TECHNICAL HANDBOOK

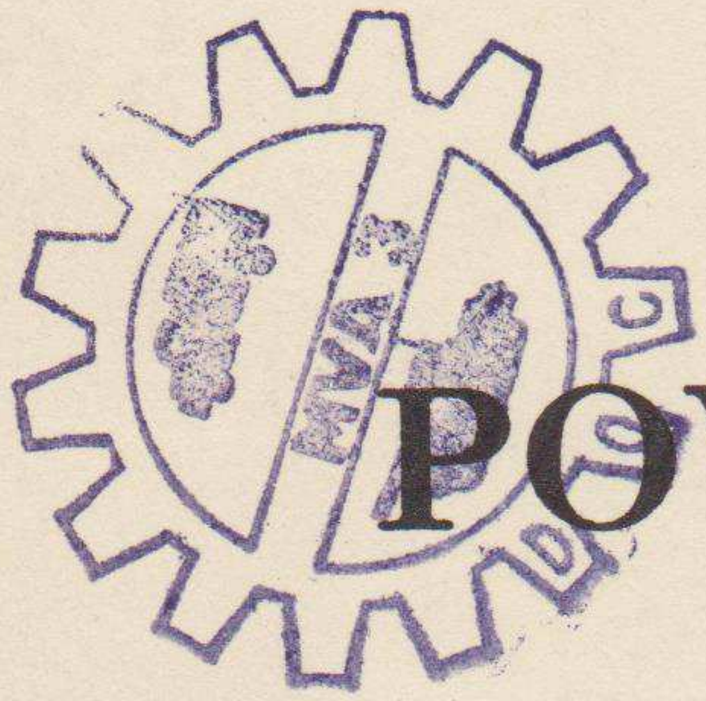
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POWER UNIT

PE-75-AF-GY

C. LORENZ AKTIENGESELLSCHAFT - STUTTGART
(GERMANY)

ARMY CONTRACT NO. DA-91-557-EUC-368 AND
DA-91-516-EUC-540

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DA – 91 – 516 – EUC – 540

SAFETY NOTICE

This equipment generates high voltage which is dangerous to life. At all times, be careful to observe every safety regulation. Keep clear of all live parts. Never make or change electrical connections while the unit is in operation.

Do not remove any guards, shields, or screens while the unit is in operation. Keep tools, oil cans, bolts, etc., away from the unit while it is operating. Such items may fall into moving parts or may be drawn into the generator by magnetic attraction. Keep moisture away from the unit and keep the surrounding area dry.

Do not service with gasoline while the unit is running. Avoid filling the fuel tank when a radio transmitter is operating close by.

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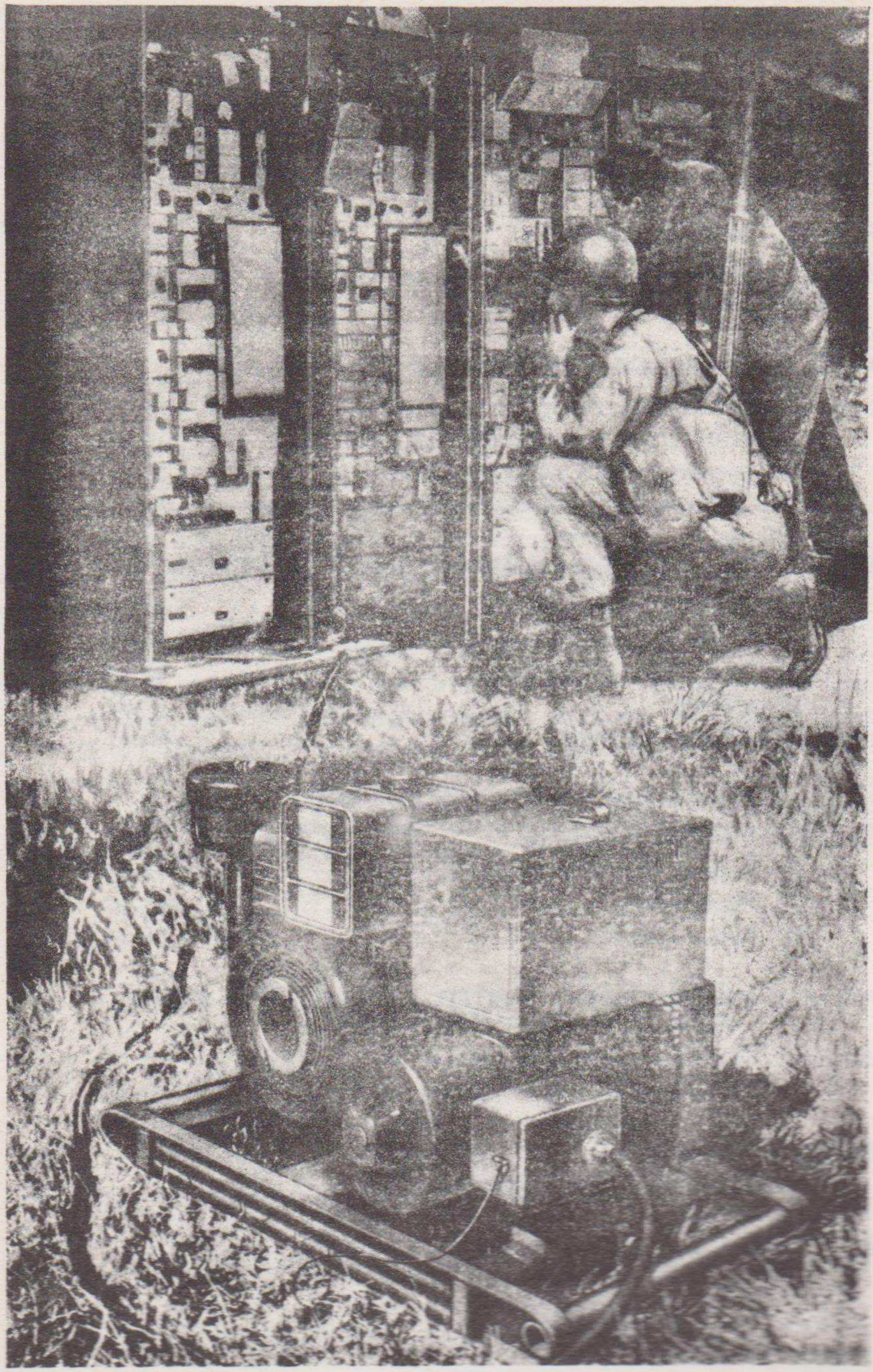


Figure 1. Power Unit in use.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the information and guidance of personnel to whom this equipment is issued. They contain information on the operation, organizational and field maintenance of the equipment, and a discussion of the theory of operation. They apply to Power Unit PE-75-AF-GY only.

b. Appendix I contains a list of current references applicable to the equipment. Appendix II contains an identification table of parts.

2. Forms and Records

a. The following forms will be used for reporting unsatisfactory conditions of Army equipment:

(1) DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army) and AFR 71-4 (Air Force).

(2) DA Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer, as prescribed in SR 700-45-5.

(3) AF Form 54, Unsatisfactory Report, will be filled out and forwarded to Commanding General, Air Matériel Command. Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700-45-5 and AFR 65-26.

(4) DA AGO Form 11-260, Operator First Echelon Maintenance Check List for Signal Corps Equipment—Power Units, Reel Units, will be prepared in accordance with instructions on the back of the form. Operations applicable to Power Unit PE-75-AF-GY are listed in paragraph 38*f*(1).

(5) DA AGO Form 11-261, Second and Third Echelon Maintenance Check List for Signal Corps Equipment—Power Units, Reel Units, will be prepared in accordance with instructions on the back of the form. Operations applicable to Power Unit PE-75-AF-GY are listed in paragraph 38*f*(2).

b. The following forms, explained in TM 37-2810, are necessary in connection with the operation and maintenance of Signal Corps internal-combustion-engine-driven equipment:

(1) DA Form 464 (Work Sheet for Preventive Maintenance Service and Technical Inspection of Engineer Equipment).

(2) DA Form 460 (Preventive Maintenance Roster).

c. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. General Description

a. Power Unit PE-75-AF-GY is a self-contained, compact, portable, gasoline-engine-driven electrical generating set of the manual-starting type. It is designed to deliver 2,500 watts of 60-cycle ac (alternating current) at 120 volts.

b. Power Unit PE-75-AF-GY is driven by Signal Corps Gasoline Engine PD-31/U (Briggs and Stratton model 23BP). This engine is a single-cylinder, four-stroke cycle, air-cooled unit which develops 6.5 hp (horsepower) at 2,800 rpm (revolutions per minute).

c. The electrical generator used in Power Unit PE-75-AF-GY is Signal Corps Alternating Current Generator G-40/U-GY. It is a single-phase, self-excited unit which develops 2,500-watt, 60-cycle, 120-volt ac at 100 percent power factor, when driven at 1,800 rpm. The generator is driven through dual V-belts and appropriate belt pulleys. Generator load connections are made through plug-in receptacles which are mounted in Signal Corps Electrical Noise Suppressor F-155/U-GY.

d. All components of Power Unit PE-75-AF-GY are mounted on a welded-steel skid base. The skid base is provided with tubular end members to permit the insertion of wooden carrying handles. These carrying handles are secured in the side channel members of the skid base when they are not in use. A tool and spare parts box is mounted on top of the generator frame, and a metal guard is provided for the generator drive belts.

4. Purpose and Use

Power Unit PE-75-AF-GY is intended as a source of a-c power for the operation of various Signal Corps telephone, radio, public address, and meteorological equipments. It may be used, also, for any purpose which requires a-c power within the rated electrical output of the equipment.

5. Other Models

There have been seventeen models of Power Unit PE-75-( ) prior to Power Unit PE-75-AF-GY. Power Units PE-75-A and PE-75-B are obsolete. All other prior models of Power Units PE-75-( ) are covered in TM 11-900. Before requisitioning parts for any model, consult the latest issue of the applicable Signal Supply Catalog.

6. Major Parts and Assemblies

a. Gasoline Engine PD-31/U (fig. 4). Gasoline Engine PD-31/U is a single-cylinder, four-stroke cycle, L-head, air-cooled gasoline engine. It has a 3-inch bore, a 3¼-inch stroke, and develops 6.5 hp at 2,800 rpm. This

Note. Basic nomenclature followed by ( ) is used to indicate all models of the equipment, regardless of past or present procurement.

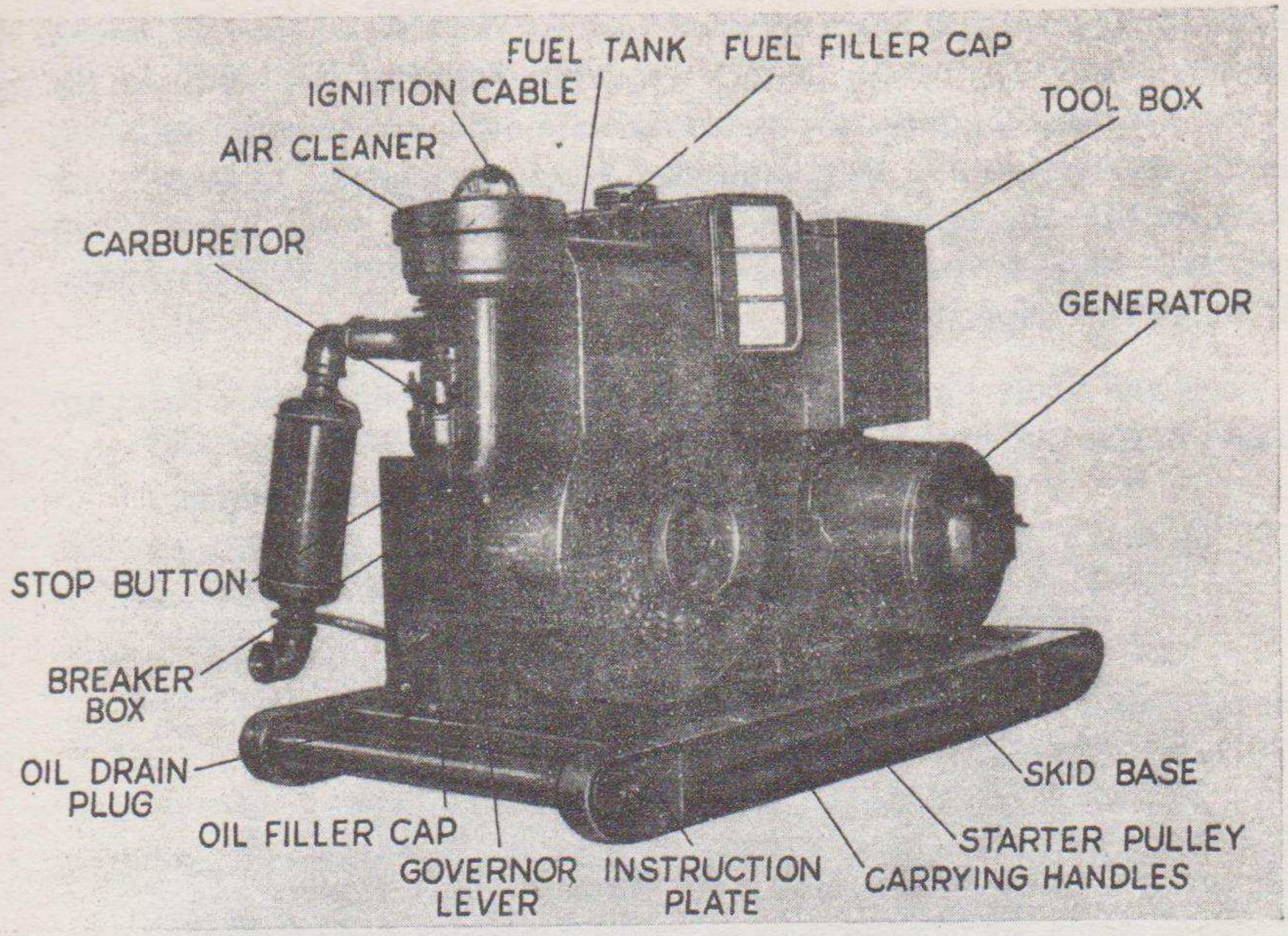


Figure 2. Power Unit PE–75–AF–GY, engine end.

engine is supplied with ball bearings at both the flywheel end and the power take-off end of the crankshaft. Ignition is provided by a magneto ignition system which consists of a generating unit within the flywheel and a breaker mechanism mounted in a separate housing on the side of the crankcase. A diaphragm-type fuel pump and a three-way fuel valve are provided to permit drawing fuel either from the fuel tank mounted on the power unit or from a remote source. The governor consists of a flyball-type governor and an automatic device for advancing and retarding the ignition spark. A rotor cap is supplied for rotating the exhaust valve and thus reducing burning of the exhaust valve and seat. The engine is lubricated entirely by splash system.

b. Alternating Current Generator G-40/U-GY (fig. 5). The main electrical component of Power Unit PE-75-AF-GY is Signal Corps Generator G-40/U-GY. These generators are supplied by C. LORENZ AG., Germany. They are 100 percent interchangeable with generators manufactured previously by Leland or Kurz-Root. They are self-excited, self-regulated, single-phase, compound wound, and are of two-wire, semi-inclosed, drip-proof construction. They are designed to generate 120-volt, 60-cycle ac when driven at a speed of 1,800 rpm. They are rated at 2,500 watts 100 percent power factor. Compound armature windings deliver 36 volts of dc (direct current) to a commutator and 120 volts ac to the slip rings. The stator field windings are excited by dc which is picked up from the commutator by the d-c brushes. The generator of Power Unit PE-75-AF-GY is driven through a double-groove pulley which is attached to one end of the armature shaft.

c. Electrical Noise Suppressor F-155/U-GY. This suppressor consists of a pressed steel box which has a removable cover. Two lock-type receptacles are mounted on the cover to permit connecting the electrical load to the generator. Two binding posts are mounted on one side of the suppressor box to permit connecting the electrical load when no plug-in terminals are provided on the connecting cables. Mounted inside the box are two 57-μh (microhenry) radio-frequency choke coils and 2 two-section .5-μf (microfarad) per section capacitors.

d. Tools and Spare Parts. The following tools and running spare parts are contained in the tool box of Power Unit PE-75-AF-GY:

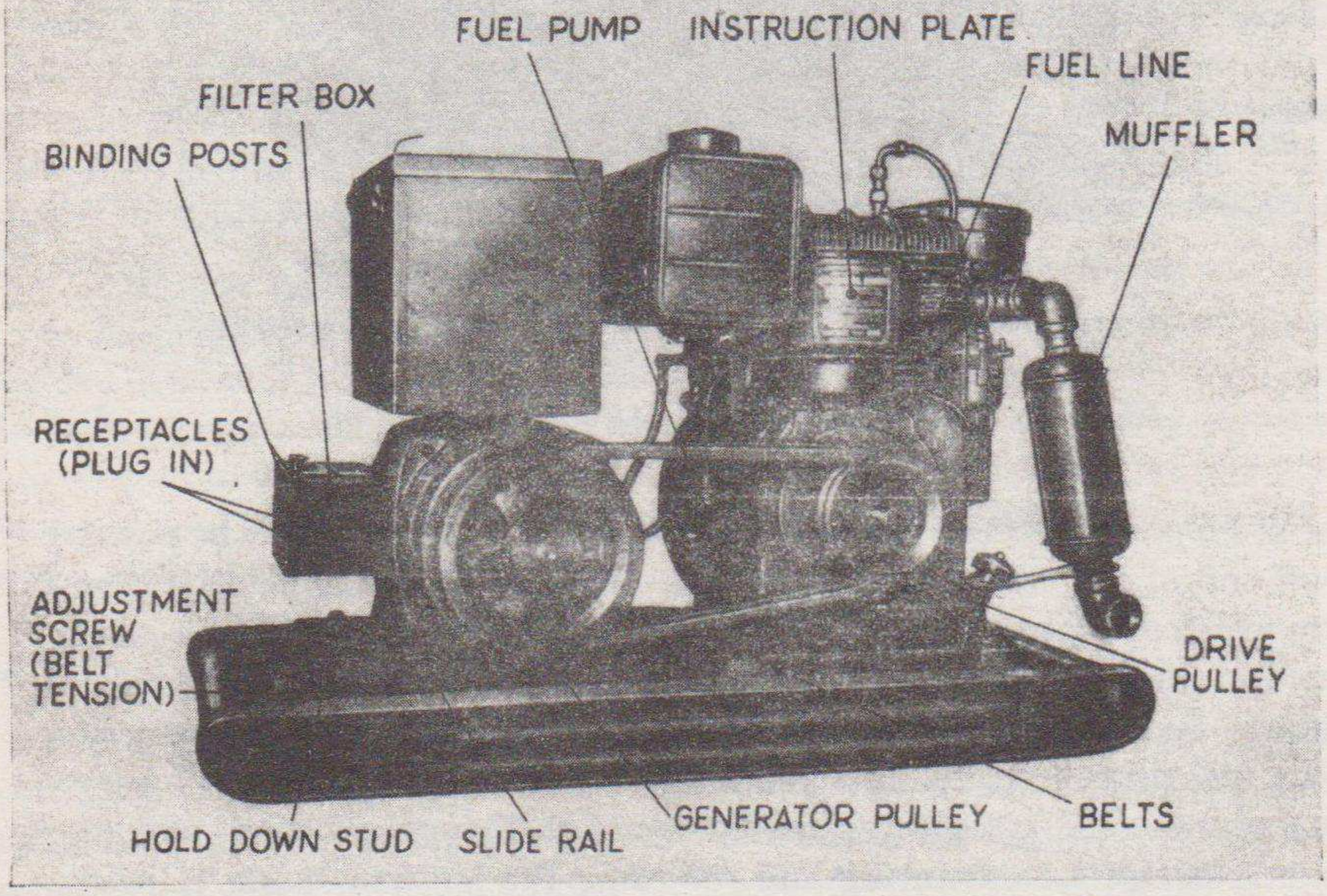


Figure 3. Power Unit PE–75–AF–GY, generator end, belt guard removed.

(1) *Tools.*

1 gage, thickness
1 pliers, combination, 6 ½-inch
1 screw driver, 9-inch
2 rope, starting
1 wrench, adjustable, 8-inch
1 wrench, box and open-end, $^{3}/_{8}$-inch opening each end
1 wrench, box and open-end, $^{7}/_{16}$-inch opening each end
1 wrench, box and open-end, $^{1}/_{2}$-inch opening each end
1 wrench, box and open-end, $^{9}/_{16}$-inch opening each end
1 wrench, hexagonal, L-shaped, $^{5}/_{32}$-inch (Allen wrench)

1 burnisher, contact
1 hose, auxiliary fuel line
2 sheets, abrasive, No. 240 AOP
1 wrench, spark plug $^{13}/_{16}$-inch, hexagonal

(2) *Running spare parts.*
1 bowl, fuel cleaner
2 gasket, air cleaner mounting
2 gasket, carburetor
2 gasket, air cleaner cover assembly
4 gasket, fuel filter bowl
2 plug spark
1 capacitor, .2-μf

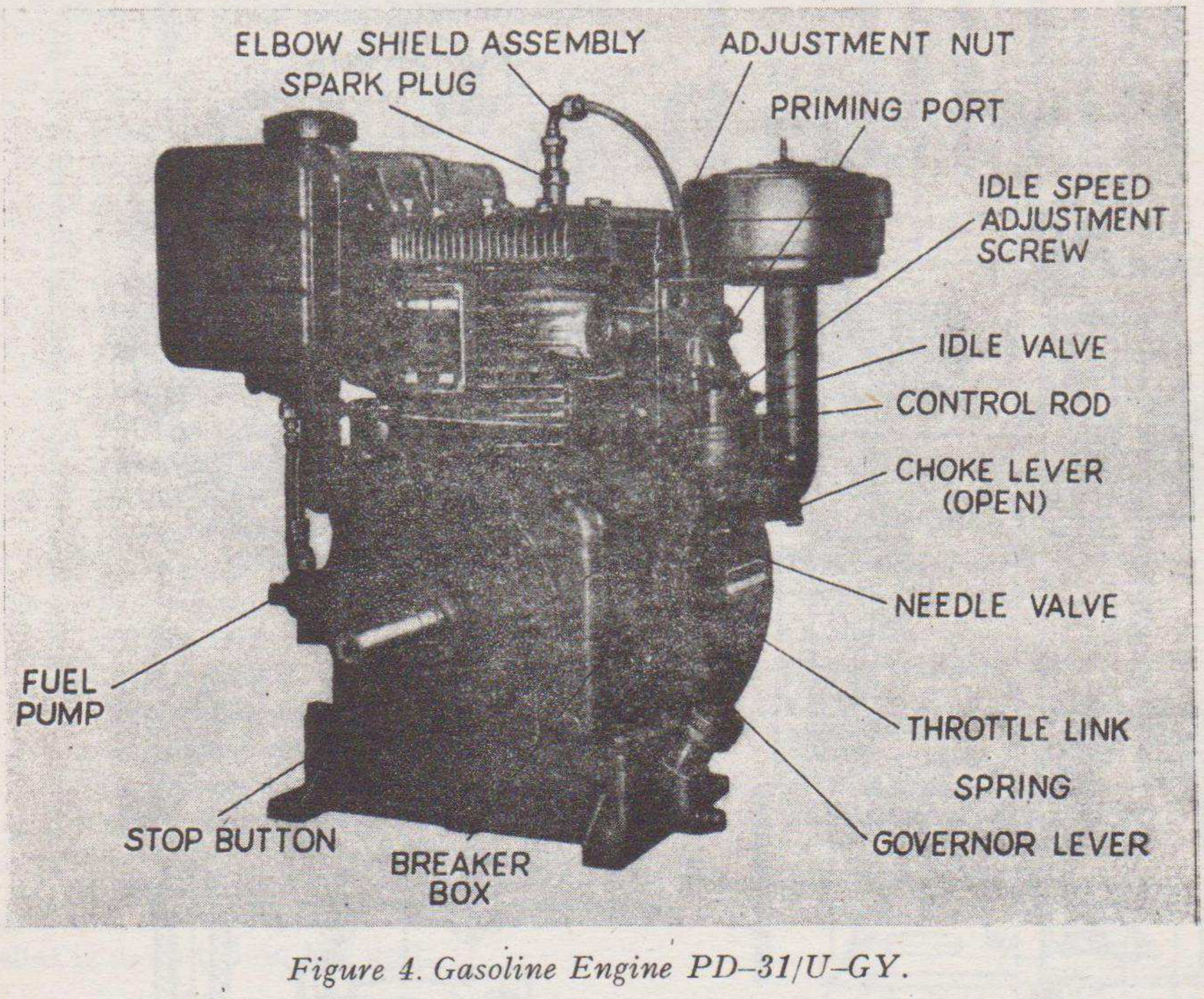


Figure 4. Gasoline Engine PD–31/U–GY.

7. Performance Characteristics

a. Power Unit PE-75-AF-GY is rated at 2.5 kw (kilowatts) under full load. As the load increases, the voltage output drops and the frequency, in cycles per second, decreases slightly. These power units are adjusted to hold the output to a variation of not more than 2 cycles, from no load to full load, and to maintain the output frequency within a range of 58 to 62 cycles. The engine speed is held between 2,950 rpm at no load and 2,750 rpm at full

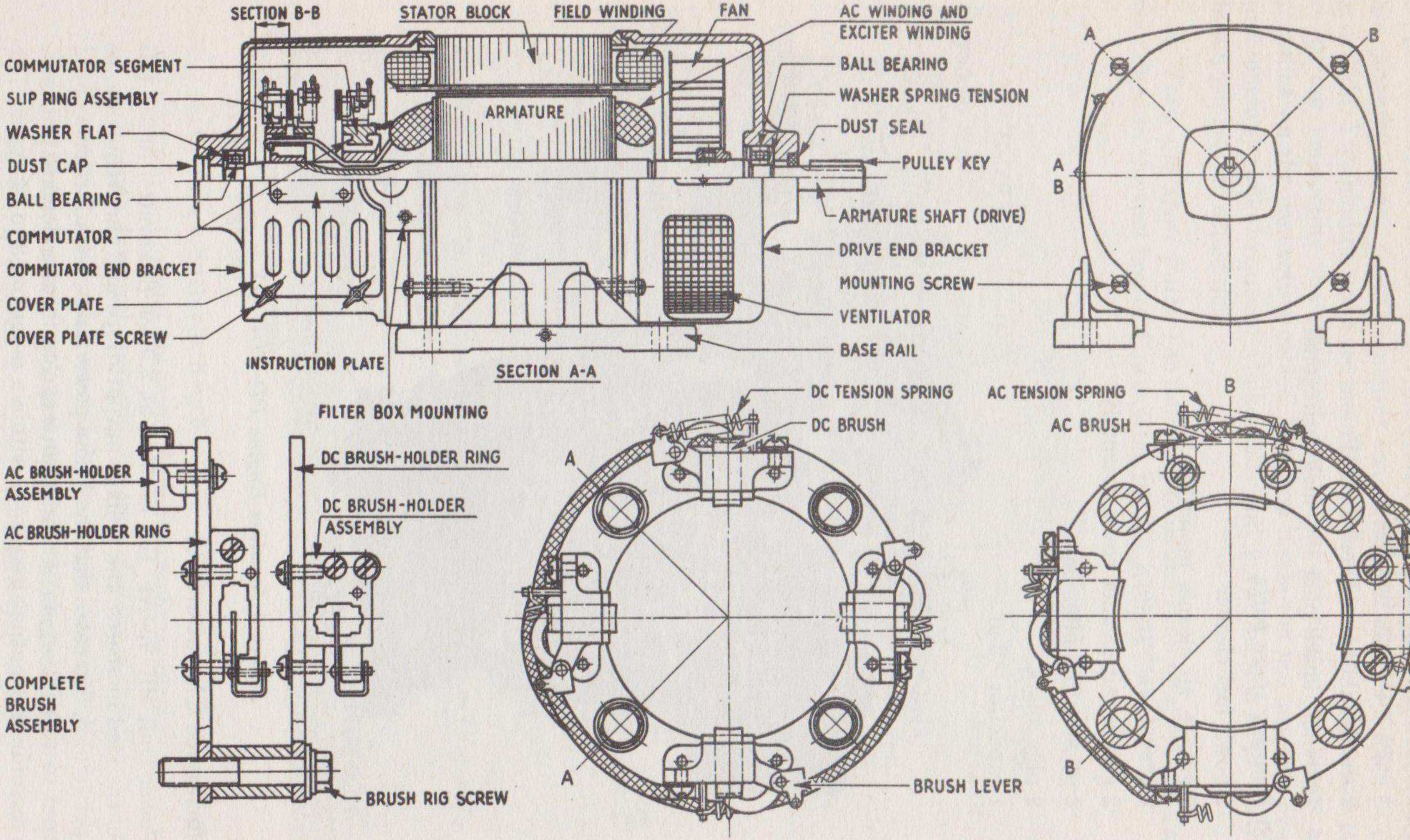


Figure 5. Alternating current Generator G–40/U–GY.

load. A variation of 50 rpm in engine speed will result in a change of 1¼ cycles in the a-c output.

b. The chart that follows shows typical performance under various load conditions.

Approximate load	Amperes	Volts	Watts	Cycles	Exciter volts
60 w	0.45	130	58.5	60.3	40.2
120 w	0.9	130	117	60.3	40.2
¼ load	6	126	756	60	40
½ load	11	124	1,364	60	39.7
¾ load	17	120	2,040	59.7	39.5
Full load	22	116	2,552	59.5	38.5
Maximum load	28	110	3,080	58.3	36.2

8. Table of Condensed Specifications

a. Engine.

Make	Briggs and Stratton.
Model	Sig C PD–31/U.
Cycle	4-stroke.
Type cylinder head	L.
Number of cylinders	1.
Bore (inches)	3.
Stroke (inches)	3¼.
Compression ratio	5.4 to 1.
Engine speed	2,200 to 3,200 rpm.
Type of cooling	Air.
Horsepower	6.5 at 2,800 rpm.
Piston rings	2 compression, 1 oil control.
Piston pin	Floating; slip fit.
Lubrication	Splash (no pump).
Air cleaner	Oil bath.
Spark plug	Champion XEJ–8.
Fuel tank capacity	6 qt.
Crankcase oil capacity	5 pt.
Governor	Mechanical.
Main bearings	Ball (both ends).

Note. Power Unit PE–75–AF–GY is supplied with a fuel pump and a three-way fuel valve to permit drawing fuel from a supply source other than the tank that is mounted on the unit.

b. Generator.

Make	C. Lorenz AG., Germany.
Model	Sig C G–40/U–GY.
Rating	2.5 kw; 120 v.
Power factor	100 percent.
Excitation	Self-excited.
Speed	1,800 rpm.
Brushes	Carbon with pigtail.
Bearings	Ball (both ends).

9. Weights and Dimensions

The following table contains the weights and dimensions of Power Unit PE-75-AF-GY and its major components:

Item	Length (in.)	Width (in.)	Height (in.)	Weight (lb)
Power Unit PE–75–AF–GY, consisting of	36	19	$24^{1}/_{2}$	298
Engine w/accessories	$19^{7}/_{8}$	$15^{5}/_{8}$	$21^{1}/_{2}$	100
Generator w/pulley and suppressor	$17^{1}/_{8}$	10	$9^{9}/_{32}$	120
Suppressor	$7^{7}/_{8}$	5	$4^{1}/_{8}$ deep.	6

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

10. Siting

Install Power Unit PE-75-AF-GY in a clean, dry, level area. When installed within a building or shelter, make ample provision for ventilation and a free circulation of air around the unit. Allow at least 2-feet clearance on all sides of the unit. When the unit is installed out of doors, place it on grass or soft ground rather than a hard surface. Hard surfaces will permit the unit to creep. If the unit must be installed on a hard surface, take appropriate measures to prevent creeping. Avoid placing the unit in low areas which may become flooded in the event of heavy rain.

11. Preparation of Foundation

Power Unit PE-75-AF-GY is assembled on a skid base and normally will not require any special foundation. However, if it is necessary to operate the equipment in a marshy location, place it on planks or packing cases.

12. Uncrating, Unpacking, and Checking

a. Uncrating and Unpacking. Power Unit PE-75-AF-GY, when packed for oversea shipment, is protected by a moisture-vaporproof barrier within the crate. This moisture-vaporproof barrier is not used when packed for domestic shipment. Do not uncrate the equipment until it is needed. Unpack the equipment as follows:

(1) Remove the packing list before removing the crate.

(2) Cut the metal straps at a point near the bottom of the crate.

(3) Remove the nails that hold the crate to the wooden base and lift the crate from the unit.

(4) Remove the inner protective covering and remove the unit from the base of the packing case.

b. Checking. Carefully check the equipment against the packing list and inspect the unit for any damage that may have occurred in transit. See that all tools and spare parts are in accordance with current parts lists. If there is any evidence of rough handling, other indication of possible damage to the equipment, other unsatisfactory condition, or if the contents of the packing crate do not check with the packing lists, fill out and forward DD Form 6.

Note. Spare parts are individually processed and packaged to protect them against moisture. Do not open packages until the parts are needed.

13. Setting Up Equipment

a. Thoroughly clean all parts of the air cleaner and see that it is installed properly on the engine. Make sure that all connections are tight.

b. Place the unit in the position previously selected. It is recommended that the unit be located as near to the center of the electrical load as possible. This will reduce line losses and improve voltage control at the remote ends of the lines.

c. If the unit is installed within a building or shelter, anchor the skid base to the floor or foundation. Remove the exhaust muffler and attach a short length of flexible exhaust line to the engine exhaust outlet. Extend the exhaust line to the outside of the building or shelter and attach the muffler to the outdoor end of the exhaust line. It is recommended that pipe having an inside diameter of not less than 1½ inches be used and that its length does not exceed 10 feet. Make certain that all connections and joints in the exhaust line are gastight.

d. If fuel is to be drawn from a remote supply tank, it is recommended that the tank be located outside the building or shelter and as far from the unit as the length of the remote fuel supply line will permit. Connect one end of the remote fuel supply line to the three-way fuel valve on the unit and connect the other end to the fuel supply tank (fig. 7).

e. Make sure that there is ample clearance all around the unit to permit servicing and that there are no obstructions to a free circulation of air for cooling and ventilation.

14. Removal of Corrosion Preventives

Remove the crankcase drain plug, below the oil-filler cap, and drain any oil that may be present in the engine crankcase. Carefully inspect the equipment for any seals or blind gaskets and remove them. Make sure that the crankcase breather, carburetor air intake, and exhaust outlet are not obstructed. Blow through the vent in the fuel tank cap to make sure that it is clear. Do not attempt to operate the equipment until after it has been lubricated in accordance with the lubrication order and the instructions in paragraph 16.

15. Connections and Interconnections

Power Unit PE-75-AF-GY is provided with two twist-lock receptacles which are mounted to the cover of the suppressor unit. Two binding posts, mounted on one side of the suppressor box, also are provided. If the using equipment has connecting power cables with plugs attached, insert the plugs into the power output receptacles. If there are no plugs attached to the power cables, connect the load to the two binding posts on the side of the suppressor unit. Make sure that the unit is grounded to a good earth ground.

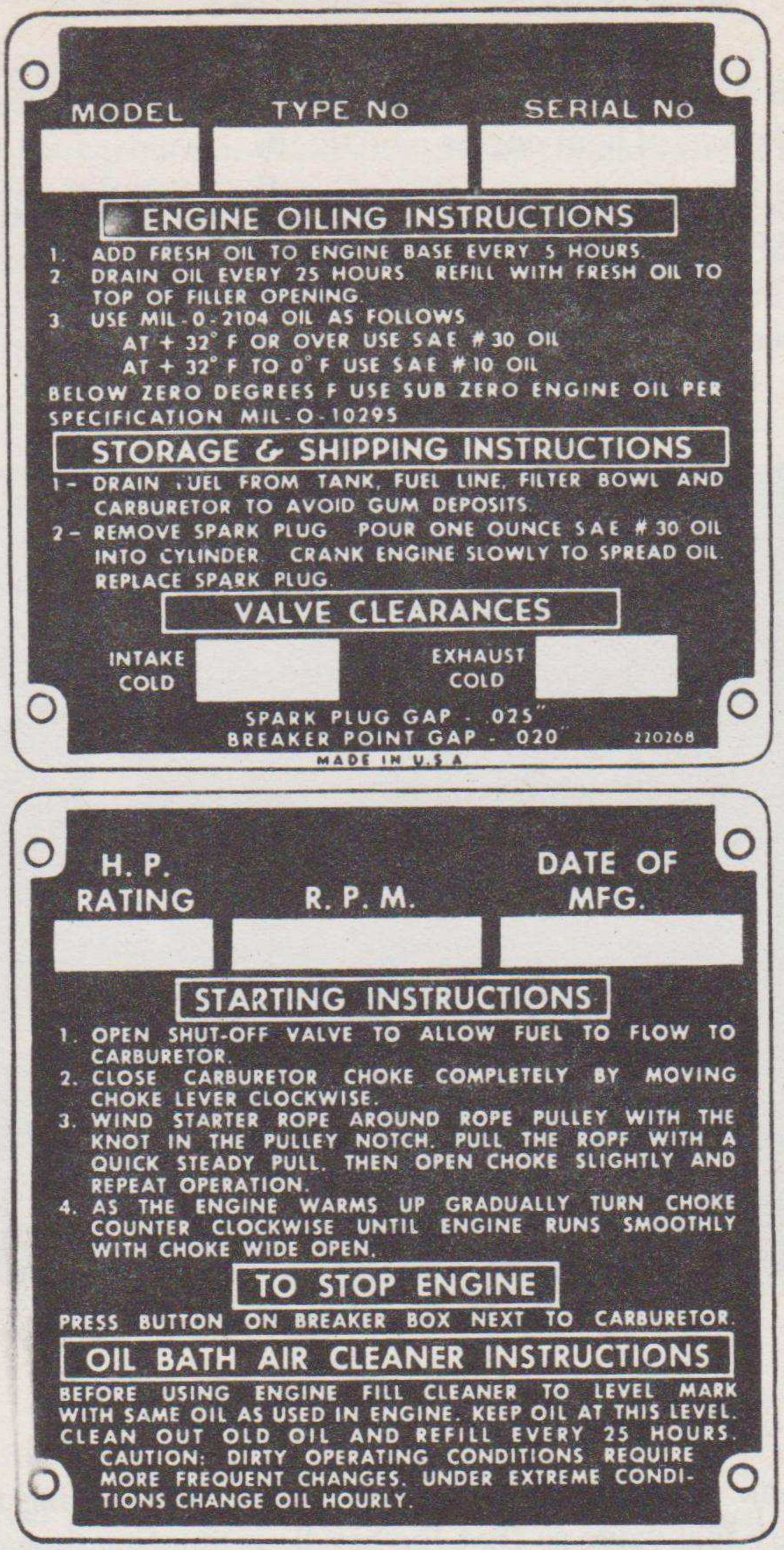


Figure 6. Power Unit PE–75–AF–GY, engine instruction plate.

16. Initial Lubrication

a. Remove the red CAUTION tag from the crankcase filler and stow it in the tool box for future use. See that the crankcase drain plug is installed securely.

b. Remove the crankcase filler cap and put the required amount (5 pints) of Oil, engine (OE) into the crankcase. See the lubrication order for the

equipment for the correct grade of oil to use. Replace the cap on the filler opening.

c. Wipe off all control linkage and lubricate all bearing surfaces and ball joints with 1 or 2 drops of light engine oil (OE 10).

d. Remove the cover from the air cleaner and fill the oil reservoir with the same grade of engine oil (OE) as used in the engine crankcase. Do not fill the reservoir above the indication mark on the inside of the bowl. If the unit is being operated in extremely low temperature, do not put any oil in the air cleaner, but operate it in a dry condition.

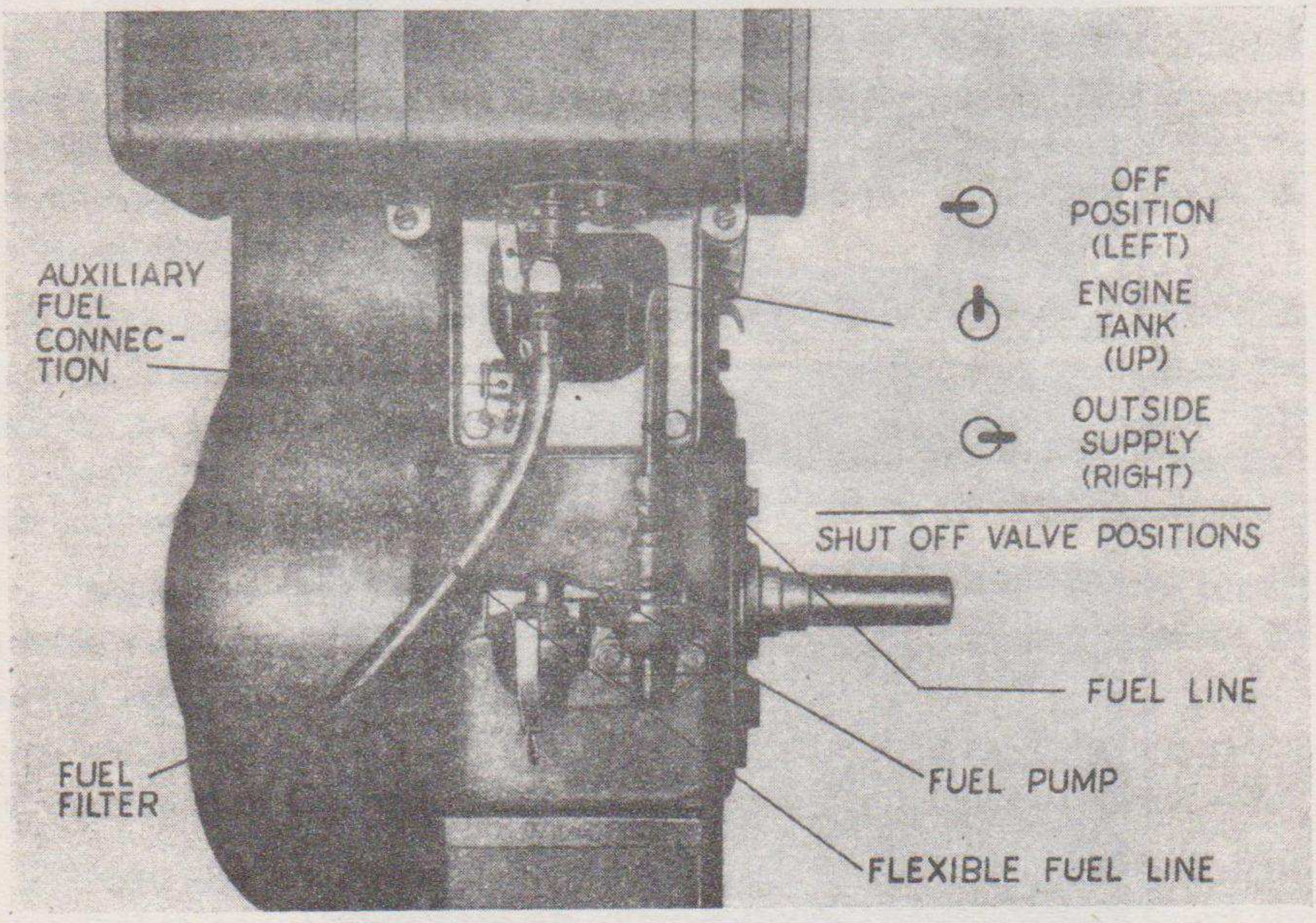


Figure 7. Power Unit PE–75–AF–GY, fuel supply assembly.

17. Preparation of Fuel System

Fill the fuel tank and inspect all connections in the fuel line for leaks. Turn the three-way fuel valve so that the handle is pointing upward. Have some one hold a finger on the stop button on the breaker box and crank the engine several times while the stop button is being pressed. If the fuel pump is functioning properly, the glass sediment bowl, which is part of the fuel filter, will fill with fuel. Shut off the fuel supply by turning the three-way valve (fig. 7) so that the handle is pointing to the left. If fuel is to be drawn from a remote source, remove the cap from the auxiliary fuel connection elbow and connect the remote fuel line to the elbow. If a remote fuel supply is not to be used, make sure that the cap is securely in place on the auxiliary fuel connection elbow. Check the carburetor and all connections to see that there are no leaks. Try all control linkage to see that it moves freely.

18. Manual Controls

Except for the carburetor choke (located on the carburetor air intake) and the stop button (located on the side of the magneto breaker box), there are no manual controls on Power Unit PE-75-AF-GY. When starting the equipment, set the choke control so that the lever is pointing downward.

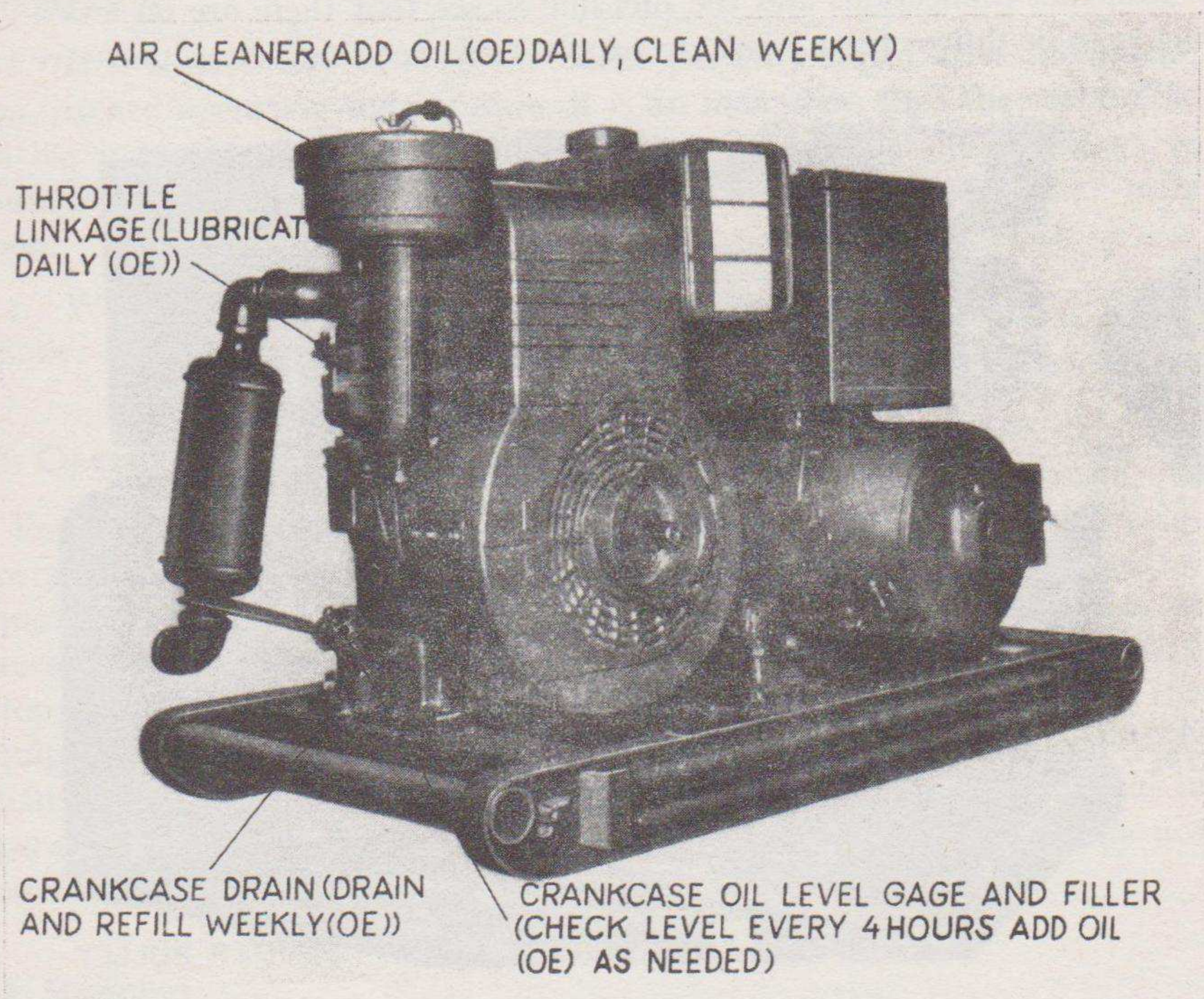


Figure 8. Power Unit PE–75–AF–GY, lubrication.

Raise this lever gradually as the engine warms up. It must be raised fully when the engine has reached operating temperature. When it is desired to stop the unit, press the stop button (fig. 2) and hold it in until the engine has stopped completely.

19. Automatic Controls and Instruments

The only automatic control on Power Unit PE-75-AF-GY is the combination governor and automatic spark control. The governor normally is adjusted at the factory and no further adjustment should be necessary. There are no meters or instruments on Power Unit PE-75-AF-GY.

Section III. OPERATION UNDER USUAL CONDITIONS

20. Preliminary Procedure

a. Before attempting to operate the unit, crank it a few times, with the stop button depressed, to make sure that all parts move freely. Follow all applicable instructions in paragraphs 10 through 17 and see that the equipment is thoroughly clean.

b. See that the fuel tank is full and that the filler cap is securely in place. Check all fuel connections and the fuel line to see that there are no leaks. If fuel is to be drawn from a remote supply tank, see that connections are

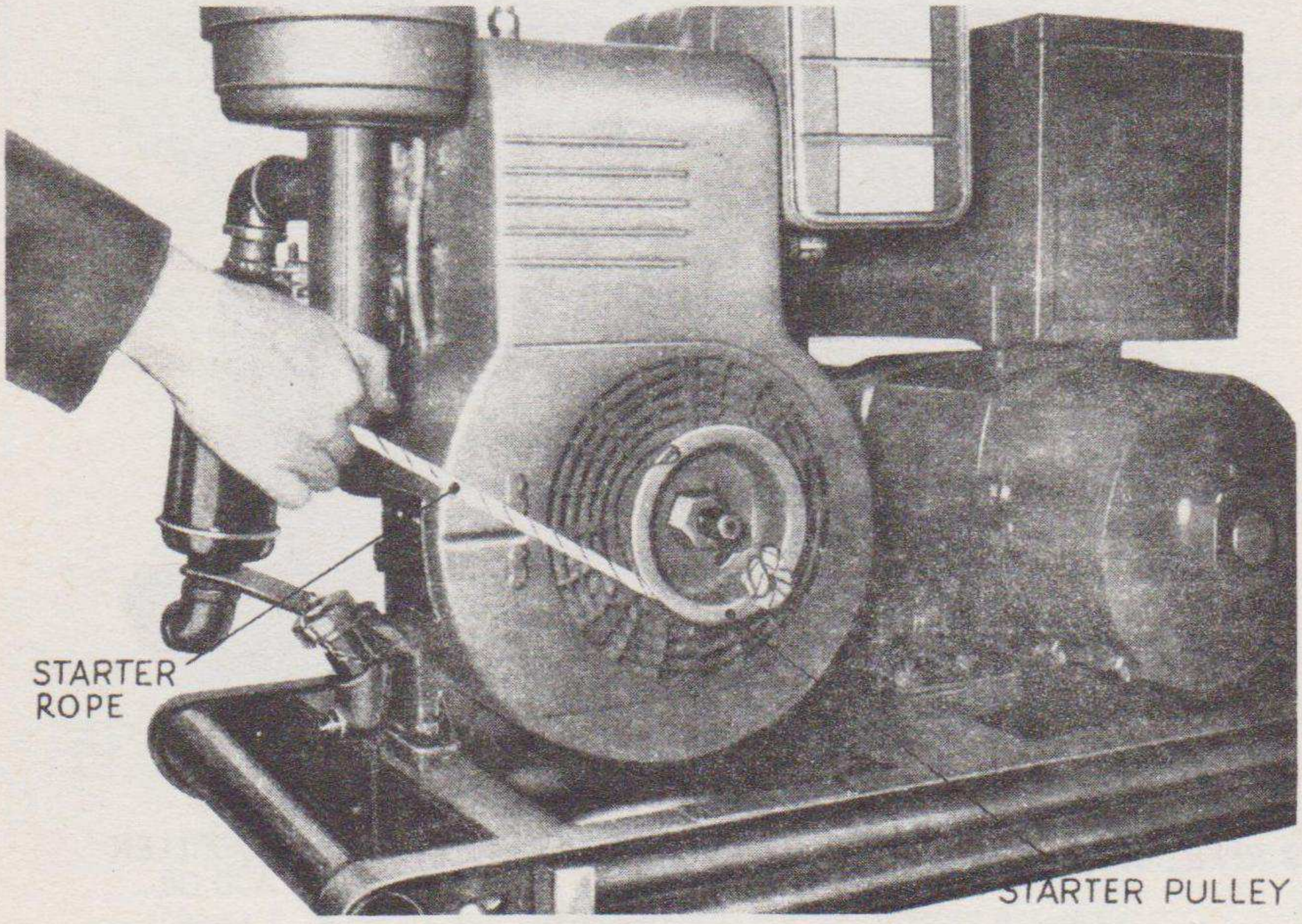


Figure 9. Starting power unit.

made properly. Place the three-way fuel valve in the correct position for the source of fuel to be used.

c. See that the equipment is lubricated in accordance with the lubrication order.

d. See that the electrical load is connected properly to either the outlet receptacles or the binding posts on the suppressor box.

21. Starting

a. Place the starting rope in the starting pulley with the knot on the outside of the pulley. Wind the rope clockwise around the pulley (fig. 9).

b. See that the glass sediment bowl of the fuel filter is filled, and set the carburetor choke in closed position.

c. Give the starting rope a quick hard pull; the unit should start. If the unit fails to start after the second or third trial, refer to the trouble chart in paragraph 51 for the possible cause.

22. Precautions After Starting

a. As the engine warms up, gradually open the carburetor choke valve. The choke should be open fully when the engine has reached operating temperature.

b. If it is necessary to keep the choke partially closed after the engine has reached operating temperature, it is an indication that the carburetor setting is too lean. Readjust the carburetor by turning the needle valve counterclockwise until the engine will run smoothly with the choke fully open.

c. While the unit is running, keep alert for any unusual noise, exhaust smoke, or evidence of overheating.

23. Operating Procedure

Power Unit PE-75-AF-GY requires very little attention while it is in operation. Be alert for any unusual conditions; listen for rattles, knocks, squeaks, or hums that may indicate trouble. Watch for indications of excessive exhaust smoke, overheated parts, uneven operation, and missing. Stop the unit every 4 hours and inspect the crankcase oil level. While the equipment is at halt, give it a quick general inspection and make any adjustments for which the need might have been indicated while the unit was in operation. Check the fuel supply and make certain that it is ample for not less than 4 hours of operation.

24. Stopping

To stop Power Unit PE-75-AF-GY, press the stop button (fig. 2) and hold it in until the engine has come to a complete stop. This button is located on the face of the breaker box which is mounted on the carburetor side of the engine.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

25. General

When Power Unit PE-75-AF-GY is operated under extreme climatic conditions, special precautions are necessary to prevent poor performance or total operational failure. Most Signal Corps equipment can be used under extreme climatic conditions provided difficulties common to the climatic conditions are anticipated and precautions taken to prevent them.

26. Operation in Arctic Climates

a. Fuel and Lubricants. Store all fuel and lubricants in tightly closed containers at all times. Keep the containers as full as possible to avoid air spaces. Condensation occurs in air spaces which causes water to be deposited at the bottom of the fuel can or oil can. Keep snow, ice, and water away from fuel and lubricant containers and keep lubrication points free from snow and ice. Follow the cold weather instructions in the lubrication order for the equipment.

b. General Precautions. Whenever possible, store the unit in a heated inclosure when not in use. If this is not possible, wrap the unit in blankets or other protective covering to retain as much heat as possible. When operating the equipment, place it in the lee of a building, hill, snowbank, or any other structure or natural formation that will protect it from cold winds. Follow applicable instructions in TB SIG 66.

27. Operation in Desert Climates

When operating the power unit under extremely dusty or sandy conditions, service the oil-bath air cleaner and crankcase breather more frequently than under normal operating conditions. Protect the equipment as much as possible from sand and dust. Keep all moving parts clean and well-lubricated. When operating outdoors, it is good practice to spread waste oil over the area immediately surrounding the power unit. If the installation is indoors, sweep out the area surrounding the unit at frequent intervals. Follow applicable instructions in TB SIG 75.

28. Operation in Tropical Climates

When the equipment is being operated under conditions of extreme heat and high humidity, take special precautions to see that the flow of air around the unit is unobstructed. Keep the equipment free from moisture, keep all air passages clean, and protect the equipment as much as possible from the direct rays of the sun. Follow applicable instructions in TB SIG 72 and TB SIG 13.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. ORGANIZATIONAL TOOLS AND EQUIPMENT

29. Catalog Reference

All tools, parts, and equipment supplied with Power Unit PE-75-AF-GY are listed in paragraph 6*d*. See the Department of the Army Supply Catalog SIG 7 & 8-PE-75 for maintenance parts and stock numbers.

30. Use and Care of Tools

a. Use of Tools.

(1) *General.* The proper use of tools is very important. Improper use will damage the tools and the equipment and may result in personal injury.

(2) *Wrenches.* When tightening a nut, bolt, or cap screw, be sure to use the correct wrench for the job. Do not use a wrench that is worn slightly or oversize. This will result in rounding the nut, bolt head, or screw head, and may cause damage to the equipment and personal injury if the wrench should slip. Never use pliers for tightening or loosening nuts, bolts, or cap screws. Always use the correct size open-end wrench, box wrench, or socket wrench. When tightening cylinder-head fastenings, use a torsion wrench, if one is available. Never use a pipe or other means to increase the leverage. This will bend or break the wrench and may strip the threads of the fastening.

(3) *Screw drivers.* When loosening or tightening a fastening which has a slotted head, use a screw driver with a blade that fits the slot in the head of the fastening. Do not use a wrench or pliers on the shank of the screw driver to increase leverage. Be sure to keep the blade of the screw driver square in the slot of the fastening. Never use a screw driver as a pry bar or chisel.

(4) *Other tools.* Specific tools are made for specific purposes. Make sure to use the right tool for the job and that it is of the correct size for the work to be done.

b. Care of tools. The condition in which a mechanic keeps his tool equipment is a good indication of his ability. Do not abuse tools by using them for work for which they were never intended. Keep tool equipment properly stowed and protected from dirt and dampness at all times when not in use. After using a tool, clean it thoroughly and replace it in its proper place in the toolbox. Keep all tools free from rust and keep adjustable tools, such as pliers and adjustable wrenches, lubricated. Keep the tool box clean and free from all foreign matter and debris. After cleaning tools and before putting them away, wipe them with a clean cloth moistened with oil to

protect them against rust. For more complete details on the care and use of tools, refer to TM 11-453.

31. Improvised Tools

A tool for undercutting the mica insulation between the copper bars of the commutator may be made from an old hack saw blade (fig. 10). Snap the blade off so that one piece is approximately 4½ inches long. Obtain a wooden block about ¾ inch square and 3 inches long. Cut a slot, the thickness of the hack saw blade, into one end of the block to a depth of about 1 inch. Place the rounded end of the hack saw blade in the slot, and drill a hole in the wooden handle so that a rivet may be passed through both the handle and the hole in the saw blade. Rivet the handle in place and bind the end into which the hack saw blade has been inserted with friction tape. Now grind the hack saw blade to the same thickness as the mica strips between the commutator bars.

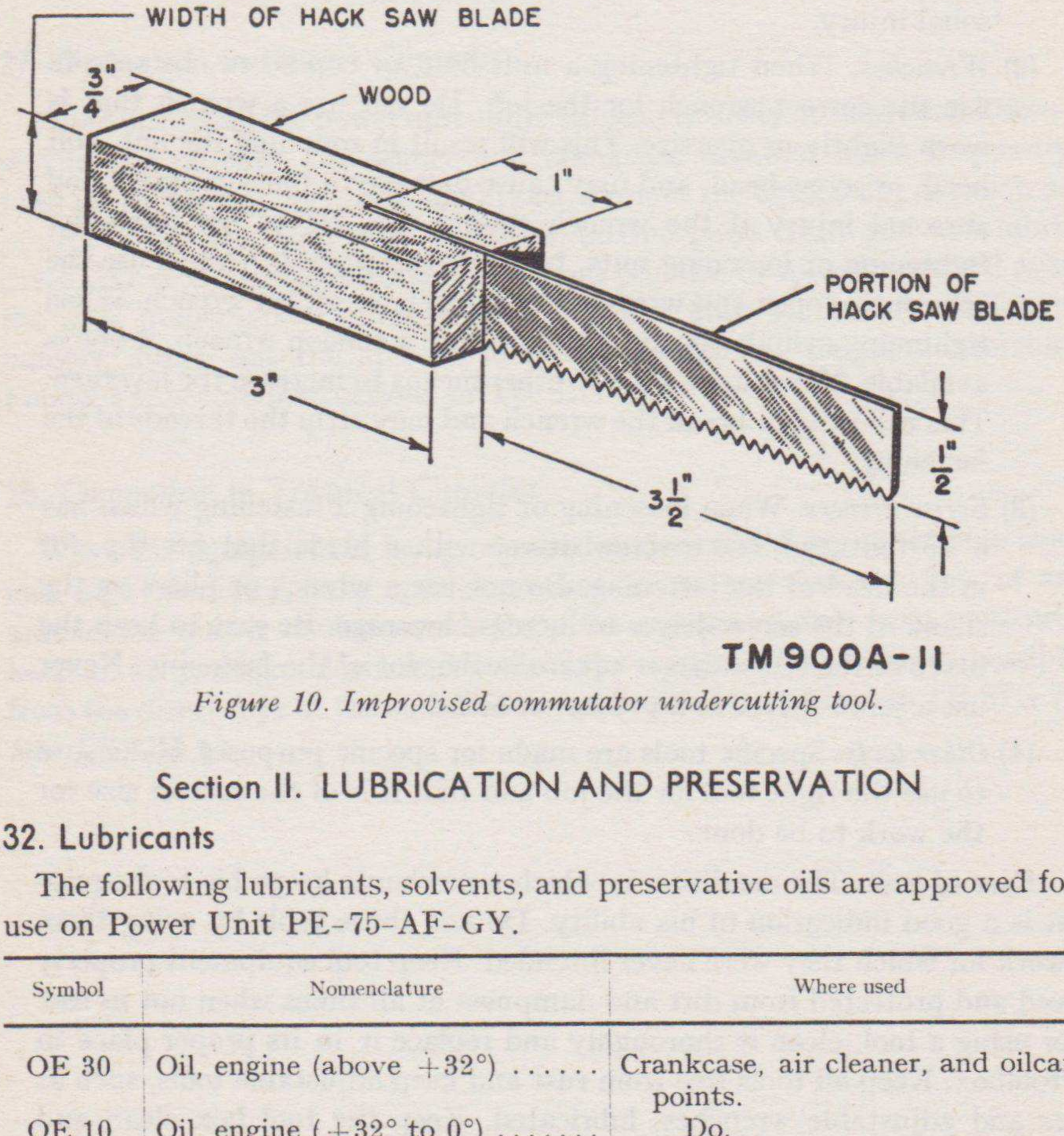


Figure 10. Improvised commutator undercutting tool.

Section II. LUBRICATION AND PRESERVATION

32. Lubricants

The following lubricants, solvents, and preservative oils are approved for use on Power Unit PE-75-AF-GY.

Symbol	Nomenclature	Where used
OE 30	Oil, engine (above +32°)	Crankcase, air cleaner, and oilcan points.
OE 10	Oil, engine (+32° to 0°)	Do.
OES	Oil, engine, subzero (below 0°) ..	Do.
SD	Solvent, dry-cleaning.....	All cleaning except electric wires.

33. Lubricating Periods

Lubrication instructions frequently are given in periods of days, weeks, months, half-years, and years. A daily period of operation consists of any consecutive 8-hour period or any number of periods of operation that total 8 hours. A weekly period of operation is any number of operating periods that total 64 hours. A monthly period of operation is any number of operating periods that total 256 hours. A half-yearly period of operation is any number of operating periods that total 1,024 hours. A yearly period of operation is any number of operating periods that total 2,048 hours.

34. Lubrication Requiring Disassembly

No parts of Power Unit PE-75-AF-GY require disassembly for lubrication. The generator bearings on Power Unit PE-75-AF-GY are factory-lubricated and do not require field lubrication. If a bearing becomes overheated and loses its lubricant or the bearing becomes otherwise unsatisfactory, replace it.

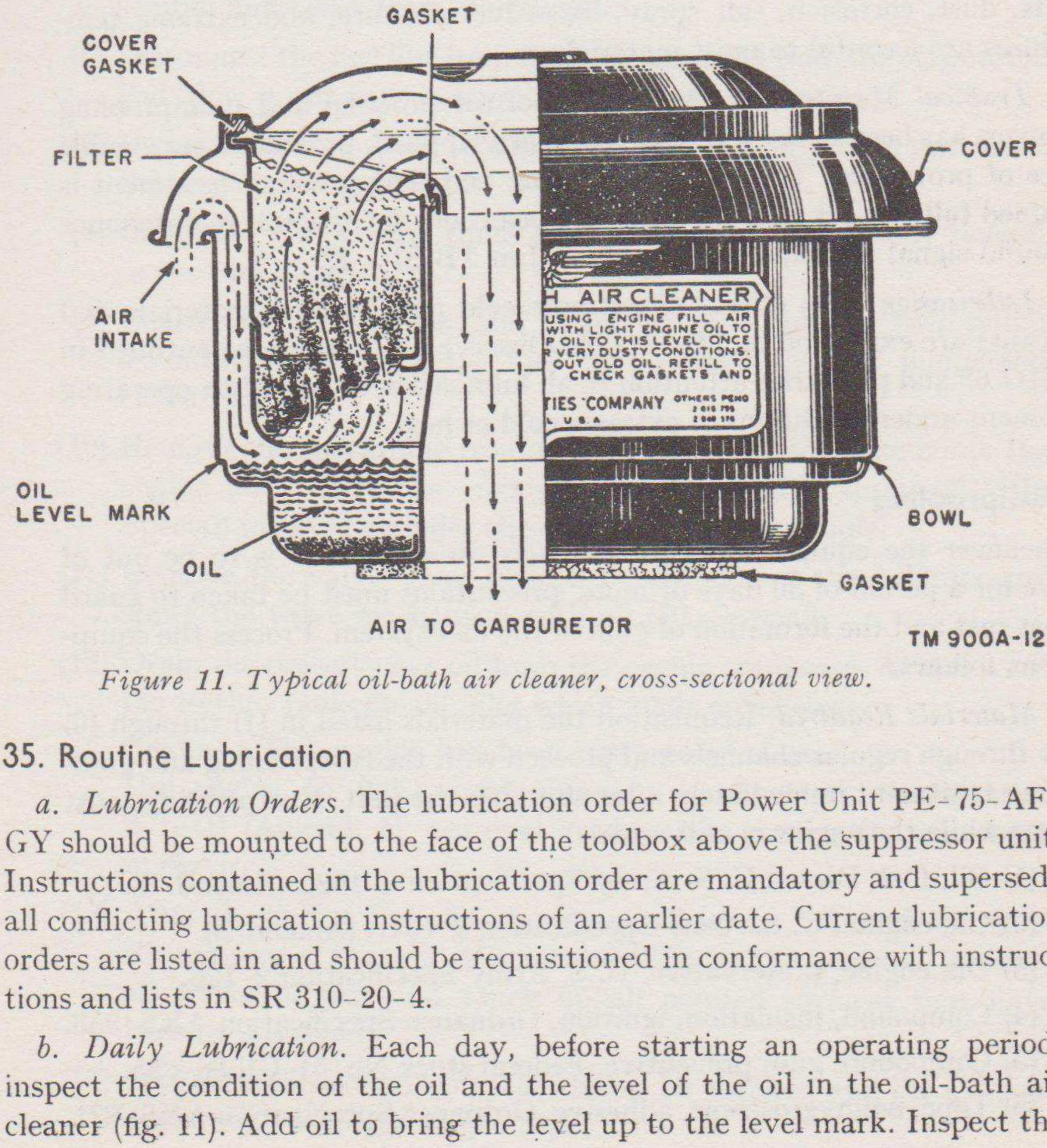


Figure 11. Typical oil-bath air cleaner, cross-sectional view.

35. Routine Lubrication

a. Lubrication Orders. The lubrication order for Power Unit PE-75-AF-GY should be mounted to the face of the toolbox above the suppressor unit. Instructions contained in the lubrication order are mandatory and supersede all conflicting lubrication instructions of an earlier date. Current lubrication orders are listed in and should be requisitioned in conformance with instructions and lists in SR 310-20-4.

b. Daily Lubrication. Each day, before starting an operating period, inspect the condition of the oil and the level of the oil in the oil-bath air cleaner (fig. 11). Add oil to bring the level up to the level mark. Inspect the

level of the engine oil in the engine crankcase and add oil to bring it up to the correct level. Stop the unit after every 4 hours of operation and recheck the oil in the crankcase. Use only the grade of oil specified in the lubrication order for the equipment.

c. Weekly Lubrication. At the end of every 64 hours of operation, lubricate the throttle and governor linkage. Remove the crankcase drain plug; drain the crankcase and refill it with the grade of oil specified in the lubrication order; replace the drain plug securely.

d. Monthly Lubrication. At the end of every 256 hours of operation, remove and disassemble the crankcase breather. Wash all parts thoroughly in Solvent, dry-cleaning (SD), saturate the element with engine oil (OE), and reassemble and reinstall it.

36. Weatherproofing

a. General. Signal Corps equipment, when operated under severe climatic conditions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. Tropical Maintenance. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. The moistureproofing and fungiproofing treatment is explained fully in TB SIG 13. Special precautions for tropical maintenance of ground signal equipment are explained in TB SIG 72.

c. Lubrication. The effects of extreme cold and heat on materials and lubricants are explained in TB SIG 69. Observe all precautions outlined in TB SIG 69 and pay strict attention to all lubrication orders when operating equipment under conditions of extreme cold or heat.

37. Rustproofing

Whenever the equipment is to be placed in storage or is to be out of service for a period of 30 days or more, precautions must be taken to guard against rust and the formation of gum in the fuel system. Process the equipment as follows:

a. Materials Required. Requisition the materials listed in (1) through (6) below through regular channels and proceed with the rustproofing and gumproofing treatment immediately after stopping the unit. Rustproofing must be done while the engine is still warm.

(1) Oil, fuel, Diesel, U. S. Army Specification 2-102C (Amend. 3).

(2) Oil, engine, U. S. Army Specification 2-104B (Amend. 5).

(3) Oil, engine, preservative, U. S. Army Specification 2-126.

(4) Compound, insulation, ignition, Ordnance Specification AXS-858.

(5) Compound, gum preventive, Federal stock No. 51-C1586-225.

(6) Tape, nonhygroscopic, adhesive, Ordnance Specification AXS-871.

b. Procedure.

(1) Drain the engine crankcase and refill it with Oil, lubricating, preservative (PL-Special).

(2) Drain the fuel tank and refill it with fresh fuel to which gum preventive compound has been added, in the proportion of one-quarter container of gum preventive compound to 5 gallons of gasoline.

(3) Place the three-way fuel valve in position to draw fuel from the fuel tank on the unit (fig. 7) (handle pointing upward). Operate the unit on this fuel mixture for 5 minutes. Shut off the fuel supply and permit the unit to come to a stop by pumping the carburetor dry.

(4) Disconnect the lower end of the fuel line from the fuel shut-off valve and drain the fuel tank.

(5) Remove the sediment bowl and screen from the fuel pump assembly and clean them thoroughly.

(6) Disconnect the fuel line from the fuel pump and from the carburetor and blow it out with compressed air.

(7) Remove the high speed jet assembly from the carburetor and drain the carburetor thoroughly.

(8) Crank the unit several times to remove any fuel that may remain in the fuel pump.

(9) Reassemble the screen and sediment bowl to the fuel pump assembly and replace the fuel line between the fuel pump and carburetor.

(10) Remove the spark plug from the engine. Have someone crank the engine and, while the engine is being cranked, spray oil (PL-Special) into the cylinder through the spark plug hole.

(11) Remove the valve cover plate from the side of the cylinder and spray the valve mechanism with oil (PL-Special).

(12) Drain the preservative oil from the engine crankcase. Attach a red tag to the crankcase oil filler which reads as follows:

Caution: This engine has been rustproofed. Date .....
Use engine oil (OE), conforming to U. S. Army Specification 2-104B (Amend. 5), seasonal grade when placing the unit back in service.

(13) After the engine has cooled, remove all grease, oil, and dirt from the exterior of the unit. Use solvent (SD) for this purpose. Remove all traces of rust and touch up all painted surfaces that have become damaged.

(14) Seal all breathers and breather holes, air intakes, and the exhaust outlet with nonhygroscopic tape.

(15) Make sure that all surfaces are dry and spray all unpainted exterior surfaces with insulation compound. Include all wiring and electrical equipment. Spray inside of the cylinder cooling-air shield. Do not get this compound on the interior of the generator. If painted surfaces of the equipment are scratched badly or blistered, follow instructions in paragraph 67.

Section III. PREVENTIVE MAINTENANCE

38. Meaning of Preventive Maintenance

a. Purpose. Preventive maintenance is a systematic series of operations performed periodically to keep equipment operating at top efficiency. The primary purpose of preventive maintenance is to prevent major breakdowns and the consequent need for repair. The primary function of trouble shooting is to locate and correct existing defects.

b. Importance. Preventive maintenance is of utmost importance since the failure or inefficient operation of one piece of equipment may cause the failure of an entire system. It is necessary to inspect the power unit systematically each day that it is operated and at weekly intervals, so that defects may be discovered and corrected before they result in serious damage or failure.

c. Responsibility. Preventive maintenance services are the responsibility of operating organizations. They comprise the scheduled maintenance services performed by the power unit operator and maintenance personnel, respectively. Ordinarily, the power unit operator will replenish the fuel and lubricants. He will perform necessary cleaning operations, tighten loose nuts, bolts, screws, and other fastenings, care for tools and accessories, and make such emergency repairs as are within the scope of his ability, tool equipment, and parts available. He will perform all daily lubrication operations, before operation, at halt (during shut-down periods), and after operation. He will assist the unit mechanic in performing the weekly maintenance on the unit. Maintenance personnel will perform the weekly and monthly maintenance operations with the assistance of the unit operator. The unit mechanic will see that daily lubrication operations have been performed properly by the unit operator. Any maintenance or repair operations beyond the scope of maintenance personnel will be reported to the officer in charge.

d. DA AGO Form 11-260 Services. Refer to the appropriate paragraphs in this manual for detailed instructions for the performance of operations listed on the back of the form. The fact that an operation, instructions for the performance of which appear in this manual, is not listed on DA AGO Form 11-260 does not excuse the operator or the repairman from the performance of such operations.

e. DA AGO Form 11-261 Services. Refer to the appropriate paragraphs in this manual for detailed instructions for the performance of operations

listed on the form. The fact that an operation, instructions for the performance of which appear in this manual, is not listed on DA AGO Form 11-261 does not excuse the operator or the repairman from the performance of such operations.

f. Operations. Items appearing on DA AGO Form 11-260 and DA AGO Form 11-261 that are applicable to Power Unit PE-75-AF-GY are as follows:

(1) *DA AGO Form 11-260 services.*

Item No.	Paragraph reference	Item No.	Paragraph reference
1	39*b*(5) and 42*i*	7	39*b*(2), 41*b*, and 42*b*
2	42*h*	10	47, item 41
3	39*b*(1)	11	47, items 11 and 84
4	39*b*(3) and 41*d*	12	47, item 18
5	42*f*	13	47, item 2
6	39*b*(4) and 41c		

(2) *DA AGO Form 11-261 services.*

Item No.	Paragraph reference	Item No.	Paragraph reference
1	47, item 1	15	47, items 12, 42, and 49
2	42*h*	16	47, items 12, 42, and 49
3	39*b*(1)	18	47, item 46
4	39*b*(3), 41*d*, and 47, items 11 and 44	20	47, item 49
		21	47, items 20 and 39
5	42*f* and 47, item 40	22	47, item 11
6	39*b*(4), 41*c*, and 47, items 20 and 21	24	47, items 40 and 43
		25	47, item 50
7	39*b*(2), 41*b*, and 47, item 2	26	47, item 172
10	47, item 41	27	47, item 13
11	47, items 11 and 84	28	47, item 13
12	47, item 18	29	47, item 20
13	47, item 2	30	68
14	47, item 43	31	47, item 50

39. Daily Maintenance Services

a. Purpose. The before-operation services are intended primarily as a check to see that the power unit has not been damaged, tampered with, or sabotaged since the after-operation services were performed. It is the duty of the operator to determine if the unit is in satisfactory condition to carry out any mission to which it may be assigned.

b. Procedures. The before-operation service consists of performing the operations listed below:

(1) *Tampering and damage.* Inspect the unit for damage that may have resulted from falling debris, shell fire, or sabotage. Be alert for the presence of booby traps. Look for signs of cut drive belts, loosened or clogged breather and air cleaner, and loosened spark plug and ignition wiring.

(2) *Fuel and lubricant.* Check the amount of fuel in the fuel tank. Note any indications of leakage or tampering. Fill the fuel tank, if necessary. If a remote fuel supply is to be used, see that the remote supply tank is full. Check the level of the lubricating oil in the engine crankcase and add oil, if necessary. Inspect the condition of the crankcase oil by noting its color on the depth gage and by rubbing a quantity of the oil between the fingers to detect the presence of sand, grit, or other foreign matter. Remove the air cleaner cover and inspect the level and condition of the oil in the air cleaner. Correct the oil level in the air cleaner, if necessary.

(3) *Leaks.* Inspect the entire fuel system to make sure that all connections are tight and that there are no leaks. Inspect the fuel in the glass sediment bowl of the fuel pump for traces of water or other foreign matter. Inspect the engine crankcase and all gasketed joints for traces of leakage. Trace all leaks to their source and correct or report them.

(4) *Engine warm-up.* Crank the engine and note whether it starts readily. During the warm-up period, be alert for any unusual sounds, sluggish operation, signs of overheating, and excessive exhaust smoke. When operating in low temperatures, follow applicable instructions in paragraph 26.

(5) *Tools and equipment.* See that all tools, running spare parts, and other items of equipment are present and stowed properly. See that two copies of this technical manual and other applicable publications are present and in legible condition. See that two copies of all applicable maintenance forms are present and filled out properly.

40. During Operation

There are no during-operation services necessary for Power Unit PE-75-AF-GY, other than keeping alert for any unusual operating condition. Stop the unit every 4 hours and perform the at-halt service.

41. At-Halt Services

a. The at-halt or at-stop services are regarded as minimum battle services and must be performed every 4 hours of operation.

b. Check the fuel supply to make sure that it is ample for the next period of operation. Refill the fuel tank, if necessary. Replenish the lubricating oil in the engine crankcase.

c. Feel the generator and bearing housings for evidence of excessive heat. If the generator or bearing housings appear excessively hot, report this condition.

d. Make a quick inspection of the entire unit for any evidence of leaks that might have developed during operation. Correct or report any leaks that are found.

e. Inspect the spark plug and spark plug cable to see that the spark plug is tight and that the cable connections are secure.

f. Investigate any deficiencies that were noted during operation. Determine whether they are serious enough to cause damage or failure of the equipment. If so, see that they are corrected before resuming operation.

42. After-Operation Services

a. Purpose. It is the purpose of the after-operation service to correct all deficiencies that were noted during operation, make necessary adjustments and repairs, replenish fuel and lubricant, and to perform any lubrication operations that are required for the period of time that the equipment has been operated. If the after-operation services are performed properly, the unit should be in a ready-to-operate condition.

b. Fuel and Lubricant. Fill the fuel tank. Note whether an unusual amount of fuel has been used during operation. If the equipment appears to be using an excessive amount of fuel, report this condition. Check the level of the engine oil in the engine crankcase and replenish it. If the unit has been operated a sufficient number of hours (64 operating hours) since the crankcase was last drained, drain the crankcase and refill it with fresh engine oil (OE) of the correct seasonal grade.

c. Accessories and Belts. Remove the belt guard and inspect the condition and adjustment of the generator drive belts (fig. 12). Check to see that all accessories are in good condition and that their mounting is secure. See that the cooling-air intake is free from obstructions.

d. Air Cleaner and Breather. Service the air cleaner and the crankcase breather in accordance with the number of hours that the unit has been operated and instructions in the lubrication order for the equipment.

e. Controls and Linkage. Inspect the linkage between the carburetor and governor to see that it is in good condition, not binding, clean, and lubricated properly.

f. Fuel Filter. Look to see if there is any water or other foreign matter in the fuel filter sediment bowl. If there is an excessive amount of foreign matter present, drain the fuel tank and refill it with clean fuel. See that the fuel filter and fuel pump are in good condition and that they do not leak.

g. Wiring and Connections. Inspect the spark plug cable and all other wires to see that they are in good condition and connected securely. Inspect the power output receptacles and binding posts to see that they are in satisfactory condition. Remove all oil, grease, and dirt from the wiring.

h. Clean. Thoroughly clean the entire exterior of the equipment. Use solvent (SD) where necessary, but avoid getting any of the cleaning solvent into the fuel tank, crankcase, air cleaner, breather, and the interior of the generator.

i. Tools and Equipment. See that all tools and spare parts belonging with the equipment are present. See that tools are clean and properly lubricated. See that the tool box is free from debris and foreign matter. If any tools or spare parts are missing or in an unsatisfactory condition, report this fact to the officer in charge.

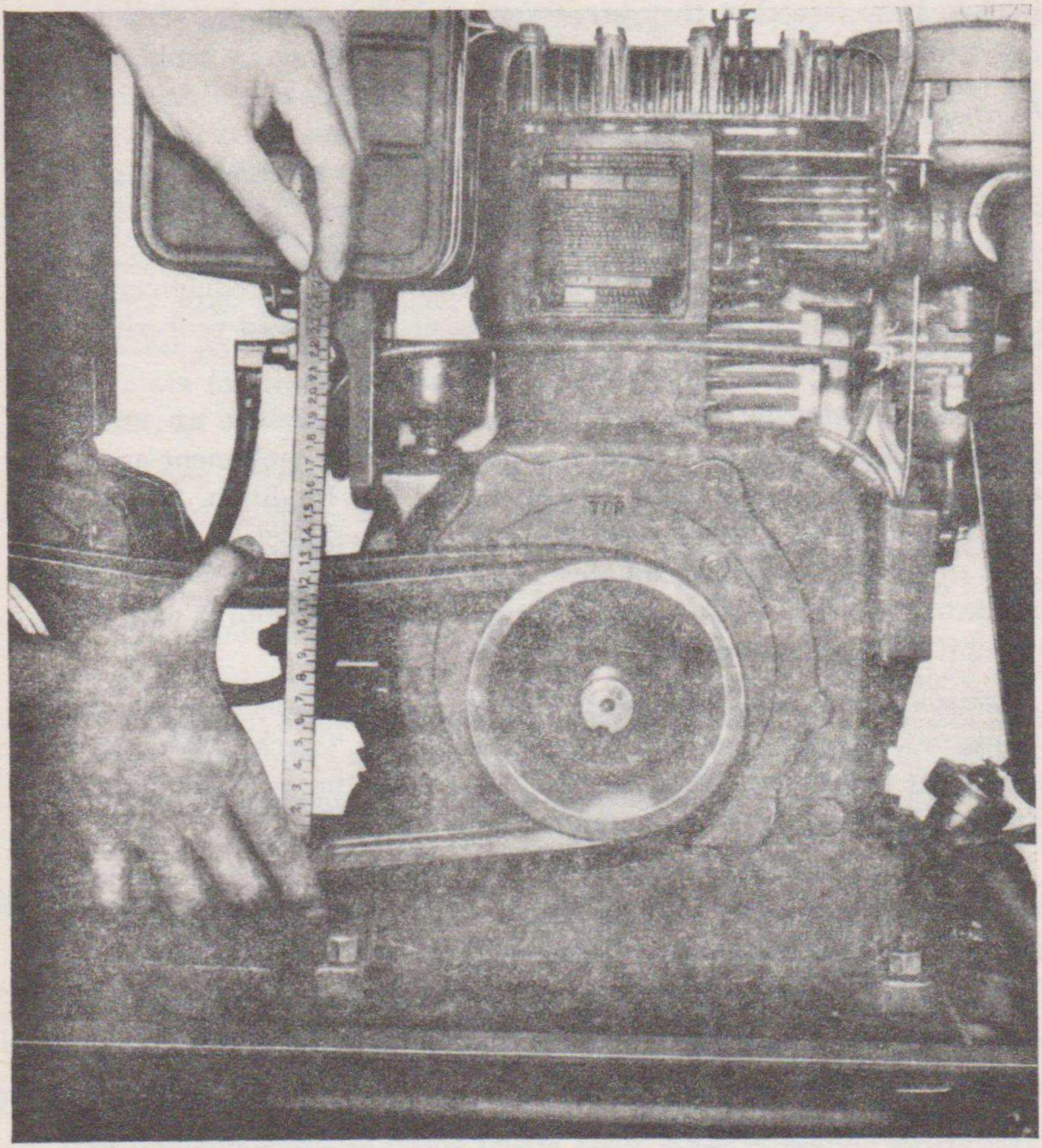


Figure 12. Checking generator drive belt adjustment.

43. Weekly Maintenance Services

For the purpose of these instructions, a weekly service period is 64 operating hours. Perform all daily maintenance services in accordance with paragraphs 38 through 41. Perform all weekly services listed on DA Form 464 that are explained in paragraph 47.

44. Monthly Maintenance Services

For the purpose of these instructions, a monthly service period is 256 operating hours. Perform all daily and weekly maintenance services in accordance with paragraphs 38 through 41 and paragraph 47.

45. Technical Inspections

These inspections are made by technically qualifred personnel. They are made for any of the following purposes:

a. To determine whether a power unit should be continued in service, should be overhauled, or should be salvaged.

b. To determine the extent of damage and estimated cost of repair in reports of survey and the like.

c. To discover the cause of difficulties encountered in service.

d. To determine that all defects have been corrected before the unit is returned to a using organization.

e. To determine the condition of a unit at the time accountability for it is transferred.

46. DA Form 464 Services

DA Form 464 is provided as a guide in the performance of necessary periodic services and inspections. Make appropriate entries on this form whenever any of the operations listed on the form are performed. Detailed instructions for the performance of operations listed on DA Form 464 are given in paragraph 47.

47. DA Form 464 Procedures

Three columns, headed TI, M, and W are shown on DA Form 464. For convenience in indicating operations to be performed weekly, monthly, and under technical inspection, three columns, headed TI, M, and W are shown in this technical manual. Detailed instructions for items on DA Form 464 which apply to Power Unit PE-75-AF-GY follow:

TI	M	W	Instructions
	S	S	1. *Before-operation Services.* Perform the before-operation services in accordance with par. 39.
	L	L	2. *Lubrication.* Lubricate the equipment in accordance with the lubrication order for the equipment. Pay special attention to special instructions for operation under unusual conditions.
	C	C	3. *Tools and Equipment.* Inspect all tools and equipment to see that all are present and in satisfactory condition. See that all tools are clean and free from rust and that adjustable tools, such as pliers and adjustable wrenches, are lubricated properly. See that the tool box is clean and free from debris. See that all spare parts are present and in satisfactory condition. Inspect the remote fuel line to see that it is in good condition, does not leak, and that it is not obstructed. Wipe all tools with a clean cloth that has been moistened with preservative oil (PL-Special) and see that all are stowed properly.

TI	M	W	Instructions
	(*)	(*)	4. *Fire Extinguisher.* Inspect fire extinguishing equipment to see that it is in good condition and charged fully.
(*)	(*)	(*)	5. *Publications.* See that all technical manuals, technical bulletins, and other required publications and forms are present and in legible condition.
(*)	(*)	(*)	6. *Appearance.* Inspect the equipment for any damage to painted surfaces and for traces of rust or corrosion. Clean and refinish as needed.
	(*)	....	7. *Modifications.* Check to find if any modification work orders have been issued for the equipment. Make sure that all MWO's have been completed.
			ENGINE AND ACCESSORIES
(*)	(*)		11. *Cylinder Head, Manifold, Gaskets.* Inspect the cylinder head, carburetor air intake, and exhaust connection to see that they are in satisfactory condition. Check the cylinder head and manifold fastenings to see that they are tight. Inspect all gasketed joints to see that they do not leak.
A	....		12. *Valve Mechanism.* Remove the valve cover plate and inspect the valve mechanism. Measure the clearance between the valve stems and valve tappets with a feeler gage. If adjustment is necessary, remove the carburetor assembly and proceed in accordance with instructions in par. 62*h*.
(*)	....	....	13. *Compression Test.* Secure a compression test meter suitable for the cylinder pressure of the engine and test the compression in accordance with instructions supplied with the test unit. Enter the compression test reading in the space provided on DA Form 464. Make this test semiannually and at the time of technical inspection.
	(*)	(*)	14. *Crankcase Breather.* Inspect around the camshaft plug, breaker box, and crankcase cover plate for oil leaks. Oil leakage at any of these points is an indication of an obstructed breather. Remove the breather assembly and test it by alternately blowing into and sucking through the tube. If the sound of the valve opening and closing is not heard, replace the breather with a new one.
	(*)	(*)	18. *Belts and Pulleys.* Remove the belt guard and inspect the drive belts. See that they are in satisfactory condition and clean off any oil and grease with soap and water. Check the alinement of the engine and generator pulleys by placing a T-square against both pulleys. The right-angle arm of the square should line up with the cross members of the skid base. See that the belts are adjusted correctly.
	(*)	(*)	20. *Governor and Linkage.* Alternately apply and remove load from the unit and observe the action of the governor. See that the throttle control linkage is in good condition, not binding, clean, and lubricated properly. If adjustment is necessary, follow instructions in paragraph 66.

TI	M	W	Instructions
			ENGINE AND ACCESSORIES
(*)	(*)	(*)	21. *Noise and Vibration.* (Enter this item on DA Form 464.) Operate the unit at normal speed and check for any unusual noise and vibration. If unusual noise or vibration is noticed, correct the cause, if possible. Otherwise, prepare a report for field maintenance personnel.
	(*)	(*)	38. *Fuel Pump and Housing.* Disconnect the fuel line between the fuel pump on the unit and the carburetor. See that the handle of the three-way fuel valve is pointing upward. Spin the engine with the starting rope and observe whether the fuel delivery is satisfactory. See that the pump is mounted securely and that there are no leaks between the upper and lower sections. Reconnect the fuel line and check for leaks at connections. If the fuel pump is unsatisfactory, replace the complete assembly.
	(*)	(*)	39. *Carburetor and Linkage.* Inspect the carburetor to see that it does not leak and that it is mounted securely. Check for leakage at the mounting flange. Inspect the throttle linkage and choke to see that they operate freely and do not bind.
	(*)	(*)	40. *Filters.* Inspect the fuel filter to see that it is mounted securely and that it does not leak. Remove the screen and sediment bowl and wash them thoroughly in solvent (SD). Reassemble the screen and sediment bowl to the fuel filter and open the fuel valve. Crank the unit a few times to fill the sediment bowl and check for leakage around the cork gasket at the top of the bowl. If any leakage is evident, replace the cork gasket.
	CS	CS	41. *Air Cleaner.* Inspect the body of the air cleaner and the air cleaner connections for leaks. See that all fastenings are secure. Service the air cleaner in accordance with the lubrication order and the number of hours that the unit has been operated.
	(*)	(*)	43. *Tank, Cap, and Gasket.* Inspect the fuel tank to see that it is in good condition, securely mounted, and that it does not leak. Blow through the vent in the filler cap to see that it is not obstructed. Inspect the filler cap gasket to see that it is in satisfactory condition. Replace the gasket, if necessary.
	(*)	(*)	44. *Fuel Lines.* Inspect the flexible fuel line between the fuel tank and the fuel pump to see that it is in satisfactory condition. Likewise, inspect the fuel line between the fuel pump and the carburetor. See that all fuel line connections and the three-way fuel valve are free from leaks. Inspect the remote fuel supply line to see that it is in good condition and free from obstructions. See that the cap for the remote fuel connection isi n place.

TI	M	W	Instructions
			ELECTRIC SYSTEM
	CA	CA	46. *Spark plug.* Disconnect the ignition cable from the spark plug. Remove the spark plug and wash it thoroughly in solvent (SD). Inspect the interior of the spark plug to see that the insulator is not damaged. Inspect the condition of the electrodes and adjust the gap, if necessary. Replace the spark plug with a new one if it is in doubtful condition.
	(*)	(*)	49. *Distributor or Magneto.* Remove the two screws that secure the breaker box cover plate and remove the cover. Crank the engine slowly and note whether the breaker points open and close properly. Crank the engine until the breaker points are separated fully. Inspect the points to see if they are burned or pitted. Use a 0.020-inch feeler gage and check to see if the gap between the breaker points is satisfactory. If the points are only slightly pitted, clean them with an ignition point file. If the points are burned or pitted badly, replace both points (par. 62*e*.2). Check for leaks around the breaker shaft. If any leakage is evident, replace the complete breaker assembly, including the oil seal. See figure 13 for details of breaker point adjustment. Once a month, remove the flywheel blower housing and the flywheel and inspect the magneto coil, rotor, and armature that are housed within the flywheel. Look for faulty wires, loose fastenings, and loose connections.
(*)	....	....	50. *Coil, Wiring, Switches.* Remove the cover from the suppressor assembly and inspect all internal wiring. See that all connections are clean and tight and that the components within the box are moistureproofed and fungiproofed properly.
			FRAMES AND MOUNTINGS
(*)	(*)	....	80. *Frame.* Inspect the skid base of the unit to see that it is in good condition. Look for cracks at welded joints and check for proper alinement.
(*)	(*)	....	84. *Mountings.* (Enter this item on DA Form 464.) Inspect the generator and engine mountings to see that they are in good condition. See that mounting bolts are secure and that the engine and generator are in proper alinement. See that the carrying handles are in good condition and stowed properly in the side channel of the skid base.

TI	M	W	Instructions
			GENERATOR
	(*)	(*)	172. *Armature*. Remove the generator end cover and inspect the brushes. Make sure that the brushes move freely in the brush holders and that they are not worn excessively. See that the brush terminal connections are secure. Rotate the armature by means of the starting rope and inspect the condition of the collector rings and commutator. If the collector rings and armature are in need of cleaning, refer to par. 60.
(*)	(*)	....	176. *Final Test*. After the unit has been checked completely, apply a load to the output terminals and measure the output voltage, frequency, and amperage. With the unit in operation feel the bearing housings for evidence of overheating. They should not be too hot to touch with the bare hand. Repeat operations under items 1, 2, and 5. (See par. 66.)

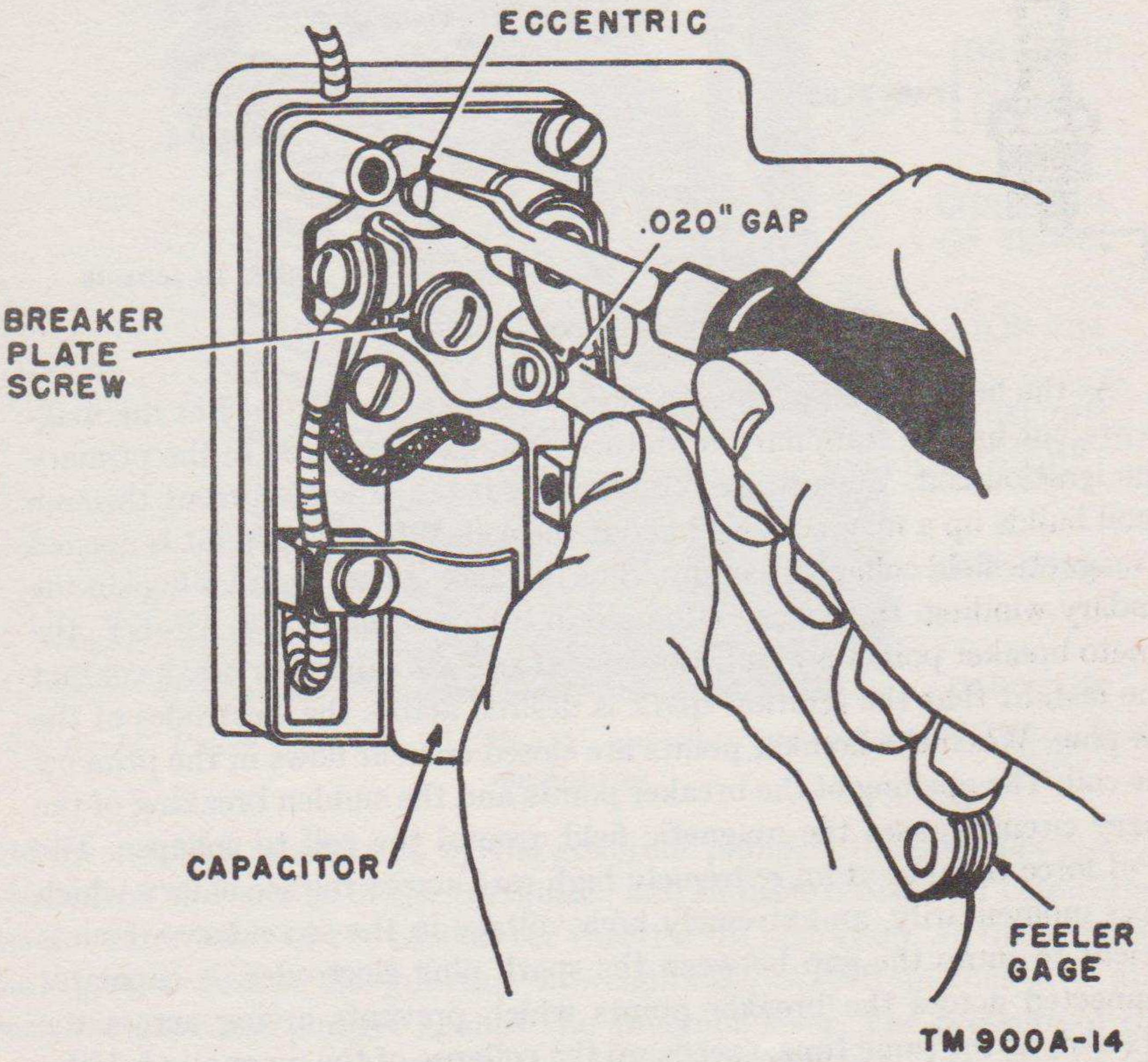


Figure 13. Breaker point adjustment.

48. Ignition System

a. The ignition system used in Power Unit PE-75-AF-GY differs from the conventional magneto within the flywheel type. The magneto used in PE-75-AF-GY consists of two separate assemblies. The armature, rotor, and coil comprise one assembly which is housed within the engine flywheel. The second assembly, which consists of the breaker assembly and capacitor, is mounted on the side of the engine crankcase. The stop switch is a part of this assembly and the complete assembly is protected by a metal cover.

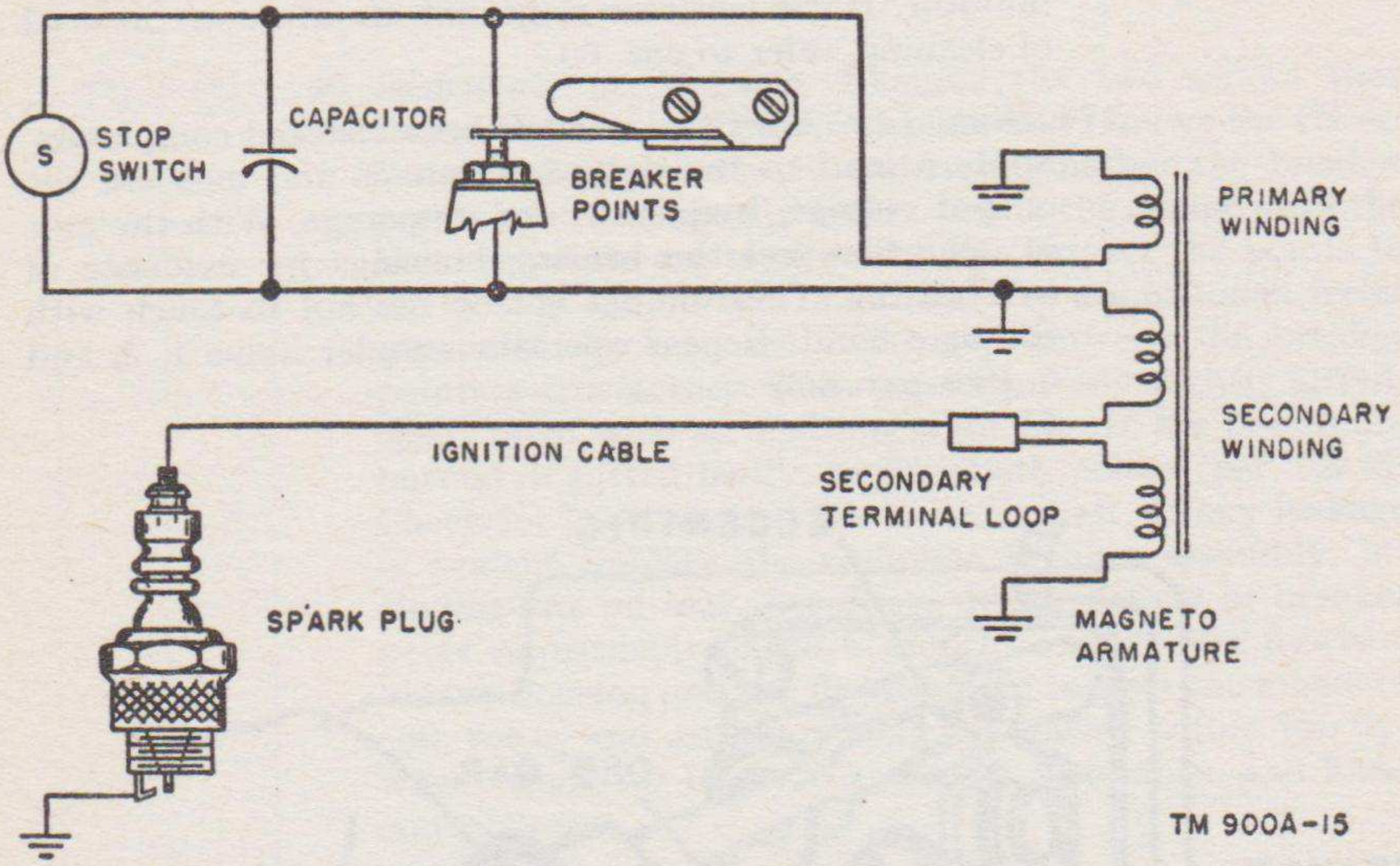


Figure 14. Ignition circuit diagram.

b. As the lines of flux of the revolving magnetic field (rotor) of the magneto are cut by the stationary armature, voltage is induced in the primary of the ignition coil. When the circuit is closed, the flow of current through the coil builds up a magnetic field about the coil. When the circuit is opened this magnetic field collapses rapidly, thus inducing a very high voltage in the secondary winding. In the magneto used in Power Unit PE-75-AF-GY, the magneto breaker points normally are closed and are caused to break contact at the instant that the ignition spark is desired across the electrodes of the spark plug. When the breaker points are closed current flows in the primary of the coil. The opening of the breaker points and the sudden breaking of the primary circuit causes the magnetic field around the coil to collapse. The lines of force collapse at an extremely high rate across the secondary which induces momentarily, an extremely high voltage in the secondary which is sufficient to jump the gap between the spark plug electrodes. A capacitor is connected across the breaker points which prevents arcing across the points and, at the same time, speeds up the collapse of the magnetic field by reversing the surge (fig. 14). The action of the magneto breaker assembly is explained in paragraph 49*b*.

49. Governor and Automatic Spark Control

(fig. 15)

a. Governor. The governor used in Power Unit PE-75-AF-GY is of the centrifugal, flyweight type. The complete governor assembly consists of the governor gear, which is driven by the camshaft gear; the flyweight and plunger assembly, which is driven by the governor gear; the governor shaft

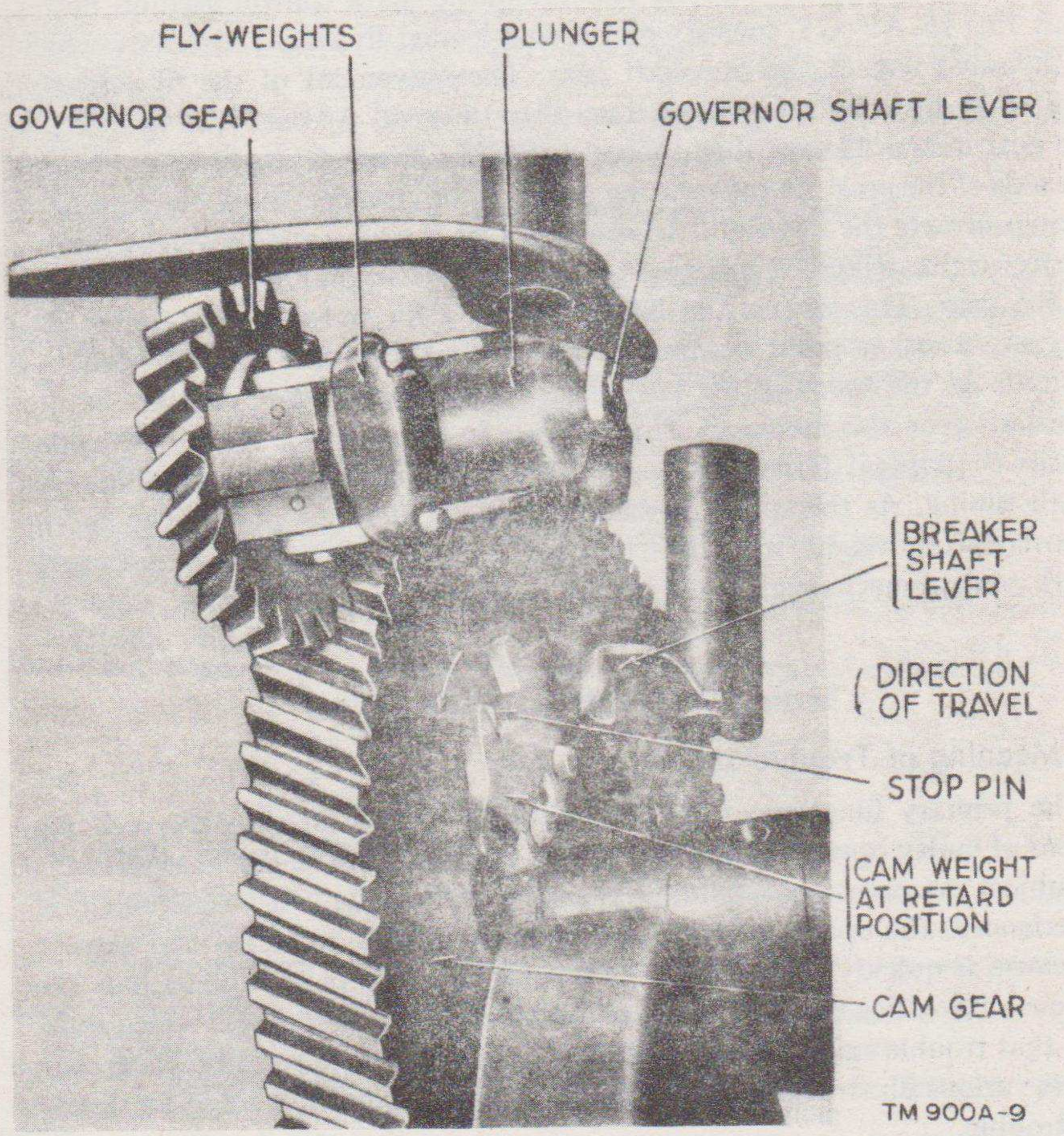


Figure 15. Power Unit PE–75–AF–GY, automatic spark control and governor mechanism.

and lever, which is actuated by the governor plunger; the governor spring, which is on the outside of the crankcase; and suitable linkage for connecting the governor lever to the carburetor throttle. In operation, as the speed of the engine increases, the governor flyweights fly away from their axis and push the governor plunger against the governor lever. The pressure of the governor plunger against the governor lever counteracts the pull of the governor spring and pushes the throttle toward closed position. This reduces the speed of the engine. As the engine speed decreases, the governor fly-

weights are pulled back toward their axis and the governor plunger is retracted. As the pressure of the governor plunger, against the governor lever, is decreased, the governor spring pulls the throttle toward an open position and thus increases the engine speed. The governor is adjusted by means of the adjusting nut and by shifting the position of the governor spring on the governor lever (fig. 4).

b. Automatic Spark Control. The automatic spark control used on Power Unit PE-75-AF-GY consists of a spring-loaded flyweight assembly which is mounted within the camshaft gear. The movement of the flyweight is limited by a stop pin which is attached to the gear. As the rotating speed of the gear increases, centrifugal force causes the flyweight to advance around the axis of the gear. As the rotating speed of the gear decreases, the flyweight spring retracts the flyweight. In operation, as the gear and flyweight rotate, the flyweight strikes the magneto breaker shaft lever once for each revolution of the gear. This causes the breaker shaft lever to make and break the magneto breaker point contact at the instant that the ignition spark is desired. As the speed of the engine increases, the speed of rotation of the camshaft gear also increases. This increase in the rotating speed of the gear causes centrifugal force to advance the flyweight, and thus advance the spark timing. As the speed of the engine decreases, the pull of the spring retards the flyweight, and thus retards the spark timing. This automatic spark control mechanism is illustrated in figure 15.

Section V. TROUBLE SHOOTING

50. Meaning of Trouble Shooting

The primary function of trouble shooting is to locate and correct the causes of faulty operation and equipment failure. All mechanical equipment is subject to occasional failure. Whenever difficulty with equipment is experienced, the operator or repairman must be able to locate and correct the cause as quickly as possible. The trouble charts in paragraph 51 indicate various difficulties that are likely to be experienced; symptoms which indicate that trouble exists, the possible cause, and suggested remedy. Reference to the various illustrations and diagrams in this manual will aid in localizing the trouble.

51. Trouble Charts

a. Engine Will Not Start.

Possible cause	Check	Remedy
Fuel tank empty	Remove fuel tank cap and check fuel supply.	Replenish fuel supply.
Fuel valve in wrong position.	Check position of fuel valve.	Place fuel valve in correct position for fuel supply used.

a. Engine Will Not Start—Continued

Possible cause	Check	Remedy
Defective fuel pump ...	Disconnect fuel line between fuel pump and carburetor. Crank engine and observe fuel delivery.	Replace fuel pump.
Defective or fouled spark plug.	Remove and inspect spark plug.	Clean or replace spark plug.
Water or dirt in fuel ...	Inspect sediment bowl for presence of dirt or water.	Drain fuel tank and refill with clean fuel.
Engine flooded	Open choke and crank engine.	Open choke.
Stop switch short-circuited.	Remove breaker cover and inspect switch.	Remove short or replace breaker box assembly.
Faulty magneto	Test ignition spark. Remove breaker cover and inspect breaker points.	Clean and adjust or replace breaker points.
Faulty ignition	Remove breaker cover and test capacitor.	Replace capacitor.
Valves not seating properly or sticking.	Inspect valve mechanism.	Make necessary repairs.
Carburetor not properly adjusted.	.....	Readjust carburetor.
Carburetor flooding	Check for fuel leakage from carburetor.	Replace carburetor.

b. Engine Starts But Misfires.

Possible cause	Check	Remedy
Loose connection in ignition system.	Inspect connections	Clean and tighten connections.
Fouled or defective spark plug.	Remove and inspect spark plug.	Clean or replace spark plug.
Dirty magneto breaker points.	Inspect breaker points ..	Clean and adjust breaker points.
Defective magneto capacitor.	Test capacitor	Replace capacitor.
Water in fuel ....., ...	Check for water in sediment bowl.	Drain and refill fuel tank.
Leaking cylinder-head or carburetor mounting gasket.	Inspect for leaks	Tighten fastenings. Replace gaskets.
Carburetor out of adjustment.	.....	Readjust carburetor.
Valves not seating properly.	Inspect valve mechanism.	Make necessary repairs or adjustments.

c. Engine Backfires Through Carburetor.

Possible cause	Check	Remedy
Engine not up to operating temperature.	Close choke slightly and see if backfiring stops.	Use choke until operating temperature is reached.
Air leak at carburetor mounting.	Inspect for leak	Tighten mounting. Replace gasket.
Fuel mixture too lean...	Close choke slightly and see if backfiring stops.	Readjust carburetor.
Faulty fuel delivery to carburetor.	Inspect fuel pump and fuel lines.	Replace pump. Clean lines.
Foreign matter in fuel ..	Inspect for dirt or water in sediment bowl.	Drain fuel system. Fill tank with clean fuel.
Intake valve not closing properly.	Inspect valve mechanism.	Make necessary repairs or adjustments.

d. Engine Knocks.

Possible cause	Check	Remedy
Incorrect fuel	Check octane rating of fuel.	Use fuel of higher octane number.
Excessive carbon in cylinder.	Remove cylinder head ..	Clean out combustion deposits.
Lack of oil	Check oil level	Replenish oil.
Engine overloaded	Check load	Reduce load.
Worn main or connecting rod bearings.	Rock engine against compression.	Replace worn bearings.
Worn piston and/or cylinder.	Test compression	Replace worn parts.
Automatic spark control sticking.	Check action of spark control.	Remove cause.
Engine overheated	See *e* below	

e. Engine Overheats.

Possible cause	Check	Remedy
Lack of oil	Check oil level	Replenish oil.
Oil too light	Check grade of oil	Use heavier oil.
Cooling air passages obstructed.	Inspect for obstructed air passages.	Remove obstructions.
Air cleaner clogged	Inspect air cleaner	Clean air cleaner.
Lack of ventilation around unit.	Check ventilation	Provide better ventilation.
Generator overloaded ..	Check generator load ...	Reduce load.

f. Excessive Exhaust Smoke.

Possible cause	Check	Remedy
Engine oil too light	Inspect grade of oil	Use heavier oil.
Fuel mixture too rich ..	Look for black exhaust smoke.	Readjust carburetor. See that choke is fully open.
Worn or sticking piston rings.	Test compression	Replace rings.
Worn cylinder and/or piston.	Test compression	Replace worn parts.

g. Engine Speed Not Steady.

Possible cause	Check	Remedy
Dirty fuel; clogged fuel line.	Inspect fuel filter for dirt.	Clean fuel system. Use clean fuel.
Governor not adjusted correctly.	Inspect governor adjustment.	Readjust governor.
Obstructed air vent in fuel tank.	Inspect vent	Clean vent.

h. Engine Lacks Power.

Possible cause	Check	Remedy
Cold engine.....	Remove load and allow engine to warm up.	
Incorrect fuel mixture ..	Inspect carburetor adjustment.	Readjust carburetor.
Worn cylinder, piston and/or piston rings.	Test compression	Replace worn parts.
Clogged exhaust	Try with muffler removed.	Replace muffler.
Faulty valve action	Inspect valve action	Adjust as required.
Engine overheated	See *e* above.	

i. Engine Lacks Compression.

Possible cause	Check	Remedy
Loose cylinder head or faulty gasket.	Inspect cylinder head fastenings; look for leak.	Tighten cylinder head and/or replace gasket.
Valves not seating properly.	Inspect valve mechanism.	Adjust valves and/or replace faulty parts.
Piston rings and/or piston and cylinder worn.	Inject oil on top of piston through spark plug hole and crank. If compression is improved, pistons and/or rings are faulty.	Return to field repair shop.

j. Arcing at Generator Brushes.

Possible cause	Check	Remedy
Dirty commutator or collector rings.	Make visual inspection . .	Clean.
Brushes not seated properly.	Look for carbon streaks on commutator and slip rings.	Reseat brushes.
Brushes worn	Inspect brushes	Replace brushes.
Brushes sticking in holders.	Make visual inspection . .	Clean brushes and holders.
Rough or pitted commutator.	Make visual inspection . .	Clean commutator.

k. Unit Fails to Deliver Voltage.

Possible cause	Check	Remedy
Brushes sticking in brush holders.	Make visual inspection . .	Clean brushes and brush holders.
Worn brushes	Make visual inspection . .	Replace brushes.
Brushes not seated properly.	Look for carbon streaks on commutator and slip rings.	Reseat brushes.
Dirty or rough commutator or slip rings.	Make visual inspection . .	Clean.
Broken connection	Inspect all wiring and connections.	Tighten connections; make necessary repairs.
Shorted or grounded armature.	See par. 60	Replace armature.
Shorted, grounded or open field.	See par. 60	Replace generator.
Faulty filter capacitor . .	Test capacitor	Replace capacitor.
Generator drive belt slipping.	Inspect belt adjustment .	Adjust belts.
Brush leads connected incorrectly.	Check connection of brush leads.	Reverse brush lead connections.

l. Generator Does Not Deliver Rated Output.

Possible cause	Check	Remedy
Engine not up to speed .	Check speed with a revolution counter.	Adjust governor.
Generator belts slipping .	Inspect belts	Adjust belts.
Dirty commutator or collector rings.	Make visual inspection . .	Clean.
Worn brushes	Make visual inspection . .	Replace brushes.
Brushes not seated properly.	Make visual inspection . .	Reseat brushes.
Loose wiring connections.	Inspect all wiring	Tighten connections.
Faulty capacitor	Test capacitors	Replace faulty capacitors.
Brush leads connected incorrectly.	Check connection of brush leads.	Reverse brush lead connections.

m. Generator Excessively Hot.

Possible cause	Check	Remedy
Shorted generator windings.	Test for short	Remove short or replace generator.
Excessive load	Check load	Reduce load.
Obstructed air passages .	Inspect air passages for obstructions.	Clean air passages.
Faulty generator bearings.	Inspect bearings	Replace bearings or replace generator.

n. Unit Causing Radio Interference.

Possible cause	Check	Remedy
Faulty filter capacitor ..	Test capacitors	Replace capacitor.
Loose connection in filter box.	Inspect connections	Clean and tighten connections.
Defective spark plug shielding.	Inspect shielding	Replace shielding.
Faulty ground connection.	Check ground connection.	Provide better ground connection.

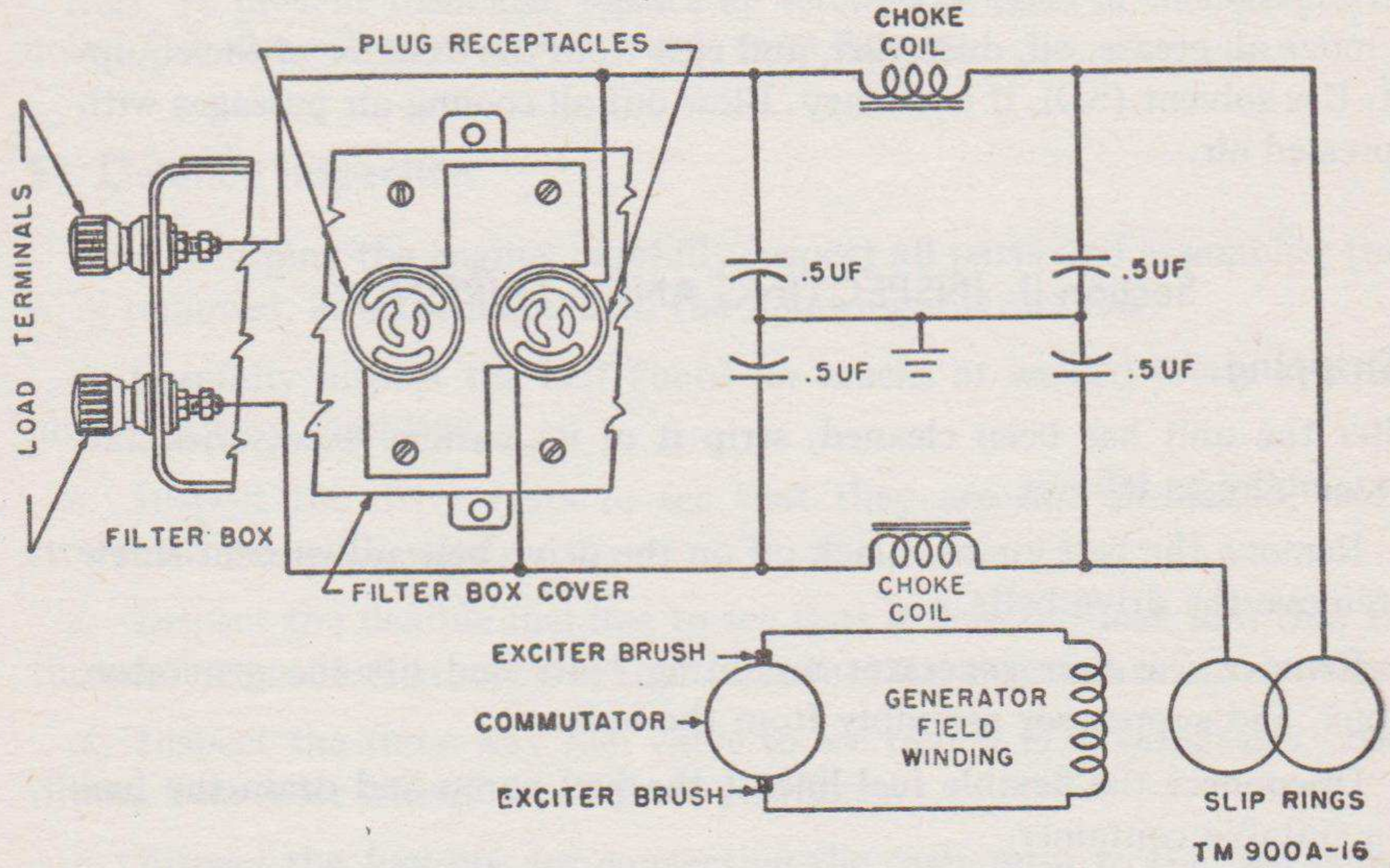


Figure 16. Generator schematic diagram.

CHAPTER 4

FIELD MAINTENANCE INSTRUCTIONS

Section I. PREREPAIR PROCEDURES

52. General

a. Scope. This chapter is written specifically for personnel charged with field maintenance and repair. These instructions cover complete repair and overhaul of Power Unit PE-75-AF-GY. Appropriate tables of clearances and tolerances are provided. Instructions include the procedure to be followed for disassembly, reassembly, adjustment, and final testing. The extent of operations to be performed is limited only by the tools and test equipment available and the skill of assigned personnel.

b. Preliminary Inspection. Before starting any repair work, check the unit for specific troubles that may have been reported by operating personnel. If the unit is in operating condition, start the equipment and check appropriate items in accordance with paragraph 47 and DA Form 464. The required technical inspection is completed only when this examination is finished and DA Form 464 is filled out properly.

53. Cleaning

Remove all grease, oil, dust, dirt, and rust from the exterior of the equipment. Use solvent (SD), if necessary. Blow out all cooling-air passages with compressed air.

Section II. INSPECTING AND STRIPPING

54. Stripping

After the unit has been cleaned, strip it of its various accessories and subassemblies as follows.

a. Remove the belt guard. Slack off on the drive belt adjustment screw and remove the drive belts.

b. Remove the four generator mounting bolts and lift the generator, tool box, and suppressor assembly from the unit.

c. Disconnect the flexible fuel line at the fuel pump and drain the fuel into a suitable container.

d. Remove the fuel line from the three-way valve at the bottom of the fuel tank. Unscrew the three-way fuel valve assembly from the fuel tank.

e. Remove the fuel line that connects the fuel pump to the carburetor.

f. Remove the cap screws that secure the fuel pump to the side of the crankcase and remove the fuel pump assembly.

g. Remove the cap screw that secures the muffler support strap to the base of the engine. Screw the muffler out of the upper exhaust elbow and then remove the elbow and nipple.

h. Remove the cap screw that secures the air cleaner mounting bracket to the intake elbow, and remove the screw that secures the air-cleaner-to-carburetor strap at the bottom of the air cleaner tube. Remove the air cleaner assembly from the engine.

i. Disconnect the linkage between the carburetor throttle and the governor arm. Unhook the governor spring; remove the governor adjusting nut; and remove the governor adjusting rod.

j. Remove the cap screws that secure the carburetor and intake elbow assembly to the cylinder and remove the carburetor assembly.

k. Remove the two cap screws that secure the lower end of the fuel tank bracket to the engine crankcase. Remove the two cap screws that secure the upper end of the fuel tank bracket and lift off the fuel tank and bracket assembly.

l. Remove the crankcase breather assembly from the engine crankcase.

m. Remove the starter pulley; remove the five cap screws that secure the blower housing and remove the blower housing.

Note. To prevent their loss, replace all screws and bolts in their respective holes. This also will protect the threads from damage.

55. Detailed Inspection

After stripping the engine, carefully inspect all parts and assemblies that were removed, in accordance with the following instructions:

a. Carefully inspect the belt guard for cracks at welded joints or other unsatisfactory condition.

b. Inspect the drive belts to see that they are not oil-soaked, badly stretched, or badly worn.

c. Inspect the flexible fuel line to see that it does not leak and that the threaded connectors are secure, and to see that the threads are not damaged.

d. Inspect the three-way fuel valve to see that it is in satisfactory condition. Test it for leakage in all three positions.

e. Inspect the fuel line for connecting the carburetor to the fuel pump. See that it is not kinked or otherwise damaged and that the threads in its threaded connectors are not damaged.

f. Attach a section of tubing to the intake connection of the fuel pump. Place the free end of the tube in a container of fuel and operate the fuel pump lever to see if the quantity of fuel delivered by the fuel pump is satisfactory. Test the fuel pump for leaks.

g. Carefully inspect the muffler to see that it is in satisfactory condition. Look for holes in the shell and make sure that it is not clogged. Check for damaged threads.

h. Carefully inspect the air cleaner assembly to see that it is in satisfactory condition. See that the filter element is not clogged, that there are no leaks in the shell and connecting tubing, and that it is not damaged otherwise.

i. Inspect the governor to throttle linkage to see that it is not excessively worn or bent. See that the governor spring is in satisfactory condition and that the adjusting rod and nut are not damaged.

j. Inspect the carburetor assembly for exterior damage. See that the carburetor bowl is not dented and that the throttle and choke move freely and are not excessively loose.

k. Inspect the fuel tank and its mounting bracket to see that they are in satisfactory condition. See that the mounting bracket is not bent or otherwise damaged. Inspect the fuel tank cap and gasket to see that they are in good condition and that the vent in the gap is not clogged. See that the tank is not dented and test it for leaks.

l. Inspect the crankcase breather to see that it is in good condition. Alternately blow and suck through the breather to see that it functions properly.

56. Fits and Tolerances

The following table lists clearances and tolerances for Power Unit PE-75-AF-GY.

Item	Minimum (inches)	Maximum (inches)	Reject (inches)
Crankshaft (crank pin)	.....	.....	—1.1854
Inlet and exhaust valve stem	.....	.....	—.308
Inlet and exhaust valve guide clearance	.....	.....	See par. 61
Inlet and exhaust valve seat	.....	.....	$+^{3}/_{32}$
Crankshaft end play	0.002	0.008	+.008
Connecting-rod bearing	.....	.....	+1.189
Connecting-rod bearing (diametral clearance)	.0007	.0016	.....
Connecting-rod end play	.009	.018	.....
Connecting-rod wrist-pin fit	.....	.....	+.002
Connecting-rod wrist-pin hold	.....	.....	+.736
Piston to wrist-pin fit	.....	.....	+.0005
Piston diameter (skirt)	.....	.....	—2.988
Camshaft diameter	.....	.....	—.4967

Item	Minimum (inches)	Maximum (inches)	Reject (inches)
Cam gear end play	.001	.012	+.012
Cylinder bore	.....	.....	+3.003
Top ring side clearance	.0025	.....	+.007
Lower ring side clearance	.001	.....	+.007
Piston ring and gap	.007	.017	+.035
Valve tappet clearance:			
Inlet valve	.007	.009	.....
Exhaust valve	.017	.019	.....

Note. When measurements given in the Reject column are exceeded plus (+) or minus (—) the figures given, the part involved must be replaced with a new part.

Inlet valve timing	Opens 28° before TDC. Closes 51° past BDC.
Exhaust valve timing	Opens 61° before BDC. Closes 18° past TDC.
Ignition timing	0° at retard to 23° before TDC at advance.

Section III. DISASSEMBLY

57. Engine Disassembly

The following instructions cover disassembly of the basic engine. These instructions are applicable after the equipment has been stripped in accordance with instructions in paragraph 54.

a. Pulley Removal. Use a suitable gear puller and pull the belt pulley from the drive side of the engine. This pulley is prevented from turning on the crankshaft by a straight key. Do not lose the key when removing the pulley.

b. Flywheel Removal. Secure a block of wood, 4 inches high, and place it under one of the fins of the flywheel fan, on the intake side of the engine. Remove the flywheel nut with a 1¼-inch socket wrench. Be careful not to damage the fins and the starter pulley pin on the flywheel. If one is available, use a puller to remove the flywheel from the crankshaft. If a puller is not available, strike the end of the crankshaft a sharp blow with a babbit or rawhide hammer to jar the flywheel loose.

c. Spark Plug Removal. Disconnect the spark plug cable and shielding assembly from the spark plug by unscrewing the connection at the spark plug. Be careful not to lose the small insert in the end of the cable. Use a suitable socket wrench or box wrench to unscrew the spark plug from the cylinder head.

d. Removal of Magneto and Backplate. Disconnect the primary lead from the magneto backplate and pull the lead out of the hole in the backplate.

Remove the screws that secure the backplate to the engine crankcase and remove the magneto armature and the backplate. Remove the set screw that secures the magneto rotor to the crankshaft and slide the rotor from the shaft. As soon as possible after removing the rotor, place it within the armature to retain its magnetism.

e. Removal of Magneto Breaker Assembly. Remove the cover from the magneto breaker box. Remove the nut and lockwasher that secure the magneto movable breaker arm to the breaker arm shaft. Remove the screw in the upper right-hand corner of the breaker assembly and the screw that holds the capacitor, and remove the breaker assembly from the side of the crankcase.

f. Cylinder Head Removal. Two of the cylinder-head cap screws were removed when removing the fuel tank. Remove the other seven cap screws and lift off the cylinder head cooling-air shroud. Remove the cylinder head and gasket. If the cylinder head cannot be removed easily, tap the underedge with a rawhide hammer to loosen it.

g. Cylinder and Crankcase Removal. Remove the cap screws that secure the cylinder and crankcase assembly to the engine base. One of these screws was removed when removing the muffler. When the screws have been removed, lift the crankcase and cylinder assembly from the base.

h. Valve Removal (fig. 17). If it has not already been removed, remove the valve cover plate from the side of the cylinder. Use a valve spring compressor and compress the spring on one of the valves until the small wedge keys can be removed. Remove the keys and lift the valve from the cylinder. Repeat this operation for the other valve and then pry out the valve springs.

i. Connecting Rod and Piston Removal. Place the cylinder and crankcase assembly on its side and remove the bolts that secure the connecting rod cap to the bottom of the connecting rod and remove the bearing cap. Push the piston and connecting rod assembly out through the top of the cylinder. Be careful, when removing the connection rod and piston, not to damage the inside of the cylinder.

j. Crankcase Cover Plate Removal. Remove the four cap screws that secure the crankcase cover plate to the crankcase. Carefully pry off the cover plate. Try to apply an even pressure on opposite sides of the plate when prying. Support the end of the crankshaft as the cover plate is removed.

k. Crankshaft Removal. Carefully position the crankshaft so that the counterweights and crank throw will not strike the cam gear as the crankshaft is being removed. Grasp the free end of the crankshaft and work it out of the bearing housing on the flywheel end.

l. Camshaft and Cam Assembly Removal. Place a piece of brass or iron rod, slightly smaller than the camshaft axle, against the camshaft axle, on the power-take-off side of the engine. Drive the axle out of the crankcase and remove the cam and cam gear assembly. Do not lose the expansion plug that

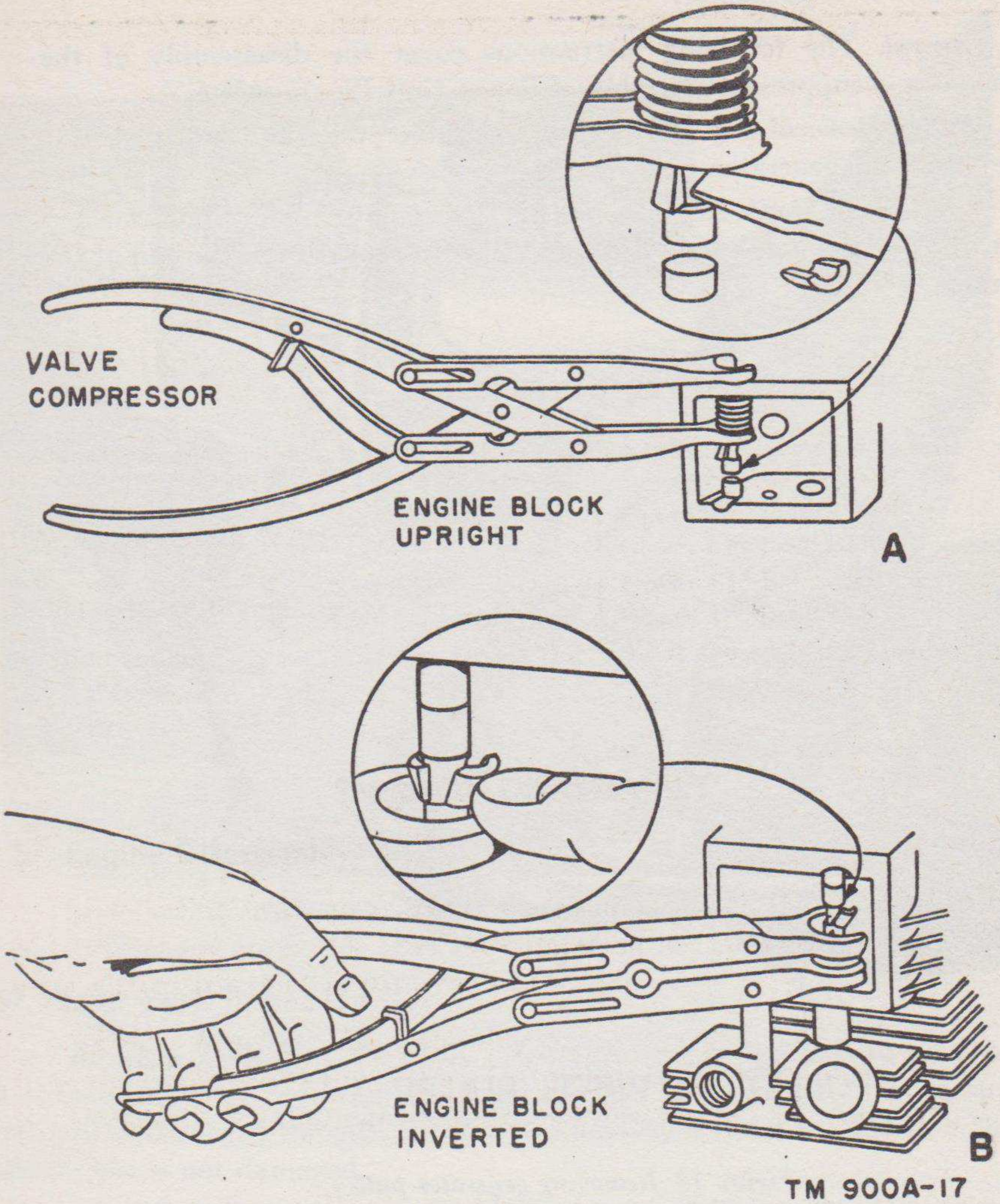


Figure 17. Removing valve springs.

will be driven from the flywheel side of the crankcase. Remove the valve tappets from their guides.

m. Governor Removal. Loosen the nut that secures the governor lever clamp and remove the governor lever from the shaft. Remove the cotter pin from the governor shaft and push the shaft into the crankcase. As the shaft is pushed out of the bushing, the governor gear and plunger assembly can be removed.

n. Piston Pin and Piston Ring Removal. Clamp the piston and connecting rod assembly in a vise. Use a piston ring expander and remove the piston rings from the piston. Pry the piston pin retainer rings from the piston and press the piston pin out of the piston and connecting rod.

58. Generator Disassembly

a. General. The following instructions cover the disassembly of the generator and suppressor assembly of Power Unit PE-75-AF-GY.

b. Pulley Removal (fig. 18). Secure a suitable puller and pull the drive pulley from the generator shaft.

c. Commutator Cover Removal (fig. 19). To remove the commutator end cover, remove the four wing screws and slide the cover from the end of the generator.

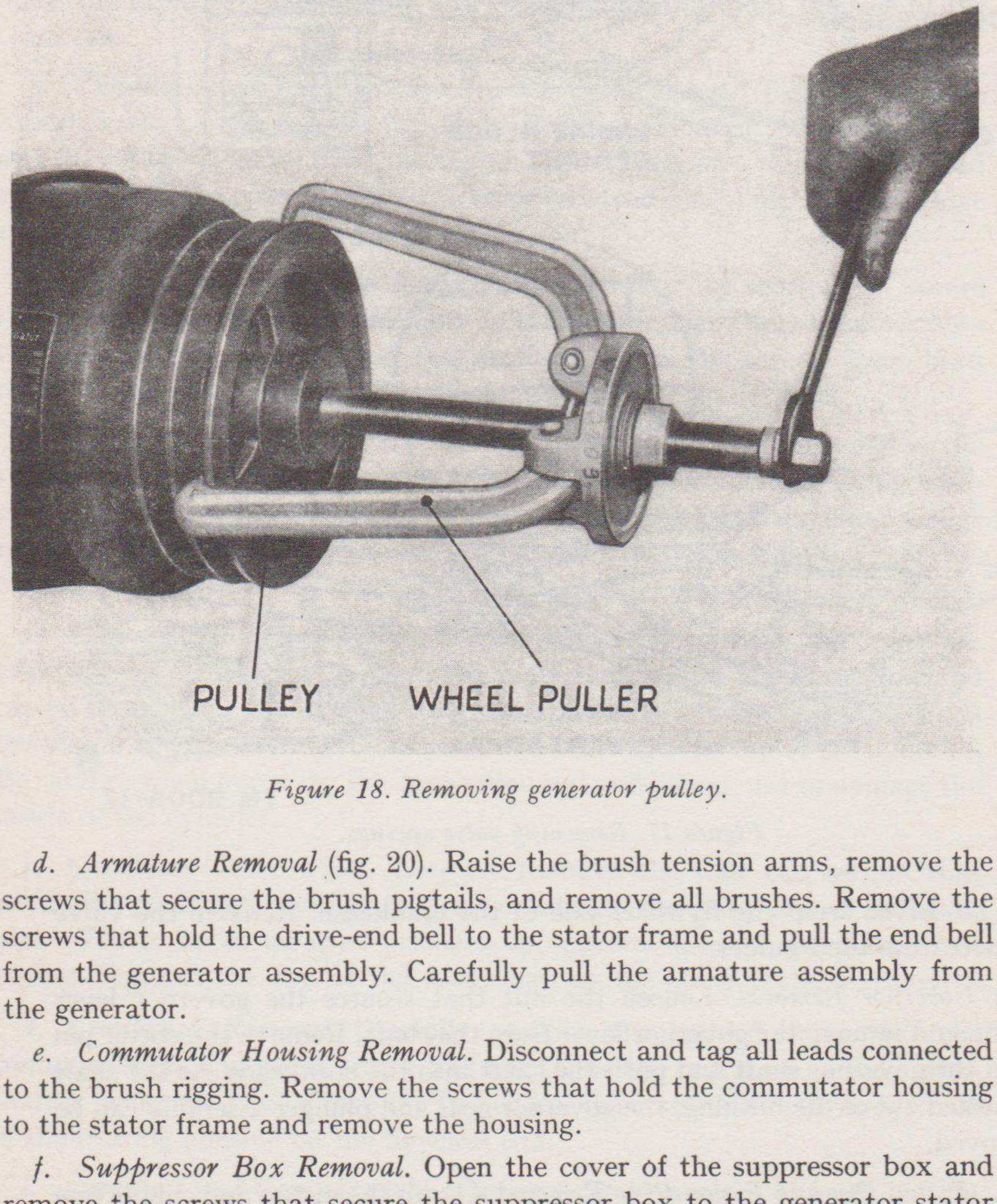


Figure 18. Removing generator pulley.

d. Armature Removal (fig. 20). Raise the brush tension arms, remove the screws that secure the brush pigtails, and remove all brushes. Remove the screws that hold the drive-end bell to the stator frame and pull the end bell from the generator assembly. Carefully pull the armature assembly from the generator.

e. Commutator Housing Removal. Disconnect and tag all leads connected to the brush rigging. Remove the screws that hold the commutator housing to the stator frame and remove the housing.

f. Suppressor Box Removal. Open the cover of the suppressor box and remove the screws that secure the suppressor box to the generator stator frame. Remove the suppressor assembly. Be careful not to injure the leads that are brought out through the back of the box.

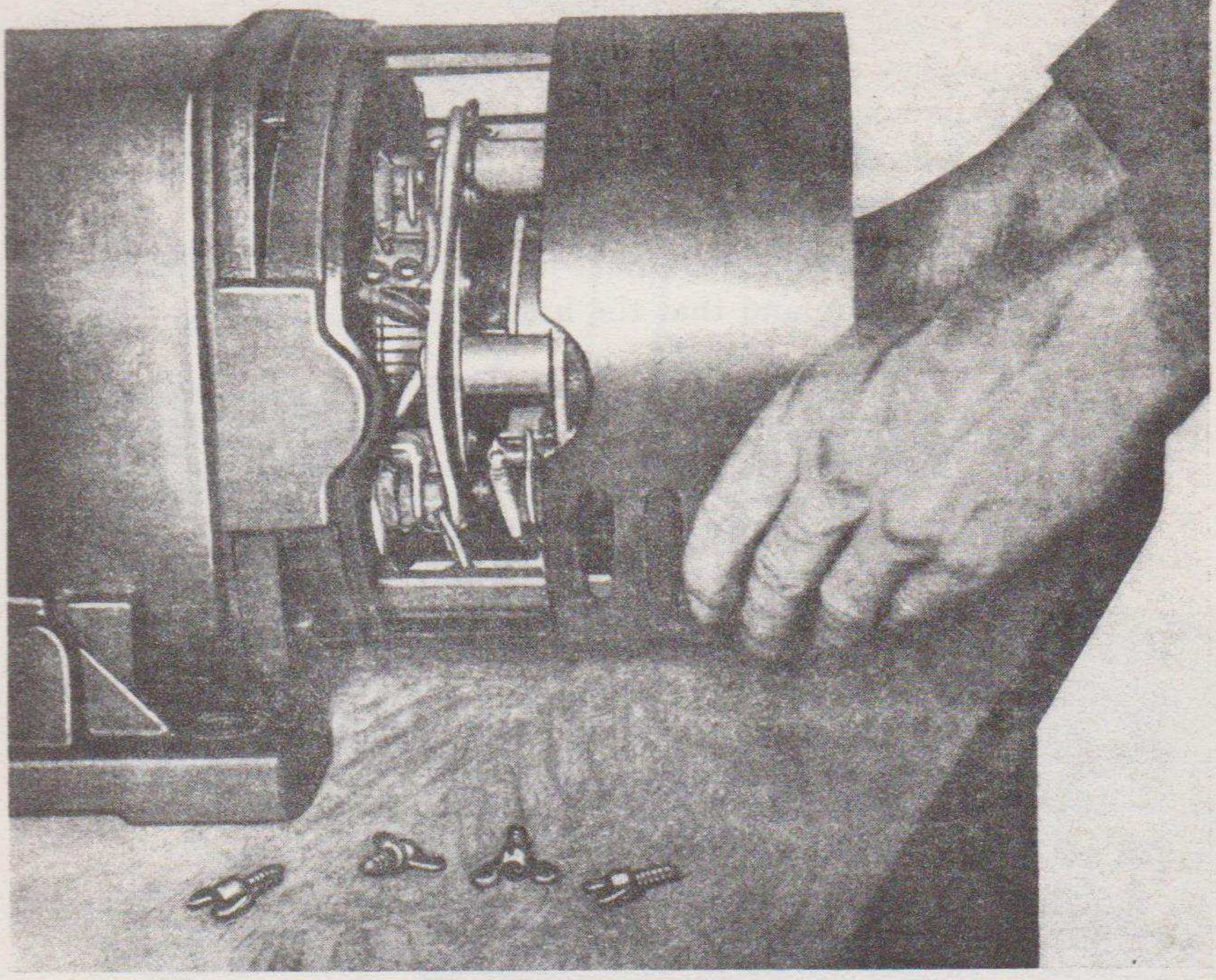


Figure 19. Removing commutator cover.

59. Major Parts Inspection

a. Flywheel Inspection. Carefully inspect the engine flywheel to see that it is in satisfactory condition. Look for cracked or broken fan blades and stripped or damaged threads. See that the keyway is not worn and that the starter pin is not damaged.

b. Drive Pulley Inspection. Inspect the generator drive pulley to see that it is in satisfactory condition. Check to see that the keyway is not damaged, that the pulley is not cracked, and that the belt grooves are in satisfactory condition. Duplicate this inspection for both the generator and engine pulleys.

c. Spark Plug and Shielding Inspection. Carefully inspect the spark plug to see that the insulator is not burned, cracked, or otherwise damaged. Inspect the electrodes to see that they are not burned excessively. Inspect the threaded portion of the plug to see that the threads are not damaged. Test the spark plug to see that it is not short-circuited. Carefully inspect the shielding to see that it is not damaged, and test the spark plug cable to see that it is not short-circuited. Inspect the elbow connector to see that it is not damaged and that the threads are in satisfactory condition. See that the small insert in the spark plug end of the assembly is present and in satis-

factory condition. Inspect the cable connection to the spark coil to see that it is secure.

d. Magneto and Backplate Inspection. Inspect the magneto armature and rotor to see that they are in satisfactory condition. Test the rotor to see that it has not lost its magnetism. Inspect all threads to see that they are not damaged. Test the primary and secondary windings of the spark coil to see that they are not open-circuited or short-circuited.

e. Magneto Breaker Assembly Inspection. Inspect all connecting leads to see that terminals are secure and that the leads are in a satisfactory con-

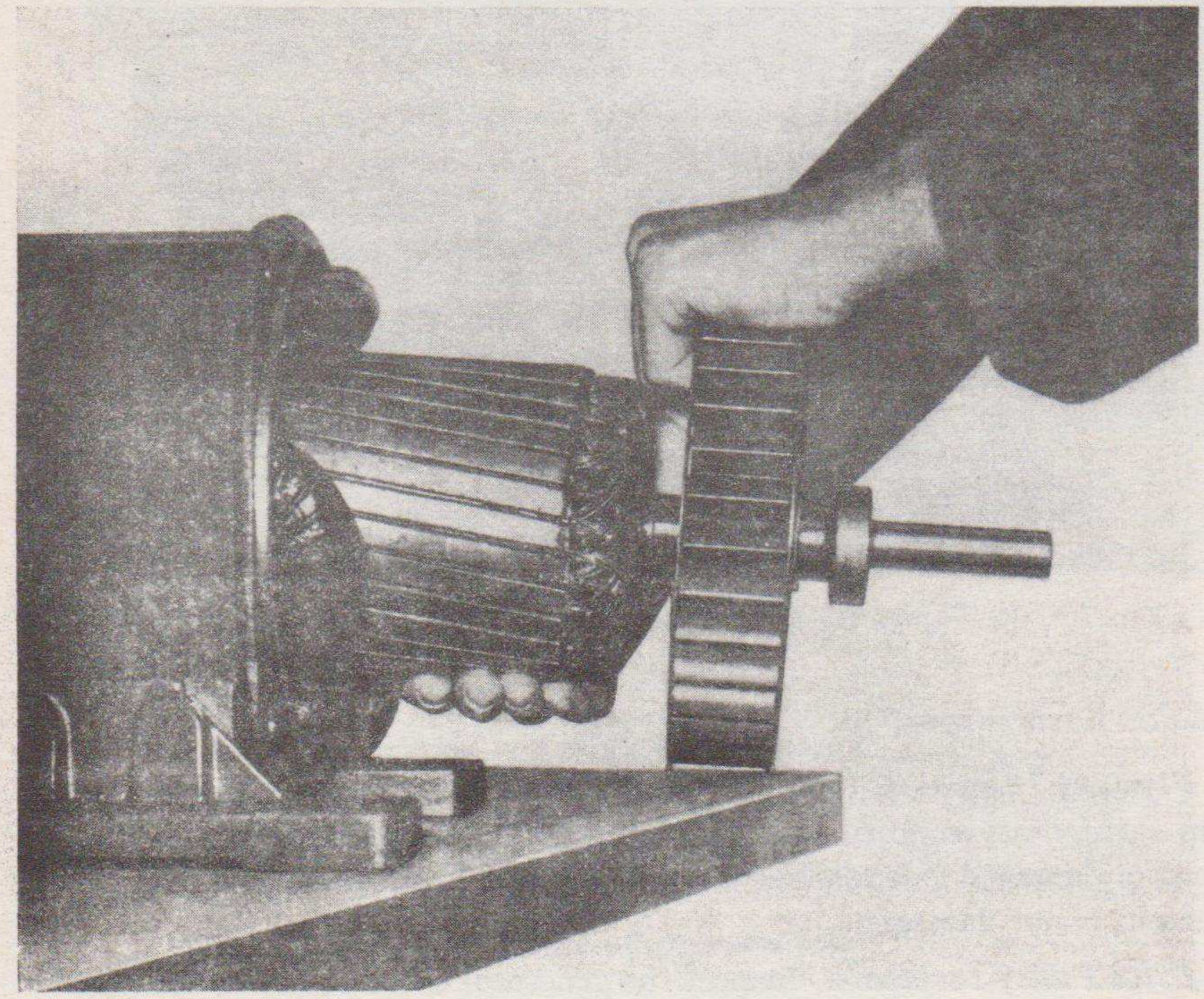


Figure 20. Removing generator armature.

dition. Inspect the shaft to which the movable arm of the breaker is attached to see that it is not worn. Inspect both the stationary and moving contacts to see that the points are not burned or pitted excessively. Test the capacitor and inspect the stop switch to see that they are in satisfactory condition.

f. Cylinder Head Inspection. Inspect the cylinder head to see that none of the cooling flanges is cracked or broken. See that the threads in the spark plug hole are not damaged. Check to see that the head is not warped. See that the mounting surfaces are not damaged.

g. Cylinder and Crankcase Inspection. Inspect the cylinder cooling flanges to see that none of them is cracked or broken. Inspect the threads in all

threaded holes to see that the threads are not damaged. See that all mounting surfaces are in satisfactory condition. Use an inside micrometer and measure the inside diameter at the approximate center of the piston ring travel. Measure the cylinder both at right angles to and parallel to the crankshaft. Compare the measurements with the table in paragraph 56.

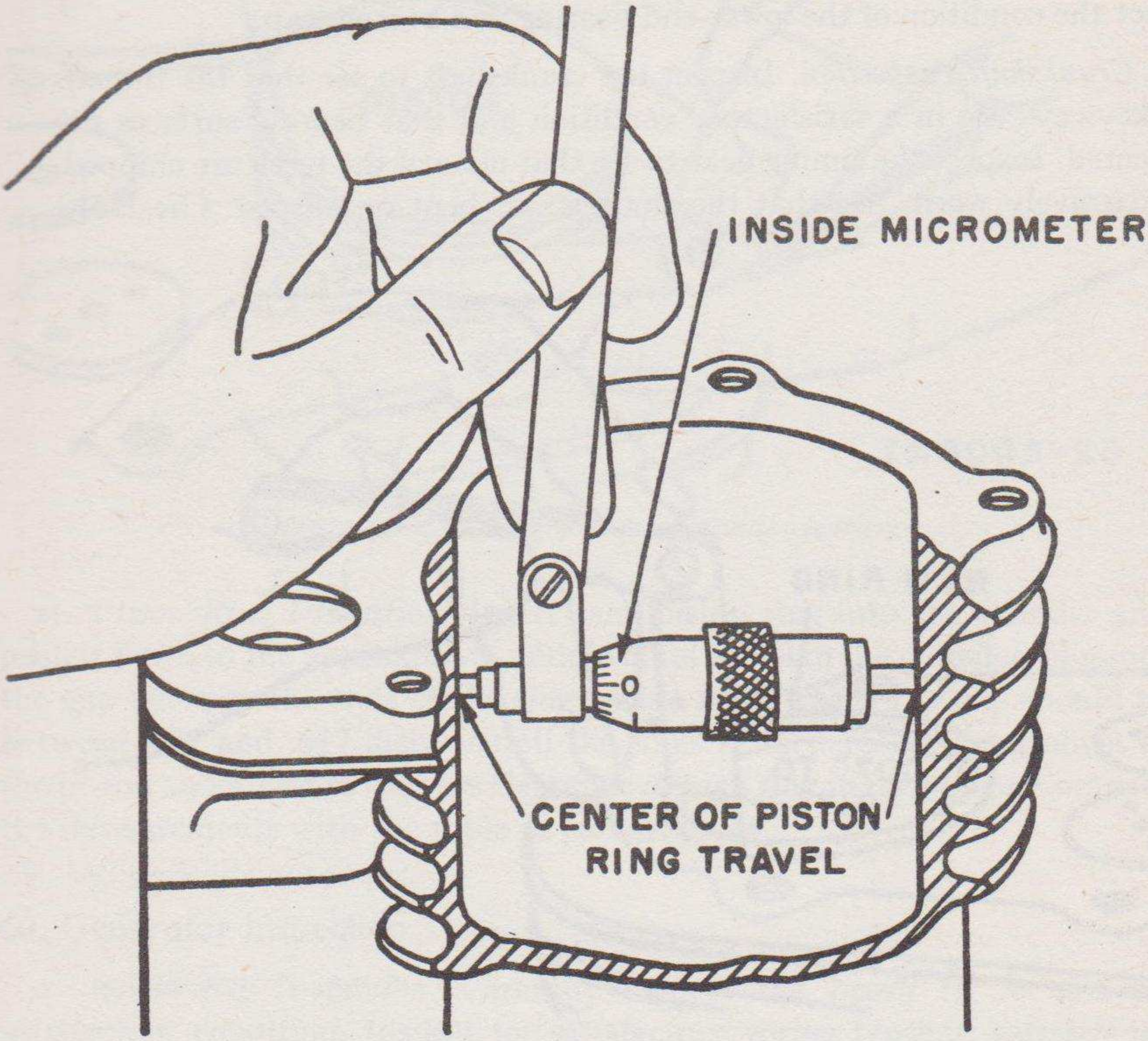


Figure 21. Measuring cylinder.

Inspect the valve seats, check their chamfer, and check the valve stem guides. Compare the measurements with the table in paragraph 56.

h. Valve Inspection. Inspect both the intake and exhaust valves. Inspect the valve stems for excessive wear; see that they are not warped or bent. Inspect the valve faces to see that they are not burned and measure the width of the seats. Check the chamfer and compare all measurements with the table in paragraph 56. Inspect the governor mounting stud for wear.

i. Connecting Rod and Piston Inspection. Inspect the piston for general condition. Measure the outside of the piston with an outside micrometer and compare the measurements with the table in paragraph 56. Take measurements both parallel to and at right angles to the piston pin. With the piston

rings installed, check the side clearance between the piston rings and the sides of the ring grooves. Compare the measurements with the table in paragraph 56. Measure the inside of the piston pin hole and compare the measurement with the table in paragraph 56. Also measure the inside diameter of the piston pin bearing in the upper end of the connecting rod. Inspect the connecting rod to see that it is not twisted or warped and inspect the condition of the lower-end bearing and bearing cap.

j. Crankshaft Inspection. Inspect the crankshaft to see that the threads and keyways are in a satisfactory condition and that bearing surfaces are not scored. Inspect the timing gear to see that none of the teeth are chipped, or excessively worn. See that the shaft is not bent or warped. Check the

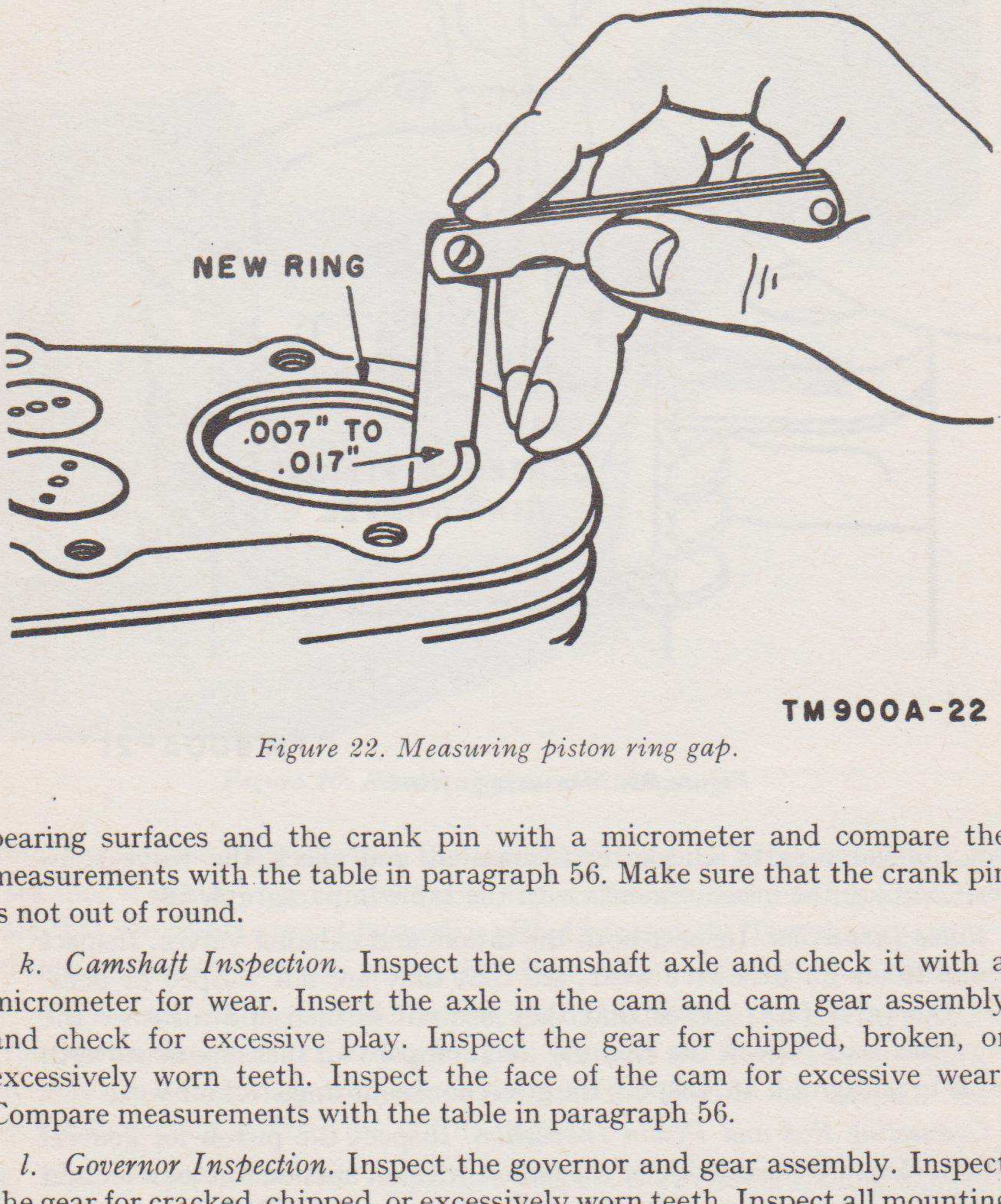


Figure 22. Measuring piston ring gap.

bearing surfaces and the crank pin with a micrometer and compare the measurements with the table in paragraph 56. Make sure that the crank pin is not out of round.

k. Camshaft Inspection. Inspect the camshaft axle and check it with a micrometer for wear. Insert the axle in the cam and cam gear assembly and check for excessive play. Inspect the gear for chipped, broken, or excessively worn teeth. Inspect the face of the cam for excessive wear. Compare measurements with the table in paragraph 56.

l. Governor Inspection. Inspect the governor and gear assembly. Inspect the gear for cracked, chipped, or excessively worn teeth. Inspect all mounting pins for wear, and see that the flyweights move freely.

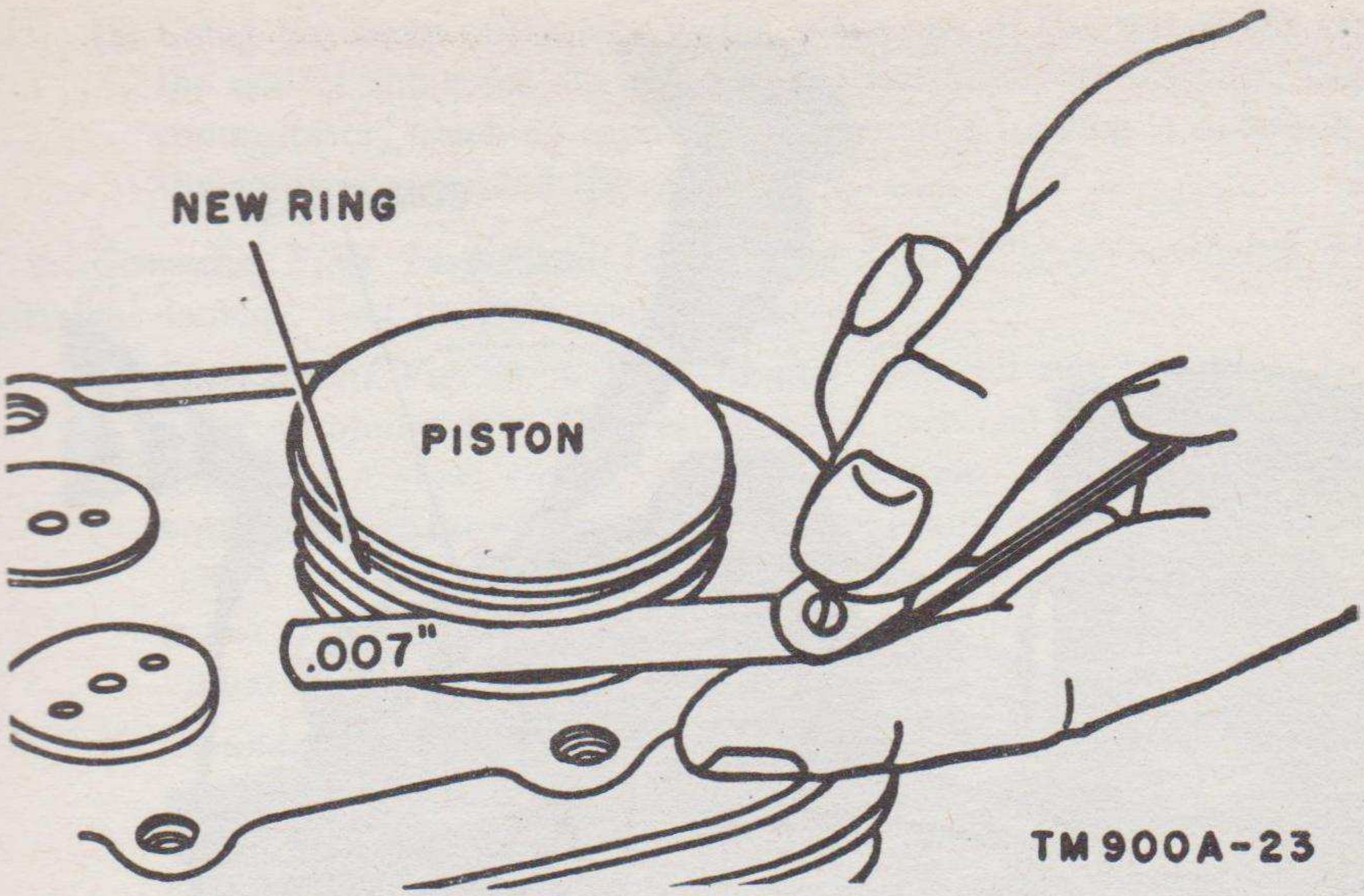


Figure 23. Checking piston ring side clearance.

m. Piston Ring Inspection. Insert each piston ring into the cylinder and push it down to the approximate middle of its travel in the cylinder. Measure the gap between the ends of the ring with a feeler gage. The gap should be between .007 and .017 inch. Install the rings in their respective grooves in the piston and measure the side clearance of each ring in its groove. Compare the measurements with the table in paragraph 56.

60. Generator Inspection

a. Brush Rig Inspection. Carefully inspect the brush rig for general satisfactory condition. Inspect for satisfactory spring tension; satisfactory brush fit in brush holders; and satisfactory mounting. Inspect all insulators and insulating washers to see that they are in satisfactory condition.

b. Generator Rotor Inspection (figs. 24 and 25). Inspect the slip rings to see that they are not worn or pitted. See that they are not grooved from brush contact. Inspect the commutator to see that it is not burned, worn, or pitted. See that it is not grooved from brush contact and that the undercutting of the mica between the commutator bars is satisfactory. Inspect the commutator to see that all leads are soldered satisfactorily. Test the rotor for grounding or for a short circuit as follows:

(1) Secure a continuity meter and place one of the test prods on one of the commutator bars. Hold this prod on the bar selected and place the other prod on the bar that is 180° around the commutator. Move the two test prods around the commutator, keeping them 180° apart, until all commutator bars have been tested. If a reading is obtained at any point, the rotor is short-circuited (fig. 24).

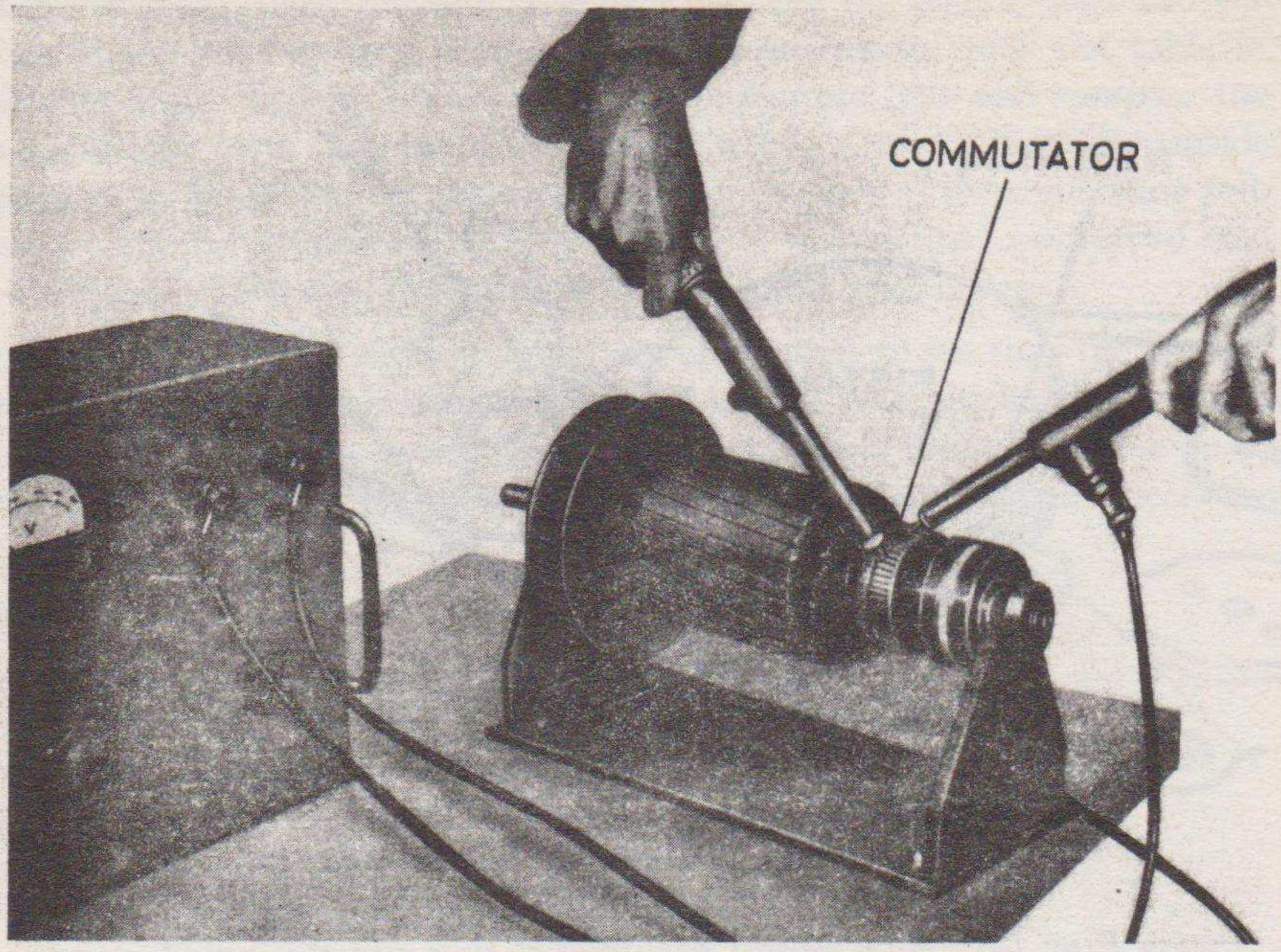


Figure 24. Testing for short-circuited armature.

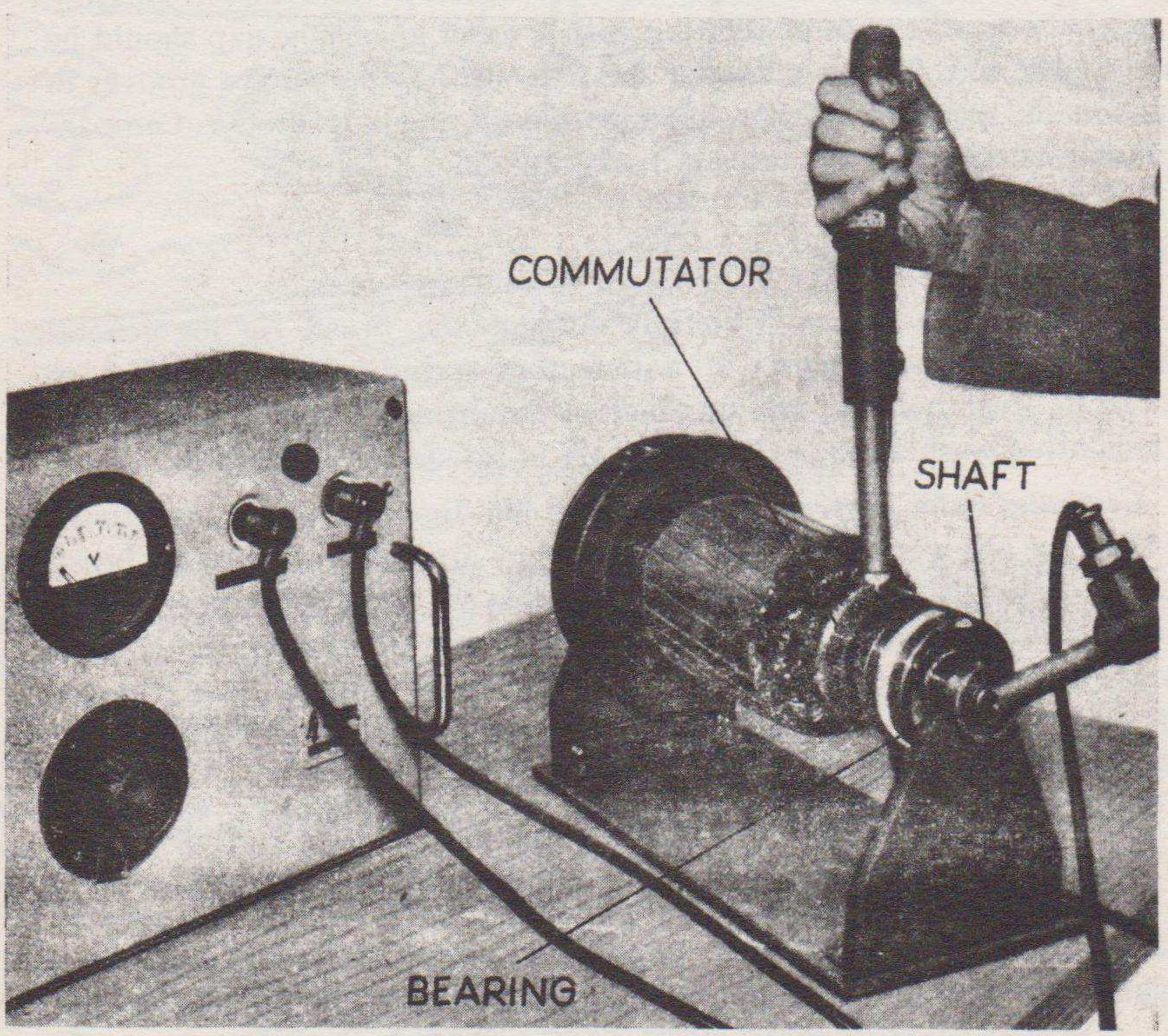


Figure 25. Testing for grounded armature.

(2) Using the same continuity meter, place one of the test prods on the end of the rotor shaft and move the other prod around the commutator, touching each bar in turn. If a reading is obtained, the rotor is grounded (fig. 25).

c. Generator Field Inspection. Inspect the field coils for evidence of physical damage. Test the field coils as follows:

(1) *Short circuit.* Fig. 26. A short-circuited field coil may be located by using an ohmmeter. (The resistance of each coil is approximately .80 ohm.) A short circuit can be located, also, by applying a low voltage across the entire winding and checking the voltage on each coil. A shorted coil will show less voltage drop than a coil which is not shorted. Break the taped field coil connectors to test individual coils.

(2) *Grounded circuit.* Fig. 27. To determine whether the field circuit is grounded, disconnect both field leads from the brushes and connect a continuity tester between one lead and the field frame. If current flows, the field circuit is grounded.

(3) *Open field circuit.* To test for an open field circuit, use a test lamp or continuity meter. Disconnect the two field leads and place one test prod on each of the leads. If the lamp does not light or there is no reading on the meter, the circuit is open (figs. 26, 28).

d. Suppressor Box Inspection. Check each capacitor in the suppressor to see if it is short-circuited or grounded. Attach one test prod to one of the

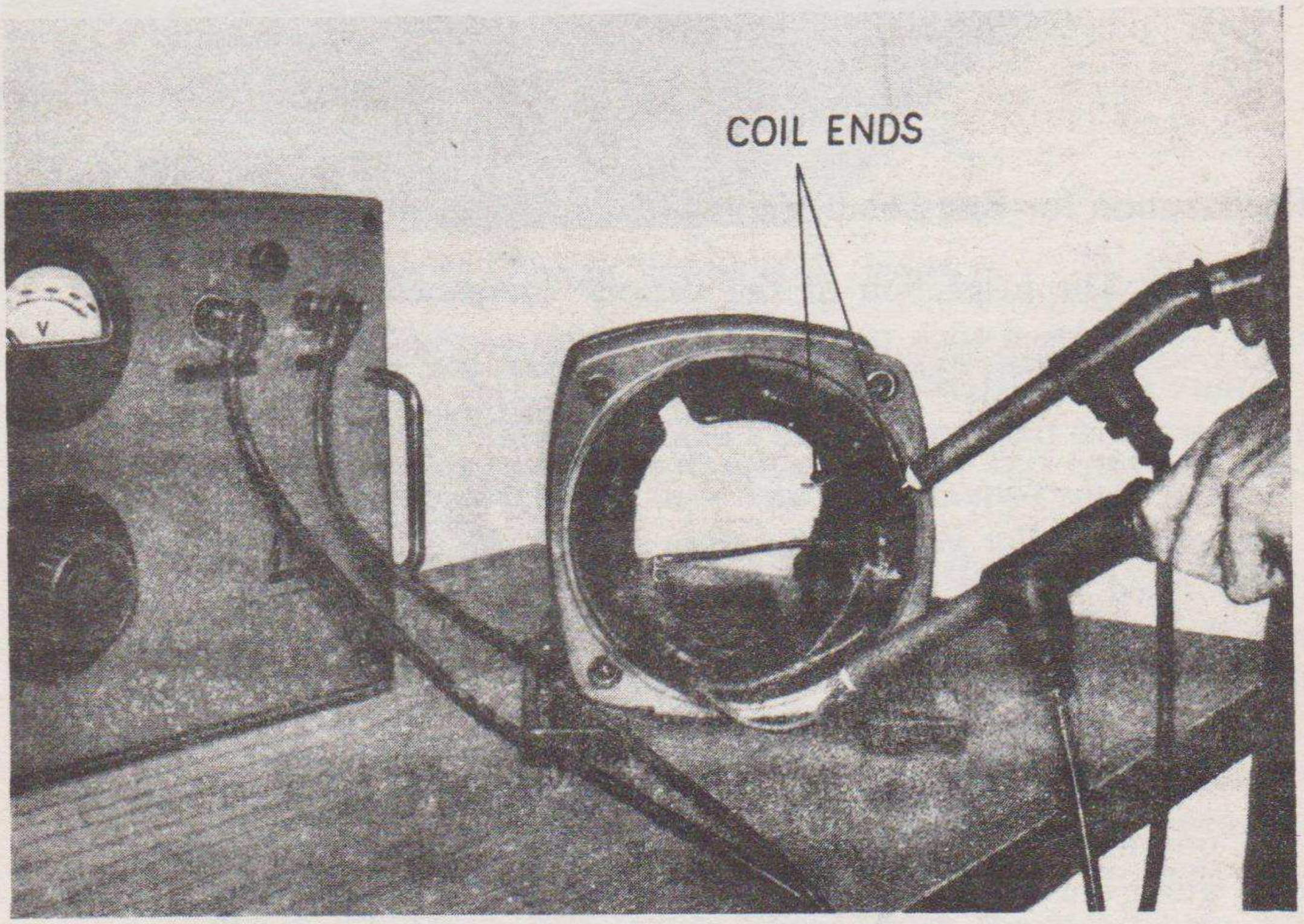


Figure 26. Testing individual field coils.

output binding posts and the other prod to the grounded side of the capacitor. If current flows, the capacitor is short-circuited. Test both choke coils with a continuity meter. Place one prod on one of the output terminals and the other on one of the generator leads. If no current flows, the choke coil is open.

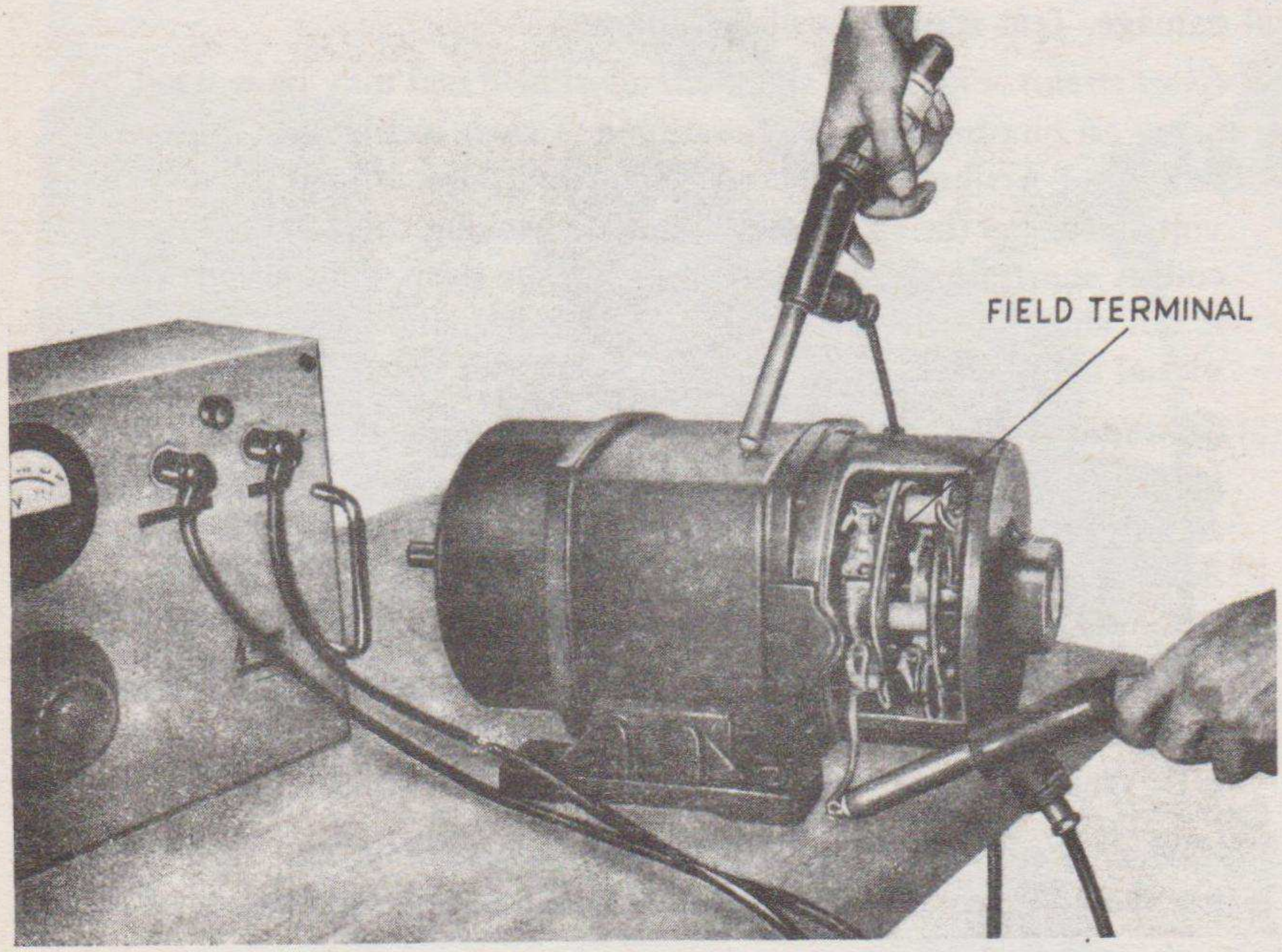


Figure 27. Testing field winding for ground.

Section IV. REASSEMBLY

61. Preparation for Reassembly

a. General. The inspection of the various components and assemblies should have disclosed such parts and assemblies as require replacement or that require special attention before reassembly. This paragraph covers any special operations that are necessary before reinstalling old parts.

b. Valves, Valve Guides, and Valve Seats. If the valve inspection indicated that the valves and/or valve stems were worn badly, that the stems were bent or warped, or that the valves were otherwise unsatisfactory, replace them with new valves. If the valve guides were found to be worn excessively, replace them as follows:

(1) Test the valve guides with Briggs and Stratton plug gage No. 69829–T 19. Try the gage in several positions because the hole may be out of round. If the gage enters the valve guide freely, a new valve guide must be installed. For the inlet valve, use valve guide, Signal Corps stock No. 3H2485–11. For the exhaust valve, use valve guide,

Signal Corps stock No. 3H2485–10. Use a piece of $^5/_{16}$-inch rod and an arbor press and press the old guide about ½ way out. Break off the exposed portion of the guide and then push the remaining portion of the guide out of the cylinder block (E of fig. 29).

(2) Insert the new valve guide into the valve guide hole and press it into place with a piece of $^5/_{16}$-inch rod and an arbor press. Do not press the guides all the way down. The top of inlet valve guide must be 1 inch below the top of the cylinder block and the exhaust valve guide must be 1 ¼ inch below the top of the block.

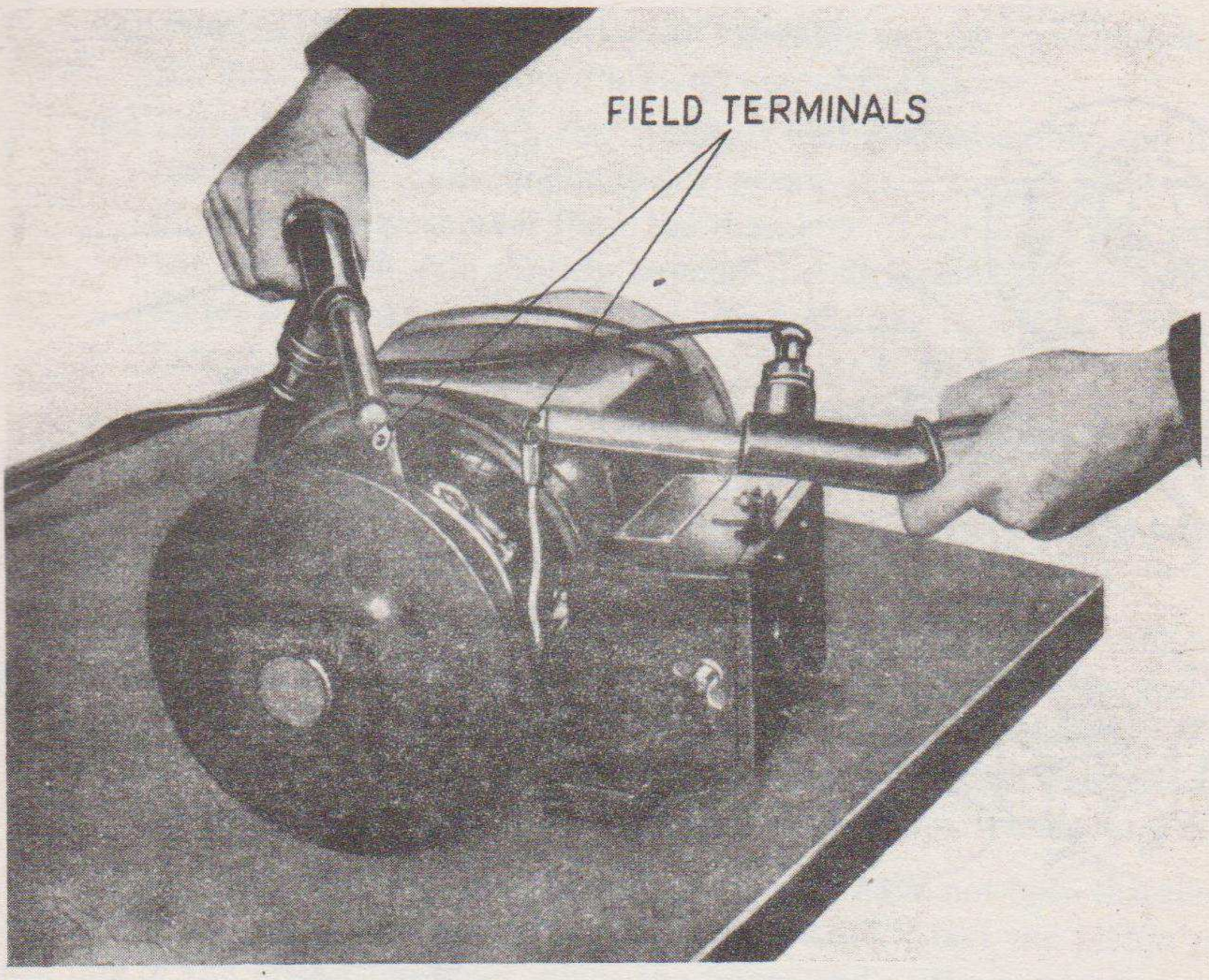


Figure 28. Testing for open field circuit.

(3) If the valve seats were found unsatisfactory upon inspection, remove and replace them as follows:

(*a*) Insert the valve seat insert puller, Briggs and Stratton No. 290914 (A of fig. 29).

(*b*) Tighten the cap screw (B of fig. 29), until the valve seat insert is pulled free.

(*c*) Insert the counterbore cutter pilot, Briggs and Stratton No. 61348–T1–23, in the valve guide (C of fig. 29).

(*d*) Place the counterbore cutter (Briggs and Stratton No. 61348–T1–63) on the cutter shank (Briggs and Stratton No. 61348–T1–43) and insert the tee handle (Briggs and Stratton No. 61348–T1–53) in the shank. Counterbore the insert hole, by

hand, until the stop on the cutter touches the top of the cylinder (C of fig. 29). *Be careful not to force the cutter to one side as this will cause it to cut oversize.*

(*e*) Remove the cutter and pilot. Place the new valve seat insert in the recess and replace the pilot in the valve guide. Use the driver (Briggs and Stratton No. 61348–T1–122) and drive the insert into place (D of fig. 29).

(*f*) Grind the valve onto the seat with a valve seat grinder and then lap the valve and seat just enough to remove the grinding marks.

Figure 29. Replacing valve seat insert and valve guide.

62. Major Engine Assembly

a. Valve Tappet and Cam Assembly.

(1) Set the cylinder and crankcase assembly so that the bottom of the crankcase is up.

(2) Insert the valve tappets in the crankcase.

(3) Enter the camshaft axle in the hole from which it was driven in disassembly. Insert the axle from the flywheel side of the crankcase.

(4) Position the camshaft and gear assembly in the crankcase with the gear toward the power take-off end of the engine.

(5) Drive the axle through the camshaft and gear assembly and into the hole in the crankcase on the drive side of the engine. Use a piece of rod, slightly smaller than the diameter of the axle, and drive the end of the axle slightly beyond the surface of the crankcase. Enter the expansion plug in the hole and drive it in flush with the face of the crankcase.

b. Governor Assembly. Install the breaker shaft and lever and the governor shaft and lever. Install the governor and gear assembly. See that the governor gear meshes properly with the cam gear and that the governor flyweights and plunger move freely.

c. Magneto Breaker Assembly. Install the magneto breaker assembly on the outside of the crankcase. Be sure that the primary lead is in the groove on the under side of the breaker box and under the capacitor mounting tang on the inside of the breaker box. Hold the magneto breaker shaft on the inside of the crankcase and install the movable breaker arm, washer, and nut.

d. Piston and Connecting Rod. If the piston rings have not been installed, install them in their respective grooves in the piston. Start the piston pin into one of the piston pin holes, place the upper end of the connecting rod in position inside the piston, and push the piston pin through the upper end of the connecting rod and into the piston pin boss on the other side of the piston. The piston pin is a slip fit, and very little pressure should be required to press it into place. Center the piston pin and install the two piston pin retainer rings.

e. Crankshaft.

(1) Before installing the crankshaft in the engine crankcase, install the two crankshaft bearings. Place the bearings in oil that has been heated to approximately 300° F. before installing them. This will expand the bearings and enable slipping them onto the crankshaft.

(2) Clamp the crankshaft in a vise and slip the two bearings onto the shaft with the sealed side toward the crank throw. Do not attempt to hasten the cooling of the bearings. Allow them to cool slowly.

(3) Install the bearing support plate on the flywheel end of the engine.

(4) Rotate the cam gear until the timing mark is visible at about the center of the crankcase cover plate opening (fig. 30).

(5) Insert the crankshaft through the cover plate opening and match the timing mark on the crankshaft gear with the timing mark on the cam gear (fig. 30).

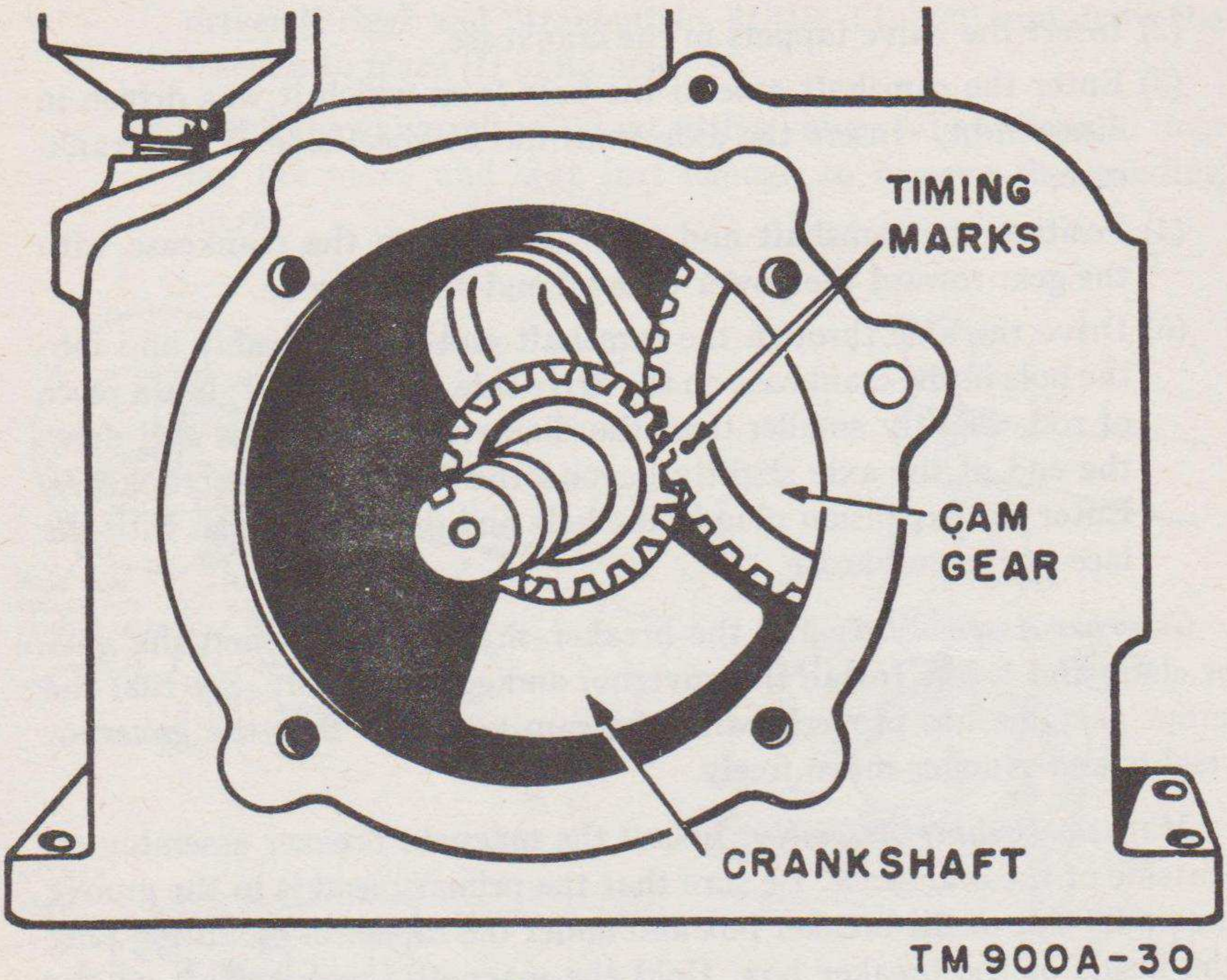


Figure 30. Timing gear markings.

Caution: When inserting the crankshaft, be careful not to damage the timing gear by striking it with the crank throw or crankshaft counterweight.

(6) Wrap a piece of .002-inch shim stock around the two shoulders on the crankshaft to protect the oil seal while installing the cover plate. Slide the cover plate and oil seal over the end of the crankshaft and secure the cover plate with the cap screws provided. Remove the shim stock after the cover plate has been installed.

(7) Check the end play of the crankshaft with a dial gage. The play should be between .002 and .008 inch. If the end play is unsatisfactory, remove the bearing support plate from the flywheel end of the engine and use a thicker or thinner gasket, as required. Gaskets of various thickness are provided and one or more may be used.

(8) Place the magneto rotor key in the keyway on the crankshaft and slide the magneto rotor onto the crankshaft until the setscrew hole in the rotor registers with the setscrew hole in the crankshaft.

(9) Insert and tighten the rotor setscrew and then screw the lockscrew into the lockscrew hole in the rotor. This is a self-tapping screw.

(10) Install the magneto backplate and secure it with the mounting screws.

e.1. Magneto Installation and Timing. Install the magneto breaker box assembly onto the side of the engine crankcase. Be sure that the primary lead is kept in the groove on the under side of the breaker box and under the capacitor mounting tang (fig. 13). Assemble the balance of the magneto breaker box assembly as follows:

(1) Place the breaker plate on the insulating plate. Make sure that the dowel on the breaker plate engages the hole in the insulating plate.

(2) Install the breaker plate screw and tighten it only enough to put a light tension on the breaker plate. Adjust the eccentric so that the left-hand edge of the insulating plate is parallel with the edge of the breaker box and then tighten the breaker plate screw securely.

(3) With the spark plug removed from the cylinder, rotate the crankshaft clockwise until the intake valve just closes. Continue to rotate the crankshaft, in the same direction, one-half turn more.

(4) Turn the breaker arm shaft as far as it will go in a clockwise direction and press the breaker arm onto the taper of the shaft. Install the lockwasher and nut and tighten the nut securely.

(5) Replace the breaker arm spring screw. Make sure that one of the plain washers is under the spring and that the second plain washer and then the lockwasher are on top of the spring when installing the screw. Tighten the screw securely.

(6) Attach the primary lead and the capacitor lead to the breaker plate terminal with the terminal screw.

(7) Loosen the breaker plate screw, rotate the eccentric and, using a feeler gage, adjust the gap between the breaker points to .020 inch. Be sure not to disturb this adjustment, and tighten the breaker plate screw securely.

(8) Rotate the crankshaft clockwise until the breaker points again open to their widest separation and recheck the gap adjustment. Readjust the gap if it does not measure .020 inch.

(9) With the breaker point gap correctly adjusted, rotate the crankshaft in its normal direction of rotation until the breaker points just begin to separate. Loosen the three armature adjusting screws slightly. Rotate the armature until the arrow on the armature lines up with the arrow (marked 23) on the rotor and tighten the armature screws securely (fig. 31).

e.2. Breaker Point Replacement. To replace the magneto breaker points, rotate the crankshaft until the breaker points are at maximum separation.

This should occur when the piston is in TDC position on the compression stroke. Remove the screw that secures the capacitor lead and the primary lead. Remove the breaker arm spring screw. Loosen the nut on the breaker arm shaft until the top of the nut is flush with the end of the shaft and then tap the nut lightly to free the breaker arm from the shaft. Remove the nut and washer and then the breaker arm. Remove the breaker plate screw and

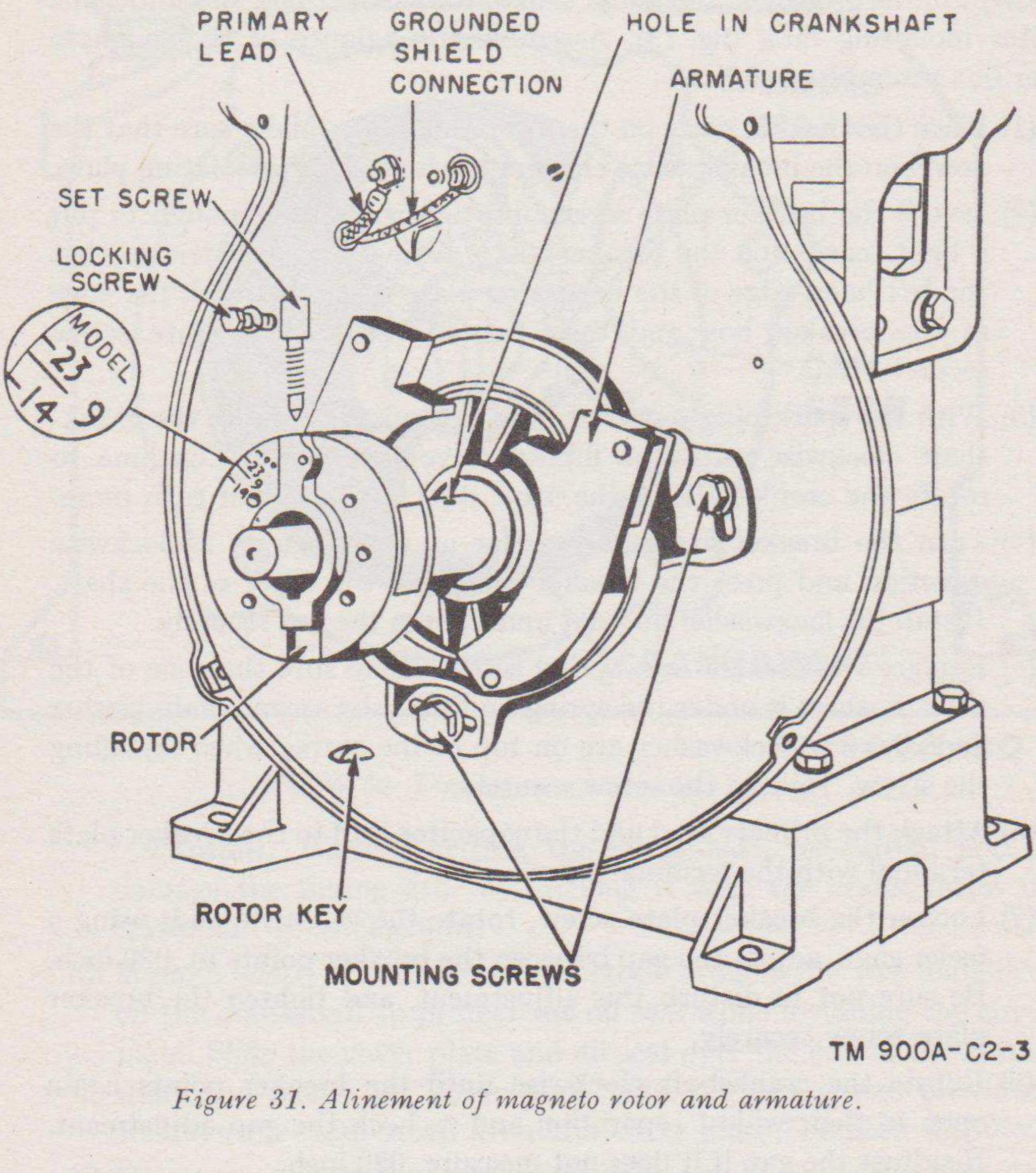


Figure 31. Alinement of magneto rotor and armature.

the breaker plate. Install the new breaker points in accordance with the procedure in *e.1* above.

f. Installing Flywheel and Drive Pulley. Rotate the crankshaft until the flywheel keyway is on top and place the flywheel key in the keyway. Line up the keyway, in the flywheel, with the key and place the flywheel on the tapered end of the crankshaft. Install the flywheel nut and screw it up as tight as possible, by hand. Place a block under one of the fins of the flywheel fan and tighten the flywheel nut securely.

g. *Installing Connecting Rod and Piston Assembly.*

(1) Place the cylinder and crankcase on its side.

(2) Compress the piston rings with a piston ring compressor and pass the lower end of the connecting rod through the cylinder, from the top. Reach into the cylinder, through the crankcase, and support the end of the connecting rod to prevent it from damaging the cylinder wall.

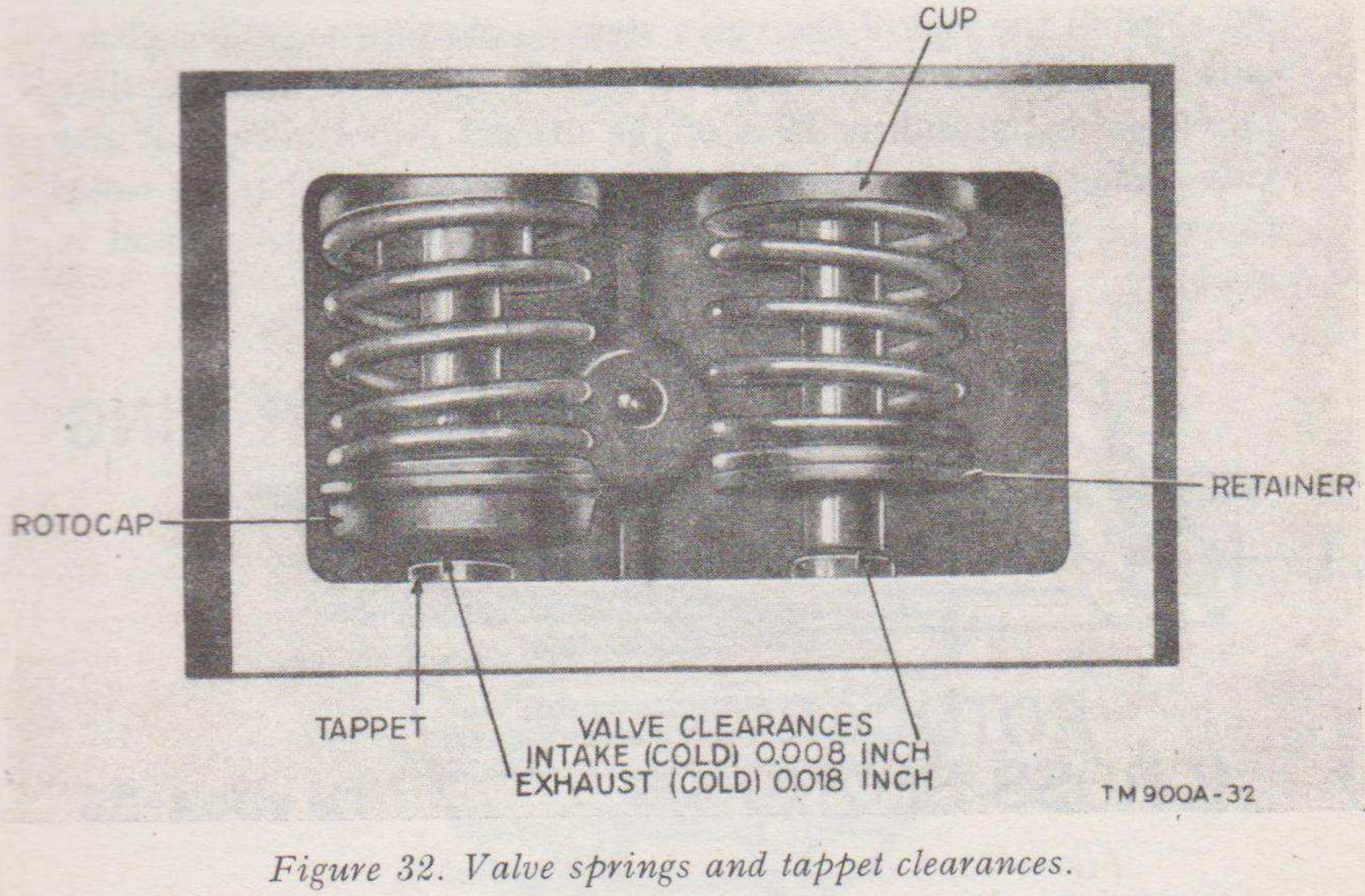


Figure 32. Valve springs and tappet clearances.

(3) Enter the piston in the top of the cylinder and press the piston down into the cylinder until its top is even with the top of the cylinder.

(4) Note that there is a flat on one side of the connecting rod and that there are assembly marks on both the rod and the bearing cap. See that the flat is on the valve side of the engine. Rotate the crankshaft until the crank throw is at the bottom of its travel and pull the connecting rod down onto the crank pin.

(5) Assemble the oil dipper to the connecting rod cap and install the bearing cap and oil dipper assembly to the bottom of the connecting rod.

(6) See that the assembly marks on the bearing cap are on the same side as the assembly marks on the connecting rod. Install the connecting rod cap screws, tighten them securely, and bend the tangs of the screw lock against one of the flats of the screw head to prevent the screw from turning.

h. *Installing Valves and Valve Springs* (figs. 32 and 33).

(1) Set the crankcase and cylinder assembly in an upright position and place the intake and exhaust valves in their respective guides and seats.

(2) Rotate the crankshaft until one of the valve tappets is at its lowest point. Press down on the associated valve and measure the clearance between the stem of the valve and the valve tappet. The clearance for the exhaust valve should be between 0.017 and 0.019 inch. The clearance for the inlet valve should be between 0.007 and 0.009 inch.

(3) If the clearance between the valve stem and valve tappet is too close, grind the end of the valve stem to obtain the proper clearance. If the clearance is too great, replace the valve with one that provides less clearance. It is of the utmost importance that the valve being tested be pressed firmly into its seat and that the valve tappet be at its lowest point when the clearance measurement is made.

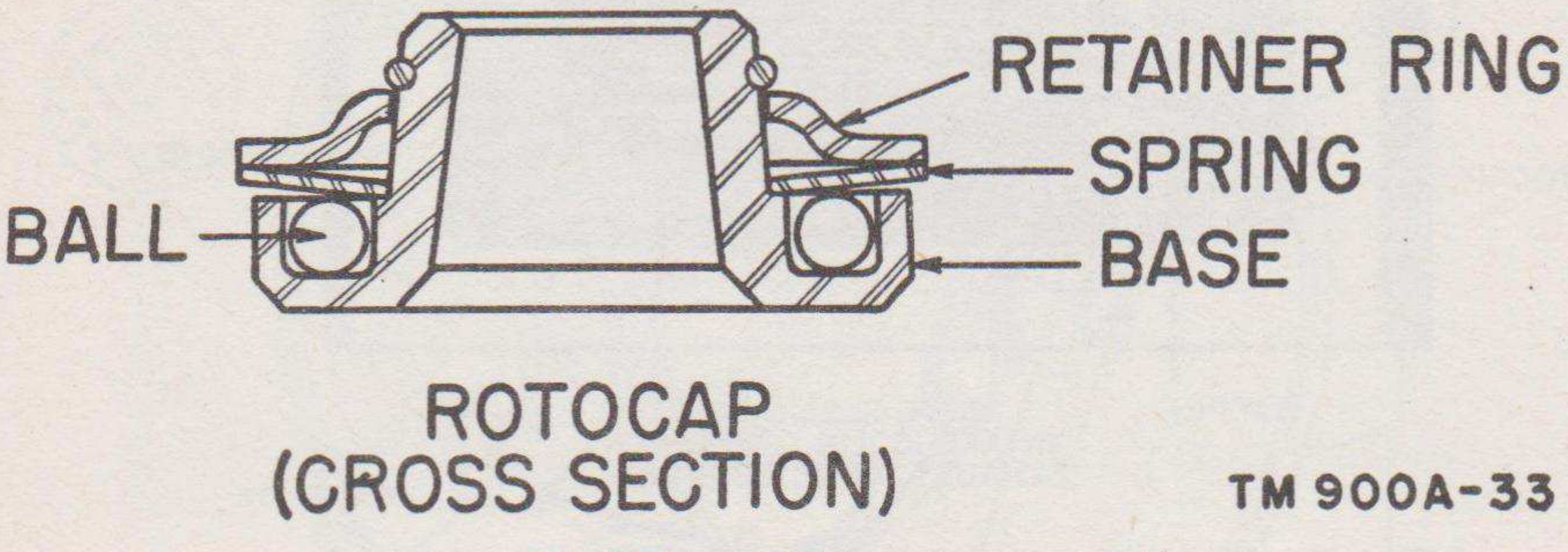


Figure 33. Exhaust valve rotocap assembly.

(4) Lift the inlet valve and slip the valve spring cup onto the valve stem. Place the valve spring in position, below the spring cup, and place the spring retainer washer below the spring.

(5) Compress the spring with a valve spring compressor. Place a dab of grease on the valve stem and install the split retainer collar. Make sure that the smallet diameter of the taper is toward the top and make sure that both halves of the retainer collar are seated properly in the groove in the valve stem. Release the spring compressor.

(6) Perform the same operations as outlined in (4) and (5) above and install the exhaust valve, valve spring cup, and retainer. Note that the exhaust valve is provided with a rotocap which is used in place of the retainer washer. Make sure that the rotocap is installed on the exhaust valve and not on the intake valve.

i. Mounting Cylinder and Crankcase on Base.

(1) See that the gasket surfaces of both the crankcase and the base are clean and smooth and place a new gasket in position on the base.

(2) Carefully place the cylinder and crankcase assembly in position on the base. The valve side of the cylinder and crankcase must be toward the side of the base on which the oil filler and oil drain are located.

(3) Install the four cap screws that secure the cylinder and crankcase to the base and pull them down tight. See that the retainer for the filler cap and the drain plug is installed under the head of one of the screws on the filler side of the engine and that all screws are provided with lockwashers.

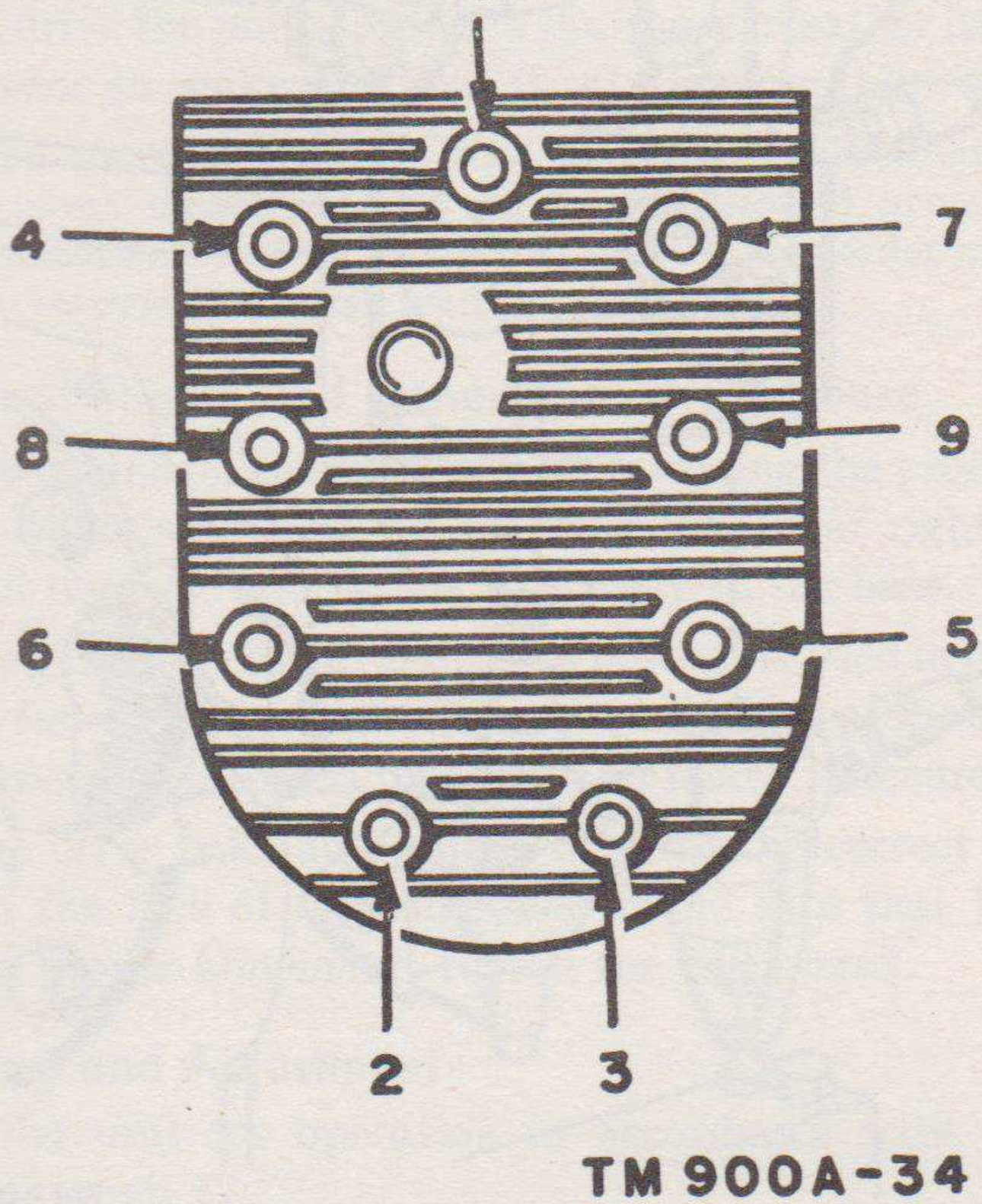


Figure 34. Sequence for tightening cylinder-head screws.

j. Installing Cylinder Head. See that the matching surfaces of the cylinder and cylinder head are clean and smooth, and set a new cylinder-head gasket in place on top of the cylinder. Place the cylinder head in position and place the cylinder-head baffle in position on the head. Install the cylinder-head screws and turn them down fingertight.

63. Installing Subassemblies and Accessories

a. Install the cylinder cooling air shroud.

b. Install the crankcase breather assembly.

c. Assemble the fuel tank to the fuel tank bracket and install the tank and bracket assembly.

d. Tighten the cylinder-head screws in accordance with the sequence shown in figure 34. Do not tighten any one of the screws all the way at one

time. Tighten each screw a little at a time to maintain even pressure on all parts of the head.

e. Install the fuel pump and filter assembly. Keep the pump mounting face parallel to the mounting face on the crankcase and see that the pump lever rides in the narrow groove that is between the cam gear and the counterweight on the crankshaft (fig. 35). See that the fuel pump mounting

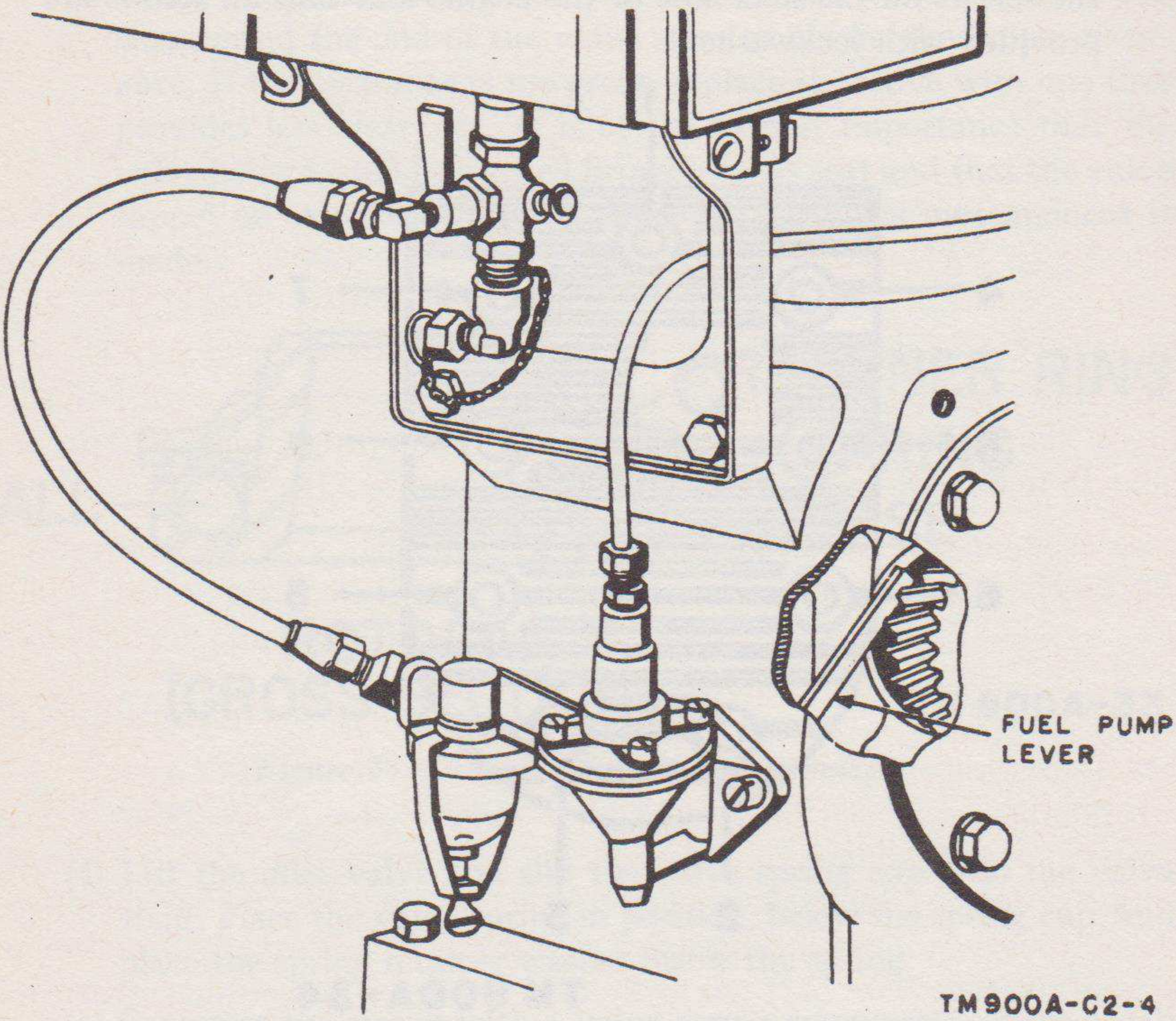


Figure 35. Position of fuel pump lever on crankshaft.

gasket is in place and in good condition. Secure the pump to the crankcase with the two cap screws provided.

f. Install the three-way fuel valve and install the fuel line between the fuel valve and fuel pump.

g. Install the carburetor elbow and baffle on the carburetor side of the engine and then mount the carburetor. See that all gaskets are in place and in good condition.

h. Install the air cleaner assembly and attach the air cleaner tube to the carburetor air intake. See that all joints and connections are airtight.

i. Install the fuel line between the carburetor and the fuel pump. Replace all control linkage, the governor spring, and the governor adjustment rod and nut by reversing the procedure used in removal.

j. Install the flywheel air shroud and place the starter pulley in position. Note that the center hole in the pulley is punched to fit the hexagonal flywheel nut and that there are three slotted holes in the pulley. Position the pulley so that the pin on the flywheel passes through one of the slotted holes and that the two cap screws that secure the pulley to the flywheel may be inserted through the other two holes. Tighten the cap screws securely.

64. Generator Reassembly

Reassemble the generator by reversing the procedure used in disassembling. Be sure that all wires are connected in accordance with the tags that were attached in disassembling. Place the key in the keyway on the drive end of the shaft and drive the pulley onto the shaft; use a leather hammer. Rotate the generator rotor to make sure that it rotates smoothly without binding.

Note. A limited number of Kurz-Root generators, procured on Order No. 22698–Phila–51, were delivered with incorrectly wound armatures. If, after replacing the armature or field on generators bearing this order number, the unit fails to generate, reverse the brush leads.

65. Installation of Engine and Generator on Skid Base

a. Mount the engine on the skid base by reversing the procedure followed in its removal. Make sure that the engine is alined at right angles to the crossmembers of the base and fasten it securely to the base.

b. Mount the generator by reversing the procedure used in its removal. The generator must be at right angles to the crossmembers of the skid base. Make sure that the generator is alined properly and fasten it securely to the base.

c. Install the drive belts and adjust them to the correct tension. Use a straightedge on the face of the pulleys to make sure that the engine and generator are in proper alinement. Install the belt guard.

66. Final Testing and Adjustment

a. Prepare the unit for operation in accordance with instructions in paragraphs 13 through 17.

b. Operate the unit, under full load, for a 3-hour period to test engine performance and generator output.

c. Apply various loads to the generator. It must operate at all loads within a frequency variation of not more than 2½ cycles between a range of 58 to 62 cycles. Full-load readings should be taken at a load of not less than 2,500 watts. The voltage reading, at no load, must not exceed 130 volts, and the temperature rise must not exceed 70° C. above the ambient temperature.

d. With the unit operating under full load, check the carburetor adjustment. Close the carburetor needle valve until the engine speed drops. Immediately open the needle valve about one-fourth of a turn or until the engine speed returns to normal. Should this adjustment result in a steady engine speed, but one that is below the rated speed of the unit (engine speed of 2,800 rpm), adjust the governor by means of the governor adjusting nut. If this does not produce the desired speed, try moving the governor spring

into a different hole in the governor arm. This spring may be connected into any one of the five holes in the arm. However, the second or third hole from the shaft will produce the best results.

e. When a satisfactory engine speed, under full load, has been obtained, remove the load from the unit and operate it at no-load or with a very light load. If the engine fails to stabilize with the governor properly adjusted, readjust the carburetor idle adjustment screw until satisfactory performance is obtained.

67. Refinishing

After the equipment has been repaired or overhauled and before returning it to the using organization, refinish it as follows:

a. If the finish of the equipment is damaged only slightly, clean the damaged surfaces thoroughly with sandpaper and solvent (SD). Apply light, even coats of paint with a small brush.

b. If the painted surfaces of the equipment are damaged badly or blistered from heat, remove all old paint with paint remover. Sandpaper the surfaces thoroughly and apply a smooth, even coat of primer to the surface. Sandpaper the priming coat lightly and apply a finish coat of paint.

Caution: Avoid getting paint on moving parts in such manner as to hinder their movement. Do not paint electrical contacts or connections, and avoid getting paint into oil and breather holes.

68. Suppression

a. Power Unit PE-75-AF-GY is suppressed to reduce interference with nearby radio equipment. Whenever the equipment has been overhauled or repaired, inspect all suppression components thoroughly. The suppression equipment is intended to suppress interference under normal operating conditions and with the power unit in a normal satisfactory condition. An abnormal condition of the power unit, or of the load, may result in greater interference than the suppression equipment can control. Do not assume that the suppression equipment is at fault until all other electrical components of the power unit have been checked thoroughly. When any work is performed on the equipment, it is vitally important that each suppression component be reinstalled in its exact original position.

b. Power Unit PE-75-AF-GY is suppressed as follows:

(1) The magneto is shielded completely and bonded to the engine.

(2) The spark plug cable is incased in a woven metallic braid. Threaded metal connectors are provided at the spark plug end of the cable for connection to the spark plug.

(3) Integrally shielded and suppressed spark plugs are used.

(4) Both internal-tooth and internal-external-tooth lockwashers and bonding straps are used on various parts of the equipment to insure good electrical contact between parts.

CHAPTER 5

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

69. Preparation for Storage or Shipment

a. If the equipment is not to be used for 30 days or more, or is to be transported to a remote point, rustproof it as instructed in paragraph 37.

b. After the equipment has been processed as instructed in paragraph 37, place it in its canvas cover and fasten the cover securely. Make sure that all tools and spare parts are present and in good condition. Replace any tools or spare parts that are missing and wrap all tools and spare parts in moistureproof wrappings. Mark all packages for identification.

70. Shipment

a. If the equipment is to be moved a short distance by truck or trailer, no crating will be required. Protect it, however, with a tarpaulin or other suitable covering.

b. If the equipment is to be shipped a considerable distance, pack it in suitable crates or boxes in accordance with applicable Joint Army-Navy Specifications.

Section II. DEMOLITION TO PREVENT ENEMY USE

71. Methods of Demolition

a. Smash. Use sledges, axes, handaxes, pickaxes, hammers, crowbars, and heavy tools.

b. Cut. Use axes, handaxes, and machetes.

c. Burn. Use gasoline, kerosene, oil, flame throwers, and incendiary grenades.

d. Explode. Use firearms, grenades, TNT.

e. Dispose. Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

f. Other. Use anything immediately available for destruction of this equipment.

72. Destruction of Components

When ordered by your commander, destroy all equipment to prevent its being used or salvaged by the enemy.

a. Smash cylinder, cylinder head, crankcase, spark plug and shielding, carburetor, muffler, air cleaner, blower housing, air ducts, flywheel and fan, suppressor box, magneto breaker assembly, fuel pump, fuel tank, all tools and spare parts.

b. Cut remote fuel hose, fuel lines, connecting wires and cables, canvas cover, and generator windings.

c. Burn fuel, lubricants, canvas cover, packing cases and crates, technical manuals, all other literature and documents, and generator windings.

d. Explode all equipment not otherwise destroyed.

e. Bury or scatter all remaining parts of the equipment.

f. Destroy everything.

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310–20–3, SR 310–20–4, and SR 310–20–5. Check Department of the Army Supply Catalog SIG 1 for Signal Corps Supply Catalogs.

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1. Army Regulations

AR 380–5 Military Security (Safeguarding Military Information).

AR 750–5 Maintenance of Supplies and Equipment (Maintenance Responsibilities and Shop Operation).

2. Supply Bulletins

SB 11–47 Preparation and Submission of Requisitions for Signal Corps Supplies.

SB 11–76 Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

SB 11–100 Serviceability Standards for Signal Equipment in Hands of Troops.

3. Painting, Preserving, and Lubrication

TB SIG 13 Moistureproofing and Fungiproofing Signal Corps Equipment.

TB SIG 23 Rustproofing of Engines.

TB SIG 69 Lubrication of Ground Signal Equipment.

TM 9–2851 Printing Instructions for Field Use.

4. Camouflage, Decontamination, and Demolition

FM 5–20 Camouflage, Basic Principles.

FM 5–25 Explosives and Demolitions.

TM 3–220 Mortar, Chemical, 4.2-inch.

5. Other Publications

SR 310–20–3 Index of Training Publications.

SR 310–20–4 Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, Modification Work Orders, Tables of Organization and Equipment, Reduction Tables, Tables of Allowances, Tables of Organization, and Tables of Equipment.

SR 700–45–5 Unsatisfactory Equipment Report (Reports Control Symbol CSGLD–247).

SR 745–45–5 AFR 71–4	Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD–66 (Army) and AF–MC–U2 (Air Force)).
TB ORD 313	Spark Plugs.
TB SIG 25	Preventive Maintenance of Power Cords.
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TM 11–453	Shop Work.
TM 11–483	Suppression of Radio Noises.
TM 11–661	Electrical Fundamentals (Direct Current).
TM 11–681	Electrical Fundamentals (Alternating Current).
TM 55–405	Preventive Maintenance of Electric Motors and Generators.

APPENDIX II

IDENTIFICATION TABLE OF PARTS

Note. The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as a specific T/O & E, T/A, SIG 7–8–10, list of allowances of expendable material, or another authorized supply basis. The Department of the Army Supply Catalogs applicable to the equipment covered in this manual are SIG 7 PE–75 and SIG 8 PE–75. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1.

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1. Power Unit PE–75–AF–GY (Sig C stock No. 3H4575AF)

Power Unit PE-75-AF-GY consists of the following major components:

Name of part	Function	Signal Corps stock No.
Gasoline Engine PD–31/U. (See par. 2, this appendix, for engine parts.)	Provides driving power for generator.	3H1909–1
Alternating Current Generator G–40/U–GY. (See par. 3, this appendix, for generator parts.)	Converts mechanical energy into electrical energy.	3H2320–40–GY
Electrical noise suppressor. (See par. 4, this appendix, for suppressor parts.)	Filters electrical noise and provides terminal outlets.	3Z1891–5.1–GY
Tools and miscellaneous parts. (See par. 5, this appendix.)		

2. Gasoline Engine PD–31/U

Gasoline Engine PD-31/U is broken down into the following subassemblies and parts:

a. Air Cleaner Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–2	CLEANER, air: oil bath type; $3^{7}/_{16}$″ h × $6^{3}/_{16}$″ dia; nonreplaceable element; one mtg hole $2^{1}/_{16}$″ dia; includes mtg gasket Br & Str part #67247 and internal gasket part #27401; Br & Str part/dwg #292401.	Filters air entering the carburetor intake passage.	3H955–30
O–6	GASKET: cork; one hole; cup-shaped; hole dia $1^{11}/_{16}$″, $2^{15}/_{64}$″ OD, 2.090″ ID, $^{9}/_{32}$″ h; Br & Str part/dwg #27401.	Seals air cleaner cover assembly to air cleaner body.	3H2154–60
O–14	GASKET: cork; one hole; round; $3^{1}/_{16}$″ OD, $2^{1}/_{16}$″ ID, $^{1}/_{8}$″ thk; Br & Str part/dwg #67247.	Seals air cleaner bowl to air cleaner pipe.	3H1909C/G4
H2	NUT, thumb: ¼″–20 NC–2; Br & Str part/dwg 92797.	Secures air cleaner cover.	6L3804–20–20C
O–15	PIPE: steel, enameled; irregularly shaped; approx 7 ¼″ lg × $5^{7}/_{8}$″ wd × $3^{1}/_{8}$″ h; one mtg hole 1 ½″ ID, two mtg holes $^{9}/_{32}$″ dia irregularly spaced; Br & Str part/dwg #292399.	Conducts air from air cleaner to carburetor.	3H4293–8
H102	STRAP, pipe: steel; $3^{13}/_{16}$″ lg × $^{5}/_{8}$″ wd × $^{1}/_{16}$″ thk, end w/ threaded hole $^{1}/_{8}$″ thk, two mtg holes, $^{17}/_{64}$″ dia and one ¼″–28 threaded on $3^{7}/_{64}$″ mtg/c; Br & Str part/dwg #220275.	Straps air cleaner pipe to lower carburetor body.	3H5341.2–5
H1	STUD: steel, zinc-plated and dichromated; 11 ½″ lg o/a; ¼″ dia × 11 ¼″ lg, .180″ dia × ¼″ lg; one end threaded $^{5}/_{8}$″ lg w/ ¼″–28 thd, other end threaded 1″ lg w/ ¼″–20 thd starting ¼″ from end; Br & Str part dwg #230141.	Mounts air cleaner assembly to air cleaner pipe and air cleaner pipe strap to pipe.	6L31180–1

b. Camshaft Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–62	GEAR ASSEMBLY: $3^{47}/_{64}$″ lg, $4^{31}/_{64}$″ dia gear w/ ½″ wd face; one ½″ dia mtg hole running thru entire lg; Br & Str part/dwg #292394.	Transmits crankshaft rotary motion through cams to operate valves.	3H2231–11
H113	PLUG, expansion: steel; .503″ OD × $^{3}/_{16}$″ lg o/a; cup-shaped; Br & Str part/dwg #65932.	Prevents oil leaks through crankcase camshaft hole.	3H1909C/P21
O–78	SHAFT: steel; $4^{25}/_{32}$″ lg, .498″ dia; 15° chamfer at ea end; Br & Str part/dwg #66203.	Supports and positions cam gear assembly to crankcase and crankshaft.	3H4575C/S22
O–68	SPRING: helical extension type; .042″ dia music wire; $1^{5}/_{64}$″ lg, .265″ OD; 13¾″ turns; hook term. at right angles to ea other; Br & Str part/dwg #26719.	Controls action of automatic spark advance weight on cam gear.	3H5255–55

c. Carburetor Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–26	CARBURETOR: updraft type; approx $4^{7}/_{16}$″ lg × $3^{5}/_{16}$″ wd × $4^{7}/_{8}$″ h o/a; $2^{3}/_{8}$″ lg × $1^{7}/_{16}$″ wd diamond flange; two ¼″–20 mtg holes on $1^{13}/_{16}$″ mtg/c; Br & Str part/dwg #292351.	Mixes air and gasoline to proper combustive mixture and controls flow of gasoline at different operating speeds.	3H687–2
O–29	BEARING, sleeve: SS; .306″ OD × $^{7}/_{32}$″ ID × $^{31}/_{64}$″ lg o/a; Br & Str part/dwg #23108.	Bearing surface for throttle shaft.	3H1909C/B17
O–43	PACKING: p/o Br & Str model 23BP engine, type #803311; leather; $^{9}/_{32}$″ OD × $^{3}/_{16}$″ ID × $^{3}/_{16}$″ thk; fits in packing nut; Br & Str part/dwg #68677.	Seals carburetor needle valve in packing nut.	3H1909C/P6

c. *Carburetor Group*—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–36	FLOAT, carburetor: brass; doughnut-shaped; approx $2^{3}/_{16}$″ lg × $2^{1}/_{8}$″ wd × $^{15}/_{16}$″ h o/a; one mtg hole $^{3}/_{32}$″ ID × ½″ lg; Br & Str part/dwg #99333.	Opens and closes carburetor float valve to control gasoline level in carburetor bowl.	3H1909C/F8
O–25	GASKET: vellumoid; three mtg holes; diamond-shaped; $2^{7}/_{16}$″ lg × $1^{7}/_{16}$″ wd × $^{1}/_{64}$″ thk o/a; Br & Str part/dwg #65647.	Seals carburetor to fuel intake elbow.	3H1909C/G9
O–35	GASKET: compressed asbestos, neoprene base; nine holes total; irregularly shaped; $3^{1}/_{8}$″ lg × 2¾″ wd × $^{1}/_{32}$″ thk; Br & Str part/dwg #27034.	Seals upper carburetor body to lower carburetor body.	3H1909C/G6
O–42	GUIDE, valve: brass; nipple w/hex. sect. at its ctr; Br & Str part/dwg #23117.	Retains and guides carburetor needle valve.	3H1909C/R1
A6	HOUSING: irregularly shaped; diamond-shaped flange w/ throat leading to round flange w/three mtg lugs; approx 3¼″ wd × $3^{1}/_{8}$″ lg × $2^{1}/_{8}$″ h o/a; three mtg holes $^{13}/_{64}$″ dia on $1^{11}/_{32}$″ rad bolt circle spaced 120° apart; includes throttle shaft and valve and idler valve; Br & Str part/dwg #292427.	Houses throttle valve assembly. Mounts idler valve screw. Mounts carburetor to fuel intake elbow.	3H2549.6–5
O–41	JET, carburetor: #50 drill size ctr hole, four .0415 dia holes spaced at right angles to ea other located $1^{5}/_{32}$″ from top of the jet; $^{5}/_{16}$″–32 × $^{1}/_{8}$″ lg male thd; $^{5}/_{16}$″ OD × $2^{7}/_{8}$″ lg o/a; Br & Str part/dwg #99345.	Meters fuel in carburetor at high speeds.	3H1909C/N15
O–45	LINK, lever: steel, zinc-plated and dichromated; irregularly shaped wire; $7^{15}/_{32}$″ lg, .080″ dia wire; hooks into holes in throttle and governor levers; Br & Str part/dwg #26845.	Connects carburetor throttle lever to governor lever.	3H2697–1
H69	NUT, packing: brass; $^{5}/_{16}$″–32 NC–2; $^{11}/_{32}$″ h o/a, thd lg $^{3}/_{16}$″, unthreaded hole .201″ dia, $^{3}/_{16}$″ lg; $^{7}/_{16}$″ wd across flats; Br & Str part/dwg #23118.	Retains carburetor needle valve packing.	3H1909C/N6
H53	PIN, grooved: steel, cadmium-plated and dichromated; Br & Str part/dwg #230132.	Attaches carburetor throttle valve stop to throttle shaft.	6L3903–7

H60	PIN, straight: brass; Br & Str part/dwg #23114.	Mounts carburetor float to upper carburetor body.	3H1901–AP/H1
H67	SCREW, machine: Fil H; steel, zinc-plated and dichromated; #8–32 NC–2; $^{9}/_{16}$″ lg; threaded portion ¼″ lg; $^{5}/_{32}$″ thk head, $^{5}/_{16}$″ dia; Br & Str part/dwg #230133.	Adjusts and maintains position of choke lever.	6L6832–9.3S1
O–27	SHAFT SUBASSEMBLY: round shaft w/small flat lever riveted to one end; approx $^{7}/_{32}$″ dia × 3 ¼″ lg o/a; lever $^{3}/_{8}$″ wd × $^{19}/_{32}$″ lg; mts into $^{7}/_{32}$″ dia holes in throttle housing; Br & Str part/dwg #292346.	Locates and operates carburetor butterfly throttle valve.	3H5220S
O–39	SHAFT SUBASSEMBLY: round shaft w/slot, w/lever riveted to one end; approx $2^{5}/_{16}$″ lg o/a; $^{1}/_{4}$″ shaft dia; lever 1 ½″ lg × $^{15}/_{16}$″ wd × $^{1}/_{8}$″ thk; mts into .255″ dia holes in lower carburetor body; Br & Str part/dwg #292349.	Controls and locates carburetor choke butterfly valve.	3H5220S–1
O–31 O–34	SPRING, helical compression type; .043″ dia music wire, zinc-plated and dichromated; .210″ ID × ½″ lg o/a; approx 5 turns; squared ends ground; Br & Str part/dwg #26867.	Retain carburetor idling valve screw position.	3H5255–96
O–40	SPRING: helical compression type; .043″ dia music wire, zinc-plated and dichromated; .240″ ID × $^{5}/_{16}$″ lg o/a; 3 ½ turns; squared ends ground; Br & Str part/dwg #26844.	Maintains friction to control position of carburetor choke lever.	3H5255–56
O–33	STOP, throttle: zinc alloy, dichromated; collar w/three lugs; Br & Str part/dwg #61967.	Stops carburetor throttle valve shaft travel.	3H1901–AP/S42
O–28	VALVE, butterfly: brass; disk-shaped; Br & Str part/dwg #62940.	Controls engine fuel intake from carburetor.	3H4575T/V4
O–38	VALVE, butterfly: steel, zinc-plated and dichromated; disk-shaped; approx 1.402″ lg × 1.230″ wd × .030″ thk; two mtg holes, oblong .142″ lg × .130″ wd on $^{13}/_{16}$″ mtg/c; Br & Str part/dwg #220259.	Closes carburetor air intake for starting engine.	3H6682–31
O–32	VALVE, needle: brass; knurled slotted head, threaded stem w/pointed end; Br & Str part/dwg #230172.	Meters upper carburetor body fuel intake at idling speed.	3H6682.2–7

c. Carburetor Group—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–44	VALVE, needle: brass; round rod w/a flatted and a pointed end; approx 2″ lg; flatted end $^{25}/_{64}$″ wd × $^{33}/_{64}$″ lg × $^{1}/_{16}$″ thk, body dia $^{3}/_{16}$″, tapered point $^{13}/_{32}$″ lg; thd into #10–32 threaded hole in retainer Br & Str part #23117; Br & Str part/dwg #230009.	Meters fuel to carburetor jet in lower body at high speeds.	3H6682–34
O–37	NEEDLE, valve: float needle valve, valve seat and fiber washer; Br & Str part/dwg #99780.	Controls fuel flow from fuel line to carburetor.	3H4575T/V2
H61 H68	WASHER, flat: fiber; round, .433″ OD, .318″ ID, $^{1}/_{16}$″ thk; Br & Str part/dwg #68667.	Seals fuel inlet valve seat to upper carburetor body.	3H1909C/G11
H66	WASHER, flat: brass; round, .225″ ID, .379″ OD, $^{1}/_{32}$″ thk; Br & Str part/dwg #62899.	Maintains friction to control position of carburetor choke lever shaft.	3H1909C/W5

d. Connecting Rod and Piston Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–22	PIN, wrist: steel; approx $2^{15}/_{32}$″ lg × $^{47}/_{64}$″ dia std; mts in hole in connecting rod and in holes in piston; includes pin lock rings; Br & Str part/dwg #69925.	Provides bearing surface and connects piston and connecting rod.	3H1901–A/P4
O–22	PIN, wrist: steel; approx $2^{15}/_{32}$″ lg × .740″ dia, .005″ oversize; mts in hole in connecting rod and in holes in piston; includes pin lock rings; Br & Str part/dwg #29103.	Provides bearing surface and connects piston and connecting rod.	3H4575C/P22
O–13	PISTON, engine: metal ring, seal type; aluminum; std size; two compression and one oil seal ring grooves; 3″ OD × $3^{1}/_{16}$″ lg; two .735″ ID rad wrist pin holes; includes piston rings and pin locks; Br & Str part/dwg #99947.	Transmits power from engine combustion chamber to connecting rod.	3H4575C/P28

O–13	PISTON, engine: metal seal type ring; aluminum; .010″ oversize; two compression and one oil seal ring grooves; 3.010″ OD × $3^{1}/_{16}$″ lg; two .735″ ID rad wrist pin holes; includes piston rings and pin locks; Br & Str part/dwg #99948.	Transmits power from engine combustion chamber to connecting rod.	3H4550/P33
O–13	PISTON, engine: metal seal type ring; aluminum; .020″ oversize; two compression and one oil seal ring grooves; 3.020″ OD × $3^{1}/_{16}$″ lg; two .735″ ID rad wrist pin holes; includes piston rings and pin locks; Br & Str part/dwg #99949.	Transmits power from engine combustion chamber to connecting rod.	3H4550/P31
O–13	PISTON, engine: metal seal type ring; aluminum; .030″ oversize; two compression and one oil seal ring grooves; 3.030″ OD × $3^{1}/_{16}$″ lg; two .735 ID rad wrist pin holes; includes piston rings and pin locks; Br & Str part/dwg #99950.	Transmits power from engine combustion chamber to connecting rod.	3H4550/P32
O–84	PLATE, retainer: steel; oblong-shaped w/a rectangular and two round holes; approx $2^{37}/_{64}$″ lg × $^{15}/_{16}$″ wd × .030″ thk; two mtg holes $^{21}/_{64}$″ dia on $1^{5}/_{8}$″ mtg/c; Br & Str part/dwg #22946.	Locks screws securing connecting rod cap, lock plate, and oil thrower to upper part of connecting rod.	3H4283
–1	RING, piston: compression type; 3″ cylinder dia, $^{3}/_{32}$″ wd, std size; straight; face; sq joint; Br & Str part/dwg #210076.	Seals combustion gases from crankcase. Prevents engine oil from entering combustion chamber.	3H5040–40
–1	RING, piston: compression type; 3.010″ cylinder dia, $^{3}/_{32}$″ wd, .010″ oversize; straight face; sq joint; Br & Str part/dwg #210077.	Seals combustion gases from crankcase. Prevents engine oil from entering combustion chamber.	3H5040–39
–1	RING, piston: compression type; 3.020″ cylinder dia, $^{3}/_{32}$″ wd, .020″ oversize; straight face; sq joint; Br & Str part/dwg #210078.	Seals combustion gases from crankcase. Prevents engine oil from entering combustion chamber.	3H5040–38
–1	RING, piston: compression type; 3.030″ cylinder dia, $^{3}/_{32}$″ wd, .030″ oversize; straight face; sq joint; Br & Str part/dwg #210079.	Seals combustion gases from crankcase. Prevents engine oil from entering combustion chamber.	3H5040–37

d. Connecting Rod and Piston Group—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
–1	RING SET, piston: two compression type, one oil type; 3″ cylinder dia, top and ctr compression type $^{3}/_{32}$″ wd; oil type $^{3}/_{16}$″ wd, all std; compression type; straight face; oil type; double bevel scraper, continuous channel, ventilated slot face; sq joint; Br & Str part/dwg #292100.	Seals combustion gases from crankcase. Seals engine oil from combustion chamber. Distributes engine oil to lubricate cylinder wall and piston rings.	3H5041–70.5
–1	RING SET; piston: .010″ oversize; two compression type, one oil type; compression type; straight face; oil type; double bevel scraper, continuous channel, ventilated slot face; sq joint; Br & Str part/dwg #292101.	Seals combustion gases from crankcase. Seals engine oil from combustion chamber. Distributes engine oil to lubricate cylinder wall and piston rings.	3H5041–70.4
–1	RING SET, piston: two compression type, one oil type; 3.020″ cylinder dia, top and ctr compression type $^{3}/_{32}$″ wd; oil type $^{3}/_{16}$″ wd, all .020″ oversize; compression type; straight face; oil type; double bevel scraper, continuous channel, ventilated slot face; sq joint; Br & Str part/dwg #292102.	Seals combustion gases from crankcase. Seals engine oil from combustion chamber. Distributes engine oil to lubricate cylinder wall and piston rings.	3H5041–70.3
–1	RING SET, piston: two compression type, one oil type; 3.030″ cylinder dia, top and ctr compression type $^{3}/_{32}$″ wd; oil type $^{3}/_{16}$″ wd, all .030″ oversize; compression type; straight face; oil type; double bevel scraper, continuous channel, ventilated slot face; sq joint; Br & Str part/dwg #292103.	Seals combustion gases from crankcase. Seals engine oil from combustion chamber. Distributes engine oil to lubricate cylinder wall and piston rings.	3H5041–70.2
–3	RING, piston: oil type; 3″ cylinder dia, $^{3}/_{16}$″ wd, std size; double bevel scraper, continuous channel, ventilated slot face; sq joint; Br & Str part/dwg #61292.	Distributes engine oil to lubricate cylinder wall and piston rings. Prevents engine oil from entering combustion chamber.	3H4575C/R20

–3	RING, piston: oil type; 3.010″ cylinder dia, $^{3}/_{16}$″ wd, .010″ oversize; double bevel scraper, continuous channel, ventilated slot face; sq joint; Br & Str part/dwg #61335.	Distributes engine oil to lubricate cylinder wall and piston rings. Prevents engine oil from entering combustion chamber.	3H4575C/R17
–3	RING, piston: oil type; 3.020″ cylinder dia, $^{3}/_{16}$″ wd, .020″ oversize; double bevel scraper, continuous channel, slot face; sq joint; Br & Str part/dwg #61336.	Distributes engine oil to lubricate cylinder wall and piston rings. Prevents engine oil from entering combustion chamber.	3H4575C/R31
–3	RING, piston: oil type; 3.030″ cylinder dia, $^{3}/_{16}$″ wd, .030″ oversize; double bevel scraper, continuous channel, ventilated slot face; sq joint; Br & Str part/dwg #61337.	Distributes engine oil to lubricate cylinder wall and piston rings. Prevents engine oil from entering combustion chamber.	3H4575C/R32
O–23	RING, retainer: music wire; $^{3}/_{4}$ circle w/end bent inward; Br & Str part/dwg #65776.	Locks wrist pin position in piston.	3H4550/R3
O–21	ROD, connecting: aluminum alloy die casting; approx $11^{1}/_{64}$″ lg × $1^{1}/_{8}$″ thk × 2 ¼″ wd; crank pin hole $1^{3}/_{16}$″ dia, wrist pin hole .7355″ dia; two identification marks opposite ea other, one on rod and one on cap; Br & Str part/dwg #291647.	Transfers reciprocating motion of piston to rotary motion of crankshaft.	3H5055–25
H143	SCREW, cap: hex. head, semifinished; steel, sp hardness; $^{5}/_{16}$″ –18 NC–3; $1^{5}/_{8}$″ lg; Br & Str part/dwg #92659.	Attaches connecting rod cap, lock plate, and oil thrower to upper part of connecting rod.	6L4905–16.26
O–83	THROWER, oil: steel; V-shaped w/two mtg tabs; approx $3^{1}/_{64}$″ lg × $2^{3}/_{16}$″ wd × $^{5}/_{8}$″ thk; two mtg holes $^{21}/_{64}$″ dia on $1^{9}/_{16}$″ mtg/c; Br & Str part/dwg #22927.	Splashes engine oil to all internal moving parts of the engine.	3H5571–4

e. Cylinder and Crankshaft Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–81 O–82	BEARING, ball: single row rad; light duty; 1.378″ bore, 2.8346″ OD, .669″ wd; nine balls; packed w/std slush grease; ND #7507XL. Br & Str part/dwg #291667.	Supports drive end and flywheel end of crankshaft and reduces operating friction.	3H320–157
O–103	BEARING, sleeve: brass; 1.138″ lg, .3685″ OD, .235″ ID; Br & Str part/dwg #23837.	Provides bearing surface in crankcase for governor crank operation.	3H330–101
A4	BLOCK, cylinder: single cylinder, cast enbloc, finned upper portion w/valve chamber; $11^{7}/_{32}$″ lg × $5^{13}/_{32}$″ wd × $13^{5}/_{8}$″ h; four $^{13}/_{32}$″ dia mtg holes on $10^{3}/_{8}$″ mtg/c; Br & Str part/dwg #292423.	Provides combustion chamber, cylinder, and engine crankcase. Provides mounting for external assemblies.	3H372–3
O–59	BREATHER, crankcase: 2 ¼″ h, 2 ¼″ dia; screws into $^{3}/_{8}$″ pipe threaded hole; Br & Str part/dwg #292332.	Ventilates and provides vacuum in crankcase to prevent oil leakage.	3H438.9
O–97	CRANKSHAFT: steel; approx $15^{19}/_{32}$″ lg × $4^{7}/_{8}$″ from top of throw to outer edge of counterweight, 4″ wd on widest counterweight; supported by ball bearings; has eccentric for fuel pump operation; Br & Str part/dwg #26837.	Converts reciprocating motion to rotary motion and transmits power from engine.	3H1409–14
O–48	GASKET: vellumoid; one hole; rectangular, $3^{3}/_{16}$″ lg × $2^{1}/_{32}$″ wd × $^{1}/_{32}$″ thk; Br & Str part/dwg #66214.	Seals valve cover plate to cylinder block.	3H2154–61
O–76	GASKET: vellumoid; five holes; round, $6^{13}/_{32}$″ OD × $5^{1}/_{16}$″ ID × $^{1}/_{64}$″ thk; Br & Str part/dwg #27350.	Seals crankcase cover plate to crankcase.	3H2154–52
O–80	GASKET: compressed asbestos sheet packing; five holes total; round, $3^{15}/_{16}$″ OD × $2^{29}/_{32}$″ ID × .020″ thk; Br & Str part/dwg #27349.	Seals crankshaft support plate to crankcase.	3H2154–54
O–80.1	GASKET: five holes total; round, $3^{15}/_{16}$″ OD × $2^{29}/_{32}$″ ID × .005″ thk; Br & Str part/dwg #27374.	Seals crankshaft support plate to crankcase. Adjusts crankshaft end play.	3H2154–56

O–80.2	GASKET: paper; five holes total; round, $3^{15}/_{16}$″ OD × $2^{29}/_{32}$″ ID × .009″ thk; Br & Str part/dwg #27375.	Seals crankshaft support plate to crankcase. Adjusts crankshaft end play.	3H2154–57
O–108	GASKET: compressed asbestos sheet packing; five holes total; rectangular, $11^{3}/_{16}$″ lg × $5^{3}/_{32}$″ wd × .020″ thk o/a; Br & Str part/dwg #27351.	Seals crankcase to engine base.	3H2154–53
O–106	GASKET: neoprene #589; single hole; round, $1^{25}/_{32}$″ OD × $1^{1}/_{32}$″ ID × $^{5}/_{32}$″ thk; Br & Str part/dwg #65938.	Seals oil-filler cover to oil-filler lip.	3H1909C/G7
H169	NUT, hexagon: steel, zinc-plated and dichromated; washer-faced bearing surface; $^{7}/_{8}$″–14 NF–2; $^{29}/_{32}$″ thk; 1¼″ across flats; Br & Str part/dwg #230135.	Secures flywheel to crankshaft.	6L3514–14.20
A8	PLATE, cover: steel, enameled; rectangular; $3^{1}/_{8}$″ lg × $2^{3}/_{16}$″ wd × ¼″ thk o/a; mounted to cylinder by means of a ¼″ cap screw; screw passes thru $^{17}/_{64}$″ dia hole in ctr of plate; Br & Str part/dwg #220283.	Incloses valve parts and closes valve adjustment opening in cylinder block.	3H4284
O–77	PULLEY: steel, enameled; $4^{7}/_{8}$″ flange dia; $1^{17}/_{32}$″ lg × $3^{13}/_{16}$″ dia body; pulley fixed w/two $^{5}/_{16}$″ hex. head cap screws; Br & Str part/dwg #220279.	Transmits energy exerted on starter rope to spin flywheel and start engine.	3H4600P1–20
O–603	PULLEY: two V-grooved std pulley; cast-iron; 4.8″ dia × $2^{3}/_{16}$″ wd; 1.00″ dia bore, $1^{7}/_{16}$″ dp; two grooves; .675″ wd × .687″ dp; std keyway for ¼″ × ¼″ × 1¾″ key; tapped $^{5}/_{16}$″–18 NC–2 for two set screws at 90° rad; Maurey Mfg Co #C–14202. Lorenz dwg #3L1.25(3).	Serves as power take-off from gasoline engine.	3H4600P1–18–GY
O–99	SEAL, oil: circular; 1.88″ OD, $^{7}/_{16}$″ thk; press fit in cylinder bore; Natl Mtr Brg part #50395.	Prevents oil leak at crankshaft on drive side.	3H5225.2–33
O–98	SEAL, oil: steel and leather; doughnut-shaped; approx 1.688″ OD × $^{3}/_{8}$″ wd; press fit into bore in crankshaft support Br & Str part #292425; Natl Mtr Brg part #50320.	Prevents oil leak at crankshaft on flywheel side.	3H5225.2–34
H72	WASHER, flat: fiber; round, $^{17}/_{64}$″ ID, $^{5}/_{8}$″ OD, $^{1}/_{32}$″ thk; Br & Str part/dwg #22353.	Seal between valve cover plate screw head and valve cover plate.	3H1901–AP/W12

f. Cylinder Head and Valve Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–55 O–56	COLLAR, locking: steel; conical split collar; Br & Str part/dwg #68283.	Lock intake valve spring retainer to valve stem.	3H987–5
O–49	RETAINER, spring: steel; 1.068″ OD, $1^{1}/_{32}$″ ID, $^{9}/_{64}$″ h; has .568″ hole at ctr; Br & Str part/dwg #62222.	Seats and positions top end of intake valve spring.	3H1909C/C30
O–7	GASKET: cylinder head; steel and asbestos; one cylinder opening; 10 holes total; irregularly shaped, $6^{3}/_{16}$″ lg × 4½″ wd × $^{1}/_{16}$″ thk o/a; Br & Str part/dwg #27352.	Seals compression chamber between cylinder head and cylinder block.	3H2154–55
O–53	GUIDE, collet: steel; round w/collar at ctr; approx $1^{1}/_{16}$″ OD × $^{15}/_{32}$″ h; one $^{7}/_{16}$″ large dia tapered mtg hole; Br & Str part/dwg #292260.	Rotates exhaust valve and retains exhaust valve spring.	3H2485–9
O–16	GUIDE, valve: cast iron; .564″ OD × .3155″ ID × $2^{15}/_{32}$″ lg; press fit into cylinder; finish reamed ID; Br & Str part/dwg #210067.	Guides exhaust valve stem in cylinder block.	3H2485–10
O–17	GUIDE, valve: cast iron; .564″ OD × .3125″ ID × $2^{15}/_{32}$″ lg; press fit into cylinder; finish reamed ID; Br & Str part/dwg #210101.	Guides intake valve stem in cylinder block.	3H2485–11
O–3	HEAD, cylinder: aluminum alloy, anodized; $7^{3}/_{8}$″ lg × $5^{17}/_{32}$″ wd × $1^{21}/_{32}$″ h; seven $^{23}/_{64}$″ dia and two $^{11}/_{32}$″ dia mtg holes, irregularly spaced; Br & Str part/dwg #292576.	Provides combustion chamber and cooling fins for engine.	3H2500–18
O–9	INSERT, valve seat: #3 stellite; ring-shaped; 1.3415″ OD × 1.130″ ID × .252″ thk; press fit in 1.3385″ dia ctb in cylinder; Br & Str part/dwg #21612.	Seats exhaust valve to prevent escape of gases.	3H1901–B.1/S10
O–54	RETAINER, spring: steel; stepped washer; Br & Str part/dwg #68293.	Seats and positions bottom of intake valve spring on valve stem.	3H4541.1/84
H4 through H12	SCREW, cap: hex. head, semifinished; steel, zinc-plated and dichromated, sp hardness; $^{5}/_{16}$″–18 NC–3; $2^{3}/_{8}$″ lg; threaded portion 1″ lg, $^{15}/_{64}$″ thk × ½″ across flats; Br & Str part/dwg #92774.	Secure cylinder head, cylinder head cover, and fuel tank bracket to cylinder block.	6L4905–18.38

O–51	SPRING: helical compression type; .118″ dia valve spring wire; .785″ ID × 1 ½″ lg o/a; 6.3 turns; squared ends ground; Br & Str part/dwg #26828.	Returns open exhaust valve to valve seat.	3H5255–49
O–52	SPRING: helical compression type; .1055″ dia valve spring wire; $1^{25}/_{32}$″ lg × $^{25}/_{32}$″ ID; 5 turns; squared ends ground; Br & Str part/dwg #65906.	Returns open intake valve to valve seat.	3H4541.1/45
O–57 O–58	TAPPET, valve: steel; pedestal-shaped; 1 ¼″ dia head, .4315″ dia stem, 2.721″ lg; Br & Str part/dwg #26670.	Transmit motion from cam on cam gear and shaft to intake valve.	3H5450–3
O–10	VALVE, engine exhaust: steel stem; steel head w/stellite face; head 1 ¼″ dia × $^{1}/_{32}$″ thk outer edge; stem 4.673″ lg × .310″ dia; .265″ wd rad groove ¼″ from end; Br & Str part/dwg #26736.	Opens and closes exhaust opening in combustion chamber.	3H6682–32
O–11	VALVE, engine intake: steel; head 1 ¼″ dia × $^{1}/_{32}$″ thk outer edge; stem 4.673″ lg × .310″ dia; .265″ wd rad groove ¼″ from end; Br & Str part/dwg #23923.	Opens and closes intake opening in combustion chamber.	3H6682–33
H13 through H19	WASHER, flat: steel, zinc-plated and dichromated; round, $^{21}/_{64}$″ ID × $^{5}/_{8}$″ OD × .0897″ thk; Br & Str part/dwg #220262.	Bearing surfaces for cylinder head-screw.	6L58026–9C4

g. Exhaust and Intake Manifold Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
H665	FITTING, pipe: 90° street elbow; 1″ male × 1″ female; Br & Str part/dwg #91308.	Exhaust elbow.	6Z3888–125–GY
H664 H666	FITTING, pipe: 90° elbow; 1″ × 1″, male; Br & Str part/dwg #91296.	Exhaust elbows.	6Z3888–124–GY
H35	FITTING, pipe: sq hd plug; ¼″; Br & Str part/dwg #92783.	Intake manifold priming plug.	6Z3888–127
O–19	GASKET: vellumoid; three holes; irregularly shaped, $2^{9}/_{16}$″ lg × 1 ¾″ wd × $^{1}/_{64}$″ thk; Br & Str part/dwg #27381.	Seals fuel intake elbow to cylinder block.	3H2154–59
–601	MUFFLER: sheet steel, black; cylindrically shaped; 10 ¼″ lg, $3^{5}/_{8}$″ dia; inlet 1″ std IPT male, outlet 1″ std IPT male; Nelson Mfg Co #T–3374; Br & Str part/dwg #293460.	Muffles exhaust noise.	3H3981–23

h. Governor Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–100	GEAR ASSEMBLY: steel and zinc, dichromated gear; $1^{13}/_{16}$″ lg, 1½″ dia, gear; mounted on .3025″ dia shaft; Br & Str part/dwg #292385.	Transmits centrifugal force from cam gear to governor crank.	3H2231–10
H30	NUT, thumb: zinc alloy, dichromated; unfinished bearing surface; #5–44 NF–2; $^{23}/_{32}$″ lg o/a; $^{5}/_{16}$″ sq × $^{7}/_{16}$″ lg, $^{5}/_{16}$″ dia × $^{3}/_{16}$″ lg, V-point $^{3}/_{32}$″ lg, $^{3}/_{16}$″ lg thd; Br & Str part/dwg #210139.	Adjusts governor control rod position to control engine speed.	6L3895–32–5
O–101	SHAFT SUBASSEMBLY: steel; arm riveted to shaft; $2^{13}/_{64}$″ lg; arm, $1^{7}/_{32}$″ h × $2^{9}/_{32}$″ lg; Br & Str part/dwg #292437.	Transmits governor gear cup thrust to governor crank.	3H5220S–3
O–71	SPRING: helical extension; .038″ dia music wire, zinc-plated and dichromated; $2^{13}/_{32}$″ lg, ¼″ ID; 41¼ turns; hook term. at right angles to ea other; term. bent on $^{1}/_{8}$″ rad; Br & Str part/dwg #26842.	Resists governor crank pressure on governor lever.	3H5255–50
H173	WASHER, flat: steel; round, .271″ ID, ½″ OD, .054″ thk; Br & Str part/dwg #22826.	Spacer on governor crankshaft between governor crank and end of governor shaft bearing.	6L58025–45

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–90	BOWL, fuel cleaner: glass; cup-shaped; body $1^{7}/_{16}$″ OD × $1^{3}/_{16}$″ ID, rim $1^{17}/_{32}$″ OD × $^{3}/_{16}$″ thk w/$1^{19}/_{64}$″ ID × $^{3}/_{32}$″ d ctb; $1^{5}/_{32}$″ h o/a; mts into ctb in fuel pump head and retained by cleaner bowl retainer; Br & Str part/dwg #68487.	Provides gasoline receptacle prior to straining.	3H1901–AP/B8
O–88	CLEANER ELEMENT, fuel: 100 mesh .0045″ dia brass wire screen; disk-shaped, $1^{23}/_{64}$″ OD w/.247″ dia hole on horizontal ctr line w/ctr $^{13}/_{32}$″ from vertical ctr line; Br & Str part/dwg #22740.	Strains fuel before entering fuel pump.	3H956–13
O–96	COCK: rotary type; single male $^{1}/_{8}$″ pipe thd, 2 female $^{1}/_{8}$″ pipe thd; Br & Str part/dwg #292370.	Fuel line shut-off valve.	6Z2118–9
Q1	DIAPHRAGM ASSEMBLY, valve: disk placed between two cups back-to-back and riveted to a central shaft; approx $1^{15}/_{32}$″ lg o/a; diaphragm $2^{5}/_{32}$″ dia; four mtg holes $^{11}/_{64}$″ dia on $1^{27}/_{32}$″ dia bolt circle spaced 90° apart; Br & Str part/dwg #292374.	Creates pressure to pump fuel from filter to carburetor.	3H1495A
H168	FITTING, tubing: 90° female elbow; ½″–20 SAE male thd one end, $^{1}/_{8}$″ female IPT other end; Br & Str part/dwg #92953.	Remote fuel connection.	6Z3888A–10
O–89	GASKET: cork; single hole; washer-shaped, approx $1^{9}/_{16}$″ OD, 1¼″ ID, $^{1}/_{16}$″ thk; Br & Str part/dwg #68477.	Seals fuel cleaner bowl to upper fuel pump housing.	3H1901–AP/G9
O–92	GASKET: vellumoid; three holes total; diamond-shaped, $2^{1}/_{8}$″ lg × $1^{5}/_{8}$″ wd × $^{1}/_{64}$″ thk; Br & Str part/dwg #27314.	Seals fuel pump to crankcase.	3H2154–58
O–94	LEVER: steel; straight flat lever w/end bent upward at an angle; approx $5^{7}/_{16}$″ lg, 2½″ h, .134″ thk o/a; single mtg hole .161″ dia, also hooks into $^{3}/_{8}$″ lg × $^{9}/_{64}$″ rectangular hole in diaphragm shaft; Br & Str part/dwg #220431.	Transmits cam action to actuate fuel pump diaphragm.	3H2681.11
O–60	LINE, fuel: straight tube $^{3}/_{16}$″ ID, 11″ lg; flexible wall neoprene tubing, woven reinforcement synthetic cover; $^{7}/_{16}$″ –24 thd female compression fitting one end, $^{1}/_{8}$″ pipe thd female fitting opposite end; Br & Str part/dwg #293646.	Conveys gasoline from fuel tank to fuel pump.	3H2689.1–59

i. Fuel System Group—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–47	LINE, fuel: preformed, $\frac{1}{4}$″ OD, 16″ lg extended; solid wall, copper; $\frac{7}{16}$″ –24 thd female compression fitting ea end; Br & Str part/dwg #291703.	Conveys gasoline from fuel pump to carburetor.	3H2689.1–58
H162	PIN, straight: steel; Br & Str part/dwg #23783	Secures and pivots fuel pump lever in fuel pump body.	6L3941–9
O–85	PUMP, liquid diaphragm: cam-operated drive, w/filter; irregularly shaped; $6\frac{29}{64}$″ lg × $4\frac{1}{2}$″ wd × $3\frac{51}{64}$″ h o/a; female inlet and outlet tapped $\frac{1}{8}$″ pipe thd; two mtg holes $\frac{17}{64}$″ dia, on 1½″ mtg/c; includes mtg gasket and a male and female tubing adapter; Br & Str part/dwg #292431.	Pumps gasoline to carburetor.	3H4601–63
O–93	RETAINER, cleaner bowl: steel, zinc-plated and dichromated; U-shaped w/thumbscrew, nut, and cup approx $2\frac{3}{8}$″ lg × $1\frac{7}{8}$″ wd × $\frac{19}{32}$″ h o/a; hooks to top of fuel pump cover, held in position by thumbscrew and cup; Br & Str part/dwg #292375.	Retains filter bowl to upper fuel pump body.	3H5033–1.1
O–91	SPRING: helical compression type; .055″ dia spring steel wire; ¾″ OD × ¾″ lg o/a; 7 turns, squared ends ground; Br & Str part/dwg #26588.	Regulates fuel pump pressure.	3H5255–51
O–95	SPRING: helical compression type; .051″ dia spring steel wire; ¼″ ID × 1″ lg o/a; 11 turns; squared ends ground; Br & Str part/dwg #26616.	Maintains fuel pump lever to crankshaft cam contact.	3H5255–52
O–86	VALVE, check: brass, steel, and fiber; 1 to $2\frac{1}{2}$ psi; disk type; $\frac{13}{16}$″ dia; $\frac{5}{8}$″ h o/a; Br & Str part/dwg #290623.	Checks fuel flow through fuel pump.	6Z8899–3
H160	WASHER, flat: fiber; round, $\frac{41}{64}$″ ID, .871″ OD, $\frac{1}{32}$″ thk; Br & Str part/dwg #66204.	Seals fuel pump check valve to fuel pump head.	6L50530–3

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
W2	CABLE ASSEMBLY, special purpose: 12½″ lg excluding terminations; Br & Str part/dwg #293197.	Conducts primary current from ignition coil terminal to breaker box.	3E7350–1.20.19
C1	CAPACITOR, fixed: paper dielectric; .20 μf capacity; 200 vdcw; HS metal case; approx $1^{27}/_{64}$″ lg × $^{43}/_{64}$″ dia; one lead wire term.; one sect. internally grounded; single hole integral mtg ear; includes mtg screw and lockwasher; Br & Str part/dwg #292439.	Reduces breaker point arcing.	3DA200–70
O–75	CLIP: curved spring; steel, rustproofed; curved to $^{7}/_{16}$″ rad, $^{7}/_{8}$″ wd × $^{49}/_{64}$″ h; Br & Str part/dwg #220245.	Retains ignition coil position on armature core.	3H961–8
O–72	CLIP: hook type; steel; approx $1^{11}/_{16}$″ lg × $^{35}/_{64}$″ wd × $^{13}/_{32}$″ h; Br & Str part/dwg #220244.	Secures ignition coil core to armature.	3H961–7
L1	COIL, magneto: irregularly shaped w/rectangular hole thru ctr; coil approx $2^{9}/_{16}$″ lg × $2^{1}/_{8}$″ wd × $1^{13}/_{16}$″ h; includes cable $19^{3}/_{8}$″ lg; one mtg hole $^{11}/_{16}$″ wd × $^{7}/_{16}$″ h × $2^{9}/_{16}$″ lg; includes shielded cable which is molded into coil; Br & Str part/dwg #293013.	Generates h-v current for ignition spark.	3C1079B
O–65	COLLAR, spacing: zinc alloy, dichromated; sq base w/round collar at ctr; Br & Str part/dwg #210153.	Retains breaker shaft oil seal.	3H987.8
E1	CONNECTOR, contact: brass; 90° elbow w/nut attached; approx $1^{11}/_{16}$″ lg o/a, $1^{3}/_{8}$″ h, ¾″ across flats on the nut; $^{11}/_{64}$″–24 NF–3 male thd, $^{5}/_{8}$″–24 NF–3 female nut; Br & Str part/dwg #292412.	Connects ignition cable to spark plug.	3H1032.6
E5	CONTACT ASSEMBLY, magneto: uses breaker points Br & Str part #292429 and capacitor Br & Str part #292439; irregularly shaped; approx $1^{5}/_{8}$″ wd × $3^{1}/_{16}$″ h × $2^{23}/_{32}$″ thk; two mtg holes $^{13}/_{64}$″ dia on .973″ mtg/c; Br & Str part/dwg #292429.	Times and releases current for ignition spark.	3H1032.1–1.2

j. Ignition Group—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
E8	CONTACT SET, distributor: steel, dichromated, and tungsten; stationary and movable point assemblies (service only in sets); Br & Str part/dwg #292429.	Makes and breaks electric circuit furnishing ignition spark.	3H1032.1–1.2
A9	COVER: u/w breaker box Br & Str part #292428; steel, zinc-plated, and dichromated; rectangular shape; approx $3^{1}/_{64}$″ lg × $1^{19}/_{32}$″ wd × $1^{1}/_{64}$″ h o/a; two mtg holes; .183″ dia on $1^{13}/_{64}$″ mtg/c; has word STOP stamped on face; has stop push button; Br & Str part #292397.	Covers breaker assembly. Houses switch for stopping engine.	3H1380.52
O–66	ECCENTRIC: steel, zinc-plated, dichromated; round w/off-ctr stem; stem has screw driver slot; Br & Str part/dwg #230140.	Adjusts breaker point gap.	3H1899E–2
O–5	GASKET: copper-clad asbestos; one hole; round, $^{9}/_{16}$″ ID × $^{23}/_{32}$″ OD × $^{1}/_{16}$″ thk; Champion part #N–672. Br & Str #3H4412–10/G1.	Seals spark plug to cylinder head.	3H4412–10/G1
O–64	GASKET: compressed asbestos sheet packing; three holes total; irregularly shaped, approx $1^{13}/_{16}$″ lg × $1^{7}/_{32}$″ wd × .020″ thk; Br & Str part/dwg #27299.	Seals breaker box to crankcase.	3H2154–51
E7	INSULATOR, bushing: round shaped; paper base bakelite; .115″ h; 600 v; $^{3}/_{8}$″ OD × $^{9}/_{32}$″ ID; Br & Str part/dwg #66338.	Breaker plate pivot bushing.	3G100–230
E2	INSULATOR, bushing: cylindrically shaped; rubber; $^{7}/_{16}$″ lg, $^{15}/_{32}$″ dia facing flange; $^{3}/_{8}$″ dia body, $^{9}/_{32}$″ ID; Hallet Mfg Co #2217; Br & Str part/dwg #66298.	Seals and insulates spark plug cable in shielding elbow.	3G100–231
E6	INSULATOR, plate: irregularly shaped; fine weave canvas bakelite; 1¼″ lg o/a; 600 v voltage rating; 1¼″ lg × $1^{9}/_{32}$″ wd × $^{1}/_{16}$″ thk; Br & Str part/dwg #66318.	Insulates breaker plate from breaker box.	3G320–314

E4	PLUG, spark: mach thd, 14 mm; hex. size $^{13}/_{16}$″; built-in suppressor; top of plug has $^{5}/_{8}$″–24 male thd; cable attached w/union nut: type EX–J–8 Champion; Br & Str #291954.	Electrically ignites charge of combustible mixture in combustion chamber.	3H4412–8.1
H96	SCREW, machine: slot drive; Fil H unfinished; steel, zinc-plated, and dichromated, sp hardness; #10–24 NC–2; $^{5}/_{8}$″ lg; Br & Str part/dwg #92790.	Secures breaker box to crankcase.	6L7024–10.12S
O–67	SEAL, oil: rubber bonded to steel; round; Br & Str part/dwg #291106.	Seals breaker point shaft to breaker box to prevent oil leaks.	3H5225.2–32
O–63	SHAFT SUBASSEMBLY: u/w breaker box assembly Br & Str part #292428; steel; round shaft w/follower arm: approx $2^{19}/_{32}$″ lg o/a, $1^{1}/_{8}$″ lg lever; mts into hole in boss on breaker box; includes breaker point mtg nut and washer; Br & Str part/dwg #292438.	Transmits cam gear flyweight action to open breaker points.	3H5220.S–2
E3	TERMINAL, sleeve: sleeve type; mycalex or ceramic, ss and brass; #16–AWG wire; $^{3}/_{8}$″ OD × $^{3}/_{4}$″ lg, $^{19}/_{64}$″ dia hole; mechanically connected to wire; Hallet Mfg Co #2215; Br & Str #92704.	Makes contact between ignition cable and spark plug.	6Z3188.6
H98	WASHER, flat: phenolic sheet insulation; round; $^{13}/_{32}$″ OD, $^{11}/_{64}$″ ID, $^{1}/_{16}$″ thk; Br & Str part/dwg #66328.	Insulates breaker plate from securing screw and washers.	6L50523–49
H79	WASHER, flat: fiber; round; .170″ ID, $^{3}/_{4}$″ OD, $^{1}/_{16}$″ thk; Br & Str part/dwg #66364.	Insulates primary lead terminal from blower housing backplate.	6L50523–48

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–301	BEARING, ball: single row rad; double shield; light duty; .7874″ bore; 1.8504″ OD; .5512″ wd; eight balls; packed w/grease according to MIL–G–3278; std fit; Hoover. C. Lorenz dwg #369L1E(5).	Supports rotor and permits it to turn with minimum of friction.	3H320–156–GY
E301	BRUSH, electrical contact: rectangular; 1″ lg × .375″ wd × 1.000″ thk; w/shunt; $1^{7}/_{8}$″ lg; electro-graphitic; stamped Carbone #EG3398; shunt has eyelet term. w/hole for #10 screw; Speer Carbon #E–25. C. Lorenz dwg #OL1–2E(5).	Transfers energy from collector ring to power supply.	3H4575C/B14–GY
E307	BRUSH, electrical contact: rectangular; 1″ lg × .625″ wd × .406″ thk; w/shunt; $1^{7}/_{8}$″ lg; straight w/$^{5}/_{16}$″ × $^{1}/_{16}$″ d recess; electro-graphitic; stamped Carbone #EG3398; shunt has eyelet term. w/hole for #10 screw; Speer Carbon #E–25. C. Lorenz dwg #OL1–1E(5).	Transfers energy from commutator to field winding.	3H4575C/B3–GY
H311	HOLDER, electrical contact brush: bronze; casting; helical spring; $2^{5}/_{32}$″ lg × $^{11}/_{16}$″ wd × $^{57}/_{64}$″ h; Leland Elec dwg #SA4459. C. Lorenz dwg #OL1.19E(5).	Holder for collector ring brush.	3H2507–168–GY
H364	HOLDER, electrical contact brush: bronze; casting; helical spring; $1^{27}/_{32}$″ lg × $1^{1}/_{16}$″ wd × $^{11}/_{16}$″ h; Leland Elec dwg #SA4461. C. Lorenz dwg #OL1.17E(5).	Holder for commutator brush.	3H2507–167–GY
E300	INSULATOR, ring: canvas base bakelite; 5 ¼″ OD, 3 ½″ ID, $^{3}/_{16}$″ thk; Leland Elec dwg #A3902. C. Lorenz dwg #OL1.16–1E(4).	Provides support and insulation for brushholders.	3G330–10–GY
O–600	PULLEY: two V-grooved std pulley; cast iron; 7.3″ dia × $2^{3}/_{8}$″ wd; .750″ dia thru wd of pulley; two grooves; .675″ wd × .687″ d std keyway for $^{3}/_{16}$″ × $^{3}/_{16}$″ × $1^{5}/_{8}$″ key; tapped on 90° for two setscrews $^{5}/_{16}$″–18UNC–2. Maurey Mfg Co #C14203. C. Lorenz dwg #OL1.52(3).	Receives transmitted power via V-belt from gasoline engine.	3H4600P1–19–GY

E311	ROTOR, generator: 1,800 rpm; 120 v; 60 cyc; single phase; 2.5 kva; Leland Elec #SC2434. C. Lorenz dwg #OL1.8(2).	Rotating part of a-c generator.	3H5200–15.1–GY
H433	SCREW, thumb: wing head; steel cad plate QQ–P–416 type 2, class B; 10–32 NF–2; $^{3}/_{8}$″ lg; $^{5}/_{16}$″ thd; cone point; Leland Elec part #A2964–1. C. Lorenz dwg #L513–1A5E(4).	To hold cover on end bell.	6L17110–6C–GY
O–316	SEAL, dust: ¼″ lg; $1^{3}/_{8}$″ OD; $^{23}/_{32}$″ ID; Leland Elec dwg #A3363–2. C. Lorenz dwg #OL.25–1E(5).	To protect bearing from dust.	3H5225–8–GY
O–302	SPRING: helical extension type; .029″ dia; ss; $1^{3}/_{16}$″ lg, .240″ OD; approx 29 turns; eye term. ea end indexed 90° ctr; Leland Elec dwg #A3938. C. Lorenz dwg #OL1.19–2E(5).	Provides pressure to hold brush against collector ring.	3H4575T/S35–GY
O–310	SPRING: helical extension type; .029″ dia; ss; 1″ lg, .240″ OD; approx 19 turns; eye term. ea end; Leland Elec dwg #A3939. C. Lorenz dwg #OL1.17–2E(5).	Provides pressure to hold brush against commutators.	3H4575T/S36–GY
H301	WASHER, flat: round; steel; $1^{15}/_{32}$″ ID, 1.840″ OD, .015″ thk; Leland Elec dwg #1562–9. C. Lorenz dwg #OL1–3A1(5).	Shim used to take up end play between bearings.	6L58043–GY
H398	WASHER, spring: tension; round; spring steel, tempered; 1.189″ ID, 1.842″ OD, .016″ thk; Leland Elec part #4418. C. Lorenz dwg #OL1–4E(5).	Circular spring washer with formed ends to take up end thrust.	6L73669–GY
E312	WINDING, generator field: single winding; layer wound; 3.3 ohms dc; 180 turns; two term. solder lug type; located commutator end; 8″ lg × 9″ wd × 4.935″ ID; eight $^{5}/_{16}$″–24 tapped holes on 4.437″ rad 90° apart; Leland Elec part #SB3045. C. Lorenz dwg #OL1.1A2(2).	To provide magnetic field for a-c rotor generator.	3H8400–51–GY
E321	WINDING, generator field: single winding; layer wound; .83 ohm; 180 turns; two term.; one ea side of coil; 8″ lg × 4″ wd; inside of coil $1^{5}/_{8}$″ wd × 5½″ lg; Leland Elec part #SA7616. C. Lorenz dwg #OL1.3A1,A2(2).	To establish magnetic field.	3H8400–50–GY

4. Electrical Noise Suppressor

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
C400	CAPACITOR, fixed: paper dielectric; two sect.; .5 μf; −10 + 20%; 400 vdcw; hs sealed metal can; 2″ lg × 1¾″ wd × ¾″ h; internally grounded; two integral mtd ears; $2^3/_8$″ on ctr; Potter #Z1065. C. Lorenz dwg #OL1.31–3E(4).	Stores electrical energy.	3DA500–327–GY
C401	CAPACITOR, fixed: paper dielectric; two sect.; .5 μf; −10 + 20%; 400 vdcw; hs sealed metal can; 2″ lg × 1¾″ wd × ¾″ h; two integral mtd ears; Potter #Z1065A. C. Lorenz dwg #OL1.33–2E(4).	Stores electrical energy.	3DA500–537–GY
J400	CONNECTOR, receptacle: female; not polarized; straight type, flush; $3^5/_8$″ lg × 1½″ wd × $1^1/_8$″ h o/a; twist-lock type; four holes, two tapped for #G32 screw, $2^3/_8$″ on ctr, 2 slots 3¼″ on ctr, $^3/_{16}$″ × $^5/_{16}$″ lg; Hubbell #7210.	Provides connection for power outlet for generator.	6Z7808
E402	POST, binding: bakelite; $1^3/_{16}$″ closed, o/a h above mtg surface; ¾″ dia stud, ¾″ lg, #10–32; ¼″ max size of wire opening; Eby #44. C. Lorenz dwg #OL1.31–1E(4).	Provides power terminal.	3Z737–68–GY
H418	WASHER, insulating; phenolic fiber; round, ¾″ OD × $^5/_{16}$″ ID × $^3/_{32}$″ thk; Natl Fibre #XXX–401. C. Lorenz dwg #L322–7A1E(4).	Insulates binding post from terminal box.	3G385–198–GY

5. Tools and Miscellaneous Parts

a. Accessory Group.

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
O–601	BELT, V: comp rubber w/cords straited in layers, matched pair; outside wd $^{11}/_{16}$″, inside wd $^{13}/_{32}$″, d $^{7}/_{16}$″, pitch 43 ½″ lg; Gates Rub #11VR54. C. Lorenz dwg #3L1–3E(5).	Transmits power from gasoline engine to generator.	3H340–19–GY
A–501	COVER: u/w Power Unit PE–75–AF; #10 cotton duck, fire resistant and waterproofed; rectangular, box-shaped pouch; 36″ wd × 24″ lg × 22″ d; 2″ hem w/drawstring; Webb Mfg Co dwg #PB8651. C. Lorenz dwg #3L1.30E(2).	Provides waterproof covering for Power Unit PE–75–AF.	3H1380.53–GY
H–628	HANDLES, carrying: hardwood, dipped in olive drab paint; 25 ½″ lg, $1^{1}/_{8}$″ OD; Penn-Boiler part/dwg #G5131. C. Lorenz dwg #3L1.1–1E(5).	Provides means of carrying power unit.	3H2490.6–GY
H–506	LINE, fuel: flex tube ½″ OD × 15 ft lg; ½″–20 SAE female swivel nut ea end. C. Lorenz dwg #3L1.15–10E(4).	Remote fuel line.	3H2689.1–30–GY
–4	ROPE ASSEMBLY: cotton; braided; $^{9}/_{32}$″ dia; 5 ft lg, both ends knotted; includes wooden grip; Br & Str part/dwg #292897.	Produces spinning motion of flywheel when pulled from starter pulley to start engine.	3H1909C/R20

b. Tool Group

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
H502	ABRASIVE, sheet: flint paper; #240; 9″ × 11″.	Toolbox spares, general purpose.	6Z7500–0000–GY
H504	BURNISHER, contact: 4 ¼″ lg × $^{3}/_{8}$″ wd × $^{3}/_{64}$″ thk o/a; Snap-On #GA3 or Flextone #5–7488 hometype.	Dress contact points.	6Q14565
–501	GAUGE, thickness: flat type, six leaves, .030, .022, .018, .020, .015, .025, on swivel pin; $2^{7}/_{16}$″ lg × $^{5}/_{8}$″ wd × $^{5}/_{8}$″ thk o/a when closed, ea leaf $1^{3}/_{8}$″ lg from axis, ¼″ wd; A & E part # FG24.	To check and set spark plug gap.	6Q45706–3–GY

b. Tool Group—Continued

Ref symbol	Name of part and description	Function of part	Signal Corps stock No.
H507	PLIERS: combination slip point, 6 ½″ lg, steel. C. Lorenz dwg #3L1.15–11E(5).	General purpose tool.	6R4721–6–GY
H508	SCREW DRIVER: slot drive; 4″ blade; o/a lg 9″; round shank; ¼″ wd × 3/64″ thk; hardwood lacquer handle; Stanley #81–4″. C. Lorenz dwg #3L1.15–14E(5).	do.	6R15610–GY
H509	WRENCH: adj angle; 8″ lg × 2 ¼″ wd o/a; drop forged steel, parkerized; 21° offset; Crescent Tool #A18. C. Lorenz dwg #3L1.15–15E(5)	do.	6R55018.1–GY
H510	WRENCH: box and open end, box end 3/8″, hex. drive open end 3/8″; 5 ½″ lg × ¾″ wd o/a; 15° offset ea end; Barcalo #1371. C. Lorenz dwg #3L1.15–16E(4).	do.	6R55112–12–GY
H511	WRENCH: box and open end, box end 7/16″ hex., open end 7/16″; 6 5/16″ lg × 7/8″ wd o/a; 15° offset ea end; Barcalo #1372. C. Lorenz dwg #3L1.15–17E(4).	do.	6R55114–14–GY
H512	WRENCH: box and open end, box end ½″ hex., open end ½″; 7″ lg × 1″ wd o/a; 15° offset ea end; Barcalo #1373. C. Lorenz dwg #3L1.15–18E(4).	do.	6R55116–16–GY
H513	WRENCH: box and open end, box end 9/16″ hex., open end 9/16″; 7″ lg × 1 ½″ wd o/a; 15° offset ea end; Barcalo #1374. C. Lorenz dwg #3L1.15–19E(4).	do.	6R55118–18.1–GY
H514	WRENCH: Allen type, hex.; 5/32″; 2 ¾″ lg × 1″ wd o/a; 90° offset; Allen #532. C. Lorenz dwg #3L1.15–20E(5).	Removes setscrews in pulleys.	6R57400–10–GY
H515	WRENCH: socket, hex. drive; 3 ½″ lg × 1″ OD o/a; loose bar handle; 4 ¾″ lg; sp for 13/16″ hex. spark plug; Penn-Boiler part #221. C. Lorenz dwg #3L1.15–21E(5).	Removes spark plug from engine.	6R57607–6–GY

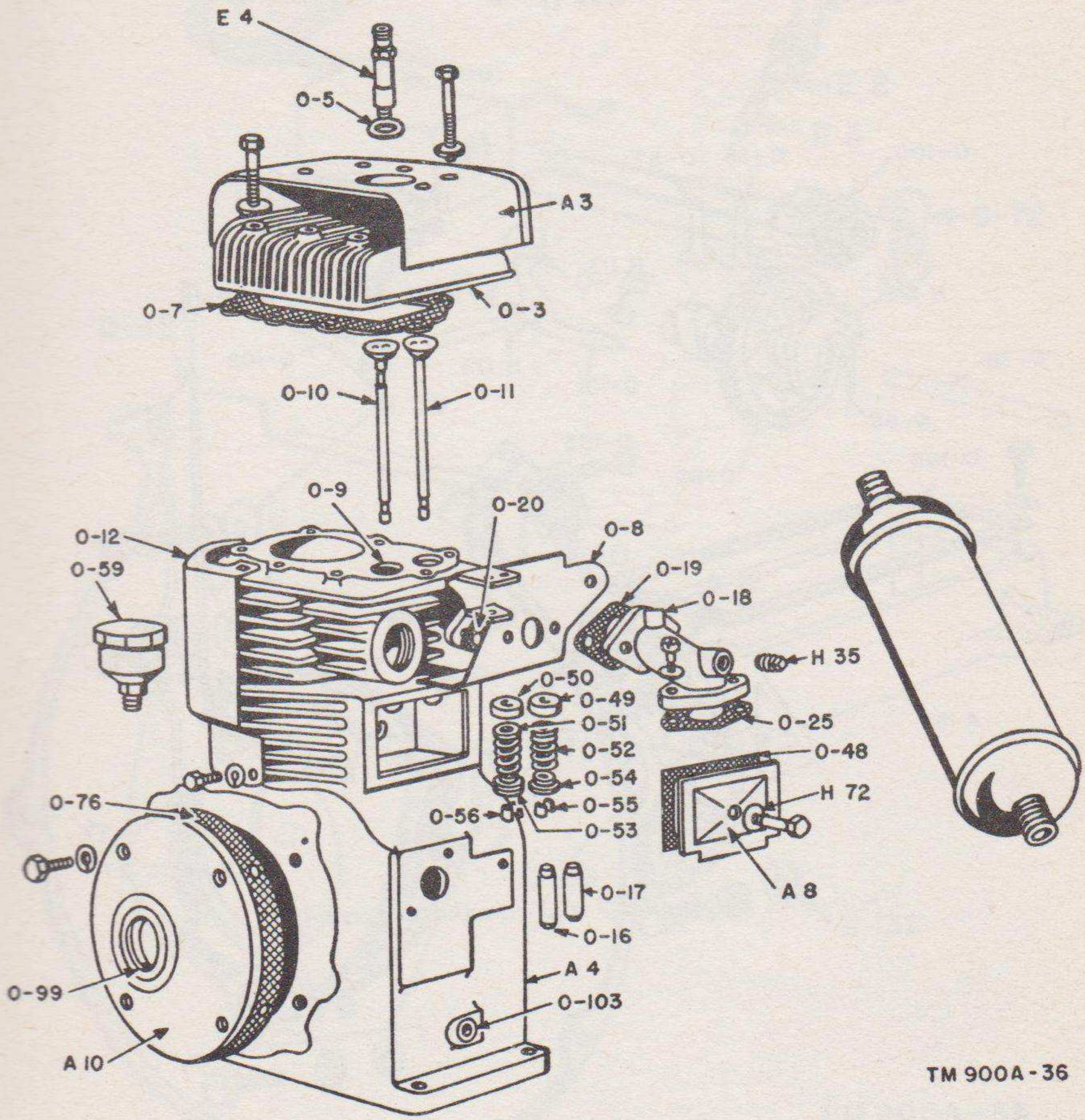


Figure 36. Cylinder and cylinder head assembly parts.

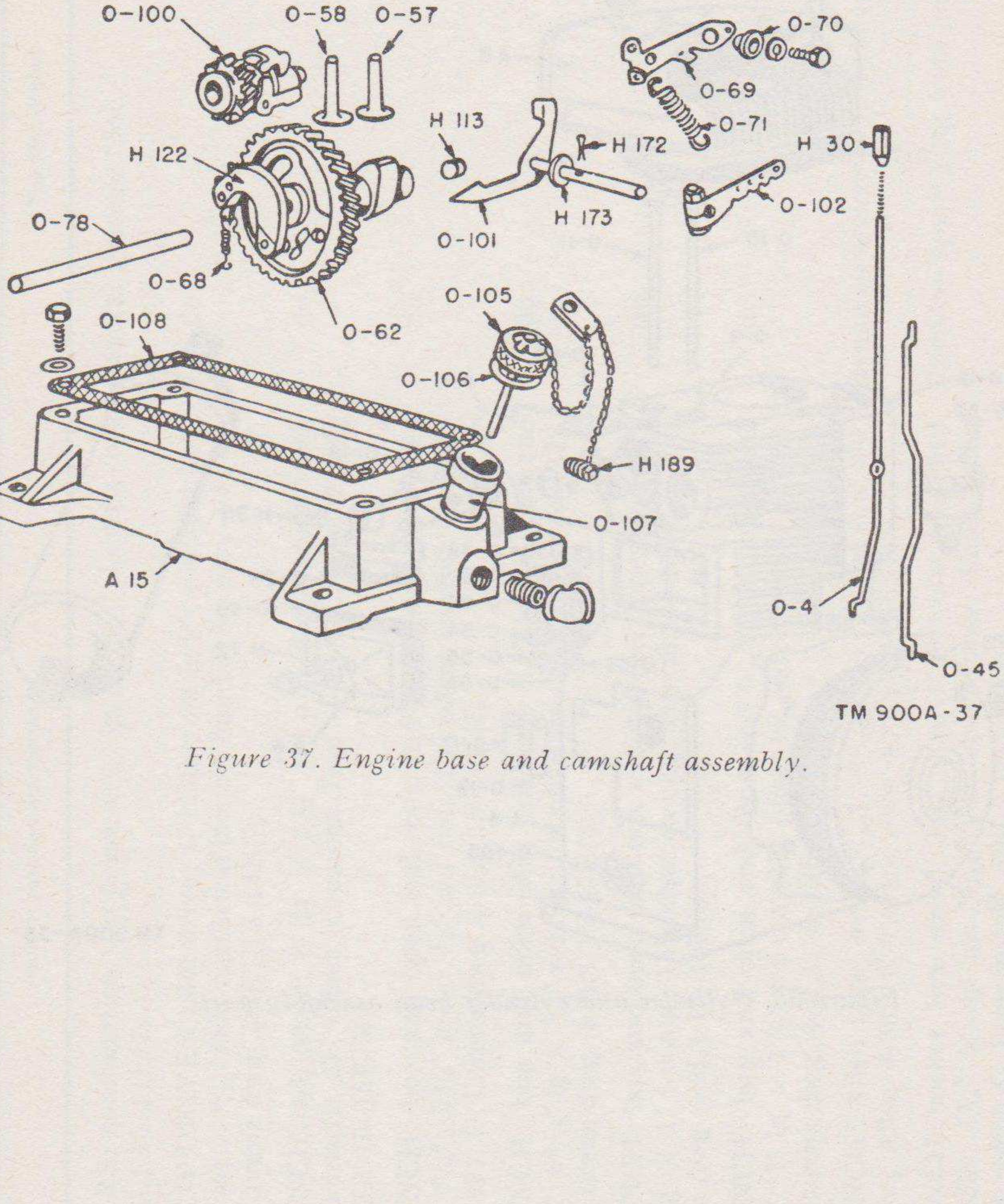


Figure 37. Engine base and camshaft assembly.

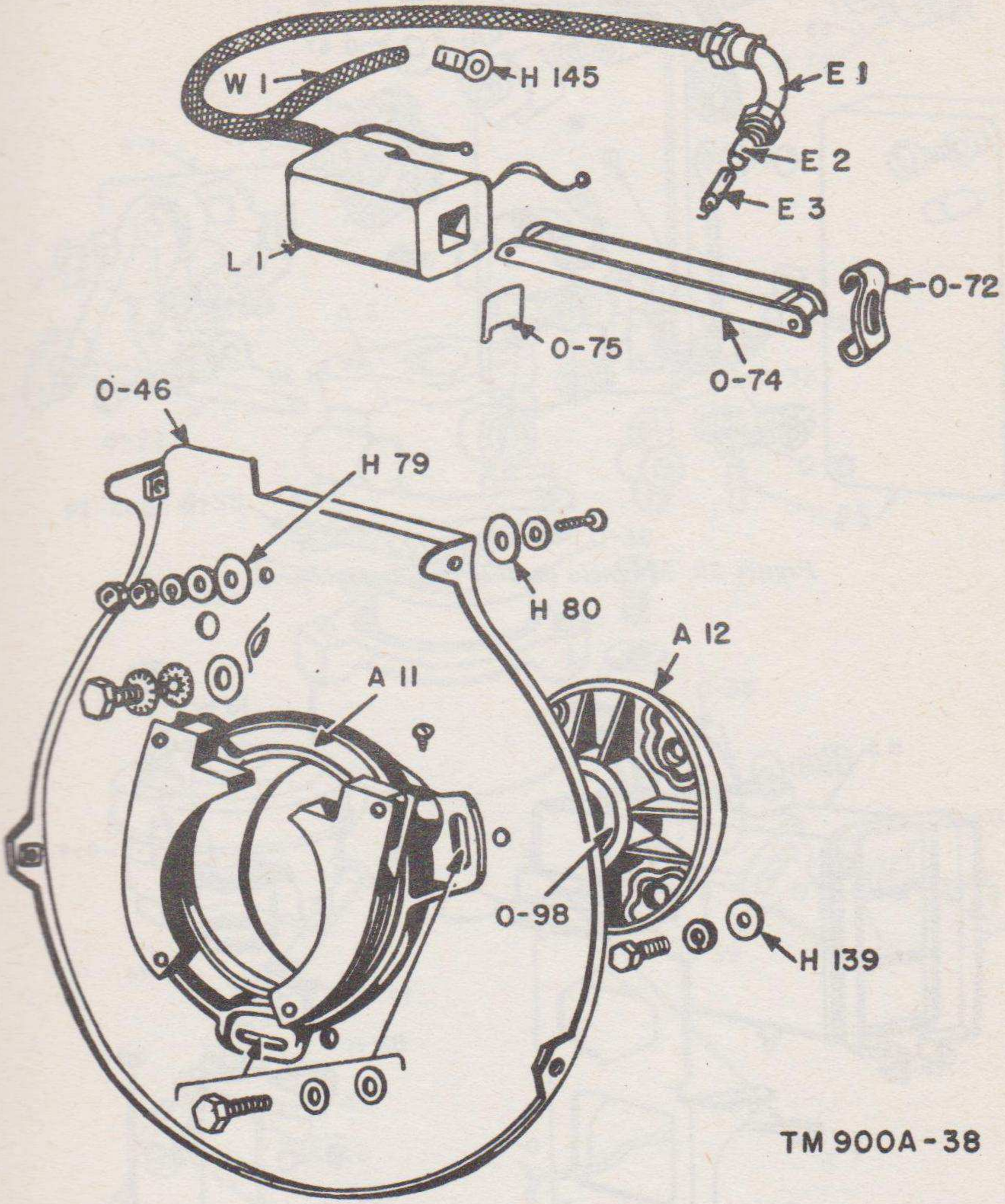


Figure 38. Magneto stator and backplate.

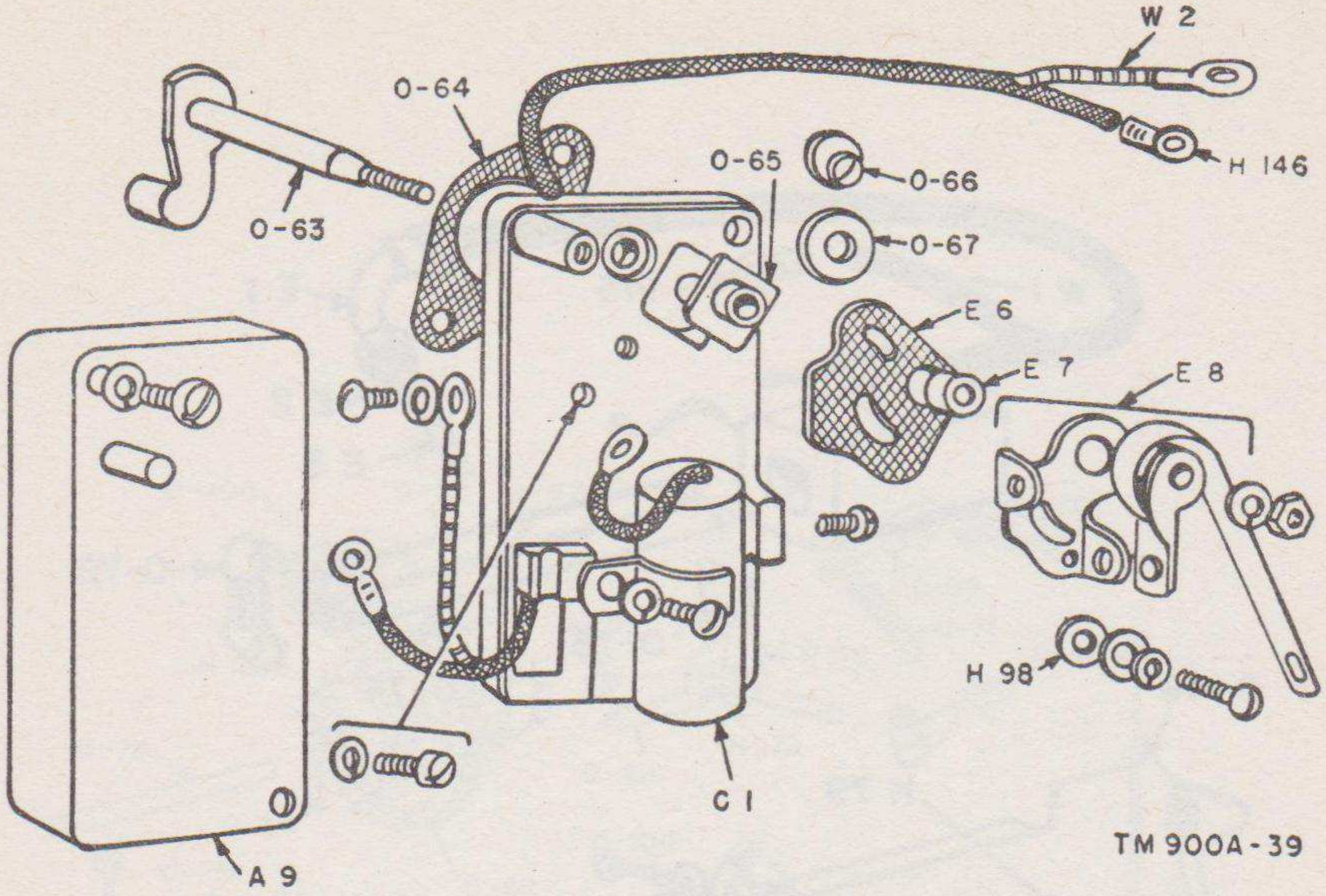


Figure 39. Magneto breaker box assembly.

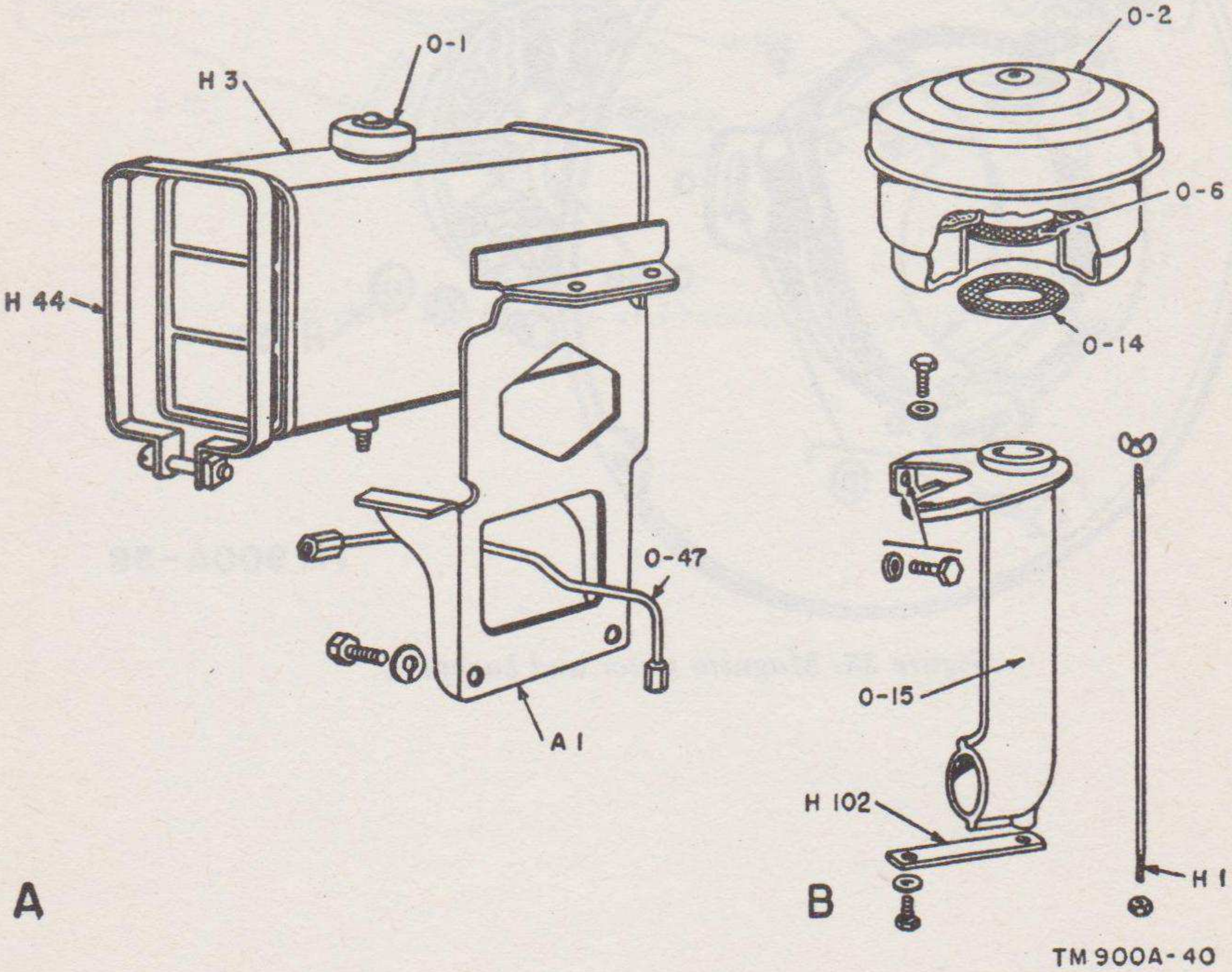


Figure 40. Fuel tank and air cleaner assemblies.

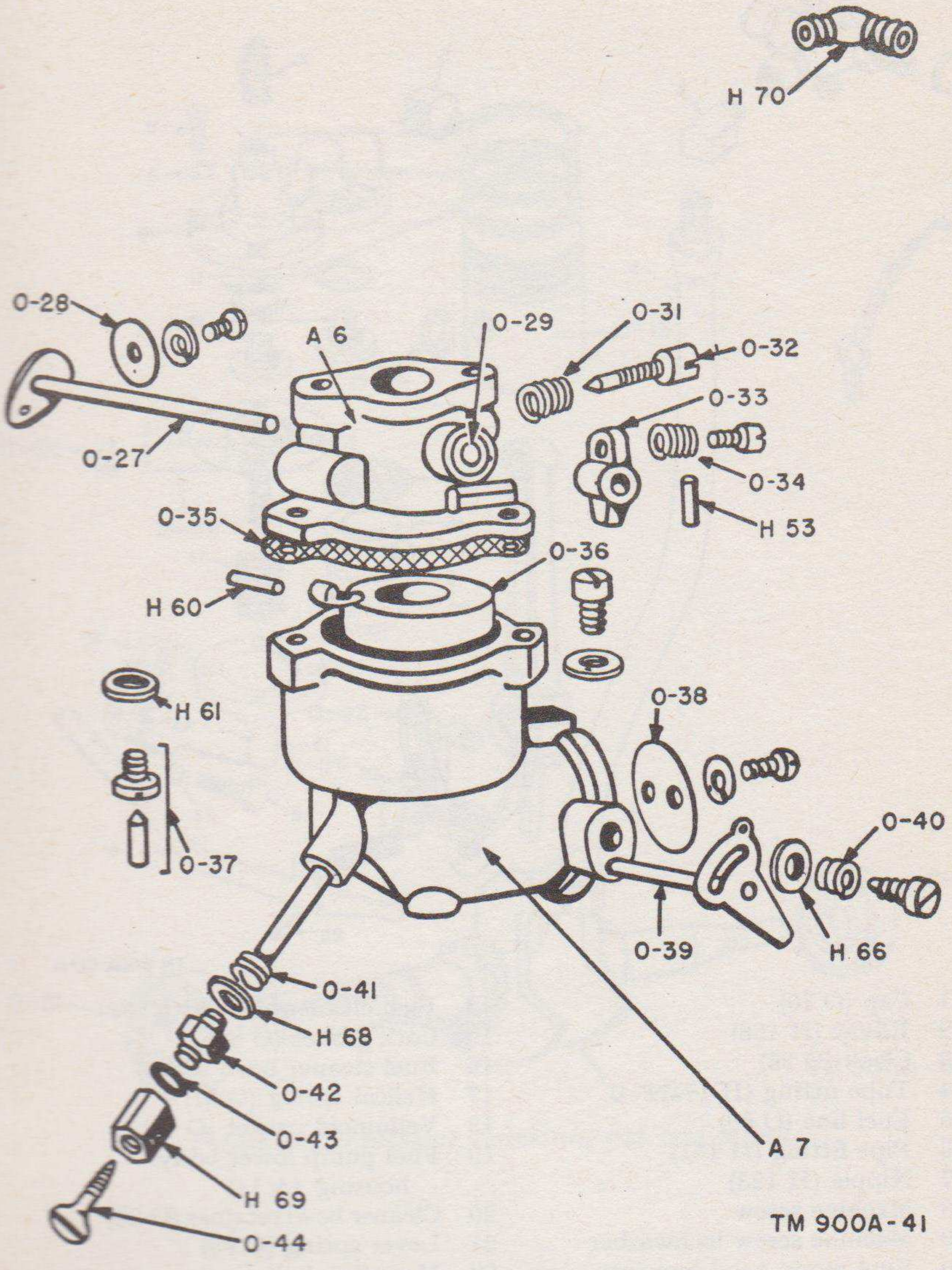
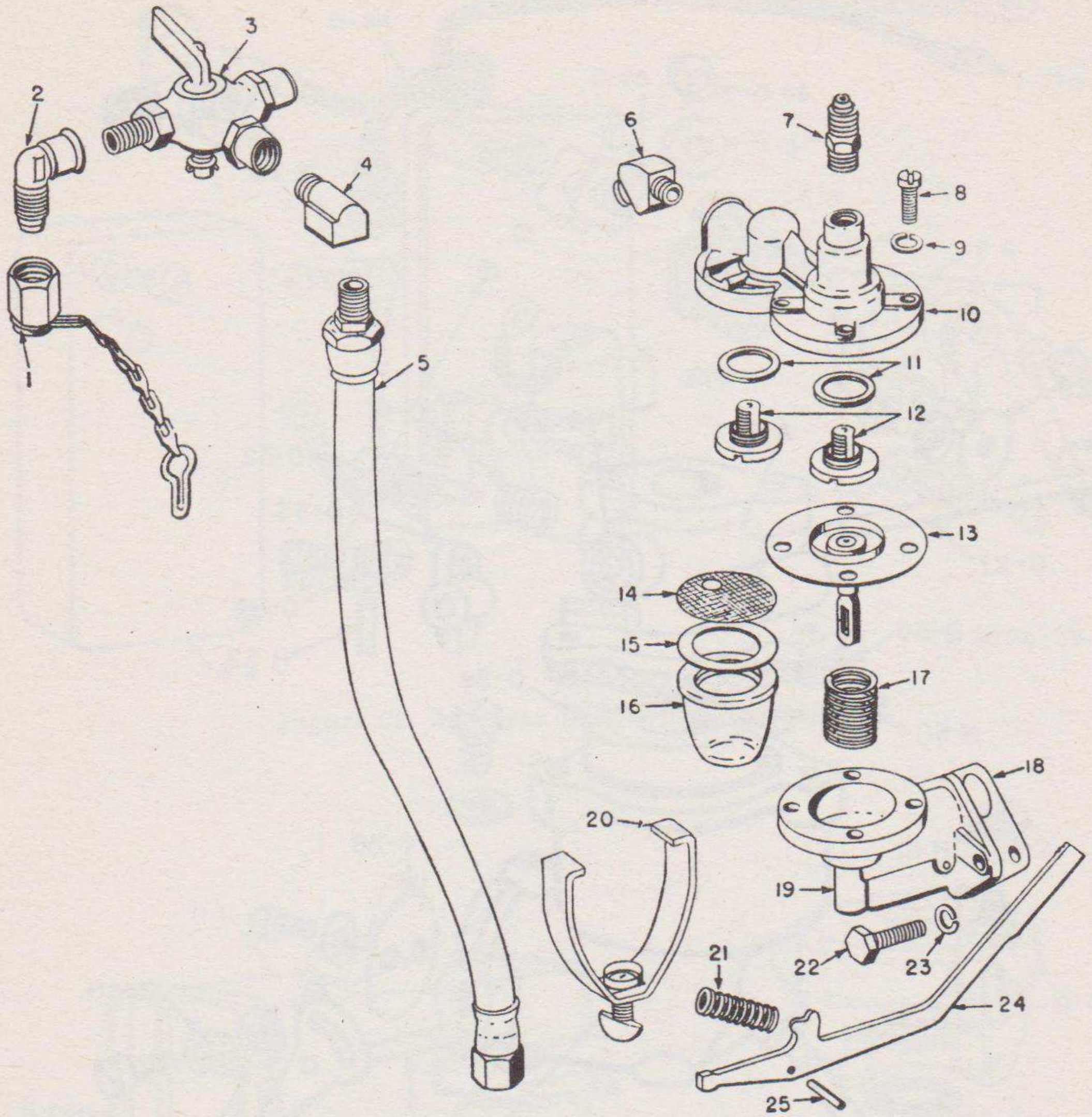


Figure 41. Carburetor assembly.



TM 900A-C2-5

1 Cap (O 70)
2 Elbow (H 168)
3 Clock (O 96)
4 Tube fitting (H 174)
5 Fuel line (O 60)
6 Pipe fitting (H 151)
7 Nipple (H 123)
8 Machine screw
9 Machine screw lockwasher
10 Fuel pump head housing (A 13)
11 Flat fiber washers (H 160)
12 Check valves (O 87)
13 Diaphragm assembly (Q 1)
14 Fuel cleaner element (O 88)
15 Cork gasket (O 89)
16 Fuel cleaner bowl (O 90)
17 Helical spring (O 91)
18 Vellumoid gasket (O 92)
19 Fuel pump lower body housing (A 14)
20 Cleaner bowl retainer (O 93)
21 Lever spring (O 95)
22 Mounting bolt
23 Mounting bolt lockwasher
24 Lever (O 94)
25 Lever pin (H 162)

Figure 42. Fuel pump assembly.

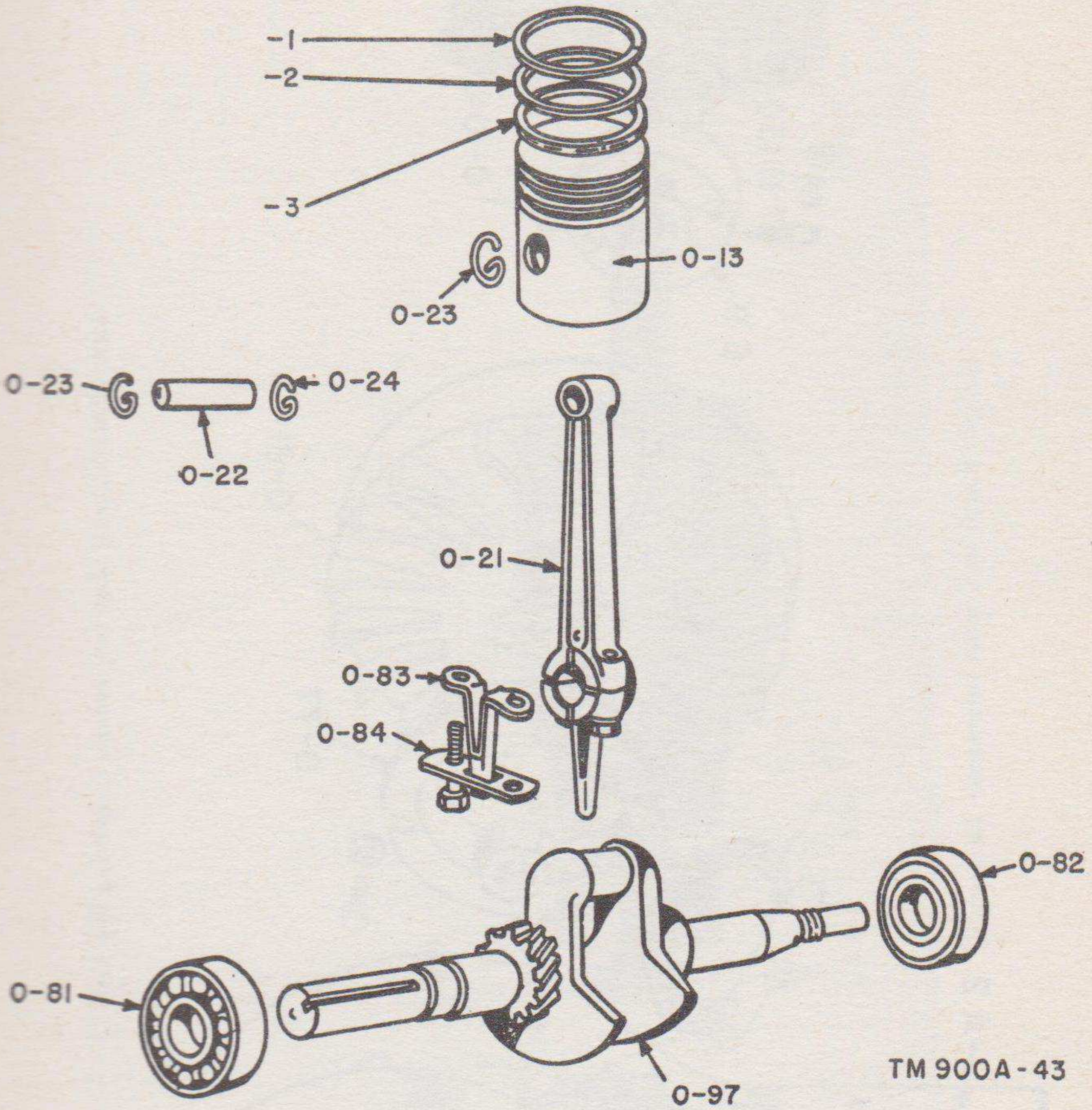


Figure 43. Crankshaft, connecting rod, and piston.

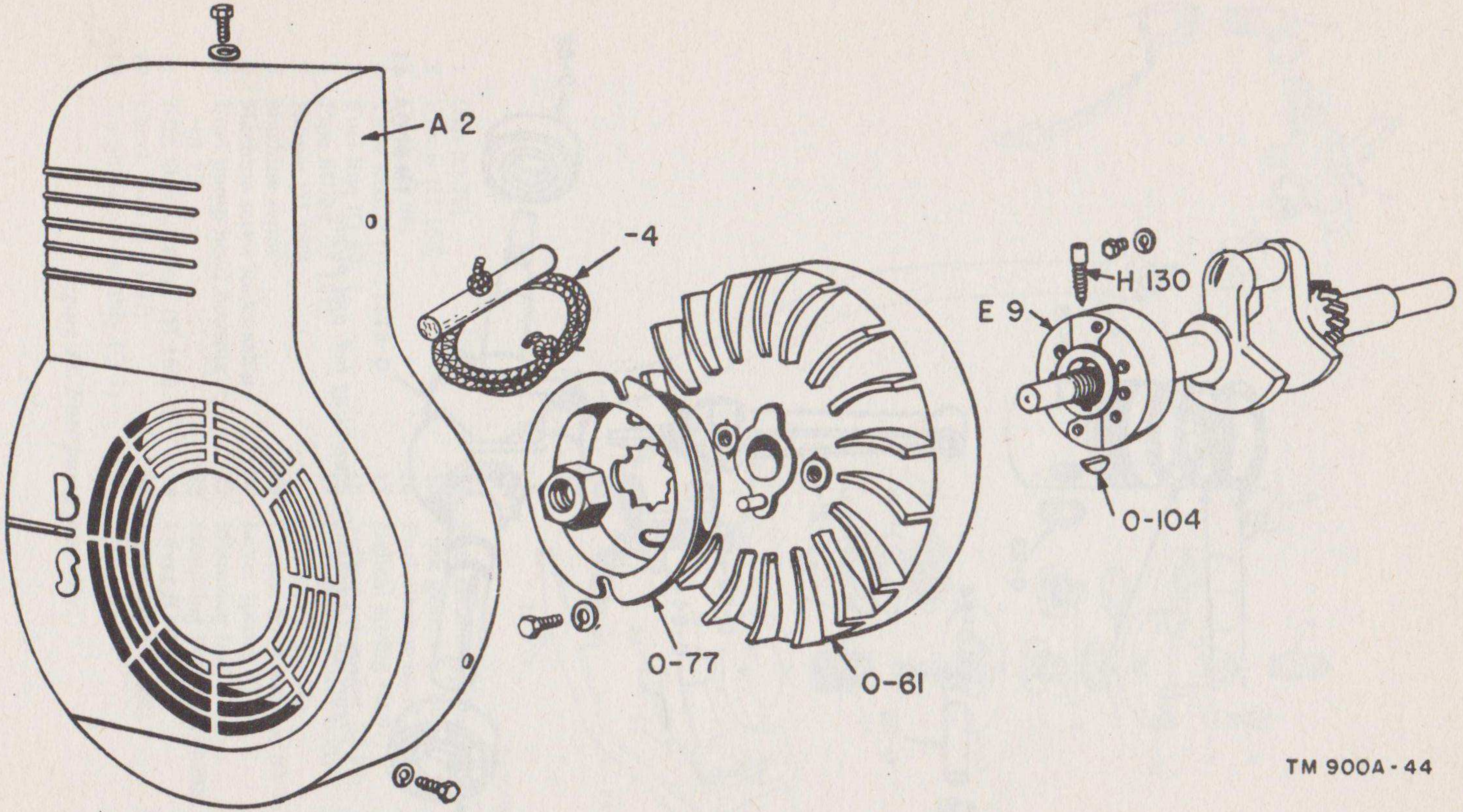


Figure 44. Flywheel, blower housing, and magneto rotor.

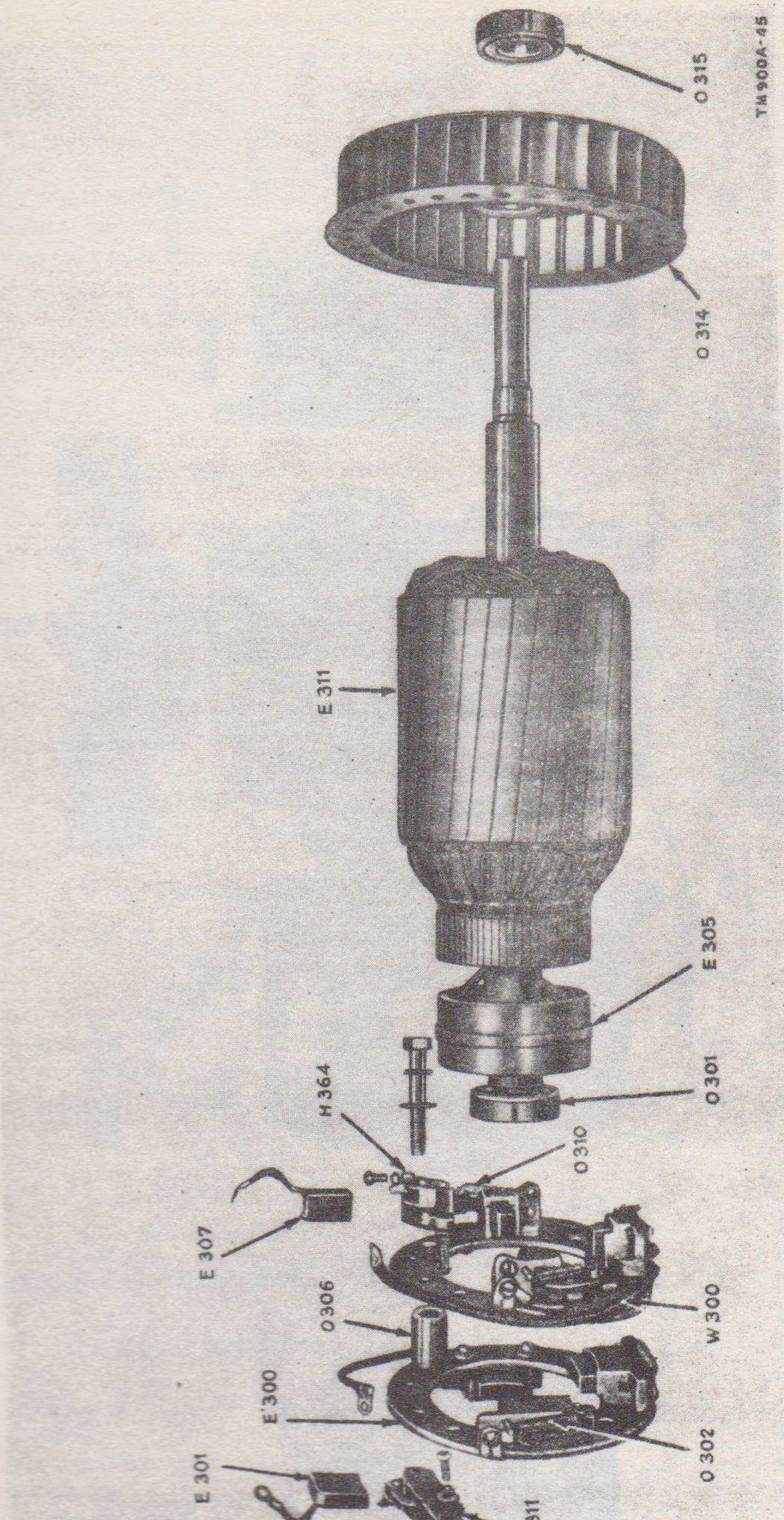


Figure 45. Generator rotor and brush rigging.

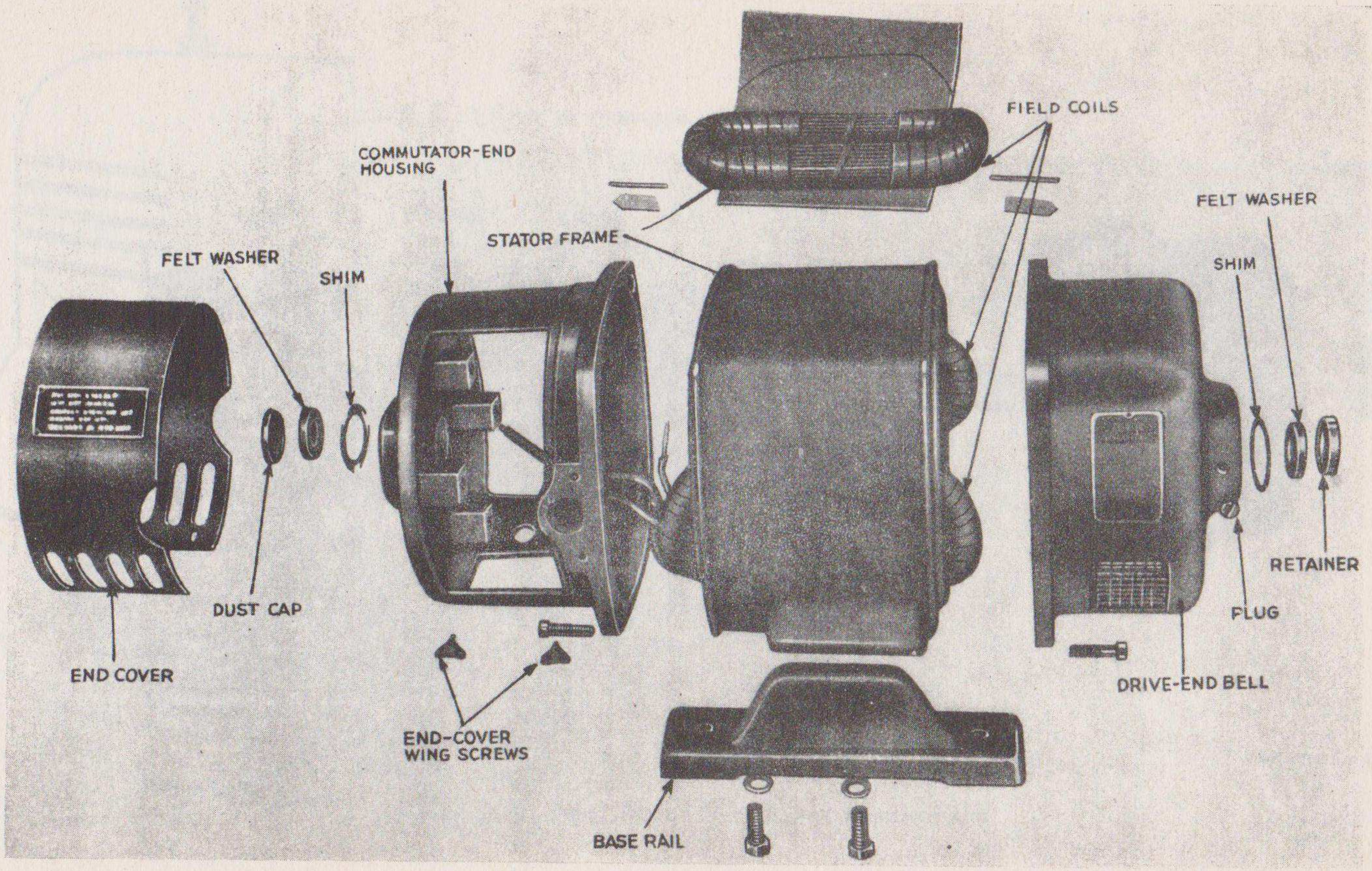


Figure 46. Generator stator and end-bells.

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