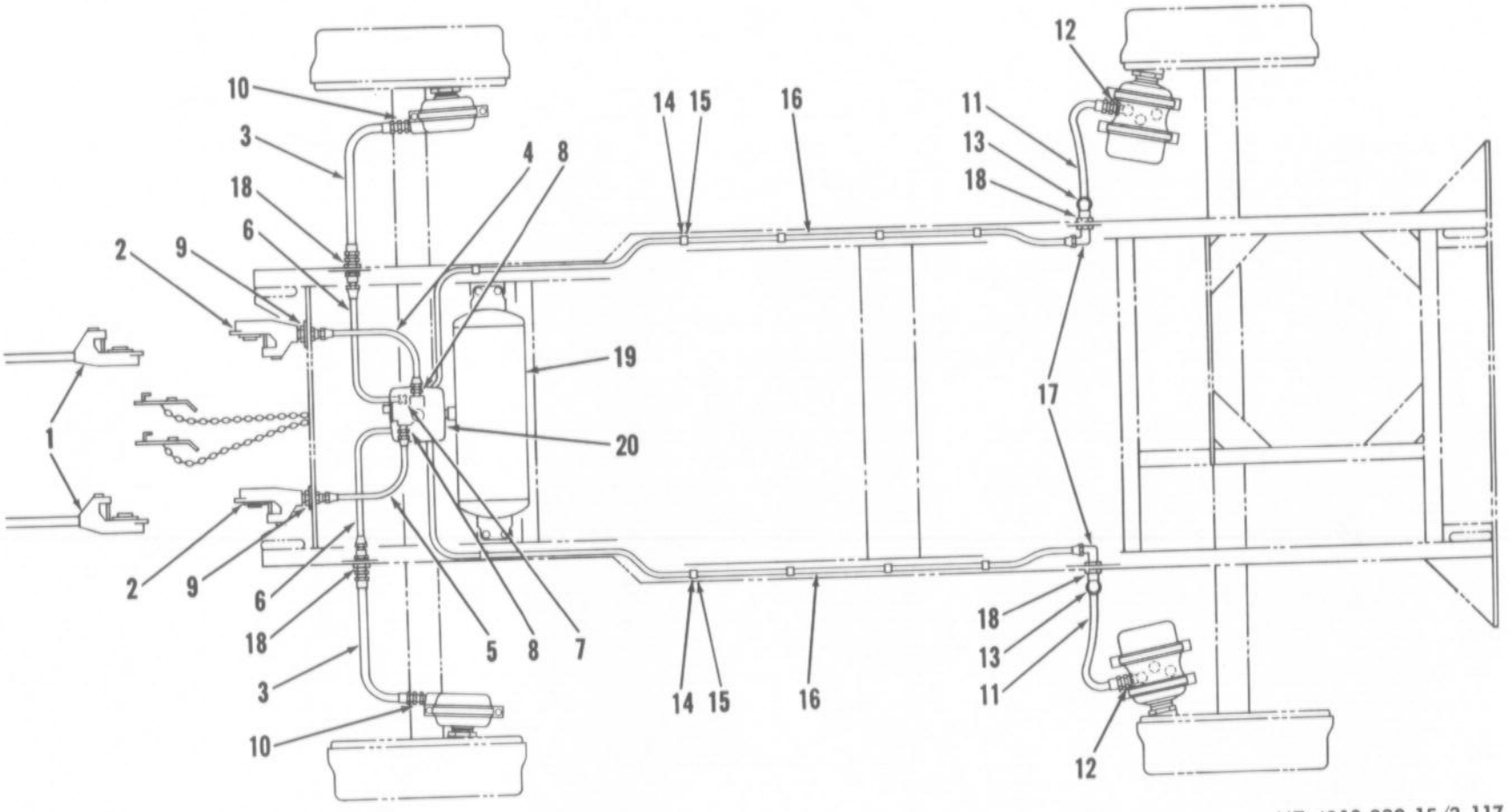


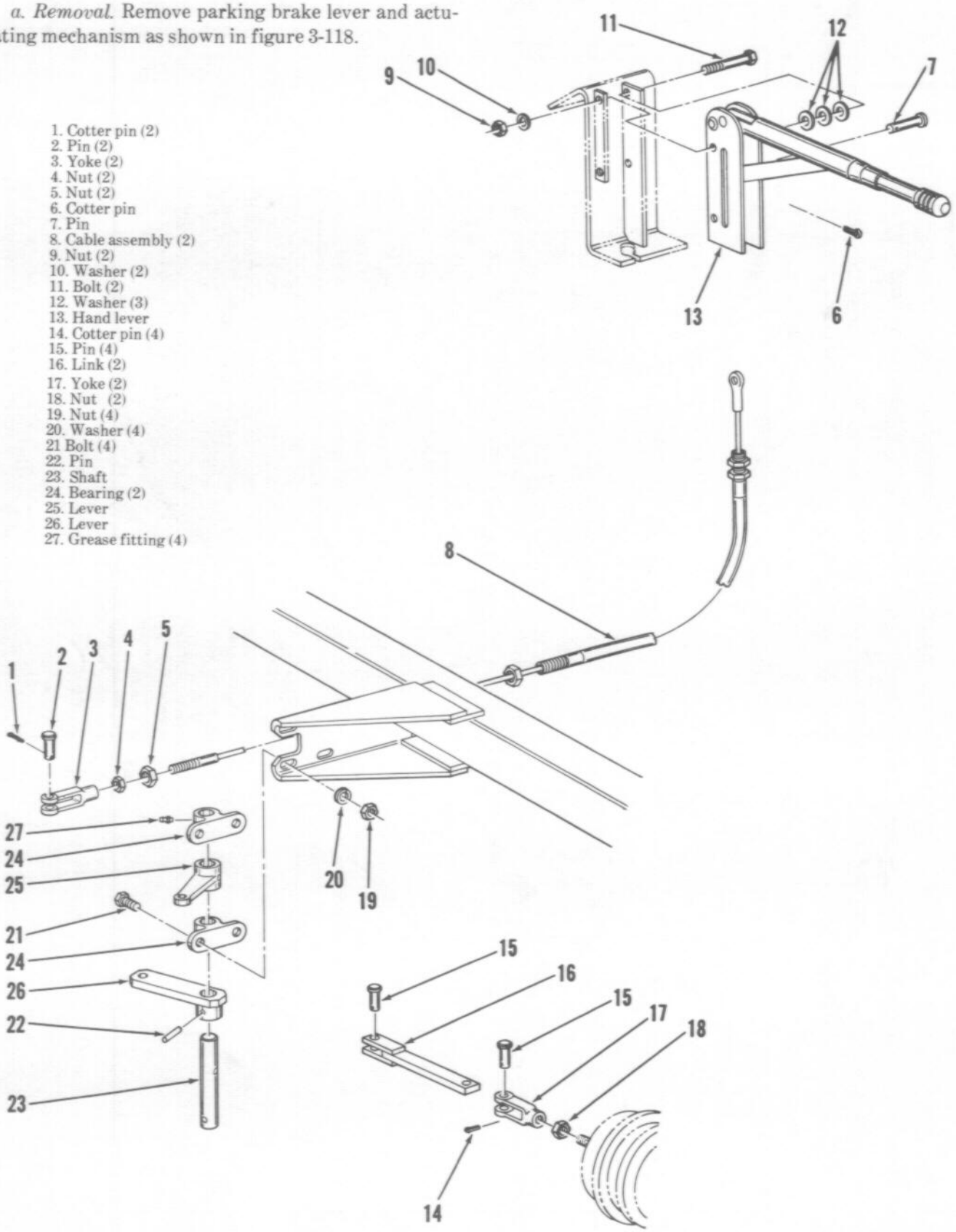
1. Intervehicular air line (2)
2. Coupler (2)
3. Hose assembly (2)
4. Tube assembly
5. Tube assembly
6. Tube assembly
7. Elbow (4)
8. Connector (2)
9. Connector (2)
10. Connector (2)
11. Hose assembly (2)
12. Elbow (2)
13. Elbow (2)
14. Clamp, tube, 3/8 in. (10)
15. Screw, self-tapping, No. 6 x 3/8 in. (10)
16. Tube assembly (2)
17. Elbow (2)
18. Connector (4)
19. Air reservoir tank (ref)
20. Emergency relay valve (ref)

Figure 3-117. Brake Air Lines, Fittings, and Couplings; Removal and Installation.

3-129. Parking Brake Lever and Actuating Mechanism

a. Removal. Remove parking brake lever and actuating mechanism as shown in figure 3-118.

1. Cotter pin (2)
2. Pin (2)
3. Yoke (2)
4. Nut (2)
5. Nut (2)
6. Cotter pin
7. Pin
8. Cable assembly (2)
9. Nut (2)
10. Washer (2)
11. Bolt (2)
12. Washer (3)
13. Hand lever
14. Cotter pin (4)
15. Pin (4)
16. Link (2)
17. Yoke (2)
18. Nut (2)
19. Nut (4)
20. Washer (4)
21 Bolt (4)
22. Pin
23. Shaft
24. Bearing (2)
25. Lever
26. Lever
27. Grease fitting (4)



ME 4310-338-15/3-118

Figure 3-118. Parking brake lever and actuating mechanism; removal and installation.

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.

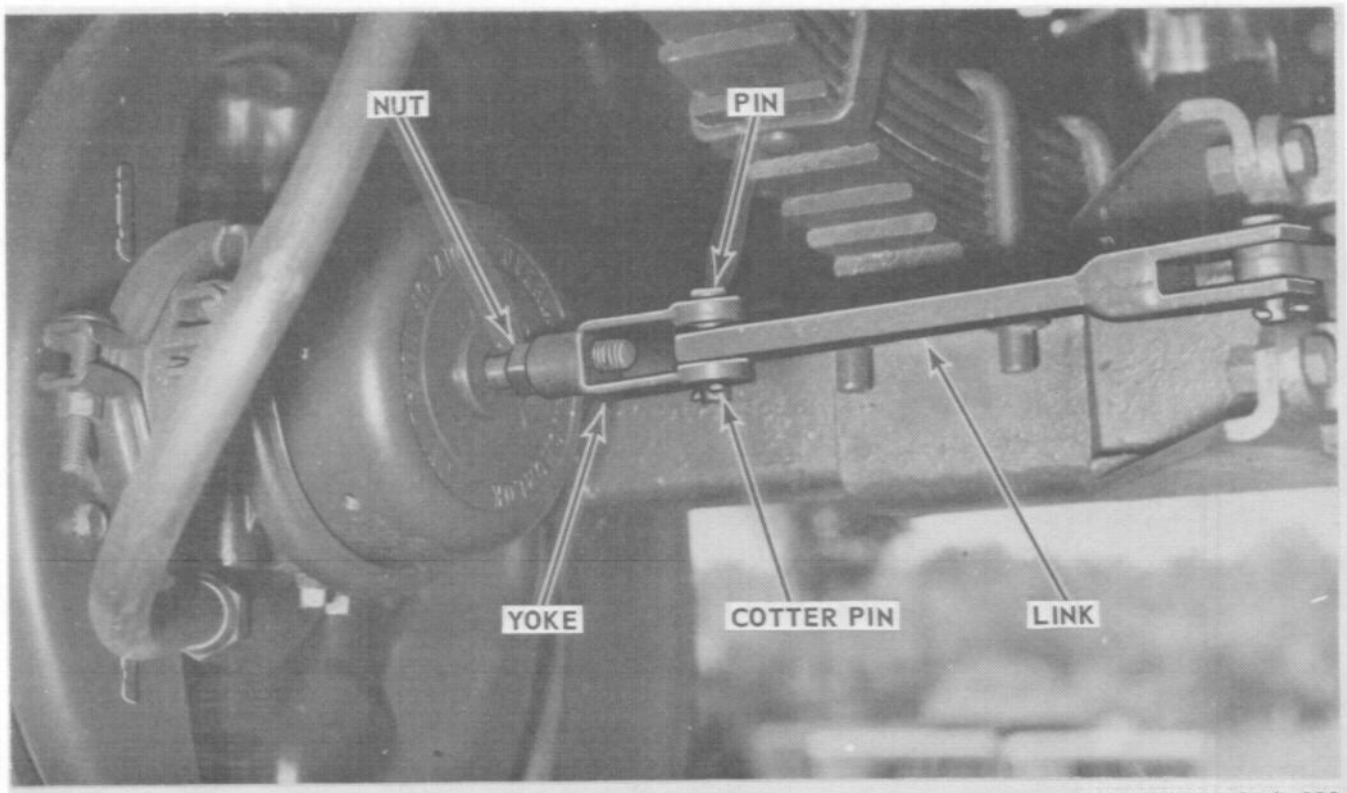
(2) Inspect cables and handle for cracks, kinks, distortion, or any other defect.

(3) Inspect yokes and links for distortion, cracks, breaks, or any other defect.

(4) Inspect all other parts for damaged threads, distortion, breaks, or any other defect.

c. Installation. Install parking brake lever and actuating mechanism as shown in figure 3-118.

d. Adjustment. Adjust parking brake as shown in figure 3-119.



ME 4310-338-15/3-119

STEP 1. BLOCK FRONT WHEELS. JACK UP UNIT UNTIL REAR WHEELS ARE OFF GROUND.

STEP 2. ENGAGE PARKING BRAKES. TURN NUT AGAINST HOUSING.

STEP 3. REMOVE PIN AND COTTER PIN. SWING LINK AWAY FROM YOKE.

STEP 4. TURN NUT AGAINST HOUSING TO DRAW RELEASE STUD OUT AND CAGE SPRING. ADJUST NUT UNTIL BRAKES JUST STOP DRAGGING AND WHEEL TURNS FREELY.

STEP 5. PLACE PARKING BRAKE HANDLE IN UP (DISENGAGED) POSITION. ADJUST YOKE TO MATCH HOLES WITH HOLE IN LINK. INSTALL PIN AND COTTER PIN BUT DO NOT BEND COTTER PIN.

STEP 6. ENGAGE PARKING BRAKES AND CHECK WHEEL TO BE SURE BRAKES ARE LOCKED. READJUST, AS NECESSARY, FOLLOWING ABOVE PROCEDURE. BEND COTTER PIN.

STEP 7. RELEASE AND REMOVE JACK. REMOVE FRONT WHEEL BLOCKS.

Figure 3-119. Parking brake lever and actuating mechanism adjustment.

3-130. General

The suspension and steering components include the springs and shackles, steering knuckles and spindles, tie rods, king pins, the center steering arm, the tow bar, and associated yokes and pins. The springs are fastened to the axle beams, then attached to the frame with shackles and pins. On the front axle, each steering knuckle and spindle pivots around a king pin and is connected to the center steering arm by a tie rod. The center steering arm also pivots around a king pin. The tow bar attaches to the center steering arm using a removable pin. The tow bar can be positioned vertically when not being used or placed in the horizontal position for towing the air compressor unit.

3-131. Springs

a. Removal.

(1) Remove wheel (para 3-121).

(2) With frame blocked up, remove spring as shown in figure 3-120.

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 spring for cracks, breaks, separation, or any other defect.

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

c. Installation.

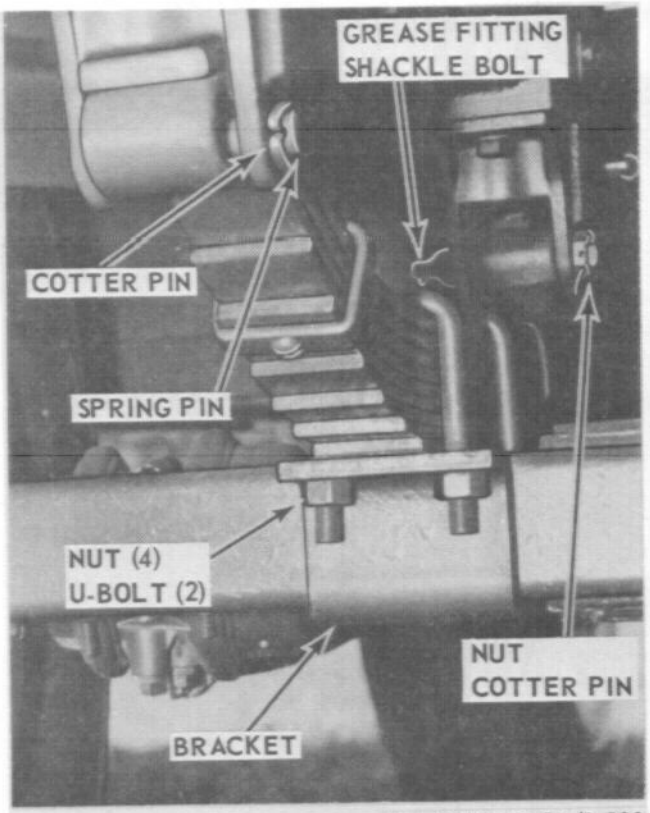
(1) Install spring as shown in figure 3-120.

(2) Install wheel (para 3-121).

(3) Lubricate spring in accordance with Lubrication Order (LO 5-4310-338-12.

3-132. Tow Bar

a. Removal. Remove tow bar as shown in figure 3-121.



ME 4310-338-15/3-120

REMOVAL

STEP 1. REMOVE COTTER PINS AND GREASE FITTING.

STEP 2. REMOVE NUT AND SHACKLE BOLT. REMOVE SPRING PIN.

STEP 3. REMOVE U-BOLTS, NUTS, AND BRACKET.

INSTALLATION

STEP 1. HOLD SPRING IN PLACE AND INSTALL SHACKLE BOLT AND NUT. INSTALL SPRING PIN.

STEP 2. INSTALL COTTER PINS AND GREASE FITTING.

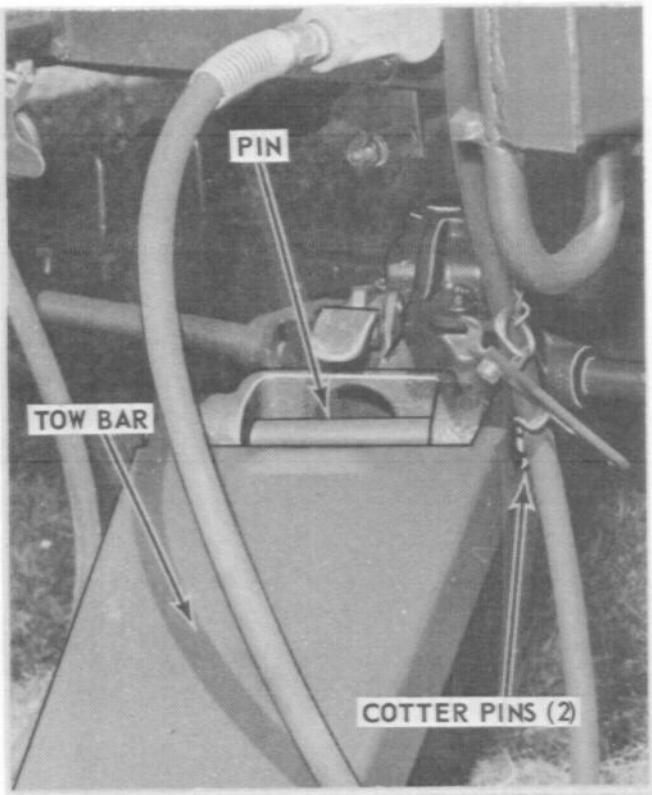
STEP 3. INSTALL BRACKET, U-BOLTS, AND NUTS.

Figure 3-120. Springs; removal and installation.

b. Cleaning and Inspection.

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

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



ME 4310-338-15/3-121

REMOVAL

STEP 1. REMOVE COTTER PINS.

STEP 2. REMOVE PIN FROM TOW BAR. REMOVE TOW BAR.

INSTALLATION

STEP 1. PLACE TOW BAR IN MOUNTING POSITION AND INSTALL PIN.

STEP 2. INSTALL COTTER PINS.

Figure 3-121. Tow bar; removal and installation.

(3) Inspect safety chains for broken links, cracks, distortion, or any other defect.

(4) Inspect tow bar for cracks, breaks, distortion, or any other defect.

c. Installation. Install tow bar as shown in figure 3-121. Lubricate in accordance with Lubrication Order (LO) 5-4310-338-12.

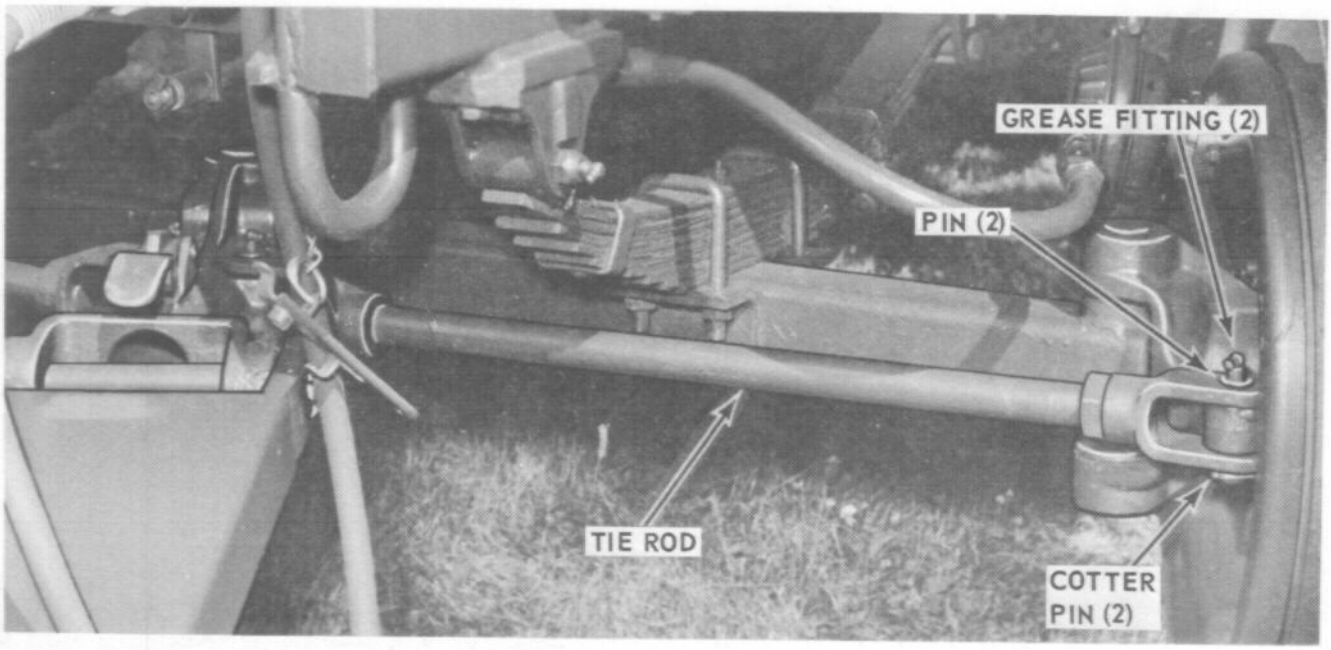
3-133. Tie Rods and Yokes

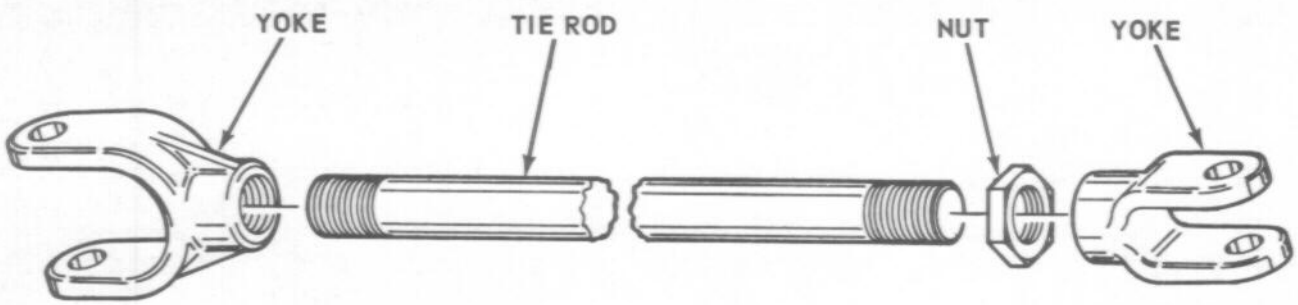
a. Removal.

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

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

(3) Remove tie rods and yokes as shown in figure 3-122.





ME 4310-338-15/3-122

REMOVAL

STEP 1. REMOVE COTTER PINS AND GREASE FITTINGS FROM EACH TIE ROD.

STEP 2. REMOVE PIN AT ENDS OF EACH TIE ROD. REMOVE TIE RODS.

STEP 3. UNSCREW AND REMOVE YOKES AND NUTS FROM TIE RODS.

INSTALLATION

STEP 1. INSTALL YOKES AND NUTS ON EACH TIE ROD.

STEP 2. PLACE TIE ROD IN MOUNTING POSITION AND INSTALL PIN AT EACH END.

STEP 3. INSTALL COTTER PINS AND GREASE FITTINGS.

STEP 4. ADJUST TIE RODS AS SHOWN IN FIGURE 3-123.

Figure 3-122. Tie rods and yokes; removal and installation.

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 yokes and pins for cracks, breaks, distortion, or any other defect.

(3) Inspect tie rods for cracks, damaged threads, distortion, or any other defect.

(4) Inspect all other parts for cracks, breaks, distortion, damaged threads, of any other defect.

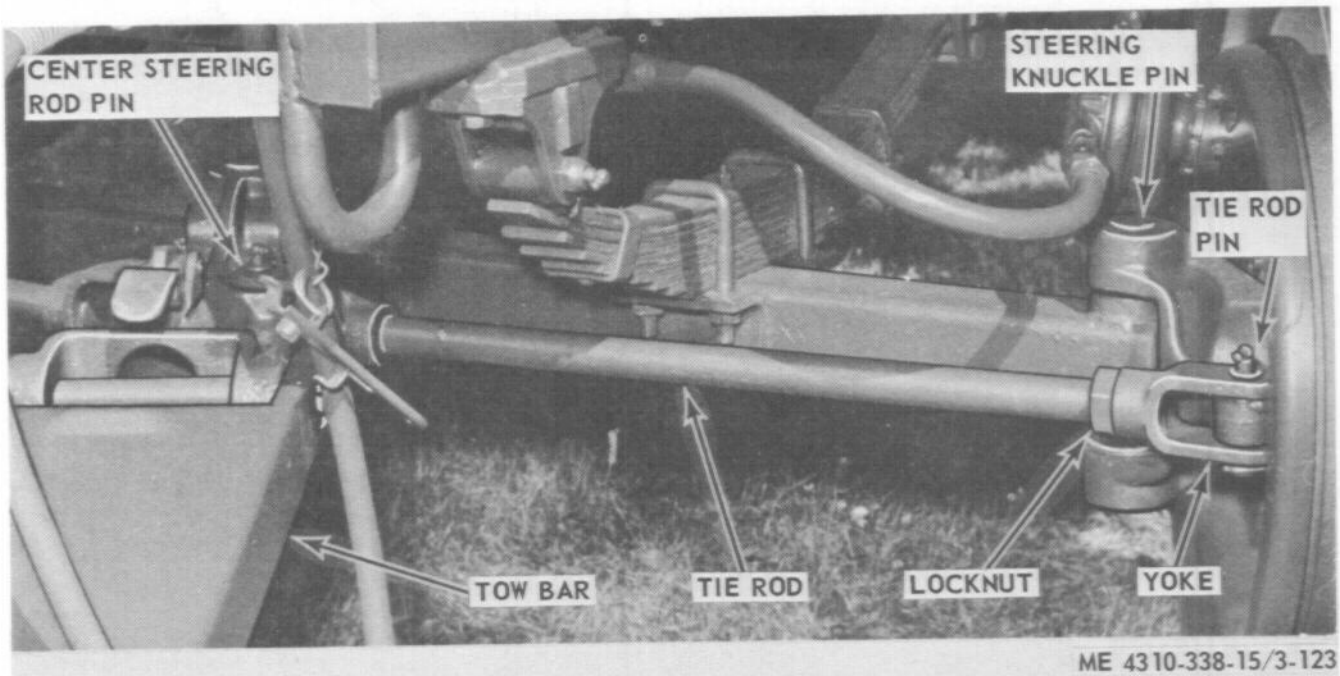
c. Installation.

(1) Install tie rods and yokes as shown in figure 3-122.

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

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

d. Adjustment. Adjust tie rods as shown in figure 3-123.



STEP 1. POSITION TOW BAR STRAIGHT AHEAD.

STEP 2. MEASURE DISTANCE FROM CENTER OF STEERING KNUCKLE PIN ON BOTH SIDES TO CENTER POINT ON TOW BAR. MOVE TOW BAR TO OBTAIN EQUAL MEASUREMENT.

STEP 3. MEASURE DISTANCE FROM CENTER OF TIE ROD PIN TO CENTER OF CENTER STEERING ROD PIN.

STEP 4. TO MAKE ADJUSTMENT, REMOVE TIE ROD PINS AND LOOSEN LOCK NUT. TURN TIE ROD IN OR OUT UNTIL THE LENGTH OF RODS ARE EQUAL. CONNECT ROD TO STEERING KNUCKLE.

STEP 5. MARK POINT ON OUTSIDE OF EACH FRONT WHEEL, AT HUB HEIGHT, AND MEASURE DISTANCE BETWEEN THESE POINTS.

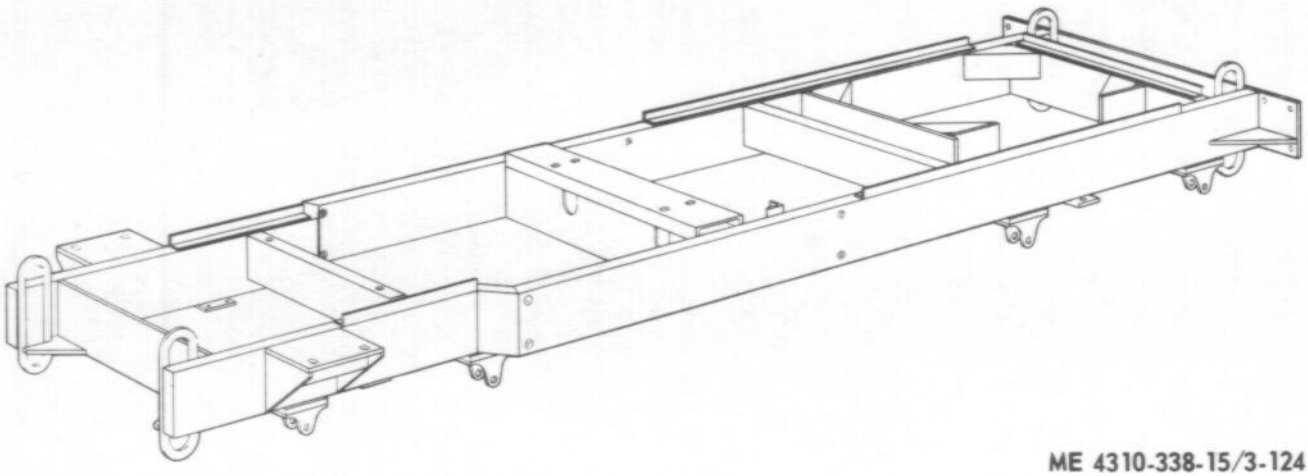
STEP 6. DISTANCE BETWEEN MARKS SHOULD BE 1/4-INCH LESS THAN AT REAR WHEELS.

STEP 7. ADJUST CLEVISES EQUALLY UNTIL ADJUSTMENT IS OBTAINED. TIGHTEN LOCK NUTS.

Figure 3-123. Tie rod adjustment.

3-134. General

The frame is a welded assembly on which is mounted all of the air compressor unit components (fig. 3-124). The lifting and tie down eyes form an integral part of the frame assembly as does the main section of the rear bumper. In addition, two removable bumpers attach to the rear of the frame.



ME 4310-338-15/3-124

Figure 3-124. Frame assembly.

3-135. Bumper Assemblies

a. Removal. Remove each bumper assembly as shown in figure 3-125.

b. Installation. Install each bumper assembly as shown in figure 3-125.

ME 4310-338-15/3-125

REMOVAL

STEP 1. REMOVE BOLT AND LOCKNUT FROM BUMPER BRACE.

STEP 2. REMOVE BOLTS AND LOCKNUTS FROM BUMPER AND FRAME. REMOVE BUMPER.

INSTALLATION

STEP 1. POSITION BUMPER IN MOUNTING POSITION AND INSTALL BOLTS AND LOCKNUTS TO FRAME. DO NOT TIGHTEN.

STEP 2. INSTALL BOLTS AND LOCKNUTS ON BUMPER BRACE. TIGHTEN ALL LOCKNUTS.

Figure 3-125. Bumper Assemblies; Removal and Installation.

CHAPTER 4
SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

4-1. Preparation of Equipment For Shipment and Storage

Detailed instructions for the preparation of the air compressor unit for storage and shipment are contained in TB 740-93-2.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

4-2. Demolitions Methods

Instructions for the destruction of equipment to prevent enemy use are contained in TM 750-244-3.

CHAPTER 5
DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

5-1. Scope

a. The following instructions are intended for use by Direct Support, General Support, and Depot maintenance personnel. The instructions contain information on equipment maintenance that is beyond the scope of tools, equipment, personnel, or supplies normally available at the organizational level.

b. Appendix A lists the publications applicable to field and depot maintenance. Appendix C is the Maintenance Allocation Chart. The Direct Support, General Support, and Depot maintenance repair parts are listed and illustrated in TM 5-4310-338-35P (When printed).

5-2. Forms and Records

For information pertaining to DA forms and records that are the responsibility of Direct Support, General Support, and Depot maintenance personnel, see paragraph 1-2.

Section II. DESCRIPTION AND DATA

5-3. Description and Data

For a complete description of the Model 1M600RPV Rotary Air Compressor, see paragraph 1-3.

5-4. Tabulated Data

a. General. This paragraph contains maintenance data pertinent to Direct Support, General Support, and Depot maintenance personnel. This information consists of equipment classification and ratings, replacement standards, an air piping diagram, a compressor oil cycle diagram, time standards, and specific torque data.

b. Engine Classification and Rating.

Type	Four-cycle Reciprocating Turbo-charged Diesel
Model	Caterpillar Tractor Co. Model D333C-T
Number of Cylinders	6
Bore and Stroke	4.75 in. x 6.0 in.
Displacement	638 cu. in.
Low Idle Speed	1000 RPM
High Idle Speed	2050 RPM
Governed Speed	1800 RPM
Brake Horsepower (W/O Fan)	190@ 1800 RPM
Firing Order	1—5—3—6—2—4
Fuel Rack Setting	+.070"

c. Compressor Classification and Rating.

Type	Sliding Blade, Air, Rotary DED
Model	Davey Compressor Company 1M600RPV
Part Number	61438
Stages	1
Air Volume	600 CFM
Air Pressure	100 PSI

d. Repair and Replacement Standards. Table 5-1 lists manufacturer's sizes, tolerances, desired clearances, and maximum allowable wear and clearances.

e. Spring Free Lengths. Table 5-2 lists the free length of certain springs that are used in the Model 1M600RPV Rotary Air Compressor. The components are listed under the appropriate functional index.

f. Schematic Wiring Diagram. See figure 1-3 for a schematic wiring diagram of the Model 1M600RPV Rotary Air Compressor.

g. Air Line Diagram. Figure 5-1 is the air line diagram for the Model 1M6000 RPV Rotary Air Compressor.

g. Air Line Diagram. Figure 5-1 is the air line diagram for the Model 1M600RPV Rotary Air Compressor.

h. Compressor Oil Cycle Diagram. Figure 5-2 depicts the path of oil flow throughout the air compressor.

i. Time Standards. Table 5-3 lists the number of man-hours required under normal conditions to perform the indicated maintenance function for the Model 1M600RPV Rotary Air Compressor. Components are listed under the appropriate functional index. The times listed are not intended to be rigid standards. Under adverse conditions, the operations can take longer, but under ideal conditions with highly skilled mechanics, most of the operations could be accomplished in considerable less time.

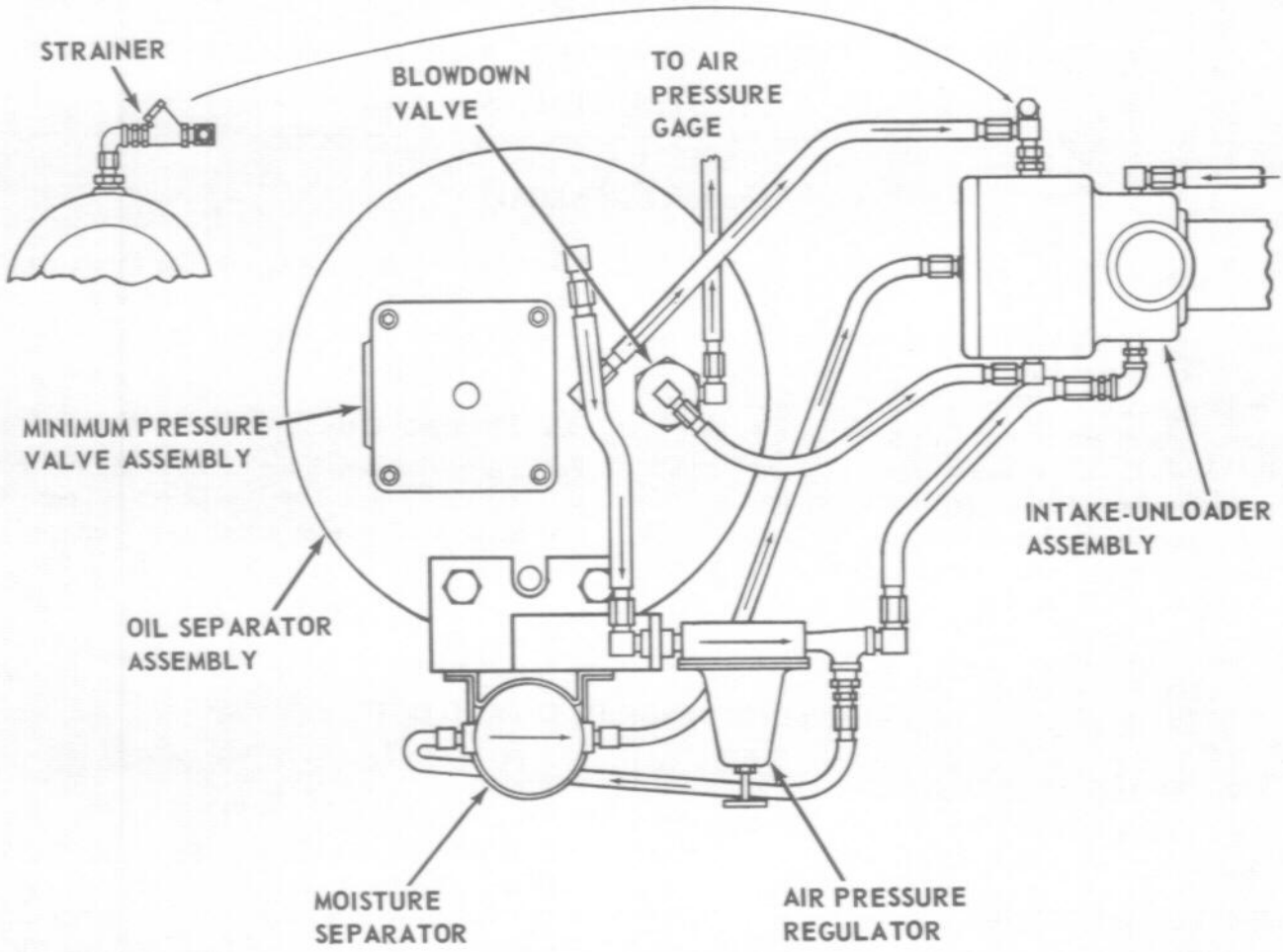


Figure 5-1. Air Line Diagram.

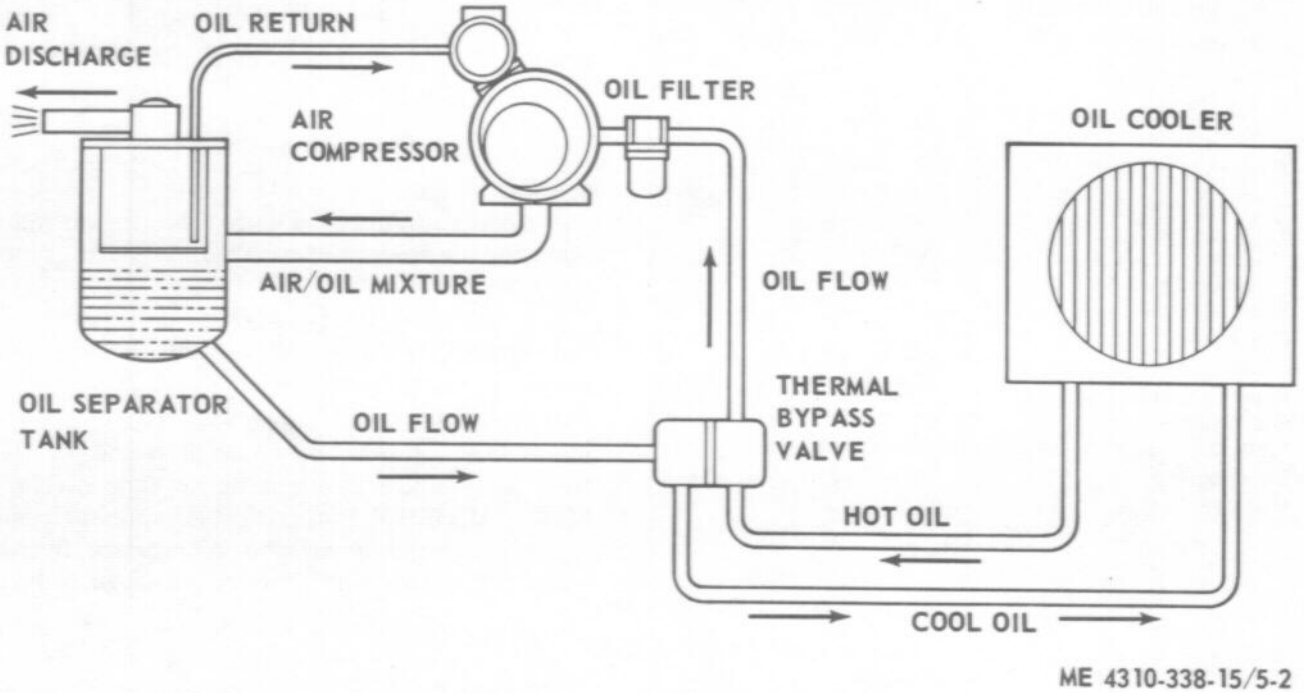


Figure 5-2. Compressor oil cycle diagram.

Table 5-1. Repair and Replacement Standards

Component	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear and clearance
	Minimum	Maximum	Minimum	Maximum	
ENGINE					
Cylinder block					
Liner counterbore depth	0.400	0.402			
Camshaft bearing bore	2.5625	2.5635			
Main bearing bore	3.8155	3.8165			
Cylinder liner					
Inside diameter	4.750	4.752			0.006*
Flange thickness	0.4040	0.4056			
Projection above block	0.0020	0.0056			
Crankshaft					
Main journal diameter	3.499	3.500			0.008
Main bearing clearance			0.0030	0.0059	0.010
End clearance			0.006	0.019	0.035
Connecting rod journal diameter	2.999	3.000			0.007
Connecting rod out-of-round					0.004
Pistons					
Pin bore	1.6999	1.7003			
Piston pins					
Clearance in piston					0.006
Clearance in rod					0.006
Pin diameter	1.6997	1.7000			
Piston Rings					
Clearance:					
Top ring			0.0030	0.0044	0.006
Intermediate			0.0025	0.0039	0.006
Oil control ring			0.0015	0.0033	0.006
Gap (at unworn 4.750 in. diameter of liner bore):					
Top ring	0.017	0.023			
Intermediate ring	0.017	0.023			
Oil control ring	0.013	0.023			
Gap (at unworn 4.751 in. diameter of liner bore):					
Top ring	0.020	0.026			
Intermediate ring	0.020	0.026			
Oil control ring	0.016	0.026			
Gap (at unworn 4.752 in. diameter of liner bore):					
Top ring	0.023	0.029			
Intermediate ring	0.023	0.029			
Oil control ring	0.019	0.029			
Connecting rod					
Bearing clearance	0.0030	0.0059			0.010
Bearing bore in rod	3.2495	3.2505			
Pin bearing bore	1.7009	1.7015			
Center-to-center distance	9.594	9.596			
Crankshaft bearing bore	3.002	3.006			0.010
Pin diameter	1.6997	1.7000			
Camshaft					
Bearing journal diameter	2.3105	2.3115			
Bearing clearance			0.002	0.006	0.008
End clearance			0.004	0.010	0.025
Fuel injection pump housing					
Fuel rack					
Diameter	0.4983	0.4987			
Bearing bore	0.5007	0.5013			
Bearing clearance					0.005
Camshaft					
Bearing bore	1.875	1.876			
Bearing clearance					0.010
Journal diameter	1.8725	1.8735			
Pump plunger length	2.5931	2.5937			0.0050
Fuel transfer pump					
Total clearance, gear-to-cover	0.001	0.003			0.0035
Bearing bore (2)	0.4950	0.4956			0.003
Shaft diameter	0.4936	0.4938			
Bearing clearance	0.0012	0.0020			
Depth-body bore	0.3747	0.3753			

*Measured near top of piston ring travel.

Table 5-1. Repair and Replacement Standards — Continued

Component	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear and clearance
	Minimum	Maximum	Minimum	Maximum	
Governor					
Backlash between drive gear and driven gear	0.000	0.006			
Turbocharger					
Shaft end clearance	0.006	0.011			
Bearing bore inside diameter	0.6268	0.6272			
Bearing outside diameter	0.9780	0.9785			
Housing bore	0.9827	0.9832			
Shaft bearing journal diameter	0.6250	0.6254			
Oil seal ring gap	0.001	0.006			
Oil Pump					
Drive shaft diameter	0.8745	0.8749			0.005
Clearance, gear-to-cover			0.002	0.004	
Drive idler gear shaft diameter	1.1220	1.1230			0.008
Idler gear shaft diameter	0.8745	0.8749			0.008
Bearing bore	0.8760	0.8766			
Bearing clearance			0.0011	0.0021	
Rocker arm					
Bearing bore	0.7260	0.7266			
Shaft diameter	0.7240	0.7520			
Shaft-to-bearing clearance					0.008
Valve lifters					
Lifter diameter	1.3100	1.3110			
Bore in block	1.3135	1.3155			
Lifter clearance					0.012
Valves, guides, and seat inserts					
Valves guide projection above head		0.875			
Exhaust valve seat insert outside diameter	2.0030	2.0040			
Inlet valve seat insert outside diameter	2.1280	2.1290			
Head bore for exhaust valve seat insert	2.0000	2.0010			
Head bore for inlet valve seat insert	2.1250	2.1260			
Exhaust valve head diameter	1.891	1.901			
Inlet valve head diameter	2.015	2.025			
Exhaust valve seat face diameter	1.810	1.860			
Inlet valve seat face diameter	1.934	1.984			
Valve stem diameter	0.3712	0.3722			0.0010
Valve guide bore (installed)	0.3736	0.3756			0.0010
Inlet valve lip thickness	0.057				
Exhaust valve lip thickness	0.070				
Closed inlet valve projection		0.138			
Closed exhaust valve projection		0.128			
Depth of bore in head for valve seat inserts	0.448	0.450			
Valve seat width		0.095			
Exhaust valve clearance				0.025	
Inlet valve clearance				0.015	
Water pump					
Clearance, impeller-to-housing	0.010	0.030			
Drive gear train					
Oil pump idler gear					
Bearing bore	1.1245	1.1255			
Bearing clearance			0.0015	0.0035	
Accessory drive idler gear					
Backlash between idler gear and camshaft gear	0.001	0.013			
End clearance			0.004	0.016	0.018
Bearing bore	1.376	1.381			
Bearing-to-shaft clearance			0.002	0.006	0.009
COMPRESSOR:					
Drive end cover					
Bearing bore diameter	5.9055	5.9071			
Bearing bore depth	3.115	3.125			
Non-drive end cover					
Bearing bore diameter	5.9055	5.9071			
Bearing bore depth	3.115	3.125			
Bearing Retaining Covers					
Mounting flange to face	0.615	0.620			

Table 5-1. Repair and Replacement Standards — Continued

Component	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear and clearance
	Minimum	Maximum	Minimum	Maximum	
Stator					
Length	19.007	19.010			
Inside diameter	9.798	9.804			
Rotor					
Length	18.993	18.996			
Outside diameter	8.497	8.500			
Bore (not at keyway)	2.7583	2.7593			
Blade slot width	0.312	0.315			
Shaft					
Bearing journals	2.7563	2.7568			
Rotor journal	2.7563	2.7573			
Coupling journal	2.749	2.750			
Concentricity (T.I.R.)		0.001			
Blades (new)					
Length	6.318	6.320			
Height	2.185	2.190			2.123
Thickness	0.3088	0.3118			
Clearance in slot			0.0002	0.0062	
FRONT AXLE:					
Steering parts					
King pins	1.2380	1.2390			
Center pin	1.2380	1.2390			
Yoke pins	0.748	0.750			

Table 5-2. Spring Free Length Table

Spring	Free length (in inches)
01 ENGINE	
0105 Valves, camshaft, and timing system:	
Rocker arm shaft spring	4.00
Rocker arm shaft spring (end)	0.0826 ± 0.005
Valve springs	2.05
0106 Engine lubrication system:	
Oil pump assembly	
Bypass valve spring	3.57
Oil filter assembly	
Element seat springs	3 61/64
Relief valve spring	1 15/16
Oil cooler assembly	
Valve springs	3.61
03 FUEL SYSTEM	
0302 Fuel pumps:	
Fuel injection pump housing assembly	
Lifter springs	1.59
Check valve springs	0.34
Fuel priming pump	
Sealing spring	0.975
Valve spring	5/16 to 3/8
Fuel line spring	1/2
0308 Engine speed governor and controls:	
Collar guide spring	0.68
Speed limiter plunger spring	2.62
Low idle adjustment spring	2.08
Piston return spring	0.344
0309 Fuel filters:	
Fuel pressure regulator valve spring	1 41/64

Table 5-2. Spring Free Length Table — Continued

Spring	Free length (in inches)
12 BRAKES	
1206 Mechanical brakes:	
Spring brake assembly	
Spring	7 11/16"
1207 Air brake system:	
Relay-emergency valve	
Check valve spring	21/32
Inlet poppet spring	21/32
Piston spring	1 53/64
Exhaust poppet spring	1 9/64 ± 3/64
Valve cartridge spring	1 15/64
50 PNEUMATIC EQUIPMENT	
5001 Crankcase, block, and cylinder head:	
Stator	
Relief drain valve springs	7/8
5006 Lubrication system	
Thermal bypass valve assembly	
Plunger spring	1 3/16
Guide spring	1 3/16
5009 Unloader system components:	
Minimum pressure valve spring	6 1/8
Blowdown valve assembly spring	1 3/8
Intake control	
Valve return spring	3 5/8
Valve spring	3
Drain valve spring	1
Air pressure regulator assembly	
Adjustment spring	2.362 ± .060
Valve spring	1.750

Table 5-3. Time Standards

Lubrication and service	Man-hours
01 ENGINE	
0101 Crankcase, block, cylinder head:	
Crankcase	
(to drain crankcase and refill with new oil)	0.3
0106 Engine lubrication system:	
Oil filter assembly	
(to replace elements, clean cases with solvent, dry, and inspect)	0.3
Crankcase breather	
(to replace filter cartridge)	0.2
03 FUEL SYSTEM	
0304 Engine air cleaner:	
Air cleaner assembly	
(to replace element, clean case with solvent, dry, and inspect)	0.8
Element, air cleaner	
(to wash, dry, and inspect element)	0.3
0309 Fuel filters:	
Primary fuel filter assembly	
(to clean case in solvent, clean element, dry components, and inspect)	0.3
Final fuel filter assembly	
(to replace element, clean case with solvent, dry, and inspect)	0.3
05 COOLING SYSTEM	
0501 Radiator:	
Radiator assembly	
(to drain radiator, clean, and replenish coolant)	0.5
0505 Fan assembly:	
Fan pulley	
(to lubricate fan pulley)	0.1

Table 5-3. Time Standards — Continued

Lubrication and service	Man-hours
06 ELECTRICAL SYSTEM	
0612 Storage batteries:	
Batteries	
(to check electrolyte level, add water, clean cap vent holes and cables)	0.5
10 FRONT AXLE	
1000 Front axle assembly	
Front axle	
(to lubricate all grease fittings)	0.3
13 WHEELS	
1311 Wheel assembly:	
Bearings, wheel	
(to remove, clean with solvent, inspect and repack wheel bearings)	0.8
1313 Tires and tubes:	
Tires and tubes	
(to check and inflate tires to correct pressure)	0.2
14 STEERING	
1401 Steering assembly	
Tie rods, drag links, and bell cranks	
(to lubricate all grease fittings)	0.3
50 PNEUMATIC EQUIPMENT	
5006 Lubrication system:	
Oil separator assembly	
(to drain all oil and refill)	0.6
Element, oil separator assembly	
(to replace element)	2.5
Oil filter assembly	
(to remove and replace element, clean case, dry components, inspect, and reassemble)	0.3
5008 Air intake:	
Air cleaner assembly	
(to replace element, clean case with solvent, dry, inspect, and reassemble)	1.0
Element, air cleaner	
(to wash, dry, inspect element, and reinstall)	0.9
5009 Unloader system components:	
Air line strainer	
(to remove element, clean with solvent, dry, inspect, and reinstall)	0.1
5012 Throttling devices:	
Moisture separator assembly	
(to drain)	0.1
Element, moisture separator assembly	
(to replace element)	0.2

Removal and replacement	Man-hours
01 ENGINE	
0100 Engine assembly:	
Engine assembly	
(includes removal and installation of necessary housing components, control panel and controls, lines and fittings, wiring, fan guard, and air compressor)	10.0
0101 Crankcase, block, and cylinder head:	
Glow plugs (each)	0.1
Precombustion chambers (each)	0.1
Cylinder head	
(includes removal and installation of turbocharger, glow plugs, precombustion chambers, valve cover, and wiring)	8.0
Cylinder liners (each)	0.2
Block	
(includes removal and installation of engine assembly and all components connected to engine assembly)	32.0
0102 Crankshaft (with engine assembly removed):	
Crankshaft	2.0
Main bearings (all)	1.0
Oil seals (all)	0.3
Vibration damper	0.2

Table 5-3. Time Standards — Continued

Removal and replacement	Man-hours
0103 Flywheel assembly (with engine assembly removed)	
Flywheel	0.2
Flywheel gear ring	0.5
Flywheel housing	0.3
0104 Pistons, connecting rods (with engine assembly removed):	
Connecting rods (all)	1.2
Pistons, rings, pins, and retainers (all)	2.0
0105 Valves, camshaft, and timing system (with engine assembly removed):	
Valves (each)	0.1
Valve seats (each)	0.5
Guides, springs, and locks (one cylinder)	0.8
Rocker arms (all)	0.3
Valve cover	0.1
Valve lifters (each)	0.1
Push rods (one cylinder)	0.1
Camshaft bearings (all)	0.5
Camshaft	0.2
Timing gear cover	1.0
Timing gears (all)	1.0
Cover thrust washer	0.2
0106 Engine lubrication system:	
Oil pan and plate	1.0
Oil pump assembly (includes removal and installation of oil pan and plate)	1.2
Oil cooler assembly	0.3
Oil filter assembly	0.2
Crankcase breather assembly	0.1
Crankcase breather element	0.1
Oil lines and fittings	0.5
0108 Manifolds:	
Exhaust manifold	0.5
0109 Accessory drive mechanism:	
Fuel injection pump and fuel transfer pump Drive mechanism (includes removal and installation of fuel transfer pump, fuel injection pump housing, and governor assemblies)	1.0
03 FUEL SYSTEM	
0301 Fuel injectors:	
Fuel injection valves (each)	0.1
0302 Fuel pumps:	
Fuel injection pump plungers (each)	0.2
Fuel injection pump housing assembly (includes removal and installation of governor assembly)	1.0
Fuel transfer pump	2.0
0304 Engine air cleaner:	
Air cleaner assembly	1.0
Air cleaner cap	0.1
Hoses and clamps	0.3
0305 Turbocharger:	
Turbocharger assembly (includes piping)	2.0
0306 Tanks, lines, and fittings:	
Fuel tank (each) (includes necessary housing to provide access to tank)	1.0
Fuel lines and fittings (total)	0.4
0308 Engine speed governor and controls:	
Governor assembly	1.0
0309 Fuel filters:	
Pressure regulator valve	0.1
Fuel pump starting tank	0.5
Primary fuel filter	0.4
Final fuel filter	0.4
0311 Engine starting aids:	
Cold weather starting aid (complete)	0.8
Fuel cylinder	0.1
Control cable	0.4

Table 5-3. Time Standards — Continued

Removal and replacement	Man-hours
04 EXHAUST SYSTEM	
0401 Exhaust pipe:	
Exhaust pipe	0.3
Rain shield	0.1
05 COOLING SYSTEM	
0501 Radiator:	
Radiator assembly (includes removal and installation of radiator-oil cooler assembly)	7.0
Radiator cap	0.1
0503 Water mainfold, headers, thermostat, and housing gaskets:	
Radiator hoses and hose clamps (all)	0.6
Water temperature regulator	0.4
0504 Water pump:	
Water pump assembly	1.5
0505 Fan assembly:	
Fan assembly	0.2
Drive belts (includes adjustment)	0.5
Fan guard	0.3
Fan pulley (includes removal and installation of radiator-cooler assembly)	4.0
06 ELECTRICAL SYSTEM	
0601 Generator assembly	
Generator assembly	0.3
Brushes (generator removed)	1.0
Pulley (generator removed)	0.3
0602 Generator regulator:	
Generator regulator assembly	0.3
0603 Starting motor:	
Starting motor assembly	0.5
Solenoid and switches (starting motor removed)	0.5
0606 Engine safety controls:	
Overspeed governor switch	0.3
Low oil pressure switch	0.3
High water temperature switch	0.3
Low fuel pressure switch	0.3
Fuel rack shutoff solenoid	0.3
Air pressure switch	0.3
0607 Instrument and engine control panel:	
Ammeter	0.4
Fuel level gage	0.8
Panel light	0.2
Panel light switch	0.2
Heat-start switch	0.4
Wiring harness	0.7
0609 Lights:	
Tail and stop light assembly (each)	1.0
Blackout tail, stop, and turn light assembly (each)	0.8
Clearance light assembly (each)	0.5
0612 Storage batteries:	
Battery (all)	0.6
Battery cables	0.5
Battery tray	0.6
0613 Hull or chassis wiring harness:	
Wiring harness, external lighting	1.5
0615 Radio interference suppression:	
Braided electrical lead	0.2
Cables (each)	0.1
10 FRONT AXLE	
1000 Front axle assembly:	
Front axle assembly (includes removal and installation of wheels)	8.0
Safety chains	1.5
11 REAR AXLE	
1100 Rear axle assembly:	
Rear axle assembly (includes removal and installation of wheels)	6.0

Table 5-3. Time Standards — Continued

Removal and replacement	Man-hours
12 BRAKES	
1201 Hand brakes:	
Hand brake lever	1.0
Clevis pins and linkage	0.5
1202 Service brakes:	
Wedge brake assembly (each) (includes removal and installation of wheels)	3.0
Brake shoes	1.0
1206 Mechanical brakes:	
Spring brake assembly (each)	1.0
1207 Air brake system:	
Service chamber (each)	0.6
Air reservoir	1.0
Relay-emergency valve	1.3
Lines, hoses, and fittings (all)	1.0
1211 Trailer brake connections and controls:	
Intervehicular couplings (all)	0.6
Intervehicular hose assemblies (all)	0.3
13 WHEELS	
1311 Wheel assemblies:	
Wheel (each)	0.2
Brake drum and hub (each)	0.5
Wheel bearing (each)	0.6
1313 Tires and tubes:	
Tire and tube (each) (includes removal and installation of wheel)	1.0
14 STEERING	
1401 Steering assembly:	
Tie rod assembly (each)	2.0
Spindle and knuckle assembly (each)	2.0
King pin (each)	0.5
Yoke pin (each)	0.5
Lubrication fitting (each)	0.4
Center arm	1.2
15 FRAME	
1501 Frame assembly:	
Frame assembly	75.0
Fenders and hangers	5.0
1503 Pintles and towing attachments:	
Towbar	0.5
16 SPRINGS AND SHOCK ABSORBERS	
1601 Springs:	
Front spring (each)	1.9
Rear spring (each)	1.7
18 BODY, HOOD, AND HULL	
1801 Housing group:	
Grille	0.8
Hood support (each)	1.0
End panel (each)	0.6
Door support (each)	0.6
Door (each)	0.4
Tray (each)	0.8
Rail (each)	0.6
Roof (each)	1.0
Roof bulkhead (each)	1.8
Side panel (each)	1.6
22 BODY, CHASSIS, OR HULL AND ACCESSORY ITEMS:	
2202 Accessory items:	
Safety reflectors (each)	0.1
Battery charging receptacle	0.2
2210 Data plates and instruction holders:	
Transportation data plate	0.1
Operating instruction plate	0.1
U. S. Army identification plate	0.1

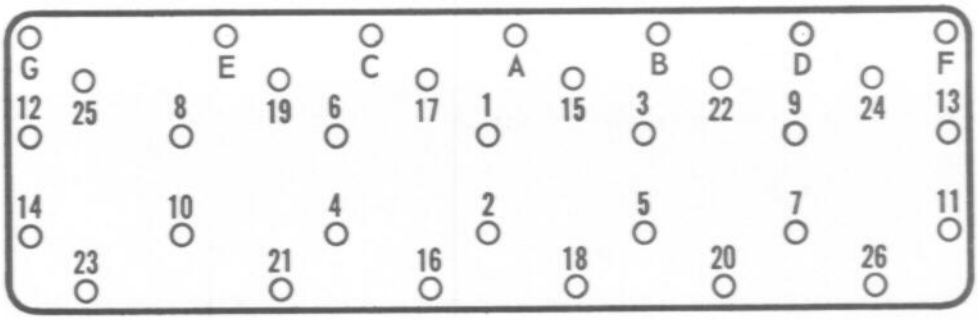
Table 5-3. Time Standards — Continued

Removal and replacement	Man-hours
Rotary compressor plate	0.1
Engine data plate	0.3
47 GAGES (NON-ELECTRICAL)	
4701 Instruments (speed and distance):	
Tachometer-hourmeter	0.1
Tachometer cable	0.2
4702 Gages, mountings, lines, and fittings:	
Air pressure gage	0.5
Oil level gage (oil separator)	0.2
Air cleaner restriction indicators	0.2
Oil pressure gage	0.4
Fuel pressure gage	0.4
Water temperature gage	0.4
Lines and fittings (all)	3.0
50 PNEUMATIC EQUIPMENT	
5000 Air compressor assembly:	
Air compressor assembly (includes removal and installation of necessary housing components, piping, oil filter, and coupling components)	6.0
5001 Crankcase, block and cylinder head:	
Stator (with air compressor removed)	0.8
Stator relief drain valves	0.3
5004 Rotor (with air compressor assembly removed):	
Rotor	1.0
Drive end bearing	0.5
Non-drive end bearing	0.5
Rotor shaft	1.0
Blades	0.3
Seal sleeves	0.5
5006 Lubrication system:	
Oil separator assembly (includes removal and installation of necessary housing components, and piping)	5.0
Element, oil separator assembly	2.5
Oil filter assembly	0.3
Oil cooler (Includes removal and installation of radiator-oil cooler assembly)	5.0
Thermal bypass valve assembly	0.6
Oil lines and fittings (all)	1.5
5007 Compressor drive (includes removal and installation of air compressor assembly):	
Coupling	6.3
Locking straps	6.5
Bushings	6.3
Pins	6.2
5008 Air intake:	
Air cleaner assembly	1.5
Air cleaner cap	0.1
Hoses, clamps and elbows	0.3
5009 Unloader system components:	
Minimum pressure valve	0.5
Blowdown valve assembly	0.4
Safety relief valve	0.3
Air line strainer	0.2
Air lines and fittings (each)	0.4
Intake control valve	0.3
Intake control diaphragm	0.3
Air pressure regulator assembly	0.3
5012 Throttling devices:	
Speed control linkage	0.4
Moisture separator assembly	0.2
5015 Air discharge system:	
Discharge manifold	0.3
Service valves (all)	0.4
Globe valve	0.4

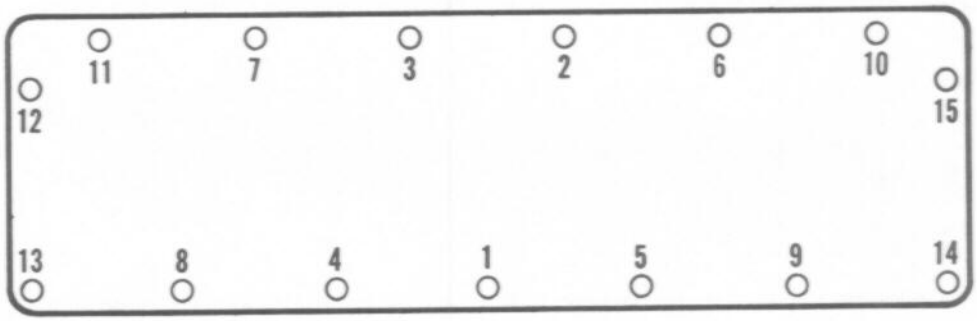
i. Torque Data. Table 5-4 lists the torque values for tightening certain nuts, bolts, screws, and components on the Model 1M600RPV Rotary Air Compressor. Each item is listed under the appropriate functional index.

Table 5-4. Torque Data

Item	Torque value
01 ENGINE	
0101 Crankcase, block, and cylinder head:	
Glow plugs	8-10 ft lb
Precombustion chambers	150 ft lb
Cylinder head capscrews	
Follow numerical sequence shown on figure 5-3:	
Initial	115 ft lb
Intermediate	170-180 ft lb
Final	170-180 ft lb
Follow alphabetical sequence shown on figure 5-3:	
Initial	22 ft lb
Intermediate	27-37 ft lb
Final	27-37 ft lb
0102 Crankshaft:	
Main bearing capscrews	165-185 ft lb
Pulley retaining capscrews	165-185 ft lb
0103 Flywheel assembly:	
Flywheel retaining capscrews	130-170 ft lb
Flywheel housing retaining capscrews	65-85 ft lb
0104 Pistons and connecting rods:	
Connecting rod bolts	
Initial	27-33 ft lb
Plus additional turn of	90°
0105 Valves, camshafts, and timing system:	
Rocker arm retaining capscrews	170-180 ft lb
Camshaft retaining capscrews	27-37 ft lb
Valve cover capscrews	
Follow numerical sequence shown on figure 5-3:	6-10 ft lb
0106 Engine lubrication system:	
Oil pump drive gear retaining nut	60 ft lb
0109 Accessor drive mechanism:	
Gear retaining nut	90-100 ft lb
03 FUEL SYSTEM	
0301 Fuel injectors:	
Valve retaining nut	100-110 ft-lb
0302 Fuel pumps:	
Fuel injecting pump	
Retaining bushing	140-160 ft-lb
Fuel transfer pump drive	
Gear retaining nut	17-27 ft-lb
0305 Turbocharger:	
Impeller housing band clamp	110-130 in-lb
Turbine housing capscrews	160-190 in-lb
Thrust plate assembly	
Retaining capscrews	30-40 in-lb
Impeller retaining nut	
Initial (hot)	120 in-lb
Final (room temperature or 150 max)	20 in-lb
Plus additional turn of	120°
Turbocharger-to-manifold capscrews	36-44 ft-lb
05 COOLING SYSTEM	
0504 Water pump:	
Impeller retaining nut	25-27 ft-lb
06 ELECTRICAL SYSTEM	
0601 Generator assembly:	
Pulley-to-shaft nut	75-90 ft-lb
50 PNEUMATIC EQUIPMENT	
5006 Lubrication system:	
Oil separator cover capscrews	250 ft-lb



A CYLINDER HEAD CAPSCREWS



B VALVE COVER CAPSCREWS

ME 4310-338-15/5-3

Figure 5-3. Capscrew tightening sequence for cylinder head and valve cover.

Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

5-5. Special Tools and Equipment

There are no special tools or equipment required to perform the repair and overhaul procedures on the Model 1M600RPV Rotary Air Compressor.

5-6. Direct Support, General Support, and Depot Maintenance Repair Parts

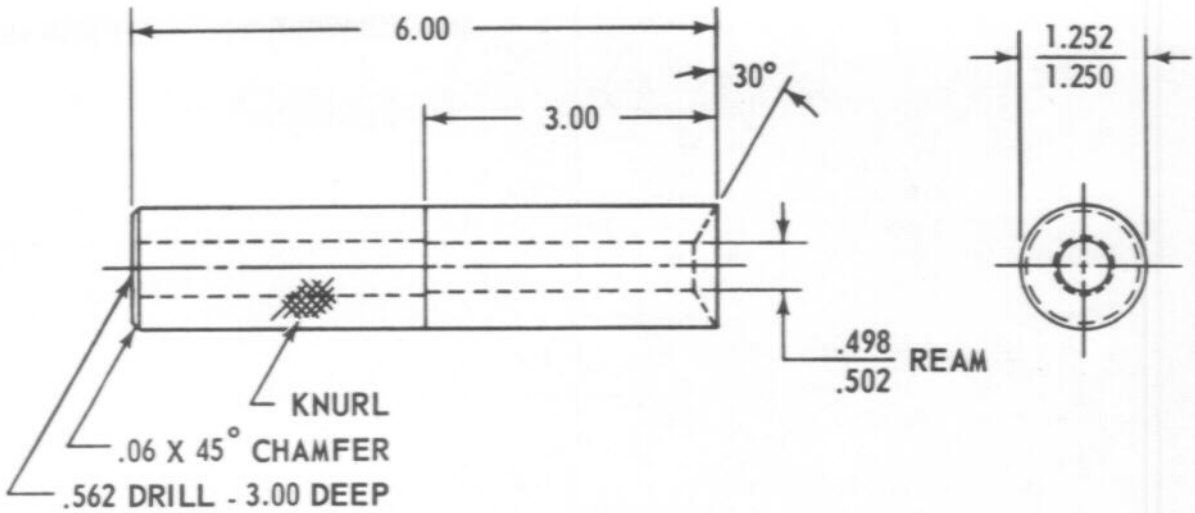
Direct, General Support and Depot maintenance repair parts are listed and illustrated in TM 5-4310-338-35P (when printed).

5-7. Specially Designed (Fabricated) Tools and Equipment

Specially designed tools and equipment are illustrated in figure 5-4 through 5-12 and listed in Table 5-5. These items are for Direct Support, General Support, and Depot level personnel performing maintenance on the Model 1M600RPV Rotary Air Compressor. The tools and equipment are not available through normal issue channels, but must be fabricated by qualified maintenance personnel.

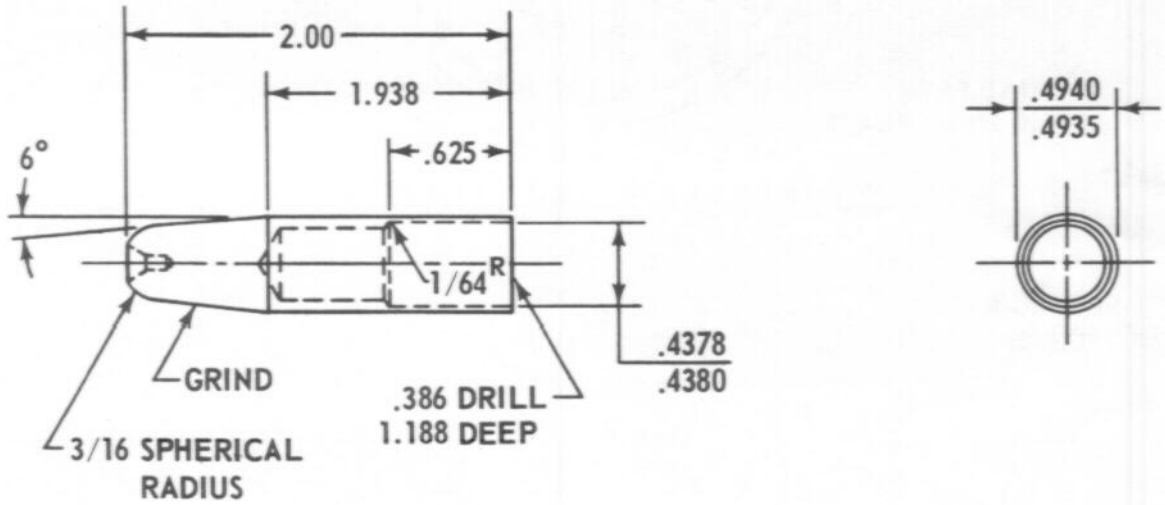
Table 5-5. Specially Designed (Fabricated) Tools & Equipment

Item	Reference		Use
	Fig.	Para.	
Seal tamping tool	5-4	6-14	Fuel transfer pump seal installation
Seal tamping tool guide	5-4	6-14	Fuel transfer pump seal installation
Fixture adapter	5-5	6-12	Turbocharger assembly
Fixture	5-5	6-12	Turbocharger assembly
Supporting screw	5-5	6-12	Turbocharger assembly
Wrench	5-6	6-12	Turbocharger assembly
Wood dowel	5-6	6-12	Turbocharger assembly
Bearing tool	5-7	6-27	Rocker arm bearing installation
Bearing tool	5-8	6-39	Main bearing removal and installation
Flywheel lifting bracket	5-9	6-32	Flywheel removal and installation
Crankshaft seal installation tools	5-10	6-39	Crankshaft seal installation
Water pump seal installation tool	5-11	6-25	Water pump assembly
Interference test block	5-12	6-6	Starting motor testing and adjustment



MAKE FROM MILD STEEL BAR STOCK

A SEAL TAMPING TOOL

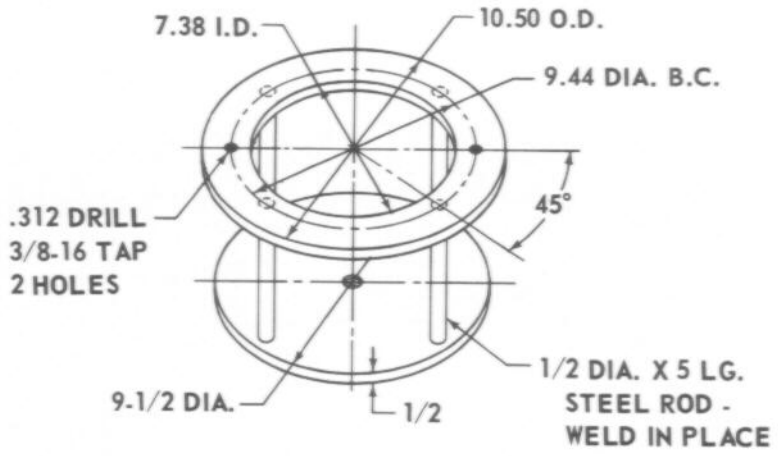


MAKE FROM MILD STEEL BAR STOCK

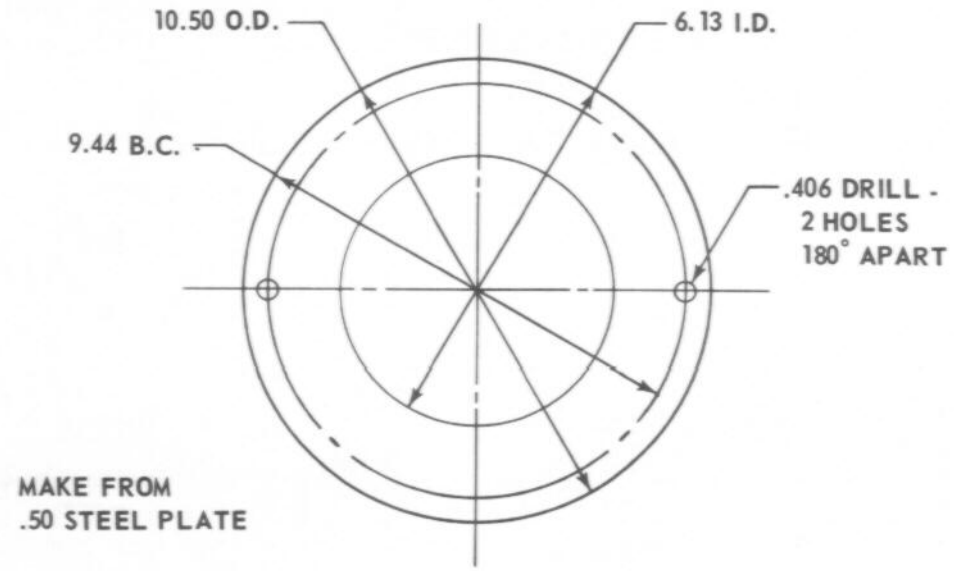
B SEAL TAMPING TOOL GUIDE

ME 4310-338-15/5-4

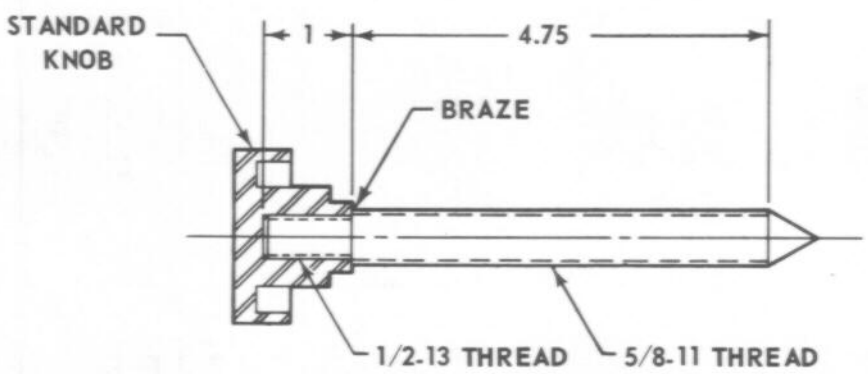
Figure 5-4. Fabrication of seal tamping tool and guide; fuel transfer pump seal installation.



A FIXTURE



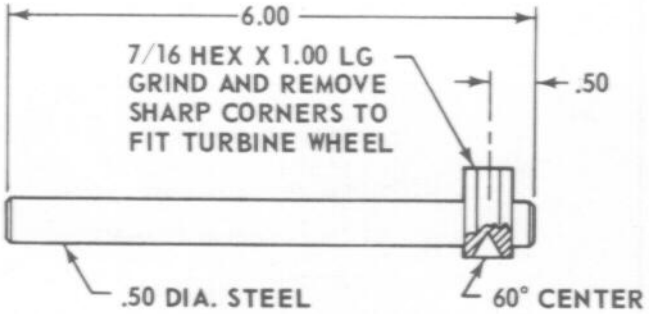
B FIXTURE ADAPTER

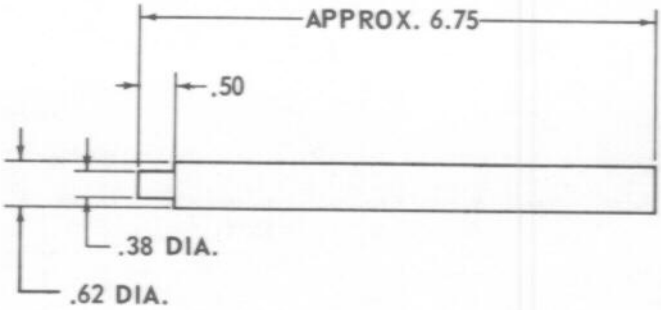


C SUPPORTING SCREW

ME 4310-338-15/5-5

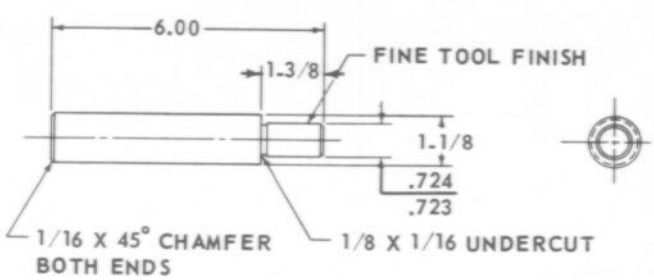
Figure 5-5. Fabrication of fixture; turbocharger assembly.





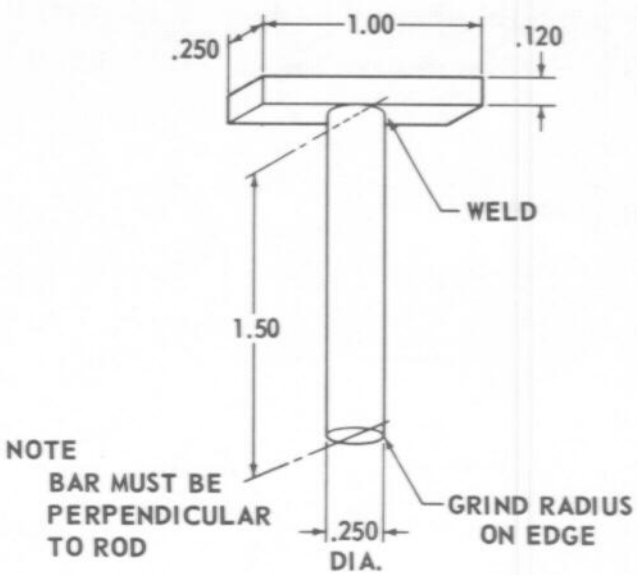
ME 4310-338-15/5-6

Figure 5-6. Fabrication of wrench and wood dowel; turbocharger assembly.



ME 4310-338-15/5-7

Figure 5-7. Fabrication of rocker arm bearing installation tool.



ME 4310-338-15/5-8

Figure 5-8. Fabrication of main bearing removal and installation tool.

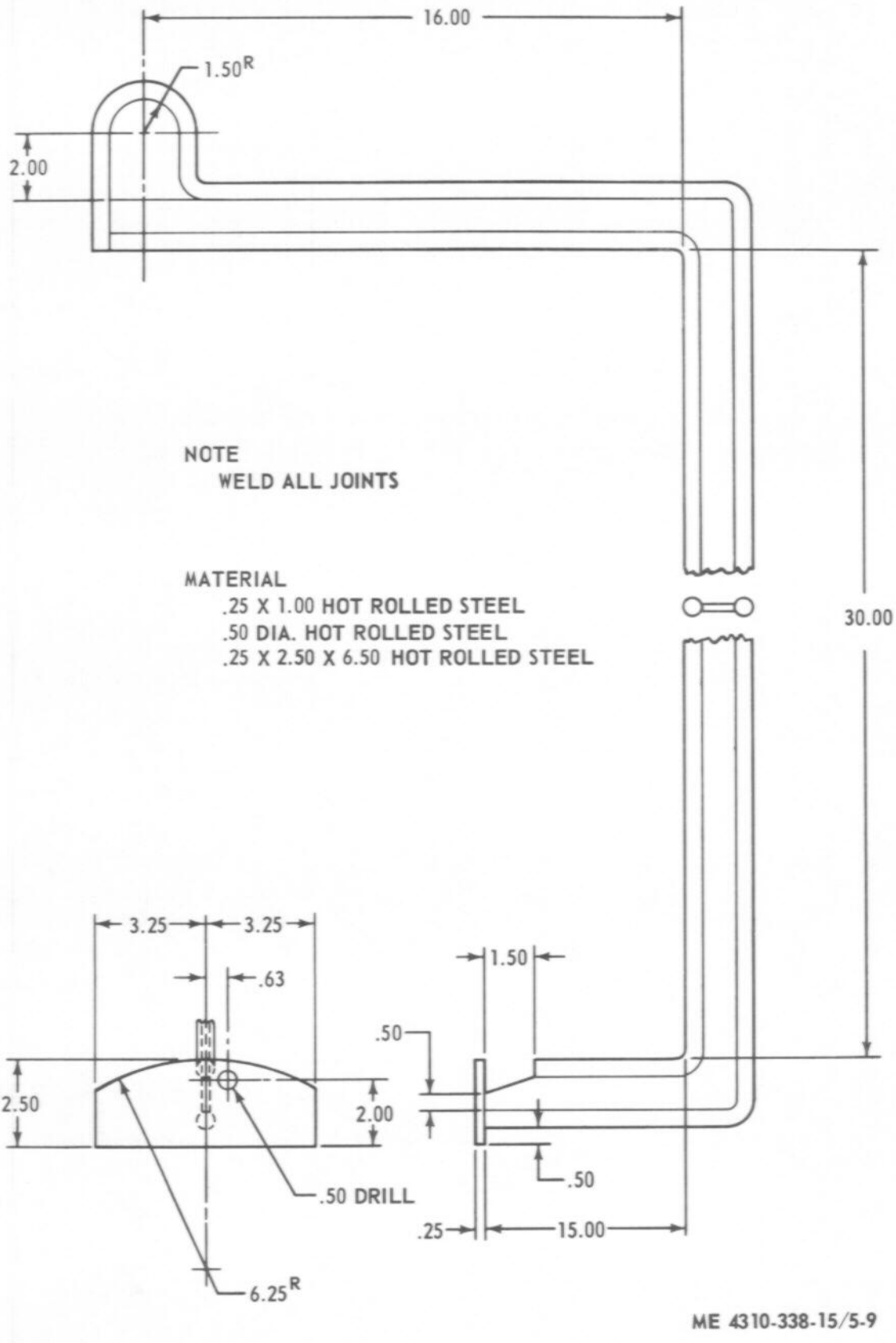
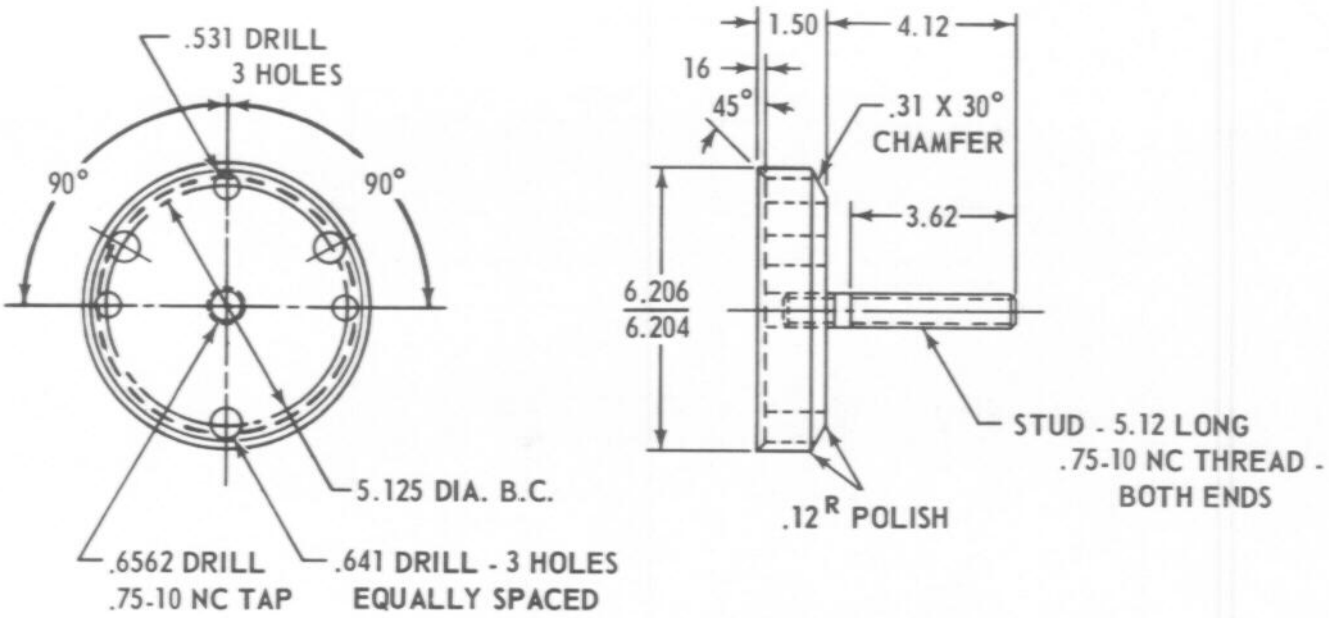
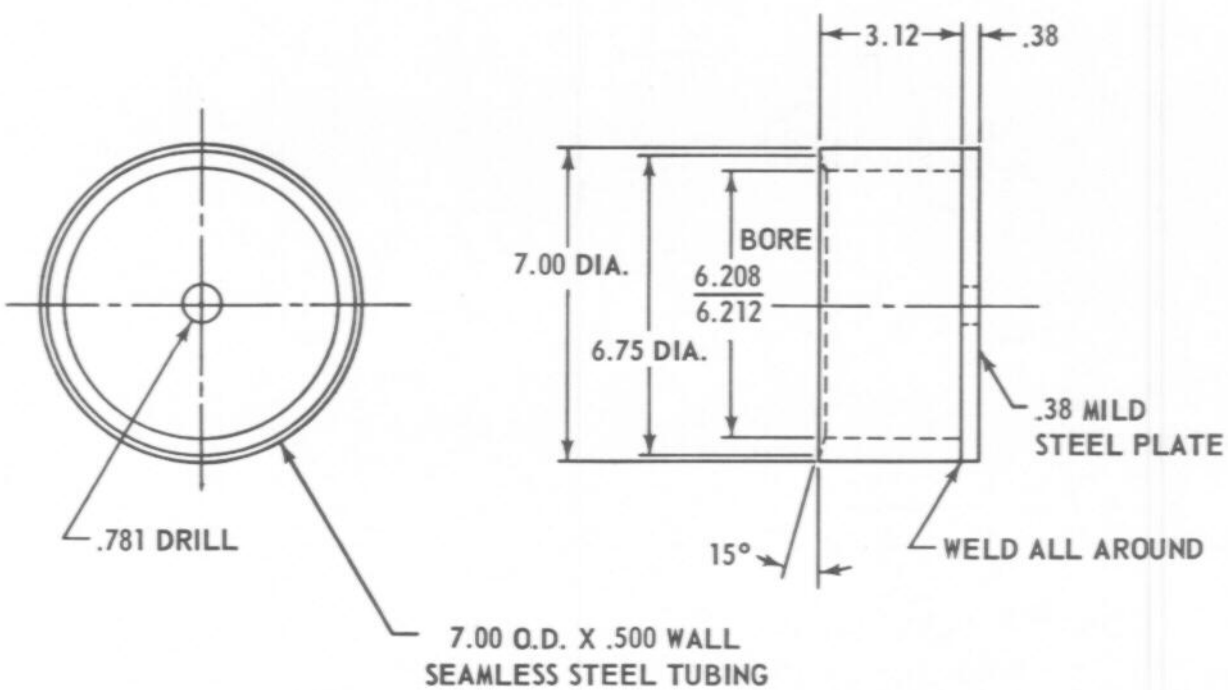


Figure 5-9. Fabrication of flywheel lifting bracket.



A PILOT



B SLEEVE

ME 4310-338-15/5-10

Figure 5-10. Fabrication of crankshaft seal installation tools.

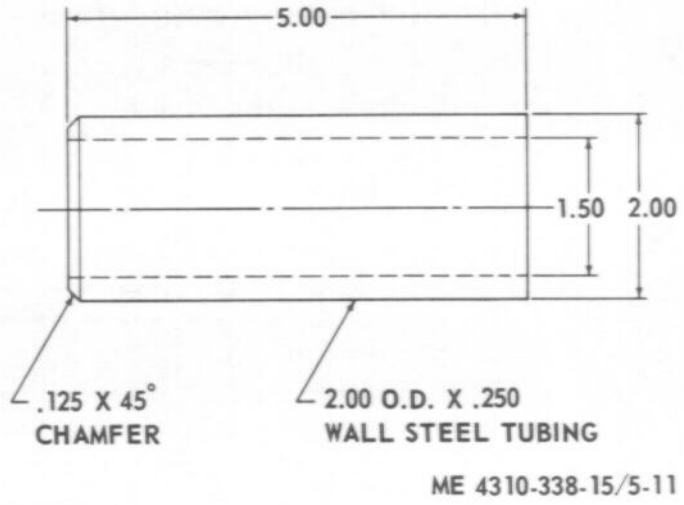


Figure 5-11. Fabrication of water pump seal installation tool.

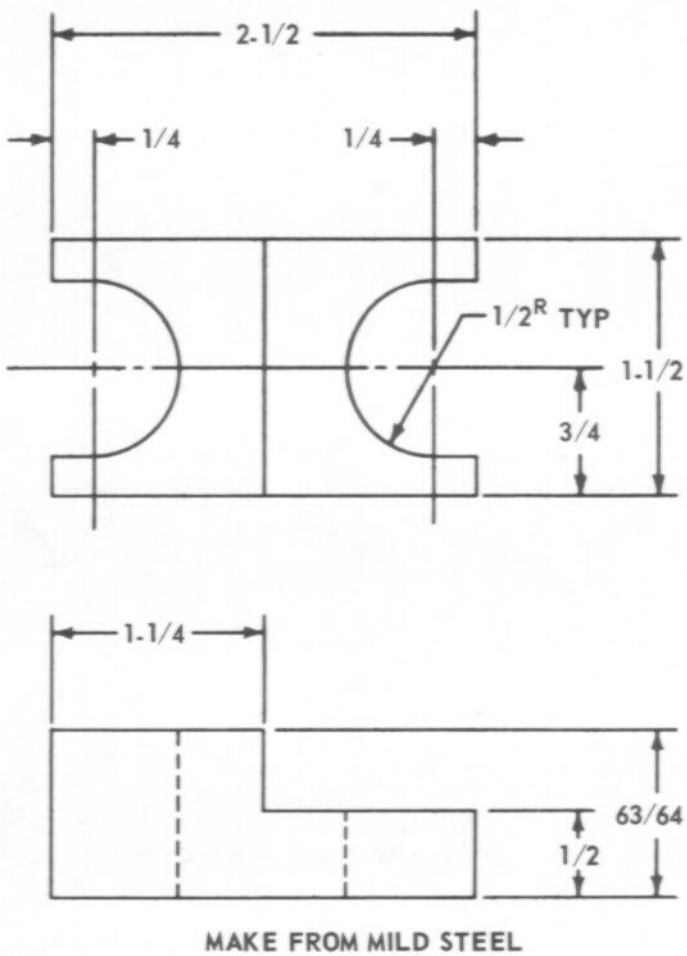


Figure 5-12. Fabrication of interference test block; starting motor assembly.

5-8. General

This section provides information useful in diagnosing and correting unsatisfactory operation or failure of the Model 1M600RPV Rotary Air Compressor that is beyond the scope of organizational maintenance. Malfunctions which may occur are listed in Table 5-6. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause. References to applicable procedural paragraphs or illustrations are also included in the corrective action column.

Table 5-6. Troubleshooting

Trouble	Probable cause	Corrective action
1. Engine will not turn over.	a. Engine internal seizure.	a. Overhaul engine to replace defective parts.
	b. Compressor internal seizure.	b. Overhaul compressor to replace defective parts.
	c. Starting motor or solenoid defective.	c. Replace or repair starting motor or solenoid (para 6-6).
2. Engine turns over but will not start or is hard to start.	a. Fuel priming pump defective.	a. Replace or repair fuel priming pump (para 6-15).
	b. Fuel transfer pump defective.	b. Replace or repair fuel transfer pump (para 6-14).
	c. Turbocharger defective.	c. Replace or repair turbocharter (para 6-12).
	d. Exhaust valves sticking or burned.	d. Replace or recondition valves and seats (para 6-27).
	e. Cylinder liner worn or cracked.	e. Replace or repair cylinder liner (para 6-45).
	f. Piston or connecting rod defective.	f. Replace defective piston or connecting rod (para 6-43).
	g. Piston rings worn or broken.	g. Replace piston rings (para 6-43).
	h. Slipping fuel injection pump drive.	h. The fuel injection pump is driven by the accessory drive gear through a tapered sleeve. If this sleeve is not tightened properly the accessory drive shaft will not rotate. Check this by removing the fuel transfer pump, cranking the engine, and observing through the pump mounting opening to see if the shaft rotates. If the shaft fails to rotate, remove

Table 5-6. Troubleshooting — Continued

Trouble	Probable cause	Corrective action
2. Engine turns over but will not start or is hard to start — continued.		the small cover from the front of the timing gear cover and tighten the accessory drive gear retaining nut. If tightening eliminates the slipping, time the fuel injection pump to the engine before starting.
	i. Engine timing incorrect.	*i.* Adjust accessory drive shaft timing (para 6-34).
3. Engine misses or runs erratically.	*a.* Fuel transfer pump defective.	*a.* Replace or repair fuel transfer pump (para 6-14).
	b. Valve clearances incorrect.	*b.* Adjust valve clearances (para 3-117).
	c. Defective fuel injection nozzle or fuel injection pump.	*c.* Run engine at speed where defect is most noticeable. Momentarily loosen fuel line nut on each injection pump, one at a time, to "cut out" that cylinder. If one is found where loosening nut makes no difference in irregular operation, replace nozzle or pump for that cylinder (para 3-94 and 3-93).
	d. Fuel rack setting incorrect.	*d.* Adjust fuel rack setting (para 6-17).
	e. Fuel injection pump timing incorrect.	*e.* Adjust fuel injection pump timing (para 6-20).
	f. Push rods bent or broken.	*f.* Replace defective push rods (para 6-27).
	g. Exhaust valves sticking or burned.	*g.* Replace or recondition exhaust valves (para 6-27).
	h. Cylinder liner worn or cracked.	*h.* Replace or repair defective liner (para 6-45).
	i. Piston or connecting rod defective.	*i.* Replace defective piston or connecting rod (para 6-43).
	j. Piston rings worn or broken.	*j.* Replace piston rings (para 6-43).
	k. Governor defective.	*k.* Repair or replace governor (para 6-17).
4. Engine lacks power.	*a.* Valve clearances incorrect.	*a.* Adjust valve clearances (para 3-117).
	b. Fuel transfer pump defective.	*b.* Replace or repair fuel transfer pump (para 6-14).
	c. Fuel rack setting incorrect.	*c.* Adjust fuel rack setting (para 6-17).
	d. Fuel injection pump timing incorrect.	*d.* Adjust fuel injection pump timing (para 6-20).

Table 5-6. Troubleshooting — Continued

Trouble	Probable cause	Corrective action
4. Engine lacks power — continued.	*e.* Defective fuel injection nozzle or fuel injection pump.	*e.* Run engine at speed where defect is most noticeable. Monetarily loosen fuel line nut on each injection pump, one at a time, to "cut out" that cylinder. If one is found where loosening nut makes no difference in irregular operation, replace nozzle or pump for that cylinder (para 3-94 and 3-93).
	f. Turbocharger carboned or otherwise dragging.	*f.* Repair or replace turbocharger (para 6-12).
	g. Cylinder liner worn or cracked.	*g.* Rplace or repair cylinder liner (para 6-45).
	h. Piston or connecting rod defective.	*h.* Replace defective piston or connecting rod (para 6-43).
	i. Piton rings worn or broken.	*i.* Replace piston rings (para 6-43).
	j. Exhaust valves sticking or burned.	*j.* Replace or recondition exhaust valves and seats (para 6-27).
	k. Governor assembly defective.	*k.* Repair or replace governor assembly (para 6-17).
5. Engine knocks, develops excessive noise, or vibration.	*a.* Crankshaft pulley or vibration damper defective.	*a.* Replace crankshaft pulley or vibration damper (para 6-36).
	b. Push rods bent or broken.	*b.* Replace defective push rod (para 6-27).
	c. Vlave clearances incorrect.	*c.* Adjust valve clearances (para 3-117).
	d. Piston pin loose.	*d.* Locate loose piston pin by deactivating injectors, one at a time, until noise stops. Replace defective piston pin and bushing (para 6-43).
	e. Cylinder liner worn or cracked.	*e.* Replace defective cylinder liner (para 6-45).
	f. Piston or connecting rod defective.	*f.* Replace defective piston or connecting rod (para 6-43).
	g. Connecting rod bearings worn or loose.	*g.* Replace defective connecting rod bearings (para 6-43).
	h. Main bearings worn.	*h.* Replace worn main bearings (para 6-39).

Table 5-6. Troubleshooting — Continued

Trouble	Probable cause	Corrective action
5. Engine knocks. develops excessive noise, or vibration. — continued.	*i.* Crankshaft worn, tapered, or out-of-round.	*i.* Recondition or replace crankshaft (para 6-39).
	j. Crankshaft and clearance excessive.	*j.* Replace crankshaft thrust washers (para 6-39).
	k. Flywheel loose.	*k.* Tighten flywheel attaching capscrews.
	l. Crankshaft vibration damper loose or defective.	*l.* Tighten or replace vibration damper (para 6-36).
6. Engine stops suddenly.	*a.* Engine seizure.	*a.* Overhaul engine and replace defective parts.
	b. Compressor seizure.	*b.* Overhaul compressor and replace defective parts.
	c. Engine overspeeds because of defective governor assembly. (Safety shutoff function.)	*c.* Repair or replace governor assembly (para 6-17).
7. Engine has low or no oil pressure.	*a.* Connecting rod bearings worn.	*a.* Replace defective connecting rod bearings (para 6-43).
	b. Oil pump defective.	*b.* Replace oil pump (para 6-30).
	c. Crankshaft worn excessively.	*c.* Recondition or replace crankshaft (para 6-39).
	d. Main bearings worn excessively.	*d.* Replace main bearings (para 6-39).
	e. Oil pump relief valve sticking.	*e.* Clean or replace relief valve (para 6-30).
	f. Fuel transfer pump drive shaft seals leaking. (Fuel leaking into lubricating oil.)	*f.* Replace or repair fuel transfer pump (para 6-14). Drain and refill crankcase in accordance with current Lubrication Order (LO) 5-4310-338-12.
	g. Camshaft bearings worn excessively.	*g.* Replace camshaft bearings (para 6-41).
	h. Rocker arm bore or rocker arm shaft worn excessively.	*h.* Replace derective rocker arm shaft and related parts (para 6-27).
	i. Timing gear bearing clearances excessive.	*i.* Inspect bearings and replace components as necessary (para 6-37;.
	j. Engine oil cooler defective.	*j.* Clean, repair, or replace engine oil cooler (para 6-23).
	k. Engine oil filter defective.	*k.* Repair or replace engine oil filter (para 6-22).
8. Engine overheats.	*a.* Clogged coolant passages in cylinder block.	*a.* Clean cylinder block (para 6-45).

Table 5-6. Troubleshooting — Continued

Trouble	Probable cause	Corrective action
8. Engine overheats — continued.	*b.* Combustion gases in coolant.	*b.* Determine point at which gases are entering cooling system and repair.
	c. Water pump defective.	*c.* Repair or replace water pump (para 6-25).
	d. Fuel injection pump timing incorrect.	*d.* Adjust fuel injection pump timing (para 6-20).
	e. Cylinder block cracked.	*e.* Replace cylinder block (para 6-45).
9. Engine fails to stop.	*a.* Governor defective.	*a.* Repair or replace governor (para 6-17).
	b. Fuel rack broken or jammed.	*b.* Repair or replace fuel rack (para 6-17).
10. Excessive engine oil consumption.	*a.* Piston rings cracked or worn excessively.	*a.* Replace piston rings (para 6-43).
	b. Cylinder liner worn excessively.	*b.* Replace cylinder liner (para 6-45).
	c. Oil cooler bypass valve defective.	*c.* Repair or replace oil cooler bypass valve (para 6-23).
	d. Oil cooler clogged or defective.	*d.* Clean or replace oil cooler (para 6-23).
	e. Valve guides worn excessively.	*e.* Recondition cylinder head assembly (para 6-27).
	f. Rocker arm shaft end plugs not in place.	*f.* Replace rocker arm shaft end plugs (para 6-27).
11. Engine exhaust excessively white or blue.	*a.* Valve guide wear excessive.	*a.* Recondition cylinder head assembly (para 6-27).
	b. Piston rings cracked or worn excessively.	*b.* Replace defective piston rings (para 6-43).
	c. Fuel injection pump timing incorrect.	*c.* Adjust fuel injection pump timing (para 6-20).
	d. Push rod bent or broken.	*d.* Replace bent or broken push rod (para 6-27).
	e. Exhaust valves not seating properly.	*e.* Replace or recondition valves or valve seats as required (para 6-27).
12. Engine exhaust excessively black or grey.	*a.* Fuel injection pump timing incorrect.	*a.* Adjust fuel injection pump timing (para 6-20).
	b. Exhaust valves not seating properly.	*b.* Replace or recondition valves or valve seats as required (para 6-27).
13. Valve clearances close-up.	Valves worn or out of adjustment.	Adjust valve clearances (para 3-117). If problen still exists, recondition cylinder head.
14. Coolant in engine lubricating oil.	*a.* Cylinder head gasket failure.	*a.* Replace head gasket (para 6-27). **NOTE** **Maintain proper torque on cylinder head capscrew.**
	b. Cylinder head cracked or defective.	*b.* Replace cylinder head (para 6-27).
	c. Cylinder block cracked or defective.	*c.* Replace cylinder block (para 6-45).
15. Premature engine wear.	Lubricating oil being diluted by fuel (probably accompanied by high fuel consumption and low engine oil pressure).	Replace leaking components.
16. Loud valve train noise.	*a.* Camshaft defective.	*a.* Replace all damaged parts (para 6-41). Clean engine thoroughly.
	b. Valve lifters broken or severely worn.	*b.* Replace camshaft (para 6-41) and valve lifters (para 6-27). Clean engine thoroughly. Adjust valve clearances (para 3-117).
17. Little rocker arm movement and excessive valve clearances.	*a.* Camshaft lobes severely worn.	*a.* Replace camshaft and followers (para (para 6-41). Clean engine thoroughly. Adjust valve clearances (para 3-117).
	b. Valve lifters severely worn or broken.	*b.* Replace valve lifters (para 6-27). Check camshaft for wear (para 6-41). Check for sticking valves and bent valve stems. Clean engine thoroughly. Adjust valve clearances (para 3-117).
	c. Valve tip worn excessively.	*c.* Replace worn valves (para 6-27).
	d. Valve lifter face worn excessively.	*d.* Replace defective valve lifter (para 6-27).

Table 5-6. Troubleshooting — Continued

Trouble	Probable cause	Corrective action
	e. Push rod worn excessively.	*e.* Replace defective push rod (para 6-27).
	f. Rocker arm anvil worn excessively.	*f.* Replace rocker arm (para 6-27).
18. Valve rotocoil or spring retainer free.	*a.* Keepers are broken.	*a.* Extensive engine damage may result from dropped valve. Replace all damaged parts.
	b. Valve spring broken.	*b.* Replace valve spring (para 6-27).
19. Engine slobber.	*a.* Valve guide worn excessively.	*a.* Recondition cylinder head assembly (para 6-27).
	b. Excessive lubricating oil in valve compartment.	*b.* Replace rocker arm shaft end plugs (para 6-27).
	c. Piston rings worn excessively.	*c.* Replace defective piston rings (para 6-43).
	d. Cylinder liners worn excessively.	*d.* Replace worn cylinder liners (para 6-45).
20. Valve train clicking noise.	Valve spring broken.	Replace valve spring (para 6-27) and all other damaged components.
21. Lubricating oil in coolant.	Head gasket failed.	Replace head gasket (para 6-27).
22. Mechanical knock.	*a.* Engine connecting rod bearing defective.	*a.* Replace connecting rod bearing (para 6-43). Inspect and replace connecting rod and crankshaft if necessary.
	b. Timing gear train defective.	*b.* Repair timing gear train (para 6-37).
	c. Crankshaft defective.	*c.* Replace crankshaft (para 6-39).
23. Compressor overheats.	*a.* Oil separator element clogged.	*a.* Replace element (para 7-9).
	b. Oxidized oil (varnished).	*b.* Disassemble and clean compressor (para 7-11) and oil separator (para 7-8). Replace oil separator element (para 7-9).
	c. Blades damaged or stuck in rotor slots.	*c.* Disassemble compressor. Clean or replace blades as necessary (para 7-11).
24. Noisy compressor operation.	*a.* Rotor bearings defective.	*a.* Replace rotor bearings (para 7-11).
	b. Broken rotor blades.	*b.* Replace rotor blades (para 7-11).
25. Compressor not operating to full capacity or pressure.	*a.* Intake control defective.	*a.* Repair or replace intake control (para 7-11).
	b. Engine governor defective.	*b.* Repair or replace governor (para 6-17).
	c. Blades sticking in rotor.	*c.* Disassemble and clean compressor (para 7-11).
26. Compressor fails to load or unload.	*a.* Intake control defective.	*a.* Repair or replace intake control (para 7-11).
	b. Air pressure regulator defective.	*b.* Repair or replace air pressure regulator (para 7-6).
	c. Dirt buildup on intake control valve seat.	*c.* Clean intake control valve and seat (para 7-11).
27. Compressor vibrates and metallic noice in compressor.	*a.* Stuck or broken rotor blades.	*a.* Clean or replace rotor blades as necessary. Clean stator (para 7-11).
	b. Defective rotor bearings.	*b.* Replace rotor bearings (para 7-11).
	c. Damaged rotor or stator.	*c.* Replace damaged rotor or stator (para 7-11).
28. Excessive compressor oil consumption.	Damaged or defective oil separator element.	Replace element (para 7-9).
29. Brake will not apply.	Punctured diaphragm in service chamber.	Repair service chamber (para 8-2 or 8-3).
30. Brakes apply but braking is not adequate.	*a.* Brake linings are glazed.	*a.* Replace brake linings (para 8-4).
	b. Self-adjusting mechanism not operating properly (front brakes only).	*b.* Repair or replace self-adjusting mechanism (para 8-4).
31. Brakes apply too slowly.	*a.* Service chamber is leaking.	*a.* Repair or replace service chamber (para 8-2 or 8-3).
32. Brakes will not release.	*a.* Spring brake is defective.	*a.* Repair or replace spring brake (para 8-2).

Table 5-6. Troubleshooting — Continued

Trouble	Probable cause	Corrective action
32. Brake will not release — continued.	*b.* Broken wedge return spring in service chamber (rear brakes) or in wedge brake assembly.	*b.* Repair or replace service chamber (para 8-2). or wedge assembly (para 8-4).
33. Brakes release too slowly.	*a.* Shoe guide ledges are corroded.	*a.* Repair wedge brake (para 8-4).
	b. Wedge actuating mechanism in service chamber is binding.	*b.* Repair or replace service chamber (para 8-2 or 8-3).
	c. Weak or broken brake shoe-to-shoe springs.	*c.* Replace shoe-to-shoe springs (para 8-4).
	d. Weak wedge return spring in service chamber (rear brakes) or wedge brake assembly.	*d.* Repair or replace service chamber (para 8-2) or wedge assembly (para 8-4).
	e. Plungers corroded or frozen.	*e.* Repair wedge brake (para 8-4).
34. Brakes apply uneven or grab.	*a.* Wedge actuating mechanism in service chamber is binding.	*a.* Repair or replace service chamber (para 8-2 or 8-3).
	b. Distorted brake linings.	*b.* Replace brake linings. Repair wedge brake (para 8-4).
	c. Linings loose on brake shoes.	*c.* Replace brake linings. Repair wedge brake (para 8-4).

Section V. RADIO INTERFERENCE SUPPRESSION

5-9. General

Refer to TM 11-483 and Chapter 3 of this manual for definitions, purposes, sources and methods used to obtained proper radio suppression. Refer to paragraph 3-30 for instructions on replacing radio interference suppression components.

Section VI. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND AUXILIARIES

5-10. General

The major components covered in this section are the engine assembly, air compressor assembly, and compressor oil separator assembly.

5-11. Compressor Oil Separator Assembly

a. Removal.

(1) Remove air discharge connection, lines, and valves from oil separator assembly (para 3-80).

(2) Remove compressor air cleaner assembly (para 3-79).

(3) Remove housing components as necessary for removal of oil separator assembly (para 3-33).

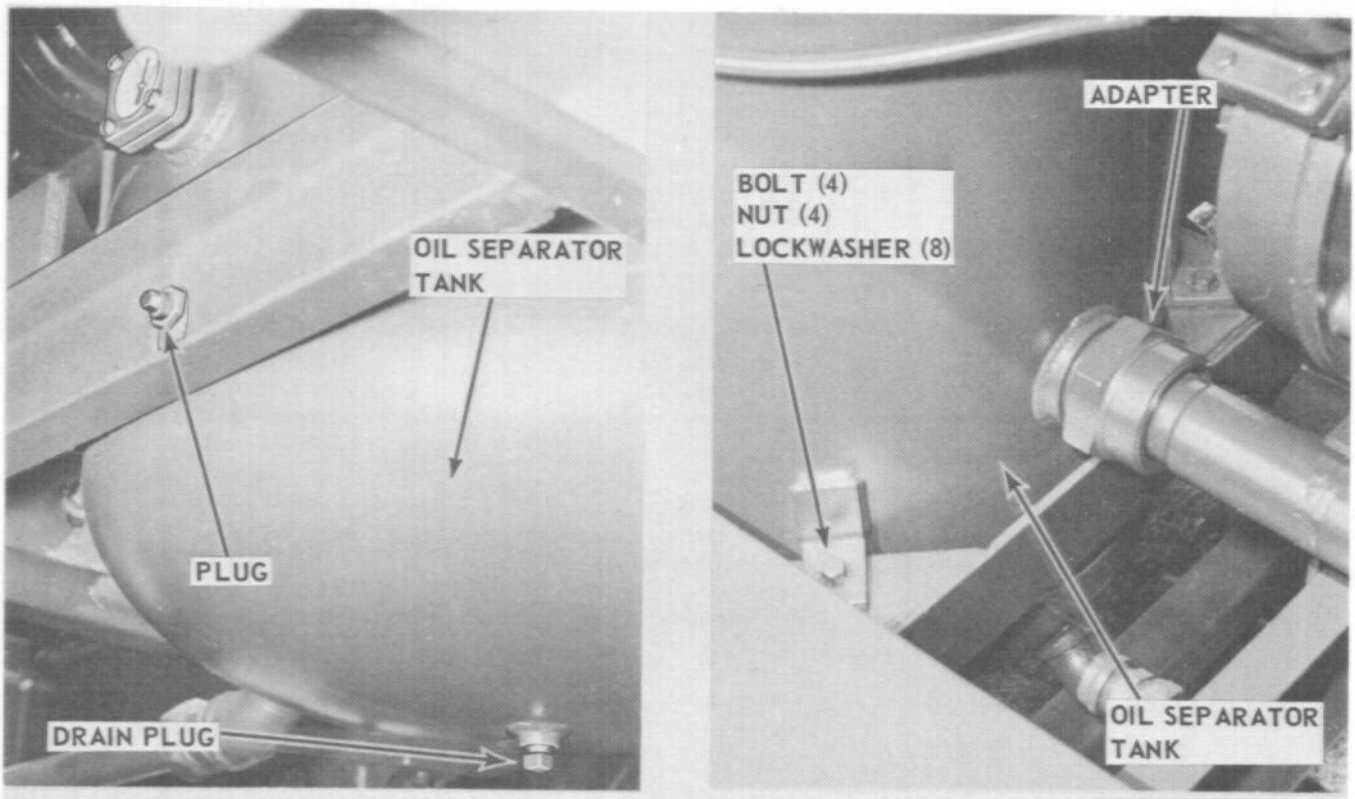
(4) Remove moisture separator assembly (para 3-90).

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

(6) Drain all oil from oil separator assembly (fig. 3-16).

(7) Remove all air lines, connections, and oil lines from oil separator assembly (para 3-81 and 3-86).

(8) Remove oil separator assembly as shown in figure 5-13.



REMOVAL

STEP 1. REMOVE PLUG FROM SIDE OF OIL SEPARATOR TANK.

STEP 2. REMOVE BOLTS, NUTS, AND LOCKWASHERS.

STEP 3. CONNECT LIFTING DEVICE TO TWO EYEBOLTS ON COVER AND REMOVE OIL SEPARATOR ASSEMBLY.

INSTALLATION

STEP 1. USING A LIFTING DEVICE, PLACE OIL SEPARATOR ASSEMBLY IN MOUNTING POSITION ON FRAME.

STEP 2. SECURE OIL SEPARATOR ASSEMBLY WITH BOLTS, NUTS, AND LOCKWASHERS.

STEP 3. INSTALL PLUG IN SIDE OF OIL SEPARATOR TANK.

Figure 5-13. Oil separator assembly; removal and installation.

b. Installation.

(1) Install oil separator assembly as shown in figure 5-13.

(2) Install all air lines, connections, and oil lines on oil separator assembly (para 3-81 and 3-86).

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

(4) Install moisture separator assembly (para 3-90).

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

(6) Install compressor air cleaner assembly (para 3-79).

(7) Install air discharge connection, lines, and valves on oil separator assembly (para 3-80).

(8) Replenish compressor oil supply (fig. 3-16).

5-12. Air Compressor Assembly

a. Removal.

(1) Remove compressor oil separator assembly (para 5-11).

(2) Remove housing components as necessary for removal of air compressor assembly (para 3-33).

(3) Remove compressor oil filter assembly (para 3-87).

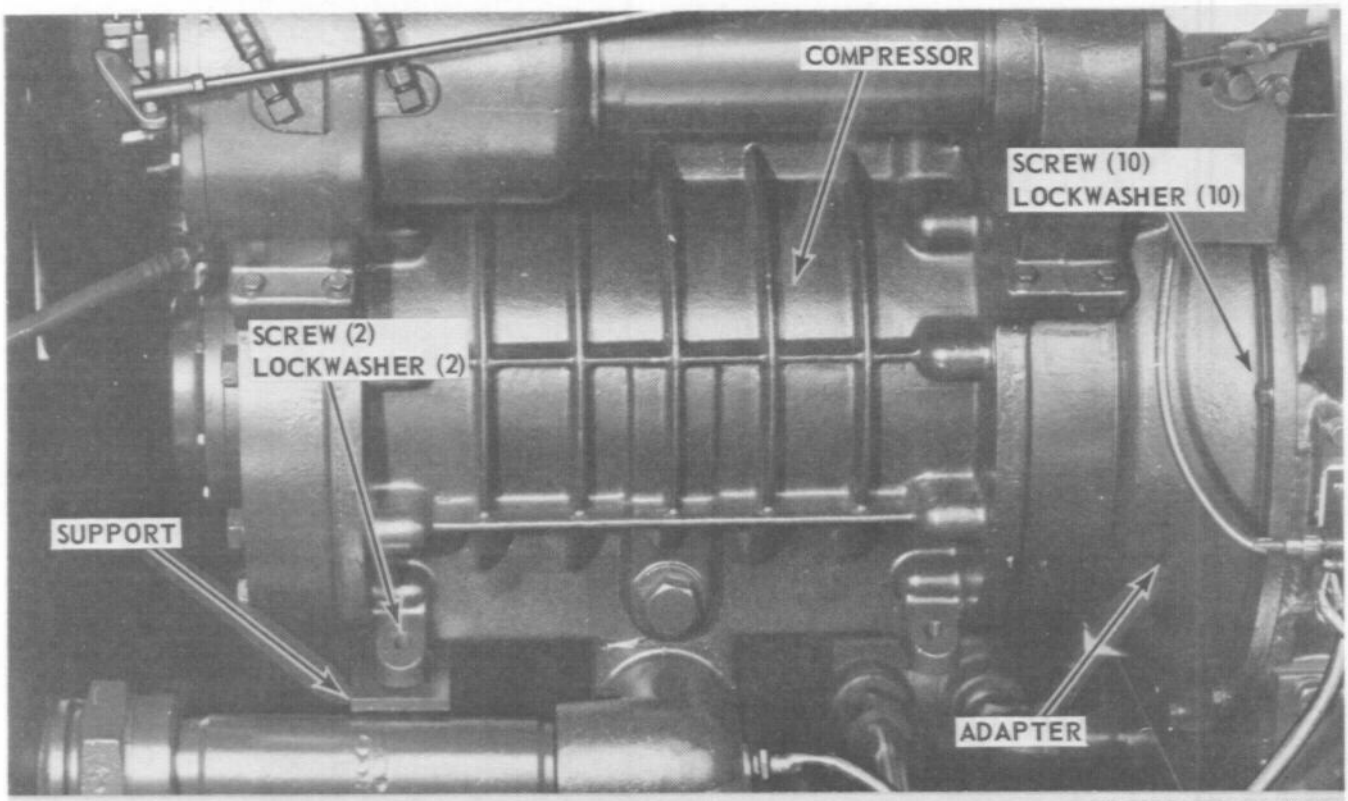
(4) Remove thermostatic switch (para 3-68).

(5) Remove discharge connection from base of air compressor (para 3-80).

(6) Remove air cleaner hose and all air lines from air compressor (para 3-81).

(7) Remove speed control linkage (para 3-88).

(8) Remove air compressor assembly as shown in figure 5-14.



ME 4310-338-15/5-14

REMOVAL

STEP 1. CONNECT LIFTING DEVICE TO EYEBOLTS.

STEP 2. REMOVE SCREWS AND LOCKWASHERS FROM COMPRESSOR SUPPORT.

STEP 3. REMOVE SCREWS AND LOCKWASHERS FROM ADAPTER. REMOVE COMPRESSOR BY PULLING STRAIGHT AWAY FROM ENGINE.

INSTALLATION

STEP 1. BE SURE BUSHINGS ARE PROPERLY INSTALLED ON COUPLING PINS.

STEP 2. USE LIFTING DEVICE AND INSTALL COMPRESSOR ONTO ENGINE. SECURE ADAPTER TO ENGINE WITH SCREWS AND LOCKWASHERS.

STEP 3. SECURE COMPRESSOR BASE TO SUPPORT WITH SCREWS AND LOCKWASHERS.

Figure 5-14. Air compressor assembly; removal and installation.

b. Installation.

(1) Install air compressor assembly as shown in figure 5-14.

(2) Install discharge connection to base of air compressor (para 3-80).

(3) Install thermostatic switch (para 3-68).

(4) Install speed control linkage (para 3-88).

(5) Install compressor oil filter assembly (para 3-87).

(6) Install compressor oil separator assembly (para 5-11).

(7) Install air cleaner hose and all air lines to air compressor (para 3-81).

(8) Install all housing components (para 3-33).

5-13. Engine Assembly

a. Removal.

(1) Remove housing components as necessary for removal of engine and air compressor (para 3-33).

(2) Remove fan guard assembly (para 3-70).

(3) Drain all coolant from radiator and engine block.

(4) Drain all oil from oil separator assembly (fig. 3-16).

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

(6) Remove fan assembly (para 3-74).

(7) Remove thermostatic switch (para 3-68).

(8) Remove air discharge connection from base of air compressor (para 3-80).

(9) Remove compressor oil filter assembly (para 3-87).

(10) Disconnect air cleaner hose and all air lines from air compressor (para 3-81).

(11) Remove air cleaner hose and tubing from turbocharger assembly (para 3-115).

(12) Disconnect battery cables from starting motor. Remove wiring harness from starting motor and fuel rack shutoff solenoid (fig. 1-3).

(13) Remove ground cable from battery. Disconnect generator regulator cables from generator assembly and ammeter (fig. 3-91).

(14) Disconnect fuel lines from primary fuel filter assembly, fuel bypass valve, and fuel priming pump (fig. 3-88).

(15) Drain fuel from primary and final fuel filter assemblies.

(16) Remove solenoid wiring harness (para 3-40).

(17) Remove instrument panel assembly (para 3-45).

(18) Remove overspeed governor switch, wires, and tachometer cables (para 3-67).

(19) Remove speed control linkage (para 3-88).

(20) Remove air compressor (para 5-12).

(21) Remove engine assembly as shown in figure 5-15.

b. Installation.

(1) Install engine assembly as shown in figure 5-15.

(2) Install air compressor (para 5-12).

(3) Install overspeed governor switch, wires, and tachometer cables (para 3-67).

(4) Install instrument panel assembly (para 3-45).

(5) Install solenoid wiring harness (para 3-40).

(6) Connect fuel lines to primary fuel filter assembly, fuel bypass valve, and fuel priming pump.

(7) Connect generator regulator cables to generator assembly and ammeter (fig. 1-3).

(8) Install wiring harness to starting motor and fuel rack shut-off solenoid. Connect battery cables to starting motor.

(9) Install speed control linkage (para 3-88).

(10) Install compressor oil filter assembly (para 3-87).

(11) Install air discharge connection on base of air compressor (para 3-80).

(12) Install thermostatic switch (para 3-68).

(13) Install fan assembly (para 3-74).

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

(15) Install fan guard assembly (para 3-70).

(16) Install air cleaner hose and tubing to turbocharger assembly (para 3-115).

(17) Connect air cleaner hose and all air lines to air compressor (para 3-81).

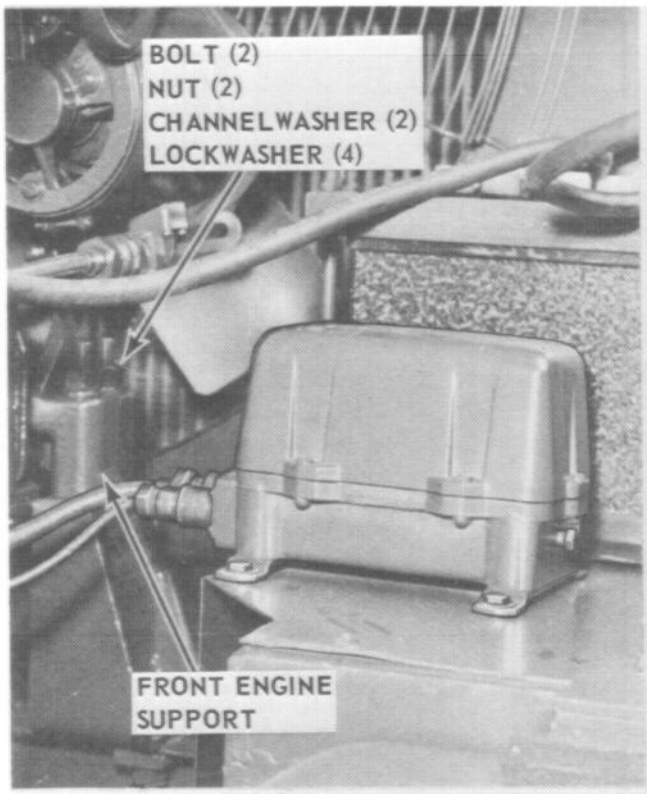
(18) Install all housing components (para 3-33).

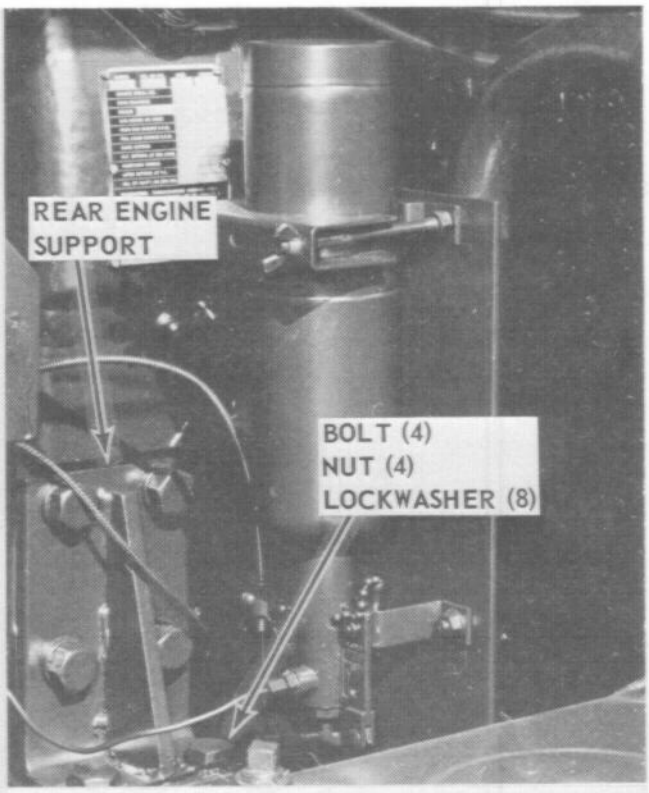
(19) Replenish coolant in engine cooling system (fig. 3-9).

(20) Replenish compressor oil supply (fig. 3-16).

(21) Connect battery ground cable.

(22) Polarize generator assembly (para 3-102).





ME 4310-338-15/5-15

REMOVAL

STEP 1. CONNECT LIFTING DEVICE TO EYEBOLTS.

STEP 2. REMOVE BOLTS, NUTS, CHANNELWASHERS, AND LOCKWASHERS FROM FRONT SUPPORT.

STEP 3. REMOVE BOLTS, NUTS, AND LOCKWASHERS FROM REAR SUPPORT. LIFT ENGINE FROM FRAME.

INSTALLATION

STEP 1. USE LIFTING DEVICE AND POSITION ENGINE ON FRAME.

STEP 2. SECURE REAR SUPPORT WITH BOLTS, NUTS, AND LOCKWASHERS.

STEP 3. SECURE FRONT SUPPORT WITH BOLTS, NUTS, CHANNELWASHERS, AND LOCKWASHERS.

Figure 5-15. Engine; removal and installation.

CHAPTER 6
ENGINE REPAIR INSTRUCTIONS

Section I. GENERATOR ASSEMBLY

6-1. General

The engine generator is a 24-volt, two-pole, shunt-type unit with sealed ball bearings at both ends. The generator is driven by three V-belts off the engine crankshaft pulley. The generator supplies electrical energy to recharge the batteries and to fulfill the load requirements of the air compressor unit when the engine is running. The generated current is controlled and distributed by the generator regulator. The generator assembly is cooled by a fan mounted on the drive end of the generator.

6-2. Generator Assembly

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

b. Disassembly. Disassemble generator assembly in numerical sequence shown in figure 6-1.

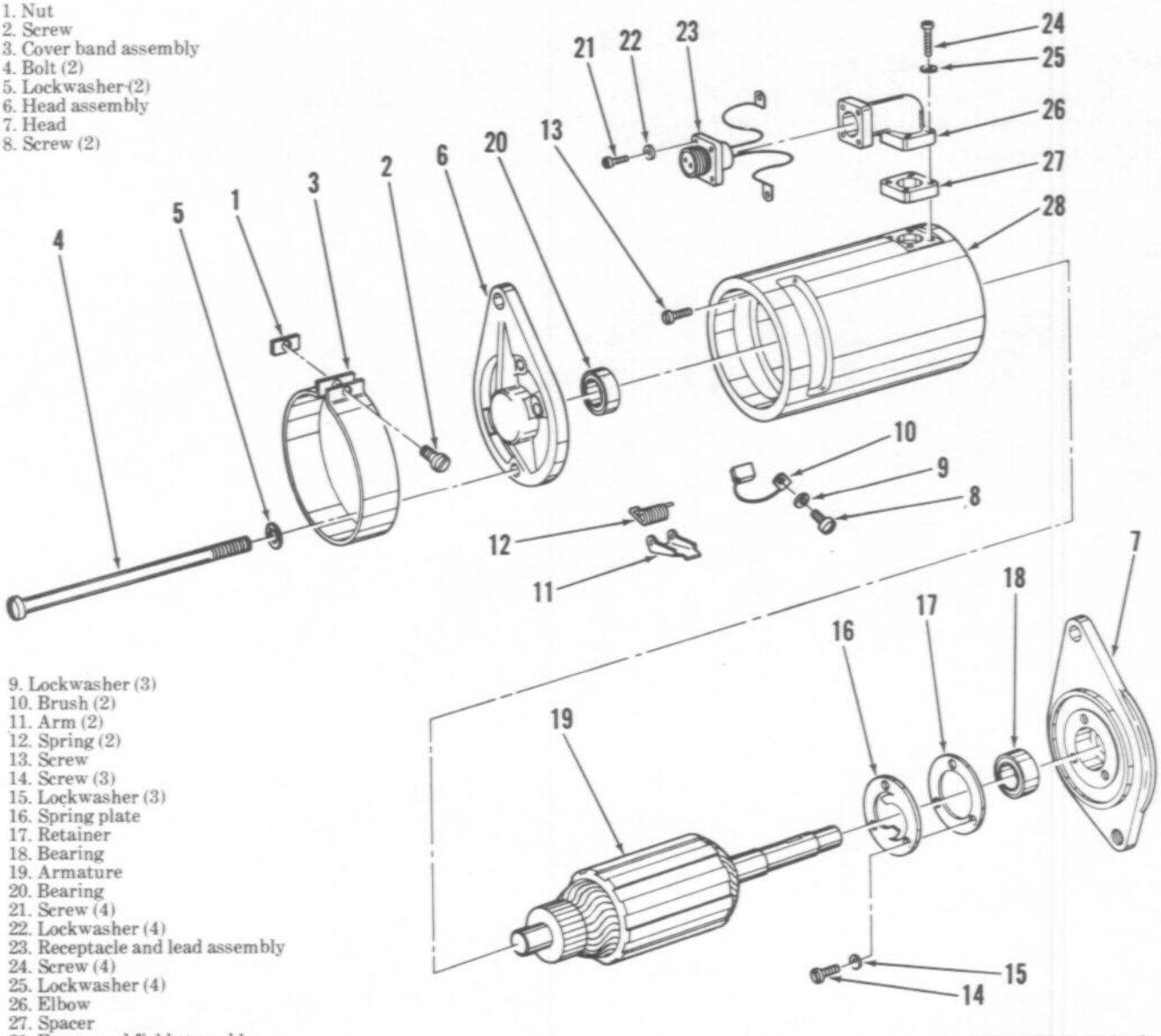


Figure 6-1. Generator assembly; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

NOTE

Refer to TM 5-764 for general repair instructions.

CAUTION

Do not soak or clean, with solvent, any insulation, or electrical components such as brushes and field coils.

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

(2) Clean internal parts with clean, dry, compressed air.

(3) Inspect brushes for cracks, chips, or excessive wear.

(4) Inspect brush springs and arms for distortion, cracks, breaks, or wear.

(5) Inspect head and head assembly for cracks, breaks, or warpage. If defective, replace entire generator assembly.

(6) Inspect bearings for wear, scoring, or pitting. Check for freedom of rotation.

(7) Inspect armature windings to see if they are properly pressed in core slots and tightly soldered to commutator risers.

(8) Inspect commutator for rough spots, discoloration, pitting, scoring, and high mica. If commutator is rough, pitted, or worn, turn commutator using a lathe. Take cuts until all pits are removed. Remove all burrs by holding No. 00 sandpaper lightly against commutator while armature is turning in lathe. Undercut mica after turning commutator. The mica must be undercut to a depth of 1/32" to 3/64".

(9) Inspect commutator for out-of-round using a dial indicator. Out-of-round shall not exceed 0.001" T.I.R.

(10) Inspect bearing journals on both ends of armature shaft for wear, scoring, or pitting. If armature is defective, replace entire generator assembly.

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

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

d. Preassembly Testing.

(1) *Current Draw Test.*

(*a*) Make current draw test setup as shown in figure 6-2.

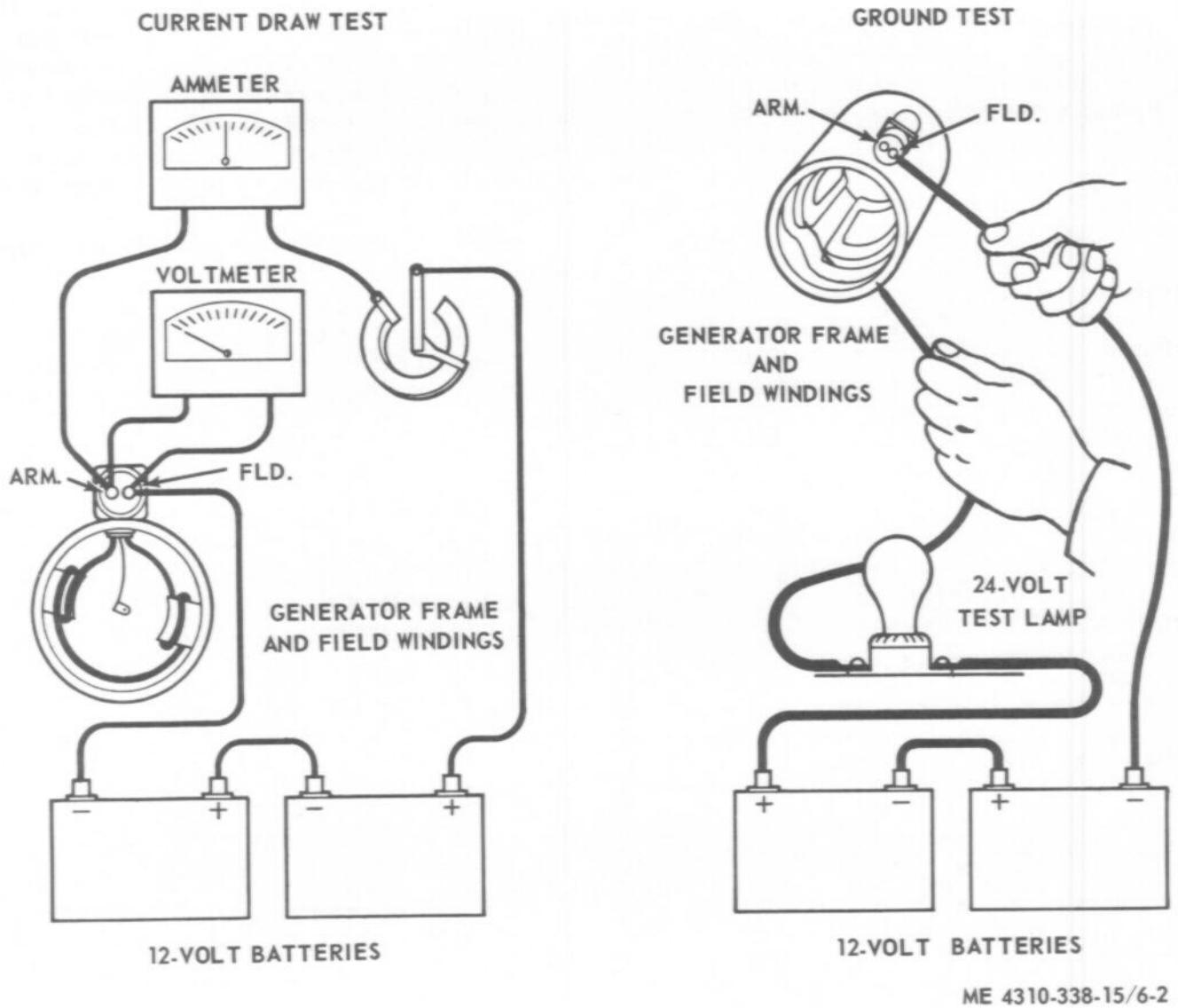


Figure 6-2. Generator preassembly test setups.

(*b*) Adjust rheostat to obtain a voltmeter reading of 28.5 volts. Normal field coil draw should be 1.07 to 1.27 amperes (70 F.). If current is not within specifications, field coils are defective and should be replaced.

(2) *Ground Test.*

(*a*) Make ground test setup as shown in figure 6-2.

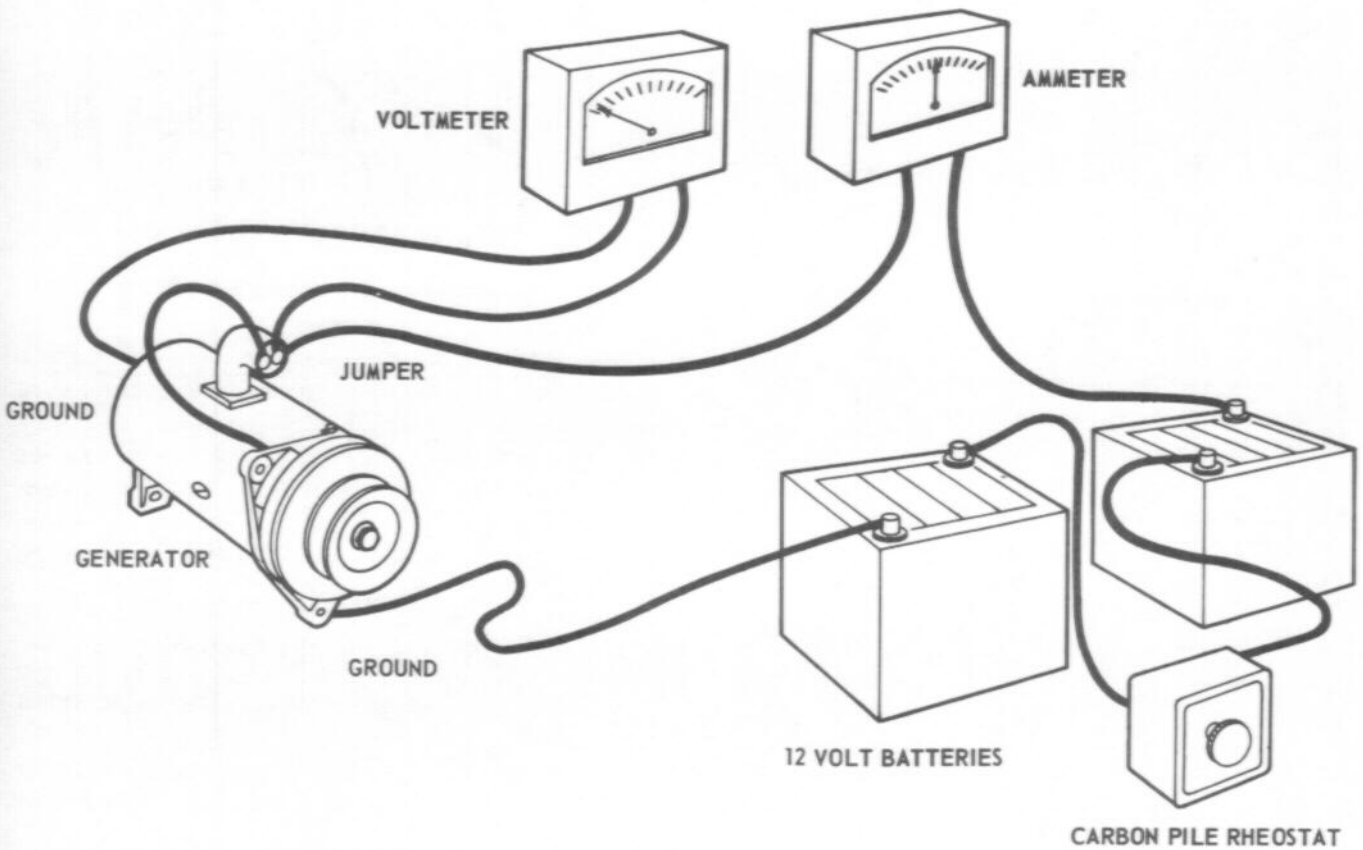
(*b*) Check armature for grounds by touching shaft with one probe and each commutator bar, in turn, with other probe. If lamp lights on any one commutator bar, armature is defective and must be replaced.

(*c*) Check for grounds between field windings and generator frame by touching frame with one probe and each terminal, in turn, with other probe. If lamp lights, field coil being checked is defective and must be replaced.

e. Reassembly. Reassemble generator assembly in reverse numerical sequence shown in figure 6-1.

f. Motoring and Output Test.

(1) Make motoring and output test setup as shown in figure 6-3.



GENERATOR MOTORING AND OUTPUT TESTS

ME 4310-338-15/6-3

Figure 6-3. Generator assembly operational test setup.

(2) Adjust rheostat to obtain a voltmeter reading of 28.5 volts. Normal current draw, as shown on the ammeter, should be 3.5 amperes maximum. Listed below are three abnormal conditions which may occur and the probable cause for each.

(a) *Low motoring current.* Check for an open winding in the armature or for high resistance at the internal connections and in the brush contact on the commutator. An open armature can be detected because one spot on the commutator will be burned by the arc which is formed every time the open passes under a brush. The most likely causes of high resistance are worn brushes and a dirty or worn commutator.

(b) *High motoring current with armature not turning.* This condition indicates that the armature may be grounded or shorted. This condition may also be due to some restriction preventing the armature from rotating. Check the latter possibility by turning the armature by hand to make sure it turns easily with only a slight brush drag. If the armature does not turn easily, it indicates worn or dirty bearings, faulty or excessively worn brushes, insufficient end play, or foreign matter rubbing on the armature or fan.

(c) *High motoring current with armature turning.* This is usually caused by excessive drag on the armature. This drag may be due to worn or improperly lubricated bearings, improper end play, loose or misaligned bearings, high brush tension, worn or rough commutator, or to some other interference with armature movement.

g. Installation. Install generator assembly (para 3-102).

Section II. GENERATOR REGULATOR ASSEMBLY

6-3. General

Basically, the generator regulator assembly consists of relays, capacitors, resistors, a diode and the associated wiring. This circuitry is divided into three independent sections, each of which has a specific function in the charging circuit. The three sections are the circuit breaker, voltage regulator and current regulator. The function of each circuit is as follows:

a. Circuit Breaker. The function of the circuit breaker in the charging circuit is to automatically open and close the circuit between the generator and battery.

b. Voltage Regulator. The function of the voltage regulator is to limit the generator voltage to a safe value. This prevents overcharging of the battery and high system voltage which could damage electrical components.

c. Current Regulator. The function of the current regulator is to limit the output of the generator to its maximum safe value. This prevents generator overheating when the battery is low and will accept more than rated generator output, or when a high accessory load is imposed on the electrical system. This section operates independent of the voltage regulator unit.

6-4. Generator Regulator Assembly

a. Removal. Remove generator regulator (para 3-104).

b. Disassembly. Disassemble generator regulator as shown in figure 6-4. Disassemble only to extent shown.

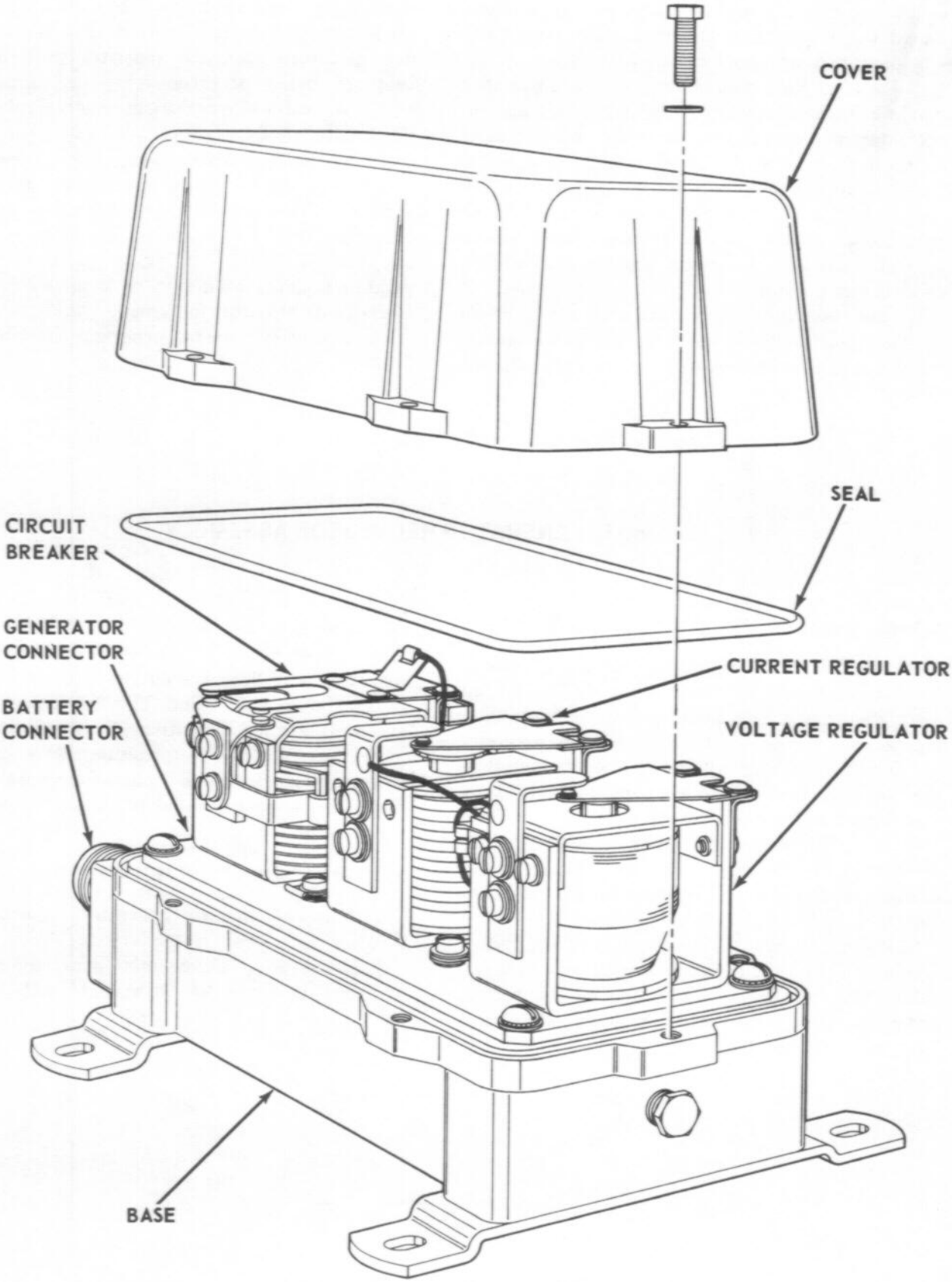


Figure 6-4. Generator regulator assembly; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

CAUTION

Do not soak or clean, with solvent, any insulating or electrical components such as capacitors, resistors, and coils.

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

(2) Clean relay contact points using a strip of ordinary blank bond paper. Hold paper strip between fingers and slide paper back and forth between contact points.

(3) Inspect relay contact points for burning, pitting, or excessive wear.

(4) Inspect all soldered connections.

(5) Inspect all other parts for any noticeable defects.

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

d. Bench Testing and Adjustment (fig. 6-5).

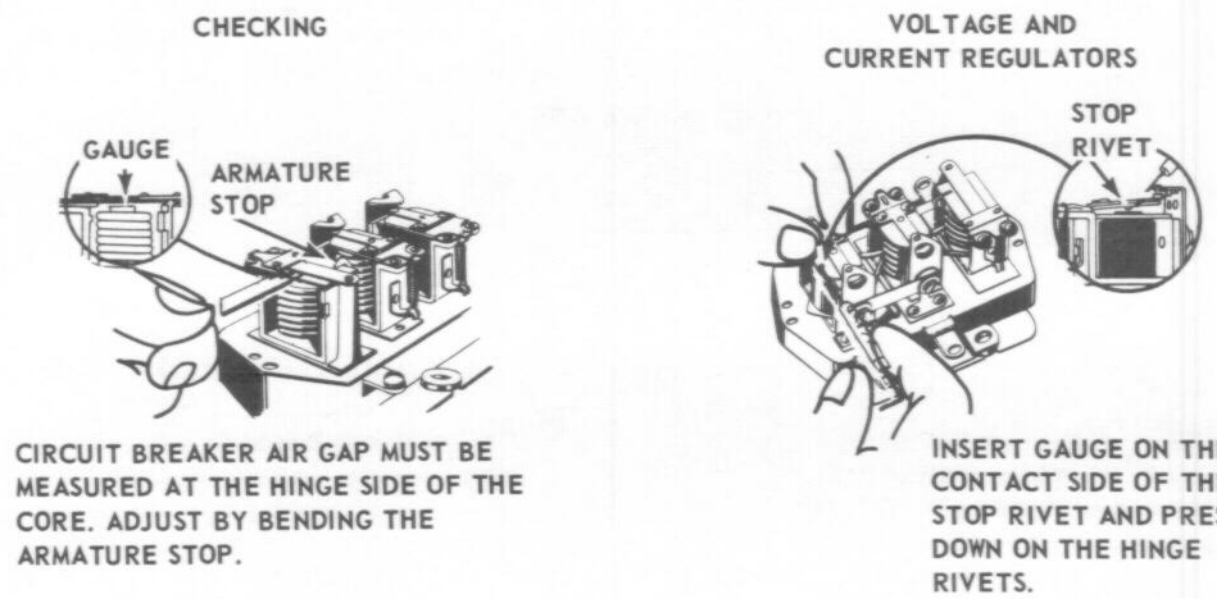


Figure 6-5. Generator regulator assembly bench test setup.

(1) Check circuit breaker armature air gap. Measure from contact side of brass armature stop pin. This measurement should be 0.066" to 0.070". If measurement is not correct, bend armature stop to bring gap within acceptable limits.

(2) Check circuit breaker contact gap. This meas-

urement should be 0.047" minimum. When armature is down against core stop, contact spring must be lifted off contact support 0.015" minimum. Adjust these measurements, as required, by moving lower contact bracket. Keep both contacts aligned so that they make and break at same time.

(3) Check current regulator armature air gap. This measurement should be 0.057" to 0.060". Contacts must be open with 0.057" gage in place and closed with 0.060" gage in place on contact side and next to armature stop. If measurement is not correct, adjust by moving upper contact bracket. Keep contacts aligned.

(4) Check voltage regulator armature air gap. This measurement should be 0.057" to 0.060". Contacts must be open with 0.057" gage in place and closed with 0.060" gage in place on contact side and next to armature stop. If measurement is not correct, adjust by moving upper contact bracket. Keep contacts aligned.

(5) Install cover on generator regulator (fig. 6-4).

e. Installation. Install generator regulator (para 3-104).

f. Operational Testing and Adjustment. The following tests and adjustments are performed with generator regulator installed on air compressor unit. See figure 6-6.

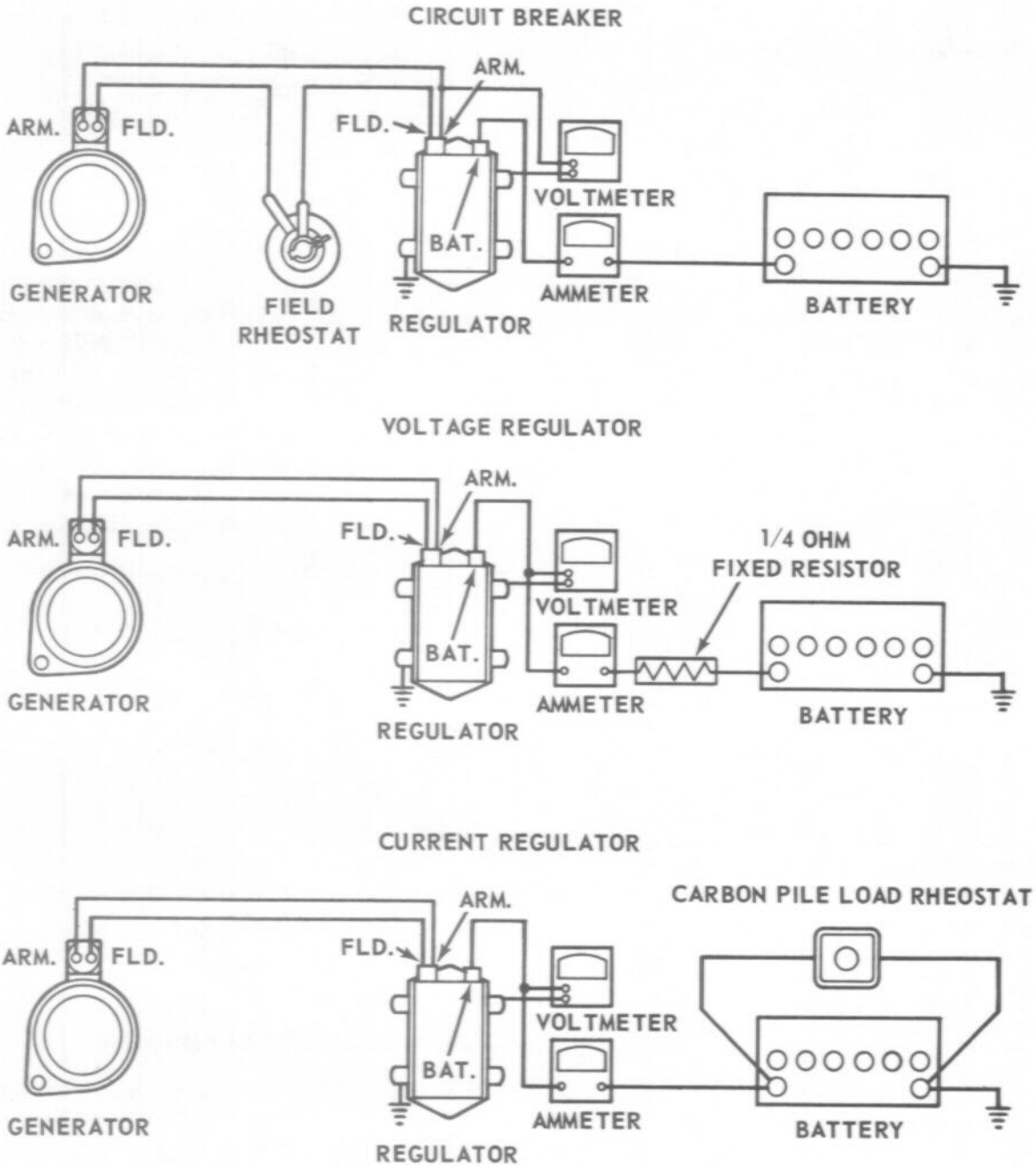


Figure 6-6. Generator regulator assembly operational test setup.

ME 4310-338-15/6-6

(1) *Circuit breaker test and adjustment.*

(a) Make test setup connections as illustrated. The field rheostat is a three-ampere, 50-ohm, variable type.

(b) Start engine (para 2-9). Allow equipment to reach operating temperatures.

(c) Open air discharge valve to point where engine is running steady and generator assembly is rotating at 1500-2000 RPM. Use a friction type tachometer held against generator pulley to determine generator RPM

(d) Adjust field rheostat to obtain maximum resistance, then slowly reduce resistance and observe voltage reading just as circuit breaker closes. The voltmeter gives a sharp fluctuation and a slight click can be heard as contacts close. The closing voltage should be 25.5 to 26.5 volts. If voltage is not within acceptable limits, remove regulator cover and change armature spring tension by bending lower spring hanger. Increase spring tension to raise closing voltage and vice versa. Repeat test to ensure a proper adjustment has been made.

(e) Adjust field rheostat to increase resistance and note reverse current reading on ammeter just before contacts open. The current reading should be 4.2 to 6.2 amperes at 25.6 volts, after a charge of 9.0 amperes through windings. If current is not within acceptable limits, raise or lower stationary contact while keeping contact surfaces aligned. Do not decrease contact gap to less than 0.047". Repeat test to ensure a proper adjustment has been made.

(2) *Voltage regulator test and adjustment.*

(a) Change test setup to that illustrated. Reinstall regulator cover.

(b) Use air discharge valve and increase engine speed to obtain approximately 10-ampere charging rate as indicated on ammeter. Operate engine at this level for 15 minutes.

(c) After 15 minutes, stop engine (fig. 2-9), then restart it to cycle generator and obtain 10-ampere charging rate again. Note volt-meter reading. Reading should be 27.5 to 28.5 volts at all ambient temperatures from 50° F. to 100°F. If voltage is not within acceptable limits, remove cover and change armature spring tension by bending lower spring hanger. Increase spring tension to raise voltage and vice versa. After each adjustment, stop and restart engine and replace cover before taking voltage reading.

(3) *Current regulator test and adjustment.*

(a) Change test setup to that illustrated.

(b) Using air discharge valve, manually set engine at a speed which obtains a generator rotation of approximately 3000 RPM. Use a friction type tachometer held against generator pulley to determine generator RPM.

(c) Adjust carbon pile to obtain maximum amperage indication on ammeter. Amperage reading should be 18 amperes ±1 ampere. If current is not within acceptable limits, remove regulator cover and change armature spring tension by bending lower spring hanger. Increase spring tension to raise operating amperes and vice versa. Repeat test to ensure a proper adjustment has been made. Install generator regulator cover.

Section III. STARTING MOTOR ASSEMBLY

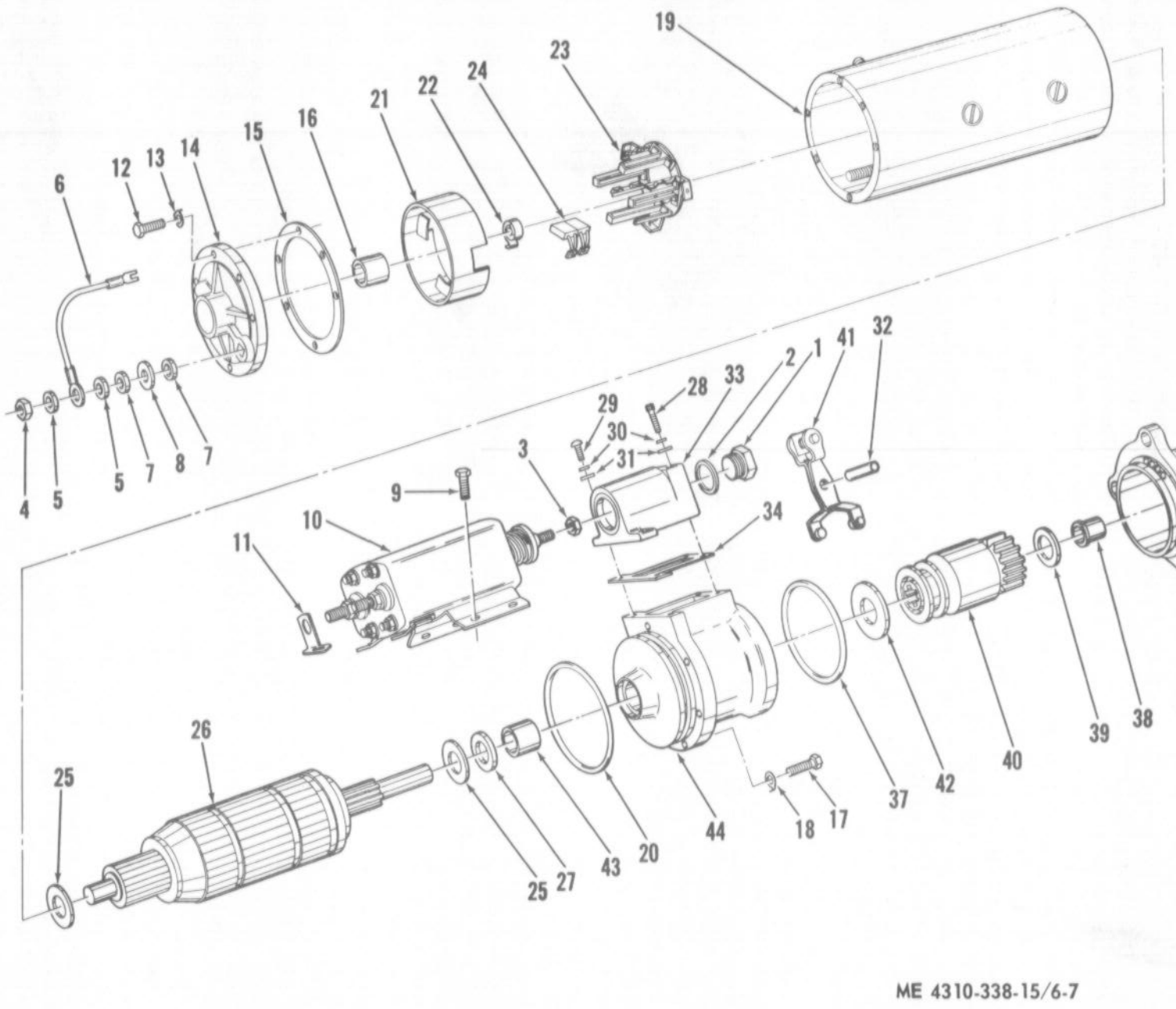
6-5. General

The starting motor converts electrical energy from the batteries into mechanical energy to turn the engine over for starting. The starting motor is a heavy-duty type that is completely sealed with gaskets, O-rings, and an oil seal. The solenoid is mounted on the outside of the frame with the solenoid plunger and pinion shifting mechanism totally enclosed. The drive assembly is an indexing type which assures complete drive pinion engagement before the motor begins to rotate. When the engine starts, the clutch releases and allows the pinion to turn faster than the armature shaft until the start switch is released and the return spring action retracts the pinion from the flywheel ring gear.

6-6. Starting Motor Assembly

a. Removal. Remove starting motor assembly (para 3-105).

b. Disassembly. Disassemble starting motor in numerical sequence shown in figure 6-7. Discard gaskets and O-rings.



1. Plug
2. Gasket
3. Nut
4. Nut (2)
5. Washer (2)
6. Lead
7. Washer (2)
8. Bushing
9. Screw (4)
10. Solenoid assembly
11. Connector
12. Screw (7)
13. Lock (7)
14. Head
15. Gasket
16. Bearing
17. Screw (7)
18. Lock (7)
19. Frame assembly
20. O-Ring
21. Insulation
22. Brush spring set
23. Brush plate assembly
24. Brush set
25. Thrust washer (A/R)
26. Armature
27. Oil seal
28. Screw (2)
29. Screw (2)
30. Washer (4)
31. Washer (4)
32. Yoke pin
33. Cover
34. Gasket
35. Screw (6)
36. Pinion housing
37. O-Ring
38. Bearing
39. Thrust washer (A/R)
40. Drive assembly
41. Yoke assembly
42. Thrust washer (A/R)
43. Bearing
44. Housing

Figure 6-7. Starting motor assembly; disassembly and reassembly.

c. Cleaning, Inspection, and Repair.

CAUTION

Do not soak or clean, with solvent, any insulating or electrical components such as brushes and coils.

NOTE

Refer to TM 5-764 for general repair instructions.

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

(2) Clean internal parts using dry compressed air.

(3) Inspect brushes for cracks, chips, excessive wear, or any other defect.

(4) Inspect bearings for wear, scoring, pitting, or any other defect. Check for freedom of rotation.

(5) Inspect brush springs and arms for distortion, cracks, breaks, excessive wear, or any other defect.

(6) Inspect commutator for rough spots, discoloration, pitting, scoring, and high mica. If commutator is rough, pitted, or worn, turn commutator using a lathe. Take light cuts until all pits are removed. Remove all burrs by holding No. 00 sandpaper lightly against commutator while armature is turning in lathe. Undercut mica after turning commutator. The mica must be undercut to a depth of 1/32".

(7) Inspect commutator for out-of-round using a dial indicator. Out-of-round shall not exceed 0.001" T.I.R.

(8) Inspect armature shaft for pitting, scoring, or excessive wear. Inspect drive assembly for broken teeth on pinion. Check to see that clutch assembly moves on shaft and that pinion spring compresses. Slide drive assembly on armature shaft to see if splines fit properly.

(9) Inspect solenoid parts. Check condition of moving core and sealing boot. Replace boot if cracked or brittle. Check contact assembly and terminal studs to see if they are burned, eroded, or pitted excessively.

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

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

d. Testing. Refer to TM 5-764 and test armature and field coils for shorts, open circuits, and grounds.

e. Reassembly. Reassemble starting motor in reverse numerical sequence shown in figure 6-7. Install new gaskets and O-rings.

(1) When installing new bearings, always use proper bearing arbor to obtain a proper fit. Remove felt wick in pinion housing reservoir before installing a new bearing. After new bearing installation, saturate felt wicks with SAE 20 oil, install wicks in reservoirs and fill reservoirs with SAE 20 oil.

(2) All O-rings should be lubricated with a film of light grease to prevent damage during reassembly.

(3) Lubricate armature bearing surfaces on shaft with SAE 10 oil. Lubricate shaft and splines under drive assembly with grease that conforms to Military Specification MIL-G-23827A.

(4) When assembling intermediate and pinion housings, tighten hex head screws to a torque value of eight foot-pounds.

(5) After assembly, the insulation on both terminal studs should be coated with glytal sealant. Keep sealant off of contact surfaces of terminal studs and nuts.

f. Bench Testing and Adjustment (fig. 6-8).

(1) *No load test.*

(*a*) Make no load current test setup as shown in view A.

(*b*) No load draw should be 22.0 volts, 90 amperes (maximum) at 7000 RPM minimum.

(*c*) If current is too high, check bearing alignment end play. Two or three sharp raps with a rawhide hammer shile motoring will often help align bearings and free armature.

(2) *Solenoid winding test.*

(*a*) Make solenoid winding test setup as shown in view B.

(*b*) Test current draw and make ground and open test on winding. Series winding values at 70 F. should be 23.2 to 26.6 amperes at 12.0 volts. Shunt winding values at 70 F. should be 4.1 to 4.8 amperes at 12.0 volts.

(3) *Stall torque test.*

(*a*) Make stall torque test setup as shown in view C.

(*b*) The solenoid winding shall be activated with a separate battery.

(*c*) Stall torque test values should be 4.0 volts, 400 amperes (maximum), and 22.0 foot-pounds (minimum).

(*d*) If torque is too low, check armature, brush spring tension, contact area, and switch contacts. If these components are not at fault, replace entire starting motor.

(4) *Armature end play adjustment.* Adjust end play to 0.005 to 0.030 inches by adding or removing thrust washers on commutator end of armature shaft.

(5) *Pinion position adjustment (fig. 6-9).* This adjustment assures correct relation between solenoid and indexing drive assembly. If adjustment is not correct, damage may result to drive gear and/or flywheel ring gear.

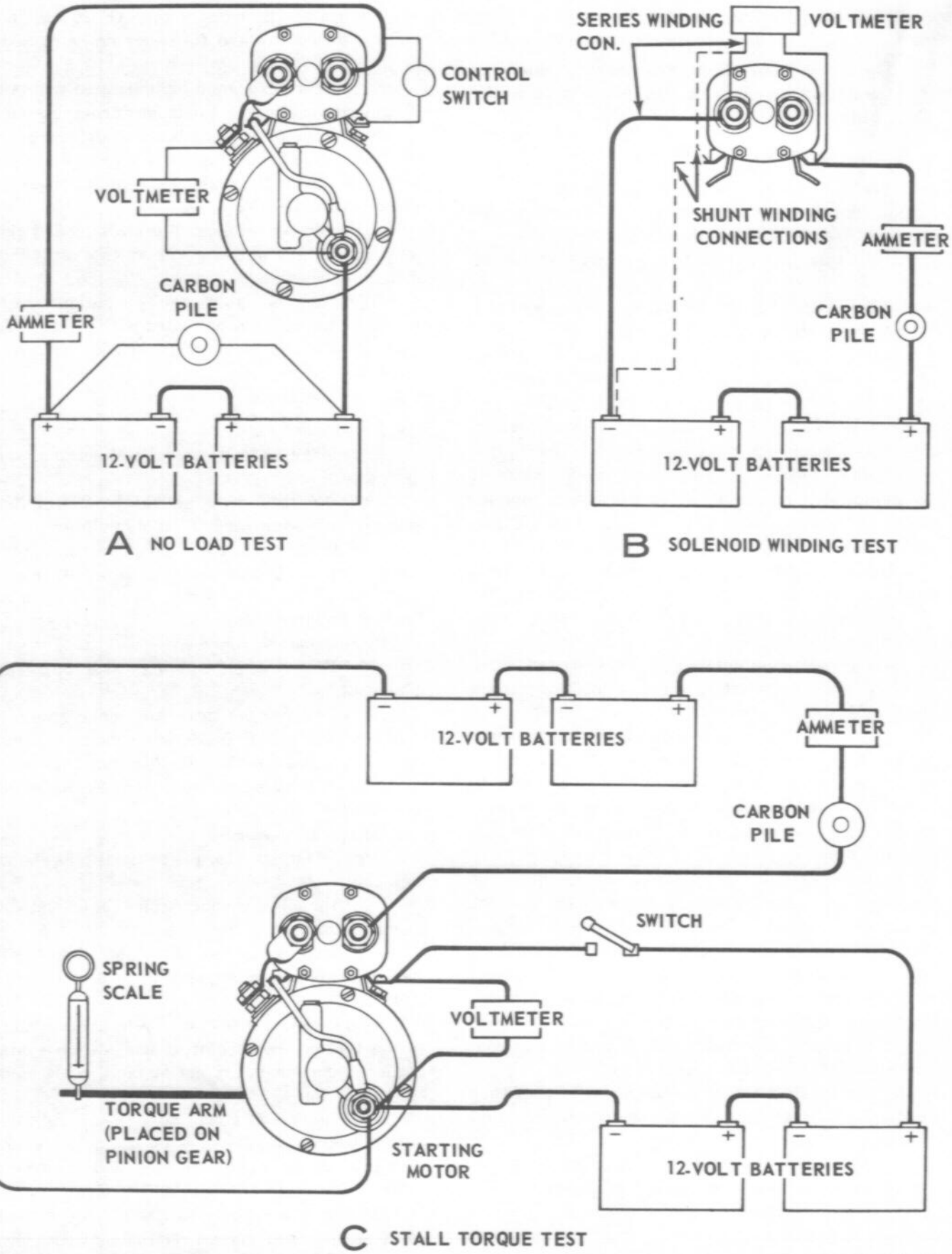


Figure 6-8. Starting motor assembly test setup.

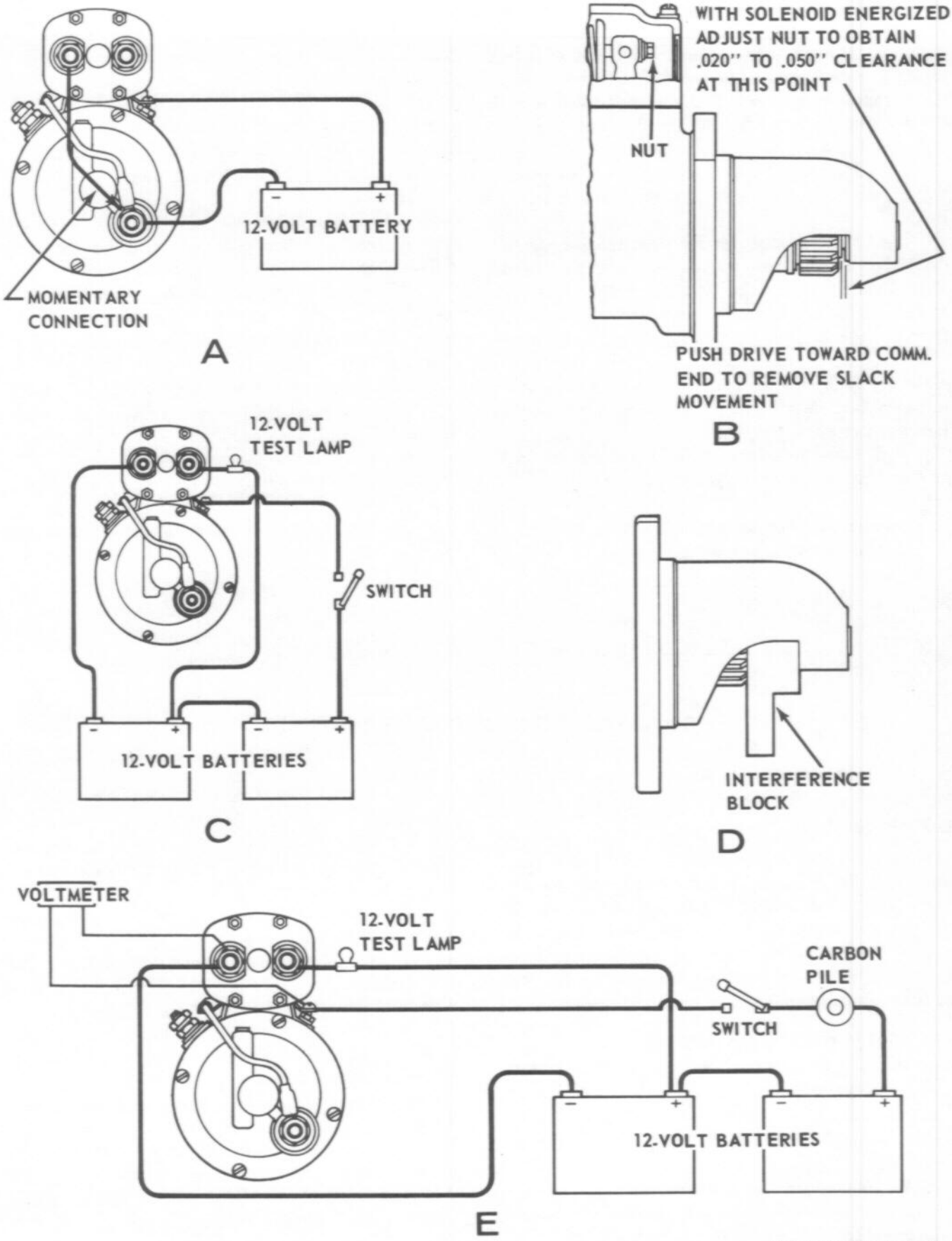


Figure 6-9. Starting motor assembly pinion position test setup.

(a) Connect a 12-volt battery as shown in view A.

(b) Momentarily touch the jumper lead between terminal stud of solenoid and terminal stud in commutator end head. This will shift solenoid and drive assembly into cranking position until battery is disconnected.

(c) Push drive assembly toward commutator end of motor to eliminate any slack movement in linkage.

(d) Measure distance between outside edge of drive sleeve and thrust washer as shown in view B. This distance should be 0.020 to 0.050 inches. If measurement is not correct, remove plug and washer from shift linkage cover and adjust nut as required to obtain proper measurement. Disconnect battery.

(e) Fabricate an interference block as shown in figure 5-12. Make test setup as shown in view C. Leave switch open.

(f) Place interference block with 63/64-inch side against drive gear as shown in view D.

CAUTION

Because of high amount of current being passed through solenoid winding, these tests should be made as brief as possible.

(g) Close switch in battery circuit. The 12-volt test lamp should not light. Be sure interference block is against drive gear and not against drive sleeve. If lamp does not light, proceed to step h. If lamp lights, solenoid has been assembled wrong. Reassemble solenoid in reverse numerical sequence shown in figure 6-7, then repeat Bench Testing and Adjustment.

(h) If test lamp does not light, open switch and connect a carbon pile and voltmeter into test circuit as shown in view E.

(i) Place interference block with ½-inch side against drive gear. Close switch and be sure interference block is against drive gear and not against drive sleeve.

(j) Adjust carbon pile and observe voltmeter. The test lamp must light before the voltmeter reads 16 volts. If lamp does not light, adjust nut (view B) until proper setting is obtained.

(k) Reinstall plug and washer in shift linkage cover.

g. Installation. Install starting motor assembly (para 3-105).

Section IV. ENGINE RADIATOR ASSEMBLY

6-7. General

The engine radiator assembly is a standard core, tank, and fin arrangement. The hot engine coolant flows into the upper tank of the radiator, drains down through the core to the lower tank, and back into the engine. The fins on the core act as a heat sink cooling the liquid as air is drawn through the radiator by the engine driven fan.

6-8. Engine Radiator 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) Before cleaning, inspect radiator for visual evidence of leaks. Mark any leaks for repair later.

(2) Clean dirt and foreign matter from radiator core using compressed air directed through core. Clean outside of radiator assembly using cleaning solvent that is in accordance with Federal specification P-D-680. Dry thoroughly.

(3) Flush fresh water through radiator to remove loose scale and rust.

(4) Plug all openings except the overflow tube. Connect a three to five PSI air source to the overflow pipe and submerge radiator in water.

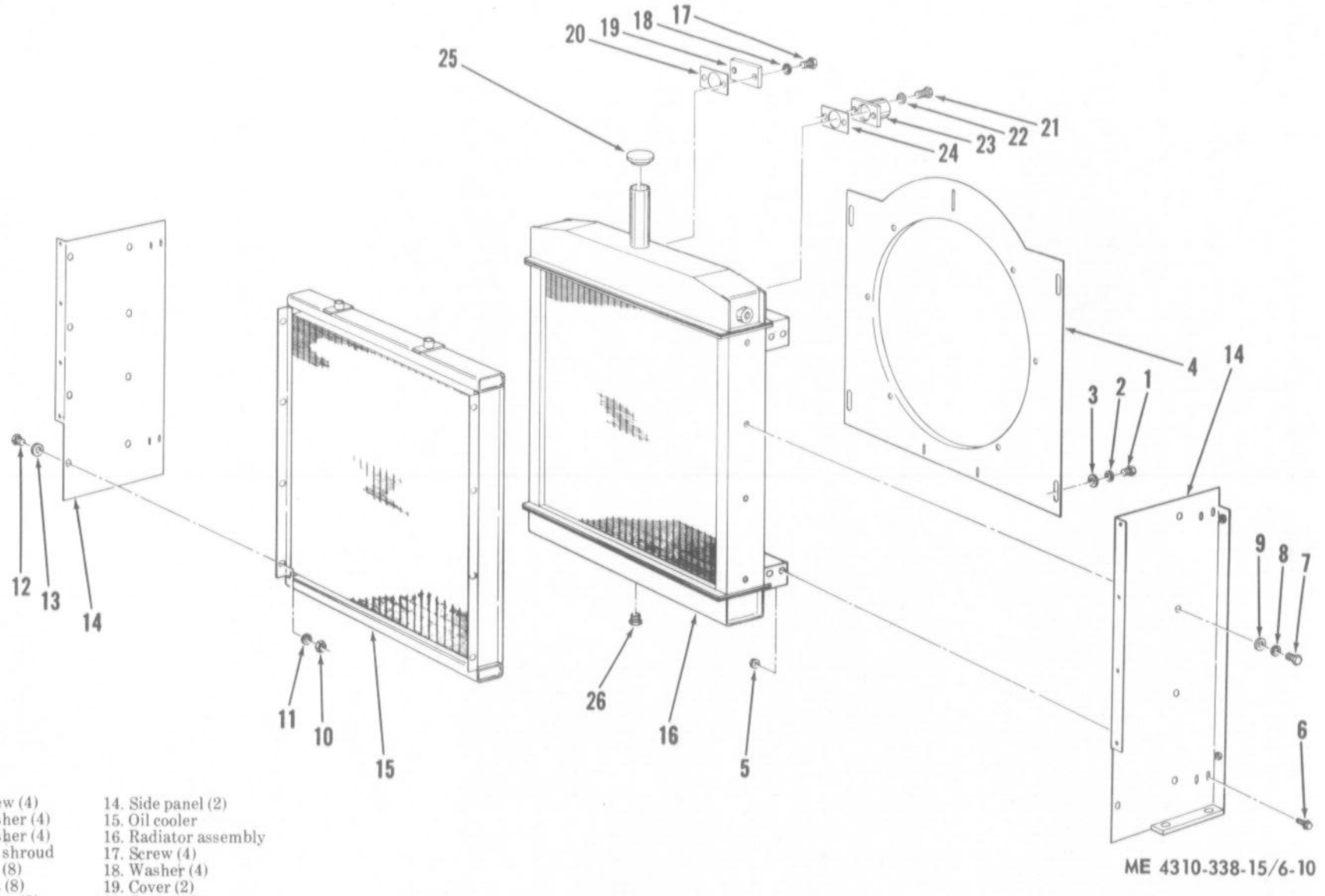
(5) Apply low pressure air. Check radiator for leaks as indicated by air bubbling up through water. Mark each leak detected.

(6) Solder or braze all leaks detected and recheck by repeating steps 4 and 5, above.

(7) Inspect attaching hardware for damaged threads, cracks, breaks, 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).



1. Screw (4)
2. Washer (4)
3. Washer (4)
4. Fan shroud
5. Nut (8)
6. Bolt (8)
7. Screw (8)
8. Washer (8)
9. Washer (8)
10. Nut (8)
11. Washer (8)
12. Bolt (8)
13. Washer (8)
14. Side panel (2)
15. Oil cooler
16. Radiator assembly
17. Screw (4)
18. Washer (4)
19. Cover (2)
20. Gasket (2)
21. Screw (4)
22. Washer (4)
23. Flange (2)
24. Gasket (2)
25. Pressure cap
26. Bushing

Figure 6-10. Radiator and oil cooler assembly; disassembly and reassembly.

Section V. OVERSPEED GOVERNOR SWITCH

6-9. General

The overspeed governor switch is driven by a cable from the service meter on the fuel transfer pump. The switch is normally open when the engine is running at proper operating speeds. Should the engine overspeed, the switch closes and completes the electrical circuit to the fuel rack shutoff solenoid. The fuel rack solenoid energizes and moves the fuel rack to the extreme fuel off position shutting down the engine. When the engine is running, the drive cable rotates a shaft within the overspeed governor switch. Attached to the shaft is a weight and spring assembly. As the shaft rotates, centrifugal force causes the weights to fly outward, however, their actual outward movement is suppressed by the springs. When the shaft speed reaches a certain point, centrifugal force overcomes spring suppression, the weights swing further outward and trip a switch which closes the circuit to the fuel rack shutoff solenoid. After the cause of the engine overspeed is corrected, a reset pushbutton on the switch, when depressed, opens the circuit to the fuel rack solenoid and the engine can be started again.

6-10. Overspeed Governor Switch

a. Removal. Remove overspeed governor switch (para 3-67).

b. Disassembly. Disassemble overspeed governor switch in numerical sequence shown in figure 6-11.

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, distortion, or any other defect. Refer to Table 5-2 for spring free length.

(3) Inspect shaft, weights, and bushings for cracks, distortion, breaks, excessive wear, or any other defect.

(4) Inspect switch for cracks, broken leads, or any other defect.

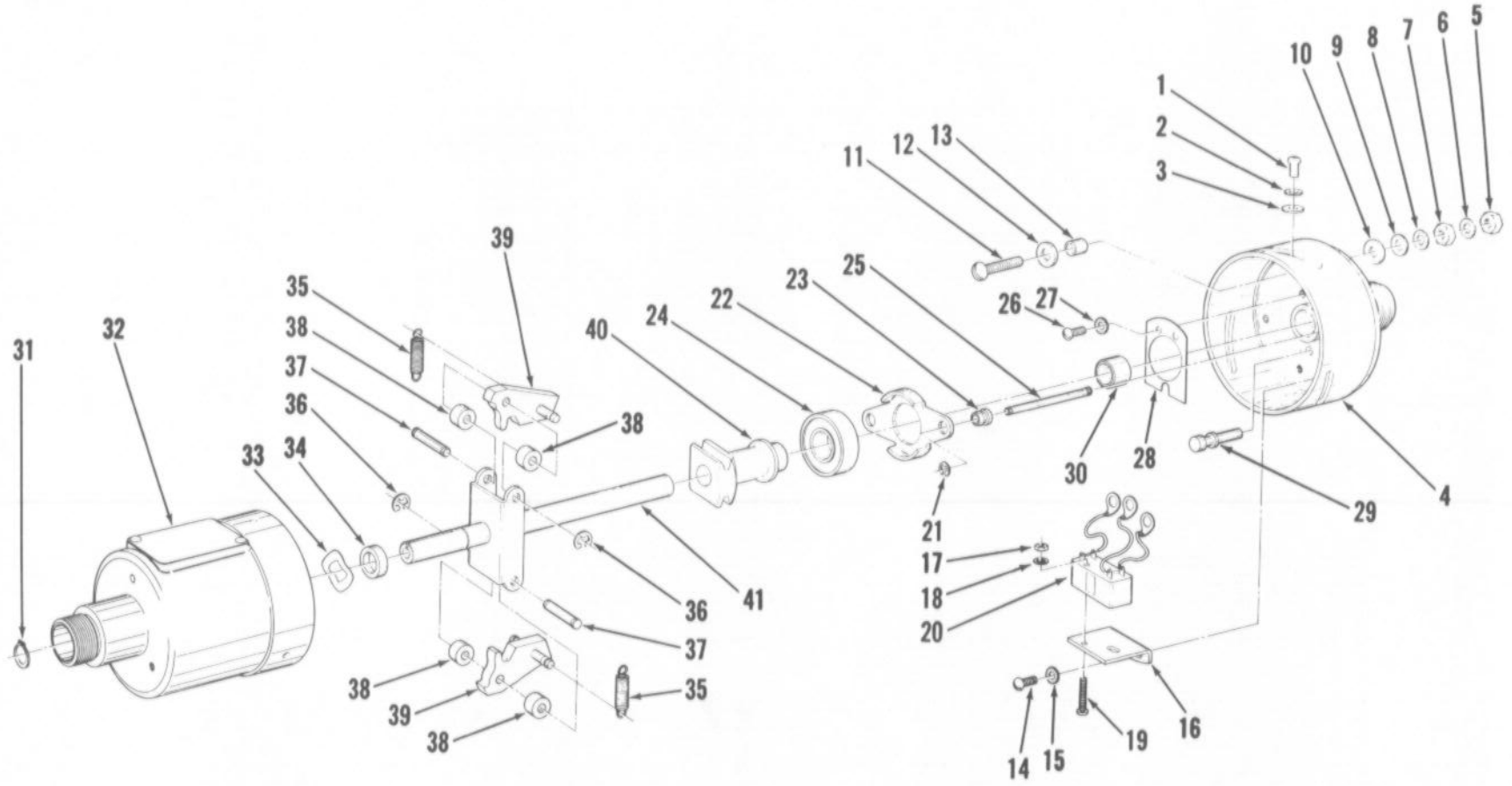
(5) Inspect all other parts for cracks, distortion, excessive wear, or any other defect.

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

d. Reassembly. Reassemble overspeed governor switch in reverse numerical sequence shown in figure 6-11.

e. Installation. Install overspeed governor switch (para 3-67).

f. Adjustment. Adjust overspeed governor switch (para 3-67).



1. Screw (3)
2. Washer (3)
3. Washer (3)
4. Cover
5. Nut (3)
6. Wesher (3)
7. Nut (3)
8. Washer (3)
9. Washer (3)
10. Insulating washer (3)
11. Bolt (3)
12. Insulating washer (3)
13. Insulating tube (3)
14. Screw (2)
15. Washer (2)
16. Bracket
17. Nut (2)
18. Washer (2)
19. Bolt (2)
20. Switch
21. Retaining ring
22. Thrust plate
23. Bushing (2)
24. Bearing
25. Guide pin (2)
26. Screw (2)
27. Washer (2)
28. Reset plate
39. Reset plunger
30. Bushing
31. Retaining ring
32. Body and bearing assy
33. Washer
34. Collar
35. Spring (2)
36. Retaining ring (2)
37. Weight pin (2)
38. Spacer (4)
39. Weight (2)
40. Sleeve
41. Spider and shaft assy

Figure 6-11. Overspeed governor switch; disassembly and reassembly.

6-11. General

The turbocharger, which is driven by the engine exhaust gases, draws in ambient air, compresses the air, and directs it into the engine intake manifold. This process supercharges the engine which results in a greater power output. The turbocharger consists of a turbine wheel and a compressor impeller mounted on a common rotating shaft, a bearing housing, compressor cover, and compressor back plate. The rotating assembly is supported by bearings and is dynamically balanced to provide freedom from vibration. Filtered engine oil flows through the turbocharger to lubricate and cool the bearings. Maximum turbocharger speed is determined by the fuel rack setting, the governed engine speed, and the altitude at which the unit is operating.

6-12. Turbocharger Assembly

a. Removal. Remove the turbocharger assembly (para 3-115).

b. Prior to Disassembly.

(1) Cover all turbocharger openings and clean all exterior surfaces using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry unit thoroughly and remove opening coverings.

(2) Punch mark turbocharger compressor cover, turbine housing, and bearing housing to ensure correct positioning upon reassembly.

c. Disassembly. Disassemble turbocharger assembly in numerical sequence shown in figure 6-12.

NOTE

Before removing impeller, ensure alignment marks on impeller and shaft are visible. Rotating parts must be aligned during reassembly to maintain the previously established dynamic balance of turbocharger.

(1) Before disassembly of rotating parts, measure shaft end clearance. End clearance should be 0.006 to 0.011 inches. If clearance is excessive, or if either the turbine wheel or impeller has rubbed against housing of cover, the bearings and/or thrust bearing and thrust collar must be replaced.

(2) Fabricate a fixture, fixture adapter, supporting screw, wood dowel, and wrench as shown in figures 5-5 and 5-6. These tools are to be used for disassembly of rotating parts.

(3) Bolt fixture adapter to fixture (fig. 6-12). Attach bearing housing to fixture with turbine wheel down.

CAUTION

Proper installation of supporting screw is important so as to allow an unobstructed pressing action on shaft and still prevent turbine wheel from being damaged by striking against fixture base.

(4) Thread supporting screw into base of fixture to contain turbine wheel and shaft when pressed from impeller. Leave a space between end of screw and turbine wheel. Approximately ½-inch of shaft and turbine wheel movement is required to free them from impeller.

(5) When removing impeller, remove nut and then position compressor end of housing in a hot oil bath so only impeller is immersed. Heat impeller to 350 F. for not longer than 10 minutes. Remove unit from oil bath and press shaft and turbine wheel as a unit from impeller.

(6) Use the wood dowel to remove thrust plate assembly from center housing.

d. Cleaning, Inspection, and Repair.

CAUTION

Rotating components must be thoroughly cleaned in order to maintain critical balance of turbocharger. Do not use a wire brush or wheel on any parts.

(1) Clean all metal parts using a cleaning solvent that is in accordance with Federal specification P-D-680. Dry parts thoroughly. Use a piece of wood to clean carbon and deposits from turbine housing. Discard all seals and O-rings.

(2) The turbine wheel must be cleaned thoroughly to remove all carbon deposits. It may be necessary to soak wheel in solvent for at least one hour to remove hardened carbon deposits. Scrape off loosened particles with a stiff brush or a specially shaped piece of wood. If turbine wheel is covered with soot only, use cleaning solvent and a stiff brush, rinse with clean water, and dry thoroughly.

CAUTION

The following step is a critical area of inspection. Any deformation or damage to wheels will cause a serious out-of-balance condition which will damage turbocharger.

(3) Inspect compressor and turbine wheels for cracks, wear, chips, or any other defect. Check carefully for any blade distortion.

(4) Inspect bearings for cracks, distortion, or any other defect. Measure bearing diameters. Inside diameters should measure 0.6268 to 0.6272 inches; outside diameter 0.9780 to 0.9875 inches.

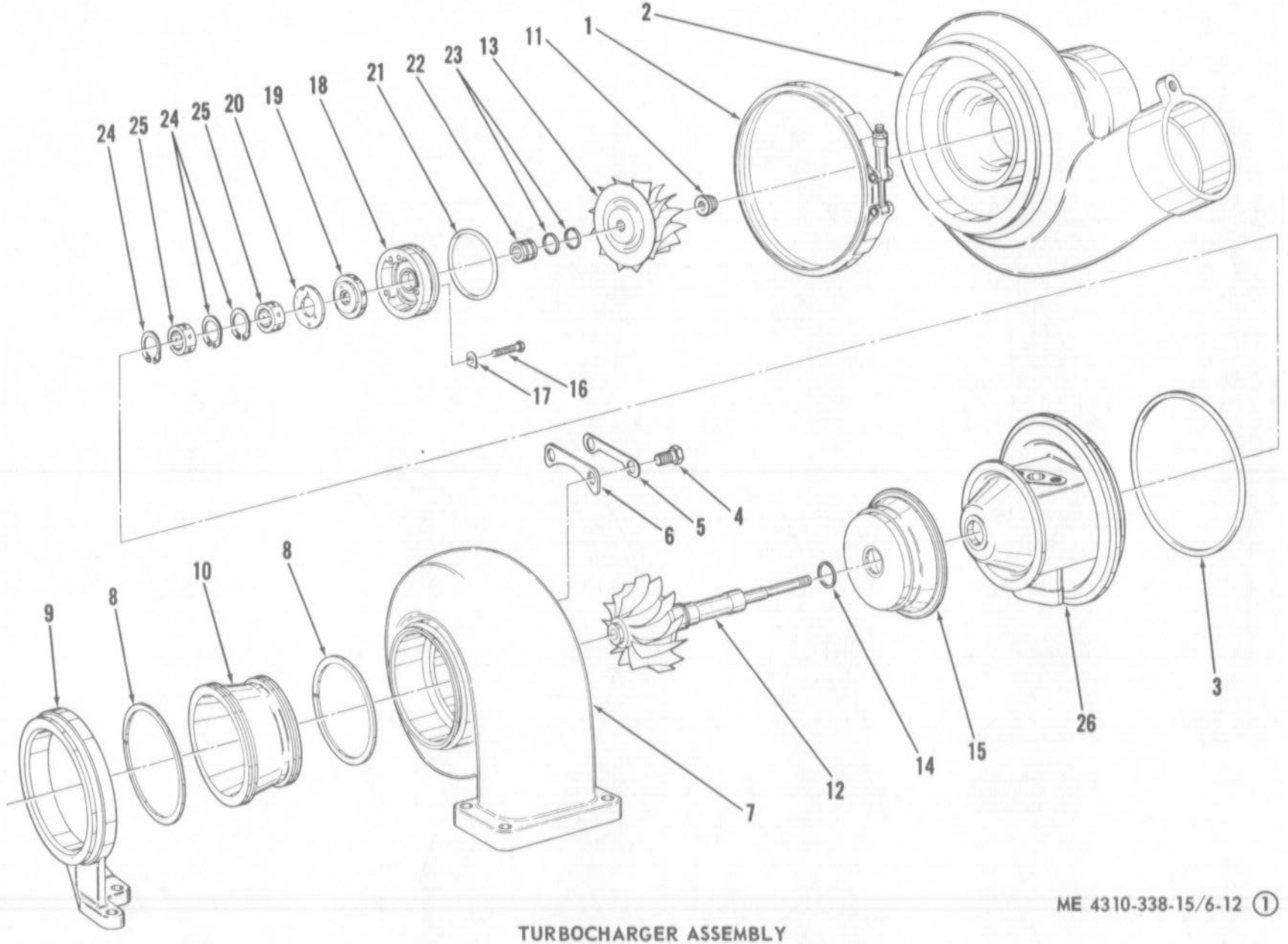
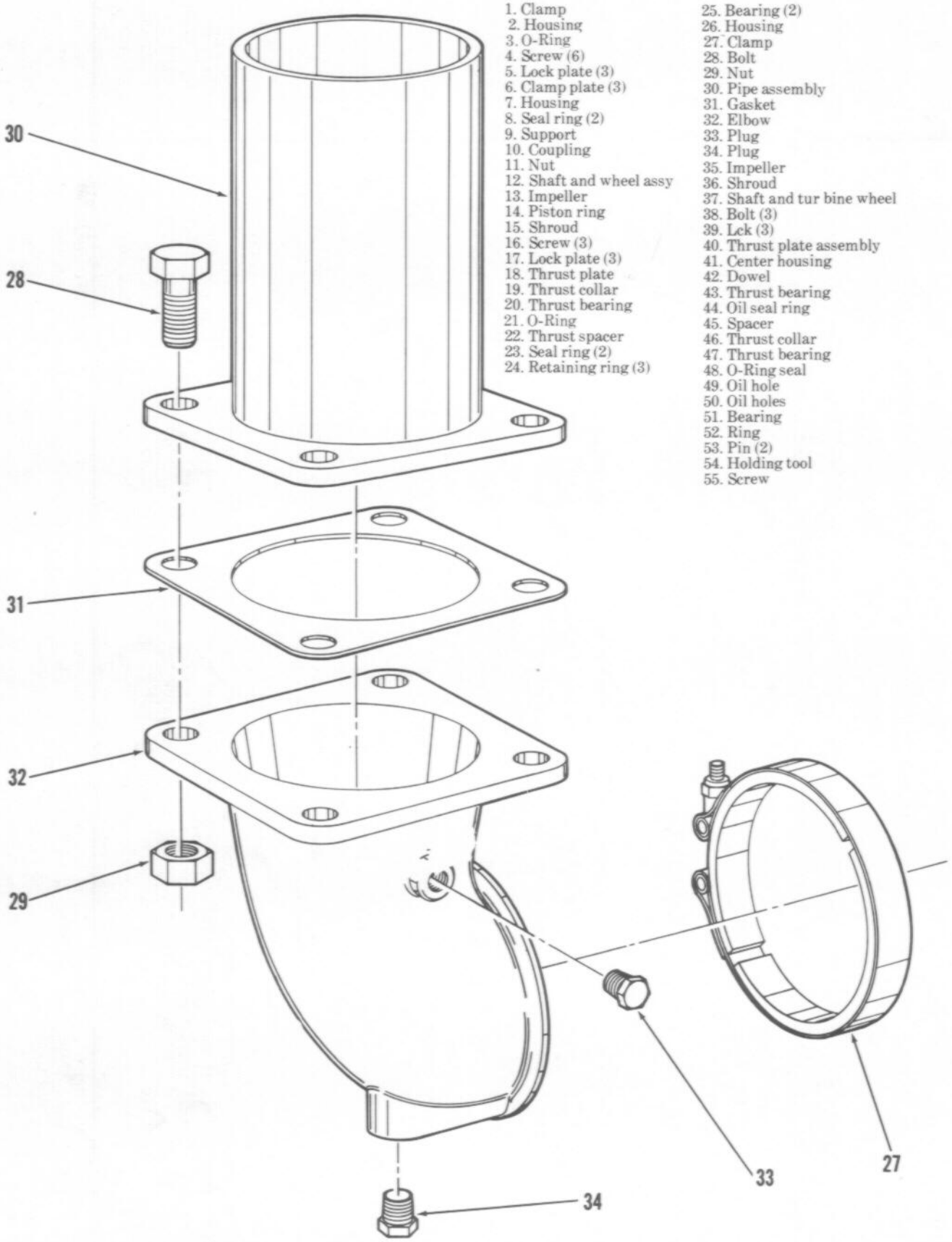


Figure 6-12. Turbocharger Assembly, Disassembly and Reassembly sheet 1 of 5

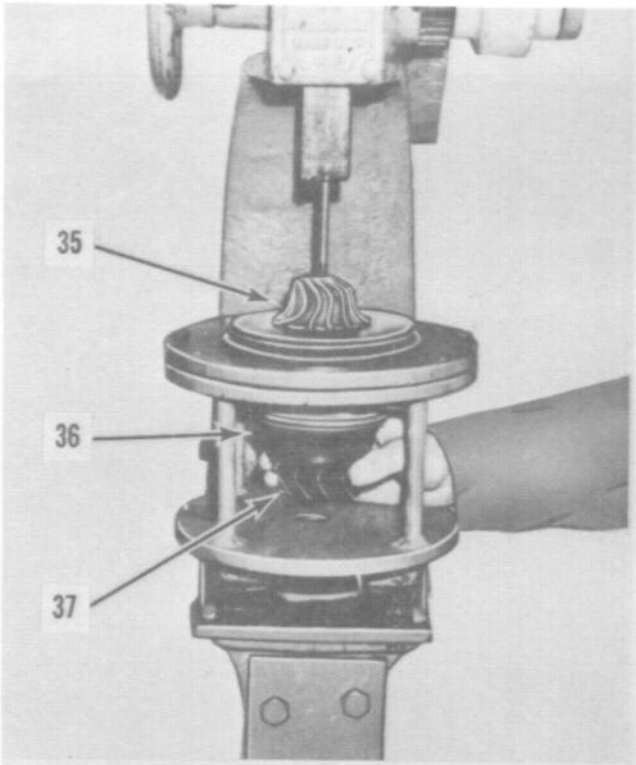


1. Clamp
2. Housing
3. O-Ring
4. Screw (6)
5. Lock plate (3)
6. Clamp plate (3)
7. Housing
8. Seal ring (2)
9. Support
10. Coupling
11. Nut
12. Shaft and wheel assy
13. Impeller
14. Piston ring
15. Shroud
16. Screw (3)
17. Lock plate (3)
18. Thrust plate
19. Thrust collar
20. Thrust bearing
21. O-Ring
22. Thrust spacer
23. Seal ring (2)
24. Retaining ring (3)
25. Bearing (2)
26. Housing
27. Clamp
28. Bolt
29. Nut
30. Pipe assembly
31. Gasket
32. Elbow
33. Plug
34. Plug
35. Impeller
36. Shroud
37. Shaft and tur bine wheel
38. Bolt (3)
39. Lck (3)
40. Thrust plate assembly
41. Center housing
42. Dowel
43. Thrust bearing
44. Oil seal ring
45. Spacer
46. Thrust collar
47. Thrust bearing
48. O-Ring seal
49. Oil hole
50. Oil holes
51. Bearing
52. Ring
53. Pin (2)
54. Holding tool
55. Screw

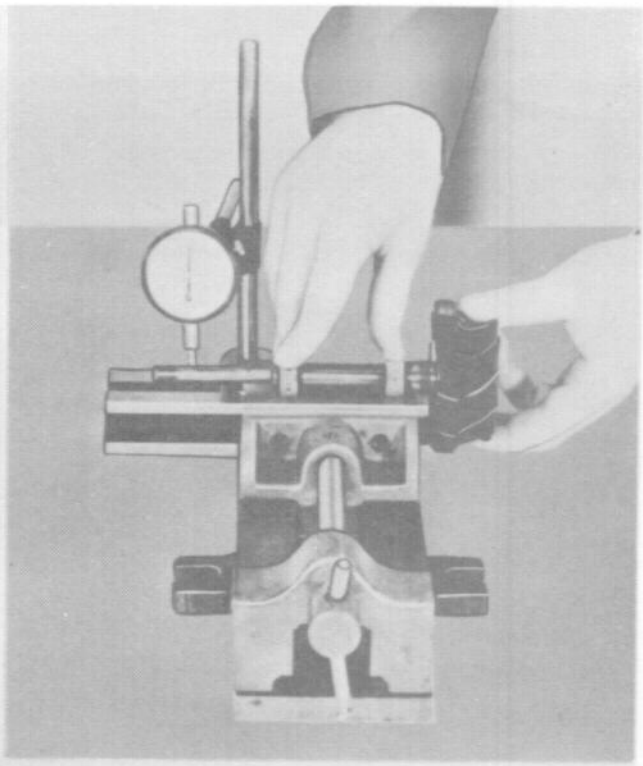
AIR INTAKE TUBE AND ELBOW

ME 4310-338-15/6-12 (2)

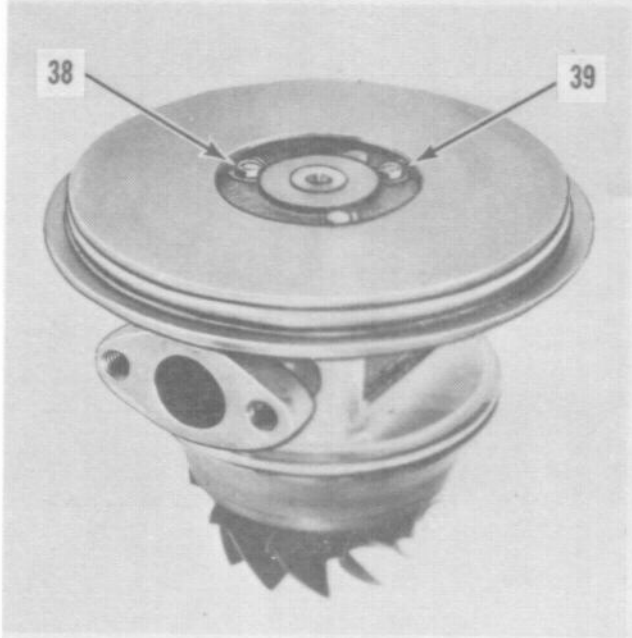
Figure 6-12. Turbocharger assembly, disassembly and reassembly (sheet 2 of 5).



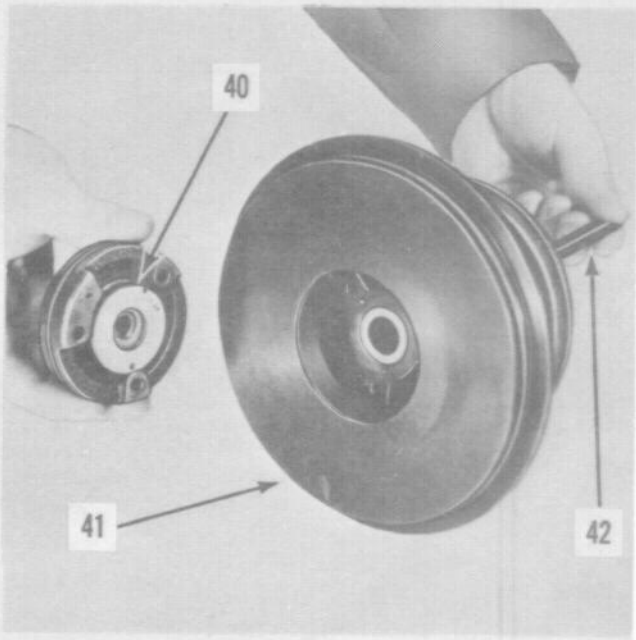
PRESSING SHAFT AND TURBINE WHEEL FROM IMPELLER



CHECKING SHAFT RUNOUT



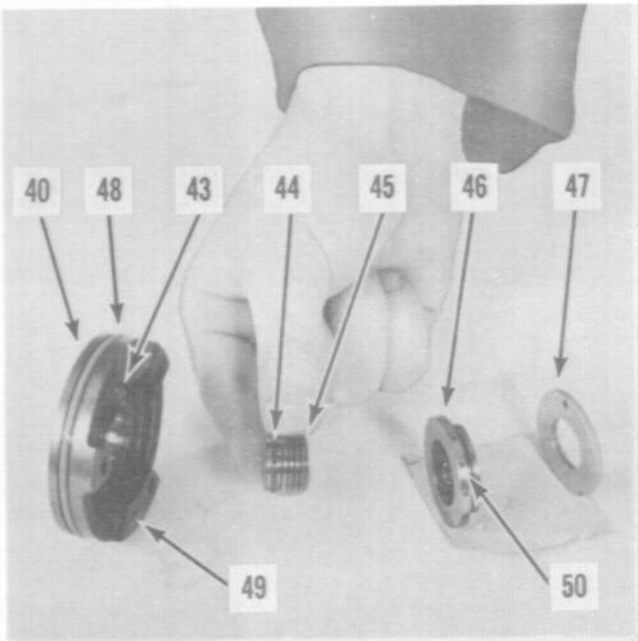
PREPARING TO DISASSEMBLY CENTER HOUSING



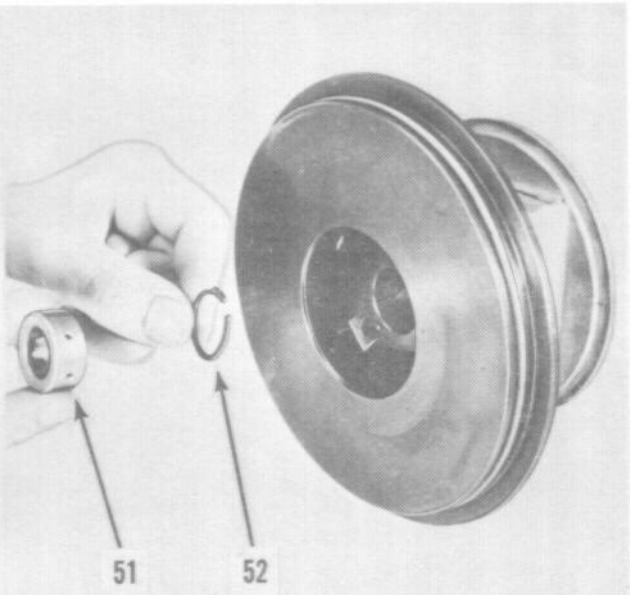
REMOVING THRUST PLATE

ME 4310-338-15/6-12 (3)

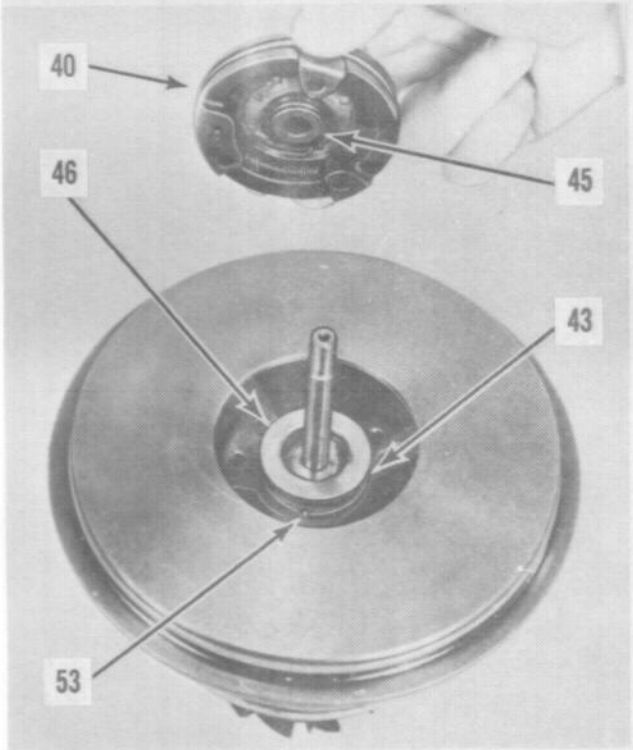
Figure 6-12. Turbocharger assembly, disassembly and reassembly (sheet 3 of 5).



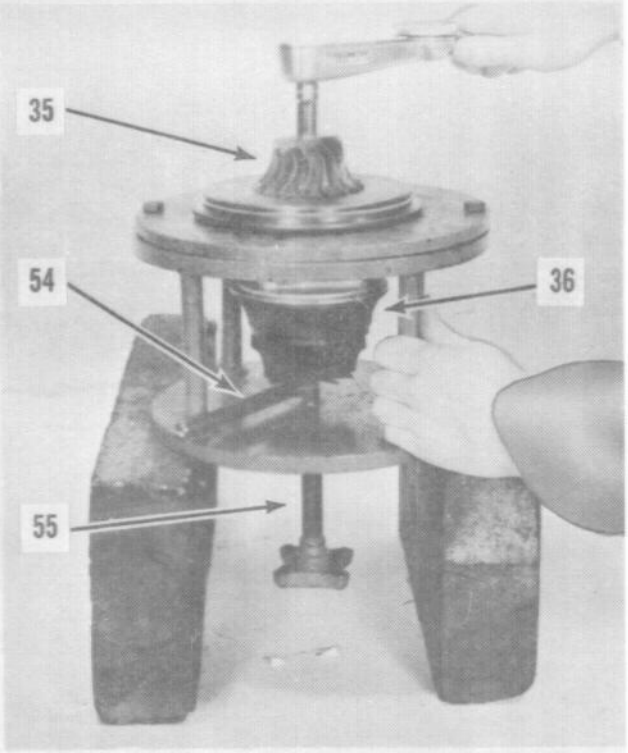
THRUST SPACER, PLATE AND WASHER REMOVAL



BEARING REMOVAL (COMPRESSOR END)



INSTALLING THRUST PLATE ASSEMBLY



INSTALLING NUT ON SHAFT

ME 4310-338-15/6-12 (4)

Figure 6-12. Turbocharger assembly, disassembly and reassembly (sheet 4 of 5).

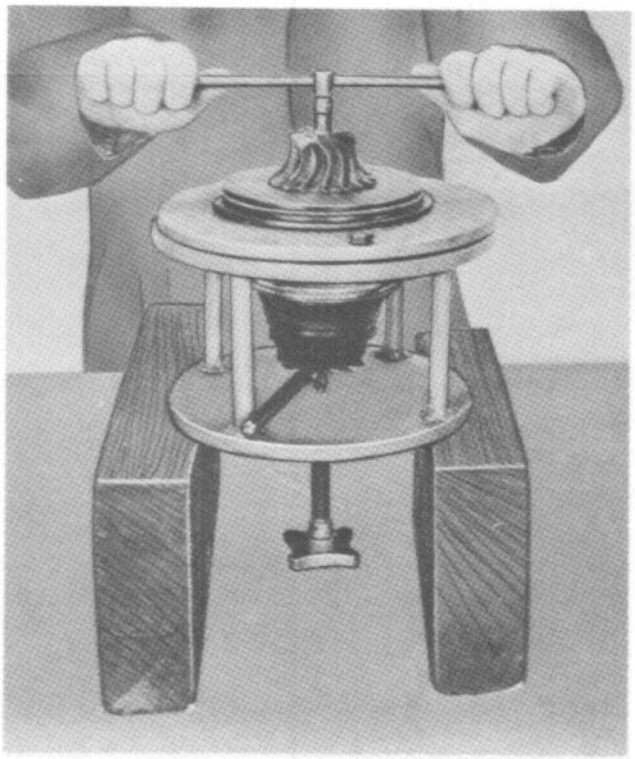


Figure 6-12. Turbocharger assembly, disassembly and reassembly (sheet 5 of 5).

(5) Check runout of shaft (fig. 6-12). This can be done by one of two methods. Use standard bearings and place shaft in vee blocks or use a partially open vise.

(6) Inspect shaft for cracks, roughness, distortion, or any other defect. Check ring grooves for wear. Measure journal diameter; measurement should be 0.6250 to 0.6254 inches.

(7) Inspect housing for cracks, breaks, or any other defect. Measure housing bore diameter; measurement should be 0.9827 to 0.9832 inches.

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

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

e. Reassembly. Reassemble turbocharger assembly in reverse numerical sequence shown in figure 6-12. Install new seals and o-rings.

(1) Install thrust collar with large outside diameter toward impeller end.

(2) After installing piston ring on spacer, install spacer in thrust plate assembly so that piston ring will be toward impeller.

(3) Install impeller as follows:

(a) Heat impeller in an oil bath 350 °F. for not longer than ten minutes.

(b) Place heated impeller on shaft and immediately install nut. Tighten nut to a torque value of 120 inch-pounds.

(c) Allow impeller to cool, then remove nut.

(d) Clean and smooth washer face of nut. Lightly oil threads of turbine shaft and nut.

(e) Reinstall nut and tighten to a torque value of 20 inch-pounds. After tightening, turn nut an additional 120 .

(4) During assembly, use specially fabricated fixture and tools as required.

(5) Be sure that alignment marks previously placed on turbocharger match when unit is reassembled.

(6) Be sure that oil holes in thrust plate assembly align with oil holes in bearing housing.

f. Installation. Install turbocharger assembly (para 3-115).

6-13. General

The gear-type fuel transfer pump is driven by a gear on the engine accessory drive shaft. The pump causes fuel to flow from the fuel tanks, through the filtering system, and into the fuel injection housing. A bypass valve on the starting tank prevents an excessive fuel pressure buildup. At cranking speed, the fuel transfer pump supplies fuel to the engine at 10 to 20 PSI. Fuel pressure must reach 10 PSI before the engine will start. The fuel transfer pump consists of a gear driven shaft supported by sleeve bearings, fuel propelling gears, seals, a bypass valve, and the housing components. The fuel priming pump is operated manually to purge air from the fuel lines and to prime the fuel system. Essentially, the priming pump consists of a plunger, barrel, handle, and body.

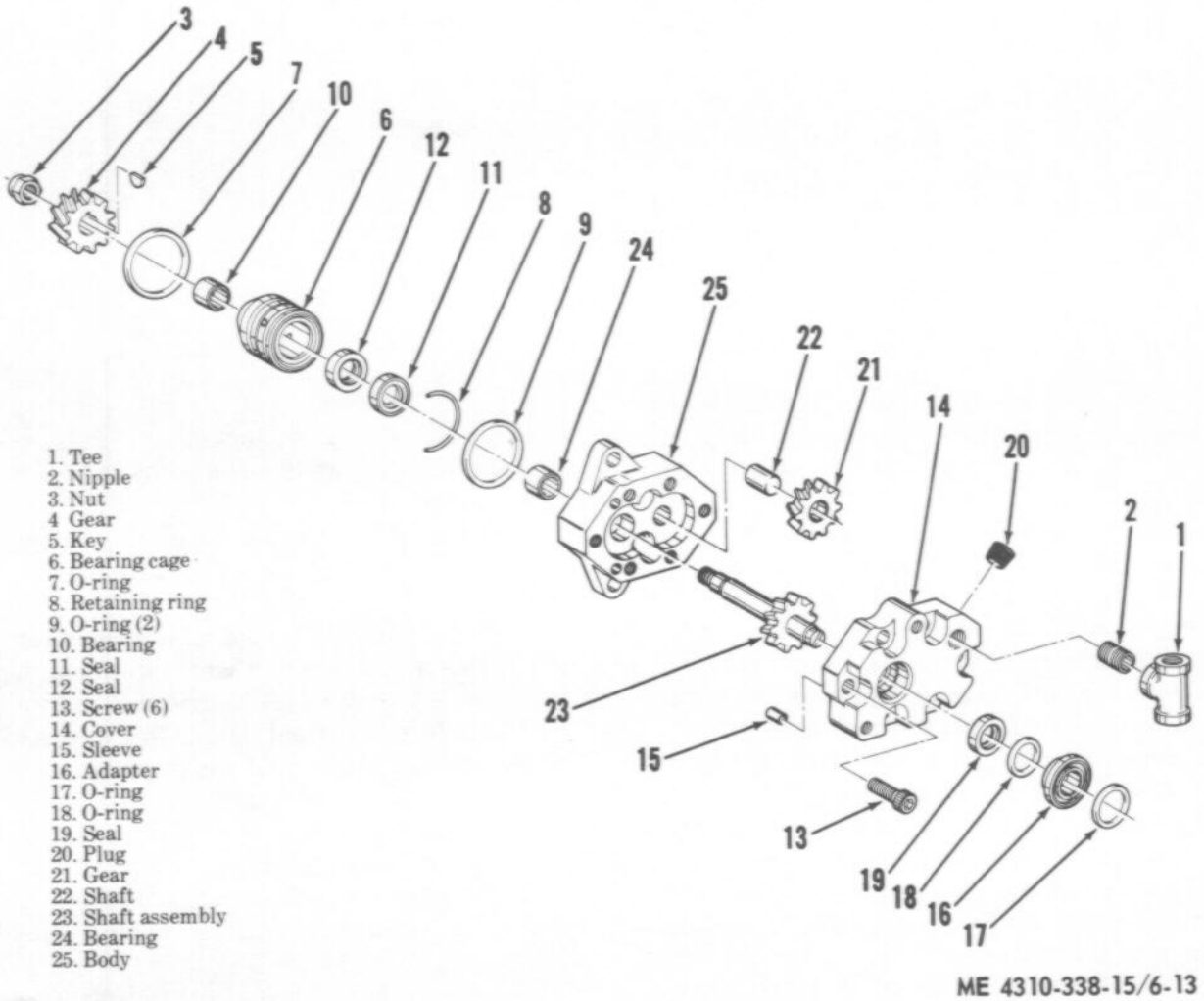
6-14. Fuel Transfer Pump Assembly

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

b. Disassembly. Disassemble fuel transfer pump assembly in numerical sequence shown in figure 6-13.

NOTE

Body and cover should be carefully pried apart due to the sealant that was used during assembly.



1. Tee
2. Nipple
3. Nut
4 Gear
5. Key
6. Bearing cage
7. O-ring
8. Retaining ring
9. O-ring (2)
10. Bearing
11. Seal
12. Seal
13. Screw (6)
14. Cover
15. Sleeve
16. Adapter
17. O-ring
18. O-ring
19. Seal
20. Plug
21. Gear
22. Shaft
23. Shaft assembly
24. Bearing
25. Body

Figure 6-13. Fuel Transfer Pump 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. Be sure to clean body and cover thoroughly where sealant was used. Discard all seals and O-rings.

(2) Inspect all gears for chipped or badly worn teeth, cracks, distortion, or any other defect.

(3) Inspect shaft for distortion, breaks, cracks, or any other defect. Measure shaft diameter; measurement should be 0.4936 to 0.4938 inches.

(4) Inspect sleeve bearings for cracks, flat spots, distortion, or any other defect. Measure inside diameter of each bearing; measurement should be 0.4950 to 0.4956 inches.

(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 fuel transfer pump assembly in reverse numerical sequence shown in figure 6-13. Install new seals and O-rings.

(1) Measure bearing clearance. Clearance should be 0.003 inches maximum.

(2) Before installation, lightly lubricate seals with clean engine oil.

CAUTION

Do not allow any sealant to enter pump assembly.

(3) Apply a thin coat of sealant to mating surfaces of body and cover.

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

6-15. Fuel Priming Pump Assembly

a. Removal. Remove fuel priming pump assembly (para 3-96).

b. Disassembly. Disassemble fuel priming pump assembly in numerical sequence shown in figure 6-14.

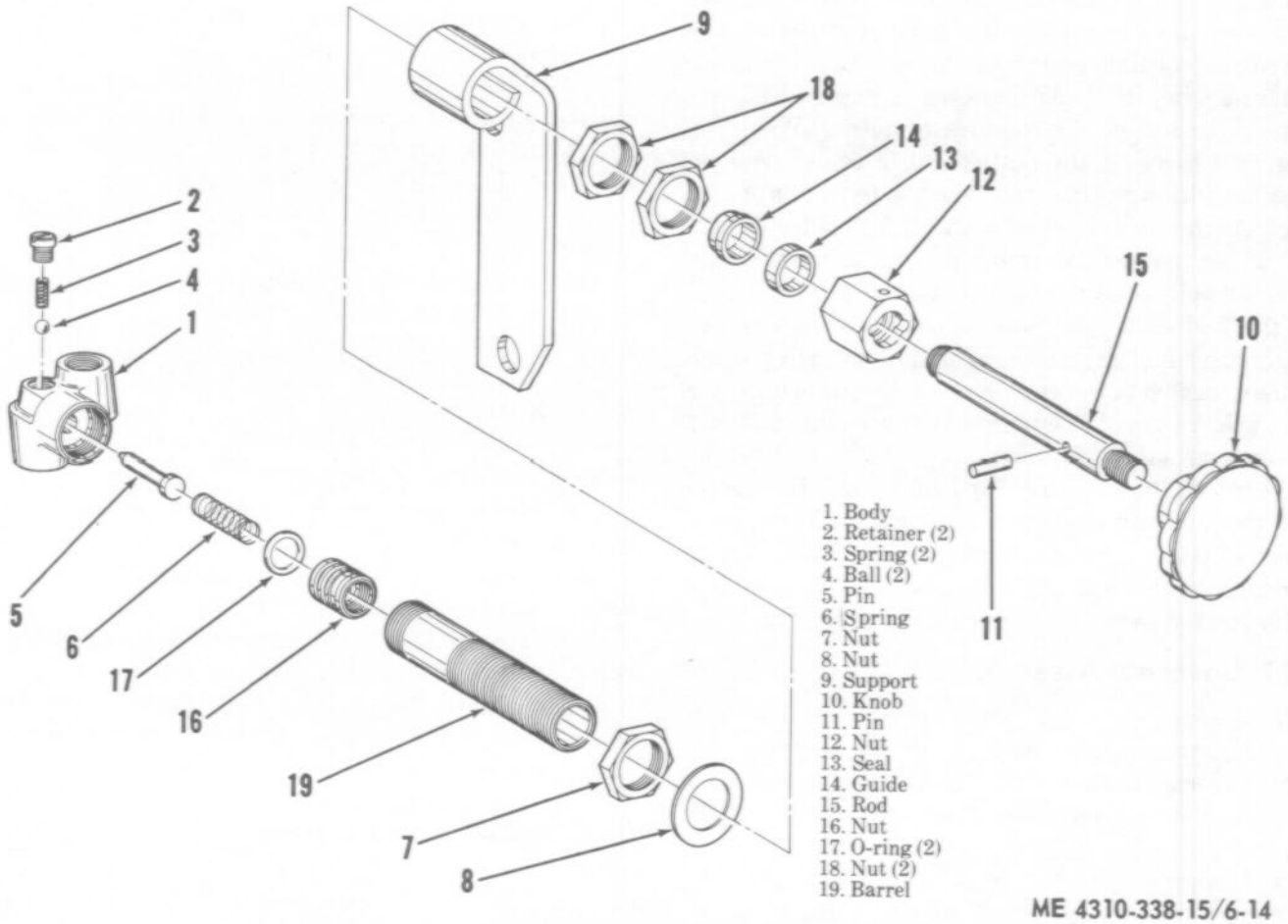


Figure 6-14. Fuel Priming Pump Assembly; Disassembly and Reassembly.

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 seal and O-rings.

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

(3) Inspect rod, pin, and ball for excessive wear, cracks, breaks, or any other defect.

(4) Inspect barrel and body for cracks, damaged threads, distortion, or any other defect.

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

d. Reassembly. Reassemble fuel priming pump assembly in reverse numerical sequence shown in figure 6-14. Install new seal and O-rings.

e. Installation. Install fuel priming pump assembly (para 3-96).

Section VIII. GOVERNOR ASSEMBLY

6-16. General

The governor assembly regulates the engine speed for each given load demand. A control lever on the governor selects the engine speed. This lever is connected to the air compressor speed control linkage and when the compressed air demand increases, the speed control linkage moves the control lever to increase engine RPM. An increase in engine RPM results in an increase in compressor output. When the engine is running, the centrifugal force of revolving weights within the governor and the force of a spring controls the movement of a valve. The valve directs oil, under pressure, to either a large volume section or small volume section of a piston which is connected to the fuel rack. The pressurized oil will move the piston and fuel rack either forward to increase the amount of fuel to the engine, or backward to decrease the fuel. A solenoid fastened to the governor is wired to various safety switches on the air compressor unit. If a malfunction develops, the solenoid energizes and mechanically pulls the fuel rack to the extreme fuel off position, stopping the engine. This shutoff function is also manually controlled using a control cable located on the instrument panel assembly.

6-17. Governor Assembly

a. Removal.

(1) Remove speed control rod and control cable from governor control arms (fig. 3-34 and 3-68).

(2) Remove governor assembly as shown in figure 6-15.

b. Disassembly. Disassemble governor assembly in numerical sequence shown in figure 6-16.

NOTE

Guide (67) will be damaged when removed and must be replaced each time governor assembly is disassembled.

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 housing and covers for cracks, breaks, distortion, or any other defect.

(3) Inspect all thrust and sleeve bearings for scoring, distortion, cracks, or any other defect.

(4) Inspect springs for damaged or distorted coils. Refer to Table 5-2 for spring free length.

(5) Inspect weights for sticking, cracks, or any other defect.

(6) Inspect weight assembly piston and valve for distortion, cracks, or any other defect.

NOTE

If either the valve or piston is faulty, replace both with a matched set.

(7) Inspect all shafts for distortion, out-of-round, score marks, or any other defect.

(8) Inspect insulator for cracks, breaks, or any other defect.

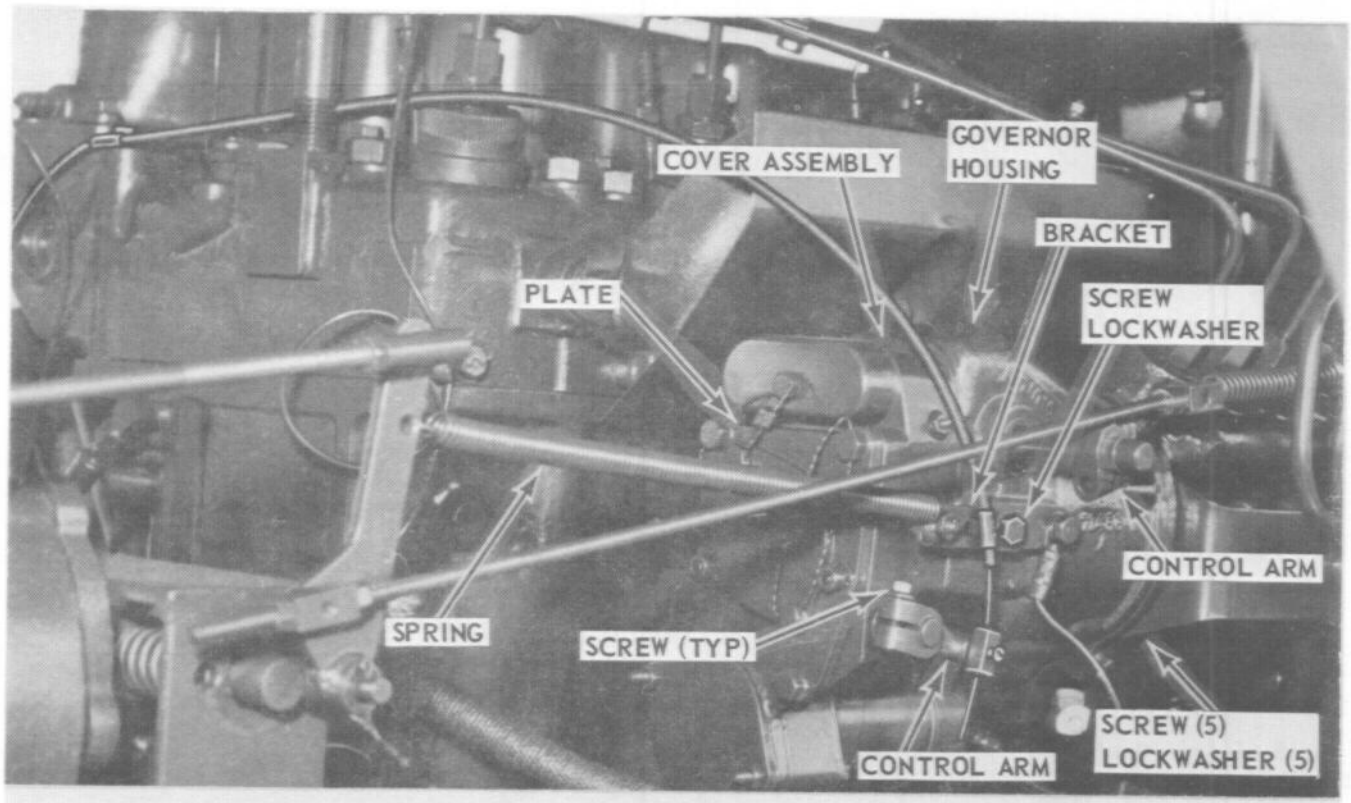
(9) Inspect all other parts for cracks, breaks, distortion, or any other defect.

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

d. Reassembly. Reassemble governor assembly in reverse numerical sequence shown in figure 6-16. Install new gaskets and O-rings.

(1) When installing new guide (67), form end of guide against, and all the way around, chamfer in governor housing.

(2) When assembling weights to carrier, stake four places around each dowel on both ends. Each weight must have 0.001 to 0.007 inches end play and must pivot freely on its dowel.



ME 4310-338-15/6-15

REMOVAL

STEP 1. LOOSEN SCREWS AND REMOVE BOTH CONTROL ARMS FROM GOVERNOR.

STEP 2. REMOVE SCREW, LOCKWASHER, BRACKET, AND SPRING.

STEP 3. REMOVE PLATE AND COVER ASSEMBLY BY REMOVING CAPSCREWS, SOCKET SCREWS, AND LOCKWASHERS. REMOVE GASKET.

STEP 4. LOOSEN SOCKET SCREW AND REMOVE COLLAR.

STEP 5. REMOVE HOUSING BY REMOVING SCREWS AND LOCKWASHERS.

STEP 6. REMOVE SPRING AND WEIGHT GROUP BY REMOVING SCREWS AND LOCK.

INSTALLATION

STEP 1. INSTALL SPRING AND WEIGHT GROUP AND SECURE WITH SCREWS AND LOCK.

STEP 2. INSTALL HOUSING AND SECURE WITH SCREWS AND LOCKWASHERS.

STEP 3. INSTALL COLLAR AND SECURE WITH SOCKET SCREW.

STEP 4. INSTALL PLATE AND COVER ASSEMBLY. SECURE WITH CAPSCREWS, SOCKET SCREWS, AND LOCKWASHERS.

STEP 5. INSTALL SPRING AND BRACKET. SECURE WITH SCREW AND LOCKWASHER.

STEP 6. INSTALL CONTROL ARMS AND TIGHTEN SCREWS.

Figure 6-15. Governor assembly; removal and installation.

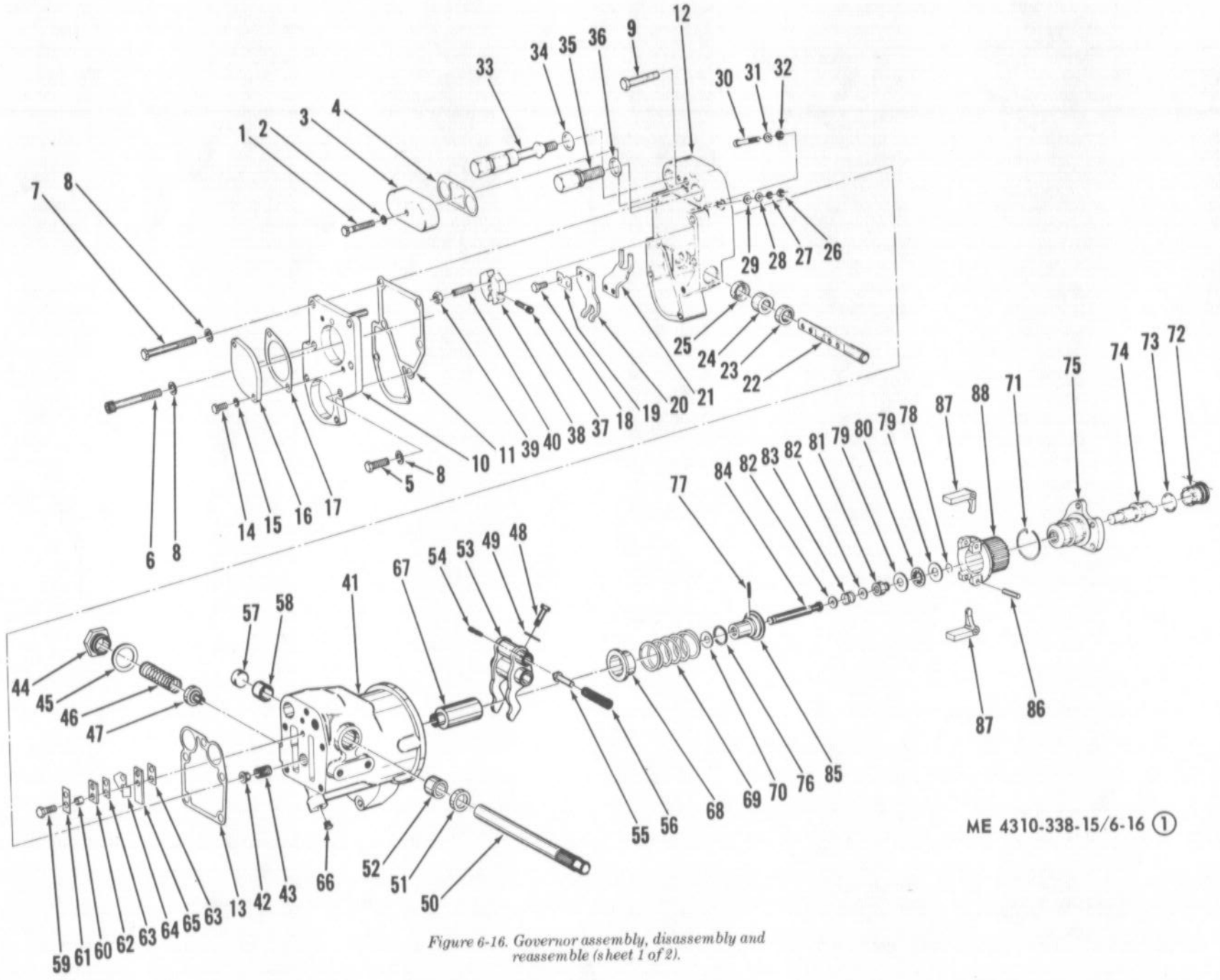


Figure 6-16. Governor assembly, disassembly and reassemble (sheet 1 of 2).

1. Screw
2. Washer
3. Cover
4. Gasket
5. Screw
6. Screw (2)
7. Screw (2)
8. Lockwasher (5)
9. Screw
10. Plate assembly
11. Gasket
12. Cover assembly
13. Gasket
14. Screw (2)
15. Washer (2)
16. Cover
17. Gasket
18. Screw (4)
19. Lock (2)
20. Lever
21. Lever
22. Shaft
23. Seal
24. Bearing
25. Seal
26. Nut
27. Lockwasher
28. Washer
29. Insulator
30. Bolt
31. Washer
32. Insulator
33. Screw
34. O-Ring
35. Screw
36. O-Ring
37. Screw
38. Collar
39. Nut
40. Screw
41. Housing assembly
42. Collar
43. Spring
44. Plug
45. Gasket
46. Spring
47. Plunger
48. Screw
49. Lock
50. Shaft
51. Seal
52. Bearing
53. Lever assembly
54. Pin
55. Plunger
56. Spring
57. Plug
58. Bearing
59. Screw (2)
60. Sleeve (2)
61. Lock
62. Retainer
63. Spacer (2)
64. Contact
65. Bar
66. Plug
67. Guide
68. Seat assembly
69. Spring
70. Spring
71. Lock ring
72. Sleeve
73. O-Ring
74 Piston
75. Cylinder
76. Ring
77. Pin
78. Ring
79. Race (2)
80. Bearing
81. Sleeve
82. Washer (2)
83. Spring
84. Bolt
85. Seat
86. Pin
87. Weight (2)
88. Weight assembly
89. Cover assembly
90. Gasket
91. Screw (3)
92. Lock

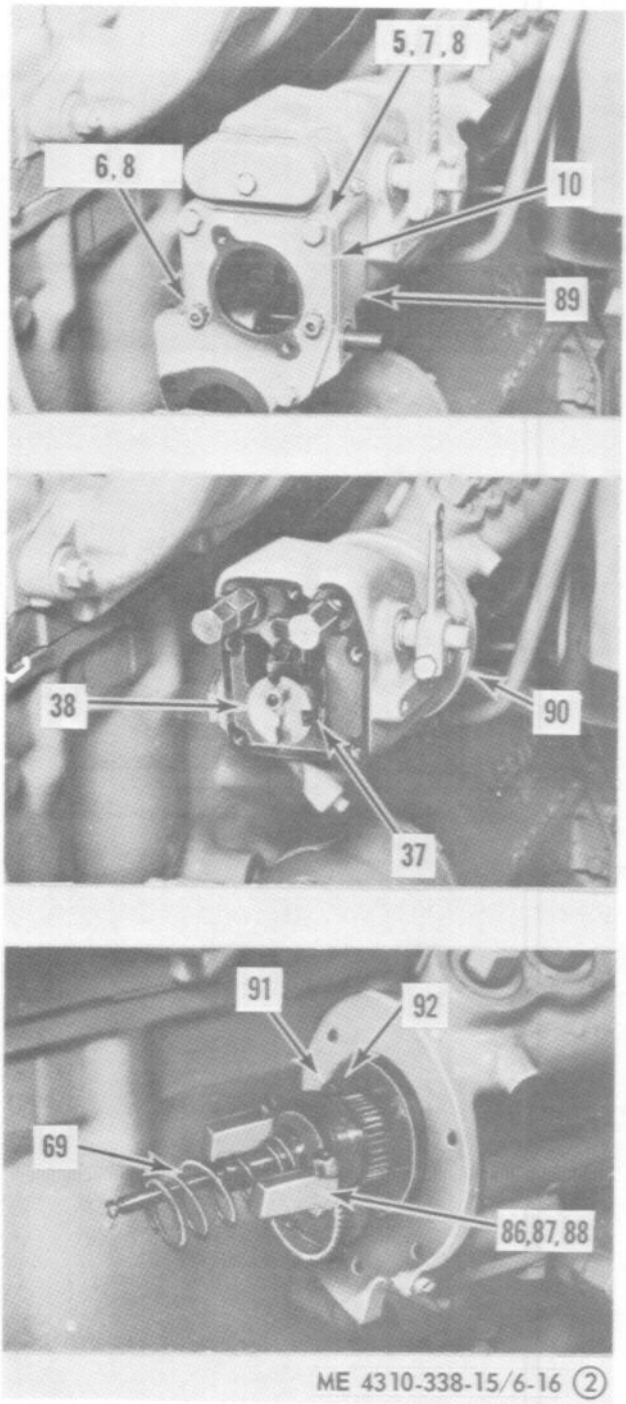


Figure 6-16. Governor assembly, disassembly and reassembly. (sheet 2 of 2).

e. Backlash Check. Check backlash between drive gear on housing and driven gear on shaft. Measurement should be 0.006 inches maximum.

f. Installation. Install governor assembly as shown in figure 6-15. Perform fuel rack setting check and adjustment, below.

g. Fuel Rack Setting Check and Adjustment. The fuel rack setting is based on the following principle: the distance the fuel rack travels from the centered position to the point where the governor stop collar adjusting screw is just touching the stop bar.

(1) Install fuel rack setting gage (fig. 3-76). Adjust gage to +.085".

(2) Disconnect speed control rod from governor control lever (figure 3-68).

(3) Connect a continuity tester between brass screw terminal and housing (view A, fig. 6-17).

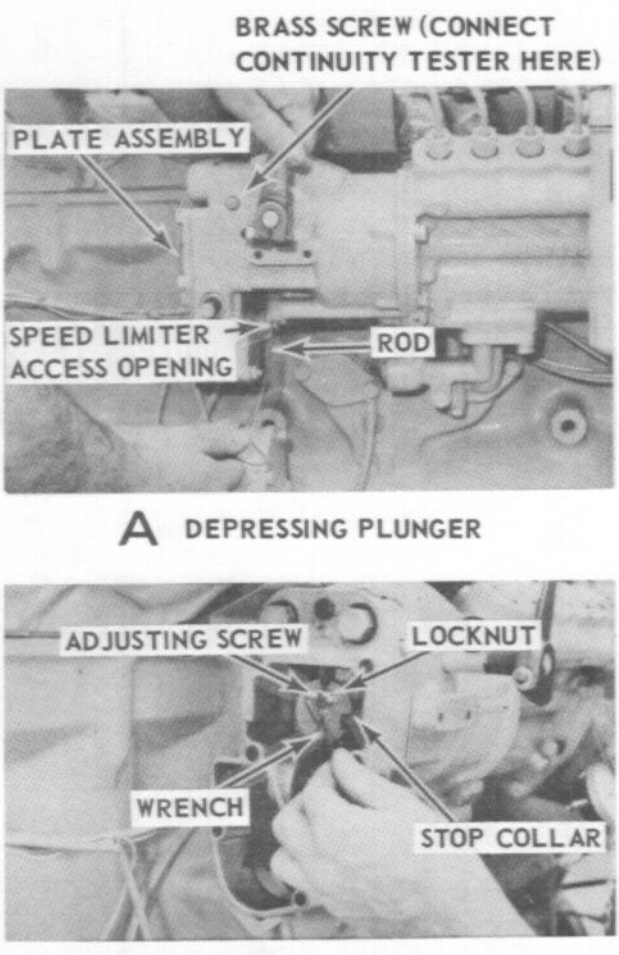


Figure 6-17. Governor assembly fuel rack setting adjustment.

(4) Remove plug and manually depress speed limiter plunger (view A).

NOTE

Speed limiter plunger must be depressed to permit full fuel rack travel when engine is not running.

(5) With speed limiter plunger depressed, move governor control lever in fuel-on direction until continuity tester lights, then slowly reverse direction of lever until tester lamp just goes out.

(6) Slowly, move governor control lever in fuel-on direction until continuity tester just barely lights (dim). Rack collar adjusting screw is now just touching stop bar.

(7) Adjust fuel rack setting gage until it is against end of fuel rack. Gage should indicate +.070" if fuel rack is adjusted correctly. If fuel rack setting is correct, proceed to step 12. If fuel rack setting is not correct, proceed to step 8.

NOTE

Because of engine dimensional tolerances, fuel rack setting may vary from engine to engine. The exact setting for each engine is stamped on engine data plate located on flywheel housing.

(8) Remove plate assembly from governor to gain access to fuel rack stop collar adjusting screw. Loosen locknut on adjusting screw.

CAUTION

When governor cover is removed, stop collar could rotate out of position resulting in a serious fuel rack misadjustment. Ensure stop collar is always positioned properly so that adjusting screw is aligned with stop bar.

(9) Adjust screw (view B) and repeat steps 5 through 7 to obtain correct fuel rack setting.

(10) Tighten adjusting screw locknut to a torque value of 9 to 12 foot-pounds. Recheck fuel rack setting.

(11) Ensure stop collar is positioned properly and install plate assembly.

(12) Install speed limiter access plug.

(13) Disconnect and remove continuity tester.

(14) Remove fuel rack setting gage and reinstall cover.

(15) Connect engine stop control cable to governor control arm (fig. 3-34).

(16) Connect speed control rod to governor control lever and adjust linkage (para 3-88).

6-18. General

The fuel injection group consists of the fuel injection pump housing, camshaft, fuel injection pumps, fuel injection valves, and associated tubing. Fuel, after passing through the filters, flows into the injection pump housing manifold which distributes the fuel to the injection pumps. The injection pump for each cylinder measures and delivers the fuel to its associated fuel injection valve for insertion into the precombustion chamber. The amount of fuel pumped per stroke is varied by turning the pump plunger in the barrel. This turning is accomplished by governor action through the fuel rack and gear arrangement. Injection pump plungers and lifters are lifted by lobes on the fuel injection camshaft.

6-19. Fuel Injection Pumps

a. Removal. Remove fuel injection pump (para 3-93).

CAUTION

All service work should be done with clean hands and on a clean, lint free cloth. Keep parts for each injection pump separate since each pump has matched parts that are not interchangeable.

b. Disassembly. Disassemble fuel injection pumps in numerical sequence shown in figure 6-18.

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 bonnet for damaged threads, cracks, distortion, or any other defect.

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

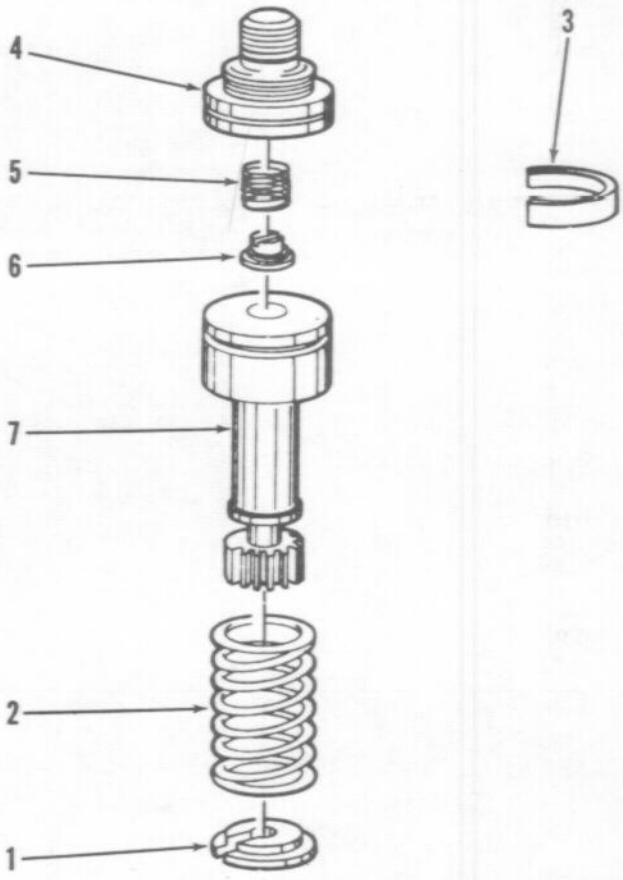
(4) Inspect retaining rings, check valves, barrels, and washers for cracks, distortion, or any other defect.

(5) Use a micrometer and measure plunger length. Length should be 2.5931 to 2.5937 inches. Inspect plungers for excessive wear on end which makes contact with fuel injection pump lifter washers.

NOTE

Whenever a plunger is replaced, it is also necessary to replace associated fuel injection pump lifter assembly.

d. Reassembly. Reassemble fuel injection pump in reverse numerical sequence shown in figure 6-18.



ME 4310-338-15/6-18

1. Washer
2. Spring
3. Retaining ring
4. Bonnet
5. Spring
6. Check valve
7. Plunger and barrel assembly

Figure 6-18. Fuel injection pump; disassembly and reassembly.

NOTE

Align notches on bonnet and barrel with slot on gear segment.

e. Installation. Install fuel injection pump (para 3-93).

6-20. Fuel Injection Pump Housing Assembly

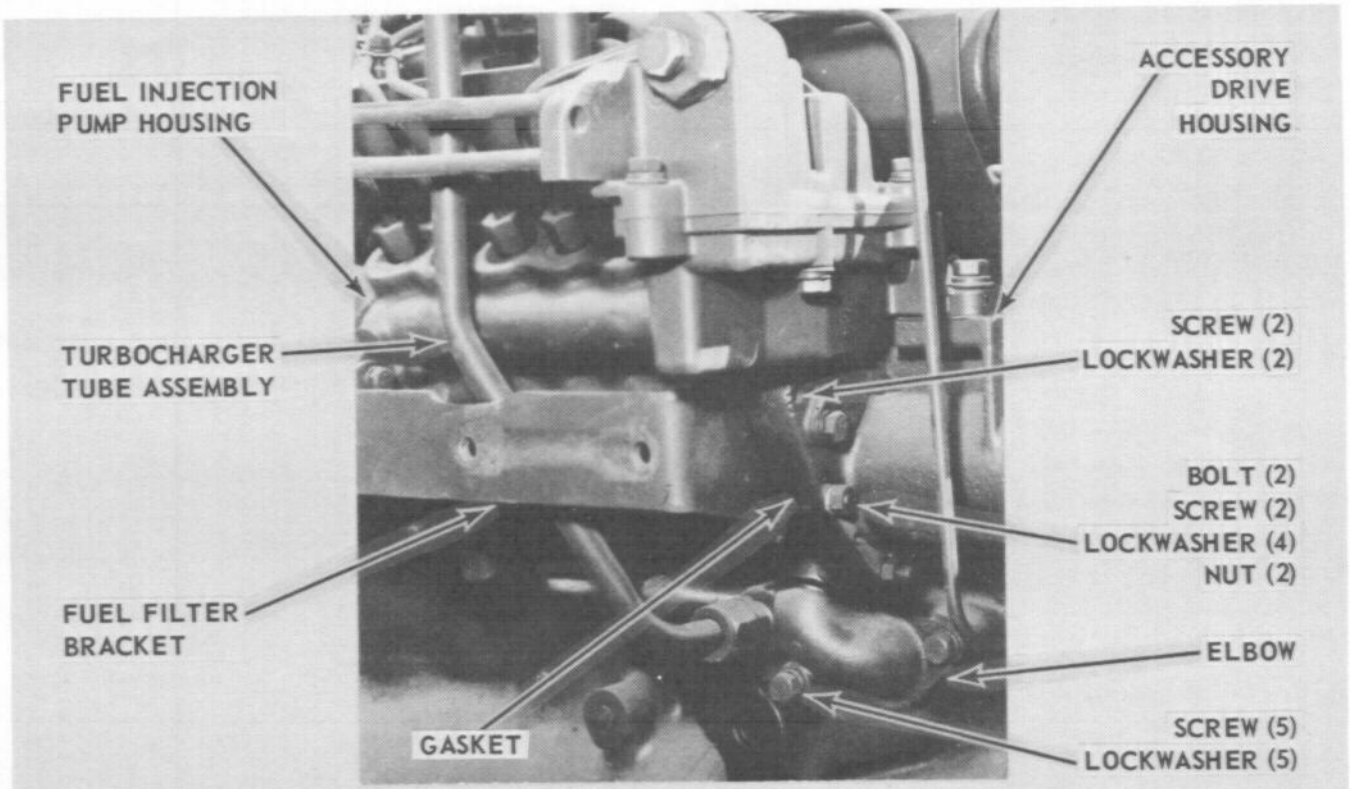
a. Removal.

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

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

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

(4) Remove fuel injection pump housing assembly as shown in figure 6-19.



ME 4310-338-15/6-19

REMOVAL

STEP 1. DISCONNECT TURBOCHARGER LUBRICATION TUBE ASSEMBLY.

STEP 2. REMOVE SCREWS AND LOCKWASHERS FROM ELBOW.

STEP 3. REMOVE SCREWS, BOLTS, NUTS, AND LOCKWASHERS. REMOVE FUEL INJECTION PUMP HOUSING, ELBOW, GASKET, AND FILTER BRACKET.

INSTALLATION

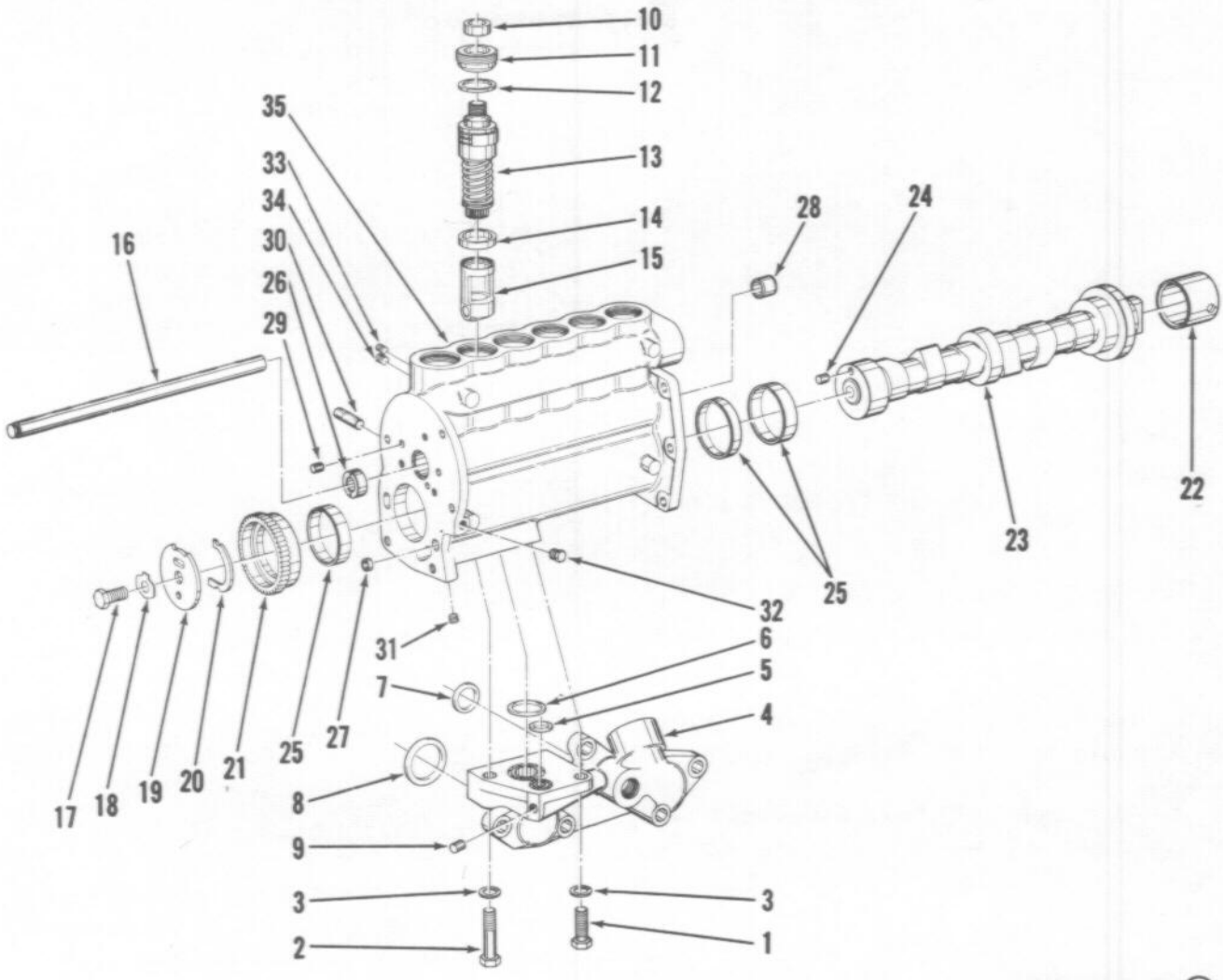
STEP 1. INSTALL GASKET. PLACE FUEL INJECTION PUMP HOUSING, FILTER BRACKET, AND ELBOW IN MOUNTING POSITION. SECURE WITH SCREWS, BOLTS, NUTS, AND LOCKWASHERS.

STEP 2. SECURE ELBOW WITH SCREWS AND LOCKWASHERS.

STEP 3. CONNECT TURBOCHARGER LUBRICATION TUBE ASSEMBLY.

Figure 6-19. Fuel injection pump housing assembly; removal and installation.

b. Disassembly. Disassemble fuel injection pump housing assembly in numerical sequence shown in figure 6-20.



1. Screw
2. Screw
3. Washer (2)
4. Elbow
5. O-ring
6. O-ring
7. O-ring
8. O-ring
9. Dowel pin
10. Washer (6)
11. Bushing (6)
12. Gasket (6)
13. Pump assembly (6)
14. Spacer (6)
15. Lifter assembly (6)
16. Fuel rack
17. Screw
18. Lock
19. Plate
20. Spring
21. Gear
22. Sleeve
23. Camshaft
24. Dowel pin
25. Bearing (3)
26. Bearing
27. Plug
28. Bearing
29. Dowel pin (2)
30. Pin (3)
31. Plug
32. Plug
33. Dowel pin (6)
34. Dowel pin (6)
35. Housing

Figure 6-20. Full injection pump housing assembly disassembly and reassembly (sheet 1 of 2).

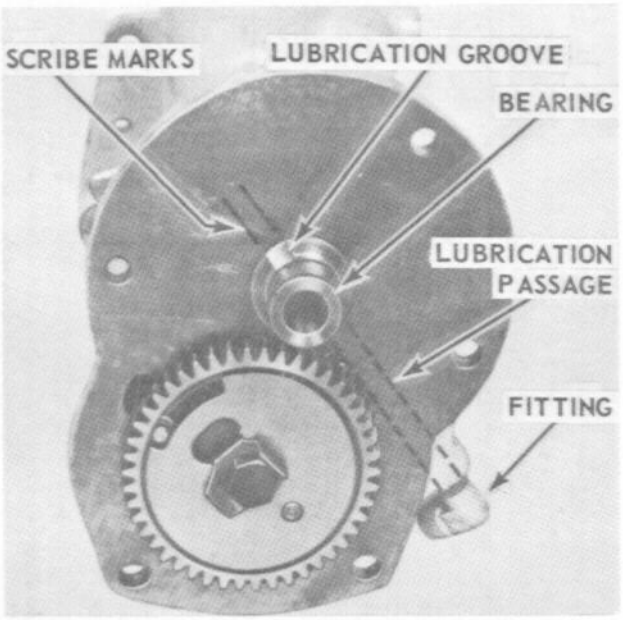


figure 6-20. Fuel injection pump housing assembly disassembly and reassembly (sheet 2 of 2).

(1) Refer to paragraph 6-19 for disassembly, service, and reassembly instructions for fuel injection pumps.

(2) When removing fuel rack bearings, first make two scribe marks on housing above groove on bearing (fig. 6-20, view B). This procedure allows for the alignment of groove on bearing with drilled lubrication passage during reassembly.

(3) Wire together each spacer and fuel pump lifter. Tag each pair and identify the pump bore from which they were removed.

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 thouroughly. Discard all gaskets and seals.

(2) Inspect fuel injection pump lifters for cracks, breaks, distortion, or any other defect.

NOTE

Whenever a fuel injection pump lifter is replaced, it is also necessary to replace the associated fuel injection pump plunger.

(3) Inspect fuel rack for damaged threads, distortion, cracks, or any other defect.

(4) Inspect fuel rack bearings for cracks, breaks, or any other defect. Measure bearing bores and clearances. Each bore should measure 0.5007 to 0.5013 inches; each clearance is 0.005 inches maximum.

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

(6) Inspect camshaft bearings for cracks, breaks, or any other defect. Measure bearing bores and clearances. Each bore should measure 1.8750 to 1.8760 inches; each clearance is 0.010 inches maximum.

(7) Inspect all other parts, including attaching hardware, for cracks, breaks, distortion, or any other defect.

d. Reassembly. Reassemble fuel injection pump housing in reverse numerical sequence shown in figure 6-20. Install new gaskets and seals.

(1) All assembly should be done with clean hands and on a clean, lint free cloth.

(2) Install camshaft bearing so that hole in bearing aligns with passage in housing.

(3) Install fuel rack bearing so that groove in bearing aligns with scribe marks on housing.

(4) Use fuel rack setting gage when installing fuel rack. See figure 3-76. Position fuel rack so that gage indicates .000".

(5) Install each fuel injection pump so that notches engage with two locating dowel pins in each housing bore. Use an extractor tool.

CAUTION

When tightening retaining bushing, a lesser torque value will allow pump to leak; a greater torque value can damage housing.

(6) Tighten each pump retaining bushing to a torque value of 140 to 160 foot-pounds.

CAUTION

A misaligned fuel injection pump can cause an engine to overspeed with resultant damage to engine, turbocharger, and compressor.

(7) After pumps are installed, check fuel rack setting. With fuel rack at extreme fuel on position, rack setting gage should indicate +.312" minimum. If reading is less than +.312", remove pump assemblies, position fuel rack to .000", and reinstall pumps. Recheck extreme fuel on rack position.

e. Installation.

(1) Install fuel injection pump housing assembly as shown in figure 6-19.

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

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

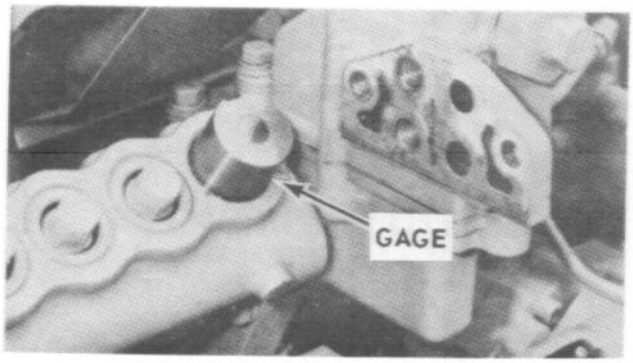
(4) Install final fuel filter assembly (para 3-98).

f. Fuel Injection Pump Timing Dimension Check and Adjustment — On Engine fig. 6-21).

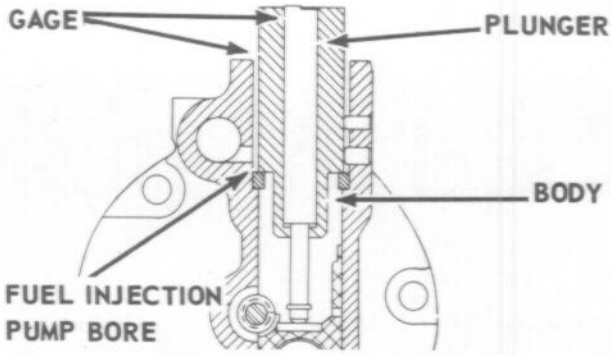
(1) Remove valve cover (para 3-116.

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

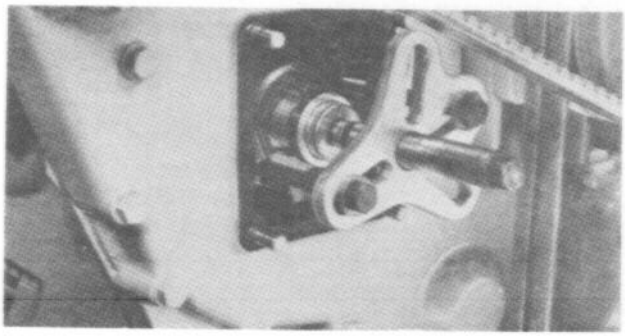
(3) Remove fuel injection pump for cylinder No. 1 (para 3-93).



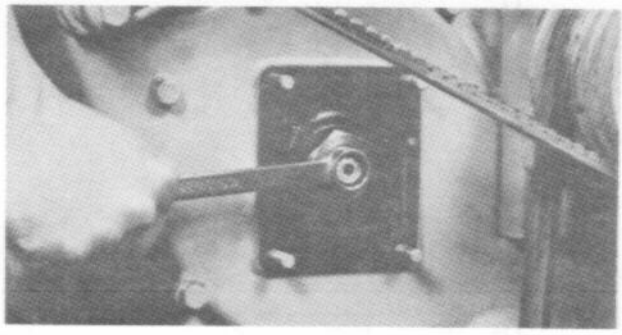
FUEL PUMP LIFTER GAGE INSTALLED



FUEL PUMP LIFTER GAGE INSTALLED



SEPARATING GEAR



ROTATING THE ACCESSORY DRIVE SHAFT

ME 4310-338-15/6-21

Figure 6-21. Fuel injection timing; on engine.

(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 gage in pump bore. Measure timing dimension using a depth micrometer. Timing dimension should be 4.2159 to 4.2199 inches. If timing dimension is correct, proceed to step 10. If timing dimension is not correct, proceed to step 6 and make an adjustment.

(6) Remove small cover from front of timing gear cover and loosen accessory drive gear retaining nut (do not remove nut).

(7) Separate gear from accessory drive shaft. Remove gear pulling tools.

(8) Turn accessory drive shaft extension nut counterclockwise and adjust timing dimension. Timing dimension should be 4.2159 to 4.2199 inches.

(9) Install accessory drive gear. Tighten retaining nut to 100 ± 10 foot-pounds. Recheck timing dimension. Replace cover.

(10) Install fuel injection pump for cylinder No. 1 (para 3-93).

(11) Install timing pointer cover on flywheel housing (fig. 3-103).

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

g. Fuel Injection Pump Timing Dimension Check and Adjustment — Off Engine (fig. 6-22).

(1) Install pointer assembly on fuel injection pump housing.

(2) Install timing plate on drive end of fuel injection camshaft.

(3) Remove fuel injection pump for cylinder being checked (para 3-93). Install gage in pump bore.

(4) Refer to Table 6-1 and select the timing plate degree setting for lifter being checked. Rotate timing plate counterclockwise until proper degree setting aligns with pointer assembly. Tighten screw to lock in position.

(5) Measure timing dimension using a depth micrometer. Timing dimension should be 4.2670 to 4.2680 inches. If timing dimension is correct, proceed to step 7. If timing dimension is not correct, proceed to step 6.

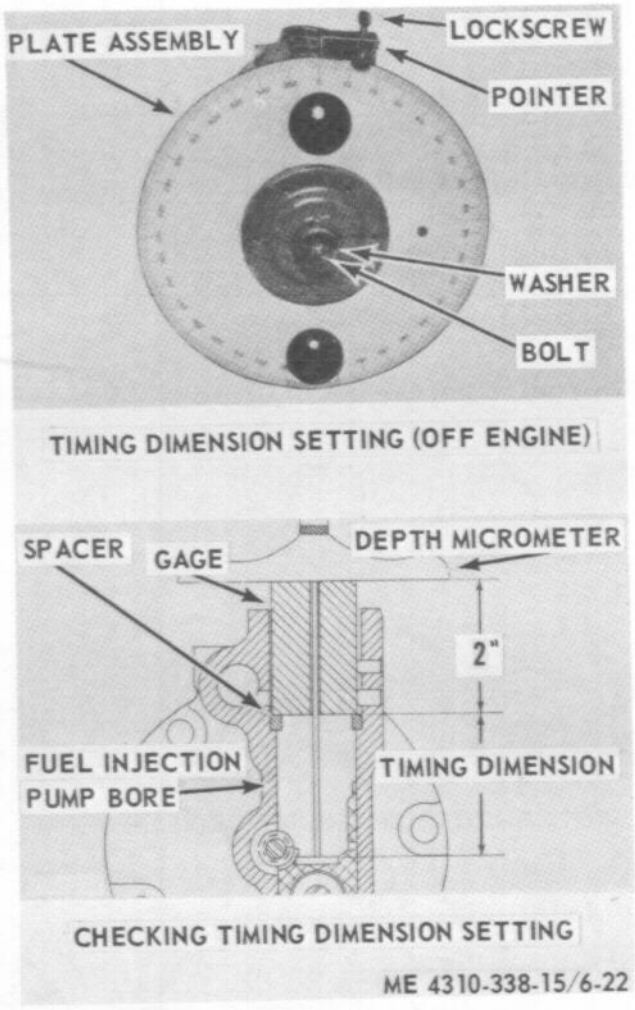


Figure 6-22. Fuel injection timing; off engine.

(6) If timing dimension is not correct, replace spacer (1). Select a spacer thickness which will correct the timing dimension. Spacers are available in varying thicknesses from 0.170" to 0.198". Recheck timing dimension.

(7) Install fuel injection pump (para 3-93).

(8) If timing dimension is to be checked for each cylinder, repeat steps 1 through 7 following firing order of engine.

Table 6-1. Timing Plate Degree Settings

Lifter number (numbered consecutively from to rear)	Timing plate degrees
1	170° 30'
2	59° 30'
3	299° 30'
4	119° 30'
5	239° 30'
6	359° 30'

Section X. OIL COOLER AND OIL FILTER GROUP

6-21. General

The oil cooler and oil filter group consists of the oil cooler assembly, oil filter assembly, a water bonnet, and associated tubing and connections. The oil cooler assembly contains a tube bundle, two bypass valves, and a housing. The oil filter assembly consists of two filter elements, two cases, two bypass valves, and a base assembly. On cold engine starts, the cool viscous oil does not flow immediately through the oil cooler and oil filter. The cool oil forces bypass valves, located on the oil filter and oil cooler, to open and the oil flows unrestricted through the engine. As the temperature of the oil increases, the viscosity and pressure of the oil decreases and the oil filter bypass valves close. Now, only filtered oil is delivered to all of the engine parts. As oil temperature continues to increase, the oil cooler bypass valves close, allowing the oil to flow through the oil cooler prior to entering the oil filters. If an oil filter becomes clogged, that oil filter bypass valve opens and allows the oil to flow directly from the oil cooler into th engine. Water from the engine cooling system flows through the tube bundle section of the oil cooler to reduce the heat of the engine lubricationg oil

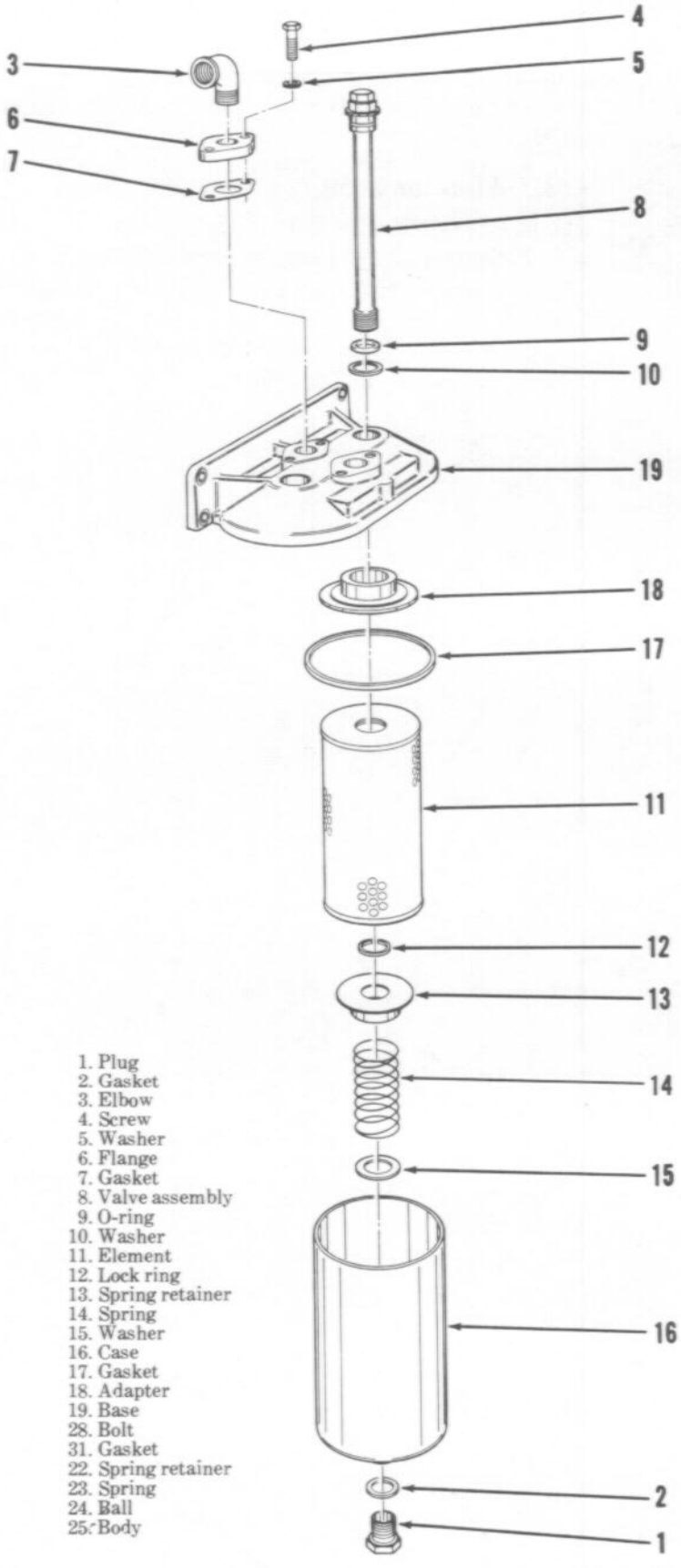
6-22. Oil Filter Assembly

a. Removal. Remove oil filter assembly (para 3-108).

NOTE

Before removing filter assembly, drain all oil from cases.

b. Disassembly. Disassemble oil filter assembly assembly in numerical sequence shown in figure 6-23.



1. Plug
2. Gasket
3. Elbow
4. Screw
5. Washer
6. Flange
7. Gasket
8. Valve assembly
9. O-ring
10. Washer
11. Element
12. Lock ring
13. Spring retainer
14. Spring
15. Washer
16. Case
17. Gasket
18. Adapter
19. Base
28. Bolt
31. Gasket
22. Spring retainer
23. Spring
24. Ball
25. Body

Figure 6-23. Engine oil filter assembly, disassembly and reassembly (sheet 1 of 2).

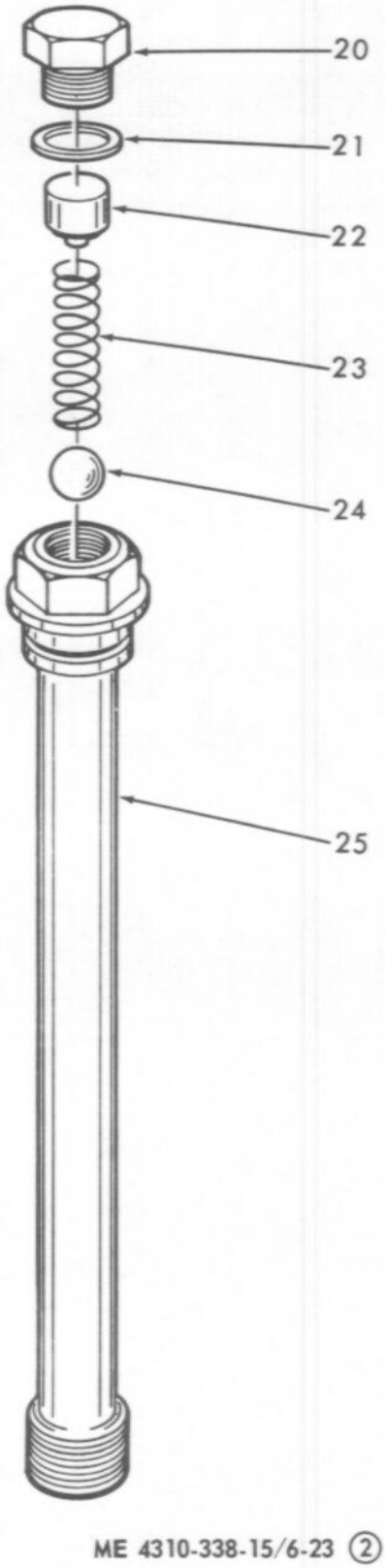


Figure 6-23. Engine oil filter assembly, disassembly and reassembly (sheet 2 of 2).

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. Discard elements and gaskets.

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

(3) Inspect relief valve parts for cracks, breaks, distortion, or any other defect.

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

(5) Inspect plugs and attaching parts for damaged threads, distortion, or any other defect.

d. Reassembly. Reassemble oil filter assembly in reverse numerical sequence shown in figure 6-23. Install new elements and gaskets.

e. Installation. Install oil filter assembly (para 3-108).

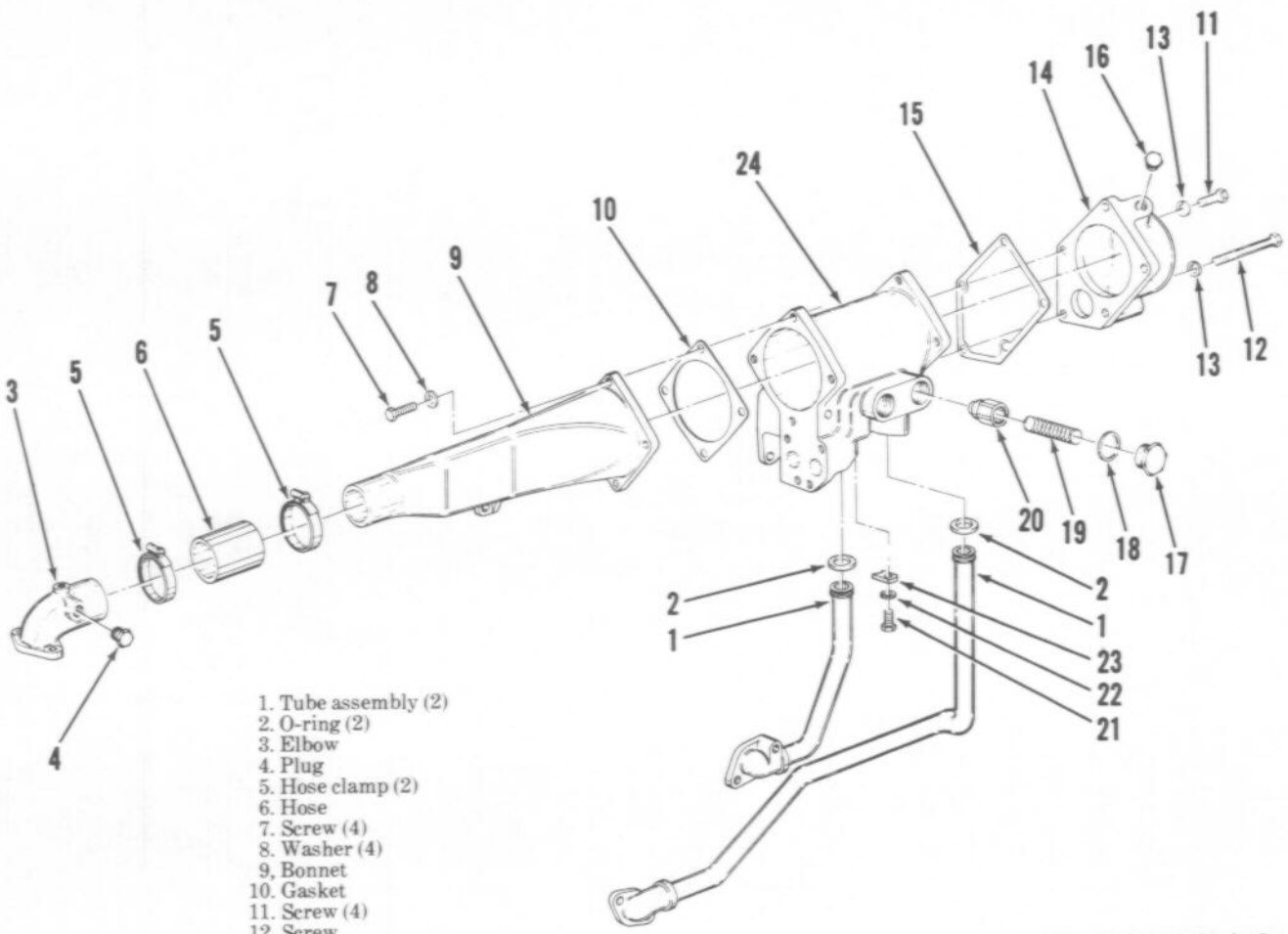
-23. Oil Cooler Group

a. Removal.

(1) Remove oil filter assembly (para 3-108).

(2) Remove oil cooler group as shown in figure 3-95.

b. Disassembly. Disassemble oil cooler in numerical sequence shown in figure 6-24.



1. Tube assembly (2)
2. O-ring (2)
3. Elbow
4. Plug
5. Hose clamp (2)
6. Hose
7. Screw (4)
8. Washer (4)
9. Bonnet
10. Gasket
11. Screw (4)
12. Screw
13. Washer (5)
14. Bonnet
15. Gasket
16. Plug
17. Plug (2)
18. Gasket (2)
19. Spring (2)
20. Plunger (2)
21. Screw (2)
22. Washer (2)
23. Lug (2)
24. Oil cooler

Figure 6-24. Engine Oil Cooler; Disassembly and Reassembly.

c. Cleaning, Inspection, and Repair.

(1) Discard all gaskets and o-rings.

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

(3) If tube bundle is corroded, scale deposits can be removed by either of the following methods:

(a) Ream tubes with a drill bit welded to end of rod long enough to penetrate length of tubes. Extreme care must be taken to avoid piercing sides of tubes with drill bit.

WARNING

Use extreme caution when mixing acid solution and when cleaning oil cooler. Always add acid to water when mixing; never add water to acid. Avoid any contact of solution with skin. Keep away from eyes.

(b) Clean tubes with a solution of 15% hydrochloric acid and 85% water. The oil cooler should be immersed in or flushed with the solution until the scale is softened. Wash cooler thoroughly with water to remove scale and solution. Repeat procedure as necessary to achieve proper cleaning.

(4) Inspect tube bundle for cracks, breaks, uncleanable corrosion, or any other defect.

(5) Inspect bonnets for cracks, breaks, uncleanable corrosion, or any other defect.

(6) Inspect tube assembly for cracks, breaks, damaged fittings, or any other defect.

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

d. Reassembly. Reassemble oil cooler group in reverse numerical sequence shown in figure 6-24, adding new gaskets and O-rings.

e. Installation.

(1) Install oil cooler group as shown in figure 3-95.

(2) Install oil filter assembly (para 3-108).

Section XI. WATER PUMP ASSEMBLY

6-24. General

The centrifugal-type water pump is driven by the accessory drive gear train. Basically, the pump consists of an impeller and drive gear mounted on a common rotating shaft. The shaft is supported by roller bearings. Seals mounted on the shaft prevent water from leaking into the gear section and oil from leaking into the impeller section. The pump is contained in a cast housing. As the diesel engine is running, the drive gear in the water pump turns the shaft and impeller. The impeller creates a forceful flow of water throughout the engine cooling system.

6-25. Water Pump Assembly

a. Removal. Remove water pump assembly (para 3-76).

b. Disassembly. Disassemble water pump assembly in numerical sequence shown in figure 6-25.

(1) Remove impeller by unscrewing it in a clockwise direction.

CAUTION

When pressing shaft and bearing out of housing, place a nut on end of shaft to protect threads.

(2) Press shaft and bearing out of housing. Press from impeller end. Do not remove bearing from shaft unless bearing or shaft is being replaced. If an inspection reveals that bearing or shaft is defective, press bearing off of shaft.

(3) Press water seal out of impeller end of housing.

c. Cleaning, Inspection, and Repair.

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

(2) Inspect bearings for freedom of movement, grittiness, cracks, distortion, or any other defect.

(3) Inspect shaft for distortion, cracks, pits, or any other defect.

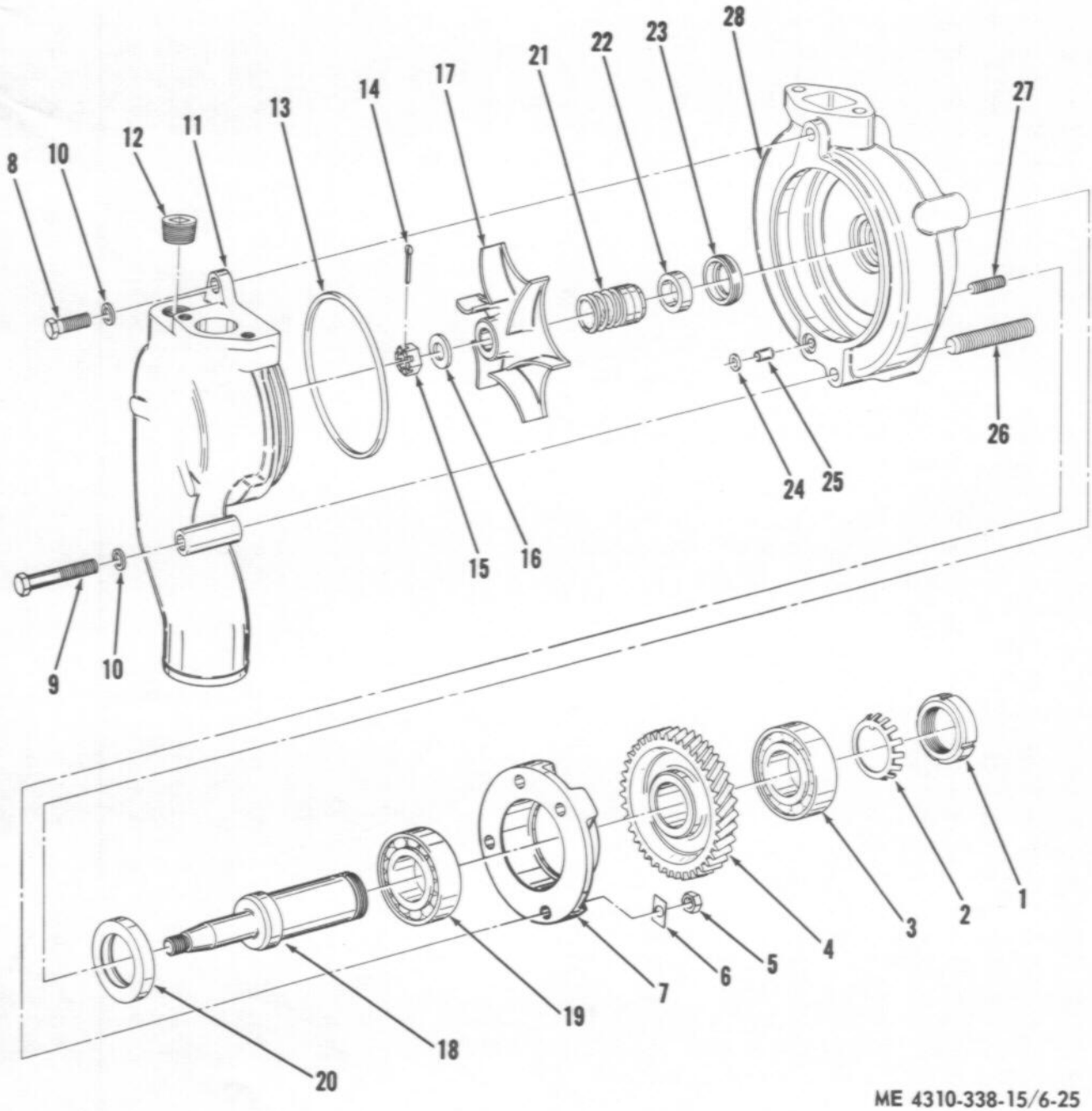
(4) Inspect gear and impeller for nicks, distortion, cracks, or any other defect.

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

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

d. Reassembly. Reassemble water pump assembly in reverse numerical sequence shown in figure 6-25. Install new seals, o-rings, and gaskets.

(1) Press oil seal into pump housing with lip facing drive end. Lightly lubricate sealing lip using engine lubricant.



1. Nut
2. Lock
3. Bearing
4. Gear
5. Nut (4)
6. Lock (4)
7. Bearing cage
8. Screw
9. Screw
10. Washer (2)
11. Cover
12. Plug
13. O-ring
14. Cotter pin
15. Nut
16. Washer
17. Impeller
18. Shaft
19. Bearing
20. Seal
21. Seal assembly
22. Washer
23. Seal ring
24. O-ring
25. Sleeve
26. Stud
27. Stud
28. Housing

Figure 6-25. Water pump assembly; disassembly and reassembly.

(2) If bearing is being replaced, press bearing onto shaft. Press shaft and bearing assembly into housing.

(3) Install water seal using an installation tool and hand pressure. Place ceramic ring and rubber cap onto shaft and seat into housing. Press rubber bellows-carbon washer assembly on pump until carbon washer contacts ceramic rings.

(4) Install impeller by screwing it onto shaft in a counterclockwise direction. Tighten impeller retaining nut to a torque value of 25 to 35 foot-pounds. Measure clearance between impeller vanes and pump housing. Clearance should be 0.010 to 0.030 inches. Reassemble water pump, as necessary, to achieve proper clearance.

(5) Press drive gear and bearing onto shaft.

e. Installation. Install water pump assembly (para 3-76).

Section XII. CYLINDER HEAD AND VALVE MECHANISM GROUP

6-26. General

The cylinder assembly houses the valves, valve mechanism, precombustion chambers, glow plugs, and fuel injection valves. The air inlet manifold is cast integral with the cylinder head. Rubber seals and ferrules seal the water and lubrication passages between the cylinder head and cylinder block. Cored passages in the cylinder head direct the flow of coolant around the valve ports and precombustion chambers. The valves and valve mechanism admit inlet air and release exhaust gases at precisely timed intervals during each cycle of a piston. The camshaft, geared and timed to the crankshaft, rotates at one-half crankshaft RPM. he camshaft activates the rocker arms and valves through mechanical lifters and push rods. Valve clearances are adjusted by turning a screw on each rocker arm. Each valve spring has a mechanism which allows that valve to rotate a few degrees each time the valve is lifted. This action minimizes carbon deposits and promotes longer valve life. The cylinder head contains valve seat inserts which can be replaced when the seats have been reground to the extreme dimensional limits.

6-27. Cylinder Head and Valve Mechanism

a. Removal.

(1) Remove housing front doors and roof (para 3-33).

(2) Remove turbocharger assembly and manifold (para 3-115 and 3-118).

(3) Drain cooling system. Remove hoses and tube assembly (para 3-71).

(4) Remove fuel injection lines and valves (para 3-100 and para 3-94). Install caps or plugs where lines were removed to prevent dirt from entering fuel injection system.

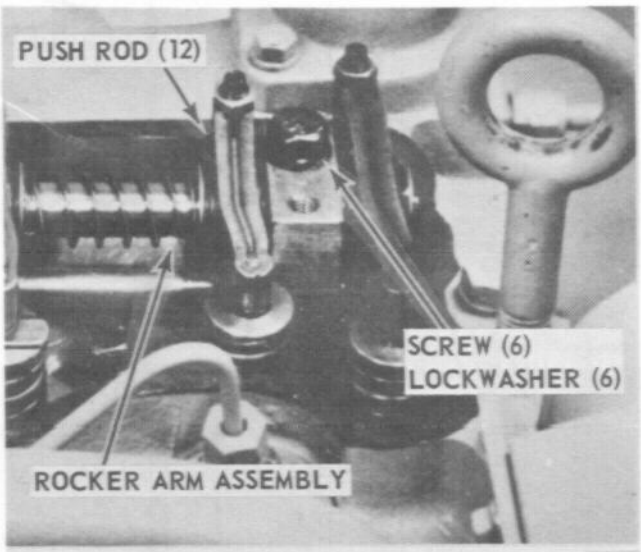
(5) Disconnect wiring from water temperature safety switch and glow plugs. Remove glow plugs (para 3-119).

(6) Remove water temperature sensing bulb (fig. 3-34).

(7) Remove cold weather starting aid atomizer (fig. 3-32).

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

(9) Remove rocker arm assembly and push rods as shown in figure 6-26.



ME 4310-338-15/6-26 (1)

REMOVAL

STEP 1. REMOVE SCREWS AND LOCKWASHERS. REMOVE ROCKER ARM ASSEMBLY.

STEP 2. REMOVE PUSH RODS.

INSTALLATION

STEP 1. INSTALL PUSH RODS. BE SURE RODS SEAT IN LIFTERS.

STEP 2. PLACE ROCKER ARM ASSEMBLY IN MOUNTING POSITION AND SECURE WITH SCREWS AND LOCKWASHERS.

A

1. Nut (12)
2. Screw (12)
3. Retaining ring (2)
4. Washer
5. Spring (2)
6. Washer (2)
7. Dowel pin
8. Bracket
9. Bracket (4)
10. Washer (12)
11. Spring (5)
12. Arm assembly (6)
13. Bearing (12)
14. Bracket
15. Dowel pin
16. Arm assembly (6)
17. Shaft
18. Plug (2)
19. Push rod (12)
20. Lifter (12)

Figure 6-26. Rocker arms and push rods, removal and installation (sheet 1 of 2).