Ref

TM 8-630

WAR DEPARTMENT TECHNICAL MANUAL

X-RAY FIELD UNIT GENERATOR ITEM 9606000

WAR DEPARTMENT • NOVEMBER 1944

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X-RAY FIELD UNIT

GENERATOR

ITEM 9606000

WAR DEPARTMENT • NOVEMBER 1944

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WAR DEPARTMENT,
WASHINGTON 25, D. C., 30 NOVEMBER, 1944.

TM 8–630, X-ray Field Unit Generator, Item 9606000, is published for the information and guidance of all concerned.

[AG 300.7 (18 Oct 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

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IR 8 (1): T/O & E 8–580, Conval Hosps.
IC 8: T/O & E 8–187, 8–667.

For explanation of symbols, see FM 21–6.

CONTENTS

PART ONE

INTRODUCTION

Section I. GENERAL

1. SCOPE. a. These instructions are published for the information and guidance of the personnel to whom this equipment is assigned. They contain information on the operation and maintenance of the equipment as well as descriptions of the major units and their functions in relation to the other components of the equipment. They apply only to the Medical Department Item No. 9606000, X-ray field unit generator, and are arranged in five parts: Part One—Introduction; Part Two—Operating instructions; Part Three—Maintenance instructions; Part Four—Auxiliary equipment; Part Five—Repair instructions.

b. Supply Catalogs, Field Manuals, Technical Manuals, and other publications applicable to the material covered by this manual are listed in reference section at end of manual.

2. RECORDS. AR 850–15 and current directives direct that WD, Form 48, Drivers Trip Ticket and Preventive Maintenance Service Record and WD, AGO Form 461, Work Sheet for Wheeled and Half-track Vehicles, or an adapted form of each be used to record the various preventive maintenance services performed.

Section II. DESCRIPTION AND DATA

3. DESCRIPTION. a. General information. The X-ray field unit generator is a self-contained unit completely inclosed in a carrying case. The item is a gasoline engine powered electrical generator designed to furnish sufficient electrical energy of the proper wave form to operate Medical Department items No. 9608508 and No. 9608510 X-ray field unit machines, and 9621500 X-ray field unit, fluoroscopic and foreign body localization.

b. Identification information. The carrying case is marked with Medical Department item No. 9606000. If the plant is separated from the carrying case, it can be identified by the manufacturers nameplate on the blower housing showing the model No. OTC-38 or OTC-38B. A similar unit showing model No. OTC-1 is not to be confused with the X-ray field unit generator.

c. Models. At present two models, OTC–38 and OTC–38B, are supplied under Medical Department item No. 9606000. The electrical output of both models is identical. External appearance is very similar. The construction of the models varies in two main respects. Model OTC–38 has a plunger type oil pump with oil lines to the front and rear crankshaft bearings whereas model OTC–38B has a gear type oil pump and a crankcase with drilled oil passages. Instructions contained in this manual apply to either model unless one model is specifically stated at beginning of section, paragraph, or subparagraph.

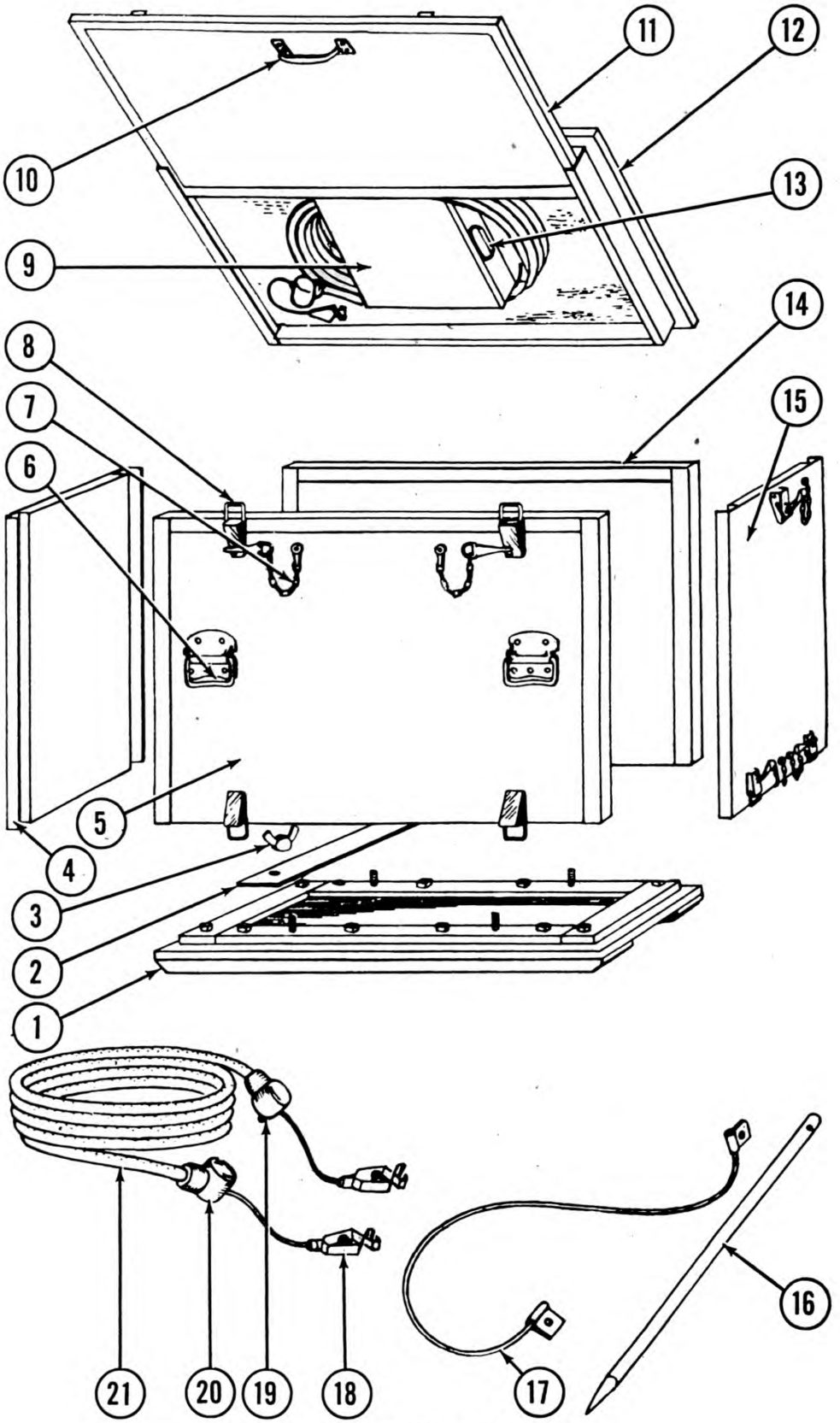


Figure 1. Carrying case assembly.

INTRODUCTION

	Med. Dept. No.	Nomenclature
1.	9R00912	Panel, base and skid.
2.	9R00898	Bracket, clamp.
3.	SR00685	Nut, 5/16 x 18, wing.
4.	9R00892	Panel, left side.
5.	9R00910	Panel, front.
6.	9R00890	Handle, carrying.
7.	9R00902	Snap and chain, harness.
8.	9R00900	Clasp, trunk.
9.	9R00896	Box, tool and spare part.
10.	9R00916	Handle, cover, wire compartment.
11.	9R00904	Cover, wire compartment.
12.	9R00906	Panel, top, cable compartment.
13.	9R00918	Handle, box, tool and spare part.
14.	9R00908	Panel, back.
15.	9R00894	Panel, right side.
16.	9R00810	Rod, grounding.
17.	9R00812	Cable, grounding.
18.	9R00820	Clip, spring.
19.	9R00818	Plug, angle-cord.
20.	9R00816	Connector, angle-cord.
21.	9R00814	Cable, No. 12, type S, 3 conductor.

Figure 1. *Carrying case assembly—Continued.*

X-RAY FIELD UNIT GENERATOR

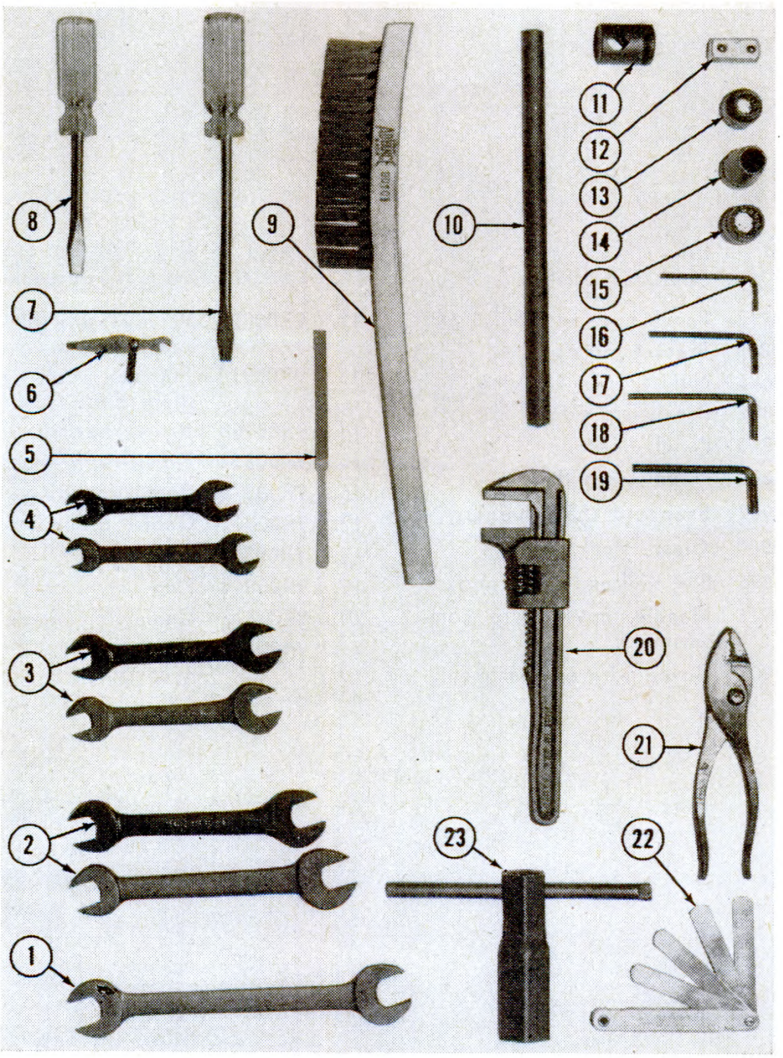


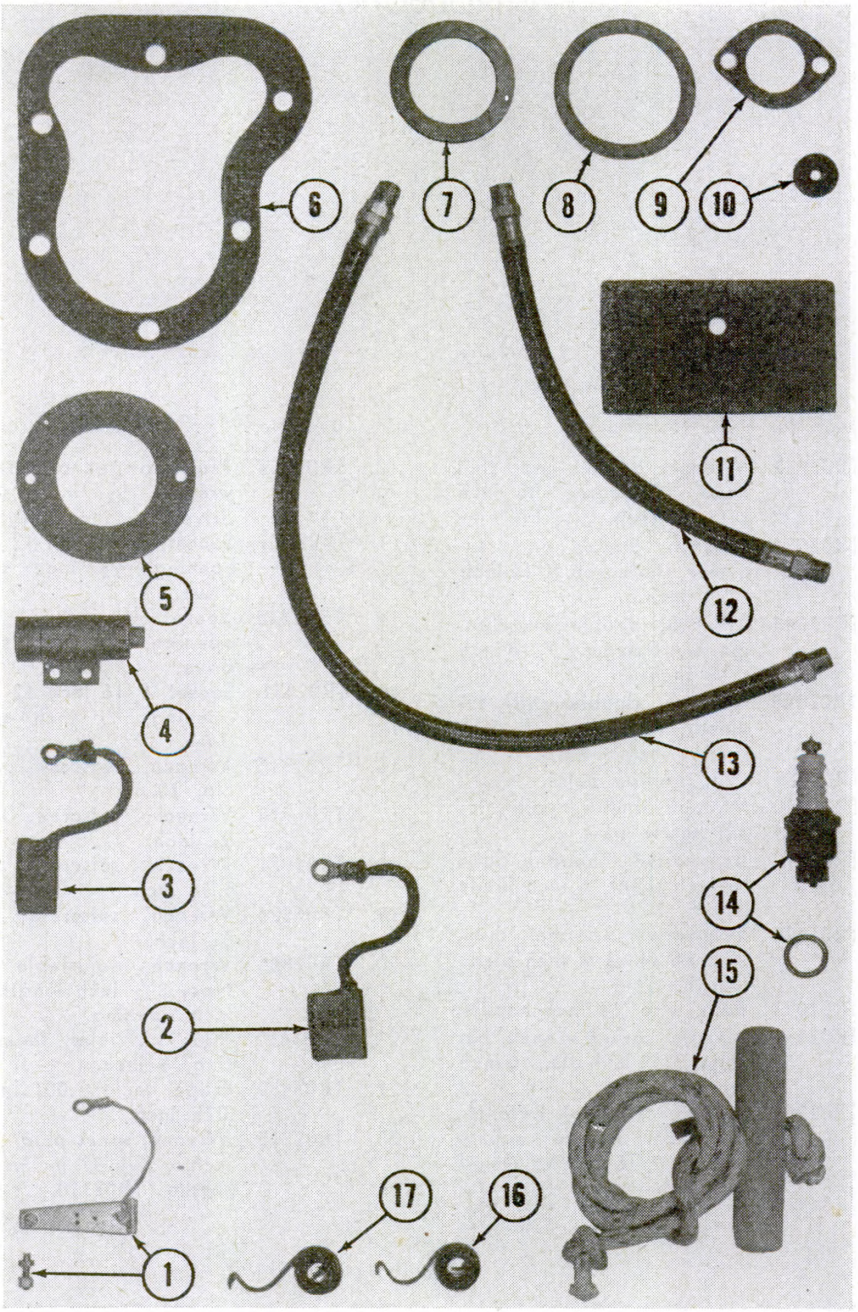
Figure 2. Tools with X-ray field unit generator.

INTRODUCTION

	Med. Dept. No.	Nomenclature
1.	TR02057	Wrench, double end, thin head, 15 degree, 5/8 inch x 11/16 inch.
2.	TR02054	Wrench, double end, engineer, 15 degree, 9/16 inch x 5/8 inch.
3.	TR02048	Wrench, double end, engineer, 15 degree, 7/16 inch x 1/2 inch.
4.	TR02045	Wrench, double end, engineer, 15 degree, 3/8 inch x 7/16 inch.
5.	TR01355	File, ignition point.
6.	TR02080	Wrench, ignition point, for nut screw sizes.
7.	TR01710	Screwdriver, normal duty, 1/4 inch shank, 6 inch blade length.
8.	TR01705	Screwdriver, normal duty, 1/4 inch shank, 4 inch blade length.
9.	TR01033	Bush, wire, 14 inch handle.
10.	TR02315	Handle, socket wrench, bar type, 9/16 inch dia., 10 inch length.
11.	TR02255	Adapter, socket wrench, 1/2 inch female square drive, 9/16 inch round handle hole.
12.	TR02355	Plug-connector, socket wrench, 1/2 inch square drive, 1 1/4 inch length.
13.	TR02425	Socket, 7/16 inch 12 point opening, 1/2 inch square drive.
14.	TR02428	Socket, 1/2 inch 12 point opening, 1/2 inch square drive.
15.	TR02431	Socket, 9/16 inch 12 point opening, 1/2 inch square drive.
16.	TR01915	Wrench, setscrew, Allen, No. 10.
17.	TR01918	Wrench, setscrew, Allen, 1/4 inch.
18.	TR01921	Wrench, setscrew, Allen, 5/16 inch.
19.	TR01924	Wrench, setscrew, Allen, 3/8 inch.
20.	TR01865	Wrench, adjustable, auto type, 8 1/2 inch length, 2 5/8 inch opening.
21.	TR01610	Plier, slip joint, shear cutting, 6 inch.
22.	TR01430	Gage, feeler, .001 inch to .025 inch.
23.	TR02215	Wrench, spark plug, 27/32 inch x 1–1/32 inches: with handle, TR02310.

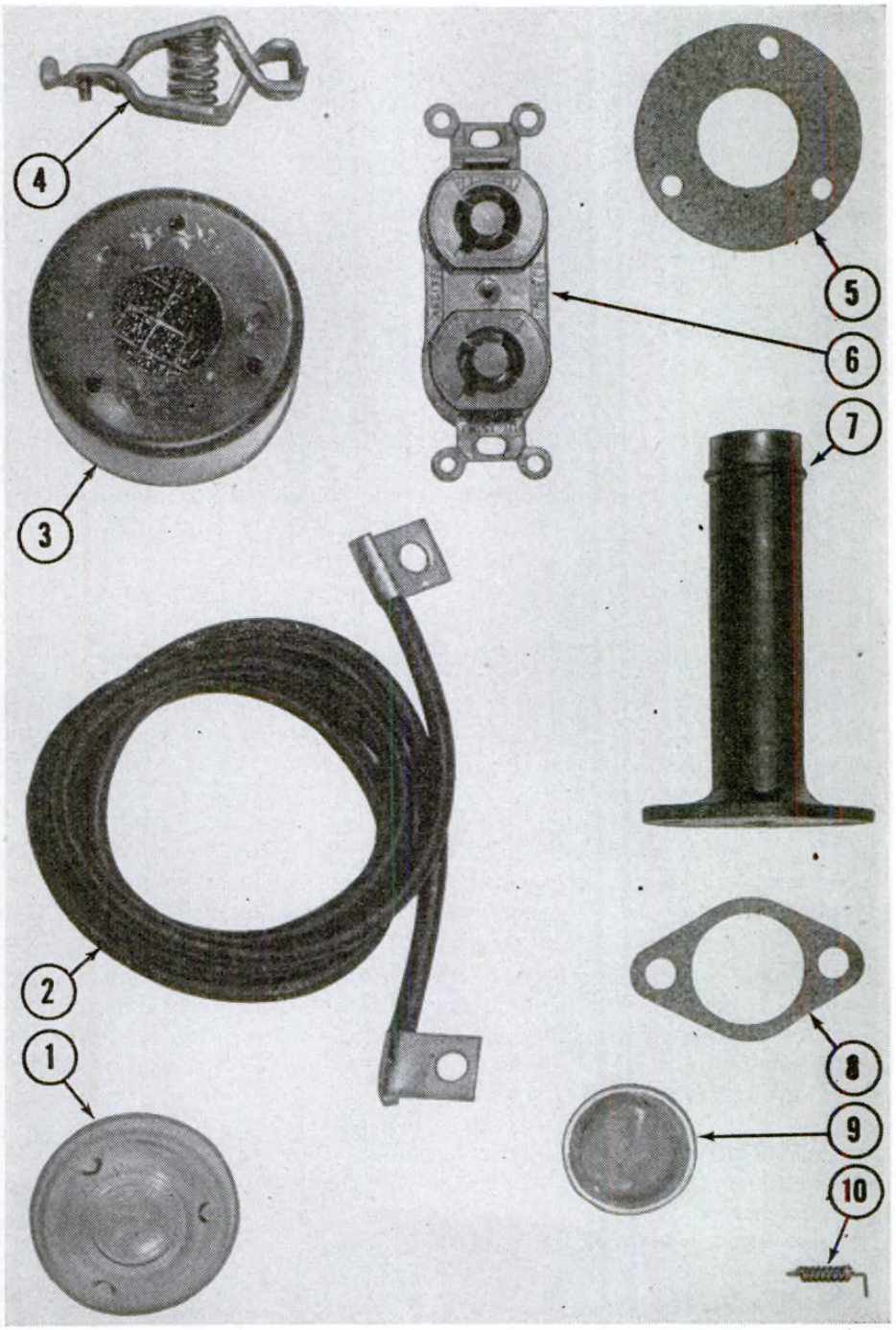
Figure 2. Tools with X-ray field unit generator—Continued.

X-RAY FIELD UNIT GENERATOR



	Med. Dept. No.	Nomenclature	Quantity
1.	9R00772	Arm and points, breaker.	1
2.	9R00798	Brush, AC.	4
3.	9R00788	Brush, DC.	4
4.	9R00766	Condenser, magneto	1
5.	9R00804	Gasket, bearing cover.	2
6.	9R00612	Gasket, Cylinder head	4
7.	9R00830	Gasket, filler cap.	2
8.	9R00756	Gasket, fuel pump, bowl.	2
9.	9R00648	Gasket, manifold.	8
10.	9R00832	Gasket, shut-off screw.	4
11.	9R00628	Gasket, valve cover.	4
12.	9R00744	Line, fuel, carburetor.	1
13.	9R00746	Line, fuel, tank.	1
14.	9R00780	Plug, spark: with gasket.	4
15.	9R00826	Rope, starter.	2
16.	9R00800	Spring, brush, AC.	4
17.	9R00794	Spring, brush, DC.	4

Figure 3. Spare parts with X-ray field unit generator.



	Med. Dept. No.	Nomenclature	Quantity
1.	9R00754	Bowl, fuel pump.	1
2.	9R00812	Cable, grounding.	1
3.	9R00734	Cleaner, air.	1
4.	9R00820	Clip, spring.	1
5.	9R00738	Gasket, air cleaner.	4
6.	9R00822	Receptacle, duplex.	1
7.	9R00736	Screen, breather tube.	1
8.	9R00750	Gasket, fuel pump adapter and breather tube.	4
9.	9R00752	Screen, fuel pump.	1
10.	9R00776	Spring, breaker.	1

Figure 4. Additional spare parts for second echelon.

d. Manufacturer. At present this item is manufactured for the Medical Department by D. W. Onan and Sons, Minneapolis, Minnesota.

4. TABULATED DATA. a. General. (1) *Engine.*
Two cylinder opposed type.
Four-stroke cycle type.
Air cooled.
Bore, 2¾ inches.
Stroke, 2¼ inches.
Compression ratio, 5.9 cubic inches to 1 cubic inch.
(2) *Generator.*
Four pole, self-excited type.

b. Performance. (1) *Engine.* Develops 3.7 horsepower at 1800 revolutions per minute.
(2) *Generator.* Furnishes 120-volt single phase 60-cycle alternating current. Develops 2000-watt unity power factors.

c. Capacities. (1) *Engine fuel.* 2-gallon fuel tank.
(2) *Engine oil.* 2½ quarts.

Section III. TOOLS, PARTS, AND ACCESSORIES

5. TOOLS. Tools for use by the operator of the equipment are shipped with the unit. They are carried in the tool and spare part box (fig. 1, (9)) within the cable compartment top panel. (See fig. 1, (12).) The contents of the tool box are illustrated and listed in figure 2.

6. PARTS. a. Spare parts with unit. Certain spare parts for replacement by the operator of the equipment and the organizational maintenance personnel are shipped with the unit. They are stowed in the tool and spare part box. The parts are illustrated and listed in figure 3.

b. Second echelon spare parts. All spare parts with the unit are supplied for replacement by the maintenance personnel of the using organizations. The additional spare parts supplied to the using organization are illustrated and listed in figure 4. The conductor cable (fig. 1, (21)) is also supplied to the using organization as a spare part.

7. ACCESSORIES. a. Carrying case assembly. (See fig. 1.)
b. Conductor cable, plug (fig. 1, (19)) connector (fig. 1, (20)), and spring clips (fig. 1, (18)).
c. Grounding rod. (See fig. 1, (16).)
d. Grounding cable. (See fig. 1, (17).)

PART TWO
OPERATING INSTRUCTIONS

Section IV. GENERAL

8. SCOPE. Part two contains information for the guidance of the personnel responsible for the operation of this equipment. It contains information on the operation of the equipment with the description and location of the controls and instruments.

Section V. SERVICE UPON RECEIPT OF EQUIPMENT

9. NEW EQUIPMENT. a. Unpacking. (1) Remove the packing crate.
(2) Place the cased unit in the location selected.
(3) Remove the cable compartment top panel. (See fig. 1, (12).)
(4) Remove the front panel. (See fig. 1, (5).)
(5) No further unpacking is necessary to put the unit in operation.

b. Assembling. The unit is completely assembled within the carrying case when shipped. No mechanical assembling of engine or generator is necessary upon receipt of equipment.

c. Inspecting. (1) *Visual.* Make a thorough visual inspection for any apparent damage or shortage.

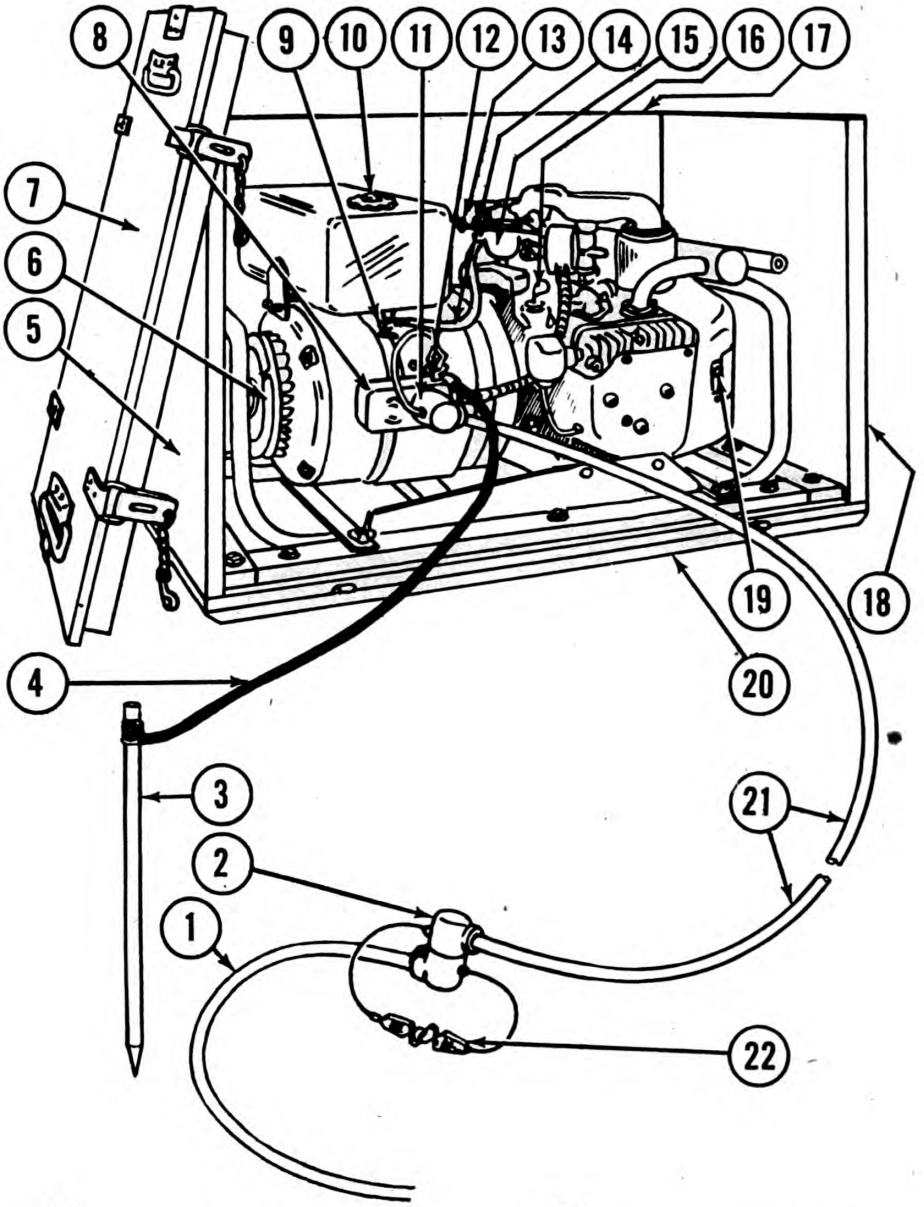
(2) *Running test.* Follow procedure for running test contained in items 1 through 14. (See par. 33.) Run the unit for a minimum of 30 minutes.

d. Installing. (1) *Location.* As this plant is auxiliary to the X-ray field unit it will frequently be operated in the open. Select a place as free from sand, mud, or dust as possible. If it can be anticipated that the plant will remain for some time in one location, it is advisable to build an inclosure about it. To further protect it from dust or dampness, it should be elevated from the ground on a platform of convenient height. At all times keep the plant in an upright level position.

(2) *Ventilation.* Ventilation is very necessary to prevent serious damage due to overheating. Any gasoline engine develops heat which must be removed from the compartment or inclosure in which the engine is operating. Any inclosure must have sufficient openings or removable panels, depending on climatic conditions, to permit adequate cooling of this engine.

(3) *Exhaust.* If the plant is to be used indoors the exhaust gases must be piped from the building. Use a flexible metal tube not less than 1 inch in diameter between the exhaust muffler and a solid pipe or vent to the outside. The flexible tube is necessary to take up the engine vibrations and permit a leakless connection. A vent pipe with a length of not more than 6 feet will require a diameter of 1 inch. To prevent any back pressure, an additional ½ inch must be added to the vent pipe diameter for each additional 6 feet of length. Be certain the exhaust vent extends far enough from or above the building to eliminate the possibility of the exhaust gases being carried back

X-RAY FIELD UNIT GENERATOR



	Med. Dept. No.	Nomenclature
1.	9R05388	Cable, line, complete: Assembly; for X-ray field unit, machine.
2.	9R00816	Connector, angle-cord.
3.	9R00810	Rod, grounding.
4.	9R00812	Cable, grounding.
5.	9R00892	Panel, left side.
6.	9R00838	Pulley, starter rope.
7.	9R00906	Panel, top, cable compartment.
8.	9R00869	Outlet, conductor cable.
9.	9R00886	Petcock, shut-off, fuel tank.
10.	9R00880	Cap and chain, filler, fuel tank.
11.	9R00818	Plug, angle-cord.
12.		Outlet ground terminal.
13.	9R00719	Control, manual choke.
14.	9R00746	Line, fuel, tank.
15.	9R00754	Bowl, fuel pump.
16.	9R00709	Gage and chain, oil filler.
17.	9R00908	Panel, back.
18.	9R00894	Panel, right side.
19.	9R00763	Button, stop.
20.	9R00912	Panel, base and skid.
21.	9R00814	Cable, No. 12, type S, 3 conductor.
22.	9R00820	Clip, spring.

Figure 5. Medical Department Item No. 9606000 X-ray field unit generator.

into the building. Caution must also be taken to keep the exhaust tube and vent shielded. During operation the exhaust vent will become extremely hot and is a fire hazard.

(4) *Grounding.* (*a*) Drive grounding rod (fig. 5, (3)) into the earth for its entire length and near enough to the unit to connect the grounding cable. (See fig. 5, (4).)

(*b*) Moisten soil around the grounding rod when in a dry region.

(*c*) Connect the grounding cable to the grounding rod and on the outlet ground terminal. (See fig. 5, (12).)

10. USED EQUIPMENT. Procedure for the receipt of used equipment will be the same as prescribed for new equipment. (See par. 9.) The visual inspection will be very thorough and a running test (par. 33) of 1 hour will be conducted.

Section VI. CONTROLS AND INSTRUMENTS

11. CONTROLS. a. Starter. The engine is of the manual crank type using a starter rope (fig. 3, (15)) and a starter rope pulley. (See fig. 5, (6).)

b. Fuel tank shut-off petcock. The petcock (fig. 5, (9)) is a means of stopping the flow of gasoline from the fuel tank.

c. Filler cap shut-off screw. The shut-off screw is a part of the fuel tank filler cap. (See fig. 5, (10).) When closed it seals the fuel tank. When open it serves as a vacuum break when the fuel is being drained from the tank.

d. Manual choke control. This control (fig. 5, (13)) is linked to the choke plate and controls the volume of air entering the carburetor. The operation of the choke control is the same as on all gasoline engines. Pull out for starting, push in when running.

e. Stop button. The stop button (fig. 5, 19)), or an identical stop button in the same position on the opposite side of the unit, is a means of stopping the engine. Either stop button must be held down until the engine has completely stopped running.

f. Governor-booster spring adjusting screw. This adjusting screw will not be changed by the operating personnel.

g. Carburetor idle jet needle. The idle jet needle is held in the factory adjusted setting by a welded clip. Operating personnel will not change the existing setting.

12. INSTRUMENTS. The oil filler gauge (fig. 5, (16)) is the only instrument on the unit.

Section VII. OPERATION UNDER USUAL CONDITIONS

13. SCOPE. This section contains the instructions pertaining to the operation of a unit which has been serviced upon receipt. (See sec. V.) The operator will carefully study and apply the instructions for first echelon (operator) maintenance (par. 28) and lubrication (par. 26).

14. STARTING ENGINE. a. Check the grounding cable (fig. 5, (4)) and grounding rod (fig. 5, (3)) making certain the connections are firm.

b. Do not connect the generator to the X-ray machine until the engine is running smoothly.

c. Open the filler cap shut-off screw in the fuel tank filler cap. (See fig. 5, (10).)

d. Open the fuel tank shut-off petcock. (See fig. 5, (9).)

e. Pull out the manual choke control. (See fig. 5, (13).) In cold climate it will be necessary to pull the choke control outward for its entire travel. In hot climates very little movement of the control will be required.

f. Wind the starter rope around the starter rope pulley (fig. 5, (6)) so it will be turned as indicated by the arrow on the pulley.

g. It may be necessary to crank the engine several times before it starts.

15. ENGINE WARM-UP. a. Move the choke control in or out as necessary to keep the engine running.

b. Continue warm-up period until the choke control has been pushed inward for its entire travel and the engine runs smoothly. The engine must not be operated for long periods with the choke control partially pulled out.

16. CONNECTING X-RAY MACHINE. a. Connect the X-ray machine to the generator by means of the conductor cable. (See fig. 5, (21).) The cable plug (fig. 5, (11)) and cable outlet (fig. 5, (8)) form a turn lock connection. Push the plug into the outlet and then turn the plug clockwise.

b. Ground the connection by means of the spring clips (fig. 5, (22)) at the cable connector (fig. 5, (2)) and the cable plug and to the outlet ground terminal. (See fig. 5, (12).)

c. If there is any unsteadiness of engine operation, or hunting of the governor after connecting the X-ray machine, the engine is too cold and requires additional warm-up.

17. STOPPING ENGINE. It is important that this operation be performed in the follow sequence.

a. Disconnect the X-ray machine from the generator. Turn the cable plug to the left before pulling from the cable outlet.

b. Press the stop button (fig. 5, (19)), or the identical stop button in the same position on the opposite side of the machine. The stop button will ground the ignition circuit and must be depressed until the engine has completely stopped running.

c. Close the fuel tank shut-off petcock.

Section VIII. OPERATION OF AUXILIARY EQUIPMENT

18. GENERAL. Medical Department item No. 9606000, X-ray field unit generator, has no auxiliary equipment. Item No. 9606000 is, however, an auxiliary piece of equipment for Medical Department items No. 9608508 and No. 9608510, X-ray field unit machines. It may also be used as auxiliary equipment with item No. 9621500 X-ray field unit, fluoroscopy and foreign body localization.

Section IX. OPERATION UNDER UNUSUAL CONDITIONS

19. SCOPE. This section covers the exceptions or additions to instructions for normal operation (sec. VII) that will be necessary for operation under unusual conditions.

OPERATING INSTRUCTIONS

20. EXTREME COLD. a. Starting the engine. (1) It would be advisable to keep the unit indoors or within a heated inclosure when not in operation.

(2) Full outward position of the manual choke control (fig. 5, (13)) will be necessary.

b. Warm-up. Considerably lengthen the warm-up period.

c. Location. Remove only the front panel (fig. 1, (5)) from the carrying case when the unit is in operation. If possible install unit in a heated inclosure.

21. EXTREME HEAT. a. Starting. Position of choke control will require very little movement from the inward running position.

b. Warm-up. Only a relatively short warm-up period will be required.

c. Location. Place unit in an open shaded area and remove all carrying case panels.

22. DUST AND SAND. a. Reduce operation. Reduce the operating time of the unit to a minimum.

b. Protect unit. (1) Remove only the front panel of the carrying case, if temperature is not too high, and place unit with open side downwind.

(2) Close and seal carrying case when unit is not in operation.

Section X. DEMOLITION TO PREVENT ENEMY USE

23. DEMOLITION. Use any means available to render the unit unfit for enemy use, repair, or salvage. If fire will not disclose your position, puncture fuel tank, allow time for gasoline to spill over generator, and ignite. Use sledge or heavy rocks to smash and break off parts, such as, carburetor and fuel pumps. Should silence and security be necessary in the withdrawal, remove such parts as the carburetor, spark plugs or fuel pump and bury or otherwise hide them. If two or more units are with the same organization, be certain the same parts are removed from each. Because of the small size of the unit, it may be possible to bury the remaining bulk in an abandoned foxhole or slit trench.

PART THREE

MAINTENANCE INSTRUCTIONS

Section XI. GENERAL

24. SCOPE. Part three contains information for the guidance of the personnel of the using organizations responsible for the maintenance (first and second echelon) of this equipment. It contains information needed for the performance of the scheduled lubrication and preventive maintenance services as well as descriptions of the major systems and units and their functions in relation to other components of the equipment.

Section XII. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

25. GENERAL. The tools supplied with the unit (par. 5) are all that are necessary to perform the maintenance service covered in part three of this manual. No other tools, special or common, will be required.

No. 5001

WAR DEPARTMENT — **LUBRICATION ORDER**

WAR DEPARTMENT — WASHINGTON 25, D. C., 26 JULY 1944

GENERATOR, X-RAY FIELD UNIT

ONAN MODELS OTC-38, OTC-38 B — For Detailed Instructions, refer to TM 8-630

Clean parts with Solvent, dry cleaning, or Oil, fuel, diesel. Dry before lubricating.

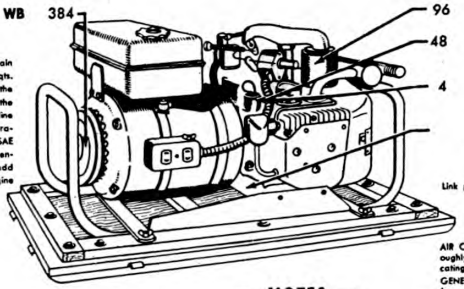
Requisition replacement Lubrication Orders from the Commanding Officer, St. Louis Medical Depot, St. Louis 2, Missouri.

Reduce intervals under severe operating conditions

Lubricant • Operating Hours

Generator Bearing WB 384

Cold Weather Note: Below 0° F. drain crankcase. Refill crankcase with 2 qts. OE-SAE 10 and mark this level "X" on the level gage. This new level is below the indicated full mark. Add ½ qt. of gasoline and run engine five minutes. During operation and before shut-down add OE-SAE 10 to "X" level. Before shut-down replenish to "X" level with OE-SAE 10 and add gasoline to full mark on gage. Run engine five minutes to mix after stopping.



Operating Hours • Lubricant

96 OE Air Cleaner

48 OE Crankcase Fill Capacity 2½ Qts.

4 Crankcase Level—Check Level

Oil Base (Drain plug on opposite side)

DO NOT LUBRICATE
Link passing through electric booster, commutator.

AIR CLEANER—Remove air cleaner and wash it thoroughly with Solvent, dry cleaning. Dip in clean lubricating oil, allow to drain, then replace on engine.
GENERATOR BALL-BEARING—Clean hardened grease from bearing with Solvent, dry cleaning. Refill with about one tablespoonful of WB.
OIL CAN POINTS—Every 48 operating hours place one drop of OE on throttle shaft bearings of carburetor, governor link ball joints, carburetor choke shaft bearings.

—NOTES—

CRANKCASE—Drain only when engine is thoroughly warm. Refill to "High" mark on bayonet gage.
CAUTION—Plant should never be operated with oil level below the "Low" mark on bayonet gage.

—KEY—

	LOWEST ANTICIPATED AIR TEMPERATURE		
	above + 32° F.	+32° F. to 0° F.	below 0° F.
OE—CRANKCASE	SAE 30	SAE 10	SEE NOTE
EXCEPT CRANKCASE	SAE 30	SAE 10	PS
WB—GREASE, general purpose, No. 2—All temperatures			
PS—OIL, lubricating, preservative, special			

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained therein are mandatory and supersede all conflicting lubrication instructions dated prior to 26 July 1944.

BY ORDER OF THE SECRETARY OF WAR:
G. C. MARSHALL,
Chief of Staff.

OFFICIAL
J. A. ULIO,
Major General,
The Adjutant General

No. 5001 [NOT TO BE REPRODUCED in whole or in part without the permission of the Office of the Surgeon General]

This order to be kept in the top panel cable compartment.

Figure 6. War Department Lubrication Order 5001.

MAINTENANCE INSTRUCTIONS

Section XIII. LUBRICATION

26. LUBRICATION. a. War Department Lubrication Order 5001 (fig. 6) illustrates the parts which require lubrication and specifies the lubricants and the intervals of lubrication under all climatic conditions.

b. Records. WD Form 48, Drivers Trip Ticket and Preventive Maintenance Service Record, will be used to keep proper lubrication intervals. WD, AGO Form 468, Unsatisfactory Equipment Report, can be used to forward notations of lubrication failures to proper authorities.

Section XIV. PREVENTIVE MAINTENANCE SERVICES

27. GENERAL. a. To insure mechanical efficiency it is necessary that the equipment be systematically inspected at designated intervals in order that defects may be discovered and corrected before they result in serious damage. The scheduled preventive maintenance services prescribed in this section are designed to insure maximum efficiency in the operation of the unit.

b. The general inspection or servicing of each item applies also to any supporting member or connection, and generally includes a check to see whether the item is in good condition, correctly assembled, secure, and not excessively worn.

c. The inspection for good condition is usually an external visual inspection to determine whether the unit is damaged beyond safe or serviceable limits. The term good condition is explained further by the following descriptions: not bent or twisted, not chafed or burned, not broken or cracked, not bare or frayed, not dented or collapsed, not torn or cut.

d. The inspection of a unit to see that it is "correctly assembled" is usually an external visual inspection to see whether it is in its normal assembled position in the unit.

e. The inspection of a unit to determine if it is "secure" is usually an external visual examination, a hand feel, or a pry-bar check for looseness. Such an inspection should include any brackets, lock washers, lock nuts, locking wires or cotter pins used in the assembly.

f. "Excessively worn" is generally understood to mean worn close-to or beyond serviceable limits, and likely to result in a failure if not replaced before the next scheduled inspection.

28. OPERATORS SERVICE (first echelon). **a.** Operators preventive maintenance services are listed on the back of the "Drivers Trip Ticket and Preventive Maintenance Service Record," WD Form 48 and are prepared to cover gasoline engine powered equipment of all types and models. Items peculiar to this equipment but not listed on WD Form 48 are covered under items with which they are related. Those items that are listed on the form that do not pertain to this equipment are omitted from the procedures as written in this section.

b. The items listed on WD Form 48 that apply to this equipment are expanded in this section to provide specific procedures or references to proper paragraph for accomplishment of the inspections and services. These procedures are arranged to facilitate their execution and to conserve the time of the operator, and are not necessarily in the numerical order as given on WD Form 48. The item numbers, however, are identical with those shown on that form.

c. Any defects or unsatisfactory operating characteristics beyond the scope of first echelon to correct must be reported at the earliest opportunity to the designated individual in authority.

29. BEFORE OPERATION SERVICES. a. This inspection schedule is designed primarily as a check to see that the equipment has not been tampered with or sabotaged, that engine oil and fuel have not leaked out, and that nothing has happened to change conditions of operation since the last after operation service was performed.

b. The before operation service consists of inspecting the items in the following schedule according to the procedures prescribed, and correcting or reporting any deficiencies. Upon completion of the service, results should be reported promptly to the designated individual in authority.

(1) *Item 1. Tampering or damage.* Look for any damage to equipment and for any signs of tampering or sabotage. To facilitate starting the engine, dry the spark plugs and wiring if they appear wet. See that equipment is placed in a level position and on a firm foundation.

(2) *Item 3. Fuel and oil.* See that fuel tank is full, adding fuel, gasoline (unleaded and undyed) 62 octane number (U.S.A. 2-116 Amend 2), if required. The oil level in crankcase should be at the "High" mark on the oil filler gauge. (See fig. 5, (16).) Check level and add specified oil (par. 26) if required. Inspect for any foreign material in either fuel or oil that might cause damage to the engine and correct if found before starting engine. Any appreciable loss in either fuel or oil since the after operation services must be investigated and the cause corrected or reported.

(3) *Item 6. Leaks, general.* Look for fuel or oil leaks. Trace source and correct or report.

(4) *Item 4. Accessories.* Inspect carburetor, air cleaner, fuel tank, muffler and governor to see that they are secure and correctly assembled. Make sure the soil around the grounding rod is moist. Inspect booster coil conduit and spark plug cables making certain connections are tight and cables and conduit are clean, and free from water or moisture.

(5) *Item 7. Engine warm-up.* (*a*) Open full tank shut-off petcock (fig. 5, (9)) and close choke. The operation of the choke should be in accordance with instructions in Item 8 which follows.

(*b*) Wind the starting rope around the starter rope pulley (fig. 5, (6)) and give a strong, steady pull the full length of the rope. Then proceed according to instructions given in Item 8.

(6) *Item 8. Choke.* When starting a cold engine keep the manual choke control (fig. 5, (13)) pulled out for first 3 or 4 turns. If engine fails to start push choke control completely in and continue cranking for several turns. Then repeat entire procedure until engine starts. This will prevent overchoking. When engine starts adjust choke control so that engine runs without surging or missing. Gradually push choke control inward as engine warms up until it will operate smoothly with choke control pushed completely in. Never operate with the choke control partly out.

(7) *Item 25. During the operation check.* As soon as the engine starts, observation of the during operation service should begin.

30. DURING OPERATION SERVICES. a. While the equipment is operating listen for any sounds such as rattles, knocks, squeals, or hums that would

indicate trouble. Look for smoke, and be on the alert to detect any unusual odor that might indicate unsatisfactory operation, overheating, or fuel and oil leaks. Use information on trouble shooting (sec. XV) to aid in locating cause of unsatisfactory operation.

b. During operation, services consist of observing Item 31, below, according to the procedures prescribed, and immediately investigating any indications of serious trouble. Notice minor deficiencies to be corrected or reported at the earliest opportunity, usually the next scheduled halt.

Item 31. Engine and controls. Be on the alert at all times while the equipment is operating to detect any unusual operating characteristics such as fluctuating, excessive, or low speed. Note any looseness or binding in governor and booster linkage. Observe for any looseness that may develop in any part of the equipment or its skid and mounting. Use information on trouble shooting. (See par. 35.)

31. AT STOP SERVICES. a. *Caution*: Be sure to disconnect the X-ray load before stopping the engine. Stop the plant by pressing one of the stop buttons (fig. 5, (19)) located on the blower housing of the engine. It should be held in until the engine stops.

b. At stop services may be regarded as minimum maintenance and should be performed under all conditions even though more extensive scheduled maintenance services can not be accomplished at the prescribed interval.

c. At stop services are to be performed between periods of operation or at least every 2 hours of operation. They consist of investigating any deficiencies noted during operation, and inspecting the following items according to the prescribed procedures. In either case, any deficiencies should be corrected or reported.

(1) *Item 38. Fuel and oil.* Check for adequate supply of fuel, (par. 29b) to run until next scheduled stop and replenish if needed. Add engine oil of correct grade (par. 26) if necessary to bring level to "High" mark on oil filler gauge.

(2) *Item 46. Leaks, general.* Look for any fuel or oil leaks on equipment mount and at all connections.

(3) *Item 47. Accessories.* Examine air cleaner, breather tube, carburetor, ignition breaker box, fuel tank, fuel pump, and exhaust muffler for looseness. Be sure ground around grounding rod is moist.

32. AFTER OPERATION SERVICES. a. *Caution*: Be sure to disconnect the X-ray load before stopping the engine. Stop the engine by pressing one of the stop buttons located on the blower housing of the engine. It should be held in until the engine stops.

b. After operation servicing is particularly important because at this time the operator inspects and services the equipment to detect and correct any deficiencies first echelon personnel is authorized to correct and to prepare it so it is ready for use at any time that it is needed. The before operation service, with a few exceptions, is then necessary only to be certain that the equipment is in the same condition in which it was left upon completion of the after operation service. The after operation service should never be entirely omitted, but may be reduced under extreme conditions to the bare fundamental services prescribed for the at stop service.

c. When performing the after operation service the operator must re-

member and consider any irregularities noticed during the operation of the equipment and found at the stop service.

d. The after operation services are to be performed after each day or 8 hours of operation. They consist of inspecting and servicing the following items according to the prescribed procedures. Those items marked with an asterisk (*) require additional services weekly or every 48 operating hours, whichever occurs first, the procedures for which are given in (*b*) of each applicable item.

(1) *Item 54. Fuel and oil.* Wipe gasoline tank filler cap clean and remove and see that air vent hole is open. (See par. 44b.) Fill tank with fuel (par. 29b) and replace cap. Check crankcase oil level and replenish with correct grade of engine oil (par. 26) if needed to bring level to "High" mark on oil filler gauge.

(2) *Item 55. Engine operation.* Investigate any deficiencies or unusual operating characteristics noted during operation. (See par. 35.) Correct or report. See that cooling fins on cylinders are clean.

(3) *Item 63. *Accessories.* (*a*) Examine breather tube, carburetor, ignition breaker box, fuel tank, fuel pump, and exhaust muffler to see that they are in good condition, clean and secure.

(*b*) (*Weekly*). Tighten all loose mountings and line connections. Close fuel tank shut-off petcock. Clean fuel pump bowl and screen. (See par. 45a.) Check for leaks after engine starts.

(4) *Item 64. *Electrical wiring.* (*a*) Examine booster conduit and spark plug cables to see that they are in good condition, well supported, clean, and properly connected.

(*b*) (*Weekly*). Clean booster conduit, spark plug cables and shielding, and see that all connections are secure.

(5) *Item 65. Air cleaner.* Check air cleaner to see if it is excessively dirty, and if so remove and clean. (See par. 48a.)

(6) *Item 73. Leaks, general.* Examine the entire equipment thoroughly for indications of fuel or oil leaks.

(7) *Item 67. Engine controls.* Examine the engine and accessory controls and linkage to see that they are in good condition, secure and operate freely. Close fuel tank shut-off petcock.

(8) *Item 82. *Tighten.* (*a*) No daily tightening is required other than where inspection shows looseness of accessories or mountings.

(*b*) (*Weekly*). Check all engine mounting, base and skid bolts, exhaust and intake manifold screws, breather tube and carburetor mounting screws, and tighten as required.

(9) *Item 83. *Lubricate as needed.* (*a*) Lubricate controls according to instructions. (See par. 26.)

(*b*) (*Weekly*). Lubricate all points shown on WD Lubrication Order 5001 (par. 26) requiring weekly lubrication.

(10) *Item 85. *Tools and equipment.* (*a*) Check to see that all tools, extra equipment, and spare parts are present. (See figs. 2 and 3.)

(*b*) (*Weekly*). Check to see that all tools, extra equipment, and spare parts are present and in working and usable condition. (See figs. 2 and 3.)

MAINTENANCE INSTRUCTIONS

33. SECOND ECHELON PREVENTIVE MAINTENANCE. a. The numbers of the preventive maintenance procedures given in the chart which follows, are identical with those outlined in WD, AGO Form 461. Certain items on the work sheet that do not apply to this equipment are not included in the procedures in this manual. In general, the numerical sequence of the items on the work sheet is followed in the chart, but in some instances there is deviation for conservation of time and effort.

b. Special services are directed by repeating the item numbers in the columns which indicate the interval at which the services are to be performed, and show the parts or assemblies which are to receive certain mandatory services. For example, an item number in one or both columns opposite a procedure marked "tighten" means that the actual tightening of the object must be performed. The special services are described as follows:

(1) *Adjust.* Make all necessary adjustments in accordance with the instructions available in paragraphs pertinent to the part or assembly.

(2) *Clean.* Clean components and parts of the equipment indicated with dry cleaning solvent, unless otherwise directed to remove excess lubricant, dirt, and other foreign material. If parts have been removed from equipment, they should be rinsed in clean solvent and dried thoroughly before installing. Be sure to keep parts clean until reassembled and installed. Clean the protective grease coating from new parts since this material is not a good lubricant.

(3) *Special lubrication.* This applies either to lubrication operations that do not appear on the WD Lubrication Order or to items that do appear on the order but should be performed in connection with the maintenance operations if components have to be disassembled for inspection or service.

(4) *Service.* This usually consists of performing certain operations such as draining and refilling oil base with oil.

(5) *Tighten.* All tightening operations must be performed with sufficient force on the wrench handle (torque) to tighten the unit sufficiently to hold under jarring and vibration but still not damage threads or cause distortion. Tightening will always be understood to include the correct installation of lock washers, lock nuts and cotter pins provided and necessary to secure the tightening.

c. The procedures for performing operations for each item in the 96 operating hours of monthly (whichever occurs first) and 384 operating hours or 6 months (whichever occurs first) schedule are described in the chart below. Each page of the chart has two columns at its left edge corresponding to the monthly or 6 months maintenance intervals, respectively. It will be found that a particular procedure may not be required at both intervals. In order to determine those procedures that are to be performed, follow the column corresponding to the maintenance interval that is due, and wherever an item number appears in that column perform the operations indicated opposite that number.

d. The frequencies of preventive maintenance services outlined herein are considered a minimum requirement for normal operation of the equipment. Under *unusual* operation conditions it may be necessary to perform the maintenance services more frequently.

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RUNNING TEST

384 operating hours or 6 months	96 operating hours or 1 month	
1	1	*BEFORE OPERATION SERVICE.* Perform before operation service as outlined in paragraph 29 to determine whether equipment is supplied with fuel and oil, and to make it ready for running test.
9	9	*ENGINE.* Operate engine with and without load and listen for knocks, rattles, hums and any other unusual noises that would indicate trouble. Notice any tendency to surge, stall, or miss. (Under load, readings on the X-ray machine at 85 K.V.P. should have a range from 5 Ma. to 25 Ma.) Look for excessive smoking from the exhaust that would indicate too rich carburetor adjustment or high oil consumption. Be on the alert for any odors that might mean undesirable operation. (Engine speed should be 1,800 RPM.) Use information on trouble shooting. (See sec. XV.)
10	10	*UNUSUAL NOISES.* Be on the alert for any unusual noises that would indicate trouble in the generator; loose, damaged or unsatisfactory operating accessories, or mounting bolts that need tightening. Use information on trouble shooting. (See par. 36.)
14	14	*LEAKS.* Examine the equipment and mounting in general, and all lines and connections, to detect any signs of fuel or oil leaks. Look particularly for signs of oil being thrown from the ventilating openings between the engine crankcase and generator frame which normally indicates leakage from the rear main bearing. Leakage at this point should be reported to the designated individual in authority.

MAINTENANCE INSTRUCTIONS

MAINTENANCE OPERATIONS

384 operating hours or 6 months	96 operating hours or 1 month	
18	18	*CYLINDER, HEAD, AND GASKET. Clean.* Follow instructions for removing carbon. (See par. 52.)
18	18	*TIGHTEN.* Tighten cylinder head nuts evenly and securely. (See par. 52d.)
19	19	*VALVE MECHANISM. Adjust.* Adjust valve tappet clearances to .006 inch — .008 inch for intake and .008 inch to .010 inch for exhausts with engine cold. (See par. 52.)
20	20	*SPARK PLUGS. Clean.* Clean and inspect plugs and replace if necessary. (See par. 42.)
20	20	*ADJUST.* Set electrode gaps to .025 inch to .030 inch. (See par. 42d.)
31	31	*BREAKER POINTS. Adjust.* Reface the points and adjust the gap as specified on the plate near the ignition breaker box. If the contacts are badly burned, pitted, or damaged replace them. (See par. 38.)
33	33	*MANIFOLDS.* Observe the intake and exhaust manifolds and breather tube to see that they are in good condition, secure, and that manifold gaskets appear to be in good condition and not leaking.
33		*TIGHTEN.* Tighten all manifold and breather tube nuts.
84	84	*MUFFLER.* Examine exhaust manifold to see that it is in good condition and not clogged.
34	34	*AIR CLEANER. Clean and service.* Follow instructions for cleaning and servicing air cleaner. (See par. 48.)
34	34	*TIGHTEN.* Tighten connecting screws evenly and securely.
35	35	*BREATHER TUBE AND SCREENS.* See that they are in good condition, correctly installed and secure.
35		*CLEAN.* Remove breather tube assembly and wash tube and screen in dry cleaning solvent and dry. (See par. 49.)
36	36	*CARBURETOR.* (Choke, linkage, governor.) See that these items are in good condition, correctly assembled and securely installed. Examine particularly the governor arm ball joint to assure that it operates freely and is lubricated properly (par. 26), and that none of the other connections of the governor to carburetor linkage are binding.

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384 operating hours or 6 months	96 operating hours or 1 month	
37	37	*FUEL FILTER, SCREEN AND LINES.* See that fuel tank shut-off petcock is closed. Inspect fuel lines from fuel pump to fuel tank and carburetor to see that they are in good condition and that connections are tight and not leaking.
37	37	*CLEAN.* Remove and clean fuel sediment bowl and screen. Clean fuel lines. (See pars. 44d and 45b.) Check for leaks after engine starts.
38	38	*FUEL PUMP.* Inspect fuel pump for leaks, good condition and to see that it is securely mounted.
38	38	*CLEAN.* Clean bowl and screen. (See par. 45a.)
82	82	*FUEL TANK AND FITTINGS.* Inspect fuel tank to see that it is in good condition and securely mounted. Examine fuel tank cap for defective gasket and plugged vent. Check fuel shut-off valve and connections for good condition and security. Be certain tank and fittings do not leak.
27	27	*GENERATOR.* Remove bell housing band and examine commutator and collector rings for good condition. Inspect brushes for good condition. (See par. 55.)
27	27	*CLEAN.* If interior surfaces are oily or greasy wipe them clean with a dry cloth.
27		*TIGHTEN.* Tighten armature through stud nut.
80	80	*FRAME.* Inspect frame skid and mount to see that they are in good condition and that unit is securely bolted to them.
85	85	*LUBRICATION.* Lubricate as directed in WD Lubrication Order 5001. (See par. 26.)
131	131	*TOOLS.* Check tools to see that they are all present. (See fig. 2.) Inspect to see that tools are in good condition, clean and properly stowed.
135	135	*PUBLICATIONS.* Check to see that WD Lubrication Order 5001 is present and legible.
138	138	*SPARE PARTS.* Check to see that the prescribed number of spare parts are present (fig. 3), in good condition, and properly stowed.
142	142	*FINAL RUNNING TEST.* Repeat items 1 through 14 of "running test."

MAINTENANCE INSTRUCTIONS

Section XV. TROUBLE SHOOTING

34. GENERAL. a. The possible troubles and remedies listed below will assist in determining the cause of unsatisfactory operation. A separate list is provided for the engine and the generator. If the remedy is not given, reference is made to a paragraph where more complete information will be found. Only those causes which can be detected during operation or during first and second echelon maintenance service are listed. Therefore, if the trouble still exists after performing the listed remedies the unit requires higher echelon service.

b. The information in this section applies to operation of the unit under normal conditions. If extreme conditions are encountered, it is assumed the unit has received the attention outlined for operation under unusual conditions. (See sec. IX.)

35. ENGINE. a. Engine fails to start or is hard to start.

Possible cause	*Possible remedy*
Improper electrical load.	Use unit only with specified X-ray machines. (See par. 3a.)
Oil too heavy due to temperature drop.	Change oil. Follow lubrication instructions. (See par. 26.)
Fuel tank empty.	Refill.
Air cleaner clogged.	Clean. (See par. 48.)
No spark or weak spark.	See possible causes and remedies for this condition. (See par. 35g.)
Contaminated engine fuel.	Drain and refill.

b. Engine starts but does not continue running.

Possible cause	*Possible remedy*
Overheating.	See possible causes and remedies for this condition. (See par. 35c.)
Air lock in fuel supply system.	Open fuel tank shut-off petcock. Clean gas tank filler cap vent. (See par. 44b.)
Screen in fuel pump clogged.	Remove and clean. (See par. 45a.)
Fuel lines clogged.	Remove and clean. (See pars. 44d and 45b.)
Carburetor dirty.	Report to proper authority. Do not disassemble.
Contaminated engine fuel.	Drain and refill.
Short circuit in conductor cable.	Replace with new cable.
Short circuit in X-ray machine.	Report to proper authority.

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c. Engine overheating.

Possible cause	*Possible remedy*
Exhaust back-up due to improper size exhaust vent.	Correct vent pipe size. (See par. 9d.)
Exhaust muffler clogged.	Replace.
Improper ventilation.	Remove all carrying case panels. Move unit into shaded outside area if possible.
Excessive carbon in cylinder heads and on piston.	Remove carbon. (See par. 52.)
Cooling fins dirty.	Clean.
Engine oil level low.	Fill to full mark on gauge.
Incorrect valve tappet adjustment.	Adjust. (See par. 52c.)

d. Excessive engine oil consumption.

Possible cause	*Possible remedy*
Overheating.	See possible causes and remedies of the condition. (See par. 35c.)
Engine oil held above full mark.	Allow at least 5 minutes to elapse, after engine stops for oil to drain back into base, before checking. Add oil only to full mark on gauge.
Oil leaks at gaskets and seals.	Report to proper authority.
Leak in oil base.	Report to proper authority.

e. Engine lacks power.

Possible cause	*Possible remedy*
Poor compression.	See possible causes and remedies for this condition. (See par. 35f.)
Weak spark.	See possible causes and remedies for this condition. (See par. 35g.)
Air cleaner clogged.	Clean. (See par. 48.)
Contaminated engine fuel.	Drain and refill.
Overheating.	See possible causes and remedies for this condition. (See par. 35c.)
Incorrect valve tappet adjustment.	Adjust. (See par. 52c.)

MAINTENANCE INSTRUCTIONS

f. Poor compression.

Possible cause	*Possible remedy*
Incorrect valve tappet adjustment.	Adjust. (See par. 52c.)
Loose spark plug.	Tighten.
Loose cylinder head.	Tighten. (See par. 52d.)
Head gasket leaking.	Replace. (See par. 52.)
Piston cracked or broken.	Report to proper authority.
Valves sticking.	Report to proper authority.

g. No spark or weak spark.

Possible cause	*Possible remedy*
Dirty or loose wire connections.	Clean and tighten.
Incorrect spark plug gap.	Set gap. (See par. 42d.)
Carbon deposits on spark plug porcelains.	Clean or replace with new plug. (See par. 42b.)
Cracked spark plug porcelain.	Replace with new plug.
Pitted breaker points.	Reface. (See par. 38.)
Incorrect breaker point clearance.	Reset. (See par. 38.)
Broken ignition breaker spring.	Replace with new spring. (See par. 38.)
Defective condenser.	Replace with new condenser. (See par. 38.)
Stop wire grounded.	Tape worn insulation.

h. Popping, spitting, and pinging (spark knock).

Possible cause	*Possible remedy*
Valve tappet clearance too close.	Adjust. (See par. 52c.)
Excessive carbon deposits causing cylinder head hot spots.	Clean carbon. (See par. 52.)
Overheating.	See possible causes and remedies for this condition. (See par. 35c.)

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36. GENERATOR. a. Generator heating.

Possible cause	*Possible remedy*
Improper electrical load on unit.	Use unit only with specified X-ray machine. (See. par. 3a.)
Short circuit in conductor cable.	Replace with new cable.
Short circuit in X-ray machine.	Report to proper authority.
Excessive engine speed.	Report to proper authority.

b. Generator does not produce.

Possible cause	*Possible remedy*
Brush rig not set in neutral position.	Correct setting. (See par. 55j.)
Brushes binding in holders.	Loosen in holders. (See par. 55b.)
Brushes worn to less than 5/8 inch.	Replace with new brushes. (See par. 55g.)
Brush springs broken.	Replace with new spring. (See par. 55h.)
Brush spring resting in holder.	Position correctly. (See par. 55h.)
Dirty commutator.	Report to higher authority.
Commutator bar loose or projecting above others.	Report to proper authority.
Mica extending above commutator bar surface.	Report to proper authority.
Engine speed too slow.	Report to proper authority.
Break in conductor cable wire.	Replace with new cable.

c. Noise in brushes.

Possible cause	*Possible remedy*
High and low commutator bars.	Report to proper authority.
Mica extending above commutator bars.	Report to proper authority.

Section XVI. IGNITION SYSTEM SERVICE

37. GENERAL. a. This section contains instructions on the engine ignition system for the personnel of the first and second echelons to enable them to perform the scheduled preventive maintenance services (sec. XIV) and to

replace the spare parts available to the first and second echelons. No other services will be attempted.

b. Ignition current is furnished by a flywheel type magneto. The magneto proper is located inside the blower wheel and consists of the rotor or magnets, integral with blow wheel, and the stator assembly mounted on the gear cover. The stator assembly includes the right-hand coil (fig. 7, (3)), left hand coil (fig. 7, (4)), laminated coil shoes (fig. 7, (2)), and the back plate (fig. 7, (5)). The ignition breaker is mounted atop the crankcase. The breaker arm (fig. 7, (39)) and arm point (fig. 7, (36)) are operated by a plunger (fig. 7, (40)) which rides on the camshaft. A condenser (fig. 7, (43)), connected across the points, greatly increases the spark intensity and the life of the breaker points. High tension current is generated within the coils, each of which is connected to a spark plug by a high tension cable.

38. IGNITION BREAKER ASSEMBLY. a. Breaker arm and points (fig. 3, (1)) consist of the following five component parts:

(1) *Stationary point.* The stationary point (fig. 7, (37)) fastens to the ignition breaker box (fig. 7, (35)).

(2) *Stationary point lock nut.* A brass hex nut (fig. 7, (38)) locks the stationary point in position.

(3) *Arm point.* The arm point (fig. 7, (36)) is an integral part of the breaker arm.

(4) *Arm to ground wire.* Grounds arm to box.

(5) *Breaker arm.* The breaker arm (fig. 7, (39)) pivots on the arm stud (fig. 7, (42)). It is lifted by the plunger and depressed by the spring.

b. Disassembling. (1) Remove ignition breaker box cover.

(2) Compress and remove spring.

Caution: Cover rear generator vent openings to prevent dropping the ignition breaker spring into the generator.

(3) Remove the breaker arm from arm stud.

c. Cleaning disassembled parts. Use a clean lintless cloth, dampened with dry cleaning solvent to wipe all parts of the ignition breaker and the interior of the ignition breaker box. Thoroughly wipe all parts with a dry clean lintless cloth.

d. Inspecting points. Determine if points are burned, pitted, or have a carbonlike deposit. Reface the points if any of these conditions exist.

e. Refacing points. Use the ignition point file (fig. 2, (5)), to reface the points. File points until each face is free of pits or deposit and has a clean metallic appearance.

f. Replacing points. (1) If points cannot be refaced, replace with a new breaker arm and points. (See fig. 3, (1).)

(2) Replace disassembled arm with new arm.

(3) Loosen lock nut on stationary point.

(4) Remove stationary point.

(5) Install new stationary point in breaker box.

(6) Fasten lock nut.

g. Reassembling. (1) Place breaker arm on arm stud.

(2) Compress spring and slip into position.

(3) Connect arm to ground wire on terminal at inside rear of ignition breaker box.

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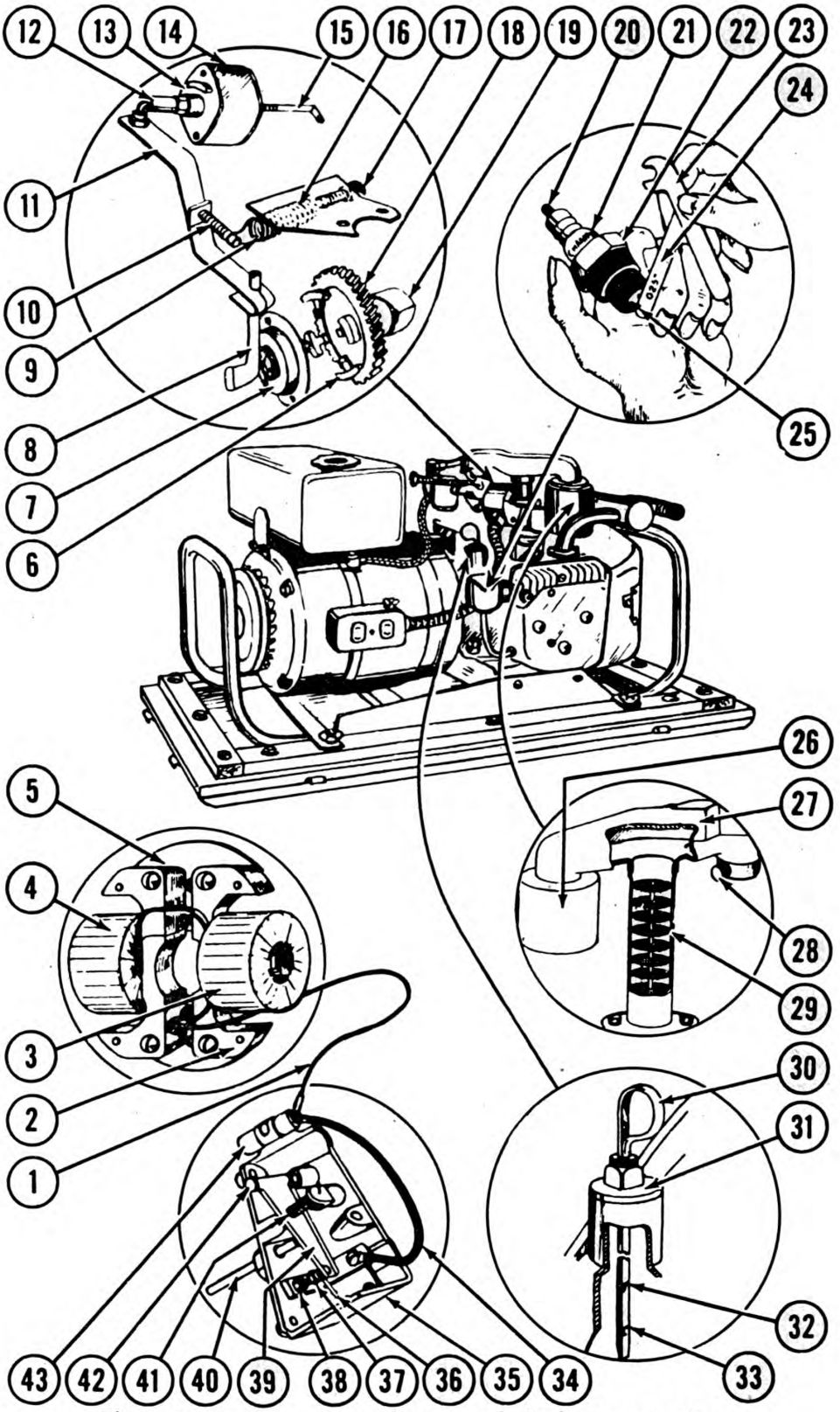

Figure 7. Ignition, governor-booster, and air cleaner assemblies.

MAINTENANCE INSTRUCTIONS

	Med. Dept. No.	Nomenclature
1.	9R00771	Wire, magneto to condensor.
2.	9R00761	Shoe, magneto coil, laminated.
3.	9R00762	Coil, magneto, right.
4.	9R00764	Coil, magneto, left.
5.	9R00760	Plate, back, magneto.
6.	9R00662	Weight, governor.
7.	9R00667	Cup and stud, governor.
8.	9R00866	Shaft and paddle, governor.
9.	9R00805	Spring, governor-booster.
10.	9R00852	Stud, spring, governor.
11.	9R00668	Rod, arm, governor.
12.	9R00670	Joint, ball, governor.
13.	9R00858	Cover, housing, booster.
14.	9R00856	Housing, booster.
15.	9R00864	Rod, control, throttle.
16.	9R00844	Bracket, adjusting spring, governor.
17.	9R00842	Nut, adjusting, governor spring.
18.	9R00660	Gear, camshaft.
19.	9R00654	Camshaft.
20.		Terminal of spark plug, 9R00780.
21.		Porcelain of spark plug, 9R00780.
22.		Hex body of spark plug, 9R00780.
23.	TR02080	Wrench, ignition point, for nut screw size 5.
24.		.025 inch feeler gage on ignition point wrench, SR01824.
25.		Electrodes of spark plug, 9R00780.
26.	9R00734	Cleaner, air.
27.	9R00733	Adapter, air cleaner.
28.	9R00737	Screw, locking, air cleaner adapter.
29.	9R00736	Screen, breather tube.
30.	9R00709	Gage and chain, oil filler.
31.	9R00707	Cap and bushing, oil filler.
32.		Oil level full mark.
33.		Oil level low mark.
34.	9R00914	Wire, condenser to points.
35.	9R00779	Box, ignition breaker.
36.		Arm point of breaker arm and points, 9R00772.
37.		Stationary point of breaker arm and points, 9R00772.
38.	SR00665	Nut, 5 x 40, hex, brass: For locking stationary point.
39.		Breaker arm of breaker arm and points, 9R00772.
40.	9R00774	Plunger, breaker.
41.	9R00776	Spring, breaker.
42.	9R00782	Stud, arm, ignition breaker.
43.	9R00766	Condenser, magneto.

Figure 7. Ignition, governor-booster, and air cleaner assemblies—Continued.

h. Resetting point gap. (1) Slowly turn starter rope pulley (fig. 5, (6)) until the breaker plunger reaches its highest position. This in turn opens the space between the stationary point and the arm point to the maximum gap.

(2) Loosen the lock nut on the stationary point.

(3) Turn the stationary point to open or close the gap.

(4) Check the breaker point gap specified on the plate fastened to generator near the ignition breaker box. If plate is missing set gap at .020 inch.

(5) Select the required leaf from the feeler gauge. (See fig. 2, (22).)

(6) Place the correct feeler gauge leaf between the stationary point and the arm point. Turn stationary point until feeler gauge leaf touches both points. Do not turn stationary point up so far as to raise the arm off the plunger.

(7) Tighten stationary point lock nut.

i. Fasten ignition breaker box cover in place.

39. SPARK PLUG CABLES. To clean and inspect—

a. Remove spark plug shields.

b. Remove spark plug cables from the spark plugs.

c. Inspect spark plug ends of the cables.

d. Use ignition point file to clean any corrosion or deposit from cable terminals.

e. Carefully inspect cable insulation for wear, frayed ends, or breaks.

40. MAGNETO AND IGNITION BREAKER TEST. a. Before proceeding with this test, check for any leaks or pools of gasoline on or about the unit to eliminate any fire hazard.

b. Support plug ends of cables in such a manner that there is a $\frac{1}{8}$-inch air gap between each cable end and a cylinder fin.

c. Grasp the starter rope pulley with both hands and quickly turn it counterclockwise.

d. Spark will jump the $\frac{1}{8}$-inch air gap if the magneto and ignition breaker are functioning properly.

e. Connect cable to spark plug, put spark plug shields in place and fasten.

41. MAGNETO CONDENSER. a. If spark fails to bridge the $\frac{1}{8}$-inch air gap when tested (par. 40), it may be due to a break-down of the magneto condenser. (See fig. 3, (4).)

b. Replacing magneto condenser.

Note. It is impossible to repair a condenser; it must be replaced.

(1) Disconnect wires from condenser.

(2) Remove condenser from ignition breaker box.

(3) Install new magneto condenser.

(4) Connect wires to condenser.

(5) Fasten ignition breaker box cover in place.

(6) Repeat magneto and ignition breaker test. (See par. 40.)

42. SPARK PLUGS. a. Removing. (1) Remove spark plug shields.

(2) Disconnect cables from spark plugs.

(3) Use the spark plug wrench (fig. 2, (23)) to remove the spark plugs from the cylinder heads. Do not misplace the spark plug gaskets.

b. Cleaning spark plugs. (1) Use a clean cloth, dampened with dry cleaning solvent to wipe any oil and dirt from the plug. Be certain to thoroughly clean the terminal (fig. 7, (20)) and the porcelain (fig. 7, (21)).

(2) Follow with a clean dry cloth.

(3) Use a knife blade or small screw driver to remove deposits from the portion of porcelain within the metal hex body. (See fig. 7, (22).) Extreme care must be exercised in this operation. Do not exert undue force because the porcelain is easily cracked and the spark plug rendered useless.

(4) Wipe the plug with a clean dry cloth.

c. Inspecting spark plugs. (1) Very carefully inspect the porcelains for cracks or chips.

(2) Inspect electrodes to determine if there is sufficient metal remaining to permit proper resetting of the gap.

d. Resetting spark plug electrode gap. (1) Proper electrode gap is .025 inch.

(2) Use a screw driver to bend the outer electrode; do not bend the center electrode until .025 inch gap is obtained.

(3) Wipe the spark plug with a clean dry cloth.

e. Testing spark plugs. (1) Predetermine proper functioning of magneto and ignition breaker. (See par. 40.)

(2) Connect cables to spark plugs.

(3) Place spark plugs on cylinder cooling fins in such a manner that only the metal hex body of the spark plug touches the cooling fins.

(4) Spin the starter rope pulley.

(5) Both spark plugs should arc only between the electrodes and both should arc at the same instant.

f. Replacing spark plugs. (1) If the spark plug test (par. 42e) indicates either of the plugs to be faulty replace both with new spark plugs. (See fig. 3, (14).)

(2) Wipe plugs with a clean cloth.

(3) Place gasket on spark plugs.

(4) Screw spark plugs into cylinder heads and tighten with the spark plug wrench.

(5) Connect spark plug cables.

(6) Fasten spark plug shields in place.

Section XVII. FUEL SUPPLY SYSTEM SERVICE

43. GENERAL. a. This section contains instructions on the fuel supply system for personnel of the first and second echelons to enable them to perform the scheduled preventive maintenance services (sec. XIV) and to replace the spare parts available to the first and second echelons. No other services will be attempted.

b. Fuel is stored in a 2-gallon tank mounted over the generator. The fuel tank filler cap (fig. 5, (10)) is provided with a shut-off screw which closes the air vent. The fuel tank shut-off petcock (fig. 5, (9)) is a means of shutting off the flow of fuel from the tank to the fuel pump. Fuel tank line (fig. 5, (14)) connects the fuel tank and the fuel pump. The fuel pump draws the fuel from the tank through the fuel tank line and forces it through

the carburetor fuel line to the carburetor. The air cleaner and carburetor are essentially part of the fuel supply system but are covered separately. (See sec. XVIII.)

c. Preparation for servicing fuel supply system. (1) Allow engine to completely cool before servicing fuel supply system.

(2) Close fuel tank shut-off petcock.

(3) Place a clean 2-gallon container near fuel tank line.

(4) Disconnect swivel end of fuel tank line. Allow gasoline to drain from the line into the container.

(5) Open filler cap shut-off screw.

(6) Open the shut-off petcock and drain the gasoline from the tank into the container using any means necessary and available to limit spillage to a minimum.

(7) Remove spark plug shields.

(8) Disconnect spark plug cables from spark plugs. Place cable ends in such a position that they will not arc to any part of the unit.

(9) Place container near the carburetor fuel line.

(10) Disconnect swivel end of carburetor fuel line and drain gasoline into container.

(11) Crank engine until gasoline is pumped from the interior of the fuel pump. The fuel pump bowl (fig. 5, (15)) cannot be emptied in this manner.

(12) Wrap any large rag around the flange of the fuel pump to absorb the gasoline remaining in the fuel pump bowl when removing the bowl. Be certain the engine is cool before proceeding.

(13) Loosen the bowl yoke nut. (See fig. 8, (7).)

(14) Swing the bowl yoke (fig. 8, (8)) clear of the bowl (fig. 8, part (9)).

(15) Remove the bowl from the fuel pump.

(16) Remove both fuel lines.

44. FUEL TANK AND FITTINGS. a. *Caution.* Never attempt to repair a fuel tank whether full or empty.

b. Cleaning filler cap vent. (1) Remove the filler cap from the tank to avoid the possibility of dropping any part of the cap mechanism into the tank.

(*a*) Unscrew filler cap.

(*b*) Compress the wire stop at the end of the cap chain and remove from tank.

(2) Remove the chain loop from the shut-off screw.

(3) Remove shut-off screw from cap.

(4) Use a strand of wire or a needle to open the air vent through the filler cap.

(5) Remove gasket from shut-off screw and replace with a new gasket. (See fig. 3, (10).)

(6) Screw shut-off screw into filler cap.

(7) Put shut-off screw spring in place and clamp chain lock to screw.

(8) Remove gasket from tank and replace with new filler cap gasket. (See fig. 3, (7).)

Med. Dept. No.	Nomenclature
1. 9R00750	Gasket, fuel pump adapter and breather tube.
2. 9R00749	Rod, push, fuel pump.
3. 9R00751	Adapter, fuel pump.
4. 9R00748	Gasket, fuel pump.
5. 9R00715	Elbow, carburetor.
6. 9R00752	Screen, fuel pump.
7. 9R00753	Nut, bowl yoke, fuel pump.
8. 9R00757	Yoke, bowl, fuel pump.
9. 9R00754	Bowl, fuel pump.
10. 9R00756	Gasket, fuel pump, bowl.
11. 9R00743	Body, upper, fuel pump.
12. 9R00744	Line, fuel, carburetor.
13. 9R00952	Body, lower, fuel pump.
14. 9R00715	Elbow, carburetor.

Figure 8. Fuel pump assembly.

c. Cleaning fuel tank shut-off petcock. Use a copper wire to remove any sediment from petcock.

d. Cleaning or replacing fuel tank line. (1) Use a copper wire of sufficient length, to remove any sediment from the line.

(2) If line is too tightly clogged to be opened with a wire or previous inspection has disclosed a leak, replace it with a new fuel tank line. (See fig. 3, (13).)

e. Flush the shut-off petcock and fuel tank line. (1) Close the shut-off petcock.

(2) Place a container below the shut-off petcock.

(3) Pour approximately ½ gallon of gasoline into the tank.

(4) Open the petcock and allow gasoline to drain into the container. This will remove any loose sediment from the shut-off petcock.

(5) Place a clean piece of cloth over the fuel tank cap opening to strain the gasoline and using the same gasoline, repeat the process several times. This will also flush any sediment from the tank.

(6) Install fuel tank line. Connect the stationary coupling first and then the swivel end.

(7) Connect the fuel tank line to the fuel pump at the coupling marked "In."

45. FUEL PUMP. a. Cleaning or replacing bowl and screen. (1) Use a clean cloth soaked with dry cleaning solvent to wipe the interior of the bowl. In case of breakage, replace with a new fuel pump bowl. (See fig. 4, (1).)

(2) Lift the screen from the pump.

(3) Pour solvent through screen in both directions. Use care not to puncture the screen.

(4) If screen is damaged, replace it with a new fuel pump screen. (See fig. 4, (9).)

(5) Put a new fuel pump bowl gasket (fig. 3, (8)) in place.

(6) Reassemble screen and bowl by reversing procedure for disassembly.

b. Cleaning or replacing carburetor fuel line. (1) Use a copper wire, of sufficient length, to remove any sediment from the interior of the line.

(2) Flush the line with solvent to remove loosened sediment.

(3) If line is too tightly clogged or leaks have been detected in previous inspection, replace with a new carburetor fuel line. (See fig. 3, (12).)

(4) Connect carburetor fuel line to the fuel pump and the carburetor.

46. FUEL SUPPLY SYSTEM TEST. a. Prepare engine as for starting (par. 14a) but do not run engine.

b. Disconnect the carburetor fuel line at the carburetor.

c. Place the disconnected end of the carburetor fuel line in a clean empty container.

d. Use the starter rope to crank the engine. After many turns the fuel pump bowl should fill followed by the ejections of gasoline from the disconnected carburetor fuel line.

e. Visually inspect for any leaks in the system.

f. Connect the carburetor fuel line to carburetor.

g. Connect the spark plug cables to the spark plugs.

h. Replace the spark plug shields.

MAINTENANCE INSTRUCTIONS

Section XVIII. AIR CLEANER ASSEMBLY AND CARBURETOR SERVICE

47. GENERAL. **a.** This section contains instructions on the air cleaner assembly and carburetor for the personnel of the first and second echelon of maintenance to enable them to perform the scheduled preventive maintenance services (sec. XIV) and to replace the spare parts available to the first and second echelons. No other service will be attempted.

b. The air cleaner and breather assembly filters the air before entering the carburetor and removes heated gases from the crankcase. The outside air is drawn through the air cleaner (fig. 7, (26)) by the vacuum created during each intake stroke of the engine. The air passes through the air cleaner adapter (fig. 7, (27)) to the carburetor. Pressure within the crankcase is relieved through the breather tube screens (fig. 7, (29)) into the adapter and the carburetor. The carburetor mixes the air and the fuel before they enter the intake manifold. The carburetor also houses the choke valve plate and the throttle valve plate.

48. AIR CLEANER. To clean or replace air cleaner—

a. Remove the three screws which fasten the air cleaner to the adapter.

b. Soak and rinse the air cleaner in dry-cleaning solvent.

c. This should be done until the solvent flows from the air cleaner with very little discoloration.

d. If the air cleaner is so dirty as to retard or prohibit the flow of solvent through it or the operating conditions are known to have been severely dusty, it should be replaced with a new air cleaner. (See fig. 4, (3).)

e. After cleaning with solvent soak the air cleaner for 1 hour in engine oil of the type used in this unit. Allow air cleaner to drain before installing.

f. Put a new air cleaner gasket (fig. 4, (5)) in place.

g. Install the clean or new air cleaner on the adapter.

49. BREATHER TUBE SCREEN. To clean or replace breather tube screen—

a. Loosen the adapter locking screw. (See fig. 7, (28).)

b. Lift the adapter from the carburetor and the breather tube screen. (See fig. 7, (29).) It is not necessary to remove the air cleaner from the adapter.

c. Mark position of booster bracket on breather tube.

d. Loosen both screws which fasten booster bracket to breather tube.

e. Remove booster bracket from breather tube.

f. Remove the two screws which fasten the breather tube screen to the engine.

g. Use dry cleaning solvent to clean the screens by pouring through the tube. Soak and rinse until solvent will pour from tube with very little discoloration.

h. If tube unit is damaged, replace with a new breather tube screen. (See fig. 4, (7).)

i. Place a new breather tube gasket (fig. 4, (8)) in position.

j. Fasten breather tube to engine.

k. Place booster bracket on breather tube in previously marked position.

l. Insert and tighten both screws which fasten booster bracket to breather tube.

m. Put adapter on breather tube and fasten to the carburetor.

50. CARBURETOR. No carburetor service will be performed or attempted by the personnel of the first and second echelons of maintenance.

Section XIX. CYLINDER HEADS AND VALVE MECHANISM SERVICE

51. GENERAL. a. This section contains instructions on the cylinder heads and valve mechanism for the personnel of the first and second echelons of maintenance to enable them to perform the scheduled preventive maintenance services (sec. XIV) and to replace the spare parts available to the first and second echelons. No other services will be attempted.

b. The cylinder heads support the spark plugs and form the combustion chambers (fig. 9, (5)) over the cylinders and pistons. The electrodes of the spark plugs extend into the combustion chambers. The exterior fins are a means of dissipating the heat from the cylinder heads. The intake valve (fig. 9, (23)) opens to permit the passage of the fuel-air mixture into the combustion chamber during the intake stroke of the engine and seals off the combustion chamber during the compression, power, and exhaust strokes. The exhaust valve (fig. 9, (24)) opens during the exhaust stroke to permit the escape of the burned gases to the exhaust manifold and seals the combustion chamber during the intake, compression, and power strokes. The valves are opened when the camshaft lifts the valve lifters (fig. 9, (13) and (36)), and are closed by the valve springs. (See fig. 9, (20) and (41).) Valve tappets (fig. 9, (15) and (38)) are a means of adjusting the clearance between the valve lifters and the valves.

52. REMOVING CARBON AND ADJUSTING VALVE TAPPETS. a. Disassembling. (1) Remove spark plug shields.

(2) Remove spark plug cables.

(3) Remove spark plugs from cylinder heads.

(4) Remove screws which fasten the cylinder air housings to the cylinder heads.

(5) Remove both cylinder air housings.

(6) Remove the six cylinder head nuts from each head.

(7) Remove cylinder heads.

(8) Remove cylinder head gaskets. (See fig. 9, (6) and (28).)

(9) Remove the four screws which fasten the intake manifold adapters to the intake ports. (See fig. 9, (2) and (9).)

(10) Remove intake manifold adapters by pulling them free of the intake manifold tubes.

(11) Remove manifold gaskets.

(12) Remove screws which fastens valve covers (fig. 9, (17)) to tappet adjustment housings. (See fig. 9, (10) and (35).)

(13) Remove valve covers.

(14) Remove valve cover gaskets. (See fig. 9, (18).)

b. Removing carbon. (1) Use the wire brush (fig. 2, (9)) to remove the carbon and lead deposits from the combustion chamber of the cylinder heads.

(2) Turn starter rope pulley to bring pistons (fig. 9, (30)) to the top position.

(3) Use wire brush to remove deposits from piston heads. (See fig. 9, (29).)

(4) Turn starter rope pulley to open one of the four valves.

(5) Carefully use the wire brush to remove deposits from the valve and valve seat. Do not scrape either the valve or the valve seat with a sharp instrument.

(6) Repeat for each of the three remaining valves.

(7) Use clean cloth to wipe away the loosened carbon.

c. Adjusting valve tappets. (1) Adjust tappets for one cylinder at a time.

(2) Turn starter rope pulley until the piston is at top dead center of the compression stroke. The compression stroke can be identified by the closed position of both valves.

(3) Loosen tappet locking nut. (See fig. 9, (37).)

(4) By turning valve tappet, the clearance between the tappet and the stem end of the valve (fig. 9, (39)) can be adjusted.

(5) Proper tappet clearances.

(*a*) Intake valve tappet .006 – .008 inch.

(*b*) Exhaust valve tappet .008 – .010 inch.

(6) The intake valve can be identified as the valve directly under the intake port. The intake port does not have cooling fins.

(7) The exhaust valve can be identified as the valve directly under the exhaust port. (See fig. 9, (1) and (8).) The exhaust port is surrounded by cooling fins. When separated from the cylinder the exhaust valve can be identified by a small bore in the center of head and a narrow stem below the head.

(8) Insert the correct leaf of the feeler gauge (fig. 9, (3)) between the valve tappet and stem end of valve being adjusted.

(9) Turn tappet until feeler gauge fits snugly. Use end wrenches to hold tappet and lifter in position and tighten tappet locking nut against the lifter.

(10) Turn starter rope pulley several times and stop with same piston at top dead center of the compression stroke.

(11) Recheck tightness of the tappet locking nut.

(12) Recheck the tappet adjustment.

(13) Never file or grind the stem end of the valves.

(14) Repeat preceding steps for each of the valves on both cylinders.

d. Reassembling. (1) Place new valve cover gaskets (fig. 3, (11)) over the valve tappet adjustment housing.

(2) Position valve cover on valve tappet adjustment housing.

(3) Screw in valve cover screws and tighten.

(4) Use new manifold gaskets. (See fig. 3, (9).)

(5) Slip intake manifold adapters over the intake manifold tubes and line up holes through adapters with those in cylinders.

(6) Screw in and tighten adapter screws.

(7) Use new cylinder head gaskets. (See fig. 3, (6).) Be certain the gasket surfaces of both the cylinders and heads are clean before putting new gasket in position.

(8) Position cylinder heads on cylinders.

(9) Screw on cylinder head nuts turning each down to draw head against the cylinder but do not tighten.

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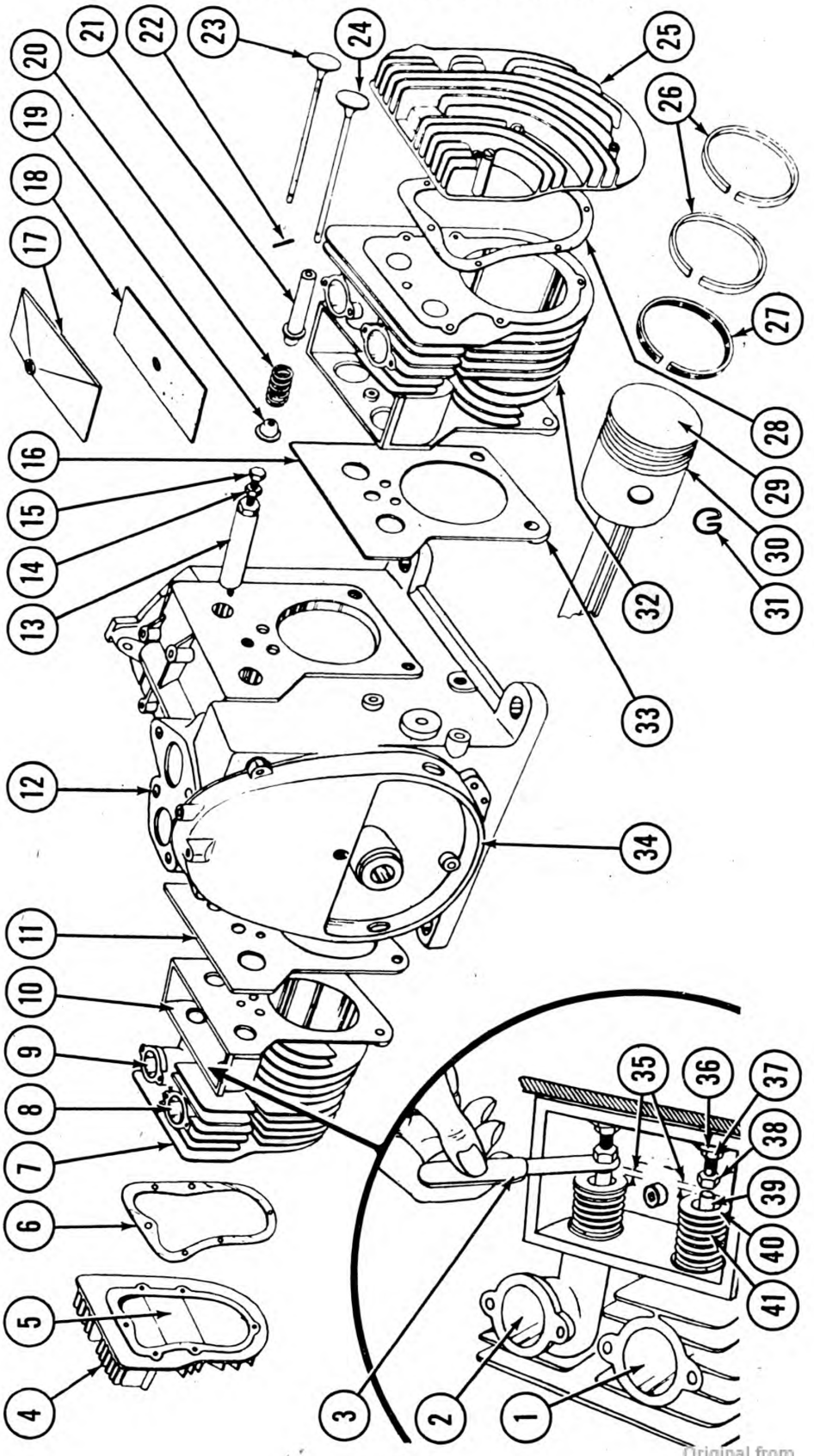

	Med. Dept. No.	Nomenclature
1.		Exhaust port.
2.		Intake port.
3.	TR01430	Gage, feeler, .001 inch to .025 inch.
4.	9R00610	Head, cylinder, L/H.
5.		Combustion chamber.
6.	9R00612	Gasket, cylinder head.
7.	9R00604	Cylinder, C.I., 2¾ inch, L/H.
8.		Exhaust port.
9.		Intake port.
10.		Valve tappet adjustment housing.
11.	9R00606	Gasket, cylinder base.
12.	9R00700	Crankcase, with bearing plate assembly.
13.	9R00623	Lifter, valve.
14.	9R00621	Nut, locking, tappet.
15.	9R00622	Tappet, valve.
16.	9R00606	Gasket, cylinder base.
17.	9R00627	Cover, valve.
18.	9R00628	Gasket, valve cover.
19.	9R00626	Washer, valve.
20.	9R00620	Springs, valve.
21.	9R00618	Guide, valve.
22.	9R00624	Pin, valve.
23.	9R00614	Valve, intake.
24.	9R00616	Valve, exhaust.
25.	9R00608	Head, cylinder, R/H.
26.		Compression rings of piston ring set, 9R00632.
27.		Oil ring of piston ring set, 9R00632.
28.	9R00612	Gasket, cylinder head.
29.		Head of piston.
30.	9R00630	Piston, 2¾ inch bore.
31.	9R00638	Ring, lock, piston pin.
32.	9R00602	Cylinder, C.I., 2¾ inch, R/H.
33.	9R00606	Gasket, cylinder base.
34.	9R00708	Gearcase.
35.		Valve tappet adjustment housing.
36.	9R00623	Lifter, valve.
37.	9R00621	Nut, locking, tappet.
38.	9R00622	Tappet, valve.
39.		Stem end of exhaust valve.
40.	9R00626	Washer, valve.
41.	9R00620	Springs, valve.

Figure 9. Engine and valve assembly.

(10) When the six nuts of one head are turned down, tighten each nut one quarter turn at a time until all are secure. Do not follow a clockwise or counterclockwise sequence when tightening head nuts. Follow a scattered sequence such as:

(*a*) Lower right side.
(*b*) Upper left side.
(*c*) Lower center.
(*d*) Upper center.
(*e*) Lower left side.
(*f*) Upper right side.

(11) Place spark plug washer on spark plugs and screw into the cylinder heads.

(12) Connect spark plug cables.

(13) Start engine. (See par. 14.)

(14) Make visual inspection for leaking gaskets. Check for unusual operating characteristics and use information on trouble shooting. (See sec. XV.)

(15) If operation is satisfactory allow engine to run for 30 minutes before stopping.

(16) Check all head nuts for tightness.

(17) Position both cylinder air housings.

(18) Screw in cylinder air housing screws and tighten.

(19) Fasten spark plug shields in place.

53. COMPRESSION TEST. **a.** Disconnect both spark plug cables.

b. Firmly grasp the starter rope pulley with both hands and *slowly* crank the engine counterclockwise. Once each revolution there will be noticed a period of considerable resistance, due to one of the pistons compressing a charge in its cylinder. The degree of compression should be such that if the starter rope pulley is released just before the point of maximum compression is reached, the direction of rotation will be reversed.

c. Test by rocking back and forth against the compression.

d. Turn the starter rope pulley one complete turn and test the compression of the other cylinder in a like manner.

e. Compression leakage may be detected by a hissing sound at either the exhaust or intake valves. Severe leakage exists if it is possible to hold the piston against compression and then slowly complete the rotation.

Section XX. GENERATOR SERVICE

54. GENERAL. **a.** This section contains instructions on the generator for the personnel of the first and second echelons of maintenance to enable them to perform the scheduled preventive maintenance services (sec. XIV) and to replace the spare parts available to the first and second echelons. No other service will be attempted.

b. In the text of the manual the term "generator," used independently of the full nomenclature of Medical Department item No. 9606000, X-ray field unit generator, means only that part of the entire item which generates electrical energy. It is illustrated and its component parts listed in figure 10. The engine serves only to turn the generator. It is the construction of the generator plus the movement supplied by the engine which produces the electrical energy.

MAINTENANCE INSTRUCTIONS

55. BRUSHES, BRUSH SPRINGS, AND BALL BEARING. a. Disassembling generator for inspection. (1) Tighten fuel tank filler cap (fig. 5, (10)) and shut-off screw.

(2) Close fuel tank shut-off petcock. (See fig. 5, (9).)

(3) Remove the four screws which fasten the fuel tank brackets to the generator.

(4) Remove fuel tank and place at side of unit.

(5) Remove the two screws from the ends of the bell housing band. (See fig. 10, (6).)

(6) Remove band from generator.

b. Inspecting brushes. (1) Remove spring tension from one brush at a time and check that it moves freely in the holder.

(2) If an AC brush (fig. 10, (18)) is worn to 5/8 inch or less all AC brushes should be replaced. This applies also to the DC brushes (fig. 10, (13)), however it is not necessary to replace both sets of brushes when only an AC or DC is found to be worn.

(3) It will be found that the DC brushes will wear much more rapidly than the AC brushes.

c. Inspecting brush springs. (1) Visually inspect the four DC brush springs (fig. 10, (14)) and the four AC brush springs (fig. 10, (17)) for broken or missing springs.

(2) Inspect for proper position on brush rig. (See fig. 10, (16).) The DC springs are smaller and are on the side of the rig nearest the starter rope pulley.

(3) Inspect position of springs on brushes. The end of each spring should rest on its respective brush and be free to move inward as the brush wears. Carefully check that the spring ends are not resting on the brush holders.

d. Inspecting commutator and slip rings. (1) There is very little information to be obtained from a visual inspection of the commutator and slip rings. Any defects will be previously detected during operation and the cause determined by using the information on trouble shooting. (See par. 36.)

(2) If the commutator and slip rings have lost the newly machined appearance and have a mahogany color it is the result of normal operation and is no cause for service.

(3) If the commutators or slip rings require service, report the condition to the proper authority.

e. Reassembling after inspection. If inspection reveals no parts require replacing, reassemble by reversing procedure for disassembling. (See a above.) should service be required further disassemble the generator by following steps on disassembling for service. (See f below.)

f. Disassembling generator for service. (1) Follow procedure on disassembling for inspection (a above) and continue with following steps.

(2) Disconnect the generator lead wires from the conductor cable outlet. (See fig. 10, (3).)

(3) Disconnect the two lead wires of the field coil set (fig. 10, (1)) from their respective terminals on the brush rig. It is important to use some means to mark the terminals to correctly connect these wires when reassembling the generator.

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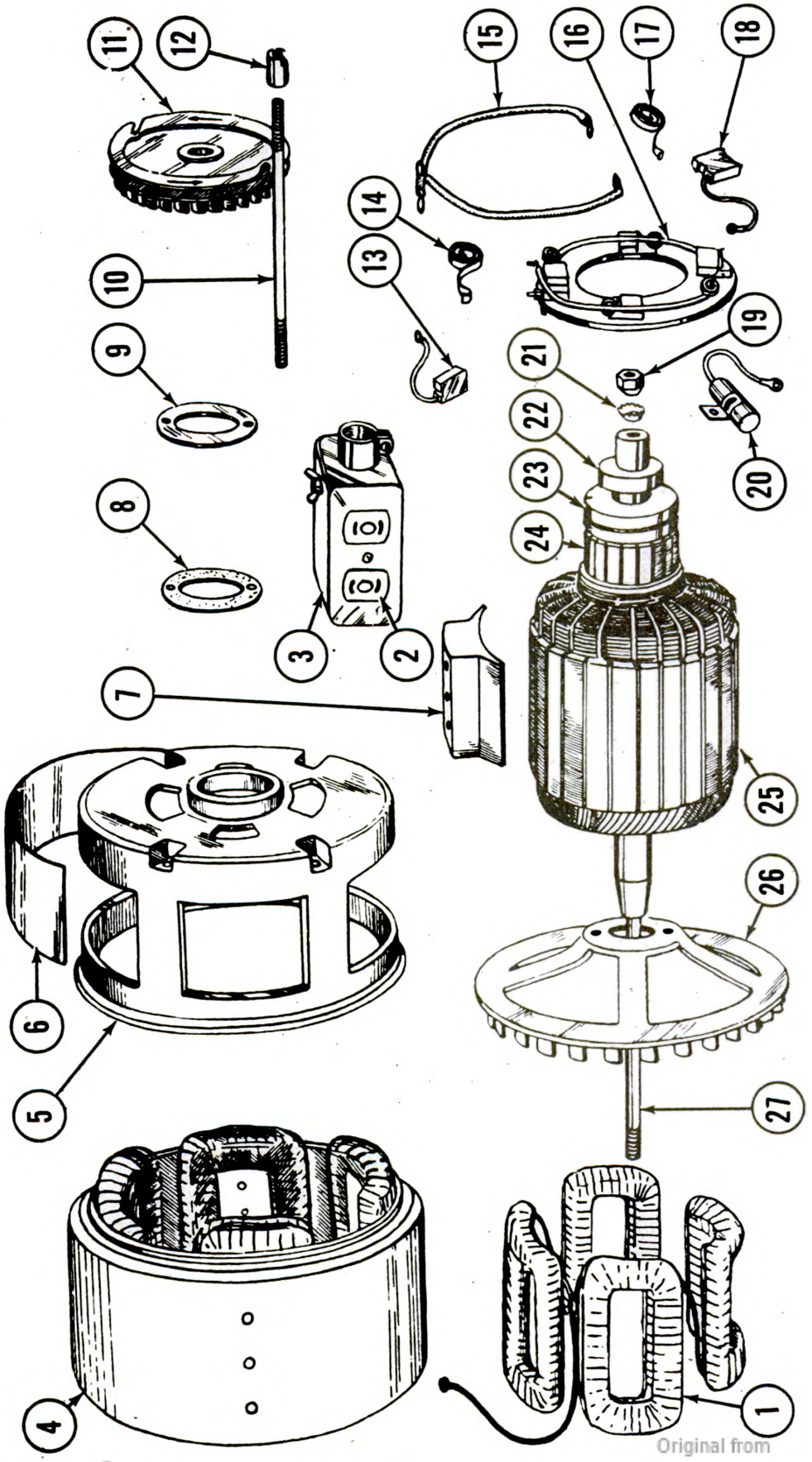

	Med. Dept. No.	Nomenclature
1.	9R00792	Coil set, field.
2.	9R00822	Receptacle, duplex.
3.	9R00869	Outlet, conductor cable.
4.	9R00795	Frame, generator.
5.	9R00803	Housing, end bell, generator.
6.	9R00801	Band, end bell housing, generator.
7.	9R00840	Shoe, pole.
8.	9R00804	Gasket, bearing cover.
9.	9R00799	Cover, bearing, generator.
10.	9R00787	Stud, generator frame.
11.	9R00838	Pulley, starter rope.
12.	9R00791	Nut, stud, generator frame.
13.	9R00788	Brush, DC.
14.	9R00794	Spring, DC.
15.	9R00797	Wire, AC brush.
16.	9R00786	Rig, brush, complete.
17.	9R00800	Spring, brush, AC.
18.	9R00798	Brush, AC.
19.	9R00796	Nut, stud, armature.
20.	9R00802	Condenser, line, AC 1-MFD.
21.	9R00793	Washer, stud, armature.
22.	9R00790	Bearing, ball.
23.		Slip rings.
24.		Commutator.
25.	9R00784	Armature, complete.
26.	9R00789	Blower, generator.
27.	9R00785	Stud, armature.

Figure 10. *Generator assembly.*

(4) Raise the eight brushes in the holders so that the springs rest on the sides of the brushes and will retain them in the raised position.

(5) Loosen set screw in hub of starter rope pulley. (See fig. 10, (11).)

(6) Remove starter rope pulley from shaft. Be certain not to lose the shaft key.

(7) Remove both screws from the bearing cover. (See fig. 10, (9).)

(8) Remove bearing cover and gasket. (See fig. 10, (8).)

(9) Remove the four generator frame stud nuts. (See fig. 10, (12).)

(10) Pull generator end bell housing (fig. 10, (5)) from the generator frame. (See fig. 10, (4).)

(11) Remove the four screws which fasten the brush rig to the generator end bell housing.

(12) Remove the brush rig from the end bell housing.

g. Replacing brushes. (1) It is advisable to replace one brush and complete the wire connection before disconnecting the next brush of the set.

(2) Trace the wire from the brush to the terminal.

(3) Disconnect brush wire from terminal.

(4) Lift free end of brush spring and slide worn brush from its holder.

(5) Insert new brush half way into holder. Use the correct brush. AC brushes (fig. 3, (2)) and DC brushes (fig. 3, (3)) are not interchangeable.

(6) Place end of brush spring against side of brush to retain it in the raised position.

(7) Connect brush wire to proper terminal.

(8) Repeat this procedure for each of the three remaining brushes of the set being replaced.

(9) After generator has been reassembled (j below), run the unit for at least 30 minutes before connecting the X-ray load. This allows the brushes to properly seat without severe arcing.

h. Replacing brush springs. (1) Lift brush spring from the brush rig stud.

(2) Place new spring on stud so there will be tension against the brush for the full length of its wear.

(3) Be certain the replacement spring is the same type. AC brush springs (fig. 3, (16)) and DC brush springs (fig. 3, (17)) are not interchangeable. The AC spring is thinner than the DC spring.

(4) Raise the brush and use spring to retain it for reassembling.

i. Lubricating ball bearing. (1) Refill ball bearing (fig. 10, (22)) with about a tablespoonful of grease, general purpose, No. 2 (WB).

(2) Do not use a cup grease or engine oil for the ball bearing.

(3) Use a clean lintless cloth to remove any grease that may have crept through the bearing to the inside of the generator.

j. Reassembling after service. (1) Check that all brushes are in the raised position, that is, not extending beyond the inner ends of the brush holders.

(2) Place brush rig within end bell housing. Be certain the yellow indicating mark on the edge of brush rig is in line with the matching mark on the inner side of the bell housing.

(3) Screw in the four screws and tighten brush rig. Again check that the yellow marks are in line.

MAINTENANCE INSTRUCTIONS

(4) Slide generator bell housing on the generator frame studs (fig. 10, (10)) and fit it against the generator frame. There is a small pin extending from the frame which fits into a receptacle in the bell housing, bell housing must be placed on studs so as to make this connection.

(5) Tighten down the four frame stud nuts.

(6) Use a new bearing cover gasket. (See fig. 3, (5).)

(7) Position bearing cover.

(8) Screw in both bearing cover screws.

(9) Place key in position on shaft.

(10) Place starter rope pulley on shaft. Be certain the fins are on the inner or generator side.

(11) Tighten starter rope pulley setscrew.

(12) Lower the eight brushes and place spring tension on ends of brushes. Check that no spring is resting on the brush holder.

(13) Connect the lead wires from the generator field coils to the proper terminals (f above) on the brush rig.

(14) Connect the lead wires from the generator to the conductor cable outlet.

(15) Reassemble bell band and fuel tank by reversing the procedure for their disassembly. (See a above.)

PART FOUR

AUXILIARY EQUIPMENT

Section XXI. GENERAL

56. SCOPE. There is no auxiliary equipment used with Medical Department item No. 9606000, X-ray field unit generator. This item is one of the pieces of auxiliary equipment for Medical Department items No. 9608508 and No. 9608510, X-ray field unit machine. It may also be used as auxiliary equipment with item No. 9621500, X-ray field unit, fluoroscopic and foreign body localization.

PART FIVE

REPAIR INSTRUCTIONS

Section XXII. GENERAL

57. SCOPE. Part five contains instructions for the information and guidance of the maintenance personnel responsible for the fourth and fifth echelons of maintenance of this equipment. This information is on maintenance services which are beyond the scope of the tools, equipment, or supplies normally available to the using organizations. These instructions are specific only as to clearances, settings, adjustments, and parts. Maintenance personnel not familiar with the repair of gasoline engines should not attempt to use these general instructions to accomplish a major engine overhaul.

Section XXIII. CARBURETOR REPAIR

58. GENERAL. The carburetor is equipped with a special offset to throttle shaft. The fuel-air mixture is not adjustable and the carburetor requires little attention other than draining of the bowl and cleaning at time of a major engine overhaul.

59. REMOVING AND DISASSEMBLING. a. Removing. (1) Remove carburetor fuel line. Disconnect the swivel end first. Drain the fuel from the line into a container.

(2) Start engine (par. 14) and allow it to run until the fuel remaining in the carburetor bowl (fig. 11, (3)) has been consumed.

(3) Loosen adapter locking screw. (See fig. 7, (28).)

(4) Remove air cleaner adapter (fig. 7, (27)) from the carburetor air intake. (See fig. 11, (14).)

(5) Remove both hex head screws (fig. 11, (19)) from the carburetor body. (See fig. 11, (21).)

(6) Remove carburetor bowl from body.

(7) Remove throttle linkage from throttle arm. (See fig. 11, (22).) Do not disturb the position of the arm in the throttle shaft (fig. 11, (25)) or the setting of the stop screw. (See fig. 11, (28).)

(8) Removal manual choke control (fig. 5, (13)) from choke arm. (See fig. 11, (18).) Do not disturb the position of the choke arm on choke shaft (fig. 11, part 15).

(9) Remove two screws which fasten carburetor to intake manifold.

(10) Remove carburetor from intake manifold.

b. Disassembling. (1) Remove the four fillister head screws (fig. 11, (6)) from cover (fig. 11, (8)).

(2) Remove cover from bowl.

(3) Pull float pin (fig. 12, (11)) from its bracket on the cover.

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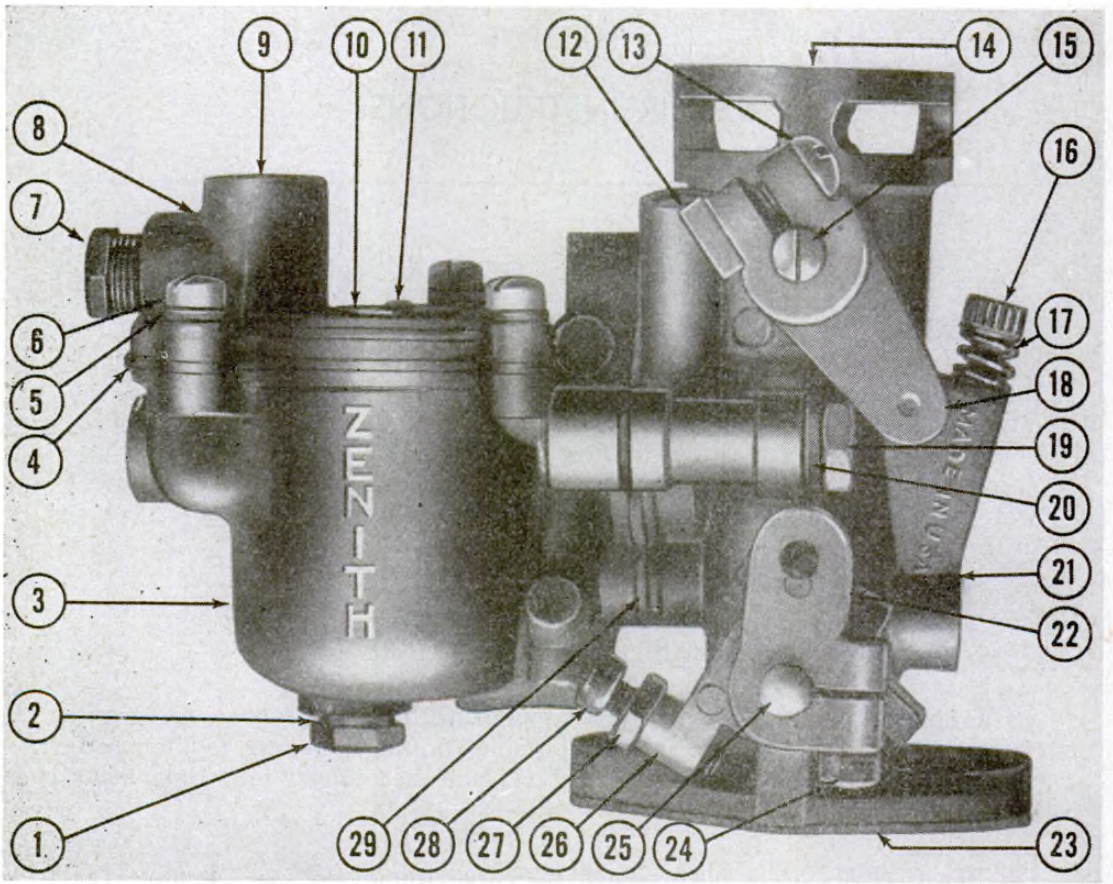

	Med. Dept. No.	Nomenclature
1.	9R00723	Plug, drain and cover, carburetor.
2.	9R00920	Washer, drain and cover plug, carburetor.
3.	9R00727	Bowl, carburetor.
4.		Bowl to cover gasket carburetor gasket set, 9R00730.
5.	SR00151	Washer, lock, screw size 10.
6.	SR00813	Screw, 10–32 x 1/2 inch, Fill. H.M.
7.	9R00723	Plug, drain and cover, carburetor.
8.	9R00922	Cover, carburetor.
9.		Carburetor inlet.
10.	9R00926	Plate, serial, carburetor.
11.	9R00924	Nail, metal, serial plate carburetor.
12.	SR00672	Nut, 10 x 32, square.
13.	SR00314	Screw, 10–32 x 5/8 inch, R.H.M.
14.		Carburetor air intake.
15.	9R00930	Shaft, choke, carburetor.
16.	9R00934	Needle, idle jet, carburetor.
17.	9R00936	Spring, idle jet, carburetor.
18.	9R00932	Arm, choke, carburetor.
19.	SR00816	Screw, 1/4–28 x 1 1/4 inch, hex H.M.
20.	SR00229	Washer, lock, screw, size 1/4.
21.	9R00938	Body, carburetor.
22.	9R00940	Arm, throttle, carburetor.
23.	9R00724	Gasket, carburetor to manifold.
24.	SR00815	Screw, 10–32 x 9/16 inch, hex H.M.
25.	9R00944	Shaft, throttle, carburetor.
26.	9R00942	Stop, throttle arm, carburetor.
27.	SR00330	Nut, 10 x 32, hex.
28.	SR00814	Screw, 10–32 x 5/8 inch, fill. H.M.
29.		Body to bowl gasket of carburetor gasket set, 9R00730.

Figure 11. *Carburetor.*

(4) Remove only the valve pin, of the valve and seat (fig. 12, (12)), from cover.
(5) Remove main jet (fig. 12, (8)) from bowl.
(6) Remove metering well plug. (See fig. 12, (1).)
(7) Remove metering well (fig. 12, (3)) from body.

60. CLEANING AND REPLACING PARTS. a. Cleaning. (1) Use compressed air, if available, or a strand of copper wire, never a needle or steel wire, to open and clean the passages through the following parts:
(*a*) Valve seat.
(*b*) Main jet.
(*c*) Metering well.
(*d*) Notch in throttle plate. (See fig. 12, (39).)
(*e*) Discharge tube. The discharge tube extends through the body of the carburetor and the opening is accessible from the under side of the carburetor body.
(2) Use a cloth soaked with dry cleaning solvent to wipe the interior of the bowl, float, and the float pin.
b. Inspecting parts. Inspect all disassembled parts for wear, damage, and incorrect fit with component parts. Check for presence of four cover screw lock washers and two body to bowl screw lock washers.
c. Replacing parts. (1) Use new body to bowl gasket and bowl to cover gasket when reassembling carburetor. (See par. 61a.) Both gaskets are supplied under spare part 9R00730, gaskets, carburetor, set.
(2) Use a new carburetor to manifold gasket when installing carburetor on engine. (See par. 61b.)
(3) Other parts found to be defective during inspection of parts (b above) will be replaced with new when reassembling or installing carburetor.

61. REASSEMBLING AND INSTALLING. a. Reassembling. (1) Invert bowl.
(2) Drop a new metering well upper washer (fig. 12, (5)) in place. Be certain the old washer has been removed and that the new washer is seated in the well housing of bowl.
(3) Insert metering well in well housing.
(4) Put new metering well lower washer (fig. 12, (2)) in place.
(5) Screw in metering well plug.
(6) Invert cover.
(7) Drop valve pin, pointed end first, into valve seat.
(8) Position float (fig. 12, (10)) between cover brackets, being certain arm of the float will lift the valve.
(9) Insert float pin.
(10) Put a new main jet washer (fig. 12, (7)) in place. Be certain the old washer has been removed.
(11) Screw main jet into receptacle.
(12) Place new bowl to cover gasket (fig. 12, (9)) on bowl.
(13) Place cover, with float assembled, on bowl.
(14) Place lock washers (fig. 11, (5)) on the four cover screws.
(15) Screw in and evenly tighten four cover screws.
b. Installing. This procedure will be the same when installing the cleaned and repaired carburetor or a new carburetor. (See fig. 11.)

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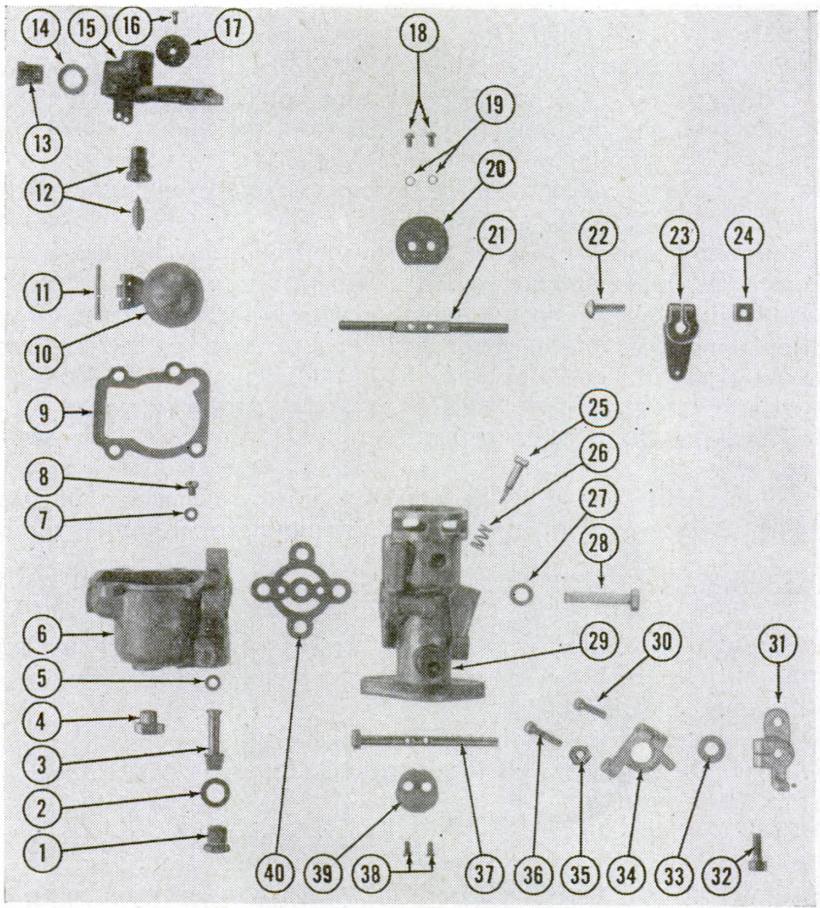


Figure 12. *Carburetor parts.*

REPAIR INSTRUCTIONS

	Med. Dept. No.	Nomenclature
1.	9R00713	Plug, metering well, carburetor.
2.	9R00721	Washer, lower, metering well, carburetor.
3.	9R00722	Well, metering, carburetor.
4.	9R00723	Plug, drain and cover, carburetor.
5.	9R00725	Washer, upper, metering well, carburetor.
6.	9R00727	Bowl, carburetor.
7.	9R00729	Washer, main jet, carburetor.
8.	9R00716	Jet, main, carburetor.
9.		Bowl to cover gasket of carburetor gasket set, 9R00730.
10.	9R00728	Float, complete.
11.	9R00731	Pin, float, carburetor.
12.	9R00720	Valve and seat, carburetor.
13.	9R00723	Plug, drain and cover, carburetor.
14.	9R00920	Washer, drain and cover plug, carburetor.
15.	9R00922	Cover, carburetor.
16.	9R00924	Mail, metal, serial plate, carburetor.
17.	9R00926	Plate, serial, carburetor.
18.	SR00818	Screw, 5–40 x 3/16 inch, R.H.M.
19.	SR00723	Washer, lock, screw size 5.
20.	9R00928	Plate, choke, carburetor.
21.	9R00930	Shaft, choke, carburetor.
22.	SR00314	Screw, 10–32 x 5/8 inch, R.H.M.
23.	9R00932	Arm, choke, carburetor.
24.	SR00672	Nut, 10 x 32, square.
25.	9R00934	Needle, idle jet, carburetor.
26.	9R00936	Spring, idle jet, carburetor.
27.	SR00229	Washer, lock, screw size 1/4.
28.	SR00816	Screw, 1/4–28 x 1 1/4 inch, hex H.M.
29.	9R00938	Body, carburetor.
30.	SR00813	Screw, 10–32 x 1/2 inch, fill. H.M.
31.	9R00940	Arm, throttle, carburetor.
32.	SR00815	Screw, 10–32 x 9/16 inch, hex H.M.
33.	SR00297	Washer, screw size 1/4.
34.	9R00942	Stop, throttle arm, carburetor.
35.	SR00330	Nut, 10 x 32, hex: For locking throttle adjusting screw.
36.	SR00814	Screw, 10–32 x 5/8 inch, fill. H.M.: For adjusting throttle.
37.	9R00944	Shaft, throttle, carburetor.
38.	SR00817	Screw, 5–40 x 1/4 inch, O.H.M.
39.	9R00946	Plate, throttle, carburetor.
40.		Body to bowl gasket of carburetor gasket set, 9R00730.

Figure 12. *Carburetor parts—Continued.*

(1) When installing a new carburetor it is necessary to separate the bowl from the body.

(2) Use a new carburetor to manifold gasket. (See fig. 11, (23).)

(3) Position carburetor on intake manifold, insert and tighten carburetor base screws.

(4) Connect manual choke control to choke arm.

(5) Connect throttle linkage to throttle arm.

(6) Use a new body to bowl gasket. (See fig. 12, (40).)

(7) Position bowl on body.

(8) Put lock washers (fig. 12, (27)) on both hex head screws.

(9) Insert screws through body and fasten assembled bowl in place.

(10) Connect carburetor fuel line.

(11) Put air cleaner adapter in place.

(12) Tighten adapter locking screw.

62. ADJUSTING AND TESTING. a. Adjusting. There is no adjustment to be made within the carburetor. Adjustment and setting of the throttle arm and stop is covered under governor adjusting and testing. (See par. 77.)

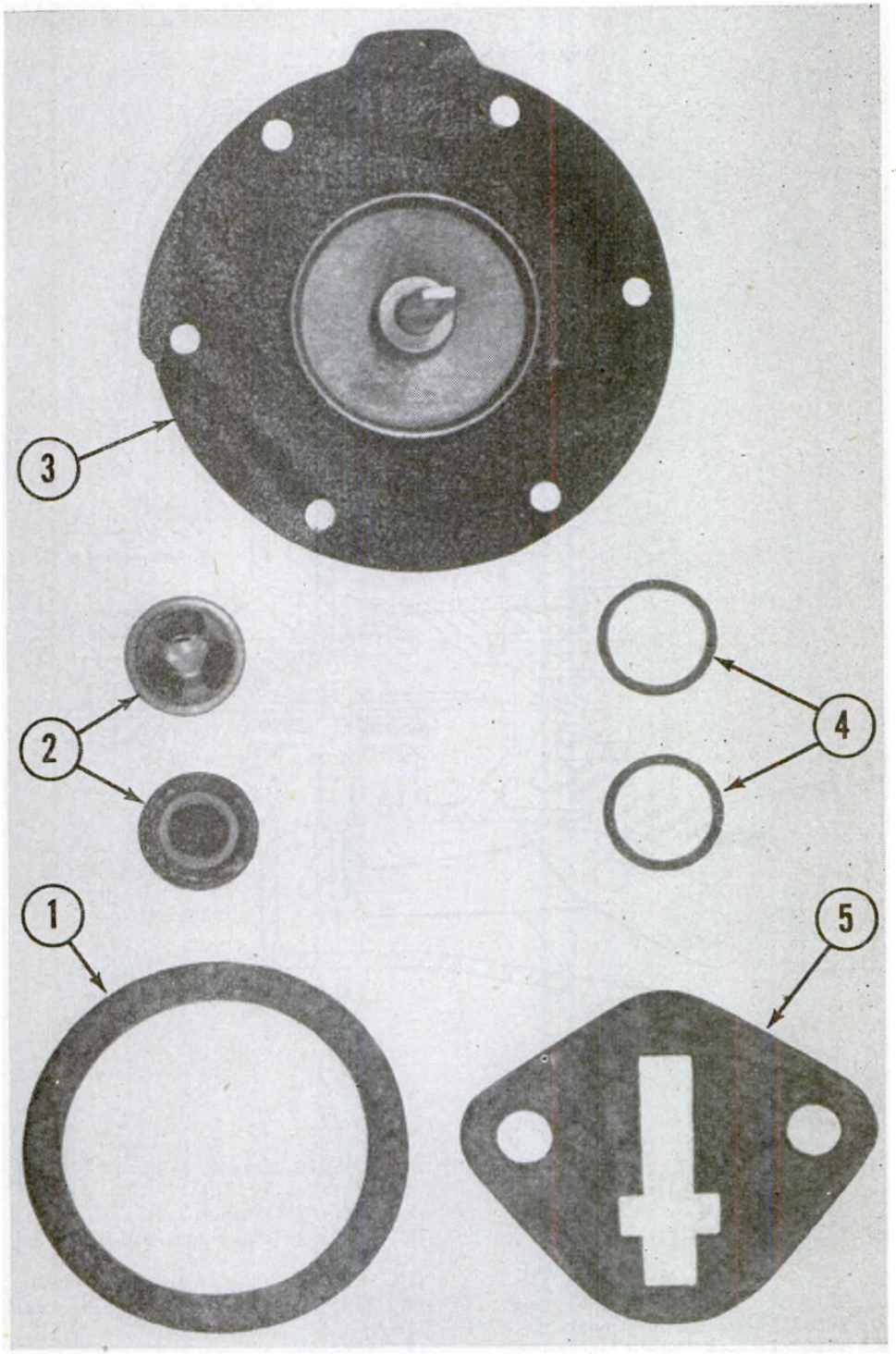
b. Testing. Start engine. (See par. 14.) It will require considerable cranking to fill the carburetor bowl. Check for leaks, hard starting, and unsteady operation of engine.

Section XXIV. FUEL PUMP REPAIR

63. GENERAL. This section contains supplemental instructions on the fuel pump service. (See par. 45.) Carefully read the instructions on fuel supply system service (sec. XVII) before proceeding with repairs covered in this section.

a. Models. Model OTC–38 and model OTC–38B are equipped with different fuel pumps. Both fuel pumps as complete assemblies are interchangeable between models. The component parts of each fuel pump are not interchangeable with the other. Instructions contained in this section of the manual pertain only to the improved fuel pump on model OTC–38B. The instructions for removing, disassembling, cleaning, and inspection will generally cover both fuel pumps. If inspection of disassembled parts of the model OTC–38 fuel pump discloses necessary replacement of component parts the entire fuel pump assembly should be replaced with the model OTC–38B fuel pump assembly which is spare part No. 9R00740, fuel pump, complete. Attach a notation to the unit that this change has been made. All spart parts supplied are for the model OTC–38B fuel pump only.

b. Spare Part No. 9R00758, Fuel Pump Kit. This kit is assembled to furnish the parts necessary for a general reconditioning of the fuel pump. When replacing any part of the fuel pump it is advisable to replace all the spare parts contained in the kit as a preventive maintenance service to avoid repeated fuel pump failure. The contents of the kit are illustrated and listed in figure 13.



	Med. Dept. No.	Nomenclature
1.	9R00756	Gasket, fuel pump, bowl.
2.	9R00745	Valve, fuel pump.
3.	9R00948	Diaphragm and lever link, fuel pump.
4.	9R00956	Gasket, valve, fuel pump.
5.	9R00748	Gasket, fuel pump.

Figure 13. Fuel pump kit, No. 9R00758.

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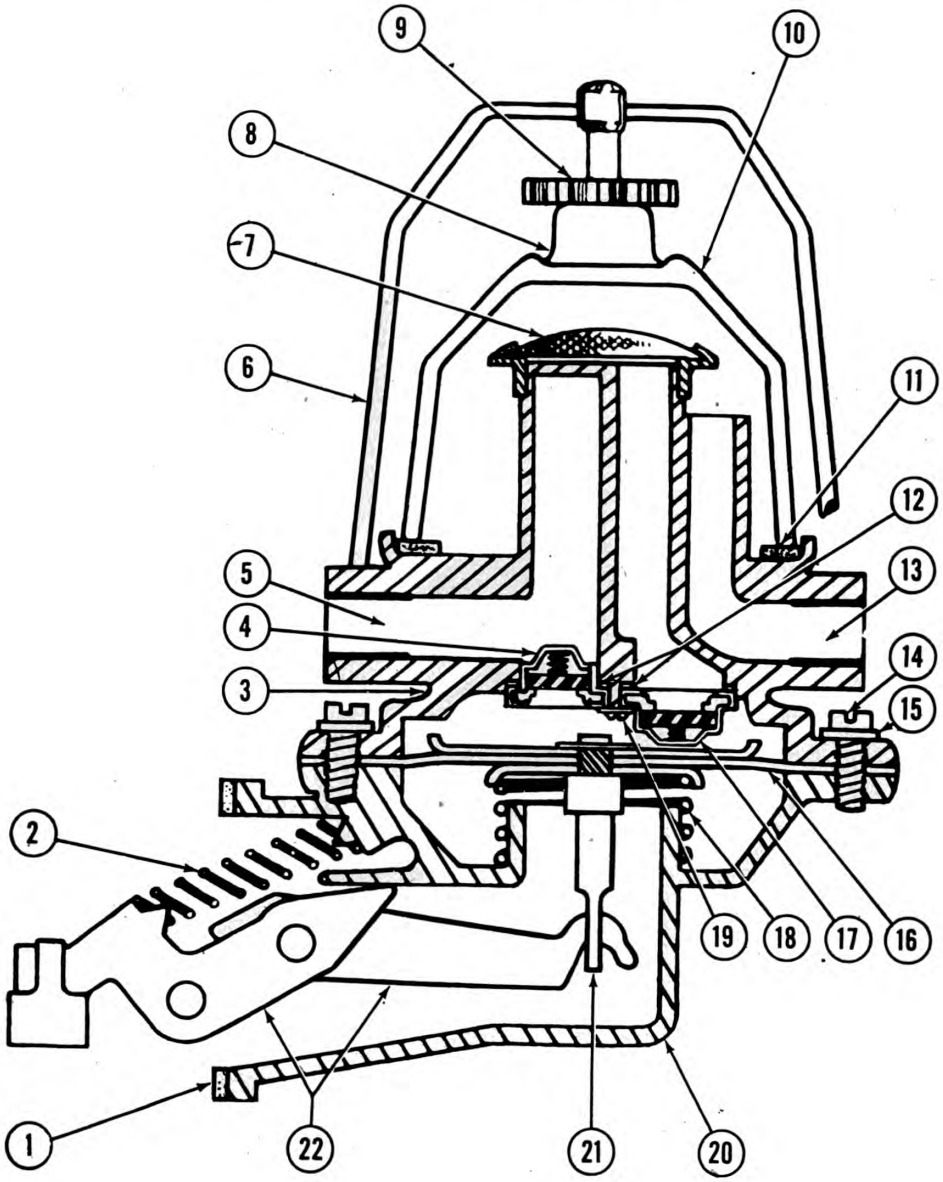

	Med. Dept. No.	Nomenclature
1.	9R00748	Gasket, fuel pump.
2.	9R00739	Spring, lever, fuel pump.
3.	9R00743	Body, upper, fuel pump.
4.	9R00745	Valve, fuel pump: Pressure.
5.		Fuel pump outlet.
6.	9R00757	Yoke, bowl, fuel pump.
7.	9R00752	Screen, fuel pump.
8.	9R00747	Cap, bowl, fuel pump.
9.	9R00753	Nut, bowl yoke, fuel pump.
10.	9R00754	Bowl, fuel pump.
11.	9R00756	Gasket, fuel pump, bowl.
12.	9R00956	Gasket, valve, fuel pump.
		Fuel pump inlet.

	Med. Dept. No.	Nomenclature
14.	SR00280	Screw, 8–32 x 5/8 inch, fill. H.M.
15.	SR00152	Washer, lock, screw size 8.
16.	9R00948	Diaphragm and lever link, fuel pump.
17.	9R00745	Valve, fuel pump: Vacuum.
18.	9R00950	Spring, diaphragm, fuel pump.
19.	SR00105	Screw, 6–32 x 3/8 inch, R.H.M.
20.	9R00952	Body, lower, fuel pump.
21.		Diaphragm link and lever connection.
22.	9R00954	Lever, fuel pump.

Figure 14. *Fuel Pump.*

REPAIR INSTRUCTIONS

64. REMOVING AND DISASSEMBLING. a. Removing. (1) Allow engine to cool completely.

(2) Close fuel tank shut-off petcock. (See fig. 5, (9).)

(3) Remove fuel tank line. Disconnect swivel end first.

(4) Remove carburetor fuel line. Disconnect swivel end first.

(5) Remove two fillister head screws (fig. 14, (14)) which fasten the governor adjusting spring bracket to the fuel pump flange. Remove the bracket from the fuel pump. Do not disturb the adjustment of the governor adjusting spring and nut.

(6) Remove both screws which fasten fuel pump to the adapter. (See fig. 8, (3).)

(7) Remove fuel pump from fuel pump adapter. Some difficulty may be encountered when disengaging the fuel pump lever (fig. 14, (22)) from the push rod (fig. 8, (2)). It may be necessary to revolve the starter rope pulley to bring the push rod to its lowest position and at the same time lifting upward on the fuel pump.

b. Disassembling. (1) Invert fuel pump.

(2) Loosen bowl yoke nut. (See fig. 14, (9).)

(3) Swing bowl yoke (fig. 14, (6)) to side of bowl (fig. 14, (10)).

(4) Some force may be necessary to loosen bowl because it becomes firmly seated in the bowl gasket. (See fig. 14, (11).) Avoid unnecessary spilling of the gasoline.

(5) Lift screen (fig. 14, (7)) from the center well of the upper body.

(6) Pump need no longer be held in the inverted position.

(7) Remove the four remaining fillister head screws from the fuel pump flange.

(8) Remove upper fuel pump body (fig. 14, (3)) from lower body. (See fig. 14, (20).)

(9) Remove both round head screws (fig. 14, (19)) from the valve plate.

(10) Remove valve plate.

(11) Remove both fuel pump valves. (See fig. 14, (4) and (17).)

(12) Remove diaphragm and lever link (fig. 14, (16)) by pressing upward on the external part of lever and holding it in the upper position and at the same time pressing downward on the diaphragm in such a manner as to swing the lever link off the lever connecting hook. (See fig. 14, (21).) Lift diaphragm from body.

(13) Remove diaphragm spring. (See fig. 14, (18).)

(14) It will not be necessary to disassemble the fuel pump lever and lever spring. (See fig. 14, (2).)

65. CLEANING, INSPECTING, AND REPLACING PARTS. a. Cleaning. Follow instructions for cleaning fuel pump bowl and screen. (See par. 45.) Use dry-cleaning solvent to clean additional disassembled parts.

b. Inspecting disassembled parts. (1) *Lever spring.* Inspect for breakage.

(2) *Bowl.* Inspect for cracks.

(3) *Screen.* Inspect for excessive gum and punctures.

(4) *Diaphragm spring.* Inspect for breakage.

c. Replacing defective parts. (1) See instructions for replacement of pump on model OTC–38. (See par. 63b.)

(2) New gaskets and parts contained in fuel pump kit (fig. 13) will be installed when reassembling and installing. (See par. 66.)

(3) Parts found to be defective during inspection of disassembled parts (b above) will be replaced with new when reassembling and installing.

66. REASSEMBLING AND INSTALLING. a. Reassembling. (1) Position diaphragm spring in lower body of fuel pump.

(2) Position new diaphragm (fig. 13, (3)) on the lower body. It will be helpful to invert the lower body and work from the underside when engaging the diaphragm lever link to the lever connecting hook. When the diaphragm can not be lifted from the pump body it indicates that the diaphragm link is engaged with the lever connecting hook. Further check by moving the external portion of the lever and watching the reaction on the diaphragm. Do not continue the assembly until certain this engagement has been made.

(3) Place new fuel pump valve gaskets (fig. 13, (4)) in position. Be certain the old gaskets have been removed.

(4) Install new fuel pump valves. (See fig. 13, (2).) Both valves are interchangeable. The function of the valve is determined by its position in the upper body of the pump. The pressure valve (fig. 14, (4)) is installed with the spring up and on the outlet (fig. 14, (5)) side of the pump. The vacuum valve (fig. 14, (17)) is installed with the spring down and on the inlet (fig. 14, (13)) side of the pump.

(5) Position valve plate.

(6) Insert and tighten valve plate round head screws.

(7) Position upper body on lower body and line up screw taps of diaphragm and both bodies. Position pump inlet and outlet in relationship to lower body as illustrated in figure 14.

(8) Insert and tighten four of the six screws in pump flange, omitting the two screws which fasten the governor adjusting spring bracket in place. Be certain all lock washers (fig. 14, (15)) are in place.

(9) Put screen in position.

(10) Use a new bowl gasket. (See fig. 13, (1).)

(11) Put bowl in position.

(12) Swing yoke over bowl and tighten down bowl yoke nut.

b. Installing. (1) Turn starter rope pulley until fuel pump push rod reaches its lowest position. It may be necessary to press downward on rod to make it follow the cam travel.

(2) Use a new fuel pump gasket. (See fig. 13, (5).)

(3) Insert cup end of fuel pump lever into the adapter and over the push rod. Be certain the cup is engaged with the rod before continuing the installation.

(4) Insert and tighten both fuel pump to adapter screws.

(5) Position governor adjusting spring bracket on the fuel pump flange.

(6) Insert and tighten the two remaining flange screws.

(7) If setting of governor adjusting spring and nut has been changed, follow the instructions for adjusting. (See par. 77a.)

(8) Connect carburetor fuel line to the fuel pump outlet.

(9) Connect fuel tank line to the fuel pump inlet.

(10) Open fuel tank shut-off petcock.

REPAIR INSTRUCTIONS

67. ADJUSTING AND TESTING. a. Adjusting. There is no adjustment to be made on a reconditioned fuel pump.

b. Testing. Follow procedure for testing the fuel supply system. (See par. 46.)

Section XXV. MAGNETO REPAIR

68. GENERAL. This section contains instructions for the service of the magneto. Carefully read the instructions on the ignition system service (sec. XVI) before proceeding with the repairs covered in this section.

69. REMOVING AND DISASSEMBLING. a. Removing. Remove the four wing nuts (fig. 1, (3)) from base and skid panel studs.

(2) Lift the entire unit from the base and skid panel and place it on a bench with the engine end of the unit even with the front edge of the bench.

(3) Remove the four exhaust muffler screws.

(4) Remove the exhaust muffler from the engine.

(5) Insert a socket wrench through the blower housing grill and loosen the nut in the center of the blower wheel one and one half turns. If necessary to lock crankshaft by means of the blower fins use the inner edge of a fin and use extreme care not to damage fins.

(6) Insert a block of hardwood through the grill and against the nut and give a sharp blow with a hammer to loosen the blower wheel from the tapered shaft.

(7) Remove the nut.

(8) Remove blower housing screws.

(9) Pull blower housing forward against carrying frame.

(10) Reach inside the housing and disconnect the wires from the stop buttons. (See fig. 5, (19).) These are spring type connections.

(11) Pull blower wheel off shaft into blower housing.

(12) Turn blower housing counterclockwise about 45° and remove blower wheel and housing through the bottom of carrying frame.

(13) Use any means available to mark each wire and its respective terminal. Unscrew and unsolder wires leading from magneto assembly.

(14) Note the arrow near the top of magneto back plate. (See fig. 7, (5).)

(15) Mark the gear case at a point that coincides with the point of the arrow.

(16) Remove both screws from the slotted holes in the back plate and remove the magneto assembly.

b. Disassembling. Do not remove the two laminated magneto coil shoes (fig. 7, (2)) from back plate unless the coils or plates require replacing. Test coils. (See par. 70b.)

(1) If coil shoes are removed use a sharp steel point to mark their positions on back plate.

(2) Carefully observe the arrangement of the coil connections and the positions of the right coil (fig. 7, (3)) and the left coil. (See fig. 7, (4).) Note that the high tension terminals are about 15/32 inch from the nearest point on the coil shoes and this spacing serves as a safety gap.

(3) Slip the insulating tube from the connection between the coils.

(4) Unsolder the connection.

(5) Each coil is retained by the bent end of a lamination. Straighten these ends and remove coils.

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70. CLEANING, TESTING, INSPECTING, AND REPLACING PARTS. a. Cleaning parts. Use a clean cloth, slightly dampened with dry-cleaning solvent to wipe any oil and dirt from the coil shoes, back plate, and inner side of blower wheel.

b. Testing coils. (1) Use test meter in Medical Department maintenance and repair tool set, 9N45705.

(2) Set meter for continuity test.

(3) Connect meter leads to terminal ends of one coil. Meter should show continuity.

(4) Connect a meter lead to one terminal end of a coil and move other meter lead about the exterior of the same coil. If meter shows continuity during this test it indicates faulty external insulation.

(5) It is possible for the coil to be internally shorted which is cause for replacement. This defect is difficult to detect by means of a test meter. An internal short would show the coil to have less resistance than the other and would, if the short is serious, result in too little output to bridge the spark plug gap during the ignition system test. (See par. 40.)

c. Inspecting disassembled parts. (1) *Coil shoes.* Inspect for excessive rust or corrosion.

(2) *Wiring.* Inspect for frayed or worn insulation.

d. Replacing parts. Parts which are found to be defective will be replaced with new when reassembling. (See par. 71a.)

71. REASSEMBLING AND INSTALLING. a. Reassembling. (1) Slip coils on coil shoes. Be careful not to damage the insulation of the coils.

(2) Bend one lamination over the end of each coil to retain it in position. Again be careful not to damage the coil insulation.

(3) Solder the intercoil wire connection.

(4) Slip insulating tube over the intercoil connecting wire.

(5) If coil shoes have been removed position them exactly as marked when disassembling.

(6) Insert four screws through shoes and fasten to back plate.

(7) To aid in determining proper connections make use of the wiring diagram. (See fig. 15.)

b. Installing. (1) Insert both screws through slotted holes of back plate and screw into taps in gearcase. Do not tighten.

(2) Position back plate until the arrow is exactly in line with the mark place on the gearcase during disassembly.

Note. At this point of reassembly any adjustment of timing (par. 72a), found to be necessary in previous operation, will be made.

(3) Tighten both back plate screws securely.

(4) Solder spark plug cables and stop button wires in position.

(5) Place blower wheel within blower housing and insert both through the bottom of the carrying frame and turn until in approximate position.

(6) Put blower wheel on shaft.

(7) Snap stop button wires into the spring connectors at each stop button.

(8) Put blower housing in correct position and fasten all blower housing screws.

(9) Install and tighten nut on shaft of blower wheel. Use a socket wrench.

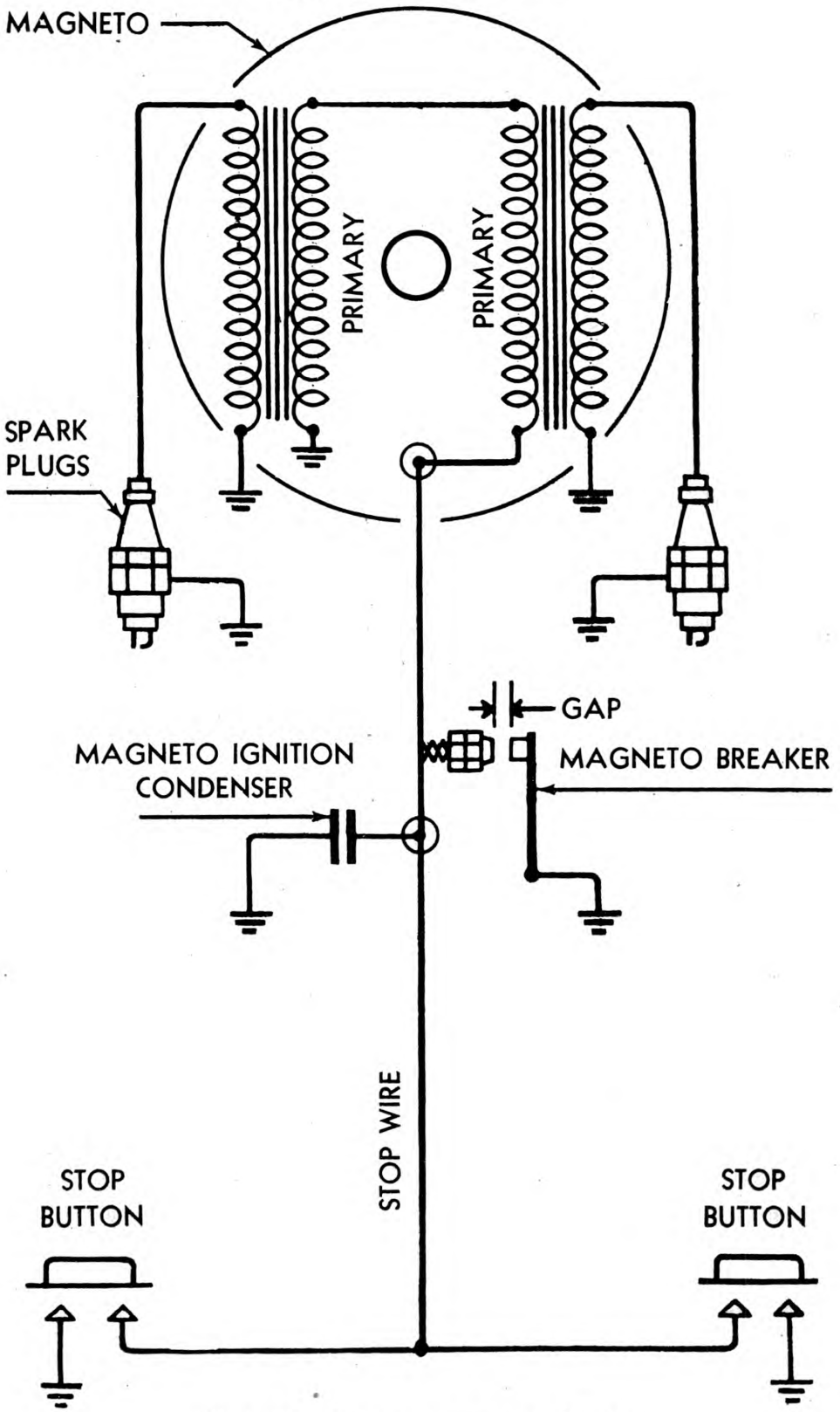

Figure 15. *Ignition system wiring diagram.*

(10) Put new muffler gaskets (fig. 3, (9)) in place.
(11) Position exhaust muffler on engine.
(12) Insert and tighten the four exhaust muffler screws.
(13) Replace unit on base and skid panel of carrying case.
(14) Securely tighten the base panel wing nuts.

72. ADJUSTING AND TESTING. a. Adjusting.

Note. Right and left position and clockwise rotation as mentioned in this subparagraph will be as viewed from the gearcase end of the unit.

(1) *Mark exterior of blower wheel.* (*a*) It will be noted that the inner edge of the blower wheel has two opposing magnets. Each of the magnets has two surface areas. The blower wheel, when installed, turns counterclockwise and, using that direction of travel, determines the leading surface of each magnet and the trailing edge of each surface.

(*b*) Mark the position of the trailing edge of the leading surface of each magnet on exterior of blower wheel.

(2) *Mark position of magneto core on gearcase.* (*a*) Position back plate until the arrow is exactly in line with the mark placed on gearcase.

(*b*) Mark the position of the lower edge of the right coil core on the exterior of the gearcase.

(3) *Positioning breaker points.* (*a*) Place blower wheel key in crankshaft.

(*b*) Place blower wheel on crankshaft.

(*c*) Turn blower wheel until the top dead center mark (*TC*) is in line with the corresponding line on the gearcase.

(*d*) Set test meter to indicate continuity.

(*e*) Connect one test meter lead to the stationary point of the ignition breaker.

(*f*) Connect the second test meter lead to the arm of the ignition breaker. Be certain this connection does not in any way retard or prohibit the movement of the breaker arm.

(*g*) Turn the blower wheel clockwise until the meter shows the continuity broken. Make this adjustment as fine as possible. If the meter needle is vibrating between a reading and no reading hold the blower wheel in that position. At this position the ignition breaker points are just opening.

(4) *Positioning the back plate.* (*a*) When the breaker points are barely open, as described above, one mark on the blower wheel should be 1/16 inch beyond, or below, the mark on the gearcase.

(*b*) Determine the necessary direction and distance of movement of back plate.

(*c*) Remove the blower wheel and make the predetermined adjustment of the back plate. Tighten the screws which fasten the back plate of the gearcase.

(*d*) In this position the maximum spark is developed.

(*e*) Mark the new position of the back plate on the gearcase.

(*f*) Continue the installation of magneto. (See par. 71b.)

b. Testing. (1) *Coils.* Testing of the magneto coil is covered under replacing of magneto parts. (See par. 70b.)

(2) *Ignition system.* Follow instructions for testing ignition system. (See par. 40.)

REPAIR INSTRUCTIONS

Section XXVI. GOVERNOR AND BOOSTER REPAIR

73. GENERAL. a. This section contains instructions on the repair of the governor and booster. The existing setting of the governor and booster should never be changed unless necessary as after a major engine overhaul.

b. Purpose of governor and booster. (1) *Governor.* The governor maintains a constant engine speed of 1,800 RPM. This control is accomplished by means of four weights (fig. 16, (18)) pivoted on a revolving pivot plate, (fig. 16, (17)) which is fastened to the camshaft gear. When the engine speed increases, the weights pivot outward and react on a series of shafts and links which throttle down the engine. If the engine speed decreases, the weights are pivoted inward by the tension of the governor spring (fig. 16, (16)) and results in the throttle opening and increasing the engine speed. This is a constant balancing of engine speeds but it will be noted that there must be a change in engine speed before the governor functions.

(2) *Booster.* The booster also maintains a constant engine speed of 1,800 RPM but is on instantaneous electrical action. The booster coil (fig. 16, (6)) is connected in series with one line to the cable outlet. When the X-ray load is placed on the generator, the current flow through the coil is increased. This reacts on the throttle linkage and opens the throttle to offset the drop in engine speed, which results from a load being placed on the generator. This, therefore, is the purpose of the booster, to open the throttle wider at the same instant the load is applied to the generator, to avoid a decrease in engine speed. If the governor were the only controlling member the engine speed would decrease momentarily until the governor leveled off the speed.

74. REMOVING AND DISASSEMBLING. a. Removing governor. (1) Make a sketch which shows all details of existing adjustment, noting the number of threads exposed beyond nuts, length and position of arm, and the spacing between members. Use figure 17 as a guide for the sketch.

(2) Slip governor spring from spring stud. (See fig. 16, (24).)

(3) Mark position of booster housing (fig. 16, (7)) on booster bracket, (fig. 16, (25)).

(4) Loosen both screws which fasten booster housing to booster bracket.

(5) Loosen governor arm rod screw.

(6) Pry governor arm rod upward and off shaft of paddle. (See fig. 16, part (15).)

Note. To repair internal mechanism of the governor, it is not necessary to further disassemble the external linkage and mechanism.

(7) Remove the four wing nuts (fig. 1, (3)) from base and skid panel (fig. 5, (20)).

(8) Remove both clamp brackets. (See fig. 1, (2).)

(9) Lift the entire unit from the base and skid panel and place it on a bench with the engine end of the unit even with the front edge of the bench.

(10) Remove the four exhaust muffler screws.

(11) Remove the exhaust muffler.

(12) Insert a socket wrench through the blower housing grill and loosen nut in the center of blower wheel one and one half turns. If necessary to

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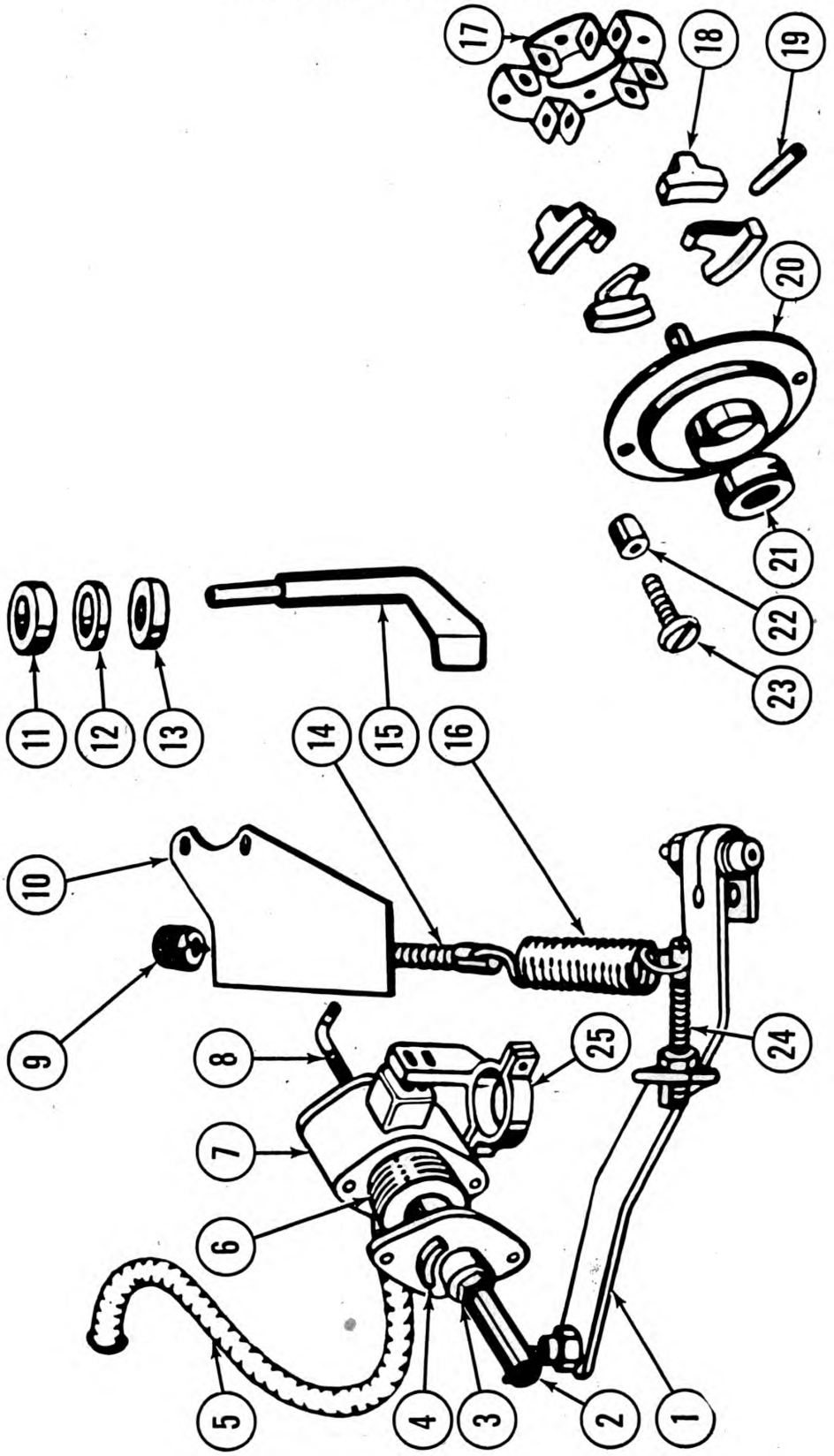

	Med. Dept. No.	Nomenclature
1.	9R00668	Rod, arm, governor.
2.	9R00670	Joint, ball, governor.
3.	9R00860	Plunger, booster.
4.	9R00858	Cover, housing, booster.
5.	9R00806	Conduit, flexible, governor-booster.
6.	9R00868	Coil, booster.
7.	9R00856	Housing, booster.
8.	9R00864	Rod, control, throttle.
9.	9R00842	Nut, adjusting, governor spring.
10.	9R00844	Bracket, adjusting spring, governor.
11.	9R00850	Bearing, upper shaft, governor.
12.	9R00846	Spacer, shaft, governor.
13.	9R00848	Bearing, lower, shaft, governor.
14.	9R00862	Screw, adjusting, governor spring.
15.	9R00866	Shaft and paddle, governor.
16.	9R00666	Spring, governor.
17.	9R00665	Plate, pivot, governor.
18.	9R00662	Weight, governor.
19.	9R00672	Pin, weight, governor.
20.	9R00667	Cup and stud, governor.
21.	9R00666	Stud, governor.
22.	9R00663	Spacer, cup stop screw, governor.
23.	9R00661	Screw, cup stop, governor.
24.	9R00852	Stud, spring, governor.
25.	9R00854	Bracket, booster.

Figure 16. Governor and booster assembly.

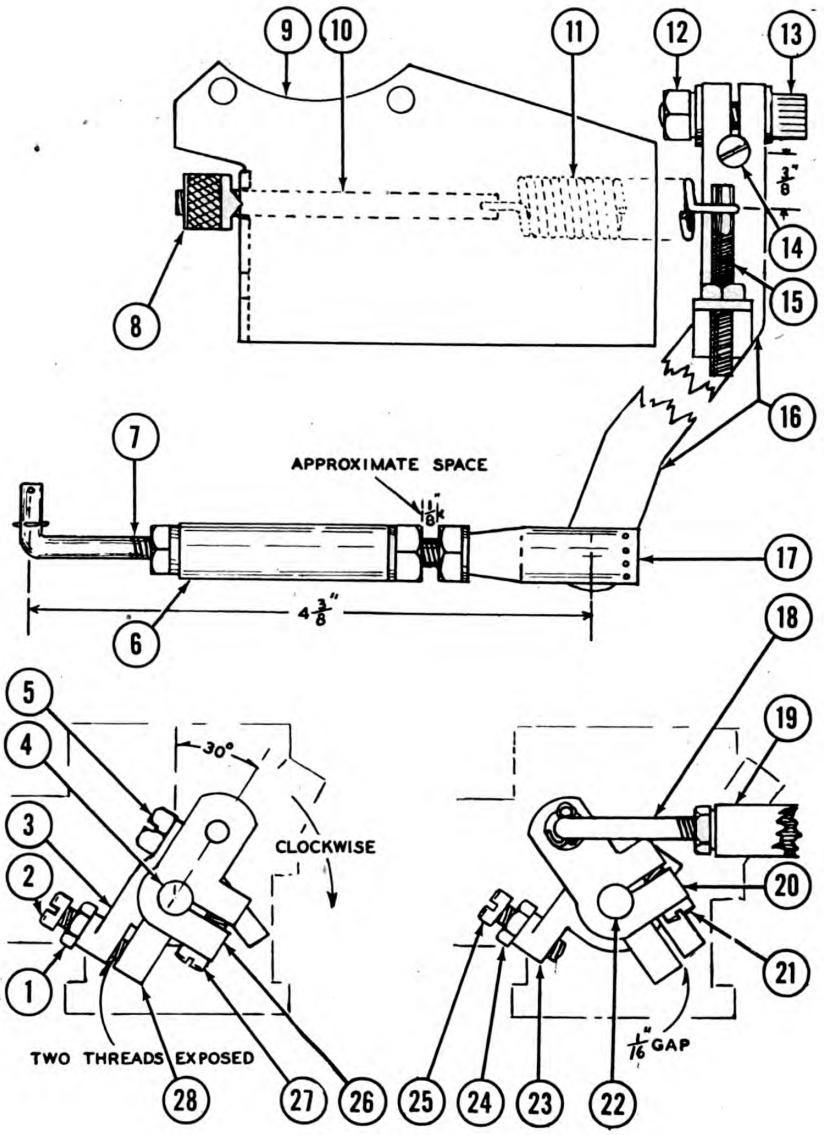

Figure 17. Approximate governor and booster adjustments.

	Med. Dept. No.	Nomenclature
1.	SR00330	Nut, 10 x 32, hex.
2.	SR00814	Screw, 10–32 x 5/8 inch, fill. H.M.
3.	9R00942	Stop, throttle arm, carburetor.
4.	9R00944	Shaft, throttle, carburetor.
5.	SR00813	Screw, 10–32 x 1/2 inch, fill. H.M.
6.	9R00860	Plunger, booster.
7.	9R00864	Rod, control, throttle.
8.	9R00842	Nut, adjusting, governor spring.
9.	9R00844	Bracket, adjusting spring, governor.
10.	9R00862	Screw, adjusting, governor spring.
11.	9R00666	Spring, governor.
12.	SR00230	Nut, 1/4 x 20, hex.
13.	SR00722	Screw, 1/4–20 x 3/4 inch, Allen H.M.
14.		Slotted end of governor shaft, 9R00866.
15.	9R00852	Stud, spring, governor.
16.	9R00668	Rod, arm, governor.
17.	9R00670	Joint, ball, governor.
18.	9R00864	Rod, control, throttle.
19.	9R00860	Plunger, booster.
20.	9R00940	Arm, throttle carburetor.
21.	SR00815	Screw, 10–32 x 9/16 inch, hex H.M.
22.	9R00944	Shaft, throttle, carburetor.
23.	9R00942	Stop, throttle arm, carburetor.
24.	SR00330	Nut, 10 x 32, hex.
25.	SR00814	Screw, 10–32 x 5/8 inch, fill. H.M.
26.	9R00940	Arm, throttle, carburetor.
27.	SR00815	Screw, 10–32 x 9/16 inch, hex H.M.
28.		Stop flange on carburetor throttle arm, 9R00940.

Figure 17. *Approximate governor and booster adjustments—Continued.*

lock crankshaft by means of the blower fins, use the inner edge of a fin and use extreme care not to damage fins.

(13) Insert a block of hardwood through the grill and against the nut and give it a sharp blow with a hammer, to loosen blower wheel from tapped end of crankshaft.

(14) Remove nut.

(15) Remove the three blower housing screws.

(16) Pull blower housing forward against carrying frame.

(17) Reach inside blower housing and disconnect wires from stop buttons. (See fig. 5, (19).) These are spring type connections.

(18) Pull blower wheel off shaft into blower housing.

(19) Turn blower housing counterclockwise about 45° and remove blower wheel and housing through bottom of carrying frame.

(20) Remove spark plug shields.

(21) Disconnect spark plug cables from spark plugs.

(22) Remove the four screws which fasten gearcase (fig. 9, (34)) to crankcase. (See fig. 9, (12).)

(23) Remove gearcase from crankcase. This will expose the internal moving parts of the governor.

b. Disassembling governor. After the governor mechanism has been exposed (a above), it is unlikely that the governor will require further disassembly. Further disassembly should not be done unless required by a broken, damaged, or missing part of the internal mechanism.

c. Removing booster. (1) Make a sketch which shows all details of existing adjustments noting the number of threads exposed beyond nuts, length and position of arms, and the spacing between members. Use figure 17 as a guide for the sketch.

(2) Mark position of booster housing on booster bracket.

(3) Remove both screws which fasten booster housing to booster bracket.

(4) Remove booster housing from bracket.

(5) Remove cotter pin from throttle control rod. (See fig. 16, (8).)

(6) Disconnect throttle control rod from carburetor throttle arm.

(7) Disconnect throttle control rod from booster plunger. (See fig. 16, (3).)

(8) Remove booster coil and housing from plunger.

d. Disassembling booster.

Note. Booster need only be completely disassembled if booster coil is believed to be faulty.

(1) *Test booster coil.* (*a*) Remove both screws which fasten the face place of the conductor cable outlet to the outlet box.

(*b*) Remove the outlet face plate.

(*c*) Draw the receptacle far enough from the outlet box to expose the connections.

(*d*) Disconnect one coil wire from the receptacle.

(*e*) Slip the insulating sleeve from the connection of the second coil wire to one of the incoming AC brush wires.

(*f*) Unscrew connection.

(*g*) Use the test meter from the Medical Department maintenance and repair tool chest, 9N45705.

(*h*) Set test meter for testing continuity.

(*i*) Connect test meter leads to disconnected coil wires. If test meter

indicates continuity the coil is good and no further disassembly is required. If test meter does not indicate continuity the coil is defective. Continue disassembly.

(2) Straighten connecting loops at outlet end of coil wires.

(3) Loosen setscrew which fastens conduit to booster housing.

(4) Loosen screw which locks conduit to cable outlet box.

(5) Remove coil wires from conduit by pulling booster housing and coil away from conduit.

75. CLEANING, INSPECTING, REPLACING, AND LUBRICATING PARTS.

a. Cleaning governor parts. (1) Use a clean cloth soaked with dry-cleaning solvent to wipe all oil and dirt from the disassembled and exposed parts.

(2) Follow with a dry lintless cloth to wipe same parts clean and dry.

b. Inspecting governor parts. (1) *Weights and weight pins.* Inspect the four weights and weight pins (fig. 16, (19)) for freedom of movement.

(2) *Pivot plate.* Inspect for alignment of pivot pin plate brackets and that they are securely fastened to the camshaft gear.

(3) *Cup and stud.* Inspect the cup and stud (fig. 16, (20)) for freedom of horizontal movement.

(4) *Paddle and shaft.* Inspect for freedom of rotary movement in upper bearing (fig. 16, (11)) and lower bearing (fig. 16, (13)). There should be no horizontal or vertical movement of shaft in bearing.

c. Replacing governor parts. Any binding of parts, detected during inspection of parts (b above), will best be corrected by proper alignment and lubrication (d below) rather than replacement, particularly weight pins and pivot plate brackets.

d. Lubricating parts. Use one drop of engine oil (OE), of the type specified in WD Lubrication Order 5001 (par. 26), at each of the following points:

(1) Between each of the four governor weights and weight pins.

(2) Between each of the four governor weights and the governor cup and stud.

(3) Between paddle and stud. One drop of oil in the upper bearing will be sufficient to lubricate also the shaft spacer (fig. 16, (12)) and the lower bearing.

e. Cleaning booster parts. (1) Use a clean cloth slightly dampened with dry-cleaning solvent to wipe oil and dust from the disassembled metal parts. Do not wipe the coil with the solvent cloth.

(2) Follow with a clean dry lintless cloth to clean and dry the same parts. Clean both outside and inside of coil with this cloth.

f. Inspecting parts. Inspect disassembled parts for excessive rust or corrosion. Condition of coil will have been previously determined by test (par. 74d) when disassembling booster.

g. Replacing parts. If coil has been found to be defective, replace it with new one when reassembling booster. (See par. 76c.) Spare part No. 9R00808 is a complete assembly including the coil (fig. 16, (6), housing (fig. 16, (7)), and both housing covers (fig. 16, (4)).

h. Lubricating parts. Use one drop of engine oil (OE), of the type specified in WD Lubrication Order 5001 (par. 26), at the governor ball joint. (See fig. 16, (2).) Do not put any lubrication on the booster plunger.

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76. REASSEMBLING AND INSTALLING. a. Reassembling governor. Reassemble any new part which may have been defective and required removal and replacement during inspection of governor. (See par. 75b.)

b. Installing governor. (1) Use new gearcase gasket.

(2) Be certain governor shaft and paddle is in position so the paddle will be in contact with the governor stud.

(3) Position gearcase on crankcase.

(4) Insert and tighten the four gearcase screws.

(5) Connect spark plug cables to spark plugs.

(6) Fasten spark plug shields in place.

(7) Place blower wheel in blower housing.

(8) Insert both through under side of carrying frame and turn until in approximate position for fastening to engine.

(9) Force blower wheel on shaft. Be certain it slips over keyed ridge.

(10) Connect stop button wires to stop button.

(11) Insert and tighten the three blower housing screws.

(12) Place washer, lock washer, and nut on blower wheel shaft.

(13) Use piece of wood to drive wheel in place.

(14) Tighten blower wheel shaft nut.

(15) Use new exhaust muffler gaskets. (See fig. 3, (9).)

(16) Position the exhaust muffler on engine.

(17) Insert and tighten the four muffler screws.

(18) Replace unit on base and skid unit.

(19) Position both clamp brackets over the carrying frame and on the studs of the base panel.

(20) Screw down the four wing nuts on the base stud.

(21) Place governor arm rod on the paddle shaft extending above the gearcase.

(22) Move booster housing to previously marked position on booster bracket. (See par. 74a.)

(23) Tighten both booster bracket screws.

(24) Connect governor spring to spring stud.

(25) For final adjustment follow instructions for adjusting governor and booster. (See par. 77.)

c. Reassembling booster. (1) Insert booster coil wires through conduit.

(2) Tighten conduit setscrew in booster housing.

(3) Insert exposed coil wires into the cable outlet box.

(4) Bend exposed coil wire ends to form connecting loops.

(5) Connect one coil wire to the open stud on the cable outlet receptacle.

(6) Connect second coil wire to the open AC brush wire within the outlet box.

(7) Insert screw through coil wire and brush wire connection, put nut in place, and tighten connection.

(8) Slide insulating sleeve over the connection. Tape the sleeve in place.

(9) Insert conduit into the locking sleeve on the cable outlet box.

(10) Tighten conduit locking screw in outlet box.

(11) Position receptacle in outlet box and place the face plate over box.

(12) Insert and tighten both face plate screws.

d. Installing booster. (1) Place booster housing over booster plunger so it will be in proper position for fastening to booster bracket.

(2) Connect throttle control rod to booster plunger. Use the sketch made when removing. (See par. 74c.)

(*a*) Be certain the distance from the bent end of the throttle connecting wire to the governor ball joint is the same as when removed.

(*b*) Have bent end of throttle control rod in position to connect into the carburetor throttle arm.

(3) Connect throttle control rod to carburetor throttle arm.

(4) Bend throttle control rod cotter pin in place.

(5) Place booster housing on booster bracket at the previously marked position. (See par. 74c.)

(6) Insert both booster housing screws and tighten housing in correct position on bracket.

(7) For final adjustment follow the instructions on governor and booster adjustment. (See par. 77.)

77. ADJUSTING AND TESTING. a. Adjusting. Do not change any existing adjustments unless made necessary by complete disassembly of carburetor, booster or governor.

(1) *Setting carburetor throttle arm and stop.* These are approximate settings and may require slight changes after testing. (See b below.)

(*a*) Loosen throttle arm stop to carburetor screw. (See fig. 17, (5).)

(*b*) Loosen throttle arm adjusting screw lock nut. (See fig. 17, (1).)

(*c*) Turn out throttle arm stop adjusting screw (fig. 17, (2)) until it is entirely within the throttle arm stop.

(*d*) Grasp the opposite end of the carburetor throttle shaft (fig. 17, (4)) and turn it clockwise, view as in figure 17, as far as possible. This will place the throttle plate in the closed position.

(*e*) Hold throttle shaft in closed position and set carburetor throttle arm (fig. 17, (26)) at an angle of 30° to the right of vertical as shown in figure 17.

(*f*) Tighten throttle arm screw. There should be a few thousandths of an inch clearance between the throttle arm and the shaft washer behind it to prevent any binding.

(*g*) Turn in the throttle arm stop adjusting screw until two threads are exposed as in figure 17.

(*h*) Tighten stop adjusting screw lock nut.

(*i*) Set throttle arm stop (fig. 17, (3)) until the adjusting screw is in contact with the stop flange (fig. 17, (28)) on the throttle arm with throttle still held in closed position.

(*j*) Tighten throttle arm stop to carburetor screw. (See fig. 17, (5).)

(2) *Setting governor arm and linkage.* These are approximate settings and may require slight changes after testing. (See b below.)

(*a*) Loosen spring stud (fig. 17, (15)) lock nut.

(*b*) Turn spring stud until the position of the spring (fig. 17, (11)) hook on the stud is 3/8 inch from the center of the slotted end of governor paddle shaft (fig. 17, (14)) as shown in figure 17.

(*c*) Tighten spring stud lock nut.

(*d*) Loosen throttle rod (fig. 17, (7)) to plunger (fig. 17, (6)) lock nut.

(*e*) Turn throttle rod into or out of plunger until the distance from center line of throttle rod end to pivot joint of ball joint (fig. 17, (17)) is

4⅜ inches as shown in figure 17. Do not vary the ⅛ inch gap between lock nuts on plunger and ball joint.

(*f*) Tighten throttle rod to plunger lock nut.

(*g*) Check position of ball joint in relation to governor rod arm. (See fig. 17, (16).) The ball joint housing must rest directly over the ball and not be tilted to either side or angled up or down from the pivot point. Correct any variation from this position by loosening throttle rod to plunger lock nut and turn plunger to right or left until ball housing is directly over ball. Then tighten lock nut.

(*h*) Check entire governor mechanism for freedom of movement.

(*i*) Check that arm rod nut (fig. 17, (12)) is loose.

(*j*) Place a piece of 1/16-inch material, of any sort, between the stop flange of the throttle arm (fig. 17, (28)) and the throttle stop adjusting screw. Hold throttle arm against the stop.

(*k*) Turn slotted end of paddle shaft (fig. 17, (14)) clockwise viewed from the top, as far as it will go.

(*l*) Tighten arm rod nut.

(*m*) Remove 1/16 inch wedge from between the throttle arm stop flange and adjusting screw.

(*n*) Check that the 1/16 inch gap remains between stop flange and adjusting screw.

(3) *Setting booster coil housing.* These are approximate settings and may require slight changes after testing. (See b below.)

(*a*) Check position of plunger through bore of coil. It should be nearly centered within the bore through all movement of the linkage. The throttle rod end of the plunger should be approximately even with the same end of the coil when throttle is in full open position.

(*b*) Loosen screws which fasten coil housing to bracket and bracket to breather tube as necessary to position coil as previously stated. Make correction of coil position and tighten screws.

b. Testing and final adjustment. (1) Start plant (par. 14) and allow it to warm up. (See par. 15.)

(2) Set test meter on 0 to 150 volt scale.

(3) Connect test meter leads across cable outlet receptacle.

(4) Turn governor spring adjusting nut (fig. 17, (8)) clockwise or counterclockwise as necessary until test meter indicates 127 volts to 131 volts. If an engine revolution counter is available, check to see that the engine is operating at approximately 1,770 to 1,830 RPM and producing 127 volts to 131 volts respectively.

(5) Manually hold throttle in closed position. The voltage will drop as indicated by the test meter.

(6) Loosen stop adjusting screw lock nut.

(7) Turn stop adjusting screw clockwise until test meter indicates a minimum of 115 volts.

(8) Tighten stop adjusting screw lock nut.

(9) Loosen spring stud lock nut.

(10) Slowly turn spring stud to move the spring loop closer to the paddle shaft. (See fig. 17, (14).) When governor begins hunting or the engine operation becomes unsteady turn the stud to move spring loop away from paddle shaft. In this manner determine the position of the stud nearest the paddle shaft and still permitting an even and steady engine operation.

This adjustment gives the mechanism the maximum sensitivity and limits the variation of engine speed under no load and load on to a minimum.

(11) Tighten spring stud lock nut.

Section XXVII. CYLINDER AND CRANKCASE MECHANISM REPAIR

78. GENERAL. a. Scope. This section contains instructions for disassembly, inspection, repair, and reassembly of the cylinders, crankcase and the internal functional parts of the engine. Major repairs of the engine, as outlined in this section, should be done only by maintenance personnel having previous training in the repair of gasoline engines.

b. Models. These instructions are in general for both model OTC–38 and model OTC–38B. Where certain parts or operations are not applicable to both models, separate paragraphs are used for each model.

c. Clearances.

Connecting rod bearing (diameter)	.001–.002 inch
Connecting rod bearing (end play)	.002–.005 inch
Camshaft bearing, front	.002–.003 inch
Camshaft bearing, rear	.0015–.002 inch
Crankshaft bearing (diameter)	.0015–.002 inch
Crankshaft (end play)	.008–.012 inch
Gears	.002–.005 inch
Piston-cylinder	.005–.006 inch
Piston pin in piston	Hand push fit.
Piston pin in rod	.0002–.0005 inch
Piston ring gap	.010 inch
Valve seat width	.031–.078 inch
Valve stem in guide, exhaust Loose	.002–.003 inch
Valve stem in guide, intake	.002–.003 inch
Valve tappet, exhaust	.008–.010 inch
Valve tappet, intake	.006–.008 inch

79. REMOVING EXTERNAL PARTS AND ASSEMBLIES. a. Remove air cleaner and adapter. (1) Loosen adapter locking screw. (See fig. 7, (28).)

(2) Lift air cleaner and adapter from the breather tube. It is not necessary to remove the air cleaner from the adapter.

b. Remove exhaust muffler. (1) Remove four screws which fasten exhaust muffler to the cylinders.

(2) Lift exhaust muffler from engine.

(3) Remove exhaust muffler gaskets. (See fig. 3, (9).)

c. Remove fuel pump. (1) Slip loop of governor spring (fig. 17, (11)) off the spring stud (fig. 17, (15)).

(2) Close fuel tank shut-off petcock. (See fig. 5, (9).)

(3) Place empty container under the fuel tank line. (See fig. 5, (14).)

(4) Remove fuel tank line. Remove the swivel end first to avoid damage to the line.

(5) Drain gasoline from line into container.

(6) Place container near carburetor fuel line. (See fig. 8, (12).)

(7) Remove carburetor fuel line. Remove swivel end first to avoid damage to the line.

(8) Drain gasoline from line into container.

(9) Remove both screws which hold fuel pump adapter (fig. 8, (3)) to the crankcase. It is not necessary to remove fuel pump from adapter.

(10) Lift entire fuel pump and adapter from crankcase.

(11) Remove fuel pump adapter gasket.

d. Remove booster coil. (1) Remove cotter pin from throttle control rod. (See fig. 17, (18).)

(2) Remove throttle control rod from carburetor throttle arm. (See fig. 17, (20).)

(3) Remove ball joint from governor arm rod.

(4) Booster can be removed with breather tube.

e. Remove breather tube. (1) Remove both screws which fasten breather tube to crankcase.

(2) Remove breather tube.

(3) Remove breather tube gasket.

f. Remove carburetor and intake manifold. (1) Remove the four screws which fasten the intake manifold adapters to the cylinders and the two screws which fasten the center section of the intake manifold to the crankcase.

(2) Lift the entire intake manifold assembly and the carburetor from the engine.

(3) Remove the intake manifold adapter gaskets.

g. Remove ignition breaker box. (1) Remove the screw which fastens cover on ignition breaker box.

(2) Remove cover.

(3) Disconnect magneto wire (fig. 7, (1)) from condenser (fig. 7, (43)).

(4) Remove both screws which fasten ignition breaker box (fig. 7, (35)) to crankcase.

(5) Remove breaker box.

(6) Remove breaker plunger. (See fig. 7, (40).)

h. Remove fuel tank. (1) Tighten fuel tank cap.

(2) Close fuel tank cap shut-off screw.

(3) Remove the four screws which fasten fuel tank brackets to generator.

(4) Remove fuel tank from generator.

80. DISSASSEMBLING. a. Dismount unit from carrying frame. (1) Remove the four wing nuts (fig. 1, (3)) from the studs on the base and skid panel.

(2) Remove both bracket clamps. (See fig. 1, (2).)

(3) Place wood blocks on floor to take weight of unit off the carrying frame.

(4) Two men should lift the unit by the carrying frame from the base panel and place it on the prearranged wood blocks. Be certain the blocks, and not the carrying frame, support the unit.

(5) Remove the screw from the underside of the carrying frame which fastens carrying frame to generator frame.

(6) Remove the four screws which fasten oil base to carrying frame.

(7) Lift left side of unit until clear of carrying frame oil base bracket.

(8) Move unit to the left until oil drain fitting is clear of the right oil base bracket of the carrying frame.

(9) Lift unit from carrying frame.

REPAIR INSTRUCTIONS

b. Remove generator from engine. (1) Remove the two screws from the ends of the bell housing band. (See fig. 10, (6).)

(2) Remove band from generator.

(3) Disconnect the generator leads from the conductor cable outlet. Mark the connector stud of each lead.

(4) Disconnect the two lead wires of the field coil sets (fig. 10, (1)) from their respective terminals on the brush rig (fig. 10, (16)). It is important to mark the terminals to correctly connect the wires when reassembling the generator.

(5) Raise the eight brushes in the holders so that the springs rest on the sides of the brushes and will retain them in the raised position.

(6) Loosen setscrew in hub of starter rope pulley. (See fig. 10, (11).)

(7) Remove starter rope pulley from shaft of armature. (See fig. 10, (25).)

(8) Remove both screws which fasten generator bearing cover. (See fig. 10, (9).)

(9) Remove bearing cover.

(10) Remove bearing cover gasket. (See fig. 10, (8).)

(11) Remove the four generator frame stud nuts. (See fig. 10, (12).)

(12) Remove generator end bell housing. (See fig. 10, (5).)

(13) Remove generator frame. (See fig. 10, (4).)

(14) Loosen armature stud nut. (See fig. 10, (19).)

(15) Place a block of hard wood against the armature stud nut. Strike the block of wood a sharp blow with a heavy hammer. This will free the armature shaft from the crankshaft.

(16) Remove armature stud nut.

(17) Slide armature off the armature stud. Support the weight of the armature so that the stud will not be bent.

(18) Remove armature stud (fig. 10, (27)) from crankshaft.

(19) Remove the four generator frame studs (fig. 10, (10)) from the generator support.

c. Remove air housings. (1) Remove the upper and the two lower screws which fasten blower housing to engine.

(2) Carefully pull housing from engine until the stop button wires are accessible.

(3) Pull wires from stop buttons. These are snap connections.

(4) Complete the removal of the blower housing.

(5) Remove the three screws from each cylinder air housing.

(6) Remove both cylinder air housings.

d. Remove cylinder heads and cylinders. (1) Remove screws from spark plug shields.

(2) Remove spark plug shields.

(3) Disconnect spark plug cables.

(4) Remove spark plugs. Do not lose plug gaskets.

(5) Remove nuts from the six head studs of each cylinder.

(6) Remove cylinder heads. (See fig. 18, (3) and (13).)

(7) Remove cylinder head gaskets. (See fig. 18, (4).)

(8) Remove screw from each valve cover. (See fig. 18, (5).)

(9) Remove valve covers.

(10) Remove valve cover gaskets. (See fig. 18, (6).)

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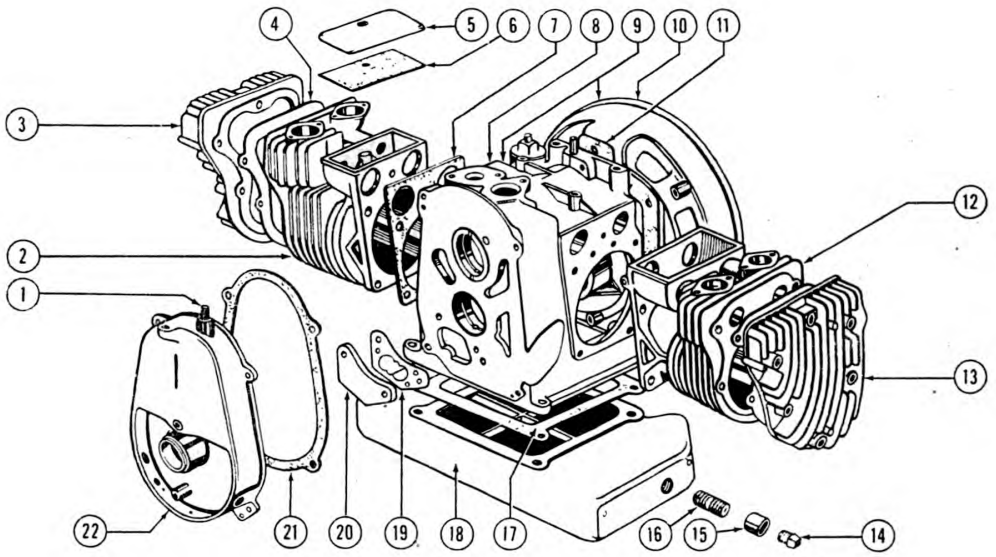
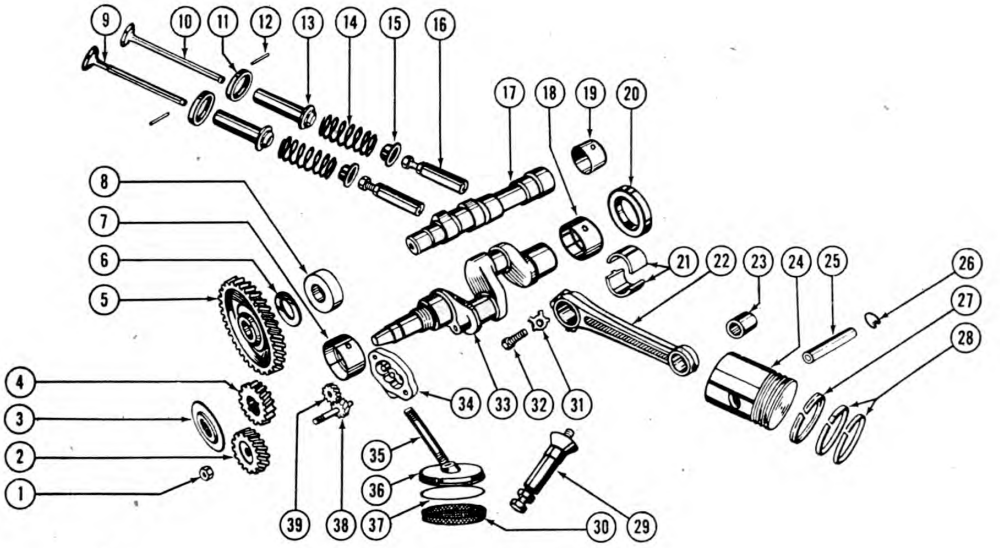


	Med. Dept. No.	Nomenclature
1.	9R00866	Shaft and paddle, governor.
2.	9R00604	Cylinder, C.I., 2¾ inch, L/H.
3.	9R00610	Head, cylinder, L/H.
4.	9R00612	Gasket, cylinder head.
5.	9R00627	Cover, valve.
6.	9R00628	Gasket, valve cover.
7.	9R00606	Gasket, cylinder base.
8.	9R00711	Crankcase: For model 38B (illustrated).
	9R01000	Crankcase: For model 38.
9.	9R00700	Crankcase, with bearing plate assembly: For model 38B (illustrated).
	9R00960	Crankcase, with bearing plate assembly: For model 38.
10.	9R00701	Bearing plate and generator support.
11.	9R00702	Gasket, bearing plate and generator support.
12.	9R00602	Cylinder, C.I., 2¾ inch, R/H.
13.	9R00608	Head, cylinder, R/H.
14.	9R00706	Plug, oil.
15.	SR00451	Coupling, pipe, ⅜ inch.
16.	SR00215	Nipple, close, pipe, ⅜ inch: For oil drain.
17.	9R00705	Gasket, oil base
18.	9R00704	Base, oil.
19.	9R00698	Gasket, oil pump: For model 38B.
20.	9R00689	Cover, oil pump: For model 38B.
21.	9R00710	Gasket, gearcase: For model 38B (illustrated).
	9R00964	Gasket, gearcase: For model 38.
22.	9R00708	Gearcase: For model 38B (illustrated).
	9R00962	Gearcase, aluminum: For model 38.

Figure 18. *Engine assembly, structural parts.*

REPAIR INSTRUCTIONS



	Med. Dept. No.	Nomenclature
1.	9R00837	Nut, drive gear, oil pump.
2.	9R00693	Gear, drive, oil pump.
3.	9R00682	Nut, crankshaft.
4.	9R00680	Gear, crankshaft.
5.	9R00660	Gear, crankshaft.
6.	9R00659	Washer, spacer, camshaft gear.
7.	9R00678	Bearing, crankshaft.
8.	9R00656	Bearing, camshaft, front.
9.	9R00616	Valve, exhaust.
10.	9R00614	Valve, intake.
11.	9R00625	Insert, valve seat.
12.	9R00624	Pin, valve.
13.	9R00618	Guide, valve.
14.	9R00620	Springs, valve.
15.	9R00626	Washer, valve.
16.	9R00623	Lifter, valve: With tappet, 9R00622.
17.	9R00654	Camshaft.
18.	9R00678	Bearing, crankcase.
19.	9R00658	Bearing, camshaft, rear.
20.	9R00676	Seal, oil, crankshaft.
21.	9R00641	Insert, rod, connecting bearing.
22.	9R00640	Rod, connecting, complete.
23.	9R00639	Bushing, piston pin.
24.	9R00630	Piston, 2¾ inch bore.
25.	9R00629	Pin, piston.
26.	9R00638	Ring, lock, piston pin.
27.		Oil ring of piston ring set, 9R00632.
28.		Compression ring of piston ring set, 9R00632.
29.	9R00687	Valve, relief, oil pump.
30.	9R00696	Screen, oil pump.
31.	9R00637	Washer, connecting rod screw.
32.	SR00809	Screw, ¼–28 x 1 inch hex head, cap: For connecting rod.
33.	9R00674	Crankshaft.
34.	9R00685	Body and idlershaft, oil pump.
35.	SR00664	Nipple, long, pipe, ⅛ inch x 2⅛ inch.
36.	9R00697	Cup, intake, oil pump.
37.	9R00683	Ring, screen lock, oil pump.
38.	9R00691	Gear and shaft, body driver, oil pump.
39.	9R00695	Gear, idler, oil pump.

Figure 19. *Engine assembly, functional parts.*

(11) Remove nuts from the five cylinder to crankcase studs for each cylinder, including the studs which enter the valve tappet adjustment housings.

(12) Remove both cylinder. Use care not to damage the cylinder bore or pistons.

(13) Remove cylinder base gaskets. (See fig. 18, (7).)

e. Remove valves and valve lifters. (1) Place cylinder on bench with studs down.

(2) Use a piece of wood to block each valve head in closed or nearly closed position. Use any means to keep valves (fig. 19, (9) and (10)) from moving out of cylinder, or opening, when valve springs are compressed.

(3) Compress valve spring (fig. 19, (14)) and valve washer (fig. 19, (15)) to expose the valve pin (fig. 19, (12)). Hold springs in compressed position.

(4) Remove valve pin.

(5) Release valve spring.

(6) Remove valve from cylinder. Use some means to mark valve so it will be replaced in same cylinder.

(7) Remove valve washer and spring from tappet adjustment housing.

(8) Repeat same operation for the remaining three valves.

(9) Remove valve lifters from crankcase. Use some means to mark lifters so they are replaced in original position in crankcase.

f. Remove gearcase. (1) Loosen blower wheel nut.

(2) Place a block of hard wood aaginst blower wheel nut and strike it a sharp blow with a heavy hammer.

(3) Remove blower wheel nut from crankshaft.

(4) Remove blower wheel. Do not lose the key.

(5) Remove four screws which fasten the gearcase (fig. 18, (22)) to the crankcase.

(6) Remove gearcase. Do not remove the governor arm rod from the governor shaft and paddle. (See fig. 18, (1).)

(7) Remove gearcase gasket. (See fig. 18, (21).)

g. Remove gearcase oil seal. (1) Remove cork oil seal from gearcase.

(2) Scrape recess clean.

(3) Replace a new oil seal when reassembling engine. (See par. 93.)

h. Check gear clearance. (1) Clearance or backlash between crankshaft gear (fig. 19, (4)) and camshaft gear (fig. 19, (5)) should be .002 inch to .005 inch.

(2) Check. Correct clearance will permit the passage of a single thickness of ordinary newspaper through the gear mesh but will not pass a piece of heavy wrapping paper.

(3) If clearance is too great replace both the crankshaft gear and the camshaft gear when reassembling engine. (See par. 93.)

i. Remove crankshaft gear. (1) Remove crankshaft nut.

(2) Remove crankshaft gear. (See fig. 19, (4).)

j. Remove oil base. (1) Remove nuts from the four oil bases to crankcase studs.

(2) Lift crankcase assembly (fig. 18, (9)) from oil base (fig. 18, (18)).

(3) Remove oil plug (fig. 18, (14)) and drain oil from base.

(4) Remove oil base gasket. (See fig. 18, (17).)

REPAIR INSTRUCTIONS

k. Remove oil pump on model OTC–38. (1) Remove both oil lines.

(2) Remove the screw which fastens oil pump body to right side of crankcase.

(3) Remove oil pump and pusher rod from crankcase.

l. Remove oil pump on model OTC–38B. (1) Remove oil pump intake cup (fig. 19, (36)) from oil pump body (fig. 19, (34)).

(2) Remove both hex head bolts which fasten oil pump cover (fig. 18, (20)) to crankcase.

(3) Remove pump body through front of crankcase.

m. Remove pistons. (1) Remove both connecting rod cap screws. (See fig. 19, (32).)

(2) Remove lower connecting rod cap.

(3) Remove piston and rod from crankcase.

(4) Replace cap on rod to keep each rod complete with original parts.

(5) Mark rod and piston in some manner so that they will be replaced in original cylinder when reassembling engine.

(6) Repeat process for opposite piston and rod.

(7) Remove piston pin lock ring (fig. 19, (26)) from piston (fig. 19, (24)).

(8) Remove piston pin (fig. 19, (25)) from piston.

(9) Separate connecting rod (fig. 19, (22)) from piston.

(10) Remove the compression rings (fig. 19, (28)) and oil ring (fig. 19, (27)) from piston. Rings should be replaced with new ones when reassembling engine. (See par. 93.) Spare part 9R00632, rings, piston, set, contains two compression rings and one oil ring. Always requisition two sets of 9R00632 to replace rings on both pistons.

n. Remove bearing plate and generator support. (1) Remove the six screws which fasten the rear bearing plate and generator support (fig. 18, (10)) to crankcase.

(2) Remove bearing plate and generator support from crankcase.

(3) Remove bearing plate and generator support gasket. (See fig. 18, (11).)

o. Remove crankshaft oil seal. (1) Pull crankshaft oil seal (fig. 19, (20)) from the bearing plate and generator support.

(2) Replace with a new oil seal when reassembling engine. (See par. 93.)

p. Remove crankshaft and camshaft. (1) Remove crankshaft through rear of crankcase.

(2) Remove camshaft (fig. 19, (17)), with gear (fig. 19, (5)) in place, through front of crankcase.

81. SERVICING OIL PUMP ON MODEL OTC–38. a. Disassembling. (1) Remove push rod (See fig. 20, (8).)

(2) Remove plunger (fig. 20, (4)) from oil pump body (fig. 20, (1)).

(3) Remove plunger spring (fig. 20, (9)) from oil pump body.

(4) Remove inlet check ball from body.

(5) Remove cleaning plug from body.

(6) Remove outlet check ball through cleaning plug opening.

(7) Remove screen. (See fig. 20, (11).)

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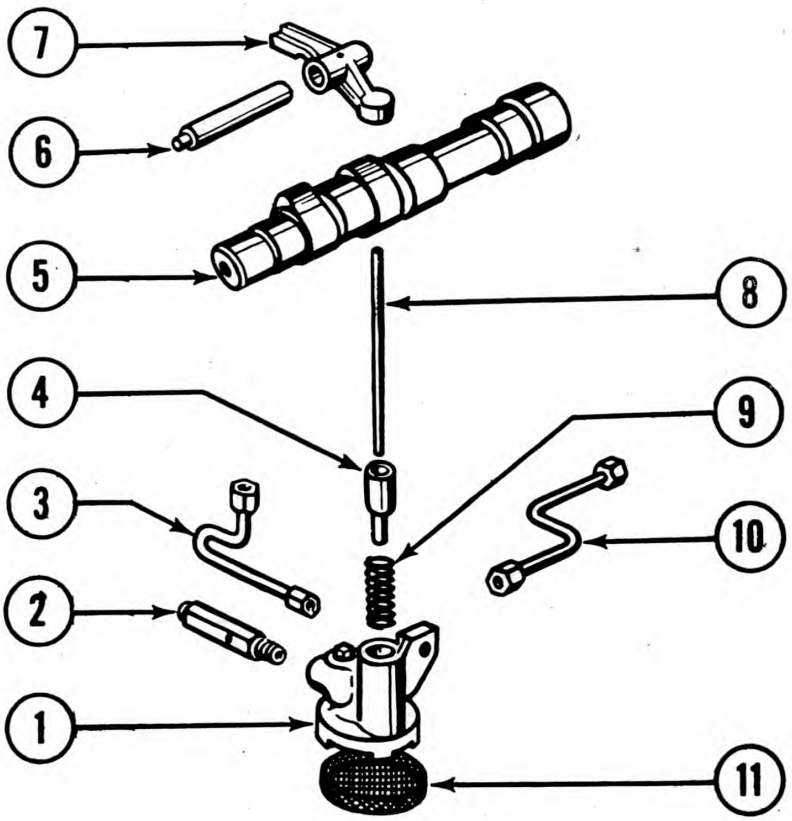

Med. Dept. No.	Nomenclature
1. 9R00977	Body, oil pump.
2. 9R00992	Valve, relief, oil pump, complete.
3. 9R00974	Line, oil, front bearing.
4. 9R00980	Plunger, oil pump.
5. 9R00958	Camshaft.
6. 9R00986	Shaft, cam follower arm, oil pump.
7. 9R00984	Arm, cam follower, oil pump.
8. 9R00988	Rod, push, oil pump.
9. 9R00982	Spring, plunger, oil pump.
10. 9R00976	Line, oil, rear bearing.
11. 9R00972	Screen, oil pump.

Figure 20. Oil pump assembly on model OTC–38.

REPAIR INSTRUCTIONS

(8) Remove complete oil pump relief valve. (See fig. 20, (2).) Do not disassemble the valve. If inspection of engine indicates the relief valve is releasing oil at too low or too high a pressure, replace the entire relief valve assembly.

b. Cleaning. (1) Submerge all disassembled oil pump parts, including both oil lines, in dry-cleaning solvent. Allow the parts to soak for approximately 30 minutes.

(2) Insert a copper wire through both oil lines to remove any restrictions.

(3) Rinse the oil pump parts in clean dry-cleaning solvent.

(4) Pour dry-cleaning solvent from oil pump body by turning body in all directions to empty the internal passages.

(5) Plunger spring and screen may require additional cleaning with a bristle brush, such as an old tooth brush, and dry-cleaning solvent.

c. Inspecting. (1) *Plunger spring.* Inspect for broken spring. If broken, replace with new spring during reassembly.

(2) *Ball check seats.* Hold pump body to light or use a flashlight to inspect ball check seats for foreign matter.

(3) *Screen.* Inspect screen for cleanliness and see that the screen is not punctured. If screen is punctured, replace with new screen during reassembly.

(4) *Oil lines.* Pour dry-cleaning solvent through each line to determine that it is open.

(5) *Cam follower arm.* Inspect cam follower arm (fig. 20, (7)) for freedom of action on the shaft (fig. 20, (6)).

(6) Complete inspection for operation after partial reassembly. (See par. 81d.)

d. Reassembling. (1) Screw pressure relief valve into pump body.

(2) Place screen in position under base of pump body. Screen may be spread slightly to make it hold in base.

(3) Give outlet check ball a final inspection for cleanliness. Drop outlet check ball through the cleaning plug opening of the pump body into place.

(4) Screw cleaning plug into pump body.

(5) Give inlet check ball a final inspection for cleanliness. Drop the inlet check ball through the cylinder of pump into its place.

(6) Place plunger spring into pump cylinder.

(7) Place plunger with smallest section down into pump cylinder.

e. Operational inspection of oil pump. (1) Temporarily connect both oil lines to the pump pipe tee.

(2) Place the assembled oil pump in a clean, small, shallow container.

(3) Pour oil, engine, into the container until the base only of the oil pump body is covered.

(4) Alternately depress and release the plunger. Oil should be ejected from the oil lines. Be certain oil is being ejected from both lines.

82. SERVICING OIL PUMP ON MODEL OTC–38B. a. Disassembling.

(1) Remove nut (fig. 19, (1)) from drive gear.

(2) Remove drive gear. (See fig. 19, (2).)

(3) Remove both bolts which fasten oil pump body (fig. 19, (34)) to oil pump cover.

(4) Remove body from cover.

(5) Remove gasket (fig. 18, (19)) from cover.

(6) Remove body driver gear and shaft (fig. 19, (38)) from body.

(7) Remove idler gear (fig. 19, (39)) from body.
(8) Remove screen lock ring (fig. 19, (37)) from intake cup.
(9) Remove screen (fig. 19, (30).)
(10) Do not remove or disassemble the oil pump pressure relief valve. (See fig. 19, (29).) If inspection of engine parts indicates the relief valve is releasing oil at too low or too high a pressure, replace it with a new relief valve.

b. Cleaning. (1) Submerge all disassembled oil pump parts in dry-cleaning solvent. Allow parts to soak for approximately 30 minutes.
(2) Rinse the oil pump parts in clean dry-cleaning solvent.
(3) Screen may require additional cleaning with a bristle brush, such as an old tooth brush, and dry-cleaning solvent.

c. Inspecting. (1) *Driver and idler gears.* Inspect for chipped or marred teeth. If either gear is defective, replace oil pump with new complete oil pump assembly, 9R00694, when reassembling engine. (See par. 93e.)
(2) *Body.* Inspect for scratched or grooved inner surfaces. If damaged, replace with new complete oil pump assembly, 9R00694, when reassembling engine. (See par. 93e.)
(3) *Screen.* Inspect screen to see that it is clean and not punctured. If punctured, replace with new screen when reassembling oil pump. (See d below.)

d. Reassembling. (1) Place screen in oil pump intake cup.
(2) Fasten screen lock ring in place.
(3) Position idler gear on shaft of pump body.
(4) Position body driver gear in body.
(5) Put new gasket (fig. 18, (19)) in place on pump cover.
(6) Position pump cover over pump body with gears in place.
(7) Insert and tighten both bolts which fasten body to cover.
(8) Place drive gear on body driver gear shaft extending through cover.
(9) Screw nut on body driver gear shaft to hold drive gear in place. Spin drive gear to see that the gears are turning freely.

83. CLEANING AND INSPECTING CYLINDER HEADS. a. Cleaning.
(1) Remove carbon deposits from heads.
(2) Thoroughly clean cooling fins.
(3) Clean gasket surfaces.

b. Inspecting. (1) Visually inspect heads for cracks. A cracked head would have been detected during operation by a hissing sound. If head is cracked, replace it with a new head (fig. 18, (3) or (13)) when reassembling engine. (See par. 93o.)
(2) Place heads on a perfectly flat surface. If head can be rocked, it is warped.
(3) Replace defective heads with new cylinder heads when reassembling engine. (See par. 93o.)

84. CLEANING AND INSPECTING CYLINDERS. a. Cleaning. (1) Clean any carbon deposit from top of cylinder bore.
(2) Clean exhaust and intake ports. Be certain to wipe any loose carbon from the interior of the ports.
(3) Clean cooling fins.
(4) Clean gasket surfaces.

REPAIR INSTRUCTIONS

b. Inspecting. (1) Inspect for cracks.

(2) Inspect bore for scored or scarred condition.

(3) Inspect bore for ring ridge. A ridge around the top of the cylinder bore might also indicate excessive out of round or tapered bore.

(4) Replace defective cylinders with new cylinders (fig. 18, (2) and (12)) when reassembling engine. (See par. 93h.) It is advisable to use new pistons and piston rings with new cylinders. Cylinders are supplied with valve seats installed which necessitates grinding the valves (par. 92) to the new seats.

85. CLEANING AND INSPECTING CRANKCASE. a. Cleaning. (1) Clean crankcase (fig. 18, (8)) and bearing plate (fig. 18, (10)) with dry-cleaning solvent.

(2) Run a copper wire through the oil passages of the model OTC-38B crankcase. Follow with compressed air if available.

(3) Clean gasket surfaces of crankcase and bearing plate.

b. Inspecting. (1) Inspect crankcase and bearing plate for cracks.

(2) Inspect both camshaft bearings and the front crankshaft bearing for scored, scarred, checked, or chipped condition. See that the bearings fit tightly in the crankcase and that the bearing oil holes are in line with the oil passages of the crankcase (model OTC-38B).

(3) Inspect the rear crankshaft bearing for scored, scarred, checked, or chipped condition. See that the bearing fits tightly in the bearing plate.

(4) If any bearing surface is defective, be certain to inspect the respective journal for damage.

(5) Any defect of the crankcase, bearing plate or bearing surface will necessitate replacing both the crankcase and bearing plate if tools and equipment are not available to remove old bearings and press in new bearings and to line ream the new bearings. The crankcase and bearing plate (fig. 18, (9)) are supplied as an assembly with bearings installed.

86. CLEANING AND INSPECTING OIL BASE. a. Cleaning. Thoroughly clean the oil base with dry-cleaning solvent. Clean gasket surface.

b. Inspecting. (1) Inspect for cracks or holes.

(2) *Repair.* Use means necessary to correct any defects in oil base.

87. CLEANING AND INSPECTING PISTONS. a. Cleaning. (1) Use a wire brush to remove the carbon from the piston head and the piston ring grooves.

(2) Thoroughly clean pistons with dry-cleaning solvent.

b. Inspecting. (1) Inspect for cracks in pistons.

(2) Inspect for scored condition of the piston exterior.

(3) Inspect to see that oil return holes in piston are open.

(4) Replace defective pistons with new pistons (fig. 19, (24)) when reassembling the engine. (See par. 93i.)

(5) Replace piston rings with a new set when reassembling engine. (See par. 93i.) This will prevent the possibility of ring failure before the next major overhaul.

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88. CLEANING AND INSPECTING CONNECTING RODS. a. Cleaning. Clean connecting rod exterior and bearings thoroughly with dry-cleaning solvent.

b. Inspecting. (1) Inspect bearing surfaces for scored, grooved, burned, chipped, or checked condition.

(2) Inspect the journal or piston pin of the bearing found to be defective.

(3) Replace the connecting rod with a new complete connecting rod assembly (fig. 19, (22)) if either bearing is defective.

89. CLEANING AND INSPECTING CRANKSHAFT. a. Cleaning. (1) Clean exterior of crankshaft.

(2) Run a copper wire through the crankshaft oil passages. Follow with compressed air if available.

b. Inspecting. (1) Inspect for flaws or cracks in crankshaft.

(2) Inspect main bearing and connecting rod journals for scored, grooved, burned, chipped, or checked condition.

(3) Also inspect the bearing surface of any defective journal for damage.

(4) Replace the crankshaft with a new crankshaft (fig. 19, (33), if any journal is damaged, when reassembling the engine. (See par. 93a.)

90. CLEANING AND INSPECTING CAMSHAFT. a. Cleaning. Clean camshaft and journals with dry-cleaning solvent.

b. Inspecting. (1) Inspect for excessive wear of cams and for scored, grooved, or burned condition of journals.

(2) Replace camshaft with a new camshaft (fig. 19, (17)), if inspection has revealed the original to be defective, when reassembling engine. (See par. 93a.) If new camshaft is installed, remove the camshaft gear (fig. 19, (5)) from the old camshaft and install it on the new.

91. CLEANING AND INSPECTING VALVES. a. Cleaning. (1) Clean valve heads and stems.

(2) Clean valve guides in cylinders.

(3) Clean valve lifters.

(4) Keep valves separate so they will be installed in original seats when reassembling the engine. The exhaust valve (fig. 19, (9)) can be identified by the narrow stem just below the head and by the small cup in the center of the head.

b. Inspecting. (1) *Valves.* (*a*) Try fit of valve stem in valve guide. It should move easily in the directions of operation but there should be no side play.

(*b*) Inspect stem for excessive wear or scoring.

(*c*) Inspect valve face. If pitted or burned, determine if valve can be ground (par. 92) or if it must be replaced. If new valve is installed, it must be ground to seat.

(2) *Springs.* (*a*) Inspect for broken springs.

(*b*) Replace with new springs (fig. 19, (14)), if original are defective, when reassembling engine. (See par. 93g.)

(3) *Seats.* (*a*) Inspect for badly worn or burned valve seats. Determine if seats are to be ground or replaced with new seats.

(*b*) Grind seats by following instructions for valve grinding. (See par. 92.)

(*c*) Seats cannot be replaced with the normally available tools and equipment. The entire crankcase will have to be replaced and the valves ground to seat properly. (See par. 92.)

(4) *Pins.* (*a*) Inspect pins for flattened surfaces or bent condition.

(*b*) Replace with new pins (fig. 19, (2)) if original pins are defective.

(5) *Washers.* (*a*) Inspect for bent or grooved flanges.

(*b*) Replace with new washers (fig. 19, (15)) if originals are defective.

(6) *Tappets.* Inspect for signs of valve stem impression. This condition makes it impossible to correctly adjust the valve tappet clearance.

(7) *Lifters.* (*a*) Inspect for wear or scoring.

(*b*) Inspect camshaft end of lifter for excessive wear.

(*c*) Inspect valve lifter ports in crankcase wall for wear and scoring. See that the cylinders are thoroughly cleaned.

(*d*) Try fit of lifters in crankcase. Lifters should move easily but there should be very little side play.

(*e*) Replace lifters with new valve lifters (fig. 19, (16)) if originals are defective.

(*f*) If valve lifter cylinders in crankcase walls are seriously enlarged, the entire crankcase (fig. 18, (9)) will require replacement.

92. GRINDING VALVES. a. Coat valve face and seat with compound, valve grinding, medium grade.

b. Insert valve in its original guide.

c. Turn the valve against the seat. Turn it back and forth within a quarter turn several times. Then turn the valve a quarter turn to a new position and repeat. Continue this process as long as is necessary to produce a bright band with a uniform width of 1/16 inch on the valve face and valve seat.

d. Carefully clean grinding compound from valves and seats.

93. REASSEMBLING. a. Install camshaft and crankshaft. (1) Place camshaft, with cam gear attached, in position in crankcase.

(2) Insert crankshaft through rear of crankcase until front bearing journal is in place in the front bearing of the crankcase.

b. Replace crankshaft oil seal. (1) Place a new crankshaft oil seal (fig. 19, (20)) in the bearing plate.

(2) Tap seal into the bearing cap evenly.

(3) Paint outer edge of seal with varnish, shellac, white. Be certain there is no varnish on the surface of the seat where it will come in contact with crankshaft.

c. Install bearing place and generator support. (1) Put a new bearing plate and generator support gasket (fig. 18, (11)) in place on crankcase.

(2) Position bearing plate and generator support on crankcase. Use care not to damage the oil seal (fig. 19, (20)) when bringing the crankshaft journal into position in the rear bearing. Check to see that the bearing plate and generator support gasket has remained in correct position.

(3) Insert and draw up the six screws which fasten the bearing plate and generator support to the crankcase. Tighten each screw one quarter turn at a time until all are secure.

d. Install oil pump on model OTC–38. (1) Place pusher rod in its receptacle in the oil pump plunger.

(2) Move oil pump assembly and pusher rod into position within the crankcase. Guide the pusher rod into the cup of the cam follower.

(3) Insert and tighten the screw which fastens the oil pump to the crankcase.

(4) Fasten the oil lines to the fittings in the bearings and oil pump.

e. Install oil pump on model OTC–38B. (1) Position assembled pump body on crankcase. See that the gasket is not folded or creased.

(2) Insert and tighten both bolts which fasten oil pump to crankcase.

(3) Replace oil pump intake cup on pump body.

f. Install crankshaft gear. (1) Position crankshaft gear so that the timing mark is adjacent to the timing mark on the camshaft gear.

(2) Put crankshaft gear key in place.

(3) Turn crankshaft until key is in line with the key slot of the crankshaft gear.

(4) Press gear on crankshaft.

(5) Screw the crankshaft nut into position.

g. Install valves. (1) Insert valve into guide. Replace each valve in its original guide (if original parts are being installed).

(2) Position valve spring on valve stem.

(3) Place washer on spring.

(4) Compress valve spring and washer and insert valve pin into stem. Release spring.

(5) Repeat procedure for remaining three valves.

h. Install cylinders. (1) Place valve lifters in their original position in crankcase.

(2) Place new cylinder base gaskets (fig. 18, (7)) on crankcase.

(3) Position cylinders on cylinder studs.

(4) Screw on and tighten the five stud nuts of each cylinder.

i. Reassemble pistons. (1) *Gap piston rings.* *(a)* Place ring in its respective cylinder bore. Square it with cylinder top and about 1 inch from top.

(*b*) Gap between ring ends should be .010 inch. File ring ends until a .010 inch gap is obtained.

(*c*) Repeat procedure for each ring, checking it in the cylinder it will be assembled in.

(2) *Place rings on pistons.* (*a*) Check rings for side marked "TOP." The "TOP" side will be placed nearest the piston head.

(*b*) Place oil ring (fig. 19, (27)) in the lower groove of piston.

(*c*) Place compression rings (fig. 19, (28)) in the remaining grooves of piston.

(*d*) Test to see that the rings move freely around the piston groove.

(3) *Install connecting rods in pistons.* (*a*) Use original piston and connecting rod combination, if new parts are not installed.

(*b*) Position rod in piston.

(*c*) Insert piston pin.

(*d*) Snap piston lock rings in place.

(*e*) Try fit of rod on pin to see that the rod does not bind on the pin and that there is no side play.

REPAIR INSTRUCTIONS

j. Install connecting rod on crankshaft. (1) Be certain the same piston and connecting rod (if original parts are being reassembled) are together and that the connecting rod is installed on its original crankshaft journal.

(2) Insert connecting rod into cylinder bore, being careful not to damage the bore, and move piston into bore as far as the piston oil ring.

(3) Position ring gaps as follows:

(*a*) Top compression ring with gap at side of bore opposite the spark plug.

(*b*) Lower compression ring with gap on same side of bore as the spark plug.

(*c*) Oil ring gap in same position as top compression ring.

(4) Compress oil ring and move piston into the bore. Successively compress each compression ring and move piston into bore. Use care not to damage either the bore or the rings during the operation.

(5) Repeat process for opposite piston.

(6) Position connecting rod cap around crankshaft journal and on connecting rod so that the figures "1" and "2" of the cap match with the same figures on the rod.

(7) Use new connecting rod cap screw washers. (See fig. 19, (31).)

(8) Insert rod cap screws with washers into rod cap and rod and tighten.

(9) Move rod and crankshaft to see that there is no binding in the connection.

(10) Repeat procedure for the opposite connecting rod.

k. Install crankcase on oil base. (1) Inspect oil base to make certain it is clean and free of any foreign particles.

(2) Put new oil base gasket (fig. 18, (17)) on oil base.

(3) Place crankcase on oil base so the oil drain is on the right hand side.

(4) Place nuts on the four oil base studs and tighten.

l. Adjust valves. Follow instructions for valve adjustment. (See par. 52c.)

m. Replace gearcase oil seal. (1) Inspect recess in gearcase to see that it is clean.

(2) Paint gearcase oil seal receptacle with varnish, shellac, white.

(3) Press new gearcase oil seal, 9R00712, into gearcase.

(4) Paint outer edge of seal with varnish, shellac, white. Be certain there is no varnish on the surface of the seal where it will come in contact with the crankshaft.

n. Install gearcase. (1) Position a new gearcase gasket (fig. 18, (21)) on the gearcase.

(2) Insert the four screws, which fasten the gearcase to the crankcase, into the gearcase.

(3) Position gearcase on crankcase and tighten the four screws.

(4) Put blower wheel key in place.

(5) Position blower wheel on crankshaft.

o. Install cylinder heads. (1) Place new cylinder head gaskets (fig. 18, (4)) on cylinders.

(2) Put heads on cylinders.

(3) Place nuts on the six head studs of each cylinder and draw up.

(4) Tighten head nuts one quarter turn at a time until all are secure. Do not follow a set clockwise or counterclockwise sequence in tightening the

head nuts. Tighten opposite nuts and in that manner work around the head until all are secure.

(5) Put gaskets on spark plugs.

(6) Insert spark plugs in cylinder heads and tighten.

(7) Connect spark plug cables.

p. Install blower housing on engine. (1) Position blower housing near engine.

(2) Snap stop wires to stop button connections.

(3) Position blower housing on engine.

(4) Insert and tighten the three screws which fasten blower housing to engine.

(5) Do not replace cylinder air housings.

q. Install generator on engine.

Note. Complete generator repairs (sec. XXVIII) before continuing reassembly.

(1) Screw the four generator frame studs into the bearing plate and generator support and tighten.

(2) Screw armature stud into crankshaft.

(3) Slide armature on the armature stud and into the crankshaft connection. Support the weight of the armature so as not to bend the stud.

(4) Put stud nut on armature stud and tighten until armature is drawn tightly against the crankshaft.

(5) Position generator frame against generator support and make certain it fits tightly and evenly.

(6) Check brush rig to see that all brushes are in the raised position.

(7) Position end bell housing on the four frame studs and against the frame. Make certain the end bell housing fits tightly and evenly with the frame.

(8) Place nuts on the four frame studs and tighten. Again check that the fit between support and frame and end bell is complete and even.

(9) Place a new bearing cover gasket (fig. 10, (8)) over the generator bearing.

(10) Position bearing cover.

(11) Insert and tighten both bearing cover screws.

(12) Put pulley key in armature shaft.

(13) Place starter rope pulley in position on armature shaft.

(14) Tighten setscrew in pulley.

(15) Release the brushes in holders so they rest against the commutator and slip rings in proper operating position.

(16) Connect both lead wires of the field coil sets to the proper, previously marked, terminals on the brush rig.

(17) Connect generator lead wires to the conductor cable outlet.

(18) Position band on end bell housing.

(19) Insert and tighten both screws which fasten the band to the end bell housing.

r. Mount unit on carrying frame and base panel. (1) Lift unit over carrying frame and lower it in such a manner as to insert the oil drain fittings through the hole of the carrying frame oil base bracket.

(2) Block up the unit so the carrying frame can be fastened to it without supporting the weight of the unit.

(3) Insert and tighten the four screws which fasten oil base to carrying frame.

(4) Insert and tighten the screw which fastens the cross frame brace to the generator frame.

(5) Lift unit into position on base and skid panel.

(6) Put both bracket clamps in place.

(7) Screw on and tighten four wing nuts on base panel studs.

94. INSTALLING ENGINE ASSEMBLIES. a. Install fuel tank. (1) Position fuel tank over generator.

(2) Insert and tighten the four screws which fasten the fuel tank brackets to the generator.

b. Install ignition breaker box. (1) Insert breaker plunger in crankcase.

(2) Position breaker box over plunger and on the crankcase.

(3) Insert and tighten both screws which fasten breaker box to crankcase.

(4) Connect magneto wire to condenser.

(5) Reset breaker point gap. (See par. 38h.)

c. Install carburetor and intake manifold. (1) Place new manifold gaskets (fig. 3, (9)) on intake port.

(2) Position intake manifold and carburetor on crankcase.

(3) Insert and tighten the four screws which fasten manifold adapters to cylinders and the two screws which fasten the intake manifold center section to crankcase.

d. Install breather tube. (1) Place new breather tube gasket (fig. 4, (8)) over breather tube port on crankcase.

(2) Position breather tube on crankcase.

(3) Insert and tighten both screws which fasten breather tube to crankcase.

e. Install booster coil. (1) Screw ball joint into governor arm rod.

(2) Slip throttle control rod into carburetor throttle arm.

(3) Insert and secure cotter pin in throttle control rod.

f. Install fuel pump. (1) Place new fuel pump adapter gasket (fig. 8, (1)) over pump push rod opening of crankcase.

(2) Position fuel pump adapter on crankcase.

(3) Insert and tighten both screws which fasten fuel pump adapter to crankcase.

(4) Turn starter rope pulley and listen for action of fuel pump diaphragm to determine that the fuel pump push rod is engaged with pump lever cup.

(5) Connect carburetor fuel line to fuel pump and carburetor. Connect the fixed end first and then the swivel end to avoid damage to the line.

(6) Connect fuel tank line to fuel pump and fuel tank petcock. Connect the fixed end first and then the swivel end to avoid damage to the line.

(7) Slip loop of governor spring into position on the spring stud.

(8) Open fuel tank shut-off petcock.

(9) Open fuel tank cap screw.

g. Install exhaust muffler. (1) Place new exhaust muffler gaskets (fig. 3, (9)) over exhaust ports.

(2) Position exhaust muffler on engine.

(3) Insert and tighten four screws which hold exhaust muffler to engine.

h. Replace air cleaner and adapter. (1) Fit air cleaner adapter over breather tube and carburetor.

(2) Tighten adapter locking screw at connection to carburetor.

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95. RUNNING TEST, ADJUSTING, AND TIGHTENING. a. Running test. Follow instructions for running test. (See par. 33, items 1 through 14.) If unit operates satisfactorily, continue operation for approximately 30 minutes.

b. Adjusting. (1) *Breaker points.* (*a*) Check breaker points for correct gap. (See par. 38h.)

(*b*) Tighten both breaker box screws.

(*c*) Position cover in breaker box.

(*d*) Insert and tighten screw which fastens cover to breaker box.

(2) *Valve tappets.* (*a*) Check valve tappet clearances. (See par. 52c.)

(*b*) Tighten tappet locking nuts and recheck clearance.

(*c*) Put new valve cover gaskets (fig. 18, (6)) in place.

(*d*) Position valve covers.

(*e*) Insert and tighten screws which fasten valve covers to cylinders.

(3) *Governor and booster.* Make necessary adjustment. Follow instructions in paragraph 77.

(4) Timing. Make necessary adjustment of magneto plate. (See par. 72.)

c. Tighten. (1) Armature stud nut.

(2) Generator frame stud nuts.

(3) Crankcase stud nuts.

(4) Cylinder stud nuts.

(5) Cylinder head nuts.

(*a*) Position cylinder air housings on cylinder head.

(*b*) Insert and tighten three screws which fasten each cylinder air housing on cylinder head.

(6) Blower wheel nut.

(7) All screws which fasten assemblies to engine.

Section XXVIII. GENERATOR REPAIRS

96. GENERAL. a. Scope. This section contains instructions on the disassembly, cleaning, inspection, repair, and reassembly of the generator. This manual does not cover technical repair such as rewinding of the armature.

b. Models. Generators are interchangeable between model OTC–38 and model OTC–38B, therefore, the instructions in this section of the manual are applicable to both.

c. Generator. In the text of the manual the term "generator," used independently of the full nomenclature of Medical Department item No. 9606000, X-ray field unit, generator, means only that part of the entire item which generates electrical energy. It is illustrated and its component parts listed in figure 10.

97. DISASSEMBLING. a. Dismount unit from carrying frame and base. Follow instructions to paragraph 80a.

b. Remove conductor cable outlet. Remove screws which fasten cable outlet (fig. 10, (3)) to generator frame. (See fig. 10, (4).) Do not disconnect the booster wires from outlet.

c. Remove generator from engine. Follow instructions in paragraph 80b.

REPAIR INSTRUCTIONS

d. Remove brush rig. (1) Remove the four screws which fasten brush rig (fig. 10, (16)) to end bell housing (fig. 10, (5)).

(2) Remove brush rig from end bell housing.

98. CLEANING. a. Wipe all generator parts with a clean dry cloth to remove any accumulation of dust and dirt.

b. Thoroughly wipe the surfaces of the pole shoes (fig. 10, (7)), commutator (fig. 10, (24)), and slip rings (fig. 10, (23)). Particularly wipe away any oil deposit on the lower pole shoe.

c. Sand commutator and slip rings with flint paper No. 2/0 until they have a bright surface. Wipe with a clean dry cloth.

d. Remove brushes from holders and wipe brushes and interior of holders.

e. Do not use cleaning solvents or lubricating oil on the generator parts.

99. INSPECTING BRUSHES, BRUSH SPRINGS, AND BALL BEARING. Follow instruction in paragraph 55 for inspection and service of the generator brushes, brush springs, and ball bearing.

100. INSPECTING COMMUTATOR AND SLIP RINGS. a. Commutator. (1) *Inspect for high mica.* The mica insulation between commutator bars wears more slowly than the copper bars. After a long period of service the mica will be even or above the level of the bars and cause severe sparking between the brushes and bars. This condition will cause the burning or pitting of commutator bars. Mica should be 1/32 inch below surface of commutator bars. If mica is even or above bars follow instructions for cutting down armature. (See par. 102.)

(2) *Inspect for loose bars.* If personnel experienced in generator service are not available to reseat loose armature bars the entire armature will have to be replaced with a new armature (fig. 10, (25)) when reassembling generator. (See par. 103.)

(3) *Inspect for uneven bars.* If one or more commutator bars are slightly out of round with the remainder of the bars the commutator can be turned down on a lathe and the mica undercut. If the equipment or personnel are not available to accomplish this repair the entire armature can be replaced with a new one when reassembling the generator.

(4) *Inspect for burned bars.* Seriously burned bars will require the same services as given for unever bars, (3) above. A slight mahogany color of the commutator does not indicate burned bars.

b. Slip ring. Inspect for burned or out of round condition. Turn down in a lathe. If the equipment or personnel are not available to accomplish this repair, the entire armature can be replaced with a new one when reassembling the generator.

101. TESTING ARMATURE AND FIELD COILS. a. General. (1) The generator wiring diagram (fig. 21) is included in the manual to serve as a guide when testing and servicing the generator.

(2) Use the test meter from the Medical Department maintenance and repair tool chest, 9N45705.

(3) Set test meter to indicate continuity.

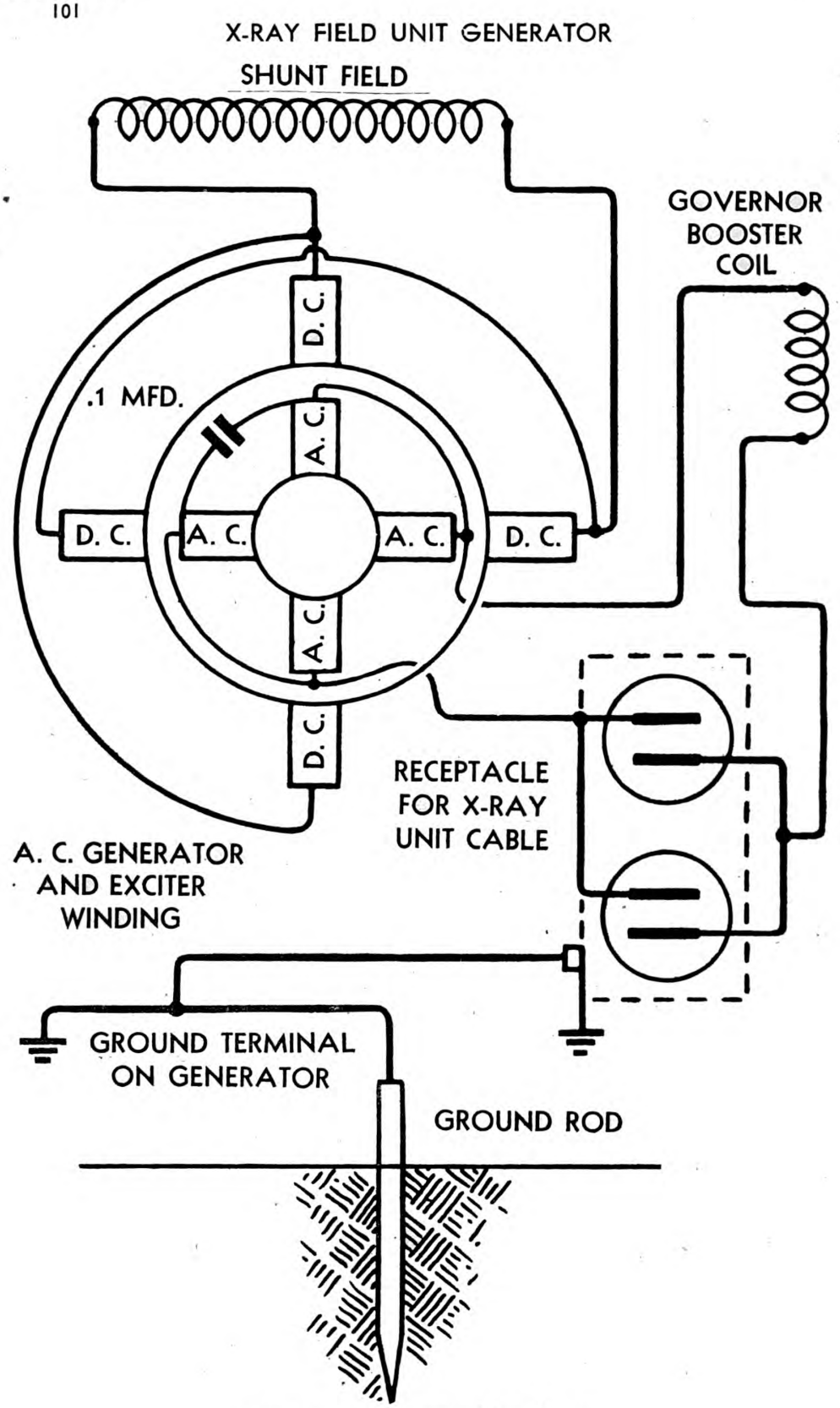

Figure 21. Generator wiring diagram.

REPAIR INSTRUCTIONS

b. Test DC winding of armature. (1) Place one test meter lead on commutator and the other on commutator shaft.

(2) *Reading.* *(a)* Meter should not indicate continuity.

(*b*) If meter does indicate continuity the armature is grounded to shaft. Replace with a new armature (fig. 10, (25)) when reassembling generator. (See par. 103.)

c. Test AC winding of armature. (1) Place one test meter lead on one slip ring and the other lead on the second slip ring.

(2) *Reading.* (*a*) Test meter should indicate continuity.

(*b*) If test meter does not indicate continuity the AC winding is open Replace the armature when reassembling generator.

(3) Place one test meter lead on the armature shaft and the other alternately on each of the slip rings.

(4) *Reading.* (*a*) Meter should not indicate continuity.

(*b*) If meter does indicate continuity the AC winding is grounded to armature shaft. Replace the armature when reassembling generator.

d. Test field coils for open circuit. (1) Connect one test meter lead on either field coil lead. Place other meter lead on the second lead from field coil.

(2) *Reading.* (*a*) Meter should indicate continuity.

(*b*) If meter does not indicate continuity the field coil set is open. Inspect for loose or broken leads. If break is within field coils, replace with new field coil set. (See fig. 10, (1).)

e. Test field coils for grounding. (1) Connect one test meter lead to either field coil lead. Place other meter lead on generator frame.

(2) *Readings.* (*a*) Meter should not indicate continuity.

(*b*) If meter indicates continuity the field coils are grounded to generator frame. Replace with new field coil set when reassembling generator.

102. UNDERCUTTING COMMUTATOR. a. Tool. Grind the cutting edge of a hack saw blade to the same width as the mica strips. Also grind one end to a point.

b. Procedure. Cut each mica strip until it is 1/32 inch below the surface of the commutator bars.

c. Clean commutator. After undercutting mica be certain to wipe away all mica dust with a clean dry cloth.

103. REASSEMBLING. a. Install brush rig. (1) Check that all brushes are in the raised position, that is, not extending beyond the inner ends of the brush holders.

(2) Place brush rig within end ball housing. Be certain the yellow indicating mark on edge of brush rig is in line with the matching mark on the inner side of the bell housing.

(3) Insert and tighten the four screws which fasten brush rig to end bell housing. Again check to see that the yellow marks are in line.

b. Installing new field coil set. If inspection revealed the field coil set to be open or shorted install a new set as follows:

(1) Note the position of old field coil set in generator frame. Install the new set in the same position.

(2) Remove the three screws holding each of the four pole shoes to the generator frame.

(3) Remove four pole shoes.
(4) Remove old field coil set from frame.
(5) Position new field coil set (fig. 10, (1)) in generator frame.
(6) Position pole shoes in generator frame.
(7) Insert and tighten screws which fasten pole shoes to frame. Be certain the pole shoes fit flush against the inside of frame and that the screws are secure.

c. Install generator on engine. Follow instructions in paragraph 93q.

d. Install conductor cable outlet. (1) Position outlet on generator frame.

(2) Insert and tighten screws which fasten outlet to frame.

e. Mount unit on carrying frame and base. Follow instructions in paragraph 93r.

104. TESTING GENERATOR OUTPUT. Follow instruction in paragraph 77b.

APPENDIX

Section I. SHIPMENT AND STORAGE

1. GENERAL. Instructions in this section of the manual cover the preparation for temporary storage or domestic shipment. Items to be prepared for temporary storage or domestic shipment are those ready for immediate service but not used for less than 30 days. These instructions cover only the preparation of the item. Packaging, crating, and method of shipment will be in accordance with existing Medical Department procedure. For detailed information on preparation for indefinite storage, see AR 850–18.

2. PREPARATION FOR TEMPORARY STORAGE AND DOMESTIC SHIPMENT. a. Lubrication. Lubricate unit completely according to WD Lubrication Order 5001. (See fig. 6.)

b. Running test. (1) Operate engine for at least 30 minutes. Follow instructions for running test. (See par. 33, items 1 through 14.)

(2) Correct any defects noted during test or note corrections to be made on a tag and attach it to the choke control.

c. Fuel in tank. It is not necessary to remove the fuel from the tank for shipment within the United States, nor to label the tank under Interstate Commerce Commission Regulation. Leave fuel in the tank, except when storing in location where fire ordinances or other local regulations require removal of all gasoline before storage.

d. Exterior of unit. (1) Remove rust appearing on any surface of the unit by sanding with paper, flint, No. 2.

(2) Place tools, spare parts, and conductor cable within the lid panel.

e. Inspection. (1) Make a systematic inspection to insure that all above steps have been covered and that the unit is ready for operation on call.

(2) Make a list of all damaged items and attach it to the unit.

f. Engine. (1) Remove air cleaner adapter from carburetor.

(2) Start engine.

(3) Pour, through the carburetor intake, 1/8 pint of oil, lubricating, preservative, medium (PM).

(4) Immediately press the stop button and hold down until engine stops.

(5) Keep stop button depressed and turn the engine, using the starter rope, for four or five complete revolutions.

g. Carrying case. Install panels and snap fasteners in place. Any over packing, crating, and marking will be as directed by storage or shipping officers.

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Section II. REFERENCES

3. ARMY REGULATIONS.

Motor vehicles	AR 850–15
Storage of Motor Vehicle Equipment	AR 850–18
Precautions in Handling Gasoline	AR 850–20

4. FIELD AND TECHNICAL MANUALS.

Camouflage Basic Principles	FM 5–20
Defense against Chemical Attack	FM 21–40
Electrical Fundamentals	TM 1–455
Decontamination	TM 3–220
Cleaning, Preserving, Seating, Lubricating, and Related Materials Issued for Ordnance Matériel	TM 9–850
Motor Vehicle Inspections and Preventive Maintenance Services	TM 9–2810
Fuels and Carburetion	TM 10–550
Basic Maintenance Manual	TM 38–250

5. ARMY SERVICE FORCES MEDICAL SUPPLY CATALOG.

Introduction	Med 1
Index	Med 2
List of items for troop issue	Med 3
Organizational and higher-echelon spare parts	Med 7
List for 9606000 X-ray field unit, generator (when published).	
List of common parts (when published).	
List for 9N45705 Medical Department maintenance and repair tool kit (when published).	
List of all parts (SNL)	Med 9
List for 9606000 X-ray field unit, generator (when published).	

6. LIST OF FORMS MENTIONED IN MANUAL.

WD Form 48, Drivers Trip Ticket and Preventive Maintenance Service Record.

WD, AGO Form 461, Work Sheet for Wheeled and Half-track Vehicles.

WD, AGO Form 468, Unsatisfactory Equipment Report.

7. LIST OF ABBREVIATIONS USED IN MANUAL.

AC	Alternating current	par.	paragraph
AGO	Adjutant General's Office	RPM	Revolutions per minute
ASF	Army Service Forces	sec.	section
DC	Direct current	SNL	Standard Nomenclature List
fig.	figure	V	Volt
No.	Number	WD	War Department

APPENDIX

Section III. LIST OF ALL SERVICE PARTS

8. INTERCHANGEABLE SERVICE PARTS.

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
		COMMON PARTS		
—	SR00045	SCREW, 10–32 x 3/8 INCH, R.H.M., 144 TO A PACKAGE: For magneto ground wire.	pkg.	
14	SR00105	SCREW, 6–32 x 3/8 INCH, R.H.M., 144 TO A PACKAGE: For fuel pump valve.	pkg.	
*—	SR00141	SCREW, 10–32 x 5/16 INCH, R.H.M., 144 TO A PACKAGE: For bell housing band and cylinder air housing.	pkg.	
*—	SR00145	SCREW, 10–32 x 1½ INCH, R.H.M., 144 TO A PACKAGE: For spark plug shields.	pkg.	
*11	SR00151	WASHER, LOCK, SCREW SIZE 10: For spark plug shield and carburetor cover.	lb.	
14	SR00152	WASHER, LOCK, SCREW SIZE 8: For fuel pump flange.	lb.	
*—	SR00156	WASHER, LOCK, SCREW SIZE 5/16: For fuel pump to adapter and fuel tank.	lb.	
—	SR00157	WASHER, SHAKEPROOF, SCREW SIZE 10, EXT.: For jumper terminal.	pkg.	
18	SR00215	NIPPLE, CLOSE, PIPE, 3/8 INCH: For oil drain.	ea.	1
*11, 12	SR00229	WASHER, LOCK, SCREW SIZE ¼:	lb.	
17	SR00230	NUT, ¼ x 20, HEX, 144 TO A PACKAGE: For governor and governor arm ball joint.	pkg.	
—	SR00273	NUT, 10 x 32, HEX, BRASS, 144 TO A PACKAGE: For generator jumper terminal.	pkg.	
14	SR00280	SCREW, 8–32 x 5/8 INCH, FILL. H.M.: For fuel pump flange.	pkg.	
—	SR00293	WASHER, SCREW SIZE ¼: For governor ball joint, governor shaft and connecting rod.	lb.	
12	SR00297	WASHER, SCREW SIZE ¼: For throttle shaft.	lb.	

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
11, 12	SR00314	SCREW, 10–32 x 5/8 INCH, R.H.M., 144 TO A PACKAGE: For choke arm.	pkg.	
*11, 12, 17	SR00330	NUT, 10 x 32, HEX, 144 TO A PACKAGE: For governor arm adjusting screw, spark plug shield and throttle adjusting screw.	pkg.	
—	SR00337	WASHER, SCREW SIZE 1/2: For blower wheel.	lb.	
*—	SR00358	WASHER, LOCK, SCREW SIZE 1/2: For blower wheel.	lb.	
*—	SR00404	WASHER, SCREW SIZE 5/16: For generator brush.	lb.	
*—	SR00422	NUT, 5/16 x 18, HEX, 144 TO A PACKAGE: For fuel tank.	pkg.	
18	SR00451	COUPLING, PIPE, 3/8 INCH: For oil drain.	ea.	1
—	SR00551	WASHER, SHAKEPROOF, SCREW SIZE 1/4, INT: For governor.	lb.	
19	SR00664	NIPPLE, LONG, PIPE, 1/8 INCH x 2 1/8 INCH: For oil pump inlet.	ea.	1
*7	SR00665	NUT, 5 x 40, HEX, BRASS: For locking stationary point.	pkg.	
—	SR00666	NUT, JAM, 3/8 x 16, HEX: For oil pump relief valve.	pkg.	
11, 12	SR00672	NUT, 10 x 32, SQUARE: For choke arm.	pkg.	
*1	SR00685	NUT, 5/16 x 18, WING: For case.	pkg.	
*—	SR00687	NUT, JAM, 1/2 x 13, HEX: For blower wheel.	pkg.	
*—	SR00688	SCREW, 1/4–20 x 1 1/4 INCH, ALLEN HEAD, CAP: For exhaust muffler.	pkg.	
*—	SR00719	SCREW, 1/4–20 x 2 INCH, ALLEN HEAD, CAP: For intake manifold.	pkg.	
*—	SR00720	SCREW, 1/4–20 x 5/16 INCH, ALLEN H.M.: For blower housing.	pkg.	
*—	SR00721	SCREW, 1/4–20 x 5/8 INCH, ALLEN H.M.: For carrying assembly.	pkg.	
*17	SR00722	SCREW, 1/4–20 x 3/4 INCH, ALLEN H.M.: For generator brush and governor shaft.	pkg.	

APPENDIX

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
12	SR00723	WASHER, LOCK, SCREW SIZE 5: For choke plate.	lb.	
*—	SR00724	SCREW, 5/16–18 x 1 INCH, ALLEN H.M.: For fuel pump and generator pole shoes.	pkg.	
—	SR00725	SCREW, 8–32 x 1/4 INCH, HEX H.M.: For governor pivot plate.	pkg.	
—	SR00801	SCREW, 1/4–20 x 5/8 INCH, HEX HEAD, CAP: For carburetor.	pkg.	
—	SR00802	SCREW, 3/8–16 x 3/4 INCH, HEX HEAD, CAP: For oil pump relief valve.	pkg.	
*—	SR00803	SCREW, 5/16–18 x 5/8 INCH, R.H.M.: For fuel tank.	pkg.	
*—	SR00804	SCREW, 5/16–18 x 1 1/4 INCH, R.H.M.: For fuel tank.	pkg.	
—	SR00805	SCREW, 10–32 x 1/2 INCH, R.H.M., BRASS: For generator jumper terminal.	pkg.	
*—	SR00806	STUD, 5/16–24 x 1 5/8 INCH: For cylinder base.	ea.	10
*—	SR00807	STUD, 5/16–24 x 2 1/8 INCH: For cylinder heads.	ea.	12
—	SR00808	WASHER, SCREW SIZE 5/16, COPPER: For fuel pump.	lb.	
*19	SR00809	SCREW, 1/4–28 x 1 INCH, HEX HEAD, CAP: For connecting rod.	pkg.	
*—	SR00810	STUD, 3/8–24 x 1 5/8 INCH: For oil base.	ea.	4
*—	SR00811	SETSCREW, 1/4–20 x 3/4 INCH, ALLEN HEAD, CONE PT.: For starter rope pulley.	pkg.	
*11, 12, 17	SR00813	SCREW, 10–32 x 1/2 INCH, FILL. H.M.: For throttle stop and carburetor cover.	pkg.	
11, 12, 17	SR00814	SCREW, 10–32 x 5/8 INCH, FILL. H.M.: For throttle stop adjusting screw.	pkg.	
11, 12, 17	SR00815	SCREW, 10–32 x 9/16 INCH, HEX H.M.: For throttle arm.	pkg.	
*11, 12	SR00816	SCREW, 1/4–28 x 1 1/4 INCH, HEX H.M.: For carburetor.	pkg.	

X-RAY FIELD UNIT GENERATOR

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
12	SR00817	SCREW, 5–40 x 1/4 INCH, O.H.M.: For throttle plate.	pkg.	
12	SR00818	SCREW, 5–40 x 3/16 INCH, R.H.M.: For choke plate.	pkg.	
		Tools		
*2	TR01033	BRUSH, WIRE, 14 INCH HANDLE:	ea.	1
*2	TR01355	FILE, IGNITION POINT:	ea.	1
*2, 9	TR01430	GAGE, FEELER, .001 INCH TO .025 INCH:	ea.	1
*2	TR01610	PLIER, SLIP JOINT, SHEAR CUTTING, 6 INCH:	ea.	1
*2	TR01705	SCREWDRIVER, NORMAL DUTY, 1/4 INCH SHANK, 4 INCH BLADE LENGTH:	ea.	1
*2	TR01710	SCREWDRIVER, NORMAL DUTY, 1/4 INCH SHANK, 6 INCH BLADE LENGTH:	ea.	1
*2	TR01865	WRENCH, ADJUSTABLE, AUTO TYPE, 8 1/2 INCH LENGTH, 2 5/8 INCH OPENING:	ea.	1
*2	TR01915	WRENCH, SETSCREW, ALLEN, NO. 10:	ea.	1
*2	TR01918	WRENCH, SETSCREW, ALLEN, 1/4 INCH:	ea.	1
*2	TR01921	WRENCH, SETSCREW, ALLEN, 5/16 INCH:	ea.	1
*2	TR01924	WRENCH, SETSCREW, ALLEN, 3/8 INCH:	ea.	1
*2	TR02045	WRENCH, DOUBLE END, ENGINEER, 15 DEGREE, 3/8 INCH x 7/16 INCH:	ea.	2
*2	TR02048	WRENCH, DOUBLE END, ENGINEER, 15 DEGREE, 7/16 INCH x 1/2 INCH:	ea.	2
*2	TR02054	WRENCH, DOUBLE END, ENGINEER, 15 DEGREE, 9/16 INCH x 5/8 INCH:	ea.	2
*2	TR02057	WRENCH, DOUBLE END, THIN HEAD, 15 DEGREE, 5/8 INCH x 11/16 INCH:	ea.	1
*2, 7	TR02080	WRENCH, IGNITION POINT, FOR NUT SCREW—SIZE 5:	ea.	1

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
*2	TR02215	WRENCH, SPARK PLUG, 27/32 INCH x 1-1/32 INCHES:	ea.	1
*2	TR02255	ADAPTER, SOCKET WRENCH, ½ INCH FEMALE SQUARE DRIVE, 9/16 INCH ROUND HANDLE HOLE:	ea.	1
*—	TR02310	HANDLE, SPARK PLUG WRENCH, SOLID, ⅜ INCH DIA., 6 INCH LENGTH:	ea.	1
*2	TR02315	HANDLE, SOCKET WRENCH, BAR TYPE, 9/16 INCH DIA., 10 INCH LENGTH:	ea.	1
*2	TR02355	PLUG-CONNECTOR, SOCKET WRENCH, ½ INCH SQUARE DRIVE, 1¼ INCH LENGTH:	ea.	1
*2	TR02425	SOCKET, 7/16 INCH 12 POINT OPENING, ½ INCH SQUARE DRIVE:	ea.	1
*2	TR02428	SOCKET, ½ INCH 12 POINT OPENING, ½ INCH SQUARE DRIVE:	ea.	1
*2	TR02431	SOCKET, 9/16 INCH 12 POINT OPENING, ½ INCH SQUARE DRIVE:	ea.	1

9. SERVICE PARTS FOR MODEL OTC–38 ONLY.

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
		UNCOMMON PARTS		
		Cylinder group		
*9, 18	9R00602	CYLINDER, C.I., 2¾ INCH, R/H.:	ea.	1
*9, 18	9R00604	CYLINDER, C.I., 2¾ INCH, L/H.:	ea.	1
*9, 18	9R00606	GASKET, CYLINDER BASE:	ea.	2
*9, 18	9R00608	HEAD, CYLINDER, R/H.:	ea.	1
*9, 18	9R00610	HEAD, CYLINDER, L/H.:	ea.	1
*3, 9, 18	9R00612	GASKET, CYLINDER HEAD:	ea.	2
		Valve group		
*9, 19	9R00614	VALVE, INTAKE:	ea.	2
*9, 19	9R00616	VALVE, EXHAUST:	ea.	2

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
*9, 19	9R00618	GUIDE, VALVE:	ea.	4
*9, 19	9R00620	SPRINGS, VALVE:	ea.	4
9	9R00621	NUT, LOCKING, TAPPET:	ea.	4
*9	9R00622	TAPPET, VALVE:	ea.	4
*9, 19	9R00623	LIFTER, VALVE:	ea.	4
*9, 19	9R00624	PIN, VALVE:	ea.	4
19	9R00625	INSERT, VALVE SEAT:	ea.	4
*9, 19	9R00626	WASHER, VALVE:	ea.	4
9, 18	9R00627	COVER, VALVE:	ea.	2
*3, 9, 18	9R00628	GASKET, VALVE COVER:	ea.	2
		Piston and connecting rod group		
19	9R00629	PIN, PISTON:	ea.	2
*9, 19	9R00630	PISTON, 2¾ INCH BORE:	ea.	2
*9, 19	9R00632	RINGS, PISTON, SET: 2 Compression and 1 oil.	set	2
*19	9R00637	WASHER, CONNECTING ROD SCREW:	ea.	2
*9, 19	9R00638	RING, LOCK, PISTON PIN:	ea.	4
19	9R00639	BUSHING, PISTON PIN:	ea.	4
*19	9R00640	ROD, CONNECTING, COMPLETE: Assembly.	ea.	2
*19	9R00641	INSERT, ROD, CONNECTING BEARING:	ea.	4
		Manifold group		
*—	9R00644	MUFFLER, EXHAUST:	ea.	1
*—	9R00646	MANIFOLD, INTAKE:	ea.	1
*3	9R00648	GASKET, MANIFOLD:	ea.	4
*—	9R00650	ADAPTER, MANIFOLD:	ea.	2
*—	9R00652	TUBE, MANIFOLD:	ea.	2
		Camshaft group		
*19	9R00656	BEARING, CAMSHAFT, FRONT:	ea.	1
*19	9R00658	BEARING, CAMSHAFT, REAR:	ea.	1
19	9R00659	WASHER, SPACER, CAMSHAFT GEAR:	ea.	1
*7, 19	9R00660	GEAR, CAMSHAFT:	ea.	1

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
		Governor group		
16	9R00661	SCREW, CUP STOP, GOVERNOR:	ea.	1
*7, 16	9R00662	WEIGHT, GOVERNOR:	ea.	4
16	9R00663	SPACER, CUP STOP SCREW, GOVERNOR:	ea.	1
*—	9R00664	BEARING, CUP, GOVERNOR:	ea.	1
16	9R00665	PLATE, PIVOT, GOVERNOR:	ea.	1
7, 16	9R00667	CUP AND STUD, GOVERNOR:	ea.	1
*7, 16, 17	9R00668	ROD, ARM, GOVERNOR:	ea.	1
16	9R00669	STUD, GOVERNOR:	ea.	1
*7, 16, 17	9R00670	JOINT, BALL, GOVERNOR:	ea.	1
*16	9R00672	PIN, WEIGHT, GOVERNOR:	ea.	4
		Crankshaft group		
*19	9R00674	CRANKSHAFT:	ea.	1
*19	9R00676	SEAL, OIL, CRANKSHAFT:	ea.	1
*19	9R00678	BEARING, CRANKSHAFT:	pr.	1
*19	9R00680	GEAR, CRANKSHAFT:	ea.	1
*19	9R00682	NUT, CRANKSHAFT:	ea.	1
		Gearcase, crankcase, oil base group		
18	9R00701	BEARING PLATE AND GENERATOR SUPPORT:	ea.	1
*18	9R00702	GASKET, BEARING PLATE AND GENERATOR SUPPORT:	ea.	1
—	9R00703	GASKET, OIL FILLER CAP:	ea.	1
*18	9R00704	BASE, OIL:	ea.	1
*18	9R00705	GASKET, OIL BASE:	ea.	1
*18	9R00706	PLUG, OIL:	ea.	1
7	9R00707	CAP AND BUSHING, OIL FILLER:	ea.	1
5, 7.	9R00709	GAGE AND CHAIN, OIL FILLER:	ea.	1
*—	9R00712	SEAL, OIL, GEARCASE:	ea.	1
		Carburetor and air cleaner group one		
12	9R00713	PLUG, METERING WELL, CARBURETOR:	ea.	1
*—	9R00714	CARBURETOR, ZENITH TU3, Y1:	ea.	1

X-RAY FIELD UNIT GENERATOR

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
8	9R00715	ELBOW, CARBURETOR:	ea.	2
*12	9R00716	JET, MAIN, CARBURETOR:	ea.	1
—	9R00717	CLIP, MANUAL CHOKE:	ea.	1
5	9R00719	CONTROL, MANUAL CHOKE:	ea.	1
*12	9R00720	VALVE AND SEAT, CARBURETOR:	ea.	1
*12	9R00721	WASHER, LOWER, METERING WELL, CARBURETOR:	ea.	1
*12	9R00722	WELL, METERING, CARBURETOR:	ea.	1
11, 12	9R00723	PLUG, DRAIN AND COVER, CARBURETOR:	ea.	2
*11	9R00724	GASKET, CARBURETOR TO MANIFOLD:	ea.	1
*12	9R00725	WASHER, UPPER, METERING WELL, CARBURETOR:	ea.	1
11, 12	9R00727	BOWL, CARBURETOR:	ea.	1
*12	9R00728	FLOAT, COMPLETE:	ea.	1
*12	9R00729	WASHER, MAIN JET, CARBURETOR:	ea.	1
*11, 12	9R00730	GASKETS, CARBURETOR, SET: Body to bowl and bowl to cover.	set	1
12	9R00731	PIN, FLOAT, CARBURETOR:	ea.	1
*7	9R00733	ADAPTER, AIR CLEANER:	ea.	1
*4, 7	9R00734	CLEANER, AIR:	ea.	1
*4, 7	9R00736	SCREEN, BREATHER TUBE:	ea.	1
*7	9R00737	SCREW, LOCKING, AIR CLEANER ADAPTER:	ea.	1
*4	9R00738	GASKET, AIR CLEANER:	ea.	1
		Fuel supply group		
14	9R00739	SPRING, LEVER, FUEL PUMP:	ea.	1
*—	9R00740	PUMP, FUEL, COMPLETE: Assembly 1537966.	ea.	1
—	9R00741	PLATE, VALVE, FUEL PUMP:	ea.	1
*—	9R00742	FILTER, COMPLETE: Assembly.	ea.	1
8, 14	9R00743	BODY, UPPER, FUEL PUMP:	ea.	1
*3, 8	9R00744	LINE, FUEL, CARBURETOR:	ea.	1

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
13, 14	9R00745	VALVE, FUEL PUMP: For pressure and vacuum.	ea.	2
*3, 5	9R00746	LINE, FUEL, TANK:	ea.	1
14	9R00747	CAP, BOWL, FUEL PUMP:	ea.	1
*8, 13, 14	9R00748	GASKET, FUEL PUMP:	ea.	1
8	9R00749	ROD, PUSH, FUEL PUMP:	ea.	1
*4, 8	9R00750	GASKET, FUEL PUMP ADAPTER AND BREATHER TUBE:	ea.	2
8	9R00751	ADAPTER, FUEL PUMP:	ea.	1
*4, 8, 14	9R00752	SCREEN, FUEL PUMP:	ea.	1
8,14	9R00753	NUT, BOWL YOKE, FUEL PUMP:	ea.	1
*4, 5, 8, 14	9R00754	BOWL, FUEL PUMP:	ea.	1
—	9R00755	KEY, COTTER, FUEL PUMP PUSH ROD:	ea.	1
*3, 8, 13, 14	9R00756	GASKET, FUEL PUMP, BOWL:	ea.	1
8, 14	9R00757	YOKE, BOWL, FUEL PUMP:	ea.	1
*—	9R00758	KIT, FUEL PUMP:	ea.	1
		Ignition breaker group		
—	9R00759	NIPPLE, SPARK PLUG SHIELDING:	ea.	2
*7	9R00760	PLATE, BACK, MAGNETO:	ea.	1
7	9R00761	SHOE, MAGNETO COIL, LAMINATED:	ea.	1
*7	9R00762	COIL, MAGNETO, RIGHT:	ea.	1
5	9R00763	BUTTON, STOP:	ea.	2
*7	9R00764	COIL, MAGNETO, LEFT:	ea.	1
—	9R00765	NAMEPLATE, STOP BUTTON:	ea.	2
*3, 7	9R00766	CONDENSER, MAGNETO:	ea.	1
—	9R00767	NUT, COUPLING, SPARK PLUG SHIELD:	ea.	2
*—	9R00768	CABLE, S.P., MAGNETO, L/H.:	ea.	1
—	9R00769	NUT, LOCK, SPARK PLUG SHIELD:	ea.	2
*—	9R00770	CABLE, S.P., MAGNETO, R/H.:	ea.	1

X-RAY FIELD UNIT GENERATOR

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
*7	9R00771	WIRE, MAGNETO TO CONDENSER:	ea.	1
*3	9R00772	ARM AND POINT, BREAKER:	ea.	1
*—	9R00773	WHEEL, BLOWER:	ea.	1
*7	9R00774	PLUNGER, BREAKER:	ea.	1
—	9R00775	SHIELD, SPARK PLUG, ASSEMBLY:	ea.	2
*4, 7	9R00776	SPRING, BREAKER:	ea.	1
—	9R00777	BRACKET, BREAKER SPRING:	ea.	1
7	9R00779	BOX, IGNITION BREAKER:	ea.	1
*3	9R00780	PLUG, SPARK:	ea.	2
—	9R00781	COVER, BOX, IGNITION BREAKER:	ea.	1
*7	9R00782	STUD, ARM, IGNITION BREAKER:	ea.	1
—	9R00783	MOUNTING, CONTACT POINT, ASSEMBLY:	ea.	1
		Generator group		
*10	9R00784	ARMATURE, COMPLETE:	ea.	1
10	9R00785	STUD, ARMATURE:	ea.	1
*10	9R00786	RIG, BRUSH, COMPLETE: Assembly.	ea.	1
10	9R00787	STUD, GENERATOR FRAME:	ea.	4
*3, 10	9R00788	BRUSH, DC:	ea.	4
10	9R00789	BLOWER, GENERATOR:	ea.	1
*10	9R00790	BEARING, BALL:	ea.	1
*10	9R00791	NUT, STUD, GENERATOR FRAME:	ea.	4
*10	9R00792	COIL SET, FIELD:	ea.	1
10	9R00793	WASHER, STUD, ARMATURE:	ea.	1
*3, 10	9R00794	SPRING, DC:	ea.	4
10	9R00795	FRAME, GENERATOR:	ea.	1
*10	9R00796	NUT, STUD, ARMATURE:	ea.	1
10	9R00797	WIRE, AC BRUSH:	ea.	2
*3, 10	9R00798	BRUSH, AC:	ea.	4
10	9R00799	COVER, BEARING, GENERATOR:	ea.	1

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
*3, 10	9R00800	SPRING, BRUSH, AC:	ea.	4
10	9R00801	BAND, END BELL HOUSING, GENERATOR:	ea.	1
*10	9R00802	CONDENSER, LINE, AC 1–MFD:	ea.	1
10	9R00803	HOUSING, END BELL, GENERATOR:	ea.	1
*3, 10	9R00804	GASKET, BEARING COVER:	ea.	1
		Governor-booster group		
*16	9R00806	CONDUIT, FLEXIBLE, GOVERNOR-BOOSTER:	ea.	1
*—	9R00808	COIL AND HOUSING, GOVERNOR-BOOSTER:	ea.	1
		Accessories		
*1, 5	9R00810	ROD, GROUNDING:	ea.	1
*1, 4, 5	9R00812	CABLE, GROUNDING:	ea.	1
*1, 5	9R00814	CABLE, NO. 12, TYPE S, 3 CONDUCTOR:	ft.	50
*1, 5	9R00816	CONNECTOR, ANGLE-CORD:	ea.	1
*1, 5	9R00818	PLUG, ANGLE-CORD:	ea.	1
*1, 4, 5	9R00820	CLIP, SPRING:	ea.	2
*4, 10	9R00822	RECEPTACLE, DUPLEX:	ea.	1
*3	9R00826	ROPE, STARTER:	ea.	1
*3	9R00830	GASKET, FILLER CAP: For fuel tank.	ea.	1
*3	9R00832	GASKET, SHUT-OFF SCREW: For fuel tank.	ea.	1
5, 10	9R00838	PULLEY, STARTER ROPE:	ea.	1
10	9R00840	SHOE, POLE:	ea.	1
		Governor-booster group section two		
7, 16, 17	9R00842	NUT, ADJUSTING, GOVERNOR SPRING:	ea.	1
7, 16, 17	9R00844	BRACKET, ADJUSTING SPRING, GOVERNOR:	ea.	1
16	9R00846	SPACER, SHAFT, GOVERNOR:	ea.	1

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
16	9R00848	BEARING, LOWER, SHAFT, GOVERNOR:	ea.	1
16	9R00850	BEARING, UPPER, SHAFT, GOVERNOR:	ea.	1
7, 16, 17	9R00852	STUD, SPRING, GOVERNOR:	ea.	1
16	9R00854	BRACKET, BOOSTER:	ea.	1
7, 16	9R00856	HOUSING, BOOSTER:	ea.	1
7, 16	9R00858	COVER, HOUSING, BOOSTER:	ea.	1
16, 17	9R00860	PLUNGER, BOOSTER:	ea.	1
16, 17	9R00862	SCREW, ADJUSTING, GOVERNOR SPRING:	ea.	1
7, 16, 17	9R00864	ROD, CONTROL, THROTTLE:	ea.	1
7, 16, 18	9R00866	SHAFT AND PADDLE, GOVERNOR:	ea.	1
16	9R00868	COIL, BOOSTER:	ea.	1
5, 10	9R00869	OUTLET, CONDUCTOR CABLE:	ea.	1
		Air housing group		
—	9R00870	HOUSING, BLOWER:	ea.	1
—	9R00872	HOUSING, AIR, R/H. CYLINDER:	ea.	1
—	9R00874	HOUSING, AIR, L/H. CYLINDER:	ea.	1
—	9R00876	GROMMET, RUBBER, CYLINDER AIR HOUSING:	ea.	2
		Fuel tank group		
—	9R00878	TANK, FUEL:	ea.	1
5	9R00880	CAP AND CHAIN, FILLER, FUEL TANK:	ea.	1
—	9R00882	SCREW, SHUT-OFF, FILLER CAP:	ea.	1
—	9R00884	SPRING, SHUT-OFF SCREW, FILLER CAP:	ea.	1
5	9R00886	PETCOCK, SHUT-OFF, FUEL TANK:	ea.	1
		Carrying case group		
—	9R00888	FRAME, CARRYING:	ea.	1
1	9R00890	HANDLE, CARRYING:	ea.	2

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
1, 5	9R00892	PANEL, LEFT SIDE:	ea.	1
1, 5	9R00894	PANEL, RIGHT SIDE:	ea.	1
1	9R00896	BOX, TOOL AND SPARE PART:	ea.	1
1	9R00898	BRACKET, CLAMP:	ea.	2
1	9R00900	CLASP, TRUNK:	ea.	14
1	9R00902	SNAP AND CHAIN, HARNESS:	ea.	14
1	9R00904	COVER, WIRE COMPARTMENT:	ea.	1
1, 5	9R00906	PANEL, TOP, CABLE COMPARTMENT:	ea.	1
1, 5	9R00908	PANEL, BACK:	ea.	1
1	9R00910	PANEL, FRONT:	ea.	1
1, 5	9R00912	PANEL, BASE AND SKID:	ea.	1
7	9R00914	WIRE, CONDENSER TO POINTS:	ea.	1
1	9R00916	HANDLE, COVER, WIRE COMPARTMENT:	ea.	1
1	9R00918	HANDLE, BOX, TOOL AND SPARE PART:	ea.	2
		Carburetor group two		
11, 12	9R00920	WASHER, DRAIN AND COVER PLUG, CARBURETOR:	ea.	1
11, 12	9R00922	COVER, CARBURETOR:	ea.	1
11, 12	9R00924	NAIL, METAL, SERIAL PLATE, CARBURETOR:	ea.	1
11, 12	9R00926	PLATE, SERIAL, CARBURETOR:	ea.	1
12	9R00928	PLATE, CHOKE, CARBURETOR:	ea.	1
11, 12	9R00930	SHAFT, CHOKE, CARBURETOR:	ea.	1
11, 12	9R00932	ARM, CHOKE, CARBURETOR:	ea.	1
11, 12	9R00934	NEEDLE, IDLE JET, CARBURETOR:	ea.	1
11, 12	9R00936	SPRING, IDLE JET, CARBURETOR:	ea.	1
11, 12	9R00938	BODY, CARBURETOR:	ea.	1
11, 12, 17	9R00940	ARM, THROTTLE, CARBURETOR:	ea.	1
11, 12, 17	9R00942	STOP, THROTTLE ARM, CARBURETOR:	ea.	1

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
11, 12, 17	9R00944	SHAFT, THROTTLE, CARBURETOR:	ea.	1
12	9R00946	PLATE, THROTTLE, CARBURETOR:	ea.	1
		Fuel supply group two		
13, 14	9R00948	DIAPHRAGM AND LEVER LINK, FUEL PUMP:	ea.	1
14	9R00950	SPRING, DIAPHRAGM, FUEL PUMP:	ea.	1
8, 14	9R00952	BODY, LOWER, FUEL PUMP:	ea.	1
14	9R00954	LEVER, FUEL PUMP:	ea.	1
13, 14	9R00956	GASKET, VALVE, FUEL PUMP:	ea.	2
		UNCOMMON PARTS		
—	9R00726	ADJUSTER, MAIN JET:	ea.	1
*7	9R00805	SPRING, GOVERNOR-BOOSTER:	ea.	1
*20	9R00958	CAMSHAFT:	ea.	1
*18	9R00960	CRANKCASE, WITH BEARING PLATE ASSEMBLY: Assembly.	ea.	1
—	9R00962	GEARCASE, ALUMINUM:	ea.	1
*—	9R00964	GASKET, GEARCASE:	ea.	1
—	9R00966	BOLT, MAGNETO:	ea.	1
—	9R00968	PLUG, CLEANING, OIL PUMP:	ea.	1
—	9R00969	BALL, CHECK, INLET, OIL PUMP:	ea.	1
—	9R00970	SEAT, RELIEF VALVE, OIL PUMP:	ea.	1
—	9R00971	BALL, CHECK, OUTLET, OIL PUMP:	ea.	1
*20	9R00972	SCREEN, OIL PUMP:	ea.	1
*20	9R00974	LINE, OIL, FRONT BEARING:	ea.	1
*20	9R00976	LINE, OIL, REAR BEARING:	ea.	1
20	9R00977	BODY, OIL PUMP:	ea.	1
*—	9R00978	PUMP, OIL, COMPLETE:	ea.	1
20	9R00980	PLUNGER, OIL PUMP:	ea.	1

APPENDIX

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
20	9R00982	SPRING, PLUNGER, OIL PUMP:	ea.	1
20	9R00984	ARM, CAM FOLLOWER, OIL PUMP:	ea.	1
20	9R00986	SHAFT, CAM FOLLOWER ARM, OIL PUMP:	ea.	1
20	9R00988	ROD, PUSH, OIL PUMP:	ea.	1
—	9R00990	BALL, RELIEF VALVE, OIL PUMP:	ea.	1
*20	9R00992	VALVE, RELIEF, OIL PUMP, COMPLETE: Assembly.	ea.	1
—	9R00994	SPRING, RELIEF VALVE, OIL PUMP:	ea.	1
—	9R00996	TEE, PIPE, OIL PUMP:	ea.	1
—	9R00998	BODY, RELIEF VALVE, OIL PUMP:	ea.	1
—	9R01000	CRANKCASE:	ea.	1

10. SERVICE PARTS FOR MODEL OTC–38B ONLY.

Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
		UNCOMMON PARTS		
*7, 19	9R00654	CAMSHAFT:	ea.	1
*16, 17	9R00666	SPRING, GOVERNOR:	ea.	1
19	9R00683	RING, SCREEN LOCK, OIL PUMP:	ea.	1
19	9R00685	BODY AND IDLER SHAFT, OIL PUMP:	ea.	1
*—	9R00686	SPRING, RELIEF VALVE, OIL PUMP:	ea.	1
*19	9R00687	VALVE, RELIEF, OIL PUMP:	ea.	1
18	9R00689	COVER, OIL PUMP:	ea.	1
19	9R00691	GEAR AND SHAFT, BODY DRIVER, OIL PUMP:	ea.	1
19	9R00693	GEAR, DRIVE, OIL PUMP:	ea.	1
*—	9R00694	PUMP, OIL, COMPLETE: Assembly.	ea.	1
19	9R00695	GEAR, IDLER, OIL PUMP:	ea.	1

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Figure No.	Medical Dept. No.	Nomenclature	Unit	Quantity
*19	9R00696	SCREEN, OIL PUMP:	ea.	1
19	9R00697	CUP, INTAKE, OIL PUMP:	ea.	1
*18	9R00698	GASKET, OIL PUMP:	ea.	1
*9, 18	9R00700	CRANKCASE, WITH BEARING PLATE ASSEMBLY: Assembly.	ea.	1
*9, 18	9R00708	GEARCASE:	ea.	1
*18	9R00710	GASKET, GEARCASE:	ea.	1
18	9R00711	CRANKCASE:	ea.	1
—	9R00834	PIN, GEAR, OIL PUMP:	ea.	1
—	9R00836	CUP, DEFLECTOR, RELIEF VALVE OIL PUMP:	ea.	1
19	9R00837	NUT, DRIVE GEAR, OIL PUMP:	ea.	1

* To be requisitioned, when required, from the supply depot.

No asterisk indicates that the item is not stocked as a Spare Part, but can be obtained by special requisition.

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