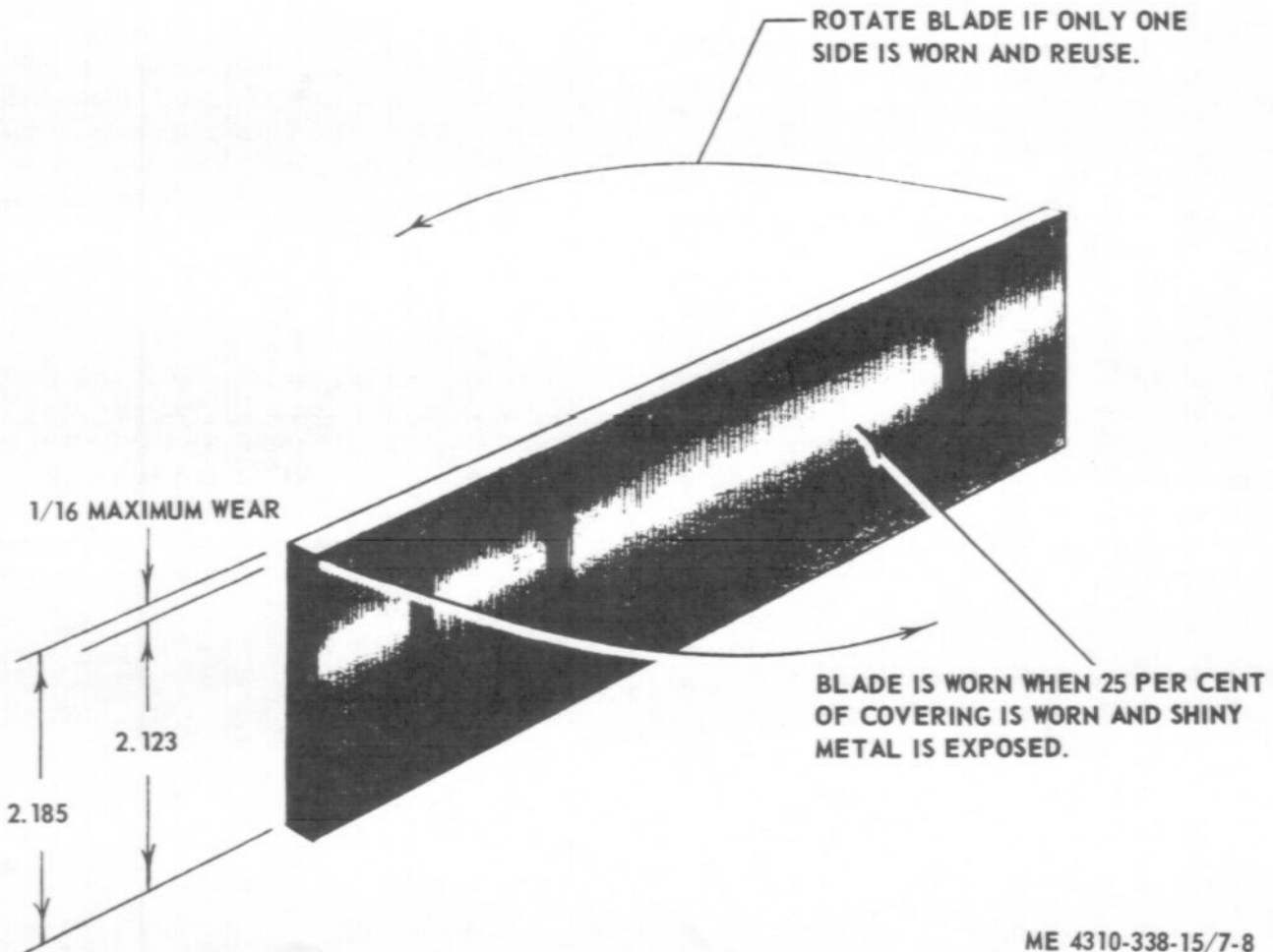
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- | | |
|----------------------|--------------------|
| 1. Cover assembly | 12. Screw (2) |
| 2. Screw (8) | 13. Screw (4) |
| 3. Washer (8) | 14. Washer (6) |
| 4. Push rod | 15. Gasket |
| 5. Diaphragm | 16. O-Ring (2) |
| 6. Cylinder assembly | 17. Tube |
| 7. Gasket | 18. Cover assembly |
| 8. Guide | 19. Screw (8) |
| 9. Spring | 20. Washer (8) |
| 10. Intake valve | 21. O-Ring |
| 11. Body | 22. Blade (24) |

Figure 7-7. Disassembly blade inspection.

b. *Inspection.* Inspect blades for evidence of excessive wear. See figure 7-8. Blades are worn when 25 per cent of covering per side has been removed, and shiny metal exposed. Blades worn on one side only are to be turned around and reused. Replace blades

which have suffered a loss of 1/16-inch in height due to wear. See figure 7-8. Replace blades worn on both sides. Replace blades damaged by scores or chips.



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Figure 7-8. Blade conditions.

c. *Reassembly.*

- (1) Dip new O-rings and new blades in clean compressor oil before installing.
- (2) Reassemble in reverse numerical sequence as shown in figure 7-7.
- (3) Install elbow on air intake opening.
- (4) Connect air lines at intake-unloader fittings.
- (5) Install engine air cleaner assembly as shown

in figure 3-99.

(6) Connect stop block to speed control arm and secure with locknut.

(7) Start unit (fig. 2-8) and check compressor and air lines for leaks or other malfunctions. Correct any malfunctions by referring to Table 3-2. Troubleshooting.

CHAPTER 8

BRAKES, STEERING, AND AXLE REPAIR INSTRUCTIONS

Section I. BRAKE GROUP

8-1. General

The brake group consists of wedge-actuated service air brakes, spring actuated mechanical parking brakes, service chambers, an emergency relay valve, an air reservoir tank, and associated lines and fittings. The parking brakes are manually controlled using a hand lever that is connected by cables, to an actuating mechanism. Compressed air from the towing vehicle is supplied to the emergency relay valve and air reservoir tank. The emergency relay valve distributes air to a service chamber mounted on each wedge brake assembly. The force from the air chamber is applied to wedges located between plungers inside the wedge brakes. The wedges move forward spreading the plungers apart which moves the brake shoes against the drum. Friction in the wedge actuating mechanism is reduced by the use of rollers located between each plunger and brake applying

wedge. If the air pressure from the towing vehicle fails, as in the case of a breakaway or uncoupling, the air from the reservoir tank actuates the service brakes automatically. The tank air pressure will then bleed off and the brakes will release.

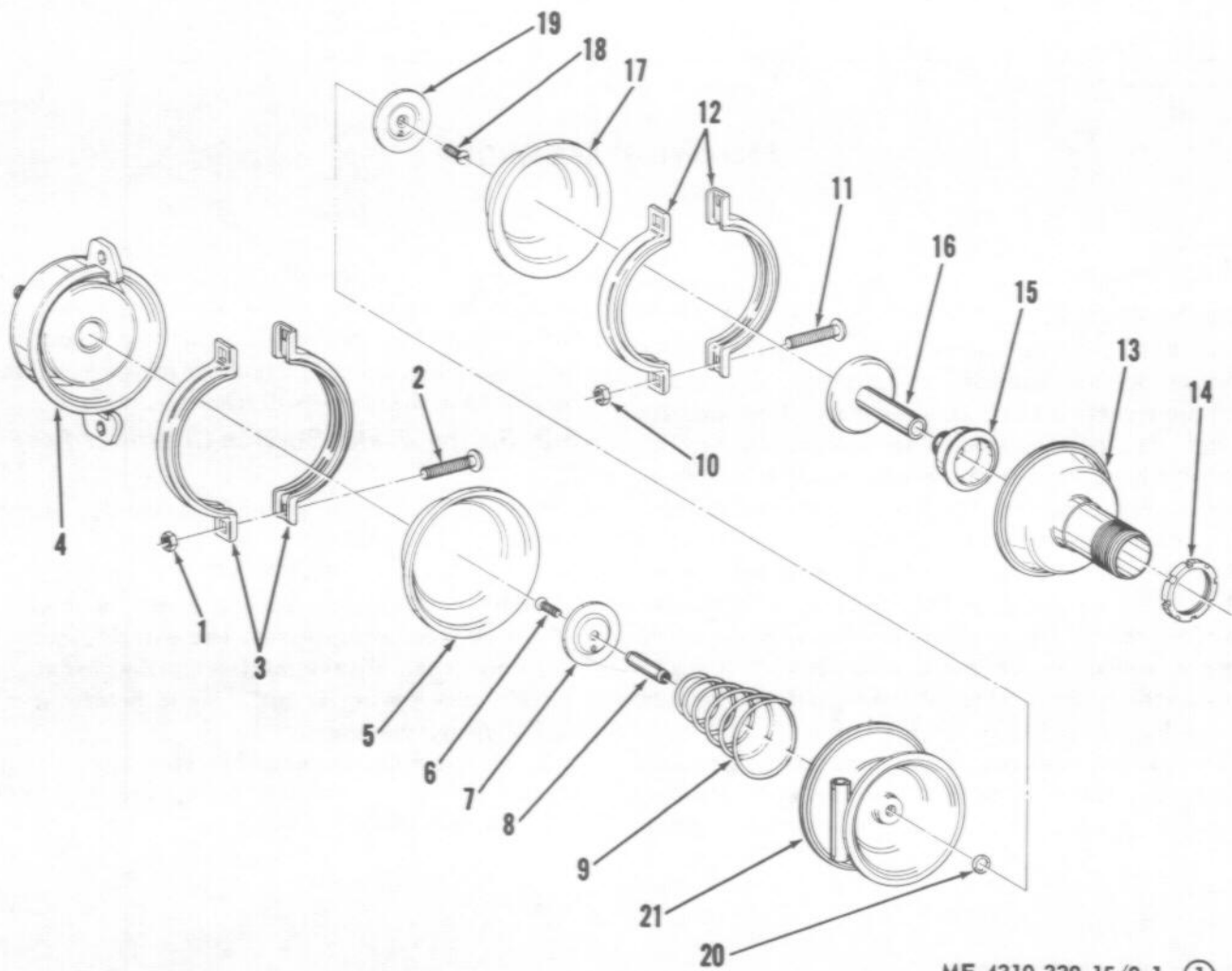
8-2. Spring Brake-Service Chamber Assembly.

a. *Removal.*-Remove spring brake-service chamber assembly (para 3-123).

WARNING

The compression spring exerts a high force when compressed. Use extreme caution when disassembling spring brake. Be sure spring is fully caged before attempting disassembly.

b. *Disassembly.* Disassembly each spring brake-service chamber assembly in numerical sequence shown in figure 8-1.

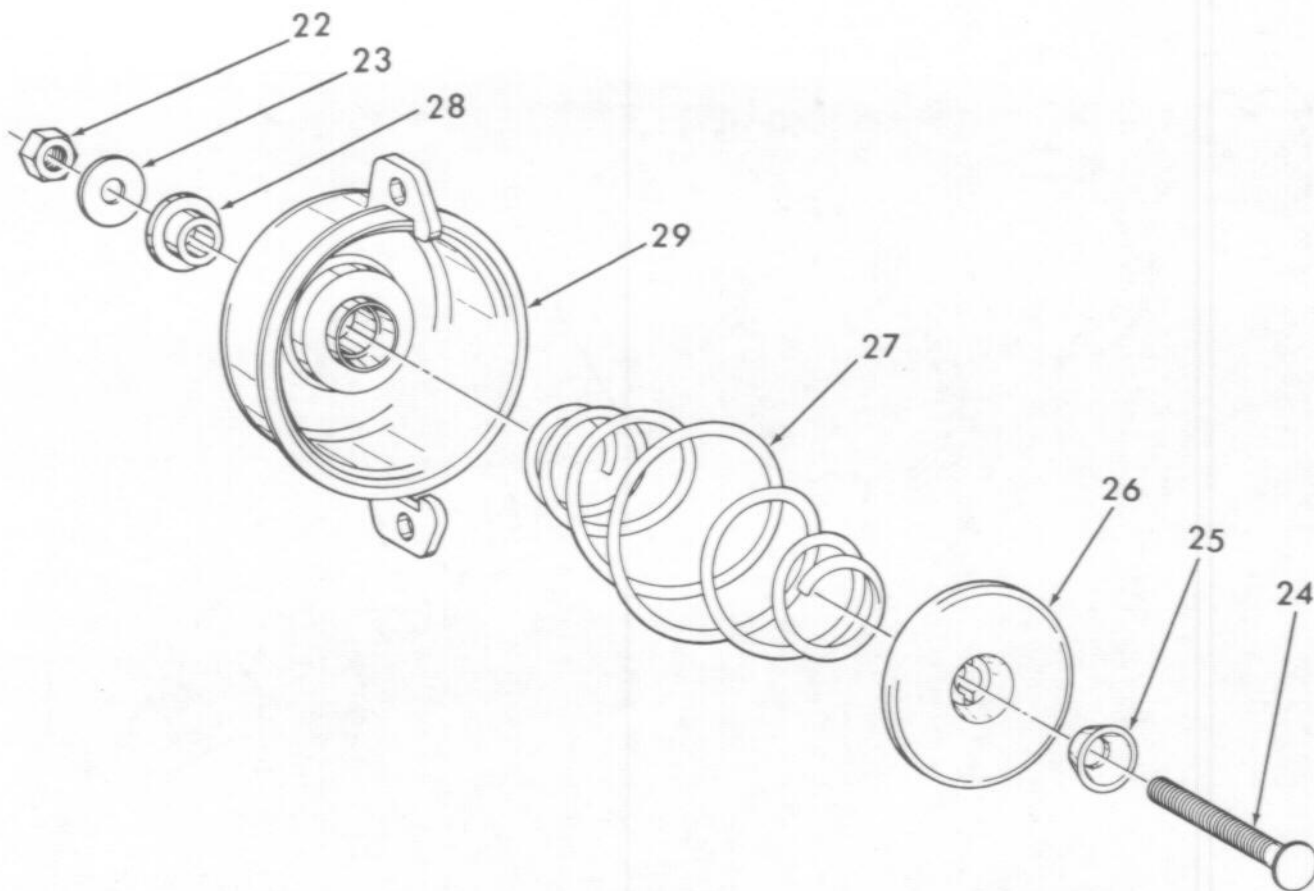


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A SPRING BRAKE-SERVICE CHAMBER ASSEMBLY

- | | |
|---------------------|------------------------|
| 1. Nut (2) | 16. Push rod |
| 2. Bolt (2) | 17. Diaphragm |
| 3. Clamp | 18. Screw |
| 4. Chamber | 19. Plate |
| 5. Diaphragm | 20. O-Ring |
| 6. Screw | 21. Adapter |
| 7. Plate | 22. Nut |
| 8. Push rod adapter | 23. Washer |
| 9. Return spring | 24. Release stud |
| 10. Nut (2) | 25. Cup |
| 11. Bolt (2) | 26. Pressure plate |
| 12. Clamp | 27. Compression spring |
| 13. Housing | 28. Bushing |
| 14. Nut | 29. Chamber |
| 15. Boot | |

Figure 8-1. Spring brake-service chamber assembly, disassembly and reassembly (sheet 1 of 2).



ME 4310-338-15/8-1 (2)

B SERVICE CHAMBER ASSEMBLY

Figure 8-1. Spring brake-service chamber assembly, disassembly and reassembly, (sheet 2 of 2).

NOTE

With compression spring caged, remove clamp; then remove spring chamber as a unit. Carefully disassemble spring chamber.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.

(2) Inspect springs for cracks, defective coils, breaks, or any other defect.

(3) Inspect diaphragm and boots for cracks, breaks, deterioration, or any other defect.

NOTE

Diaphragms should be replaced at least every 50,000 miles or once a year, whichever occurs first.

(4) Inspect push rods for cracks, breaks, distortion, or any other defect.

(5) Inspect housing assembly and pressure plate for distortion, cracks, condition of sealing surfaces, or any other defect.

(6) Inspect release stud and all other parts for cracks, distortion, damaged threads, or any other defect.

d. *Reassembly.* Reassemble each spring brake-service chamber assembly in reverse numerical sequence shown in figure 8-1.

NOTE

Assemble spring chamber and cage spring. Assemble spring chamber as a unit using clamp provided.

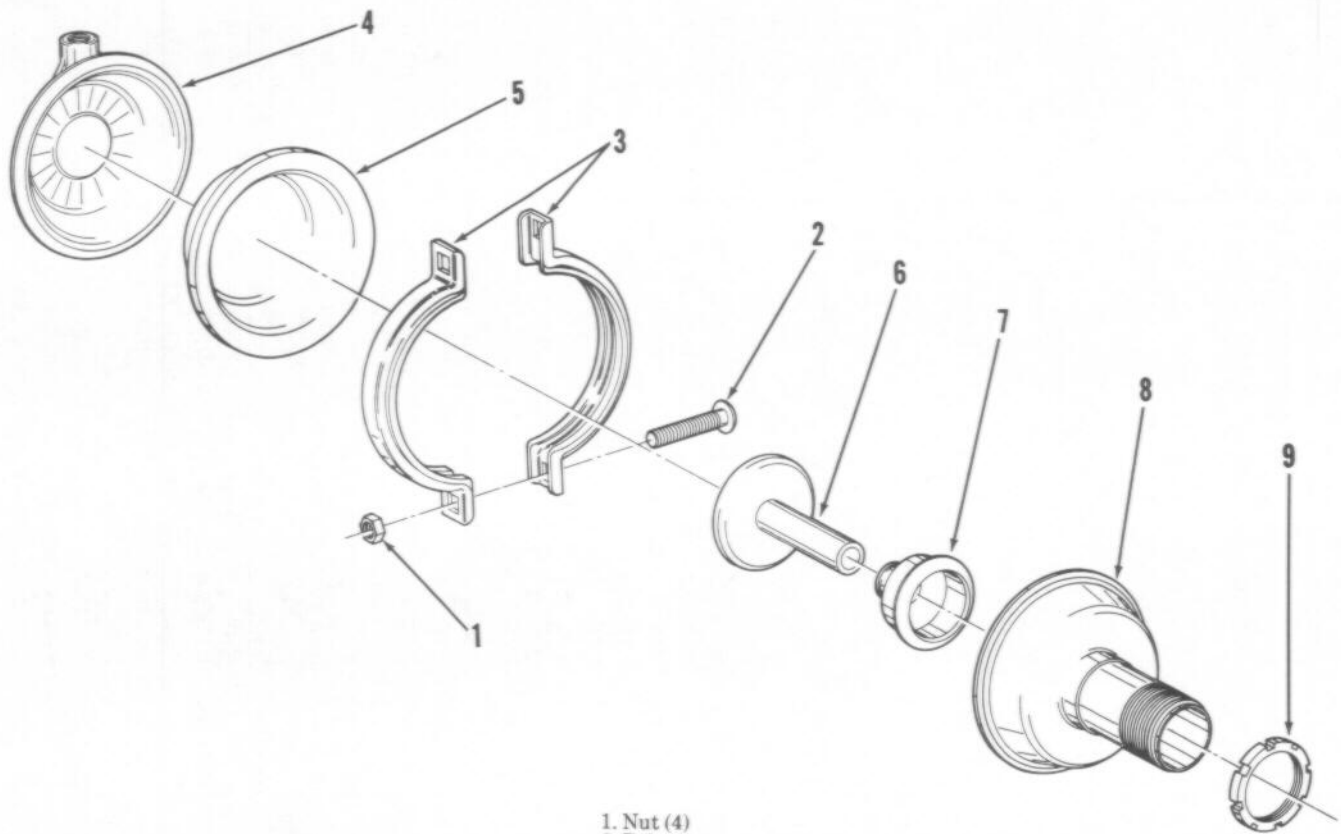
e. *Testing.* To test service chamber for leaks, charge chamber with air and apply a soapy water solution to all seams. Any bubbling indicates an air leak.

f. *Installation.* Install spring brake-service chamber assembly (para 3-123).

8-3. Service Chamber Assembly

a. *Removal.* Remove service chamber assembly (para 3-124).

b. *Disassembly.* Disassemble service chamber assembly in numerical sequence shown in figure 8-2.



1. Nut (4)
2. Bolt (2)
3. Clamp (2)
4. Pressure cap
5. Diaphragm
6. Push rod
7. Boot
8. Housing
9. Nut

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Figure 8-2. Service chamber assembly; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.

(2) Inspect diaphragm and boot for cracks, breaks, deterioration, or any other defect.

NOTE

Diaphragm should be replaced at least every 50,000 miles or once a year, whichever occurs first.

(3) Inspect push rod assembly for cracks, breaks, distortion, or any other defect.

(4) Inspect housing assembly and pressure cap for distortion, cracks, condition of sealing surfaces, or any other defect.

(5) Inspect all other parts for cracks, breaks, distortion, or any other defect.

(6) Inspect attaching hardware for damaged threads, distortion, or any other defect.

d. Reassembly. Reassemble service chamber assembly in reverse numerical sequence shown in figure 8-2.

e. Testing. To test service chamber for leaks, charge chamber with air and apply a soapy water solution to all seams. Any bubbling indicates an air leak.

f. Installation. Install service chamber assembly (para 3-124).

8-4. Wedge Brake Assembly

a. Removal. Remove wedge brake assembly (para 3-125).

b. Disassembly. Disassemble wedge brake assembly in numerical sequence shown in figure 8-3.

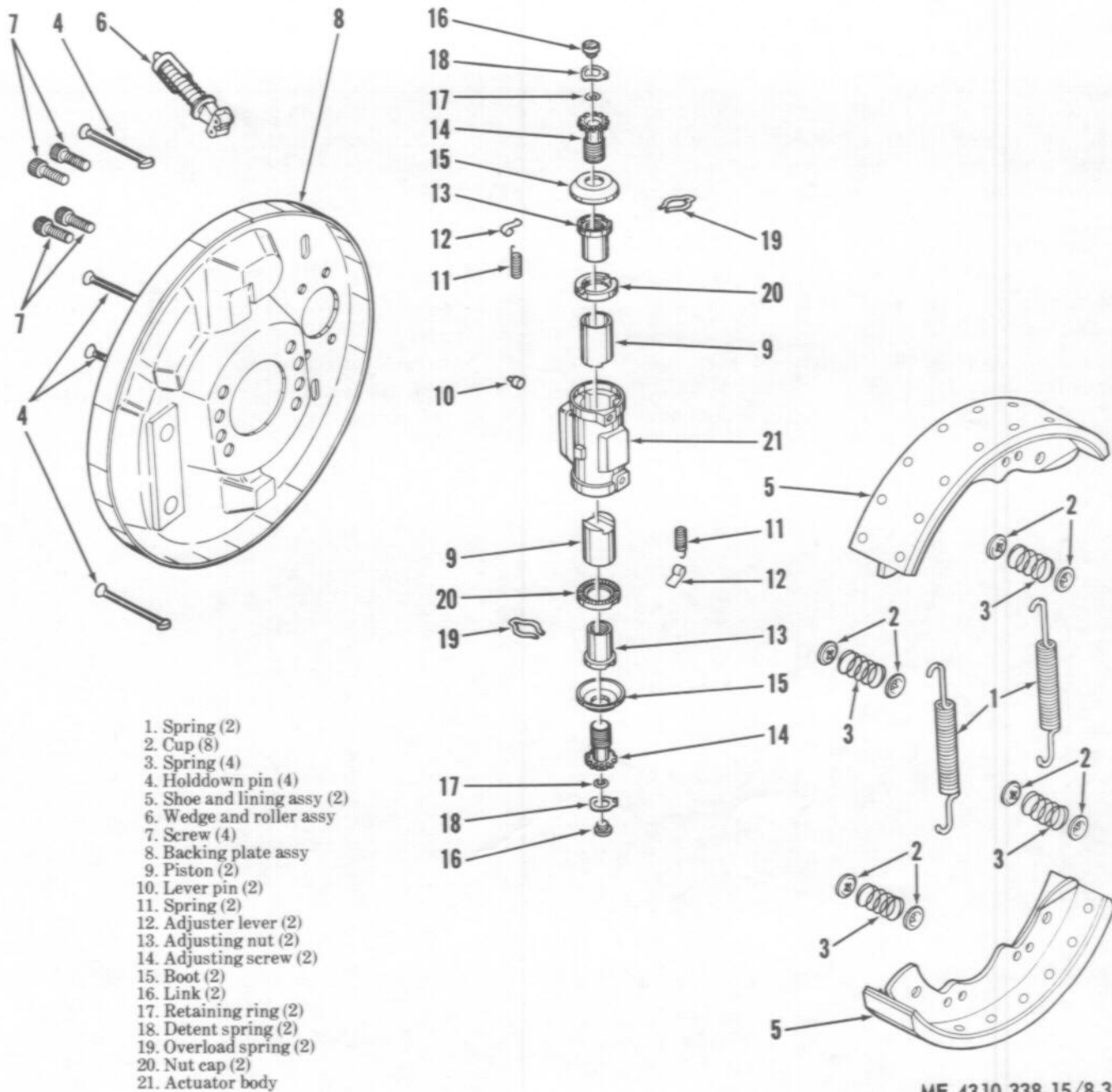


Figure 8-3. Wedge brake assembly; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Discard boots.

(2) Inspect all springs for defective coils, breaks, cracks, or any other defect. Replace overload spring if test load is less than 13 pounds when ends are compressed to 1/2-inch apart.

(3) Inspect rod and wedge surfaces, roller surfaces, and plungers for scoring, excessive wear, or any other defect.

(4) Inspect pistons for roughness in roller slots, distortion, cracks, chips, or any other defect.

(5) Inspect spring clips, retainers, and adjusting lever for cracks, breaks, or any other defect.

(6) Inspect actuator castings for roughness in

machined bore. Use emery cloth to remove any raised metal which would interfere with piston movement, then clean casting.

(7) Inspect adjusting screws, links, nuts, and caps for cracks, breaks, damaged threads, or any other defect.

(8) Inspect automatic adjuster levers, springs and pins for corrosion, distortion, cracks, or any other defect.

(9) Inspect backing plate and shoe holddown parts for cracks, breaks, distortion, or any other defect.

(10) Inspect linings for excessive wear, cracks, or any other defect.

(11) Inspect all other parts, including attaching

hardware, for cracks, distortion, excessive wear, or any other defect.

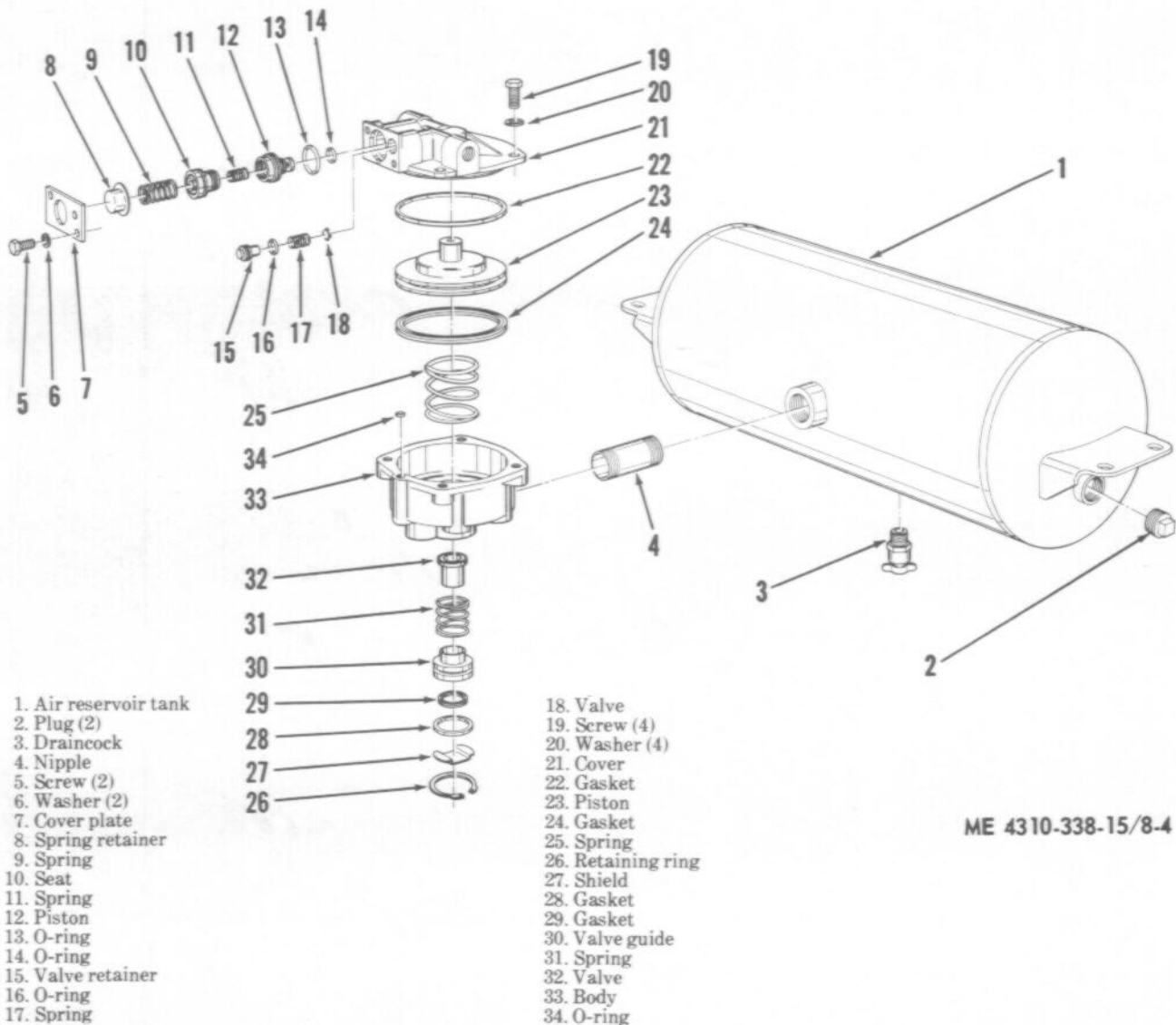
d. *Reassembly.* Reassemble each wedge brake assembly in reverse numerical sequence shown in figure 8-3. Install new boots.

e. *Installation.* Install wedge brake assembly (para 3-125).

8-5. Emergency Relay Valve

a. *Removal.* Remove emergency relay valve (para 3-126).

b. *Disassembly.* Disassemble emergency relay valve in numerical sequence shown in figure 8-4. Discard O-rings and gaskets.



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Figure 8-4. Emergency relay valve; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.

(2) Inspect springs for defective coils, cracks, breaks, or any other defect. Refer to Table 5-2 for spring free length.

(3) Inspect piston, poppets, and valves for cracks, distortion, excessive wear, or any other defect.

(4) Inspect connection ports for damaged threads, distortion, or any other defect.

(5) Inspect body and cover for cracks, distortion, excessive wear, or any other defect.

d. Reassembly. Reassemble emergency relay valve in reverse numerical sequence shown in figure 8-4. Install new O-rings and gaskets.

e. Installation. Install emergency relay valve (para 3-126).

Section II. STEERING AND AXLE GROUP

8-6. General

The steering and axle group consists of the rear axle, front axle, tow bar, and steering components. The axles are 2 $\frac{3}{4}$ -inch beams with a spindle assembly at each end. The front axle has steering knuckles which are connected to the axle beam by king pins. Tie rods connect from each knuckle to a center steering arm. The tow bar connects to the center steering arm.

8-7. Front Axle Assembly

a. Removal.

(1) Remove tow bar (para 3-132).

(2) Remove front wheels (para 3-121).

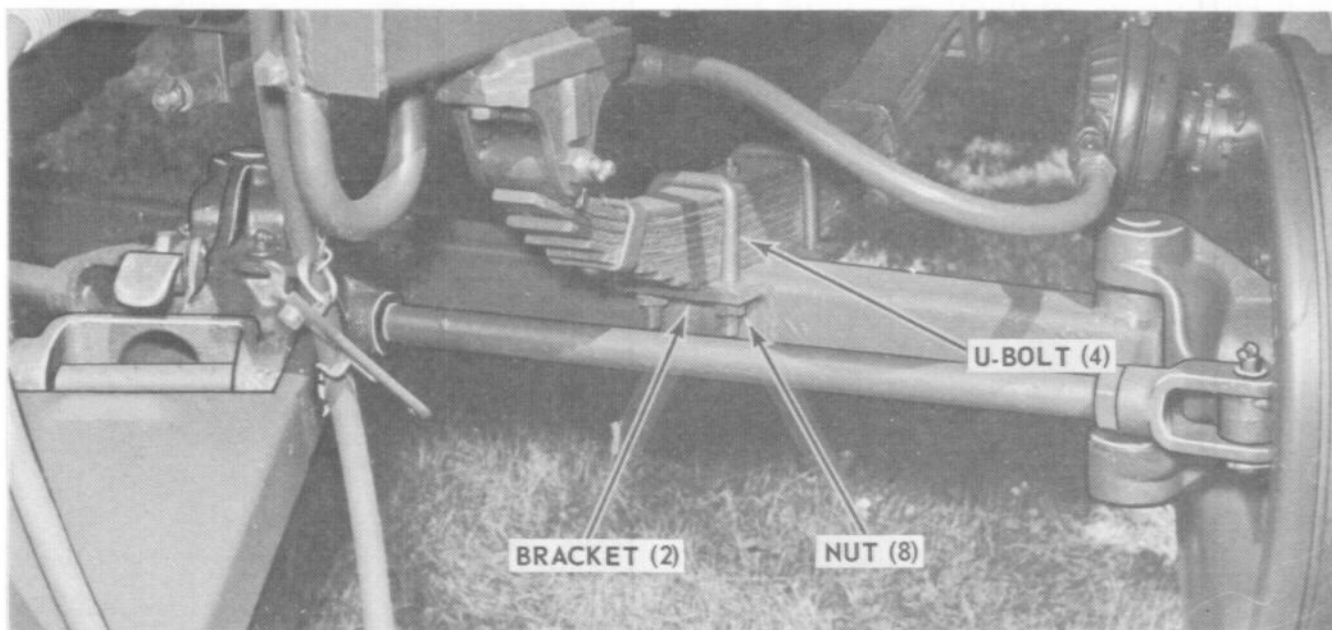
(3) Remove each hub and brake drum (para 3-122).

(4) Remove each service chamber (para 3-124).

(5) Remove each wedge brake assembly as shown in figure 3-113.

(6) Remove front axle assembly as shown in figure 8-5.

b. Disassembly. Disassemble front axle assembly in numerical sequence shown in figure 8-6.



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REMOVAL

REMOVE NUTS, U-BOLTS, AND BRACKETS. REMOVE AXLE ASSEMBLY.

INSTALLATION

PLACE AXLE ASSEMBLY IN MOUNTING POSITION AND SECURE WITH BRACKETS, U-BOLTS, AND NUTS.

Figure 8-5. Front axle assembly; removal and installation.

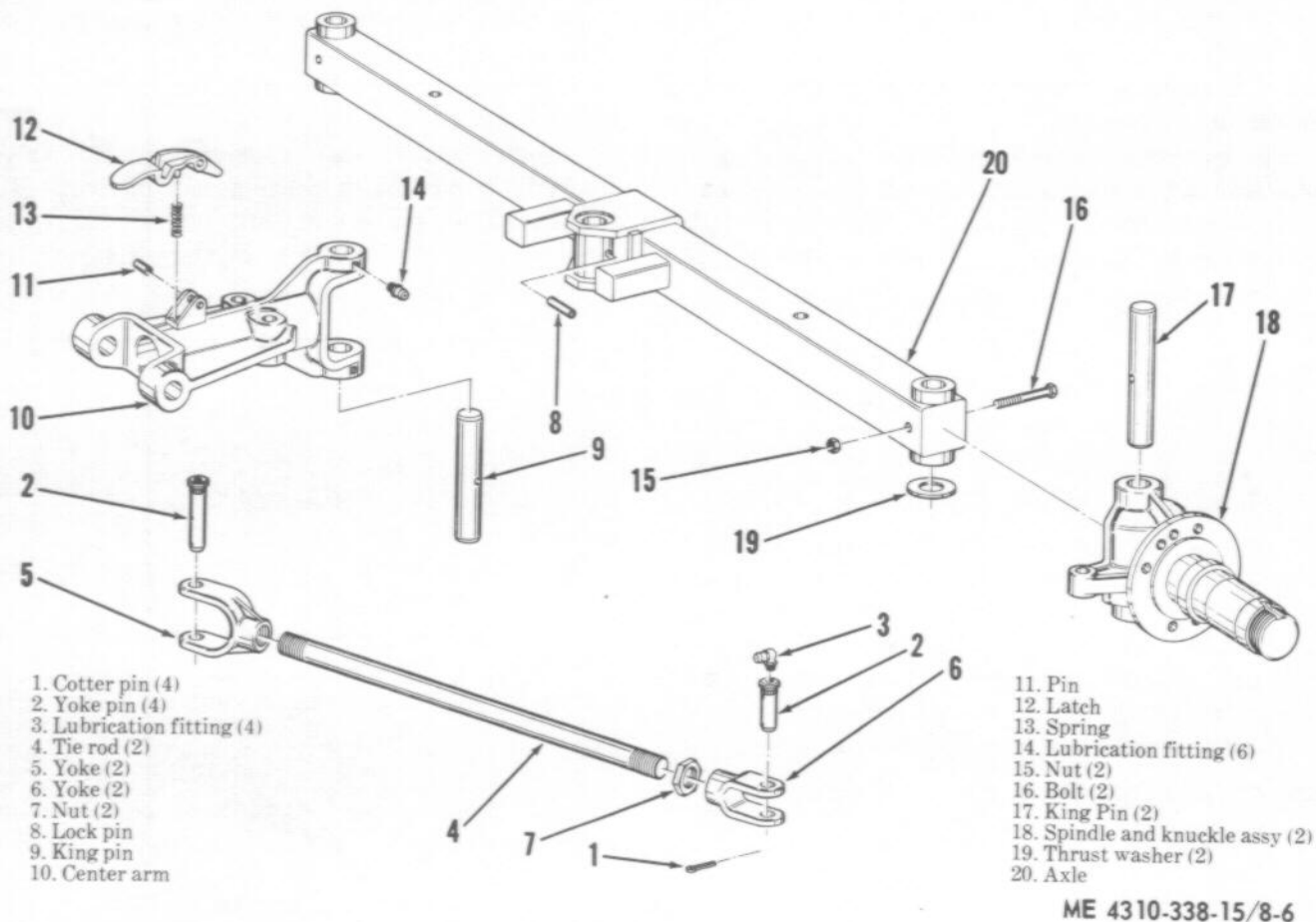


Figure 8-6. Front axle assembly; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.

(2) Inspect king pins for cracks, breaks, excessive wear, improper fit, or any other defect. Measure diameter of king pins. Diameter should be 1.2380 to 1.2390 inches.

(3) Inspect steering knuckle for cracks, breaks, excessive wear, of any other defect. Measure diameter of king pin holes. Diameter should be 1.242 to 1.247 inches.

(4) Inspect spindle for cracks, distortion, damaged threads, excessive wear, or any other defect.

(5) Inspect axle beam for cracks, distortion, or any other defect.

(6) Inspect all other parts, including attaching hardware, for cracks, breaks, damaged threads, distortion, excessive wear, or any other defect.

d. Reassembly. Reassemble front axle assembly in reverse numerical sequence shown in figure 8-6.

e. Installation.

(1) Install front axle assembly as shown in figure 8-5.

(2) Install each wedge brake assembly as shown in figure 3-113.

(3) Install each service chamber (para 3-124).

(4) Install each hub and brake drum (para 3-122).

(5) Install front wheels (para 3-121).

(6) Install tow bar (para 3-132).

(7) Adjust tie rods (fig. 3-123).

8-8. Rear Axle Assembly

a. Removal.

(1) Remove rear wheels (para 3-121).

(2) Remove each hub and brake drum (para 3-122).

(3) Remove each spring brake-service chamber assembly (para 3-123).

(4) Remove each wedge brake assembly as shown in figure 3-113.

(5) Remove rear axle assembly as shown in figure 8-7.

b. Disassembly. Disassemble parking brake actuating mechanism (para 3-129).

c. Cleaning, Inspection, and Repair.

(1) Clean all parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly.

(2) Inspect spindle for cracks, breaks, excessive wear, distortion, or any other defect.

(3) Inspect axle beam for cracks, distortion, or any other defect.

(4) Inspect all other parts, including attaching hardware, for cracks, damaged threads, distortion, or any other defect.

d. Reassembly. Reassemble parking brake actuating mechanism (para 3-129).

e. Installation.

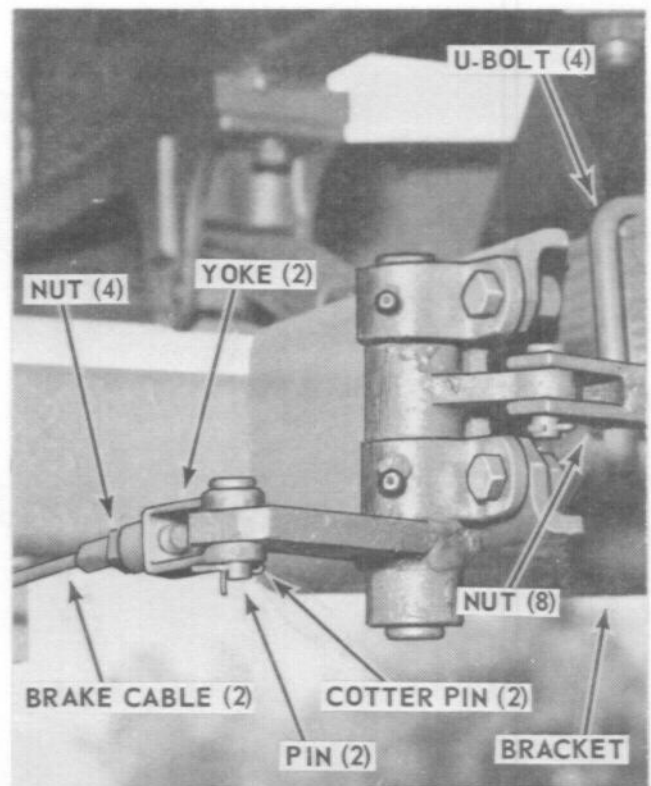
(1) Install rear axle assembly as shown in figure 8-7.

(2) Install each wedge brake assembly as shown in figure 3-113.

(3) Install each spring brake-service chamber assembly (para 3-123).

(4) Install each hub and brake drum (para 3-122).

(5) Install rear wheels (para 3-121).



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REMOVAL

STEP 1. REMOVE COTTER PINS AND PINS. REMOVE YOKES AND NUTS. REMOVE PARKING BRAKE CABLES.

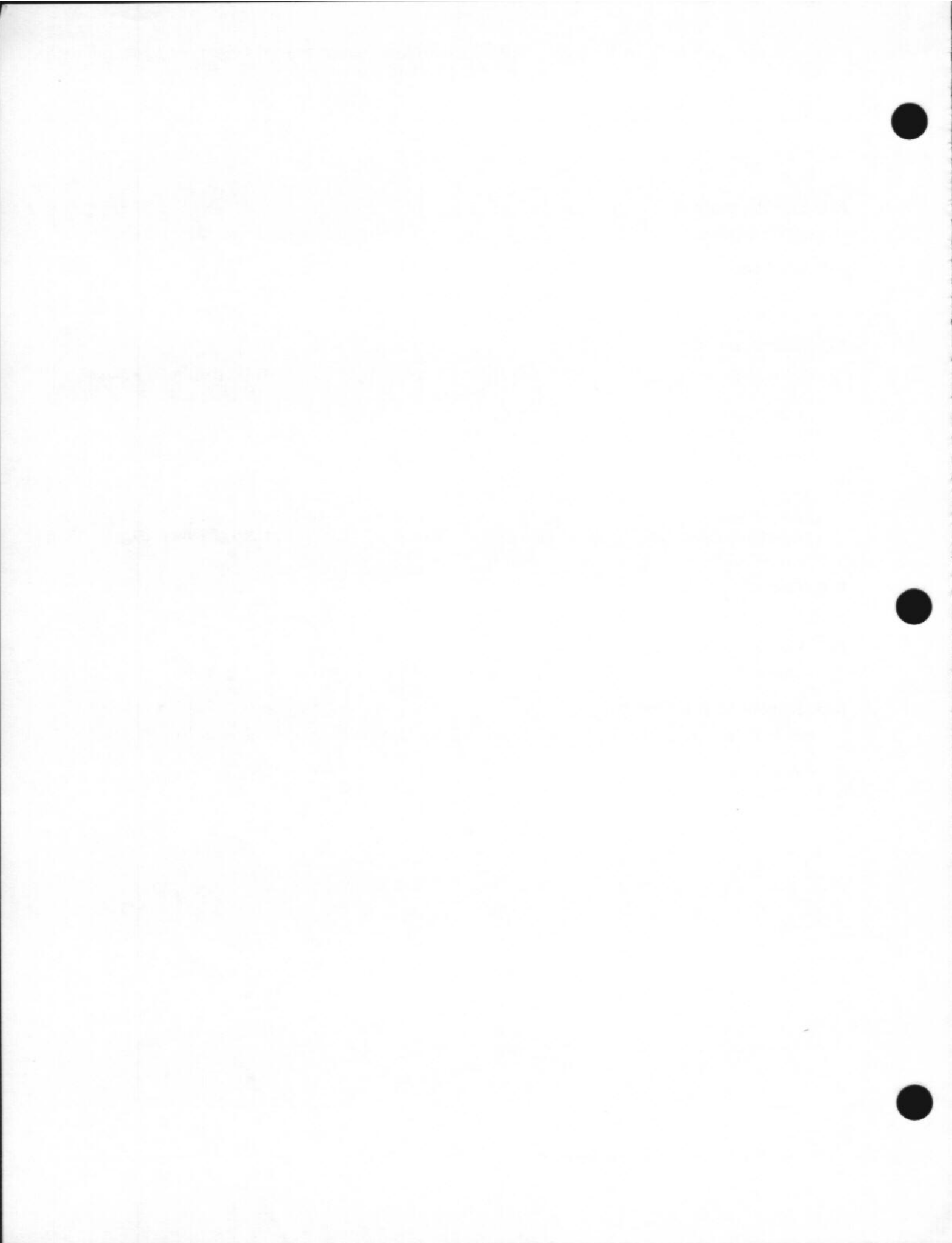
STEP 2. REMOVE NUTS, BRACKETS, AND U-BOLTS. REMOVE AXLE ASSEMBLY.

INSTALLATION

STEP 1. PLACE AXLE ASSEMBLY IN MOUNTING POSITION AND SECURE WITH BRACKETS, U-BOLTS, AND NUTS.

STEP 2. INSTALL PARKING BRAKE CABLES AND SECURE WITH NUTS. INSTALL YOKES, PINS, AND COTTER PINS.

Figure 8-7. Rear axle assembly; removal and installation.



APPENDIX A REFERENCES

A-1. Fire Protection

TB 5-4200-200-10

Hand Portable Fire Extinguishers Approved for Army Users.

A-2. Lubrication

C9100-IL

LO 5-4310-338-12

Fuels, Lubricants, Oils and Waxes.

Lubrication Order

A-3. Maintenance

TB ORD 651

Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems.

TM 38-750

Army Equipment Procedures.

TM 5-4310-338-20P

Organizational Maintenance Parts Manual.

TM 5-4310-338-35P

Direct Support, General Support, and Depot Maintenance Parts Manual.

TM 5-764

Electric Motor and Generator Repair.

TM 9-1870-1

Care and Maintenance of Pneumatic Tires.

TM 9-6140-200-15

Operation and Organizational, Field and Depot Maintenance: Storage Batteries, Lead-Acid Type.

A-4. Painting

TM 9-213

Painting Instructions for Field Use.

A-5. Radio Suppression

TM 11-483

Radio Interference Suppression.

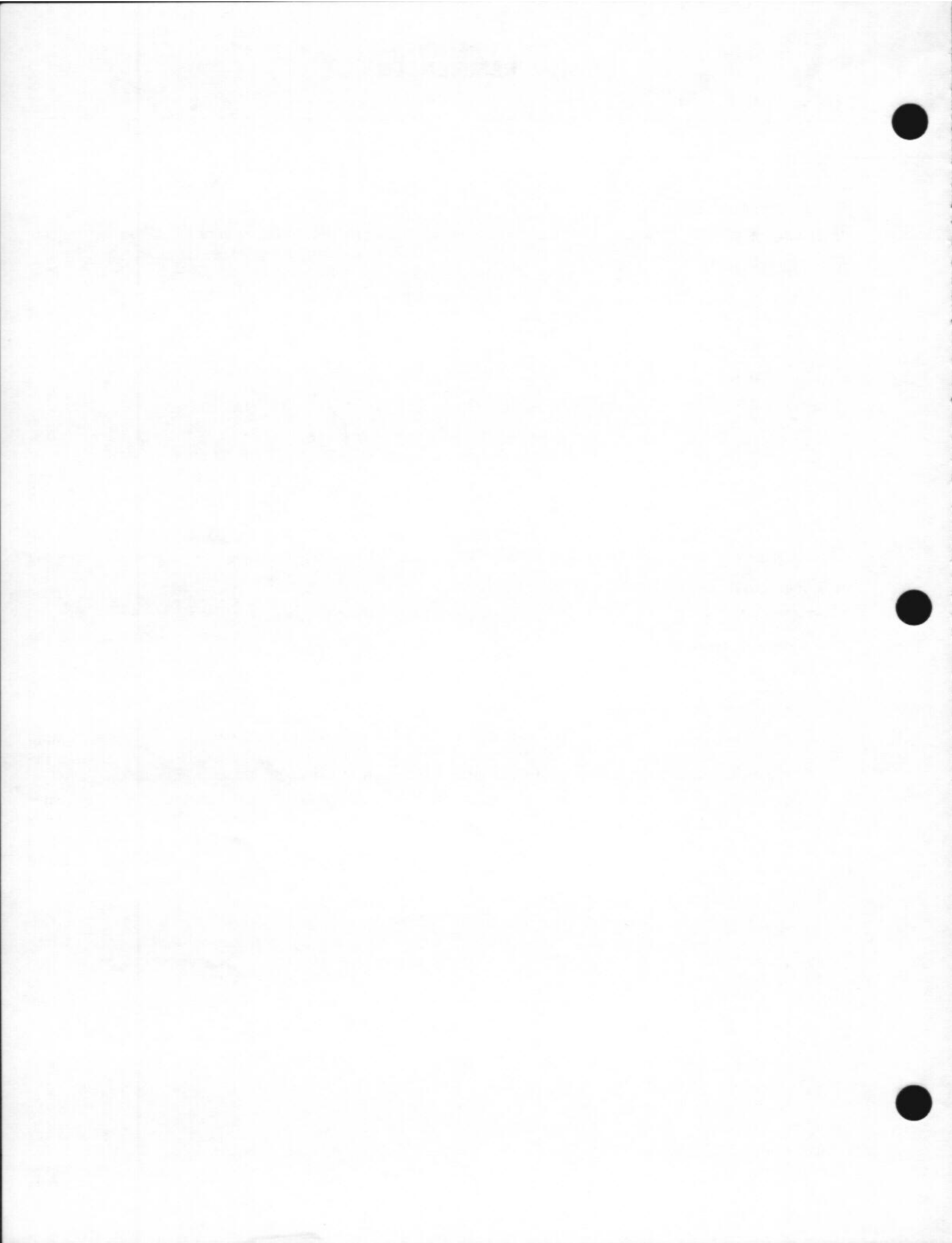
A-6. Shipment and Storage

TB 740-93-2

Preservation of USAMEC Mechanical Equipment for Shipment and Storage.

TB 740-93-3

Administrative Storage of USAMEC Mechanical Equipment.



APPENDIX B BASIC ISSUE ITEMS LIST

B-1. Scope

This appendix lists items which accompany the air compressor unit or are required for installation, operation, or operator's maintenance.

B-2. General

This Basic Issue Items List is divided into the following sections:

a. Basic Issue Items — Section II. This is a list of items which accompany the air compressor unit which are required by the operator/crew for installation, operation, or maintenance.

b. Maintenance and Operating Supplies—Section III. This is a listing of maintenance and operating supplies required for initial operation.

B-3. Explanation of Columns, Section II.

The following is an explanation of columns in the tabular list of Basic Issue Items, Section II.

a. Source, Maintenance, and Recoverability Codes (SMR); Column (1).

(1) The source code indicates the selection status and source for the listed item. The source code is:

Code	Explanation
P	Applied to repair parts which are stocked in or supplied from GSA/DSA or Army supply system, and authorized for use at indicated maintenance categories.

(2) The maintenance code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

Code	Explanation
C	Operator/Crew

(3) The recoverability code indicates whether unserviceable items should be returned for recovery or salvage. The items on this list are not coded and are expendable.

b. Federal Stock Number (FSN); Column (2). This column indicates the federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description, Column (3). This column indicates the federal item name and any additional description of the item required.

d. Unit of Measure (U/M), Column (4). The unit of measure is a two-character alphabetic abbreviation

indicating the amount or quantity of the item upon which the allowances are based (e.g., ft, ea, pr, etc).

e. Quantity Incorporated in Unit, Column (5). This column indicates the quantity of the item used in the functional group. A "V" appearing in this column in lieu of a quantity indicates that a definite quantity cannot be indicated (e.g., shims, spacers, etc.).

f. Quantity Furnished with Equipment, Column (6). This column indicates the quantity of an item furnished with the equipment.

g. Illustration, Column (7). This column is divided as follows:

(1) *Figure number, column (7) (a).* This column indicates the figure number of the illustration in which the item is shown.

(2) *Item number, Column (7)(b).* This column indicates the callout number used to reference the item in the illustration.

B-4. Explanation of Columns, Section III.

The following is an explanation in the tabular list of Maintenance and Operating Supplies, Section III.

a. Component Application, Column (1). This column identifies the component application of each maintenance or operating supply item.

b. Federal Stock Number, Column (2). This column indicates the federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description, Column (3). This column indicates the item name and brief description.

d. Quantity Required for Initial Operation, Column (4). This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

e. Quantity Required for 8 Hours Operation, Column (5). This column indicates the estimated quantities required for an average 8 hours of operation.

f. Notes, Column (6). This column indicates informative notes keyed to data appearing in a preceding column.

B-5. Abbreviations

qt.....	quart
gal.....	gallon
lb.....	pound

Section II. BASIC ISSUE ITEMS

(1) SMR code	(2) Federal stock number	(3) Description	(4) Unit of meas	(5) Qty inc in unit	(6) Qty furn with equip	(7) Illustration	
						(A) Fig No.	(B) Item No.
PC	7520-559-9618	Group 31 — Basic Issue Items Manufacturer Installed 3100 Basic Issue Items Manufactured or Depot Installed Case, Maintenance and Operational Manual MIL-E-11743 Department of the Army: Maintenance Manual TM 5-4310-338-15 Lubrication Order LO 5-4310-338-12 Group 32 — Basic Issue Items Troop Installed 3200 Basic Issue Items, Troop Installed or Authorized	EA		1		
PC	4210-555-8837	Extinguisher, Fire Monobromotrifluoromethane: Charge Hand Type, Penetrating Seal Valve, w/Bracket, 2½ lb. MIL-E-52031	EA				

Section III. MAINTENANCE AND OPERATING SUPPLIES

(1) Component application	(2) Federal stock number	(3) Description	(4) Quantity required f/initial operation	(5) required f/8 hrs operation	(6) Notes
Crankcase Engine	9150-680-1104(2) 9150-680-1105(2) 9160-242-7605(2)	Lubricating Oil: 55 Gal Drum as follows: HDO-30 HDO-10 OES	29 qt 29 qt 29 qt		(1) Includes quantity of oil to fill engine oil system as follows: 27 qts — Engine 2 qts — Oil Filter (2) See C9100-IL for additional data and requisitioning procedures. (3) See Current 2. O. for grade application and replenishment intervals. (4) Average Fuel consumption is 11 gal per hour of continuous operation. (5) Ref. TM 5-4310-338-15 Table 2-1
Grease Points		Grease, Automotive and Artillery: 5 lb can as follows:	5 lb	(3)	
Fuel Tank	9140-286-5294(2) 9140-286-5286(2) 9140-286-5283 (2)	Fuel, Diesel: Bulk as follows: DF-2 DF-1 DFA	119 gal 119 gal 119 gal	(4) (4) (4)	
Oil Separator, Compressor	9150-9437(2) 9150-265)9430(2) 9150-242-7605(2)	Lubricating Oil: 55 gal drum as follows: OE-30 OE-10 OES	104 qts 104 qts 104 qts	(3) (3) (3)	
Radiator	6850-224-8730 6850-174-1806	WATER ANTIFREEZE 5 gal can as follows: ETHYLENE GLYCOL type 1 ANTIFREEZE: 55 gal drum as follows: Arctic grade	66 qts (5) 66 qts		

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

This appendix contains the Maintenance Allocation Chart (MAC) which designates the overall responsibility for the performance of maintenance functions on specification assemblies and components. Strict compliance to the maintenance functions shall be observed by personnel in each echelon of maintenance.

a. Section I provides a general explanation of the Maintenance Allocation Chart and a general explanation of all maintenance and repair functions at the various authorized levels of maintenance. This explanation includes definitions of symbol designations and maintenance functions that appear in Section II.

b. Section II designates overall responsibility for the performance of maintenance operations on the identified end item or component. The levels of maintenance are designated by letters under the applicable maintenance of functions with double letter designations in the remarks column for additional maintenance procedures.

c. Section III lists the special tools and test equipment required for each maintenance operation as referenced from Section II.

d. Section IV contains supplemental instructions or explanatory notes required for a particular functional group. These instructions are designated by a double letter combination appearing in the remarks column in Section II.

C-2. Explanation of Columns in Section II

a. *Column (1), Group Number.* This number represents the functional group in which each assembly or component is classified (TB 750-93-1). The numbers are arranged in numerical sequence.

b. *Column (2), Functional Group.* This column contains the nomenclature for the components of each functional group number.

c. *Column (3), Maintenance Functions.* This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions.

The symbol designation for the various maintenance

levels are defined as follows:

- C — Operator or Crew
- O — Organizational Maintenance
- F — Direct Support Maintenance
- H — General Support Maintenance
- D — Depot Maintenance

The maintenance functions are defined as follows:

- A — Inspect: To determine the overall condition of a component by comparing its physical, mechanical, and electrical characteristics with established standards.
- B — Test: To verify the operating condition of a component and to check for equipment malfunction by the use of test equipment.
- C — Service: To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.
- D — Adjust: To rectify the equipment to the extent necessary to bring it into the proper operating range.
- E — Align: To adjust specific variables of a component to achieve optimum performance.
- F — Calibrate: To determine corrections to be made to the equipment as determined by test equipment readings. Consists of adjusting the performance or operation of a component to match the performance of an accurate standard known to be properly calibrated.
- G — Install: To set up for use, to attach as to make operational.
- H — Replace: To substitute an operational part or component in place of a non-operational part or component.
- I — Repair: To restore an item to an acceptable operational condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.
- J — Overhaul: To restore an item to a completely operational condition as prescribed by maintenance operational standards using the Inspect and Repair Only as Necessary (IROAN) technique.
- K — Rebuild: To restore an item to a standard as nearly as possible to original or new condition in appearance, performance and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts, repair or replacement of worn or unserviceable parts using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. *Column (4), Tools and Equipment.* This column is not applicable for this particular air compressor unit.

e. *Column (5), Remarks.* This column is provided for referencing by code the remarks pertinent to the maintenance functions. The code consists of two letters separated by a dash. The first letter represents the alphabetical sequence of the remarks; the second letter references a maintenance function in column (3).

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
01	ENGINE													
0100	Engine Assembly:	O	F	C	O				F	F	H	D		A-B
0101	Crankcase, Block, Cylinder Head:													
	Block								H	H				
	Head, cylinder								F	F	H			
	Liners, cylinder								H	H				
	Chambers, precombustion								F					
	Plugs, glow		O						O					
0102	Crankshaft:													
	Crankshaft								H			D		B-K
	Bearings, main								H					
	Seals, oil								H					
	Damper, vibration								F					
0103	Flywheel Assembly:													
	Flywheel								F	F				
	Gear, ring, flywheel	F							F					C-I
	Housing, flywheel								F					
0104	Pistons, Connecting Rods:													
	Bearings, connecting Rod	H							H					
	Pistons, rings, pins, and retainers	H							H					
	Rod, connecting								H					
0105	Valves, Camshaft, and Timing System:													
	Valves				O				F	F				
	Seats, valve								F	F				
	Guides, springs, and locks								F	F				
	Arms, rocker								F	F				
	Cover, valve								O	O				D-J
	Lifters, valve				H				H	H				
	Rods, push								H					
	Bearings, camshaft	H							H					
	Camshaft	H							H					
	Gears, timing	H							H					
	Cover, timing gear								H					
	Thrust washer, cover	H							H					
0106	Engine Lubrication System:													
	Pump assembly, oil								F	F		H		
	Cooler, oil								O	F				
	Filter, oil			C					O	F				
	Elements, oil filter			C					C					
	Breather, crankcase			C					C					
	Oil pan and plate	O		C					F	F				
	Lines and fittings	O							O	O				
0108	Manifolds:													
	Exhaust	O							O	F				
0109	Accessory Drive Mechanisms:													
	Drive assembly, fuel injection pump and fuel transfer pump								F	F				
03	FUEL SYSTEM													
0301	Fuel Injectors:													
	Valves, fuel injection		F						O	O				
0302	Fuel Pumps:													
	Housing assy, fuel injection pump				F				F	F				
	Pump, fuel injection				F		H		F	F		H		
	Pump, fuel transfer								O	F				
0304	Air Cleaner:													
	Cleaner assembly, air			C					O	O				
	Element, air cleaner	C		C					C					

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks				
		A	B	C	D	E	F	G	H	I	J	K						
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild						
0305	Hoses and clamps	C							O									
	Cap, air cleaner	C							O									
	Turbocharger:																	
	Turbocharger assembly								O	F					H			
	Piping, turbocharger	C							O									
	Tanks, Lines, and Fittings:																	
	Fuel tanks	O		O					O	F								
	Lines and fittings, fuel	O		O					O	O								
	0308	Engine Speed Governor and Controls:																
	0309	Governor assembly		F		F		H		F	F					H		
0311	Fuel Filters:																	
	Valve, fuel bypass								O	O								
	Tank, fuel filter								O	O								
	Filter, fuel; primary			C					O	O								
	Element, primary			C					O	O								
	Filter, fuel; final			C					O	O								
0311	Element, final			C					C									
	Engine Starting Aids:																	
0312	Aid, cold weather starting	C	O	C					O	O								
	Cylinder, fuel	C		C					C									
04	Accelerate, Throttle, or Choke Controls:																	
	Lever, throttle Run-Start			O					O									
0401	EXHAUST SYSTEM																	
0501	Exhaust, Pipe:																	
	Pipe, exhaust	C							O									
0503	Shield, rain	C							O									
	COOLING SYSTEM																	
0504	Radiator:																	
	Radiator assembly	C		C					F	F								
0505	Cap, radiator	C							C									
	Water Manifold, Headers, Thermostat, and Housing Gaskets:																	
0504	Hoses, radiator	O							O									
	Clamps, hose	O							O									
0504	Regulator, water temperature		O						O									
	Water Pump:																	
0505	Water pump assembly								O	F					F			
	Kit, repair									F								
0601	Fan Assembly:																	
	Fan assembly			C					O									
0602	Belts, drive				O				O									
	Guard, fan	O							O									
0603	Pulley, fan					O			O									
	ELECTRICAL SYSTEM																	
0601	Generator Assembly:																	
	Generator assembly		F	O					O	F					H			
0602	Belts, drive				O				O									
	Brushes	O							O									
0603	Kit, Repair									F								
	Pulley	O				O			O									
0602	Generator Regulator:																	
	Generator regulator assembly		F						O	F								
0603	Kit, repair									F								
	Starting Motor:																	
0603	Starting motor assembly		F	O					O	F					H			
	Brushes	O							O									
0603	Solenoid and switches	O							F	F								
	Kit, repair									F								

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks				
		A	B	C	D	E	F	G	H	I	J	K						
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild						
0606	Engine Safety Controls:																	
	Switch, overspeed governor				O							O		F				
	Switch, low oil pressure											O						
	Switch, high water temp											O						
	Switch, fuel pressure											O						
	Switch, air pressure											O						
	Solenoid, engine shutdown											O						
0607	Instrument Panel and Instruments:																	
	Panel assembly, instrument											O						
	Ammeter	C										O						
	Gage, fuel level	C										O						
	Panel light and lamp	C										O						
	Switches	C										O						
	Harness, wiring	C										O		F				
0609	Lights:																	
	Lights, tail, marker, and clearance	C										O		O				
	Lamps	C										C						
0610	Sending Units and Warning																	
	Switches:																	
	Fuel sending unit	C	O									O						
0612	Batteries, Storage:																	
	Batteries		O	C								O						
	Cables, battery	C										O						
	Tray, battery (housing)	C										O						
	Receptacle, battery charging	C	O									O						
0613	Hull or Chassis Wiring Harness:																	
	Harness, wiring (all)	C										F		O				
0615	Radio Interference Suppression:																	
	Grounding straps, lockwashers,		O									O		O				
	and shielded cables																	
10	FRONT AXLE																	
1000	Front Axle Assembly:																	
	Axle, front			C								F		F				
	Chains, safety											O						
11	REAR AXLE																	
1100	Rear Axle Assembly:																	
	Axle, rear			C								F		F				
12	BRAKES																	
1201	Hand Brakes:																	
	Lever, hand brake	C		C								O						
	Clevis pins and linkage	C		C	O							O						
1202	Service Brakes:																	
	Wedge brake assemblies			C	O							F		F		F		
1206	Mechanical Brakes:																	
	Spring Brake-Service Chamber																	
	Assemblies				O							O		F		F		
1207	Air Brake System:																	
	Service chambers	C										O		F		F		
	Reservoir, air	C										O						
	Valve, emergency relay	C										O		F				
	Lines, hoses, and fittings	C										O		O				
1211	Trailer Brake Connections and																	
	Controls:																	
	Couplings, intervehicular	C										O						
	Hose assemblies	C										O		O				
13	WHEELS																	
1311	Wheel Assemblies:																	
	Wheels	C		C								O		F				
	Bearings	O		O								O						
	Brake drums and hubs	O		O								O		F				

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks			
		A	B	C	D	E	F	G	H	I	J	K					
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild					
1313	Tires and Tubes:																
14	STEERING																
1401	Steering Assembly:																
	Tie rods and yokes				O				O								
	Center steering arm			C					F	F							
	Spindles, knuckles, king pins, and yoke pins			C					F	F							
	Lubrication fittings			C					O								
15	FRAME																
1501	Frame Assembly:																
	Frame assembly, main	O							H	F				H			
1503	Pintles and Towing Attachments:																
	Towbar	O							O	F							
16	SPRINGS AND SHOCK ABSORBERS																
1601	Springs:																
	Springs, front and rear	C							O	F							
18	BODY, HOOD, AND HULL																
1801	Housing Group:								O	O							
22	BODY, CHASSIS, OR HULL, AND ACCESSORY ITEMS																
2202	Accessory Items:																
	Reflectors	C							O								
	Harness, intervehicular wiring								O	O							
2210	Data Plates and Instruction Holders:																
	Plates, data	C							O								
	Plates, instruction, caution, and identification	C							O								
	Decals, instruction	C							O								
47	GAGES (NON-ELECTRICAL)																
4701	Instruments (Speed and Distance):																
	Tachometer-hourmeter	C							O								
	Tachometer cables	C		C					O								
4702	Gages, Mountings, Lines, and Fittings:																
	Gage, air pressure	O							O								
	Gage, separator oil level	C							O								
	Indicators, air cleaner restriction. Gage, oil pressure	C							O								
	Gage, fuel pressure	C							O								
	Gage, water temperature	C							O								
	Lines and fittings	C							O								
4703	Hourmeter:																
	Tachometer-hourmeter	C							O								
	Service meter	C							O								
50	PNEUMATIC EQUIPMENT																
5000	Air Compressor Assembly:	O	F	C					F	F	H		D				
5001	Crankcase, Block, Cylinder Head:																
	Stator, air compressor	F							F	F	H						
5004	Rotor:																
	Rotor	F							F								
	Bearings	F							F								
	Shaft, rotor	F							F								
	Blades, rotor	F							F								
	Sleeves, seal	F							F								
5006	Lubrication System:																
	Oil Separator assembly	O		C					F	F							
	Element, oil separator	F							F								

(1) Group No.	(2) Functional group	(3) Maintenance functions										(4) Tools and equipment	(5) Remarks		
		A	B	C	D	E	F	G	H	I	J			K	
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul			Rebuild	
5007	Oil filter assembly			C					O	O					
	Element, oil filter	C		C					C						
	Cooler, oil	O							F						
	Valves, relief, stator	O							F	F					
	Oil lines and fittings	C							O						
	Thermal bypass valve assembly	O							O	F					
	Compressor Drive:														
	Coupling	F							F						
	Straps, locking	F							F						
	Bushings	F							F						
5008	Pins	F							F						
	Air Intake:														
	Air cleaner assemblies			C					O	O					
	Element, air cleaner	C		C					C						
5009	Hoses and clamps	C							O						
	Cap, air cleaner	C							O						
	Unloader System Components:														
	Pressure regulator, air	O			O				O	F		F			
	Valve, minimum pressure	O							O	O					
	Valve, blowdown	O							O	O					
	Valve, relief, safety	C							O						
	Strainer, air line	O							O						
	Lines and fittings	C							O	O					
	Valve, intake control	F							F	F					
5012	Diaphragm, intake control	F							F						
	Connections, discharge	O							O						
	Throttling Devices:														
	Speed control linkage				O				O						
5015	Moisture separator assembly	C		C					O	O					
	Element, moisture separator	C		C					C						
	Air Discharge System:														
	Manifold, piping, valves, and fittings	C							O	O					

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

Reference code	Maintenance level	Nomenclature	Tool number
		No Special Tools Required	

Section IV. REMARKS

Reference code	Remarks
A-B	Test includes operation and compression.
B-K	Rebuilding of crankshaft includes metalizing, aligning and grinding.
C-I	Replace ring gear.
D-J	Repair of valves and inserts includes refacing.

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By Order of the Secretary of the Army:

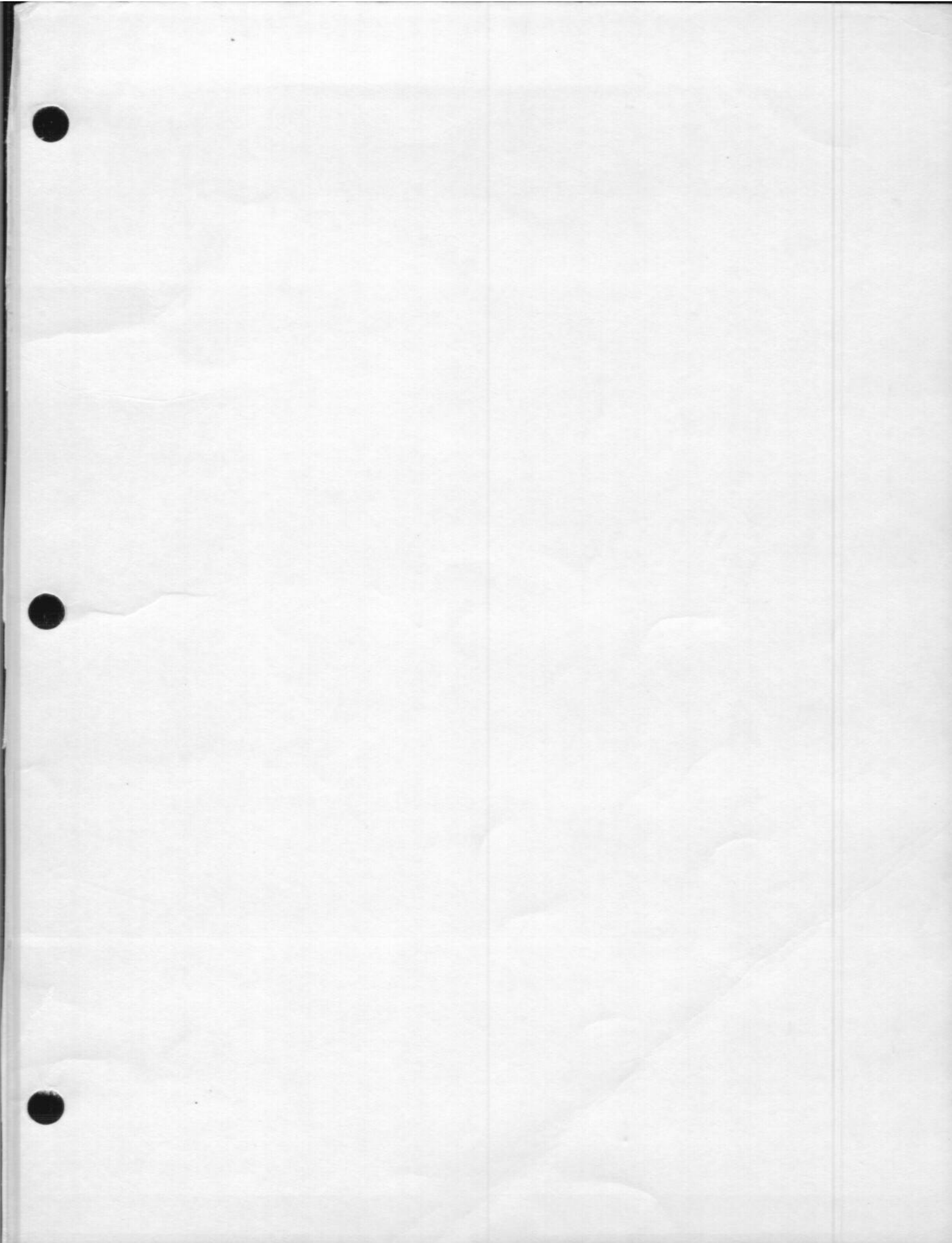
W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-25, (qty rqr block no. 42) Section I, Organizational Maintenance requirements for Air Compressors, 600 CFM.



SAFETY PRECAUTIONS

BEFORE OPERATION

Use extreme caution when handling fuel. Do not allow flame or smoking around fuel. Keep fuel free of water or dirt.

Do not smoke or allow open flames near charging batteries. Serious injury from explosion and acid may result. Avoid contact with electrolyte on clothing and flesh.

When lifting unit, lifting device must be capable of lifting a minimum of 12,000 pounds.

Always keep parking brakes locked whenever air compressor unit is not connected to a towing vehicle.

Never attempt maintenance or service on the compressor components until unit has been relieved of all air pressure.

Never attempt to disassemble any wheel until all air pressure is relieved from the tire.

Extreme caution must be taken to ensure that all air connections are tight. A loose connection can cause serious damage to air compressor or injury to personnel.

Do not operate air compressor unit in a building or closed area unless the exhaust gases are piped to the outside. Inhalation of exhaust gases can result in serious illness or death.

DURING OPERATION

Always keep parking brakes locked whenever air compressor unit is not connected to a towing vehicle.

Never attempt maintenance or service on air compressor components until the engine is shut down and unit is relieved of all air pressure.

Use only one shot of starting aid fuel for each engine start. Inject starting aid fuel only when engine is cranking. Improper use of starting aid fuel can cause severe engine damage.

Do not direct compressed air toward personnel as it can cause serious injury.

Do not touch exhaust system or turbocharger with bare hands while equipment is running or immediately after shut down. Exhaust system produces extreme heat and can cause serious burns.

Do not operate compressor with less than 80 PSI in separator tank. If end use allows pressure to fall below 80 PSI, partially close air discharge valve. Equipment operation below 80 PSI causes overheating of compressor and excessive oil consumption.

If unit is shut down by safety devices, correct the malfunction before operation is continued.

AFTER OPERATION

Be certain that air valves are closed and all air pressure is relieved before disconnecting hoses from air discharge lines and securing the unit.

Never attempt maintenance or service on air compressor components until unit has been relieved of all air pressure.

Do not use flammable cleaning solvent to clean any part of air compressor unit. Use approved cleaning solvents only.

Always keep parking brakes locked whenever air compressor unit is not connected to a towing vehicle.

Correct or report any mechanical deficiencies that may result in damage to equipment or injury to personnel if operation is to be continued.