DEPARTMENT OF THE ARMY TECHNICAL MANUAL

COMPRESSOR
AIR

TRUCK-MOUNTED
GASOLINE-DRIVEN
210 CFM
LE ROI MODEL
210G1

DEPARTMENT OF THE ARMY *AUGUST 1954*

SAFETY PRECAUTIONS

Do not remove any guards, shields or screens while the compressor is operating. Doing so removes the protection which these items are designed to provide.

Do not lubricate or adjust any assembly or part while the compressor is operating.

Do not play with compressed air. Air at the pressure developed by this compressor can put out eyes, burst ear drums, and cause other serious injuries.

Check safety valves each day to see that they are working properly. An overcharged air receiver has as much destructive force as a small bomb.

TECHNICAL MANUAL

**COMPRESSOR, AIR, TRUCK MOUNTED, GASOLINE DRIVEN,
210 CFM LE ROI MODEL 210G1**

TM 5-5065

CHANGES NO. 2

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *12 August 1963*

TM 5-5065, 11 August 1954, is changed as follows:

Page 3. Paragraph 1.

c. (Added) Report all deficiencies in this manual on DA Form 2028. Submit recommendations for changes, additions, or deletions to the Commanding Officer, U.S. Army Mobility Support Center, ATTN: SMOMS-MM, P.O. Box 119, Columbus 16, Ohio. Direct communication is authorized.

2. Record and Report Forms

(Superseded)

a. DA Form 2258 (Depreservation Guide of Engineer Equipment).

b. for other record and report forms applicable to operator, organizational, field, and depot maintenance, refer to TM 38-750.

Note. Applicable forms, excluding Standard Form 46, which is carried by the operator, shall be kept ion a canvas bag mounted on the equipment.

Page 18. Paragraph 6d(2). Delete “before-operation” and substitute: daily preventive maintenance.
Page 29. Paragraph 30a, line 1. Delete “before-operation” and substitute: daily preventive maintenance
Page 29. Paragraph 30j. Rescinded.
Page 29. Paragraph 31f. Rescinded.
Page 38.

44. General

(Superseded)

To insure that the air compressor is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary Preventive Maintenance Services to be performed are listed and descried in paragraphs 45 and 47. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit shall be noted for future correction,

***This change supersedes TB 5-5065-1, dated 3 February 1954.**

TAGO 256B-Aug. 700-478-63

to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2404 at the earliest possible opportunity.

45. Daily Preventive Maintenance Services
(Superseded)

This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to Figure 16.1 for the Daily Preventive Maintenance Services.

Page 42. Paragraph 47.

47. Quarterly Preventive Maintenance Services
(Superseded)

a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by Organizational Maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months, or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to Figure 16.2 for the Quarterly Preventive Maintenance Services.

Page 254. Paragraph 6. Delete "TB 5-5065-1, Preventive Maintenance Services", and "TM 5-505, Maintenance of Engineer Equipment".

Add: TM 38-750 — The Army Equipment Record System and Procedures.

APPENDIX IV. Page 3. Paragraph 3. (As changed by C 1)

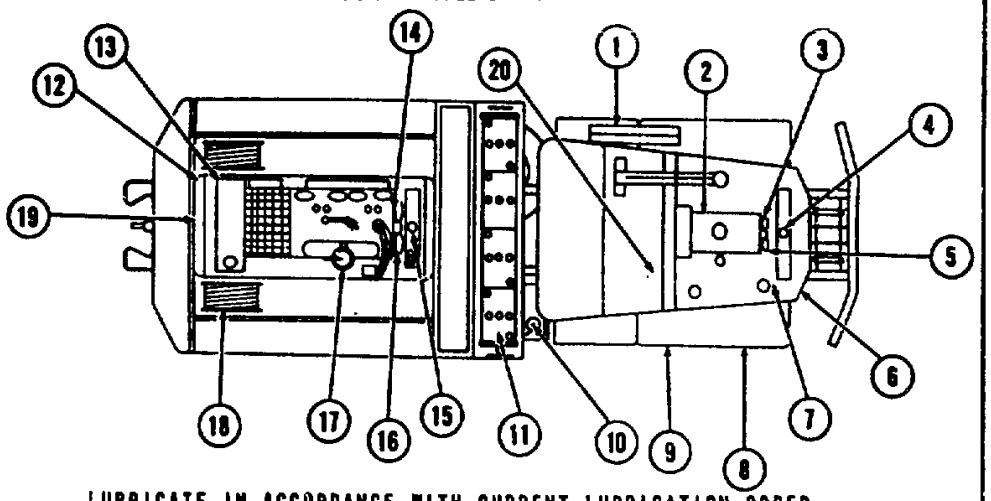
3. Comments and Suggestions
(Superseded)

Suggestions and recommendations for changes to the Basic Issue Items List will be submitted on DA Form 2028 to the Commanding Officer, U.S. Army Mobility Support Center, ATTN: SMOMS-MM, P.O. Box 119, Columbus, Ohio, 48216. Direct communication is authorized.

PREVENTIVE MAINTENANCE SERVICES

DAILY

TM5-5065 — LE ROI MODEL 210 G1 — AIR COMPRESSOR



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR REF
1	AIR RESERVOIRS. Drain condensate.	
2	OIL LEVEL GAGE. Add oil as indicated by level gage. Reference LO9-8022	
3	DRIVE BELTS. Check for worn frayed, or cracked belts.	
4	RADIATOR. Proper coolant level is 2 inches below filler neck	
5	TRUCK COMPRESSOR DRIVE BELT. Check for worn, frayed, or cracked belt.	
6	LIGHTS. Replace burned-out lamps.	
7	AIR COMPRESSOR. Clean and oil air strainer. (Weekly).	
8	TIRES. Check for cut or excessively worn tires. Proper tire highway pressure is 70 psi, crosscountry is 35 psi, and sand, mud, and snow pressure is 15 psi. (Weekly)	
9	TRUCK BATTERIES. Tighten loose cables and mountings. Remove corrosion. Inspect for cracks and leaks. Fill to 3/8 inch above plates. Clean venthole in filler cap before installing. In freezing weather run engine a minimum of 1 hour after adding water. (Weekly)	

Figure 16.1 (Added). Daily preventive maintenance services.

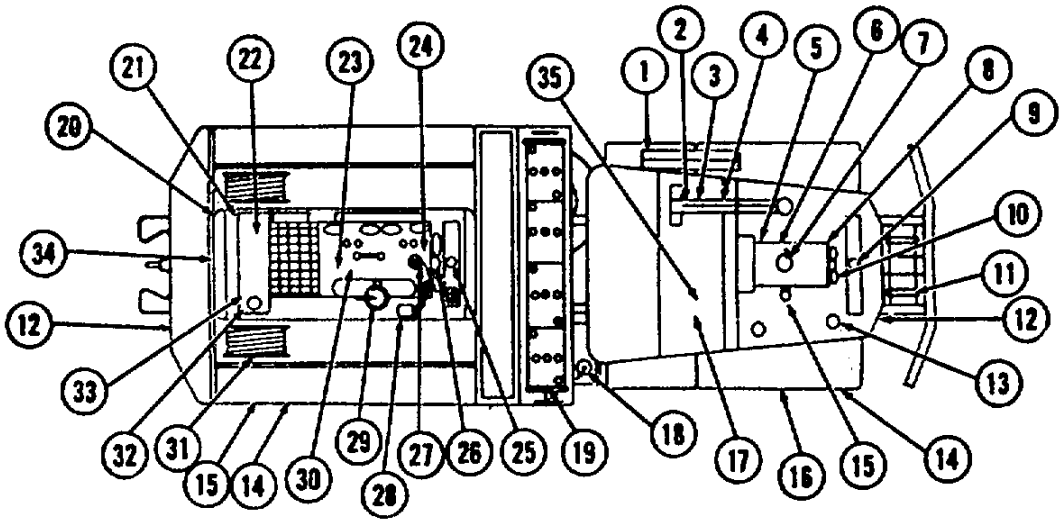
ITEM		PAR REF
10	**TRUCK FUEL TANK**. Add fuel as required	
11	**AIR COMPRESSOR BATTERIES**. Tighten loose cables and mountings. Remove corrosion. Check for cracks and leaks. Fill to 3/8 inch above plates. Clean venthole in filler cap before installing. In freezing weather run engine a minimum of I hour after adding eater. (Weekly)	
12	**FIRE EXTINGUISHER**. Inspect for broken seal.	
13	**AIR COMPRESSOR FUEL TANK**. Add fuel as required.	
14	**FAN BELT**. Check for worn, frayed. or cracked belt.	
15	**AIR COMPRESSOR RADIATOR**. Proper coolant level is 2 inches below filler neck.	
16	**GENERATOR BELT**. Check for worn, frayed. or cracked belt.	
17	**AIR COMPRESSOR OIL LEVEL GAGE**. Add oil as indicated by level gage. Reference current L.O.	
18	**AIR HOSES AND REELS**. Check hoses for worn or frayed conditions. (Weekly)	
19	**AIR COMPRESSOR CONTROLS AND INSTRUMENTS**. Check for damage, with the unit operating, check for proper operation. Normal operating readings for instruments are as follows; Ammeter — Plus side of 0 Air pressure gage — 90 to 100 psi Oil pressure gage — 15 to 100 psi Water temperature gage — 180Q to 215°F	8 28
20	**TRUCK CONTROLS AND INSTRUMENTS**. Check for damage, with the unit operating check for proper operation. Normal operating readings for instruments are as follows: Ammeer — Plus side of 0 Water temperature gage — 160e to 180°F Oil pressure gage — 30 to 40. psi Air pressure gage — 100 to 105 psi Reference T19-8022.	
	NOTE 1. OPERATION During operation observe for any unusual noise or vibration.	
	NOTE 2. FIRE EXTINGUISHER. inspect for broken seal.	
	NOTE 3. AIR SYSTEM ODRAINCOCKS. Drain condensate.	
		MSC 5065/16.1

Figure 16.1. Continued.

PREVENTIVE MAINTENANCE SERVICES

QUARTERLY

TM5-5085 — LE ROI MODEL 210 G1 — AIR COMPRESSOR



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR REF
1	AIR RESERVOIRS. Drain condensate Tighten loose mountings and connections. Replace defective reservoirs. Reference TM9-8022.	
2	STEERING. Tighten loose mountings. Add oil as indicated by level plug. Reference LO9-8022.	
3	CLUTCH. Proper clutch pedal free travel is 1 1/4 to 1 1/2 inches. Reference TM9-8022.	
4	BRAKES. Adjust service and emergency brakes if necessary. Tighten loose connections. Replace defective parts. Reference TM9-8022.	
5	OIL LEVEL GAGE. Add oil as indicated by level gage. Reference LO9-8022.	
6	DISTRIBUTOR. Replace pitted or burned points. Proper point gap adjustment is 0.022 inch. Reference TM9-8022.	
7	SPARK PLUGS AND WIRING. Replace spark plugs that have cracked insulators and burned electrodes. Clean and set spark plug gaps for 0.030 inch. Torque spark plugs to 25-28 ft.lb. Replace leads which are frayed or broken. Clean and tighten lead connections. Reference TM9-8022.	

Figure 16.2 (Added). Quarterly preventive maintenance services.

ITEM		PAR REF
8	**DRIVE BELTS**. Proper adjustment is a deflection of 1/2 inch midway between crankshaft pulley and fan pulley. Replace worn, frayed or cracked belts. Reference TM9-8022.	
9	**RADIATOR**. Proper coolant level is 2 inches below filler neck Tighten loose mounting and connections. Replace a defective radiator. Replace frayed or cracked hose. Remove obstructions in the air passages. Reference TM9-8022	
10	**TRUCK COMPRESSOR DRIVE BELT**. Proper adjustment is a deflection of 1/2 inch midway between crankshaft pulley and compressor pulley. Replace worn, frayed, or cracked belt. Reference TM9-022.	
11	**WINCH AND CABLE.** Tighten loose mounting. Replace worn or frayed cable. Reference TM9-8022. Add oil as indicated by level plug Reference LO-8022.	
12	**LIGHTS AND REFLECTORS**. Replace burned-out lamps. Replace defective lights and reflectors. Reference TM9-8022.	
13	**AIR COMPRESSOR**. Clean and oil air strainer. Tighten loose mounting and connections. Reference TM9 8022.	
14	**TIRES AND WHEELS**. Replace cut or excessively worn tires. Proper tire highway pressure is 70 psi, cross country is 35 psi. and in mud, snow, and sand is 15 psi. Replace damaged wheel. Reference TM9-8022.	
15	**DIFFERENTIALS.** Check for leaks and damage. Add oil as indicated at level plug Reference L09-8022.	
16	**TRUCK BATTERIES**. Tighten loose cables and mountings. Remove corrosion. Fill to 3/8 inch above plates. Clean venthole in filler cap. In freezing weather run engine minimum of 1 hour after adding water. Replace a cracked or leaking battery. Reference TM9-8022.	
17	**TRANSMISSION AND TRANSFER CASE**. Check for leaks and damage. Add oil as indicated by level plugs. Reference L09-8022.	
18	**TRUCK FUEL TANK**. Add fuel as required. Tighten loose mounting. Replace a leaking fuel tank. Replace defective cap gasket. Clean clogged vent. Reference TM9-8022.	
19	**AIR COMPRESSOR BATTERIES**, Tighten loose cables end mounting. Remove corrosion. Fill to 3/8 inch above plates. Clean venthole in filler cap before installing. In freezing weather run engine minimum of 1 hour after adding eater. Replace a cracked or leaking battery	90
20	**FIRE EXTINGUISHER**. Inspect for broken seal. Inspect for full charge by shaking for sound and weight.	33
1	**AIR COMPRESSOR FUEL TANK**. Add fuel as required. Replace a leaking fuel tank Replace a defective cap gasket. Clean cap vent. Clean fuel screen.	73

Figure 16.2--Continued

ITEM		PAR REF
22	**AFTERCOOLER**. Clean clogged air passages. Tighten loose mounting. Replace defective aftercooler.	117
23	**UNLOADED PILOT**. Adjust if necessary. Proper adjustment is to load at 90 psi and to unload at 100 psi. Replace detective unloader pilot.	107 108
24	**FAN BELT**. Proper adjustment is a deflection of 3/4 to 1 inch midway between crankshaft pulley and fan pulley. Replace worn, frayed or cracked belt.	85
25	**AIR COMPRESSOR RADIATOR**. Proper coolant level is 2 inches below filler neck. Tighten loose mounting and connections. Replace a defective radiator. Replace frayed or cracked hose. Remove obstructions in the air passages. Correct cap pressure rating is 3 1/4 to 4 1/4 lb.	88
26	**GENERATOR BELT**. Proper adjustment is a deflection of 1/2 inch midway between fan pulley and crankshaft pulley Replace worn, frayed, or cracked belt.	92
27	**AIR COMPRESSOR DISTRIBUTOR**. Replace pitted or burned points. Proper point gap adjustment is 0.020 inch.	95
28	**FUEL BOWL**. Drain sediment. Replace defective fuel pump.	75
29	**AIR COMPRESSOR OIL LEVEL GAGE**.. Add oil as indicated by level gage. Reference L05-5065	
30	**SPARK PLUGS AND WIRING**. Replace spark plugs that have cracked insulators and burned electrodes. Clean and set spark plug gaps for 0.023 to 0.028 inch. Torque spark plugs to 30 ft-lb. Replace leads which are frayed or broken. Clean and tighten lead connections.	96
31	**AIR HOSES**. Replace worn or frayed hoses.	112
32	**SAFETY VALVE**. Proper setting for safety valve is 120 to 125 psi. Replace a defective valve.	114
33	**AIR RECEIVER**. Check for leaks and damage. Replace defective service valves and piping.	114
34	**AIR COMPRESSOR CONTROLS AND INSTRUMENTS**. Tighten loose mounting.	
Replace	102 defective instruments. With the unit operating check for proper operation. Normal operating readings for instruments are as follows: Ammeter — Plus side of 0 Air pressure gage — 90 to 100 psi Oil pressure gage — 15 to 100 psi Water temperature gage — 180. to 215°F	

Figure 16.2. -Continued

ITEM		PAR REF
35	**TRUCK CONTROLS AND INSTRUMENTS**. Tighten loose Mounting. Replace defective instruments. With the unit operating check for proper operation. Normal operating readings for instruments are as follows: Ammeter — Plus side of 0 water temperature gage — 160° to 180F Oil pressure gage — 30 to 40 psi Air pressure gage — 100 to 105 psi Reference TM9-B022	
	NOTE 1. OPERATIONAL TEST. During operation observe for any unusual noise or vibration.	
	NOTE 2. ADJUSTMENTS. Make ill necessary adjustments during operational test.	
	NOTE 3. FIRE EXTINGUISHER. Inspect for broken seal. Inspect for condition, full charge, proper working condition. Weigh the fire extinguisher (CO2) and subtract from this weight the empty weight (stamped on the valve body). It the resulting net weight (stamped on the extinguisher) has decreased 10S or lore, the cylinder should be replaced or recharged.	
	NOTE 4. AIR SYSTEM DRAINCOCKS. Drain condensate.	
		MSC 5065/16.2

Figure 16.2-Continued.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

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5-5	5-147
5-6	5-155
5-7	5-156
5-15	5-157
5-16	5-177
5-17	5-225
5-25	5-226
5-26	5-227
5-27	5-237 (5)
5-35	5-262 (5)
5-36	5-267 (1)
5-37	5-278 (5)
5-38	5-279
5-45	5-600
5-46	5-625
5-47	5-626
5-48	5-627
5 -4	7-100
5-78	11-25
5-96	11-27
5-97	17-100
5-115	29-52 (1)
5-117	29-56
5-118	29-57
5-127	37-100
5-129	39-51
5-137	39-61
5-145	57-100
5-146	

NG: State AG (3).
USAR: Same a Active Army except allowance is one copy to each unit.
For explanation of abbreviations used see AR 82050.

TAGO 256B

* U.S. GOVERNMENT PRINTING OFFICE : 1984 O - 421-647 (10408)

TECHNICAL MANUAL

COMPRESSOR, AIR, TRUCK MOUNTED, GASOLINE DRIVEN, 210 CFM LE ROI MODEL 210G1

TM 5-5065
CHANGES No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *28 August 1961*

TM 5-5065, 11 August 1954, is changed as follows:

APPENDIX IV (Added)
BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

Section II lists the accessories, tools, and publications required in 1st echelon maintenance and operation, initially issued with, or authorized for the air compressor.

2. Explanation of Columns

a. Source Codes. The information provided in each column is as follows;

(1) *Technical services*. The basic number of the Technical service assigned supply responsibility for the item is shown. Those spaces with no number shown are Corps of Engineers supply responsibility. Other technical service basic numbers are-
10—Quartermaster Corps
12—Adjutant General's Corps

(2) *Source*. The selection status and method of supply are indicated by the following code symbols:
(a) P—applied to repair parts which are high mortality parts; procured by technical services, stocked in and supplied from the technical service depot system; and authorized for use at indicated maintenance echelons.
(b) P1—applied to repair parts which are low mortality parts; procured by technical services, stocked only in and supplied from technical service key depots, and authorized for installation at indicated maintenance echelons.

(3) *Maintenance*. The lowest maintenance echelon authorized to use, stock, install, or manufacture the part is indicated by the following code symbol:
O—Organizational Maintenance (1st and 2nd Echelons)

b. federal Stock Numbers. When a Federal stock number is available for a part, it will be shown in this column, and used for requisitioning purposes.

c. Description.

(1) The item name and a brief description of the part are shown.

(2) A five-digit Federal supply code for manufacturers and/or other technical services is shown in parentheses followed by the manufacture's part number. This number will be used for requisitioning purposes when no Federal stock number is indicated in the Federal stock number column.
Example: (08645) 86453.

(3) The letters GE, shown in parentheses immediately following the description, indicate General Engineer supply responsibility for the part.

d. Unit of Issue. Where no abbreviation is shown in this column, the unit of issue is "each."

e. Expendability. Those items classified as nonexpendable are indicated by letters NX are expendable.

f. Quantity Authorized. This column lists the quantities of repair parts, accessories, tools, or publications authorized for issue to the equipment operator or crew as required.

g. Quantity Issued With Equipment. This column lists the quantities of repair parts, accessories, tools, or publications that are initially issued with each item of equipment. Those indicated by an asterisk are to be requisitioned through normal supply channels as required.

h. Illustrations. This column is subdivided into two columns which provide the following information:

(1) figure Number. Provides the referenced number for the part shown in the illustration.

(2) Item number. Provides the referenced number for the part shown in the illustration.

3. Comments and Suggestions

Suggestions and recommendations for changes to the basic issue items list will be submitted on DA Form 2028 to the Commanding General, U.S. Army Engineer Maintenance Center, ATTN: EMCM, Corps of Engineers, P.O. Box 119, Columbus 16, Ohio. Direct communication is authorized.

Section II. BASIC ISSUE ITEMS LIST

Source codes				Federal stock No.	Description	Unit of issue	Expendability	Quantity authorized	Quantity issued with equipment	Illustration	
Technical service	Source	Maintenance	Recoverability							Fig. No.	Item No.
					GROUP 26-ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT AND TOOLS						
					2602.1-ACCESSORIES						
10	P	O	----------	7520-559-9618	CASE, MAINTENANCE AND OPERATIONAL MANUALS: cotton-duck, water repellent, mildew resistant.	--------	----------	1	1		
					2602.2-COMMON TOOLS						
10	P	O	----------	5120-204-0972	KEY SET, SOCKET HEAD SCREW			1	(*)		
10	P	O	----------	5120-277-9491	SCREWDRIVER FLAT TIP: wood handle flared tip, 1/4 in. w, 4 in. lg blade.			1	(*)		
10	P	O	----------	5120-240-5328	WRENCH, OPEN END, ADJUSTABLE: single head, 15/16 in. jaw opening, 8 in. lg.			1	(*)		
					2602.4-PUBLICATIONS						
12					DEPARTMENT OF THE ARMY LUBRICATION ORDER LO 5-5065.			1	1		
12					DEPARTMENT OF THE ARMY OPERATOR, ORORGANIZATIONAL MAINTENANCE REPAIR PARTS AND SPECIAL TOOL LISTS TM 5-4310-238-20P.			2	2		

12					DEPARTMENT OF THE ARMY TECHNICAL BULLETIN TB 5-5065-1.			2	2	
12					DEPARTMENT OF THE ARMY TECHNICAL MANUAL TM 5-5065.			2	2	
					GROUP 76-FIRE FIGHTING EQUIPMENT					
					7603-FIRE EXTINGUISHERS					
	P1	O		4210-288-8269	EXTINGUISHER, FIRE VAPORIZING LIQUID: ¼ gal capacity; w/wall bracket (GE).			See	note.	
	P1	O		4210-555-8837	EXTINGUIISHER, FIRE MONOBROMOTRIFLUOROMETHANE: charged, hand shatterable cylinder, penetrating seal valve, stored pressure, w/bracket, 2.75 lb (HALON-1301) MIL SPEC E-52031 (GE).			1	1	
					Note: **Requisition CTC/CO_2 extinguishers until t**					
					Depot stocks are exhausted					

APPENDIX V (Added)

MAINTENANCE ALLOCATION CHART

1. General

The maintenance allocation chart lists all maintenance and repair operations for the various echelons.

2. Maintenance

Maintenance is any action taken to keep material in a serviceable condition or to restore it to serviceability when it is unserviceable. Maintenance of materiel includes the following;

a. Service. To clean, to preserve, and to replenish fuel and lubricants.
b. Adjust. To regulate periodically to prevent malfunction.
c. Inspect. To verify serviceability and to detect incipient mechanical failure by scrutiny.
d. Test. To verify serviceability and to detect incipient mechanical failure by use of special equipment such as gages, meters, and other test devices.
e. Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.
f. Repair To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.
g. Overhaul. To restore an item to completely serviceable condition as prescribed by serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of “Inspect and repair only as necessary” (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

3. Explanation of columns

a. Functional Group. The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes are taken from the Corps of Engineers functional grouping indexes, and appear on the maintenance allocation chart in their correct numerical sequence. These indexes are normally set up according to their proximity to each other and their function.

b. Component and Related Operation. This column contains the functional index grouping heading, subgroup headings, -and a brief description of the part starting with the noun name It also designates the operation to be performed such as service, adjust, inspect, test. replace, repair, and overhaul.

c. Echelon Maintenance.

(1) *First echelon* First echelon maintenance is that maintenance performed by the user or operator of the equipment, such as servicing, cleaning, lubricating, and limited adjustments. It also includes removal and replacement of items to accomplish servicing and lubricating.

(2) *Second echelon* Second echelon maintenance is that maintenance performed by trained personnel provided for that purpose in the using organization, such as replacement of all items in column 2, limited parts fabrication from bulk material, adjustments, and repair of assemblies, components, and end items that can be accomplished without extensive disassembly.

(3) *Third echelon* Third echelon maintenance is that maintenance performed by specially trained units in direct support of the using organization, such as replacement of all items in columns 2 and 3, repair assemblies, components, and end items, and fabricate parts from bulk material.

(4) *Fourth echelon*. Fourth echelon maintenance is that maintenance performed by units organized as semifixed or permanent shops to serve lower echelon maintenance within a geographical area, such as replacement of items in columns 2, 3, and 4, repair end items, overhaul assemblies, components, and fabricate general use common hardware and parts.

(5) *Fifth echelon*. Fifth echelon maintenance is that maintenance authorized to overhaul assemblies, components, end items, and replacement of all parts in columns 2, 3, 4, and 5 d. Symbol X The symbol X in the appropriate column indicates the lowest echelon responsible for performing that particular maintenance operation, but does not necessarily indicates repair parts will be stocked at that level e. Remarks. The remarks column is used to explain why maintenance, that would normally be done at a lower echelon, is moved to a higher echelon because of some peculiarity in the construction of the end item

d. Symbol X. The symbol X in the appropriate column indicates the lowest echelon responsible for performing that particular maintenance operation, but does not necessarily indicates repair parts will be stocked at that level.

e. Remarks. The remarks column is used to explain why maintenance, that would normally be done at a lower echelon, is moved to a higher echelon because of some peculiarity in the construction of the end item.

Function group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
01	ENGINE.						
0100	Engine Assembly.						
	Engine Assembly:						
	Service	X					
	Inspect	X					
	Test		X				Compression.
	Replace			X			
	Repair			X			
	Overhaul				X		
0101	Crankcase, Block, Cylinder Head						
	Head, Cylinder.						
	Replace		X				
	Gasket, cylinder head						
	Replace		X				
	Sleeve, cylinder'						
	Replace			X			
0102	Crankshaft.						
	Bearings						
	Replace			X			
	Crankshaft						
	Replace			X			
	Repair				X		Metalize, resize, aline, etc.
	Seals:						
	Replace			X			
0103	Flywheel Assembly						

	Flywheel assembly:					
	Repair			X		Ring gear.
0104	Pistons, Connecting Rods.					
	Piston assembly:					
	Replace			X		
	Repair			X		
	Rod assembly:					
	Replace			X		
	Repair			X		
0105.1	Valves.					
	Guides, springs:					
	Replace		X			
	Valves, seats:					
	Replace		X			
	Repair		X			Reface.
0105.2	Rocker Arms, Tappets.					
	Gasket:					
	Replace	X				
	Rocker Arms:					
	Adjust	X				
	Replace		X			
	Repair		X			
0105.3	Camshafts.					
	Bearings:					
	Replace			X		
	Camshaft:					
	Replace			X		
0105.5	Timing Gears.					
	Seal:					
	Replace			X		
	Gears, Timing					
	Replace			X		

Function group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
0106.1	Oil Pump.						
	Pump assembly:						
	Replace----------			X			
	Repair----------			X			
0106.2	Oil Filters.						
	Filter, engine oil elements:						
	Replace----------		X				
0106.5	Crankcase Ventilation.						
	Breather assembly, engine:						
	Service----------	X					
	Replace----------		X				
0106.6	Oil Pan, Lines, Level Gage.						
	Lines, (external):						
	Replace ----------		X	----------			Fabricate.
0108	Manifolds.						
	Gaskets:						
	Replace----------		X				
0109.1	Accessory Drive.						
	Gears:						
	Replace .----------		----------		X		
	Bushings:						
	Replace ..----------		----------	--------	X		
03	FUEL SYSTEM.						
0301	Carburetor.						
	Carburetor assembly:						
	Service----------	X					
	Adjust ----------		X				

	Replace		X				
	Repair			X			Install kit.
0302.4	Fuel Pump, Gasoline.						
	Pump assembly, fuel:						
	Service	X					Clean bowl.
	Replace		X				
0304	Air Cleaner.						
	Cleaner, air, engine:						
	Service	X					Clean element.
	Gaskets, cover, air cleaner:						
	Replace	X					
0306	Tanks, Lines, Fittings.						
	Tank, fuel:						
	Service	X					
	Repair			X			
	Line assembly:						
	Replace		X				Fabricate.
3008	Engine Speed Governor.						
	Governor assembly:						
	Adjust	X					
	Replace	X					
	Repair				X		
0308 .4	Governor Controls.						
	Rod assembly:						
	Replace		X				
0312	Accelerator, Throttle, or Choke Controls.						
	Choke control:						
	Replace		X				
04	EXHAUST SYSTEM.						
0401	Muffler and Pipes.						
	Cap, exhaust pipe:						
	Replace		X				

Function group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
05	COOLING SYSTEM.						
0501	Radiator.						
	Radiator, engine cooling:						
	Service	X					
	Repair			X			
	Cap, radiator:						
	Replace .	X					
	Shutter assembly:						
	Repair			X			
	Cylinder, control, air:						
	Replace		X				
	Repair			X			
	Filter assembly, radiator shutter:						
	Service	X					
	Replace		X				
	Repair			X			
	Shutterstat:						
	Replace		X				
	Repair			X			
0503	Lines and Fittings, Hoses, Pipes, Clamps.						
	Hoses:						
	Replace		X				
	Lines:						
	Replace		X				Fabricate.
0504	Water Pump.						
	Pump assembly:						
	Replace		X				

	Repair		X			
0505	Fan Assembly.					
	Fan, engine, cooling:					
	Replace		X			
	Guard, fan:					
	Replace	X				
06	ELECTRICAL SYSTEM (ENGINE AND VEHICULAR).					
0601	Generator.					
	Generator assembly:					
	Service	X				
	Test	X				
	Replace	X				
	Repair		X			Install kit.
	Belt, V:					
	Adjust	X				
	Replace		X			
0602	Generator Regulator.					
	Regulator, engine generator:					
	Test	X				
	Adjust	X				
	Replace	X				
0603	Starter.					
	Starter, engine, electrical:					
	Service	X				
	Test	X				
	Replace	X				
	Repair		X			Install kit.
	Solenoid relay:					
	Replace	X				
	Leads:					
	Replace	X				Fabricate.

Function group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
0604.1	Distributor.						
	Distributor assembly:						
	Service		X				
	Adjust		X				
	Replace		X				
	Repair			X			Install kit.
0604.6	Ignition Coil: Wiring, Spark Plugs.						
	Coil assembly:						
	Replace			X			
	Plugs, spark:						
	Service		X				
	Adjust		X				
	Replace		X				
	Wiring:						
	Replace		X				
0607	Instrument or Engine Control Panel.						
	Ammeter:						
	Replace		X				
	Meter, time totalizing, electric:						
	Replace		X				
	Switches:						
	Replace		X				
	Light assembly:						
	Replace		X				
	Bulbs:						
	Replace	X					

	Leads:						
	Replace			X			Fabricate.
0612	Batteries.						
	Battery, storage:						
	Service .		X				
	Test			X			
	Replace		X				
	Leads:						
	Replace			X			
0615	Radio Suppression.						
	Strap, bonding:						
	Replace			X			
	Capacitor:						
	Replace			X			
15	FRAME.						
1501	Frame Assembly.						
	Frame, compressor:						
	Replace					X	
17	BODY; CAB; HOOD; HULL.						
1701.1	Fenders, Sand Shields, Running Boards.						
	Running board:						
	Replace				X		
1703	Doors; Hatches; Hood.						
	Door, hood, top:						
	Replace			X			
1708	Stowage Racks, Boxes, Straps.						
	Box, tool:						
	Re			X			
	Brackets:						
	Replace			X			
	Supports:						
	Replace			X			

Function group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
22	MISCELLANEOUS BODY, CHASSIS OR HULL AND ACCESSORY						
2210	Data Plates and Instruction Holders.						
	Plates, instruction:						
	Replace----------		X				
	Plates, identification (C.O.E.):						
	Replace ----------			X			
47	GAGES (NONELECTRICAL); WEIGHING AND MEASURING DEVICES.						
4701.2	Tachometers.						
	Drive assembly, tachometer:						
	Replace----------		X				
	Repair----------			X			
4703.1	Oil Pressure Gages.						
	Gage, oil pressure:						
	Replace----------		X				
	Line:						
	Replace----------		X	----------			Fabricate.
4705	Fuel Gages (Quantity).						
	Gage, fuel level:						
	Replace---------- ----------		X				
4708	Temperature Gages.						
	Thermometer, indicating:						
	Replace----------		X				
4709	Pressure Gages.						
	Gages, air pressure:						
	Replace----------		X				
	Line assembly:						
	Replace .----------		X	----------			Fabricate.

50	PNEUMATIC EQUIPMENT.						
5000	Air Compressor Assembly.						
	Gasket and seal kit:						
	Replace			X			
5001	Crankcase, Block, Cylinder Head.						
	Gasket, head:						
	Replace		X				
5005.1	Valves, Springs, Seats, Guides.						
	Valve assembly, compressor:						
	Replace		X				
	Repair			X			
	Gaskets:						
	Replace		X				
	Seats:						
	Replace			X			
5008	Air Intake.						
	Air cleaner:						
	Service	X					
	Gaskets:						
	Replace		X				
5009.1	Unloader Pilot.						
	Valve, relief, unloader pilot:						
	Replace		X				
	Repair			X			
	Lines:						
	Replace		X				Fabricate.
5009.3	Unloader Valves; Compressor Intake.						
	Valve, check and bleeder:						
	Replace		X				
	Lines:						
	Replace		X				Fabricate.

Function group	Components and related operation	Echelons of maintenance 1	2	3	4	5	Remarks
5009.5	Filters, Traps, Cleaners, and Strainers.						
	Air cleaner, control line:						
	Service----------	X					
	Replace ----------		X				
5009.6	Lines and Fittings.						
	Lines:						
	Replace .----------		X	----------			Fabricate.
5010	Compressor Cooling.						
	Aftercooler, pressure tank:						
	Replace----------			X			
5012	Throttling Devices.						
	Slowdown assembly:						
	Replace ----------		X				
	Repair X----------			X			
5013	Hose Reel.						
	Reel, hose:						
	Replace ----------		X				
	Adapter, air hose:						
	Replace----------		X				
5014	Air Receiver.						
	Receiver, air:						
	Service----------	X					
5015.1	Discharge Lines, Fittings, Manifolds.						
	Hose, rubber, air:						
	Replace----------	X					
	Repair----------X			----------			Fabricate.

76 7603	FIRE FIGHTING EQUIPMENT. Fire Extinguishers. Extinguisher, fire: Replace ----------	X					

BY ORDER OF THE SECRETARY OF THE, ARMY:

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General, United States Army.
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
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NG: State AG (3).
USAR: Same as Active Army except allowance is one copy to each unit.
For explanation of abbreviations used, see AR 320-50.

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Technical Manual
No. 5-5065

DEPARTMENT OF THE ARMY
Washington 25, D. C., *11 August, 1954*

COMPRESSOR, AIR, TRUCK MOUNTED, GASOLINE DRIVEN, 210 CFM LE ROI Model 210GI

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. This manual is for the use of personnel to whom this air compressor is issued, and contains information on the operation, organizational maintenance, and field and depot maintenance of the compressor as well as a description of the major units and their functions in relation to other components of the materiel. It applies only to the Le Roi Model 210G1 *compressor.*

b. Supply manuals, technical manuals and other publications applicable to the equipment covered by this manual are listed in Appendix I. Appendix II tabulates the replaceable parts available for the equipment. Appendix III lists the tools and spare parts issued with and carried on or with the equipment.

2. Record and Report Forms

Maintenance record forms listed and described in the following subdivisions will be used in the maintenance of this equipment.

a. DD Form 110, Vehicle and Equipment Operational Record. This form is used by equipment operators for reporting the accomplishment of daily preventive maintenance services, and for reporting any equipment deficiencies observed during operation.

b. Standard Form 91, Operator's Report of Motor Vehicle Accident. One copy of this form is kept with the equipment at all times. In case of an accident resulting in injury or property damage, Form No. 91 is filled out immediately (or as promptly thereafter as is practical) by the operator.

c. DA Form 464, Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment. This form is used by personnel of the using organization and higher echelons for reporting the results of preventive maintenance services and technical inspections.

d. DA Form 460, Preventive Maintenance Roster. This form is used for scheduling preventive maintenance services at prescribed intervals.

e. DA Form 478, MWO and Major Unit Assembly Replacement Record-Organizational Equipment File. Major repairs or rebuilding, replacement of major unit assemblies, and accomplishment of equipment modifications are recorded on this form.

f. DA Form 468, Unsatisfactory Equipment Report. This form is used for reporting manufacturing, design, or operational defects in the materiel, with a view to correcting such defects; it is also used for recommending modifications of the materiel. Form 468 is not used for reporting failures, isolated materiel defects, or malfunctions of materiel resulting from fair wear and tear or accidental damage. Form 468 is not used to report issue of parts and equipment, or for reporting replacements and/or repairs.

g. DD Form 6, Report of Damaged or Improper Shipment. This form is used for reporting damages incurred in shipment.

h. DA Form 9-81, Exchange Part or Unit Identification Tag. This form is used to accomplish the direct exchange of unserviceable parts for serviceable parts.

i. DA Form 811, Work Request and Job Order. This form is used to request work done by higher echelon organizations.

j. DA Form 867, Status of Modification Work Order. This form is used to maintain records of all modification work performed on equipment.

k. DA Form 5-13. Spot Check Inspection Report of Organizational Maintenance of Engineer Equipment. Organizations having engineer field maintenance responsibility use this form for reporting the results of semiannual spot check inspections.

l. DA Form 5-14. Annual Technical Inspection Report of Engineer Equipment. Organizations having engineer field maintenance responsibility use this form for reporting the results of annual technical inspections.

Section II. DESCRIPTION AND DATA

3. Description

a. General Information. The Le Roi truck-mounted air compressor Model 210G1 (fig. 1) is a self-contained unit complete with all controls, switches and indicators necessary for normal operation. The engine-compressor is completely inclosed in a sheet metal housing (fig. 2). Doors in the housing (fig. 1) provide access to all parts of the engine, compressor, and instrument panel. A weather cap mounted on the engine exhaust pipe prevents the entrance of moisture into the engine. The basic engine-compressor is set in a steel frame with neoprene vibration dampers to alleviate vibrations. The entire unit is mounted on a 2 1/2-ton, 6 x 6 truck. Hose reels (fig. 3), valves, and instruction plates are located at the rear of the compressor.

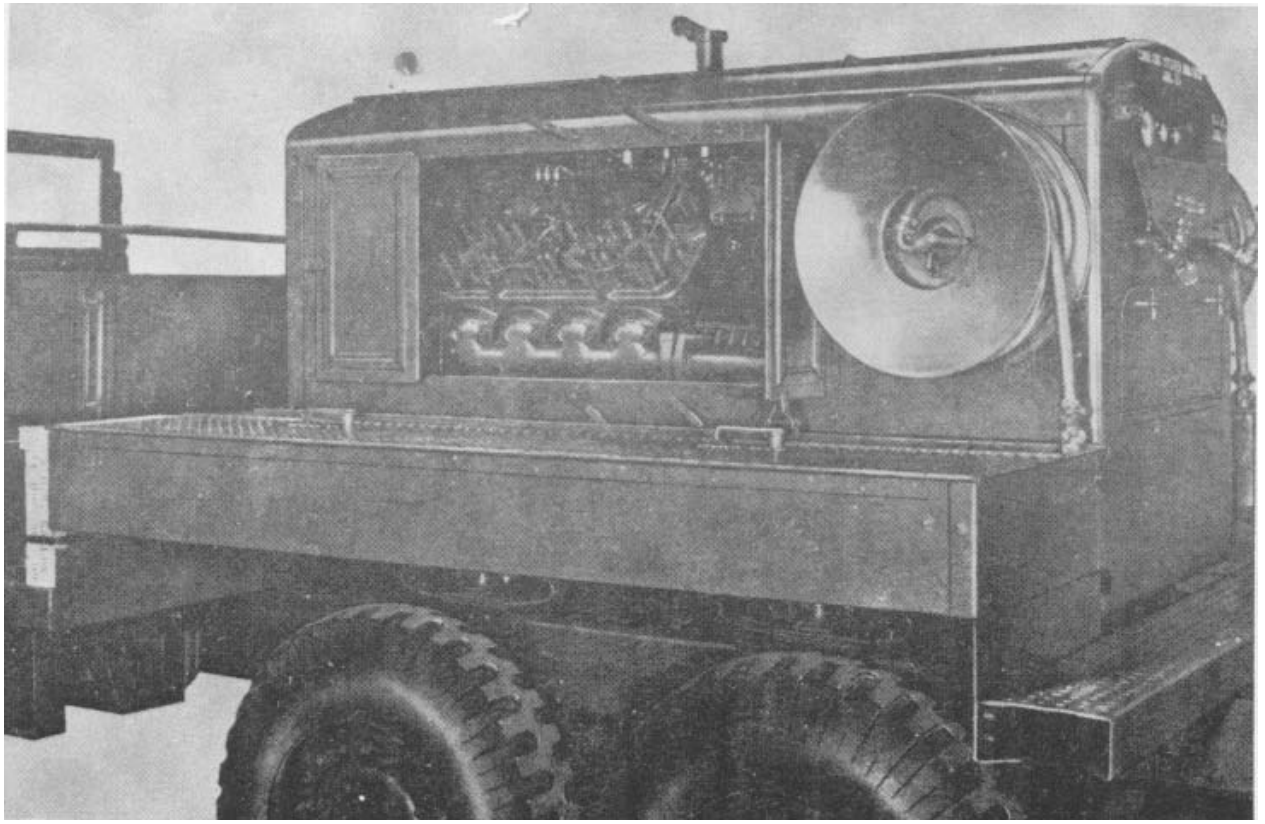


Figure 1. Air component mounted on truck.

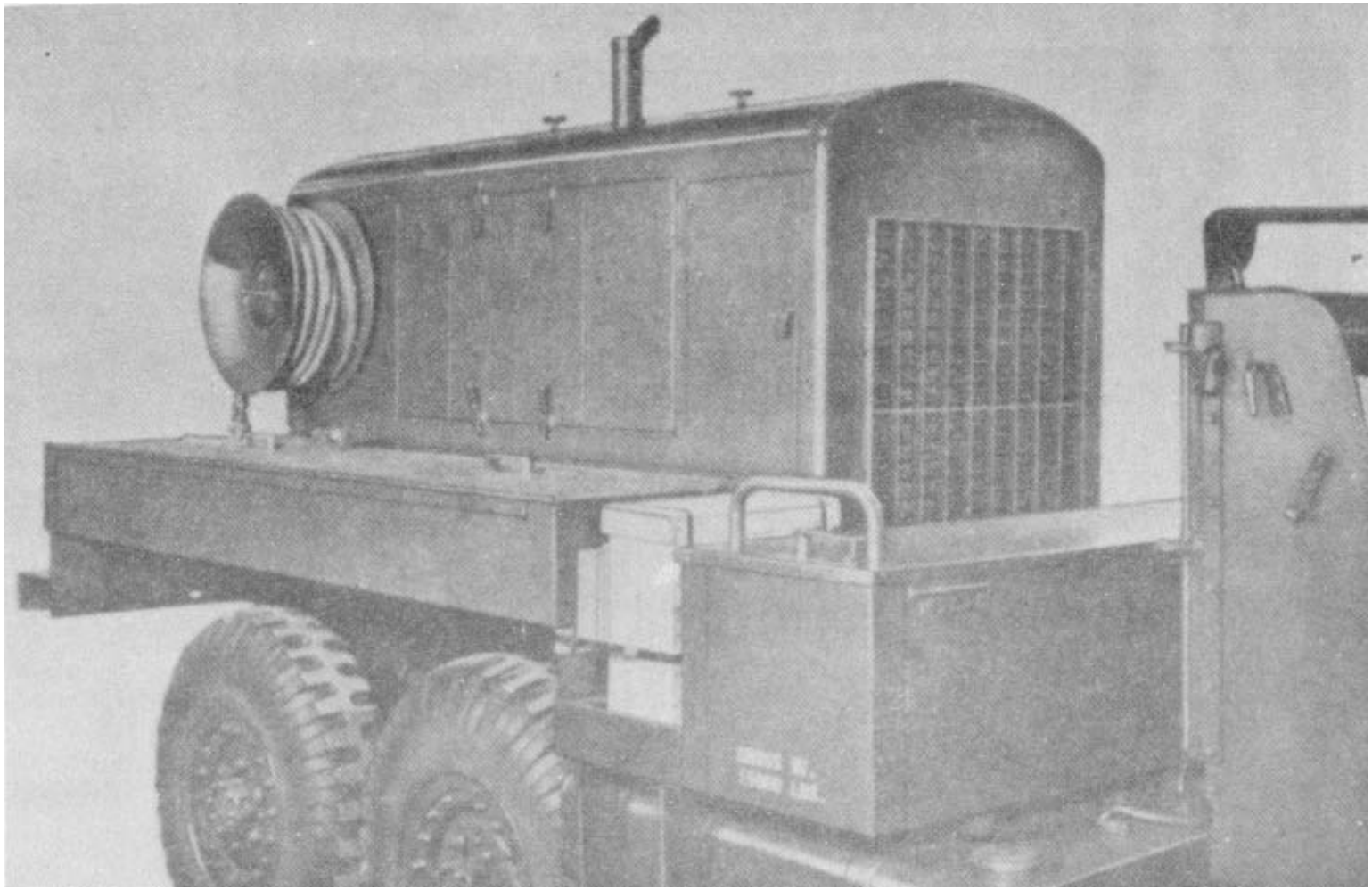


Figure 2. 3/4 left-front view of air compressor.

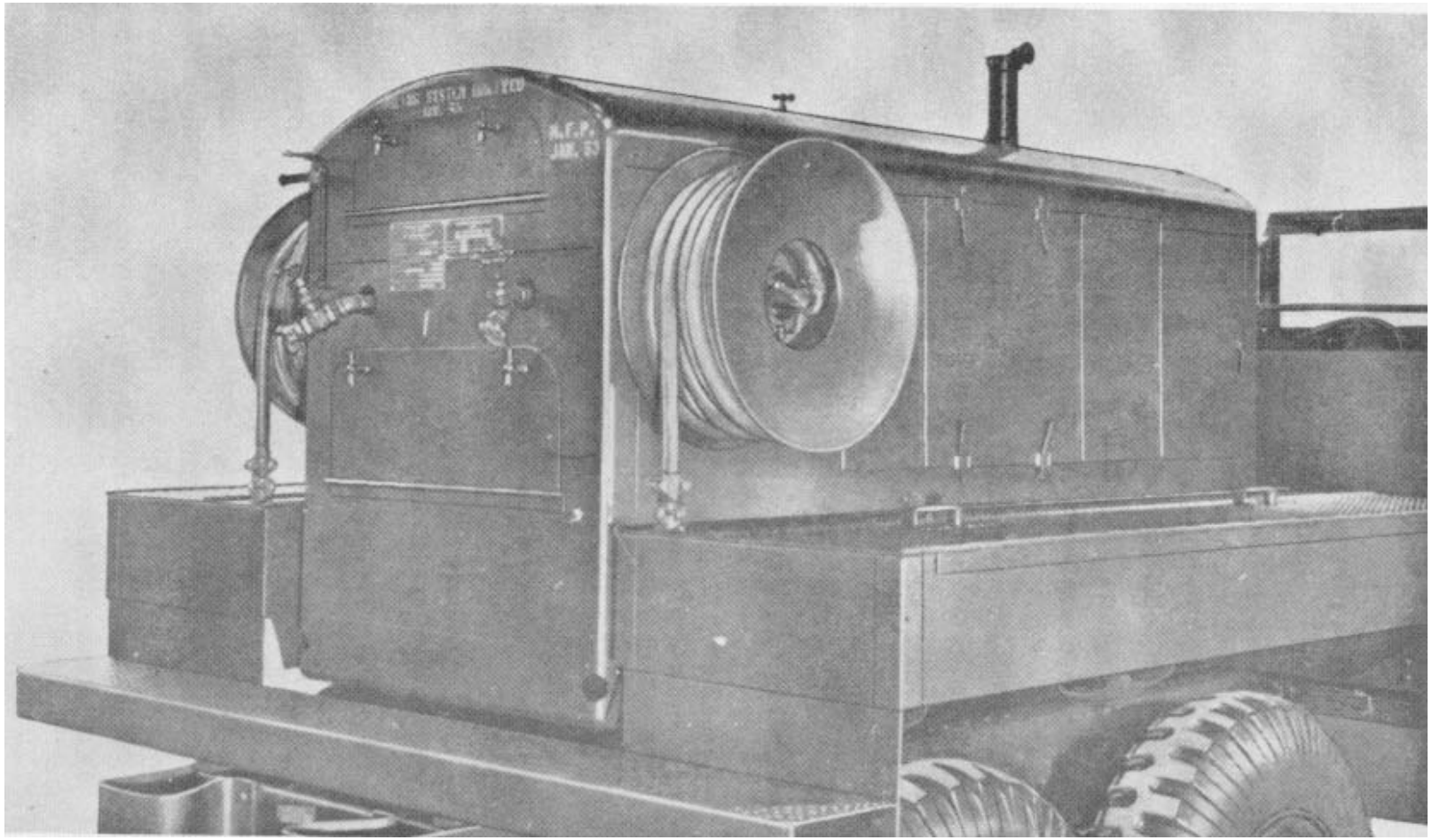


Figure 3. 3/4 right-rear view of air compressor.

b. Engine-Compressor.

(1) The basic engine-compressor is a four-piston engine and a four-piston compressor. All eight pistons are connected to a single crankshaft in the V-type crankcase. Power from the engine bank is transmitted through the crankshaft to compress air in the compressor bank.

(2) The crankshaft is-mounted in five main bearings. Drilled holes from each main bearing journal to the adjacent half of the crankpins permit oil to pass from the main bearings to the connecting rod bearings.

(3) Full pressure lubrication is supplied by a gear type pump mounted on the front main bearing cap. The accessory drive, rocker arms, and all main bearings are lubricated and no other lubrication needs to be supplied to the internal parts of the engine or compressor banks. The lubricating oil supply is filled through the combination oil-fillercap and crankcase breather located in the engine bank saluter head cover. Two bypass filters in the oil pan keep the lubricating oil clean.

(4) The ignition and electric starting system has been radio suppressed to prevent noise disturbances which would interfere with proper reception of radio signals or which would permit detection of the compressor location by receivers.

(5) The engine bank has four wet-sleeve type cylinders of 499 cubic inch displacement with a valve-in-head designed for maximum fuel economy and low operating costs. Both exhaust and intake valves are stellite-faced and each have stellite-faced inserts with positive-type valve rotators to increase valve life.

(6) The compressor bank also has four wet-sleeve type cylinders. Above each cylinder, in the compressor cylinder head, is a compressor valve assembly. Free air is admitted through the dry-type air cleaners and the intake valve part of the assembly by the action of the piston on its downward stroke. As the piston moves up from bottom dead center the suction valve is closed. When the pressure in the' cylinder rises slightly above that in the discharge manifold, the discharge valve port will open allowing air in the cylinder to flow into the compressor discharge manifold. The valve assembly is connected to an automatic operating pressure control system.

c. Pressure Control System.

(1) To maintain a constant supply of air, the compressor operates in a "loading and unloading cycle" controlled by the pressure control system. Components of the pressure control system include the intake valve unloader, unloader pilot, slow-down assembly, and the check and bleed valve.

(2) When air pressure drops to 90 psi in the air receiver, the pressure control system will "load" in the following manner: The unloader pilot valve shuts off air to the intake valve unloaders to close the intake valves. The check and bleed valve releases air from the slowdown assembly and temporarily restricts the flow of air from the suction valve unloaders. The slowdown plunger backs off from the governor lever to increase engine speed.

(3) When air pressure reaches 100 psi in the air receiver, the pressure control system will "unload" in the following manner: The unloader pilot valve admits air to the intake valve unloaders to open the intake valves. The slowdown plunger pushes out against the governor lever to reduce engine speed to idle.

d. Air Receiver and Hose Reels.

(1) The air receiver is equipped with a safety valve for protection against a build-up of excess pressure and two drain cocks to drain off condensation within the receiver. Compressed air in the receiver may be released from the two service valves connected to the rear of the air receiver or from the service valves in the hose reels.

(2) There are two hose reels, one on each end of the air receiver, to provide handy and safe storage for air hoses.

e. Auxiliary Equipment and Tools.

(1) The pneumatic tools furnished with this unit are clamped in special tool boxes. After use, all pneumatic tools should be returned to their special designated places.

(2) A set of on-equipment maintenance tools have been packed in a separate tool bag. A list of these on-equipment tools will be found in appendix III. Included in this set are the most necessary tools to perform most of the common maintenance services on the engine-compressor.

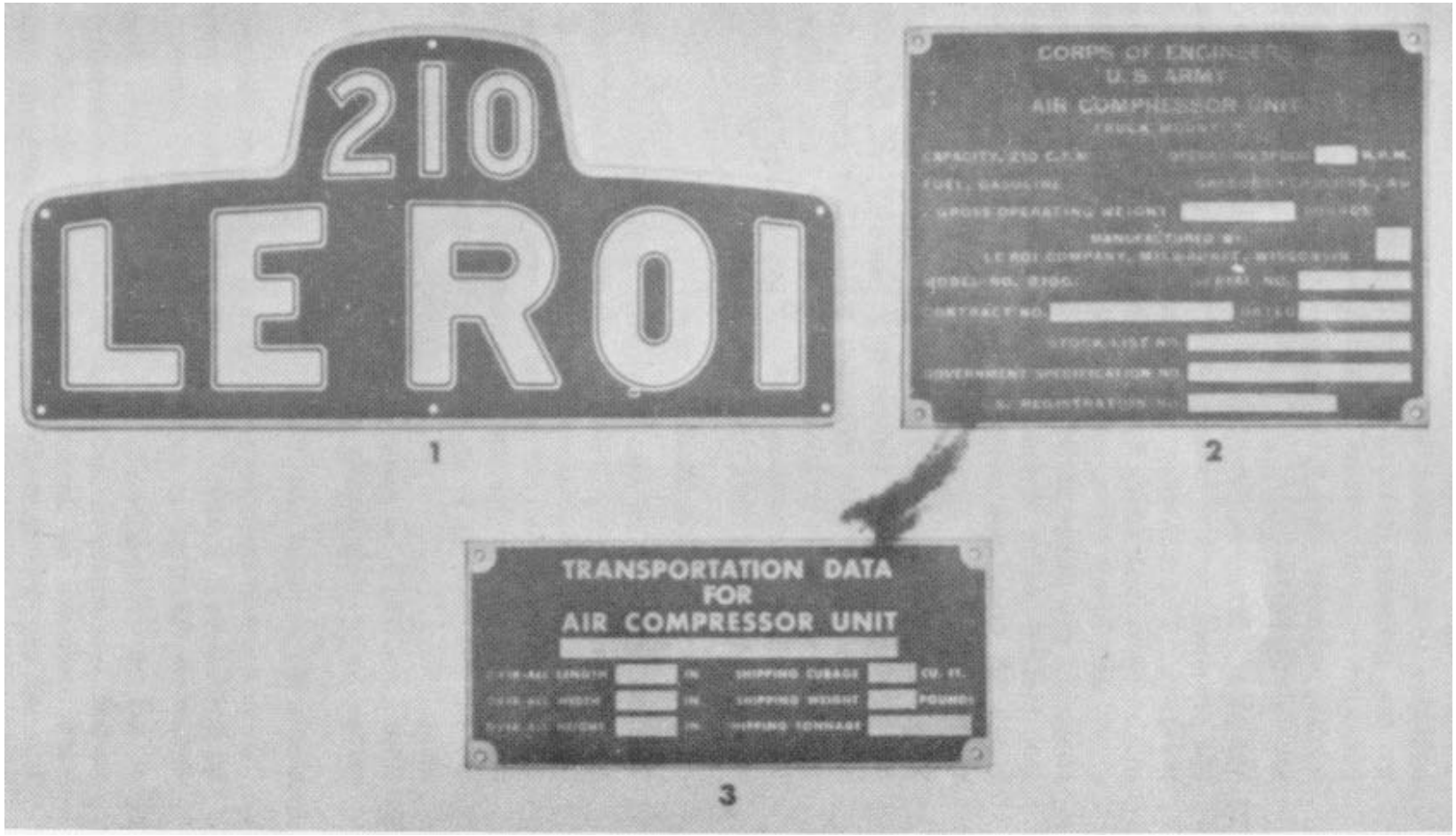
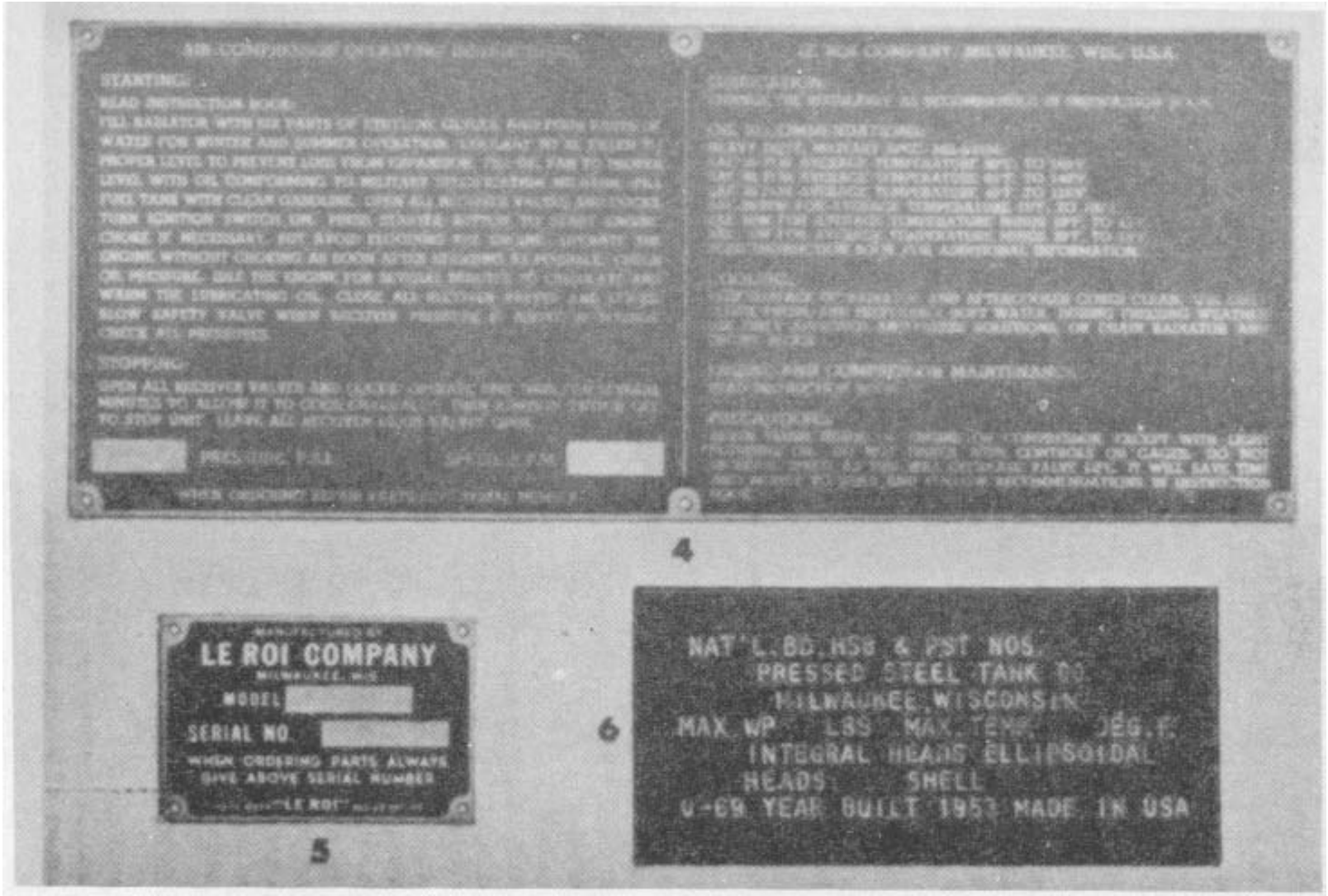


Figure 4. Identification plates.



4

LE ROI COMPANY
MODEL
SERIAL NO.
WHEN ORDERING PARTS ALWAYS
GIVE ABOVE SERIAL NUMBER

5

NAT'L. BD. HSs & PST NOS.
PRESSED STEEL TANK CO.
MILWAUKEE, WISCONSIN
MAX. W.P. LBS. MAX. TEMP. DEG. F.
INTEGRAL HEADS ELLIPSOIDAL
HEADS SHELL
U-69 YEAR BUILT 1953 MADE IN USA

6

4. Identification
(fig. 4)

Six identification plates are permanently attached to the compressor equipment. The manufacturer's nameplate (1) Corps of Engineers identification plate (2) and transportation plate (3) are grouped together at the rear of the compressor housing. The compressor instruction plate (4) is located on the inside of the rear access door on the engine side of the compressor. The serial number plate (5) is attached to the upper oil pan adjacent to the oil-level gage on the engine side of the compressor. The reservoir data plate (6) is attached to the top of the air receiver. When requisitioning spare parts for this equipment, specify the Department of the Army registration and serial numbers (from Corps of Engineers identification plate (2) and the manufacturer's serial number (from the serial number plate (5)).

5. Tabulated Data

a. General.

Manufacturer	Le Roi Company
Model	210G1
Type	V-8 crankcase with 4-cylinder engine and 4-cylinder compressor.
Bore (all cylinders)	5.5 in.
Stroke (all pistons)	5.25 in.
Piston displacement	499 cu. in.
Engine compression ratio	5.45 to 1
Lubrication	Oil pump pressure system
Spark Plugs	Champion XE5-8-64
Spark plug gap	0.023 to 0.028 in.
Firing order	1-2-4-3
Valve arrangement	Valve-in-head
Intake valve clearance	0.014
Exhaust valve clearance	0.014
Distributor contact gap	0.020 in.
Starting motor	4-volt Bendix drive
Battery charging generator	4-volt
Batteries	Four 6-volt, series connected
Cooling	Liquid
Head bolt torques	90 ft lbs

b. Performance.

Rated speed	1,125 rpm
Rotation; flywheel end	ccw
Number of stages, compressor	1
Intake valve opens	Top dead center
Intake valve closes	56° A. B. D. C.
Exhaust valve opens	46° B. B. D. C.
Exhaust valve closes	10° A. T. D. C.
Spark timing, above 1,000 rpm	30° B. T. D. C.
Timing range at 1,000 rpm	30° min

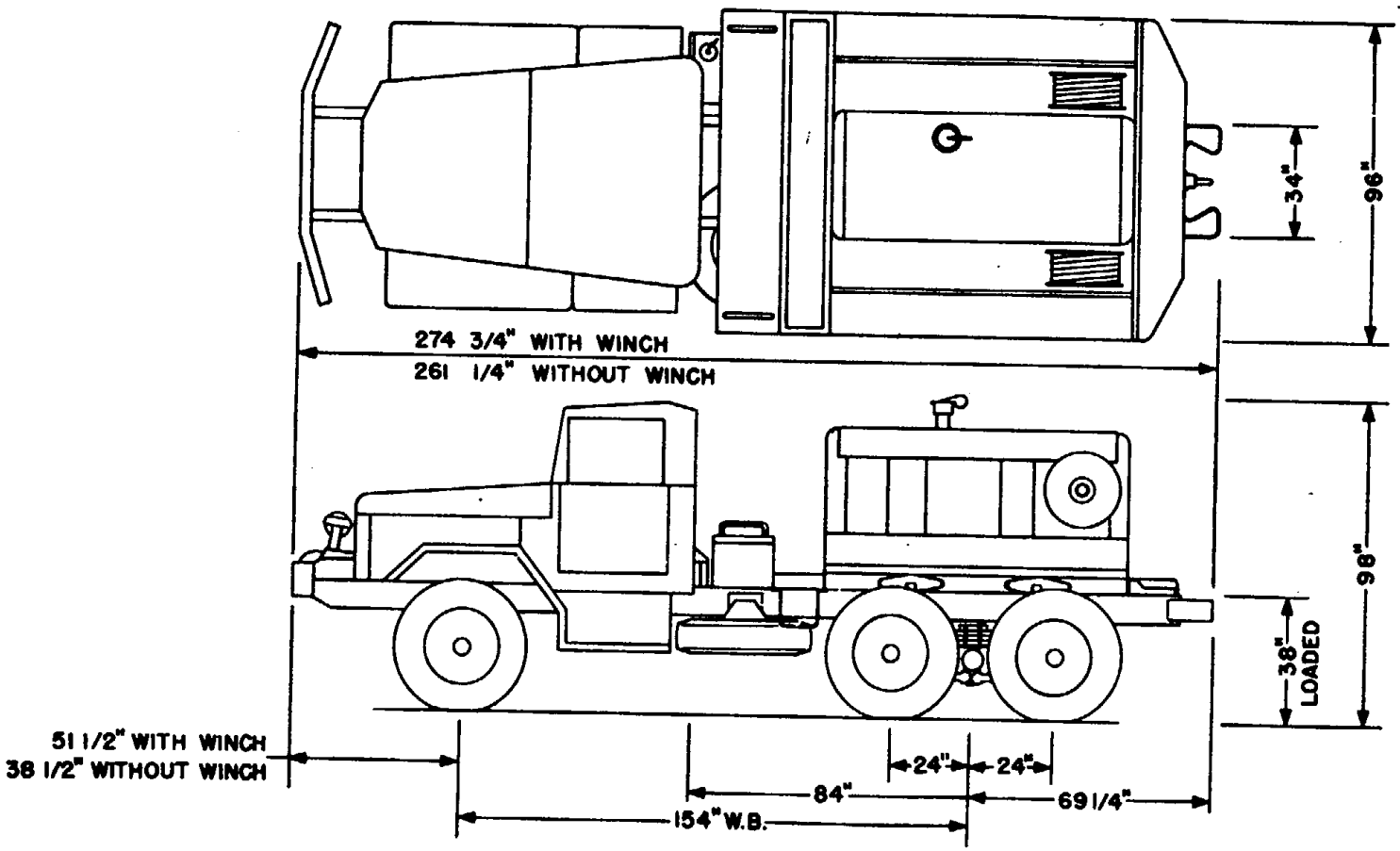


Figure 5. Shipping dimensions

Air capacity ..... 210 cfm
Air receiver, volume ..... 6 cu ft
Fuel consumption, 8 hrs ..... 40 gal

c. Capacities.

Fuel ..... 42 gal
Cooling system ..... 16 1/2 gal
Oil, crankcase and filters ..... 5 1/2 gal
Electrolyte, batteries ..... 1 gal

d. Normal Temperatures and Pressures.

Air receiver pressure, sea level ..... 100 psi
Unloader pilot setting (unloading) ..... 100 psi
Unloader pilot setting (loading) ..... 90 psi
Coolant temperature: ..... 180 to 215° F.
Oil pressure ..... 15 to 100 psi

e. Dimensions and Weights (fig. 5).

Overall length ..... 275 in.
Overall width ..... 97 in.
Overall height ..... 96 in.
Shipping cubage ..... 1,482 cu ft
Gross operating weight ..... 16,700 lb
Shipping weight ..... 16,300 lb
Shipping tonnage ..... 37 tons

f. Foundation Plan (fig. 6). To operate the engine-compressor off the truck frame, a suitable foundation must be constructed.

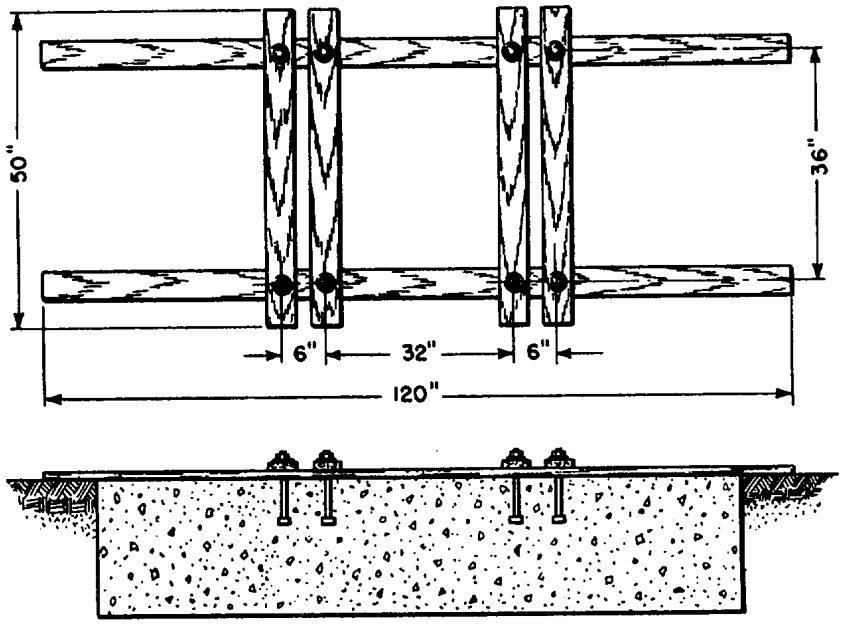


Figure 6. Mounting dimensions.

Dig a hole about 100 inches long, by 45 inches wide, and 20 inches deep.. Construct the wood template shown in figure 6. Insert a one-half inch bolt about 10 inches long through each hole in the template. Put nuts on the bolts until the bolt just clears the nut. Mix about 55 cubic feet of concrete. Use one part cement to four parts of gravel and sharp sand. Thoroughly mix and add the least amount of water for easy handling. Place the template over the hole. Tamp the concrete mixture in the hole and level it off under the lower edge of the template. Straighten the foundation bolts. Allow the concrete to set until thoroughly dry, and remove the template. Place a nut on each anchor bolt and tighten them down. Put an iron washer on each bolt. Lower the engine-compressor over the bolts so it rests on the washers. Adjust the nuts to level the unit. Place a second washer and nut on the anchor bolts and pull down tight.

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

6. New Equipment

a. General. The 210G1 compressor is mounted permanently on the truck chassis and no crating or packing is required. Refer to the TM9-819 for unloading methods and precautions pertaining to the truck.

b. Removal of Preservative Compounds and Devices (fig. 7). All engine openings, electrical component openings, control system components and gages have been preserved and protected in accordance with applicable specifications for oversea shipment, and the compressor is not ready for operation until the necessary depreservation services have been performed. Protected points are illustrated in figure 7. Remove the moisture-proof barrier from the generator (1), hose reel (2), instrument panel (3), fuel level gage (3) and air lines (6). Peel the wax-like sealer from the receiver service valves (3), drain cocks (3), air filter covers (5), oil filler cap (5) and safety valve (6). Unwrap the paper from the generator drive belt (4). After all preservatives and tapes have been removed, wipe the protected surfaces of the various components with a cloth dampened in solvent to remove all traces of preservative. After battery cables have' been unwrapped, clean terminal posts carefully and connect cables between the batteries.

c. Inspection. Check the entire unit carefully for evidence of possible damage during shipment. Make certain that all controls operate freely and easily; and that all attaching bolts and nuts are tight. If the compressor housing appears dented or otherwise damaged, open the access doors at that point and examine the compressor parts carefully behind the apparent point of impact. Check the radiator, exhaust pipe weather cap, and panel meters for damage. Open the access doors and check the control cable and wiring for mechanical damage and frayed insulation. Correct any damage immediately or report to proper authority.

d. Service.

(1) Drain the preservative oil from the crankcase and lubricate the equipment as instructed in paragraph 42.

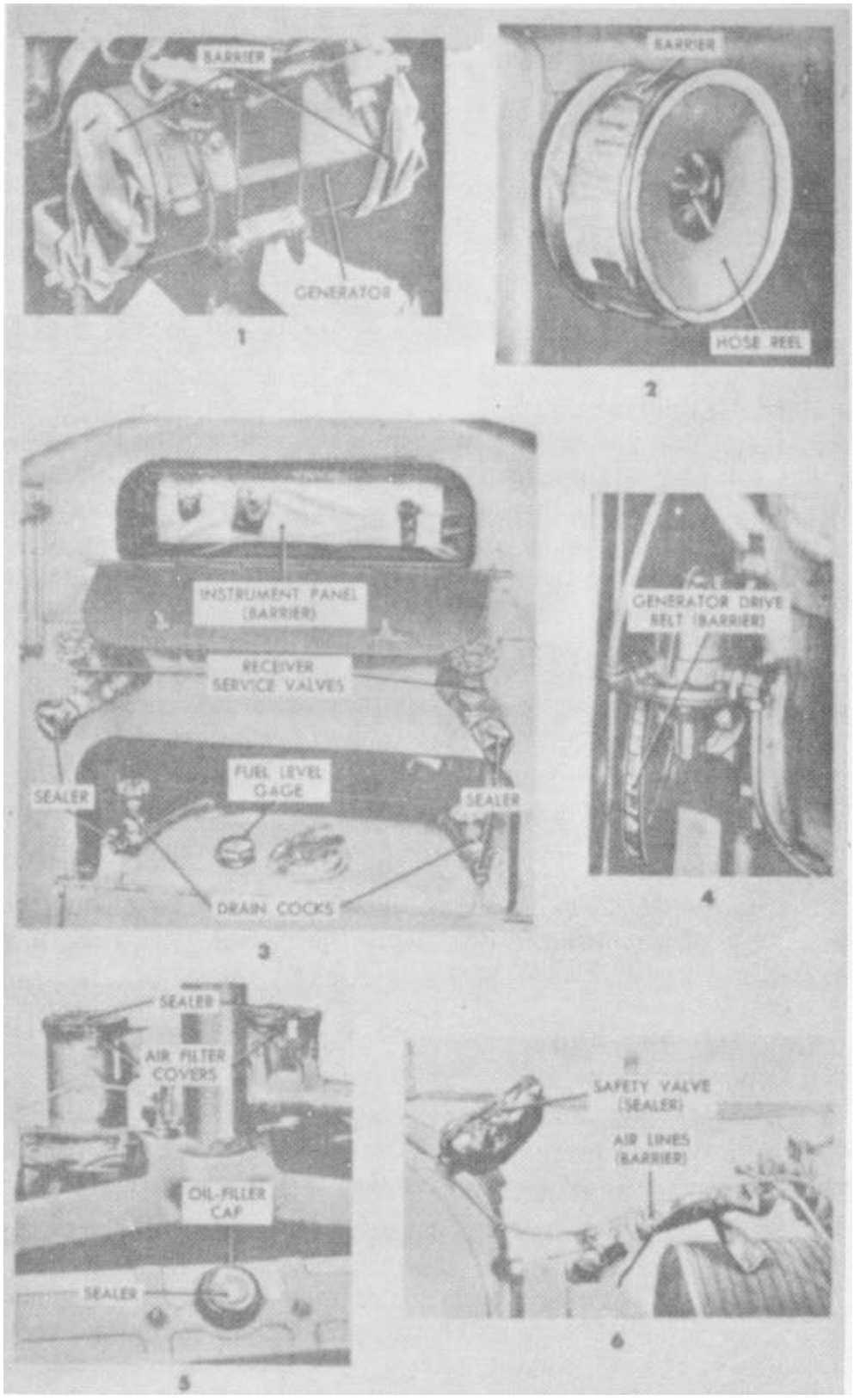


Figure 7. Preservative and protective measures for shipment.

(2) Perform before-operation services (par. 45c).

(3) Fill the fuel tank with a good grade of gasoline. Fuel tank capacity is 42 gallons.

(4) The cooling system is filled with 60 percent anti-freeze and 40 percent water and is ready for operation.

(5) Add sulfuric acid and distilled water to all batteries. The level of electrolyte should be from 3/8-inch to 5/8-inch above the top of the separators of each cell. Inspect battery connections (par. 45*f*).

(6) Perform all truck services as instructed in TM 9-819.

7. Used Equipment

The inspection and service of used equipment will be the same as that for new equipment (par. 6). However, the equipment must be more carefully inspected before it is operated. Examine the entire unit for loose or damaged connections-oil, water, electrical or air. Inspect for evidence of oil seepage and check gages for proper operation. Tighten loose mounting bolts if necessary. Start the compressor (par. 30) and listen carefully for unusual sounds or noises. If an unusual condition is indicated, stop the compressor immediately and report to proper authority.

Section II. CONTROLS AND INSTRUMENTS

8. General

This section describes, locates, illustrates, and furnishes the operator sufficient information about the various controls and instruments for the proper operation of the materiel.

9. Unloader Pilot Valve
(fig. 8)

a. Location. The unloader pilot valve is located on the crankcase cover and is interconnected by tubing to the compressor valve assembly, the slowdown assembly, and the air receiver.

b. Purpose. The unloader pilot valve is actuated automatically by the amount of air pressure in the air receiver. When air pressure in the receiver drops to approximately 90 psi, the unloader pilot valve closes and cuts off the air pressure to the intake valve unloaders to close the intake valves. When air receiver pressure reaches 100 psi, the unloader pilot valve opens to allow air pressure to enter the intake valve unloaders and open the intake valves.

10. Compressor Valve Assemblies
(fig. 8)

a. Location. The four compressor valve assemblies are located in the compressor bank cylinder head assembly. The valve assembly is connected to an automatic-operating pressure control system.

b. Purpose. The valves operate to admit and discharge air from the compressor cylinder. Free air is admitted through the air cleaners and the intake valve part of the assembly by the action of the piston on its downward stroke. As the piston moves up from bottom dead center, the suction valve is closed. When the pressure in the cylinder rises slightly above that in the discharge manifold, the discharge valve port of the assembly will open, allowing air in the cylinder to flow into the compressor discharge manifold. When the air pressure drops to 90 psi in the air receiver, the unloader pilot valve shuts off air to the suction valve unloaders to close the suction valves. When the air pressure reaches 100 psi in the air receiver, the unloader pilot valve admits air to the suction valve unloaders to open the suction valves.

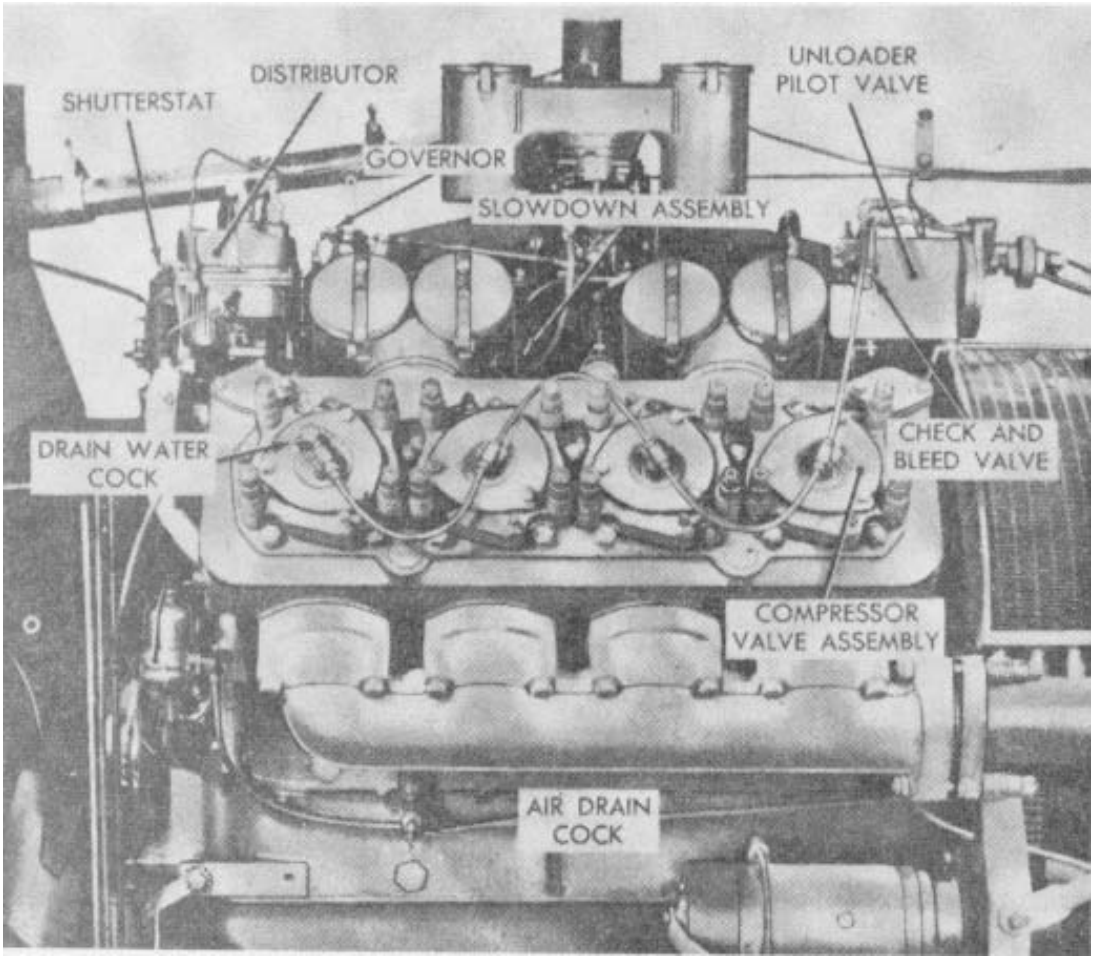


Figure 8. Engine and compressor with housing removed.

11. Slowdown Assembly
(fig. 8)

a. Location. The slowdown assembly is located on the crank-case cover next to the engine governor.

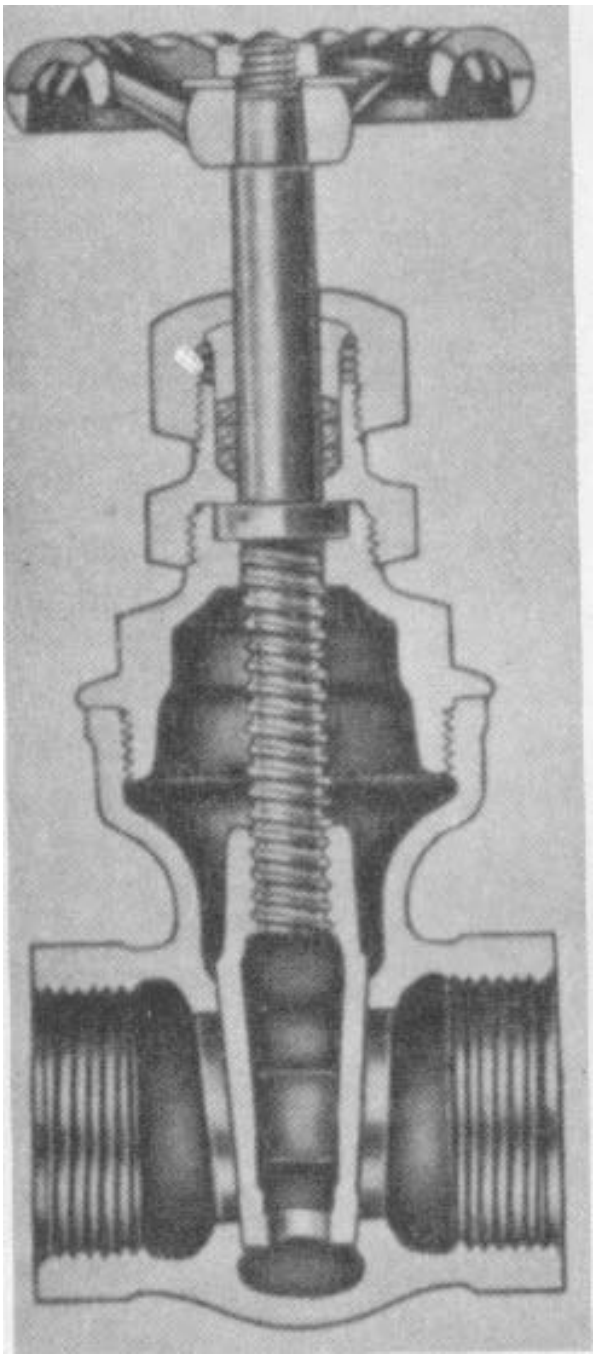


Figure 9. Receiver service valves.

b. Purpose. The slowdown assembly is merely a plunger within a barrel, which provides an engine idle condition during the unloading cycle. During the unloading operation, air pressure from the unloader pilot valve pushes out the plunger against the governor lever to change engine speed to a slow idle. When air pressure is removed, the plunger is backed into the barrel by the governor lever spring to increase the engine speed.

12. Check and Bleed Valve
(fig. 8)

a. Location. The three-way check and bleed valve is located at the unloader pilot valve and is connected to the intake valve unloaders and to the slowdown assembly.

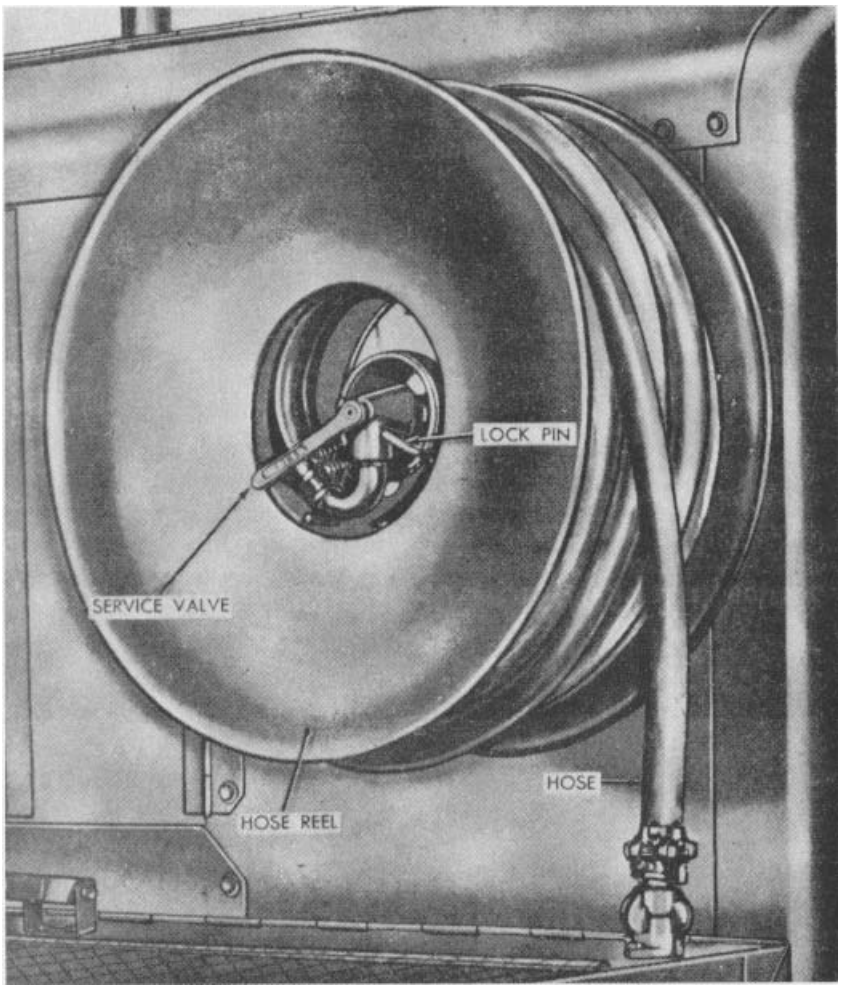


Figure 10. Hose reel and service valve.

b. Purpose. The action of a ball in the valve checks the return flow of air from the intake valve unloader and bleeds the air from the slowdown assembly at the same time. This enables the slowdown assembly to provide engine acceleration before the intake valves are fully closed.

13. Receiver Service Valves
(fig. 9)

The two wedge-disk, gate-type receiver service valves are connected directly to the rear side of the air receiver. Compressed air is released from' the air receiver by turning the handwheel at the top of each valve.

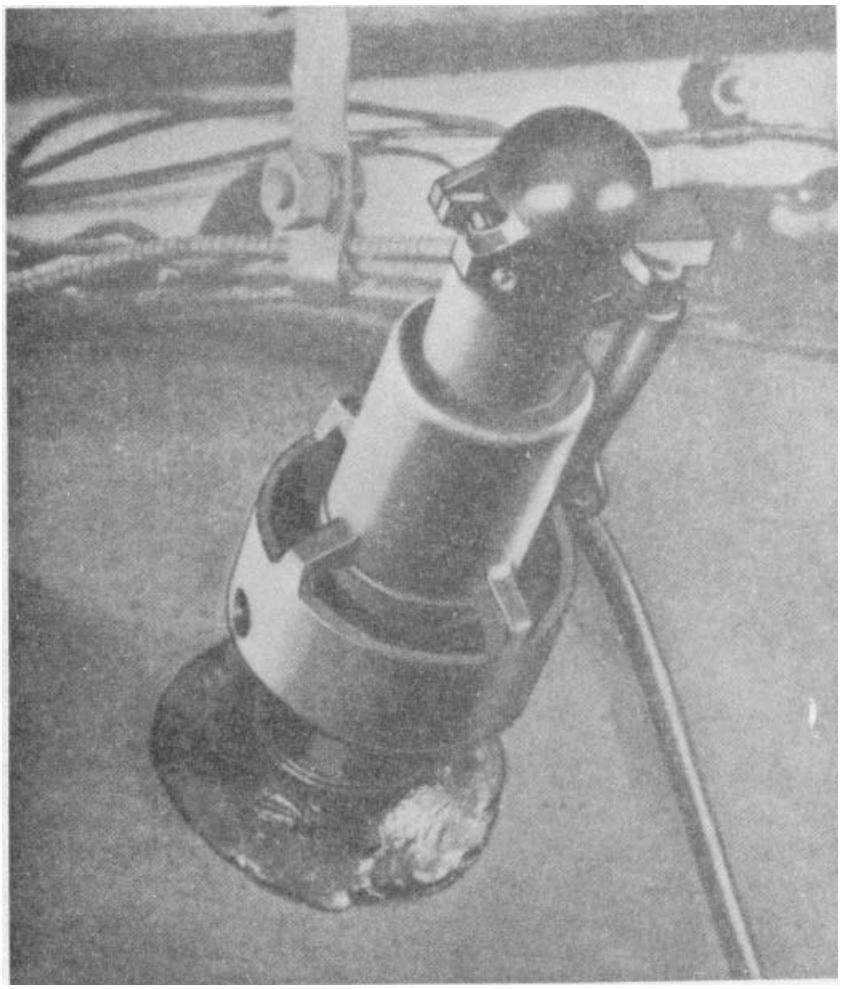


Figure 11. Receiver safety valve.

14. Hose Reel Service Valves
(fig. 10)

Each air hose is equipped with a quick-opening lever handle valve which controls th2 outlet of air at each hose reel.

These valves are open when the handle is pointing toward outlet to hose; they can be used to drain air from the hose on the reel by turning them 180° or shut off all air by turning 90°.

15. Safety Valve
(fig. 11)

The safety valve is located on the air receiver, and is set to release excess air pressure between 120 and 125 psi. No attempt should be made to change the pressure setting of the safety valve because this is the maximum pressure under which the unit can be operated safely. The safety valve must be operated manually each day when starting the unit, and also when air receiver pressure reaches about 70 psi to make certain that the valve is operating properly.

16. Hose Reel Lock Pin
(fig. 10)

Each hose reel is equipped with a locking pin assembly which prevents the hose reels from turning when the reels are not in use. The locking pins are spring loaded and must be pressed in and turned to release the reels for operation.

17. Shutterstat
(fig. 12)

a.. Location. The shutterstat is located in the connection between the water pump body and the radiator. It consists of a liquid bulb, thermostat element, and needle valve assembly, and has two air line connections. One air line is connected through an air filter to the air receiver. The other air line leads to the air cylinder which operates the radiator shutters.

b. Purpose. At normal operating pressure, air passes through the shutterstat needle valve to operate the air cylinder. This action closes the shutters against spring tension in the cylinder. When the temperature of the cooling water at the shutterstat approaches 180° F, the heat is transmitted through the liquid bulb up to the thermostat element. The element expands closing the needle valve and allowing the spring to open the shutters.

18. Ignition Switch
(fig. 13)

The ignition switch is mounted on the instrument panel. When the lever handle of this switch is snapped to the left (ON), it completes the primary circuit leading from the battery through the ammeter to the ignition coil. The switch must be turned on before pushing in the engine starting button, and shuts off the

engine automatically when the lever handle is snapped back to the vertical position. The switch is connected to a pilot light which will glow when the switch is-on.

19. Starting Switch
(fig. 13)

The starting switch is a push-button type switch mounted on the instrument panel. Pushing in the starting button completes

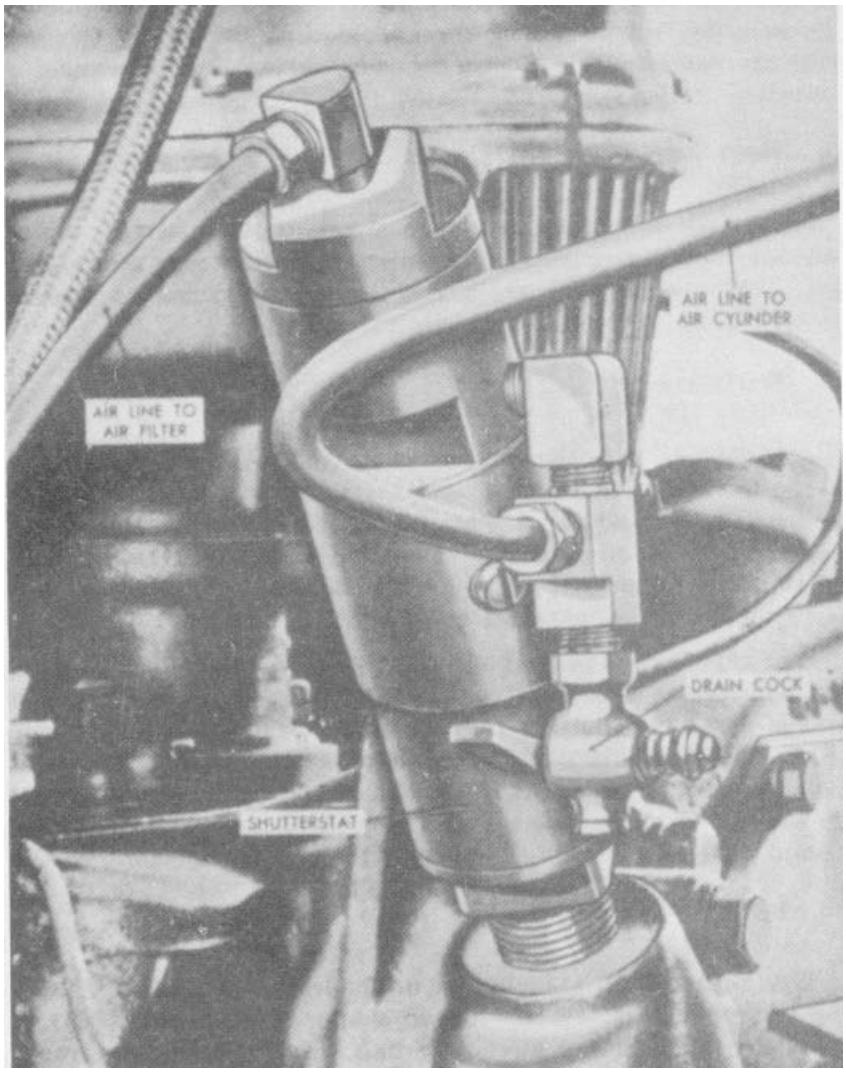


Figure 12. Shutterstat.

an electrical circuit from the batteries to the magnetic switch which is mounted on the compressor side of the battery box. The magnetic switch is energized to complete the circuit between the batteries and the starting motor. The starting motor pinion then engages the flywheel ring gear to start the engine.

20. Choke
(fig. 13)

The choke control knob is located on the instrument panel and is connected with a flexible cable to the choke plate in the carburetor air intake. When the choke control knob is pulled out, the choke plate closes, providing a richer fuel-air mixture to help start the engine.

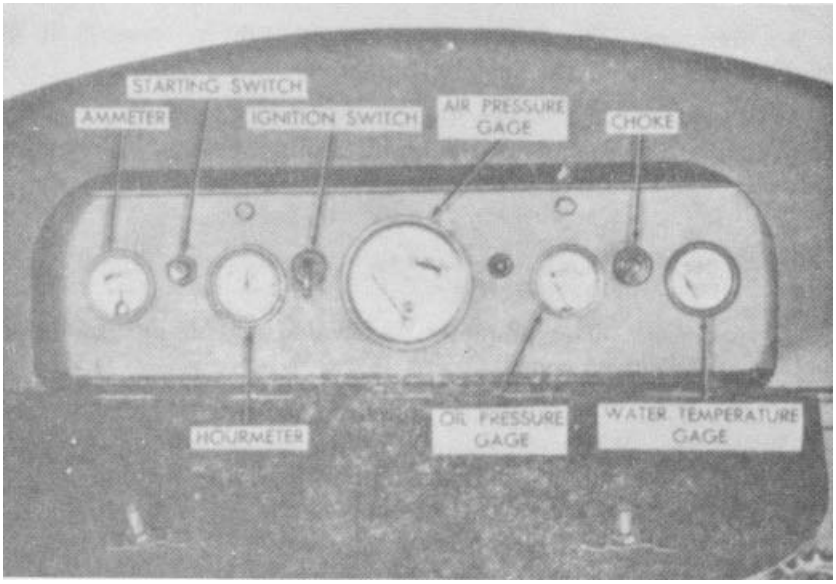


Figure 13. Instrument panel.

21. Air Pressure Gage
(fig. 13)

a. Location. The air pressure gage is located in the center of the instrument panel.

b. Purpose. The air pressure gage indicates the pressure of the air within the air receiver and should read 100 psi maximum after the unit has been thoroughly warmed up to operating temperatures. The air pressure readings are approximately'90 psi at the start of the "loading cycle" and 100 psi at the beginning of the "unloading cycle."

22. Oil Pressure Gage
(fig. 13)

a. Location. The oil pressure gage is located in the right-hand side of the instrument panel.

b. Purpose. The oil pressure gage registers the amount of oil pressure in the lubricating oil system, and its markings are divided into a red and a green area. The gage pointer should be in the green area at all times during operation. If the pointer does not show pressure, stop the unit immediately and determine the cause.

23. Water Temperature Gage
(fig. 13)

a. Location. The water temperature gage is located in the right-hand side of the instrument panel.

b. Purpose. The water temperature gage indicates the temperature of the coolant in the liquid cooling system. Normal operating temperatures are between 180° to 2150 F.

24. Ammeter
(fig. 13)

a. Location. The ammeter is located in the left-hand side of the instrument panel.

b. Purpose. The ammeter indicates the rate of battery charge or discharge. When the engine-compressor is running at normal speed, the ammeter needle should be in the charge range. If the ammeter shows discharge continuously, check the condition of the generator, voltage regulator, and batteries to determine the cause.

25. Hourmeter
(fig. 13)

a. Location. The hourmeter is located in the left-hand side of the instrument panel.

b. Purpose. The hourmeter records the elapsed time during which the unit has been in operation. It tells exactly when the unit should have the "preventive maintenance" services required to keep it in continued operation. Mounted on the instrument panel, the hourmeter is electrically operated and is connected to the ignition switch. The hourmeter operates only when the engine is in operation.

26. Fuel Level Gage
(fig. 19)

The fuel level gage (16) is mounted directly on top of the fuel tank and is actuated by an inclosed cork float. Graduations on the fuel level gage are in fractions of capacity. The capacity of the fuel tank is 42 gallons.

27. Magnetic Switch
(fig. 14)

The 24-volt magnetic switch is mounted on the compressor side of the battery box. This switch is connected to the starting button, the batteries, and the starting motor with one grounded connection for radio-field suppression. When the starter button is pushed in, the core linings of the magnetic switch are energized to pull the magnetic switch plunger to the contact disk and close the circuit from the batteries to the starting motor.

28. Drain Cocks

a. Location. Nine drain cocks are installed in the compressor equipment. One drain cock (15, fig. 28) is located at the lower

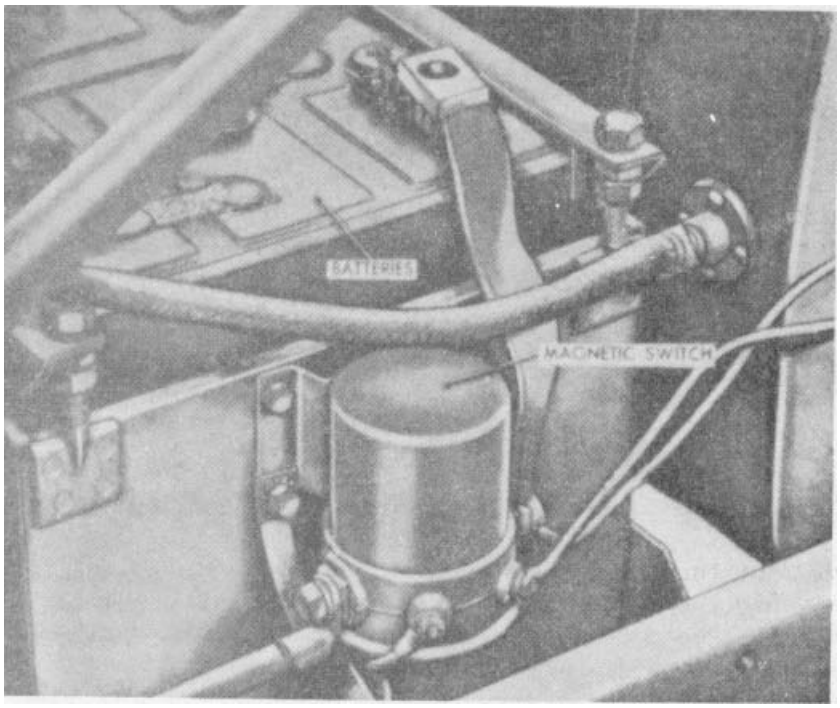


Figure 14. Batteries and magnetic switch.

left-front corner of the radiator; one is located on each side of the engine-compressor crankcase (fig. 8); two are connected by piping to the air receiver and are accessible through the lower access door at the rear of the housing (fig. 7); one is tapped into a tube elbow at the top of the slowdown assembly (6, fig. 46); one is located at the shutter air filter (fig. 15); one is installed in the tubing which connects to the shutterstat (fig. 12); one is located in the compressor valve closest to the radiator (fig. 8).

b. Purpose. Three of the drain cocks (in the radiator and crankcase) are used solely for draining coolant from the cooling system. The remaining six drain cocks are used to remove condensation from the air system components.

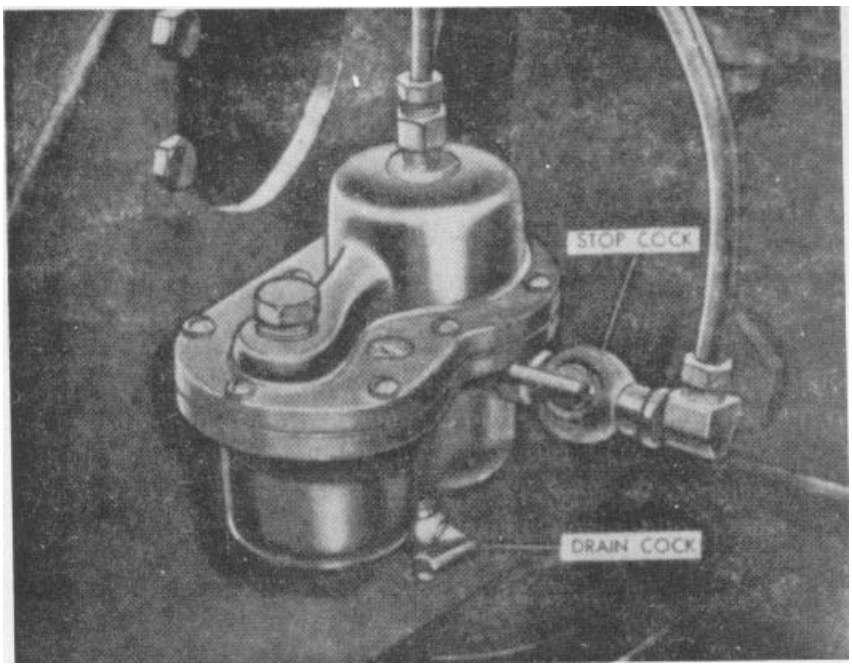


Figure 15. Shutter air filter.

Section III. OPERATION UNDER USUAL CONDITIONS

29. General

a. The instructions in this section are published for the information and guidance of the personnel responsible for the operation of this machine.

b. It is essential that the operator know how to perform every operation of which the air compressor is capable.

This section gives instructions on starting and stopping the compressor, instructions on the basic motions of the compressor, and instructions on how to coordinate the basic motions to perform the specific tasks for which the machine is designed. Since nearly every job presents a different problem, the operator may have to vary the given procedure to fit the individual job.

30. Starting the Compressor

a. Refer to paragraph 45*c* for before-operation services to be performed.

b. Open both receiver service valves (fig. 9).

c. Set the ignition switch (fig. 13) to the ON position.

d. Push the starter switch (fig. 13). Use the choke if necessary, until the engine has started and begun to warm up.

Caution: Never operate starter for more than 30 seconds at a time without pausing to allow starting motor to cool. Excessive cranking periods will cause starter to overheat and fail.

e. Check oil pressure gage (par. 22) and ammeter (par. 24) immediately after starting the engine.

f. Allow the engine to warm up for several minutes.

g. Close the receiver service valves in order to build up air pressure within the receiver.

h. When air pressure reaches 70 psi, manually operate the safety valve on the air receiver (par. 15).

i. Check all gages and meter readings on the instrument panel (fig. 13) and listen for unusual noises.

j. Perform the during-operation services (par. 46d).

k. Connect the appropriate pneumatic tool. The various pneumatic tools and their method of installation is thoroughly discussed in chapter 4.

31. Stopping the Compressor

a. Close all service valves (figs. 9 and 10) and allow the engine to idle for a few minutes.

b. Disconnect pneumatic tools.

c. Set ignition switch (fig. 13) to the OFF position.

d. Open all drain cocks (par. 28), in order to remove moisture, dirt, and oil, from the air receiver and air lines.

e. Open all service valves (figs. 9 and 10) in order to empty the compressed air from the air receiver.

f. Perform the after-operation services indicated in paragraph 45f.

Section IV. OPERATION OF MATERIEL USED IN CONJUNCTION WITH AIR COMPRESSOR

32. Vehicle Operation

The 210G1 compressor is mounted on the M45 truck. Refer to TM 9-819 for proper truck operating instructions.

33. Fire Extinguisher

a. Description.. The fire extinguisher is a one-quart, carbon tetrachloride type. The fire extinguisher is installed in a bracket mounted at the rear of the compressor housing.

b. Operation. To operate the fire extinguisher, turn the handle and work like a pump. For structural fires, direct the stream of carbon tetrachloride at the base of the flames. For burning liquids, direct the stream of carbon tetrachloride against the inside of the container above the surface of the liquid.

Warning: Extinguish fire promptly and avoid exposure to smoke and fumes.

c. Refilling. Refill the fire extinguisher as instructed in TM 5-687 and TM 9-1799.

Section V. OPERATION UNDER UNUSUAL CONDITIONS

34. Operation in Extreme Cold (Below 0° F.)

a. Cooling System Protection. The radiator should be filled with six parts of antifreeze solution and four parts of water for winter and summer operation. Coolant must be maintained at proper level to prevent loss from expansion between upper and lower step of baffle in radiator top tank. Check the entire cooling system periodically for leaks and hose deterioration.

b. Special Lubrication Instructions. Select the correct lubricants in accordance with the expected air temperatures as indicated in the lubrication order (fig. 16).

c. Fuel System Protection. In cold weather, condensation of moisture in the air causes water to accumulate in gasoline tanks, drums, and containers. This water will freeze and form ice crystals that clog fuel lines and carburetor jets unless the following precautions are taken:

(1) Use filter paper or other type of strainer when filling fuel tank or when transferring fuel from one container to another.

(2) Remove snow or ice from fuel tank fillercap and filling equipment before filling the fuel tank.

(3) Keep fillercaps tightened securely to keep snow, rain, and dirt out of tanks.

d. Electrical System Protection. Check the specific gravity reading of the battery electrolyte frequently. Keep the batteries as fully charged as possible. Refer to paragraph 90 for detailed battery maintenance.
Caution: In freezing weather, when adding water to electrolyte, run the engine for about 20 minutes to assure a ;roper electrolyte solution. Water not in solution will freeze, expand, and ruin the battery.

35. Operation in Extreme Heat

a. Cooling System Protection. Keep the radiator well filled with clean, soft water, and see that the fins of the radiator and the aftercooler are free from foreign material. Check the operation of the radiator shutters with the water temperature gage on the instrument panel. The radiator shutters should open when engine water temperature is approximately 180° F. Add water to the radiator only when the engine is stopped and cool, or idling, with moderate water temperature. Fill the radiator only to the height of the baffle. Check hoses and connections periodically for possible leaks.

b. Special Lubrication Instructions. Select the correct lubricants in accordance with the expected air temperature as indicated in the lubrication order (fig. 16).

36. Operation Under Dusty or Sandy Conditions

a. Check Air Cleaners. Dust may enter the unit through several channels; at the air .intake, engine breather, or from dust contamination of oil, water, or fuel. Remove the filters from the engine air cleaners (par. 76) and compressor air cleaners (par. 123) as often as every 2 to 4 hours and clean thoroughly.

b. Check Oil-Filler and Breather Cap. At least every 2 to 4 hours remove and clean the combination oil-filler and engine breather cap. This will help to eliminate the entrance of dust and sand into the engine crankcase.

c. Protect Stores of Oil, Water, and Fuel. Stored supplies of oil, water, and fuel must be kept tightly covered to protect these supplies from sand and dust contamination. If possible, keep such supplies in an inclosure such as a shed or storage room.

37. Operation in Salt Water Area

a. Submersion in Salt Water. If the unit has been submerged in salt water, electrical equipment and metal parts will be damaged to such an extent that complete rebuilding or replacement of assemblies will be necessary. If all traces of salt water can be removed at once, it may be possible to salvage certain units

by dismantling immediately and cleaning thoroughly. In all cases of submersion in salt water, notify the proper authority at once.

b. Exposure to Salt Air. When the compressor is operated near bodies of salt water, keep all exposed metal surfaces painted. Salt air will attack unpainted metal surfaces and cause rust to form quickly. Remove the rust immediately and protect the exposed surface with a coat of paint (par. 43).

c. Cleaning. At the end of each days operation wipe the exposed metal surfaces with a cloth dipped in cleaning solvent.
Coat electrical connections (terminals) with petroleum jelly to prevent corrosion.

d. Lubrication. At the end of each days operation put a few drops of engine oil on the control linkage connections and the air compressor support springs.

CHAPTER 3

ORGANIZATION MAINTENANCE INSTRUCTIONS

Section I. Organizational Tools and Equipment

38. General

The tools and equipment listed in this section are those that are required to perform organizational maintenance on the truck mounted air compressor. Standard mechanic's hand tools and on-equipment tools are not enumerated in this section.

39. On-Equipment Tools

The on-equipment tools normally supplied with this equipment for the use of the operator are listed in appendix III.

40. Special Organizational Maintenance Tools and Equipment No special organizational maintenance tools and equipment are required.

Section II. LUBRICATION AND PAINTING

41. General Lubrication Information

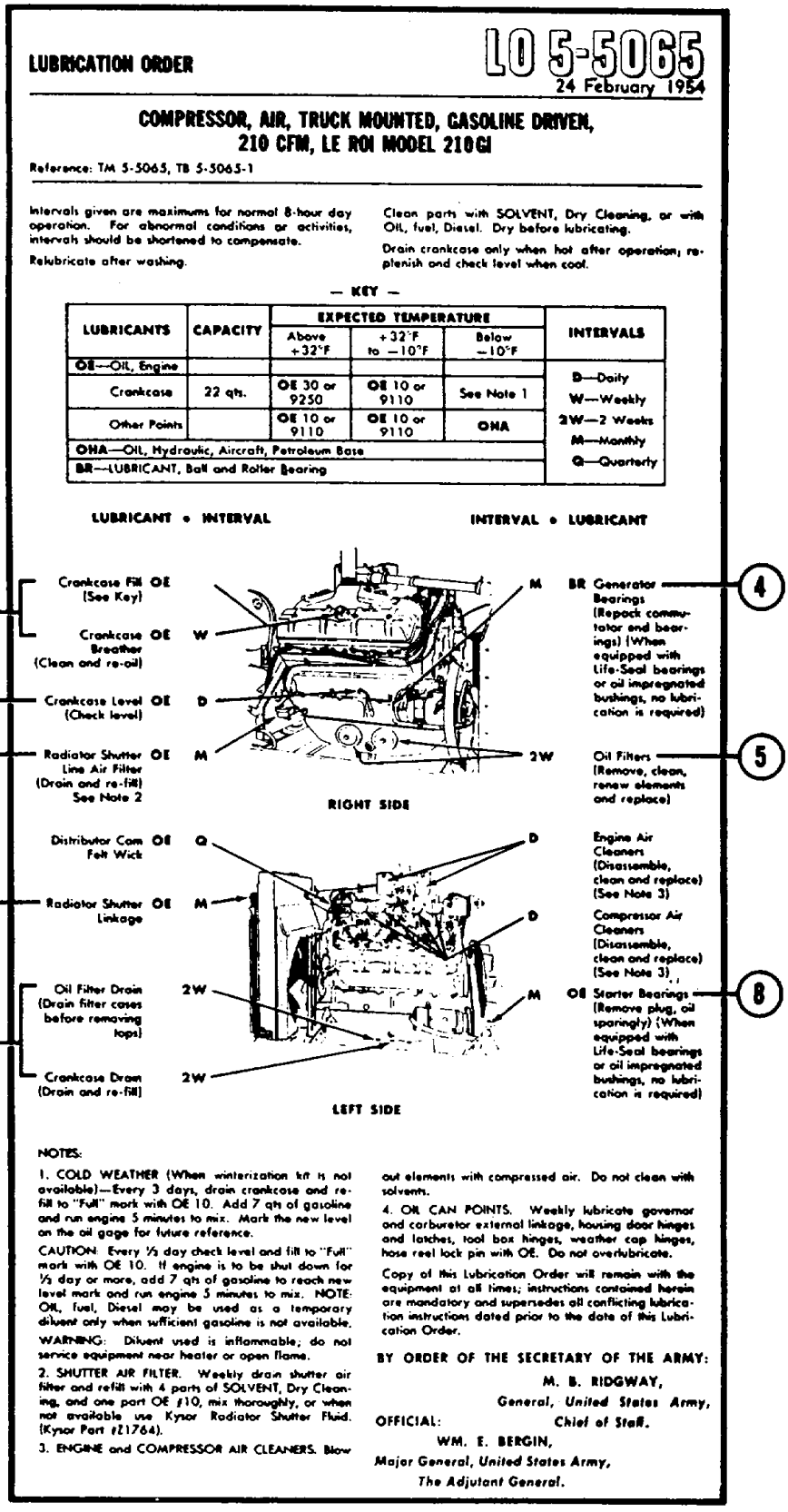
a. Lubrication Order 5-5065 prescribes first and second echelon lubrication maintenance for the truck mounted air compressor.

b. A lubrication order is published for each item of equipment. The lubrication order shown in figure 16 is a reproduction of an approved lubrication order for the air compressor. For the current lubrication order, refer to SR 310-20-4.

c. Lubrication orders prescribe approved first and second echelon lubrication procedures. The instructions contained therein are mandatory.

42. Detailed Lubrication Information

a. Care of Lubricants. The cleanliness of lubricant at the point of use is dependent upon cleanliness in storage and handling. All containers must be kept closed tight when not in use. Some oils and greases will absorb water to such an extent that their physical characteristics will change so as to definitely reduce their lubricating value. All drum or containers, openings, plugs, pumps, funnels, guns, or other lubricating utensils or equip-



LUBRICATION ORDER

LO 5-5065
24 February 1954

COMPRESSOR, AIR, TRUCK MOUNTED, GASOLINE DRIVEN, 210 CFM, LE ROI MODEL 210GI

Reference: TM 5-5065, TB 5-5065-1

Intervals given are maximums for normal 8-hour day operation. For abnormal conditions or activities, intervals should be shortened to compensate.

Relubricate after washing.

Clean parts with SOLVENT, Dry Cleaning, or with Oil, fuel, Diesel. Dry before lubricating.

Drain crankcase only when hot after operation; replenish and check level when cool.

— KEY —

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURE			INTERVALS
		Above +32°F	+32°F to −10°F	Below −10°F	
OE—Oil, Engine					D—Daily W—Weekly 2W—2 Weeks M—Monthly Q—Quarterly
Crankcase	22 qts.	OE 30 or 9250	OE 10 or 9110	See Note 1	
Other Points		OE 10 or 9110	OE 10 or 9110	OHA	
OHA—Oil, Hydraulic, Aircraft, Petroleum Base					
BR—LUBRICANT, Ball and Roller Bearing					

LUBRICANT • INTERVAL — **INTERVAL • LUBRICANT**

1. Crankcase Fill OE (See Key)
1. Crankcase Breather OE W (Clean and re-oil)
2. Crankcase Level OE D (Check level)
3. Radiator Shutter Line Air Filter OE M (Drain and re-fill) See Note 2

RIGHT SIDE

4. BR Generator Bearings (Repack commutator end bearings) (When equipped with Life-Seal bearings or oil impregnated bushings, no lubrication is required)
5. Oil Filters (Remove, clean, renew elements and replace)

6. Distributor Cam Felt Wick OE Q
6. Radiator Shutter Linkage OE M

Engine Air Cleaners (Disassemble, clean and replace) (See Note 3) D

Compressor Air Cleaners (Disassemble, clean and replace) (See Note 3) D

7. Oil Filter Drain (Drain filter cases before removing tops) 2W
7. Crankcase Drain (Drain and re-fill) 2W

8. OE Starter Bearings (Remove plug, oil sparingly) (When equipped with Life-Seal bearings or oil impregnated bushings, no lubrication is required) M

LEFT SIDE

NOTES:

1. COLD WEATHER (When winterization kit is not available)—Every 3 days, drain crankcase and refill to "Full" mark with OE 10. Add 7 qts of gasoline and run engine 5 minutes to mix. Mark the new level on the oil gage for future reference.

CAUTION: Every ½ day check level and fill to "Full" mark with OE 10. If engine is to be shut down for ½ day or more, add 7 qts of gasoline to reach new level mark and run engine 5 minutes to mix. NOTE: Oil, fuel, Diesel may be used as a temporary diluent only when sufficient gasoline is not available.

WARNING: Diluent used is inflammable; do not service equipment near heater or open flame.

2. SHUTTER AIR FILTER. Weekly drain shutter air filter and refill with 4 parts of SOLVENT, Dry Cleaning, and one part OE #10, mix thoroughly, or when not available use Kysor Radiator Shutter Fluid. (Kysor Part #21764).

3. ENGINE and COMPRESSOR AIR CLEANERS. Blow out elements with compressed air. Do not clean with solvents.

4. OIL CAN POINTS. Weekly lubricate governor and carburetor external linkage, housing door hinges and latches, tool box hinges, weather cap hinges, hose reel lock pin with OE. Do not overlubricate.

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory and supersedes all conflicting lubrication instructions dated prior to the date of this Lubrication Order.

BY ORDER OF THE SECRETARY OF THE ARMY:

M. B. RIDGWAY,
General, United States Army,
Chief of Staff.

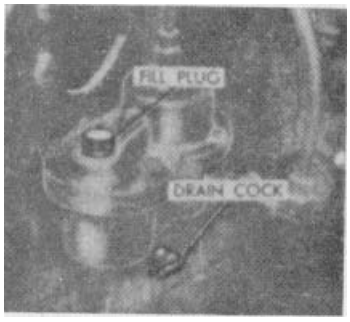
OFFICIAL:

WM. E. BERGIN,
Major General, United States Army,
The Adjutant General.

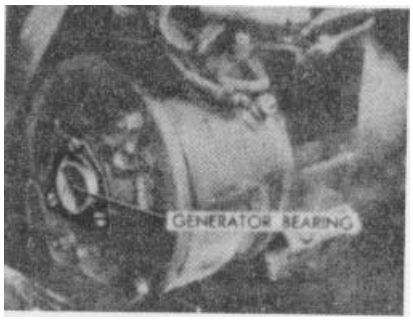
Figure 16. Lubrication order.

REFERENCE 1: Clean and oil before installation.

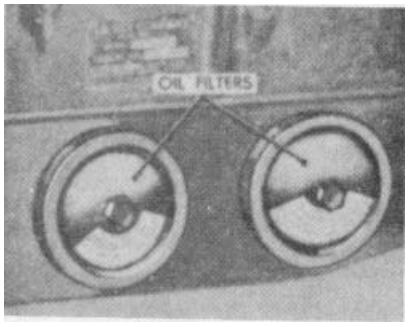
REFERENCE 2: Check crankcase oil level.



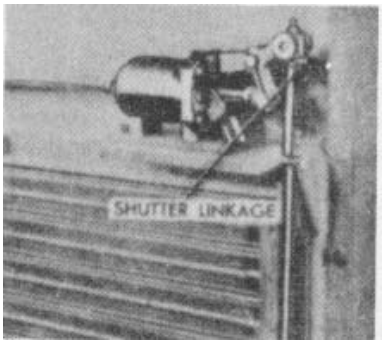
*REFERENCE 3**:** Lubricate shutter air filter. See Note 2.*



REFERENCE 4: *Repack both generator bearings.*



REFERENCE 5: Remove, clean, renew elements and replace oil filters.

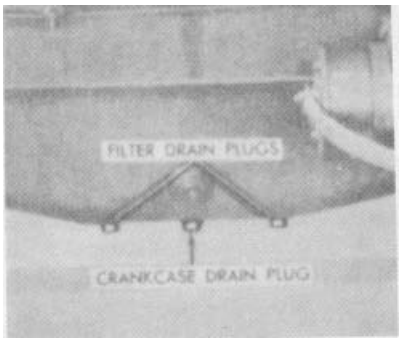


REFERENCE 6: Lubricate shutter linkage with 4 or 5 drops of oil.

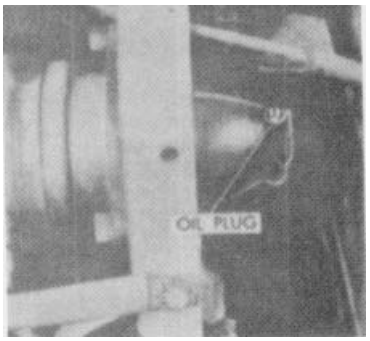
Figure 16-Continued.-

ment must be carefully protected from sand, dirt, rain, sleet, and so on, and must be kept as clean as possible. Never lay lubricating guns, couplers, or other equipment on the ground. When dispensing lubricant, wipe all dirt, moisture, or dust from around the opening before unscrewing or removing the plug or cap.

b. Points of Application. Follow the detailed lubrication instructions given beneath each lubrication point illustration (fig. 16) indicating procedures to be followed at each point. Apply the lubricant indicated on the lubrication order (fig. 16).



REFERENCE 7: Drain oil filters before removal. Drain crankcase.



REFERENCE 8: Add B to 10 drops of oil to starter end bearings.

Figure 16-Continued.

c. Cleaning. When dispensing lubricant, wipe all dirt, moisture, or dust from around the opening before unscrewing or removing the plug or cap. Use a clean, lint-free cloth dampened with cleaning solvent.

d. Operation Immediately After Lubrication. After lubricating the compressor, and especially after filling the engine crankcase, start and run the engine for approximately 5 minutes. The complete oil capacity for the crankcase includes the 5 gallon capacity of the sump and one-half gallon capacity of the sump and one-half gallon capacity of the oil filters. During the five minute running interval, enough oil will be by-passed into the filters for correct operation. It will then be necessary to check the oil level gage and refill the crankcase to the full mark.

e. Oil Filler and Breather Cap. Remove the oil filter and breather cap to fill the crankcase. Rinse the cap in gasoline and dip it in lubricating oil before installing it on the valve cover.

f. Oil Level Gage. Pull out the oil level gage and wipe the end with a clean cloth. Insert the gage into the crankcase, pull it

out a second time and read the oil level near the end of the gage. Insert the gage in the crankcase.

g. Shutter Air Filter. Remove the fill plug and open the drain cock. When the used lubricant has drained out, close the drain cock and add one ounce of the lubricant as described in the lubrication order. Install the fill plug.

h. Generator Bearings. Remove the bearing caps from both ends of the generator. Fill the bearings half full of new grease and install the bearing caps.

i. Oil Filters.

(1) *Removal.*

(a) Unscrew the two outer pipe plugs from the bottom of the oil pan, and drain the oil from the filters. The center pipe plug is the drain for the oil pan.

(b) Turn the filter cover bolt counterclockwise until the filter cover and gasket can be removed.

(c) Grasp the filter element pull ring, and pull the element from the oil filter case.

*(*2) Cleaning and inspection.

(a) Examine the inside of each filter case for oil sludge. If necessary, clean with a wire brush and kerosene or
Diesel fuel.

(b) Discard filter elements and cover gaskets and replace with new ones.

(3) *Installation.*

(a) Insert the new filter elements into the filter cases.

(b) Install the filter covers and gaskets, pressing the covers in against the tension spring until the threads of the cover bolts engage the tapped hole in the long mounting stud. Tighten the cover bolts.

(c) Install the filter drain plugs. Fill the crankcase with fresh oil, start the compressor (d above), and check for oil leaks. If necessary, tighten the filter cover bolts and drain plugs.

j. Shutter Linkage. With an oil can put a few drops of lubricating oil in the shutter linkage joints.

k. Crankcase and Filter Drain Plugs. Remove the two filter drain plugs to drain the oil filters, and the crankcase drain plug to drain the crankcase. Install the plugs.

l. Starting Motor End Bearing. Remove the plug in the starting drive housing and add lubricating oil. Install the plug.

43. Painting

Painted surfaces that show scratches and abrasions should be cleaned and repainted. Inspect all painted surfaces for chipping, peeling, and wrinkling. Sandpaper the damaged paint areas and repaint. Before applying paint, mask the identification plates, machined surfaces, wires and other electrical parts, breather cap, vents, and lubrication fittings. In general, apply paint to surfaces that have been painted and to no other. Refer to TM 9-2851 for specific painting instructions.

Section III. PREVENTIVE MAINTENANCE SERVICES

44. General

The operator of the truck mounted air compressor and the organizational maintenance personnel must perform their preventive maintenance services regularly, to make sure the air compressor operates well and to lessen the chances of mechanical failure.

45. Operator Maintenance

a. Inspections. Inspections must be made before operation, during operation, at halt, and after operation, as described in this section. All inspections of assemblies, subassemblies, or parts must include any supporting members or connections and must determine whether the unit is in good condition, correctly assembled, secure, or excessively worn. Any mechanical condition which may result in further damage to the unit must be corrected before the equipment is operated.

(1) The inspection for "good condition" is usually an external visual inspection to determine whether the unit is damaged beyond safe or serviceable limits, or to determine if it is in such a condition that damage will result from operation. The term "good condition" is further defined as: not bent or twisted; not chaffed or burned; not broken or cracked; not bare or frayed; not dented or collapsed; not torn or cut; adequately lubricated.

(2) Inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to determine whether it is in its normal assembled position in the equipment.

(3) Check of the unit to determine if it is "secure" is usually an external inspection, a hand-feel, or a pry-bar or wrench check for looseness in the units. Such an inspection should include brackets, lockwashers, locknuts, locking wires, or cotter pins used in the assembly.

(4) "Excessively worn" means worn close to or beyond serviceable limits, condition likely to result in a failure if replacement of the affected parts is not made before the next scheduled inspection.

b. Reporting Deficiencies. The operator will report all deficiencies on DD Form 110.

c. Before-Operation Services. The following services will be performed to determine if the condition of the equipment has changed since it was last operated, and to make sure the equipment is ready for operation. Any deficiencies must be corrected or reported to the proper authorities before the unit is put into operation.

(1) *Mounting*. Check the mounting of the engine compressor on the truck to make certain that it is secure.
(2) *Fuel*. Check fuel supply. See that the fuel tank is full. Check reserve supply of fuel and replenish if necessary.
(3*) Coolant*. Check coolant level in radiator and see that it is up to proper level. When filling cold radiators, allow room for expansion.
(4) *Lubrication*. Check oil level in engine crankcase. Add oil if necessary.
(5) *Leaks, general*. Check for leaks, paying particular attention to the cooling system, oil and fuel lines and connections, and for signs of leaks under the unit.
(6) *Visual inspection*. Make a general check of the entire unit for cracked or broken parts and loose or missing bolts. Before starting the unit, check the operation of all controls.
(7) *Starting precautions*. Make certain that the receiver service valves are open before attempting to start the engine. Check to see that the equipment is clear of tools and obstructions. Start engine and adjust equipment to proper operating tempo. Drain the moisture in the air receiver by opening the two drains in the bottom of the tank. Blow the condensation out of the pressure control lines by opening all air line drain cocks. Air line drain cocks are located at the No. 1 compressor cylinder head, at the shutterstat, at the shutterstat air filter, and at the slowdown assembly.
(8) *Safety valve*. Test the safety valve operation when the air receiver pressure gage reads 70 psi. Lift the valve handle to pop the valve manually.

(9) *Location*. Locate the unit so that it will be as level as possible to assure most efficient lubrication. The maximum allowable tilt is 15°.

(10) *Instruments*. Check the oil pressure gage and ammeter readings. The oil pressure should be between 15 and 100 psi and the ammeter in the charge range.

(11) *Hose (air).* Check the condition of the hose and hose connections and blow out any accumulation of dirt and moisture before attaching an air-operated tool.

d. During-Operation Services. The operator is responsible for correcting or reporting unusual sounds or odors, deficiencies in performance, or other signs of abnormal operation. He will perform the following specific services:

*(*1) *Instruments*. Check all gage and meter readings frequently. At normal operating speeds, temperature, and load, readings should be as follows:

Engine oil pressure.....15 to 100 psi
Coolant temperature.....180° to 215° F.
Air receiver pressure .....100 psi (sea level)
Battery-charging ammeter.....In charge range

(2) *Unusual operation*. Check for unusual operation such as excessive vibration, brush sparking, overheating, smoking. Report any irregularity immediately to the proper authority.

(3*) Unusual noises*. Check for abnormal noises. If any are noticed, stop operation and report to the proper authority.

e. At-Halt Services. During halts, even if only for short periods, the operator should make a general check of the equipment and correct or report any deficiencies noticed, in addition to performing the following specific duties.

(1) *Fuel*. Check fuel supply. Add fuel if necessary.

(2) *Oil.* Check oil in crankcase. Add oil if necessary.

(3) *Coolant*. Check coolant level and add if necessary.

Caution: If the engine overheats because of lack of coolant, allow it to cool before filling the radiator; otherwise there is a danger of cracking the cylinder head and block. If it is necessary to fill the radiator before the engine has cooled, be sure to fill it very slowly with the engine running at fast idling speed.

(4) *Leaks, general*. Check the entire air compressor for leaks, paying particular attention to fuel, oil, cooling system, and for signs of leaks under the unit.

(5) *Visual inspection*. Make a general check of the entire unit for cracked or broken parts and loose or missing bolts. If operating under extremely dusty conditions, inspect the air cleaner and service it according to the current lubrication order for this equipment. Inspect the air hose and connections for damage and worn or broken fittings.

f. After-Operation Services. To insure that the equipment is ready to operate at any time, the following services must be performed by the operator immediately after any operating period of 8 hours or less. All deficiencies must be corrected or reported to the proper authority.

(1) *Shutdown precautions*. Shut off all air service valves, allowing the engine to idle for a few minutes to permit even cooling. Snap ignition switch to the OFF position. Open all receiver and air line drain cocks to remove any moisture, dirt, and oil. Open air service valves to empty air receiver.

(2) *Fuel, oil, and coolant*. Check and refill all tanks. Change contaminated coolant. If antifreeze is added, run the engine to mix the solution thoroughly.

(3) *Clean equipment*. Clean all dirt and trash from around the air compressor. Remove excess dirt and grease from exterior of engine compressor, being sure to clean carefully around the spark plugs. Insects, trash, or dirt, can be removed from the radiator by directing a stream of compressed air through the rear of the radiator.

(4) *Tools and equipment*. See that all tools and equipment assigned to the air compressor are in serviceable condition, clean, and properly stowed or mounted.

(5) *Lubrication*. Lubricate the air compressor as required by the lubrication order.

(6) *Battery*. Be sure that the battery is clean, securely mounted, and not leaking. Inspect electrolyte for proper level. Be sure terminals ate tightly connected and that vent caps are clean and secure.

(7) *Fire extinguisher*. Check condition, mounting, and charge. Do not discharge any of content.

(8) *Visual inspection*. Make a general check of the entire unit for cracked or broken parts and loose or missing bolts. Check the fan belt tension. The fan belt should have a 3/4- to 1-inch deflection, without undue pressure at a point midway between the pulleys.

(9) *Protection*. Close the side doors of the engine compressor to protect the equipment against weather. If unit is to be out of operation for a lengthy period, see that all unpainted parts are covered with a film of rustpreventive compound. When exposed to the weather cover the unit with a suitable cover.

46. Maintenance and Safety Precautions

a. Correct or report any mechanical deficiencies that may result in damage to the unit if operation is continued.
b. Always stop engine before attempting adjustments, repairs, or lubrication.
c. Never pour cold coolant into radiator while engine is hot, as there is danger of cracking the cylinder head.
d. Keep electrical equipment clean and dry.
e. Always provide a metallic contact between container and tank when filling the gasoline tank.
f. Check the safety valve daily to make certain of its performance.
g. Exercise extreme caution while using compressed air. At close range, the air pressure this unit develops can put out eyes, burst ear drums, and cause serious skin blisters.

47. Organizational Maintenance

a. Organizational preventive maintenance is performed by organizational maintenance personnel, with the aid of the operator, at weekly and monthly intervals. The weekly interval will be equivalent to 60 hours of use. The monthly interval will be equivalent to 4 weeks, or 240 hours of use, whichever occurs first.

b. The column headed technical inspection is provided for the information and guidance of personnel performing technical inspection, and constitutes the minimum inspection requirements for the equipment.

c. Responsibility for performance of preventive maintenance services rests not only with operators, but with the entire chain of command from section chief to commanding officer (AR 700-105).

WEEKLY AND MONTHLY SERVICES
(For use with DA Form 464)

Note: Operators will assist the unit mechanics in performing the weekly and monthly PM services.

Technical Inspection	Service		
	Monthly	Weekly	
			GENERAL
1	1	1	*Before-Operation Services*. Check and perform services listed in daily before-operation services.
2	2	2	*Lubrication*. Inspect the entire machine for indication of insufficient lubrication (fig. 16).
.....	2	2	Lubricate if necessary. Refer to the current lubrication order.
3	3	3	*Tools and Equipment*. Inspect condition of all tools and equipment assigned to the machine.
.....	3	3	See that all tools and equipment assigned to the machine are clean, serviceable, and properly stowed or mounted. See that the tool box is in good condition and that it closes and fastens properly.
4	4	4	*Fire Extinguisher*. Carbon tetrachloride type. Check for full charge by removing the filler plug. See that the operating mechanism is not corroded and that it is securely mounted Carbon dioxide (CO_2) type. Inspect for insecure mounting, kinked or damaged hose, and missing or broken seal. If the seal is missing or broken, the extinguisher should be weighted to determine the amount of charge. The empty and full weights are stamped on the valve body.
.....	4	4	See that any deficiencies noted are corrected or reported to the proper authority.
5	5	5	*Publications*. See that a copy of this technical manual TB 5-5065-1, and current lubrication order and Standard Form 91 are on the machine and in serviceable condition.
6	6	6	*Appearance*. Inspect the general appearance of the machine, paying special attention to cleanness, legibility of identification, markings, and condition of paint.

Technical Inspection	Service		
	Monthly	Weekly	
			GENERAL-Continued
.....	6	6	See that deficiencies noticed are corrected or reported to the proper authority.
7	7	.....	*Modifications*. See if all available modifioation work orders applying to this machine have been completed and recorded on DA Form 478 (MWO and Major Unit Assembly Replacement Record-Organizational Equipment File).
			ENGINE AND ACCESSORIES
1	11	11	*Cylinder Heads, Manifolds, and Gaskets.* Inspect the cylinder heads, manifolds, and exhaust pipe for leaks, loose mounting bolts and nuts, and defective gaskets.
.....	11	11	Tighten any loose manifold and exhaust pipe mounting bolts and nuts. Replace any defective gasket. On new or reconditioned engines, check all cylinder-head bolts for tightness at the first weekly service. The correct torque-wrench pull is 90 foot-pounds.
12	12	12	*Valve Mechanism*. Check the valve adjustment if excessive valve noise or loss of power is noticed. The approximate valve-rocker arm clearance with the engine cold is 0.014 inch for both valves.
.....	12	12	Adjust the valve-rocker arm clearance if necessary. Be sure the valve-cover gasket is in good condition and that the cover fits securely.
13	13	.....	*Compression Test*. Test the compression of all cylinders and record the readings on DA Form 464. Normal compression pressure at cranking speed is 75 to 80 psi open throttle.
14	14	14	*Crankcase, Breather*. Inspect the crankcase for leaks. Check the condition of crankcase breather and cap.
.....	14	14	Correct or report any oil leaks noticed. Change the oil and clean the breather if necessary. Refer to the current lubrication order.
15	15	15	*Oil Filters*. Inspect the oil filter assembly connections for leaks while the engine is running.

Technical Inspection	Service	
	Monthly	Weekly
	15	15
16	16	16
.....	16	16
18	18	18
.....	18	18
20	20	20
.....	20	20
38	38	38
.....	38	38

ENGINE AND ACCESSORIES-Continued

Service the oil filters as specified in the current lubrication order. After servicing, check carefully for leaks while the engine is running.

Radiator and Shutter. Inspect the radiator for leaks, obstructions in core air passages, and loose mounting bolts. Check all cooling system hose for leaks, excessive deterioration, and loose connections. Check operation of shutters. Shutters should open when water temperature gage registers 180° to 190° F.

Drain, flush, and refill the cooling system if coolant is contaminate(l with rust or dirt. See that core air passages are clean. Replace any damaged or defective cooling system hose, lines, and gaskets. See that all mounting bolts and connections are tight. Protect the coolant from freezing, and record its freezing point on DA Form 464.

Fan, Belt, and Pulleys. Check condition and mounting of fan blades. Inspect for worn, cracked, or frayed belt. Check belt tension and condition and alinement of pulleys. Belt is properly adjusted when it can be deflected 3/ to I inch from normal position at a point midway between the pulleys.

Adjust the tension of the belt if necessary. Replace belt if frayed or badly worn.

Governor and Linkage. Check the governor adjustment. If the engine surges when running at top speed without load, the governor is out of adjustment.

Adjust the governor if necessary. Report any deficiencies not corrected to the proper authority.

FUEL SYSTEM

Fuel Pump and Housing. Inspect fuel pump and lines for leaks. Check for loose mounting and assembly screws. Check sediment bowl for water and dirt.

Tighten any loose screws and connections.

Clean sediment bowl if it contains water or

Technical Inspection	Service	
	Monthly	Weekly
39	39	39
.....	39	39
41	41	41
.....	41	41
43	43	43
.....	43	43
44	44	44
.....	44	44
46	46	46
.....	46	46
.....	46	.....

FUEL SYSTEM-Continued

dirt. See that screen is clean. Make sure gasket is in good condition before replacing bowl. Replace defective pump with a new or reconditioned one.

Carburetor and Linkage. See if all carburetor mounting and assembly bolts and screws are in place and secure. Check flexibility and operation of linkage.

Tighten any loose mounting and assembly bolts and screws. Replace worn or damaged linkage connections.

Air Cleaner. Inspect air cleaner for loose connections. Check condition of filter element.

Service air cleaner as specified in the current lubrication order.

Fuel Tank, Cap, and Gasket. Inspect frame and mounting of fuel tank. Check tank, gasket, and connections for leaks.

See that tank is securely mounted, air vent open, and filler cap clean and tight fitting. Repair or replace leaky or damaged gaskets and connections.

Fuel Lines. Check the fuel lines for leaks, loose connections, and damage.

Repair or replace damaged or collapsed fuel lines. Tighten loose connections. Report all uncorrected deficiencies to the proper authority.

ELECTRICAL SYSTEM

Spark Plugs. Inspect spark plugs for dirty or cracked insulators.

Clean dirt and oil from spark plug insulators. Replace defective plugs.

Remove and clean spark plugs and adjust point gap. Proper gap is 0.023 to 0.028 inch. See that plugs and gaskets are in good condition before they are reinstalled.

Technical Inspection	Service	
	Monthly	Weekly
47	47	47
.....	47	47
48	48	48
48	48	.....
.....	48	48
49	49	49
.....	49	49

ELECTRICAL SYSTEM-Continued

Battery. Inspect battery for cracked and leaky case, for loose holdown clamps, and for dirt and corrosion on top of battery. Check for loose, corroded, or damaged terminals and cables. Check level of electrolyte. Proper level is approximately Vs to %/8 inch above the plates. Check specific gravity, and record reading on DA Form 464. Readings from 1.275 to 1.300 indicate a fully charged battery. Readings of 1. 225 or below indicate battery should be recharged or replaced.

Clean all dirt and corrosion off top of battery, posts, cables, and terminals. Replace damaged cables. Apply a thin film of chassis grease over terminals. Add clean or distilled water if needed to bring solution up to proper level. If freezing temperatures prevail, battery must be charged for a period long enough to mix solution thoroughly. Where possible, water should be added just before beginning operation. See that battery is securely mounted, that fillercaps are tight, and that vent holes are open.

Generator and Starter. Inspect generator and starting motor for loose mounting bolts and wire connections.

Inspect commutators and brushes for excessive wear, dirt, and oil deposits. See if brushes are free in their holders and if brush wires are secure. If brushes are worn to less than one-half their original length, they must be replaced.

Tighten any loose mounting bolts and wire connections. Replace or free brushes, and clean commutators if necessary.

Distributor. Inspect distributor cap and rotor for cracks, burned contacts, and corroded terminals. Correct point gap is 0. 020 inch.

Clean or replace distributor cap and rotor, and adjust breaker points if necessary. Replace points if necessary. Replace points if they are badly burned or pitted.

Technical Inspection	Service	
	Monthly	Weekly
50	50	50
.....	50	50
51	51	51
.....	51	51
57	57	57
.....	57	57
58	58	58
.....	58	58
59	59	59

ELECTRICAL SYSTEM-Continued

Coil, Wiring, Switches. Check coil for loose mounting, cracked insulation, and other defects. Inspect wiring for oil-soaked, cracked, or frayed insulation; broken wires, and loose or corroded connections.

Replace defective coil, switches, and wires. See that connections are clean and tight. See that all switches and wiring conduits are securely mounted. Replace or report defective or damaged switches and external wiring.

Voltage Regulator. Check the voltage regulator for proper operation and secure mountings. See that wire connections are tight. The regulator should allow an appreciable charge to go into the battery after the starter is used. After the battery is fully charged, the ammeter should read only a slight charge.

Tighten any loose or replace any missing mounting screws. Replace the regulator if it is defective.

CONTROL SYSTEM

Gages. Inspect temperature, oil, and air pressure gages on control panel for cracked or broken glass, insecure mounting, and defective operation.

See that gages are securely mounted. Replace damaged or defective gages.

Meter. Inspect ammeter for cracked or broken glass, loose mounting screws, and defective operation.

Tighten or replace loose or missing mounting screws. Replace damaged or defective meters.

Safely Valve and Service Valves. Trip the safety valve by hand when starting the unit and when the air receiver pressure reaches 70 psi. Do not change the safety valve setting. Inspect the two air receiver service valves for proper seating.

Technical Inspection	Service	
	Monthly	Weekly
.....	59	59
62	62	62
.....	62	62
71	71	71
.....	71	71
80	80	80
.....	80	80
84	84	84
.....	84	84
142	142	142
.....	142	142
144	144	144

CONTROL SYSTEM-Continued

Report any deficiency to the proper authority.

Linkage. Inspect all control linkage for loose or missing bolts and screws, and for defective operation. Check the linkage for worn or missing connecting pins or locking pins.

Tighten or replace any loose or missing bolts, screws, and pins.

Slowdown Valve. Check to see if the slowdown valve moves the throttle lever to slow down the engine.

Report any deficiency to the proper authority.

FRAME AND MOUNTINGS

Frame. Inspect for cracks, breaks, broken welds, and for loose and missing bolts.

Tighten or replace all loose or missing bolts. See that cracks, breaks, and broken welds are repaired before further damage results.

Mounting. Inspect the mounting springs, rebound clips, and vibration dampers for cracks. Tighten the mounting nuts if they are loose.

Replace broken or cracked springs and vibration dampers.

COMPRESSOR

Aftercooler and Connections. Inspect aftercooler for obstructions in core air passages. Make certain that connections are tight and that air leaks are not evident.

Clean aftercooler core if necessary and tighten any loose mounting bolts and connections.

Valve (Inlet and Discharge). Check valves for leaks or unusual noises. Unusual noises usually indicate broken valve plates or springs. Leaks are indicated by failure of compressor bank to pump up to normal reservoir pressure.

Technical Inspection	Service	
	Monthly	Weekly
.....	144	144
145	145	145
.....	145	145
146	146	146
.....	146	146
147	147	147
.....	147	147
148	148	148
.....	148	148

COMPRESSOR-Continued

Remove valve if necessary and clean thoroughly. Replace all broken or damaged parts.

Unloader Pilot Valve. Check unloader piot valve for proper operation. Compressor should unload approximately 100 psi. If pilot valve chatters during operation, the differential range is set too close.

Adjust pilot valve setting if necessary.

Cylinder Head Valves and Gaskets. Inspect cylinder- head mounting bolts for tightness. The correct torque-wrench pull on cylinder-head bolts is 90 foot- pounds and on valve nuts is 25 foot-pounds. Check for leaks.

Tighten cylinder-head and valve mounting bolts if necessary. Correct any leaks.

Crankcase and Oil Filter. Inspect crankcase, oil filter, and lines and connections for leaks.

Change crankcase oil and replace oil filter elements as directed in the current lubrication order. See that all connections are tight.

Air Cleaners. Inspect air cleaners for secure mountings and tighten connections.

Service air cleaners as directed in the current lubrication order. See that all connections are tight.

Section IV. TROUBLESHOOTING

48. Use of Troubleshooting Section

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air compressor or any of its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause.

Note

All references in this section to paragraphs in chapter 5 (pars. 176 through 235) pertain to operations that are the responsibility of the field

and depot maintenance personnel. Organizational maintenance personnel should not proceed without proper authority.

49. Engine Fails to Start

Probable cause	*Possible remedy*
a. Lack of fuel.	Fill tank and prime carburetor.
b. Overchoking.	Let engine stand for a few minutes then repeat starting procedure without choking.
c. Dirt in fuel lines.	Disconnect and clean fuel lines (par. 71).
d. Fouled spark plug.	Remove, clean, adjust, and replace.
e. Water in fuel.	Drain and refill fuel tank (par. 72); clean fuel pump bowl (par. 74).
f. Loose wiring.	Tighten connections.
g. Defective distributor.	Clean and adjust points (par. 95). Check condenser and coil. Replace if necessary (pars. 200 through 204). See note in paragraph 48.
h. Weak batteries.	Test specific gravity (par. 90). Recharge if necessary.
i. Loose governor levers.	Tight or replace as necessary (par. 110).
j. Leaking intake manifold gasket.	Replace (par. 120).
k. Leaking valves.	Grind valves and seats (par. 122).
l. Improper ignition timing.	Check timing with timing check light (par. 98).
m. Improper valve timing.	Check valve adjustment (par. 121).

50. Engine Misfires

Probable cause	*Possible remedy*
a. Fouled spark plug.	Remove, clean, adjust and replace (par. 96).
b. Loose wiring.	Tighten connections.
c. Defective distributor.	Clean and adjust points (par. 96). Check condenser and coil. Replace if necessary (pars. 200 through 204). See note in paragraph 48.
d. Leaking cylinder head gasket.	Tighten head nuts (par. 122). Replace gasket if necessary (par. 122).
e. Leaking intake manifold gaskets.	Replace gaskets (pars. 120 and 123).
f. Dirt in fuel lines.	Disconnect and clean (par. 71).
g. Water in fuel.	Drain and refill tank (par. 72). Clean fuel pump bowl (par. 74).
h. Improper fuel mixture.	Adjust carburetor (par. 77).
i. Broken or warped valves.	Replace (par. 122).
j. Sticking valves.	Clean and inspect. Replace if necessary (par. 122).
k. Improper valve clearance.	Adjust (par. 121).
I. Improper ignition timing.	Check timing with timing check light (par. 98).

51. Engine Overheats

Probable cause	*Possible remedy*
a. Low coolant level.	Fill radiator and check for leaks.
b. Obstructed or broken water hose.	Flush cooling system (par. 80). Replace hose (par. 86).
c. Radiator shutters do not open or close.	Adjust shutterstat (par. 189). See Note in paragraph 48.
d. Clogged radiator.	Flush cooling system (par. 80). Clean radiator fins.
e. Obstructed water jackets.	Flush cooling system (par. 80).
f. Partly closed choke valve.	Push choke control button in.
g. Improper fuel mixture.	Adjust carburetor (par. 77). Blow out air cleaner (par. 76).
h. Improper ignition timing	Check timing with timing check light (par. 98).
i. Diluted oil.	Change crankcase oil (fig. 16).
j. Improper lubrication.	Check against Lubrication Order 5-5065 (fig. 16).
k. Overload.	Check load against operating capacity.

52. Engine Does Not Develop Full Power

Probable cause	*Possible remedy*
a. Improper fuel mixture.	Adjust carburetor (par. 77). Blow out air cleaner (par. 76).
b. Improper ignition timing.	Check timing with timing check light (par. 98).
c. Obstructed exhaust line.	Place a few drops of oil on weather cap hinge (fig. 16).
d. Loose governor levers.	Tighten or replace as necessary (par. 110).
e. Fouled spark plugs.	Remove, clean, adjust, and replace (par. 96).
f. Defective distributor.	Clean and adjust points (par. 95). Check condenser and coil. Replace as necessary (pars. 200 through 204). See note in paragraph 48.
g. Oil too thin.	Change crankcase oil (fig. 16).
h. Leaking spark plug gaskets	Replace gaskets (par. 96).
i. Leaking cylinder head gasket.	Tighten head nuts (par. 122). Replace gasket if necessary (par. 122).
j. Improper valve clearance.	Adjust (par. 121).
k. Worn valve seats.	Grind valves and inserts (par. 122). Replace if necessary.
l. Sticking or worn piston rings.	Replace (par. 233). See note in paragraph 48.
m. Weak valve springs.	Replace (par. 122).
n. Worn pistons.	Replace (par. 223). See note in paragraph 48.
o. Worn cylinder sleeves.	Replace (par. 225). See note in paragraph 48.

53. Engine Knocks

Probable cause	*Possible remedy*
a. Lack of oil.	Add oil to FULL mark on oil-level gage.
b. Improper ignition timing.	Adjust timing with timing check light (par. 98).
c. Improper valve clearance.	Adjust valve to rocker arm clearance (par. 121).
d. Worn pistons.	Replace (par. 23). See note in paragraph 48.

e.	Worn cylinder sleeves.	Replace (par. 225). See note in paragraph 48.
f.	Loose piston pins.	Replace (par. 223). See note in paragraph 48.
g.	Worn connecting rod bushing.	Replace (par. 223). See note in paragraph 48.
h.	Worn timing gears.	Install new camshaft and new crankshaft gear (pars. 222 and 224). See note in paragraph 48.
i.	Carbon in cylinders.	Remove carbon (par. 223). See note in paragraph 48.
j.	Excessive main bearing clearance.	Replace bearings (par. 222). See note in paragraph 48.
k.	Excessive connecting rod bearing clearance.	Replace bearings (par. 223). See note in paragraph 48.

54. Faulty Carburetion

	Probable cause	*Possible remedy*
a.	Carburetor out of adjustment.	Adjust carburetor (par. 77).
b.	Clogged air cleaner.	Blow out air cleaner elements (par. 76).
c.	Water in fuel supply.	Drain and refill fuel tank (par. 72). Clean sediment bowl at fuel pump (par. 74).
d.	Clogged fuel line.	Blow out fuel line (par. 71).
e.	Leaking intake manifold.	Replace gasket (par. 120).
f.	Leaking engine cylinder head gasket.	Tighten cylinder head nuts to recommended torque of 90 ft-lbs. Replace gasket if necessary (par. 122),
g.	Leaking valves.	Grind valves and valve inserts (par. 122). Replace if worn.

55. Unusual Noise in Air Receiver or Compressor Cylinder Head

	Probable cause	*Possible remedy*
a.	Broken valve plates or springs.	Replace defective parts (par. 126).
b.	Intake valves sticking.	Remove carbon from valve plate. Free valve springs and unloader plunger.

56. Failure to Pump Up to Pressure

	Probable cause	*Possible remedy*
a.	Leaking compressor valves or broken valve plates or springs.	Replace defective parts (par. 126).
b.	Clogged compressor air cleaners.	Remove and clean filter elements (par. 123).

c. *Unloader pilot out of adjust-* ment.	Adjust unloader pilot (par. 107).
d. Leaks in gaskets or air line fittings.	Check fittings. Replace worn gaskets (pars. 124 and 126).
e. Worn or broken piston rings.	Replace piston rings (par. 223). See note in paragraph 48.

57. Unit Stalls Before Loading

Probable cause	*Possible remedy*
a. Suction valve unloader plunger is stuck.	Replace defective parts (par. 126).
b. Pilot valve air liner loose.	Tighten air liner.
c. Check and bleed valve out of adjustment.	Adjust check and bleed valve (par.106).
d. Diaphragm end screws loose.	Tighten diaphragm end screws.

58. Compressor Cylinder Bank Knocks

Probable cause	*Possible remedy*
a. Low oil level.	Fill crankcase to FULL mark on oil level gage.
b. Loose or worn connecting rod bearings.	Replace connecting rod bearings (par. 223). See note in paragraph 48.
c. Loose or worn piston pins.	Replace piston pins (par. 223). See note in paragraph 48.

59. Unloader Pilot Chatters

Probable cause	*Possible remedy*
Differential pressure range set too close.	Adjust unloader pilot (par. 107).

60. High or Low Air Pressure Gage Reading

Probable cause	*Possible remedy*
a. Unloader pilot out of adjust- ment.	Adjust unloader pilot (par. 107).
b. Intake valve unloader plunger is stuck.	Replace defective parts (par. 126).
c. Faulty air pressure gage.	Replace air pressure gage (par. 102d).

61. Low Oil Pressure

Probable cause	*Possible remedy*
a. Lack of oil.	Fill crankcase to FULL mark on oil level gage.
b. Oil sludge.	Drain and refill crankcase with fresh oil. Replace oil-filter elements.
c. Clogged suction screen.	Remove, clean and reinstall suction screen (par. 218). See note in paragraph 48.
d. Sticking pressure relief valve.	Remove, clean and reinstall relief valve (par. 219). See note in paragraph 48.
e. Clogged lines to oil pressure gage or defective gage.	Disconnect and clean oil line (par. 219). See note in paragraph 48. Replace oil pressure gage if necessary (par. 102c).

62. Low Charging Rate When Engine is Running

Probable cause	*Possible remedy*
a. Loose generator drive belt.	Tighten generator drive belt (par. 92a).
b. Faulty generator operation.	Replace generator brushes (par. 92b). Replace generator if necessary (par. 92c and d). Overhaul generator (par. 196). See note in paragraph 48.
c. Defective current and voltage regulator.	Adjust or replace regulator (par. 197). See note in paragraph 48.

63. Panel Light Does Not Light

Probable cause	*Possible remedy*
a. Defective panel bulb.	Replace bulb (par. 103d).
b. Defective ignition switch.	Replace the switch (par. 103b),

64. Starting Motor Does Not Operate

Probable cause	*Possible remedy*
a. Weak batteries.	Change batteries (par. 90c).
b. Loose or corroded connections.	Clean and tighten connections.
c. Defective starting switch.	Replace switch (par. 103a).
d. Defective magnetic switch.	Replace switch (par. 99). Repair if necessary (par. 199). See note in paragraph 48.
e. Worn brushes.	Replace brushes (par. 94).
f. Dirty commutator.	Clean commutator (par. 198d). See note in paragraph 48.
g. Shorted armature.	Repair or replace armature (par. 198d). See note in paragraph 48.
h. Defective field coils.	Replace coils (par. 198d). See note in paragraph 48.

Section V. RADIO SUPPRESSION

65. Definition of Suppression

Radio suppression is the effective elimination of electrical disturbances within the equipment which interfere with radio reception and which disclose the location of the air compressor and associated equipment to suitable detectors.

66. Source of Interference

The spark plugs, ignition wires from distributor to spark plugs, starting motor, generator and poor electrical grounds between mounted electrical parts and the compressor mounting frame are common sources of electrical interference.

67. Methods Used to Suppress Interference

(fig. 17)

a. *Shielding*. Distributor to spark plug wires are shielded. Shielded wire is used between the ammeter and voltage regulator

and from voltage regulator to generator. All battery cables are shielded.

b. Bonding. All cable clamps and bonding straps are securely attached with bolts and external toothed lockwashers. Bonding straps are installed at the following points:

(1) One bond strap from the compressor support frame to the bolt which attaches magnetic switch to battery box.

(2) One bond strap from instrument panel to hood top.

(3) Two bond straps from radiator to compressor support frame.

(4) Two bond straps from front engine support to upper oil pan.

(5) Two bond straps from rear engine support to compressor support frame.

(6) One bond strap from voltage regulator support to crankcase upper oil pan.

(7) One bond strap from voltage regulator ground to generator stud.

c. Capacitor. A capacitor is connected from the center voltage regulator terminal to the frame. It filters the spark discharge and prevents electrical radiation.

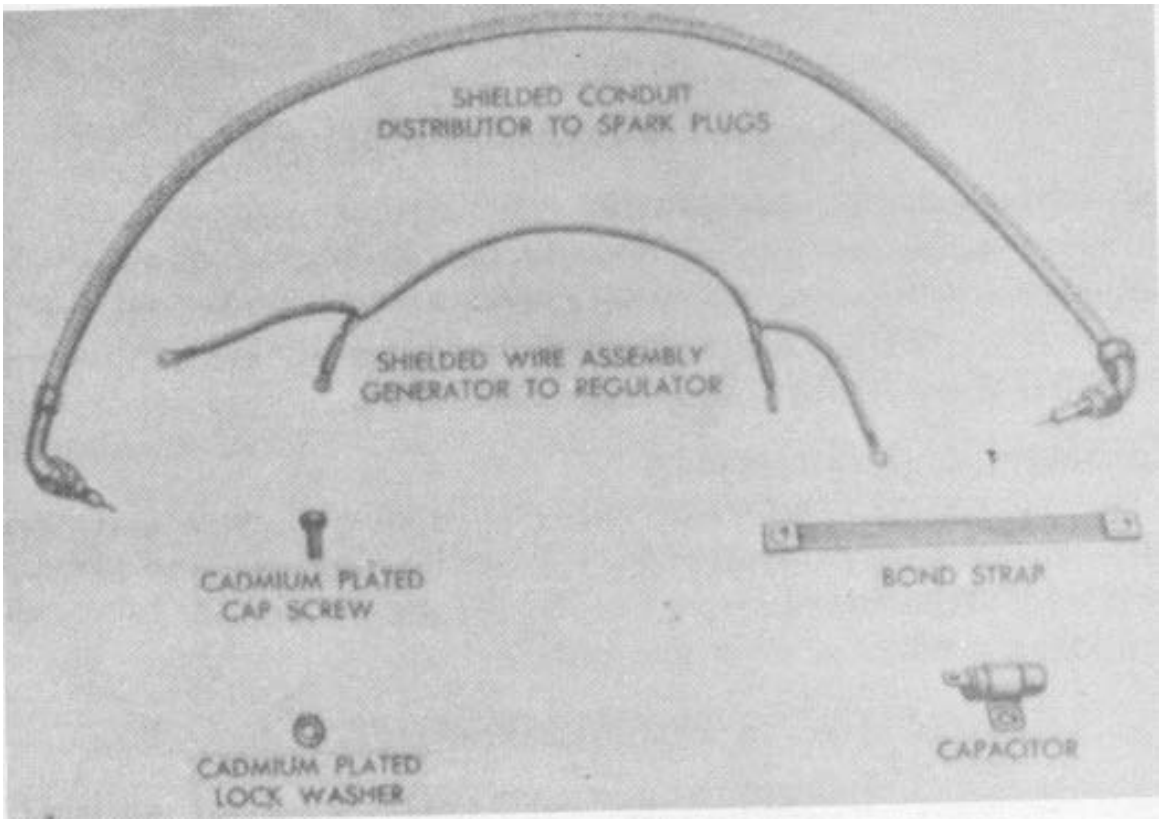


Figure 17. Radio suppression components.

68. Suppression System Testing

a. Install a battery-powered radio receiver in good operating condition not more than 10 feet from the air compressor. A wide band receiver covering the frequency range of 0.55 to 156.0 megacycles is preferred.

b. Start the equipment and tune the receiver. Turn receiver volume control to maximum and select three widely separated frequencies for listening. Use frequencies that are free from signals with strong carriers so that the receiver will be in its most sensitive operating condition.

c. Operate the engine throttle manually and listen to receiver speaker or headset. A regular clicking sound which varies with engine speed and ceases the instant the ignition switch is shut off is caused by the ignition circuit.

d. Systematically replace the suppression components in the compressor (par. 69), testing after the replacement of each component to see if the trouble has been eliminated. Make sure that bonding straps and all electrical components (voltage regulator, generator, and so forth) are securely attached and mounted.

69. Suppression Component Replacements

a. General. When replacing suppression components, be sure that new components are interconnected and attached in exactly the same position as the defective material was originally installed.

It is important that toothed lockwashers be used for attaching bonding straps to assure a firm bond.

b. Ignition System Components.

(1) One bond strap is located between voltage regulator ground and generator stud and one bond strap connects the voltage regulator support to the crankcase upper oil pan.

(2) One bond strap is located between magnetic switch mounting bolt and compressor support frame.

(3) A capacitor is connected between the voltage regulator center terminal and the frame.

c. Instrument panel.

(1) One bond strap is connected between the instrument panel and the top hood of the compressor housing.

(2) Shielded wire connects the ammeter to the voltage regulator.

d. Engine parts.

(1) A bond strap connects each side of the radiator to the compressor support frame.

(2) A bond strap is located on each side of the equipment from the front engine support to the crankcase upper oil pan.

(3) A bond strap is located on each side of the equipment from the rear engine support to the compressor frame.

Note

The replacement of the suppression components is obvious and requires no detailed instructions.

Section VI. FUEL SYSTEM

70. Description

The fuel system consists of a 42-gallon fuel tank, a single downdraft carburetor, a fuel pump, a double air filter to protect the intake from grit and dirt and a variable speed governor. Included are the necessary fuel lines from tank to pump and from pump to carburetor and the governor-to-carburetor connections. Figure 18 illustrates the fuel system schematically.

71. Cleaning Fuel Lines

a. Close the shutoff valve below the fuel tank, and disconnect the fuel line from the tube elbow below the tank (fig. 18).

b. Hold a suitable receptacle below the fuel pump and disconnect the tank-to-pump fuel line and pump-to-carburetor fuel line from the tube elbows in the pump.

c. Disconnect the fuel line from the carburetor inlet opening, meanwhile holding a shallow receptacle under the carburetor to catch whatever fuel is in the carburetor bowl.

d. Blow out the fuel lines with compressed air. Make certain that the fuel line connector threads are not stripped or otherwise damaged.

e. Reconnect the pump-to-carburetor and pump-to-tank fuel lines, and open the shutoff valve below the fuel tank.

f. Operate the fuel pump primer lever a few times to bring fuel up into the pump bowl.

72. Draining and Cleaning the Fuel Tank

a. Remove the drain plug from the bottom of the fuel tank and drain the fuel into clean receptacles for later possible re-use. It is advisable to filter the gasoline through layers of cheese cloth to remove foreign particles or sediment that may be present in the tank.

b. Flush the interior of the tank with gasoline, filtering the gasoline into a receptacle as it emerges from the drain opening. Repeat this process until the filtering cloth indicates that the draining gasoline is free of sediment.

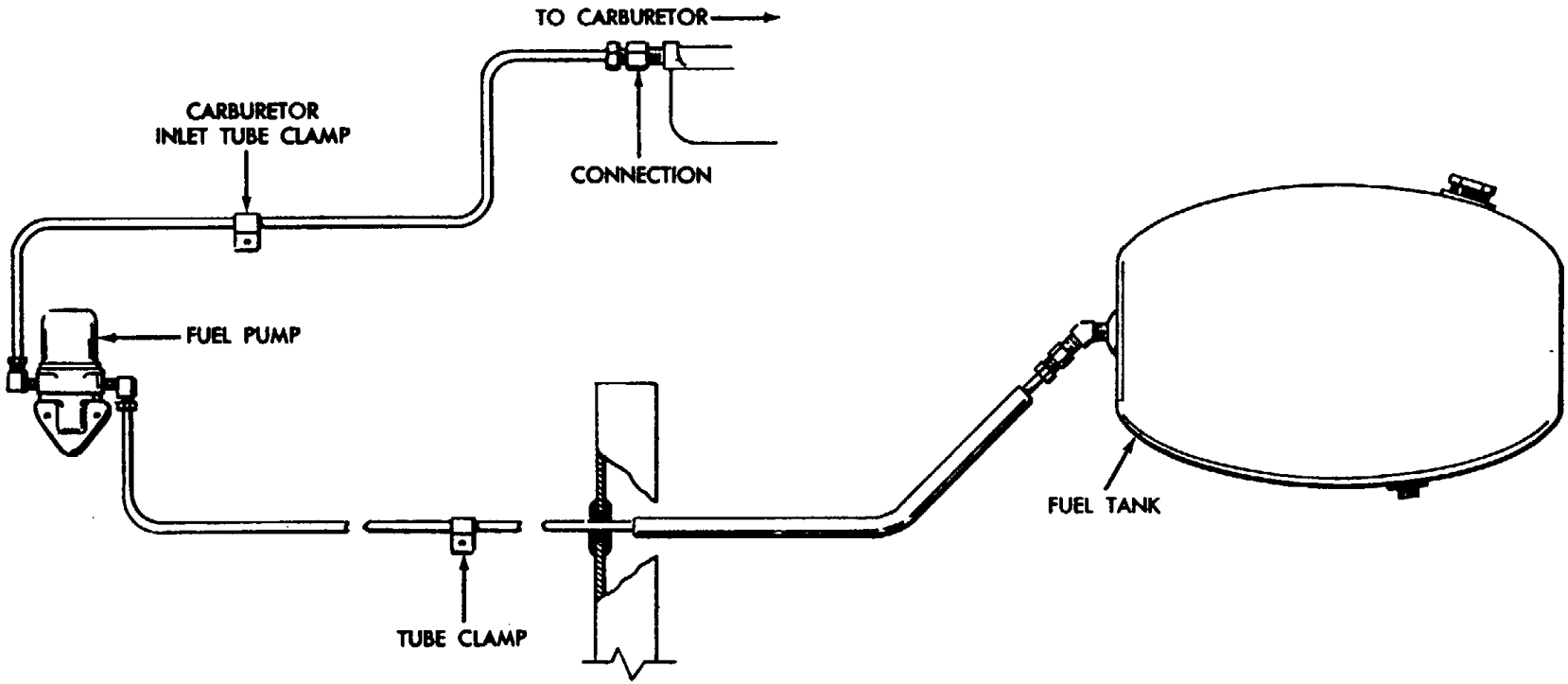
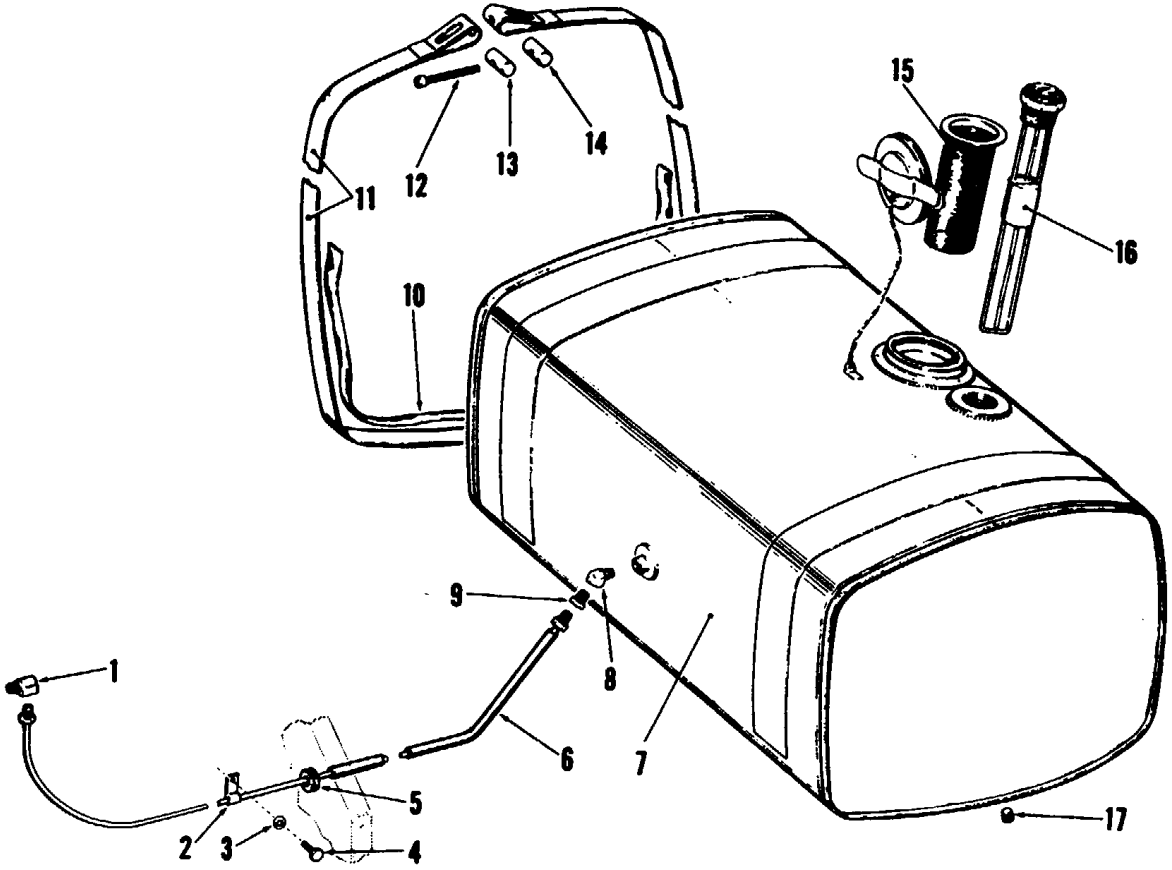


Figure 18. Diagram of fuel system.



1 Elbow
2 Clamp
3 Lockwasher
4 Cap screw
5 Grommet
6 Tube assembly
7 Fuel tank
8 Elbow
9 Connector
10 Packing
11 Strap
12 Cap screw, ⅜–16 x 3 (2 req)
13 Washer
14 Nut
15 Screen
16 Fuel level gage
17 Pipe plug, ¼

Figure 19. Exploded view of fuel tank and fittings.

c. Reinstall the drain plug and fill the tank (42 gallons) with a good grade of gasoline.

d. Make certain that the air vent hole in the tank fillercap is open. If necessary, clean out the vent hole with a short length of wire.

e. Examine the exterior of the tank for bare or rusty spots.

Repaint if necessary (par. 43).

73. Replacing Fuel Tank

a. Removal (fig. 19). Refer to paragraph 128 for removing part of the housing to make the fuel tank accessible. Disconnect the tube assembly (6) at the connector (9). Remove the cap screws (12), washers (13), and nuts (14). Take off the straps (11) from around the air receiver and fuel tank (7). Remove' the fuel tank from the unit. The fuel line to the fuel pump can be removed by disconnecting the elbow (1) at the fuel pump and removing it from the tube assembly. Take out the cap screw (4) with lockwasher (3) and remove the clamp (2). Pull the tube assembly through the grommet (5) in the rear support. Unscrew the cover and lift out the screen (15). Unscrew the fuel level gage (16). Remove the elbow (8) with the connection and the pipe plug (17). The packing (10) need not be removed.

b. Installation (fig. 19). Screw the elbow (8), pipe plug (17), and fuel level gage (16) into the fuel tank (7). Put in the screen (15) and screw on the tank cover. Slide the tube assembly (6) through the grommet (5). Screw the elbow (1) into the fuel pump and attach the tube assembly. Install the clamp (2) with the cap screw (4) and lockwasher (3). Place the fuel tank in position under the air receiver and install the straps (11) around both tanks with the cap screw (12), washer (13) and nut (14). Screw the tube assembly into the connector (9). Replace the part of the housing which was removed (par. 130).

74. Cleaning Fuel Pump

a. Loosen the thumb nut at the top of the fuel pump bail (fig. 20), and swing the bail down out of the way.

b. Remove the fuel bowl, bowl gasket and screen from the fuel pump cover.

c. Clean the screen thoroughly with solvent, and wipe out the inside of the bowl with a lint-free cloth.

d. Inspect the bowl gasket carefully. Replace gasket if there are any doubts as to its condition.

e. Reinstall the bowl gasket and bowl, and swing the bail up into place. Tighten the thumb nut securely.

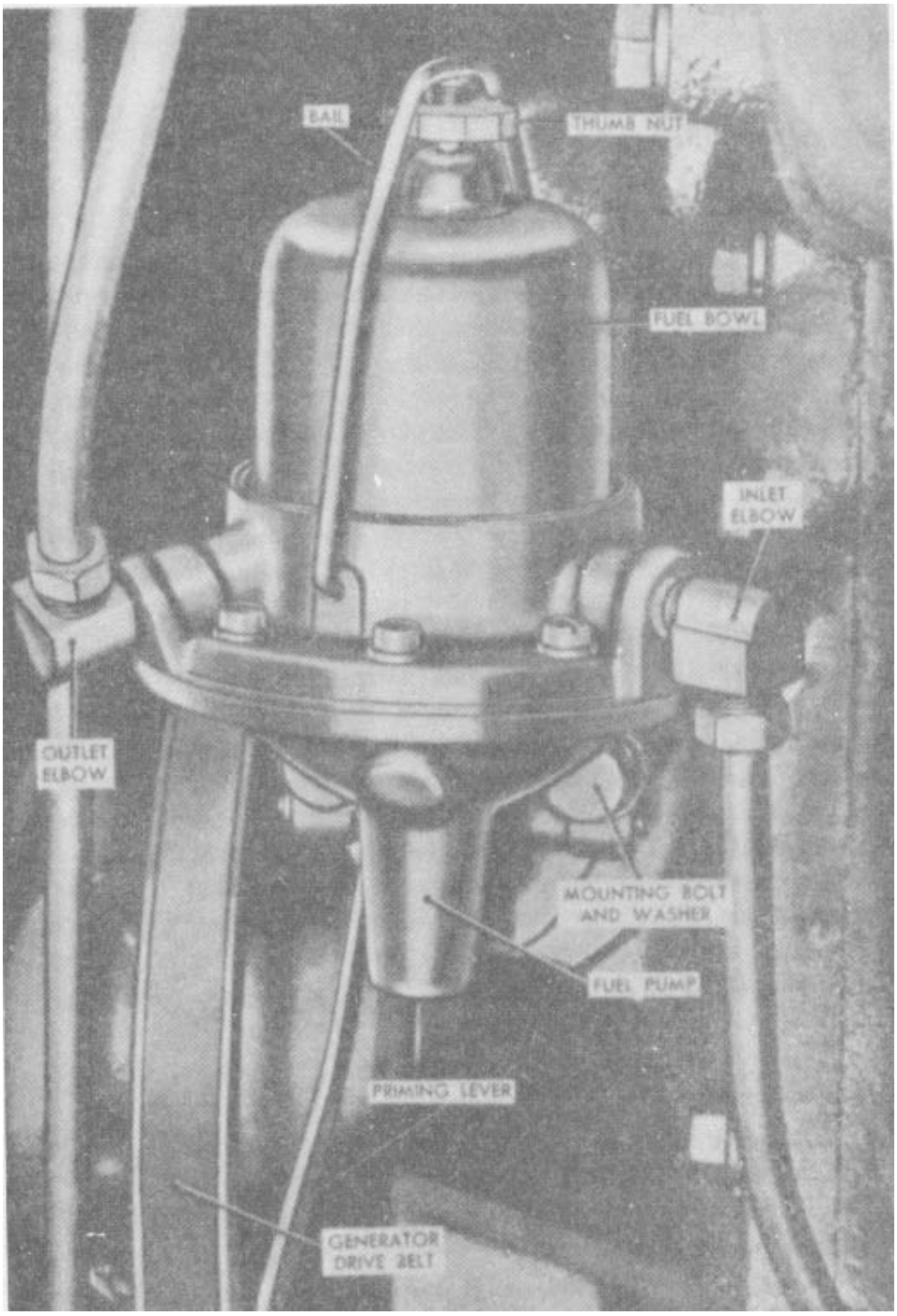


Figure 20. Fuel pump installed.

75. Replacing Fuel Pump

a. Removal (fig. 20).

(1) Disconnect the inlet and outlet fuel lines from the tube elbows in the fuel pump cover.

(2) Remove the mounting bolts and lockwashers that attach the fuel pump to the engine crankcase, and carefully lift off the fuel pump and pump mounting gasket.

b. Installation (fig. 20).

(1) With the mounting gasket in place against the mounting surface of the pump body, insert the rocker arm on the fuel pump through the opening in the engine. Make sure that the "pad" or flat surface of the rocker arm rests against the fuel cam of the engine camshaft.

(2) Hold the pump and gasket in position against the engine and install the two mounting bolts and lockwashers. Start the bolts by hand to prevent damage to the threads; then tighten them securely with a wrench.

(3) Make certain that the fuel lines are in proper alinement with the tube elbows in the pump cover. Connect both fuel lines, starting the tube nuts with the fingers and then tightening securely with a wrench of proper size.

76. Servicing Engine Air Cleaners

(fig. 21)

a. The air filter covers (4) are held in place with a spring (3). Remove the covers and lift out the filter elements (6).

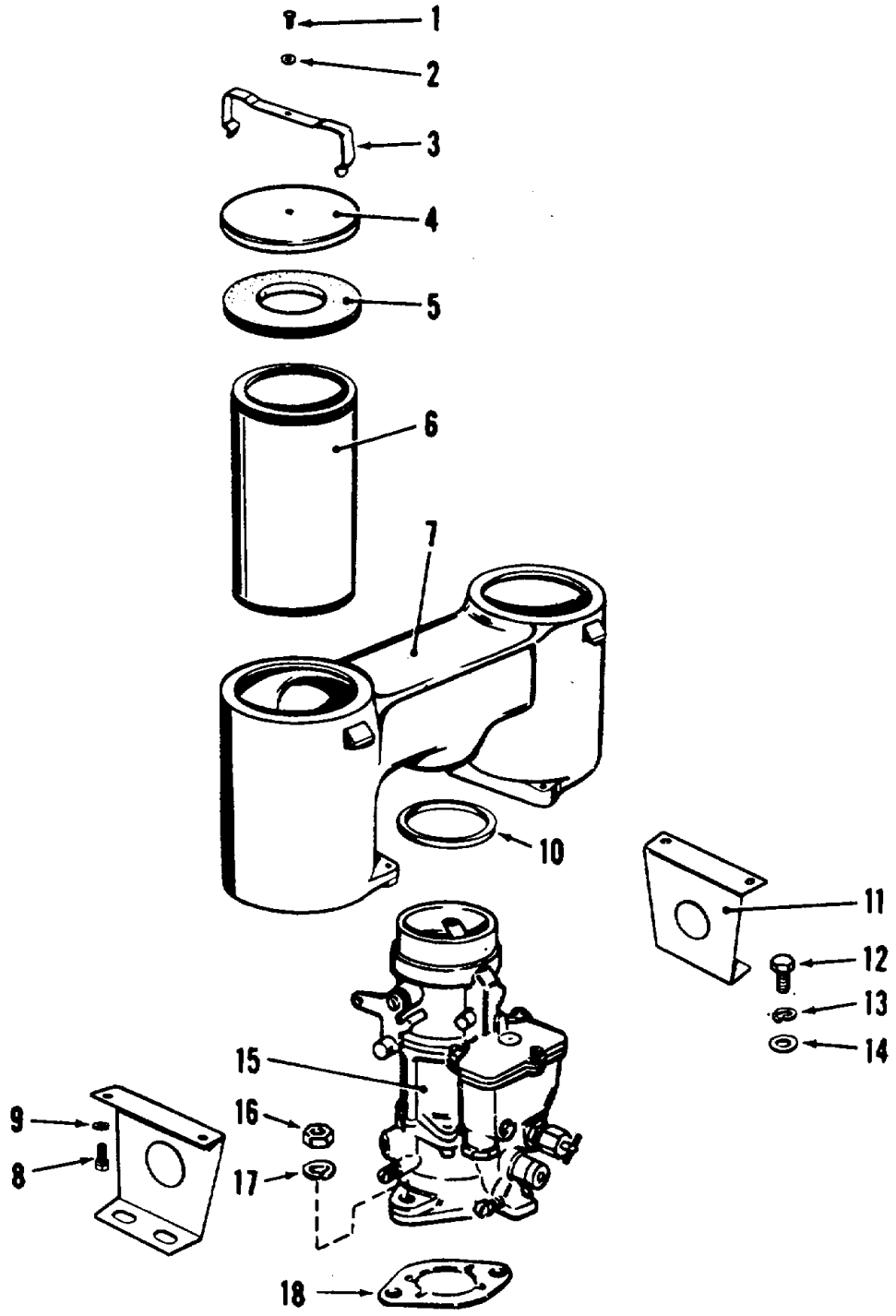
b. Blow out the filter elements with compressed air. Wipe out the inside of the filter connections with a lint-free cloth dampened with solvent.

c. If, upon inspection, gaskets have loosened from the air cleaner, remount and adhere with Pliobond or No. EC 11 cement.

d. After cleaning, insert the filter elements down into the connections, and reinstall the covers.

77. Carburetor Description and Adjustment

a. Description (fig. 22). The carburetor is a single downdraft unit, incorporating both a primary and secondary venturi. A fuel screen in the fuel inlet can be removed for cleaning or replacement by unscrewing the hex head plug that holds the screen in place. Fuel enters the bowl by passing around the fuel valve. The fuel valve assumes a more or less fixed opening, as regulated by the float, sufficient to maintain a proper level in the fuel bowl equal to the fuel demand of the engine. At slow idle, the idle adjusting needle controls the idle mixture delivery. Turning the



1	Rivet, rd hd, 3/16 x ⅜	10	Packing ring
2	Washer No. 10	11	Filter support
3	Spring	12	Bolt, hex hd, ⅜–16 x ¾ (4 req)
4	Cover	13	Lockwasher, ⅜ (4 req)
5	Gasket	14	Plain washer, ⅜ (4 req)
6	Air filter element	15	Carburetor
7	Air filter connection	16	Nut, hex, ⅜–24 (2 req)
8	Bolt, hex hd, ¼–20 x ½ (4 req)	17	Lockwasher, ⅜ (2 req)
9	Lockwasher, ¼ (4 req)	18	Carburetor gasket

Figure 21. Exploded view of carburetor and air cleaner.

needle clockwise creates a leaner idling mixture; turning the needle counterclockwise makes the mixture richer. In the double venturi system, the main venturi determines the maximum volume of air to be admitted into the engine, while the secondary venturi is used to increase the suction on the high speed system and to aid in the complete atomization of fuel. A power jet, or "economizer" controls the additional fuel required for maximum power at full throttle operation.

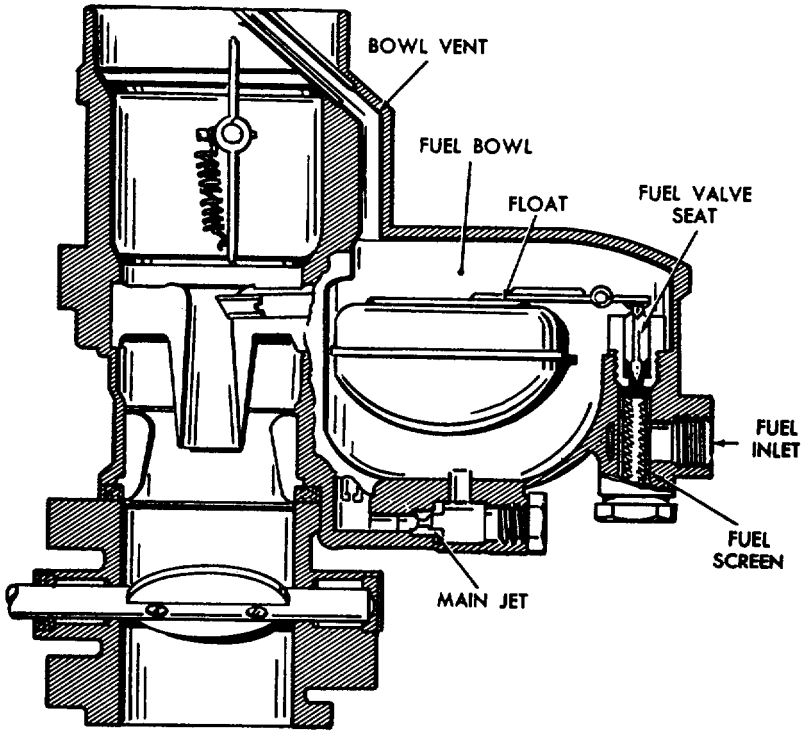


Figure 22. Cutaway view of carburetor.

b. Adjustment (fig. 23).

(1) Start the engine-compressor and allow it to run until warm. Then set the throttle stop screw for desired idling speed. Idle speed should be between 500 and 700 rpm, and the speed at which the idle is actually set should be that speed when a minimum amount of vibration takes place. It may be necessary to make a fine adjustment of the throttle stop screw after adjusting the idle adjustment needle.

(2) the idle adjustment needle to obtain the smoothest possible idle of the engine. Turning the needle in (clock wise) cuts off the flow of fuel and makes the air-fuel mixture leaner. Turning the needle out (counterclock-

wise) permits more fuel to enter the air stream and makes the mixture richer. Avoid using too lean a mixture. Good performance and fuel economy depend on an idling mixture that is well balanced.

(3) Hold the throttle approximately half-open. Turn the main jet adjustment needle clockwise until the engine begins to run irregularly, indicating a lean mixture. Then turn the needle back out slowly and carefully, counting the complete turns of the needle required before the engine begins to show a trace of rich mixture. The final main jet adjustment will be a point halfway between the lean point and the rich point. Hold the needle firmly, and tighten the packing nut to prevent leakage of fuel around the needle.

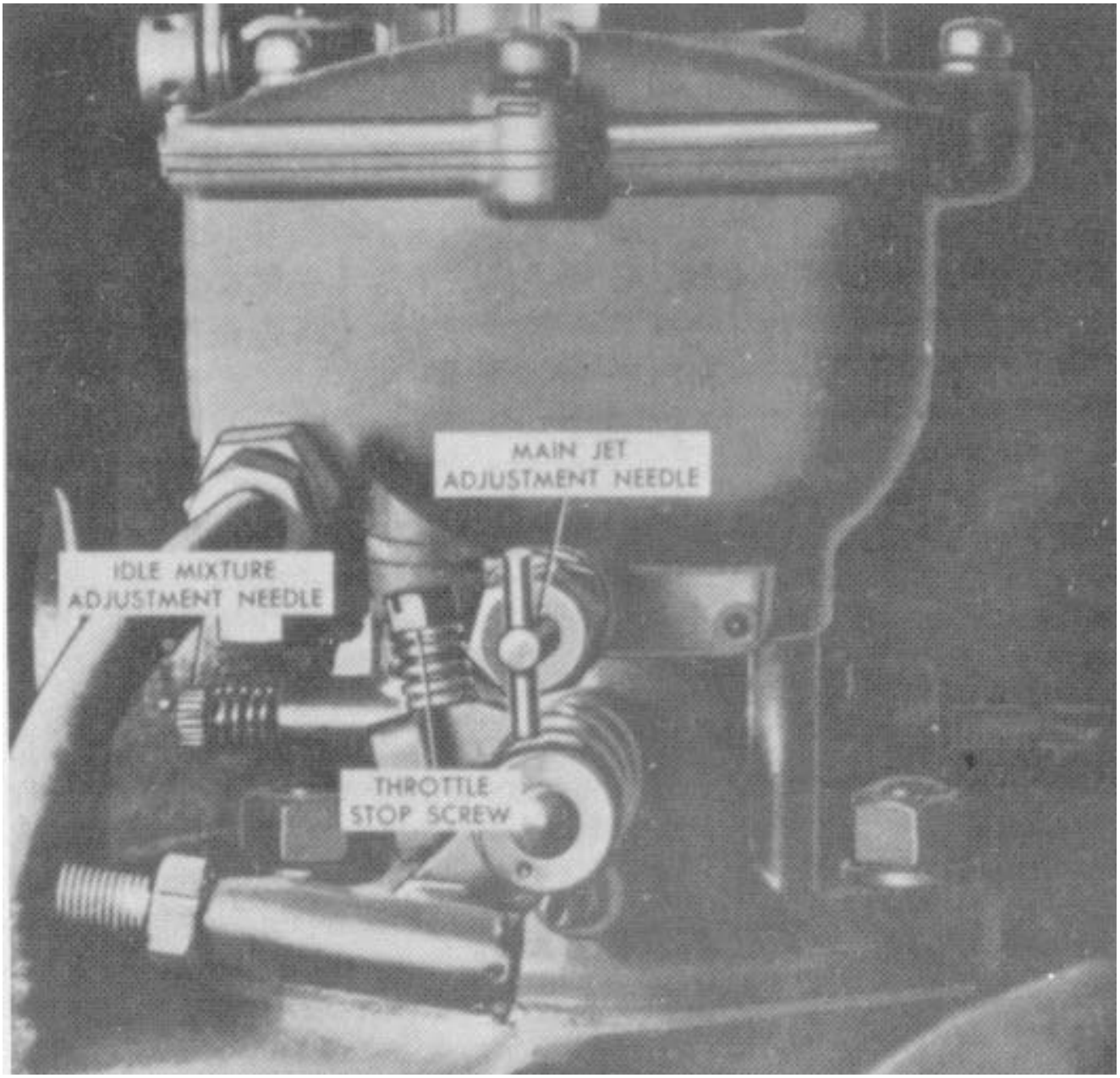


Figure 23. Carburetor adjustments.

78. Carburetor

(fig. 21)

a. Removal.

(1) Remove the four bolts (8) and lockwashers (9) that fasten the air cleaner assembly (1 through 7) to the filter supports (11). Lift the assembled air cleaner and the packing ring (10) from the carburetor (15).

(2) Disconnect the pump-to-carburetor fuel line from the carburetor fuel inlet.

(3) Disconnect the governor rod from the carburetor throttle lever.

(4) Remove the two hex nuts (16) and lockwashers (17) and lift the carburetor and its gasket (18) from the intake manifold studs.

b. Installation.

(1) Position the carburetor (15) and its mounting gasket (18) on the engine intake manifold studs, and install the two hex nuts (16) and lockwashers (17). Tighten the nuts securely.

(2) Reconnect the governor rod to the carburetor throttle lever.

(3) Reconnect the fuel line to the carburetor fuel inlet.

(4) Install the packing ring (10) and assembled air cleaner (1 through 7) and fasten the air cleaner to the supports (11) with the four hex head bolts (8) and lockwashers (9).

(5) Adjust the carburetor, if necessary, as instructed in paragraph 77b.

Section VII. COOLING SYSTEM

79. Description

(fig. 24)

a. Water Pump Circulation. The water pump circulates coolant from a common suction connection leading from the radiator bottom tank into two individual discharge connections. One connection directs coolant to the engine bank; the other directs coolant to the compressor bank.

b. Engine Bank Circulation. From the engine bank connection, coolant passes around the cylinder liners and up through cored holes in the engine cylinder head. Jacketing is provided to avoid overheating the intake and exhaust valves in the cylinder head. After cooling the engine cylinder head and combustion

chamber, the coolant flows into the exhaust manifold and through the water hose into the radiator top tank.

c. Compressor Bank Circulation. From the compressor bank connection, coolant passes around the cylinder liners and up through cored holes in the compressor cylinder head. Jacketing is provided in the compressor cylinder head to lower the temperature of the compressed air being diverted into the compressor discharge manifold. After cooling the compressor cylinder head and valves, the coolant flows through the engine intake manifold and into a common connection which merges with the coolant from the exhaust manifold. The coolant then is directed through the water hose into the radiator top tank.

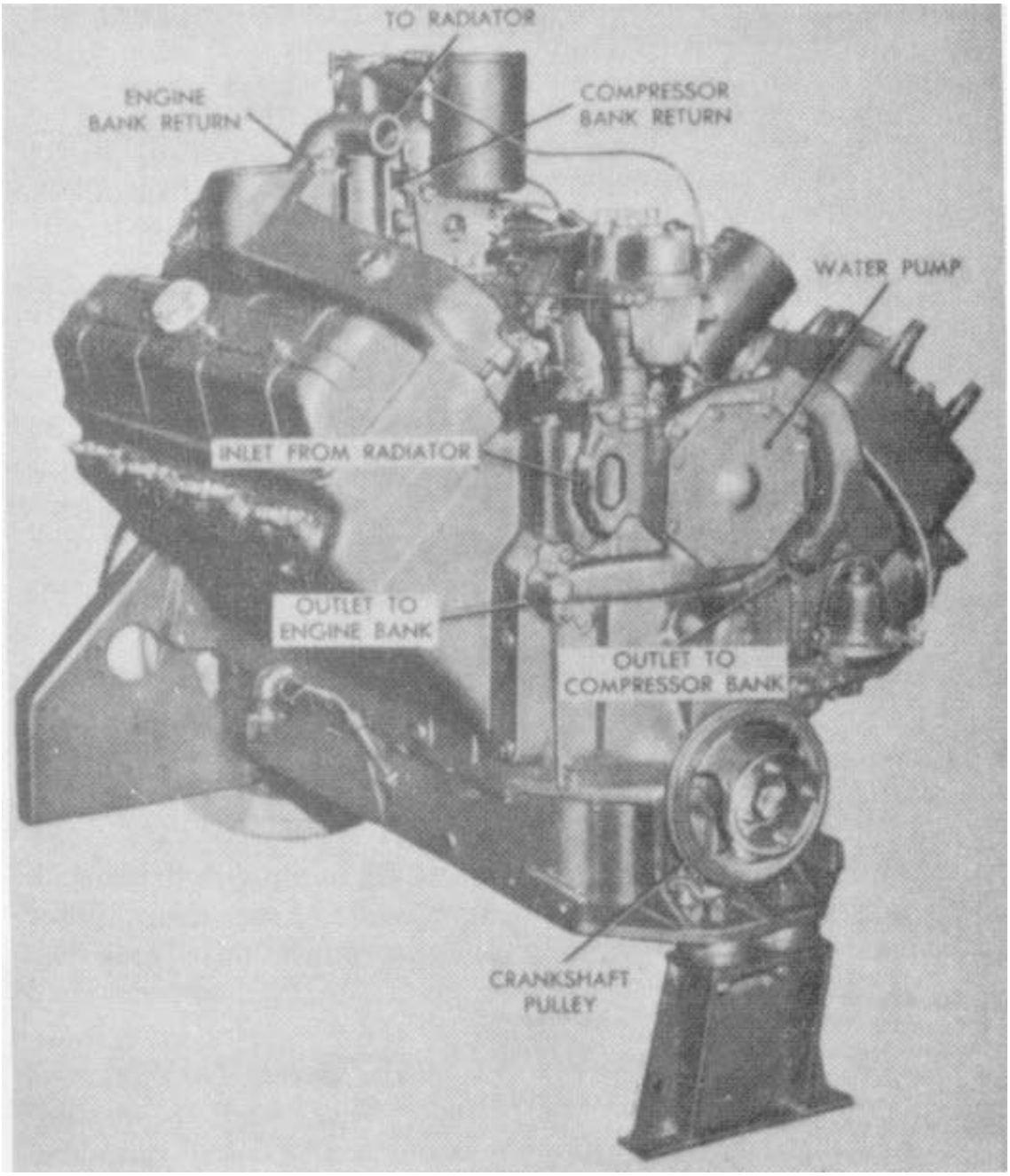


Figure 24. Engine-compressor cooling system

d. Air Shutter System. The radiator shutters are operated by an air cylinder connected with a shutterstat and an air filter to an air line from the air receiver. The shutterstat is mounted in the coolant connection between the water pump body and the radiator. As long as the temperature of the coolant remains normal (below 180° F.), the air line from the air receiver to the air cylinder is "open" and the cylinder plunger holds the pivoting shutter lever in a raised position to keep the radiator shutter closed. However, as the temperature of the coolant approaches 180° F., the shutterstat element expands, forcing the needle valve toward its Seat. Thus, the air pressure to the cylinder is decreased gradually, and the cylinder spring forces the plunger toward the cylinder air inlet. The shutter lever is pivoted downward, opening the radiator shutters.

80. Flushing the Cooling System

The entire cooling system must be flushed approximately every 1,024 hours of operation to remove dirt, foreign matter, and liming deposits. In hard water areas, flush the system more frequently. The flushing procedure is as follows:

a. Open the radiator drain cock and the two drain cocks in the crankcase, and drain all coolant from the entire system.

> ***Note.*** **One crankcase drain cock is located on each side of the engine-compressor crankcase. Be sure to open both drain cocks.**

b. Prepare a cleaning solution of one pound of washing soda to every three gallons of water (a total of 5 1/2 pounds of washing soda and 16 1/2 gallons of water). Close the radiator drain cock and fill the system with the cleaning solution.

c. Start the engine and allow it to run for 30 minutes after it has reached normal operating temperature (180° to 215° F.).

d. Drain the cleaning solution from the cooling system (a, above) and thoroughly flush the system with clean, soft water to remove all traces of solution.

e. After the system has been thoroughly flushed with clean soft water, close the radiator drain cock and fill the cooling system with 10-gallons of antifreeze solution and 6 1/2 gallons water. Add an acceptable rust inhibitor.

81. Shutterstat
(fig. 25)

a. Removal.

(1) Close the shutoff cock (29) in the air filter air inlet line (27).

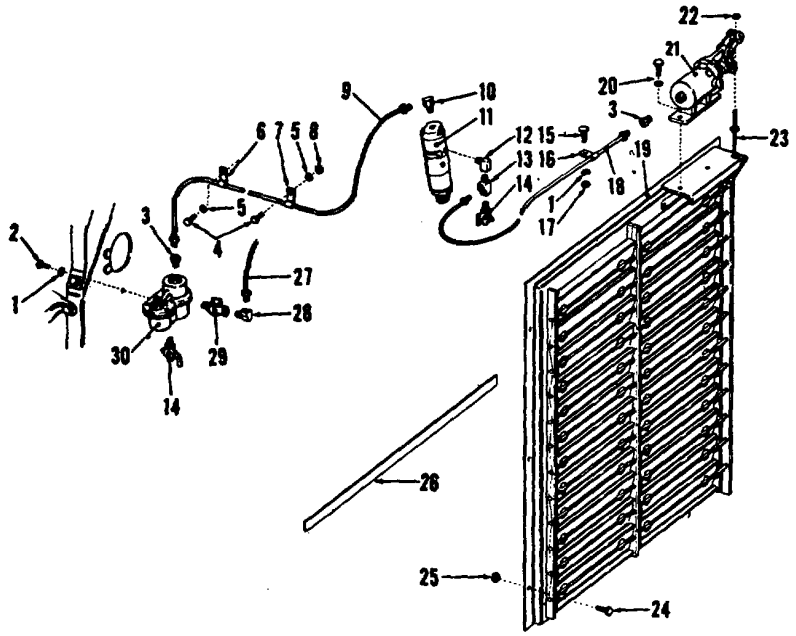
(2) Disconnect the air line (9) from filter to shutterstat and the elbow (10) at the top of the shutterstat.

(3) Disconnect the air line (18) from shutterstat to air cylinder and the tee (13) at the side of the shutterstat.

(4) Unscrew the shutterstat (11) from the water pump inlet connection and remove the elbow (12), tee (13) and drain cock (14) from the shutterstat outlet opening.

b. Installation.

(1) Assemble the elbow (12, fig. 25), tee (13) and drain cock (14) to the shutterstat (11), and screw the shutterstat down into the opening in the water pump inlet connection.



1	Lockwasher, 1/4 (2 req)	17	Nut, hex 1/4-20 (1 req)
2	Cap screw, 1/4-20 x 5/8 (2 req)	18	Air line, 1/4 x 40
3	Connector, 1/4 x 1/8 M (2 req)	19	Shutter assembly
4	Bolt, hex hd, 5/16-18 x 1/2 (2 req)	20	Bolt, hex hd, 5/16-18 x 5/8 (2 req) and washer
5	Lockwasher, 5/16 (4 req)	21	Air cylinder
6	Clamp	22	Nut, hex, 4-28 (1 req)
7	Clamp	23	Control rod
8	Nut, hex, 5/16-24 (1 req)	24	Bolt, hex hd, 5/16-18 x ½ (6 req)
9	Air line, 1/4 x 50	25	Nut, special (6 req)
10	Elbow, 1/4 x 1/8 M x 90°	26	Packing
11	Shutterstat	27	Air line, 5/16 x 30
12	Elbow 1/8 M x 1/8 F x 90°	28	Elbow, 5/16 x 1/8 M x 90°
13	Tee, 1/8 M x 1/8 F x 1/4	29	Shutoff cock
14	Drain cock (2 req)	30	Air filter
15	Cap screw, 1/4-20 x 1/2 (1 req)		
16	Clamp		

Figure 25. Exploded view of radiator shutter and controls.

(2) Connect the air line (18) to the tee (13) and the air line (9) to the elbow (10).

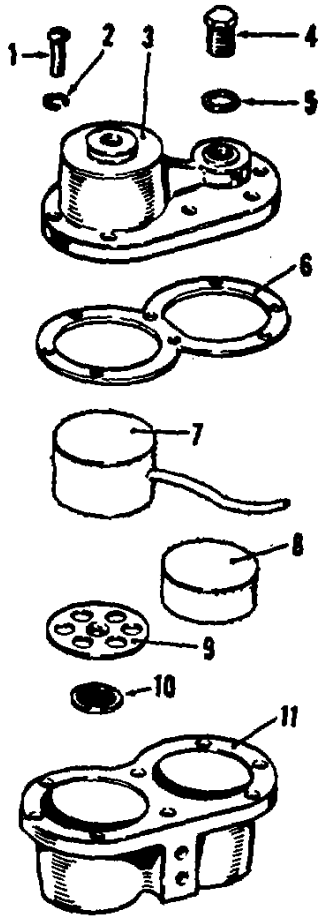
(3) Open the shutoff cock (29).

82. Shutter Air Filter

a. Removal (fig. 25).

(1) Close the shutoff cock (29).

(2) Disconnect the air line (9) from filter to shutterstat and the connector (3) in the top of the filter (30).
(3)



1	Screw, cover (7 req)	7	Felt, with oiler
2	Lockwasher (7 req)	8	Felt
3	Top filter body	9	Filter disk
4	Filler plug	10	Filter screen
5	Filler plug gasket	11	Bottom filter body
6	Filter body gasket		

Figure 26. Exploded view of shutter air filter.

(3) Remove the two hex head bolts (2) and lockwashers (1) that fasten the filter (30) to the rear engine support.

(4) Pull the filter and air line (27) carefully away from the side of the engine, and hold the shutoff cock (29) firmly while unscrewing the filter from the male threads of the shutoff cock.

b. Disassembly (fig. 26).

(1) Remove the cover screws (1) and lockwashers (2) and disassemble the top filter body (3) and gasket (6) from the lower filter body (11).

(2) Remove the felt with oiler (7) from the top filter body and the filter disk (9), felt (8) and filter screen (10) from the bottom filter body.

c. Cleaning. Wash all parts, including the felts, with cleaning solvent, and blow dry with a low pressure air jet. If the compressor has been in operation for a year or more, discard the felts and replace with new ones.

d. Reassembly (fig. 26).

(1) Place the filter disk (9) and then the filter screen (10) into the countersunk ledge of the bottom filter body (11) to protect the body cavity which contains the air inlet opening.

(2) Insert the felt (8) into the remaining cavity in the bottom filter body. It is this latter cavity that will be filled with radiator shutter fluid after installation.

(3) Insert the felt with oiler (7) up into the top filter body (3), threading the oiler through the oil hole in the top body so that it can be inserted into the fluid reservoir of the bottom body.

(4) Fasten the top body (3) and gasket (6) to the bottom body with the cover screws (1) and lockwashers (2).

(5) Remove the filler plug (4) and gasket (5) from the top body, and carefully poke the oiler, or wick, down under the felt (8). Temporarily reinstall the filler plug and gasket.

e. Installation (fig. 25).

(1) Hold the shutoff cock (29) firmly, and carefully screw the air filter (30) onto the threads of the shutoff cock.

(2) Aline the tapped holes in the bottom of the filter with the drilled holes in the rear engine support and install the two hex head bolts (2) and lockwashers (1).

(3) Connect the air line (9) to the connector (3) in the top of the filter. Start the tube nut with the fingers; then tighten with a proper size wrench.

(4) Fill the fluid reservoir of the filter as instructed in the lubrication order (par. 42g) and reinstall the filler plug.

(5) Open the shutoff cock (29).

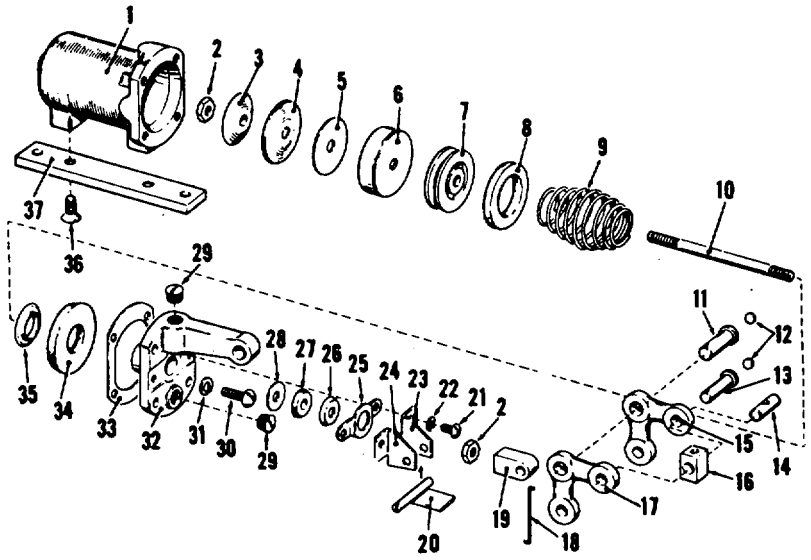
83. Shutter Air Cylinder

a. Removal (fig. 25).

(1) Close the shutoff cock (29), and disconnect the air line (18) from the connector (3) in the air cylinder (21).

(2) Remove the hex nut (22) from the shutter control rod (23).

(3) Remove the two hex head bolts (20) and lockwashers (5), and lift the air cylinder (21) and bracket from the shutter assembly (19).



1	Cylinder body	21	Screw, rd hd, No. 10-24 x 1/4 (2 req)
2	Nut, hex jam, 5/16-18 (2 req)	22	Lockwasher, No. 10 (2 req)
3	Piston head, small	23	Lock clip, rh
4	Piston cup expander	24	Lock clip, 1h
5	Piston cup washer	25	Dust cap retainer
6	Piston cup	26	Dust cap
7	Piston head, large	27	Dust cap felt
8	Piston lubricator felt	28	Dust cap washer
9	Spring	29	Plug, pipe, 1/8-27 (2 req)
10	Piston rod	30	Screw, rd hd, 1/4-20 x 5/8 (4 req)
11	Bearing pin, 3/8 in.	31	Lockwasher, 1/4 (4 req)
12	Expansion plug (2 req)	32	Cylinder head
13	Bearing pin, 5/16 in.	33	Cylinder head gasket
14	Drilled bearing pin	34	Bearing lubricator felt
15	Bellcrank, rh	35	Felt retainer ring
16	Bearing block	36	Screw, flat hd, 5/16-18 x 5/8 (2 req)
17	Bellcrank, 1h	37	Mounting bracket
18	Cotter pin, special, 3/32 x 1 3/4		
19	Rod connecting block		
20	Shutter lock 37		

Figure 27. Exploded view of air cylinder.

b. Disassembly (fig. 27).

(1) Remove the two flathead screws (36) and disassemble the air cylinder from the mounting bracket (37).

(2) Remove the drilled bearing pin (14) and bearing block (16) from the bell-cranks (15 and 17). Remove the special cotter pin (18), drive out the bearing pins (11 and 13) and remove the bell-cranks (15 and 17) from the cylinder head arm and the rod connecting block (19).

(3) Remove the connecting block (19) and hex jam nut (2) from the end of the piston rod (10).

(4) Take out the two roundhead screws (21) and lockwashers (22) and disassemble the shutter lock (20), lock clips (23 and 24), dust cap retainer (25), dust cap (26), felt (27) and washer (28) from the cylinder head (32).

(5) Remove the four roundhead screws (30) and lockwashers (31) and carefully remove the cylinder head (32) and its gasket (33) from the cylinder body. Slide the retainer ring (35) and lubricator felt (34) from the bearing boss on the inside of the cylinder head.

(6) Pull the piston rod (10) from the cylinder body (1) and slide the spring (9), large piston head (7), piston cup (6), washer (5), piston cup expander (4) and small piston head (3) from the rod.

c. Cleaning and Inspection.

(1) Clean all parts thoroughly with cleaning solvent and blow dry with compressed air.

(2) Examine the piston cup carefully for damage or excessive wear. At regular overhaul periods, it is advisable to replace the piston cup and cup expander.

(3) Replace any broken parts with new ones.

d. Reassembly and Adjustment (fig. 27).

(1) Saturate the lubricating felts (8 and 34) with light machine oil during reassembly. Also, apply a film of light machine oil to the inside surface of the cylinder body (1).

(2) Install the small piston head (3), piston cup expander (4), washer (5), piston cup (6), large piston head (7) and spring (9) onto the piston rod (10). Assemble the lubricator felt (8) to the large piston head. Insert this assembled group into the cylinder body, using a compression sleeve to avoid scuffing the edges of the piston cup.

(3) Position the lubricator felt (34) and retainer ring (35) over the bearing boss on the inside of the cylinder head

(32). Assemble the cylinder head (32) and its gasket (33) to the cylinder body, and install the four round-head machine screws (30) and lockwashers (31).

(4) Slide the dust cap washer (28), felt (27), dust cap (26) and dust cap retainer (25) over the piston rod and down against the cylinder head. Attach the right-hand lock clip (23) and right side of the retainer (25) to the cylinder head with a roundhead screw (21) and lockwasher (22). Assemble the lock (20) to the right-hand lock clip (23) and the left-hand lock clip (24) to the lock. Attach the left-hand lock clip and left side of the retainer (25) to the cylinder head with the remaining roundhead screw (21) and lockwasher (22).

(5) Temporarily install the hex jam nut (2) and connecting block (19) onto the end of the piston rod (10). Assemble the bellcranks (15 and 17) to the cylinder head arm and connecting block (19) with the bearing pins (11 and 13). Position the bearing block (16) between the bellcranks and install the drilled bearing pin (14).

(6) Place the assembled cylinder on a flat, smooth surface and press the piston rod in the fully retracted position. Measure the distances from the surface plate to the center of the drilled bearing pin (14) and from the surface plate to the center of the cylinder head arm bearing pin (11). The center of the drilled bearing pin should be 11./16 inch lower than the center of the upper bearing pin. If this measurement is less than 11/16 inch, the connecting block (19) must be screwed further onto the piston rod. If the measurement is greater than 11/16 inch the connecting block must be backed off slightly. Repeat the measuring and adjusting 'process until the measurement is exact. Then tighten the hex jam nut (2) and install the connecting block bearing pin (13). Lock the two bearing pins (11 and 13) with the special cotter pin (18).

(7) Fasten the mounting bracket (37) to the air cylinder with the two flathead screws (36).

e. Installation (fig. 25).

(1) Fasten the air cylinder (21) and its bracket to the top of the shutter assembly with the two hex bead bolts (20) and lockwashers (5). The shutter control rod (23) must be inserted up through the bearing block and drilled bearing pin at the end of the bell cranks. Install the hex nut (22).

(2) Connect the air line (18) to the tube connector (3) in the air cylinder, and open the shutoff cock (29).

84. Shutter Assembly
(fig. 25)

a. Removal.

(1) Remove the air cylinder (21) from the shutter as instructed in paragraph 83a.

(2) Remove the six hex head bolts (24) and hex nuts (25) that fasten the shutter assembly (19) and bond straps to the front hood end support. Remove the packing (26).

b. Installation.

(1) Fasten the new shutter assembly (19) and two bond straps to the front hood end support with the six hex head bolts (24) and hex nuts (25). Be sure the packing (26) is seated between the mounting flange on the shutter assembly and the radiator.

(2) Install the air cylinder as instructed in paragraph 83e.

(3) Check to see that the shutters and shutters-to-cylinder linkage move freely and easily.

85. Replacing the Fan Belt

a. Loosen the hex nuts on the through-bolt that attaches the generator to its mounting bracket, and tilt the generator toward the engine until the fan belt can be removed from the generator pulley. Lift the belt over the fan.

b. Install the new belt around the crankshaft pulley and generator pulley.

c. Pivot the generator away from the engine on the through bolt. The tension of the fan belt must be such that pressure of the thumb at a point midway between the two pulleys will deflect the belt approximately 3/4 to 1 inch. When the generator has been pivoted enough to meet this requirement, tighten the through bolt hex nuts securely.

86. Water Pump Removal and Installation

a. Removal.

(1) Open the drain cock (15, fig. 28) and drain the coolant into a clean receptacle for possible re-use.

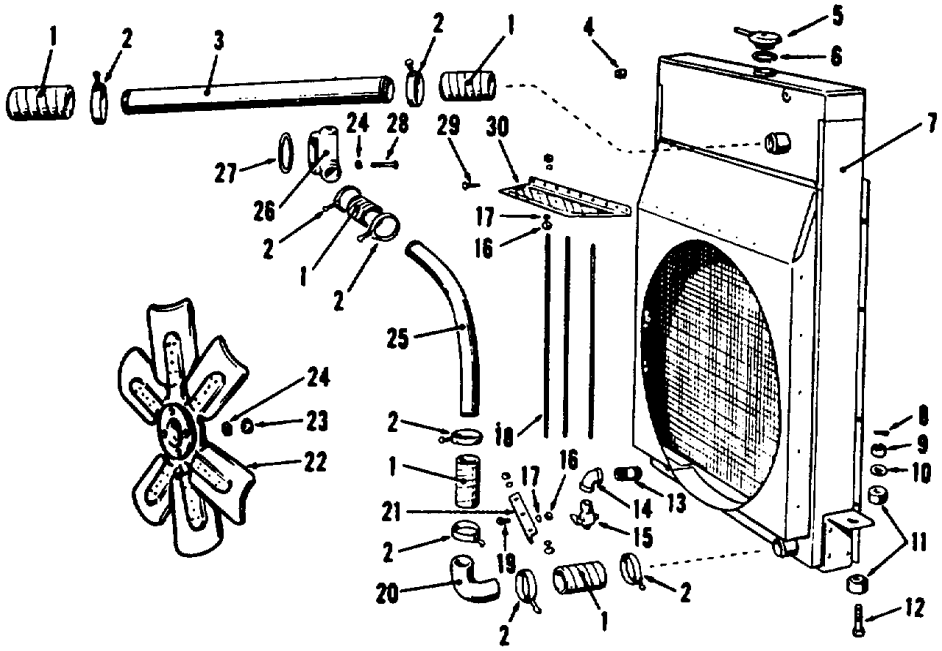
(2) The radiator inlet pipe (3), radiator-to-pump connection (25), elbow (20), or any one of the five short lengths of hose (1) can be removed by loosening the screws in the appropriate hose clamps. (2).

(3) To separate the radiator water inlet connection (26) and its gasket (27) from the water pump inlet, remove the two hex head bolts (28) and lockwashers (24).

(4) Remove the pump (fig. 24) by unscrewing and removing the six hex head bolts and lockwashers that fasten the body to the crankcase.

b. Installation.

(1) Install the radiator water inlet connection (26) and its gasket (27) to the water pump inlet by inserting the two hex head bolts' (28) and lockwashers (24). Before applying the gaskets, clean mating surfaces and coat gaskets with sealing compound.



1 Hose, 1 3/4 x 4 (5 req)
2 Hose clamp (10 req)
3 Radiator inlet pipe
4 Pipe plug, 1/4 M
5 Radiator cap
6 Radiator cap gasket
7 Radiator
8 Cotter pin, 1/8 x 1 1/4 (2 req)
9 Nut, castellated, 5/8-11 (2 req)
10 Plain washer, 5/8 (2 req)
11 Rebound unit
12 Bolt, special
13 Nipple, 1/2 x 2
14 Elbow, 1/2-90°
15 Drain cock
16 Nut, hex, 5/16-18 (15 req)
17 Lockwasher, int-ext tooth, 5/16 (15 req)
18 Fan guard rod
19 Bolt, hex hd, 5/16-18 x 3/4 (3 req)
20 Elbow, radiator
21 Fan guard support
22 Fan
23 Nut, hex, 3/8-24 (4 req)
24 Lockwasher, 3/8 (6 req)
25 Radiator-to-pump connection
26 Radiator water inlet connection
27 Gasket
28 Bolt, hex hd, 3/8-16 x 2 1/4 (2 req)
29 Screw, self-tapping, No. 10 x 3/8 (8 req)
30 Fan guard

Figure 28. Exploded view of radiator, fan and coolant hoses.

(2) Install the pump (fig. 24) by inserting the six hex head bolts and lockwashers that fasten the body to the crankcase. Apply sealing compound to all gaskets and replace gaskets if they appear badly worn or damaged.

(3) Install the five short lengths of hose (1), elbow (20), radiator-to-pump connection (25), and radiator inlet pipe (3), by tightening the screws in the appropriate clamps (2). Before making connections, coat mating surfaces with sealing compound.

(4) Close the drain cock (15) and fill the radiator with coolant.

87. Replacing the Fan Guard
(fig. 28)

a. Removal. Unscrew the self-tapping screws (29) that fasten the fan guard (30) to the radiator shroud. Remove the hex nuts (16) and lockwashers (17) that secure the fan guard rods (18) to the fan guard support (21) and lift off the assembled guard and rods. If necessary, remove the upper hex nuts (16) and lockwashers (17) and disassemble the rods from the fan guard.

b. To install the fan guard, reverse the procedures in a above.

88. Radiator and Fan
(fig. 28)

a. Removal.

(1) Open the radiator drain cock (15) and drain the coolant into a clean receptacle for possible re-use.

(2) Remove the radiator shutter assembly (par. 84a).

(3) Remove enough of the compressor housing (par. 128) so that the radiator is exposed for removal.

(4) Disconnect the coolant hoses from the radiator inlet and outlet connections (par. 86).

(5) Remove the fan guard (par. 87*a*).

(6) Remove the cotter pins (8), castellated nuts (9), plain washers (10), and hex head bolts (12) that fasten the lower radiator mounting angles to the compressor frame.

(7) Lift the radiator (7) from the frame, being careful not to lose the four rebound units (11) that serve as vibration dampeners between radiator and frame.

(8) Remove the fan belt (par. 85a). Remove four hex nuts (23) and lockwashers (24) to dismount the fan (22).

b. Installation.

(1) Place the fan (22) on the crankshaft pulley and attach with four hex nuts (23) and lockwashers (24). Install the fan belt (par. 85b and c).

(2) Lift the radiator (7) up into position, making certain that a new rebound unit (11) is placed between the radiator mounting angle and the compressor frame.

(3) Insert the hex head bolts (12) up through the frame, rebound unit, and mounting angle, and install the remaining rebound units (11), the plain washers (10) and castellated nuts (9).

(4) Reinstall the fan guard (par. 87b).

(5) Reconnect the coolant hoses to the radiator inlet and outlet openings (par. 86).

(6) Reinstall the housing components (par. 130).

(7) Reinstall the radiator shutter assembly (par. 84b).

(8) Close the shutoff cock and fill the cooling system with 10 gallons of antifreeze solution and 6 1/2 gallons water. Add an approved rust inhibitor.

(9) When assembling the radiator rebound units (11), the nuts (9) should be drawn down finger tight and turned one full turn with a wrench when the radiator is full of coolant. Install the cotter pins (8).

Section VIII. ELECTRICAL SYSTEM

89. Description
(fig. 29)

a. General. Three basic electrical circuits that are incorporated into the engine-air compressor are the ignition circuit, the starting circuit, and the generating circuit. All three circuits are provided with radio interference suppression equipment and are treated for moisture and fungus-proof resistance.

b. Ignition Circuit. The ignition circuit includes the ignition switch, distributor and coil, spark plugs, and all wiring and cables which interconnect those components. Each of these parts must be functioning properly to complete the ignition circuit. The 24-volt distributor and coil are assembled into one housing to increase radio interference suppression. It is mounted on the crankcase cover and is driven by the accessory drive gear.

c. Starting Circuit. The starting circuit supplies the power to crank the engine and includes the starting motor, magnetic switch, starting button, batteries, and all interconnecting cables and wiring. The 24-volt starting motor is equipped with a Bendix drive which automatically meshes the drive pinion with the engine flywheel for starting and disengages after the engine has been started. The 24-volt magnetic switch is mounted on the battery box and is used to close the circuit between the batteries and the starting motor. When the starting button on the instrument

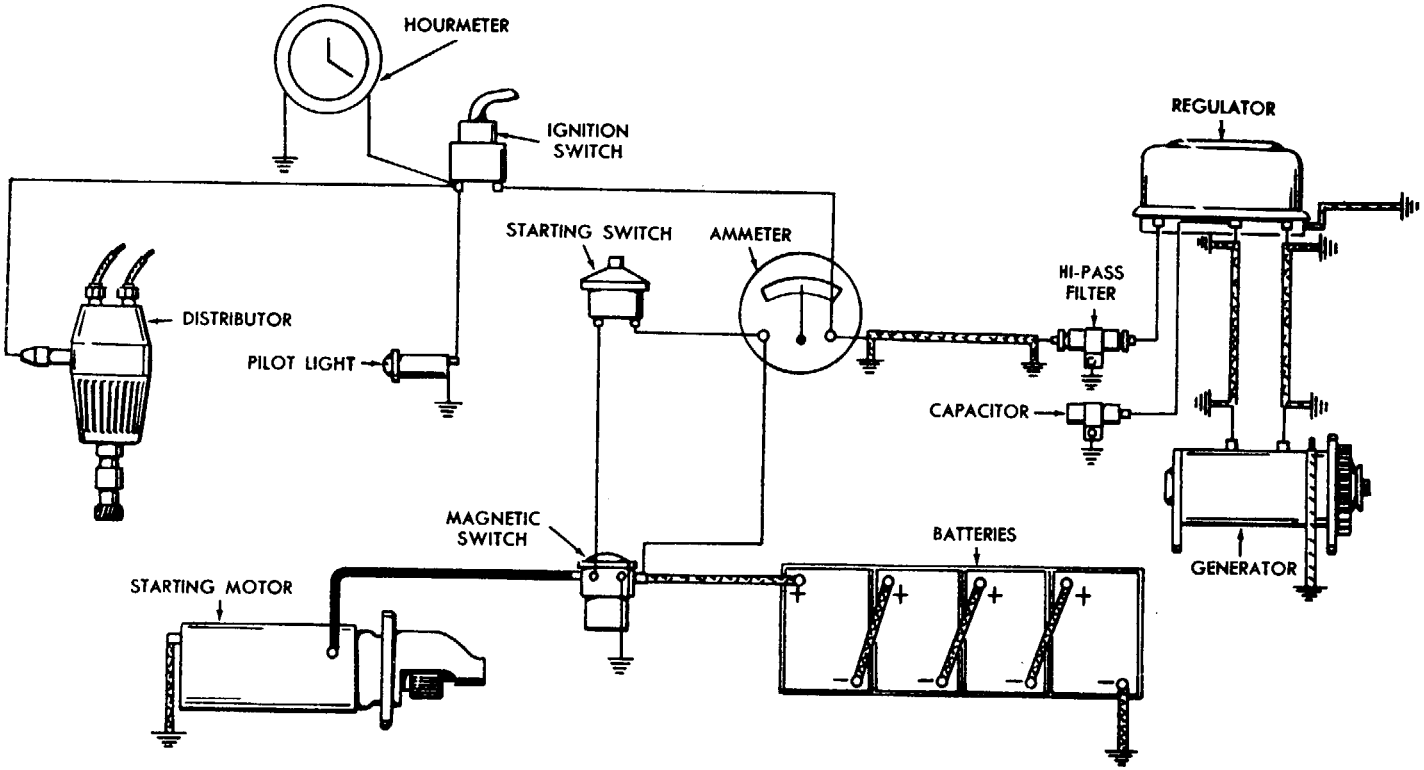


Figure 29. Pictorial wiring diagram.

panel is depressed, the coil winding in the magnetic switch is energized and the switch plunger is forced against the contact switch to close the electrical circuit. Four 6-volt batteries are connected in series to provide 24 volts for ignition and starting. The battery cable from ground is connected to the negative post of the last battery in the series.

d. Generating Circuit. The generating circuit supplies all of the electricity required by the electrical system. Basically, this circuit consists of the generator, current and voltage regulator, ammeter, batteries, and all interconnecting cables and wiring. The generator is driven by a belt between the generator and crankshaft pulleys. This is a two-brush generator with ball bearings in the drive end and commutator end. A ventilating fan is mounted on the drive end of the armature shaft. The current and voltage regulator is mounted on a bracket bolted to the top of the generator frame. This is a three-unit regulator, consisting of a voltage regulator, current regulator, and cutout relay. The voltage regulator limits the voltage of the electrical system, protecting the batteries, distributor points and other accessories from excessively high voltage. The current regulator prevents the generator from exceeding its maximum output. The cutout relay closes the circuit between generator and batteries when the generator is operating at a sufficient speed to charge the batteries. When the generator slows down or stops, the cutout relay opens the battery-to-generator circuit to prevent the batteries from discharging back to the generator. The ammeter indicates battery charge or discharge rate. When the engine-compressor is running at normal speed, the ammeter hand should be in the "charge" range. If the ammeter shows a continuous discharge, the condition of the generator, voltage regulator and batteries should be checked to determine the cause.

90. Batteries

a. Cleaning. Keep the batteries clean at all times. If electrolyte is spilled on the battery, wipe off with a weak solution of baking soda and water. Then rinse off with clear water and dry with a clean cloth. Discard the wiping cloths. Clean the battery terminals with a wire brush and wash them with a weak solution of baking soda and water. Rinse and dry terminals after using cleaning solution and apply a thin coating of vaseline to restrict further corrosion.

b. Filling Battery Cells. Check the level of electrolyte in the batteries. The level should be at least ’/8 inch, but not more than -/g inch, above top of separators of each cell. Add only distilled water or water of known purity to the electrolyte.

Caution: **In freezing temperatures, water should be added immediately before the engine-compressor is started. This will permit the water and electrolyte to be thoroughly mixed by the charging process and will prevent the added water from freezing.**

c. Checking Specific Gravity. Check the specific gravity of the electrolyte with a reliable hydrometer and a thermometer. All cells will have an approximate gravity reading of 1.285 when fully charged and 1.150 when completely discharged. Because specific gravity varies with temperature, all hydrometer readings should be corrected in accordance with the chart shown in figure 30. Recharge the batteries if the corrected specific gravity reading is below 1.225 in warm weather or 1.250 in cold weather.

d. Battery Removal (fig. 31).

(1) Remove the hood sides from the housing (par. 128).
(2)

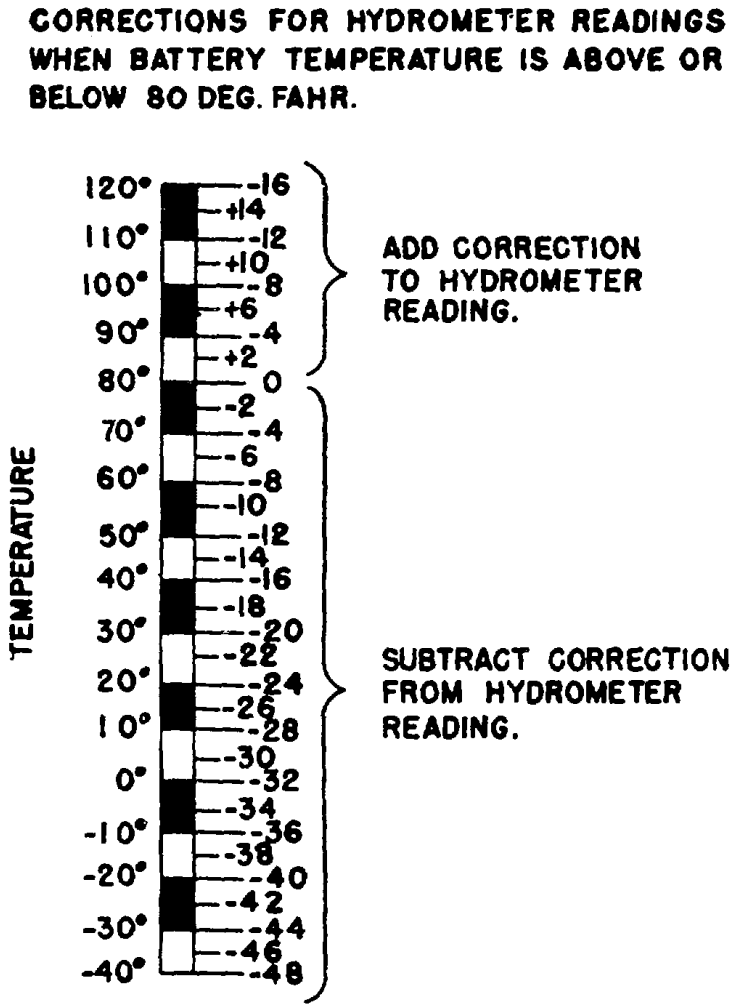
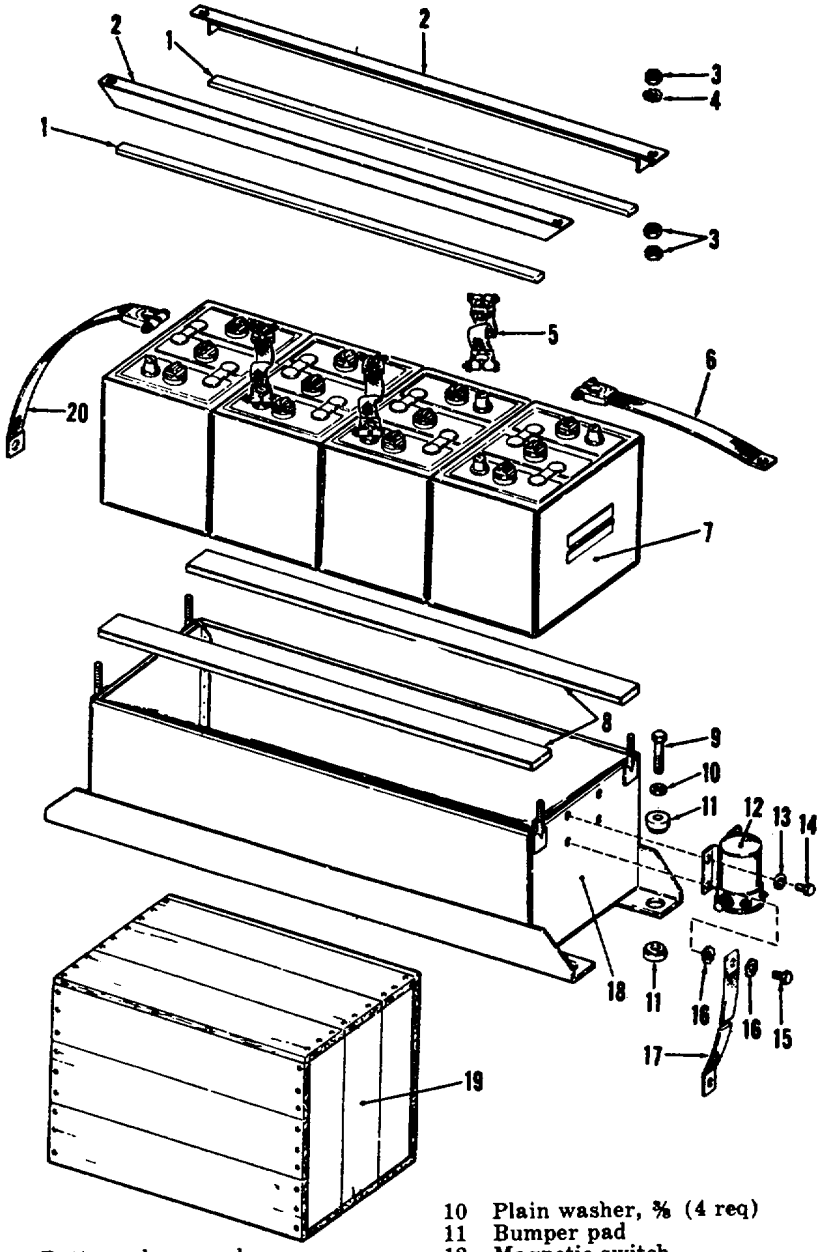


Figure 30. Hydrometer correction chart.



1 Battery clamp pad
2 Battery hold-down clamp
3 Nut, hex, ⅜-16 (12 req)
4 Lockwasher, ⅜ (4 req)
5 Electrical lead assembly
6 Electrical lead assembly
7 Storage battery
8 Battery pad
9 Cap screw, hex hd, ⅜-24 x 2 (4 req)
10 Plain washer, ⅜ (4 req)
11 Bumper pad
12 Magnetic switch
13 Lockwasher, ¼ (3 req)
14 Cap screw, hex hd, ¼-20 x ⅜ (3 req)
15 Cap screw, special
16 Lockwasher, special ¼
17 Bond strap
18 Battery box
19 Sulphuric acid electrolyte
20 Electrical lead assembly

Figure 31. Exploded view of batteries and supporting parts.

(2) Disconnect the electrical lead assemblies (5, 6, and 20) from the terminals on top of the storage batteries (7). Take care not to short the batteries to the frame or other battery terminals.
(3) Remove four hex nuts (3) and lockwashers (4) and lift off the battery hold-down clamps (2) and battery clamp pads (1). Lift individual batteries out with a suitable carrier.
(4) Sulphuric acid electrolyte is shipped in boxes (19) used in refilling batteries.

e. Battery Box Removal (fig. 31).

(1) Remove the batteries (d, above).
(2) Remove three hex head cap screws (14) and lockwashers (13). Remove a fourth hex head cap screw (15) and two lockwashers (16) to free the bond strap (17) and magnetic switch (12) from the battery box (18).
(3) Remove four hex head cap screws (9), plain washers (10), and bumper pads (11). Lift the battery box up and remove it through the side of the housing. It may require some manipulating of the battery box so it clears the fuel tank, brace and aftercooler. Remove the four remaining bumper pads. Do not remove the battery pads (8) unless deteriorated.

f. Inspection. Examine batteries for cracks, leaks and evidence of corrosion. Check specific gravity (par. 90c). Clean the batteries (par. 90a). Inspect electrical lead assemblies for fraying and breaks. Inspect the battery hold-down clamps and battery box for deformity. Replace all deteriorated pads and other defective parts.

g. Battery Box Installation (fig. 31).

(1) If removed, cement the battery pads (8) to the bottom. of the battery box with Pliobond or other suitable adhesive.
(2) Slide the battery box through the side of the housing and place it on the frame over its mounting holes. Slip four bumper pads (11) under the battery box corners and into the corner mounting holes. Install four more bumper pads and secure with the hex head cap screws (9) and plain washers (10).
(3) Fasten the magnetic switch (12) to the side of the battery box with three hex head cap screws (14) and lockwashers (13). Attach the bond strap (17) with a fourth hex head cap screw (15) and two lockwashers (16).
(4) Install the batteries (h, below)

h. Battery Installation.

(1) Place the storage batteries (7, fig. 31) in the battery box (18). Make sure that common terminals are in the same side; the positive (+) terminals should be nearest the fuel tank.

(2) If removed, cement two battery clamp pads (1) to each battery hold-down clamp (2). Mount the clamps with four hex nuts (3) and lockwashers (4). It may be necessary to adjust the position of the hex nuts (3) under the clamp to provide positive holding.

(3) Connect the electrical lead assemblies (5, 6, and 20) to the batteries as shown in figure 30.

(4) Install the hood sides (par. 130).

91. Current and Voltage Regulator

a. Removal (fig. 32).

(1) Remove the three regulator terminal screws and disconnect the electrical leads (28 and 29) from the regulator terminals. Tape together and mark each group of wires so that they can be reinstalled easily.

(2) Remove the ground screw (6) and lockwasher (5) that attach the bond strap (4) to the regulator cover.

(3) Remove the three hex nuts (2), lockwashers (3) and mounting screws (11) that fasten the regulator to the regulator support (10), and lift off the regulator (1).

b. Installation (fig. 32).

(1) Position the regulator (1) on the regulator support (10) and install the three mounting screws (11), lockwashers

(3) and hex nuts (2).

(2) Attach the bond strap (4) to the regulator cover with the ground screw (6) and lockwasher (5).

(3) Attach the electrical leads (28 and 29) to the regulator terminals with the terminal screws.

Note. **Momentarily connect a jumper lead between the BATTERY and GENERATOR terminals of the regulator before starting the engine-compressor. This produces a momentary surge of current from batteries to generator, thus polarizing the generator with respect to the batteries.**

92. Generator and Drive Belt

a. Generator Belt Tension Adjustment (fig. 32). Check the tension of the generator drive belt by pressing against the belt with the thumb at a point midway between the generator pulley and crankshaft pulley. It should be possible to depress the belt approximately 1/2 inch without too much effort. To adjust belt ten-

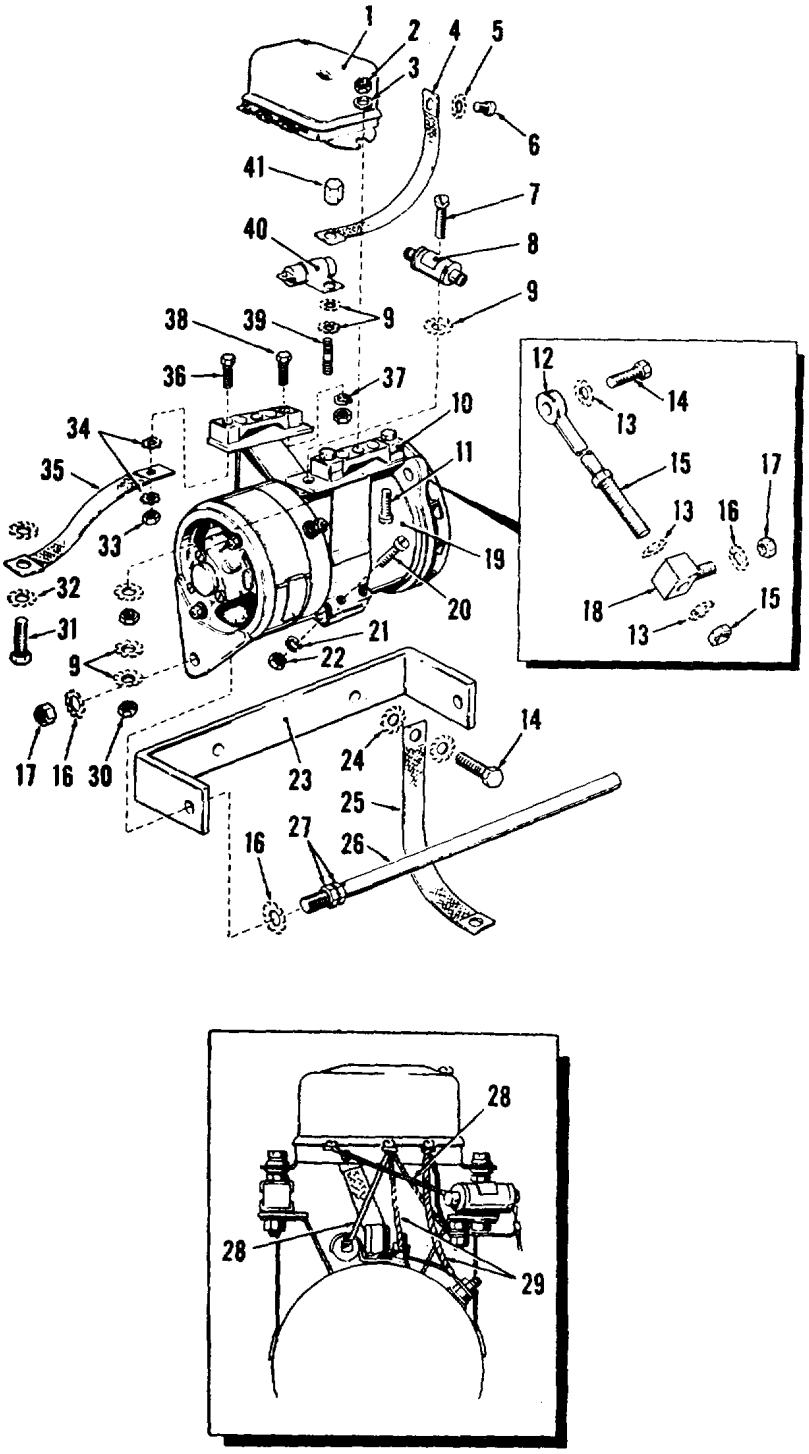


Figure 32. Exploded view of generator and regulator mounting parts.

1 Regulator
2 Nut, hex, regulator mtg (3 req)
3 Lockwasher, regulator mtg (3 req)
4 Bond strap
5 Lockwasher, special
6 Ground screw
7 Cap screw, special
8 Bypass filter
9 Lockwasher, special (6 req)
10 Regulator support
11 Cap screw, regulator mtg (3 req)
12 Generator adjusting support
13 Lockwasher, special (3 req)
14 Cap screw, special (3 req)
15 Nut, hex, special (2 req)
16 Lockwasher, special (3 req)
17 Nut, hex, special (2 req)
18 Locking screw
19 Generator
20 Cap screw, fil hd, 1/4-28 x 1 1/2 (2 req)
21 Lockwasher, 1/4 (2 req)
22 Nut, hex, 1/4-28 (2 req)
23 Generator bracket
24 Lockwasher, special (3 req)
25 Bond strap
26 Generator rod
27 Nut, hex, special (2 req)
28 Electrical lead (2 req)
29 Electrical lead (2 req)
30 Nut, hex, special (2 req)
31 Cap screw, special
32 Lockwasher, special (2 req)
33 Nut, hex, special (4 req)
34 Lockwasher, special (2 req)
35 Bond strap
36 Cap screw, special
37 Lockwasher, 5/16 (3 req)
38 Cap screw, special (3 req)
39 Generator body stud
40 Capacitor
41 Nut, hex, special

Figure 32. Continued.

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sion, first loosen the special hex nut (17) on the end of the generator rod (26). If the belt is too loose, loosen the adjusting support hex nut (15) below the locking screw (18) until the correct belt tension is obtained. Then tighten the upper hex nut (15) securely. If the belt is too tight, loosen the adjusting support hex nut (15) securely. If the .belt is too tight, loosen the adjusting support hex nut (15) above the locking screw (18) and tighten the lower hex nut (15) until correct belt tension is obtained. Then tighten the upper hex nut (15) securely. After the proper adjustment has been obtained, tighten the generator rod hex nut (17) securely.

b. Generator Brushes (fig. 33).

(1) Removal. Remove the cover band from around the commutator end of the generator frame, exposing the brushes (fig. 33). Remove the screw and lockwasher that attach the brush lead to the brush holder. Swing the brush arm up out of the way and remove the brush from the holder.

(2) Installation. Lift the brush arm (fig. 33) and install the brush in the brush holder. Then release the brush arm so that it bears against the end of the brush. Fasten the brush pigtail lead to the brush holder with the screw

and lockwasher. Fasten the cover band in place over the brush openings.

(3) Adjustment. Brushes should be replaced if they measure 1/ inch or less. No adjustment is required,

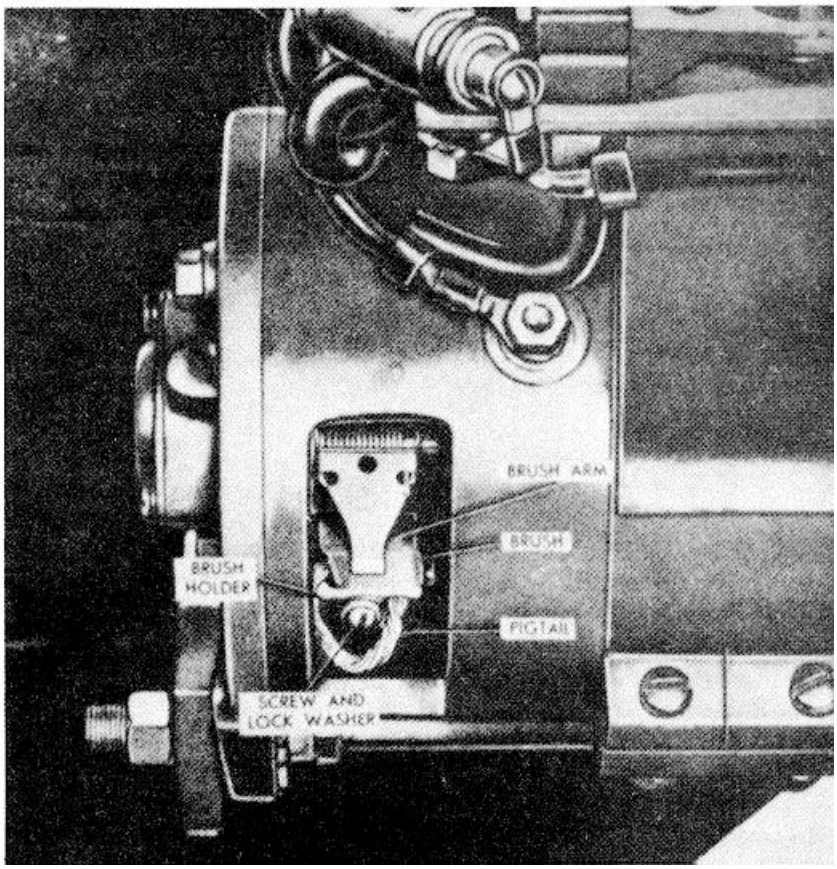


Figure 33. Generator brushes exposed.

c. Generator Removal (fig. 32).

(1) Remove the current and voltage regulator (par. 91a).
(2) Remove the cap screw (31) and lockwashers (32) that attach the bond strap (35) to the upper oil pan.
(3) Disconnect the ammeter lead wire from the bypass filter (8).
(4) Remove the hex nut (16) and lockwasher (13) from the lower end of the generator adjusting support (12) and loosen the upper hex nut.

(5) Remove the hex nut (17) and lockwasher (16) from the end of the generator rod (26) and tilt the generator toward the crankcase until the drive belt can be slipped from the generator pulley. Then support the generator firmly while withdrawing the generator rod (26). Lift the generator out from between the ears of the generator bracket (23).

d. Generator Installation (fig. 32).

(1) Lift the generator up into position between the ears of the generator bracket (23), at the same time guiding the threaded end of the generator adjusting support (12) through the hole in the locking screw (18). Insert the support rod (26) and install, but do not tighten, the hex nuts (17 and 15) and lockwashers (16 and 13).
(2) Attach the bond strap (35) to the upper oil pan with the cap screw (31) and two lockwashers (32). One lockwasher must be placed on either side of the bond strap.
(3) Install the current and voltage regulator (par. 91b).
(4) Slip the generator drive belt around the generator pulley and adjust the belt tension (par. 92a).
(5) Make certain that all electrical leads (28 and 29) are properly connected as illustrated in the inset for figure 32.

NOTE

Momentarily connect a jumper lead between the BATTERY and GENERATOR terminals of the regulator before starting the engine-compressor. This produces a momentary surge of current from batteries to generator, thus polarizing the generator with respect to the batteries.

93. Starting Motor

a. Removal (fig. 34).

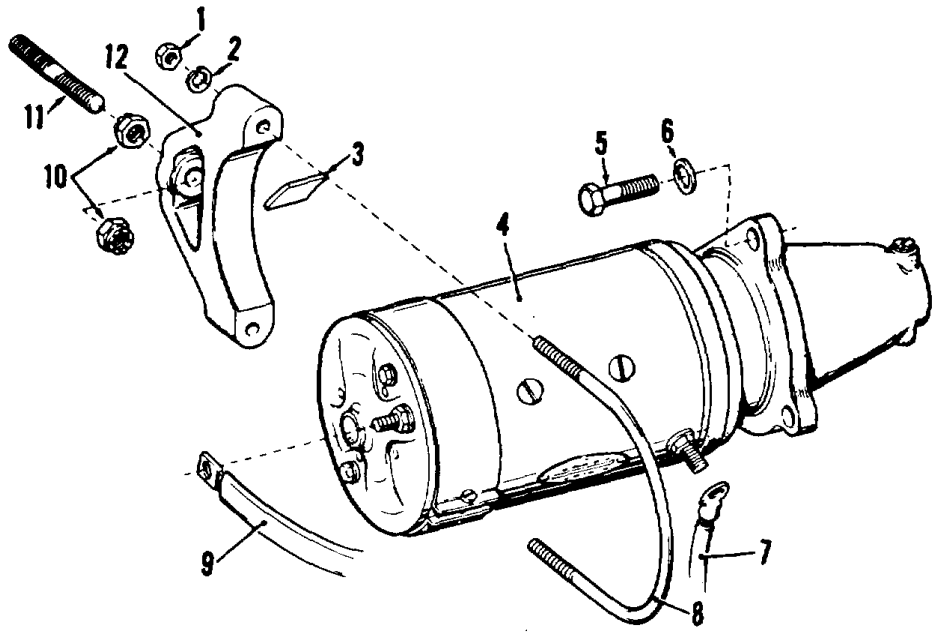
(1) Disconnect the starter cable (7) and ground cable (9) from the starting motor terminals.
(2) Remove the three hex head bolts (5) and lockwashers (6) that attach the motor mounting flange to the rear engine support.
(3) Support the starting motor firmly, and remove the hex nuts (1), lockwashers (2) and U-bolt (8). Carefully remove the starting motor from the rear engine support.

b. Installation (fig. 34).

(1) Lift the starting motor up into position, carefully engaging the Bendix drive with the flywheel ring gear. Slip the two rubber spacers (3) between the starting

motor housing and the clamp (12) and install the U-bolt (8), lockwashers (2) and hex nuts (1), tightening the hex nuts finger tight.

(2) Aline the three holes in the motor mounting flange with those in the rear engine support, and install the hex head bolts (5) and lockwashers (6). Tighten the bolts (5) and the hex nuts (1) securely.
(3) Connect the starter cable (7) and ground cable (9) to the starting motor terminals.



1	Nut, hex, 5/16-18 (2 req)	7	Starter cable
2	Lockwasher, 5/16 (2 req)	8	U-bolt
3	Rubber spacer (2 req)	9	Ground cable
4	Starting motor	10	Nut, hex, ½-20 (2 req)
5	Bolt, hex hd, ½-13 x 1½ (3 req)	11	Stud
6	Lockwasher, ½ (3 req)	12	Clamp

Figure 34. Exploded view of starting motor and attaching parts.

94. Starting Motor Brushes

a. Removal. Remove the cover band screw and nut and slip the cover band from the commutator-end frame to expose the starting motor brushes (fig. 35). Raise the loop of the brush tension spring until a pin or short length of stiff wire can be passed through the loop to support it above the inspection opening. Remove the brush screw and lockwasher and lift the brush from the holder.

b. Installation. Install a new brush (fig. 35) in the brush holder, remove the pin or wire, and allow the loop of the tension

spring to bear against the brush. Install the brush screw and lockwasher, and the cover band.

c. Adjustment. Brushes should be replaced if they measure 1/2 inch or less. No adjustment is required.

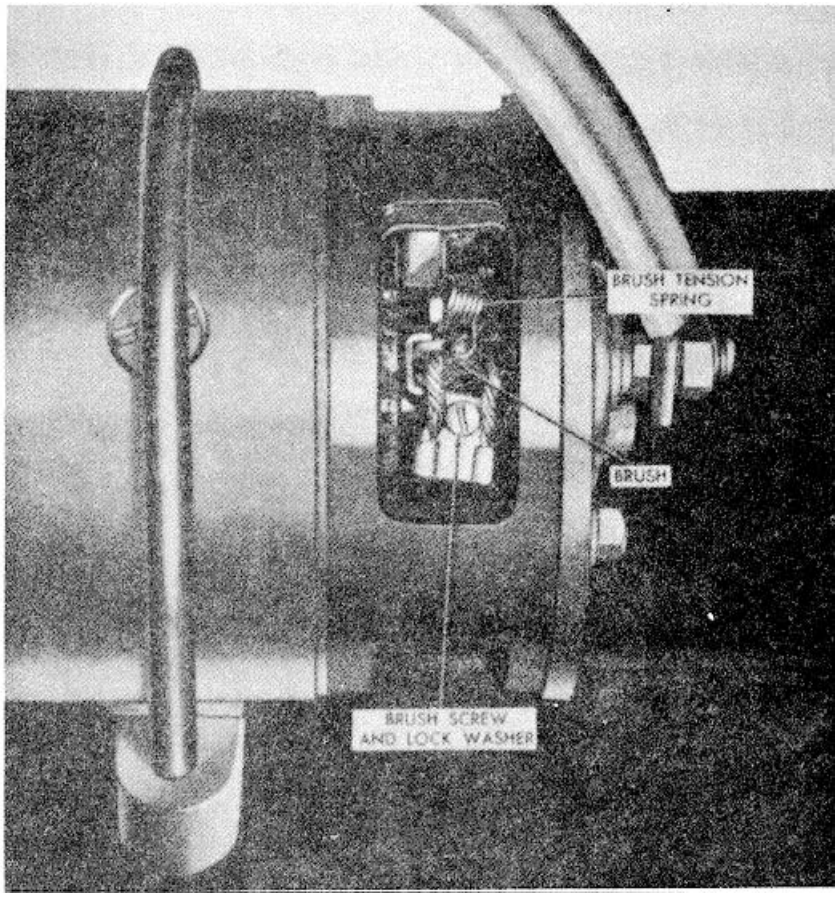


Figure 35. Starting motor brushes exposed.

95. Distributor Point Adjustment
(fig. 36)

a. Remove the six screws and lift off the distributor cap. Make a sketch of the relationship between the rotor and the offset drive tongue. Pull the rotor off the top of the cam.

b. Turn the distributor shaft so that the distributor lever rubbing block is on the high point of the cam.

c. Loosen the lock screw slightly. Adjust the contact gap 0.020 inch by turning the adjustment screw. Use a wire feeler gage to check the contact gap. Tighten the lock screw.

d. Turn the shaft until the contacts close. Bend the stationary contact bracket to aline the contacts for full-face contact. Adjust the contact gap as in c above after alining the contacts.

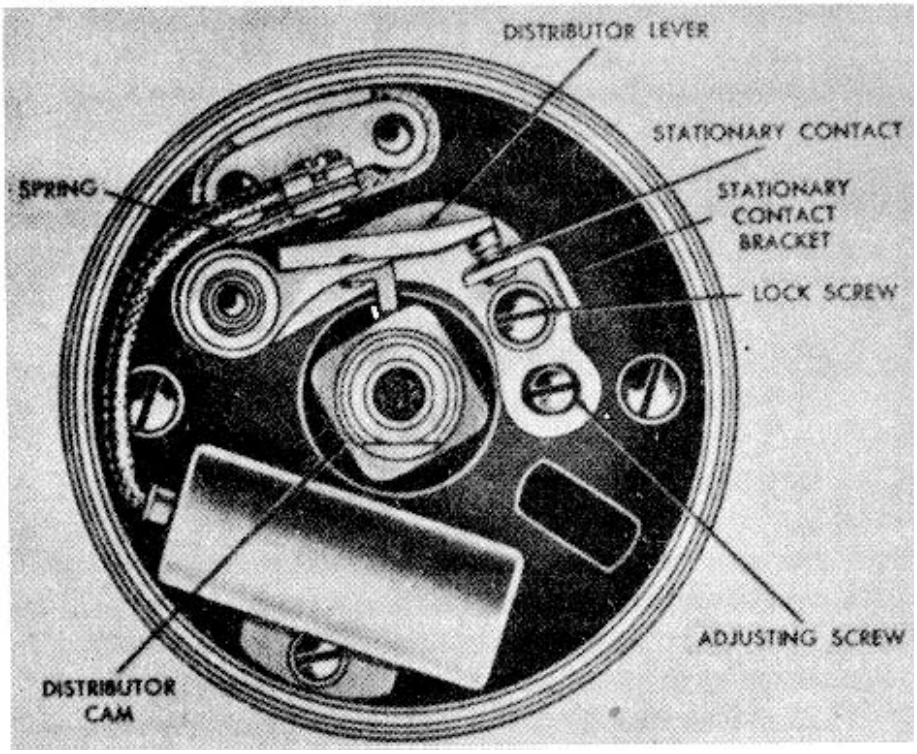


Figure 36. Distributor point adjustment.

e. Hook a spring scale on the distributor lever at the contact and pull on the line with the contacts. Take a reading as the points separate. Adjust the tension to 17-20 ounces by loosening the screw holding the distributor lever spring and sliding the spring in or out as necessary. Tighten the screw and check the pressure.

f. Place the rotor on the distributor shaft according to the sketch made at disassembly. Install the distributor cap, and install the six attaching screws.

96. Spark Plugs and Cables

a. Disconnect the ignition cables from the spark plugs.

b. Blow away all loose dirt from around the plugs with compressed air and remove the plugs with a spark plug wrench.

c. Clean the plugs with approved sand blasting method, and then inspect each plug carefully for cracks, chips, or erosion of the electrodes. Discard those plugs which are not in good condition.

d. Check spark plug air gap with a wire feeler gage. A gap of 0.023 to 0.028-inch must be maintained between the center and outer electrodes. Adjust gap, if necessary, by carefully bending the outer electrode.

e. Inspect the ignition cables for frayed shielding and damaged insulation. Examine the cable coupling nuts for cracks or breaks. Make sure the cables are securely mounted. Tighten mounting screws, if necessary. Do not attempt to repair a defective ignition cable; always install a new cable.

f. Install the spark plugs and reconnect ignition cables.

97. Distributor

a. Removal (fig. 37).

(1) Disconnect the manifold tube assembly (13) from elbow (14) and low tension plug assembly (18) from the distributor connector.

(2) Disconnect the air cleaner tube (5) from the elbow (34) and the four ignition cables (35, 36, 37, and 41) from the distributor cap.

(3) Scribe or chalk a line on the bottom flange of the adapter (32) and a corresponding line on the crankcase cover. This will eliminate the necessity of timing the ignition when the distributor is reinstalled.

(4) Remove the hex nuts (21), lockwashers (22) and clamps (23) and lift the distributor (33) straight up from the crankcase cover.

b. Installation (fig. 37).

(1) Carefully insert the drive gear end of the distributor down into the opening in the crankcase cover. Be sure the gasket (27) is in place. Aline the scribe mark on the adapter mounting flange with that on the crankcase cover, and install the clamps (23), lockwashers (22) and hex nuts (21).

(2) Connect the four ignition cables (35, 36, 37 and 41) to the distributor cap.

(3) Connect the air cleaner tube (5) to the elbow (34), the manifold tube assembly (13) to elbow (14), and the low tension plug assembly (18) to the distributor connector.

Note

If a new distributor is being installed, the ignition timing must be checked and adjusted (par. 98).

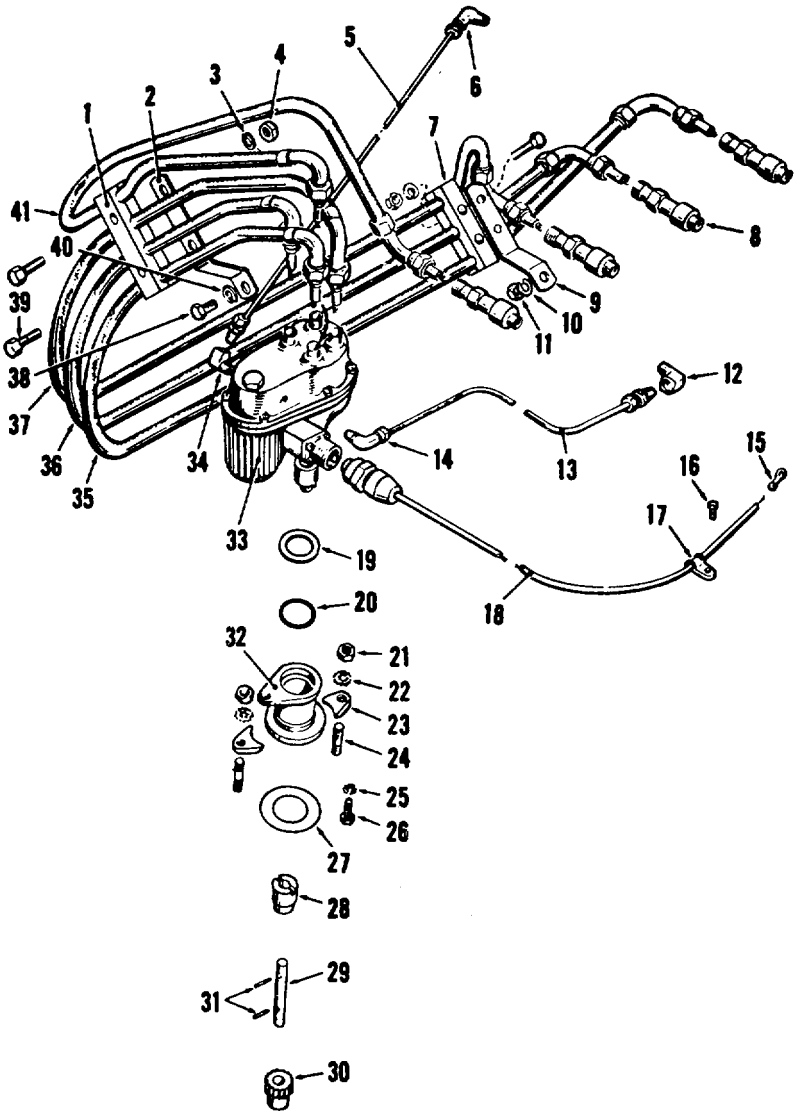


Figure 37. Exploded view of ignition group.

98. Ignition Timing Adjustment

a. Checking the Timing.

(1) Crank the engine over until the timing marks on the flywheel are visible through the inspection hole in the rear engine support just above the shutter air filter (fig.15). Make a white chalk mark in line with timing mark "30" and on the timing pointer.

1 Front support (2 req)
2 Front support bracket
3 Lockwasher, 5/16 (4 req)
4 Nut, hex, 5/16-18 (4 req)
5 Air cleaner tube
6 Elbow
7 Side support (2 req)
8 Spark plug (4 req)
9 Side support bracket
10 Lockwasher, 5/16
11 Nut, hex, 5/16-24
12 Restricted elbow
13 Tube assembly
14 Elbow
15 Terminal
16 Bolt, hex hd, 5/16-18 x 3/8
17 Clamp
18 Plug assembly
19 Special washer
20 O Ring
21 Nut, hex, Special (2 req)
22 Lockwasher, special (2 req)
23 Clamp (2 req)
24 Stud (2 req)
25 Lockwasher, special
26 Bolt, hex head, special
27 Gasket
28 Coupling
29 Drive shaft
30 Drive shaft gear
31 Roll pin, 3/16 x 7/8 (2 req)
32 Adapter
33 Distributor
34 Elbow
35 Ignition cable, No. 4
36 Ignition cable, No. 3
37 Ignition cable, No. 2
38 Bolt, hex hd, 5/16-18 x 5/8
39 Bolt, hex hd, 5/16-18 x 1 1/2 (4 req)
40 Lockwasher, 5/16
41 Ignition cable, No. 1

Figure 37-Continued.

(2) Hook up a timing light, with the high tension lead to the No. 1 spark plug and the remaining two leads to the proper battery terminals.

(3) With the engine idling, direct the timing light into the inspection hole and check the position of the timing mark on the flywheel with the timing pointer. If the mark is past the pointer before the flash occurs, the timing is slow. If the flash occurs before the mark gets to the pointer, the timing is fast.

b. Adjusting the Timing.

(1) Loosen the hex nuts (21, fig. 37) that clamp the distributor adapter to the crankcase cover.

(2) With the engine idling and the timing light directed at the inspection hole, rotate the distributor housing slowly in one direction or the other until the timing mark coincides with the timing pointer when the light flashes. If the timing is slow, turn the distributor housing counterclockwise. If the timing is fast, turn the distributor housing clockwise.

(3) When the ignition timing has been properly adjusted, tighten the adapter clamp hex nuts securely and disconnect the timing light.

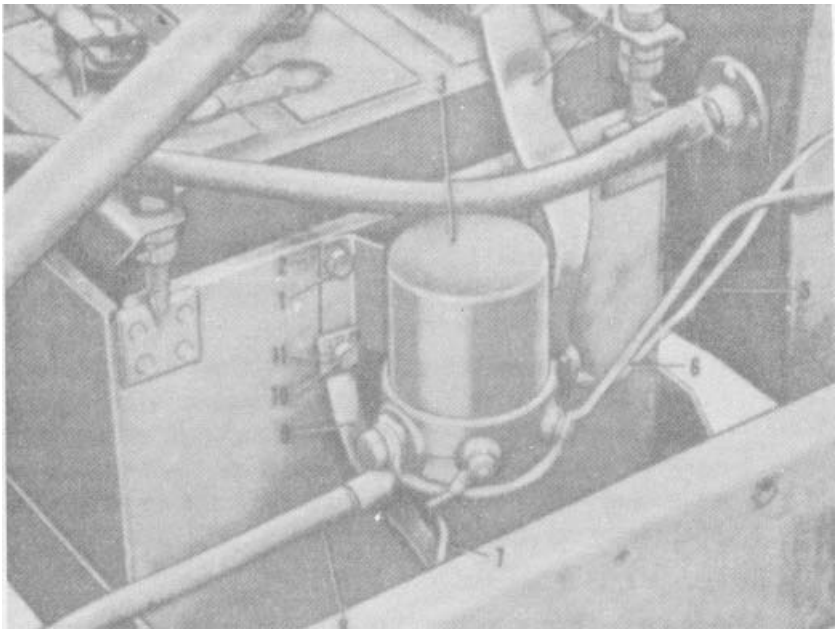
99. Magnetic Switch

a. Removal (fig. 38).

(1) Unscrew the two magnetic switch terminal screws and disconnect the battery cable (4), wire assembly (5) from ammeter to magnetic switch and starter cable (8) from the switch terminals.

(2) Disconnect the wire assembly (6) from starting switch to magnetic switch and ground wire assembly (7) from the coil terminals of the switch.

(3) Remove the four hex head bolts (1), cap screws (10), and lockwashers (2 and 11) and lift the magnetic switch from the side of the battery box.



1 Bolt, hex hd, 1/2-13 x 1% (3 req)
2 Lockwasher, 1/2 (3 req) to magnetic switch
3 Magnetic switch
4 Battery cable
5 Wire assembly, ammeter to magnetic switch
6 Wire assembly, starting switch
7 Wire assembly, ground
8 Starter cable
9 Bond strap
10 Cap screw, hex hd, special
11 Lockwasher, special (2 req)

Figure 38. Magnetic switch installed.

b. Installation (fig. 38).

(1) Attach the magnetic switch to the side of the battery box with the four hex head bolts (1), cap screws (10), and lockwashers (2 and 11). Note that the longer bolt (10) and external toothed lockwashers (11) also serve to attach the bond strap (9).

(2) Connect the battery cable (4) and wire assembly (5), from ammeter to magnetic switch to one switch terminal and the starter cable (8) to the other. Connect the wire assembly (6) from starting switch to magnetic switch and ground wire assembly (7) to the proper coil terminals as shown.

Section IX. INSTRUMENT PANEL

100. Description

The instrument panel is bracket-mounted to the air receiver at the rear of the engine-compressor (fig. 13). A hinged door swings down to expose the instruments when the unit is in operation.

a. Ammeter. The ammeter indicates battery charge or discharge rate and thus provides a check on the electrical system of the engine-compressor. When the unit is running at normal speed, the ammeter needle should be in the charge range. If the ammeter indicates a continuous discharge, the generator, voltage regulator and batteries must be checked to determine the cause.

b. Starting Switch. The push-button type starting switch is located to the right of ammeter. When the starting button is pressed, the electrical circuit is completed from the batteries to the magnetic switch. The magnetic switch, in turn, is energized to complete the circuit between the batteries and the starting motor. The starting motor pinion (Bendix drive) then engages the flywheel ring gear to start the engine.

c. Hourmeter. The electrically-operated hourmeter is connected to the ignition switch and operates only when the engine-compressor is in operation. It thus provides an accurate record of elapsed operating time and serves to remind the operator when to perform the required preventive maintenance services.

d. Ignition Switch. When the lever handle of the ignition switch is snapped to the left, it completes the primary circuit leading from the battery through the ammeter to the ignition coil. The switch must be turned on before the engine can be started, and it shuts off the engine when the lever is snapped back to the vertical position.

e. Air Pressure Gage. The air pressure gage indicates the pressure of air within the air receiver. Normal air pressure readings are 90 psi at the start of the "loading" cycle and 100 psi at the beginning of the "unloading" cycle.

f. Pilot Light. The pilot light is connected to the ignition switch and will glow only when the switch is on. This will

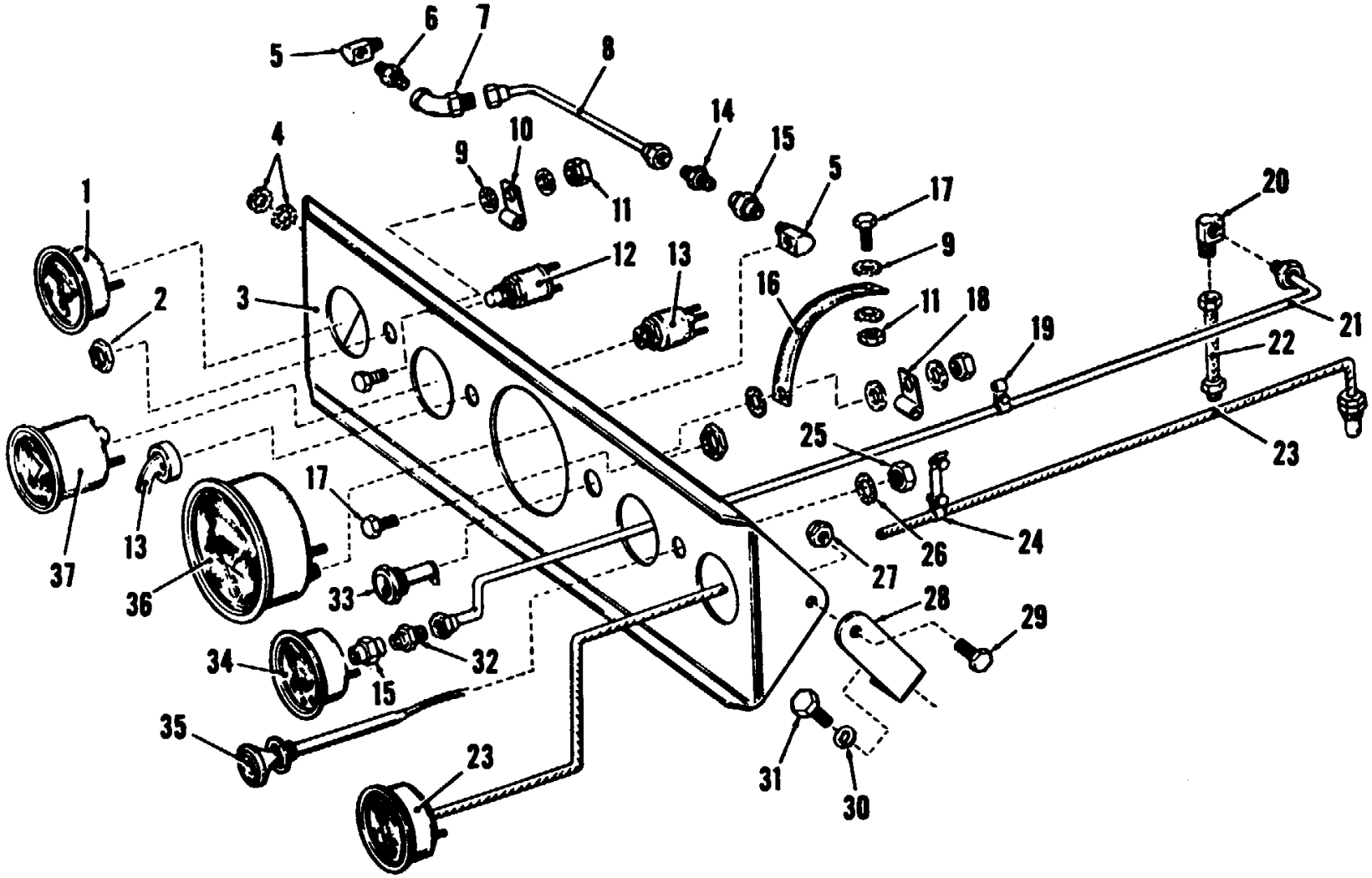


Figure 39. Exploded view of instrument panel.

1 Ammeter
2 Nut, starting switch
3 Instrument panel
4 Lockwasher, special (2 req)
5 Elbow, 1/8 x 1/8F x 90°
6 Dampening orifice
7 Flexible fitting
8 Tube assembly
9 Lockwasher, special
10 Clamp, 3/16
11 Nut, hex, special (3 req)
12 Starting switch
13 Ignition switch
14 Connector
15 Coupling, 1/8 (2 req)
16 Bond strap
17 Bolt, hex hd, special (3 req)
18 Clamp, 1/4
19 Clamp, 5/16 x ¼ (2 req)
20 Elbow, ¼ x 1/8 M x 90°
21 Tube assembly
22 Tube, special
23 Water temperature gage
24 Clamp (3 req)
25 Nut, hex jam
26 Lockwasher
27 Nut, hex, 3/8-16 (2 req)
28 Bracket
29 Cap screw, 3/8-16 x 1 (2 req)
30 Lockwasher, ½ (2 req)
31 Bolt, hex hd, ½-13 x 1 (2 req)
32 Connector
33 Pilot light assembly
34 Oil pressure gage
35 Choke control
36 Air pressure gage
37 Hourmeter

Figure 39-Continued.

prevent the switch from being left on accidentally, thereby causing an unnecessary drain on the batteries.

g. Oil Pressure Gage. The engine oil pressure gage registers the amount of oil pressure in the lubricating system. A small segment of the indicating band is painted red, and the remainder of the band is green. For normal operation, the indicating pointer should be in the green area at all times. If the pointer indicates no pressure, stop the unit at once until the cause can be determined and corrected.

h. Choke Control. The choke control is connected with a flexible cable to the choke plate in the carburetor air intake. As the choke control knob is pulled outward, the choke plate closes, providing a richer fuel-air mixture to start the engine.

i. Temperature Gage. The temperature gage indicates the temperature of the coolant in the liquid cooling system. Normal operating temperatures are between 180° and 215° F.

101. Instrument Panel Removal and Installation (fig. 39)

a. Removal.

(1) Remove the two hex nuts (11), four lockwashers (9) and two hex head bolts (17) that fasten the bond strap (16) to the top of the engine-compressor housing and to the instrument panel. This will also free the clamp (18). Remove one hex head bolt (17), two lockwashers (9) and one hex nut (11) to free the clamp (10).

(2) Open the hood top door and remove the hood top panel on the compressor side (par. 128).

(3) Disconnect the wires from the ammeter (1), ignition switch (13) and starting switch (12), labeling them to facilitate reinstallation.

***Caution*: Release the air receiver pressure before removing the tubing from the air pressure gage.**

(4) Disconnect the tubing and fittings from the air pressure gage (36) and oil pressure gage (34). Remove the bulb on the water temperature gage (23) from the exhaust manifold (8, fig. 55). Remove the clamps (24, fig. 39).

(5) Remove the two hex head bolts (31) and lockwashers (30) that attach the brackets (28) and lift off the instrument panel (3).

b. Installation.

(1) Lift the instrument panel up into position and install the two hex head bolts (31) and lockwashers (30).

(2) Connect the tubing and fittings to the air pressure gage (36) and the oil pressure gage (34). Install the bulb on the water temperature gage (23) in the exhaust manifold (8, fig. 55). Secure the flexible tubing with three clamps (24, fig. 39)..

(3) Reconnect the wires to the ammeter (1), starting switch (12) and ignition switch (13) as shown in figure 29.

(4) Install the compressor side top hood panel (par. 130) and close the hood top door.

(5) Attach the bond strap (16, fig. 39) to the top of the engine-compressor housing with the one hex head bolt (17), two lockwashers (9) and one hex nut (11).

(6) Fasten the bond strap and clamp (18) to the instrument panel (3) with one hex head bolt (17), two lockwashers (9) and one hex nut. Attach the clamp (10) with one hex head bolt (17), two lockwashers (9) and one hex nut (11).

102. Instruments

a. Ammeter.

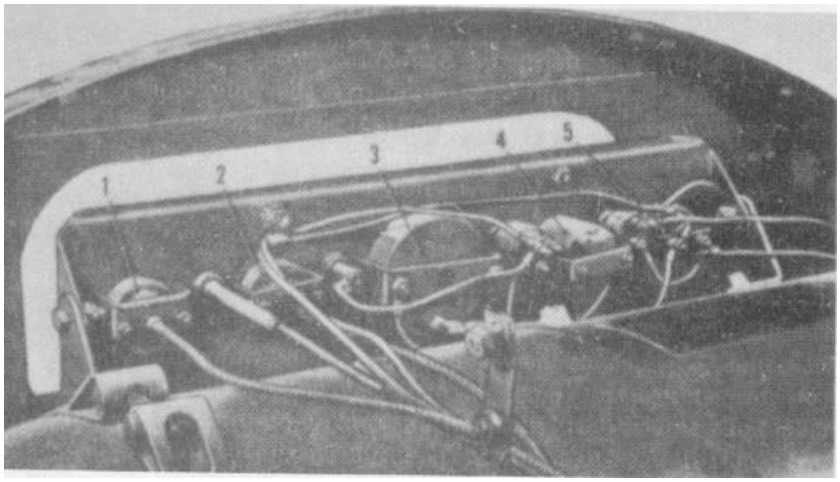
(1) Removal. Disconnect the ammeter (1, fig. 39) leads and tag the wires to eliminate confusion at installation. Remove the nuts and washers holding the ammeter mounting bracket (5, fig. 40) to the ammeter and pull the ammeter from the front of the panel.

(2) Installation. Place the ammeter (1, fig. 39) in position in the panel, and place the ammeter mounting bracket 100

(5, fig. 40) over the ammeter terminals. Install the mounting washers and nuts. Connect the leads according to the tags placed on the ammeter at removal.

b. Temperature Gage.

(1) Removal. Remove the water temperature gage bulb from the exhaust manifold (8, fig. 55). Remove the three clamps (24, fig. 39) from around the temperature gage flexible tube, and slip the flexible tubing out of the clamps. Do not allow the tubing to kink. Remove the. nuts and lockwashers holding the water temperature gage mounting bracket (1, fig. 40), and pull the water temperature gage (23, fig. 39), together with the bulb and flexible tubing, from the front of the panel.



1 Water temperature gage mtg bracket
2 Oil pressure gage mtg bracket
3 Air pressure gage mtg bracket bracket
4 Hourmeter mtg
5 Ammeter mtg bracket

Figure 40. Rear -view of installed instrument panel.

(2) Installation. Place the water temperature gage (23, fig. 39) in position in the panel, and place the temperature gage mounting bracket (1, fig. 40) over the gage studs. Install the mounting washers and nuts. Slip the flexible tube into the three clamps (24, fig. 39) and tighten the clamps. Install the temperature bulb in the exhaust manifold (8, fig. 55).

c. Oil Pressure Gage.

(1) Removal. Disconnect the tube assembly (21, fig. 39) coupling (15) and connector (32) at the rear of the oil

pressure gage (34). Remove the nuts and washers holding the oil pressure gage mounting bracket (2, fig. 40) to the oil pressure gage, and pull the gage from the front of the instrument panel (3, fig. 39).

(2) Installation. Place the oil pressure gage (34, fig. 39) in position in the panel, and place the oil pressure gage mounting bracket (2, fig. 40) over the gage studs. Install the mounting washers and nuts. Connect the tube assembly (21, fig. 39), connector (32, and coupling (15) to the rear of the gage.

d. Air Pressure Gage.

***Caution*: Release the air receiver tank pressure before removing the air pressure gage.**

(*1) Removal*. Disconnect the tube assembly (8, fig. 39), connector (14), coupling (15) and elbow (5) from the rear of the air pressure gage (36). Remove the nuts, ground lead, and washers holding the air pressure gage mounting bracket (3, fig. 40) to the air pressure gage, and pull the gage from the front of the instrument panel (3, fig. 39).

(2) Installation. Place the air pressure gage (36, fig. 39) in position in the panel, and place the air pressure gage mounting bracket (3, fig. 40) over the gage studs. Install the ground lead, and mounting washers and screws. Connect the elbow (5, fig. 39), coupling (15), connector (14) and tube assembly (8) to the rear of the gage.

e. Hourmeter.

(1) Removal. Remove the black wire from the air pressure gage (36, fig. 39), and the red wire from the ignition switch (13). Remove the nuts and washers holding the hourmeter mounting bracket (4, fig. 40) to the hourmeter (37, fig. 39) and pull the hourmeter from the front of the instrument panel (3).

(2) Installation. Position the hourmeter (37, fig. 39) on the instrument panel (3). Place the hourmeter mounting bracket (4, fig. 40) over the stud on the hourmeter and secure with the mounting nuts and washers. Connect the red wire and black wire as shown in figure 29.

103. Controls

a. Starting Switch.

(1) *Removal*. Disconnect the starting switch (12, fig. 39) leads, and tag the wires to eliminate confusion at installation. Remove the starting switch nut (2), and pull the starting switch (12) from the front of the instrument panel (3).

(2) *Installation*. Place the starting switch (12, fig. 39) in position in the instrument panel (3) and install the starting switch nut (2), connect the wires to the switch terminals according to the tags placed on the switch at removal.

b. Ignition Switch.

(1) *Removal*. Disconnect the ignition switch (13, fig. 39) leads, and tag the wires to eliminate confusion at installation. Loosen the lock nut at the rear of the instrument panel (3) and unscrew the switch handle. Pull the switch from the rear of the instrument panel.

(2) *Installation*. Place the ignition switch (13, fig. 39) in position in the panel, and screw on the switch handle. Tighten the rear lock nut. Connect the switch wires according to the tags placed on the switch at removal.

c. Choke Control.

(1) *Removal*. Disconnect the choke control (35, fig. 39) cable from the carburetor (15, fig. 21). Loosen the nut (25, fig. 39) and lockwasher (26). Remove three clamps (24) from around choke cable and pull the choke control from the front of the instrument panel (3).

(2) *Installation*. Insert the cable end of the choke control (35, fig. 39) in the hole in the instrument panel (3) and place the lockwasher (26) and nut (25) over the end of the cable. Slip the choke cable into the three clamps (24). Push the choke control (35) all the way into the panel, and tighten the nut (25). Tighten the three clamps (24). Connect the choke control cable to the carburetor (15, fig. 21).

d. Pilot Light (fig. 39).

(1) *Removal*. Unsolder the wire from the rear of the pilot light assembly (33). Remove the locknut that holds the pilot light to the panel, and remove it from the instrument panel (3). The pilot light bulb is inside the pilot light assembly. Unscrew the red jewel to remove the bulb.

(2) *Installation*. Install a new pilot light bulb in the pilot light assembly (33) by inserting the bulb into the pilot light socket and screwing on the red jewel. Insert the pilot light assembly in the instrument panel (3) and screw on the pilot light locknut. Solder the wire to the pilot light terminal.

Section X. PRESSURE CONTROL SYSTEM

104. Description

b. Loading Cycle. When the air pressure in the air receiver drops to 90 psi, the unloader pilot shuts off the flow of air to the suction valve unloaders and causes the suction valves to close. The check and bleed valve releases air from-the slowdown assembly and temporarily restricts the flow of air from the suction valve unloaders. The slowdown plunger backs off from the governor lever to increase the speed of the engine.

c. Unloading Cycle. When the air pressure in the air receiver reaches 100 psi, the unloader pilot valve admits air to the suction valve unloaders thus opening the suction valves. The check and bleed valve admits air to the slowdown assembly, and the slowdown plunger pushes out against the governor lever to reduce engine speed to idle.

***Caution*: Before disconnecting air line tubing or removing pressure control system components, release all air from the air receiver.**

105. Check and Bleed Valve

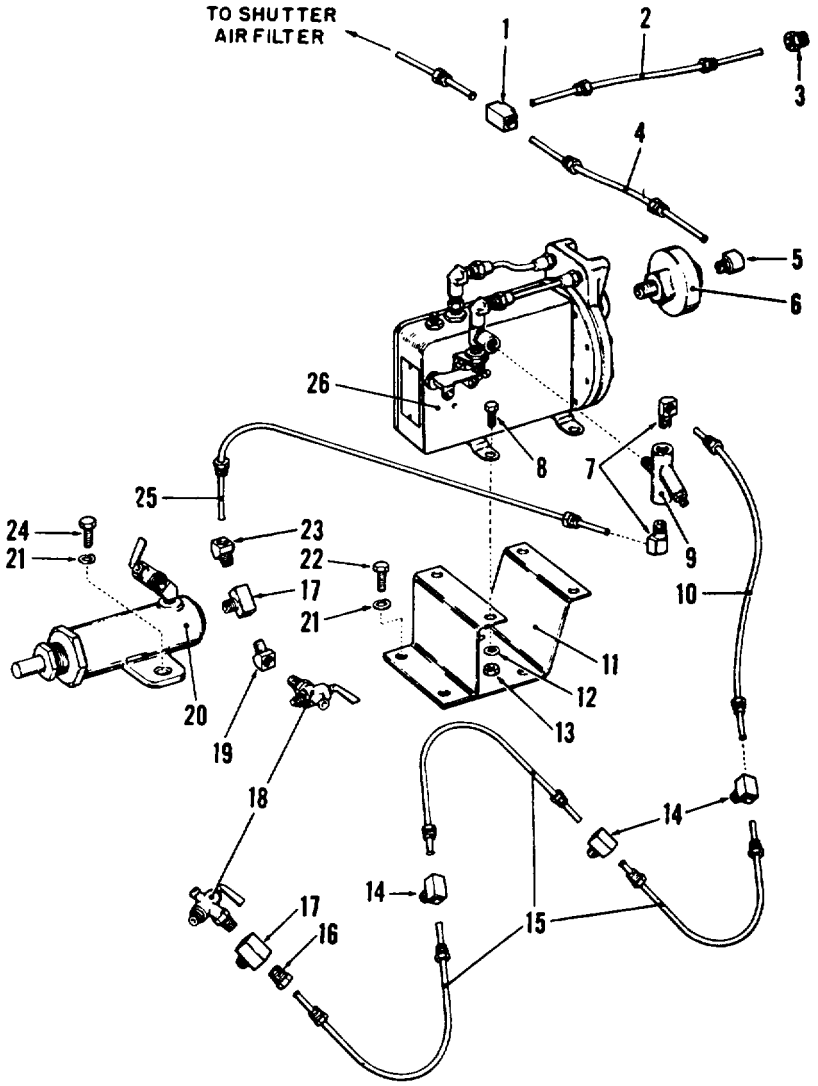
a. Removal (fig. 41). The check and bleed valve (9) is mounted in the side of the unloader pilot (26). Disconnect tube assemblies (10 and 25) from the elbows (7) at the top and bottom of the check and bleed valve. Unscrew the valve from the unloader pilot.

b. Installation (fig. 41). Use reverse order of removal instructions to install the valve.

c. Adjustment (fig. 42). The check and bleed valve provides a time delay which allows the engine to pick up speed before full load is applied. To increase the time delay, turn the adjusting screw inward (clockwise). To decrease the time delay, turn the adjusting screw outward (counterclockwise). Do not change the setting of the check and bleed valve unless absolutely necessary.

106. Control Line Air Filter

a. Removal (fig. 1). Disconnect the tube assembly (4) from the elbow (5) and unscrew the control line air filter (6) from the unloader pilot (26). Unscrew the elbow from the filter.



1	Tee, 5/16 x 5/16 x 5/16	16	Connector, ¼ x ⅛ M
2	Tube assembly	17	Tee, ⅛ F x ⅛ F x ⅛ M (2 req)
3	Connector, 5/16 x ⅛ M	18	Drain cock (2 req)
4	Tube assembly	19	Elbow, ⅛ F x ⅛ M x 45
5	Elbow, 5/16 x ¼ x 90°	20	Slowdown assembly
6	Control line air filter	21	Lockwasher, 5/16 (6 req)
7	Elbow, ¼ x ⅛ x 90° (2 req)	22	Bolt, hex hd, 5/16-18 x ⅝ (4 req)
8	Bolt, hex hd, ¼-28 x ½ (4 req)	23	Elbow, ¼ x ⅛ M x 45°
9	Check and bleed valve	24	Bolt, hex hd, 5/16-18 x 1 (2 req)
10	Tube assembly	25	Tube assembly
11	Mounting bracket	26	Unloader pilot
12	Lockwasher, ¼ (4 req)		
13	Nut, hex, ¼-28 (4 req)		
14	Tee, ¼ x ¼ x ⅛ M (3 req)		
15	Tube assembly		

Figure 41. Pressure control system.

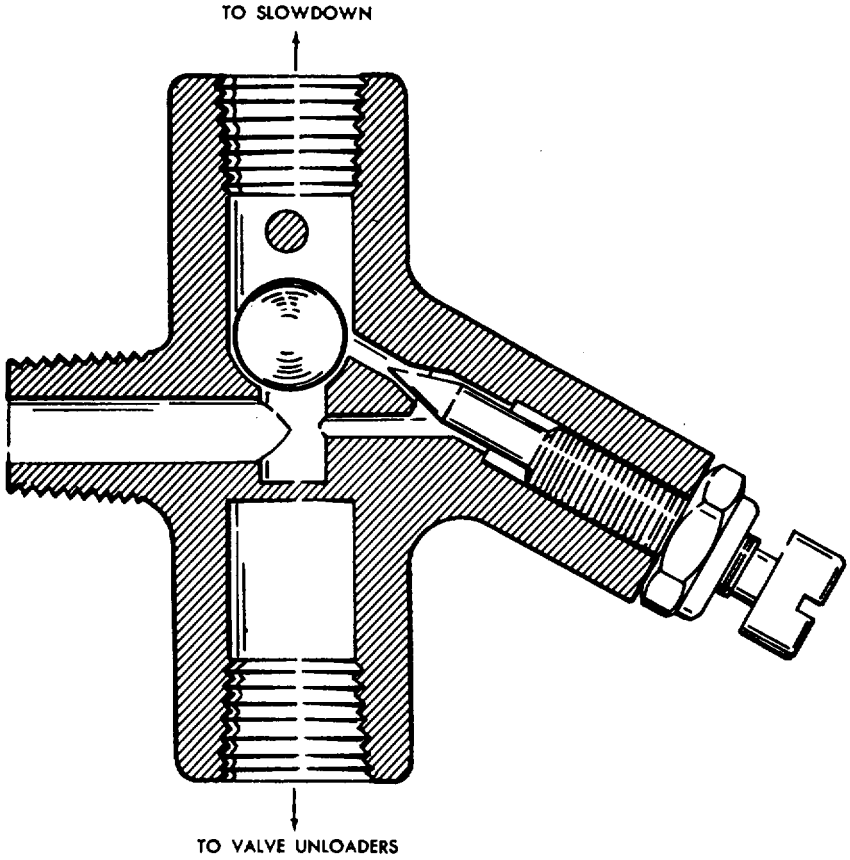
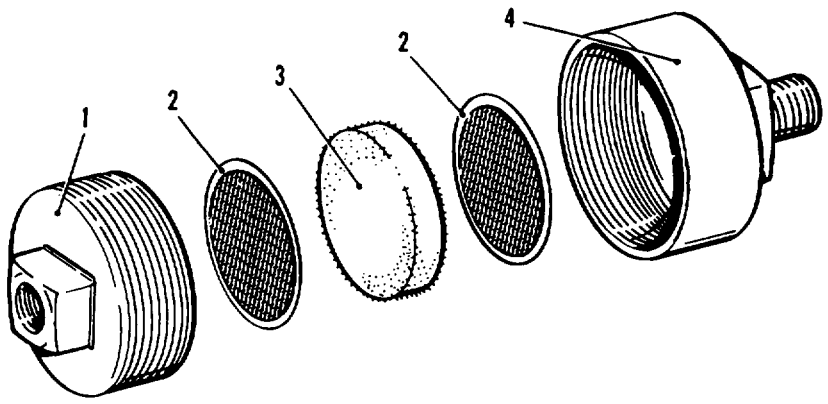


Figure 42. Cross-section of check and bleed valve.



1 Filter top
2 Filter screen (2 req)
3 Felt disk
4 Filter base

Figure 43. Exploded view of control line air filter.

b. Disassembly (fig. 43). Clamp the square flange of the filter base (4) in a vise and unscrew the filter top (1). Remove the screens (2) and felt disk (3) from the base.

c. Cleaning and Inspection. Clean all parts thoroughly with compressed air. Make certain that the screens are not damaged in any way. Do not get oil on the felt.

d. Reassembly (fig. 43). Place the felt disk (3) between the two screens (2) and insert these parts into the filter base (4). Clamp the square flange of the base in a vise, and screw on the filter top (1).

e. Installation (fig. 41). Screw the elbow (5) into the control line air filter (6) and screw the filter into the unloader pilot (26). Connect the tube assembly (4) to the elbow.

107. Unloader Pilot Adjustment

The pressure control system must be set to load at 90 psi and unload at 100 psi. The adjustment must be made with the engine-compressor in operation and while observing the pressure on the air receiver pressure gage. Turning the

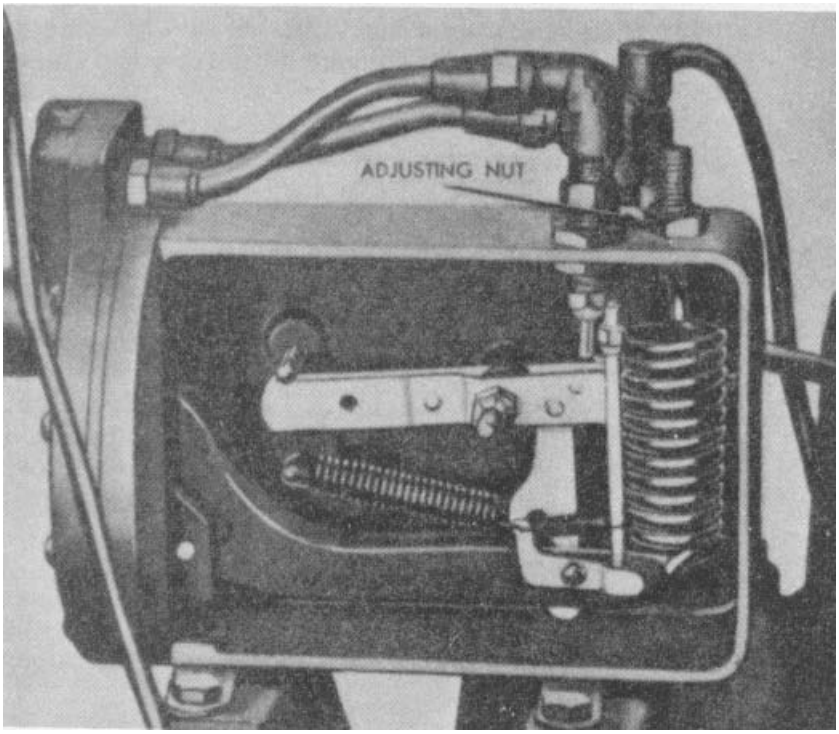


Figure 44. Adjusting the unloader pilot.

adjusting nut (fig. 44) clockwise raises both the loading and unloading setting; turning the nut counterclockwise lowers both settings. The differential pressure (difference between loading and unloading points) is factory set and must not be changed.

108. Unloader Pilot

a. Removal (fig. 41).

(1) Remove the check and bleed valve (par. 105a).

(2) Remove the control line air filter (par. 106a).

(3) Remove the four hex nuts (13), lockwashers (12) and hex head bolts (8) and lift the unloader pilot (26) from the mounting bracket (11).

b. Disassembly (fig. 45).

(1) Remove the wing nut (29) and plain washer (28) and lift the side cover (27) from the frame casting (15).

(2) Unhook and remove the trip lever spring (30) and extension spring (33). Take out the screw (31) and remove the spring stud keeper (32) and valve plunger rod (20).

(3) Unscrew the adjusting nut (17) and remove the adjusting screw (18) and main spring (19) from the frame casting.

(4) Remove the hex nut (26), lockwasher (25) and trip lever (24) from the trip lever screw (12) and press the felt washer (23) from between the two arms of the trip lever.

Note: The trip lever stud, which protrudes through the back of the frame casting, supports the unloader valve plunger pin (6). Be careful not to lose this pin.

(5) Pull out the main arm pivot pin (35) and remove the main arm (34) from the casting.

(6) Disconnect the tubes (13 and 14) from the elbows (11). Unscrew the twelve screws (1, 2, and 3) and disassemble the outer diaphragm casting (4), diaphragm (40), plunger disk (39) and inner diaphragm casting (38) from the frame casting. Unscrew the couplings (5) from the outer diaphragm casting.

(7) Remove the two lock nuts. (7) and disassemble the unloader valve (10) from the bracket (8) and the kickoff valve (16) from the frame casting. Unscrew the elbows (11) from the valves.

c. Cleaning and Inspection.

(1) Clean all parts with thoroughly with a low pressure jet of compressed air. Wipe the exterior of the cover and castings

with a cloth dampened in cleaning solvent.

(2) Wash the diaphragm in warm, soapy water, rinse with clear water and dry thoroughly.

(3) Inspect all parts carefully for damage. If the diaphragm is torn or shows signs of deterioration, replace it. Weak or broken springs, bent tubes and similarly damaged parts must be discarded and replaced.

d. Reassembly (fig. 45).

(1) Assemble the unloader valve (10) to the valve bracket (8) and install the lock nut (7). Assemble the kickoff valve (16) into the frame casting (15) and install the lock nut (7).

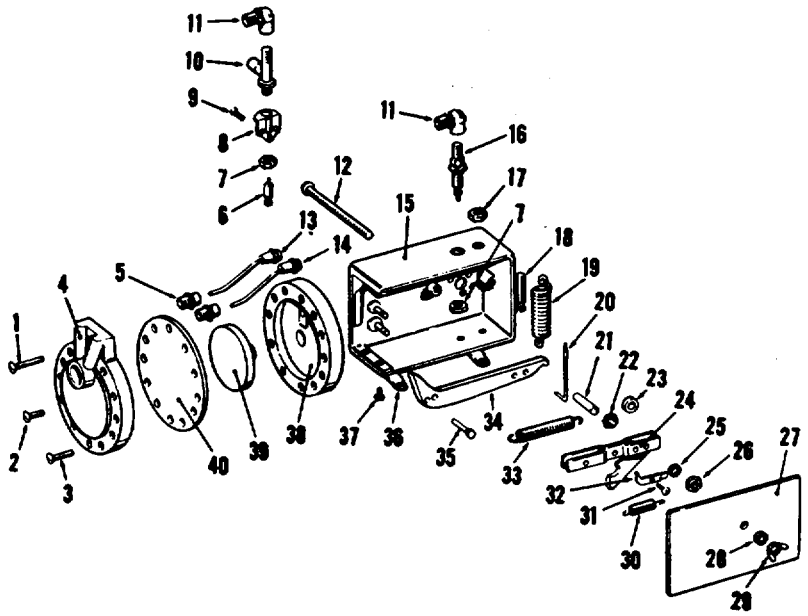
(2) The tubes (13 and 14) are soldered to the couplings (5). Screw the couplings into the outer diaphragm casting (4). Assemble the diaphragm (40), plunger disk (39) and inner diaphragm casting (38) to the outer casting (4), carefully alining all screw holes. Fasten this group together with ten :y.-inch long screws (1) inserted through all but the top and bottom center holes in the outer diaphragm casting. Attach the diaphragm group to the frame casting with the longer screw (3) at the top and the shorter screw (2) at the bottom.

(3) Screw the elbows (11) onto the valves (10 and 16) and connect the tubes (13 and 14) to the elbows.

(4) Insert the main arm (34) into the frame casting with the pivot end behind the cast bracket arm of the inner diaphragm casting. Aline the pivot hole in the main arm with that in the cast arm and install the pivot pin (35).

(5) Insert the felt washer (23) in between the two arms of the trip lever (24). Insert the valve plunger pin (6) up into the unloader valve (10) and hold it in place while installing the trip lever on the trip lever screw (12). The long stud of the trip lever will protrude through the frame casting to support the valve plunger pin. Secure the trip lever with the lockwasher (25) and hex nut (26).

(6) Insert the leg of the valve plunger rod (20) through the drilled hole in the main arm (34) and install the spring stud keeper (32) with the roundhead screw (31). Hook the extension spring (33) between the plunger rod (20) and the keeper (32). Hook the trip lever spring (30) between the trip lever (24) and the spring stud in the frame casting.



1	Screw, rd hd, 10–32 x ¾ (10 req)	21	Trip lever bushing
2	Screw, rd hd, 10–32 x 1⅛	22	Nut, lock, 8–32
3	Screw, rd hd, 10–32 x 1½	23	Felt washer
4	Outer diaphragm casting	24	Trip lever
5	Compression coupling (2 req)	25	Lockwasher, No. 8
6	Valve plunger pin	26	Nut, hex, 8–32
7	Valve lock nut (2 req)	27	Side cover
8	Valve bracket	28	Plain washer, No. 8
9	Screw, rd hd, 10–32 x ¼ (3 req)	29	Wing nut
10	Unloader valve	30	Trip lever spring
11	Elbow, ⅛ x ¼ (2 req)	31	Screw, rd hd, 6–32 x 3/16
12	Trip lever screw	32	Spring stud keeper
13	Unloader valve tube	33	Extension spring
14	Kickoff valve tube	34	Main arm
15	Frame casting	35	Main arm pivot pin
16	Kickoff valve	36	Mounting foot
17	Adjusting nut	37	Screw, rd hd, 10–32 x 5/16 (4 req)
18	Adjusting screw	38	Inner diaphragm casting
19	Main spring	39	Diaphragm plunger disk
20	Valve plunger rod	40	Rubber diaphragm

Figure 45. Exploded view of unloader pilot.

(7) Hook one end of the main spring (19) around the main arm and the other end through the adjusting screw (18). Insert the threaded end of the adjusting screw up through the hole in the frame casting and install the adjusting nut (17). The side cover (27) need not be installed until the unloader pilot has been adjusted.

e. Installation (fig. 41).

(1) Position the unloader pilot (26) on the mounting bracket

(11) and install the four hex head bolts (8), lockwashers (12) and hex nuts (13).

(2) Install the control line air filter (par. 106e).

(3) Install the check and bleed valve (par. 105c).

(4) Adjust the unloader pilot '(par. 107) and install the side cover with the washer and wing nut.

109. Slowdown Assembly

a. Removal (fig. 41).

(1) Disconnect the tube assembly (25) from the elbow (23).

(2) Remove the two hex head bolts (24) and lockwashers (21) and lift the slowdown assembly (20) from the crankcase cover.

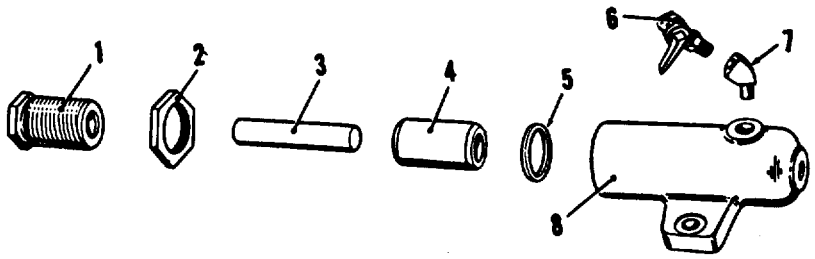
(3) Unscrew the tee (17) from the slowdown assembly.

b. Disassembly (fig. 46).

(1) Unscrew the shutoff cock (6) and elbow (7) from the slowdown body (8).

(2) Loosen the locking nut (2) and unscrew the stroke adjusting screw (1) from the slowdown body.

(3) Remove the plunger pin (3) and plunger (4) and slip the O ring (5) from the groove in the slowdown body.



1 Stroke adjusting screw
2 Locking nut
3 Plunger pin
4 Plunger
5 O ring
6 Shutoff cock
7 Elbow, ⅛ M x ⅛ F x 45°
8 Slowdown body

Figure 46. Exploded view of slowdown assembly.

c. Cleaning and Inspection.

(1) Clean all parts thoroughly with a clean, lint-free cloth, and wipe the exterior of the slowdown body with a cloth dampened with cleaning solvent.

(2) Inspect all parts carefully for physical damage. The plunger and inner walls of the body should be free of deep grooves or scratches which might impair the operating efficiency of the assembly. Replace damaged parts.

d. Reassembly (fig. 46).

(1) Slip a new O ring (5) into the groove around the inside of the slowdown body (8), and insert the plunger (4) down into place.

(2) Assemble the plunger pin (3) into the adjusting screw (1) and screw the adjusting screw into the slowdown body.

(3) Install the elbow (7) and shutoff cock (6).

e. Installation (fig. 41).

(1) Screw the tube tee (17), with elbows (19 and 23) and drain cock (18) attached, into the slowdown body.

(2) Fasten the slowdown assembly to the crankcase cover with the two hex head bolts (24) and lockwashers (21). The slowdown plunger pin must engage the lower end of the governor lever.

(3) Connect the tube assembly (25) to the elbow (23).

f. Slowdown Stroke Adjustment. The slowdown assembly should not be adjusted unless the engine does not return to idle speed when the compressor unloads. Lengthen the slowdown stroke, to further reduce engine speed, by loosening the locking nut (2, fig. 46) and turning out the stroke adjusting screw (1). Tighten the locking nut. Check operation. If the engine still runs too fast with an unloaded compressor, turn the stroke adjusting nut out further. To increase the engine speed while the compressor is unloaded, reverse the above procedure.

110. Governor

a. Removal (fig. 47).

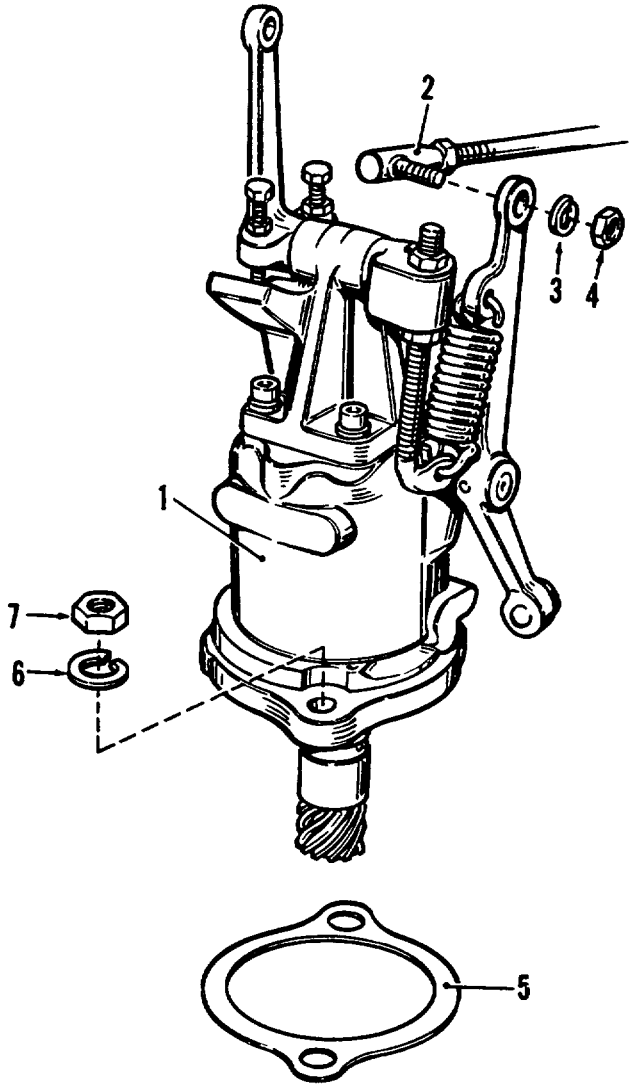
(1) Remove the hex nut (4) and lockwasher (3) and disassemble the control rod (2) from the upper end of the governor lever.

(2) Remove the hex nuts (7) and lockwashers (6) from the governor mounting studs, and carefully lift the governor (1) and mounting gasket (5) from the crankcase cover.

b. Installation (fig. 47).

(1) Position the gasket (5) around the governor mounting opening, and carefully install the governor (1), meshing the governor gear with the accessory governor drive gear. Install the hex nuts (7) and lockwashers (6).

(2) Connect the control rod (2) to the upper end of the governor lever and install the hex nut (4) and lockwasher (3).



1 Governor
2 Control rod
3 Lockwasher, ¼
4 Nut, hex, ¼–28
5 Mounting gasket
6 Lockwasher, ⅜ (2 req)
7 Nut, hex, ⅜–24 (2 req)

Figure 47. Exploded view of governor and attaching parts.

c. Adjustment (fig. 48). If the governor has been removed from the engine or if incorrect adjustments are indicated by the engine performance, complete checking of governor operation is necessary.

(1) Start and warm up the engine until operation temperatures are reached.

(2) Run the engine with no load, then suddenly apply full load, by opening air receiver service valve, and note the governor action. After one or possibly two surges, the engine speed should become steady.

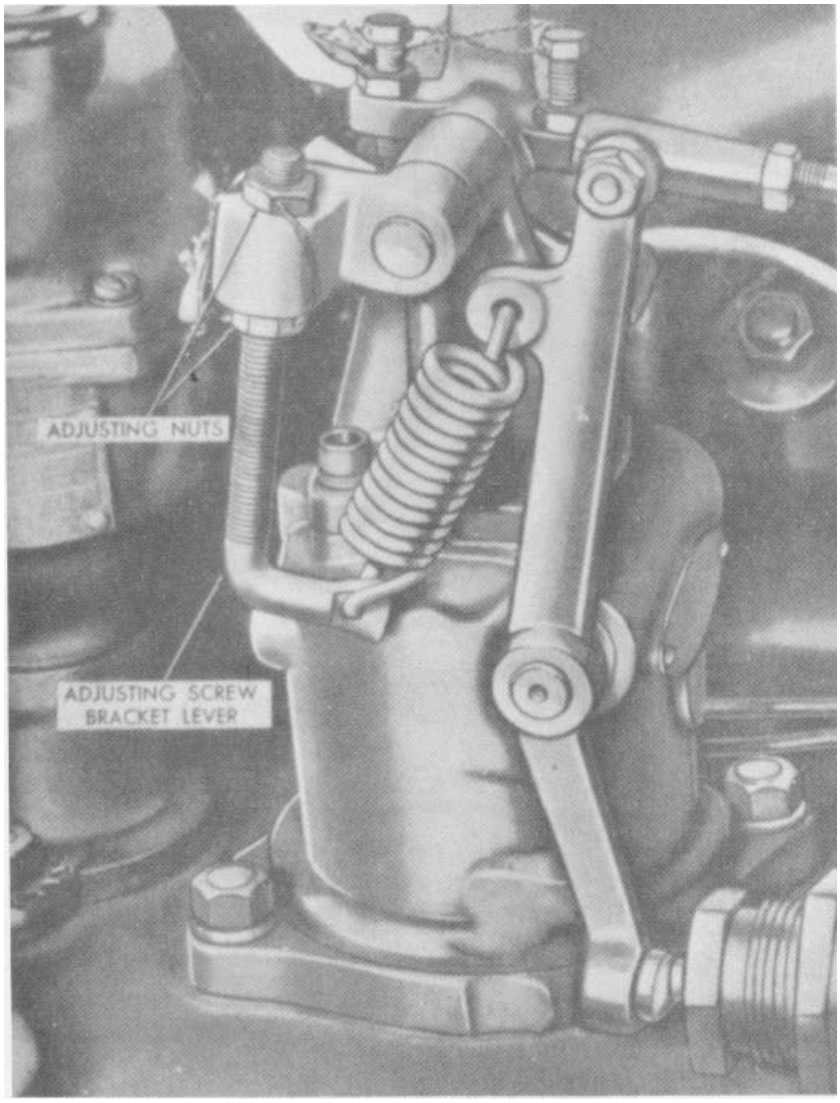


Figure 48. Governor adjustment.

If the governor hunts when load is applied, close the receiver service valve to idle the engine, and lengthen the adjusting screw bracket lever by turning the adjusting nuts. Lengthening the lever makes the engine more stable, but also increases

the speed droop from no load to full load. For this reason, a satisfactory governor setting must be a compromise between stability and speed regulation.

(3) After the governor is set so that there is no hunting, tighten the adjusting nuts.

Section XI. AIR RECEIVER AND AFTERCOOLER

111. Description

The air receiver has a volumetric capacity of 6 cubic feet. It is mounted above the engine-compressor fuel tank on two cradle-like supports and is held rigidly by straps and braces. Compressed air leaves the compressor exhaust manifold and enters one end of the finned aftercooler (fig. 49) where the temperature of the air is lowered by its passage through a series of cooling tubes. The cooled air then enters the air receiver through the aftercooler to receiver connection. The air receiver is equipped with a safety valve for protection against a build-up of excess pressure. The compressed air in the receiver may be obtained from the two receiver service valves. Two drain valves located at the bottom of the receiver provide a means for draining off condensation.

***Caution*: Be sure to release all air from the air receiver before attempting to remove the hose reels, aftercooler, receiver or any of the associated piping or fittings.**

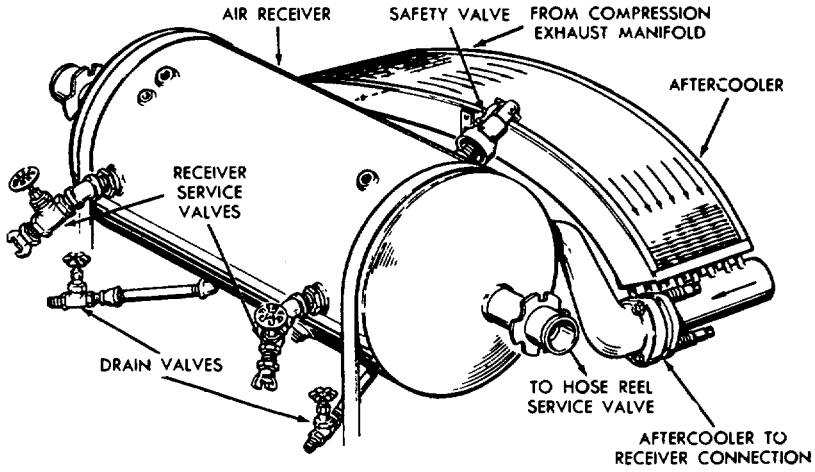


Figure 49. Aftercooler and air receiver.

112. Hose Reel Air Hoses (fig. 10)

a. Removal. Release the hose reel lock pins so that the reels can revolve freely. Disconnect the free ends of the hoses from the couplings at the rear of the side tool boxes and unwind the hoses from the hose reels. Then loosen the two hose clamps and disconnect the hoses from the hose reel service valve couplings and slip the hoses from the slots in the hose reels.

b. Cleaning and Inspection. Do not clean hoses with cleaning solvent or other petroleum products. Wash with warm, soapy water; then rinse with clear water and blow dry with compressed air. Examine the hoses carefully for cracks or breaks and for signs of deterioration. If hoses or their couplings are damaged, they must be replaced.

c. Installation. Slip the end of each hose through the slot in the hose reel and connect it to the service valve hose couplings. Hoses must unwind over the tops of the hose reels and toward the rear of the truck. Wind the hoses onto the hose reels and connect the end of each hose to the stationary coupling mounted at the rear of the side tool boxes. Lock the hose reels with the lock pins.

113. Hose Reel and Service Valve

a. Removal (fig. 50).

(1) Remove the hose from the hose reel (par. 112a).

(2) Unscrew the service valve (1) from the end of the slip fittings (7) and disassemble the hose coupling (18) from the valve.

(3) Remove the lock ring (4) from the groove around the reel shaft hub, and slide off the reel.

b. Disassembly (fig. 50).

(1) Remove the two self-tapping screws (11) and lockwashers (10) and lift the lock pin assembly (9) from the hose reel (8). If the lock pin assembly is to be disassembled, support it solidly while driving out the taper pins (13 and 16). Then slip the collar (12), spring (14) and support (15) from the lock pin (17).

(2) Remove the four fillister head screws (2) and lockwashers (3) that fasten the retainer fitting (5) inside the reel shaft hub, and remove the retainer fitting, slip fitting (7) and packing (6).

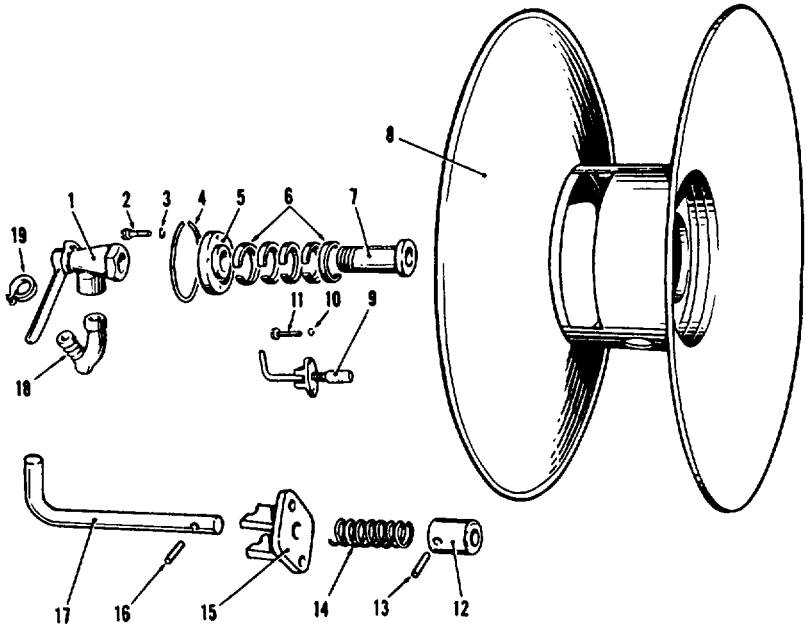
c. Cleaning and Inspection. Wipe the hose reels and lock pin parts with a cloth dampened with cleaning solvent. Clean all

parts with compressed air. Discard and replace the packing set. Inspect the remaining parts for physical damage which may impair the operating efficiency of the hose reel and replace, if necessary.

d. Reassembly (fig. 50).

(1) Assemble the packing (6) and retainer fitting (5) to the slip fitting (7) and insert this assembled group into the recess in the hose reel shaft hub. Install the four fillister head screws (2) and lockwashers (3), tightening the screws evenly until the retainer fitting is firm. Do not overtighten these screws.

(2) Secure the support (15) to the lock pin (17) with the taper pin (16). Slide the spring (14) over the end of



1 Hose reel service valve (2 req)
2 Screw, fil hd, 5/16–18 x 1 (8 req)
3 Lockwasher, 5/16 (8 req)
4 Lock ring (2 req)
5 Retainer fitting (2 req)
6 Packing (2 req)
7 Slip fitting (2 req)
8 Hose reel (2 req)
9 Lock pin assembly (2 req)
10 Lockwasher, No. 10 (4 req)
11 Screw, self-tapping, No. 10 x ½ (4 req)
12 Lock pin collar (2 req)
13 Taper pin, No. 000 x ½ (2 req)
14 Lock pin spring (2 req)
15 Lock pin support (2 req)
16 Taper pin, No. 000 x ¾ (2 req)
17 Lock pin (2 req)
18 Hose coupling (2 req)
19 Hose clamp (4 req)

Figure 50. Exploded view of hose reel.

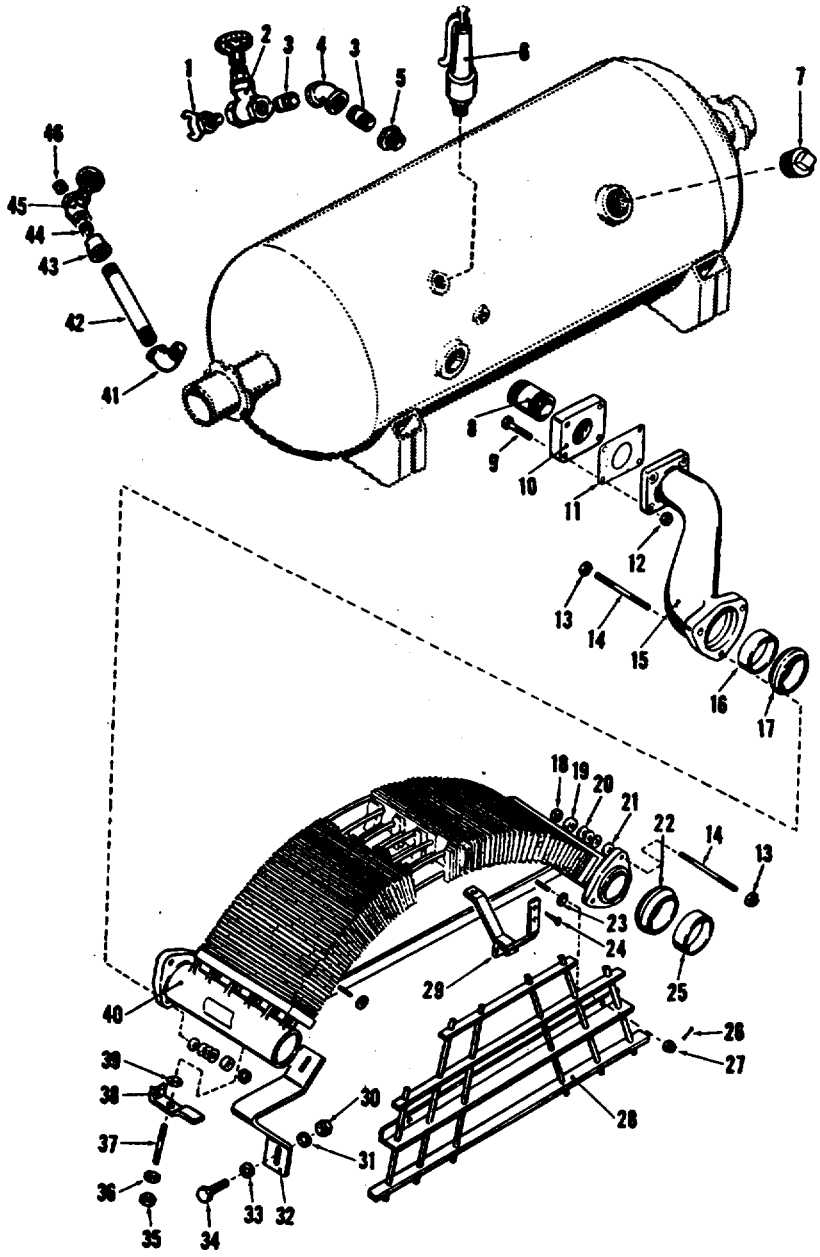


Figure 51. Exploded view of aftercooler and valves.

the lock pin, and secure the collar (12) to the lock pin with the taper pin (13).

(3) Fasten the lock pi. assembly (9) to the hose reel (8)

1 Hose end coupling (2 req)
2 Service valve (2 req)
3 Nipple, 3/4 x 1 3/8 (4 req)
4 Elbow, 3/4 x 45° (2 req)
5 Reducing bushing, 1 to 3/4 (2 req)
6 Safety valve
7 Pipe plug
8 Nipple, 2 ½ x 2 ½
9 Bolt, hex hd, 1/2-20 x 2 3/4 (4 req)
10 Connection fitting
11 Connection gasket
12 Nut, self-locking, 1/2-20 (4 req)
13 Nut, self-locking, 1/2-20 (6 req)
14 Stud, (6 req)
15 Connection
16 Sleeve
17 Packing
18 Nut, special (6 req)
19 Spacer (6 req)
20 Spring washer (84 req)
21 End washer (6 req)
22 Packing
23 Plain washer, 1/4 (2 req)
24 Screw, self-tapping, No. 10 x 1/2 (3 req)
25 Sleeve
26 Cotter pin, 1/16 x 3/4 (2 req)
27 Nut, castellated, 1/4-28 (2 req)
28 Flywheel guard
29 Brace
30 Nut, hex, 5/16-18 (2 req)
31 Lockwasher, 5/16 (2 req)
32 Engine support brace
33 Plain washer, 5/16 (2 req)
34 Bolt, hex hd, 5/16-18 x 7/8 (2 req)
35 Nut, hex, 7/16-20
36 Lockwasher, 7/16
37 Stud
38 Aftercooler clamp
39 Plain washer, 7/16 (10 req)
40 Aftercooler
41 Elbow, 3/8 x 90°
42 Nipple, 3/8 x 6 1/2
43 Reducing bushing, 3/8 to 1/4
44 Nipple, 1/4 x 7/8
45 Drain cock
46 Nipple, 1/4 x 1

Figure 51. -Continued.

with the two self-tapping screws (11) and lockwashers (10).

e. *Installation* (fig. 50).

(1) Apply a coat of general purpose grease to the friction surfaces of the reel shaft hub where the reel flanges will revolve and lift the reel up into position on the hub. Install the lock ring (4) around the groove in the end of the hub.

(2) Assemble the hose coupling (18) to the service valve (1) and screw the service valve onto the end of the slip fitting (7).

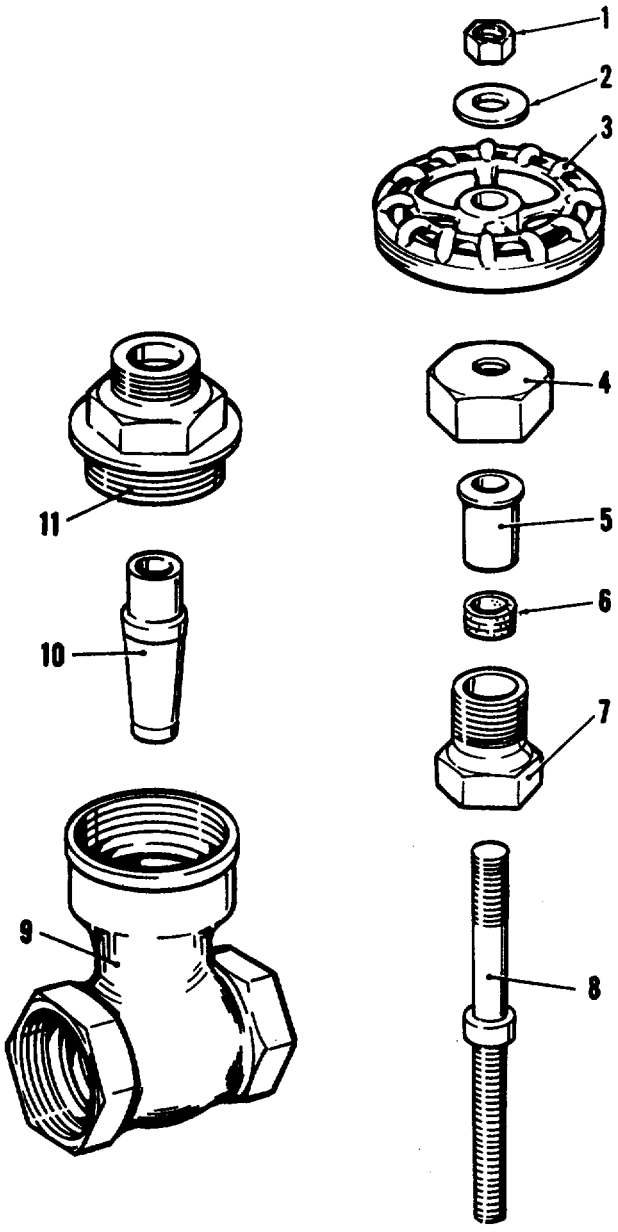
(3) Install the hose on the hose reel (par. 112c).

114. Receiver Service Valves and Piping

a. *Removal* (fig. 51). Unscrew and remove the hose end coupling (1), service valve (2), nipple (3), elbow (4), nipple (3) and reducing bushing (5) in that order.

b. *Disassembly* (fig. 52).

(1) Unscrew the wheel nut (1) and remove the identification



1 Wheel nut
2 Identification plate
3 Handwheel
4 Packing nut
5 Gland
6 Packing
7 Stuffing box
8 Valve stem
9 Valve body
10 Disk
11 Bonnett

Figure 52. Exploded view of receiver service valve.

plate (2) and handwheel (3) from the valve stem (8).

(2) Unscrew and remove the packing nut (4) and stuffing box (7). Press the gland (5) and packing (6) from the stuffing box.

(3) Unscrew the bonnet (11) from the valve body (9) lifting off the stem (8) and disk (10) with the bonnet. If necessary, unscrew the stem from the disk.

c. Cleaning and Inspection. Clean all parts inside and out, with cleaning solvent, and allow parts to dry thoroughly before reassembling. Discard and replace the packing.

d. Reassembly (fig. 52).

(1) Insert the worn end of the stem (8) through the bonnet (11) and screw the stem into the disk (10). Screw the bonnet into the valve body (9).

(2) Screw the stuffing box (7) onto the bonnet, and carefully press the packing (6) and gland (5) down into place. Then install the packing nut (4), being careful not to overtighten it.

(3) Fasten the handwheel (3) and identification plate (2) to the end of the stem with the wheel nut (1).

e. Installation (fig. 51). In the following order, install the reducing bushing (5), nipple (3), elbow (4), nipple (3), service valve (2) and hose end coupling (1).

115. Drain Cocks and Piping

a. Removal (fig. 51). In the following order, remove the 1-inch nipple (46), drain cock (45), 7/8-inch nipple (44), reducing bushing (43), 6 1/2-inch nipple (42) and elbow (41).

b. Cleaning and Inspection. Clean the drain cock and all fittings with a cloth dampened in cleaning solvent and dry with compressed air. If the drain cock is not operating properly, it must be replaced.

c. Installation (fig. 51). In the following order, install the elbow (41), 6 1/2-inch nipple (42), reducing bushing (43), 7/8-inch nipple (44), drain cock (45) and 1-inch nipple (46).

116. Aftercooler to Receiver Connection

a. Removal (fig. 51).

(1) Remove the four hex head bolts (9) and self-locking nuts (12) that fasten the connection (15) to the connection fitting (10).

(2) Remove the three self-locking nuts (13) from the studs (14), and remove the studs with the special nuts (18), spacers (19), spring washers (20) and end washers (21) installed.

(3) Grasp the connection and swing the upper end forward until it clears the air receiver. Then remove the connection, sleeve (16), packing (17) and gasket (11).

b. Cleaning and Inspection. Blow out the interior of the connection with compressed air, and wipe the exterior with a cloth dampened in cleaning solvent. Discard and replace the packing and gasket.

c. Installation (fig. 51).

(1) Assemble the packing (17) to the sleeve (16) and insert these parts into the connection (15).

(2) Apply a thin coat of gasket cement to the gasket surface of the connection fitting (10), and carefully position the gasket (11) on the fitting.

(3) Assemble the connection to the aftercooler intake manifold and swing it up until it meets the connection fitting (10). Install the four hex head bolts (9) and self-locking nuts (12).

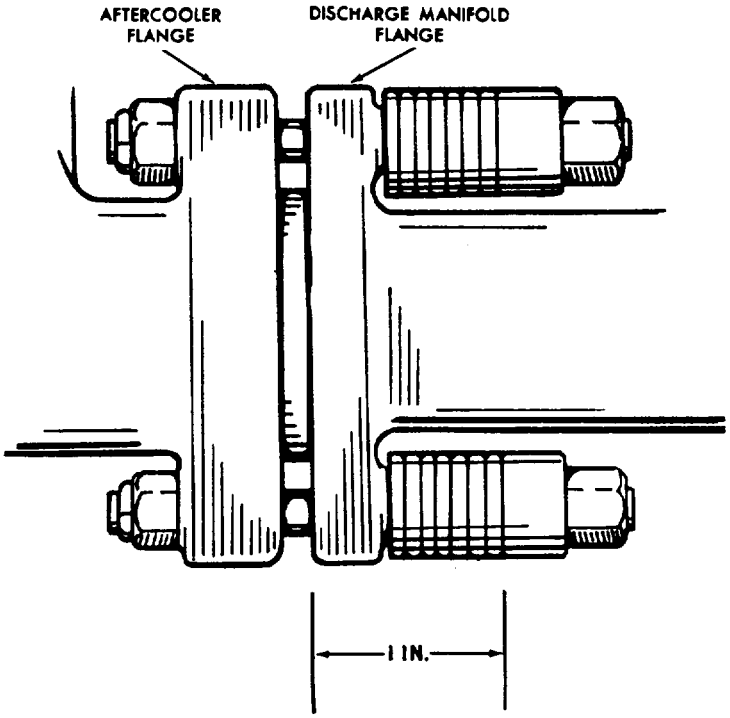


Figure 53. Aftercooler flange mounting view.

(4) Insert the three studs (14), with the special nuts (18), spacers (19), spring washers (20) and end washers (21) installed, through the mounting flanges of the aftercooler and connection. Install and tighten the self-locking nuts (13) until the distance from the outer spring washer on each stud to the surface of the aftercooler flange measures one inch (fig. 53).

117. Aftercooler

a. Removal and Disassembly (fig. 51).

(1) Remove the aftercooler to receiver connection (par. 116a).

(2) Loosen the hex nut (35) so that the clamp (38) can be swung away from the engine support brace (32).

(3) Remove the self-locking nuts (13) from the three studs (14) connecting the aftercooler manifold to the compressor discharge manifold, and remove the studs with the special nuts (18), spacers (19), spring washers (20) and end washers (21) installed.

(4) Lift the assembled aftercooler (40) and flywheel guard (28) from the engine-compressor. To disassemble the flywheel guard from the aftercooler, remove the two cotter pins (26) and castellated nuts (27) and three self-tapping screws (24). Note that plain washers (23) are located on the two studs between the guard and aftercooler.

b. Cleaning and Inspection. Blow the dirt, leaves, twigs and other debris from between the fins of the aftercooler with compressed air. Wipe the grease or oil from all parts with a cloth dampened in cleaning solvent. The packing used at the aftercooler intake and outlet must be discarded and replaced. Inspect the aftercooler fins for good condition. Where fins have been bent or crushed together, straighten and separate them as well as possible to permit free circulation of air.

c. Reassembly and Installation (fig. 51).

(1) Assemble the packing (22) to the sleeve (25) and insert these parts into the recess in the compressor manifold discharge opening.

(2) Install the plain washers (23) on the aftercooler brace studs, and fasten the flywheel guard (28) to the studs with the castellated nuts (27) and cotter pins (26). The brace (29) welded to the top of the guard is secured to the aftercooler with three self-tapping screws (24).

(3) Lift the assembled aftercooler and guard up into position with one end of the aftercooler resting on the engine support brace (32). Insert the three studs (14), with the special nuts (18), spacers (19), spring washers (20) and end washers (21) installed, through the mounting flanges of the aftercooler and compressor exhaust manifold. Install and tighten the self-locking nuts (13) until the distance from the outer spring washer on each stud to the surface of the aftercooler flange measures one inch (fig. 53).

(4) Swing the clamp (38) underneath the engine support brace (32) and tighten the hex nut (35) securely.

(5) Install the aftercooler to receiver connection (par. 116c).

Section XII. ENGINE-COMPRESSOR

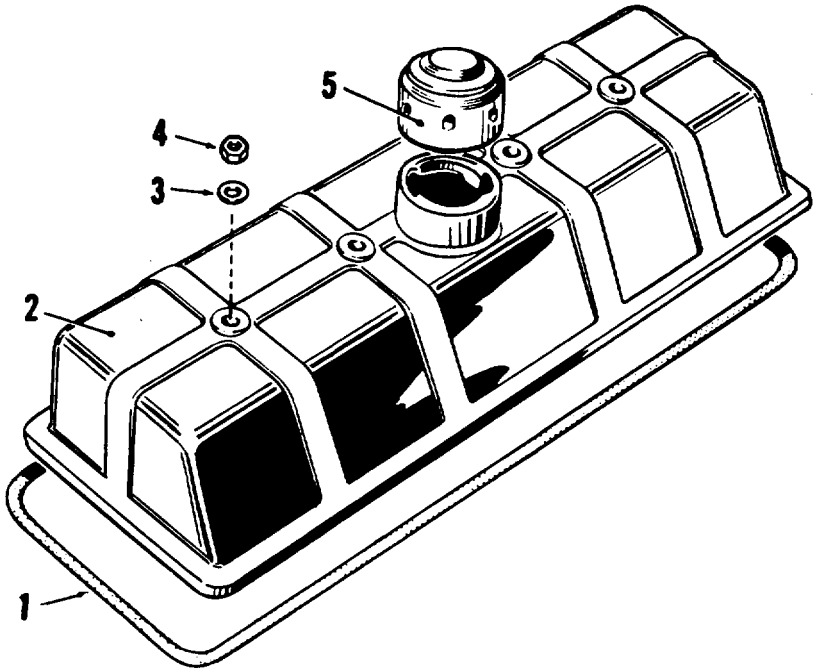
118. Description

a. The engine-compressor actually is a four-piston-engine and four-piston compressor, with all pistons connected to a single crankshaft in a V-type crankcase. Power from the engine bank is transmitted through the crankshaft to compress air in the compressor bank. The crankshaft is mounted in five main bearings. Full-pressure lubrication is supplied by a gear driven oil pump mounted on the front main bearing cap. Two bypass oil filters in the lower oil pan help to keep the lubricating oil free from foreign matter.

b. The engine and compressor banks are equipped with wet sleeve cylinders. The engine exhaust and intake valves, are stellite faced and each has stellite inserts with positive type valve rotators to increase valve life. Above each cylinder in the compressor cylinder head is a compressor valve assembly. Free air is admitted through the dry-type air cleaners and through the suction valve part of the valve assembly by the action of the piston on its downward stroke. When the piston reaches top dead center on its upward stroke (at which time the suction valve is closed), the air is compressed and released through the discharge valve part of the assembly into the compressor discharge manifold.

119. Cylinder Head Cover and Gasket

a. Removal (fig. 54). Unscrew and remove the four hex nuts (4) and plain washers (3) from the four cover mounting studs, and lift off the cylinder head cover (2) and gasket (1). Twist the crankcase breather (5) clockwise until it can be lifted from the cover.



1 Cover gasket, 5/8-inch thick
2 Cylinder head cover
3 Plain washer, 3/8 (4 req)
4 Nut, hex 3/8-24 (4 req)
5 Crankcase breather

Figure 54. Exploded view of cylinder head cover and gasket.

b. Cleaning and Inspection. Clean the crankcase breather with compressed air. Wipe the cylinder head cover with a cloth dampened in cleaning solvent. If the gasket has been damaged during removal of the cover, it must be replaced. Blow all loose dirt away from the cylinder head valves with compressed air. Wipe grit from surface of head with a cloth dampened in cleaning solvent.

c. Installation (fig. 54). Apply a light coat of gasket cement to the gasket surfaces of the cylinder head and cylinder head cover. Carefully position the gasket (1) around the cover mounting surface of the cylinder head. Install the cylinder head cover on the four mounting studs and fasten securely with the plain washers (3) and hex nuts (4). Install the crankcase breather (5) and twist it counterclockwise to lock it in place.

120. Engine Manifolds

a. Removal and Disassembly.

(1) Unscrew the exhaust nipple (2, fig. 55) and weather cap (1) from the exhaust manifold (8).

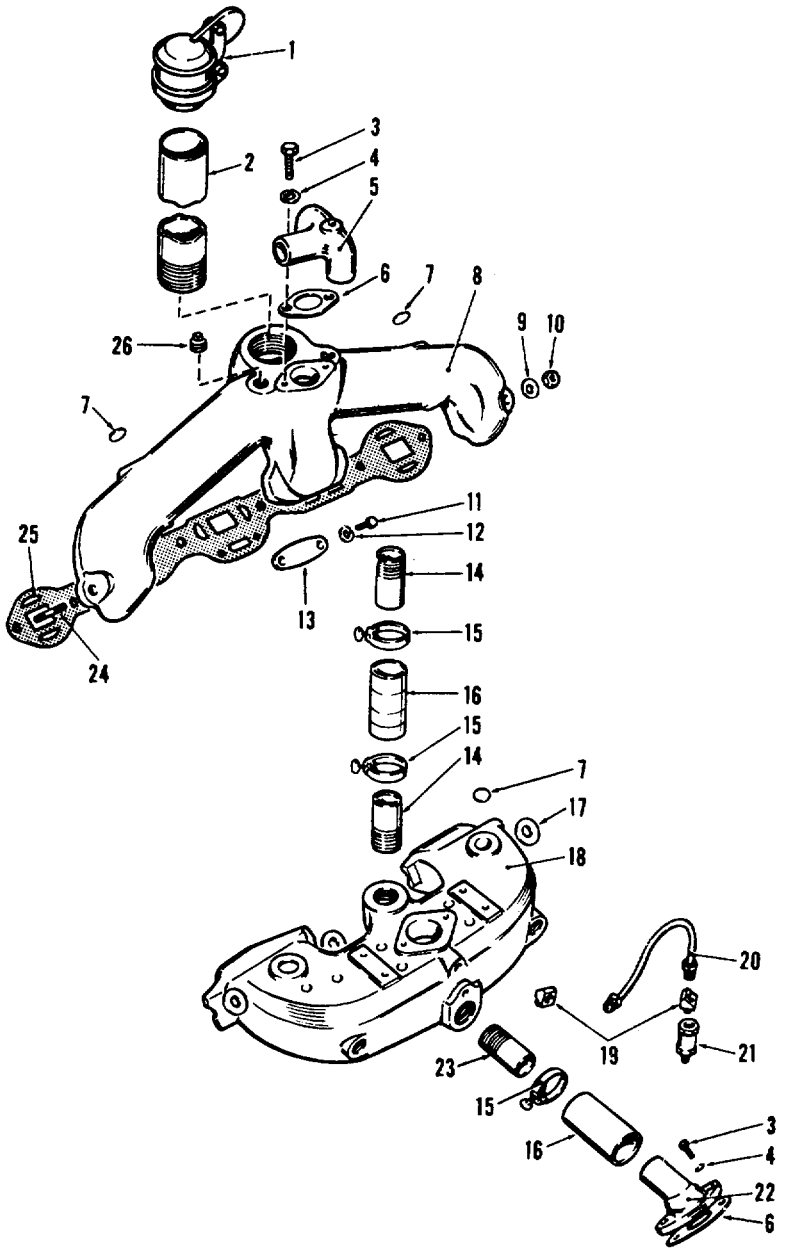


Figure 55. Exploded view of engine manifolds.

(2) Remove the engine air cleaners and carburetor (par. 78a) from the intake manifold (18).

(3) Drain the cooling system at least below the level of the cylinder head and disconnect the coolant hose from the coolant outlet at the top of the exhaust manifold. Release the hose clamps (15) and loosen the hoses (16).

1 Weather cap
2 Nipple, 2 1/2 x 15
3 Bolt, hex hd, 3/8-16 x 1 (4 req)
4 Lockwasher, 3/8 (4 req)
5 Connection
6 Gasket (2 req)
7 Welch plug, 1-inch (12 req)
8 Exhaust manifold
9 Washer, special, 7/16 (2 req)
10 Nut, hex 7/16-20 (6 req)
11 Bolt, hex hd, 7/16-14 x 1/4 (2 req)
12 Lockwasher, 7/16 (2 req)
13 Heat connection cover
14 Nipple, 1 x 1 3/4 (2 req)
15 Hose clamp (4 req)
16 Hose, 1 1/4 x 4 1/2 (2 req)
17 Clamp washer (4 req)
18 Intake manifold
19 Elbow, 3/8 x 1/4 M x 45°
20 Tube assembly
21 Ventilation regulator
22 Connection
23 Nipple, 1 x 3
24 Stud (6 req)
25 Manifold gasket
26 Pipe plug, 1-inch

Figure 55-Continued.

(4) Disconnect the tube assembly (20) from the elbow (19) in the intake manifold (18). Unscrew the bulb on the water temperature gage (23, fig. 39) from the exhaust manifold (8, fig. 55).

(5) Remove four hex head bolts (3) and lockwashers (4) to detach the connections (5 and 22). Remove the connections and the gaskets (6).

(6) Remove the six hex nuts (10), two special washers (9) and four clamp washers (17) from the studs (24) in the engine cylinder head and lift off the exhaust manifold (8), intake manifold (18) and manifold gasket (25).

(7) Remove the nipples (14 and 23) and the pipe plug (26).

b. Cleaning and Inspection. Clean all parts, inside and out, with compressed air. Wipe grease and oil from the manifold and gasket surface of cylinder head with a cloth dampened in cleaning solvent. The manifold gasket must be discarded and replaced. Make certain that the manifold castings are not cracked or broken and that tubing and piping are in good condition. Replace damaged parts.

c. Reassembly and Installation.

(1) Apply a coat of gasket cement to the gasket surface of the engine cylinder head and install the new manifold gasket (25, fig. 55).

(2) Lift the exhaust manifold (8) up into position on the two outer studs (24) and install the special washers (9) and hex nuts (10).

(3) Lift the intake manifold (18) up into position on the four inner studs (24) and install the manifold clamp washers (17) and remaining four hex nuts (10). Tighten all six hex nuts with a torque wrench to 60 foot-pounds of torque.

(4) Apply a coat of gasket cement to the gasket surface of the exhaust manifold and crankcase. Install the connections (5 and 22) and two gaskets (6) with four hex head bolts (3) and lockwashers (4).

(5) Install the nipples (14 and 23), hoses (16), and clamps (15). Connect the radiator coolant hose to the coolant outlet opening at the top of the exhaust manifold.

(6) Connect the ventilation regulator tube (20) to the tube elbow (19) in the intake manifold.

(7) Screw the bulb on the water temperature gage (23, fig. 39) and the pipe plug (26, fig. 55) into the exhaust manifold (8) (8) Install the engine air cleaners and carburetor (par. 78b).

(9) Screw the nipple (2), with weather cap (1), into the top of the exhaust manifold.

(10) Fill the radiator (par. 6d (4)).

121. Valve Clearance Adjustment

a. Run the engine at a fast idle for about 15 minutes to normalize heat expansion of all parts. Then turn off the ignition switch to prevent accidental starting during the adjustment procedure.

b. Remove the cylinder head cover (par. 119a), being careful not to damage the cover gasket.

c. Remove the spark plug from the number one cylinder (nearest the radiator) and place the thumb over the spark plug opening. Have the engine cranked slowly by hand until an outward pressure is felt against the thumb. Continue cranking slowly until the "DC" (dead center) mark on the flywheel is alined with the timing pointer on the rear engine support. The number one piston now is at top dead center.

d. Loosen the lock nut (fig. 56) and turn the adjusting screw in or out until a 0.014-inch feeler gage fits snugly between the rocker arm valve contact face and the end of the valve stem. Without further movement of the screw, tighten the lock nut securely. Adjust the clearance of the second valve of the number one cylinder in the same manner.

e. Cranking the engine one-half revolution at a time, check and adjust each set of valves in succession. Remember that the firing order of the engine is 1 2 4 :3. In other words, check and adjust the valve sets for cylinder one,

cylinder two, cylinder four and cylinder three, in that order.

f. After all valves have been checked and adjusted, install the cylinder head cover and gasket (par. 119c).

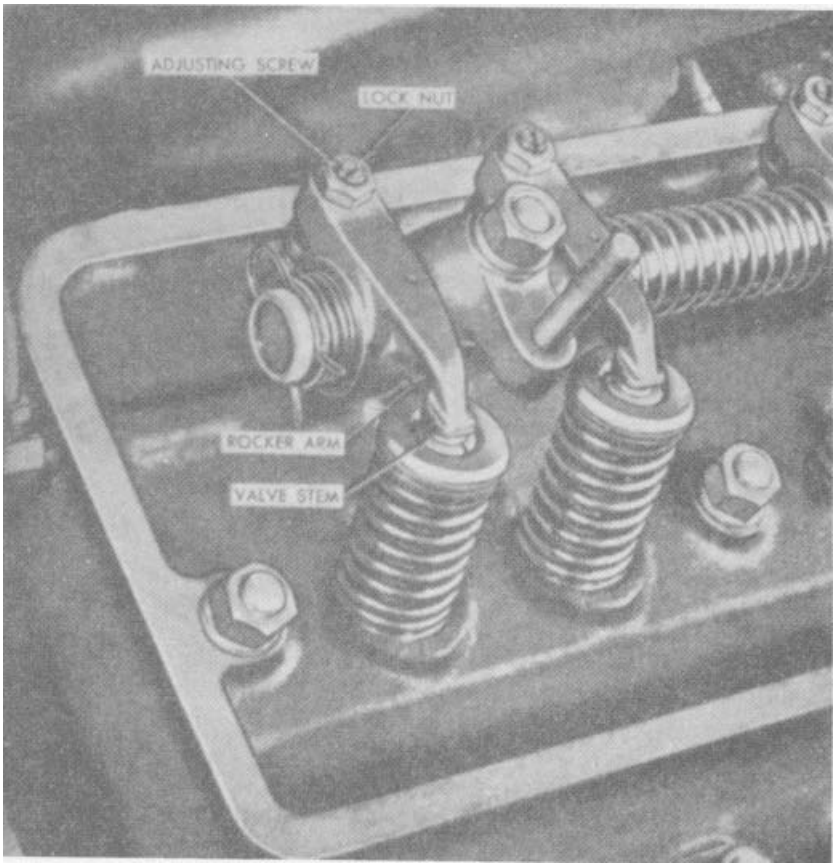


Figure 56. Valve clearance adjusting screws.

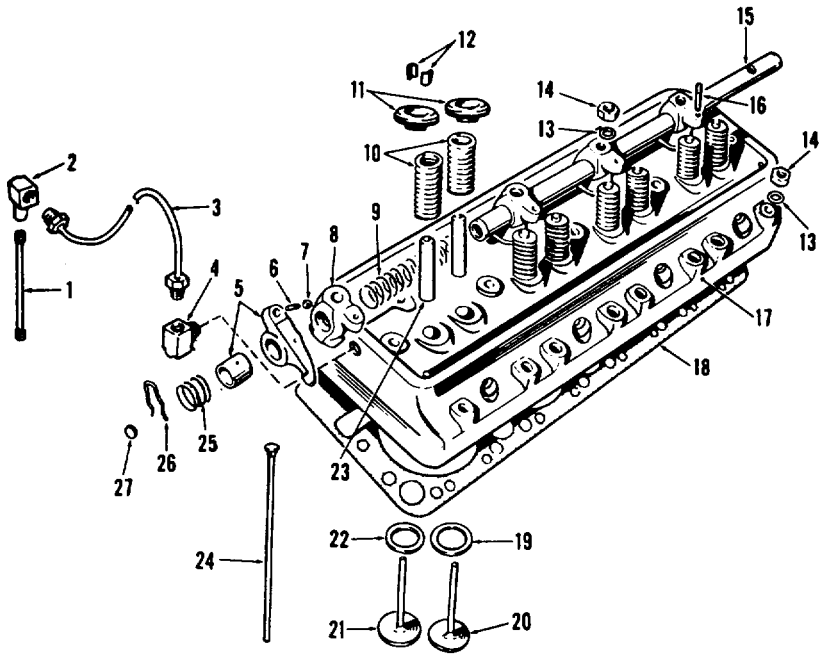
122. Engine Cylinder Head and Valves

a. Removal (fig. 57).

(1) Remove the cylinder head cover and gasket (par. 119a).
(2) Remove the engine manifolds (par. 120a).
(3) Remove all spark plugs and cables (par. 96).
(4) Disconnect the tube assembly (3) from the elbow (4) in the aftercooler end of the cylinder head (17).
(5) The engine cylinder head is mounted on 17 studs in the crankcase. Four of these studs protrude up through the rocker arm brackets (8); five studs are located in line with the valve springs (10); the remaining

eight studs are located in line with the spark plug openings. Remove the hex nuts (14) and the special washers (13) from all studs. Lift the rocker arm assembly from its four mounting studs and remove the eight push rods (24). Lift the assembled cylinder head and valves straight up from the studs and place it on a clean working surface.

(6) Remove the cylinder head gasket (18) from the studs. If there is any doubt as to the serviceability of the gasket, it must be discarded and replaced.



1 Nipple
2 Elbow
3 Tube assembly
4 Elbow
5 Rocker arm assembly (8 req)
6 Adjusting screw (8 req)
7 Nut, hex, 3/8-24 (8 req)
8 Rocker arm bracket (4 req)
9 Spacer spring (3 req)
10 Valve spring (8 req)
11 Valve rotator (8 req)
12 Spring lock retainer (16 req)
13 Washer, special (17 req)
14 Nut, hex 1/2-20 (17 req)
15 Rocker arm shaft
16 Stud (4 req)
17 Cylinder head
18 Cylinder head gasket
19 Intake valve insert (4 req)
20 Intake valve (4 req)
21 Exhaust valve (4 req)
22 Exhaust valve insert (4 req)
23 Valve stem guide (8 req)
24 Push rod (8 req)
25 End spring (2 req)
26 Spring retainer (2 req)
27 Expansion plug, 3/4 (2 req)

Figure 57. Exploded view of cylinder head and valves.

b. Disassembly (fig. 57).

(1) To disassemble the rocker arm assembly, remove one spring retainer (26) and slide the end springs (25), rocker arm assemblies (5), rocker arm brackets (8), and spacer springs (9) from the rocker arm shaft (15). If possible, do not disturb the setting of the adjusting screws (6) and their hex nuts (7).

(2) Compress the valve springs (10) until the spring lock retainers (12) can be removed. Then disassemble the valve rotators (11), valve springs (10), valves (20 and 21) and valve stem guides (23) from the cylinder head (17).

Caution

When removing valves, arrange them in the order in which they are removed so that they can be reinserted into the same valve ports during installation.

c. Cleaning and Inspection.

(1) Clean and inspect all valves carefully. See that carbon or other foreign matter is removed from the valve head and stem. Inspect the end of the valve stem and face of each valve for pitting, scoring or warping. If warped or excessively pitted or scored, replace the valve.

(2) Inspect valve springs for broken coils and make certain that they have adequate tension. Replace weak or broken springs.

(3) Clean the oil holes in the rocker arm shaft thoroughly. To clean the inside of this hollow shaft, the expansion plugs (27, fig. 57) must be removed. Make certain that the shaft is not bent or distorted. Replace shaft if necessary.

(4) Thoroughly clean the oil holes in the rocker arms and bushings, and examine the bushings for wear. Rocker arms and their bushings are serviced only as assemblies. Carefully inspect the valve contact face of each rocker arm for excessive grooving or pitting. If such a condition is evident, the rocker arm must be replaced.

(5) Clean the cylinder head casting and the head mounting surface of the crankcase with a cloth dampened in cleaning solvent. It is very important that the mating surfaces of the cylinder head and crankcase block be absolutely clean before installing the cylinder head.

d. Reassembly.

(1) Press the valve stem guides (23, fig. 57) down into place in the cylinder head (17) and insert the valves (20 and 21) up into their proper ports. Install the valve springs

(10) and valve rotators (11) and compress each spring until the spring lock retainers (12) can be slipped into the groove around the valve stem.

(2) Make certain that an expansion plug (27) is pressed into each end of the rocker arm shaft (15). Press a spring retainer (26) into the groove at one end of the rocker arm shaft and, in the order listed, install the following rocker arm parts: end spring (25), rocker arm assembly (5), rocker arm bracket (8), rocker arm assembly (5), spacer spring (9), a second pair of arms (5) with a bracket (8) between, spacer spring (9), a third pair of arms (5) with bracket (8) between, spacer spring (9), a fourth pair of arms (5) with bracket (8) between, and another end spring (25). Compress these parts until the remaining spring retainer (26) can be installed.

e. Installation (fig. 57).

(1) Apply a light coat of general purpose grease on the crankcase mounting surface and upper surface of the cylinder head gasket (18), and install the gasket.

(2) Lift the assembled cylinder head into position over the top of the crankcase, and very carefully lower the head down over the mounting studs and onto the gasket. Insert the eight push rods (24) down into the rod openings behind the rocker arm bracket mounting studs.

(3) Rotate the rocker arm brackets (8) until the stud hole in each bracket is alined with the corresponding hole in the rocker arm shaft (15). Drop a : y8-inch or 7/16 inch bolt down into each mounting hole to keep these

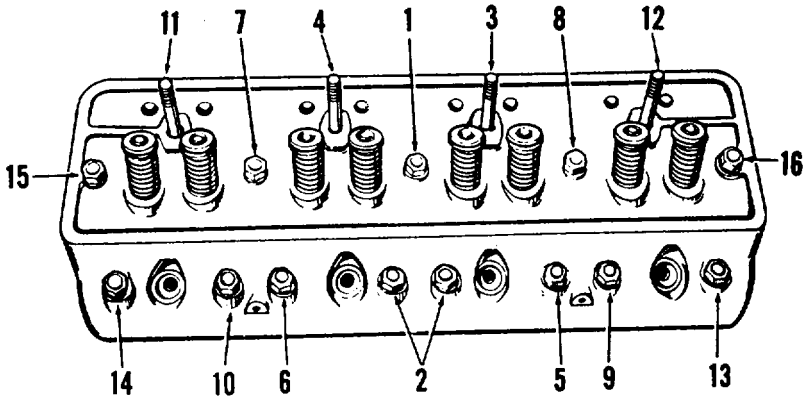


Figure 58. Engine cylinder-head stud nut tightening diagram.

holes alined during installation. Install the rocker arm assembly on the four mounting studs, with the valve contact faces of the rocker arms resting on the ends of the valve stems.

(4) Install and tighten the 17 hex nuts (14) and special washers (13), following the sequence shown in figure 58. Tighten all cylinder head nuts with a torque wrench to 90 foot-pounds of torque. These nuts must be retightened after the engine is warm and before adjusting the valve clearance.

(5) Connect the tube assembly (3, fig. 57) to the elbow (4) in the aftercooler end of the cylinder head.

(6) Install all spark plugs and cables (par. 96) and the engine manifolds (par. 120c).

(7) Run the engine at a fast idle for 15 minutes. Then retighten all cylinder head nuts with a torque wrench to 90 foot-pounds and adjust the clearance of all valves (par. 121).

(8) Install the cylinder head cover and gasket (par. 119c).

123. Compressor Air Cleaners

a. Removal (fig. 59).

(1) Two pairs of air cleaners are mounted at the back of the compressor cylinder head. Both pairs are identical in construction and are mounted in the same fashion.

(2) Reach behind the air filter connection (8) and remove the self-locking nut (11) and copper washer (10) from the long mounting stud (9).

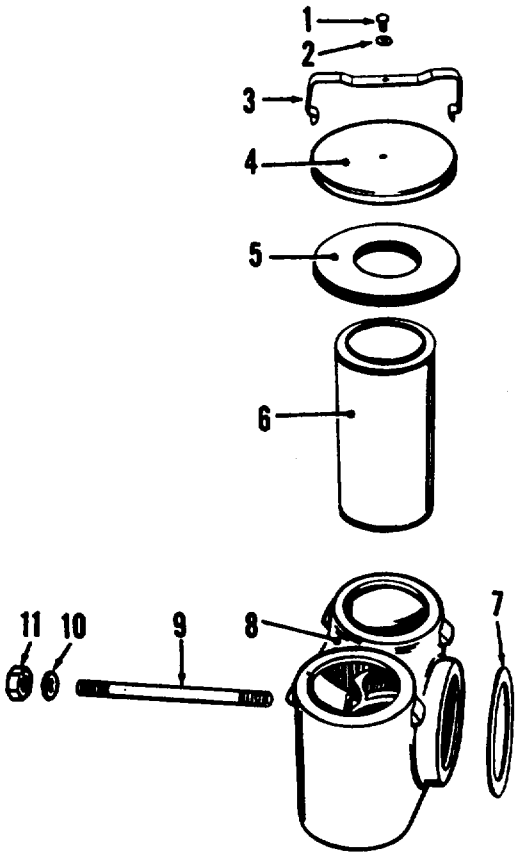
(3) Lift the assembled air cleaner and its gasket (7) from the cylinder head port. Remove the covers (4) and filter elements (6) from the air filter connection.

b. Cleaning and Inspection. Blow out the filter elements and the inside of the filter connection with compressed air. Wipe the exterior of the filter connection and cover with a cloth dampened with cleaning solvent. If the filter element appears to be clogged or caked with dirt it must be replaced. If, upon inspection, gaskets have loosened from the air cleaner, remount and adhere with Pliobond or No. EC11 cement.

c. Installation (fig. 59).

(1) Insert the filter elements (6) into the filter connection (8) and install gasket (7) and the cover (4), snapping the ends of the spring (3) under the cast lugs on the connection.

(2) Install the assembled air cleaner on the mounting stud (9). Secure the air cleaner to the stud with the copper washer (10) and self-locking nut (11).



1 Rivet, 3/16 x ⅜ (4 req)
2 Plain washer, No. 10 (4 req)
3 Cover spring (4 req)
4 Cover (4 req)
5 Cover gasket (4 req)
6 Filter element (4 req)
7 Port gasket (2 req)
8 Air filter connection (2 req)
9 Mounting stud (2 req)
10 Copper washer, ⅝ (2 req)
11 Nut, self-locking, ⅝ (2 req)

Figure 59. Exploded view of compressor air cleaners.

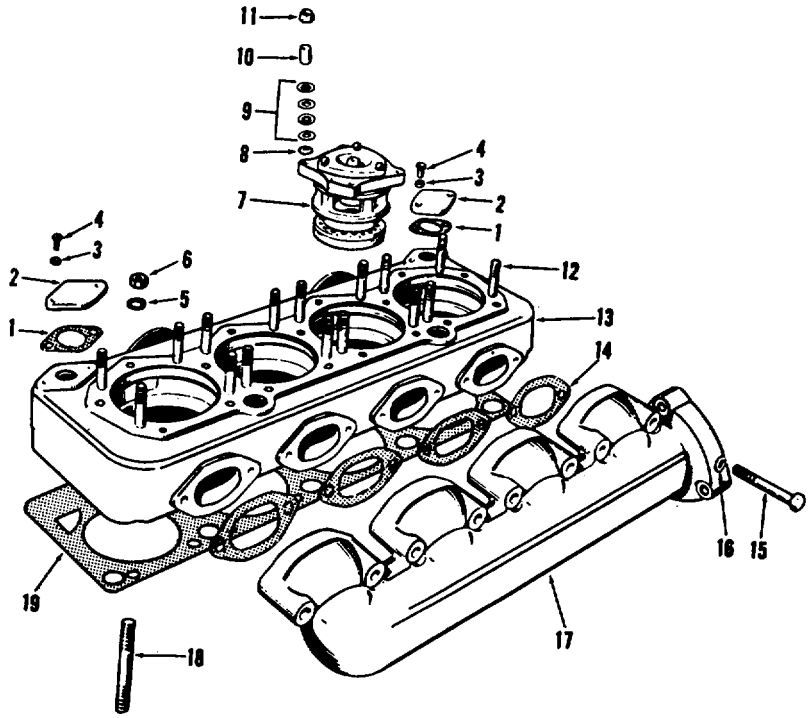
124. Air Discharge Manifold

a. Removal.

(1) Open the receiver service valves and release the air from the air receiver.

(2) Remove the aftercooler to manifold studs and nuts (par. 117a(3)).

(3) Remove the eight hex head bolts (15, fig. 60) and special washers (16) and lift the air discharge manifold (17) and gaskets (14) away from the compressor cylinder head and aftercooler. Remove the packing and sleeve (22 and 25, fig. 51) from the manifold discharge opening.



1	Cover gasket (2 req)	11	Nut, hex, special, ½–20 (16 req)
2	Cover (2 req)	12	Valve mounting stud (16 req)
3	Lockwasher, ⅜ (4 req)	13	Cylinder head
4	Bolt, hex hd, ⅜–16 x 1 (4 req)	14	Manifold gasket (4 req)
5	Washer, special (17 req)	15	Bolt, hex hd, ½–13 x 3½ (8 req)
6	Nut, hex, ½–20 (17 req)	16	Washer, special (8 req)
7	Valve assembly	17	Air discharge manifold
8	End washer (16 req)	18	Head mounting stud (17 req)
9	Spring washer (224 req)	19	Cylinder head gasket
10	Spacer (16 req)		

Figure 60. Exploded view of compressor cylinder head, valves and manifold.

b. Cleaning and Inspection. Clean the interior of the air discharge manifold with compressed air. Wipe the exterior of the Casting with a cloth dampened in cleaning solvent. If the packing (22, fig. 51) is not in good condition, it must be discarded and replaced. Replace the four manifold gaskets.

c. Installation.

(1) Assemble the packing (22, fig. 51) t9 the sleeve (25), and insert these parts into the recess in the compressor manifold discharge opening.

(2) Apply a coat of gasket cement to the gasket surfaces of the manifold (17, fig. 60) and compressor cylinder head (13). Position the gaskets (14) around the cylinder head openings and lift the manifold up into place. In so doing, engage the manifold discharge opening with the aftercooler inlet opening.

(3) Install the eight hex head bolts (15) and special washers (16), tightening the nuts with a torque wrench to 60 foot-pounds.

(4) Install the aftercooler to manifold studs as instructed in paragraph 117c (3).

125. Compressor Valve Assemblies

a. Removal.

(1) Open the receiver service valves and release the compressed air from the air receiver.

(2) Remove the drain cock (18, fig. 41) and disconnect the tube assemblies (15), connector (16) and tees (17) from the valve assembly, or assemblies, to be removed.

(3) Each valve assembly (7, fig. 60) is mounted on four studs (12) in the cylinder head. From each stud, remove a special nut (11), a spacer (10), 14 spring washers (9) and an end washer (8). Lift the valve assembly from the cylinder head.

b. Cleaning and Inspection. Clean the valve assembly, tube assemblies and fittings with compressed air or with a non-explosive solvent such as carbon tetrachloride. If solvent is used, dry with compressed air after cleaning. Do not lubricate the valve assembly. Insert a pencil or punch through the elongated holes in the discharge valve seat at the bottom of the valve. Press the valve plate at several points and note whether it snaps back into place when released. This will indicate that the bumper springs are in good condition. If the valve is not in good condition it must be replaced with a new valve assembly.

c. Installation.

(1) Install the valve assembly (7, fig. 60) on the four mounting studs (12) in the cylinder head.

(2) Directly across from one another, at the edge of the valve body, are two square head set screws with lock nuts. These set screws must be adjusted so that a 3/32- inch feeler gage fits, snugly between the

underside of the valve body and the mounting surface of the cylinder head. Then tighten the lock nuts securely.

(3) Install an end washer (8), 14 spring washers (9), a spacer (10), and a special nut (11) on each mounting stud. Tighten the special nuts evenly all the way around until the distance from the uppermost spring washer to the top surface of the valve body measures 1/8-inch.

(4) Connect the tees (17, fig. 41), connector (16) and tube assemblies (15) to the valve assembly, or assemblies as they are installed.

126. Compressor Cylinder Head

a. Removal (fig. 60).

(1) Remove the air discharge manifold (par. 124*a*).

(2) Remove the compressor valves (par. 125*a*).

(3) Remove the compressor air cleaners (par. 123*a*).

(4) Remove the 17 hex nuts (6) and special washers (5) from the head mounting studs (18), and lift the compressor cylinder head (13) and gasket (19) straight up from the studs.

b. Cleaning and Inspection. Clean out the inside of the cylinder head with compressed air. Wipe the head casting with a cloth dampened in cleaning solvent and dry with compressed air. Discard and replace the cylinder head gasket.

c. Installation (fig. 60)

(1) Place the new cylinder head gasket (19) on the mounting studs (18). Lift the cylinder head into position above the crankcase, and carefully lower it onto the mounting studs.

(2) Install the 17 special washers (5) and hex nuts (6). These nuts must be tightened with a torque wrench to 90 foot-pounds. Tighten the center nut first; then work alternately toward each end of the cylinder head, using a cross-cross pattern, until all nuts are tightened.

(3) Install the compressor air cleaners (par. 123c).

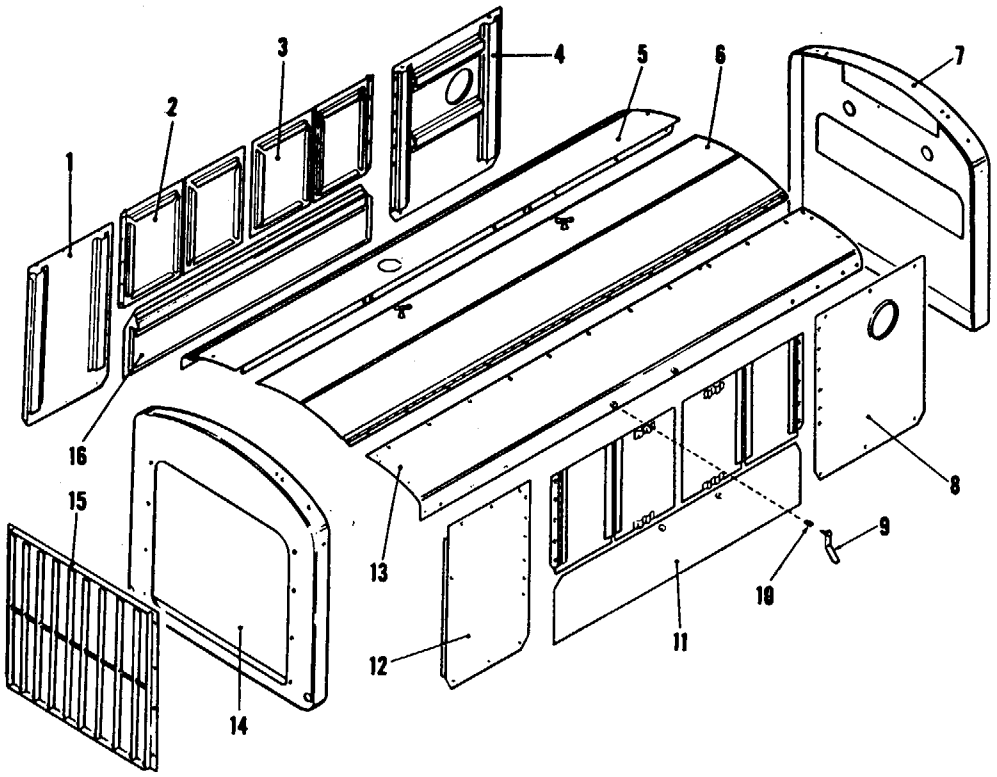
(4) Install the air discharge manifold (par. 124c).

(5) Install the compressor valve assemblies (par. 125c).

Section XIII. HOUSING

127. Description

The engine-compressor housing protects the equipment from rain, snow, and accidental mechanical damage. Keep the covers closed except when inspecting or repairing the unit. The housing includes-top, side, rear, and radiator covers



1 Front lh side panel
2 Front hood side door
3 Rear hood side door
4 Rear lh side panel
5 Hood top panel
6 Hood top door
7 Rear hood end support
8 Rear rh side panel
9 Handle
10 Spring
11 Center-compressor side panel
12 Front rh side panel
13 Hood top panel
14 Front hood end support
15 Front radiator guard
16 Center-engine side panel

Figure 61. Exploded view of engine-compressor housing.

The top and side covers are hinged to give the operating or maintenance personnel easy access to the equipment.

128. Housing Removal

Remove the hoses and hose reels (par. 113). Turn the eight handles (9, fig. 61) up. Remove the side doors (2 and 3), and the side panels (11 and 16). Remove the hood top door (6), the hood top panel (13), and the hood top panel (5). Remove the side panel (8), the side panel (12), the side panel (4), and the side panel (1). Remove the hood end support (14) with the radiator guard (15), and the hood end support (7). Lift out the cross-member supports, the straps, and hood top support with rubber packing and the hood top panels.

129. Housing Inspection and Repair

Inspect all the doors and panels for corrosion, tears, or breaks. Remove all corrosion and repaint immediately (par. 43). Straighten-any distorted surfaces, and reweld any torn spots before repainting. Inspect the handle springs (10, fig. 61) and clamp springs for breakage and replace any that are damaged. Replace any bent or broken handles.

130. Housing Installation

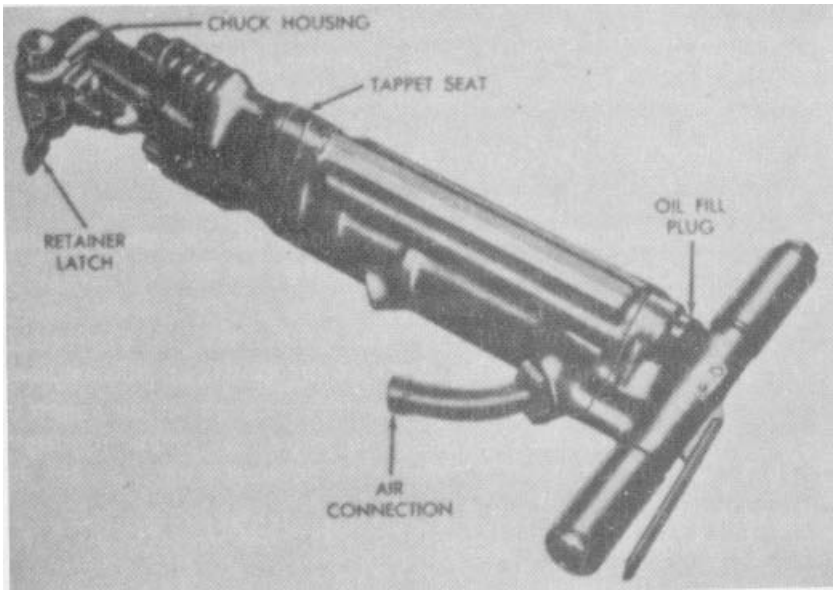
Install the housing in the reverse order of removal. See paragraph 128.

CHAPTER 4
MATERIEL USED IN CONJUNCTION WITH AIR COMPRESSOR

Section I. PAVING BREAKER

131. Description

The two piston-type paving breakers (fig. 62) are designed for general duty demolition and wall breaking. The throttle lever is conveniently located at the handle, which is equipped with rubber grips. The following attachments are provided with the paving breakers: one sheeting driver (fig. 63), four moil points, two cutting chisels, one tamping rod and one tamping pad. When not in use, the paving breakers and their attachments are stored in the engine side tool box.



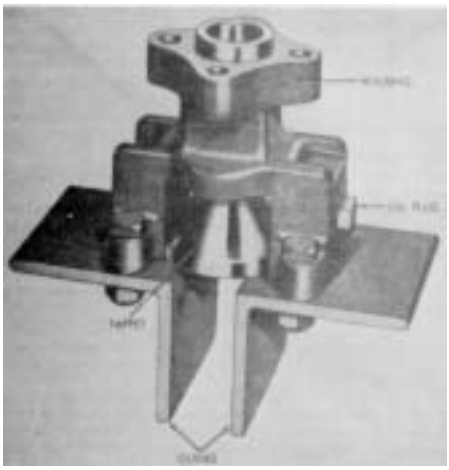


Figure 63. Sheeting driver.

132. Tabulated Data

Manufacturer	Le Roi-Cleveland
Model Number	52
Weight	80 ½ lbs
Overall length	28 ½ in.
Bore and stroke	2 ½ x 5 5/8 in.
Recommended hose size	¾ in.
Air connection	¾ in. pipe
Recommended air pressure	80 to 90 psi
Air requirements	60 cfm

133. Precautions

In order to safeguard the operator and to insure longer operating life of the equipment, the following precautionary measures always must be taken.

a. Never neglect the necessary lubrication procedures (par. 135*a)*

b. If possible, avoid operating the paving breaker with air pressure greater than 90 psi.

c. Hold the paving breaker handles firmly and plant feet solidly during operation.

d. Always turn off the paving breaker before laying it down.

e. Always detach the air hose from the air connection when stopping operations for any length of time.

134. Operation

a. Attach the tool to be used to the paving breaker. The moil point, chisel and tamping rod are inserted up into the breaker and are locked in with the retainer latch
(fig. 62). When the sheeting driver (fig. 63) is to be used, the chuck housing (fig. 62) and tappet seat must be removed and the sheeting driver installed.

b. Fill the paving breaker oil reservoir with oil (par. 135a).

c. Blow out the air hose and connect it to the air connection of the paving breaker.

d. Operate the paving breaker at low speed for a few moments to permit even distribution of oil to all working parts.

135. Servicing

a. Lubrication. It is vitally important that the paving breaker (fig. 62) and sheeting driver (fig. 63) be well lubricated at all times. Always fill the oil reservoir before starting operations, and check the oil supply frequently, refilling whenever necessary. Wipe off the oil plugs before removing them to fill the oil reservoirs. Below 32° F. use engine oil, OE--10 or OHA; above 32° F., use OE 30.

b. Preparing for Storage. To prevent the internal parts of the paving breaker (fig. 62) and sheeting driver (fig. 63) from rusting while in storage, the following procedure is recommended.

(1) Flush the paving breaker and sheeting driver with cleaning solvent to remove grit, dirt and other foreign matter.

(2) Flush the paving breaker and sheeting driver with light machine oil to lubricate internal parts.

(3) Wedge a cloth plug into the air connection and exhaust openings of the paving breaker to prevent dust from entering while the tool is in storage. Wedge a cloth plug into the open end of the housing on the sheeting driver for the same reason.

(4) Store the paving breaker and sheeting driver in its appropriate place in the engine side tool box.

Section II. CLAY DIGGER

136. Description

The two piston-type clay diggers (fig. 64) are light weight units designed for overhead and side wall work. The digger is equipped with a closed handle and inside trigger. When not in use, the clay diggers and their attachments (two clay spades, two flat picks and two moil points) are stored in the engine side tool box.

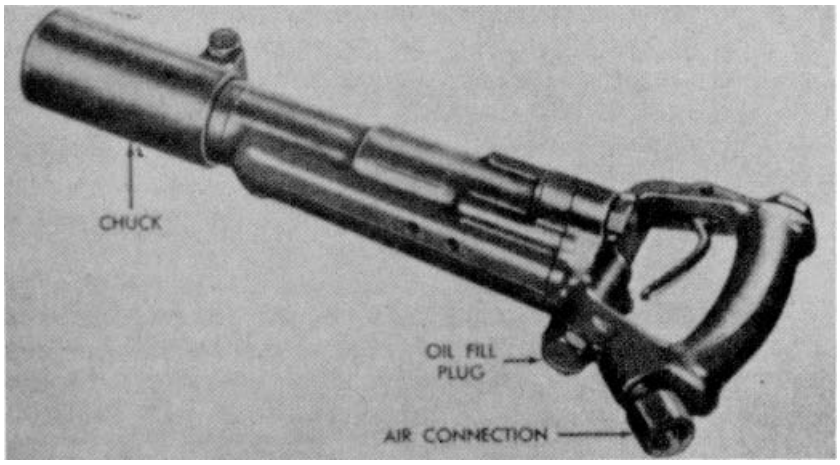


Figure 64. Clay digger.

137. Tabulated Data

Manufacturer	Le Roi--Cleveland
Model number	31
Weight	18 lbs
Overall length	19 in.
Recommended hose size	½ in.
Air connection	3/8 in. pipe
Recommended air pressure	80 to 90 psi
Air requirements	.40 cfm

138. Precautions

In order to safeguard the operator and to insure longer operating life of the equipment, the following precautionary measures always must be taken.

a. Never neglect the necessary lubrication procedures (para. 140*a*).

b. If possible, avoid operating the clay digger with air pressures greater than 90 psi.

c. Always turn off the clay digger before laying it down.

d. Before changing attachments, turn off the air pressure at the air compressor.

e. Always detach the air hose from the air connection when stopping operations for any length of time.

f. Never operate tool unless attachment is in contact with work.

139. Operation

(fig. 64)

a. Insert the attachment to be used (clay spade, flat pick, or moil point) into the chuck of the clay digger.

b. Fill the clay digger oil reservoir with oil (par. 140*a*).

c. Blow out the air hose and connect it to the air connection of the clay digger.

d. Operate the clay digger at slow speed for a few moments to permit even distribution of oil to all working parts.

140. Servicing

(fig. 64)

a. Lubrication. It is vitally important that the clay digger be well lubricated at all times. Always remove the oil fill plug and fill the oil reservoir before starting operations. Clean the surface around the filler hole before removing the plug, and wipe the plug before it is reinstalled. Check the oil supply frequently, refilling whenever necessary. Below 32° F., use OE 10, engine oil; above 32° F., use OE 30, engine oil.

b. Preparing for Storage. To prevent internal parts of the digger from rusting while in storage, follow the procedure outlined below:

(1) Flush the clay digger thoroughly with cleaning solvent.

(2) Flush the tool with light machine oil to lubricate all parts.

(3) Wedge a cloth plug into the air inlet and exhaust openings to prevent dust from entering while the tool is in storage.

(4) Store the clay digger in its appropriate place in the engine Side tool box.

Section III. WOOD DRILL

141. Description

The pneumatic reversible wood drill (fig. 65) is powered by a blade-type, rotary pneumatic motor. This drill has a wood bore capacity of two inches and is equipped with a griphandle, a dead handle, and a roll type throttle handle. The following ship auger bits are supplied in a canvas bag: three 7/16 x 12, three , 3/4 x 12, one 1 x 12, one 2 x 12,

three 7/16 x 36, three 3/4 x 36, one 1 x 36, and one 2 x 36. When not in use the wood drill and ship auger set are stored in the front tool box.

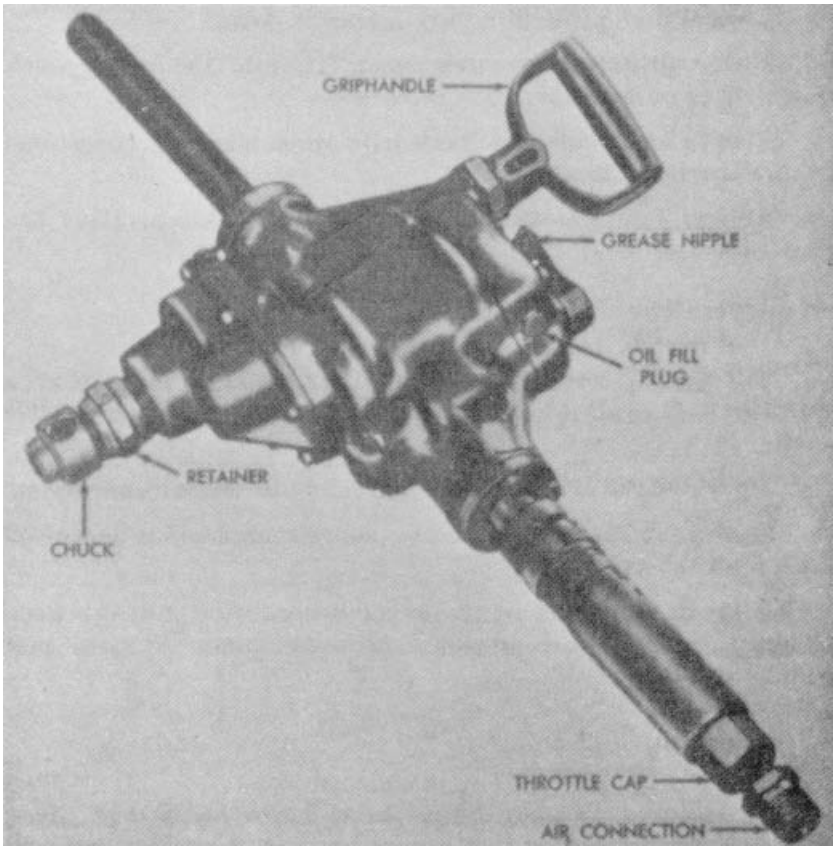


Figure 65. Wood drill.

142. Tabulated Data

Manufacturer	Independent Pneumatic Tool
Model number	362 RHW
Weight	27 1/2 lbs
Overall length	17 3/8 in.
Morse taper size.	No. 2
Recommended hose size	3/4-in.
Air hose connection	1/2-in. pipe
Recommended air pressure	80 to 100 psi
Air requirements	60 cfm

143. Precautions

a. Never neglect the necessary lubrication procedures (para. 145a).

b. Never operate the drill with air pressures higher than 100 psi.

c. Always turn off drill before laying it down.

d. Never adjust or assemble auger bit into the wood chuck when drill is in operation.

e. Always detach air hose from drill when stopping operations for any length of time.

f. Always secure sleeves and pants legs before operating the wood borer.

144. Operation

(fig. 65)

a. Fill the oil reservoir with oil (par. 145a). Also, pour a liberal amount of oil into the throttle cap at the end of the throttle handle.

b. Blow out the air hose and connect it to the air connection.

c. Operate drill at slow speed to insure even distribution of oil to all internal working parts.

d. Tighten the shank of the auger bit securely into the wood bit chuck. Always use properly sharpened auger bits for best drilling results.

145. Servicing

(fig. 65)

a. Lubrication. The drill must be well lubricated at all times. The oil reservoir, located in the upper end of the motor, must be filled before placing the drill in operation. Inspect oil level at least every four hours of operation, and replenish oil supply if necessary. Remove the oil fill plug and fill the oil reservoir. Two grease nipples are supplied for application of grease to vital internal points of lubrication. Apply grease sparingly through each nipple weekly. Use engine oil OE, and grease, GAA for general lubrication.

b. Replacing Wood Chuck.

(1) Unscrew the retainer from the spindle by turning it in a counterclockwise direction.

(2) If the wood chuck bit has become jammed in the spindle socket, insert a rod through the slotted opening in the

stem of the griphandle and pry down on the ejecting pin extension.

c. Preparing for Storage. To prevent internal parts of the drill from rusting while in storage, follow the procedure outlined below:

(1) Flush the drill thoroughly with cleaning solvent; then flush with light oil to lubricate all internal parts.

(2) Wedge a cloth plug into the air inlet and exhaust openings to prevent dust from entering the tool while in storage.

(3) Store the wood drill and auger set in its appropriate place in the front tool box.

Section IV. ROCK DRILL

146. Description

The pneumatic rock drill (fig. 66) is a piston-rotary-type unit primarily designed as a hard rock drill. However, it is equally efficient in soft and medium formations as well. Two rock drills are supplied with the air compressor, and the following attachments are included: four each of 2-foot, 4-foot and 6-foot drill steels and 40 each of 1-5/8-inch, 1 3/4-inch, 1 7/8-inch and 2-inch detachable rock bits. When not in use, the rock drills and attachments are stored in the compressor side tool box.

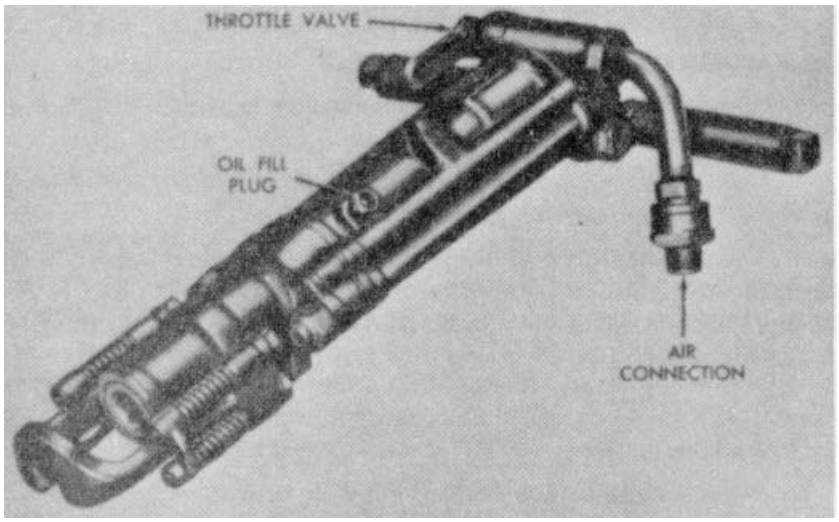


Figure 66. Pneumatic rock drill.

147. Tabulated data

Manufacturer	Le Roi-Cleveland
Model number	H 111
Weight	7 lbs
Overall length	23 5/8 in.
Bore and stroke	2 5/8 x 2 3/4 in.
Recommended hose size	¾ in.
Air hose connection	¾ -in. pipe
Recommended air pressure	80 psi
Air requirements	95 cfm

148. Precautions

a. Never neglect the necessary lubrication procedures (par. 150a)

b. Be sure to blow out the air hose before connecting it to the drill air connection.

c. Always turn off the drill before laying it down.

d. Inspect the nuts, bolts, and oil plug of the drill frequently for tightness. Loose nuts and bolts allow excessive play between parts causing early wear and unnecessary loss of air pressure.

e. Clean the drill frequently (as often as once a shift) using the same flushing methods as described in paragraph 150b.

f. Always detach air hose from drill when stopping operations for any length of time.

149. Operation

(fig. 66)

a. Fill the oil reservoir of the drill with oil (par. 150a), and pour about two tablespoonfuls of oil into the air inlet.

b. Blow out the air hose and connect it to the air inlet pipe connection.

c. Operate drill at slow speed to insure even distribution of oil to all internal working parts.

d. When starting a hole use a 2-foot drill steel, even if the rock is soft and fast cutting. Start the drill with the bit between boots at the slow speed; after the hole is approximately 1 in. deep, push throttle valve down to fast speed. When starting a hole the largest size bit should be used until the hole is approximately 2 ft. deep; then the next smallest size is used for the next 2 ft., and so on.

e. When drilling deep holes, blow the cuttings from the hole frequently by pulling the throttle valve up to the top position. This will insure that the drill is cutting on fresh rock at all times.

150. Servicing

(fig. 66)

a. Lubrication. The drill must be well lubricated at all times. The oil reservoir must be filled before placing the drill in operation and must be inspected and refilled (if necessary) at frequent intervals thereafter. Remove the oil fill plug and fill the oil reservoir. Below 32° F, use engine oil, OE-10 or OHA; above 32° F. use engine oil, OE-30.

b. Preparing for Storage. To prevent internal parts of the drill from rusting while in storage, follow the procedure outlined below:

(1) Flush the drill thoroughly with cleaning solvent; then flush liberally with light machine oil to lubricate all internal working parts.

(2) Wedge a cloth plug into the air inlet and exhaust openings to prevent dust from entering the tool while in storage.

(3) Store the rock drills and their attachments in the compressor side tool box.

Section V. NAIL DRIVER

151. Description

The pneumatic nail driver and rivet buster (fig. 67) is a long-stroke piston type riveting hammer with nail driving attachments for holding 1/2-inch and 3/4-inch diameter nail heads. Spikes can be started by hand or with the hammer. When not in use, the nail driver, and rivet buster retainer set, 1/2-inch attachment and 3/4-inch attachment are stored in the compressor side tool box.

152. Tabulated Data

Manufacturer	Independent Pneumatic Tool Co.
Model number	63-N
Weight	24 lbs
Overall length	20 5/8 in.
Bore and stroke	1 1/16 x 6 in.
Recommended hose size	½ in.
Air hose connection	½ in. pipe
Recommended air pressure	90 psi
Air requirements	30 cfm

153. Precautions

a. Never neglect the necessary lubrication procedures (par. 155a).

b. Be sure to blow out the air hose before connecting it to the air connection.

c. Never operate the nail driver unless a nail set is inserted into the tool and held firmly against a solid object.

d. Always detach the air hose from the nail driver when stopping operations for any length of time.

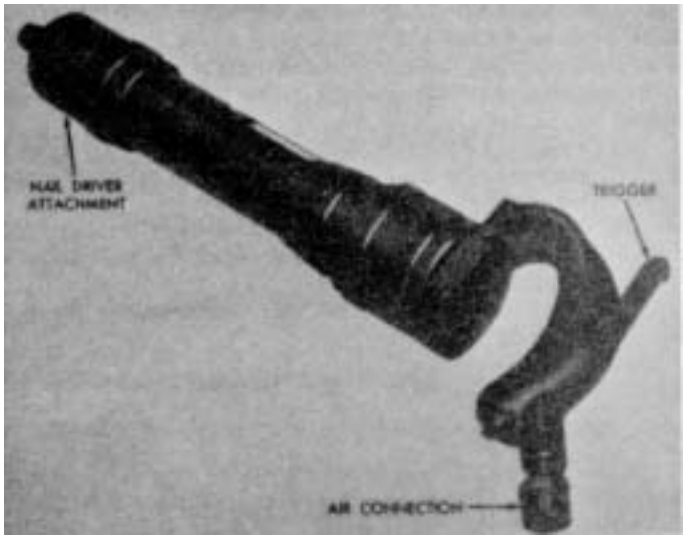


Figure 67. Pneumatic nail driver.

154. Operation

(fig. 67.)

a. Remove the plug from the end of the nail driver barrel and install the retainer set and appropriate nail driver attachment.

b. Pour a liberal quantity of oil (par. 155*a*) into the air connection in the nail driver handle.

c. Blow out the air hose and connect it to the air connection.

d. Hold the nail driver with the nail set pressed firmly against a solid object. Depress the trigger slightly so that the nail driver operates at slow speed for a few moments. This will insure even distribution of oil to all internal working parts.

e. When starting spikes with the driver, proceed carefully and at slow speed until the spike has a firm hold. Then drive it in the rest of the way.

155. Servicing

(fig. 67)

a. Lubrication. Proper and sufficient lubrication is the most important factor in obtaining maximum performance from the nail driver. Always use clean machine oil applied before placing the tool in operation, after each two to three hours of continued operation, and when halting operations at the end of the work period. Pour the oil in the air connection. Below 32° F., use engine oil, OE-10 or OHA; above 32° F. use engine oil, OE-30.

b. Preparing for Storage. To prevent internal parts of the nail driver from rusting while in storage, follow the procedure outlined below:

(1) Flush a small amount of cleaning solvent through the nail driver to remove foreign matter.

Caution: Never operate the nail driver for flushing purposes without a nail set installed and held firmly against a solid object.

(2) After flushing with solvent, flush the nail driver with light machine oil to lubricate internal working parts.

(3) Wedge a cloth plug into the inlet and exhaust openings and into the end of the barrel to prevent dust from entering the tool while in storage.

(4) Store the nail driver and its attachments in the compressor side tool box.

Section VI. CIRCULAR SAW

156. Description

The rotary type pneumatic circular saw (fig. 68) is built for heavy duty use. The four-vane motor is designed for operation at 80 to 100 pounds air pressure. Two sighting notches are located on the front of the saw foot. The deep notch is a guide for making vertical cuts; the small notch for 45-degree (bevel) cuts. The bevel is adjusted by means of a wing nut at the front of the foot. The depth of cut is adjusted by means of 'a wing nut at the rear of the foot. These wing nuts must be tightened securely after adjustments are made. When not in use, the circular saw is stored in the front tool box,

157. Tabulated Data

Manufacturer	Skilsaw, Inc.
Model number	2127
Weight	32 1/2 lbs
Recommended hose :size .	½ in.
Recommended air pressure .	80 to 100 psi

Air requirement-normal load ..... 55 cfm
Air requirement average ..... 65 cfm
Air requirement-maximum hp ..... 75 cfm

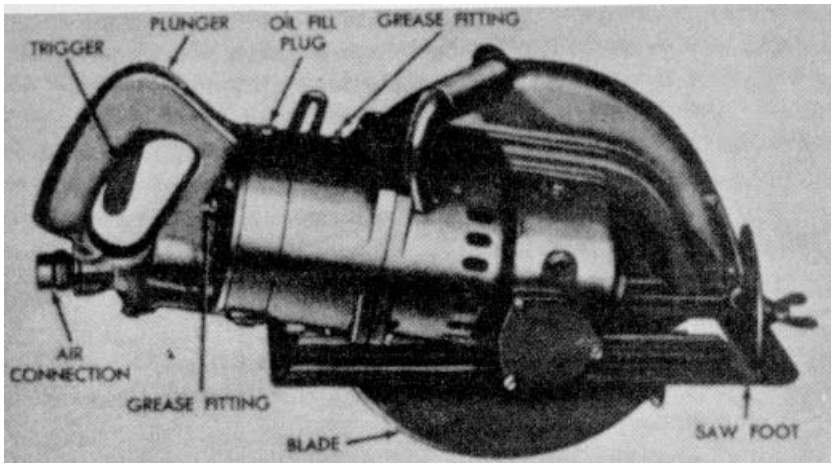


Figure 68. Pneumatic circular saw.

158. Precautions

a. Never neglect the necessary lubrication procedures (par. 160b).

b. Be sure to blow out the air hose before connecting it to the air connection.

c. Operate the saw only at recommended air pressure. Less than 80 psi will cause loss of power; more than 100 psi will cause undue wear of moving parts.

d. Do not force the blade through the work. Allow the speed of the blade to do the cutting.

e. Keep the saw blade well sharpened. 'When "touching up" the blades, do not change shape or bevel of blade teeth.

f. Always make certain that the trigger is locked before changing blades. When replacing the blade, remember that the teeth must point in the direction of rotation.

g. Always detach the air hose from the circular saw when stopping operations for any length of time.

159. Operation

(fig. 68)

a. Rest the front of the saw foot on the work and line up the blade with the cutting line.

b. Press down the trigger safety locking plunger on the top of the saw handle.

c. Depress the trigger and guide the saw through the work. Do not force the blade into the material.

d. When work has been cut through, release the trigger to stop the saw.

e. Never attempt to loosen the telescopic guard or adjust the foot while the blade is rotating.

160. Servicing

(fig. 68)

a. Changing Blades. Always make certain that the trigger is locked before changing blades. Use the special wrench provided and remove the saw stud by turning it clockwise. In replacing blade, the saw teeth must point in the direction of rotation. After the new saw blade is in place, tighten the saw stud securely but not excessively.

b. Lubrication. There are four points of lubrication on the circular saw. Before lubricating any of these points, be sure to clean around the fittings or plugs to prevent foreign matter from contaminating the grease or oil. One grease fitting is located on top at the motor housing near the front handle; the other on the right side of the rear handle. The oil plug is located on the top of the motor housing near the rear handle. The gear plug is located at the top center of the gear case. Use the lubricants recommended in table I. Note that the gear reservoir oil level can be checked through the inspection window on the side of the

Table I. Lubrication for-Circular Saw.

Position	Lubricant	Temperature			Interval
		Below 0°F.[1]	0° to 32° F.[1]	Above 32°F.	
Two grease fittings.	Grease. automotive and artillery.	GAA	GAA.....	GAA.....	Weekly.
Oil reservoir..	Engine oil...	OE-10...	OE-10...	OE-30...	Check every 4 hours.
Gear case.....	Gear oil....	GOS	GO-75...	GO-90...	Check every 8 hours.

[1] In low temperature. run saw "idle" for few minutes until gear case warms up.

gear case while the saw is level. Gear oil must be up to the center of this window.

Section VII. CHAIN SAW

161. Description

The chain saw (fig. 69) is driven by a rotary vane-type air motor which is designed so that a governor is not required. The tension of the chain is adjusted by means of the idler handle which is turned to the left to loosen, and to the right to tighten, the chain. When not in use, the chain saw is stored in the front tool box.

162. Tabulated Data

Manufacturer	Mall Tool Co.
Model number	5P24
Weight	45 lbs
Recommended hose size:	
25 ft from source	5/8 in.
25 to 100 ft from source	3/4 in.
Above 100 ft from source	1 in.
Air requirements	90 cfm
Recommended air pressure	80 to 100 psi

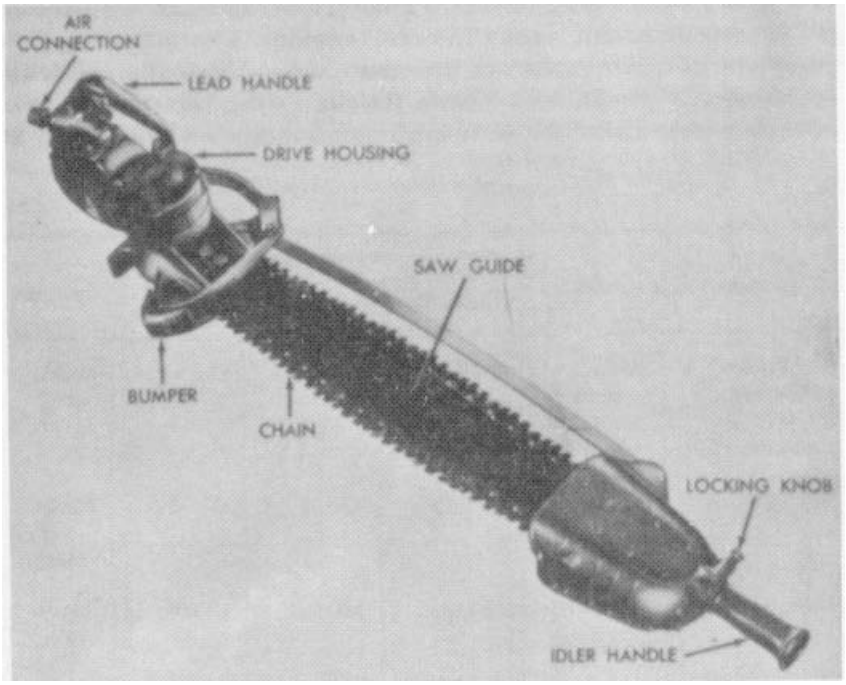


Figure 69. Chain saw.

163. Precautions

a. Always keep the chain saw well lubricated (par. 165a).

b. Be sure to blow out the air hose before connecting it to the air connection.

c. Operate the saw only at recommended air pressure. Less than 80 psi will result in loss of power; more than 100 psi will cause undue wear of moving parts.

d. Be sure to keep the air inlet strainer clean.

e. Keep the chain properly sharpened at all times. Chains should be "touched up" with a file after every 4 hours of continuous operation. Do not attempt to remove much metal, and maintain the original cutting angles (bevels) on all cutting edges.

f. Always detach the air hose from the air connection when stopping operations for any length of time. Then brush the chain with OE, engine oil.

164. Operation

(fig. 69)

a. Normal Operation. The bumper, which is the part of the drive housing fastened to the saw plate, must be placed and held against the log before the teeth begin cutting. The saw guide must be kept in the middle of the cut so that the teeth returning in the upper groove do not cut into the sides of the kerf. Feed the saw into the timber slowly. The rate of feed will depend on the kind and size of timber. When making a deep cut, the saw slot should be spread with a wedge to prevent pinching of the guide bar and chain saw. Many times it will be found possible to cut faster if operators advance their ends separately. Do not expect to cut fast with a dull chain. Sharpen or "touch up" the chain at least every 4 hours of continuous operation.

b. Tree Felling. Turn the saw to cut down at an angle of about 30° from the horizontal. Make a cut at this angle on the falling side of the tree in about one-fourth to one-third of its diameter. Then make a horizontal cut in to meet the end of the angle cut. Remove the cutout piece. Make a horizontal cut on the opposite side of the tree about one-quarter of the tree diameter above the cutout wedge. As soon as the tree inclines, remove the saw a safe distance away. When felling heavy trees, it may be advisable to insert a wedge in the cut.

c. Underwater Cutting. For underwater cutting, remove the 3/4-inch pipe plug under the dead handle and screw this plug into the exhaust port near the sprocket. Install at 3/4-inch standard 45° street elbow and an exhaust hose or pipe into the exhaust port. The exhaust hose or pipe must be of sufficient length to reach above the surface of the water. If the cut is being made

in shallow water so that the water pressure is not too great, a short length of pipe may be sufficient to carry the exhaust up above the cutting plane to enable the worker to watch the cut.

165. Servicing
(fig. 69)

a. Lubrication. Proper and sufficient lubrication is most important in obtaining maximum performance from the chain saw. A chain should never be permitted to run dry. Keep the oil reservoir filled with OE, engine oil. The oil fill plug is in the drive housing, painted blue or red. In extremely cold weather, or to cut wood which contains a considerable amount of pitch, mix kerosene with the oil. Brush the chain itself with OE, engine oil. Before installing a chain into the chain guide, apply a thin film of graphite into the guide groove.

b. Adjusting Chain Tension. Chain tension is very important for ease of operation and long chain life. A chain that is too loose may jump out of the chain guide and bind, causing the motor to stall. A tight chain places a load on the motor and undue strain on the chain. When properly adjusted, it should be possible to grasp the chain and lift it approximately l/2-inch above the groove near the center of the guide. The chain may be loosened by turning the idler handle to the left after lifting the small locking knob above it to unlock the idler handle. To tighten the chain turn the idler handle to the right.

c. Sharpening the Chain. All chain cutting teeth should be sharpened at the same time, because it is important that all teeth be of equal height. The height of chain teeth should be checked with a straight edge while filing or grinding procedure goes on. It is possible to file saw teeth to one-fourth of their original height without impairing saw cutting ability. If sharpening is to be done by hand, a mill bastard file 8-inches long and with round edges should be used. Do not try to take off too much metal at one time. Long even strokes in one direction, taking care not to rock the file while it is cutting, should result in a well controlled sharpening job. Care must be given in maintaining equal tooth height and also in maintaining the clearance between the height of the cutter and raker. Normally, this distance should be 1/32 inch; however, the difference in the hardness of woods may require different clearance dimensions. In general, the harder the wood, the smaller this clearance must be. The chain must be held firmly and in a straight line during the filing operation. Use two straight steel bars 18-inches long, held in a vise to hold the chain teeth straight and level. A straight edge and feeler gage should be used for constant checking of tooth height and clearances.

d. Preparing for Storage. When not in use, thoroughly brush the chain with OE, engine oil. When storing for extending periods, remove the chain from the guide and submerge in engine oil. Never let the chain rust. Cutting edges will not hold up and a rusty chain will no longer be flexible. Inject an ounce or two of light machine oil or kerosene through the air inlet opening. This will prevent rust from forming in the cylinder. Then stuff the inlet and exhaust openings with clean cloth to prevent the entrance of dirt and dust into the internal mechanism of the saw. Store the saw and chain in the front tool box of the compressor.

Section VIII. GREASE GUN KIT

166. Description

The grease gun kit (fig. 70) consists of a high pressure gun, a low pressure gun, and all of the adapters and attachments necessary for proper lubrication of various types of equipment. All of the adapters and the guns are packed in a convenient carrying case, which is stored in the front tool box.

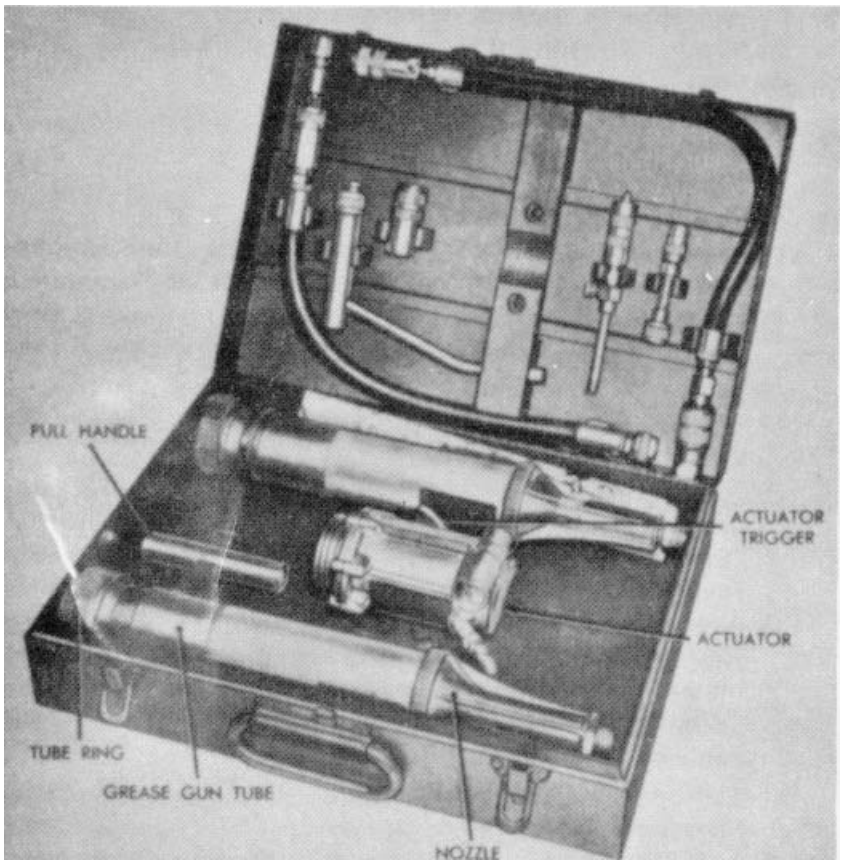


Figure 70. Grease gun kit.

167. Tabulated Data

Manufacturer	Gray Co., Inc.
Model number	225-047
Weight	25 lbs
Recommended hose size	¼ in.
Recommended hose pressure	80 to 100 psi
Air requirements	1 cfm max

168. Precautions

a. Be sure to blow out the air hose before connecting it to the air inlet of the grease gun.

b. Be sure to attach the proper nozzle to the grease gun. The nozzle with the round adapter is for the high pressure gun having the small piston. The nozzle with the hexagon adapter is for the low pressure gun having the larger piston.

c. Be sure to lubricate the gun regularly (at least every 2 to 3 weeks) as instructed in paragraph 170a.

169. Operation

(fig. 70)

a. Filling the Grease Gun by Suction.

(1) Before filling the gun for the first time, lubricate the inner wall of the grease gun tube with OE, engine oil.

(2) Attach the actuator to the grease gun by engaging the ball in the end of the grease gun with the socket in the end of the actuator.

(3) Connect a 1/4-inch air hose to the air source and to the air line coupler.

(4) Attach the air line coupler to the fitting in the actuator and press the actuator trigger, driving the slider to the nozzle end of the tube. Disconnect the coupler and remove the actuator.

(5) Attach the pull handle to the grease gun by engaging a steel ball with the notch in the handle. With the opening of the tube completely submerged in lubricant, slowly drive the pull rod outward 'as far as possible until the gun has been filled with grease.

(6) Screw the nozzle securely onto the grease tube with the nozzle gasket in place.

(7) Rap the pull handle sharply with the heel of the hand, push the rod inward, and remove the handle.

(8) Attach the actuator to the grease gun tube and with the gasket in place, screw the actuator into the tube ring as tightly as required to affect an air seal.

(9) Select an adapter from the grease gun kit and attach it to the grease gun nozzle outlet.

b. Filling the Grease Gun Manually.

(1) Remove the actuator and nozzle from the grease gun tube.

(2) Using the pull handle as instructed in a above, pull the rod outward as far as possible, drawing the grease slider toward the actuator end of the tube.

(3) Hold the tube with the open end up and pack solidly with grease. Screw the nozzle securely upon the tube with the nozzle gasket in place.

(4) Remove the pull handle as instructed in a above. Then attach an adapter to the nozzle outlet.

(5) Connect the air line coupler to the grease gun.

c. Operating the Grease Gun.

(1) Press the actuator trigger, allowing the pistol to discharge grease.

(2) Release the trigger for a second or two while the actuator piston completes its stroke. The completion of the stroke will be evidenced by a slight click, and the grease slider will then recharge to the nozzle.

(3) Continue to alternately press and release the trigger at the fastest practical speed, considering the physical characteristics of the grease being dispensed.

(4) If necessary to bleed air from the high pressure grease tube, press down upon the small valve located in the grease gun nozzle.

170. Servicing
(fig. 70)

a. Lubrication. The grease gun must be lubricated weekly with OE, engine oil. Apply the lubricant to the cylinder walls of the actuator. Also, squirt 6 to 8 drops of oil into the air line fitting of the actuator. Remove the actuator from the grease gun. Hold the grease gun tube with the open end up, and allow several drops of oil to run down into the tube around the pull rod and down to the O ring.

b. Correcting Air Leaks

(1) If air leaks around the trigger when it is fully depressed, it is possible that the valve stem of the actuator has be come unseated. Press the trigger down and tap it sharply with a hammer directly above the valve stem.

(2) If air leaks where the actuator is screwed into the tube, the gasket between the grease gun and the actuator may be worn. Reverse or replace the gasket.

(3) If air leaks into the grease, disassemble the grease gun and remove the slider assembly, which is the leather cup assembly at the end of the pull rod. It is possible that the slider 0 ring or leather cups may be dry or worn. Lubricate these items as described in a above. If the air leak continues, replace the leather cups and slider O ring.

(4) If the air line coupler should leak, it is possible that the valve seat is worn. Disassemble the air line coupler, and replace the valve seat.

c. Correcting for Insufficient Dispensing. If the actuator operates, but insufficient material is dispensed, these possible causes and remedies are suggested: Check the supply' of lubricant within the grease gun. If lubricant supply is exhausted, refill the grease gun as instructed in paragraph 169. Do not operate the actuator trigger too rapidly. Follow the operating instructions carefully as outlined in paragraph 169c. Inspect the nozzle adapters or dispensing adapters carefully for signs of clogging. If necessary, remove, disassemble and thoroughly clean these parts with cleaning solvent. Dry with compressed air, and reassemble the adapters.

d. Preparing for Storage.

(1) Flush the grease gun and adapters which have been used with cleaning solvent to remove all grease from the equipment. Then blow these parts dry with compressed air.

(2) Place the grease guns and accessories in their appropriate places within the grease gun kit box as shown in figure 70. Close and lock the grease kit box and place the box in its appropriate position in the compressor front tool box.

Section IX. PNEUMATIC TOOL ACCESSORIES

171. Description

(fig. 71)

In addition to the various pneumatic tools supplied with the equipment a tire inflating attachment (2), a blow gun attachment (1), and two air line oilers (3) are included among the accessories. The air line oilers are designed to be connected into the air line between the compressor and the tool being used. Air passing through the oiler picks up a fine

mist of oil from the oil reservoir which aids in lubricating the internal mechanism of the pneumatic tool being used. The blow gun attachment is used primarily for cleaning purposes or drying purposes and can be attached directly to the end of the air line. The tire inflating attachment includes an air gage which is attached by a chain to the inflating tool.

172. Tabulated Data

Air line oiler:
- Manufacturer ..... The Rucker Co.
- Model number 3
- Oiler capacity ..... 1 pint

Blow gun attachment:
- Manufacturer ..... Gates Rubber Co.
- Specification number JAN-B-622

Tire inflating attachment:
- Manufacturer ..... Gates Rubber Co.
- Specification number T-2226

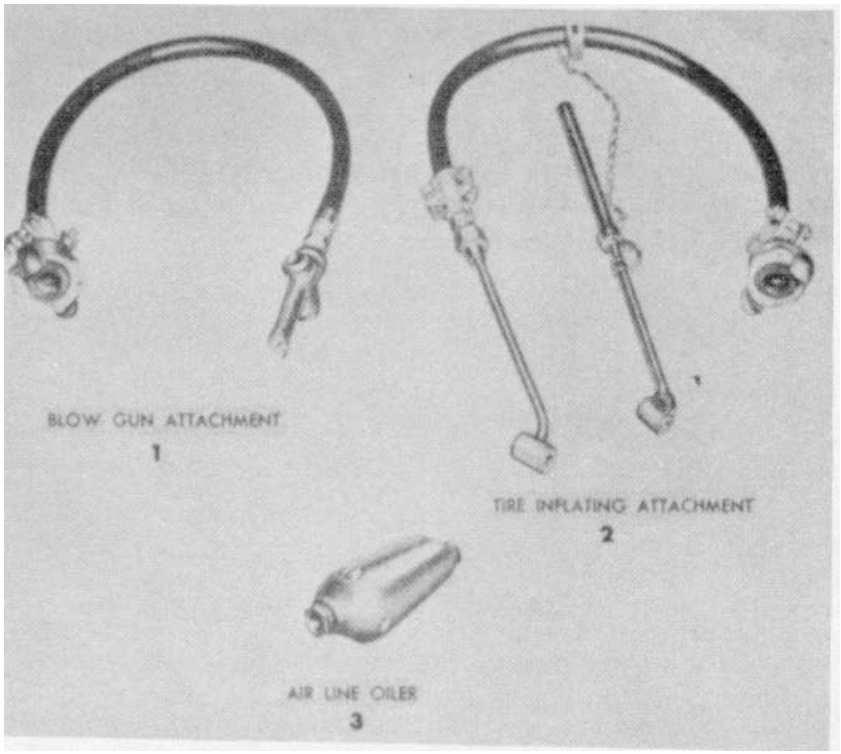


Figure 71. Pneumatic tool accessories.

173. Precautions

a. Never direct the stream of air from the blow gun attachment at nearby individuals. The air under this pressure could be very injurious to the person.

b. Check the oil level of the air line oiler frequently.

c. Install the air line oilers as close as possible to the tools used. The oiler will operate satisfactorily at a distance as great as 25 feet from the pneumatic tool.

174. Operation

The air line oiler can be used to add an antifreeze solution to the air entering the tool by connecting it before the regular oiler. This is usually necessary in extreme cold weather to keep the moisture in the air from freezing in the line or tool.

175. Servicing

a. The tire inflating attachment, blow gun attachment and air line oilers require no servicing other than keeping them clean and free from dirt and muck at all times. When the equipment is to be stored for any length of time brush out the oiler with cleaning solvent and blow dry with compressed air.

b. To adjust the air line oiler for the tool being used it is necessary to operate the tool, holding the palm of the hand over the exhaust of the tool. If the lubrication is correct, a small amount of oil will collect in the hand. If no oil is coming out of the exhaust, adjust the needle valve inside the oiler reservoir by turning it counterclockwise. If an excess of oil appears from the exhaust, adjust it clockwise.

CHAPTER 5
FIELD AND DEPOT MAINTENANCE

Section I. INTRODUCTION

176. General

Instructions in this chapter are published for the information and guidance of maintenance personnel responsible for third and higher echelons of maintenance of the air compressor. They contain information on maintenance which is beyond the scope of the tools, equipment, or supplies normally available to using organizations.

177. Procedure

Paragraphs 178 through 235 describe the complete disassembly, repair, and reassembly of each major unit or system comprising the air compressor. Before proceeding with overhaul, check to see that replacement parts are available.

Section II. TOOLS AND EQUIPMENT

178. General

The tools and equipment as listed in this section are those that are required to perform field and depot maintenance on the air compressor. Tools and equipment issued as on-equipment tools and common mechanic's hand-tools have not been enumerated in this section.

179. Field and Depot Maintenance Tools and Equipment

Special tools required for field and depot maintenance are listed below.

Tool	Stock No.	Reference (Pars.)
Tool, valve, check	41-8967-500-005	185*h*
Punch, shot	41-6434-500-100	187*b*
Extractor, plug	41-3164-500-021	185*m*

Tool	Stock No.	Reference (Pars.)
Wrench, jet, main	41-9665.500.283	187*d*
Wrench, seat, valve	41-9729.700.085	185*g*
Reamer, high speed steel, hand, straight shank, straight flute, carburetor throttle bushing	41-R-2308-825	185*l*
Driver, bushing, 5/16 in., length overall 4 in	41-D2870	185*l*
Gage, depth, carburetor float	41-G-130-225	187*g*
Lifter, float axle (Zenith #C161-168)	.....	185*f*
Tool, valve, check, for installation (Zenith ..... #C161-161).	.....	187*e*
Tool, reseating, shutterstat (Kysor #B-2441).....		191*a*
Wrench, torque indicating.....	41-9847.500.150	.....
Puller, gear and bearing, 2 arm type. 12 in ..... capacity.	41-6272.348.120	196*c* 222*a* 224*b*
Compressor, piston ring, hand type, with ratchet.	41-2430.500.500	223*c*
Tool, mica undercutter, hand type.....	41-8963.780.600	196*d*(2)
Press, arbor, bench type	41-6228.500.080	196*c* 196*e* 198*c* 220*b* 222*c* 223*a, c* 224*b* 225*b*
Indicator, dial, universal, 1 in., with 3/8 in. sleeve.	41-4791.500.600	191*b* 202*h*(2) 202*h*(3) 222*b*
Caliper, micrometer, outside, single, 3 to 4 in	41-1945.700.030	222*b*(2)
Caliper, micrometer, outside, 5 to 6 in.....	41-1945.700.050	223*b*
Caliper, micrometer, inside, 1 1/2 to 12 in.....	41-1940.500.015	223*b* 225*b*

Tool	Stock No.	Reference (Pars.)
Expander, piston ring, 5% in. piston size	41-3160.800.057	223*a* 223*c*
Puller, cylinder sleeve	41-6272.300.500	225*b*
Grinder, crankshaft	40-5145.500.510	222*c*

Section III. FUEL PUMP

180. Description

The fuel pump is mounted at the foot of the crankcase on the compressor side of the unit. The rotation of the camshaft eccentric actuates the rocker arm which pulls the diaphragm downward against the diaphragm spring, creating a vacuum within the pump chamber. On the suction stroke of the pump, fuel from the fuel tank enters through the inlet into the sediment bowl, is filtered by the screen, and passes into the pump chamber through the inlet valve. On the return stroke, the diaphragm spring pushes the diaphragm upward, forcing fuel from the pump chamber through the outlet valve and to the carburetor. When the carburetor bowl is filled, the flute in the carburetor will shut off the needle valve, thus creating a pressure within the pump chamber. This pressure will hold the diaphragm downward against the diaphragm spring pressure, where it will remain inoperative in the downward position until the carburetor requires further fuel and the carburetor needle valve opens. The rocker arm spring supplies the tension which keeps the rocker arm in constant contact with the camshaft.

181. Fuel Pump Disassembly

(fig. 72)

a. Remove fuel pump (par. 75*a*).

b. Before disassembling the fuel pump, file a mark across the diaphragm flanges. These file marks will serve as a guide during reassembly to make certain that the inlet and outlet holes will match the position of the fuel line.

c. Loosen the thumb nut at the top of the lifting bail (1) and lift the bail, metal fuel bowl (2), bowl gasket (3), and screen (4) from the pump.

d. Remove the ten cover screws (5) and lockwashers (6) and lift the pump cover (7) from the assembly. Invert the pump cover, and remove the two retainer screws (11), the valve cage

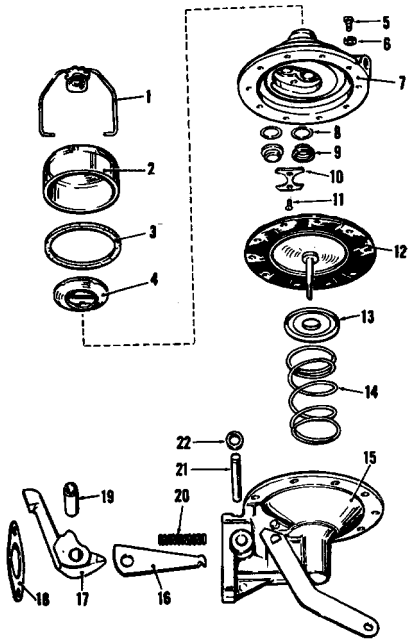


Figure 72. Exploded view of fuel pump.

retainer (10), valve cage assemblies (9), and valve cage gaskets (8) from the cover.

e. Remove the retainer washers (22) from the rocker arm pin (21). Drive out the rocker arm pin and carefully disassemble

1 Lifting bail
2 Fuel bowl
3 Bowl gasket
4 Screen
5 Cover screw (10 req)
6 Cover lockwasher (10 req)
7 Pump cover
8 Valve cage gasket (2 req)
9 Valve cage assembly (2 req)
10 Valve cage retainer
11 Retainer screw (2 req)
12 Diaphragm assembly
13 Diaphragm spring retainer
14 Diaphragm spring
15 Pump body
16 Rocker arm link
17 Rocker arm
18 Mounting gasket
19 Rocker arm bushing
20 Rocker arm spring
21 Rocker arm pin
22 Retainer washer (2 req)

Figure 72. -Continued.

the rocker arm (17) rocker arm link (16) and rocker arm spring (20) from the pump body (15). Press the bushing (19) from the rocker arm.

f. Lift straight up on the diaphragm assembly (12), removing the diaphragm assembly, diaphragm spring retainer (13), and diaphragm spring (14) from the pump body.

182. Fuel Pump Inspection and Cleaning

a. Clean all parts thoroughly with cleaning solvent, and dry with compressed air.

b. Inspect the diaphragm carefully for signs of deterioration or other damage.

c. Inspect the fuel pump screen for indications of gum or varnish deposits in the holes. If the screen cannot be cleaned with an available solvent, then it should be replaced.

d. Examine the pump body carefully for signs of damage particularly at the rocker arm holes. The reciprocal motion of the rocker arm may sometime loosen the rocker arm pin and eventually wear the rocker arm hole in the body into an oval shape. Correction requires replacement of the fuel pump body.

e. Discard the pump mounting gasket and fuel bowl gasket. These gaskets should be replaced at regular overhaul periods.

183. Fuel Pump Reassembly
(fig. 72)

a. Assemble the rocker arm link (16) to the rocker arm (17) with the bushing (19).

b. Insert the rocker arm and link into the body and temporarily hold it into place with a drift pin of appropriate size. Install the rocker arm spring between the cast button inside of the pump body and the small ear on the rocker arm spring (20).

c. Insert the diaphragm spring (14) into the pump body (15). Place the diaphragm spring retainer (13) on top of the spring, 167

and insert the pull rod of the diaphragm assembly (12) down through the spring and oil sea!, which is pressed into the pump body.

d. Press on the diaphragm in such a manner that the pull rod is tilted slightly away from the rocker arm link. Invert the pump body until it is upside down, and allow the link to fall into engagement with the pull rod. Bring the diaphragm back to level position in order to hook the pull rod onto the link.

e. Hold the drift pin with the left hand and carefully drive the drift pin out of the pump body with the permanent rocker arm pin (21). Note that the rocker arm pin has a head on one end and a tapered hollow end at the other. Install the retainer washer (22) over the hollow end of the pin. Rest the head of the rocker arm pin on a solid surface and spread or "mushroom" the hollow end of the pin with a ball peen hammer or round-point punch.

f. Invert the cover casting and drop the valve gage gaskets (8) down into the two drive pockets of the cover. Insert the valve cage assemblies (9) down into the valve holes on top of the valve cage gaskets. The inlet valve must be installed with the legs upward; the outlet with the legs downward. Place the valve cage retainer (10) down on the valves so that the two pairs of arms rest on the edges of the valve assemblies and the two small holes in the retainer are aligned with the screw holes in the cover casting. Install and tighten the retainer screws (11).

g. Turn the pump cover right side up. Install the bowl gasket (3) on the edge of the cover casting. Place the screen (4) over the gasket in such a way that the rim of the screen lies close against the gasket. The two small metal projections near the center of the screen should be facing up. Install the fuel bowl (2) and lifting bail (1) and tighten the lifting bail nut securely.

h. Lock the partially assembled pump body in a soft-jaw vise. Position the partially assembled cover on top of the pump body and line up the file marks. Level the diaphragm by moving the rocker arm. Hold the rocker arm in while installing the cover screws (5) and cover lockwashers (6). Be sure that these screws pass through the holes in the diaphragm easily and without chewing the fabric. Tighten the screws only enough so that they just touch the lockwashers.

i. Push the rocker arm back and forth several times, releasing it with a snap. Tighten the cover screws, using a crisscross pattern from side to side until all screws are secure.

j. Install the pump to the crankcase as instructed in paragraph 75b.

Section IV. CARBURETOR

184. Description

The carburetor is a down draft unit, incorporating a primary and secondary venturi. The main discharge tube is located in one of the two supporting arms and 'terminates at the center of the secondary venturi. All air is taken from inside the air intake. This balanced construction enables the carburetor to maintain correct air-fuel ratios even though the air cleaner may become restricted. The accelerating pump and the power (or economizer) systems are controlled by engine manifold vacuum. The accelerating pump system is vacuum operated. The accelerating pump instantly delivers fuel directly into the air stream on sudden throttle openings. It also controls the volume of discharge of this fuel. The power jet controls the additional fuel required for maximum power at wide-open throttle operation. It is called an economizer or a bypass jet in some carburetors.

185. Carburetor Disassembly

(fig. 73)

a. Remove the carburetor (par. 78a).

b. With a file, make match marks on the choke bracket (2) and the air intake body (5) to aid in reassembling these parts. Remove the five screws with lockwashers (4 and 9), raise the air intake body (5) until the gasket (12) can be loosened, and lift the air intake body from the fuel bowl.

c. With the choke in the wide-open position, file off the end of the riveted fillister head screw (7). Remove this screw (7) and the choke plate spring (8). Then remove the choke shaft and lever (13) so that the choke plate (6) can be lifted from the air intake body. Remove the fillister head screw (14).

d. Remove the vent and idle well (11) and the well seal washer (10), using the fingers only. Remove the air intake gasket (12), then remove the assembled pump (49), guide (50), spacer (51), and pump spring (52) from the fuel bowl.

e. Remove the check valve with jet (47) and the well seal washer (10). It may be necessary to use a small wire hook to lift the well seal washer from the recess in the fuel bowl.

f. Remove as a group, the float (15), float axle (17), axle retainer plugs (16), and the needle portion of the fuel valve and seat (19). Use the special tool, float axle lifter (par. 179) to do this. Insert the forked end of the float axle lifter into the bowl and under the float axle (17). Use the edge of the bowl as a fulcrum to pry the axle and retainer plugs up out of the fuel bowl.

g. Unscrew and remove the fuel valve seat (19) and fiber washer (20). Use the special tool, valve seat wrench (par. 179).

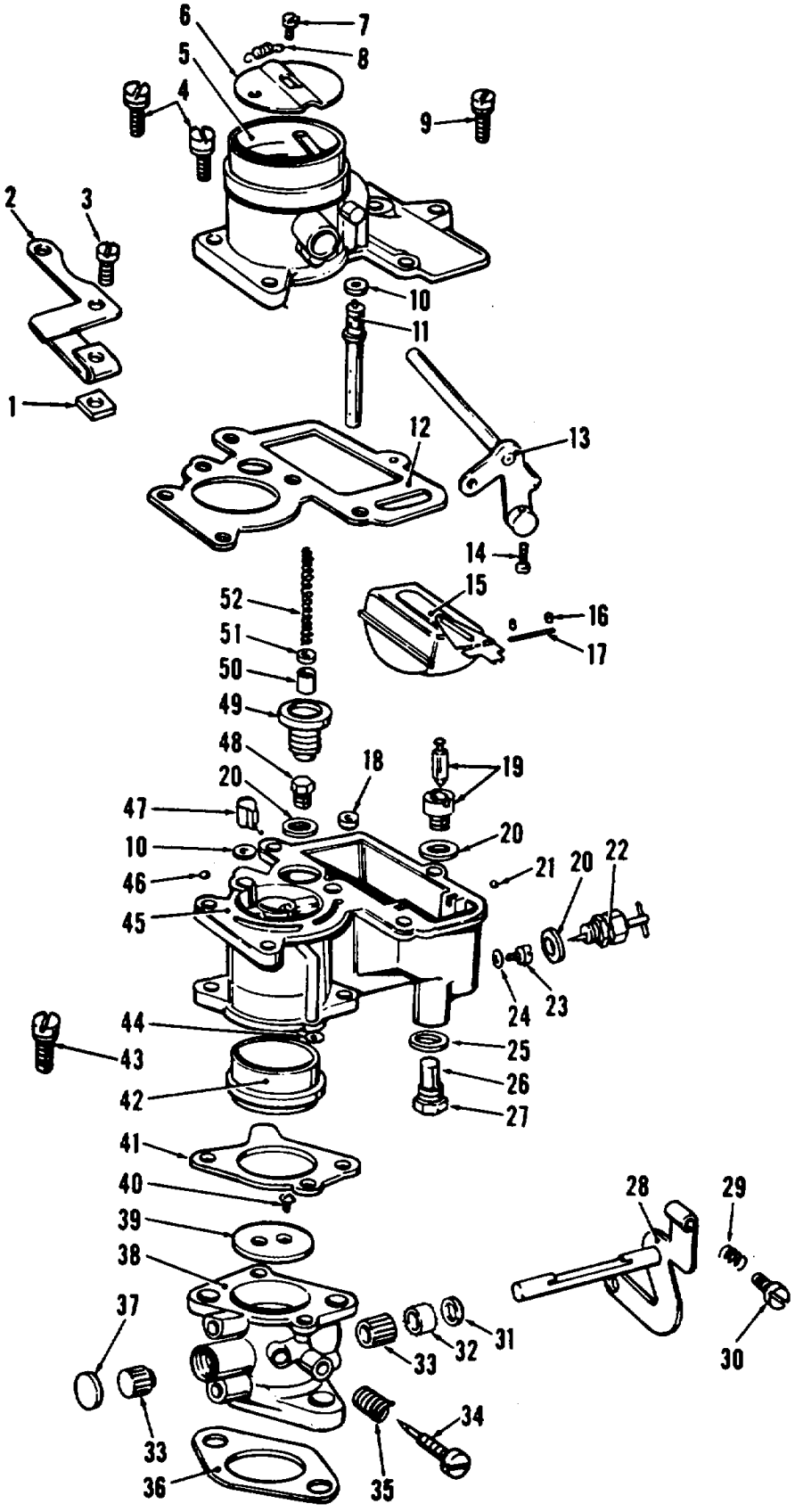


Figure 73. Exploded view of carburetor.

1	Nut, square, No. 6-36	27	Channel plug
2	Choke bracket	28	Throttle shaft and lever
3	Screw, fil hd, No. 8-36 x ½	29	Stop screw spring
4	Screw, with lockwasher (2 req)	30	Stop screw
5	Air intake body	31	Shaft seal retainer
6	Choke plate	32	Shaft seal
7	Screw, fil hd, No. 6-32 x 3/8	33	Throttle shaft bushing
8	Choke plate spring	34	Idle adjusting needle
9	Screw, with lockwasher (3 req)	35	Adjusting needle spring
10	Well seal washer	36	Flange gasket
11	Vent and idle well	37	Shaft hole plug
12	Bowl-to-intake gasket	38	Throttle body
13	Choke shaft and lever	39	Throttle plate
14	crew, fil hd, No. 8-32 x ½	40	Throttle plate screw
15	Float	41	Bowl-to-body gasket
16	Axle retainer plug	42	Venturi
17	Float axle	43	Screw, with lockwasher
18	Check valve	44	Idle channel bushing
19	Fuel valve and seat	45	Fuel bowl
20	Fiber washer (3 req)	46	Bowl channel plug
21	Bowl channel plug	47	Check valve, with jet
22	Main jet adjusting screw	48	Channel plug
23	Main jet	49	Pump
24	Fiber washer	50	Guide
25	Fiber washer	51	Spacer
26	Fuel screen	52	Pump spring

Figure 73. -Continued.

for this purpose. Remove the channel plug (48) and fiber washer (20) from the pump cylinder.

h. Screw the special check valve tool (par. 179) into the check valve (18) until firmly attached. Strike the crossbar sharply with sliding weight to remove the check valve. Do not leave the check valve disk on the channel.

i. Unscrew and remove the main jet adjusting screw (22) and fiber washer (20). Remove the main jet (23) and fiber washer (24). Unscrew and remove the channel plug (27) and fiber washer (25) from the fuel bowl. Then remove the fuel screen (26) from the plug (27)..

j. Remove the two screws with lockwashers (43) and lift the fuel bowl (45), bowl-to-body gasket (41), and the venturi (42) from the throttle body (38). Remove the idle channel bushing (44) only if it is obviously damaged and in need of replacement.

k. Unscrew and remove the idle adjusting needle (34) and spring (35) from the throttle body. With the throttle open, file off: the riveted ends of the throttle plate screws (40). Use a flat file with the edges ground smooth. Remove the throttle plate screws (40) and throttle plate (39) from the throttle body. Re move the throttle shaft and lever (28), shaft seal (32) and seal retainer (31). Remove the stop screw (30) and stop screw spring (29).

l. Insert a 5/16-inch rod through the shaft hole and lightly tap out the shaft hole plug (37).

NOTE

If the throttle shaft bushings (33) must be replaced, remove them one at a time and ream as instructed below.

Insert a 3/8-inch fine thread tap into one of the bushings (33). Drive out the bushing from the opposite side with a 5/16-inch rod. Install a new bushing (33) with the special bushing driver (par. 179). Insert the special reamer (par. 179) through the old bushing and ream the new bushing to size. Repeat this operation to install a new bushing on the opposite side.

m. Drill a No. 46 hole in the center of the bowl channel plug (21). Screw the special plug extractor (par. 179) into the hole counterclockwise until firmly seated. Strike sharply on the opposite end to remove the plug. Repeat the above operation to remove the second bowl channel plug (46).

186. Carburetor Cleaning and Inspection
(fig. 73)

a. Clean all metal parts thoroughly with a cleaning solvent and blow them dry with compressed air. Blow out all passages (channels) in the air intake, fuel bowl, and throttle body. Make certain that all carbon deposits have been removed from the blower and the idle ports. It is advisable to reduce the flow of compressed air in each channel to insure the removal of all particles of dirt. Never use a wire or a drill to clean out a jet or channel.

b. Inspect the machined surface of the air intake body for dents, warpage, or any other damage that might cause air leaks which would upset the fuel delivery characteristics of the carburetor. Replace the air intake body if such damage is evident.

c. Examine the fuel bowl to make certain that the secondary venturi is not loose and to insure that gasket surfaces have not been damaged to the part where air leaks might result.

d. Several carburetor parts should be automatically replaced at every overhaul period. These parts are all gaskets and fiber washers, the fuel valve and seat (19), the pump (49), the choke plate spring (8), and the check valve (18).

e. Examine the float parts carefully for damage. The float must be replaced if loaded with gasoline, dented, or if the float axle bearing is excessively worn. Replace the axle if wear can be detected visually on bearing surface.

f. Inspect the point of the idle adjusting needle (34). It must be smooth and free of ridges. If damaged, the idle adjusting needle must be replaced.

g. Inspect the throttle plate for burrs or damaged edges. Do not attempt to clean the throttle plate with a wire wheel or a sharp instrument.

h. Examine the throttle shaft and lever for wear. If the throttle shaft is noticeably worn or if the lever is loose on the shaft, this assembly must be replaced.

i. Inspect the point of the idle adjusting needle (34). It within the limits set up by the choke assembly screw.

j. Inspect the bearing surfaces of the choke shaft and lever. See that the shaft is straight and that the lever is securely fastened to the shaft.

187. Carburetor Reassembly
(fig. 73)

a. Install the shaft hole plug (37) into the throttle shaft opening of the throttle body (38), and stake it in place with a sharp chisel. Then place the shaft seal retainer (31) and the shaft seal (32) on the throttle shaft and lever (28). Insert the throttle shaft and lever into the throttle body while holding the throttle body with the flanged end down. Rotate the shaft to the wide open position with the cutout section of the shaft facing away from the idle discharge ports. Insert the throttle plate (39) with the bevel on the leading edge away from the idle discharge ports. Close the throttle and center the plate so that the bevel fits the bore snugly; then start the throttle plate screws (40). Hold the throttle in the closed position and, at the same time, press in on the end of the throttle shaft to press the packing snugly in place while tightening the throttle plate screws securely. Screw the idle adjusting needle (34) with spring (35) into the throttle body. Seat it lightly against the needle seat and then back out one and one-half turns as a preliminary adjustment.

b. Install the bowl channel plugs (21 and 46) with the special shot punch (par. 179).

c. Assemble the fuel screen (26) to the channel plug (27). Install the fiber washer (25) on the filter plug, and install this group of parts in the fuel bowl.

d. Install the main jet (23) and fiber washer (24) with the special main jet wrench (par. 179). Install the main jet (23) and fiber washer (20) into the fuel bowl.

e. Install the check valve (18), disk side down, in the bottom of the fuel bowl and flush with the casting. Use the special check valve tool (par. 179) for installation. Then screw the valve channel plug (48) and fiber washer (20) down into place in the fuel bowl.

f. Screw the fuel valve seat (19) and its fiber washer (20) into place, with the special valve seat wrench (par. 179). Then place the fuel valve needle into the fuel valve seat with the knob end of the needle up.

g. Hold the free end of the float (15) and engage the knob end of the needle (19) with the slotted end of the float lever. Lift the float and needle and slip the float axle (17) through the float lever; then lower the axle into the slots and the casting. Press down firmly on the float lever directly over the fuel valve and check the float for correct level. This float level can be checked with the special Zenith carburetor float depth gage (par. 179) as shown in figure 74. A tolerance of plus or minus 1/32 inch from the gage setting is permitted. Install the axle retainer plugs (16) with a flat end punch. Allow approximately 1/64 inch tolerance above the machined surface.

h. Insert the well seal washer (10) down into its opening in the fuel bowl. Then install the check valve with jet (47) open end down, into the same opening above the seal washer. The valve will extend approximately 1/64 inch above the surface of the bowl casting.

i. Install the pump (49), guide (50), spacer (51), and pump spring (52), in that order, into the pump cylinder. Position the bowl-to-intake gasket (12) on the fuel bowl. Then insert the vent and idle well (11) into the well on top of the bowl gasket, and put the well seal washer (10) in place on top of the idle jet.

j. Place the air intake body (5) upright on a bench, with the bowl cover end toward the right. Hold the choke plate (6) with

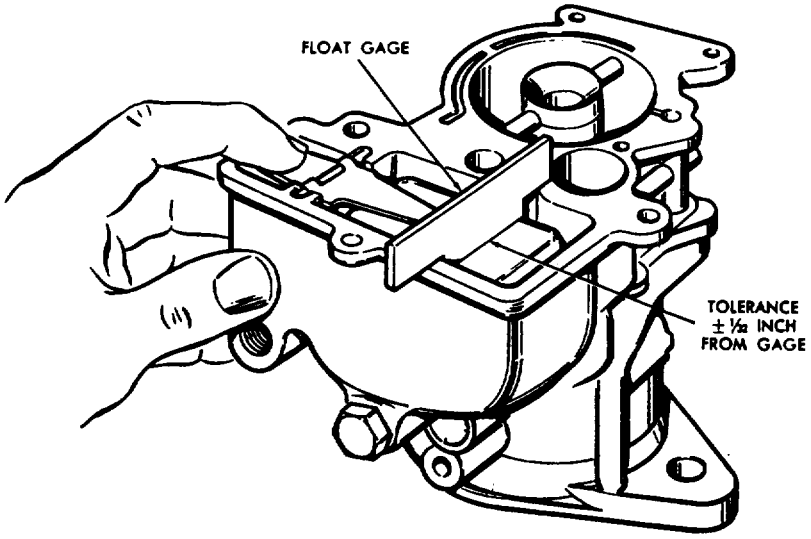


Figure 74. Checking carburetor float level.

the long side down and the spring anchor clip away from you. Insert the plate into the air intake and hold it in position in line with the choke shaft holes. Insert the choke shaft and lever (13) through the shaft boss and the choke plate. Rotate the choke shaft and lever clockwise until the lock lever stop is against the stop boss. Move the choke plate to the closed position. Hold the choke in the closed position and install the fillister head screw (7) through the eye of the choke plate spring (8). Do not tighten this screw completely as the spring (8) should be free. Rivet the end of the screw (7), using a flat-end punch held in a vise as a mandril to support the screw. Avoid bending the choke shaft. Then hold the choke in open position and hook the free end of the choke plate springs (8) over the anchor clip in the choke plate (6).

k. Hold the assembled air intake body in position over the bowl, and guide the pump spring (52) into the pump guide tube. At the same time, guide the vent and idle well (11) with the well seal washer (10) into place. Install but do not tighten the three screws with lockwashers (9). Install the choke bracket (2) and the two screws with lockwashers (4), alining the file marks on the choke bracket with those on the air intake body. Then tighten all five screws (4 and 9) evenly and securely.

l. Install the venturi (42) with its small end up. Position the bowl-to-body gasket (41) on the throttle body (38), making certain that all channel openings are in alinement. Then assemble the throttle body to the fuel bowl (45) and install and tighten the screws with the lockwashers (43).

m. Install the carburetor (par. 78b).

Section V. SHUTTERSTAT

188. Description

The shutterstat is a thermostatic valve which controls the flow of air under pressure. Single inlet and outlet fittings are provided for external air connections. The passage of air is controlled by a needle valve which is coupled to a thermostat element and a liquid bulb. At normal temperature, air under pressure will pass through the needle valve. When the temperature of the bulb approaches 180° F., the thermostat element expands to close the needle valve and cut off the air. The needle is precision ground and lapped. The body of the shutterstat is rolled aluminum.

189. Shutterstat Adjustment

(fig. 75)

Remove the screw and lockwasher and take off the jacket from

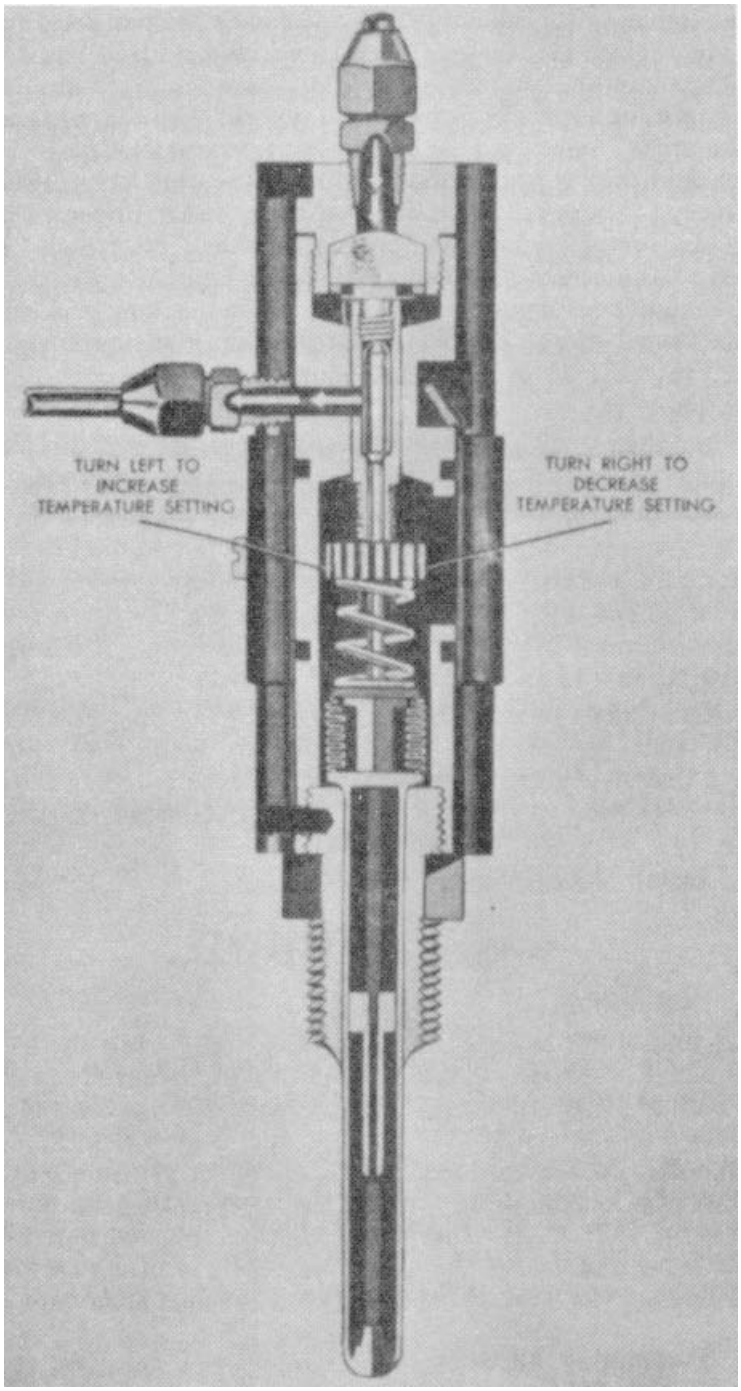


Figure 75. Shutterstat adjustment.

around the center of the shutterstat. Turn the adjusting wheel to the left to increase the spring tension for higher temperature setting or turn the adjusting wheel to the right for lower temperature setting. After adjusting the shutterstat, install the jacket, lockwasher, and screw.

190. Shutterstat Disassembly
(fig. 76)

a. Remove shutterstat (par. 81a.).

b. Remove the jacket (17) by removing the screw and lockwasher (12). In removing the jacket, the seal rings (18) may bind if dry. Two or three drops of shutter fluid at the top of the jacket will free the seal rings.

c. Place the shutterstat in a vise using two ¼- x ½ -inch spacers in the slotted slides to protect the shutterstat. Remove the two locking set screws (13). Remove the base assembly (14). Be careful of the base assembly as the bellows are easily dam. aged by rough handling.

d. Take the shutterstat from the vise and remove the adjusting spring (15) and the push pin (8). The adjusting wheel (16) should be left in the same position as it may not be necessary to readjust.

e. Place the shutterstat, with the spacers, in the vise with the end cap up. Remove the end cap (1), screen (4), felt (3), and gasket (2). Remove the needle seat cap (5) and the spacer gasket (6). Remove the needle (7). Remove the two screens (11) and felt (10) from the outlet opening on the side of the shutterstat body (9).

191. Shutterstat Inspection

Carefully clean and inspect all parts. If necessary, replace any worn parts. Replace all the gaskets. Wash all parts in shutter fluid or other noncorrosive solvent. Blow all parts and openings with clean, dry, compressed air.

a. Seating a Replacement Needle. To prepare the valve bushing, inside the shutterstat body, it will be necessary to resurface the valve bushing and the needle seat cap. Use the shutterstat reseating tool B-2441 (par. 179). Secure the body in a drill press, and with the reseating tool, clean the bushing surface. Do not remove more than 1/32 inch of stock, or the shutterstat body must be replaced. Remove an equal amount of stock from the end of the push pin. Remove any burrs with a tapered 1/4-inch wood dowel. Do this by hand to avoid too much pressure. Place the needle in the bushing and apply a drop of light oil. Screw a new seat cap into the bushing without the spacer gasket. Tighten the seat cap with a socket wrench, slowly working the seat surface

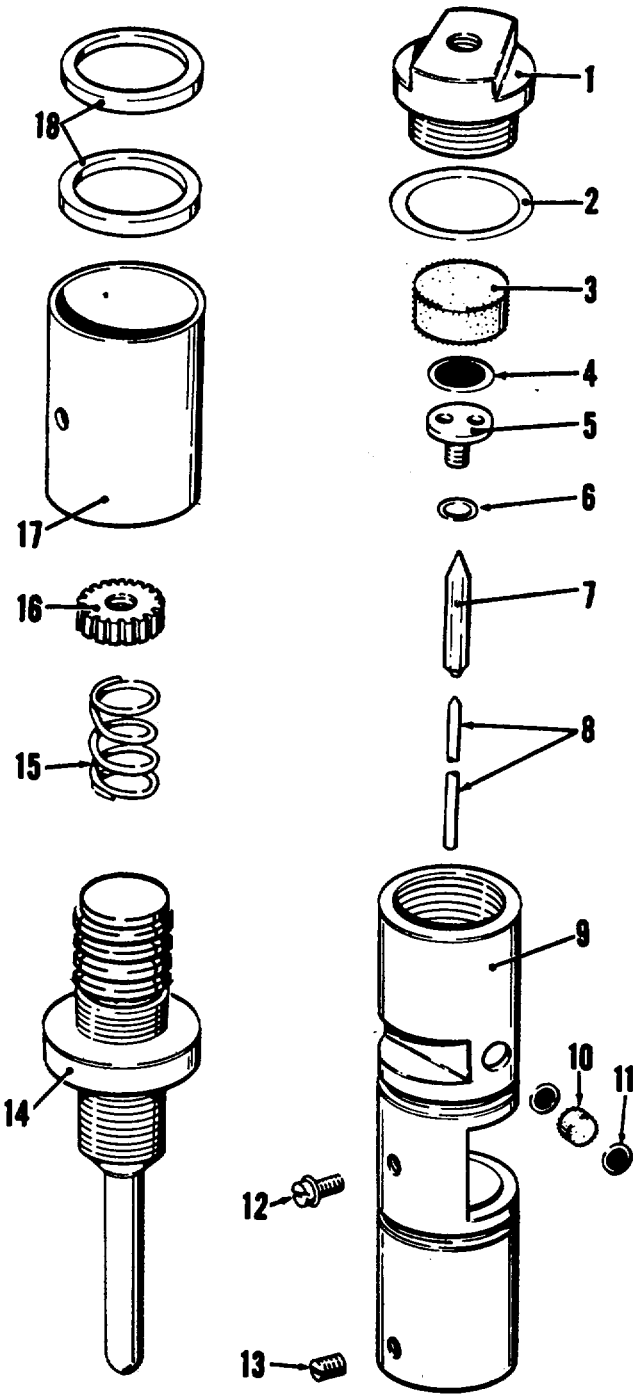


Figure 76. Exploded view of shutterstat.

1 End cap
2 Gasket
3 Felt-
4 Screen
5 Seat cap
6 Spacer gasket
7 Needle
8 Push pin
9 Body
10 Felt
11 Screen
12 Screw and lockwasher
13 Set screw
14 Base assembly
15 Adjusting spring
16 Adjusting wheel
17 Jacket
18 Seal ring

Figure 76. -Continued.

against the needle point. Remove the seat cap, clean all parts, and blow out the bushing with compressed air to remove any foreign particles. Place the spacer washer on the seat cap and firmly screw it into the bushing to prevent air leakage.

b. Checking Needle Travel. With the shutterstat completely dismantled with the needle and seat cap in place, place the body assembly in the vise with the bushing adjusting stem up. Insert the push pin against the needle. Attach a dial indicator to the body with the plunger against the push pin. Turn the indicator to zero. Insert a small pin through the hole in the needle seat cap and move the needle to the other side of the seat. Use a light pressure. The needle travel should not be less than 0.005 inch or more than 0.006 inch. If the travel is more than 0.006 inch, tighten the needle cap to make the correction. If the travel is less than 0.005 inch, replace the spacer gasket and recheck the needle travel. Install the shutterstat end cap. Connect an air line to the fitting in the end cap. Plug the side opening with a 1/8-inch IPS pipe plug. With the air applied hold the shutterstat body under water and test for leakage out of the threaded end of the bushing. With the pin, move the needle to the upper seat. Test for air leaks. If either seat shows air leakage, rotate the needle with a small shank screwdriver. This will lap the needle and the seats. Lap the needle with the air applied.

192. Shutterstat Reassembly
(fig. 76)

a. Place the body in a vise, with the spacers, and the end cap (1) down. Drop the push pin (8) and adjusting wheel (16) into place, and install the adjusting spring (15). Screw in the base assembly (14), and lock the set screws (13) into position. Install the jacket (17), locking into place with the screw and lockwasher (12). This screw also serves as a lock for the adjusting wheel (16).

b. Install the shutterstat (par. 81*b*).

Section VI. WATER PUMP

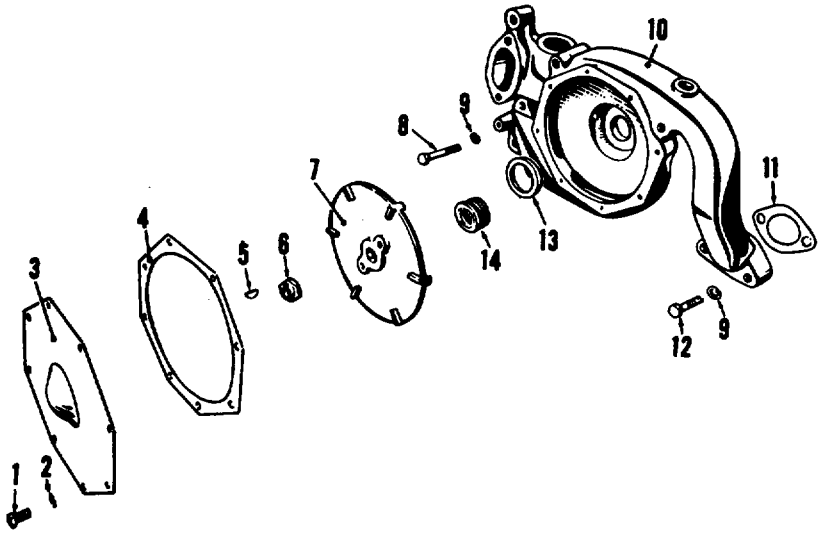
193. Water Pump Disassembly

(fig. 77)

a. Remove the fan guard (par. 87a).

b. Remove the radiator water inlet connection and gasket (par. 86)

c. Remove the pump (par. 86).



1	Bolt, hex hd, ¼–20 x ½ (8 req)	9	Lockwasher, ⅜ (6 req)
2	Washer, copper (8 req)	10	Water pump body
3	Pump body cover	11	Mounting gasket (2 req)
4	Cover gasket	12	Bolt, hex hd, ⅜–16 x 1¾ (4 req)
5	Woodruff key, No. 5	13	Seal seat
6	Special nut, 9/16–18	14	Pump seal
7	Impeller		
8	Bolt, hex hd, ⅜–16 x 2¾ (2 req)		

Figure 77. Exploded view of water pump.

d. Remove the eight hex head bolts (1) and copper washers (2) that attach the pump cover (3) and its gasket (4) to the water pump body (10).

e. Unscrew the special nut (6) from the drive shaft and remove the impeller (7) and the woodruff key (5). Remove the pump seal (14) and seal seat (13) from the shaft.

f. If necessary to replace the pump body (10) or mounting gaskets (11), unscrew and remove the six hex head bolts (8 and 12) and lockwashers (9) that fasten the body to the crankcase.

194. Water Pump Cleaning and Inspection
(fig. 77)

a. Examine all water pump parts for evidences of excessive rust, scale or corrosion. Clean or replace parts as necessary.

b. If the pump cover gasket (4) and mounting gaskets (11) appear badly worn or damaged, discard them and replace with new gaskets.

c. Inspect the pump seal (14) carefully for good condition and replace, if necessary.

195. Water Pump Reassembly
(fig. 77)

a. Apply shellac to the gasket surfaces of the water pump body (10) and crankcase, and position the gaskets (11) on the pump body.

b. Fasten the pump body (10) and mounting gaskets (11) to the crankcase with the six hex head bolts (8 and 12) and lockwashers (9). Tighten the bolts securely.

c. Slide the seal seat (13) and pump seal (14) over the pump shaft and up against the pump body. Insert the woodruff key (5) into the key slot of the shaft, and press the impeller (7) into place. Install and tighten the special nut (6).

d. Fasten the pump cover (3) and cover gasket (4) to the pump body with the eight hex head bolts (1) and copper washers (2).

e. Reconnect the radiator water inlet connection to the water pump body (par. 86).

f. Install the fan guard (par. 87b).

Section VII. GENERATOR AND VOLTAGE REGULATOR

196. Generator

a. Description. The 24-volt shunt generator is driven by a drive belt connected to the crankshaft pulley. Two brushes are employed which are held in separate brush holders mounted on the commutator-end frame. Torsion springs are used to apply proper brush pressure on the commutator. The armature shaft rotates in ball bearings on either end of the generator. A ventilating fan is mounted on the armature shaft. Pole shoes strengthen and improve distribution of the magnetic field and support the field coils in the field frame.

b. Removal. Refer to paragraph 92c.

c. Disassembly (fig. 78). Remove the band cover (14) by snapping back the, catch. Disconnect the leads from the brush holders that are attached to the commutator-end frame (21), by

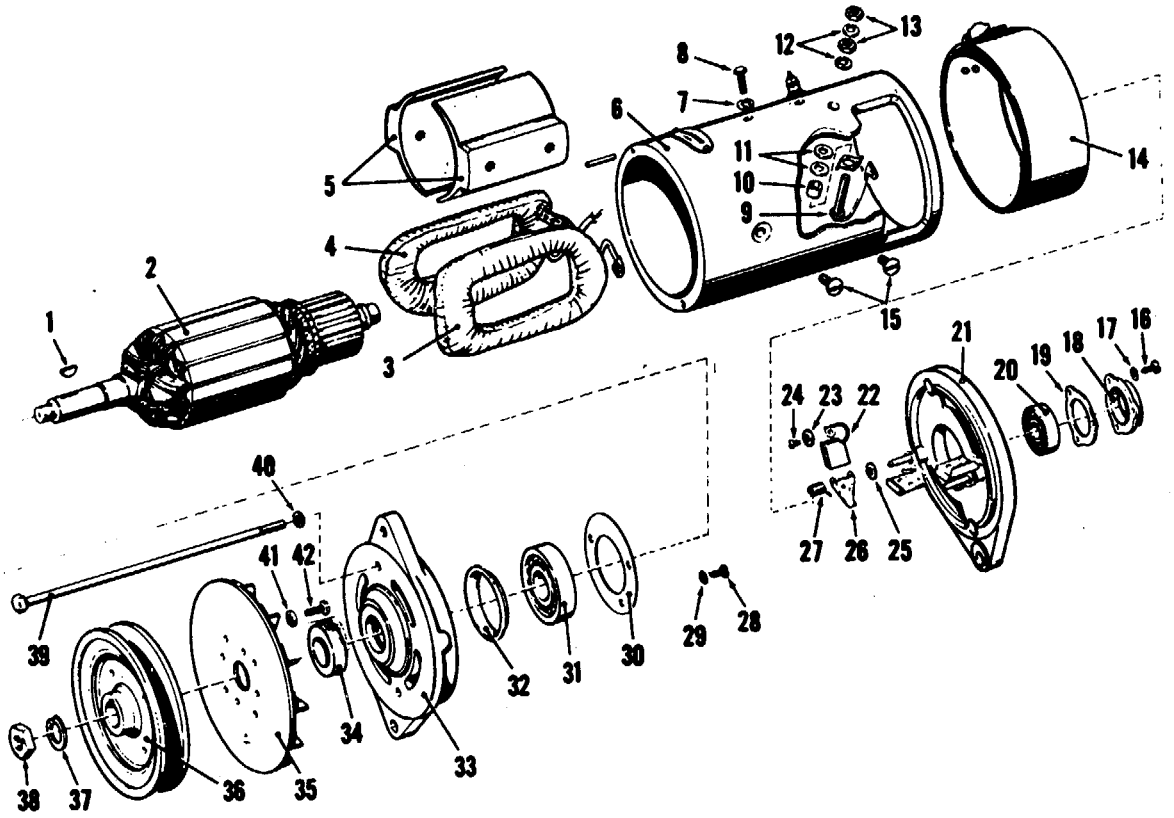


Figure 78. Exploded view of generator.

1 Woodruff key
2 Armature
3 Field coil
4 Field coil
5 Pole shoe
6 Field frame
7 Lockwasher
8 Screw
9 Terminal stud
10 Stud bushing
11 Washer
12 Lockwasher
13 Nut, hex, No. 12-24 (4 req)
14 Band cover
15 Pole shoe screw
16 Cover plate screw
17 Lockwasher
18 End cover plate
19 Cover plate gasket
20 Commutator-end bearing
21 Commutator-end frame
22 Brush
23 Lockwasher
24 Screw
25 Brush arm spacer
26 Brush arm
27 Brush spring
28 Screw
29 Lockwasher
30 Inner bearing retainer plate
31 Drive-end bearing
32 Outer bearing retainer plate
33 Drive-end frame
34 Spacing collar
35 Fan
36 Pulley
37 Washer
38 Shaft nut
39 Through-bolt
40 Washer
41 Lockwasher
42 Screw

Figure 78. -Continued.

removing the screws (24) and lockwashers (23). Detach the commutator-end frame by removing the two through-bolts (39) and washers (40). Tap with a soft hammer to loosen, if necessary. Detach the field frame (6), using a soft hammer, if necessary. Separate the armature (2) and drive-end frame (33) by placing the armature in soft jaws of a vise. Take off the shaft nut (38) and washer (37). Remove the pulley (36) with a gear and bearing puller (par. 179) and slide off the drive-end frame. Remove the woodruff key (1). Remove the screws (42) and lockwashers (41), and separate the fan (35) from the pulley. Remove the spacing collar (34). Take out the three screws (28) and lockwashers (29), and remove the inner bearing retainer plate (30). Press out the drive-end bearing (31) with the outer bearing retainer plate (32). Use an arbor press (par. 179) for this purpose supporting the inner bearing race where possible. The field frame, including lockwasher (7), screw (8), terminal stud and lead (9), stud bushing (10), washer (11), lockwashers (12), the lower hex nut (13), pole shoe screws (15), pole shoes (5), and the field coils (3 and 4), cannot be disassembled. The field coils are varnished and baked in place and are not serviced separately. If the coils are defective, replace the complete frame and field assembly. Lift the ends of the brush springs (27) over the stops. The brush arms (26), brush springs, and brush arm spacers (25) will slide off the pins. Lift out the brushes (22). Remove the cover plate screws (16) and lockwashers (17), and

take off the end cover plate (18) and cover plate gasket (19). Remove the commutator-end bearing (20).

NOTE

The bearing may remain on the shaft when the commutator-end frame is removed. Leave it on the shaft if it is not defective.

d. Cleaning and Inspection.

(1) *General.* Clean and inspect ail parts, and replace any defective parts.

(2) *Armature.* Do not clean the armature by any degreasing method, since this would damage the insulation and ruin the armature. 'Wipe with a clean cloth slightly dampened with carbon tetrachloride or similar solvent. If the commutator is rough, out-of-round, worn, has high mica, filled slots, or is burned, turn down the commutator in a lathe, and undercut the mica. Use a mica undercutter (par. 179) for this purpose, if available, or use a hacksaw blade as shown in figure 79. Follow the numerical sequence (1), (2), and (3) in figure 79.

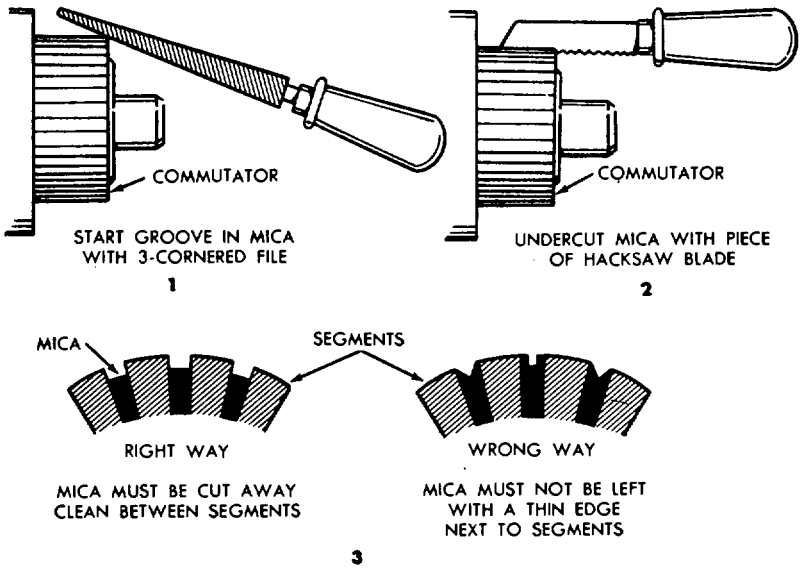


Figure 79. Correct method of undercutting mica.

(a) Ground. Use a test lamp to check for grounds from the ends of the commutator segments to the end of the armature shaft or lamination. Do not place the test probes on the commutator or bearing surface or the arching will mar the polished surfaces. If the test

lamp lights, indicating a ground, and if the ground is not apparent and repairable, replace the armature.

(b) *Open*. An open-circuited armature is easily detectable, since this condition produces badly burned commutator bars. The bars connected to the open armature coils soon burn, since every time they pass under the brushes they interrupt a flow of current, causing heavy arcing. Check the armature coil continuity with a test light. If one or more coils are open, replace the armature.

(c) *Short (fig. 80).* A shorted armature may be detected on a growler. When an armature is placed on the growler, and a hacksaw blade held above each armature coil, the blade will be alternately attracted to and repelled from a shorted armature coil. Replace a shorted armature. Before discarding an armature, inspect the commutator slots. Copper and brush dust sometimes collects in the slots and shorts adjacent bars.

(3) *Field*. Test the field coil current draw by connecting a battery and an ammeter between the two field leads. The current draw at 24-volts should be from 0.66 to 0.74 amperes. Replace the frame and field assembly if the field coil current is not between the limits specified.

(4) *Brushes.* Replace the brushes as instructed in paragraph 92b.

(5) *Brush springs.* The brush springs must have enough tension to provide proper pressure between the brushes and the commutator after the generator is assembled. After reassembling the brushes, brush springs, and brush arms to the commutator-frame end, place the commutator in position and check with a spring scale the amount of pull needed to raise the brush arms from the brushes. Replace the springs if the tension is not 28 ounces.

(6) *Bearings*. Replace the ball bearings if they roll rough, or sloppily. Otherwise, clean the bearings by rotating them in carbon tetrachloride, or similar solvent. Dry them with compressed air and immediately relubricate with grease, ball and roller bearing BR.

(7) *Commutator-end frame*. Replace the commutator-end frame if the holders or pins are damaged in any way. The frame is of riveted construction and must be replaced as a unit.

e. Reassembly (fig. 78). Install the outer bearing retainer plate (32) in the drive-end frame (33). Place the drive end bearing

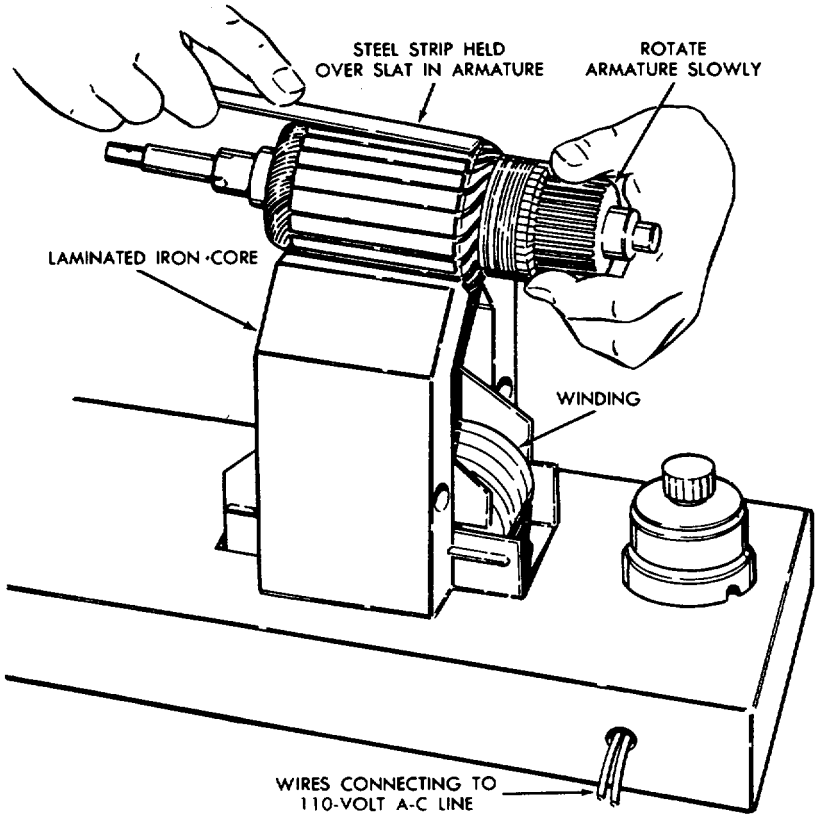


Figure 80. Testing armature on a growler.

(31) against the outer bearing retainer, and attach the inner bearing retainer plate (30) with the screws (28) and lockwashers (29). Fasten the fan (35) to the pulley (36) with the screws (42) and lockwashers (41). Instant the spacing collar (34). Press the drive-end frame on the armature in an arbor press (par. 179). Insert the woodruff key (1) in the armature shaft. Press on the pulley and install the shaft washer (37) and shaft nut (38). Reassemble the commutator-end frame (21). Put the brush arm spacers (25) over the pins. Place the brush springs (27) in the brush arms (26) with the straight end of the spring through the hole in the brush that is to be installed toward the pulley end of the generator. Slide each arm and spring assembly over the pins, and hook the bent end of each spring over the stops. Install the commutator-end bearing (20) in the commutator-end frame and fasten the cover plate gasket (19) and end cover plate (18) with the cover plate screws (16) and lockwashers (17).

Insert the armature and pulley assembly into the drive end of the field frame (6). Put the commutator-end frame assembly on the commutator-end. Line up the through-bolt holes. Install the brushes (22). Check the brush spring tension (d (5) above). Be sure that the brushes are correctly seated and follow the contour of the commutator. Install and tighten the through-bolts (39) with their lockwashers (40). Fasten the brush leads with the screws (24) and lockwashers (23). Install the band cover (14).

f. Testing. Mount the generator on a test stand or on the unit if no test stand is available. Connect the field terminal (fig. 32) to the generator frame with a jumper lead. Connect an ammeter in series with the armature terminal, the batteries, and the generator frame. Connect a voltmeter across the batteries. Run the generator, increasing the speed to 1, 650 rpm. The -generator output should be 10 amperes at 26 volts. If the generator fails the test, check further according to d above.

g. Installation. Refer to paragraph 92d.

197. Voltage Regulator

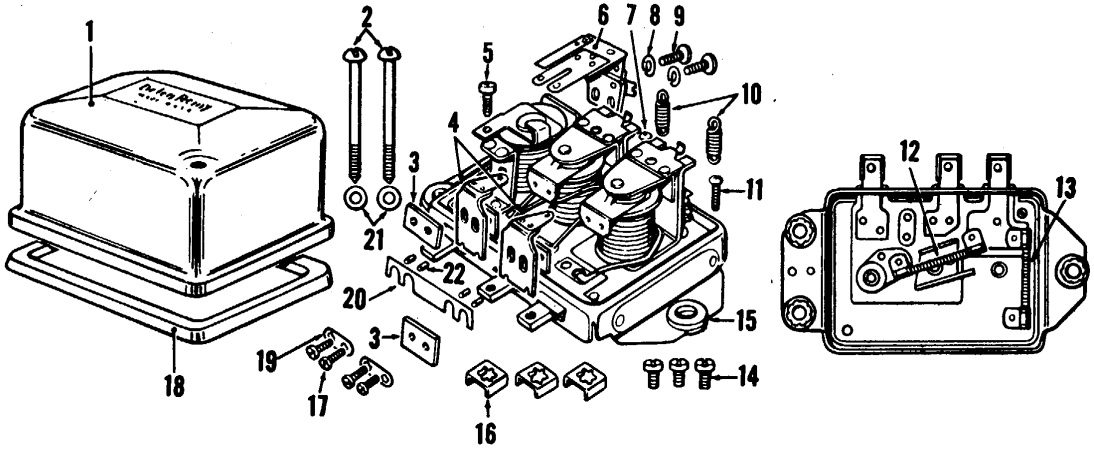
a. Description. The voltage regulator consists of a voltage regulator, current regulator and cutout relay, The voltage regulator limits the voltage of the electrical system, protecting the batteries, distributor points and other accessories from excessively high voltage. The current regulator prevents the generator from exceeding its maximum output. The cutout relay closes the circuit between the generator and batteries when the generator is operating at sufficient speed to charge the batteries. When the generator slows down or stops, the cutout relay opens the battery to-generator circuit to prevent discharge of the batteries through the generator. All three of these units are adjustable.

b. Removal. Refer to paragraph 91*a*.

c. Disassembly (fig. 81).

(1) Never disassemble the regulator unless some part requires replacement. This disturbs the electrical and mechanical settings and makes it necessary to completely reset the unit.

(2) Remove the cover screws (2) and washers (21), and lift off the cover (1). Remove the relay armature (6) by unsoldering the lead and removing the screws (9) and lockwashers (8). Remove the current regulator contact support (4, end unit) by unsoldering the lead and removing the screws (17), lockwasher (19), two insulating washers (3), two insulators (22), upper contact support, and the other insulating washer (3).



1 Cover
2 Cover screw
3 Insulating washer
4 Contact support
5 Adjusting screw
6 Relay armature
7 Adjusting screw
8 Lockwasher
9 Screw
10 Spring
11 Adjusting screw
12 Resistor
13 Resistor
14 Terminal screw
15 Grommet
16 Terminal clamp
17 Screw
18 Cover gasket
19 Lockwasher
20 Connector
21 Washer
22 Insulator

Figure 81. Exploded view of regulator.

Remove the voltage regulator upper contact support (4, middle unit) by removing the screws (17), removing the screws (17), lockwashers (19), insulating washer (3), two insulators (22), upper contact support, and the other insulating washer (3). The connector (20) comes off with the upper contact support. To remove either the current regulator or voltage regulator armature, take off the spring (10). Drill out the two rivets that mount the armature spring hinge to the regulator frame. Support the frame to avoid bending it, center punch the rivet head, and use a 3/32-inch drill. Remove an armature only if it is damaged, bent, or if the contact is burned, or worn away.

d. Cleaning and Inspection. Inspect all the parts. Clean dirty, burned, or oxidized contact points. If contacts are badly pitted they should be replaced. Use a riffer or spoon file to clean out any pits that may have formed on the flat contact. The insulators, screws, washers, and leads must be in good condition.. If the coil windings, stationary relay contact point, or insulators, are burned or otherwise defective, replace the complete regulator. The regulator is of riveted construction, and only the parts shown detached in figure 81 are serviceable items.

e. Reassembly (fig. 81). If the current regulator or voltage regulator armature has been removed, install a replacement armature with the screws, lockwashers, and nuts, furnished with the replacement armature. Assemble the screws down so they do not ground against the cover. Install the voltage regulator contact support (4, middle unit). An insulating washer (3) goes next to the regulator frame, then the contact support, two small insulators (22), the connector (20), insulating washer (3), lockwasher (19), and screws (17). Note that this connects the connector to the contact support. Install the current regulator contact support (4, end unit). An insulating washer (3) goes next to the regulator frame, then the contact support, two small insulators (22), insulating washer (3), connector (20), insulating washer (3), lockwasher (19), and screws (17). This fastens the connector (20). The connector is insulated from the current regulator contact support. Resolder the lead to the upper contact support. Install the relay armature (6) with the screws (9) and lockwashers (8). Resolder the lead to the relay armature. Install the two springs (10).

f. Test and Adjustment.

(1) *Cutout Relay*. Connect the regulator to the batteries and generator. Connect a voltmeter from the GENERATOR terminal to GROUND and insert an ammeter in series with the BATTERY terminal as shown in figure 82. Increase the generator speed until the cutout relay contacts close. The contacts should close

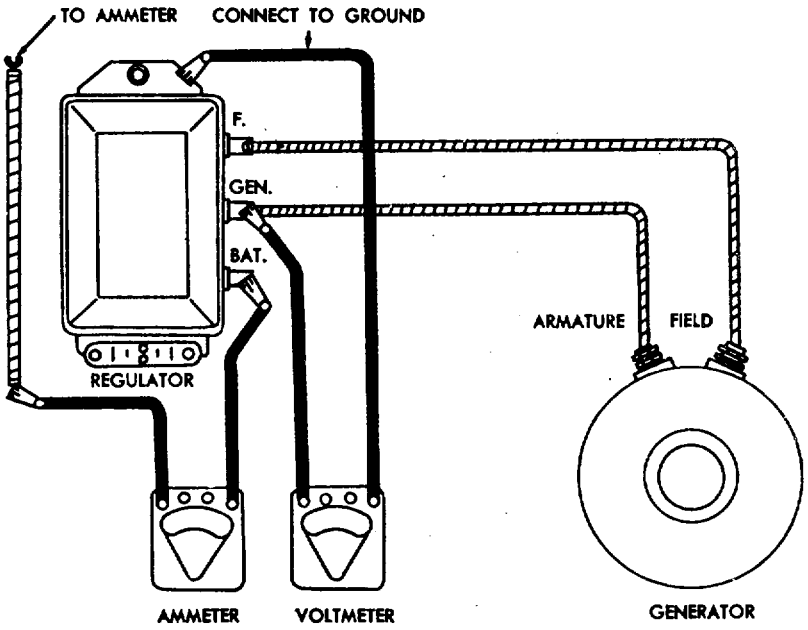


Figure 82. Checking the cutout relay setting.

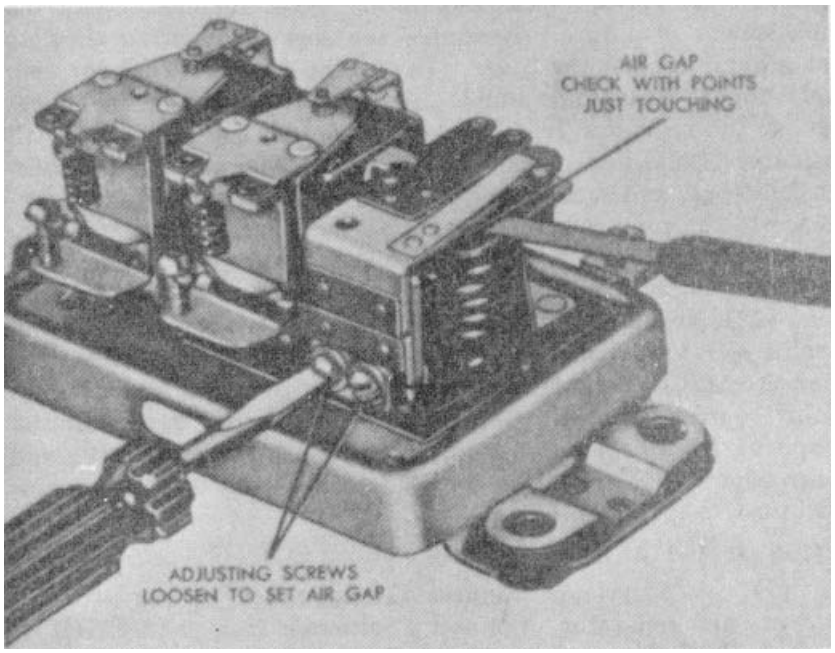


Figure 85. Adjusting cutout relay air gap.

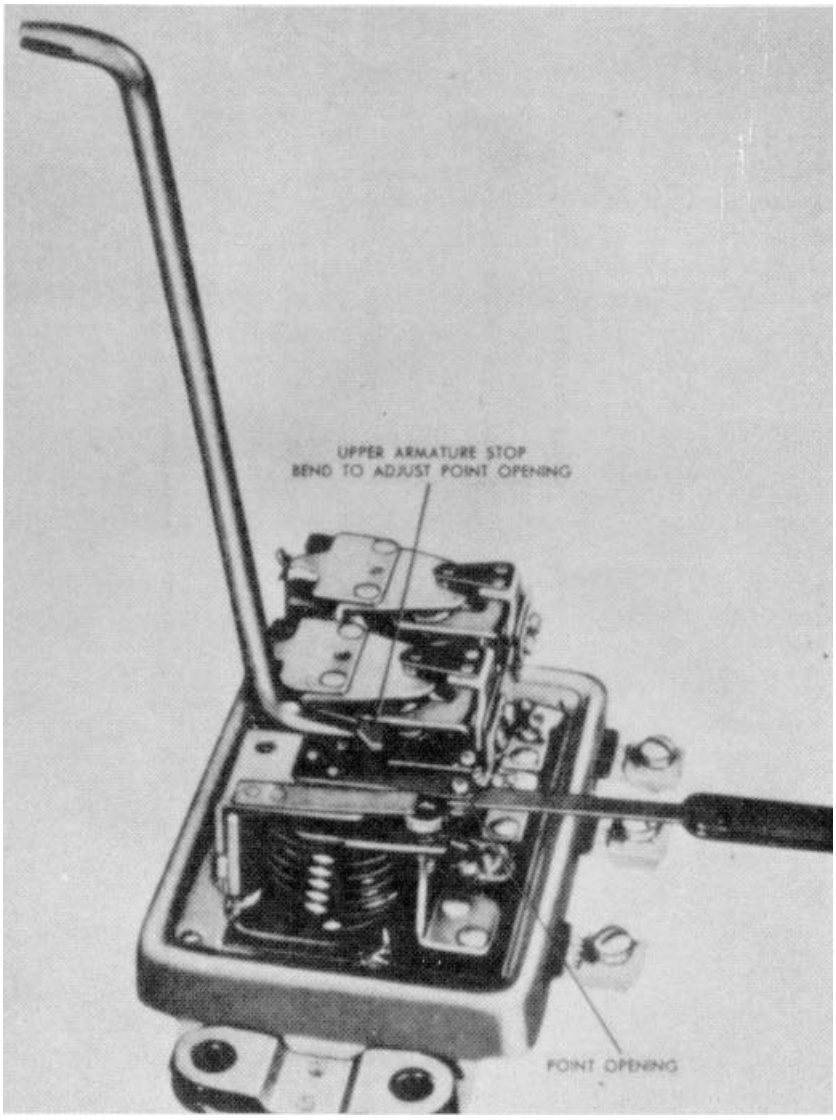


Figure 84. Adjusting cutout relay point opening.

at 25.5 volts. If the contacts do not close at the specified voltage, disconnect the regulator. Measure the air gap between the armature and the center of the core with the contacts closed (fig. 88). The air gap should be 0.017 inch. Loosen the adjusting screws at the back of the relay and raise or lower the armature as

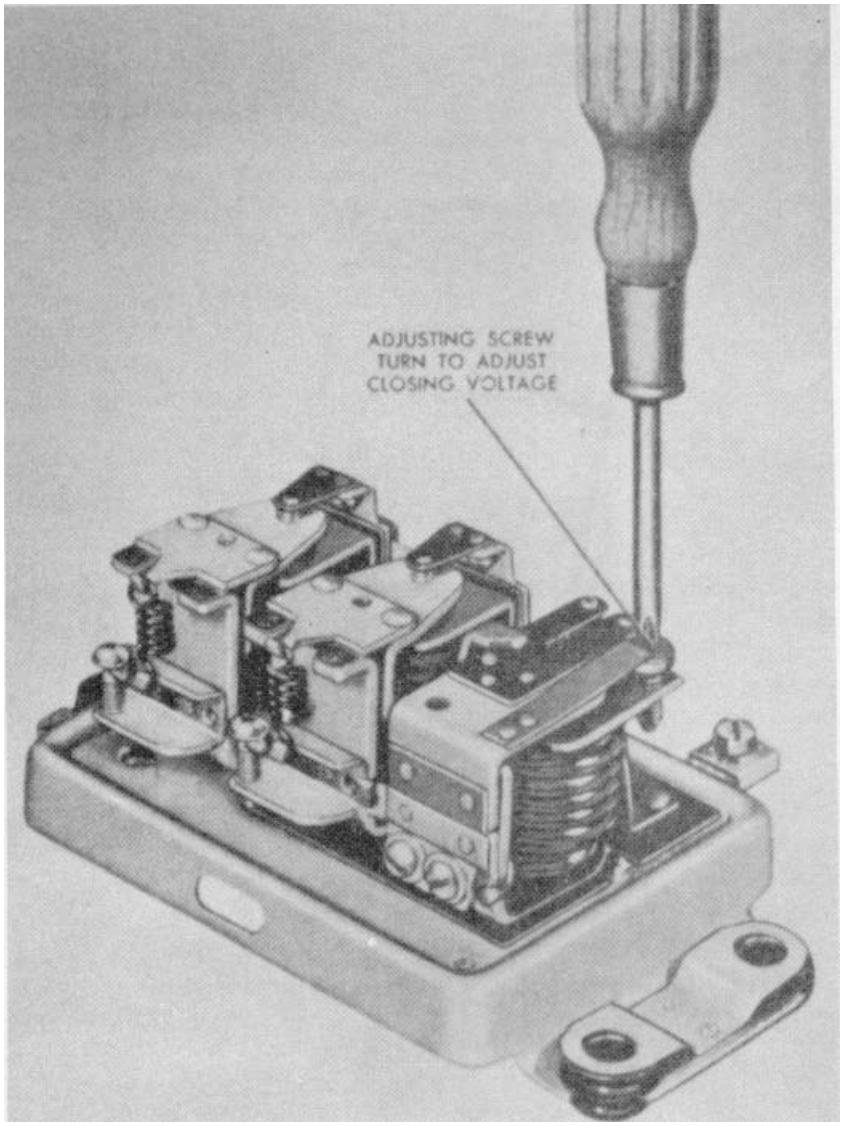


Figure 85. Adjusting cutout relay closing voltage.

required. Tighten the screws after adjustment. Measure the contact point opening with the contacts open (fig. 84). The contact point opening should be 0.32 inch. Bend the upper armature stop with an offset screwdriver to adjust the contact point opening as required. Connect the regulator (fig. 82) and check the

closing voltage. If the contacts still do not close at 25.5 volts turn the adjusting screw (fig. 85). Raising the screw raises the closing voltage.

(2) *Voltage regulator*. Disconnect the lead from the BATTERY terminal and connect a 7-ohm resistor between the BATTERY terminal and the regulator base (fig. 86). Connect a voltmeter across the 7-ohm resistor. Operate the generator at medium speed, and with the regulator at operating temperature, note the voltage setting. The voltage regulator contacts should open at 28.5 volts. The regulator cover must be, on for this test. If the contacts do not open at the specified voltage, disconnect the regulator. Measure the air gap with the points just touching between the center of the winding core and the armature (fig. 87). Push the armature all the way down by hand, release until the points come together and then measure the air gap. The air gap should be 0.075 inch. Adjust the air gap by loosening the contact mounting screws, and raising or lowering the upper contact support as required. Tighten the screws after adjustment. Turn the adjusting screw (fig. 88) in to increase the voltage setting or out to decrease the setting. After each change of voltage

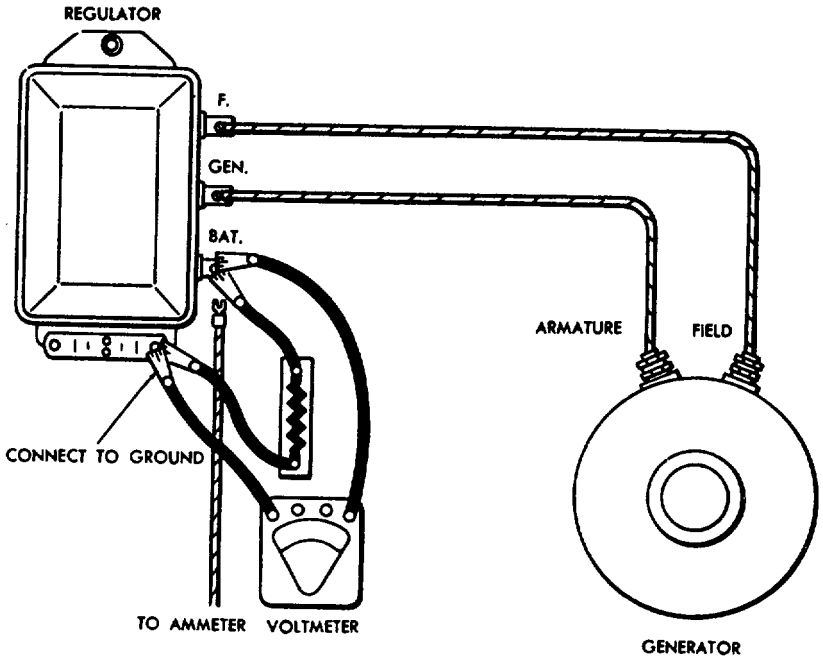


Figure 86. Checking voltage regulator setting.

setting put the cover on the regulator and connect the regulator as in figure 86. Reduce the generator speed until the contact points close, then bring up the speed until the contacts open at the voltage setting.

(3) *Current regulator*. Connect the regulator to the batteries and generator. Bridge the voltage regulator contacts (fig. 89), and insert an ammeter in the BATTERY line. Operate the generator at medium speed and note the current regulator setting. The contacts should open at 10 amperes. If the contacts do not open at the specified current, disconnect the regulator. Measure the air gap between the armature and the center of the core with the contacts closed. Refer to the center unit in figure 87, and adjust the contacts the same as

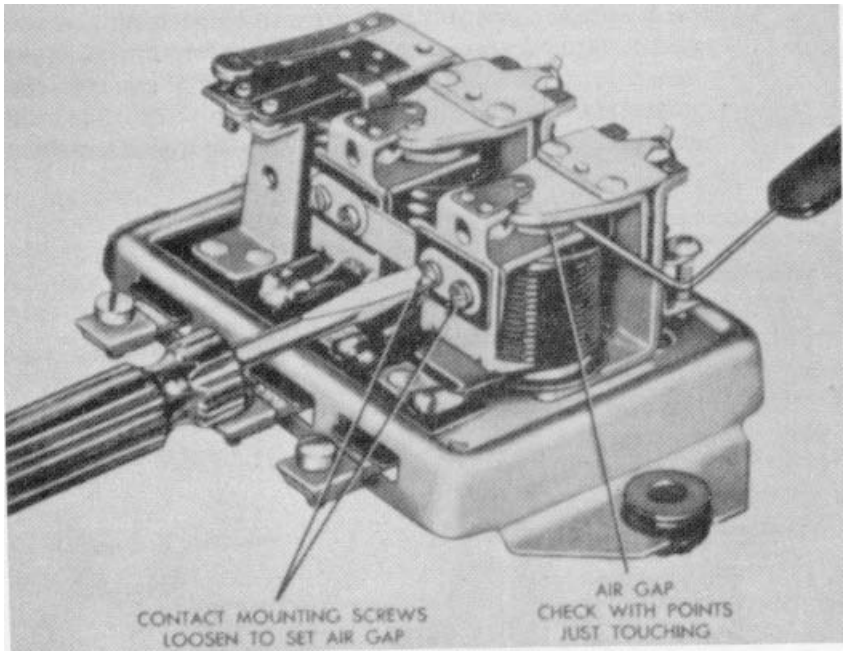


Figure 87. Adjusting voltage regulator air gap.

for the voltage regulator discussed in (2) above. The air gap should be 0.075-inch. Turn the adjusting screw of the center unit (fig. 88) in to increase the current setting, and out to decrease the current setting. After each change of current setting put the cover on the regulator and connect the regulator as in figure 89.

Reduce the generator speed until the contact points close, then bring up the speed until the contacts open at the current setting.

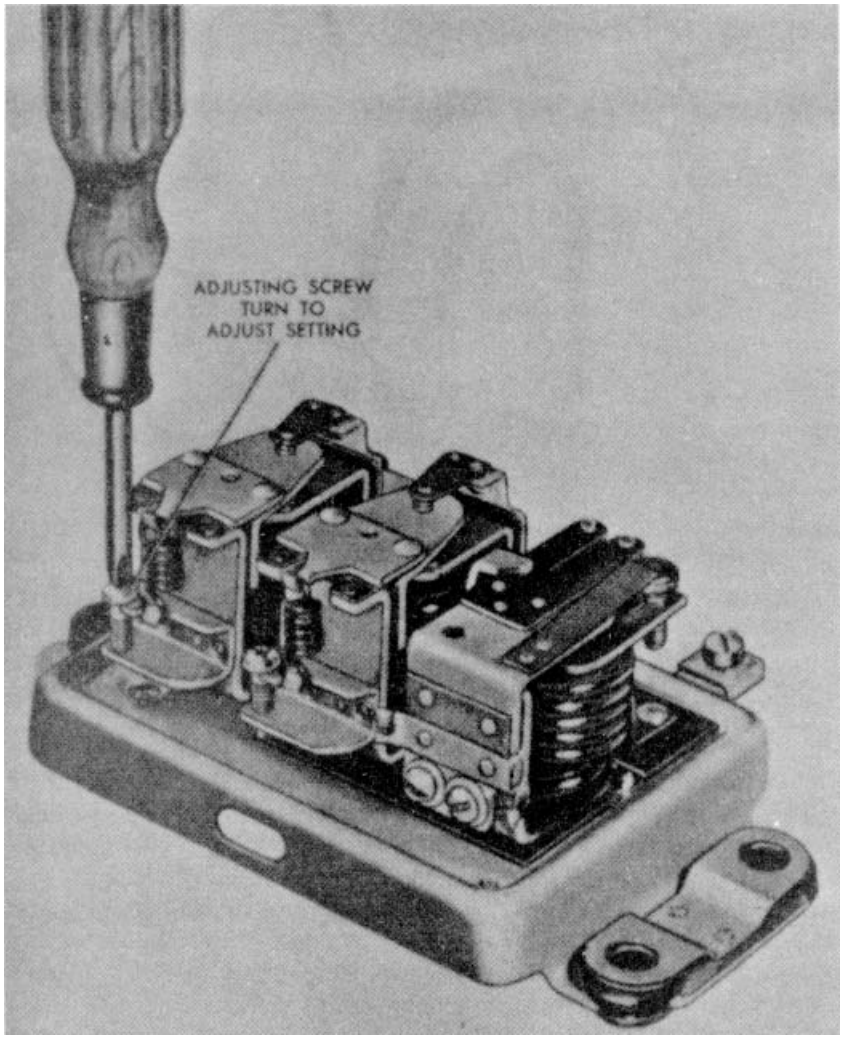


Figure 88. Adjusting voltage regulator setting.

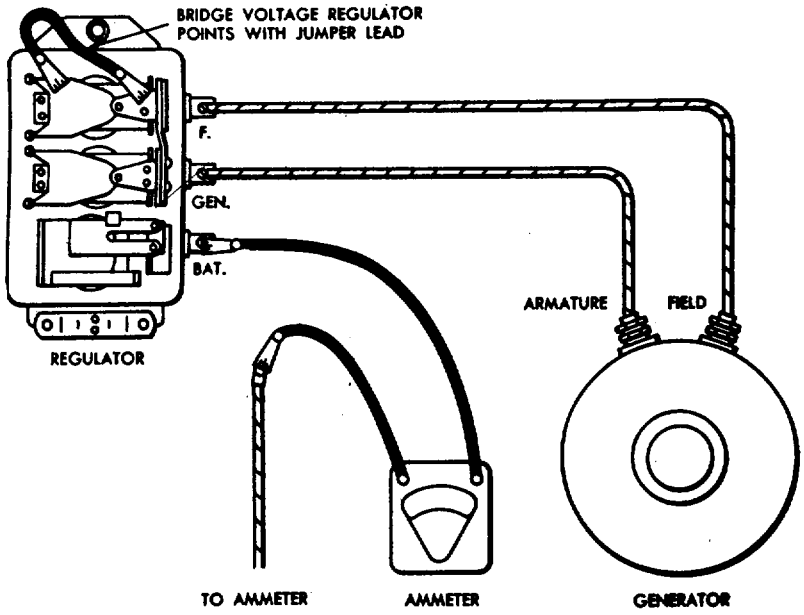


Figure 89. Checking current regulator setting.

g. Installation. Refer to paragraph 91*b.*

Section VIII. STARTING MOTOR AND MAGNETIC SWITCH

198. Starting Motor

a. Description. The 24-volt starting motor is equipped with a Bendix-type drive which automatically meshes with the flywheel ring gear for starting and unmeshes after starting. The Bendix-type drive is housed in the drive housing. The armature shaft rotates in three bronze bushings in the commutator-end frame, center bearing and drive housing. The four brushes are held in brush holders which are an integral part of the commutator-end frame. Torsion springs provide the proper brush pressure in the commutator. Field poles support the four-coil field coil assembly and strengthen and improve distribution of the magnetic field.

b. Removal. Refer to paragraph 93*a.*

c. Disassembly (fig. 90). Detach the commutator-end frame (36) by removing the cover band (29), disconnecting the field coil leads from the brush holders, and removing the through-bolts (39) and lockwashers (38). Tap the commutator-end

frame lightly with a soft hammer to loosen it. Remove the commutator-end spacer washer (1) from the armature shaft. Do not remove the dowel pin (35). Detach the field frame (6). Detach the drive housing (28) by removing the center bearing screws (10) and lockwashers (11). Place the armature (2) in soft vise jaws, bend down the tong of locking clip (19) and unscrew the Bendix-drive head spring screw (20). Slip the Bendix-drive off the armature shaft. Remove the woodruff key (3) and slip off the drive head assembly (18), the center bearing (12), and the spacer washer (24). Disassemble the Bendix-drive further, if required, by bending down the tong of the locking clip (19) and removing the shaft spring screw (21). Separate the drive spring (23) and the driving shaft assembly (22). Remove the roundhead screws (30) and lockwashers (31), and the brushes (32). Detach the brush springs (33) by catching the straight section with pliers and lifting them off. Remove the commutator-end plug (37), and press out the commutator-end bushing (34) in an arbor press (par. 179). Do not disassemble the field frame because the field coil assembly (4) and pole shoes (5) are varnished and baked in place. The field frame assembly includes the pole shoe screws (7), insulation strip (8), terminal stud (9), terminal stud bushing (13), insulating washer (14), hex nut (15), lockwasher (16), and locknut (17). Remove the pipe plug (25) and oil wick (26). Press out the drive-end bushing (27) in an arbor press (par.179).

d. Inspection and Cleaning. Inspection and cleaning of the starting motor is similar to that given for the generator. Procedures in the following paragraphs are referenced where applicable.

(1) *General*. Refer to paragraph 196*d*(1).

(2) *Armature*. Refer to paragraph 196*d*(2).

(a) Ground. Refer to paragraph 196*d*(2) (*a*).

(b) Open. Refer to paragraph 196*d*(2) (*b*).

(c) Short. Refer to paragraph 196*d*(2) (*c*).

(3) *Fields*. Do not attempt to clean the field coils because they are protected with a corrosion proof varnish. Check the field coils for opens and grounds with a test light. Replace the field frame assembly if the coils are defective.

(4) *Brushes*. Replace the brushes as instructed in paragraph 94c.

(5) *Brush springs*. The brush springs must have sufficient tension to provide the proper pressure between the

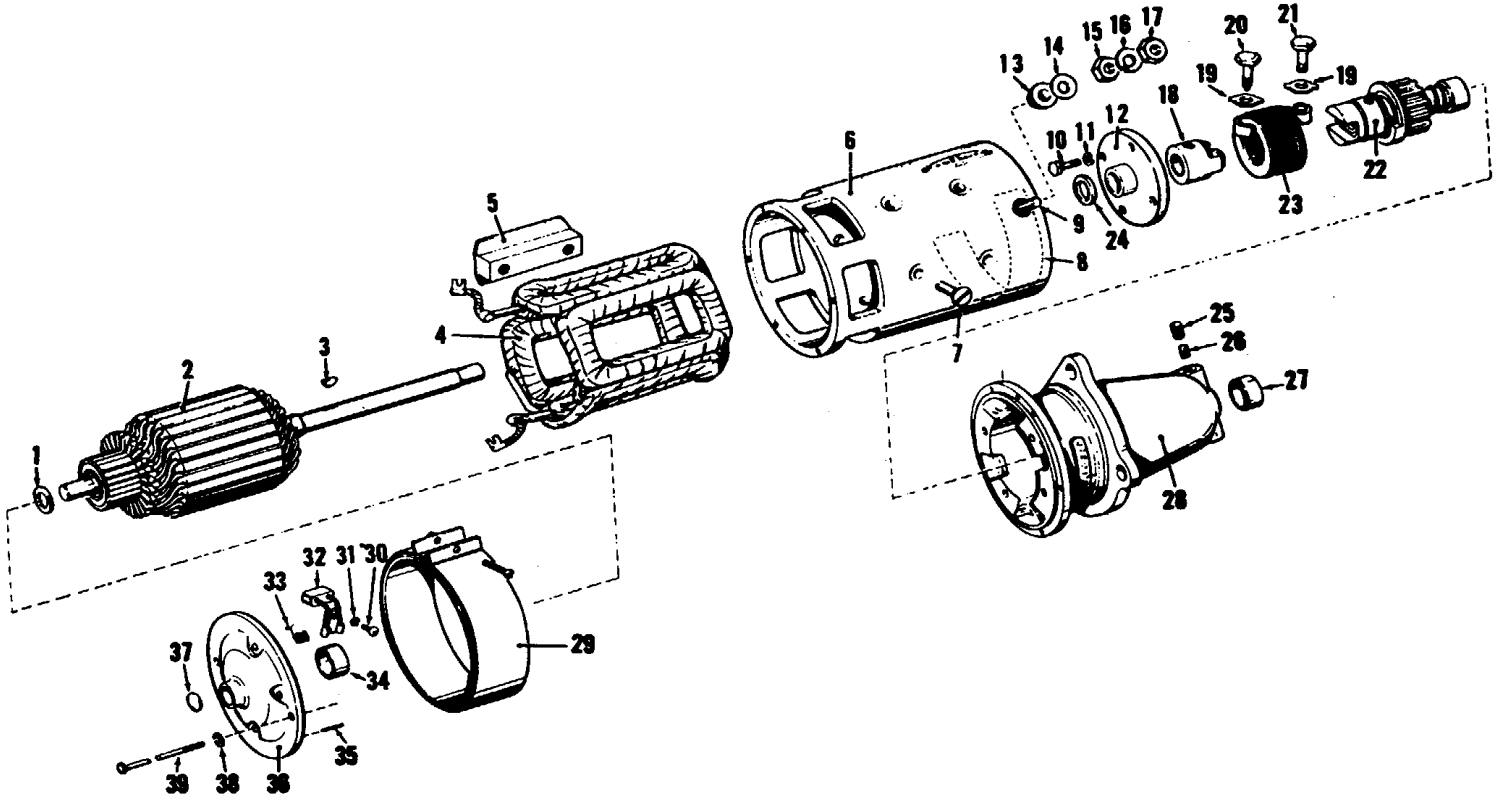


Figure 90. Exploded view of starting motor.

1 Commutator-end spacer washer
2 Armature
3 Woodruff key
4 Field coil assembly
5 Pole shoe
6 Field frame
7 Pole shoe screw
8 Insulation strip
9 Terminal stud
10 Center bearing screw
11 Center bearing lockwasher
12 Center bearing
13 Terminal stud bushing
14 Insulating washer
15 Nut, hex, 3/8 -16
16 Terminal stud lockwasher
17 Terminal stud locknut
18 Drive head assembly
19 Locking clip
20 Head spring screw
21 Shaft spring screw
22 Driving shaft assembly
23 Drive spring
24 Spacer washer
25 Pipe plug
26 Oil wick
27 Drive-end bushing
28 Drive housing
29 Cover band
30 Screw, rd hd, No. 8-32 x 5/16 (4 req)
31 Brush lead lockwasher
32 Brush
33 Brush spring
34 Commutator-end bushing
35 Dowel pin
36 Commutator-end frame
37 Commutator-end plug
38 Through-bolt lockwasher
39 Through-bolt

Figure 90. -- Continued.

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brushes and commutator after the unit is reassembled. Check by placing the armature and the commutator-end frame together in their normal operating position. Place the. brushes in their holders with the springs in place. Check with a spring scale the amount of pull needed to raise the brush arms from the brushes. Replace the springs if the tension is not from 36 to 40 ounces.

(6) *Bearings*. Replace the bearings if they are worn. Wear will not be even, but on the side which sustains the greatest thrust during starting. Where bearing is lubricated by an oil wick, drill an oil hole for the wick. Remove all cuttings and install a new wick.

(7) *Brush holders*. Replace the brush holders if they are bent, warped, cracked, or burned.

e. Reassembly (fig. 90). Slip the brush springs (33) on the brush arm hinge pins. The long tong of the spring goes back of the arm. Catch the short hooked end of the spring and hook it over the stop pin. Attach the brushes (32) with the roundhead screws (30) and lockwashers (31) to the brush holders. At the same time, attach the two brush grounding leads to the grounded brush holders. Attach the other ends of the leads to the commutator-end frame (36). Place the armature (2) in soft vise jaws. Install the spacer washer (24) and the center bearing (12). Insert the woodruff key (3) in

the armature shaft and slide on the drive head assembly (18) over the key. Install the drive spring (23) over the drive head. Place the driving shaft assembly (22) in its position inside the drive spring, and mated with the drive head. Use new locking clips (19), and install the head spring screw (20) in the drive head and the shaft spring screw (21) in the driving shaft assembly. Insert the armature into the drive housing (28) until the shaft mates with the drive-end bushing (27). Install the oil wick (26) and pipe plug (25). Fasten the center bearing to the drive housing with the screws (10) and lockwashers (11). Place the commutator-end spacer washer (1) on the shaft next to the commutator. Place the field frame followed by the commutator-end frame (36) into position. Lift the brushes as the commutator is brought into position. Fasten the assembly with the through-bolts (39) and lockwashers (38). Install the commutator-end plug (37). Fasten the field coil leads to the brush holders. Install the cover band (29).

f. Testing.

(1) *No-load test*. Connect the starting motor in series with a freshly charged 24-volt battery and an ammeter with a 0-50 ampere range. At no-load the starting motor should draw 30 amperes and run at 6,000 rpm. Read the motor speed with a tachometer. If the speed or current drain is not as specified, check the brushes, commutator, field coils, and bearings as in d above.

(2) *Torque test*. Torque testing equipment is required for conducting a stall torque test on the starting motor. With the motor connected in series with a freshly charged 24-volt battery, an ammeter with a 0-300 ampere range, and a voltmeter connected across the motor terminals, run the stall torque test. When the motor stalls, the current should be 200 amperes, the voltage 6.6 volts, with a torque of 21 ft-lbs. If the motor fails this test, check the brushes, commutator, field coils, and bearings as in d above.

g. Installation. Refer to paragraph 93b.

199. Magnetic Switch

a. Description. The 24-volt magnetic switch is used with the starting switch in the starting circuit to close the circuit between the batteries and starting motor. It consists essentially of a coil, plunger, contact disk, a terminal cap assembly and return spring. When the coil is engaged through the starting switch, the plunger moves the contact disk to make

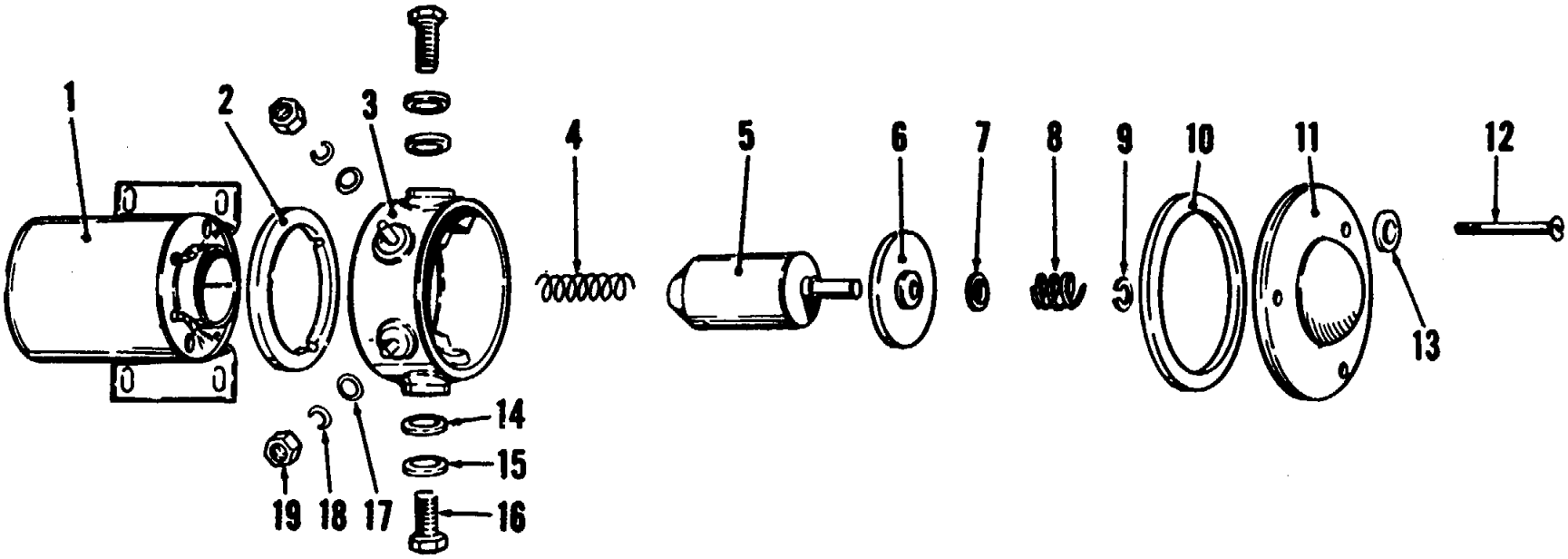
electrical contact and complete the batteries-to-starting motor circuit. The contacts and terminals on the magnetic switch are capable of handling the large current which flows to the starting motor during starting. The return spring pushes the plunger and contact disk up to the initial position when the coil is de-energized.

b. Removal. Refer to paragraph 99a.

c. Disassembly (fig. 91). Take out the three cover screws (12) with the rubber washers (13), and remove the cover (11) and the cover gasket (10). Lift out the slotted spring retainer washer (9), contact spring (8), spring retainer washer (7), and contact disk (6). Lift out the plunger (5). Disconnect the coil leads from the terminal cap assembly (3). Lift off the terminal cap assembly and the terminal cap gasket (2). Remove the return spring (4) from the case and coil assembly (1). Unscrew the two terminal studs (16), and remove the lockwashers (15) and plain washers (14). Unscrew the two terminal nuts (19), and remove the lockwashers (18) and plain washers (17).

d. Inspection and Cleaning. Wipe the switch parts with a clean cloth slightly moistened with carbon tetrachloride. After cleaning, blow the case and coil assembly and the terminal cap assembly dry with compressed air. Do not soak the gaskets. Connect a variable resistance, a 24-volt battery, and an ammeter in series with the two coil leads. Adjust the voltage to 24-volts and read the ammeter. Replace the case and coil assembly if the current is not between 3.1 and 3.5 amperes. Inspect the switch parts for cracks, or corroded surfaces. Flex the springs to detect hidden cracks. Replace the gaskets and washers if they are cracked, or oil-soaked. Clean a corroded plunger or core surface with fine sandpaper.

e. Reassembly (fig. 91). Place the lockwashers (15) and plain washers (14) on the terminal studs (16), and screw the studs into the terminal cap assembly (3). Attach the plain washers (17), lockwashers (18), and terminal nuts (19). Place the return spring (4) over the spindle inside the case and coil assembly (1). Place the plunger (5) over the return spring. Place the terminal cap gasket (2) on the case and coil -assembly and set the terminal cap assembly on the gasket. Connect the coil leads. Set the contact disk (6) over the plunger; and install the spring retainer washer (7), contact spring (8), and slotted spring retainer washer (9). Be sure the washers are cupped around the spring. Place the cover gasket (10) over the terminal cap assembly. Press the cover (11) over the gasket, and while holding it down, install the rubber washers (13) and the cover screws (12).



1	Case and coil assembly	8	Contact spring	14	Plain washer
2	Terminal cap gasket	9	Spring retainer washer, slotted	15	Lockwasher, ⅜ (2 req)
3	Terminal cap assembly	10	Cover gasket	16	Terminal stud
4	Return spring	11	Cover	17	Plain washer
5	Plunger	12	Cover screw	18	Lockwasher
6	Contact disk	13	Rubber washer	19	Terminal nut
7	Spring retainer washer				

Figure 91. Exploded view of magnetic witch.

f. Testing. Test the solenoid coil as in d above. Connect a voltmeter across the coil terminals. Insert all the resistance into the circuit and then decrease resistance slowly until the switch closes. Note the closing voltage. Increase the resistance and not the opening voltage. The switch should close at not more than 10 volts and open at from 0.5 to 3 volts. Refer to d above if the switch does not meet specifications.

g. Installation. Refer to paragraph 99b.

Section IX. DISTRIBUTOR AND COIL

200. Description

a. Distributor. The distributor provides current to the primary winding of the ignition coil at the proper time, and also distributes the high tension voltage to the proper spark plug. The breaker contacts of the distributor are connected in the coil primary circuit so that the rotation of the cam opens the coil circuit at the proper instant to generate a spark. The distributor cap and rotor are arranged so that the high tension voltage is connected to the correct spark plug for firing each cylinder. The distributor has centrifugal governor control of the timing, and the cam is connected to the drive shaft through the governor. This is arranged so that as the speed is increased, the relationship of the cam to the breaker arm is changed by the centrifugal governor action. The rate or amount of spark advance is controlled by the weight springs and the centrifugal governor.

b. Ignition Coil. The ignition transforms the low voltage supplied by the batteries into the high voltage needed to jump the spark plug gap. The coil has two windings, one the primary winding which consists of a comparatively few turns of heavy wire, and the secondary winding which consists of many turns of very fine wire. The secondary winding is wound on a soft iron core, while the primary winding is wound around the outside of the secondary winding. A soft iron shell encloses the outside of both windings and serves to complete the magnetic circuit. Carefully selected and tested insulation is placed between the winding layers, the primary and secondary windings, and between the outside of the primary winding and the soft iron shell. Whenever current is built up and broken in the primary winding, a voltage is induced in the secondary winding. The design of the coil is such that the induced voltage will be high enough to produce a spark at the spark plug.

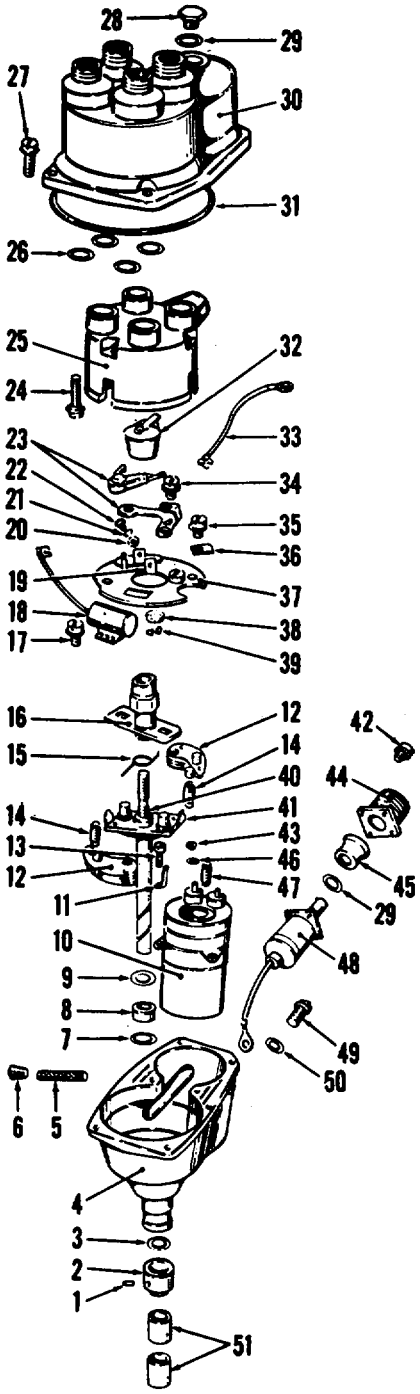


Figure 92. Exploded view of distributor and coil.

1 Coupling rivet
2 Drive coupling
3 Lower drive shaft thrust washer
4 Base assembly
5 Felt wick
6 Pipe plug
7 Seal washer
8 Shaft seal
9 Upper drive shaft thrust washer
10 Ignition coil
11 Lead clamp
12 Governor weight
13 Fillister head screw, No. 10-32 x 7/16 (2 req)
14 Governor spring
15 Antirattle spring
16 Cam and stop plate
17 Capacitor mounting screw
18 Capacitor
19 Breaker arm spring clip
20 Plain washer, No. 6
21 Lockwasher, No. 6
22 Clamp screw
23 Breaker contact set
24 Cap and cover screw
25 Cap assembly
26 Cap sealing washer
27 Fillister head screw, No. 10-32 x 11/16
28 Cap cover plug
29 O-ring
30 Distributor cap cover
31 O-ring
32 Rotor
33 Primary lead assembly
34 Fillister head screw, No. 8-32 x 3/16
35 Breaker plate screw
36 Breaker plate holder
37 Breaker plate
38 Cam sleeve felt wick
39 Cam retaining snap ring
40 Cam spacer
41 Drive shaft
42 Receptacle screw
43 Nut, hex, No. 10-32
44 Receptacle
45 Receptacle seal
46 Lockwasher, No. 6
47 Cap contact spring
48 Connector
49 Drain plug
50 Drain plug washer
51 Drive shaft bearing

Figure 92. -- Continued.

201. Distributor Disassembly
(fig. 92)

a. Remove the distributor (par. 97*a*).

b. Take out the six fillister head screws (27) and lift the distributor cap cover (30). Remove the O-ring (31) from the top of the base assembly (4).

c. Make a sketch of the relationship between the rotor (32) and the offset drive torque. Pull the rotor from the top of the cam and stop plate.

d. Disconnect the primary lead assembly (33) and the lead from the connector (48), by removing the nuts (43) and lockwashers (46). Remove the two fillister head screws (13), and lift out the ignition coil (10). Lift out the two lead clamps (11).

e. Take out the two breaker plate screws (35) and holders (36). Lift the breaker plate (37) out of the base.

f. Remove the cam sleeve felt wick (38) and the cam retaining snap ring (39) from the cam sleeve. Lift out the cam and stop plate (16) and the cam spacer (40).

g. Slip the governor springs (14) off the lugs on the weight carrying plate. Slide the governor weights (12) off the pivots and remove the spring from the weight pins.

h. Take out the four receptacle screws (42), and remove the receptacle (44). Remove the receptacle seal (45) and O-ring (29), and pull the connector (48) from the base.

202. Distributor Cleaning, Inspection, and Repair
(fig. 92)

a. Distributor Cap.

(1) Take out the three cap and cover screws (24) and detach the distributor cap cover from the cap assembly (25). Remove the cap sealing washers (26) from the cap towers. Remove the cap contact spring (47) from the cap connector pin.

(2) Discard the cap if it is cracked, has corroded terminals, or if carbon runners have formed either on the inside or outside surfaces. Inspect the contacts on the inside of the cap. After normal use these contacts become slightly burned on the inside tip. If burning is excessive or uneven, replace the cap. If burning is found on the horizontal face of the contacts, it indicates the rotor is too short and must be replaced. Clean the contacts with carbon tetrachloride, but do not file. Do not clean the carbon contact with solvent. Wipe thoroughly and inspect for cracks and an oil soaked condition. Replace the cap if the carbon contact is not in good condition.

(3) Replace the rubber sealing washers if they are rough, or do not fit properly.

(4) Thoroughly clean the distributor cap cover in a cleaning solvent, and inspect for cracks, or other damage. Place the cover on the base, and inspect to make sure it touches the base on all sides. Replace the cover if it is distorted.

(5) Place the sealing washers on the cap towers and install the cap in the distributor cap cover. Install the three cap and cover screws (24), and tighten them evenly.

b. Rotor. Discard the rotor if it is cracked, has a loose contact strip, or if burning is found on top of the strip. Inspect the contact end. If burning is excessive, replace the rotor. If burning is only slight, clean with carbon tetrachloride. Do not file. Inspect the contact spring, and replace the rotor if the contact does not spring instantly back when the contact button

is pressed against the rotor. Apply the pressure to the contact button to avoid setting the spring. Clean the button so that it makes a good contact on the carbon contact in the center of the cap.

c. Ignition Coil. Never dip-clean, or steam-clean the ignition coil since this causes injury to the windings and insulation, and produces early failure. Clean by wiping with a clean, dry cloth. Inspect the terminals for stripped, or crossed threads. Check coil head for cracks, chipped places, or burned paths that would allow high tension leakage to ground. Note the condition of the coil case, making sure that it is not punctured, or that the seams have not opened up. Test the coil on a coil tester. Replace the coil if it is damaged mechanically, or electrically in any way.

d. Breaker Plate.

(1) Remove the clamp screw (22), plain washers (20) lockwashers (21), and spring clip (19). Take off the primary lead assembly (33). Remove the fillister head screw (34), and lift the contact from the plate. Take out the capacitor mounting screw (17), and lift out the capacitor (18).

(2) Clean all parts with a cloth dampened in a cleaning solvent.

(3) Rub contacts with linen tape that has been dampened in carbon tetrachloride. Dry with clean tape to remove any residue.

(4) Test capacitor for capacity and grounds on a tester. Replace the capacitor if grounded, leaky, or if the capacity is not between 0.18 to 0.21 microfarads. Inspect the lead and replace condenser if the lead or terminal is chafed, partially broken, or damaged.

(5) Inspect the plate for stripped threads, and damaged or worn pivot pin. Replace the plate if any of these conditions are found. Check the primary terminal for grounds with a test light and test probes. Replace the plate if the primary terminal is grounded.

(6) Inspect the breaker contact set (23). If the contacts are a grayish color and are not pitted or burned, they need not be replaced. Replace the breaker contact set if the contacts are rough, burned, or pitted.

(7) Install' the contacts on the plate and turn the distributor lever on the pivot. It must turn easily without binding or looseness. Remove the lever and inspect the pivot. Replace the plate if wear is evident on the pivot, or if the pivot is loose or not perpendicular to the plate. If the pivot is in good condition, install a new breaker

contact set to get the correct pivot fit.

(8) Assemble the contacts, capacitor, and primary lead assembly on the plate. Install the distributor lever spring and the spring clip on the inside of the terminal.

(9) Place one drop of light oil on the distributor lever pivot pin. Operate the lever once or twice and remove the excess oil.

e. Connector.

(1) Clean the primary connector (48) with a cloth dampened in a cleaning solvent.

(2) Inspect for damaged or corroded connector pin, lead, and terminal. Check for grounds with a test light and test probes, and replace the connector if grounded.

(3) Inspect seals and seal seats. Replace them if they are rough or damaged.

f. Cam and Stop Plate. Clean the cam and stop plate in a cleaning solvent and inspect the cam lobes and weight slots for wear. Replace the cam if the lobes are grooved, or if the sides of the weight slots are rough.

g. Governor. Clean the weights (12), springs (14), antirattle spring (15), and spacer (40) in cleaning solvent, and dry thoroughly. Replace the weights if the pivot holes are, worn, or if they are a loose fit on the pivots. Replace -the springs if they are bent or distorted.

h. Base Assembly and Drive Shaft.

(1) *Cleaning.* Wipe the drive shaft (41) and inside of the base assembly (4) as clean as possible with cloth dampened with cleaning solvent. Do not soak. Dry immediately with clean, dry compressed air.

(2) *Inspection.*

(a) Inspect the base assembly for cracks or other damage. Make sure the groove for the cap O-ring is smooth and clean. Remove the pipe plug (6) and take out the felt wick (5). Inspect the wick for damage and soak in medium engine oil. Fill the wick cavity with light high-temperature grease, and insert the wick. Wipe off the excess grease. Coat plug with Permatex No. 2, or equivalent, and install the plug.

(b) Clamp a dial indicator (par. 179) on the base assembly with the plunger resting against the side of

the shaft. With a spring scale apply a 5 pound pull in line with the plunger. Install new drive shaft bearings (51) if the side play is more than 0.005 inch.

(c) Clamp a dial indicator on the base with its plunger against the end of the shaft. Move the shaft to its two extreme positions and read the total end play. End play can also be measured with a flat feeler gage inserted between the drive coupling (2) and lower drive shaft thrust washer (3). If the end play is less than 0.003 inch, tap the lower end of the shaft to loosen. If the end play is more than 0.010 inch, remove the coupling and install additional thrust washers between the base assembly and coupling.

(3) Repair.

(a) Remove the coupling rivet (1) and take the drive Coupling (2) off the shaft. Take off the lower drive shaft thrust washer (3), and remove the burr from the rivet hole in the shaft. Pull the shaft out of the base assembly and remove the upper drive shaft thrust washer (8), shaft seal (8), and seal washer (7). Measure the inside diameter of the bearing; replace the bearings if this diameter is greater than 0.505 inch. Drive out the old bearings with an arbor press (par.179) or bolt that rests on the bearing without gouging the bearing bore.

(b) Install the new bearings of correct size to give proper bearing diameter (0.4995 0.500), and press the bearings into place with an arbor press. Install the lower bearing flush with the bottom of the base; install the upper bearing flush with the face of the bearing bore. Continue the oil hole in the base through the :bearing, using a drill of the same diameter. Remove all burrs from the inside of the bearing. Do not mar the bearing.

(c) Soak the bearings in engine oil and drain off the excess oil. Do not get oil into the upper part of the base.

(d) Install the seal washer (7) and shaft seal (8) in the top of the bearing bore.

(e) Grease the upper drive shaft thrust washer (9) and install it on the shaft. Place the shaft in the bearings and install the lower drive shaft thrust washer (3) and collar. Drill the rivet hole in the shaft to

correspond with the hole in the collar. Install the coupling rivet (1) and swage it so both ends are riveted over and the rivet spreads to fill the rivet hole.

(f) Check the end and side play of the shaft.

203. Distributor Reassembly (fig. 92)

a. Place a small amount of grease on the weight pivot pins, weight pivot holes, cam yoke slats, and weight spring lugs and pins. Place the governor weights (12) in position and install the governor springs (14). Make sure the springs are properly seated on the weight pins and carrying plate brackets.

b. Apply a film of medium engine oil to the upper end of the drive shaft. Place the cam and stop plate (16) in position over the shaft and weights. Place the rotor (32) on the cam and check the relation between the rotor and the cam and stop plate. If not correct, lift the cam and turn 180°.Remove the rotor. Install the snap ring (39) and felt wick (38). Add 5 to 10 drops of medium engine oil to the wick.

c. Place the breaker plate (37), with breaker contact set (23), in the base and turn it so the locating lug fits into the slot. Install the breaker plate screws (35) and holders (36).

d. Place the connector (48), with receptacle (44), O-ring (29), and receptacle seal (45) into position on the base assembly. Make the connector assembly fit tightly. Install the receptacle screws (42).

e. Place the ignition coil (10) in position in the base assembly and arrange the leads so they will reach the coil terminals without kinks or cramping. Install the coil fillister head screws (13) and lead clamps (11).

f. Connect the primary lead assembly (33) to the coil terminal under the cover plug. Connect the connector lead to the second coil terminal.

g. Adjust the contact gap as instructed in paragraph 95.

204. Distributor Final Assembly (fig. 92)

a. Place the rotor (32) on the cam and press down firmly. Turn the shaft and arrange the leads so as to not interfere with the rotor.

b. Install the O-ring (31) in the groove in the base assembly. Install the cap contact spring (47) on the cap connector pin. Place the distributor cap cover (30) and cap assembly (25) on the base taking care that the spring enters the coil high

tension terminal, and that the O-ring is in its proper place. Make sure the leads are not closed to the secondary terminal, or do not extend beyond the coil so that the leads are pinched between the cover and the base assembly.

c. Coat all base plugs and pipe connectors with Permatex No. 2 and install them.

d. Connect an air hose to one of the ventilating air holes in the base and plug the other holes. Apply 6 pounds of air pressure and submerge the unit in water. If bubbles appear at any point except around the drive shaft, correct the cause of the leak.

e. Time the distributor according to paragraph 98.

f. Install the distributor as instructed in paragraph 97*b*.

Section X. GOVERNOR

205. Description

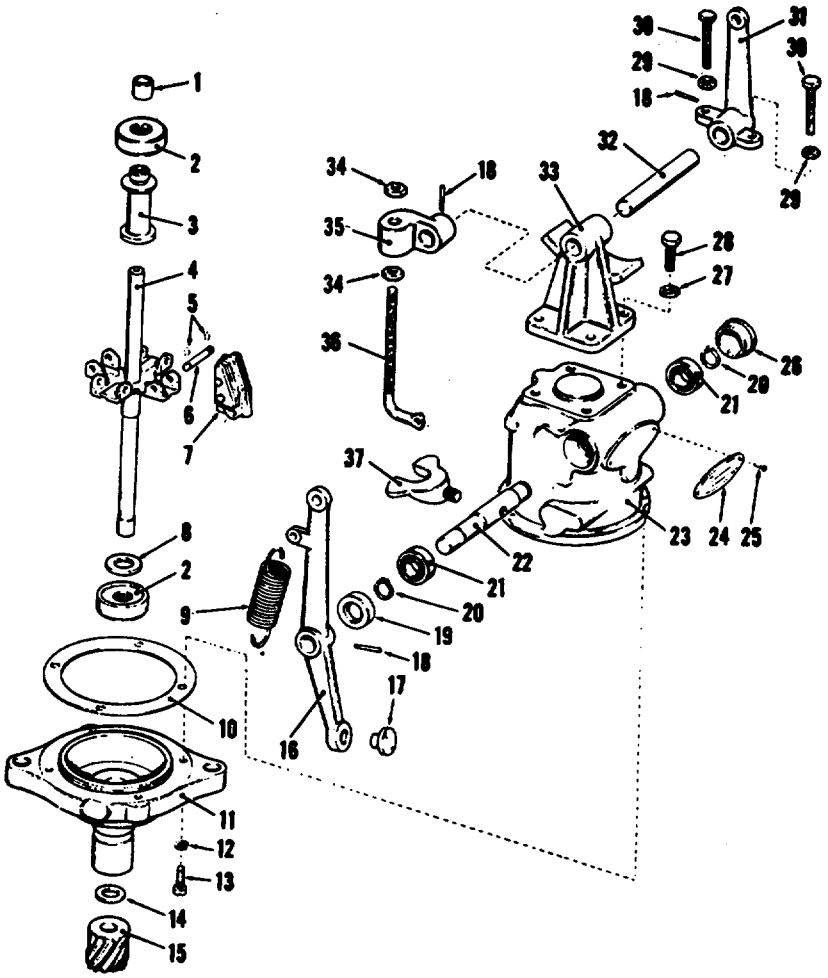
A small heavy-duty governor mounted on the crankcase top cover controls the engine speed through the gasoline carburetor throttle. Incorrect governor adjustments, carburetor settings, or binding governor linkage may cause a surging of engine speed known as "hunting." Should this condition exist, check the governor levers and rods for binding. Refer to paragraph 110. The slightest drag on the linkage will cause the governor to over travel as it opens and closes the carburetor butterfly valves to maintain a constant speed. Lubricate the control rods frequently to prevent binding.

206. Governor Disassembly

(fig. 93)

a. Remove the governor (par. 110*a*).

b. Unhook the governor spring (9). Unscrew the top hex nut (34) and remove the level (36). Remove the four oval fillister head screws (13) and lockwashers (12) and remove the governor mechanism with the gasket (10). Remove the four cap screws (28) with lockwashers (27) and lift off the speed change bracket (33) with its attached parts. The nameplate (24) and escutcheon pins (25) need not be removed. Pull the gear (15) and remove the thrust washer (14). Slide the base and bushing assembly (11) off the shaft. Pull the lower thrust bearing (2) and remove the spacing washer (8). Pull the upper thrust bearing (2). Remove the hair pin clips (5), weight pins (6), and weight assemblies (7). Lift the thrust sleeve (3) from the spider and shaft assembly (4). Drive out the taper pin (18) from the speed change lever (31)



1	Oilite bearing	19	Oil seal
2	Thrust bearing	20	Snap ring
3	Thrust sleeve	21	Ball bearing
4	Spider and shaft assembly	22	Rocker shaft
5	Hair pin clip	23	Governor body
6	Weight pin	24	Nameplate
7	Weight assembly	25	Escutcheon pin
8	Spacing washer	26	Plug
9	Governor spring	27	Lockwasher (4 req)
10	Gasket	28	Cap screw (4 req)
11	Base and bushing assembly	29	Nut, hex, No. 10–24 (2 req)
12	Lockwasher, No. 10 (4 req)	30	Screw
13	Screw, oval, fil hd, No. 10–24 x ⅛ (4 req)	31	Speed change lever
		32	Shaft
14	Thrust washer	33	Speed change brackets
15	Gear	34	Nut, hex, 5/16–24 (4 req)
16	Throttle lever	35	Bracket
17	Button	36	Lever
18	Taper pin (3 req)	37	Yoke

Figure 93. Exploded view of governor.

and shaft (32). Slide off the lever. Drive out the taper pin (18) from the bracket (35) and remove the bracket and shaft. Drive out the taper pin (18) from the throttle lever (16) and pull off the lever. Reach inside the governor body (23) and unscrew the yoke (37). Remove the plug (26) and oil seal (19). Remove the two snap rings (20) and withdraw the ball bearings (21). Slide the rocker shaft (22) from the governor body. Do not tamper with the screws (30) and hex nuts (29). It is not necessary to remove the button (17).

207. Governor Cleaning and Inspection

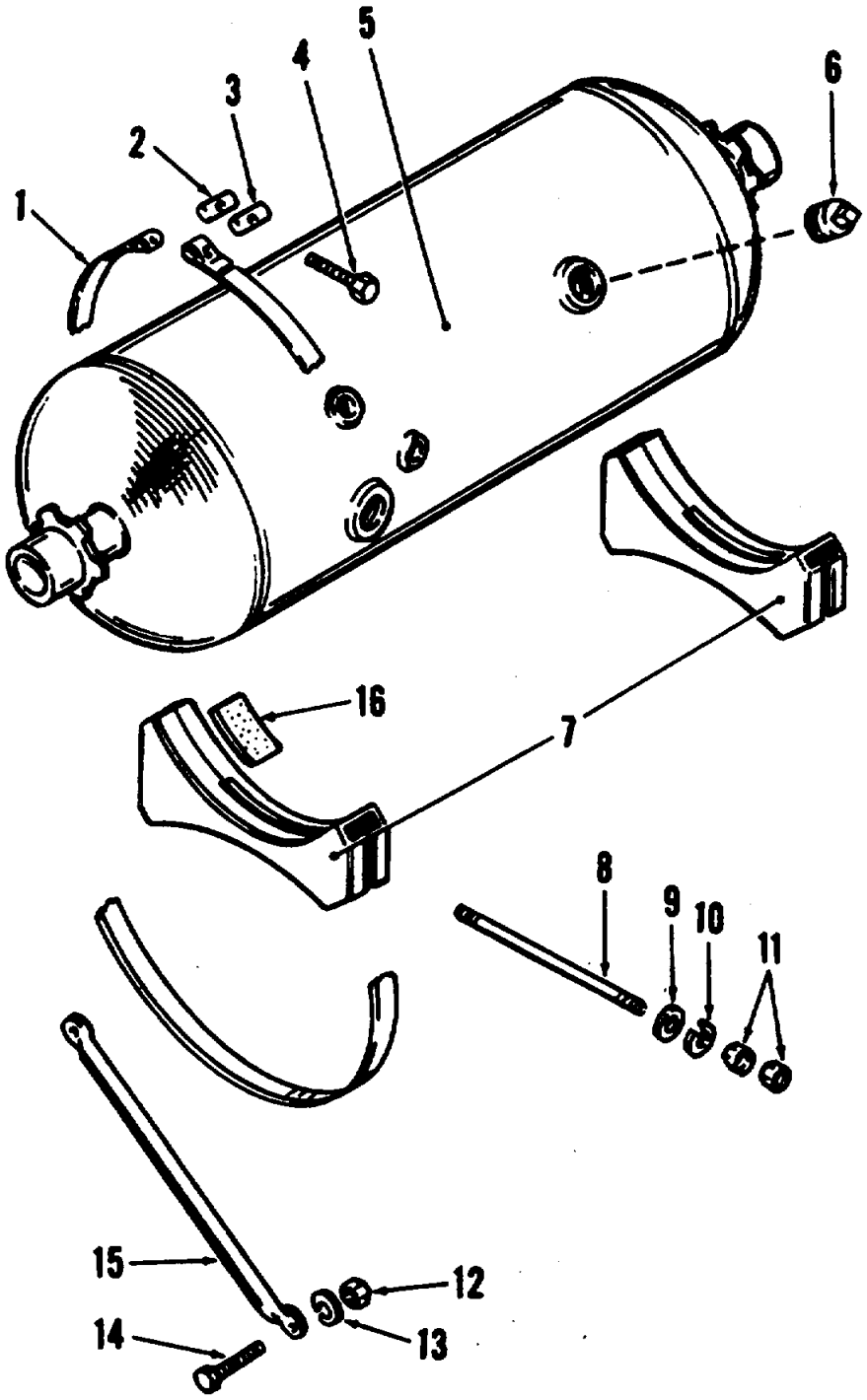
(fig. 93)

Inspect the oilite bearing (1) in the top of the governor body. If any wear is apparent, replace the bearing. Soak the new bearing in engine oil before installation. Inspect the pin holes in the spider and shaft assembly (4) and weight assemblies (7). If the holes do not look round, replace both these assemblies. Replace the weight pins (6) if they show any wear. Replace the thrust bearings (2) if they show any wear. Inspect the gear (15) for cracks and broken or chipped teeth. Replace a damaged gear. Check the governor spring (9) for cracks. Replace a cracked spring. If the oil seal (19) shows any sign of having leaked, replace it. Inspect the ball bearings (21). If they are loose or missing any steel balls, replace a defective bearing. Replace the gasket (10) and taper pins (18).

208. Governor Reassembly

(fig. 93)

a. Insert the rocker shaft (22) into the governor body (23). Press the two ball bearings (21) over the ends of the shaft and seat them in the governor body. Install the two snap rings (20). Install the plug (26) in the recess in the governor body and slide the oil seal (19) over the shaft extension. Screw the yoke (37) into the threaded hole in the rocker shaft, inside the governor body. Slide the throttle lever (16) over the shaft extension and drive in the taper pin (18). Slide the bracket (35) over the shaft (32) and drive in the taper pin (18). Insert the shaft into the speed change bracket (33). Slide the speed change lever (31) over the shaft and drive in the taper pin (18). Place the thrust sleeve (3) over the spider and shaft assembly (4). Install the weight assemblies (7), weight pins (6), and hair pin clips (5). Install the upper thrust bearing (2) over the shaft and thrust sleeve. Install the spacing washer (8) and lower thrust bearing (2) on the shaft below the weight assembly brackets. Slide the base and bushing assembly (11) on the shaft. Install the thrust washer (14) and



1 Strap (2 req)
2 Nut, special (2 req)
3 Washer, special (2 req)
4 Cap screw, special (2 req)
5 Air receiver
6 Pipe plug
7 Support (2 req)
8 Rod (2 req)
9 Washer, plain, ⅜ (8 req)
10 Lockwasher, ⅜ (4 req)
11 Nut, hex, ⅜–16 (8 req)
12 Nut, hex, 7/16 (4 req)
13 Lockwasher, 7/16 (4 req)
14 Bolt, hex hd, 7/16–14 x 1 (4 req)
15 Brace (2 req)
16 Packing (8 req)

Figure 94. Exploded view of air receiver.

press on the gear (15). Place the speed change bracket on the governor body and install the four cap screws (28) and lockwashers (27). Place the gasket (10) on the base and bushing assembly flange and insert the governor mechanism into the governor body. Install the four screws (13) and lockwashers (12). Insert the lever (36) through the hole in the auxiliary adjusting screw bracket and install the hex nut (34). Hook the governor spring (9) through the lever and throttle lever.

b. Install the governor (par. 110*b*).

c. Adjust the governor (par. 110*c*).

Section XI. AIR RECEIVER

209. Air Receiver Removal

a. Remove hose reel air hoses (par. 112*a*.), hose reel and service valves (par. 113*a*), the receiver service valves and piping (par. 114*a*), drain cocks and piping (par. 115*a*), and aftercooler to receiver connection (par. 116*a*).

b. Remove the cap screws (4, fig. 94), special washers (3) and special nuts (2) to release the straps (1) which encircle the air receiver (5) and fuel tank.

c. Remove eight hex nuts (11), four lockwashers (10), eight plain washers (9) and two rods (8). Lift off the air receiver (5). Remove the pipe plug (6) as desired.

d. Remove four hex head bolts (14), hex nuts (12) and lockwasher (13) to detach the braces (15) from the supports (7) and rear engine support (4, fig. 102). Remove the support (7, fig. 94).

210. Air Receiver Cleaning and Inspection
(fig. 94)

a. Wipe off all parts with a cloth to remove accumulation of dust, dirt or lubricants. Use a solvent if necessary.

b. Inspect the air receiver (5) for signs of corrosion, particularly around the fittings welded into the air receiver.

c. Examine the supports (7), braces (15) and straps (1) for mechanical damage and corrosion. Replace damaged nuts, washers and pipe plugs.

d. Inspect the packing (16) for deterioration and replace if defective. Cement new packing to the supports (7) with Pliobond adhesive or its equivalent.

211. Air Receiver Repair

a. It is possible to repair by welding minor leaks in the air receiver which are caused by corrosion. Do not attempt to repair serious defects; replace the air receiver in such cases.

b. Straighten any bends or twists in the supports, braces or straps. Replace badly damaged parts.

212. Air Receiver Installation

a. Place the supports (7, fig. 94) on the fuel tank. Fasten the braces (15) to the supports (7) and the rear engine support (4, fig. 102) with four hex nuts (12, fig. 94), lockwashers (13) and hex head bolts (14).

b. Place the air receiver (5) on the supports (7) and install with two rods (8), eight plain washers (9), four lockwashers (10) and eight hex nuts (11).

c. Guide the straps (1) around the fuel tank and air receiver (5) and secure with two special nuts (2), special washers (3) and special cap screws (4). Be sure the air receiver seats properly on the supports.

d. Screw in the pipe plug (6) tightly.

e. Install the aftercooler to receiver connection (par. 116*c*) drain cocks and piping (par. 115*c*), receiver service valves and piping (par. 114*e*), hose reel and service valves (par. 113*e*), and hose reel air hose (par. 112*c*).

Section XII. ENGINE-COMPRESSOR

213. Description

a. The engine-compressor is a combination four-piston engine and four-piston compressor which is housed in a V-8 type crankcase and uses a single crankshaft mounted in five main bearings. The engine and compressor sections form separate banks on either side of the crankcase.

b. The engine-compressor is mounted on a front and rear engine support which are attached to the H-type frame supporting the entire air compressor. A two-section crankcase coveris mounted on the center of the crankcase. A lifting bail and the tachometer drive are installed in the cover.

c. Two oil pans are employed on the underside of the crankcase. The lower oil pan holds the oil filters. The upper oil pan attaches directly to the crankcase; oil seals are employed where the crankshaft extends from the crankcase and upper oil pan.

d. oil pump is mounted on the front bearing cap. Oil is drawn from the sump through an oil intake screen, and is

discharged through two tube assemblies. One tube leads to the oil filters; the other tube leads to the crankcase when oil is delivered to the front camshaft bearing support and hollow camshaft. The main bearings are lubricated with oil through passages to the camshaft bearings. The connecting rod bearings are connected by oil passages in the crankshaft to the main bearings. The accessory drive is lubricated by means of oil flow through a tube assembly from the tappet chamber. Oil is supplied intermittently to the engine cylinder head through a tube assembly from the rear camshaft bearing support.

e. The gear cover assembly encloses the front of the crank case. The accessory drive components are mounted to the gear cover assembly.

214. Engine-Compressor Removal

a. Removal from Truck. Remove the hood top door (6, fig. 61). Remove the nuts, vibration dampeners, and washers that fasten the engine-compressor to the mounting springs on the truck frame. Refer to paragraph 231. Insert a lifting hook in the lifting bail (fig. 95) and lift the engine-compressor from the truck frame. Remove the housing (par. 128) before proceeding with engine-compressor disassembly.

b. Removal from Frame (fig. 96). Remove the radiator and fan (par. 88a). Remove the cotter pins (8) and

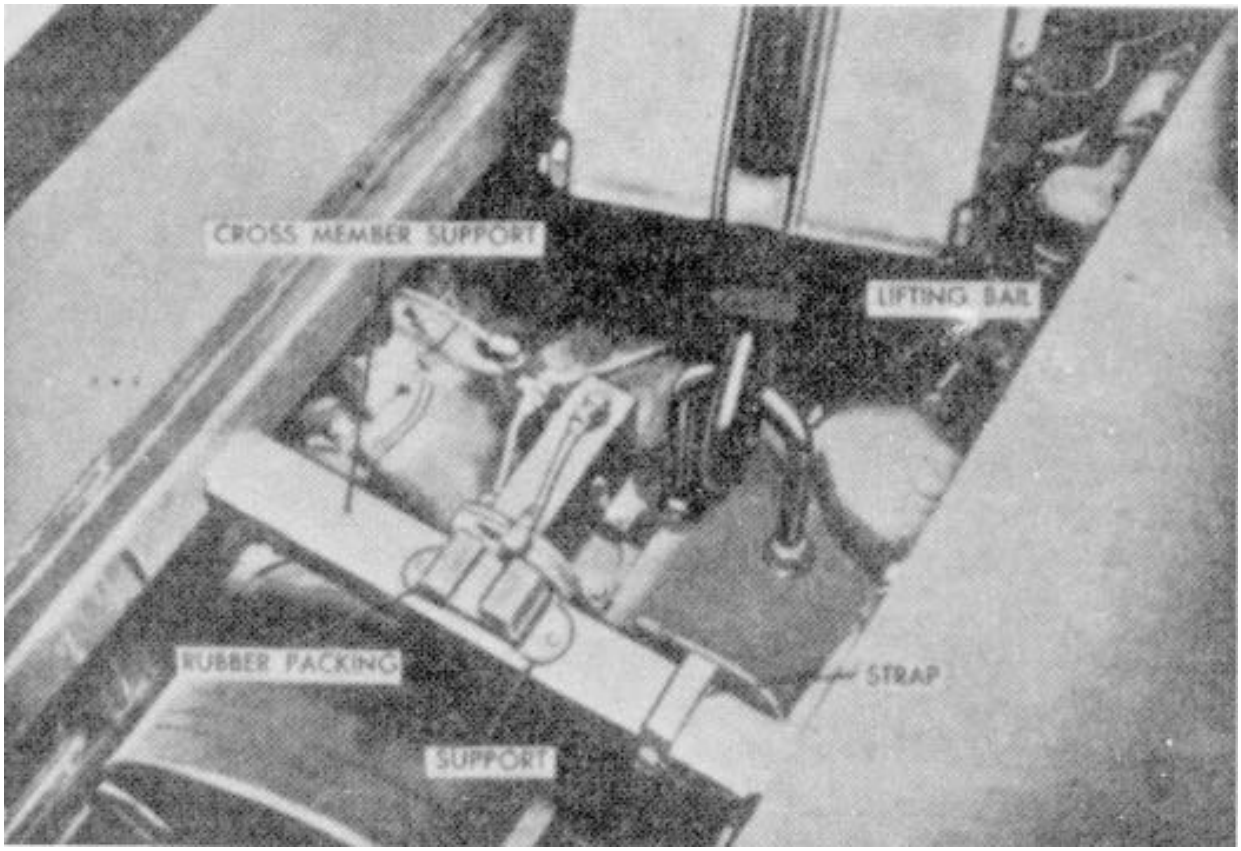


Figure 95. Lifting the engine-compressor.

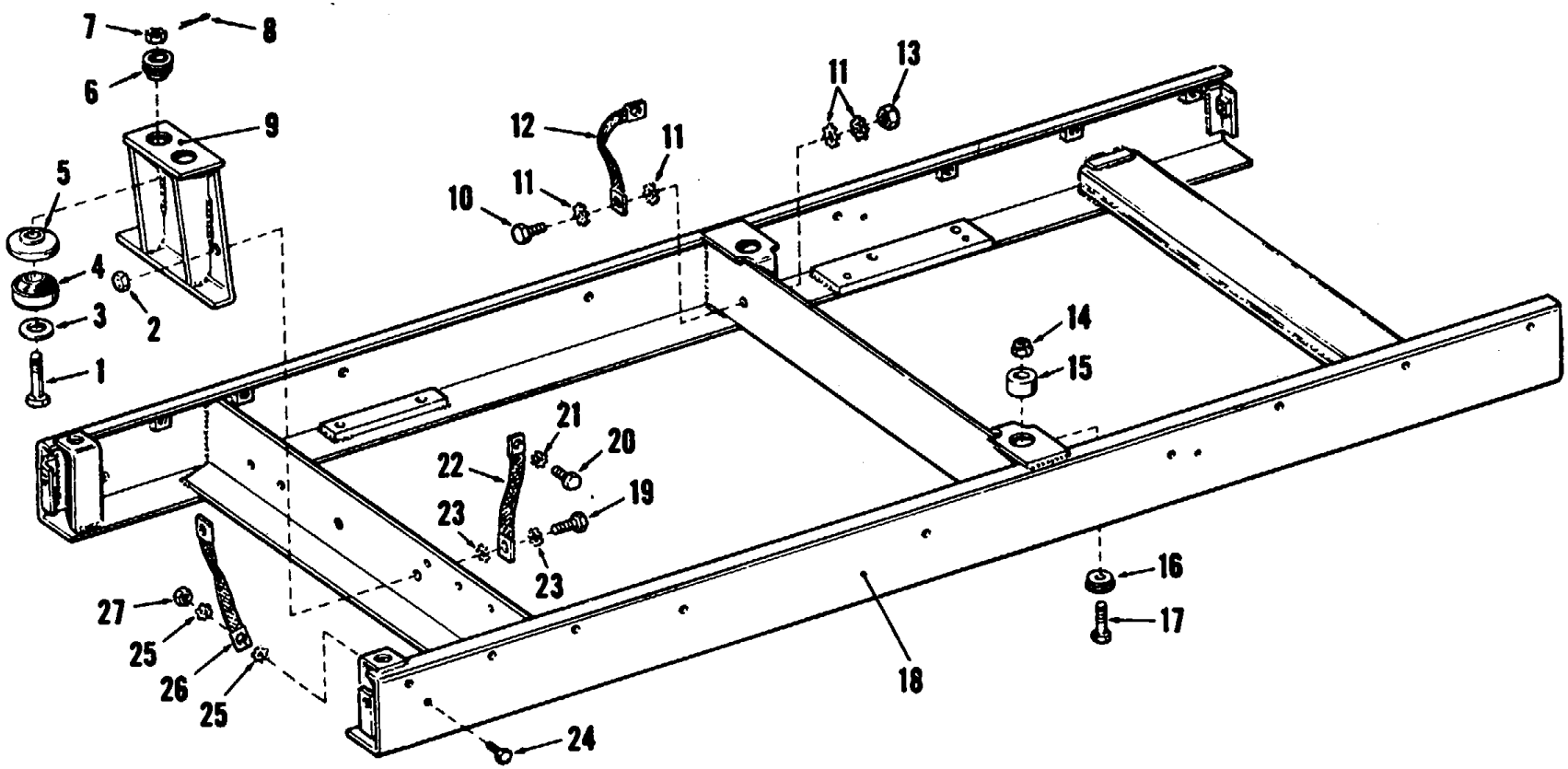


Figure 96. Engine-compressor frame and mounting.

1 Cap screw (2 req)
2 Nut (2 req)
3 Washer, plain, % (2 req)
4 Vibration dampener
5 Retainer
6 Rebound unit
7 Nut (2 req)
8 Pin, cotter, 1/8 x 1 1/4 (2 req)
9 Front engine, support
10 Cap screw (4 req)
11 Lockwasher (8 req)
12 Bond strap
13 Nut (4 req)
14 Special nut
15 Spacer
16 Spacer
17 Cap screw 5/8-18 x 3 (2 req)
18 Frame
19 Cap screw (2 req)
20 Cap screw
21 Lockwasher (2 req)
22 Bond strap
23 Lockwasher (2 req)
24 Cap screw (2 req)
25 Lockwasher (4 req)
26 Bond strap
27 Nut (2 req)

Figure 96. -- Continued.

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unscrew the nuts (7). Withdraw the cap screws (1) with the retainers (5), vibration dampers (4) and washers (3). Unscrew the special nuts (14). Withdraw the cap screws (17) with the spacers (16). Lift the engine-compressor from the frame (18) and lower it to suitable supports placed under the rear engine support and front end of the upper oil pan. Do not rest the equipment on the oil pan. Lift off the rebound units (6) and spacers (15).

c. Inspection of Frame (fig. 96). While the engine-compressor unit is out of the frame (18), inspect the bond straps (12, 26, and 22) for breaks or frayed surfaces. Inspect the bond strap bolts and nuts for tightness and check the lockwashers for breaks. Inspect the front engine support (9) for cracks. Replace any parts that are damaged in any way. Do not re-use old cotter pins.

215. Engine-Compressor Installation

a. Installation on Frame (fig. 96). Place the rebound units (6) spacers (15) on the frame (18), and lower the engine-compressor to the frame over the spacers and rebound units. Put the spacers (16) over the cap screws (17) and insert them through the frame and the rear support. Screw on and tighten the special nuts (14). Put the washers (3), vibration dampers (4), and retainers (5) over the cap screws (1). Insert the cap screws through the front engine support (9) and the upper oil pan. Screw on and tighten the nuts (7) and install the cotter pins (8).

b. Installation on Truck. To install the engine-compressor on the truck frame, lift the unit and place it on the truck frame spring mountings. Refer to paragraph 233 for correct spring mounting assembly. Install the hood top door.

216. Crankcase Covers, Lifting Bail, and Tachometer Drive

a. Removal (fig. 97). Before taking off the crankcase covers, the following items must be removed: governor (par. 110*a*), distributor (par. 97*a*), water pump (par. 193), intake manifold (par. 120*a*), carburetor (par. 78*a*),

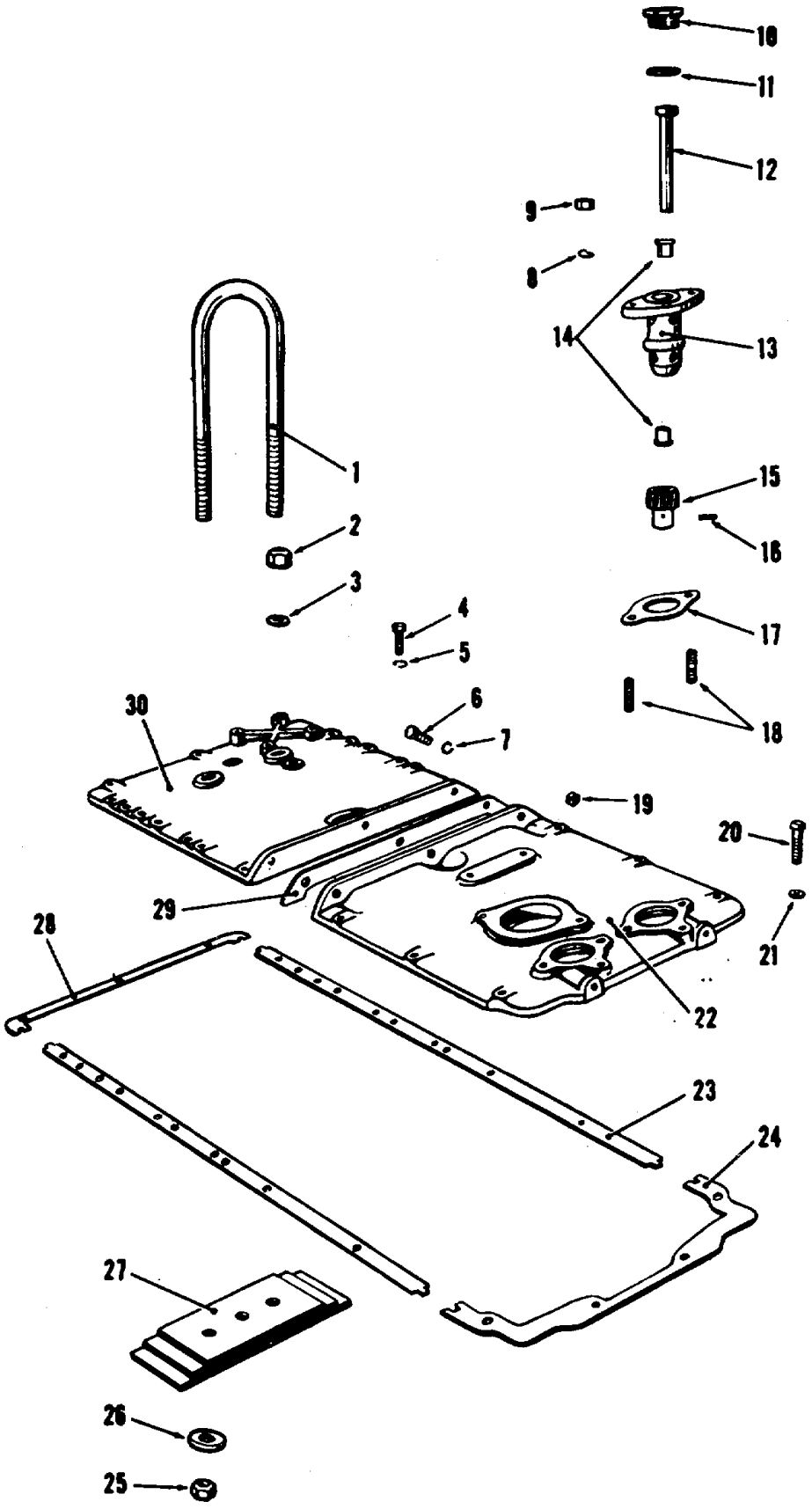

Figure 97. Exploded view of Crankcase covers, lifting bail, and tachometer drive.

1 Lifting bail
2 Nut, elastic stop, 3/4-16 (2 req).
3 Copper washer
4 Bolt, hex hd, 3/8-16 x 1 1/4 (22 req)
5 Lockwasher, 3/8 (22 req)
6 Cap screw, 3/8-24 x 1 1/4 (3 req)
7 Lockwasher, 3/8 (3 req)
8 Lockwasher, 3/8 (2 req)
9 Nut, hex, 3/8-24 (2 req)
10 Plug nut
11 Gasket
12 Shaft
13 Body
14 Bushing
15 Gear
16 Roll pin
17 Gasket
18 Stud
19 Nut, hex, 3/8-24 (3 req)
20 Bolt, hex hd, 5/16-18 x 1 1/2
21 Copper washer
22 Front half cover
23 Side gasket
24 Front gasket
25 Nut, hex, 3/4-16 (2 req)
26 Plain washer, 3/4 (2 req)
27 Leaf spring
28 Rear gasket
29 Gasket
30 Rear half cover

Figure 97. -- Continued.

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unloader pilot (par. 108*a*), and the slowdown assembly (par. 109*a*). Remove the two nuts (9) and lockwashers (8) that hold the tachometer body (13) to the front half cover (22). Lift out the tachometer drive assembly, comprised of the plug nut (10), gasket (11), shaft (12), body, bushings (14), gear (15), and roll pin (16). Do not disassemble the tachometer drive assembly. Remove the gasket (17). Remove the two hex head bolts (20) and copper washers (21). Remove the 22 hex head bolts (4) and lockwashers (5) that fasten the front half cover and the rear half cover (30) to the crankcase. Remove the three cap screws (6), lockwashers (7), and nuts (19) that hold the covers together. Remove the gasket (29). Lift off both covers. Carefully remove the two side gaskets (23), front gasket (24) and rear gasket (28). The four studs (18) need not be removed, if they are not bent and their threads intact. Unscrew the two hex nuts (25), and remove the two plain washers (26), and the leaf spring (27) from the underside of the rear half cover. Lift off the lifting bail (1), with the elastic stop nuts (2), and copper washers (3) from the rear half cover.

b. Inspection. Inspect all parts for damage. Replace cracked covers. Replace the complete tachometer drive assembly if the tachometer drive gear shows any sign of wear. Replace all gaskets.

c. Installation. (fig. 97). Put the copper washers (3) over the threaded ends of the lifting bail (1) and under the elastic stop nuts (2). Insert the lifting bail with the washers into the two holes in the rear half cover (80). Put the leaf

spring (27) over the threaded ends of the lifting bail and install the plain washers (26) and nuts (25). Position the rear half cover and the front half cover (22) together, with the gasket (29) between them. Insert the cap screws (6) with lockwashers (7) through the two cover flanges and install the nuts (19). Use care in alining the cover halves. Place the gaskets (23, 24, and 28) on the crankcase. Set the covers on the gaskets and aline all the holes. Fasten the covers to the crankcase with the hex head bolts (4) and lockwashers (5). Install the hex head bolts (20) and lockwashers (21) in the front of the front half cover. Place the gasket (17) over the studs (18) in the top of the front half cover. Insert the complete tachometer drive assembly over the studs and on the gasket. Put the lockwashers (8) over the studs and install the nuts (9). Reinstall the slowdown assembly (par. 109*e*), unloader pilot (par. 108*e*), carburetor (par. 78b), intake manifold (par. 120*c*), water pump (par. 195), distributor (par. 97*b*), and governor (par. 110*b*). Adjust the governor (par. 110*c*), the carburetor (par. 77*b*) and/or unloader pilot (par. 107) if necessary.

217. Oil Pans

a. Removal (fig. 98).

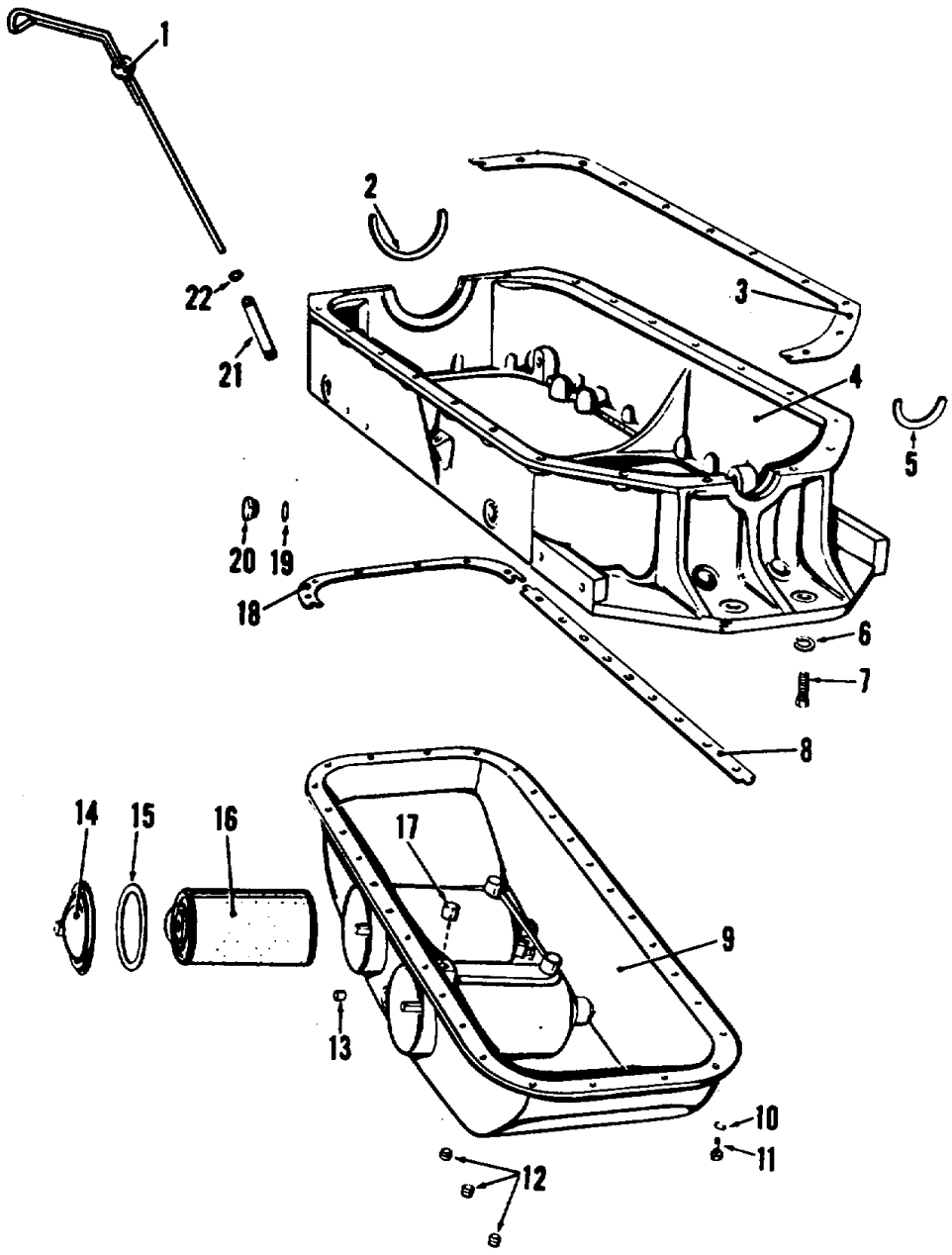
(1) Remove the engine-compressor (par. 214).

(2) Unscrew three pipe plugs (12) from the lower oil pan (9). Drain out all the oil (fig. 16). Remove the oil filters (16) as instructed in paragraph 42*i* (1).

(3) Pull out the dipstick (1), remove the O-ring (22), and screw out the pipe extention (21). Unscrew the 30 cap screws (11) and lockwashers (10). Carefully drop the lower oil pan (9) and disconnect the oil line to the filter cases. Remove the pipe plug (13) and oil filter seal (17). Carefully remove the end gaskets (18) and the side gaskets (8).

(4) Insert a lifting hook in the lifting bail (fig. 95) and tighten the hoist cables to support the engine-compressor during the time the upper oil pan is removed. Unscrew the 20 cap screws (7) and lockwashers (6). Carefully lower the upper oil pan (4) and remove it from the engine-compressor. Use care, in removing the two oil pan gaskets (3). Lift out the rear oil seal (2) and the front oil seal (5). It is not necessary to remove the special nuts (20), or the gasket (19).

b. Inspection and Cleaning. Inspect both oil pans for breaks, or cracks. Replace a damaged oil pan. Replace all gaskets. Refer to paragraph 42*i* (2) for the oil filter maintenance. Inspect the front and rear oil seals. Replace



1	Dipstick	12	Pipe plug, ⅜ (3 req)
2	Rear oil seal	13	Pipe plug, ½ (2 req)
3	Oil pan gasket	14	Oil filter cover
4	Upper oil pan	15	Gasket
5	Front oil seal	16	Filter element
6	Lockwasher, ⅜ (20 req)	17	Oil filter seal
7	Cap screw, ⅜–16 x 1¼ (20 req)	18	End gasket
8	Sidegasket	19	Gasket
9	Lower oil pan	20	Special nut
10	Lockwasher, 5/16 (30 req)	21	Pipe extension
11	Cap screw, 5/16–18 x ¾ (30 req)	22	O-ring

Figure 98. Exploded view of oil pans.

the seals if they are cracked, visibly worn, or otherwise damaged. Replace a bent, or twisted dipstick.

c. Installation.

(1) Place the rear oil seal (2, fig. 98) and the front oil seal (5) in the recesses in the ends of the upper oil pan (4). Fasten the two oil pan gaskets (3) to the upper oil pan with shellac. See that all the holes in the gaskets line up with the holes in the upper oil pan. Support the upper oil pan in position under the crankcase and install and tighten the 20 cap screws (7) with their lockwashers (6). Screw in the pipe extension (21). Install the O-ring (22) and insert the dipstick (1). Fasten the end gaskets (18) and the side gaskets (8) to the oil pan (9) with shellac. See that the holes in the gaskets line up with the holes in the oil pan. Support the oil pan in position, connect the oil line to the filter cases, and install and tighten the 30 cap screws (11) with their lockwashers (10).

(2) Install the oil filters (16) as instructed in paragraph 42i(3). Install the pipe plugs (12 and 13) and refill with oil (fig. 16).

(3) Install the engine-compressor (par. 215).

218. Oil Intake Screen

a. Removal.

(1) Remove the lower oil pan as instructed in paragraph 217a.

(2) Pull out the long cotter pin, permitting the intake screen to drop down out of the suction line connection (fig. 99).

b. Cleaning and Inspection.

(1) Wash the intake screen in cleaning solvent.

(2) Clean the inside of the suction line connection with a stiff brush and cleaning solvent.

(3) Inspect the intake screen to make certain that it is not torn.

c. Installation.

(1) Insert the intake screen up into the suction line connection. Aline the holes in the screen tabs with those in the lower edge of the connection and insert the cotter pin (fig. 99).

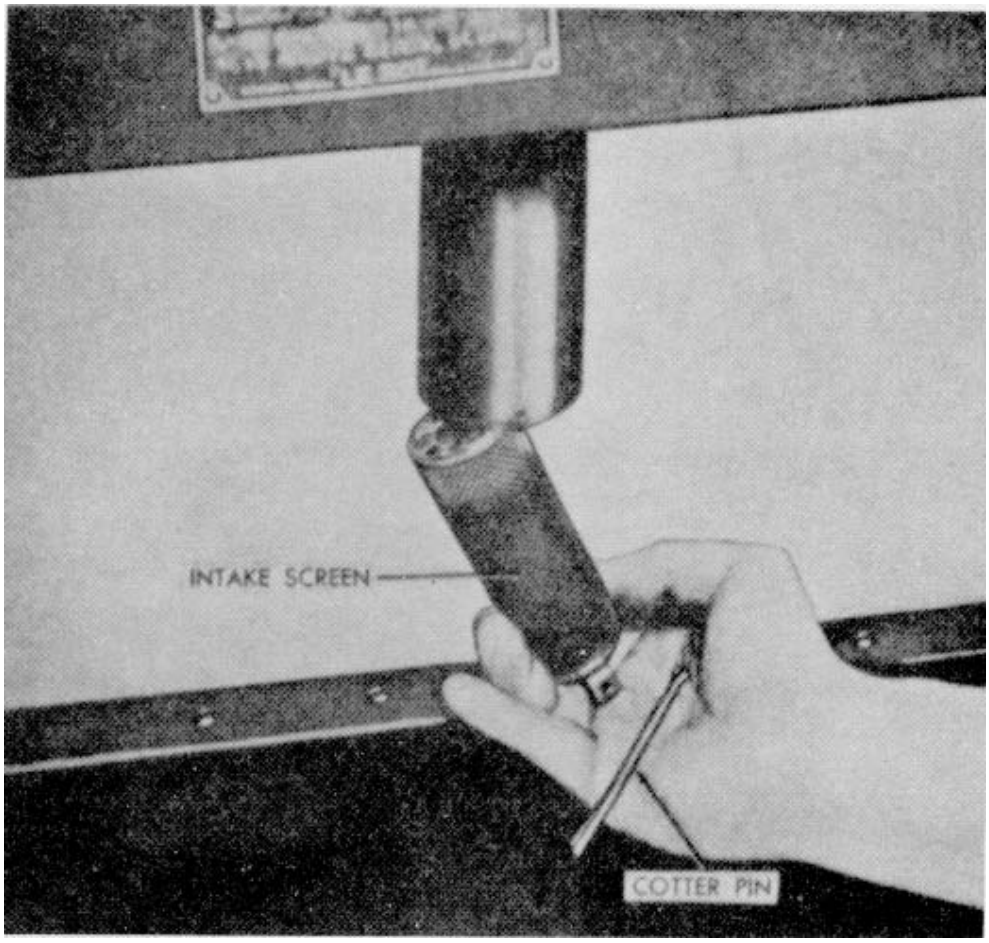


Figure 99. Removing the oil intake screen.

(2) Install the lower oil pan (par. 217*c*) and fill the lubricating system with oil (fig. 16).

219. Oil Pump and Oil Line

a. Removal (fig. 100).

(1) Drain and remove the lower oil pan (par. 217*a*).

(2) Pull out the cotter pin (27) and remove the oil intake screen (28) from the suction line connection (4).

(3) Remove the two hex head bolts (1) and lockwashers (2) that fasten the suction line connection (4) to the pump cover. Then remove the two hex head bolts (1), lockwashers (2) and plain washers (3) that attach the connection to the mounting boss within the upper oil pan and lift out the connection. Discard the connection gasket (6).

(4) Disconnect the connector (16) and tube assembly (17) from the pump body and crankcase oil passage.

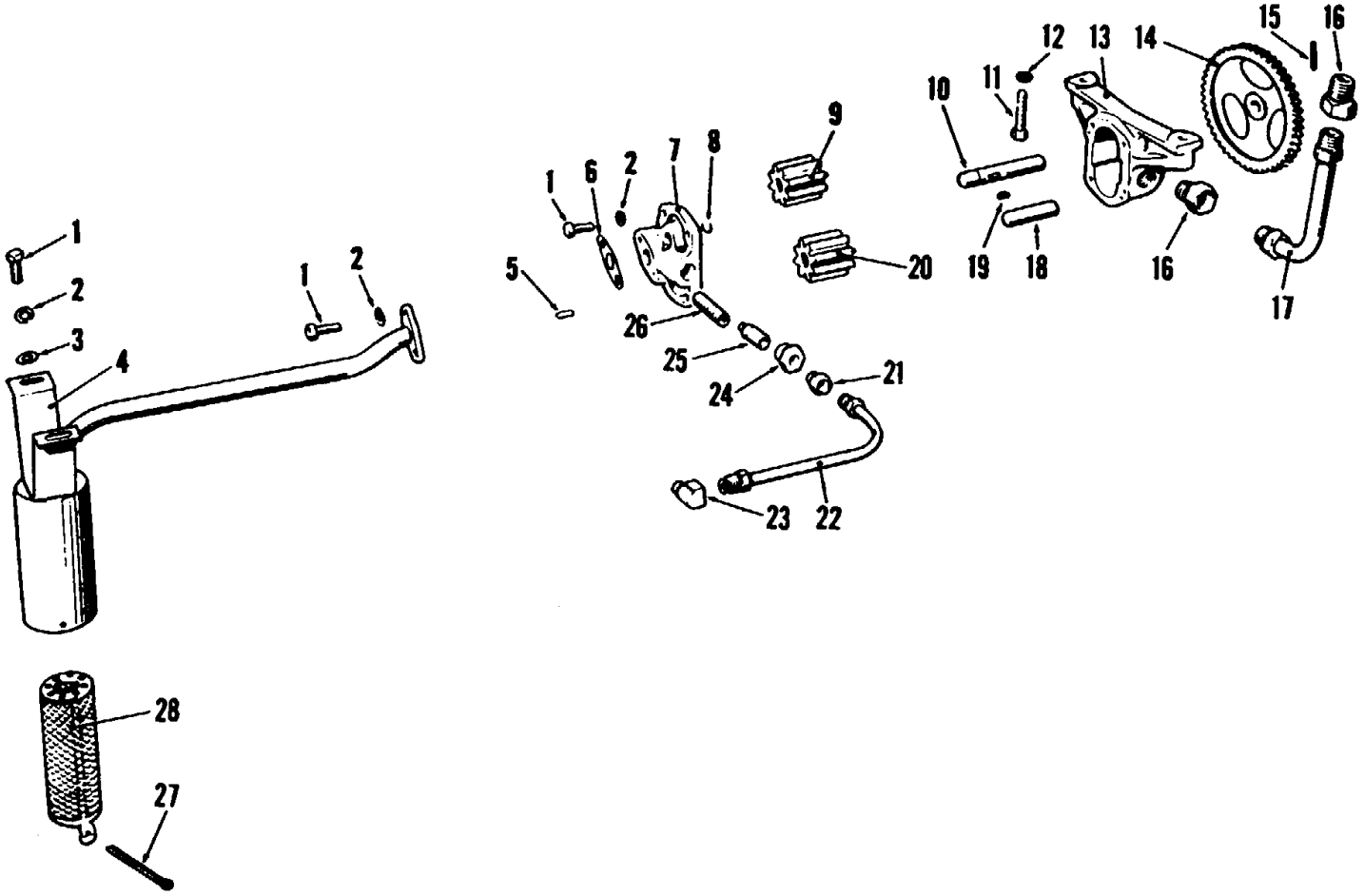


Figure 100. Exploded view of oil pump and oil lines.

1 Bolt, hex hd, 5/16-18 x 7 (8 req)
2 Lockwasher, 5/16 (8 req)
3 Plain washer, 5/16 (2 req)
4 Suction line connection
5 Dowel pin (2 req)
6 Connection gasket
7 Oil pump cover
8 Snap ring
9 Pump gear
10 Drive shaft
11 Bolt, hex hd, 7/16-14 x 3/4 (2 req)
12 Lockwasher, 7/16 (2 req)
13 Oil pump body
12 Lockwasher, 7/16 (2 req)
13 Oil pump body
14 Drive gear
16 Taper pin, No. 2 x 1 L
16 Connector, 5/8 x 1/2 MPT (2 req)
17 Tube assembly
18 Idler shaft
19 Woodruff key, No. 5
20 Idler gear
21 Connector, 5/16 x 1/8 MPT
22 Tube assembly
23 Elbow, 90'
24 Reducing bushing, 3/8 x 1/8
25 Pressure relief plunger
26 Pressure relief spring
27 Cotter pin, 1/8 x 3
28 Intake screen

Figure 100. -- Continued.

(5) Disconnect the tube assembly (22) from the elbow (23) and the connector (21). The connector screws into a reducing bushing (24) and the elbow screws into the oil pan filter connection.

(6) Remove the two hex head bolts (11) and lockwashers (12) that attach the oil pump assembly to its mounting boss, and carefully lower the pump down out of the upper oil pan.

b. Oil Pump Disassembly (fig. 100).

(1) Unscrew the reducing bushing (24) from the oil pump cover (7) and remove the pressure relief plunger (25) and spring (26).

(2) Support the hub of the drive gear (14) to prevent damage to the gear or shaft (10) while driving out the taper pin (15). Remove the gear from the shaft.

(3) Remove the four hex head bolts (1) and lockwashers (2) and separate the pump cover (7) from the pump body (13). Lift the pump gear (9) and shaft (10) and the idler gear (20) from the pump body. The pump gear need not be pressed from its shaft except for replacement purposes.

c. Cleaning and Inspection.

(1) Clean all parts thoroughly with cleaning solvent and dry with compressed air.

(2) Inspect all gears for chipped or broken teeth.. Damaged gears must be replaced. If the pump gear or idler gear is damaged, replace both gears.

(3) Examine the inside of the pump housing for signs of scoring. Also make certain that the plunger (25, fig. 100)

and its bore are not scored. Replace damaged parts with new ones.

(4) Check tube assemblies carefully for dents or crimps which might restrict the flow of oil. Replace damaged tube assemblies, if necessary.

d. Oil Pump Reassembly (fig. 100).

(1) Install the idler gear (20) on the idler shaft (18). Secure the pump gear (9) to the drive shaft (10) with the woodruff key (19), and install the snap ring (8). Insert the assembled shaft and gear into the pump body, meshing the pump gear with the idler gear.

(2) Attach the drive gear (14) to the drive shaft with the taper pin (15), supporting the hub of the drive gear firmly while driving the pin into place.

(3) Position the pump cover on the pump body by means of the locating dowel pins (5) and install the four hex head bolts (1) and lockwashers (2). Insert the spring (26) and plunger (25) into the pressure relief opening in the pump cover (7) and screw the reducing bushing (24) into place.

e. Installation (fig. 100).

(1) Lift the assembled oil pump carefully up into the upper oil pan, meshing the pump drive gear with the crankshaft gear and alining the pump body mounting holes with the tapped holes in the mounting boss. Install the two hex head bolts (11) and lockwashers (12).

(2) Screw a connector (16) into the pump body and the tapped crankcase oil passage, and install the tube assembly (17) between the two connectors.

(3) Screw the connector (21) into the reducing bushing (24) and the elbow (23). Install the tube assembly (22) between the elbow and connector.

(4) Apply a thin coat of shellac to the gasket surfaces of the pump and the suction line connection (4) and position the gasket (6) on the connection. Loosely attach the bracket arms of the suction line connection to the mounting boss within the upper oil pan with two hex head bolts (1), lockwashers (2) and plain washers (3). Shift the connection toward the pump until the connection flange bears against the pump cover flange and install and tighten two hex head bolts (1) and lockwashers (2). Then tighten the two hex head bolts that attach the suction line bracket arms to the cast mounting boss.

(5) Install the oil intake screen (28) and cotter pin (27). Install the lower oil pan (par. 217c) and fill the lubricating system with oil (fig. 16).

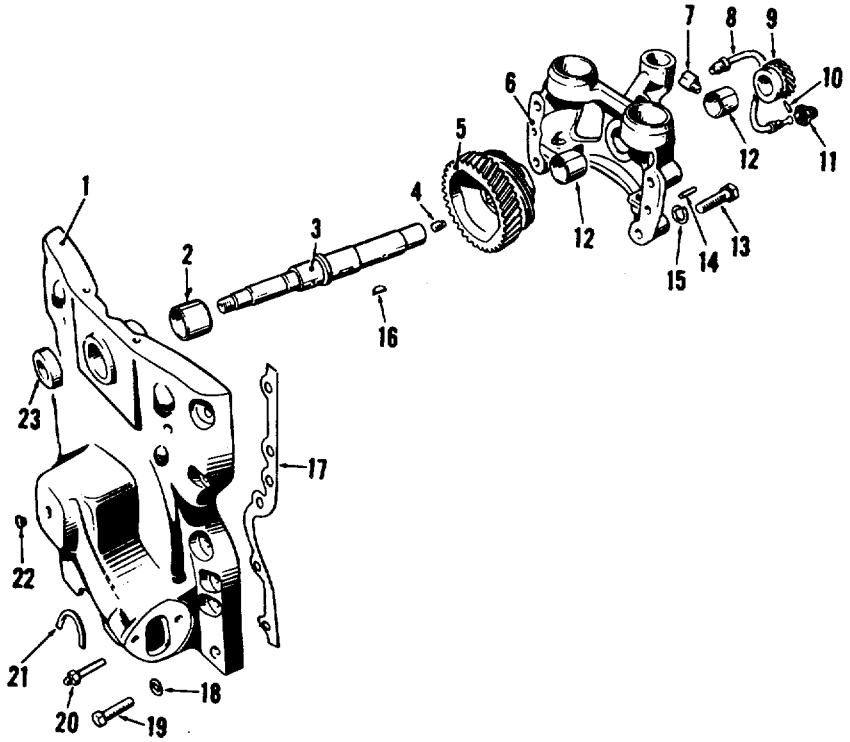
220. Gear Cover and Accessory Drive

a. Removal. Remove the engine-compressor (par. 214). Remove the governor (par. 110a), thd distributor (par. 97*a*), and the water pump (par. 193). Remove the tachometer drive and front half cover (par. 216*a*). Remove the fan (par. 88*a*), the fuel pump (par. 75*a*), the shutterstat (par. 81a), and the fan belt (par. 85). Remove the 10 hex head bolts (19, fig. 101) and lockwashers (18). Disconnect the tube assembly (8), elbow (7) and connector (11). Withdraw the two taper pins (20) from the bottom of the gear cover (1). Pry the cover slightly to loosen the taper pins. Lift off the gear cover. Watch for the oil seal half (21). to not let it drop to the floor. Take off the two gaskets (17). The gear cover assembly comes off as a unit. Do not disassemble unless there is evident damage. To remove the accessory drive housing (6), withdraw taper pin (10), pull governor drive gear (9), and remove the hex head bolts (18), and lockwashers (15). Carefully pry the gear cover and housing apart. They are doweled together with taper pins (14). Do not remove the thrust plug (22).

b. Inspection (fig. 101). Replace all taper pins and the two cover gaskets. Inspect the governor drive gear (9) for worn or broken teeth. Replace a damaged gear. Inspect the accessory drive gear (5). If the gear is worn, or the teeth cracked or broken, replace the gear. Pull the gear over the woodruff key (16). Press a new gear on the accessory drive shaft (3) over the key. It is not necessary to remove the pipe plug (4). Inspect the inside surface of the gear cover bushing (2). If the bushing shows signs of wear, pull out the oil seal (23) and press the bushing out of the cover with an arbor press (par. 179). Press in a new bushing and install the oil seal. Inspect the drive housing bushings (12). The bushings (12), gear cover (1), accessory drive housing (6), and thrust plug (22) are not serviced separately. Damage on any one of these components results in replacing the complete assembly.

c. Installation (fig. 101). Insert the drive shaft (3) into the gear cover (1). Start the two taper pins (14) into the gear cover. Carefully press the accessory drive housing (6) over the pins. Install the hex head bolts (13) and lockwashers (15). Put the governor drive gear (9) on the end of the shaft and drive in the taper pin (10). Shellac the two gaskets (17) to the crankcase. With the oil seal half (21) in position in recess in the bottom of the cover, position the cover against the

crankcase and in stall the two taper pins (20). Install the 10 hex head bolts (19) and lockwashers (18). Connect the elbow (7), tube assembly (8) and connector (11) to the accessory drive housing (6) and tappet chamber in the crankcase. Install



1 Gear cover
2 Gear cover bushing
3 Accessory drive shaft
4 Pipe plug
5 Accessory drive gear
6 Accessory drive housing
7 Elbow, 1/4 x 1 MPT x 90°
8 Tube assembly
9 Governor drive gear
10 Taper pin
11 Connector, 1/4 x 1/8 MPT
12 Drive housing bushing
13 Bolt, hex hd, 7/16-14 x 2 (4 req)
14 Taper pin
15 Lockwasher, 7/16 (4 req)
16 Woodruff key
17 Gasket
18 Lockwasher, 3/8 (10 req)
19 Bolt, hex hd, 3/8-16 x 1/4 (10 req)
20 Taper pin
21 Oil seal half
22 Thrust plug
23 Oil seal

Figure 101. Exploded view of gear cover assembly.

the water pump (par. 195), fan, (par. 88*b*), shutterstat (par. 81*b*), fan belt (par. 85), fuel pump (par. 75b), tachometer drive and front half cover (par. 216*c*), distributor (par. 97*b*), and governor (par. 110*b*). Install the engine-compressor (par. 215).

221. Flywheel and Rear Engine Support

a. Removal.

(1) Remove the engine-compressor (par. 214) and the housing (par. 128).

(2) Remove the shutter air filter (par. 82*a*), starting motor (par. 93a), and aftercooler (par. 117*a*).

(3) Remove the two hex head bolts (14, fig. 94), hex nuts (12) and lockwashers (13) to detach the braces (15) from the rear engine support (4, fig. 102).

(4) Support the engine-compressor with a cable hooked on the lifting bail (1, fig. 97) to take the weight off the rear engine support (4, fig. 102).

(5) Remove the nuts (14, fig. 96), spacers (15 and 16), and cap screws (17) holding the rear engine support to the frame (18).

(6) Unscrew the locknuts (1, fig. 102) from the flywheel bolts (10, fig. 103) through the flywheel (2, fig. 102). Lift off the flywheel and ring gear (3). Remove the six cap screws (5) and lockwashers (6) that fasten the rear engine support to the crankcase and upper oil pan. Pull the taper pins (7) and lift out the rear engine support. The hex head bolts (8), hex nuts (11), and lockwashers (10) need not be removed if the timing indicator (9) is undamaged. The ring gear is integral with flywheel and is not serviced separately.

b. Inspection (fig. 102). Replace the taper pins (7). Replace the timing indicator (9) if bent or cracked. Examine the ring gear (3) for cracked or broken teeth. Replace both the flywheel and ring gear as an assembly if the ring gear is damaged.

c. Installation.

(1) Install the timing indicator (9, fig. 102) if it was replaced. Place the rear engine support (4) against the crankcase and drive in the two taper pins (7). Install the cap screws (5) and lockwashers (6) that fasten the rear support. Position the flywheel (2) and ring gear (3) over the flywheel bolts (10, fig. 103) through the crankshaft flange and install the locknuts (1, fig. 102). Install the spacers (15 and 16, fig. 96), cap screws (17), and nuts (14) that fasten the rear engine support to the frame.

(2) Remove the cable from the lifting bail (1, fig. 97).

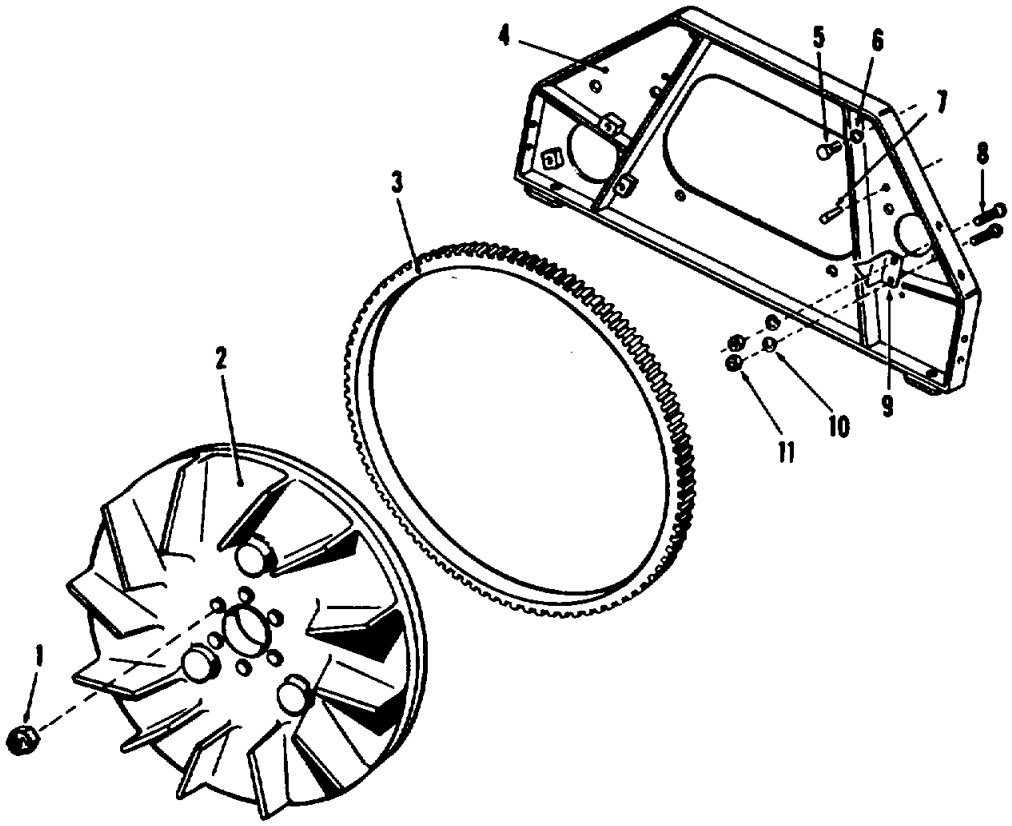


Figure 102. Exploded view of flywheel and rear support.

(3) Fasten the two braces (15, fig. 94) to the rear engine support (4, fig. 102) with two hex head bolts (14, fig. 94), hex nuts (12) and lockwashers (13).

(4) Install the aftercooler (par. 117*c*), starting motor (par. 93*b*) and shutter air filter (par. 82*e*). Install the housing (par. 130) and engine-compressor (par. 215).

222. Crankshaft and Main Bearings

a. Removal.

(1) Remove the engine-compressor from the truck (par. 214). Remove the housing (par. 128). Remove the upper and lower oil pans (par. 217*a*), flywheel (par. 221*a*), and radiator and fan (par. 88*a*). Remove the engine cylinder head (par. 122*a*) compressor cylinder head (par. 126*a*), and the pistons, connecting rods and rings (par. 223*a*).

(2) Remove six cap screws (9, fig. 106) and the three outer bearing caps (10) with the lower main bearing

shells (7 and 9, fig. 103). Mark the bearing caps so they can be installed in their original positions. Push the exposed upper bearing shells (7 and 9) counterclockwise (facing the front of the engine) until they can be removed. Keep each pair of bearing shells together and tag them so they can be installed in their original positions.

(3) Support the crankshaft (8) to prevent it from dropping. Remove four cap screws (9, fig. 106) and the front and rear bearing caps (8 and 11) together with the front and rear bearing shells (7, fig. 103).

(4) Remove the crankshaft and place it on a clean surface. Do not use chains to support the crankshaft or the bearing surfaces will be marred. Remove the cap screw (2), lockwasher (3) and washer (4). Remove the crankshaft pulley (5) and gear (6) with a gear and bearing puller (par. 179). Do not lose the woodruff keys (11 and 12).

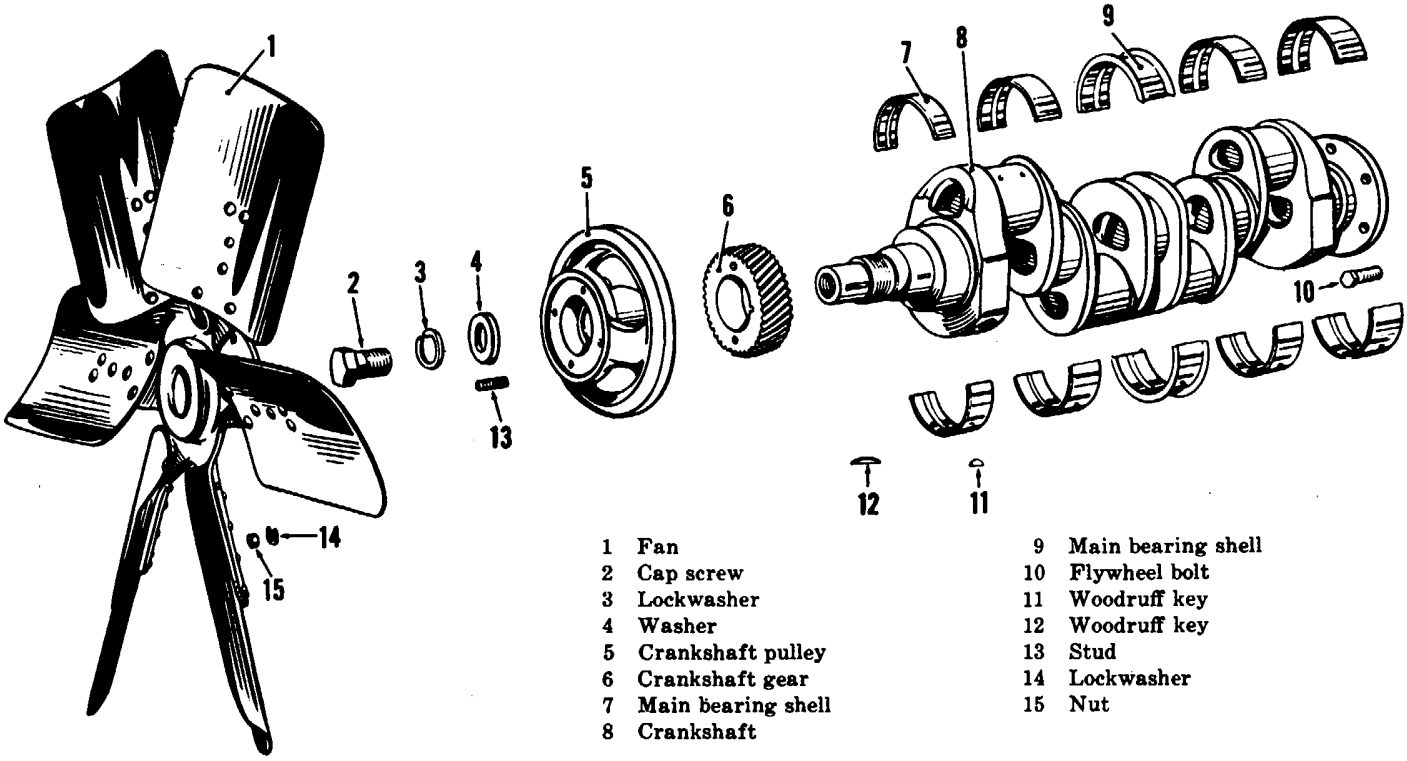
b. Inspection.

(1) Inspect the crankshaft gear for broken or chipped teeth. Replace the gear if it is damaged in any way. Examine the crankshaft pulley for cracks and replace it if damaged.

(2) Inspect the crankshaft bearing surfaces for cuts, scoring and cracks. Check the crankshaft journals with an 0to 4-inch outside micrometer caliper (par. 179) for wear, concentricity and taper. The journals should be 3.748 to 3.749 inches in diameter. Set the crankshaft on center blocks and check for straightness using a dial indicator (par. 179) or a suitable stand and setup.

(3) Inspect the bearings for scoring and wear. Measure the thickness of the bearing shells. The bearing thickness should be 0.1250 to 0.1255 inches. If any bearing shell is worn beyond the minimum, replace all the bearings. This will eliminate the danger of a shutdown when another bearing fails.

c. Repair. Remove small defects in the crankshaft journals with strips of emery cloth well oiled. Wrap the strip around the journal to prevent lapping the journal to a oval shape. If the crankshaft is worn excessively or bent, it must be ground in a crankshaft grinder (par. 179) or replaced with an undersize crankshaft which is: available in two sizes: 0.010and 0.030 inch undersize. By installing an undersize crankshaft, the engine compressor can be put in operating



1	Fan	9	Main bearing shell
2	Cap screw	10	Flywheel bolt
3	Lockwasher	11	Woodruff key
4	Washer	12	Woodruff key
5	Crankshaft pulley	13	Stud
6	Crankshaft gear	14	Lockwasher
7	Main bearing shell	15	Nut
8	Crankshaft		

Figure 103. Exploded view of crankshaft, fan, and main bearings.

condition without waiting for repair of the original. A bent crankshaft must be straightened in a hydraulic press before grinding. If the crankshaft is ground down, undersize bearings must be installed. Undersize bearings are available in two sizes: 0.010 and 0.030-inch undersize.

d. Installation.

(1) Press on the crankshaft gear (6, fig. 103) over the woodruff key (11) using an arbor press (par. 179). Also press the crankshaft pulley (5) over the woodruff key (12).

(2) Install the upper bearing shells (7 and 9) in the crankcase. The bearing backs must be clean and dry. Coat the bearing surfaces with clean engine oil OE.

(3) Support the crankshaft (8) in position under the crankcase. Mesh the timing marks on the camshaft gear (2, fig. 105) with those on the crankshaft gear (6, fig. 103). Install the front and rear bearing caps (8 and 11, fig. 106) and their main bearing shells (7, fig. 103) with four cap screws (9, fig. 106). Install the three center bearing caps (10) and main bearing shells (7 and 9, fig. 103) with six cap screws (9, fig. 106). Tighten all the cap screws to 150 foot-pounds of torque.

(4) Install the flywheel (par. 221*c*). Turn the crankshaft over by rotating the flywheel. No difficulty should be experienced in turning the crankshaft over.

(5) Install the pistons, connecting rods and rings (par. 223*c*). Install the compressor cylinder head (par. 126*c*), engine cylinder head (par. 122*e*), oil pans (par. 217*c*) and radiator and fan (par. 88*b*). Install the housing (par. 130) and engine-compressor on the truck (par. 215).

223. Pistons, Connecting Rods, and Rings

a. Removal and Disassembly (fig. 104). Remove the compressor bank cylinder head (par. 126*a*). Remove the engine bank cylinder head (par. 122*a*). Remove the lower oil pan (par. 217*a*). Unscrew the connecting rod bolt nuts (14) and remove the bearing caps (1). The lower bearing shell (2) comes with the cap. Push the piston (5) through the cylinder bore. Remove the rings (6, 7, 9, and 10) with a piston ring expander (par. 179). Remove the upper bearing shell. Do not let it drop out of the engine. Keep the pairs of shells with their corresponding caps. Tag the pistons so they can be returned to their original positions. Note the relative positions of the inner face of the rod and the T-slot of the piston.

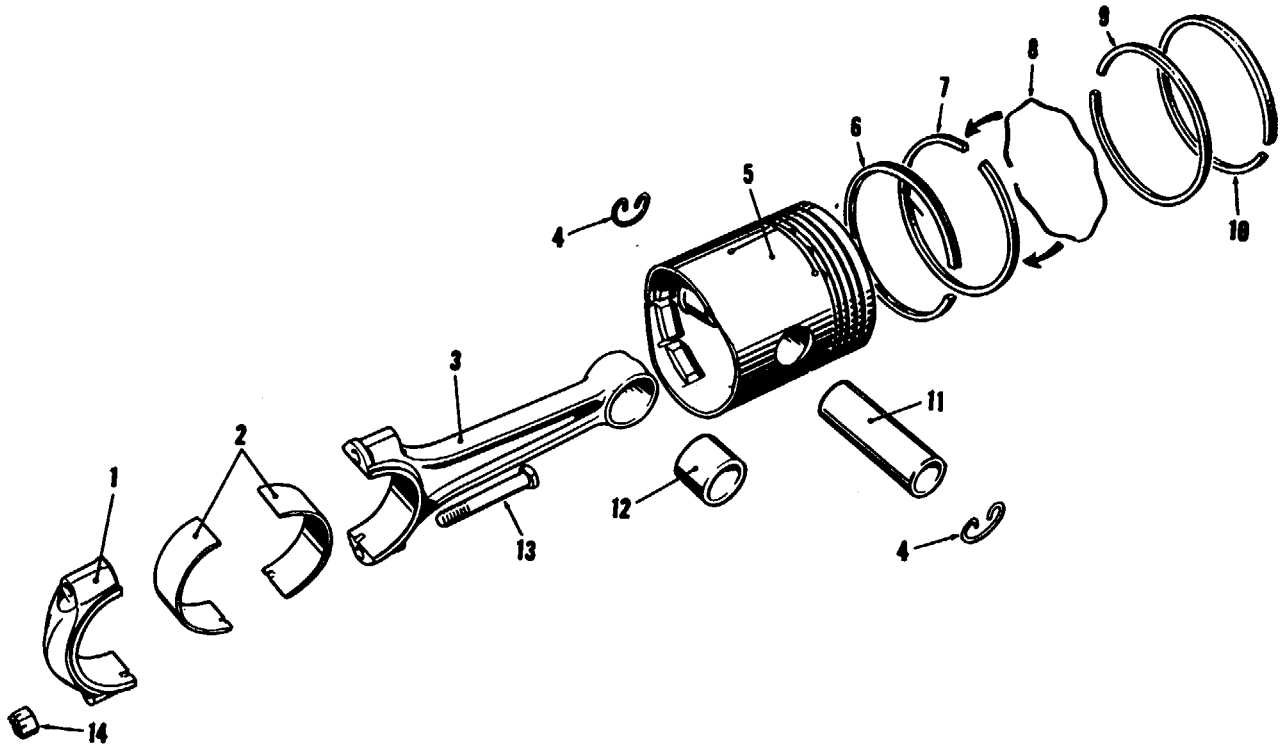


Figure 104. Exploded view of piton and connecting rod.

1	Bearing cap	8	Expander
2	Bearing shell	9	Second groove ring
3	Connecting rod	10	Top groove ring
4	Pin retainer	11	Piston pin
5	Piston	12	Piston pin bushing
6	Oil control ring	13	Connecting rod bolt
7	Third groove ring	14	Connecting rod bolt nut

Figure 104. Continued.

Take out the connecting rod bolts (13) and put them with their corresponding caps. Remove the pin retainers (4). Drive out the piston pins (I1) and separate the connecting rods (3) and piston pin and bushings (12) from the piston. Press the bushings from the connecting rod with an arbor press (par. 179).

b. Cleaning and Inspection.

(1) The connecting rod bearing shells should be free from nicks or scratches and show no signs of overheating. An overheated bearing will show dark discoloration. Check the bearing shell thickness. The thickness should be from 0.0952 inch to 0.0956 inch. Replace all connecting rod bearings if any bearing shell is worn to less than the minimum thickness. If an undersize crankshaft is installed, undersize bearing shells must be installed. Refer to paragraph 222*c.* Undersize bearings are available in two sizes: 0.010- and 0.030-inch undersize.

(2) Clean the pistons by soaking them in carbon tetrachloride or similar solvent. Clean any carbon deposits. Replace a cracked or broken piston. Check the pistons with a 5 to 6 inch outside micrometer caliper (par. 179) to determine out of round by taking readings at several points around the diameter. The diameter of the piston should be 5.4955 to 5.4965 inches at the skirt bottom. Check the piston clearance by inserting the piston, top down, in the cylinder sleeve bore. Use a feeler gage. The clearance of the piston skirt to cylinder sleeve should be 0.0035 to 0.0055 inches.

(3) Check cylinder sleeve diameter for size and concentricity using a 1 1/2 to 12 inch inside micrometer caliper (par. 179). Take several readings the same way as checking pistons. If the sleeve diameter is greater than 5.501 inch, replace the sleeve (par. 225). If the sleeve diameter is between 5.500 and 5.501 inches and the piston to sleeve clearance is greater than 0.0055 inches replace the piston. Check the gap clearance of new piston rings

by placing them in a sleeve, square them up in the bore with a piston, and measure the gap with a feeler gage. The piston ring gap should not be less than 0.015 inches.

(4) Check the piston pin to connecting rod bushing clearance. This should be from 0.0007 to 0.0012 inches. If this clearance is more than 0.0012 inches, press out the bushing in an arbor press (par. 179) and install a new bushing.

(5) Roll each piston ring in its groove and check the side clearance in several locations. Refer to figure 104 for correct ring position. The side clearance for each ring is as follows: Top groove ring (10, fig. 104), 0.0020 to 0.0045 inch; second groove ring (9), third groove ring (7), and oil control ring (6), 0.0015 to 0.0035 inch. Do not use a ring whose side clearance is greater than the maximum.

c. Reassembly and Installation (fig. 104).

(1) Press new piston pin bushing (12) into the connecting rod (3). Use an arbor press (par. 179) for this purpose.

(2) Install the piston rings (6, 7, 9, and 10) with a piston ring expander (par. 179) spreading the gap only enough to slide them into place. Start with the oil control ring (6) and proceed to the top of the piston. Put the expander (8) in the third ring groove before installing the third groove ring (7). Heat the piston (5) in warm water, locate the piston **T-**slot and connecting rod (3) in their original relative position, then insert the piston pin (11) with a very light tap. Put in the pin retainers (4).

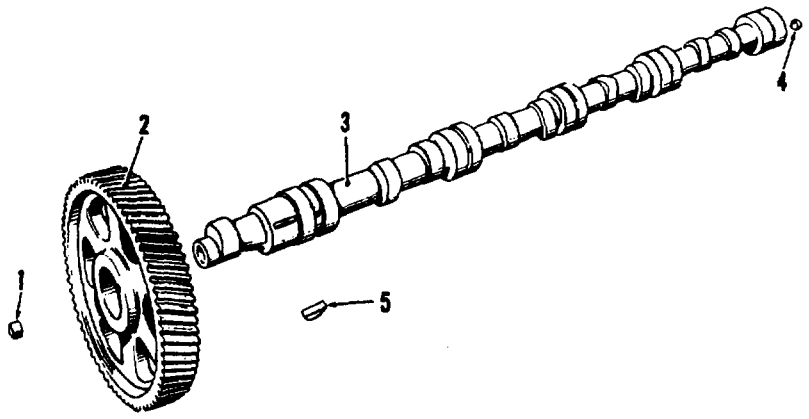
(3) Put the connecting rod bolts (13) through their connecting rod holes. Coat the cylinder walls with clean engine oil. Place piston ring compressor (par. 179) over the top of the piston and apply enough pressure to compress the rings so the piston is snug. Insert the piston assembly into the cylinder bore. Check to see that the side of the connecting rod with the least chamfer faces the adjacent connecting rod, and the **T-**slotted side of all pistons face towards the engine bank. Guide the piston into the bore with the ring compressor, releasing the tension enough to allow the piston to enter the bore without binding of the rings.

(4) Clean the backs of the bearing shells (2), lubricate their surfaces with engine oil, and install them in the connecting rod. Position the connecting rods on the crankshaft.

Rotate the crankshaft if necessary. Install the bearing caps (1) with their bearing shells. Tighten the connecting rod bolt nuts to 90 foot-pounds of torque.

224. Camshaft and Gear

a. Removal. Remove the fuel pump (par. 75a). Remove the crankcase covers (par. 216*a*). Remove the gear cover (par. 220a). Remove the engine cylinder head and valves (par. 122*a*) and lift up and tie the valve tappets (16, fig. 106) so they will not catch the cams on the camshaft (3, fig. 105). Turn the engine so the timing marks on the camshaft gear (2) and crankshaft gear (6, fig. 103) coincide. Note this position. Pull the camshaft and gear from the crankcase. Twist the gear to disengage it while pulling. Do not remove the cup plugs (1 and 4, fig. 105).



1 Front cup plug
2 Camshaft gear
3 Camshaft
4 Rear cup plug
5 Woodruff key

Figure 105. Exploded view of camshaft and gear.

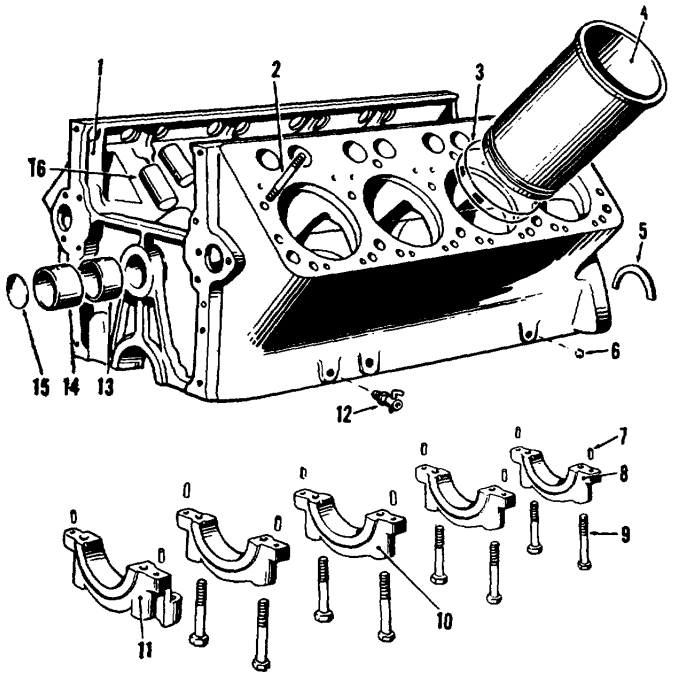
b. Inspection. Inspect the camshaft gear (2, fig. 105) for chipped or broken teeth. Examine the camshaft (3) for scratches or obvious wear. Slight scratches can be removed with crocus cloth. Clean any residue from the 'camshaft surface. If the gear is damaged, pull it off over the Woodruff key (5) using a gear and bearing puller (par. 179). Carefully press on the new gear with an arbor press (par. 179). If the camshaft is damaged beyond repair, replace the camshaft and gear as a unit. The camshaft and front cup plug (1) are not serviced separately.

c. Installation. Insert the camshaft (3, fig. 105) and camshaft gear (2) in the front of the crankcase. Be careful in meshing the gears. See that the timing marks on the camshaft and

crankshaft gears coincide. Turn the engine over if necessary. Release the valve tappets (16, fig. 106) and install the cylinder head and valves (par. 122*e*). Install the fuel pump (par. 75*b*). Install the gear cover (par. 220*c*). Install the crankcase covers (par. 216*c*).

225. Crankcase and Cylinder Sleeves

a. Removal (fig. 106). Remove the engine-compressor from the frame (par. 214). Remove both cylinder heads (pars. 122*a* and 126*a*), crankcase covers (par. 216*a*), rear support (par. 221*a*), gear cover (par. 220(*a*), crankshaft and main bearings



1 Crankcase
2 Stud
3 Packing ring
4 Cylinder sleeve
5 Oil seal half
6 Pipe plug
7 Dowel pin
8 Rear bearing cap
9 Cap screw
10 Center bearing cap
11 Front bearing cap
12 Drain cock
13 Intermediate and center camshaft bushing
14 Front and rear camshaft bushing
15 Welch plug
16 Valve tappet

Figure 106. Exploded view of crankcase and sleeves.

(par. 222*a*), oil pans (par. 217*a*), camshaft (par. 224*a*), and pistons, connecting rods and rings (par. 223*a*). After removing the main bearings, be sure to keep them with their bearing caps (8, 10, and 11), and cap screws (9). Do not loose the dowel pins (7). Place the oil seal half (5) on a clean surface. The pipe plug (6) and drain cock (12) need not be removed unless damaged.

b. Inspection. Measure the inside diameter of the cylinder sleeves (4, fig. 106) with an inside micrometer caliper (par. 179). Check the sleeves for out of round by taking several measurements down the base and around the inside diameter. They should measure from 5.500 to 5.501 inches. Replace the sleeves if one measures greater than the maximum out-of-round. Remove a sleeve by driving it up from the bottom with a mallet and a hardwood block, or with a cylinder liner puller (par. 179). Before installing a new sleeve make sure the crankcase bore and sleeve upper seating surface are clean. Install new packing rings (3) in the crankcase grooves. Apply a liberal amount of soap to the rings and grooves. Guide the new sleeve into the bore and carefully drive it into place. Clean the crankcase in solvent and remove all dirt and grease deposits.

NOTE

Test the cooling system for leaks into the crankcase after installing a cylinder sleeve.

Insert the camshaft (3, fig. 105) into the crankcase (1, fig. 106) and measure the camshaft to bushing clearance. On all bushings (13 and 14) this clearance should be from 0.0015 to 0.0035 inches.

Drive out any camshaft bushing where the clearance is greater than 0.0035 inch. Press in a new bushing with an arbor press (par. 179). If the rear bushing is at fault, replace the Welch plug (15). Replace any valve tappets (16) that show scratches or nicks. Replace worn oil seals.

c. Installation. Replace the crankshaft and main bearings (par. 222*d*) with the bearing caps (8, 10, 11), dowel pins (7) and cap screws (9). Tighten the cap screws to 150 foot-pounds of torque. Install the oil seal (5) in the crankcase recess. Install the pistons, connecting rods and rings (par. 223c) and camshaft (par. 224*c*). Insert the valve tappets (16). Install the oil pans (par. 217*c*), gear cover (par. 220*c*), rear support (par. 221*c*), crankcase covers (par. 216*c*), and both cylinder heads (pars. 122*e* and 126*c*). Install the engine-compressor in the frame (par. 215).

Section XIII. TOOL BOXES AND RUNNING BOARDS

226. Description

The three tool boxes on the front and sides of the engine-compressor contain all the air-operated tools furnished with the equipment.

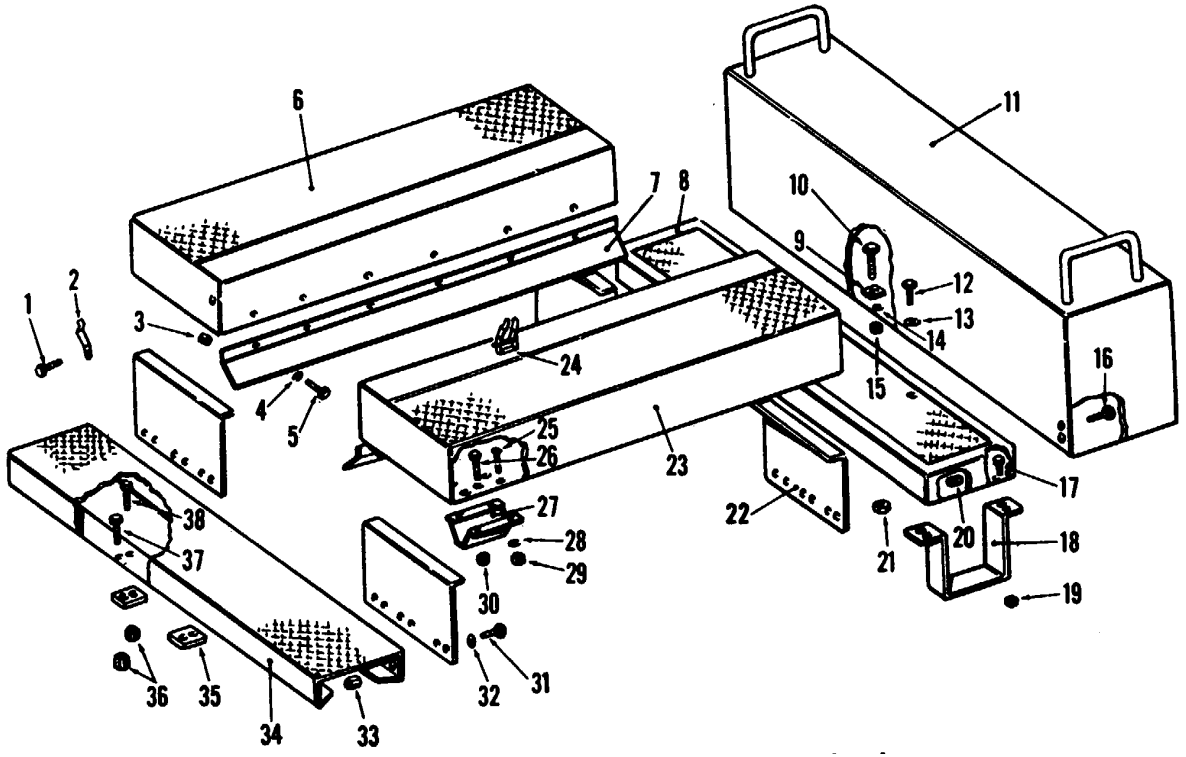


Figure 107. Exploded view of tool boxes and running boards.

1 Cap screw, No. 10-24 x 3/8 (4 req)
2 Hinge pin spring
3 Nut
4 Washer, plain, 5/16 (24 req)
5 Cap screw, 5/16-24 x 3/4 (12 req)
6 Compressor-side tool box
7 Mud guard
8 Front running board
9 Front spacer
10 Cap screw, 1/2-20 x 1 1/2 (2 req)
11 Front tool box
12 Cap screw, 1/2-20 x 1 1/2 (4 req)
13 Washer, plain, 1/2 (4 req)
14 Washer, plain, 1/2 (2 req)
15 Nut
16 Cap screw, 1/2-20 x 1 (14 req)
17 Cap screw, 3/8-24 x 7/8 (8 req)
18 Running board step
19 Nut
20 Nut
21 Nut
22 Side tool box support
23 Engine-side tool box
24 Rear door brace
25 Cap screw, 5/16-24 x 1 (32 req)
26 Cap screw, 1/2-20 x 1 1/4 (8 req)
27 Vibration dampener
28 Washer, plain, 5/16 (32 req)
29 Nut
30 Nut
31 Cap screw, 1/2-20 x 1 (24) req)
32 Washer, plain, 1/2 (24 req)
33 Nut
34 Rear running board
35 Rear spacer
36 Nut
37 Cap screw, 1/2-20 x 1 3/4 (2 req)
38 Cap screw, 1/2-20 x 1 1/2 (2 req)

Figure 107-Continued.

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a. The compressor-side tool box contains the rock drills and the nail driver. Air hoses are attached to each of these units.

b. The engine-side tool box contains the paving breakers and the clay diggers. Air hoses are attached to each of these units.

c. The front tool box contains the circular saw, the chain saw, the wood drill, and the grease gun kit. The front tool box also contains three connecting air hoses.

227. Tool Box and Running Board Removal

(fig. 107)

Remove the engine-compressor unit (par. 214). Remove the two rear door braces (24). Remove the nuts (3), cap screws (5), and plain washers (4). Lift off the mud guards (7). Remove the nuts (30), cap screws (26), and lift off the compressor side tool box (6) and the engine-side tool box (23). Remove the nuts (29), plain washers (28), cap screws (25), and remove the vibration dampeners (27). Remove the nuts (33), cap screws (31), plain washers (32), and lift off four side tool box supports (22). Remove the nuts (19), cap screws (17), and take off two running board steps (18). Remove the nuts (36), cap screws (37 and 38), and lift off the rear running board (34). Take off two rear spacers (35). Remove the nuts (20), cap screws (16),
nuts (21), cap screws (12), plain washers (13), and lift off the

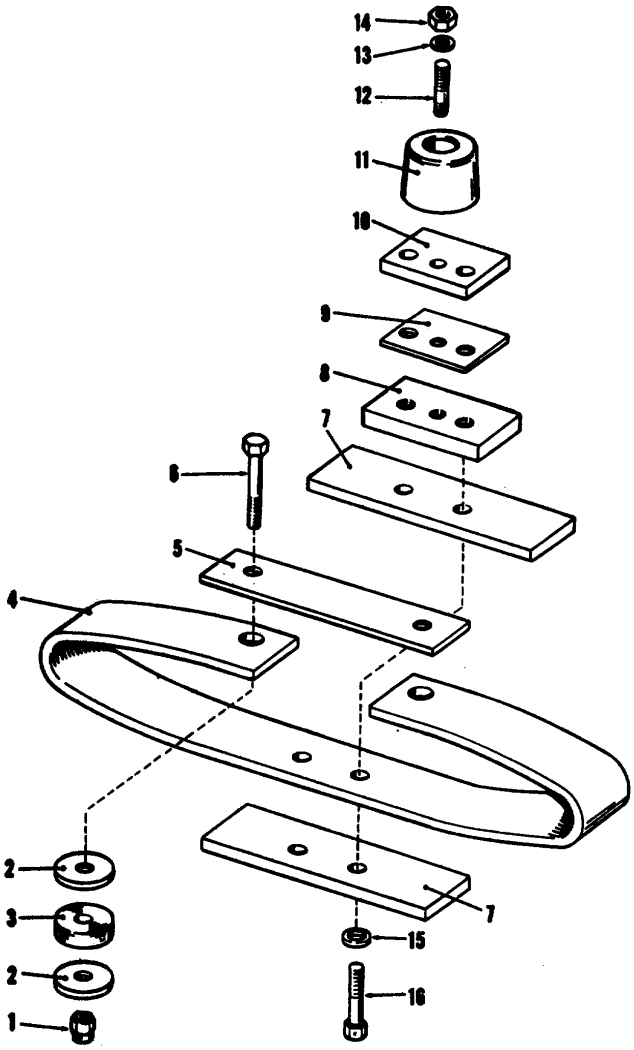


Figure 108. Exploded view of unit spring mounting.

1	Nut	9	Spacer
2	Washer	10	Spacer
3	Vibration dampener	11	Bumper
4	Spring	12	Stud
5	Plate	13	Lockwasher, 3/8 (4 req)
6	Cap screw	14	Nut, hex, 3/8-24 (4 req)
7	Spring plate	15	Washer, flat
8	Plate	16	Cap screw

Figure 108--continued.

front running board (8). Remove the nuts (15), cap screws (10), plain washers (14), and lift off the front tool box (11). Lift off two front spacers (9). Take out the cap screws (1) and remove the hinge pin springs (2).

228. Tool Box and Running Board Inspection and Repair

Clean all mud and dirt from frame and tool box parts. After cleaning, inspect for rust. Sand ail rust spots and repaint immediately. Check for cracks, dents, and broken welds. Inspect the hinge pin springs and the rear door braces. Replace these units if they are damaged in any way. Replace cracked vibration dampeners. Weld broken or torn welded seams; any torn surfaces. Pound out dents. Repaint as instructed in paragraph 43. Repaint any repaired surface immediately.

229. Tool Box and Running Board Installation

(fig. 107)

Install two hinge pin springs (2), at the rear of the side tool boxes, with the cap screws (1). Place two front spacers (9) on the truck frame, and put the front tool box (11) over the spacers. Install the cap screws (10), plain washers (14), and nuts (15). Place the front running board (8) behind the front tool box. Install the cap screws (12), plain washers (13), nuts (21), cap screws (16), and nuts (20). Place two rear spacers (35) over the holes in the rear of the truck frame. Place the rear running board (34) over the spacers. Install the cap screws (37 and 38) and nuts (36). The longer cap screws (37) go towards the rear. Place the running board steps (18) in position, and install the cap screws (17) and nuts (19). Install the side tool box supports (22) with the cap screws (31), plain washers (32), and nuts (33). Place the vibration dampeners (27) in position at the bottom corners of the side tool boxes, and install the cap screws (25), plain washers (28), and nuts (29). Place both side

tool boxes (6 and 23) over their supports, and install the cap screws (26) and nuts (30). Place the mud guards (7) in position and install the cap screws (5), plain washers (4), and nuts (3). Install the rear door braces (24). Install the engine-compressor unit (par. 215).

Section XIV. UNIT SPRING MOUNTING

230. Description

The engine-compressor unit is mounted on four spring mountings. These mountings isolate the equipment to prevent vibration while operating or moving the equipment.

231. Spring Mounting Removal

(fig. 108)

Remove the nuts (1), washers (2), vibration dampeners (3), and cap screws (6). Lift the engine-compressor from the truck frame (par. 214). Lift off the plates (5). Take out the cap screws (16) with washers (15) and lift out the spring assemblies. Unscrew the nuts (14) and remove the lockwashers (13). Lift off the bumpers (11) and separate the spacers (9 and 10) and plates (7 and 8) from the springs (4). Do not unscrew the stud. (12).

232. Spring Mounting Cleaning and Inspection

Clean the mounting assembly parts in carbon tetrachloride or similar solvent, except the bumpers and vibration dampeners. Clean off all rust or corrosion with steel wool or a buffing wheel. Inspect all parts for breaks or cracks. Replace any damaged springs, spacers, or plates. Wash the bumpers and vibration dampeners in water. Dry thoroughly. Inspect them for flaws or nicks. Replace any bumper or vibration dampener that shows any sign of weakness. Repaint as instructed in paragraph 43.

233. Spring Mounting Installation

(fig. 108)

Place one spring plate (7) on each of the truck frame brackets. Set the springs (4), the other spring plates (7), and plates (8) with stud (12) on the springs. Put the flat washers (15) on the cap screws (16), insert the cap screws through the springs, and screw them into the plates. Put the spacers (9 and 10) and the bumpers (11) over the stud. Install the lockwashers (13) and hex nuts (14). Put the plates (5) on the springs. Lower the engine-compressor to the truck frame (par. 215). Insert the cap screws (6) through the springs. Install a washer (2) on

each of the cap screws (6). Put on the vibration dampeners (3), the other washers (2), and install the nuts (1).

Section XV. ENGINEERING DATA

234. Recommended Wrench Torques

Main bearing bolts	150 ft-lbs
Connecting rod bolts	90 ft-lbs
Cylinder head studs, engine bank	90 ft-lbs
Cylinder head cover, engine bank	40 ft-lbs
Cylinder head studs, compressor bank	90 ft-lbs
Compressor valve assembly studs	25 ft-lbs
Manifold studs, engine bank	60 ft-lbs
Flywheel bolts	125 ft-lbs
Fan and crankshaft pulley studs	40 ft-lbs

235. Table of Clearances

In all cases original manufacturing clearances and dimensions are used herewith:

Piston diameter, at skirt bottom	5.4955-5.4965
Cylinder sleeve diameter	5.500-5.501
Clearance, piston to cylinder at skirt bottom	.0035-.0055
Piston top groove ring width	.1235-.1240
Clearance, top groove ring in top groove	.0020-.0045
Piston second groove ring width	.1230-.1240
Second groove width	.1255-.1265
Clearance, second groove ring	.0015-.0035
Piston third groove ring width	.1230-.1240
Third groove width	.1255-.1265
Clearance, third groove ring	.0015-.0035
Piston oil control ring width	.2480-.2490
Fourth groove width	.2505-.2515
Clearance, oil control ring	.0015-.0035
Gap. piston rings	.015 min.
Gap, expander ring, under third ring	.0625 min.
Clearance, piston to piston pin, selective fit, not interchangeable.	.0001-.0003
Connecting rod & cap bore	3.4415-3.4425
Rod bearing shell thickness	.0956
Crankpin diameter	3.2480-3.2490
Clearance, connecting rod bearing running	.0013-.0043
Connecting rod bushing diameter	1.5007-1.5010
Piston pin diameter	1.4998-1.5000
Clearance, pin to bushing	.0007-.0012
Main bearing bore	4.002-4.003
Main bearing shell thickness	.1250-.1255
Main bearing journal diameter	3.748-3.749
Clearance, main bearing running	0.02-.005

Center main bearing width	1.649-1.651
Crankshaft journal width	1.655-1.657
Clearance, main bearing end	.004-.008
Camshaft journal diameter	2.2470-2.2480
Camshaft, bushing inside diameter	2.2495-2.2605
Clearance, camshaft bushing running	.0015-.0035
Intake valve guide bore	.4370-.4380
Intake valve stem diameter	.4345-.4355
Clearance, intake valve stem	.0015-.0035
Exhaust valve guide bore	.4370-.4380
Exhaust valve stem diameter	.4335-.4345
Clearance, exhaust valve stem	.0025-.0045
Crankshaft-camshaft gear backlash	.006
Crankshaft-oil pump drive gear backlash	.006
Accessory drive-ignitor drive gear backlash	.006
Camshaft-accessory drive gear backlash	.006
Oil pump idler-oil pump gear backlash	.008-.014

CHAPTER 6
SHIPMENT, LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

236. Limited Storage

a. General. To insure perfect operating conditions at all times, all air compressors not intended for immediate use must be subjected to certain services prior to storage. This procedure is designed to protect exterior surfaces of the air compressor, as well as the interior surfaces, against rust or corrosion for a period of 30 days. Before proceeding to prepare the air compressor for storage, open the service valves at the rear of the air receiver to relieve the air pressure; then close the valves.

b. Inspection. Perform preventive maintenance services (par. 47).

c. Cleaning and Painting.

(1) Remove grease and dirt from the exterior of the engine compressor. Be sure surfaces are dry and spray or brush all exterior surfaces of the engine-compressor and accessories with compound No. AXS858.

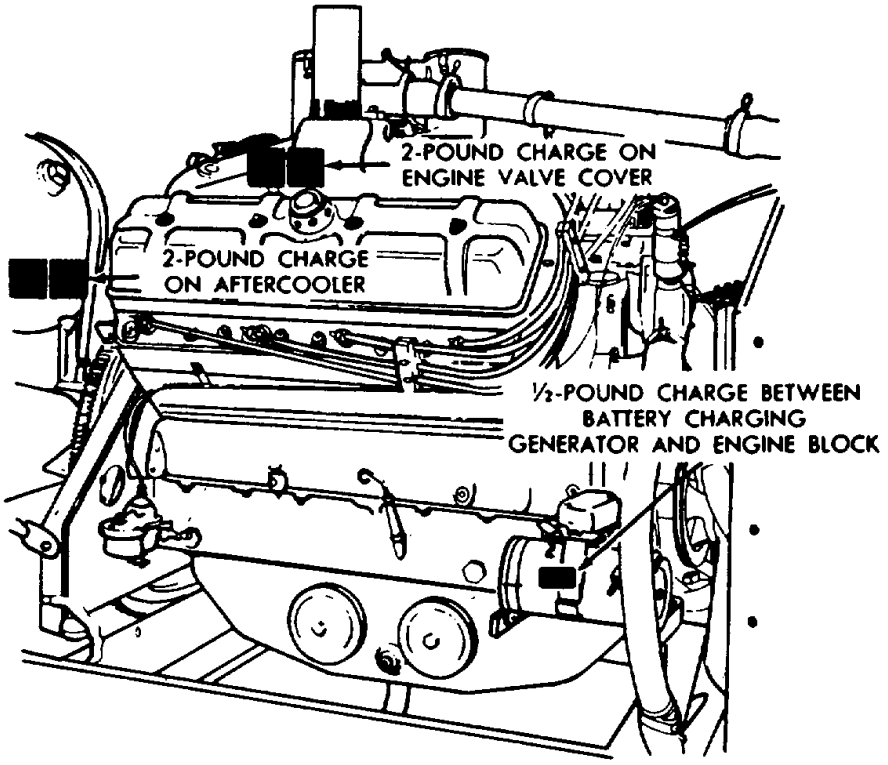
(2) Remove dirt, dust, grease and other foreign materials from the housing. Use solvent where necessary. Touch up or repaint surfaces (par. 43).

d. Lubrication. Lubricate the entire unit (pars. 41 and 42).

e. Protection in Storage.

(1) Drain the fuel tank (par. 72).
(2) Drain the cooling system (par. 80a).
(3) Remove the batteries from the unit (par. 90d) and service (par. 90*a* and *b*). Check specific gravity (par. 90c). Batteries should be stored in a warm, dry place. Be certain that all filler plugs are tight and that the tops of the batteries are clean and dry.

NOTE. **.The electrolyte of charged batteries not in service will show a gradual and continuous drop in specific gravity, as the acid will slowly react with the active materials, even when there is no closed external circuit. This drop, when the batteries are kept below 80° F, will average about 0.001 per day over a month's time. When storing batteries, they should be recharged every 30**



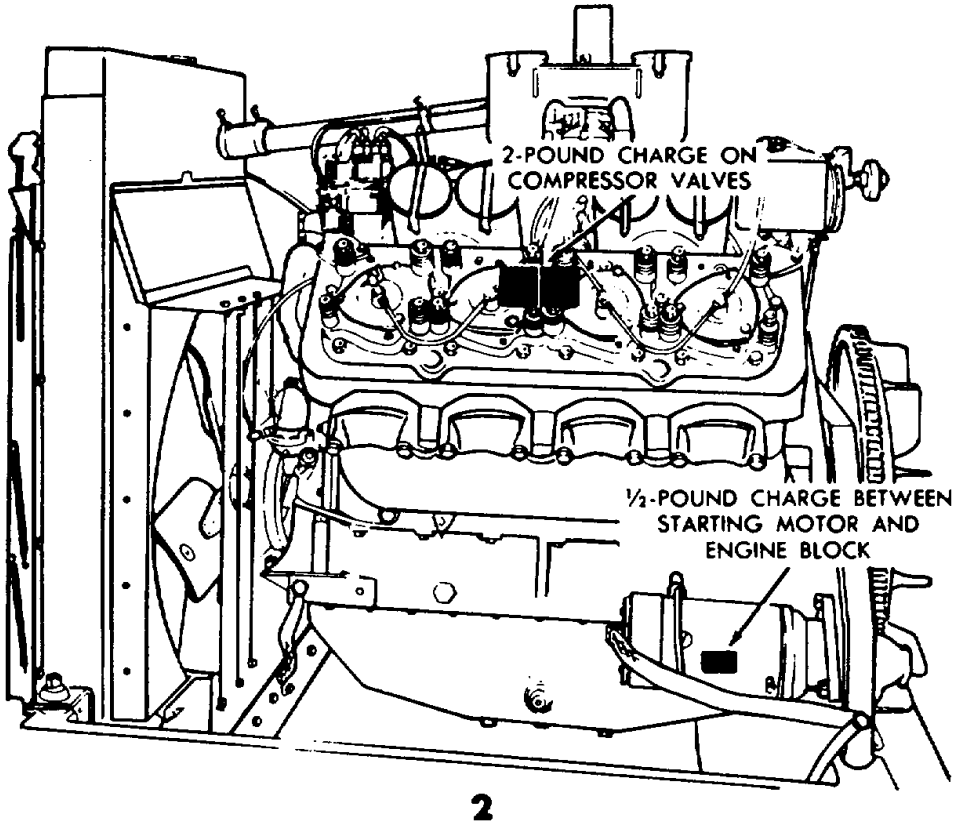


Figure 109. Placement of demolition charges.

days, to keep them ready for service. This charging should be at one ampere per positive plate per cell. This means that a 25-plate battery should be charged at 12.0 amperes.

(4) Blow the filter elements and the inside of filter connections with compressed air. Refer to lubrication order (fig. 16).

(5) Tag the unit indicating that the cooling system is dry and batteries are removed.

237. Domestic Shipment

a. General. Information in this section is published for the guidance of personnel responsible for packaging and shipping the air compressor. Refer to paragraph 236 for preparation for shipment.

b. Hoisting and Blocking. Since the air compressor is mounted on a truck, refer to TM 9-819 for instructions for hoisting and blocking the truck for shipment.

Section II. DEMOLITION OF AIR COMPRESSOR TO PREVENT ENEMY USE

238. General

When capture or abandonment of the air compressor is imminent, the responsible unit commander must make the decision either to destroy the equipment or render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. Whatever method of demolition is employed, it is essential to destroy the same vital parts of all air compressors and all corresponding repair parts.

239. Preferred Demolition Methods

Explosives and mechanical means, either alone or in combination, are the most effective methods of demolition to employ. Listed below are the vital parts in order of priority of demolition for each preferred method. In each case, completion of the first three steps will render the equipment inoperative. Completion of the additional steps listed will further destroy the unit.

a. Demolition by Explosives (fig. 109). Place as many of the following charges as the situation permits and detonate them simultaneously with detonating cord and a suitable detonator:

(1) Two 2-pound charges on the engine and compressor valve covers.

(2) A 2-pound charge on the crankcase cover.

NOTE

The above charges are the minimum requirement for this method.

(3) A 2-pound charge on the aftercooler.
(4) A 1/2-pound charge between the starting motor and the engine block.
(5) A 1/2-pound charge between the battery charging generator and the engine block.

b. Demolition by Mechanical Means. Use sledge hammers, crowbars, picks, axes, or any other heavy tools which may be available, together with the tools normally included with the air compressor, to destroy the following:

(1) The air compressor instrument panel.
(2) The compressor valves and engine valve rocker arm assemblies.

NOTE

The above steps are the minimum requirement for this method.

(3) The distributor and governor.
(4) The storage batteries.
(5) The radiator.
(6) The fire extinguisher.

240. Other Demolition Methods

If the situation prevents employing either of the preferred methods, use the following, either singly or in combination.

a. Demolition by Weapons Fire. Fire on the air compressor with the heaviest weapons available. Direct the fire toward both sides of the equipment.

b. Demolition by Scattering and Concealing. Remove all easily accessible vital parts such as the spark plugs, fuel pump, and starter motor and battery charging generator brushes. Scatter these parts through dense foliage, bury them in dirt or sand, or throw them into a lake, stream, or other body of water.

c. Demolition by Burning. Pack rags, clothing, or canvas under and around the equipment. Saturate this packing with gasoline, diesel fuel, or some other inflammable liquid, and ignite it.

d. Demolition by Submersion. Totally submerge the unit in a body of water to provide some water damage and concealment. Salt water will do the greatest damage to metal parts.

e. Demolition by Misuse. Perform the first step listed below to put the governor out of action and the remaining steps to make the air compressor inoperative.

(1) Remove the slowdown assembly and break the linkage between the governor and carburetor.
(2) Drain radiator and crankcase.

(3) Open the service valves and start the engine.
(4) Run the air compressor at maximum speed until failure occurs.

241. Training

All operators should receive thorough training in the destruction of the air compressor. Simulated destruction, using all methods listed above, should be included in the operator training program. It must be emphasized in training that demolition operations are usually necessitated by critical situations when the time available for destruction is limited. For this reason, it is necessary that operators be thoroughly familiar with all methods of destruction and be able to carry out demolition instructions without reference to this or any other manual.

APPENDIX I
REFERENCES

1. Accessory Equipment

TM 9-819, 2 1/2 ton, 6 x 6, Cargo Truck M34, M35, and M36; Chassis Truck M44, M45, and M46; Crane Truck M108; Dump Truck M47 and M59; Gasoline Tank Truck M49; Shop Van Truck M109; Tractor Truck M48; Water Tank Truck M50.

TM 5-687, Inspection and Preventive Maintenance Services for Fire Protection Equipment and Appliances.

TM 9-1799, Ordinance Maintenance: Fire Extinguishers.

2. Auxiliary Equipment

TM 5-4004, Saw, Circular, Portable, Pneumatic, 12 in. Blade, Skillsaw, Model 2127.

TM 5-4089, Drill, Rock, Pneumatic, Portable: Cleveland Model H-111.

TM 5-4087, Drill, Wood Boring, Thor Models 362 RHW, 362 RXW, 363 RYW.

3. Dictionaries of Terms and Abbreviations

SR 320-5-1, Dictionary of United States Army terms.

SR 320-50-1, Authorized Abbreviations.

4. Lubrication and Painting

LO 5-5065, Lubrication Order.

TM 9-2851, Painting Instructions for Field Use.

5. Preparation for Export Shipment

TB 5-9711-1, Preparation of Corps of Engineers Equipment for Overseas Shipment.

TB 5--9713-1, Preparation for Export, Spare Parts for Corps of Engineer Equipment.

6. Preventive Maintenance

TB 5-5065-1, Preventive Maintenance Services.

TM 5-505, Maintenance of Engineer Equipment.

7. Publications Indexes

SR 110-1-1, Index of Army Motion Pictures, Kinescope Recordings and Film Strips.

SR 310 20-3, Index of Training Publications.

SR 310-20-4, Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletin, Lubrication Orders, and Modification Work Orders.
SR 310-20-5, Index of Administrative Publications.
SR 310-20-6, Index of Blank Forms.
SR 310-20-25, Index of Supply Manuals-Corps of Engineers.
FM 21-8, Military Training Aids.

8. Supply Publications

ENG 7 & 8-5065, Compressor, Air: Truck-Mounted; Gasoline-Driven; 210 CFM; LeRoi Model (66-3270.210.460).

APPENDIX II

IDENTIFICATION OF REPLACEABLE PARTS

Section I. STANDARD HARDWARE

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWARE AND PARTS	
914	45-1760.004.001	770	013-1062	.....	BUSHING, pipe: iron; black headed; FS WW-P-471; Type I; 3/8 x 1/8 in.	1
914	45-1760.010.007	770	013-1073	.....	BUSHING, pipe: iron; black; headed; FS WW-P-471; Type I; 1 x 3/4 in.	2
910	33-2344.500.170	770	83-223-28	.....	CLAMP, hose: water, 1 3/4 in	10
910	33-2344.500.180	770	83-223-20	.....	CLAMP, hose: water; 1 7/8 in	4
914	45-2680.004.003	770	013-718	.....	COUPLING, pipe: malleable iron; 150 lb. pressure; reducing; threaded; FS WW-P-521; black; 3/8 x 1/4 in.	2
914	45-2736.500.001	770	33-574	.....	COUPLING, pipe: malleable iron; 150 lb. pressure; straight; threaded; FS WW-P-521; black; Type I; 1/8 in.	2
914	45-3632.450.007	770	013-435	.....	ELBOW, pipe: cast iron; 125 lb pressure; straight; threaded; FS WW-P-501; 45-deg; black; 3/4 in.	2
914	45-3688.003.001	770	182-42	227-6877	ELBOW, pipe: malleable iron; 150 lb pressure; FS WW-P-521; reducing; threaded; 90-deg; black; 1/4 x 1/8 in.	1

914	45-3716.453.001	770	182-192	.....	ELBOW, pipe: malleable iron; 150 lb pressure; FS WW-P-521; straight; threaded; 45-deg; black; 1/8 in.	
914	45-3716.970.005	770	013-404	.....	ELBOW, pipe: malleable iron; 150 lb pressure; FS WW-P-521; straight; threaded; 90-deg; galvanized; Type II; 3 in.	1
914	45-3772.830.003	770	182-219	.....	ELBOW, pipe: malleable iron; 150 lb pressure; FS W-P-521; street; straight; threaded; 90-deg; black; Type I; 1/4 in.	1
914	45-3772.830.004	770	013-503	.....	ELBOW, pipe: malleable iron; 150 lb pressure; FS WW-P-521; street; straight; threaded; 90-deg; black; 3/8 in.	2
914	45-3772.900.005	770	013-504	.....	ELBOW, pipe; malleable iron; 150 lb pressure; FS WW-P-521; street; straight; threaded; 90-deg; galvanized; Type II; 1/2 in.	2
912	42-5416.500.200	770 623	09-5 124545	012-4545	KEY, woodruff: nickel steel; single; No.5, 3/8 x 5/8 in. KEY (Supplied under Stock No.912 42-5416.500 200).	3
912	42-5416.500.270	770	09-10	012-0051	KEY, woodruff: nickel steel; single; No.10, 5/32 x 7/8 in.	1
912	42-5416.500.330	770	09-19	.....	KEY, woodruff: nickel steel; single; No.15, 1/4 x 1 in	2
912	42-5416.500.540	770	09-41	.....	KEY, woodruff: nickel steel; single; No.127, 1/4 x 2 1/8 in.	1
914	45-5600.001.060	770	013-57	.....	NIPPLE, pipe: FS WW-N-351; wrought iron; std; black; 1/8 in. ips, 6 in. long.	1
914	45-5600.003.008	770	013-2	192-9450	NIPPLE, pipe: FS WW-N-351; wrought iron; std; black 1/4 in. ips, 5 in. long.	2
914	45-5600.004.070	770	35-51-49	.....	NIPPLE, pipe: FS WW-N-351; wrought iron; std; black; 3/8 in. ips, 2 in. long.	2
914	45-5600.005.020	770	013-111	192-9479	NIPPLE, pipe: FS WW-N-351; wrought iron; std; black; 1/2 in. ips, 2 in. long.	1

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWAREAND PARTS-Continued	
914	**45-5600.007.014**	**770**	**013-5**	**192-9453**	**NIPPLE, pipe: FS WW-N-351; wrought iron; std; black; ¾ in. ips, 1 3/8 in. long.**	**4**
914	**45-5600.010.020**	**770**	**33-158-20**	**192-9463**	**NIPPLE, pipe: FS WW-N-351; wrought iron; std; black; 1 in. ips, 2 in. long.**	**2**
914	**45-5600.010.030**	**770**	**33-158-38**	**192-9488**	**NIPPLE, pipe: FS WW-N-351; wrought iron; std; black; 1 in. ips, 3 in. long.**	**1**
914	45-5600.025.025	770	013-10	NIPPLE, pipe: FS WW-N-351; wrought iron; std;	**black; 2 1/2 in. ips, 2 1/2 in. long.**	1
913	43-4074.030.280	770	04-801	NUT, castellated: FS FF-B-571; Type A-4; steel;	**semifinished; NF; hex; rh 1/4 in.; 28 threads per in.**	2
913	43-4074.060.180	770	B53-26	NUT, castellated: FS FF-B-571; Type A-4; steel;	**semifinished; NF; hex; rh; 5/8 in.; 18 threads per in.**	**4**
913	43-4092.070.160	770	53-295	NUT, Elastic Stop: steel; NF; hex; rh; 3/4 in.; 16	**threads per in.**	4
913	43-4162.040.240	770	199-6597	199-6597NUT, jam: regular; steel; finished; FSF F-B-571,	**grade 6; NF; hex; Type A; rh; 3/8 in.; 24 threads per in.**	**8**
913	43-4162.050.200	770	04-955	5310-266-0344NUT, jam: regular; steel; finished; FS FF-B-571,	**grade 6; NF; hex; Type A; rh; 1/2 in.; 20 threads per in**	**1**
913	**43-4164.540.160**	**623**	**134569**	**22-7208NUT, jam: regular; steel; semifinished; FS FF-B-571, grade 5; NC; hex; Type A; rh; cadmium plated; 3/8 in.; 16 threads per in.**		**1**

913	43-4164.035.180	476	RA-172	.....	NUT, jam: regular; steel; semifinished; FS FF-B-571, grade 5; NC; hex; Type A; rh; 5/16 in.; 18 threads per in.	
913	43-4164.040.160	770	04-403	.....	NUT, jam: regular; steel; semifinished; FS FF-B-571, grade 5; NC; hex; Type A; rh 3/8 in.; 16 threads per in.	2
913	43-4260.008.320	476	R-157	011-3102	NUT, machine screw: brass; NC; hex; rh; screw No. 6; 32 threads per in.	1
913	43-4286.010.240	770	04-13	5310-011--0633	NUT, machine screw; steel; NC; hex; rh; screw No. 10; 24 threads per in.	8
913	43-4286.012.240	674	X-991	5310-010 3084	NUT; machine screw; steel; NC; hex; rh; screw No. 12; 24 threads per in.	2
913	43-4350.010.320	606	8X-1372	010-3088	NUT, machine screw; steel; NF; hex; rh; screw No. 10; 32 threads per in. (IMO 50).	2
913	43-4355.008.360	699	T21S-8	5310-266 4172	NUT, machine screw: steel; NF, sq; rh; screw No. 8; 36 threads per in.	1
913	43-4445.030.200	770	53-274	.....	NUT, regular: steel; black; semifinished; FS FF-B-571; NC; hex; Type A2; rh; 1/4 in.; 20 threads per in. (IMO 50).	4
		770	04-101		NUT (Supplied under Stock No. 913 43-4445.030. 200).	
913	43-4445.035.180	770	04-102	5310-266-0386	NUT, regular: steel; black; semifinished; FS FF- 1 B-571; NC; hex; Type A2; rh; 5/16 in.; 18 threads per in. (IMO 25).	6
913	43-4445.040.160	770	04-108	.....	NUT, regular: steel; black; semifinished; FS FF-B-571; NC; hex; Type A2; rh; 3/8 in.; 16 threads per in. (IMO 25).	20
		770	04-103		NUT (Supplied under Stock No. 913 43-4445.040. 160).	
913	43-4445.045.140	770	04-104	.....	NUT, regular: steel; black; semifinished; FS FF-B-571; NC; hex; Type A2; rh; 7/16 in.; 14 threads per in. (IMO 25).	4

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWARE AND PARTS-Continued	
913	43-4445.050.130	770	04105	222-7222	NUT, regular: steel; black; semifinished; FS FF-B-571; NC; hex; Type A2; rh; 1/2 in.; 13 threads per in.	1
913	43-4489-030.280	770	04-601	5310-222-7217	NUT, regular: steel; black; semifinished; FS FF-B-571; NF; hex; Type A2; rh; 1/4 in.; 28 threads per in. (IMO 100).	26
913	43-4489.035.240	674	X250-1	5310-265-9214	NUT, regular: steel; black; semifinished; FS FF-B-571; NF; hex; Type A2; rh; 5/16 in.; 24 threads per in. (IMO 100).	4
		770	04-602	.....	NUT (Supplied under Stock No. 913 43-4489.035 240).	.....
913	43-4489.040.240	770	04603	5310-265-9215	NUT, regular: steel; black; semifinished; FS FF-B-571; NF; hex; Type A2; rh; 3/8 in.; 24 threads per in. (IMO 25).	24
913	43-4489.045.200	770	04-604	5310-265-9216	NUT, regular: steel; black; semifinished; FS FF-B-571; NF; hex; Type A2; rh; 7/16 in.; 10 threads per in.	7
913	43-4489.050.200	770	04-605	5310-265-9217	NUT, regular: steel; black; semifinished; FS FF-B-571; NF; hex; Type A2; rh; 1/2 in.; 20 threads per in.	34
913	43-4489.070.160	770	04-608	5310-265-9220	NUT, regular: steel; black; semifinished; FS FF-B-571; NF; hex; Type A2; rh; 3/4 in.; 16 threads per in. (IMO 5).	4
913	434519.012.240	623	115596	199-6562	NUT, regular: steel; cadmium plated; semifinished;	4

					FS FF-B-571; NC; hex; Type A2; rh; bolt No. 12; 24 threads per in. (IMO 5).	
913	43-4519.035.180	770	53-27	431-4347	NUT, regular: steel; cadmium plated; semifinished; FS FF-B-571; NC; hex; Type A2; rh; 5/16 in.; 18 threads per in.	15
912	42-6880.050.100	770	07-5	5315-010-8634	PIN, cotter: split; FS FF-P--386; steel; Type B; 1/16 x 1 in. (IMO 100).	3
		770	07-3	.....	PIN (Supplied under Stock No. 912 42-6880.050 100).	.....
912	42-6880.100.200	770	07-41		PIN, cotter: split; FS FF-P-386; steel; Type B; 1/8 x 2 in.	4
912	42-6880.100.300	770	07-50		PIN, cotter: split; FS FF-P-386; steel; Type B; 1/8 x 3 in.	1
912	42-7100.003.050	770	010-201	011-3389	PIN, taper: steel; single; size No. 000, 0.125 in. large end,1/2 in. long.	1
912	42-7100.003.070	770	010-202	011-1828	PIN, taper: steel; single; size No. 000, 0.125 in. large end dia, 3/4 in. long.	1
912	42-7100.010.070	674	X-74	010-3573	PIN, taper: steel; single; size No. 1, 0.172 in. large end dia, 3/4 in. long.	3
912	42-7100.020.130	770	010-30	010-3585	PIN, taper: steel; single; size No. 2, 0. 193 in. large end dia, 1 1/4 in. long.	1
912	42-7100.020.150	770	010-31	010-3586	PIN, taper: steel; single; size No. 2, 0.193 in. large end dia, 1 1/2 in. long.	1
912	42-7100.070.100	770	010-98	010-0359	PIN, taper: steel; single; size No. 7, 0.409 in. large end dia, 1 in. long.	2
912	42-7100.090.170	770	010-131	191-4365	PIN, taper: steel; single; size No. 9, 0.591 in. large end dia, 1 3/4 in. long.	2
910	08-4700.300.055	770	19-87	448-0856	PLUG, expansion: cup-type; 9/16 in	1
910	08-4700.700.070	770	019-11	.....	PLUG, expansion: standard-type; 3/4 in. (IMO 10).....	2
910	08-4700.700.7100	770	019-15	.....	PLUG, expansion: standard-type; 1 in 12	
910	08-4700.700.250	770	019-35	.....	PLUG, expansion: standard-type, 21/2 in. (IMO 10).....	1

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWARE AND PARTS-Continued	
914	45-6040.500.001	770	011-1	187-4206	PLUG, pipe: cast iron; 125 lb pressure; FS WW-P-471; threaded; sq hd; black; Type I, 1/8 in. (IMO 5)	1
914	45-6040.500.003	770	011-252	187-4207	PLUG, pipe: east iron; 125 lb pressure; FS WW-P-471; threaded; sq hd; black; Type I, 1/4 in.	2
		770	011-2	.....	PLUG (Supplied under Stock No. 914 45-6040.500.003).	
914	45-6040.500.004	770	011-3	010-3867	PLUG, pipe: cast iron; 125 lb pressure; FS WW-P-471; threaded; sq hd; black; Type I, 3/8 in. (IMO 5).	1
914	45-6040.500.010	770	011-206	4730-263-3125	PLUG, pipe: east iron; 125 lb pressure; FS WW-P-471; threaded; sq hd; black; Type I, 1 in.	1
914	45-6068.500.001	770	011-101		PLUG, pipe: malleable iron; 150 lb pressure; FS WW-P-471; threaded; countersunk hd; black; 1/8 in.	1
914	45-6068.500.004	770	011-103	4730-263-3123	PLUG, pipe: malleable iron; 150 lb pressure; threaded; hex socket; FS WW-P-471; black; Type I, 1/2 in.	3
914	45-6068.500.005	770	011-104	4310-263-3120	PLUG, pipe: malleable iron; 150 lb pressure; threaded; hex socket; FS WW-P-471; black; Type I; 1/2 in.	6
910	17-7624.270.170	770	86-27	2920-243-5087	PLUG, spark: shielded; industrial resistor; normal; Champion or equal; Type XEJ-8; 14 mm thread	4

					size; 13/16 in. hex size; 2% in. installed height; 3/8 in. reach.	
913	43-6710.030.070	674	X-1627	.....	SCREW, cap: steel; NC; Allen hd; 1/4 in. dia,3/4 in. long; 20 threads per in.	4
913	43-6720.035.100	770	03-414	496-8346	SCREW, cap: steel; NC; fillister hd; 5/16 in. dia, 1 in. long; 18 threads per in.	8
913	43-6782.035.070	770	34-346	.....	SCREW, cap: steel; NC; hex hd; cadmium plated; NS 42S5, class 2, free fit; 5/16 in. dia. 3/4 in. long; 18 threads per in.	13
913	43-6792 030.040	770	02-1	496-8395	SCREW, cap: steel; NC; hex hd; heat treated; ¼ in. dia, 5/8 in. long; 20 threads per in.	33
913	43-6792.030.060	770	02-3	.....	SCREW, cap: steel, NC; hex hd; heat treated; ¼ in. dia, 3/4 in. long; 20 threads per in.	2
913	43-6792.030.070	770	34-351	.....	SCREW, cap: steel; NC; hex hd; heat treated; ¼ in. dia, 3 in. long; 20 threads per in. (IMO 100).	3
		770	02-4	.....	SCREW (Supplied under Stock No. 913 43-6792. 030.070).	
913	43-6792.035.050	770	02-16	.....	SCREW, cap: steel; NC; hex hd; heat treated; 5/16 in. dia, 1/2 in. long; 18 threads per in.	19
913	43-6792.035.060	770	02-17		SCREW, cap: steel; NC; hex hd; heat treated; 5/16 in. dia, 5/8 in. long; 18 threads per in.	12
		770	34-415	.....	SCREW (Supplied under Stock No. 913 43-6792. 035. 080).	
913	43-6792.040.070	770	02-34	.....	SCREW, cap: steel; NC; hex hd; heat treated; 3/8 in. dia, 3/4 in. long; 16 threads per in.	4
913	43-6792.040.170	770	02-39	.....	SCREW, cap: steel; NC; hex hd; heat treated; 3/8 in. dia, 13/4 in. long; 16 threads per in.	5
913	43-6792.040.270	770	02-43	.....	SCREW, cap: steel; NC; hex hd; heat treated; 3/8 in. dia, 23/4 in. long; 16 threads per in.	2
913	43-6792. 045.100	770	02-54	.....	SCREW, cap: steel; NC; hex hd; heat treated; 7/16 in. dia, 1 in. long: 14 threads per in.	4

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWARE AND PARTS-Continued	
913	43-6792.045.130	770	02-55	.....	SCREW, cap: steel; NC; hex hd; heat treated; 7/16 in. dia 11/4 in. long; 14 threads per in.	2
913	43-6792.045.170	770	02-57	496-8399	SCREW, cap: steel; NC; hex hd; heat treated; 7/16 in. dia, 13/4 in. long; 14 threads per in.	2
913	43-6792.050.350	770	02-79	.....	SCREW, cap: steel; NC; hex hd; heat treated; 1/2 in. dia, 31/2, in. long; 13 threads per in.	8
913	43-6792.060.100	770	02-99	431-4576	SCREW, cap: steel; NC; hex hd; heat treated; 5/8 in. dia, 1 in. long; 11 threads per in.	7
913	43-6777.030.050	770	02-2	.....	SCREW, cap: steel; NC; hex hd; NS 4285, class 2 free fit; 1/4 in. dia, 1/2 in. long; 20 threads per in. (IMO 100).	16
913	43-6777.035.070	770	02-18	.....	SCREW, cap: steel; NC; hex hd; NS 4285; class 2 free fit; 5/16 in. dia, 3/4 in. long; 18 threads per in. (IMO 100).	32
913	43-6777.035.080	770	02-19	.....	SCREW, cap: steel; NC; hex hd; NS 42S5, class 2 free fit; 5/16 in. dia, 7/8 in. long; 18 threads per in.	30
913	43-6777.035.100	770	02-20	.....	SCREW, cap: steel; NC; hex hd; NS 4285; class **2** free fit;5/16 in. dia, 1 in long; 18 threads per in.	**2**
913	43-777.035.150	770	02-22	.....	SCREW, cap: steel; NC; hex hd; NS 4285, class 2 free fit; 5/16 in. dia. 11/2 in. long; 18 threads per in.	6
913	43-6777.040.100	770	02-36	.....	SCREW, cap: steel; NC; hex hd; NS 4285, class 2, free fit; 3/8 in. dia, 1 in, long; 16 threads per in. (IMO 100).	22
913	43-6777.040.130	770	02-37	.....	SCREW, cap: steel; NC; hex hd; NS 4285, class 2,	52

					free fit; 3/8 in. dia, 11/4 y in. long; 16 threads per in. (IMO 100).	
913	43-6777.040.150	770	02-38	.....	SCREW, cap: steel; NC;. hex hd; NS 42S5; class 2 free fit; 3/8 in. dia, 11/2 in. long; 16 threads per in.	2
913	43-6777.040.230	770	02-41	.....	SCREW, cap: steel; NC; hex hd; NS 42S5; class 2 free fit; 3/8 in. dia, 21/4 in. long; 16 threads per in.	2
913	43-6777.050.100	770	02-69	.....	SCREW, cap: steel; NC; hex hd; NS 42S5, class 2 free fit; 1/2 in. dia, 1 in. long; 13 threads per in.	2
913	43-6777.050.130	770	02-70	.....	SCREW, cap: steel; NC; hex hd; NS 42S5, class 2, free fit; 1/2 in. dia, 11/4 in. long, 13 threads per in.	1
913	43-6777.050.150	770	02-71	.....	SCREW, cap: steel; NC;. hex hd; NS 42S5, class 2 free fit; 1/2 in. dia, 11/2 in. long; 13 threads per in.	3
913	43-6834.030.050	770	02-502	.....	SCREW, cap: steel; NF; hex hd; heat treated; 1/4 in. dia, 1/2 in. long; 28 threads per in.	8
913	43-6834.030.060	770	02-503	.....	SCREW, cap: steel; NF; hex hd; heat treated; 1/4 in. dia, 5/8 in. long; 28 threads per in.	8
913	43-6834.030.070	770	02-504	431-4680	SCREW, cap: steel; NF; hex hd; heat treated; 1/4 in. dia, 3/4 in. long; 28 threads per in.	4
913	43-6834.035.070	770	02-518	.....	SCREW, cap: steel; NF; hex hd; heat treated; 5/16 in. dia, 3/4 in. long; 20 threads per in.	137
913	43-6834.040.080	770	2-535	.....	SCREW, cap: steel, NF; hex hd; heat treated; 3/8 in. dia, 7/8 in. long; 24 threads per in.	8
913	43-6834.040.130	770	02537	.....	SCREW, cap: steel; NF, hex hd; heat treated; 3/8 in. dia, 11/4 in. long; 24 threads per in.	3
913	43-6834.040.200	770	34-414	.....	SCREW, cap: steel; NF; hex hd; heat treated; 3/8 in. dia, 2 in. long; 24 threads per in.	4
913	43-6834.050.100	770	02-569	.....	SCREW, cap: steel; NF; hex hd; heat treated; 1/2 in. dia, 1 in. long; 20 threads per in.	38
913	43-6834.050.130	770	02-570	.....	SCREW, cap: steel; NF; hex hd; heat treated; 1/2 in. dia, 11/4 in. long; 20 threads per in.	4
913	43-6834.050.150	770	02-571	.....	SCREW, cap: steel; NF; hex hd; heat treated; 1/2 in. dia, 11/2 in. long; 20 threads per in.	8

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWARE AND PARTS- Continued	
913	43-6834.050.170	770	02-572	.....	SCREW, cap: steel; NF; hex hd; heat treated; 1/2 in. dia, 13/4 in. long; 20 threads per in.	2
913	43-6834.050.250	770	34-417	.....	SCREW, cap: steel; NF; hex hd; heat treated; 1/2 in. dia, 21/2 in. long; 20 threads per in.	8
913	43-6834.050.270	770	02-576	496-8460	SCREW, cap: steel; NF; hex hd; heat treated; 1/2 in. dia, 23/4 in. long, 20 threads per in.	4
913	43-6834.060.300	770	02-607	.....	SCREW, cap: steel; NF; hex hd; heat treated; 5/8 in. dia, 3 in. long; 18 threads per in.	2
913	43-6830.040.150	770	02-538	021-4100	SCREW, cap: steel; NF; hex hd; NS 42S5, class 2, free fit; 3/8 in. dia, 11/2 in. long; 24 threads per in.	2
913	43-6844.035.100	770	03-929	.....	SCREW, cap: steel; NF; rd hd; 5/16 in. dia, 1 in. long; 24 threads per in.	32
913	43-6850.020.020	770	03-2001	014-5366	SCREW, drive: steel; FS FF-S-107; Type U; style 1P; rd hd; gage No. 2, 3/16 in. long.	4
913	43-7245.100.040	770	03-90	496-8493	SCREW, machine: FS FF-S-91; steel; NC; flat fillister hd; bright; size No. 10, 3/8 in. long; 24 threads per in.	2
913	43-7290.100.050	674	X-189	5305-011-0487	SCREW, machine: FS FF-S-91; steel; NC; oval fillister hd; bright; size No. 10, 1/2 in. long; threads per in.	10 24
		770	03-92	.....	SCREW (Supplied under Stock No. 913 43-7290 100.050).	
913	43-7291.035.060			431-4776	SCREW, machine: FS FF-S-91; steel; NC; oval fillister hd; bright; 5/16 in. dia, 5/8 in. long; 18 threads per in.	4

913	43-7292.060.040	699	T11S6-6	.....	SCREW, machine: FS FF-S-91; steel; NC; oval fillister hd; cadmium plated; size No. 6, 3/8 in. long; 32 threads per in.	1
913	43-7292.080.020	606	X-3031	013-1949	SCREW, machine: FS FF-S-91; steel; NC; oval fillister hd; cadmium plated; size No. 8, 3/16 in. long; 32 threads per in.	1
913	43-7405.060.030	476	S2400B206	010-0736	SCREW, machine: FS FF-S-91; steel; NC; rd hd; bright; size No. 6, 1/4 in. long; 32 threads per in.	1
913	43-7405.080.060	476	S2400B324	5305-010-0752	SCREW, machine: FS FF-S-91; steel; NC; rd hd; bright; size No. 8, 5/8 in. long; 32 threads per in. (IMO 25).	1
913	43-7429.080.035	623	453281	.....	SCREW, machine: FS FF-S-91; steel; NC; rd hd; cadmium plated; size No. 8, 5/8 in. long; 32 threads per in. (IMO 100).	4
913	43-7500.030.150	770	03-704	.....	SCREW, machine: FS FF-S-91; steel; NF; flat fillister hd; bright; 1/4 in. dia, 11/2, in. long; 28 threads per in.	2
913	43-7506.100.060	600	855493	010-0661	SCREW, machine: FS FF-8-91; steel; NF; oval fillister hd; bright; size No. 10, 5/8 in. long; 32. threads per in.	10
913	43-7508.008.050	699	T1S8-8	022-5543	SCREW, machine: FS FF-S-91; steel; NF; oval fillister hd; cadmium plated; size No. 8,1/2 in. long; 36 threads per in.	1
913	43-7508.010.065	606	X-3029	.....	SCREW, machine: FS FF-8-91; steel; NF; oval fillister hd; cadmium plated; size No. 10, 11/16 in. long; 32 threads per in.	6
913	43-7710.100.030	476	82400B404	.....	SCREW, machine: FS FF-91; steel; NF; rd hd; bright; size No. 10, 1/4 in. long; 32 threads per in.	3
913	43-7710.100.035	476	S2400B406	.....	SCREW, machine: FS FF-S91; steel; NF; rd hd; bright; size No. 10, 5/16 in long; 32 threads per in.	4
913	43-7710.100.070	476	S2400B414	010-0766	SCREW, machine: FS FF-S-91; steel; NF; rd hd; bright; size No. 10, 3/4 in. long; 32 threads per-in.	8

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWARE AND PARTS-Continued	
913	43-7710.100.110	476	S2400B418	010-0769	SCREW, machine: FS FF-S-91; steel; NF; rd hd; bright; size No. 10, 1 1/8 in. long; 32 threads per in.	1
913	43-7710.100.150	476	S2400B419	010-0772	SCREW, machine: FS FF-S-91; steel; NF; rd hd; bright; size No. 10, 1 1/2 in. long; 32 threads per in.	1
913	43-7930.010.050	770	03-1542	.....	SCREW, self-tapping steel; Type F; Parker-Kalon or equal; binding hd; size No. 10, 1/2 in. long; 24 threads per in.	4
913	43-7992.040.150	770	014-233	.....	SCREW, set: FS FF-S-103; steel; NC; headless; slotted; Type II, oval point, style 3; single; 3/8 in. dia, 1 ½ in. long; 16 threads per in.	2
913	43-8053.130.030			.....	SCREW, set: FS FF-S-103; steel; NF; Allen hd; Type III; cup point, style 4; single; 1/4 in. dia, 1/4 in. long; 28 threads per in.	2
913	43-8105.100.040	770	03-1537	5305-011-6500	SCREW, sheet metal: self-tapping; steel; Type A; Parker-Kalon or equal; rd hd; gage No. 10, 3/8 in. long (IMO 100).	8
910	17-8463.250.100			.....	SLEEVE, rubber; terminal; 0.250 in. id, 1 in. long; for 10-8 AWG; Packard 284 or equal.	2
913	43-9840.500.030	770	06-67	010-3339	WASHER, cold rolled steel; SAE; rd; cut; bright; bolt size 1/4 in., 5/8 in. od, 1/16 in. thick (IMO 100).	10
913	43-9840.500.035	770	06-68	5310-010-3340	WASHER: cold rolled steel; SAE; rd; cut; bright; bolt size 5/16 in.; 11/16 in. od, 1/16 in. thick (IMO 100).	135
		770	20-68	.....	WASHER (Supplied under Stock No. 913 43-9840 500.035).	

913	43-9840.500.041	770	06-69	010-3341	WASHER: cold rolled steel; SAE; rd; out; bright bolt size 3/8 in.; 13/16 in. od, 1/16 in. thick.	20
913	43-9840.500.045	770	06-70	010-3342	WASHER: cold rolled steel; SAE; rd; cut; bright; bolt side 7/16 in.; 15/16 in. od, 1/16 in. thick.	10
913	43-9840.500.051	770	20-430	010-3343	WASHER: cold rolled steel; SAE; rd; cut; bright; bolt size 1/2 in.; 15/16 in. od, 3/32 in. thick.	16
913	43-9840.500.070	770	06-9	010-3346	WASHER: cold rolled steel; SAE; rd; cut; bright; bolt size 3/4 in.; 1 1/2 in. od, 1/8 in. thick.	2
913	43-9840.501.006	606	IGE-15	.....	WASHER: cold rolled steel; SAE; rd; cut; bright; screw No. 6; 3/8 in. od, 1/32 in. thick.	1
913	43-9060.500.035	770	20-427	186-9342	WASHER: copper; rd; std; bolt size 5/16 in.; 7/8 in. od, 1/16 in. thick.	2
913	43-9351.500.035	770	20-460	011-5548	WASHER, lock: high carbon steel; Shakeproof; internal teeth; standard screw and bolt; bright; 5/16 in. (IMO 100).	15
913	43-9405.500.020	600	855064	.....	WASHER, look: spring steel; regular; heavy-weight; SAE; black; 3/16 in.	10
913	43-9532.500.090	674	X-1048	5310-0106497	WASHER, look: spring steel; regular; std wt; SAE; bright; size No. 10.	18
		770	05-5	.....	WASHER (Supplied under Stock No. 913 43-9532 500.090).	.....
		770	05-25	.....	WASHER (Supplied under Stock No. 913 43-9532 500.090).	.....
		606	12X-196	.....	WASHER (Supplied under Stock No. 913 43-9532 500.090).	.....
913	43-9533.500.030	770	05-49	010-3319	WASHER, look: spring steel; regular; std wt.; SAE; bright; 1/4 in. (IMO 100).	43
		674	X-1050	.....	WASHER (Supplied under Stock No. 913-43-9533.500.030).	.....
		770	20-40-2	.....	WASHER (Supplied under Stock No. 913 43-9533 500.030).	.....

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					STANDARD HARDWARE AND PARTS-Continued	
913	43-9533.500.033	770	05-50	5310-010-3320	WASHER, lock: spring steel; regular; std wt; SAE; bright; 5/16 in.	84
		770	05-107	.....	WASHER (Supplied under Stock No. 913 43-9533 500.033).	.....
913	43-9533.500.040	770	05-51	.....	WASHER, lock: spring steel; regular; std wt; SAE; bright; 3/8 in. (IMO 50).	112
913	43-9533.500.044	770	05-52	010-3322	WASHER, lock: spring steel; regular; std wt; SAE; bright; 7/16 in.	11
913	43-9533.500.050	770	05-53	010-3323	WASHER, lock: spring steel; regular; std wt; SAE; bright; 1/2 in. (IMO 25).	7
		770	05-110	.....	WASHER (Supplied under Stock No. 913 43-9533 500.050).	.....
913	43-9533.500.061	770	05-55	010-3325	WASHER, lock: spring steel; regular; std wt; SAE; bright; 5/8 in. (IMO 25).	7
913	43-9533.500.101	770	05-74	012-1326	WASHER, lock: spring steel; regular; std wt; SAE; bright; 1 in. (IMO 50).	1
913	43-9549.500.060	606	12X-194		WASHER, lock: spring steel; regular; std wt; SAE; cadmium plated; size No. 6.	1
913	43-9550.500.040	623	1918619	.....	WASHER, lock: spring steel; regular; std wt; SAE; cadmium plated; 3/8 in.	2
913	43-9215.500.021	770	06-65	187-5341	WASHER, wrought iron; rd; std; bright; JAN-W-1085; Type A; bolt size 3/64 in. thick.	6
913	43-9215.500.036	770	06-3	107-5343	WASHER, wrought iron; rd; std; bright; JAN-W-	1

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					1085; Type A; bolt size 5/16 in.;7/8 in. od; 5/64 in. thick.	
913	43-9215.500.041	770	06-4	187-5344WASHER,	wrought iron; rd; std; bright; JAN-W- 12 1085; Type A; bolt size 3/8 in.; 1 in. od, 5/64 in. thick.	
913	43-9215.500.051	770	06-71	187-5347	WASHER: wrought iron; rd; std; bright; JAN-W- 36 1085; Type A; bolt size 1/2 in.; 11/8 in. od, 7/64 in. thick.	
913	43-9215.500.061	770	06-73	187-5349	WASHER: wrought iron; rd; std; bright; JAN-W- 1085; Type A; bolt size 5/8 in.; 13/4 in. od, 9/64; in. thick.	8
913	43-9215.500.071	770	06-9	187-5351	WASHER: wrought iron; rd; std; bright; JAN-W- 1085; Type A; bolt size 3/4 in.; 2 in. od, 5/32 in. thick.	4
					BULK MATERIAL	
910	15-2559.380.100		.....	191-6441	CABLE, primary: single conductor; rubber insulated; braided; flexible; No. 16 AWG; 19 x 29 stranding (ft). (CABLE, Part No. 61-306-25, will be supported by Stock No. 910 15-2559.380. 100).	.....
ORD	H007-0100160	.....	.....	.....	HOSE, rubber: radiator; 1 3/4 in. id; 3 ply; 3 ft long (ft). (HOSE, Part No. 73-303-1, will be supported by Stock No. ORD H007-0100160).	.....
ORD	H007-0100220	.....	.....	.....	HOSE, rubber: radiator; 1 3/4 in. id; 3 ply; 3 ft long (ft). (HOSE, Part No. 73-305-5, will be supported by Stock No. ORD H007-0100220).	.....

Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
Code No.	Part No.	Code No.	Part No.			
					BULK MATERIAL-Continued	
914	448094.030.035	.....	.....	.....	TUBING: copper; seamless; Type N; annealed; for fuel and lubrication tubes; for solder-joints or flared-tube fittings; 1/4 in. nominal size, 0.250 in. actual od, 0.035 in. wall thickness; F8 WW-T-799 (ft). (TUBING, Part No. 55-29-63, will be supported by Stock No. 914 448094. 03. 035).	.....
914	44-8094.035.035	.....	.....	.....	TUBING: copper; seamless; Type N; annealed; for fuel and lubrication tubes; for solder-joints or flared-type fittings; 5/16 in. nominal size, 0.312 in. actual od, 0.035 in. wall thickness; FS WW-T-799 (ft). (TUBING, Part No. 55-2-2, will be supported by Stock No. 914 4i8094.035.035).	.....
910	22-8011.500.380	.....	.....	1989105	WIRE: steel carbon; annealed; bare; FS QQ-W-461; form I; finish I; grade FS 1045; 0.0625 in. dia; 5 lb reel (rl). (LOCK WIRE, Part No. 61-5, will be supported by Stock No. 910 22-8011.500.380).	.....

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
4	(1)	770		770	62-317	.....	PLATE, name	2
4	(2)	770	62-221-4	770	62-303	.....	PLATE, data	1
4	(3)	770	62-290	770	62-290	.....	PLATE, transportation.....	1
4	(4)	770	62-300	770	62-300	.....	PLATE, instruction	1
4	(5)	770	62-48	770	62-48	.....	PLATE, serial number.....	1
10	.....			770	1A73-301	.....	HOSE, air.....	2
10	.....			770	A73-301	.....	HOSE, air.....	2
17	.....	770	167-28	770	167-28	.....	CAPACITOR, generator.....	1
17	.....	770	34-343	770	34-343	.....	SCREW, cap.....	1
17	.....	770	34-346	770	34-346	.....	SCREW, cap.....	6
17	.....	770	34-349	770	34-349	.....	SCREW, cap.....	4
17	.....	770	34-351	770	34-351	.....	SCREW, cap.....	1
17	.....	770	34-395	770	34-395	.....	SCREW, cap.....	1
17	.....	770	34-408	770	34-408	.....	SCREW, cap.....	2
17	.....	770	34-413	770	34-413	.....	SCREW, cap.....	1
17	.....	770	61-481-19	770	61-481-19	.....	STRAP, bond, magnetic switch to frame.	1
17	.....	770	61-481-17	770	61-481-17	.....	STRAP, bond, instrument panel ...	1
	.....					.....	to frame.	
17	.....	770	61-481-17	770	61-481-17	.....	STRAP, bond, radiator to frame ...	2
17	.....	770	61-483-1	770	61-483-1	.....	STRAP, bond, support to oil pan..	2
17	.....	770	61-481-13	770	61-481-13	.....	STRAP, bond, support to upper ... oil pan.	1

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
17	.....	770	61-481-20	770	61-481-20	.....	STRAP, bond, regulator guard to generator stud.	1
17	.....	770	20-460	770	20-460	.....	WASHER, lock	1
17	.....	770	2-460-1	770	20-460-1	.....	WASHER, look	6
17	.....	770	20-460-2	770	20-460-2	.....	WASHER, look	4
17	.....	770	20-460-4	770	20-460-4	.....	WASHER, lock	1
17	.....	770	20-460-6	770	20-460-6	.....	WASHER, lock	2
17	.....	770	20-460-8	770	20-460-8	.....	WASHER, lock.	1
17	.....	770	55-764	770	5-764	.....	WIRE, ignition, No. 1 spark plug to distributor.	1
17	.....	770	55-764-1	770	55-764-1	.....	WIRE, ignition, No. 2 spark plug to distributor.	1
17	.....	770	55-74-2	770	55-764-2	.....	WIRE, ignition, No. 3 spark plug to distributor.	1
17	.....	770	55-764-3	770	55-764-3	.....	WIRE, ignition, No. 4 spark plug to distributor.	1
17	.....	770	61-486-38	770	61-486-38	.....	WIRE ASSEMBLY, ammeter to regulator.	1
17	.....	770	61-486-36	770	61-486-36	.....	WIRE ASSEMBLY, generator to regulator.	2
18	.....	600	1539442	770	81-190-2	.....	PUMP, fuel	1
18	.....	770	79-169	770	79-169	.....	CLAMP, carburetor inlet tube	1
18	.....	770	83-126	770	83-126	.....	CLAMP, tube	1
18	.....	896	200X5		182-14	.....	CONNECTION	1
18	.....	770	A55-2-48	770	A55-2-48	.....	LINE ASSEMBLY, fuel pump to carburetor.	1

18	.....	770	A55-2-103	770	A55-2-103	.....	LINE ASEMBLY, tank to fuel pump.	1
18	.....	770	69-316	770	69-316	.....	TANK, fuel	1
19	1	896	400X5	770	182-35	.....	ELBOW	1
19	2	770	83-126	770	83-126	.....	CLAMP, tube	1
19	5	770	150-30	770	150-30	.....	GROMMET	1
19	6	770	A55-2-103	770	A55-2-103	.....	TUBE ASSEMBLY	1
19	7	770	69-316	770	69-316	.....	TANK, fuel.	1
19	9	770	182-15	770	182-15	.....	CONNECTOR	1
19	10	770	74-122	770	74-122	.....	PACKING	2
19	11	770	83-230	770	83-230	.....	STRAP	2
19	12	770	34-311	770	34-311	.....	SCREW, cap	2
19	13	770	20-447	770	20-447	.....	WASHER	2
19	14	770	53-259	770	53-259	.....	NUT	2
19	15	.....	.....	770	43-271	.....	SCREEN	1
19	16	770	60-175-5	770	60-175-5		GAGE, fuel level	1
20		896	400X5	770	182-35	.....	ELBOW	2
20		770	41-259	770	41-259	.....	BELT, generator drive	1
20		600	1539442	770	81-190-2	.....	PUMP, fuel	1
20		770	16-997	770	16-997	.....	GASKET	1
21	1	770	08-346	770	08-346		RIVET	1
21	3	770	24-379	770	24-379	.....	SPRING	2
21	4	770	14-975	770	14-975	.....	COVER	2
21	5	770	16-1144-1	770	16-1144-1	.....	GASKET	2
21	6	770	43-169	770	43-169	.....	FILTER ELEMENT, air	2
21	7	770	65-1036	770	65-1036	.....	CONNECTION, air filter	1
21	10	770	125-126	770	125-126	.....	RING, packing	1
21	11	770	39-2232	770	39-2232	.....	SUPPORT, filter	2
21	15	699	0-11362	770	84-580	.....	CARBURETOR	1
21	18	770	16-1174	770	16-1174	.....	GASKET, carburetor	1
25	3	896	200X4	770	182-13	.....	CONNECTOR	2

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
25	6	770	83-243	770	83-243	.....	CLAMP	1
25	7	770	79-186	770	79-186	.....	CLAMP	1
25	9	770	A55-29-67	770	A55-29-67	.....	LINE, air, 1/4 x 50	1
25	10	896	400X4	770	182-33	.....	ELBOW, 1/4 x 1/8 M x 90°	1
25	11	770	116-190	770	116-190	.....	SHUTTERSTAT.....	1
25	12	770	182-145	770	182-145	.....	ELBOW, 1/8 M x 1/8 F x 90°	1
25	13	770	182-157	770	182-157	.....	TEE, 1/8 M x 1/8 F x 1/4	1
25	14	896	6891	770	52-1	.....	COCK, drain.....	2
25	16	770	79-41	770	7-41	.....	CLAMP	1
25	18	770	A55-29-76	770	A55-29-76	.....	LINE, air, 1/4 x 40	1
25	19	770	991M1	770	991M-1	.....	SHUTTER ASSEMBLY.....	1
25	21	770	410X	770	410-X	.....	AIR CYLINDER.....	1
25	23	770	B5704	770	B-5704	.....	ROD, shutter control	1
25	25	770	53-315	770	53-315	.....	NUT, special	6
25	26	770	74-131	770	74-131	.....	PACKING.....	2
25	27	770	A55-2-24	770	A55-2-24	.....	LINE, air, 5/16 x 30	1
25	28	896	400X5	770	182-35	.....	ELBOW, 5/16 x 1/8 M x 90°	1
25	29	770	15-416	770	15-416	.....	COCK, shutoff.....	1
25	30	770	43-265	770	43-265	.....	AIR FILTER	1
26	3	770	B1234	770	B1234	.....	BODY, top filter.....	1
26	4	770	B1239	770	B1239	.....	PLUG, filler	1
26	5	770	B1414	770	B1414	.....	GASKET, filler plug	1
26	7	770	B1238	770	B1238	.....	FELT, with oiler.....	1
26	8	770	238XC	770	238XC	.....	FELT.....	1
26	9	770	B1236	770	B1236	.....	DISK, filter.....	1

26	10	770	238XB	770	238XB	.....	SCREEN, filter	1
26	11	770	B1235	770	B1235	.....	BODY, bottom filter	1
27	1	770	C2007	770	C-2007	.....	BODY, cylinder	1
27	3	770	864XA	770	864-XA	.....	PISTON HEAD, small	1
27	4	770	866XA	770	866-XA	.....	EXPANDER, piston cup	1
27	5	770	865XA	770	865-XA	.....	WASHER, piston cup	1
27	6	770	368X	770	368-X	.....	CUP, piston.....	1
27	7	.....	.....	.....	369-XA	.....	PISTON HEAD, large.....	1
27	8	770	370XB	770	370-XB	.....	FELT, lubricator	1
27	9	770	211X	770	211-X	.....	SPRING.....	1
27	10	770	291XB	770	291-XB	.....	ROD, piston (Includes piston head 369-XA).	1
		770	B2554A	770	B2554-A	.....	ARM, rocker (Includes items 11 through 19)	
27	11	770	B2555	770	B-2555		PIN, bearing, 3/8	1
27	12	.....	.....	.....	394-XE	.....	PLUG, expansion.....	2
27	13	770	B2556	770	B-2556	.....	PIN, bearing, 5/16	1
27	14	.....	.....	.....	354-XD	.....	PIN, bearing, drilled.....	1
27	15	.....	.....	.....	B-2554-1	.....	BELLCRANK, rh	1
27	16	.....	.....	.....	329-XD	.....	BLOCK, bearing.....	1
27	17	.....	.....	.....	B-2554-2	.....	BELLCRANK, lh.....	1
27	18	770	B2557	770	B-2557		PIN, cotter, special, 3/22 x 1 3/4	1
27	19				291-XA		BLOCK, connecting rod	1
27	20	770	B5697	770	B-697	.....	BLOCK, shutter.....	1
27	23	770	B3600-1R	770	B-3600-1R	.....	CLIP, look, rh	1
27	24	770	B3600--1L	770	B-36001L	.....	CLIP, lock, lh.....	1
27	25	770	363XB	770	363-XB	.....	RETAINER, dust cap	1
27	26	770	363XA	770	363-XA	.....	CAP, dust.....	1
27	27	770	363XC	770	363-XC	.....	FELT, dust cap	1
27	28	770	363XD	770	363-XD	.....	WASHER, dust cap	1
27	32	770	C2008	770	C-2008	.....	HEAD, cylinder.....	1

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
27	33	770	336X	770	336-X	.....	GASKET, cylinder head	1
27	34	770	370XA	770	370-XA	.....	FELT, bearing lubricator.....	1
27	35	770	363XE	770	363-XE	.....	RING, felt retainer	1
27	37	770	329XA	770	329-XA	.....	BRACKET, mounting	1
28	3	770	65-1044	770	65-1044	.....	PIPE, radiator inlet	1
28	5	770	4-223	770	4-223	.....	CAP, radiator	1
28	6	770	16-1176	770	16-1176	.....	GASKET, radiator cap.....	1
28	7	770	71-564	770	71-564	.....	RADIATOR	1
28	11	770	74-121-1	770	74-121-1	.....	REBOUND UNIT.....	4
28	12	770	34-410	770	34-410	.....	BOLT, special	2
28	15	770	52-14	770	52-14	.....	COCK, drain.....	1
28	18	770	47-758	770	47-758	.....	ROD, fan guard.....	3
28	20	770	65-1034	770	65-1034	.....	ELBOW, radiator.....	1
28	21	770	39-2328	770	39-2328	.....	SUPPORT, fan guard.....	1
28	22	770	42-133	770	42-133	.....	FAN	1
28	25	770	65-1041	770	65-1041	.....	CONNECTION, radiator-to-pump.	1
28	26	770	65-1040	770	65-1040	.....	CONNECTION, radiator water .... inlet.	1
28	27	770	16-1148	770	16-1148	.....	GASKET	1
28	30	770	156-286	770	156-286	.....	GUARD, fan.....	1
31	1	770	74-110-4	770	74-110-4	.....	PAD, battery clamp; rubber	4
31	2	770	83-342	770	83-342	.....	CLAMP, battery hold-down.....	2
31	5	770	61-452-5	770	61-452-5	....	LEAD ASSEMBLY, electrical: .... battery to battery.	1
31	6	770	61-452-6	770	61-452-6	.....	LEAD ASSEMBLY, electrical: .... battery to magnetic switch.	1

31	7	ORD	H015-0572884	770	117-69	.....	BATTERY, storage	4
31	8	770	74-128	770	74-128	.....	PAD, battery	2
31	11	770	74-121-1	770	74-121-1	.....	PAD, bumper	8
31	12	623	1119751	770	76-255	.....	SWITCH, magnetic	1
31	15	770	34-413	770	34-413	.....	SCREW, cap, special.....	1
31	16	770	20-460-2	770	20-460-2	.....	LOCKWASHER, special, 1/4	2
31	17	770	61-481-19	770	61-481-19	.....	STRAP, bond.....	1
31	18	770	119-191	770	119-191	.....	BOX, battery.	1
31	19	ORD	51A-1562-150	770	204-89	.....	SULPHURIC ACID, electrolyte.....	1
31	20	770	61-452-4	770	61-452-4	.....	LEAD ASSEMBLY, electrical:	1
						.....	ground to rear engine support.	
32	1	623	1118746	770	116-206	.....	REGULATOR.....	1
32	4	770	61-481-20	770	61-481-20	.....	STRAP, bond.....	1
32	5	770	20-40-4	770	20-464	.....	WASHER, lock, special.....	1
32	7	770	34-421	770	34-421	.....	SCREW, cap, special.....	1
32	8	770	18-7-30	770	167-30	.....	FILTER, bypass	1
32	9	770	20-460-2	770	20-62	.....	WASHER, lock, special.....	6
32	10	770	39-2339	770	39-2339	.....	SUPPORT, regulator.....	1
32	12	770	47-608-3	770	47-608-3	.....	SUPPORT, adjusting, generator ..	1
32	13	770	20-463-4	770	20-463-4	.....	WASHER, lock, special.....	3
32	14	770	34-396	770	34-396	.....	SCREW, cap, special.....	3
32	15	770	53-300	770	53-300	.....	NUT, hex, special.....	2
32	16	770	20460-5	770	20-460-5	.....	WASHER, lock, special.....	3
32	17	770	53-298	770	53-298	.....	NUT, hex, special.....	2
32	18	770	34-403	770	34-403	.....	SCREW, locking	1
32	19	623	1105964	770	108-177	.....	GENERATOR	1
32	23	770	39-2261	770	392261	.....	BRACKET, generator.....	1
32	24	770	20-40-6	770	204606	.....	WASHER, lock, special.....	3
32	25	770	61-483-1	770	61-483-1	.....	STRAP, bond.....	1
32	26	770	47-753	770	47-753	.....	ROD, generator.....	1
32	27	770	53-307	770	53-307	.....	NUT, hex, special.....	2

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
32	28	770	A61-306-47	770	A61-306-47	.....	LEAD, electrical	2
32	29	770	61-486-36	770	61-486-36	.....	LEAD, electrical	2
32	30	770	53-318	770	53-318	.....	NUT, hex, special.....	2
32	31	770	34-343	770	34-343	.....	SCREW, cap, special.....	1
32	32	770	20-460-1	770	2046-1	.....	WASHER, lock, special.....	2
32	33	770	53-272	770	53-272	.....	NUT, hex, special.....	4
32	34	770	20-460	770	20-460	.....	WASHER, look, special	2
32	35	770	61-481-13	770	61-481-13	.....	STRAP, bond.....	1
32	36	770	34-420	770	34-420	.....	SCREW, cap, special.....	1
32	38	770	34-367	770	34-367	.....	SCREW, cap, special.....	3
32	39	770	105-434	770	105-434	.....	STUD, generator body	1
32	40	770	167-28	770	167-28	.....	CAPACITOR.....	1
32	41	770	53-319	770	53-319	.....	NUT, hex,. special.....	1
34	3	770	22-384	770	22-384	.....	SPACER, rubber.....	2
34	4	623	1109168	770	107-123	.....	STARTING MOTOR.....	1
34	7	770	61-107-31	770	61-107-31	.....	CABLE, starter.....	1
34	8	770	34-400	700	34400	.....	U-BOLT.....	1
34	9	770	61-452-8	770	61-452-8	.....	CABLE, ground.....	1
34	10	770	53-299	770	53-299	.....	NUT, self-locking.....	2
34	11	770	105-426		105-426	.....	STUD.....	1
34	12	770	83-238	770	83-238	.....	CLAMP	1
37	1	770	39-2265	770	39-2265	.....	SUPPORT, front	2
37	2	770	39-2229	770	39-2229	.....	BRACKET, front.....	1
37	5	770	55-51-38	770	55-51-38	.....	TUBE, air cleaner.....	1
37	6	770	182-209	770	182-209	.....	ELBOW.....	1
37	7	770	39-2264	770	39-2264	.....	SUPPORT, side.....	2

37	9	770	39-2230	770	39-2230	.....	BRACKET, side support.....	1
37	12	770	182-133	770	182-133	.....	ELBOW, restricted	1
37	13	770	1A551-54	770	IA55-1-54	.....	TUBE ASS88EMBLY	1
37	14	770	182-209	770	182-20	.....	ELBOW.....	1
37	15	770	121-5	770	121-5	.....	TERMINAL.....	1
37	17	770	83-248	770	83-248	.....	CLAMP	1
37	18	770	13826	770	138-26	.....	PLUG A8BSEMBLY.....	1
37	19	770	20-477	770	20-477	.....	WASHER, special	1
37	20	770	125-115	770	125-115	.....	O-RING.....	1
37	21	770	53-304	770	53-304	.....	NUT, hex, special.....	2
37	22	770	20-461	770	20-461	.....	WASHER, look, special	2
37	23	770	83-136	770	83-136	.....	CLAMP	2
37	24	770	105-61	770	105-61	448-0877	STUD.....	2
37	25	770	20-460-2	770	204602	.....	WASHER, lock, special.....	1
37	26	770	34-351	770	34-351	.....	BOLT, hex hd, special.....	1
37	27	770	16-1060	770	16-1060	.....	GASKET	1
37	.....	770	A27-1554	770	A27-1554	.....	SHAFT ASSEMBLY.....	1
37	28	770	28-801	770	28301	.....	COUPLING	1
37	29	770	27-1554	770	27-1554	.....	SHAFT, drive	1
37	30	770	26600	770	26-600	.....	GEAR, drive shaft	1
37	31	770	17-488-2	770	17-488-2	.....	PIN, roll, 3/16 x 7/8.....	2
37	32	770	207-12	770	207-12	.....	ADAPTER.....	1
37	33	606	IAU401OUT	770	110-74	.....	DISTRIBUTOR.....	1
37	34	770	182-145	770	182-145	.....	ELBOW.....	1
37	35	770	55-7643	770	5764-3	.....	CABLE, ignition, No. 4	1
37	36	770	55-764-2	770	55-764-2	.....	CABLE, ignition, No. 3	1
37	37	770	55-764-1	770	55-764-1	.....	CABLE, ignition, No. 2	1
37	41	770	55-764	770	55-764	.....	CABLE, ignition, No. 1	1
38	3	623	1119751	770	76-255	.....	SWITCH, magnetic	1
31	6	770	61-452-6	770	61-452-6	.....	LEAD ASSEMBLY, electrical:	1

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
38	5	770	A61-306-102	770	A61-306-102	.....	WIRE ASSEMBLY, ammeter to ... magnetic switch.	1
38	6	770	A61-306-65	770	A61-306-65	.....	WIRE ASSEMBLY, starting ..... switch to magnetic switch.	1
38	7	770	A61306-97	770	A61-306-97	.....	WIRE ASSEMBLY, ground	1
38	8	770	61-107-31	770	61-107-31	.....	STARTER CABLE	1
38	9	770	61-481-19	770	61-481-19	.....	STRAP, bond.....	1
38	10	770	34-413	770	34-413	.....	SCREW, cap, hex hd, special	1
38	11	770	20-460-2	770	20-460-2	.....	WASHER, look, special	2
39	1	770	60-180	770	60-180	.....	AMMETER.....	1
39	2	770	53-312	770	53-312	.....	NUT, starting switch.....	1
39	3	770	151-262	770	151-262	.....	PANEL, instrument	1
39	4	770	20460-1	770	20-460-1	.....	WASHER, lock, special.....	2
39	5	770	182-145	770	182-145	.....	ELBOW.....	1
39	6	770	74-90	770	74-90	.....	ORIFICE, dampening.....	1
39	7	770	182-221	770	182-221	.....	FITTING, flexible.....	1
39	8	770	1A55-51-25	770	1A55-51-25	.....	TUBE ASSEMBLY	1
39	9	770	20-460	770	20-460	.....	WASHER, lock, special.....	6
39	10	770	83-97	770	83-97	.....	CLAMP	1
39	11	770	53-272	770	53-272	.....	NUT, hex, special.....	3
39	12	770	76-260	770	76-260	.....	SWITCH, starting.....	1
39	13	770	76-257	770	76-257	.....	SWITCH, ignition	1
39	14	896	200X3	770	182-12	.....	CONNECTOR.....	1
39	16	770	61-481-17	770	61-481-17	.....	STRAP, bond.....	1
39	17	770	34-346	770	34-346	.....	BOLT, hex hd, special.....	3
39	18	770	79-162	770	79--162	.....	CLAMP, 1/4	1

39	19	770	B79-10	770	B79-10	4310-430-0085 .	CLAMP, 5/16 x 1/4	2
39	20	896	400X4	770	182-33	.....	ELBOW, 1/4 x 1/8 M x 90°	1
39	21	770	A55-29-2	770	A55-29-2		TUBE ASSEMBLY	1
39	22	770	55-717-2	770	55-717-2	.....	TUBE, special	1
39	23	770	60-237-1	770	60-237-1	.....	GAGE, water temperature.....	1
39	24	770	83-247	770	83-247	.....	CLAMP	3
39	28	770	39-2267	770	39-2267	.....	BRACKET.....	2
39	32	896	200X3	770	182-13	.....	CONNECTOR.....	1
39	33	770	1A16-18	770	1A160-18	.....	LIGHT ASSEMBLY, pilot.....	1
		770	160-20	770	160-20	.....	LIGHT, incandescent	1
		770	A61-306-101	770	A61-306-101	.....	LEAD, electrical	1
		770	160-18	770	160-18	.....	LIGHT, pilot.....	1
39	34	770	60-153-8	770	60-153-8	.....	GAGE, oil pressure	1
39	35	770	120-31	770	120-31	.....	CONTROL, choke.....	1
39	36	162	644-0-160-3-1-2	162	60-83	.....	GAGE, air pressure.....	1
39	37	770	60-177-1	770	60-177-1	.....	HOURMETER.....	1
41	1	770	182-124	770	182-124	.....	TEE, 5/16 x 5/16 x 5/16.....	1
41	2	770	A55-2-93	770	A55-2-93	.....	TUBE ASSEMBLY	1
41	3	896	200X5	770	182-14	.....	CONNECTOR, 5/16 x 1/8 M.....	1
41	4	770	A55-2-10	770	A55-2-10	.....	TUBE ASSEMBLY	1
41	5	896	434X5	770	182-36	.....	ELBOW, 5/16 x 1/4 x 90°	1
41	6	770	77-207	770	77-207	.....	AIR FILTER, control line	1
41	7	896	400X4	770	182-33	.....	ELBOW, 1/4 x 1/8 x 90°	2
41	9	770	15-286	770	15-286	.....	VALVE, check and bleed	1
41	10	770	A55-29-93	770	A55-29-93	.....	TUBE ASSEMBLY	1
41	11	770	39-2285	770	39-2285	.....	BRACKET, mounting	1
41	14	770	182-82	770	182-82	.....	TEE, 1/4 x 1/4 x 1/8 M.....	1
41	15	770	A55--29-9	770	A55-29-9	.....	TUBE ASSEMBLY	1
41	16	896	200X4	770	182-13	.....	CONNECTOR, 1/4 x 1/8 M	1
41	17	770	182-188	770	182-188	.....	TEE, 1/8 F x 1/8 F x 1/8 M	2
41	18	896	6891	770	52-1	.....	COCK, drain.....	2
41	19	770	182-192	770	182-192	.....	ELBOW, 1/8 F x 1/8 M x 45°	1

Fig. No.	Index No.	Engineer stock No.		Manufacturer's part No.		Federal supply class and item identification	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
41	20	770	A116-194	770	A116-194	.....	SLOWDOWN A8SEMBLY	1
41	23	896	352X4	770	182-52	.....	ELBOW, 1/4 x 1/8 M x 45°	1
41	25	770	A55-29-63	770	A5-29-63	.....	TUBE ASSEMBLY	1
41	26	476	GI90-100	770	76-81-4	.....	PILOT, unloader.....	1
45	4	476	G1810	476	GI-810	4310-428-0615	CASTING, outer diaphragm	1
45	5	476	G112	476	GI-12	4310-428-0602	COUPLING, compression	2
45	6	476	G1I827	476	GI-827	.....	PIN, valve plunger.....	1
45	7	476	HP50	476	HP-50	428-0616	NUT, valve lock.....	2
45	8	476	GI121	476	GI-21	4310-428-605	BRACKET, valve.....	1
45	10	476	GI829	476	GI-829	.....	VALVE, unloader	1
45	11	896	W50X4	476	GI-6	.....	ELBOW, 1/8 x 1/4	2
45	12	476	GI132	476	GI-32	4310-428-0608	SCREW, trip lever.....	1
45	13	476	GI803	476	GI-803	4310-428-3793	TUBE, unloader valve	1
45	14	476	GI804	476	GI-804	4310-428-0613	TUBE, kickoff valve.....	1
45	15	476	GI1801	476	GI-801	4310-428-0612	CASTING, frame.....	1
45	16	476	GI800	476	GI-800	4280611	VALVE, kickoff	1
45	18	476	RA55	476	RA-55	428-0625	SCREW, adjusting	1
45	19	476	RA151	467	RA-151	.....	SPRING, main	1
45	20	476	RAB805	476	RAB-805	.....	ROD, valve plunger.....	1
45	21	476	F65	476	F-65	.....	BUSHING, trip lever.....	1
45	23	476	T54	476	T-54	428-0630	WASHER, felt	1
45	24	476	G812	476	G-812	4310-428-3795	LEVER, trip.....	1
45	26	476	86453B1	476	S6453B1	.....	NUT, lock.....	1
45	27	476	RA25	476	RA-25	.....	COVER, side	1
45	29	476	R82	476	R-82	428-0629	NUT, wing.....	1
45	30	476	R131	476	R-131	428-0628	SPRING, trip lever	1

45	32	476	RAB3	476	RAB-3		KEEPER, spring stud.....	1
45	33	476	R51	476	R-51		SPRING, extension.....	1
45	34	476	RAB800	476	RAB-800		ARM, main.....	1
45	35	476	RA47	476	RA-47		PIN, pivot, main arm	1
45	36	476	RA73	476	RA-73	4310-428-0626	FOOT, mounting.....	2
45	38	476	T97	476	T-97	4310-428-0632	CASTING, inner diaphragm	1
45	39	476	HP805	476	HP-805		DISK, diaphragm plunger...	1
45	40	476	R110	476	R-110	4310-428-0627	DIAPHRAGM, rubber.....	1
46	1	770	34-407	770	344.07		SCREW, stroke adjusting ..	1
46	2	770	53-297	770	53-297		NUT, looking.....	1
46	3	770	17-508	770	17-508		PIN, plunger.....	1
46	4	770	8-284	770	8-284		PLUNGER	1
46	5	770	125-118	770	125-118		O RING.....	1
46	6	896	6891	770	52-1		COCK, shutoff.....	1
46	8	770	116-194	770	116-194		BODY, slowdown.....	1
47	1	674	GC-802	770	116-126-2	2855-248-9271	GOVERNOR.....	1
47	2	770	A47-754	770	A47-754		ROD, control.....	1
47	5	770	16-1075	770	16-1075		GASKET, mounting	1
49			770	69-315	770	69-315	RECEIVER, air.....	1
49			770	71-563	770	71-563	AFTER COOLER	1
50	1	770	15-323-1	770	15-323-1		VALVE, service.....	2
50	4	770	31-455	770	31-455		RING, lock	2
50	5	770	54-287	770	54-287	4310-430-0671	FITTING, retainer.....	2
50	6	770	125-69	770	125-69	5330-234-8758	PACKING	10
50	7	770	54-296	770	54-296	4310-430-0672	FITTING, slip	2
50	8	770	180-9	770	180-9		REEL, hose	2
50	9	770	A17-465	770	A17'-465		LOCK PIN ASSEMBLY.....	2
50	12	770	63-128	770	63-128		COLLAR, look pin	2
50	14	770	24-352	770	24-352		SPRING, look pin.....	2
50	15	770	39-1695	770	39-1695		SUPPORT, lock pin	2
50	17	770	17-465	770	17-465		PIN, look.....	2
50	18	770	54-297	770	54-297	4310-430-0673	COUPLING, hose	2

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
50	19	770	83-251	770	83-251		CLAMP, hose.....	4
51	1	770	28-237	770	28-237		COUPLING, hose end	2
51	2	770	15-439	770	15-439		VALVE, service.....	2
51	6	770	15-405-1	770	15-405-1		VALVE, safety	1
51	10	770	54-315	770	54-315		FITTING, connection.....	1
51	11	770	16-967	770	16-967		GASKET, connection.....	1
51	12	770	53-269	770	53-269		NUT, self-looking, ½ -20	4
51	13	770	53-292	770	53-292		NUT, self-looking, ½ -20	6
51	14	770	105-431	770	105-431		STUD.....	6
51	15	770	65-1033	770	65-1033		CONNECTION.....	1
51	16	770	22-377	770	22-377		SLEEVE.....	1
51	17	770	16-1132	770	16-1132		PACKING	1
51	18	770	53-310	770	53-310		NUT, special	6
51	19	770	22-391	770	22-391		SPACER.....	6
51	20	770	20-480	770	20-480		WASHER, spring	84
51	21	770	B20-1	770	B20-1	5310-186-7403	WASHER, end.....	6
51	22	770	161132	770	16-1132		PACKING	1
51	25	770	22-377	770	22-377		SLEEVE.....	1
51	28	770	156-290	770	156-290		GUARD, flywheel (includes brace)	1
51	29						BRACE	1
51	32	770	39-2330	770	39-2330		BRACE, engine support.....	1
51	37	770	105-435	770	105-435		STUD.....	1
51	38	770	83-250	770	83-250		CLAMP, after cooler.....	1
51	40	770	71-563	770	71-563		AFTER COOLER.....	1
51	45	770	15-350-1	770	15-350-1		COCK, drain	2
51	46	770	33-562-7	770	33-562-7		NIPPLE, 1/4x 1	I

52		770	15 439	770	15-439	.....	VALVE, service	2
52	1				A132		NUT, wheel	1
52	2				E21380		PLATE, identification	1
52	3				E26		HANDWHEEL.	1
52	4				E72		NUT, packing	1
52	5				E2097		GLAND	1
52	6				A6804		PACKING.	1
52	7				E21140		BOX, stuffing	1
52	8				E2533		STEM, valve.	1
52	9				E2571		BODY, valve	1
52	10				E2556		DISK	1
52	11				E2548		BONNET	1
54	1	770	16-1181	770	16-1181	.....	GASKET, cover	1
54	2	770	14-995	770	14-995	.....	COVER, cylinder head	1
54	5	770	49-68	770	49-68	.....	BREATHER, crankcase	1
55	1	770	4-219	770	4-219	.....	CAP, weather	1
55	2	770	33-178-18	770	33-178-18	.....	NIPPLE, 2 ½ x 15	1
55	5	ir770	61039	770	65-1039	.....	CONNECTION	1
55	6	770	16-146	770	16-146	5330-255-1262	GASKET	2
55	8	770	A10-367	770	A10-367	.....	MANIFOLD, exhaust	1
55	9	770	20-390	770	20-390	.....	WASHER, special	2
55	13	770	54-342	770	54-342	.....	COVER, heat connection	1
55	16	770	73-303-1	770	73-303-1	.....	HOSE (See Stock No. ORD H007-0100160). ...	2
55	17	770	20-428	770	20-428	.....	WASHER, clamp	4
55	18	770	A10-382	770	A10-382	.....	MANIFOLD, intake	1
55	19	770	182-54	770	182-54	.....	ELBOW, 3/8 x1/4x 45°	1
55	20	770	A55-48-20	770	A55-48-20	.....	TUBE ASSEMBLY	1
55	21	770	116-36	770	116-36	.....	REGULATOR, ventilation	1
55	22	770	65-1035	770	65-1035	.....	CONNECTION	1
55	24	770	105-347	770	105-347	424-5415	STUD	6
55	25	770	16-1084	770	16-1084	.....	GASKET, manifold	1

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
57	3	770	A55-29-52	770	A55-29-52		TUBE ASSEMBLY	1
57	4	896	400X4	770	182-33		ELBOW	1
57	5	770	2A98-46-1	770	2A98-46-1		ROCKER ARM ASSEMBLY	8
57	6	770	106-159	770	106-159	422-9935	SCREW, adjusting	8
57	8	770	A39-1737	770	A39-1737		BRACKET, rocket arm	4
57	9	770	24-350	770	24-350		SPRING, spacer	3
57	10	770	24-394	770	24-394		SPRING, valve	8
57	11	770	31-475	770	31-475		ROTATOR, valve	8
57	12	770	31-463	770	31-463		RETAINER, spring lock	16
57	13	770	B20-1	770	B20-1	5310-1867403	WASHER, special	17
57	15	770	A27-1479	770	A27-1479		SHAFT, rocker arm	1
57	16	770	B105-12	770	B105-12		STUD	4
57	17	770	.....	770	2-262		CYLINDER HEAD (not serviced separately).	1
57	18	770	16-1170	770	16-1170		GASKET, cylinder head	1
57	19	770	15-438	770	15-438		INSERT, intake valve	4
57	20	770	15-389	770	15-389		VALVE, intake	4
57	21	770	15-388	770	15-388		VALVE, exhaust	4
57	22	770	15-434	770	15-434		INSERT, exhaust valve	4
57	23	770	58-52	770	58-52		GUIDE, valve stem	8
57	24	770	99-105	770	99-105		PUSH ROD	8
57	25	770	24-349	770	24-349		SPRING, end	2
57	26	770	31454	770	31-454		RETAINER, spring	2
59	1	770	08-346	770	08-346		RIVET, 3/16 x 3/8	4
59	3	770	24-379	770	24-379		SPRING,	4
59	4	770	14-975	770	14-975		COVER	4

59	5	770	16-1144-1	770	16-1144-1	.....	GASKET, cover	4	
‘59	6	770	43-169	770	43-169	.....	ELEMENT, filter	4	
59	7	770	16-914	770	16-914	250-0483	GASKET, port	2	
59	8	770	65-980-1	770	65-980-1	.....	CONNECTION, air filter	2	
59	9	770	105-423	770	105-423	.....	STUD, mounting	2	
59	10	770	20-474	770	20-474	.....	WASHER, copper	2	
59	11	770	53-293	770	53-293		NUT, self-locking	2	
60	1	770	16-146	770	16-146	5330-255-1262	GASKET, cover	2	
60	2	770	14-848	770	14-848		COVER	1	
60	5	770	B20-1	770	B20-1	5310-186-7403	WASHER, special	17	
60	7	770	A15-445	770	A15-445		VALVE ASSEMBLY	4	
60	8	770	B20-1	770	B2-1	5310186-7403	WASHER, special	16	
60	9	770	20-480	770	20-480		WASHER, spring	224	
60	10	770	22-391	770	22-391		SPACER	16	
60	11	770	53-310	770	53-310		NUT, hex, special	16	
60	12	770	105-428	770	105 428		STUD, valve mounting	16	
60	13	770	.....	770	2-263		HEAD, cylinder (not serviced separately).		1
60	14	770	16-1166	770	16-1166	.....	GASKET, manifold	4	
60	16	770	B20-1	770	B20-1	5310-186-7403	WASHER, special	8	
60	17	770	10-381	770	10-381	.....	MANIFOLD, air discharge	1	
60	18	770	105-429	770	105-429	.....	STUD, head mounting	17	
60	19	770	16-1169	770	16-1169	.....	GASKET, cylinder head	1	
61	1	770	68-894	770	68-894	.....	PANEL, side, front lh	1	
61	2	770	68-902	770	68-902	.....	DOOR, side, front hood	1	
61	3	770	68-903	770	68-903	.....	DOOR, side, rear hood	1	
61	4	770	68-896	770	68-896	.....	PANEL, side rear lh	1	
61	5	770	68-891	770	68-891	.....	PANEL, hood top	1	
61	6	770	68-801	770	68-802	.....	DOOR, hood top	1	
61	7	770	39-2271	770	39-2271	.....	SUPPORT, end, rear hood	1	
61	8	770	68-895	770	6-895	.....	PANEL, side, rear rh	1	
61	9	770	50-130	770	50-130	.....	HANDLE	8	

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
61	10	770	24-393	770	24-393		SPRING	10
61	11	770	68-897	770	68-897		PANEL, side, center-compressor	1
61	12	770	68-893	770	68-893		PANEL, side, front rh	1
61	13	770	68-890	770	68-890		PANEL, hood top	1
61	14	770	39-2270	770	39-2270		SUPPORT, end, front hood	1
61	15			770	156-285		GUARD, radiator, front	1
61	16	770	68-904	770	68-904		PANEL, side, center-engine	1
72		600	1539442	600	1539442		FUEL PUMP	1
72	1	600	5590155	600	5590155		BAIL, lifting	1
72	2	600	1537915	600	1537915		BOWL, fuel	1
72	3	600	5590038	600	5590038		GASKET, bowl	1
72	4	600	1537212	600	1537212		SCREEN	1
72	7	600	1537075	600	1537075		COVER, pump	1
72	8	600	1521953	600	1521953	5330-245-5512	GASKET, valve cage	2
72	9	600	5591860	600	5591860		VALVE CAGE ASSEMBLY	2
72	10	600	1521956	600	1521956		RETAINER, valve cage	1
72	11	600	132696	600	132696		SCREW, retainer	2
72	12	600	1537306	600	1537306		DIAPHRAGM ASSEMBLY	1
72	13	600	1523259	600	1523259		RETAINER, diaphragm spring	1
72	14	600	1537096	600	1537096		SPRING, diaphragm	1
72	15	600	5590582	600	5590582		BODY, pump	1
72	16	600	1522077	600	1522077		LINK, rocker arm	1
72	17	600	5591911	600	5591911		ARM, rocker	1
72	18	770	16-997	770	16-997		GASKET, mounting	1
72	19	600	1522024	600	1522024		BUSHING, rocker arm	1
72	20	600	1523118	600	1523118	5340-253-6885	SPRING, rocker arm	1

72	21	600	1522023	600	1522023	.....	PIN, rocker arm.....	1
72	22	600	1521288	600	1521288	.....	WASHER, retainer.....	1
73	2	699	C109-62	699	C109-62	.....	BRACKET, choke	1
73	4	699	T311S12-12	699	T311S12-12	.....	SCREW, with lockwasher	2
73	5	699	A4-40-1	699	A4-40-1	.....	BODY, air intake.....	1
73	6	699	C102-108	699	C102-108	.....	PLATE, choke.....	1
73	8	699	C112-6	699	C112-6	.....	SPRING, choke plate.....	1
73	9	699	T311S12-10	699	T311S12-10	.....	SCREW, with lockwasher	3
73	10	699	CT48-6	699	CT 48-6	.....	WASHER, well seal	2
73	11	699	C66-88-1-2	699	C66-88-1-2	.....	WELL, vent and idle.....	1
73	12	699	C143-22	699	C143.-22	.....	GASKET, bowl-to-intake	1
73	13	699	C108-121	699	C108-121	.....	SHAFT AND LEVER, choke	1
73	15	699	C85-108	699	C85-108	.....	FLOAT.....	1
73	16	699	C137-53	699	C137-53	.....	PLUG, axle retainer	2
73	17	699	C120-59	699	C120-59	.....	AXLE, float.....	1
73	18	699	CR41-1	699	CR41-1	.....	VALVE, check.....	1
73	19	699	C81-57-20	699	C81-57-20	.....	VALVE AND SEAT, fuel.....	1
73	20	699	T56-23	699	T56--23	.....	WASHER, fibre	3
73	21	699	CR137-27	699	CR137-27	.....	PLUG, bowl channel	1
73	22	699	C71-43	699	C71-43	.....	SCREW, adjusting, main jet.....	1
73	23	699	C52-7-42	699	C52.-7-42	2910-429--5096	JET, main	1
73	24	699	T56-24	699	T56-24	.....	WASHER, fibre.....	1
73	25	699	T56-10	699	T56-10	.....	WASHER, fibre.....	1
73	26	699	C150-27	699	C150-27	.....	SCREEN, fuel.....	1
73	27	699	C138-42	699	C138-42	.....	PLUG, channel	1
73	28	699	C29-1054	699	C29 -1054	.....	SHAFT AND LEVER, throttle.....	1
73	29	699	Cl11-62	699	Cll11-62	.....	SPRING, stop screw.....	1
73	30	699	T8S10-13	699	T8S10-13	.....	SCREW, stop	1
73	31	699	CT52-44	699	CT52-44	.....	RETAINER, shaft seal	1
73	32	699	CT48-5	699	CT48-5	.....	SEAL, shaft.....	1
73	33	699	CR9-36	699	CR9-36	.....	BUSHING, throttle shaft.....	2
73	34	699	C46-57	699	C46-57	.....	NEEDLE, idle adjusting.....	1

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
73	35	699	C111-191	699	C11-191	.....	SPRING, adjusting needle	1
73	36	770	16-1174	770	16-1174	.....	GASKET, flange	1
73	37	699	C135-25	699	C135-25	.....	PLUG, shaft hole	1
73	38	699	B12-11362	699	B12-11362	.....	BODY, throttle.....	1
73	39	699	C21-184	699	C21-184	.....	PLATE, throttle	1
73	40	699	T15B5-4	699	T15B5-4	.....	SCREW, throttle plate.....	2
73	41	699	C142-59	699	T142-59	.....	GASKET, bowl-to-body.....	1
73	42	699	B38-67-33	699	B38-67-33	.....	VENTURI.....	1
73	43	699	T311825-12	699	T311S25-12	.....	SCREW, with lockwasher	2
73	44	699	CR67-1	699	CR67-1	.....	BUSHING, idle channel	1
73	45	699	A3-110-1	699	A3-110-1	.....	BOWL, fuel	1
73	46	699	CR137-37	699	CR137-37	.....	PLUG, bowl channel	1
73	47	699	C41-27-12	699	C41-27-12	.....	VALVE, check, with jet.....	1
73	48	699	C138-23	699	C138-23	.....	PLUG, channel	1
73	49	699	B192-2	699	B192-2	.....	PUMP.....	1
73	50	699	C131-32	699	C131-32	.....	GUIDE.....	1
73	51	699	C63-193-2	699	C63-193-2	.....	SPACER.....	1
73	52	699	C111-190	699	C111-190	.....	SPRING, pump.....	1
		770	C181-322	770	C181-322	.....	GASKET SET, carburetor	1
		699	K11362	699	K11362	.....	REPAIR KIT, carburetor.....	1
76	1	770	B4085	770	B4085	.....	CAP, end	1
76	2	770	B4086	770	B4086	.....	GASKET.....	1
76	3	770	406XB	770	406XB	.....	FELT.....	1
76	4	770	407XA	770	407XA	.....	SCREEN.....	1
76	5	770	100XA	770	100XA	.....	CAP, seat	1
76	6	770	408XB	770	408XB	.....	GASKET, spacer	1

76	7	770	99XA	770	99XA	.....	NEEDLE	1
76	8	770	99XB	770	99XB	.....	PIN, push.....	1
76	9	770	B5147	770	B5147	.....	BODY	1
76	10	770	B4084	770	B4084	.....	FELT.....	1
76	11	770	407XB	770	407XB	.....	SCREEN.....	2
76	12	770	10CA770	770		.....	SCREW, with lockwasher	
76	14	770	B5149	770	B5149	.....	BASE ASSEMBLY.....	1
76	15	770	220X	770	220X	.....	SPRING, adjusting.....	1
76	16	770	B4082	770	B4082	.....	WHEEL, adjusting.....	1
76	17	770	B5240	770	B5240	.....	JACKET.....	1
76	18	770	B4087	770	B4087	.....	RING, seal	2
77	2	770	20-97	770	20-97	423-3771	WASHER, copper	8
77	3	770	14-909	770	14-909	.....	COVER, pump body	1
77	4	770	16-1056	770	16-1056	.....	GASKET, over	1
77	6	770	53-257	770	53-257	.....	NUT, special	1
77	7	770	101-34	770	101-34	.....	IMPELLER.....	1
77	10	770	81-188-2	770	81-188-2	.....	BODY, water pump.....	1
77	11	770	16-1061	770	16-1061	.....	GASKET, mounting	2
77	13	770	125-116	770	125-116	.....	SEAT, seal.....	1
77	14	770	125-97	770	125-97	.....	SEAL, pump	1
78	1	912	42-5416.500.200	623	124545	012-4545	KEY, Woodruff.....	1
78	2	623	1923299	623	1923299	.....	ARMATURE.....	1
78	3	623	1920926	623	1920926	.....	FIELD COIL	1
78	4	623	1920928	623	1920928	.....	FIELD COIL	1
78	5	623	1920280	623	1920280	.....	POLE SHOE.....	2
78	7	623	453294	623	453294	.....	WASHER, look	1
78	8	623	132250	623	132250	.....	SCREW	1
78	9	628	1914186	623	1914186	.....	STUD, terminal	1
78	10	623	1885090	623	1885090	.....	BUSHING, stud.....	2
78	11	623	1914751	623	1914751	.....	WASHER.....	2
78	12	623	1914579	623	1914579	.....	WASHER, lock	4

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
78	14	623	1914748	623	1914748	.....	COVER, band	1
78	15	623	1914750	623	1914750	.....	SCREW, pole shoe	2
78	16	623	1914580	623	1914580	424-3752	SCREW, cover plate	3
78	17	623	453296	623	453296	.....	WASHER, lock	3
78	18	623	1914752	623	1914752	.....	PLATE, end cover	1
78	19	623	1914753	623	1914753	.....	GASKET, cover plate	1
78	20	870	87503	623	954259	3110-156-3496	BEARING, commutator-end	1
78	21	623	1920284	623	1920284	.....	FRAME, commutator-end	1
78	22	623	1906935	623	1906935	.....	BRUSH	2
78	23	623	1914578	623	1914578	.....	WASHER, lock	2
78	24	623	454329	623	454329	.....	SCREW	2
78	25	623	1914741	623	1914741	.....	SPACER, brush arm	2
78	26	623	1904514	623	1904514	.....	ARM, brush	2
78	27	623	1905219	623	1905219	.....	SPRING, brush	2
78	28	623	1914580	623	1914580	.....	SCREW	3
78	29	623	1914123	623	1914123	.....	WASHER, lock	3
78	30	623	1916378	623	1916378	.....	PLATE, retainer, inner bearing	1
78	31	522	203KLL2	623	954143	3110-156-3502	BEARING, drive-end	1
78	32	623	1916377	623	1916377	.....	PLATE, retainer, outer bearing	1
78	33	623	1920290	623	1920290	.....	FRAME, drive-end	1
78	34	623	1916376	623	1916376	.....	COLLAR, spacing	1
78	35	770	42-117	770	42-117	.....	FAN	1
78	36	770	36-539	770	36-539	.....	PULLEY	1
78	37	623	1914754	623	1914754	.....	WASHER	1
78	38	623	1914279	623	1914279	.....	NUT, shaft	1
78	39	623	1914755	623	1914755	.....	BOLT, through	2

78	40	623	453301	623	453301	.....	WASHER, lock	2
81	1	623	1914807	623	1914807	.....	COVER.....	1
81	2	623	1914799	623	1914799	.....	SCREW, cover	2
81	3	623	1914805	623	1914805	.....	WASHER, insulating.....	2
81	4	623	1914762	623	1914762	.....	SUPPORT, contact	2
81	5	623	1912159	623	1912159	.....	SCREW, adjusting	1
81	6	623	1915896	623	1915896	.....	ARMATURE, relay.....	1
81	7	623	1922408	623	1922408	.....	SCREW, adjusting	1
		623	454504	623	454504	.....	SCREW, with look washer	2
81	8			623	1914816		WASHER, lock.....	2
81	9			623	1914817		SCREW	2
81	10	623	1914831	623	1914831	.....	SPRING.....	2
81	11	623	1922408	623	1922408	.....	SCREW, adjusting	1
81	12	623	1910182	62.3	1910182	.....	RESISTOR	1
81	13			623	1910181		RESISTOR	2
81	14	623	1914800	623	1914800	.....	SCREW, terminal	3
81	15	623	1914766	623	1914766	.....	GROMMET.....	3
81	16	623	1914801	623	1914801	.....	CLAMP, terminal.....	3
81	17	623	1914808	623	1914808	.....	SCREW	4
81	18	623	1878510	623	187510	2920-167-1675	GASKET, cover	1
81	19	623	1914803	623	1914803	.....	WASHER, lock	2
81	20	623	1914802	623	1914802	.....	CONNECTOR.....	1
81	21	623	1922996	623	1922996	.....	WASHER.....	2
81	22	623	1922599	623	1922599	.....	INSULATOR	4
		623	1915331	623	1915331	.....	BRACKET, shock mounting, ... three holes.	1
90	1	623	1914842	623	1914842	.....	WASHER, spacer, commutator- ..... end.	1
90	2	623	1919203	623	1919203	.....	ARMATURE.....	1
90	3	623	453325	623	453325	.....	KEY, woodruff.....	1
90	4	623	1919097	623	1919097	.....	FIELD COIL ASSEMBLY	1
90	5	623	1915386	623	1915386	.....	POLE SHOE.....	4

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
90	7	623	1913960	623	1913960	2920-428-6527	SCREW, pole shoe	8
90	8	623	1914873	623	1914873		STRIP, insulation	2
90	9	623	1910099	623	1910099	5305-428-6516	STUD, terminal	1
90	12	623	1915388	623	1915388	2920-428-6564	BEARING, center	1
90	13	623	1913958	623	1913958		BUSHING, terminal stud	3
90	14	623	1913959	623	1913959		WASHER, insulating	2
90	16	623	453297	623	453297		WASHER, lock, terminal stud	2
90	17	623	1904419	623	1904419		LOCKNUT, terminal stud	1
90	18	623	1902730	623	1902730		DRIVE HEAD ASSEMBLY	1
90	19	623	1902736	623	1902736		CLIP, locking	2
90	20	354	F4611	623	1902733		SCREW, head spring	1
90	21	354	F4609	623	1902732		SCREW, shaft spring	1
90	22	623	1915542	623	1915542		DRIVING SHAFT ASSEMBLY	1
90	23	623	1902731	623	1902731		SPRING, drive	1
90	24	623	1913967	623	1913967	428-6528	WASHER, spacer	1
90	25	896	3150X2	623	118831	119-4384	PLUG, pipe	1
90	26	623	1909654	623	1909654		WICK, oil	1
90	27	623	1904083	623	1904083		BUSHING, drive -end	1
90	28	623	1923322	623	1923322		HOUSING, drive	1
90	29	623	1914955	623	1914955	2920-428-6545	BAND, cover	1
90	31	623	453299	623	453299		WASHER, lock, brush lead	4
90	32	623	1906902	623	1906902		BRUSH	4
90	33	623	1904981	623	1904981		SPRING, brush	4
90	34	623	810620	623	810620		BUSHING, commutator-end	1
90	35	623	1914853	623	1914853		PIN, dowel	1
90	36	623	1919200	623	1919200		FRAME, commutator-end.	1

90	37	623	1914994	623	1914994	.....	PLUG, commutator-end	1
90	38	623	453467	623	453467	.....	WASHER, lock, through bolt	2
90	39	623	1915383	623	1915383	5305-428-6563	THROUGH-BOLT	2
91	1	623	1918610	623	1918610	.....	CASE AND COIL ASSEMBLY	1
91	2	623	1904966	623	1904966	.....	GASKET, terminal cap	1
91	3	623	1918616	623	1918616	.....	TERMINAL CAP ASSEMBLY	1
91	4	623	1914477	623	1914477	.....	SPRING, return	1
91	5	623	1918601	623	1918601	.....	PLUNGER	1
91	6	623	1914470	623	1914470	.....	CONTACT	1
91	7	623	1913041	623	1913041	.....	WASHER, spring retainer	1
91	8	623	1914478	623	1914478	.....	SPRING, contact	1
91	9	623	1913043	623	1913043	.....	WASHER, spring retainer, slotted	1
91	10	623	1904967	623	1904967	.....	GASKET, cover	1
91	11	623	1918618	623	1918618	.....	COVER	1
91	12	623	1914475	623	1914475	.....	SCREW, cover	3
91	13	623	1918621	623	1918621	.....	WASHER, rubber	3
91	14	623	1914474	623	1914474	.....	WASHER, plain	2
91	16	623	1923231	623	1923231	.....	STUD, terminal	2
91	17	623	1914472	623	1914472	.....	WASHER, plain	2
91	18	623	1918620	623	1918620	.....	WASHER, look	2
91	19	623	142212	623	142212	.....	NUT, terminal	2
92	1	606	SW213	606	SW-213	.....	RIVET, coupling	1
92	2	606	IGC1180	606	IGC-1180	.....	COUPLING, drive	1
92	3	606	1G90	606	IG-90	.....	WASHER, thrust, lower drive shaft.	1
92	4	606	IAU2064S1	606	IAU-2064S-1	.....	BASE ASSEMBLY	1
92	5	606	GT97	606	GT-97	.....	WICK, felt	1
92	6	606	X865A	606	X-865A	.....	PLUG, pipe	1
92	7	606	IAU1010	606	IAU-10	.....	WASHER, seal	1
92	8	606	XA751	606	XA-751	.....	SEAL, shaft	1
92	9	606	IG313	606	IG-313	.....	WASHER, thrust, upper drive shaft.	1

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
92	10	606	CT4002	606	CT-4002	.....	COIL, ignition	1
92	11	606	IAU6	606	IAU-6	.....	CLAMP, lead	2
92	12	606	IGC2168R	606	IGC-2168R	.....	WEIGHT, governor	2
92	13	606	X3028	606	X-3028	.....	SCREW, fillister head, No. 10-32 x 7/16	2
92	14	606	IAU14S	606	IAU-14S	.....	SPRING, governor	2
92	15	606	IGT70	606	IOT-70	.....	SPRING, antirattle	1
92	16	606	IAU1100RB	606	IAU-11OORB	.....	PLATE, cam and stop	1
92	17	606	X3030	606	X-3030	.....	SCREW, capacitor mounting	1
92	18	606	IAU3076L	606	IAU-3076L	.....	CAPACITOR	1
92	19	606	IG676	606	IG-676	2920-143-5304	CLIP, breaker arm spring	1
92	22	606	IGC175	606	IGC-175	.....	SCREW, clamp	1
92	23	606	IGP3028FS	606	IGP-3028FS	.....	CONTACT SET, breaker	1
92	24	606	X3032	606	X-3032	.....	SCREW, cap and cover	3
92	25	606	IAU1048	606	IAU-1048	.....	CAP ASSEMBLY	1
92	26	606	IAU52	606	IAU-52	.....	WASHER, cap sealing	4
92	28	606	IAU54	606	IAU-54	.....	PLUG, cap cover	1
92	29	606	XA744P	606	XA-744P	.....	O RING	2
92	30	606	IAU49	606	IAU-49	.....	COVER, distributor cap	1
92	31	606	XA744G	606	XA-744G	.....	O RING	1
92	32	o06	IAU1066	606	IAU-1066	.....	ROTOR	1
92	33	606	IAU24	606	IAU—24	.....	LEAD ASSEMBLY, primary	1
92	35	606	X2878	606	X-2878	.....	SCREW, breaker plate	2
92	36	606	IAU39	606	IAU-39	.....	HOLDER, breaker plate	2
92	37	606	IAU1004	606	IAU-1004	.....	PLATE, breaker	1
92	38	606	IGH28	606	IGH-28	.....	WICK, felt, cam sleeve	1

92	39	606	IG680	606	IG-680	.....	RING, snap, cam retaining.....	1
92	40	606	IGS99	606	IGS-99	.....	SPACER, cam	1
92	41	606	IAU1013R	606	IAU-1013R	.....	SHAFT, drive	1
92	42	606	X3123	606	X-3123	.....	SCREW, receptacle.....	1
92	44	606	IAU63	606	IAU-63	.....	RECEPTACLE.....	1
92	45	606	IAU62	606	IAU-62	.....	SEAL, receptacle	1
92	47	606	IAU29	606	IAU-29	.....	SPRING, gap contact.....	1
92	48	606	IAU1065	606	IAU-1065	.....	CONNECTOR.....	1
92	49	606	IAU41	606	IAU-41	.....	PLUG, drain.....	1
92	50	606	IAU42	606	IAU-42	.....	WASHER, drain plug	1
92	51	606	IG579A	606	IG-57AA	.....	BEARING, drive shaft	2
93	1	674	X1506	674	X-1506	.....	BEARING, oilite	1
93	2	245	6053	674	X-317	3110-157-0439	BEARING, thrust.....	2
93	3	674	G9845	674	G-9845	.....	SLEEVE, thrust.....	1
93	4	674	A2763	674	A-2763	.....	SPIDER AND SHAFT ASSEMBLY	1
93	5	674	X689	674	X-689	.....	CLIP, hair pin.....	8
93	6	674	G8887	674	8887	.....	PIN, weight	4
93	7	674	A2426	674	A-2426	.....	WEIGHT ASSEMBLY	4
93	8	674	G8260	674	G--8260	.....	WASHER, spacing.....	1
93	9	674	SN1236	674	SN-1236	.....	SPRING, governor.....	1
93	10	674	X1425	674	X-1425	5330-255-1255	GASKET	1
93	11	674	A2356	674	A-2356	.....	BASE AND BUSHING ASSEMBLY ...	1
93	14	674	G2608	674	G-2608	.....	WASHER, thrust.....	1
93	15	674	G9745	770	26-598	.....	GEAR	1
93	16	674	G8202	674	G-8202	.....	LEVER, throttle.....	1
93	17	674	G11222	674	G-11222	.....	BUTTON.....	1
93	18	912	42-7100.010.70	674	X-74	010-3573.....	PIN, taper	3
0								
93	19	674	X1552	674	X-1552	.....	OIL SEAL.....	1
93	20	674	X1904	674	X-1904	.....	RING, snap.....	2
93	21	245	6062	674	X-328	3110-158-8137	BEARING, ball.	2

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
93	22	674	G11601	674	G-11601	.....	SHAFT, rocker	1
93	23	674	G9042-15	674	G-9042-15	.....	BODY, governor.....	1
93	24			674	X-581		NAMEPLATE	1
93	25			674	X-455		PIN, escutcheon.....	2
93	26	674	G9595	674	G-9595	.....	PLUG.....	1
93	28	674	X171	674	X-171	.....	SCREW, cap	4
93	30	674	X1049	674	X-1049	.....	SCREW	2
93	31	674	G8123	674	G-8123	.....	LEVER, speed change.....	1
93	32	674	G8867	674	G-8867	.....	SHAFT.....	1
93	33	674	G9548	674	G-9548	.....	BRACKET, speed change.....	1
93	35	674	G8174	674	G-8174	.....	BRACKET.....	1
93	36	674	G8708-1	674	G-8708-1	.....	LEVER.....	1
93	37	674	G9820-2	674	G-9820-2	.....	YOKE	1
94	1	770	83-230	770	83-230	.....	STRAP.....	2
94	2	770	53-259	770	53-259	.....	NUT, special	2
94	3	770	20-447	770	20-447	.....	WASHER, special.....	2
94	4	770	34-311	770	34-311	.....	SCREW, cap, special	2
94	5	770	69-315	770	69-315	.....	RECEIVER, air (includes pipe plug)...	1
94	6						PLUG, pipe	1
94	7	770	39-2233	770	39-2233	.....	SUPPORT	2
94	8	770	47-752	770	47-752	.....	ROD.....	2
94	15	770	39-2327	770	39-2327	.....	BRACE	2
94	16	770	74-123	770	74-123	.....	PACKING	8
95	.....	770	83-249	770	83-249	.....	STRAP.....	2
95	.....	770	39-2338	770	39-2338	.....	SUPPORT, cross member	2

95		770	74-135	770	74-135	.....	PACKING, rubber	4
96	1	770	34-411	770	34-411	.....	SCREW, cap	2
96	2	770	53-278	770	53-278	.....	NUT	2
96	4	770	74-119	770	74119	.....	DAMPENER, vibration	2
96	5	770	31-477	770	31-477	.....	RETAINER	2
96	6	770	74-120	770	74-120	.....	REBOUND UNIT.....	2
96	7	770	B53-26	770	B53-26	.....	NUT	2
96	9	770	39-2234	770	39-2234	.....	SUPPORT, front engine.....	1
96	10	770	34-349	770	34-349	.....	SCREW, cap	4
96	11	770	20-46(1	770	20-460-1	.....	WASHER, look	8
96	12	770	61-481-4	770	61-481-4	.....	STRAP, bond.....	2
96	13	770	53-271	770	53-271	.....	NUT	4
96	14	770	53-316	770	53-316	.....	NUT	2
96	15	770	22-400	770	22-400	.....	SPACER.....	2
96	16	770	22-401	770	22-401	.....	SPACER.....	2
96	18	770	11-608	770	118l08	.....	FRAME.....	1
96	19	770	34-408	770	34-408	.....	SCREW, cap	2
96	20	770	34-395	770	34-395	.....	SCREW, cap	1
96	21	770	20-460-6	770	20-460-6	.....	WASHER, lock	2
96	22	770	61-483-1	770	61-483-1	.....	STRAP, bond.....	2
96	23	770	20460-6	770	20-460-6	.....	WASHER, look	2
96	24	770	34-346	770	34-346	.....	SCREW, cap	2
96	25	770	20-460	770	20-460	.....	WASHER, lock	4
96	26	770	61-481-17	770	61-481-17	.....	STRAP, bond.....	2
96	27	770	53-272	770	53-272	.....	NUT	2
97	1	770	103-32	770	103-32	.....	BAIL, lifting	1
97	3	770	20-476	770	20-476	.....	WASHER, copper.....	2
97	10	770	53-294	770	53-294	.....	NUT, plug	1
		770	1A207-14	770	1A207-14		DRIVE ASS88EMBLY.....	1
97	11	770	B16-137	770	B16-137	.....	GASKET.....	1
97	12	770	27-1559	770	27-1559	.....	SHAFT.....	1

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
97	13	.....	.....	770	207-14		BODY (not serviced separately).....	1
97	14	770	21-452	770	21-452	.....	BUSHING	2
97	15	770	26-00	770	26 00	.....	GEAR	1
97	16	770	17-488-2	770	17- 2	.....	PIN, roll.....	1
97	17	770	16-1046	770	16-1046	.....	GASKET	1
97	22	770	14-999	770	14-999	.....	COVER, front half	1
97	23	770	16-1082	770	16-1082	.....	GASKET, side	2
97	24	770	16-1079	770	16-1079	.....	GASKET, front.	1
97	27	770	24-390	770	24-390	.....	SPRING, leaf	1
97	28	770	16-1078	770	16-1078	.....	GASKET, rear.....	1
97	29	770	16-1175	770	16-1175	.....	GASKET	1
97	30	770	14-1000	770	14-1000	.....	COVER, rear half.....	1
98	1	770	60-238	770	6(0-238	.....	DIPSTICK	1
98	2	770	125-124	770	125-124	.....	SEAL, oil, rear.....	1
98	3	770	16-1085	770	16-1085	.....	GASKET, oil pan.....	2
98	4	770	3-250	770	3-250	.....	PAN, oil, upper.....	1
98	5	770	125-67	770	125-67	5330-241-9227	SEAL, oil, front.....	1
98	8	770	16-1177	770	16-1177	.....	GASKET, side	2
98	9	770	3-251	770	3-251	.....	PAN, oil, lower	1
98	14	770	14-996	770	14-996	.....	COVER, oil filter.....	2
98	15	770	16-1172	770	16-1172	.....	GASKET	2
98	16	876	P50	770	43-269	.....	ELEMENT, filter	2
98	17	876	125-121	770	125-121	.....	SEAL, oil filter	1
98	18	876	16-1178	770	16-1178	.....	GASKET, end	2
98	19	876	B16-137	770	B16-137	.....	GASKET	4

98	20	876	53-294	770	53-294	.....	NUT, special	4
98	21	876	33-606	770	33-606	.....	EXTENSION, pipe	1
98	22	876	125-112	770	125-112	.....	O-RING.....	1
100	4	770	65-1038	770	65-1038	.....	CONNECTION, suction line	1
100	5	770	17-456	770	17-456	.....	PIN, dowel	2
100	6	770	16-1063	770	16-1063	.....	GASKET, connection	1
100	7	770	14-907	770	14-907	.....	COVER, oil pump	1
100	8	770	64-66	770	64-66	.....	RING, snap.....	1
100	9	770	26-642-2	770	26-642-2	.....	GEAR, pump.	1
100	10	770	27-1555	770	27-1555	.....	SHAFT, drive	1
100	13	770	81-207	770	81-207	.....	BODY, oil pump	1
100	14	770	26-643	770	26-643	.....	GEAR, drive.....	1
100	16	770	182-218	770	182-218	.....	CONNECTOR, 5/8 X ½ MPT	2
100	17	770	A55-774	770	A55-774	.....	TUBE ASSEMBLY.....	1
100	18	770	27-1556	770	27-1556	.....	SHAFT, idler	1
100	20	770	26-642-1	770	26--642-1	.....	GEAR, idler.....	I
100	21	770	182-14	770	182-14	.....	CONNECTOR, 5/3 x 1/8 MPT.....	1
100	22	770	A55-2-2	770	A55-2-2	.....	TUBE ASSEMBLY.....	1
100	23	770	182-35	770	182-35	.....	ELBOW, 90°.	1
100	25	770	8-267	770	8.-267	.....	PLUNGER, pressure relief.....	1
100	26	770	24-347	770	24-347	.....	SPRING, pressure relief	1
100	28	770	43-270	770	43.-270	.....	SCREEN, intake	1
101	1	770	14-918	770	14-918	.....	COVER, gear (not serviced sepa-..... rately).	1
101	2	770	21-426	770	21-426	.....	BUSHING, gear cover.....	1
101	3	770	27-1455	770	27-1455	.....	SHAFT, accessory drive	1
101	5	770	26-617	770	26-617	.....	GEAR, accessory drive.....	1
101	6			770	270-3-1		HOUSING, accessory drive (not ..... serviced separately).	1
101	7	896	400X4	770	182-33	.....	ELBOW, 1/4X 1/8 x MPT x $90^{0.}$.....	1
101	8	770	A55-29-41	770	A55-29-41	.....	TUBE ASSEMBLY.....	1
101	9	770	26-599	770	26-599	.....	GEAR, governor drive.....	1

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
101	11	896	200X4	770	182-13	.....	CONNECTOR,, ¼ X 1/8 MPT	1
101	12	770	21-426	770	21-426	.....	BUSHING, drive housing	1
101	17	770	16-1080	770	16-1080	.....	GASKET	1
101	20	770	010-347	770	010-347	.....	PIN, taper	2
101	21	770	125-67	770	125-67	5330-241-9227	HALF, oil seal	1
101	22	770	19-127	770	19-127	.....	PLUG, thrust	1
101	23	770	125-13-1	770	125-13-1	.....	SEAL, oil	1
102	1	770	53-285	770	53-285	.....	NUT, lock	6
102	.....	770	A9-560	770	A9-560	.....	FLYWHEEL ASSEMBLY	1
102	2	770	9-560	770	9-560	.....	FLYWHEEL	1
102	3	770	26-267	770	26-267	.....	EAR, ring	1
102	4	770	39-2235	770	39-2235	.....	SUPPORT, rear engine.....	1
102	9	774)	60-239	770	60-239	.....	INDICATOR, timing	1
103	1	770	42-133	770	42-133	.....	FAN	1
103	2	770	34-383-1	770	34-383-1	.....	SCREW, cap	1
103	4	770	20-466	770	20-466	.....	WASHER, flat	1
103	5	770	36-630	770	36-630	.....	PULLEY, crankshaft	1
103	6	770	26-644	770	26-44	.....	GEAR, crankshaft	1
103	7	770	21465	770	21-465	.....	SHELL, bearing, main.....	8
103	.....	770	21-465-F	770	21-465-F	.....	SHELL, bearing, 0.010 in. Undersize	8
103	.....	770	21-465-K	770	21-465-K	.....	SHELL, bearing, 0.030 in. under size	8
103	.....		A5-391	770	A5-391	.....	CRANKSHAFT ASSEMBLY (in- ..... cludes gear 26-664).	1

103	8	770	A5-391-F	770	A&-391-F	.....	CRANKSHAFT ASSEM-BLY, 0.010 in. undersize.	1
103	.....	770	A5-391-K	770	A5-391-K	.....	CRANKSHAFT ASSEM-BLY, 0.030 in. oversize. iced separately).	1
103	9	770	21-464	770	21-464		SHELL, bearing, main	2
				770	5-391	.....	CRANKSHAFT (not serv-	1
103	.....	770	21F-464-F	770	21-464-F	.....	SHELL, bearing, main, 0.010 in. undersize.	2
103	.....	770	21-464-K	770	21-464-K	.....	SHELL, bearing, main, 0.030 in undersize.	2
103	10	770	34-399	770	34-399		BOLT, flywheel	6
103	13	770	105-419	770	105-419		STUD	4
104		770	A7-86-1	770	A7-8	.....	ROD ASSEMBLY, connecting (includes items 13 and 14).	8
104	1	770	.....	770		.....	CAP, bearing	8
104	2	770	21-444	770	21-444	.....	SHELL, bearing	16
104	.....	770	21-444-F	770	21-444-F	.....	SHELL, bearing, 0.010 in undersize.	8
104		770	21-444K	770	21 444K	.....	SHELL, bearing, 0.030 in. undersize.	8
104	3	.....					ROD, connecting	8
104	4	770	64-65-3	770	64-65-3	.....	RETAINER, pin	16
104	5, 11	770	A8-285	770	A8-285	.....	PISTON (includes pin)	8
104	.....	770	204-118	770	204-118	.....	RING SET, piston	8
104	6	770	18-311	770	18-311	.....	RING, oil control	8
104	7	770	18-313	770	18-313	.....	RING, third groove	8
104	8	770	18-314	770	18-314	.....	EXPANDER, ring	8
104	9	770	18-315	770	18-315	.....	RING, second groove	8
104	10	770	18-312	770	18-312	.....	RING, top groove	8
104	11	770	17-507	770	17-507	.....	PIN, piston	8

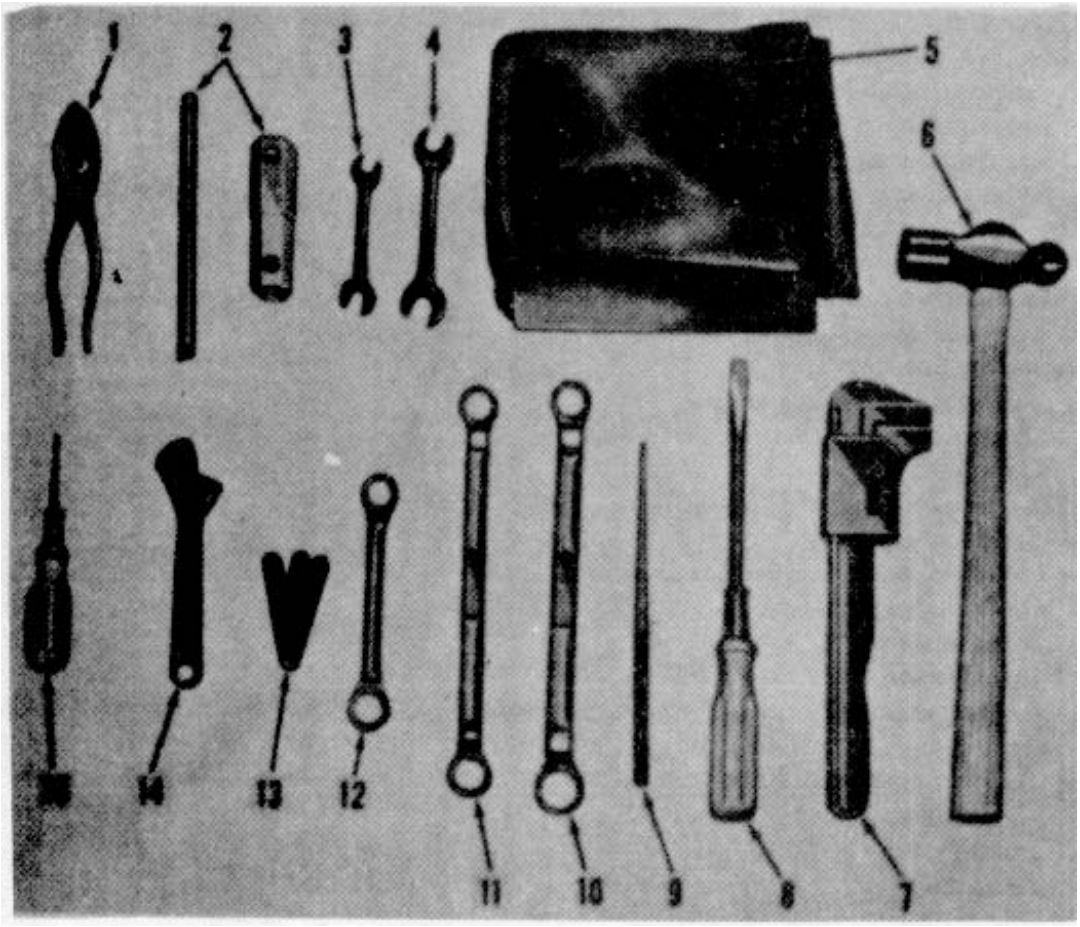
Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
104	12	770	21-449	770	21-449	.....	BUSHING, piston pin	8
104	13	770	34-401	770	34-401	.....	BOLT, connecting rod	16
104	14	770	53-247	770	53-247	.....	NUT, connecting rod bolt	16
105	.....	770	A6-175	770	A6-175	.....	CAMSHAFT ASSEMBLY	1
105	1	770	19-87-1	770	1987-1	.....	CUP PLUG, front	1
105	2	770	26-618	770	26-618	.....	GEAR, camshaft	1
105	3	770	6-175	770	6-175	.....	CAMSHAFT (not serviced separately).	1
106	1	770	1A100-196-1	770	1A100-196-1	.....	CRANKCASE	1
106	2	770	105-429	770	105-429	.....	STUD	17
106	.....	770	105-2813	770	105-2813	.....	STUD	5
106	.....	770	105-421	770	105-421	.....	STUD	4
106	.....	770	105-420	770	105420	.....	STUD	8
106	3	770	125-123	770	125-123	.....	RING, packing	16
106	4	770	175-18	770	175-18	.....	SLEEVE, cylinder	8
106	5	770	125-124	770	125-124	.....	HALF, oil seal	1
106	7	770	17-475	770	17-475	.....	PIN, dowel	10
106	8	770	4-211-1	770	4-211-1	.....	CAP, bearing, rear	3
106	9	770	34-296	770	34-296	.....	SCREW, cap	10
106	10	770	4-211-2	770	4-211-2	.....	CAP, bearing, center	1
106	11	770	4-211-3	770	4-211-3	.....	CAP, bearing, front	1
106	12	770	52-14	770	52-14	.....	COCK, drain	2
106	13	770	21-442	770	21-442	.....	BUSHING, camshaft, intermediate and center.	3
106	14	770	21-443	770	21-443	.....	BUSHING, camshaft, front and rear.	2

106	16	770	23-23	770	23-23	.....	TAPPET, valve	8
107	2	770	24-54-1	770	24-54-1	.....	SPRING, hinge pin.....	2
107	3	770	53-302	770	53-302	.....	NUT	12
107	6	770	119-192	770	119-192	.....	TOOL BOX, compressor-side	1
107	7	770	156284	770	156-284	.....	GUARD, mud.....	2
107	8	770	68-900	770	68900	.....	RUNNING BOARD, front	1
107	9	770	22-394	770	22-394	.....	SPACER, front.....	2
107	11	770	119-194	770	119-194	.....	TOOL BOX, front	1
107	15	770	53-292	770	53-292	.....	NUT	2
107	18	770	83-244	770	83-244	.....	STEP, running board	2
107	19	770	53-309	770	53-309	.....	NUT	8
107	20	770	53-292	770	53-292	.....	NUT	14
107	21	770	53-292	770	53-292	.....	NUT	4
107	22	770	39-2294	770	39-2294	.....	SUPPORT, side tool box.....	4
107	2a	770	119-193	770	119-193	.....	TOOL BOX, engine-side	1
107	24	770	A39-2300	770	A39-2300	.....	BRACE, rear door	2
107	27	770	74-129	770	74-129	.....	DAMPENER, vibration	8
107	29	770	53-302	770	53-302	.....	NUT	32
107	30	770	53-292	770	53-292	.....	NUT	8
107	33	770	53-292	770	53-292	.....	NUT	24
107	34	770	68-901	770	68-901	.....	RUNNING BOARD, rear	1
107	35	770	22-395	770	22-395	.....	SPACER, rear.....	2
107	36	770	53-292	770	53-292	.....	NUT	4
107				770	A73-301		HOSE ASSEMBLY, in front tool box.	1
107				770	A73-302		HOSE ASSEMBLY, in tool boxes.....	4
107				770	A73-301-1		HOSE ASSEMBLY, in tool boxes.....	5
108	1	770	53-292	770	53-292	.....	NUT	8
108	3	770	74-88	770	74-88	.....	DAMPENER, vibration	8
108	4	770	24-391	770	24-391	.....	SPRING.....	4
108	5	770	38-454	770	38-454	.....	PLATE	4
108	6	770	34-417	770	34-417	.....	SCREW, cap	8

Fig No.	Index No.	Engineering stock No.		Manufacturer's part No.		Federal supply class and item identification No.	Description	Quantity per unit
		Code No.	Part No.	Code No.	Part No.			
108	7	770	24-392	770	24-392	.....	PLATE, spring.....	8
108	8	770	38-455	770	38-455	.....	PLATE, threaded	4
108	9	770	22-398	770	22-398	.....	SPACER, 1/8.....	4
108	10	770	22-298-1	770	22-298-1	.....	SPACER, 3/8.....	4
108	11	770	192-5	770	192-5	.....	BUMPER	4
108	12	770	105-433	770	105-433	.....	STUD.....	4
108	15	770	B20-1	770	B20-1	5310-186-7403	WASHER, flat	8
108	16	770	34-235	770	34-235	.....	SCREW, cap	8
				770	15A88-237		MAINTENANCE TOOLS AS-..... SEMBLY.	1
110	1			770	88-40	.....	PLIERS.....	1
110	2			770	88-83	....	WRENCH, spark plug and com- ..... pressor nuts.	1
110	3			770	88-11	.....	WRENCH, open end, 3/8 x 7/16	1
110	4			770	88-9	.....	WRENCH, open end, ½ x 9/16	1
110	5			770	88-237	.....	TOOL BAG	1
110	6			770	88-36	.....	HAMMER.....	1
110	7			770	88-72	.....	WRENCH, 11 in. automobile.....	1
110	8			770	88-74	.....	SCREW DRIVER, 6 in	1
110	9			770	88-44	.....	PIN PUNCH	1
110	10			770	88-17	.....	WRENCH, box socket, 5/8 x ¾	1
110	11			770	88-363	.....	WRENCH, box socket, 11/16 x 13/16·	1
110	12			770	88-390	.....	WRENCH, dwarf box, 5/8 x ¾	1
110	13			770	88-10	.....	FEELER GAGE	1
110	14			770	88-260	.....	WRENCH, adjustable	1
110	15			770	88-229	.....	SCREWDRIVER, 2 ½ in	1

APPENDIX III

ON-EQUIPMENT TOOLS



1 Pliers
2 Spark plug wrench
3 Open end wrench - ½ x 9/16"
4 Open end wrench 3/8 x 7/16"
5 Tool bag
6 Ball peen hammer
7 Monkey wrench
8 Screwdriver
9 Drift
10 Box socket wrench 11/16" x 13/16”
11 Box socket wrench ½” x 9/16”
12 Box socket wrench 5/8" x ¾”
13 Feeler gage
14 Crescent wrench
15 Screwdriver

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