

TM 11-933

WAR DEPARTMENT TECHNICAL MANUAL

POWER UNIT

PU-6 / TPS-1

WAR DEPARTMENT • JULY 1944

WARNING
HIGH VOLTAGE

Voltages sufficient to cause

DEATH ON CONTACT

are generated by Power Unit PU-6/TPS-1

OBSERVE ALL POSSIBLE PRECAUTIONS

WAR DEPARTMENT TECHNICAL MANUAL
TM 11-933 CONFIDENTIAL

POWER UNIT
PU-6/TPS-1



WAR DEPARTMENT • JULY 1944

WAR DEPARTMENT,
WASHINGTON 25, D. C., 26 July 1944

TM 11-933, Power Unit PU-6/TPS-1, is published for the information and guidance of all concerned.

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(EG); Wire Rep Sec (GQ); 11-587; 11-592; 11-597; 11-617.

For explanation of symbols see FM 21-6.

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DESTRUCTION NOTICE

WHY - To prevent the enemy from using or salvaging this equipment for his benefit.

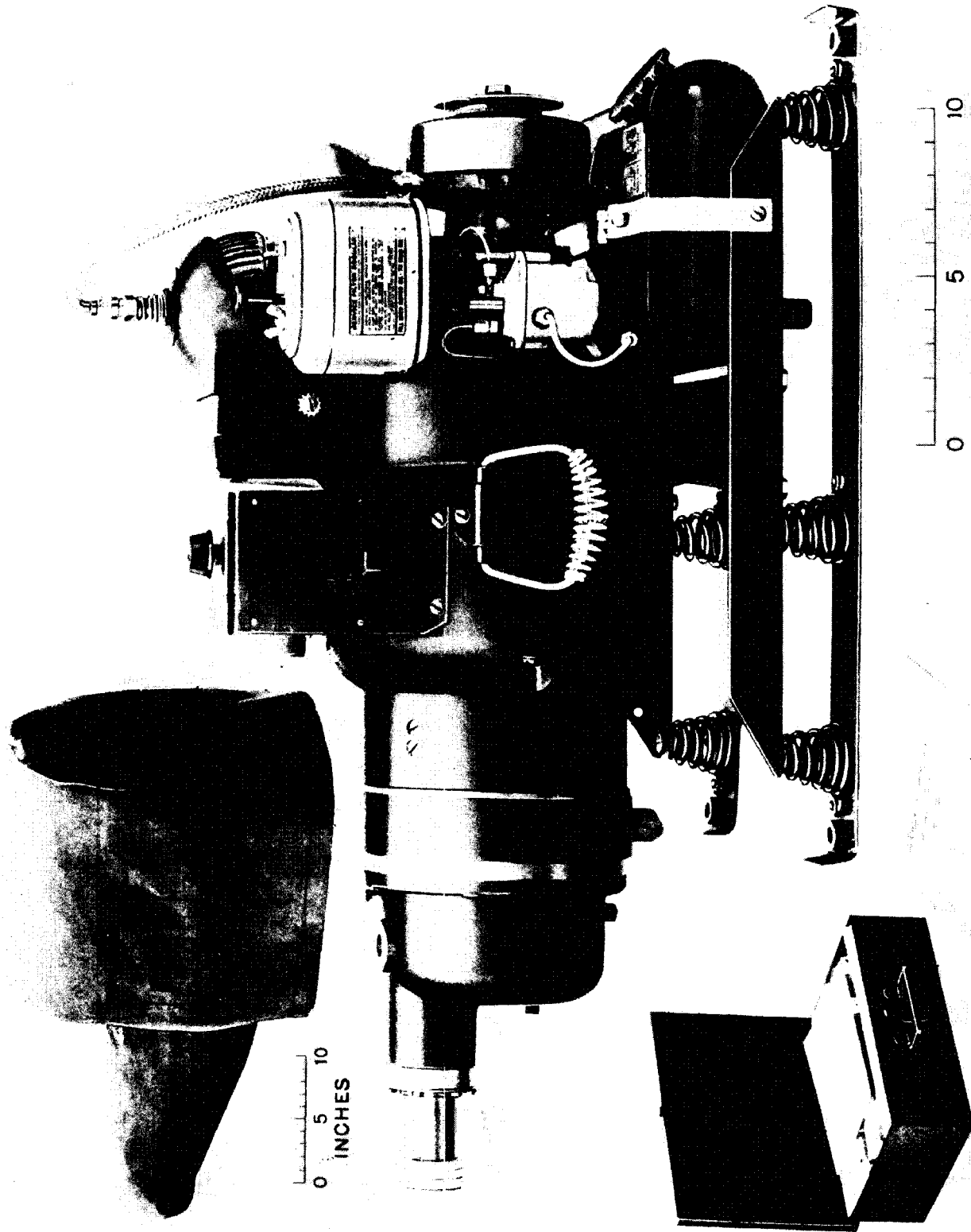
WHEN - When ordered by your commander.

HOW - 1. Smash - Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.
2. Cut - Use axes, handaxes, machetes.
3. Burn - Use gasoline, kerosene, oil, flame throwers, incendiary grenades.
4. Explosives - Use firearms, grenades, TNT.
5. Disposal - Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE
FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT - 1. Smash - All castings.
2. Cut - All cables and wires.
3. Burn - Instruction manual and all papers pertaining to the operation of the unit.
4. Bend or break - Control box and panel.
5. Bury or scatter - Any or all pieces mentioned above, after breaking.

DESTROY EVERYTHING



TL-35584

Figure 1. Power Unit PU-6/TPS-1

SECTION I

DESCRIPTION

1. GENERAL DESCRIPTION OF POWER UNIT.

a. Engine. The motive power for this unit is a single-cylinder, air-cooled, two-cycle gasoline engine governed for 4,000 rpm. A fuel container is mounted on angle irons under the engine, and fuel is forced to the carburetor by crankcase pressure. The carburetor is a Homelite, adjustable-jet type, equipped with an oil-bath air cleaner. Ignition is supplied by a Wico, flywheel-type magneto which is mounted as a complete assembly on the end of the intake-valve shaft. The spark plug and ignition are completely shielded.

b. Generator. The generator assembly consists of a 1,400-watt, 120-volt, 400-cycle inductor-alternator and a 400-watt, 27-volt direct-current generator. The alternator rotor and the direct-current generator armature are mounted on a common shaft which is directly connected to the engine crankshaft. The alternator stator is mounted in a shell which is fastened to the fan housing. The direct-current yoke, field-coil assembly, and brush head are fastened to this shell. A spark-wheel assembly is mounted on the end of the armature shaft. A spark-gap housing with pot head encloses the spark wheel.

c. Controls. A weatherproof output box is mounted on the stator shell. It contains a rheostat, adjustable resistor, two pin jacks for plugging in the voltmeter, one LOCAL and one REMOTE receptacle for plug-in connections, one a-c circuit breaker, and one d-c circuit breaker. A toggle switch is installed in the d-c circuit of the LOCAL receptacle.

d. Cover, Tool, and Spare-parts Box. A waterproof canvas cover and a box containing the following tools and spare parts is shipped with each power unit:

Spare Parts

- 1 Felt cam wiper (Ref. 70)
- 1 Breaker arm, complete (Ref. 62)
- 1 Contact plate (Ref. 63)
- 4 Generator-brush (Ref. 165)
- 2 Piston ring (Ref. 11)
- 2 Piston pin retaining ring (Ref. 14)
- 15 Spark plug (Ref. 3)
- 4 Spark-plug adapter (Ref. 4)

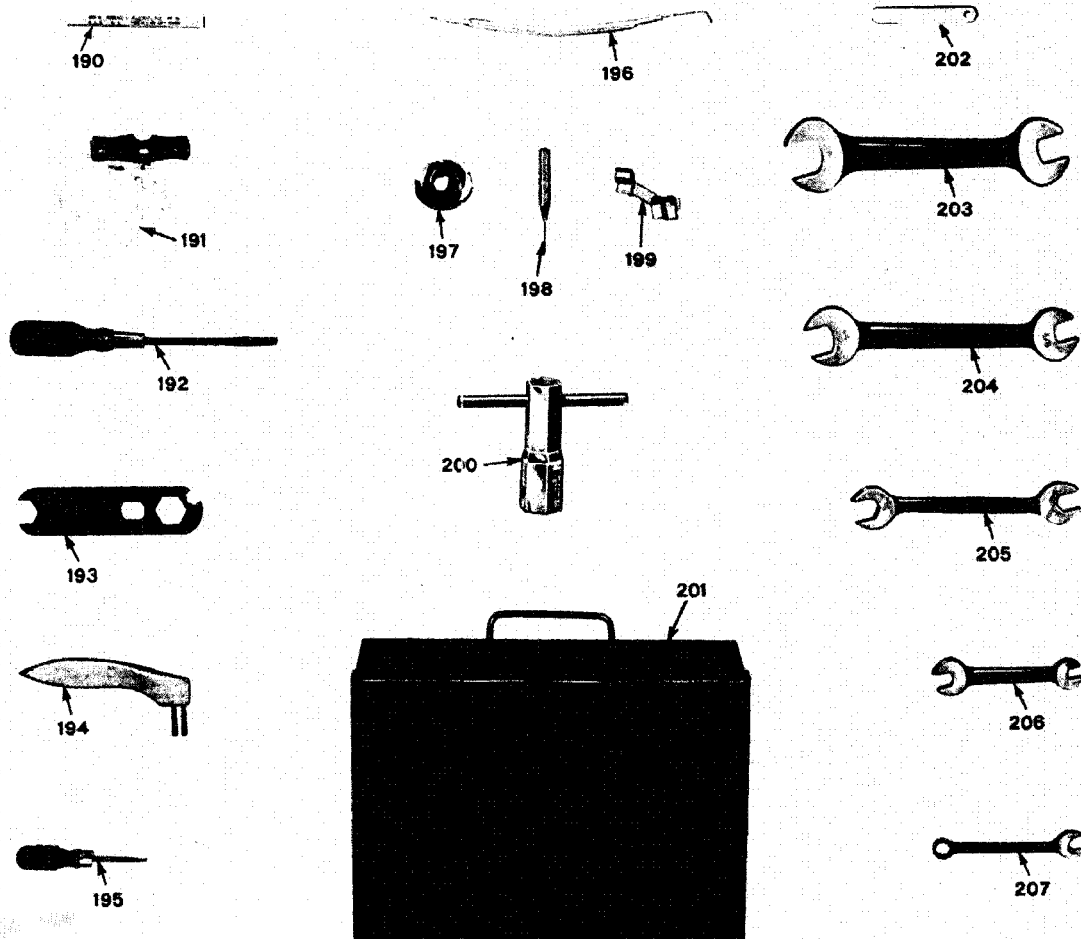
- 4 Adapter gasket (Ref. 5)
- 3 Cylinder gasket (Ref. 19)
- 3 Timer bracket gasket (Ref. 37)
- 3 Carburetor gasket (Ref. 97)
- 2 Fuel filter (Ref. 109)
- 1 Adjustable-jet assembly (Ref. 95)
- 1 Valve spring (steel) (Ref. 82)
- 2 Check ball (Ref. 83)
- 1 Suppressor (spark plug) (Ref. 57)
- 1 Capacitor (magneto) (Ref. 66)
- 3 Starting rope (Ref. 191)
- 7 Tungsten electrode (Ref. 137)
- 2 Cylinder flange gasket (Ref. 118)
- 4 Formica washer (Ref. 17)
- 5 Grounding-brush assembly (Ref. 177)
- 1 High-tension lead (Ref. 56)
- 2 Connecting rod bearing (Ref. 18)
- 1 Generator bearing (Ref. 150)

Tools

- 1 Combination wrench (Ref. 193)
- 1 Wrench, 7/16" box and open end (Ref. 207)
- 1 Screwdriver, large (Ref. 192)
- 1 Screwdriver, small (Ref. 195)
- 1 Socket wrench, 7/8" x 1-1/32" (Ref. 200)
- 1 Point dressing tool (Ref. 190)
- 12" Sandpaper No. 00 (Ref. 197)
- 1 Wrench, 5/8" x 7/8", open end (Ref. 204)
- 1 Wrench, 3/8" x 1/2", open end (Ref. 206)
- 1 Gauge, 0.020" thickness (Ref. 202)
- 1 Wrench, 3/4" x 1", open end (Ref. 203)
- 1 Wire brush (Ref. 194)
- 1 Wrench, 9/16" x 11/16", open end (Ref. 205)
- 1 Spark gap tester (Ref. 199)
- 1 Carbon scraper (Ref. 196)
- 1 Baffle reamer (Ref. 198)

2. MAJOR COMPONENTS (fig. 1).

<i>Component</i>	<i>Width</i>	<i>Length</i>	<i>Height</i>	<i>Weight</i>
PU-6/TPS-1	17"	35"	21"	128 lbs.
Tool box	8-1/4" x 12-1/4" x		3-3/4"	16 lbs.
Unit packed for export shipment	21-1/2" x 40"		x 23-1/8"	235 lbs.



TL-33748

Figure 2. Tools and tool box

Key to Reference Numbers in Figure 2

Ref. No.	Name of Part	Part Number
190	Point Dressing Tool	RM-22065
191	Starting Rope	HL-AA-290
192	Screwdriver, large	MT-H-4 (22080)
193	Combination Wrench	HL-22079
194	Wire Brush	MI-1186 (22083)
195	Screwdriver, small	MT-S-498
196	Carbon Scraper	FC-22055
197	12" Sandpaper No. 00	
198	Baffle Reamer	IE-22012
199	Spark Gap Tester	FS-22082
200	Socket Wrench, 7/8" x 1-1/32"	MT (22074)
201	Tool Box	MI-25566
202	Gauge, 0.020" thickness	MT-S-631
203	Wrench, 3/4" x 1" open end	MT (S-502)
204	Wrench, 5/8" x 7/8" open end	MT (22007)
205	Wrench, 9/16" x 11/16" open end	MT (22008)
206	Wrench, 3/8" x 1/2" open end	MT (22006)
207	Wrench, 7/16" box and open end	MT (S-500)

SECTION II

INSTALLATION AND OPERATION

3. INSTALLATION (fig. 3).

The power unit is packed in a wooden case for shipment and is fastened to the base of the case. Remove unit from base before operation and make sure any blocks between the angle irons and skids are removed. The unit must be free to *float* on the shock-absorbing foot mountings.

A spark-gap housing, which is on the end of the generator and held to the brush head by a clamp ring, encloses the spark wheel. This spark wheel has six equally spaced collect screws. Due to different designs of modulator circuits which can be used with this power unit, either three or six electrodes are used on the spark wheel. Most units will be shipped with three electrodes equally spaced on the spark wheel. The three additional electrodes will be furnished in the spare-parts box together with a complete replacement set. Before the unit is placed in operation, turn the engine slowly by hand. Through the Gits window (peep hole) in the spark-gap housing, check the number of electrodes installed in the spark wheel. *The number of electrodes must be correct for the particular modulator circuit.* If the number of electrodes must be changed, refer to paragraph 10 *i*.

4. OPERATION (fig. 3).

a. General. Remove the two plastic pipe plugs inserted in the back and bottom of the spark-gap housing before the unit is operated. The only purpose of these plugs is to seal the housing from dirt and moisture during shipment. Fill the air-cleaner bowl to the oil bead before the engine is started. Use the same oil as is used in the fuel mixture.

b. Fuel and Oil. One-half pint engine oil, specification 2-104-B (SAE 10), must be thoroughly mixed with each gallon of gasoline before pouring into the fuel container. To measure the oil, fill the fuel-tank cap (capacity $\frac{1}{8}$ pint) four times and pour into a 1-gallon measure. Pour 1 or 2 quarts of gasoline into the measure and stir with a clean stick until it foams; then fill the measure with gasoline, stir again, and pour into the fuel container. Since the entire engine is lubricated by oil mixed with the gasoline, *it is extremely important that the oil and gasoline are completely mixed. Both fuel and oil must be dirt-free.*

CAUTION: Use SAE-30 or-50 oil when unit is operated in a confined area without adequate circulation of air or in extremely hot weather.

c. Starting. (1) Turn the shut-off valve on the fuel container to ON.

(2) In extremely cold weather, open the carburetor adjusting needle (fig. 2) $\frac{1}{4}$ turn (counterclockwise). Turn back to the original setting after engine has warmed up.

(3) Choke the engine by operating the priming pump two or three times; in very cold weather, operate six to eight times.

(4) Wind the starting rope on the starter plate in the direction of arrow (counterclockwise), and pull the rope hard to give a quick spin to the engine. Repeat, if necessary, until the engine starts.

(5) If the engine falters after starting, operate the priming pump at short intervals until the engine warms up.

(6) If the engine does not start after 10 spins, it may be flooded. Open the drain cock on the crankcase and spin the engine a few times to expel raw fuel. Close the drain cock and spin the engine again until it starts.

d. Connections for Operations. (1) The low-voltage cable of the modulator must be plugged into the *Local* connector. The short high-voltage cable must be connected to the pot head on the end of the generator. The cable from the radar console must be plugged into the *Remote* connector.

(2) To check the voltage or frequency of the a-c output, a phone tip jack is provided on the control panel. The voltage may be regulated by the rheostat on top of the control box.

(3) Make sure the modulator switch on the control panel is OFF before the unit is started. *Do not turn to ON until the power unit has been in operation for at least 30 seconds.*

e. Stopping. (1) Turn the shut-off valve on the fuel container to OFF.

(2) A stop button is also provided on the magneto for emergency stopping, or if unit is to be restarted soon.

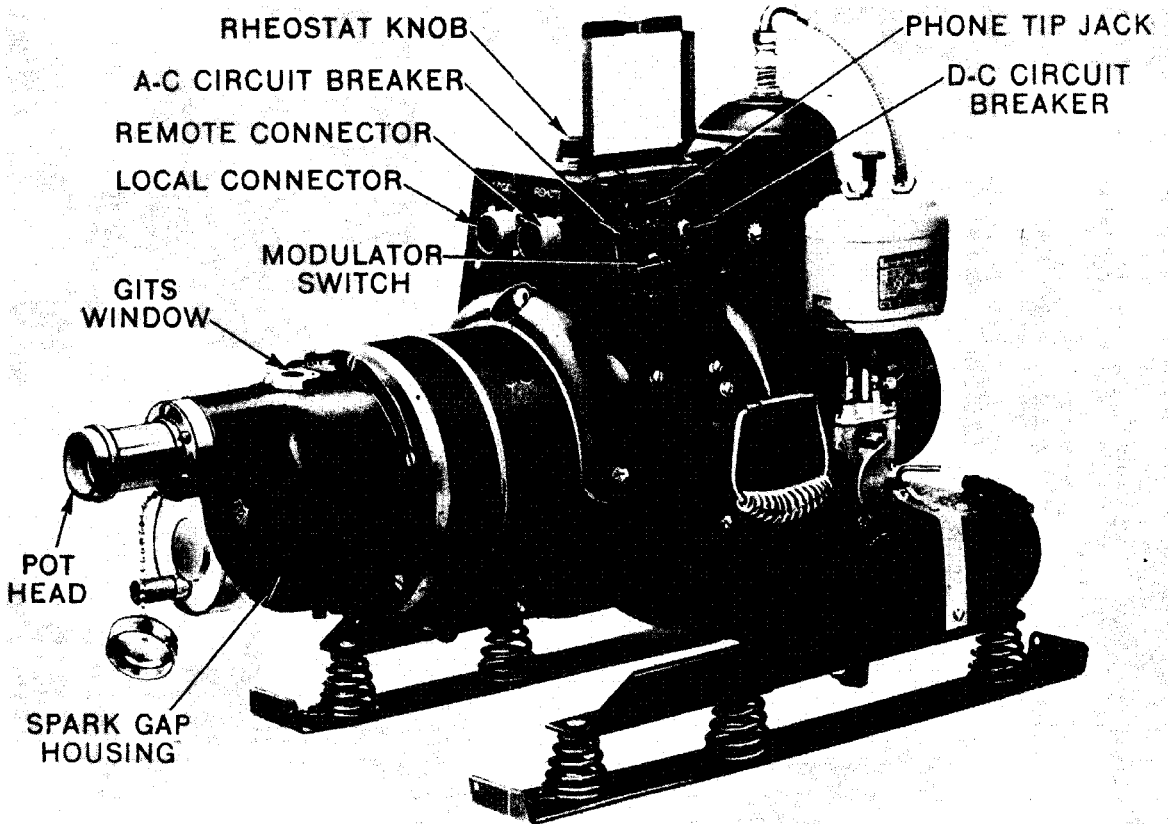
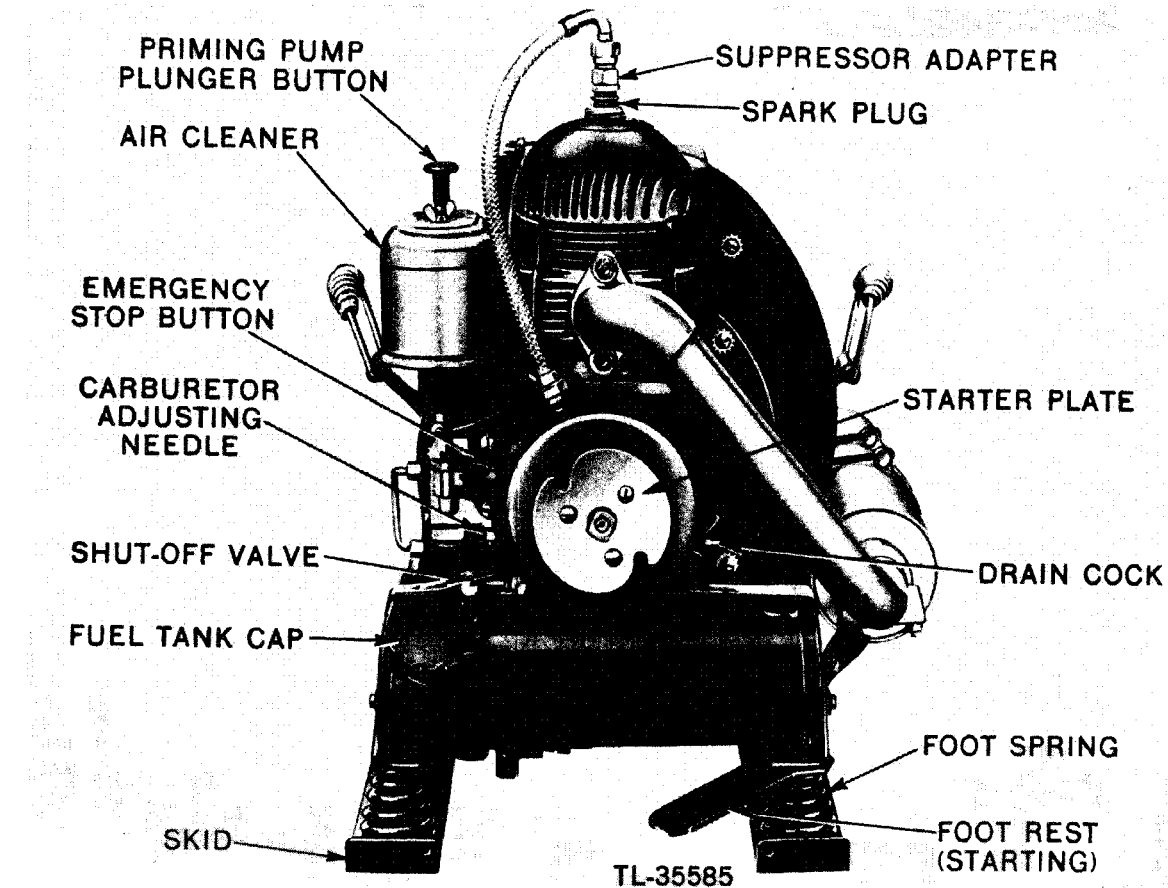


Figure 3. Starting, stopping, and operation

5. SERVICE TROUBLES.

<i>Trouble</i>	<i>Possible Cause</i>
Engine fails to start	<p>Spark plug and adapter</p> <ol style="list-style-type: none"> (1) Carbon across points (2) Points worn or gap wrong (3) Wrong type plug (4) Cracked porcelain (5) Adapter holes plugged <p>Fuel supply</p> <ol style="list-style-type: none"> (1) No fuel in container (2) Shut-off valve closed (3) Filters clogged (4) Fuel lines clogged (5) Water or dirt in fuel (6) Drain cock in crankcase open <p>Carburetor</p> <ol style="list-style-type: none"> (1) Improper adjustment (2) Nozzle clogged (3) Pressure or feed tubes clogged or broken (4) Priming pump not operating <p>Ignition</p> <ol style="list-style-type: none"> (1) Contact points pitted or out of adjustment (2) Broken high-tension cable (3) Loose or grounded connections in magneto (4) Defective coil or capacitor (5) Magnet weak (rare) <p>Exhaust</p> <ol style="list-style-type: none"> (1) Cylinder ports closed with carbon (2) Muffler closed with carbon
Engine lacks power	<ol style="list-style-type: none"> (1) Carburetor needs adjustment (2) Water or dirt in fuel (3) Exhaust ports clogged (4) Muffler clogged (5) Piston or cylinder carbonized (6) Piston rings worn (7) Cylinder, piston or rings scored (8) Breaker points pitted or out of adjustment (9) Spark plug worn or defective (10) Oil not thoroughly mixed with gas (11) Defective crankcase sealing or timer-bracket gasket (12) Drain cock in crankcase open
Engine overheats	<ol style="list-style-type: none"> (1) Exhaust ports clogged (2) Muffler clogged (3) Piston or cylinder carbonized (4) Overload on generator (5) Insufficient oil or oil not thoroughly mixed with gas (6) Improper point adjustment (7) Low octane fuel (below 80)

<i>Trouble</i>	<i>Possible Cause</i>
Poor compression	<ul style="list-style-type: none"> (1) Piston rings worn or stuck in grooves (2) Spark plug or adapter loose (3) Defective spark plug or adapter gasket (4) Cylinder worn or scored
Arcing at brushes	<ul style="list-style-type: none"> (1) Defective capacitor on brush head (2) Commutator dirty or scored (3) Worn brushes (4) Brushes stuck in holders or reversed (5) Broken or weak brush springs (6) Short circuit in system (7) Shorted field coil (8) Open or shorted coil in armature
Fails to generate current	<ul style="list-style-type: none"> (1) Circuit breakers on control panel open (2) Brushes stuck in holders or reversed (3) Defective capacitor on brush head (4) Worn brushes (5) Dirty commutator (6) Broken or loose connections (7) Defective armature (8) Defective rheostat or resistor (9) Defective field coil (10) Defective stator winding (a-c) (11) Loss of residual magnetism (d-c field)
Fails to deliver rated output (1,400 watts a-c in addition to 400 watts d-c)	<ul style="list-style-type: none"> (1) Engine not up to speed (2) Dirty commutator (3) Worn brushes (4) Brushes not properly seated (5) Short circuit in system (6) Broken or weak brush spring (7) Defective capacitor on brush head
Noisy radio reception	<ul style="list-style-type: none"> (1) Defective capacitor on brush head (2) Loose connections (3) Loose or dirty spark plug shielding assembly (4) Excessively dirty commutator (5) Arcing at brushes (6) Defective capacitor in control box (7) Muffler ground strap loose (8) Grounding pads not installed between straps and fuel container (9) Suppressor (contained in molded tube) on high tension cable defective (10) Internal-external lockwashers not used on screws in the following places: <ul style="list-style-type: none"> (a) Under fuel tank straps (b) Under muffler ground strap on both ends (c) Securing capacitor in brush head (d) Securing capacitor in control box (two external lockwashers used)

SECTION III

FUNCTIONING OF PARTS

6. ENGINE OPERATING PRINCIPLE.

a. General. The two-cycle engine used on Power Unit PU-6/TPS-1 completes a cycle in one revolution, or one downstroke and one upstroke of the piston. A charge of gasoline vapor and air is drawn through a rotary intake valve into the crankcase on the upstroke of the piston. This same stroke also compresses a charge already in the cylinder. The compressed charge is then ignited and the downstroke of the piston is the power stroke. This same stroke also compresses the charge in the crankcase. At the bottom of the stroke the piston passes below the intake ports on one side and the exhaust ports on the other side. The compressed gases from the crankcase rush into the cylinder and push the burned gases out through the exhaust ports. This completes the cycle of intake, compression, explosion, and exhaust.

b. Governor. This engine has a combination rotary intake valve and governor to control the admission of the charge from the carburetor to the crankcase. When the engine runs above the desired speed, centrifugal force causes the governor weight to partially close the intake opening and thus reduce the flow of gasoline vapors to the cylinder. If the engine drops below speed, the governor spring pulls the weight away from the intake opening and increases the speed.

c. Carburetor. The engine is equipped with a

Homelite adjustable-jet carburetor. Fuel is fed to the carburetor from the fuel container by crankcase pressure. This pressure forces the fuel up the feedline inside the carburetor to the venturi where it is vaporized and drawn into the engine. For starting, a priming pump, which is part of the carburetor, shoots gas directly into the intake ports in the cylinder.

d. Lubrication. *The entire engine is lubricated by oil mixed with the gasoline.* Each new charge going into the cylinder sprays a fresh film of oil over all moving parts and insures complete lubrication.

7. GENERATOR.

a. D-c Generator and Exciter. This is a compound-wound, four-pole, direct-current generator. In addition to supplying 400 watts of useful output at 27 volts d-c, it also excites the field of the 400-cycle alternator. There is no provision for controlling the output voltage of this generator.

b. Generator, 400-cycle. This is a 400-cycle, inductor-type alternator having its excitation winding and output winding both on the stator. The rotor has six equally spaced projections which cause the flux through the stator teeth to pulsate and thus generate voltage. The field rheostat mounted in the control box regulates the output voltage of this generator.



Figure 4. Spark plug and adapter

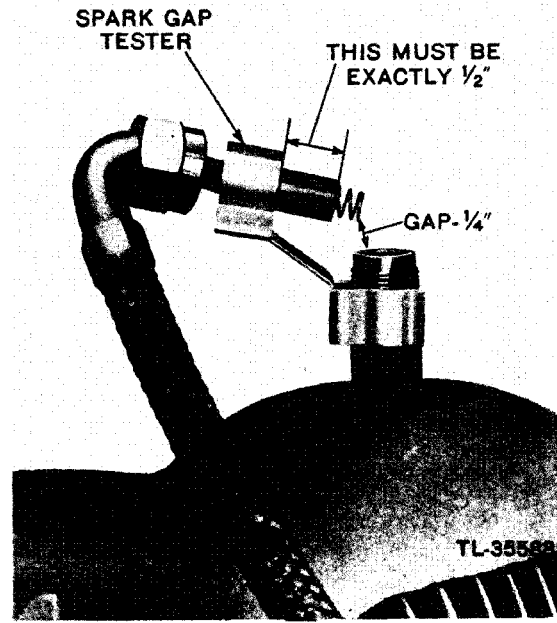


Figure 5. Testing ignition spark

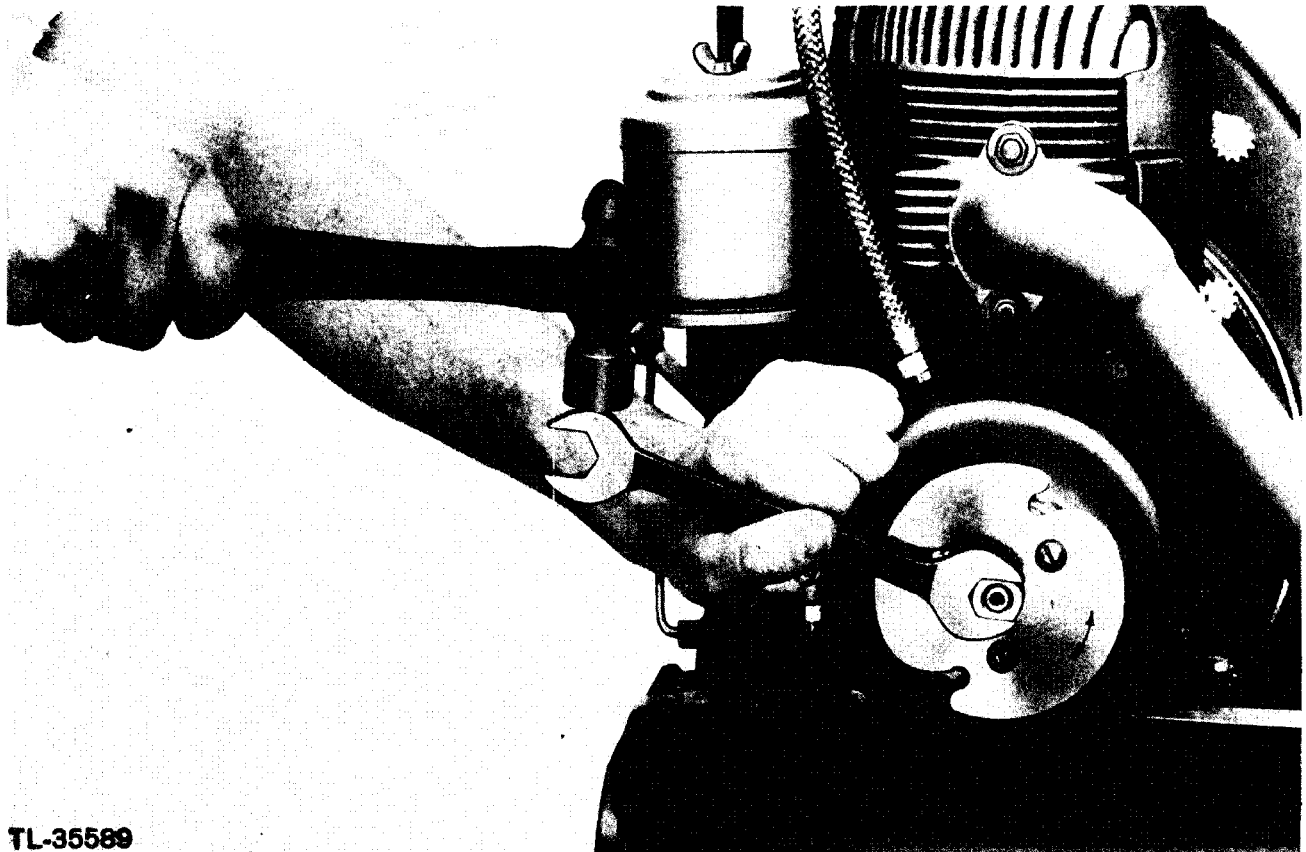


Figure 6. Removing magneto rotor

SECTION IV

MAINTENANCE

8. INSPECTION.

a. Daily. Inspect the spark plug for proper gap (0.025 inch) and cleanness. Examine the spark-plug adapter baffle for carbon or lead formation around holes (par. 10 *a*). Clean carbon from exhaust ports (par. 10 *d*). Check the oil level in the air-cleaner bowl (par. 10 *c*).

b. Hours, 100. Inspect the adjustable-jet assembly in the carburetor (par. 10 *c*).

c. Hours, 150. Inspect the magneto-breaker points after 150 hours of operation and then recheck every 100 hours thereafter (par. 10 *b*).

d. Hours, 200. Clean the filter and drain the sump in the fuel container (par. 10 *c*).

e. Hours, 350. Inspect the cam wiper on the magneto (par. 10 *b*).

f. Hours, 500. Inspect the brushes and the commutator (par. 10 *f* and *g*).

g. Hours, 700. Clean carbon from the cylinder and piston and replace the rings. Replace the cam wiper and points in the magneto. Examine the connecting rod and the bearings. Replace the formica washers on each side of the connecting-rod bearing. Disassemble and examine parts of the timer-bracket assembly. Further repairs are not required unless operation is faulty (sec. V).

9. LUBRICATION. The only lubrication for the entire unit is oil mixed with the gasoline and possible oiling of the cam wiper (par. 10 *b* (7)).

10. MAINTENANCE.

a. Spark Plug and Adapter (fig. 4). (1) Clean the spark plug and spark-plug adapter every day and whenever the engine does not start or perform properly. Remove the shielded conduit connection with a wrench (ref. 203) and take out the spark plug and adapter with a wrench (ref. 200). If the adapter comes out on the spark plug, remove it.

(2) Clean spark-plug points with wire brush (ref. 194). If points are badly worn, replace the plug using only a Champion Spark Plug HO-14S. *Do not use standard aircraft plugs* with a gap of approximately 0.012 inch. This

engine requires a gap setting of 0.025 inch and it is impractical to open the gap of standard aircraft plugs.

(3) Clean carbon and lead deposits from both sides of the adapter baffle with a wire brush (ref. 194). If any of the holes are partially plugged, clean them out with baffle reamer (ref. 198). Replace the adapter gasket if necessary. Clean the exhaust ports (par. 10 *d*). Replace the spark plug and adapter.

b. Ignition (fig. 7). (1) TESTING COMPLETE IGNITION SYSTEM. Disconnect the shielded-conduit connection at the spark plug and remove the suppressor adapter. Slide the molded tube (suppressor) into the smaller end of the spark-gap tester (ref. 199) and snap the larger end of the tester to the spark plug (fig. 5). Slide the tester on the spark plug until the gap between the plug and spring on the end of the molded tube is $\frac{1}{4}$ inch. Spin the engine quickly. If a weak spark or no spark at all is obtained, check the following items.

(2) CONTACT POINT ADJUSTMENT. The only adjustment in the magneto is at the contact points which should be examined at 150 hours and every 100 hours thereafter. The gap setting should be 0.020 inch and the points must be clean and free from oil. To adjust, proceed as follows:

(a) Remove the magneto rotor by loosening the puller nut with a wrench (ref. 205). The points are then exposed for adjustment. Do not remove the three screws holding the starter plate to the rotor. If the rotor sticks on the shaft, tap the wrench sharply with a hammer (fig. 6).

(b) Remove the spark plug to relieve engine compression and turn the flywheel slowly counterclockwise until the breaker arm fiber rests on the highest point of the cam which is approximately $\frac{1}{8}$ inch past the breaking edge of the cam. Check the gap with thickness gauge (ref. 202).

CAUTION: It is highly important in inserting the gauge, to separate points by hand and then place the gauge between contact surfaces. Follow the same procedure in removing the gauge. Sliding the gauge between the points will damage the contact surfaces.

(c) If it is necessary to adjust the gap, *slightly loosen* the screw which fastens the contact plate to the stator plate.

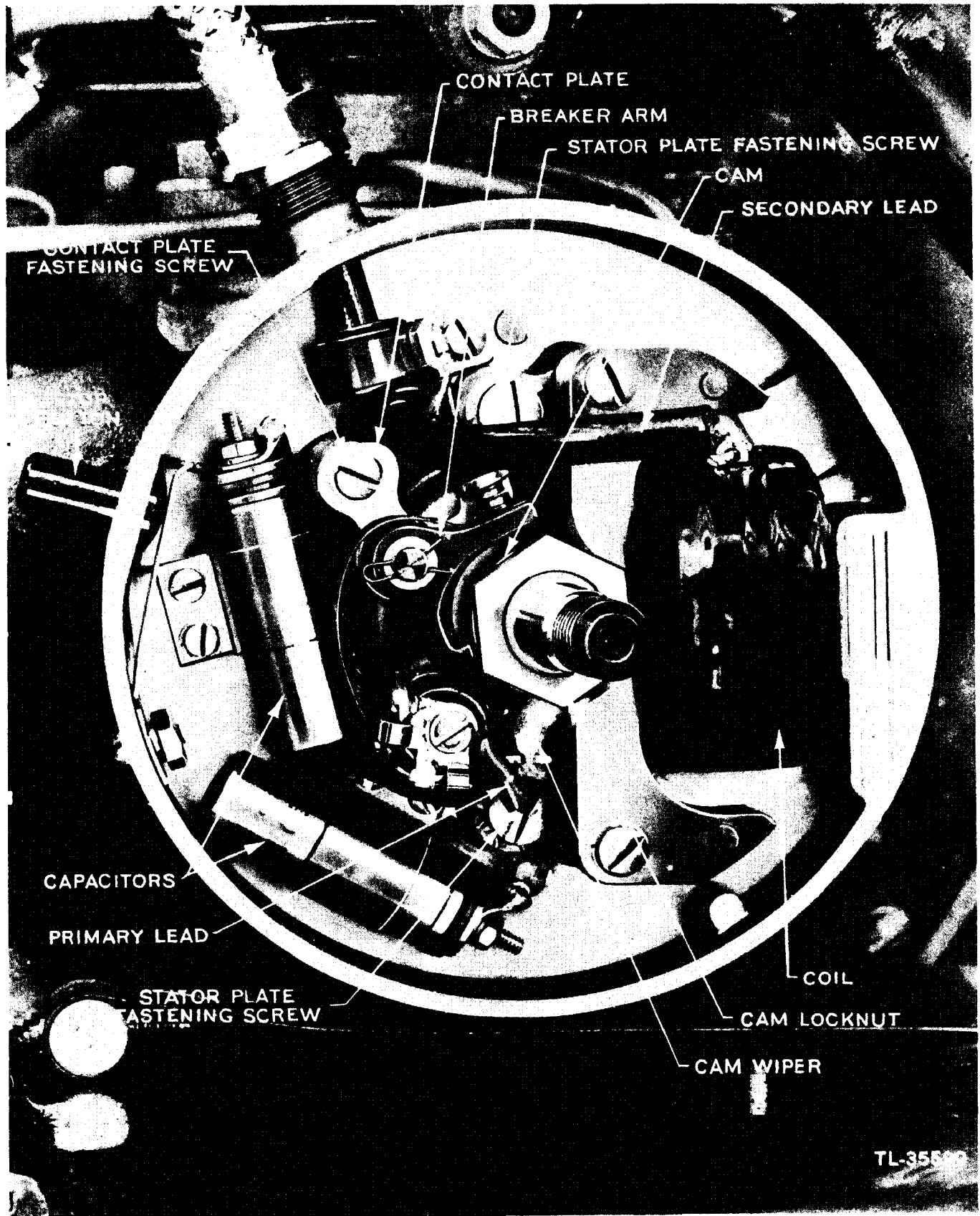


Figure 7. Magneto assembly

Move the contact plate away from the cam to increase the gap; toward the cam to decrease the gap. Tighten the fastening screw securely.

(d) Recheck the gap with thickness gauge (ref. 202) after tightening the screw. This tightening sometimes changes adjustment.

(3) TO DRESS CONTACT POINTS. If contact points appear pitted or uneven upon inspection, they can be restored to a true, even condition with the contact-point dressing tool (ref. 190). If points are badly pitted and cannot be made even with the dressing tool, they should be replaced. This will probably be necessary after 700 hours of operation.

(4) TO REPLACE CABLES. Chafed or broken cables which cause continuous or intermittent misfiring should be replaced. Strip the magneto end of the cable $\frac{1}{2}$ inch; then twist the strands together and fasten to the coil. *It is essential that the bare end be kept short and folded close to the coil surface after cable is in place.* Make sure there are no stray ends sticking out. On the spark plug end, strip cable $\frac{1}{4}$ inch and insert it into the molded tube so that the bare end goes through the brass insert at the base of the spring. Fan out the strands of the wire to hold it in place. Do not solder the wire on either end.

(5) COIL AND CAPACITORS. If no spark is obtained after adjusting the contact points, the trouble probably lies in either the capacitors or the coil windings. However, replace these parts only after checking points, connections, and cables. The capacitors may be replaced in the field, but the coil windings should be checked in a Signal Corps depot before removal. Replacing this winding is a delicate operation and should be done only at a Signal Corps depot. See section V for test data and removal instructions.

(6) MAGNET. With normal use, the magnet will retain its magnetism indefinitely; therefore no trouble should be expected from this source.

(7) CAM WIPER. The felt cam wiper should be inspected every 350 hours. If it is dry, lubricate it with oil. If the felt is badly worn, replace it. This will probably require replacement after 700 hours.

(8) CLEANING. If an excessive amount of oil and dirt is found when inspecting the contact points, it should be carefully wiped out with a clean, dry cloth.

c. Carburetor Assembly and Fuel Container (fig. 8).

(1) ADJUSTABLE-JET ASSEMBLY. (a) The adjustable-jet assembly should be removed and cleaned every 100 hours of operation. Remove assembly by using a wrench (ref. 207) on the hex section. Remove the adjusting needle from the nozzle by screwing it counterclockwise; then wipe it with a clean cloth. Blow through the nozzle to remove any dirt. *Do not use a wire to clean the nozzle as this will cause burrs which affect*

carburetion. Before replacing the adjustable-jet assembly, spin the engine several times to flush out the jet chamber with gasoline.

(b) When the adjustable-jet assembly is completely out of adjustment, set the needle one turn from the closed position. Do not screw it hard against the seat as this will damage both the needle and the seat. Final setting of the jet must be made when the engine is warm and operating under full load.

(c) Start the engine; then apply load and run until warm. Turn the adjusting needle clockwise until the engine speed just begins to fall off. *This can be noted by the sound of the exhaust.* Then turn back counterclockwise very gradually until the engine reaches full speed.

(d) If the adjusting needle appears worn and difficulty is experienced in making proper adjustment, the complete assembly should be replaced.

(2) PRIMING PUMP. (a) Choke or prime the engine by pulling up and pushing back quickly the black plunger button on top of the carburetor. This action pumps fuel directly into the intake ports in the cylinder. If the engine fails to start (providing the shut-off valve on fuel container is open) the priming pump may not be delivering fuel to the cylinder.

(b) To check the pump, disconnect the priming line at the carburetor and operate the pump. If fuel does not spurt out, loosen the two wing bolts on the top of the air cleaner and lift off the complete air-cleaner assembly. The plunger rod and knob will remain attached to the outer shell of the air cleaner. Put a few drops of oil in the plunger tube, slide the plunger rod (still attached to the air-cleaner shell) into the plunger tube, and recheck the pump. If the pump still does not operate, remove the priming-line screw and examine the check ball and valve spring below it. Clean any dirt from the check-ball seat and make sure the valve spring maintains sufficient pressure on the check ball to seal well. Replace the check ball, valve spring (tapered end down), gasket, priming-line connector fitting, gasket, and priming-line screw in that sequence. Note that a gasket is installed on both sides of the priming-line connector fitting. Recheck the pump as instructed above. If the priming pump still does not operate, remove the plug from the sump fitting on the bottom of the fuel container and make sure fuel flows freely at this point. If fuel does not flow, see subparagraph (3) below; if fuel does flow, see subparagraph (c) below.

(c) Remove the air-cleaner adapter by removing the screw holding it to the carburetor body. Disconnect the pressure line at the carburetor cover and remove the two screws holding the cover. The complete cover assembly can now be lifted out of the carburetor body. Disconnect the suction tube on the under side of the cover, taking care not to lose the check ball within this fitting. The

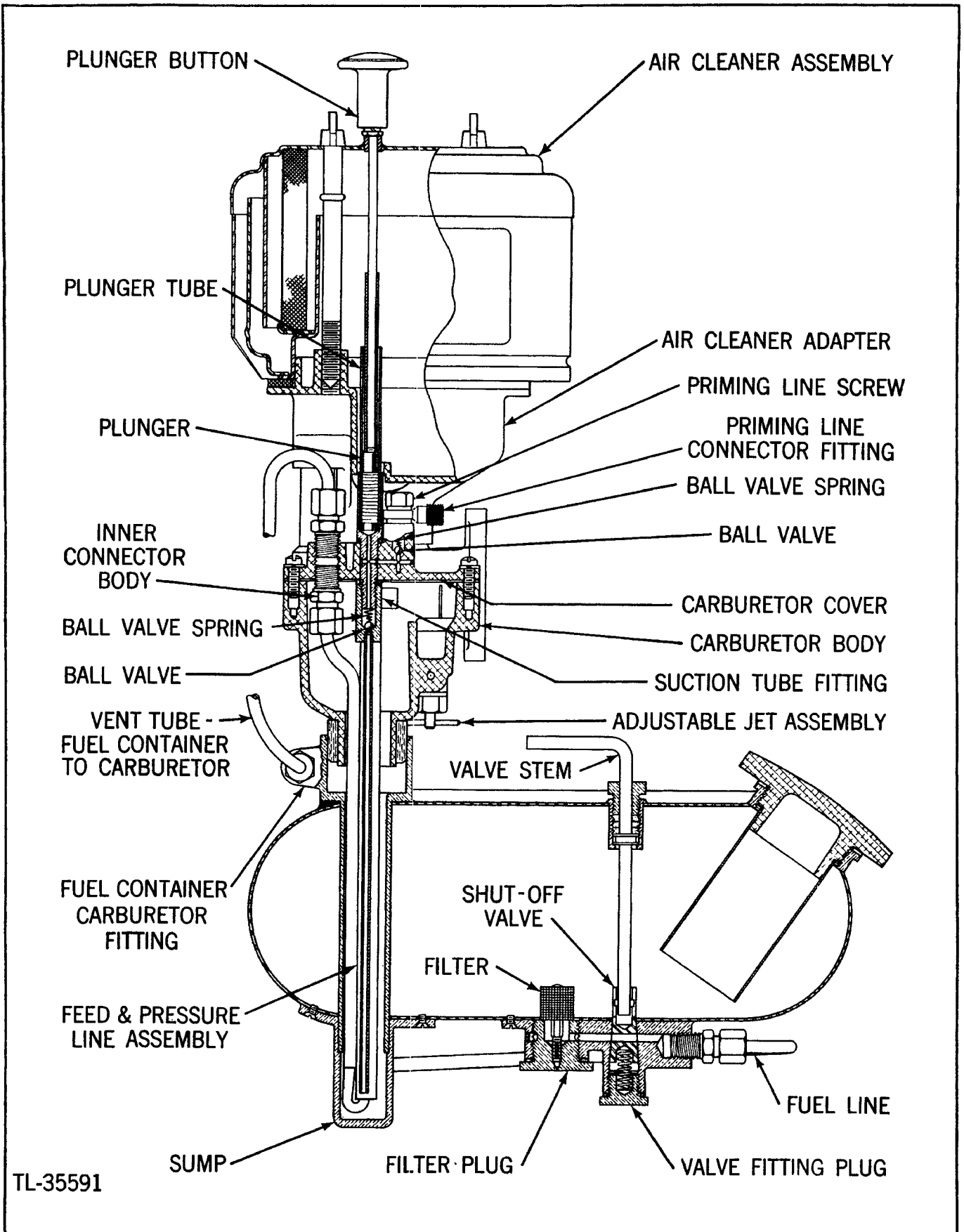


Figure 8. Carburetor and fuel-container assembly

suction tube has a foot valve at the lower end. Check the valve by blowing into each end of the tube. Air should pass through freely from the lower, or foot valve end, and should not pass through from the upper end. Flush out tube with gasoline if foot valve does not operate freely. Replace the check valve ball then reassemble the suction tube with a gasket between the tube and carburetor cover. Replace and fasten the carburetor-cover assembly and reconnect the pressure line. Replace the air-cleaner adapter, and fasten it with the long screw; then replace the air-cleaner assembly with the pump plunger rod attached. Be sure the cork gasket is installed under the air-cleaner bowl.

(3) FUEL LINE, FILTER, AND SHUT-OFF VALVE.

If fuel does not flow from the sump fitting plug when removed as instructed above, empty the fuel container. Remove the fuel line which runs from sump fitting to valve fitting and clean out. Remove the two hex plugs in the valve fitting on the bottom of the fuel container. Loosen the fuel filter attached to one of the these plugs and blow with air to clean it. The other hex plug conceals the shut-off valve. Remove the valve stop-screw and the valve will drop out. Clean both the valve and seat thoroughly. Flush out the fuel container with about a pint of gasoline to remove loose sediment and dirt. Replace the hex plug with fuel filter attached. Install the shut-off valve with the cutout section on the large end facing toward the front to permit installation of the valve stop-screw. Replace the stop-screw, valve spring, and hex plug in sequence. Gaskets must be installed on both hex plugs which must be tight to prevent leakage. Replace the fuel line from valve fitting to sump fitting.

(4) FEED AND PRESSURE LINES. Since fuel is fed to the carburetor by crankcase pressure, it is important that the pressure line running from the timer bracket to the carburetor be airtight and free from dirt. This also applies to the feed- and pressure-line assembly connected to the carburetor cover. If everything else has been checked and fuel is still not flowing to the carburetor, examine these two lines carefully for air leakage and stoppage.

(5) AIR CLEANER. Usually service the air cleaner once a week, but service daily if operating under very dusty conditions. Remove the cover and flush out the bowl with gasoline. Wash the screen in thin oil (if thin oil is not available, use gasoline). Refill the bowl to the oil bead, as marked on filter, using the same oil as was used in the fuel mixture (specification 2-104-B) and reassemble the filter.

CAUTION: In extremely cold weather use light winter-grade oil in the air cleaner.

d. Carbon and Lead Deposits. (1) EXHAUST PORTS. (a) Clean carbon formation from exhaust ports every day. Using a wrench (ref. 207), remove the nuts from the studs holding the manifold to the cylinder flange.

Loosen the screws in the muffler straps and slide the complete muffler and manifold assembly forward until it clears the studs; then turn it up out of the way.

(b) With the spark plug and adapter removed, turn the piston to bottom dead-center. Scrape all carbon and lead deposits from the exhaust ports (fig. 9) through the exhaust outlet with the carbon scraper (ref. 196). Be particularly careful to remove all carbon from top of the exhaust ports. Spin the engine several times to remove any loose particles from the cylinder.

(c) Reconnect the manifold to the cylinder flange, making sure the gasket is in place; then tighten the muffler strap screws. Replace the spark plug and adapter after cleaning as instructed earlier in this paragraph.

(2) CYLINDER AND PISTON. Every 700 hours, the cylinder and piston should be removed for a thorough cleaning. See section V for instructions on removal and cleaning.

e. Piston Rings. Replace after 700 hours operation (sec. V).

f. Brushes. (1) Inspect the brushes on the commutator every 500 hours of operation. Under normal operating conditions, the life of the brushes will be about 1,000 hours. However, arcing may cause them to wear excessively.

(2) Replace the brushes only if worn so that the brush spring rides on the brush holder or if the lead wire is loose. To inspect, loosen the screw on the brush-head band and slide the band to one side (fig. 11).

(3) The brushes must fit freely in the brush holder. If binding occurs, sand lightly on the side showing bind-marks. New brushes are formed to the shape of the commutator and do not require special care in wearing-in.

(4) Inspect the grounding brush in the spark-wheel housing every 500 hours (fig. 10). Tip up the engine end of unit and remove the brush-holder assembly in the end of the spark-wheel housing. Use extreme care not to tip down the unit when doing this, since the brush assembly will drop out of the holder and necessitate removing the complete spark-wheel housing.

g. Commutator (fig. 11). (1) Every 500 hours, slide back the brush head and inspect the commutator. The commutator ordinarily will not require cleaning for a long period of time. It need be cleaned only if excessively carbonized or scored by excessive arcing.

(2) To clean the commutator, place a strip of sandpaper (No. 00 to No. 8/0, not emery) (ref. 197) over the end of a narrow block of wood. Press this block lightly against the commutator, with the engine running. Move sandpaper across the width of the commutator until entirely clean.

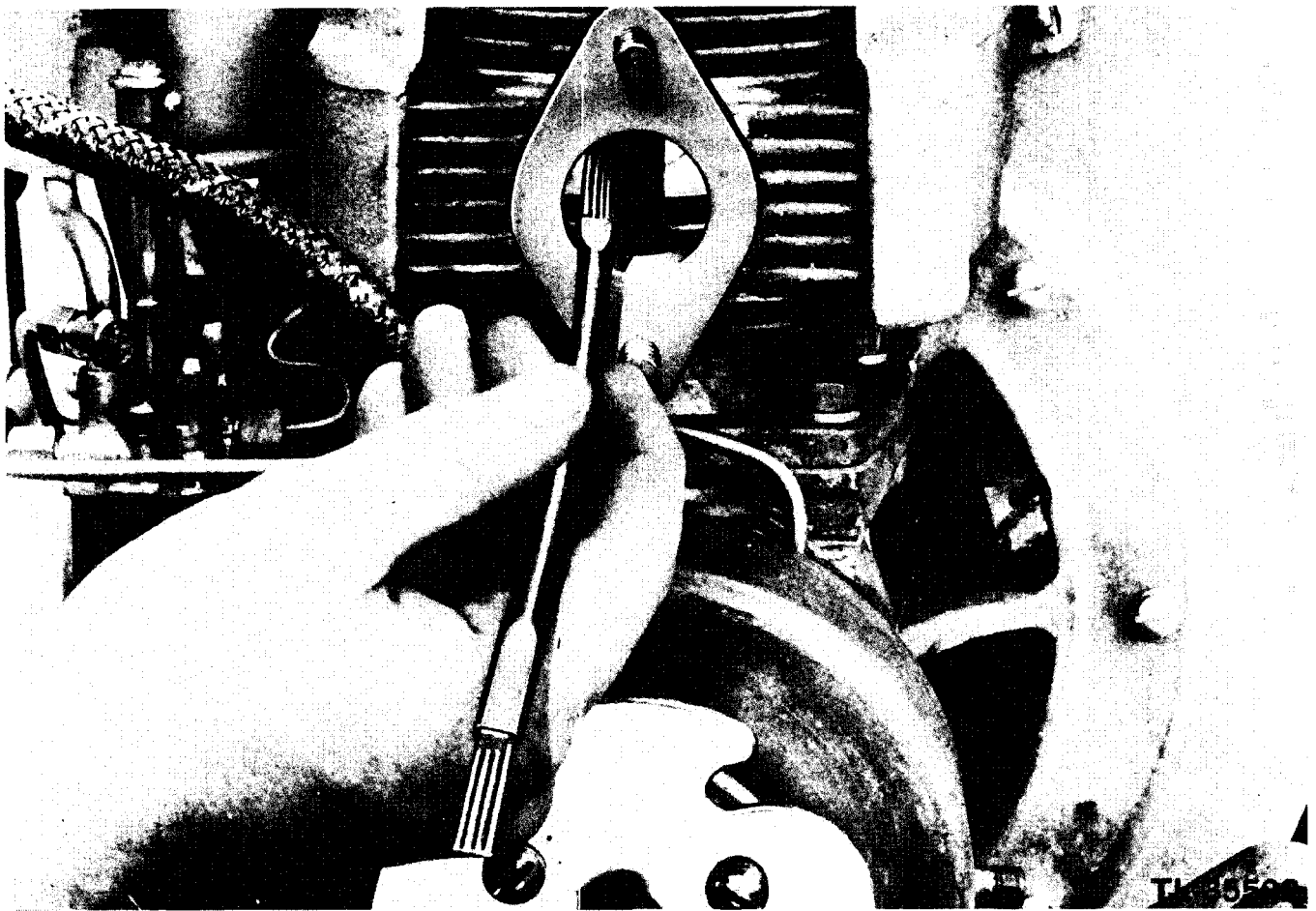


Figure 9. Cleaning exhaust ports

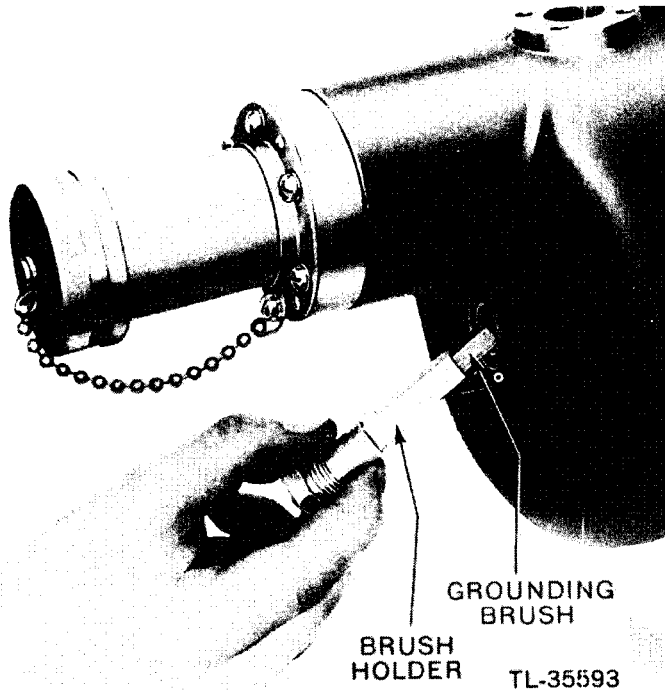


Figure 10. Inspecting grounding brush

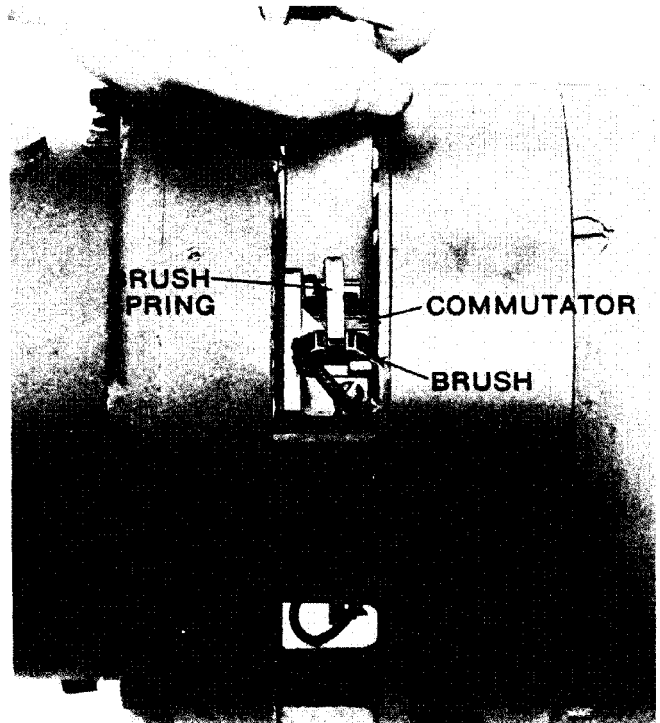


Figure 11. Cleaning commutator

h. Brush Springs. The tension of the springs should be approximately 14 ounces and they should last the life of the power unit.

i. Electrodes. (1) The electrodes on the spark wheel will become severely pitted during normal operation. This does not indicate the end of their usefulness. *Do not attempt to polish them.* Do not replace them until they are eroded to the point where there is danger of their breaking.

(2) To replace electrodes, remove the six screws holding the clamp ring to the brush head. The complete spark-wheel housing may then be removed (fig. 12). Loosen the collet nuts on the spark wheel with a wrench (ref. 207). Remove burned-out electrodes and install new ones. The square end of the electrode should be flush with the back of the collet screw. Tighten the collet nut to secure electrodes in place. *If only three electrodes are used on the spark wheel, they must be evenly spaced.*

j. Resistor Assembly. The adjustable resistor mounted in the control box is factory-adjusted and should not be changed unless special equipment is to be used with the power unit. Its function is to maintain uniform voltage at the receiver when the modulator is turned on or off.

11. PREPARATION FOR STORAGE.

a. Extended Storage. (1) Thoroughly inspect the engine and make all necessary repairs to insure that it is in good running condition. If it is not practicable to make the repairs, attach a tag in a conspicuous place stating what repairs are necessary.

(2) Remove the cylinder and scrape all carbon deposits from the cylinder head, exhaust ports, and piston. Replace the cylinder using a new gasket.

(3) Clean all external surfaces of the engine and generator. Drain all fuel mixture from the fuel container.

(4) Mix $\frac{1}{8}$ pint (fill fuel tank cap once) of medium preservative lubricating oil, specification AXS-674, with one quart of undyed, unleaded motor fuel, specification U. S. Army 2-116. If this fuel is not available, use the usual grade.

(5) Run the engine for 20 minutes. Remove the magneto rotor and put a few drops of the preservative oil on the breaker points when the points are open.

(6) Remove the spark plug and adapter from the cylinder and, with an atomizer spray gun, spray enough of the preservative oil specified (par. 11 a (4) above) into the cylinder to protect the cylinder walls and crankcase. Rotate the crankshaft slowly by hand while spraying. Do not flood the crankcase with oil. Spray the inside of the magneto stator plate and intake-valve shaft. If the oil is too heavy to be used in a spray gun, it may be thinned

by heating. Do not dilute with gasoline or any similar fluid. The air supply for the spray gun should pass through a moisture trap such as is used in spraying paint. Replace the spark plug and adapter using a new adapter gasket.

(7) Drain the entire fuel system, including the carburetor and fuel container. Flush the fuel container thoroughly with the preservative oil specified (par. 11 a (4) above). Remove, clean, and replace the strainer and fuel line on the bottom of the fuel container.

(8) Remove, drain, and clean all parts of the air cleaner. Dip the bowl, screen, and cover into the preservative oil specified (par. 11 a (4) above) and reassemble the air cleaner.

(9) Clean off any oil or dirt which may have accumulated on the external surfaces of the engine during the above operations. Paint all spots where the original paint is off or brush on a coating of rust-preventative compound. Brush a substantial coating of rust-preventative compound on the manifold, muffler, and any unpainted metal parts (exclude the cylinder which is aluminum). Rust-preventative, thin film compound, specification AXS-673 applied cold or rust-preventative, light compound, specification U. S. Army 2-84 (latest revision) applied hot, is satisfactory for coating external surfaces.

(10) Seal openings with greaseproof paper and tape. For this purpose, use greaseproof, wrapping paper, specification AXS-840 and nonhygroscopic, adhesive tape, specification AXS-871.

(11) Attach a tag to the unit stating that the engine has been prepared for storage in accordance with specification AXS-836 and the date upon which it was treated.

(12) Use only dry-cleaning solvent, specification Fed. P-S-661a, or diesel fuel oil, specification U. S. Army 2-102 (latest revision) for cleaning fluid.

b. Stand-by Storage. (1) Follow the procedure described in paragraph 11 a above with the following changes.

(2) Omit paragraphs 11 a (1) and (2) above unless engine is in need of repair.

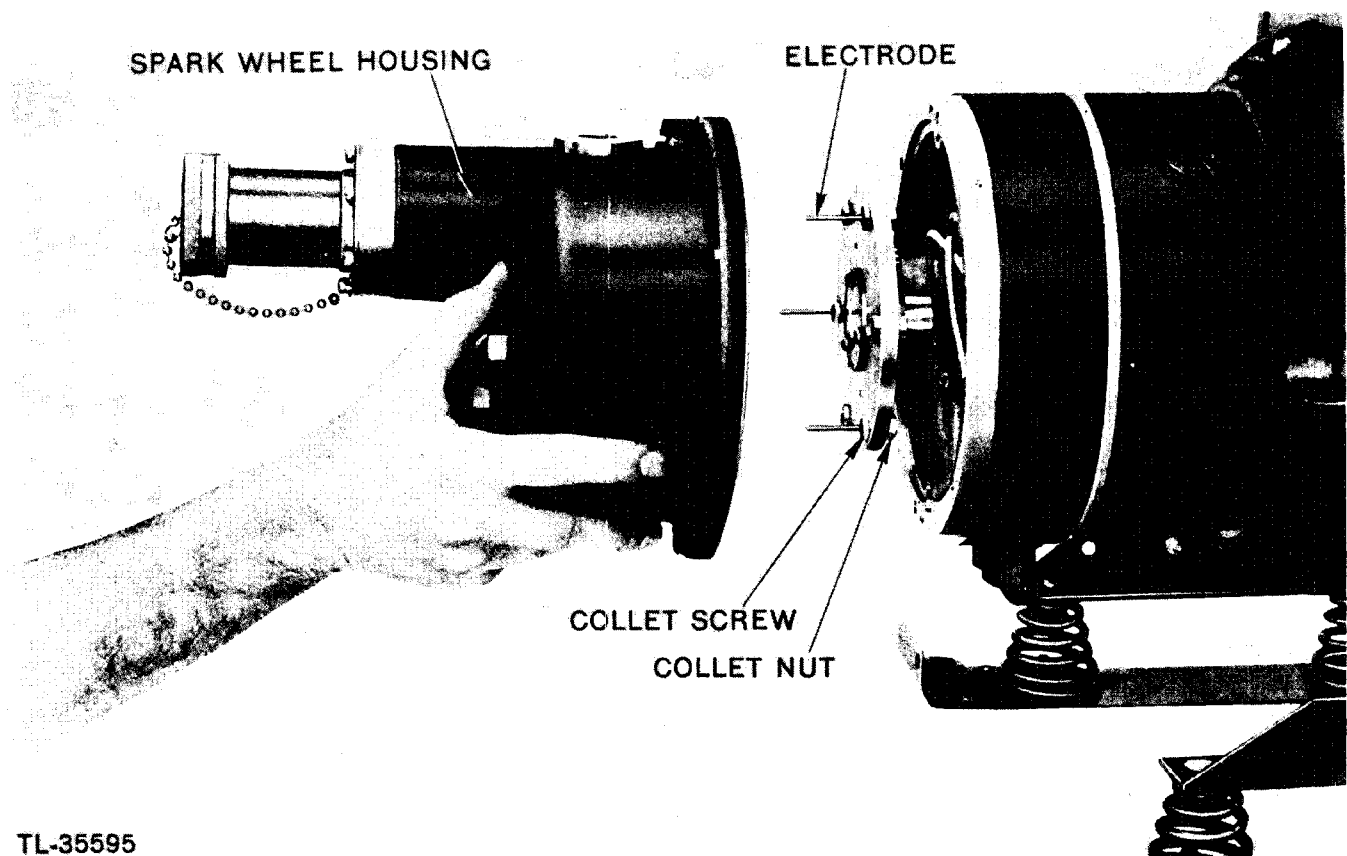
(3) Be extremely careful not to spray too much oil into the cylinder and crankcase.

(4) Fuel container should be *kept full* of fuel mixture.

(5) The air cleaner should be prepared in accordance with paragraph 11 a (8) above; then filled with oil to the bead for usual operation.

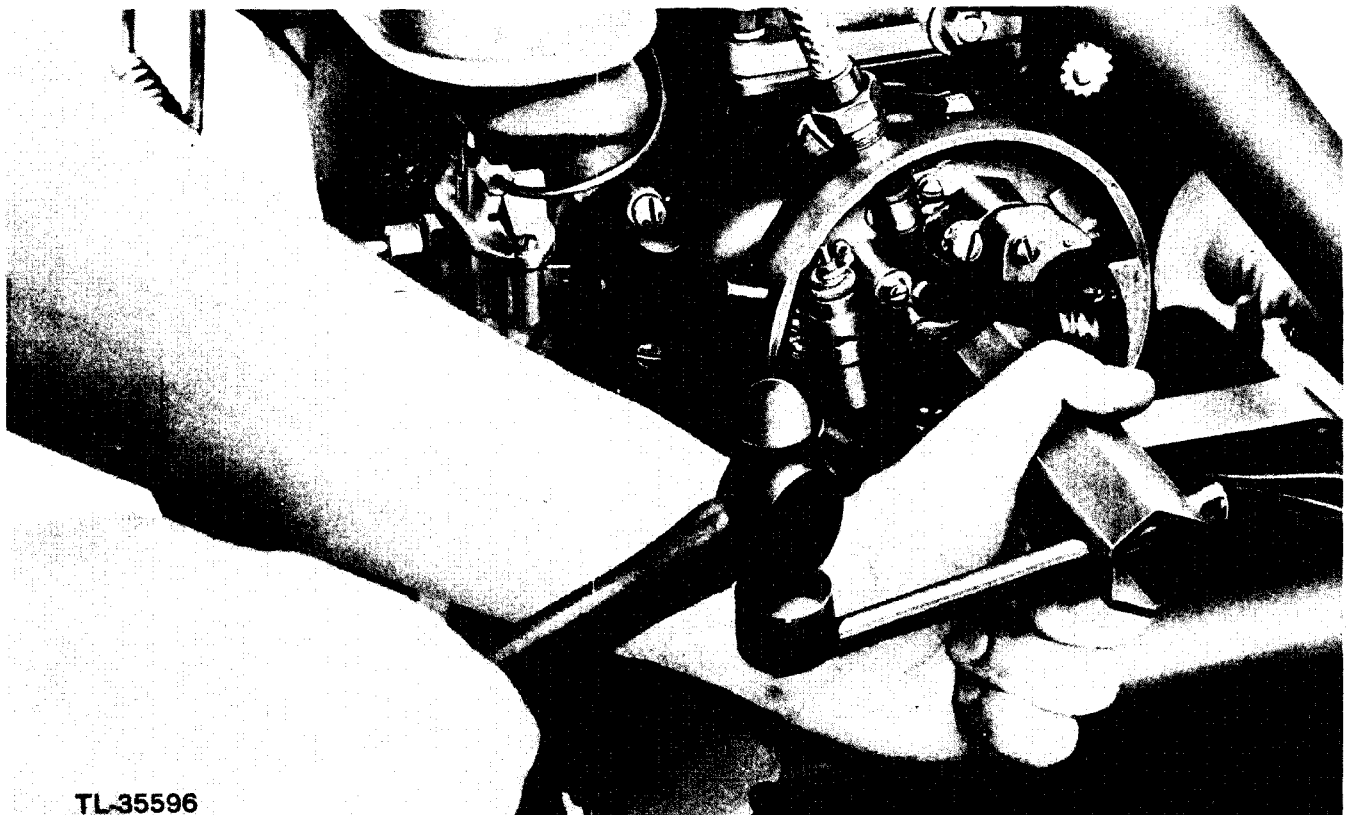
(6) Unless it is expected that the engine will not be used for a long time or is to be kept in an extremely humid atmosphere, it is not necessary to seal openings with greaseproof paper or tape.

(7) Whenever the engine is started, it should be run



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Figure 12. Inspecting electrodes



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Figure 13. Removing cam locknut

until it is thoroughly warmed up and, if run on other than the mixture of fuel and preservative oil specified in paragraph 11 *a* (4) above, it should be treated again before being put back in stand-by storage.

12. MOISTUREPROOFING AND FUNGI-PROOFING.

a. General. Communication failures commonly occur when Signal Corps equipment is operated in tropical areas where temperatures and relative humidity are extremely high. The following problems are typical:

- (1) Resistors and capacitors fail.
- (2) Electrolytic action takes place in coils, chokes, transformer windings, etc., causing eventual break-down.
- (3) Hook-up wire and cable insulation breakdown. Fungus growth accelerates deterioration.
- (4) Moisture forms electrical leakage paths on terminal boards and insulating strips causing flash-overs.
- (5) Moisture provides leakage paths between terminals.

b. Treatment. A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture- and fungi-resistant varnish applied by means of a spray gun. A brief description of the method of application follows:

- (1) All repairs and adjustments necessary for the proper operation of the equipment are made.
- (2) Equipment to be processed is thoroughly cleaned of all dirt, dust, rust, fungus, oil, grease, etc.
- (3) Equipment is partially disassembled and certain points, such as relay contacts, open switches, commutators, slip rings, voltage regulators, and outlet connections, are covered with masking tape.
- (4) Equipment is thoroughly dried by heat to expel moisture which the circuit elements have absorbed.
- (5) The surfaces of all panels; control boxes which contain wiring, relays, and instruments; all relay coils, resistors, ignition coils, ignition leads, magneto housing, and terminal connecting blocks (after connections have been made) should be sprayed with three coats of moistureproofing and fungiproofing varnish.
- (6) The equipment is given a final operational check and marked MFP and date of treatment.

c. Step-by-step Instructions.

- (1) DISASSEMBLY. (*a*) Remove the four screws holding the control box to the generator frame.
 - (*b*) Turn back the box to expose the inside.

- (*c*) Remove the lead with the red marking band from the d-c circuit breaker.

- (*d*) Remove the lead with the green marking band from the ground lug on the filter capacitor.

- (*e*) Replace the remaining three leads on the capacitor ground lug and tighten the screw.

- (*f*) Remove the white lead from the rheostat terminal.

- (*g*) Replace the remaining two wires on this terminal and tighten the screw.

- (*h*) Remove the white lead with the black tracer from the other rheostat terminal.

- (*i*) Loosen slightly the locknut on the modulator switch.

- (*j*) Rotate the body of the switch so that the white lead with the black tracer may be removed.

- (*k*) Replace the remaining lead on this switch terminal and tighten the screw.

- (*l*) Remove the generator lead with the green marking band from the a-c circuit breaker. Replace the remaining lead and tighten the screw.

- (*m*) Remove the control box (to be treated).

- (*n*) Remove the six screws holding the spark wheel housing to the brush head.

- (*o*) Remove the spark wheel housing (to be treated).

- (*p*) Remove the three screws and take out the ground plate.

- (*q*) Remove the armature bolt with the collet washer, and back off the rear hex nut on the armature shaft to remove the spark wheel (to be treated).

- (*r*) Pull the brush out of the spark wheel housing.

- (2) MASKING. (*a*) Mask with tape the bare wire portion of the rheostat.

- (*b*) Mask with tape the contact on the rheostat arm.

- (*c*) Mask with tape the bare wire portion of the resistor.

- (*d*) Mask with tape the openings in the power outlet receptacles.

- (*e*) Mask with tape the terminal on the d-c circuit breaker from which the lead was removed.

- (*f*) Mask with tape the terminal on the rheostat from which the lead was removed.

- (*g*) Mask the spark wheel electrode pins with paper and hold with tape.

- (*h*) Mask the stationary electrode pin with paper and hold with tape.

(i) Mask the opening in the brush holder on the spark wheel housing.

(j) Mask with tape the shaft openings on the spark wheel hub.

(3) DRYING. Dry for two or three hours at 160°F.

(4) VARNISHING. Apply three coats of moistureproofing and fungiproofing varnish as follows:

(a) Spray the inside of the control box.

(b) Spray the inside of the spark wheel housing.

(c) Spray all sides of the spark wheel.

(5) FINAL STEPS. (a) Reassemble and check operation.

(b) Mark MFP and date of treatment.

d. Reference. For a full description of the varnish spray method of moistureproofing and fungiproofing, refer to TB SIG 13.

SECTION V

SUPPLEMENTARY DATA

13. DISMANTLING POWER UNIT.

CAUTION: Internal-external tooth lockwashers must be reinstalled on all screws exactly as removed to prevent radio interference. See paragraph 5, under heading *Noisy Radio Reception* for location of these lockwashers.

a. Dismantling Magneto and Timer-bracket Assembly. This should be done every 700 hours of operation.

- (1) Remove the shielding conduit from spark plug.
- (2) Disconnect the pressure line from the timer bracket to the carburetor.
- (3) Remove two screws holding the carburetor to the timer bracket. (If the magneto and timer bracket assembly is not to be disassembled, it may now be removed by taking out the six screws holding timer bracket to crankcase.)
- (4) Remove the magneto rotor by loosening the puller nut (fig. 6). Do not remove the three screws holding the starter plate to rotor. *Do not block the flywheel in any way.* Distortion of the flywheel caused by blocking will result in serious damage.
- (5) Remove the rotor drive key.
- (6) Remove the cam locknut. Place a socket wrench over the nut, hold tightly in place, and strike the handle sharply with a hammer (fig. 13.) The inertia of the engine parts will be sufficient to permit removal of the nut. *Do not block the flywheel.*
- (7) Remove the stator plate by taking out the two screws (fig. 7) holding it to the timer bracket.
- (8) Remove the cam, cam key, and cam spacer.
- (9) Remove the timer bracket by taking out the six screws (fig. 14).
- (10) Drive out the intake-valve shaft by striking with a *soft mallet* on the threaded end. Take care not to damage the governor and intake-valve assembly or threads.
- (11) The governor and intake-valve assembly may be removed by inserting a knife point in the retaining ring groove and removing the snap ring.

(12) Remove the bearings and spacers from the timer bracket. Insert a short length of round bar stock through hole in the valve face of the timer bracket and press out the bearings and spacers with an arbor press (fig. 15). The diameter of the bar must be greater than the inside diameter of the bearings.

b. Remove Carburetor and Air-cleaner Assembly. (1) Remove the priming tube from the carburetor to the cylinder.

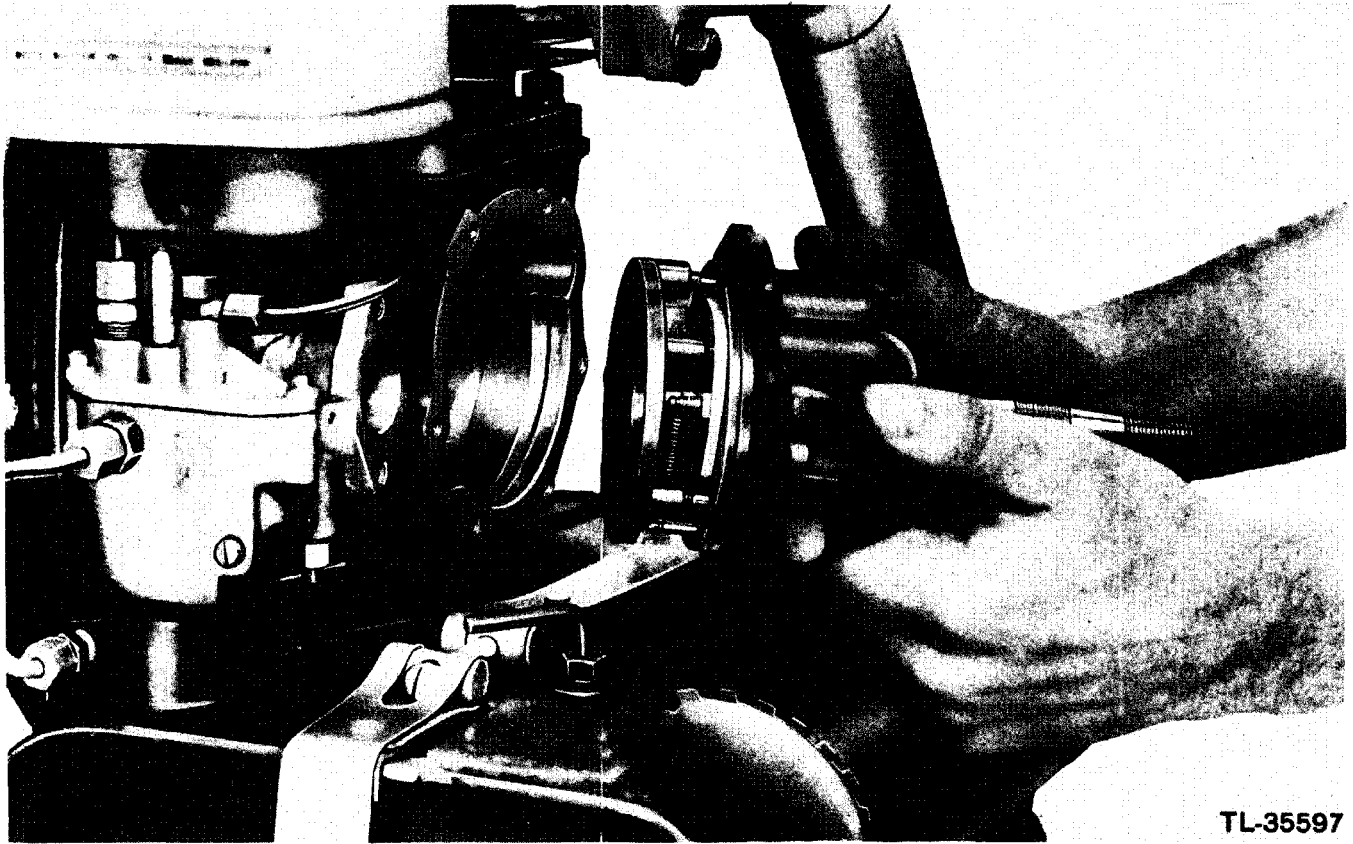
- (2) Remove the vent tube from the fuel container to the carburetor.
- (3) Drain the oil from the air cleaner before it spills out. The carburetor can now be lifted out of the rubber spacer on the fuel container.
- (4) The carburetor need not be dismantled except to perform cleaning and adjustment specified in paragraph 10 c.

c. Remove Cylinder and Piston. (1) Remove the spark plug and adapter; then remove the cylinder shield by taking out the two holding screws.

- (2) Remove the nuts from exhaust-flange studs, loosen the screws in the muffler straps and slide the manifold and the muffler assembly forward to clear the studs.
- (3) Remove the nuts and washers from the four cylinder studs and lift off the cylinder.
- (4) Place the crankthrow at bottom dead-center (fig. 16); then slide the formica washer and split roller bearing off the shaft. The connecting rod and second formica washer may then be removed.
- (5) Remove the piston pin retaining rings. Insert a rod into the hollow end of the piston pin and drive it out. Remove the piston rings.

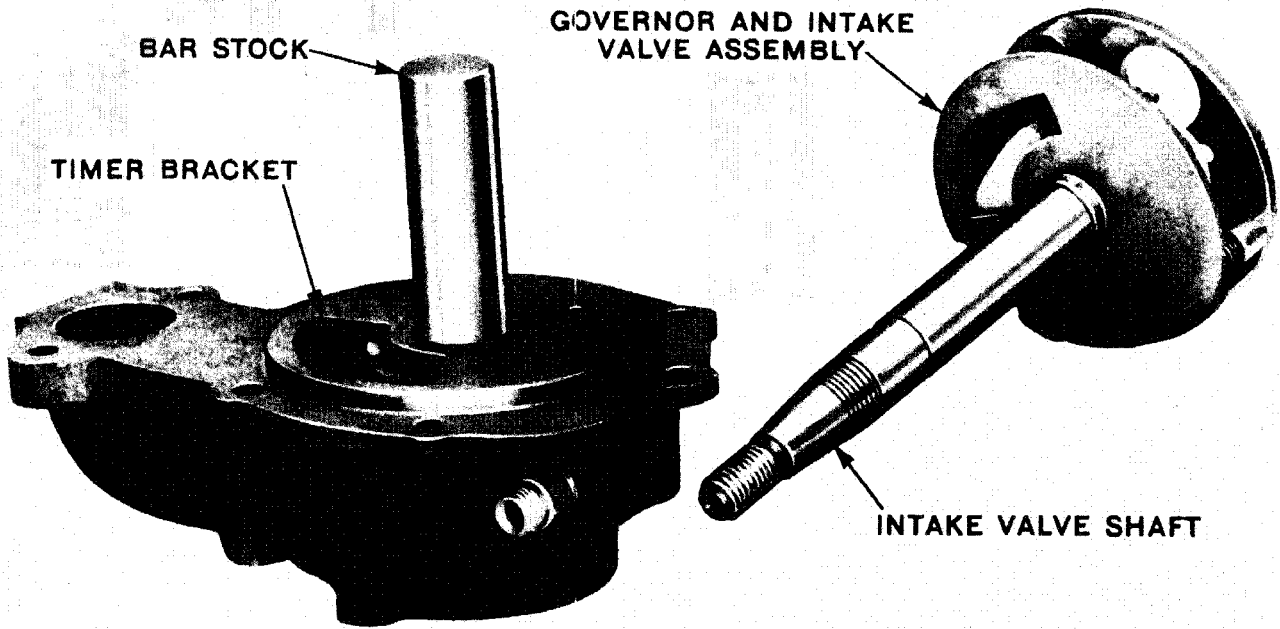
NOTE: All parts should be inspected and cleaned before reassembly. Unless the main bearings on the crankshaft are definitely known to be defective, further dismantling of the engine should not be done. See subparagraph g below for details.

d. Remove Fuel Container. Take out the screw running through the fuel-container strap studs and lift off the container.



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Figure 14. Removing timer bracket



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Figure 15. Removing bearings from timer bracket

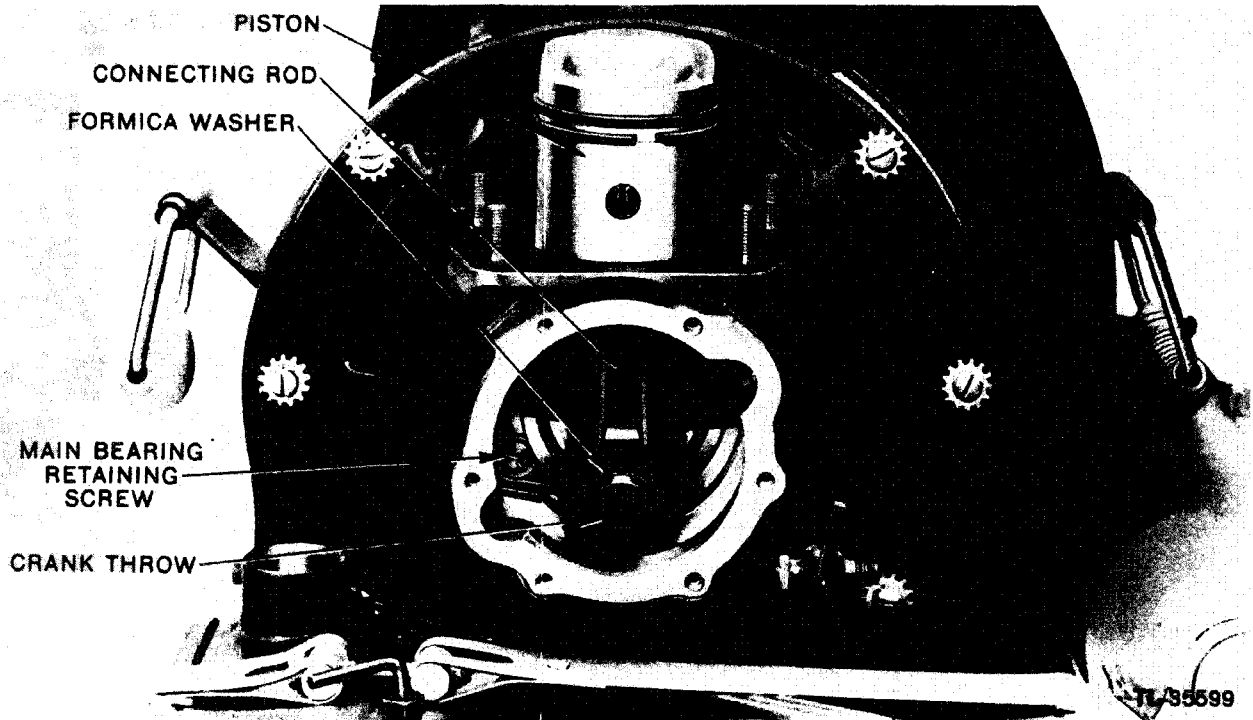


Figure 16. Removing connecting rod

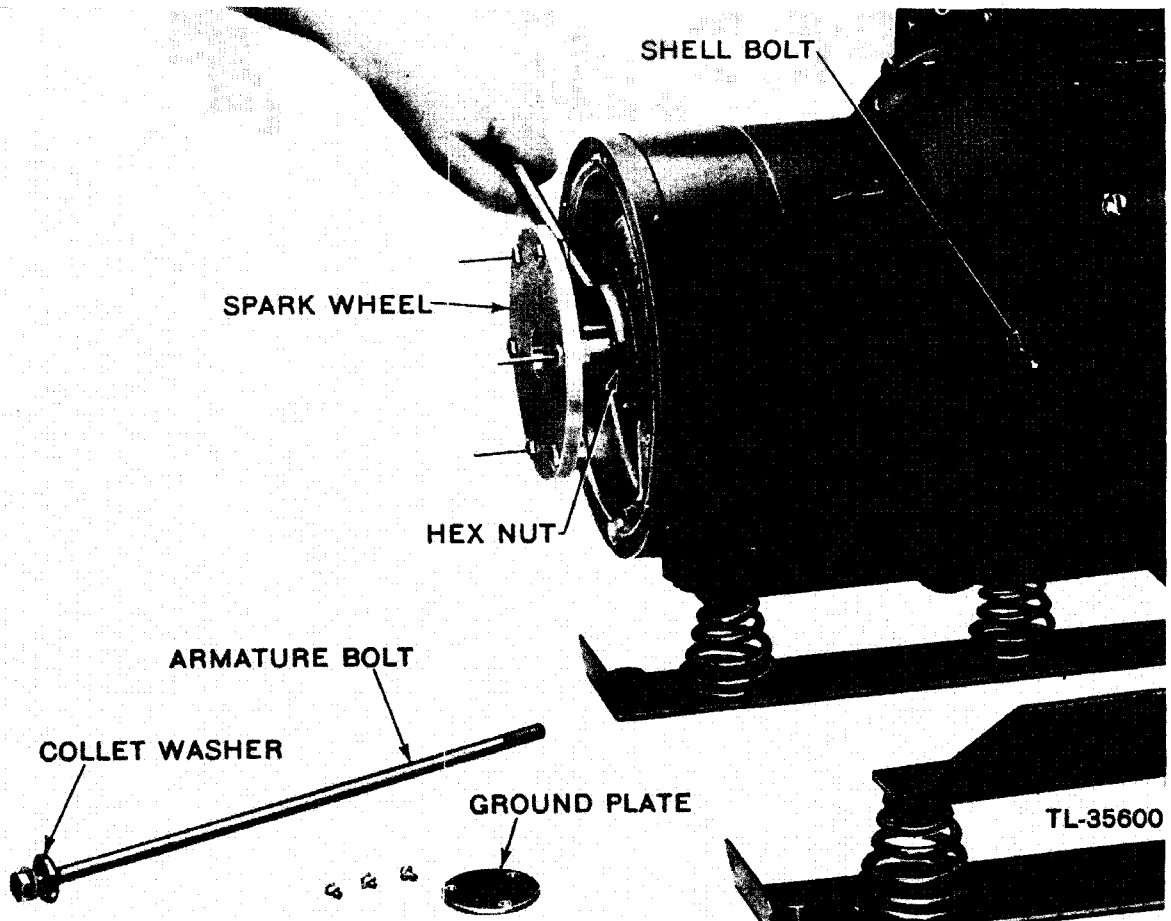


Figure 17. Removing spark wheel

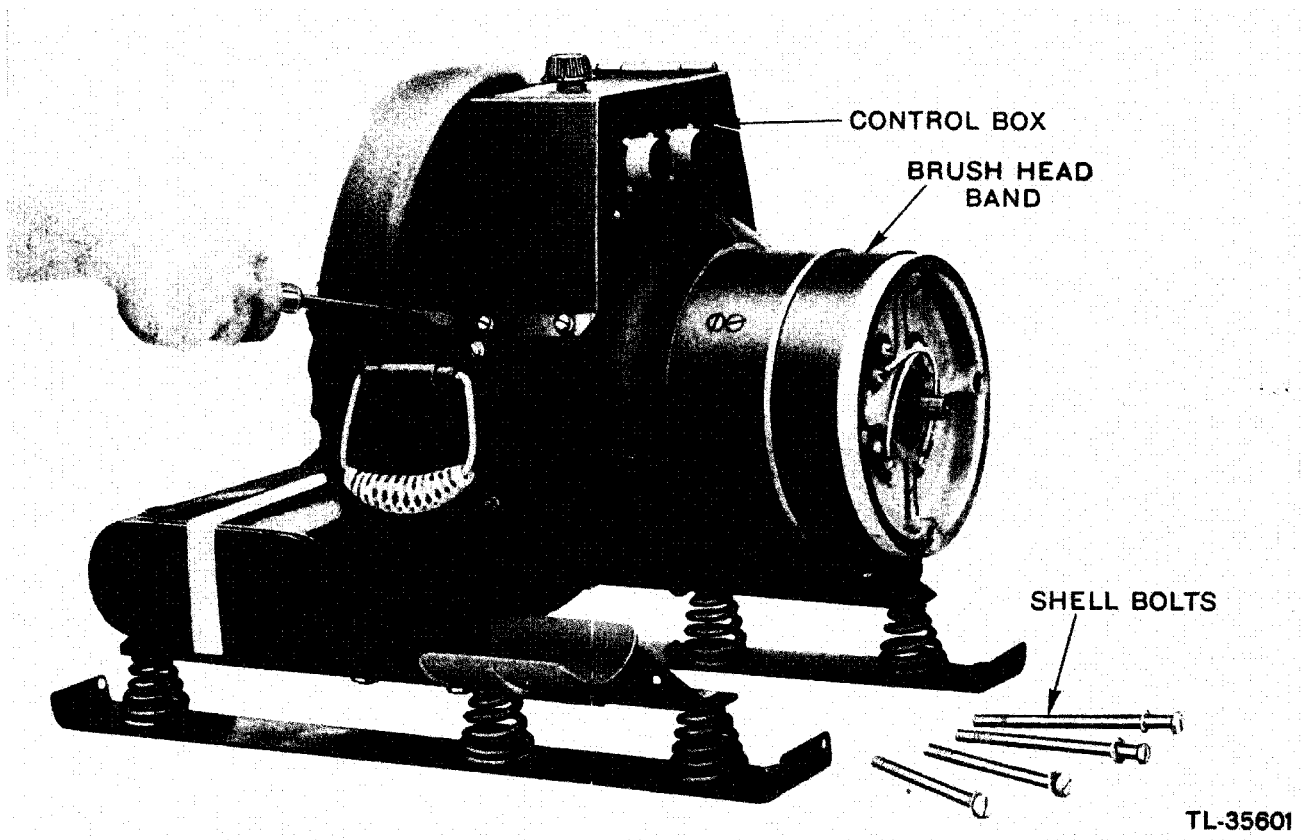


Figure 18. Removing generator assembly

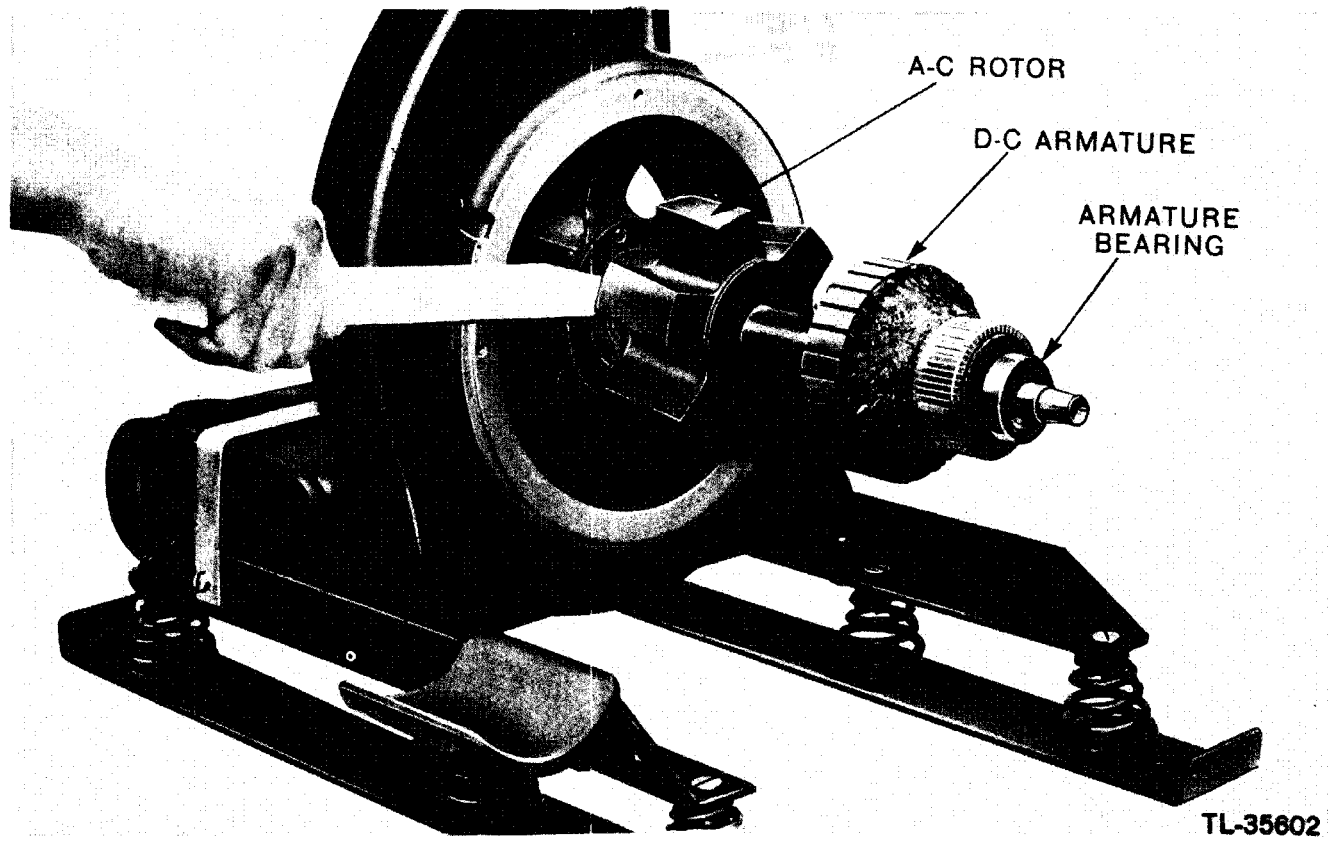


Figure 19. Removing armature assembly

e. Remove Spark-wheel Housing (fig. 12).

- (1) Take out the six screws in the clamp ring, holding the spark-wheel housing to the brush head; then remove the complete housing.
- (2) It is unnecessary to remove any part from the housing unless it seems defective after visual inspection. The main point of inspection is the electrode and the grounding brush (fig. 10).

f. Disassemble Generator. (1) Remove the ground plate by taking out the three screws.

(2) Remove the armature bolt with collet washer and back off the rear hex nut on the armature shaft to remove the spark wheel (fig. 17). Remove the brush-head band and lift the four brushes out of their holders.

(3) Remove the four shell bolts, insert a large screwdriver in the notch on the side of the shell, and pry off the complete generator assembly (fig. 18). The armature shaft is keyed onto the crankshaft. To remove it, pry with a wooden bar between the fan housing and the a-c rotor (fig. 19). Remove the key from the crankshaft. The armature bearing should be removed only if defective.

(4) For testing and inspection, the brush-head band and four screws holding the control box to the shell should be removed. Further dismantling of the generator end is unnecessary unless parts are defective and require replacement.

g. Disassemble Crankcase. (1) Remove the six screws holding the crankcase to the fan housing.

(2) Remove the large hex nut and washer on the crankshaft behind the flywheel. *This nut has a left-hand thread.*

(3) Remove the two screws and lockwashers holding the main bearing in the crankcase (fig. 16).

(4) Place the crankcase in an arbor press with the open side downward; then press out the crankshaft. The front main bearing will usually remain on the shaft. It need be removed from the shaft only if defective. If the bearing remains in the crankcase, drive it out from the flywheel end after the flywheel has been removed.

(5) The flywheel may be removed by placing a length of 1- $\frac{3}{4}$ -inch diameter bar stock through the crankcase and against crankshaft spacer. Tap on this bar until the flywheel and bearing are driven out.

(6) To remove the flywheel bearing, remove the cork plugs from the three holes in the face of the flywheel and insert $\frac{1}{4}$ -20-inch screws. Turn down these screws until bearing is pressed from flywheel hub, being very careful to maintain equal pressure on each screw to prevent binding.

14. INSPECTION AND REPAIR.

a. Cylinder and Piston. (1) Clean all carbon

and lead deposits from the cylinder and piston heads, exhaust ports, and ring grooves in the piston.

(2) Maximum clearance between cylinder and piston is 0.005 inch. If clearance is too great or walls are scored, replace the cylinder. Bent or broken fins will not affect operation unless five fins are completely off.

(3) If the piston is scored, ring grooves damaged, or the piston pin is loose, replace both the piston and the piston pin. The pins are selectively fitted to the pistons and are procurable only as a set.

b. Piston Rings. (1) The rings should make contact with the cylinder wall around the entire circumference. If the end clearance when in the cylinder exceeds 0.020 inch or if the rings are stuck in the grooves, replace them. Clean all carbon from the grooves in the piston. The side clearance in grooves for replacement rings should be between 0.0025 inch and 0.004 inch. The end clearance should be 0.008 inch to 0.013 inch.

(2) Ring tension should be neither below 3- $\frac{1}{2}$ pounds on worn rings, nor above 6- $\frac{1}{2}$ pounds on new replacement rings. To determine the tension place one side of the ring on a platform scale with the gap 90 degrees from the point of contact on the scale. Apply pressure 180 degrees from the point of contact and close gap to 0.010 inch. Tension should be between 4- $\frac{1}{2}$ and 6- $\frac{1}{2}$ pounds on new rings.

c. Connecting Rod and Bearings. (1) Examine the bearing surfaces of the connecting rod and the crankshaft. If they are scored, replace them. Inspect the bronze cages and the steel rollers in the connecting-rod bearing; then replace the bearing if they are not smooth. Also remove and inspect the piston-pin needle bearings.

(2) Replace the formica washers on each side of the connecting-rod bearing after 700 hours of operation.

d. Timer-bracket Assembly. (1) Inspect both intake-valve shaft bearings. If they are rough turning or have excessive radial play, replace them.

(2) Examine the formica sealing ring carefully. If it does not seal well against the tapered side of the seal retaining ring, replace it.

(3) If the bearing surfaces of the intake valve shaft show signs of wear, replace the shaft.

(4) Make no attempt to adjust the governor. Each governor is set exactly for the requirements of the particular unit and should not require attention during the life of the engine. Use extreme care not to damage the governor assembly in any manner.

e. Magneto. (1) CONTACT POINTS. Replace the contact points if they are badly pitted or worn. They will usually require replacement after 700 hours of service.

(2) CAM WIPER. Replace the cam wiper after 700 hours of service. If not replaced, it becomes worn and does not ride against the cam.

(3) CAPACITORS. Disconnect the lead and place an ohmmeter between the terminals and the case. Reading should be infinity; if low, replace capacitor.

(4) COIL WINDINGS. (a) To test the primary winding, disconnect the primary lead at the terminal screw and place the ohmmeter between the lead and the magneto stator plate. The reading should be approximately 0.95 ohms.

(b) To test the secondary winding, connect the ohmmeter between the lead (disconnected above) and the connection for the high-tension cable on the coil. The reading should be approximately 3,800 ohms.

(c) If these readings are not obtained, replace the coil as follows: Remove the coil and core from the stator plate by disconnecting the leads and removing the two holding screws. Pry the core off the dowel pins with a screwdriver, being careful not to bend the pins. Then bend down the one lamination holding the coil to the core and press off the coil. It is necessary to use considerable force because the coil is held by wooden wedges.

(d) In installing the new coil, use extreme care to avoid damaging the windings. Before inserting the coil wedge, be sure that the secondary terminal is correctly located. Use great care not to bend the dowels or disturb the laminations while replacing the coil core; it is essential that it be in exactly the original position. Pry up the one lamination to secure the coil.

NOTE: Do not, under any circumstances, install any but the original laminated core on a stator plate. If the core is broken, the complete stator-plate assembly must be replaced.

(5) In normal use, the magnet will retain its magnetism indefinitely; therefore, no trouble should be expected from this source. It may be remagnetized, if necessary.

f. Spark Plug and Adapter. (1) Replace the adapter when the holes in the baffle or rolled edge become eroded. Keep the holes clear at all times.

(2) Replace spark plug if porcelain is cracked, if points are worn excessively, or if engine misfires under load.

g. Crankcase Assembly. (1) Replace the crankshaft if the keyways or bearing surfaces are worn, or if threads on the end are stripped.

(2) Replace flywheel if any fins are broken or loose, or if keyways are so worn that it does not fit tightly on the crankshaft.

(3) Replace bearings only for rough turning or for excessive radial play.

(4) Replace the crankcase sealing gasket behind the

front main bearing every time the crankshaft is disassembled. Make sure that the ends of the crankshaft spacer are not burred, as this will cut the sealing gasket.

(5) See that the crankshaft washer and locknut faces are smooth and free from burrs. The armature shaft bears against them and roughness may distort the alignment of the shaft.

h. Generator Tests. (1) PRELIMINARY TESTS. Make the following tests with the stator and yoke assembled, the armature removed or brushes lifted from commutator, and all wires connected:

(a) Remove the four screws holding the control box to the shell. Turn back the box to expose the inside, but do not disconnect any wires.

(b) Slide a piece of paper under the rheostat arm (fig. 20) to insulate it. Connect an ohmmeter between the positive lead of the d-c circuit breaker and the center arm of the rheostat. The resistance should be approximately 18 ohms. This tests the shunt winding of the d-c field. *Remove the paper after this test.*

(c) Connect an ohmmeter between the right-hand top brush holder and the C terminal of REMOTE receptacle. The resistance should be approximately zero ohms. This tests the series winding of the d-c field.

(d) Test with the ohmmeter between A and B terminal of either REMOTE or LOCAL receptacle. Reading should be approximately zero. The B terminal of both receptacles is grounded to the control box.

(e) Turn the rheostat completely clockwise and the modulator switch to ON. Connect ohmmeter between D terminal of REMOTE and LOCAL receptacles. The reading should be approximately 5 ohms.

(2) INDIVIDUAL TESTING. If all of the readings in subparagraph (1) above are not obtained, check all connections; then test the individual parts.

(3) RHEOSTAT. Resistance, when fully cut-in, 10 ohms.

(4) RESISTOR. Adjustable, full resistance, 5 ohms.

(5) CIRCUIT BREAKERS. Two 25-ampere, one d-c and one a-c.

(6) DIRECT-CURRENT FIELD. (a) *Shunt Winding.* The smaller diameter wires are the shunt winding leads. The resistance for all four coils is approximately 16 ohms. The resistance of the individual coil is approximately 4 ohms at room temperature (24°C).

(b) *Series Winding.* The larger diameter wires are the series winding leads. Resistance for all four coils or for one coil should be approximately zero. If the field coils are removed, be sure to mark the pole piece so that they may be replaced in original location and exact position.

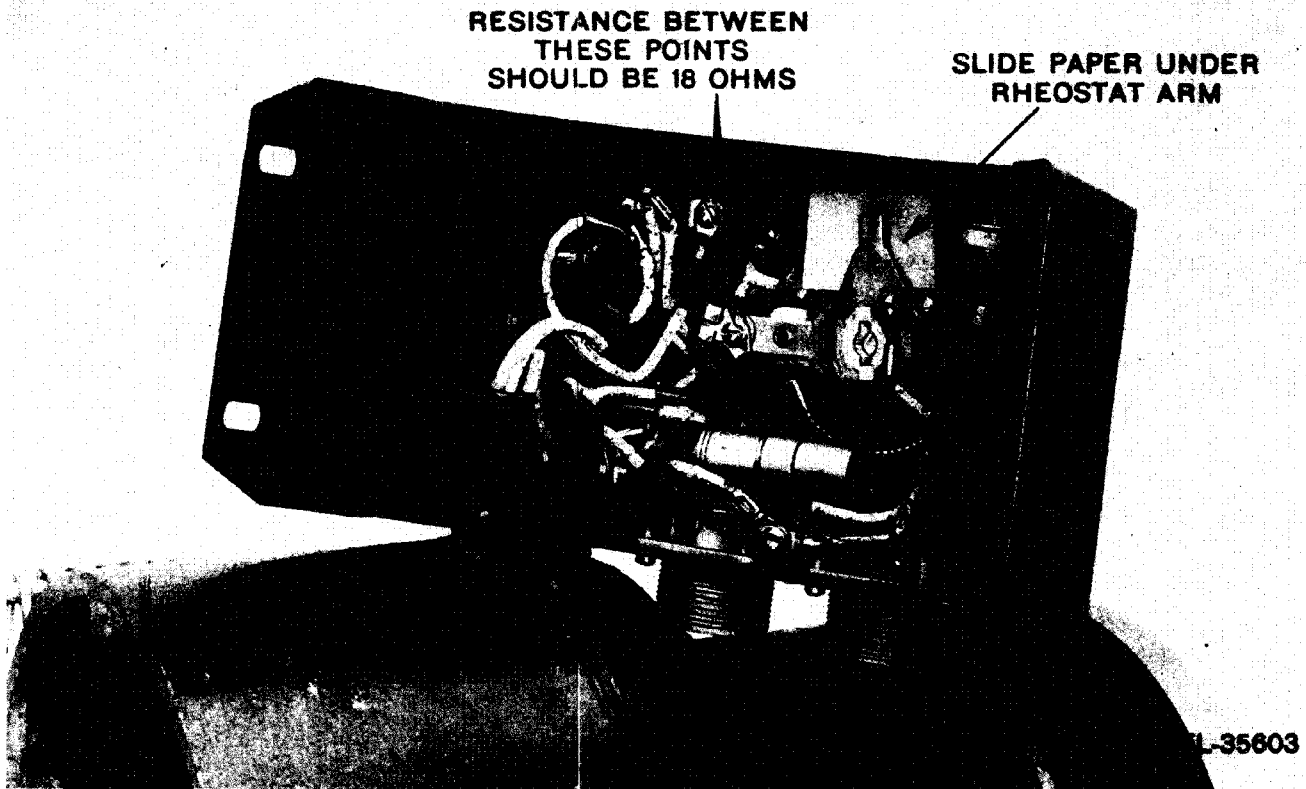


Figure 20. Testing shunt winding of d-c field

(7) ALTERNATOR. (a) *A-c Winding*. The green coded wires coming from the stator shell are the a-c winding leads. Resistance between them should be 0.125 ohms at 24°C.

(b) *Field Winding*. The black coded wires coming from the stator shell are the field winding leads. The resistance between them should be approximately 4 ohms at 24°C.

(8) SPARK WHEEL. Examine the spark wheel visually; the electrodes are the only wearing parts (par. 10 i).

(9) ARMATURE. (a) *Short Circuit*. Test by use of a growler.

(b) *Open Circuit*. Apply not more than 5 amperes at 24 volts to adjacent commutator segments with the shaft of the armature in a horizontal position. Place a compass 1/16 inch above armature core. The compass needle will pull down if the winding is continuous. No deflection of the needle will occur if there is an open circuit. This test must be made on every commutator segment.

(c) *Grounded*. Apply 500 volts between core, or shaft, and commutator segments. An indicating device of some type should be in series with the 500-volt source to indicate possible break-down of the armature. If high voltage is not available, place a 75- or 100-watt bulb in a socket and connect one terminal to one line of a 110-volt lighting circuit. Connect the other terminal of the socket to

the armature shaft; then connect the other line of the lighting circuit to the commutator. If the bulb lights, the armature is grounded.

(d) The armature bearing requires replacement only if it is rough turning or has excessive radial play.

15. ASSEMBLY.

CAUTION: Internal-external-tooth lockwashers must be reinstalled on all screws exactly as removed to prevent radio interference. See paragraph 5 section II under heading *Noisy Radio Reception* for location of these lockwashers.

a. Crankcase Assembly. (1) First, assemble the front main bearing on the crankshaft with the shielded side of the bearing next to the crankthrow. Then place the crankcase sealing gasket next to the bearing.

CAUTION: The crankcase sealing gasket must be soaked in engine oil before assembly to insure proper sealing. Always use a new gasket.

(2) Place the crankshaft through the crankcase as far as possible by hand. Take care not to catch the sealing gasket between the edge of the crankcase and the bearing as this causes an imperfect seal. Press the crankshaft into place with an arbor press.

(3) Fasten the front main bearing in place with the two

special screws and lockwashers. Place the crankcase on an arbor press with the open end downward. Place a block under the crankshaft head so that the crankcase does not touch the bed plate and pressure is exerted on the crankshaft alone when assembling the flywheel. Slide the crankshaft spacer over the crankshaft.

(4) Press the bearing onto the flywheel hub, if it was previously removed. Place the flywheel on the crankshaft, being very careful that *both keyways* are in proper alignment with the keys in the shaft. Place a collar about 2 inches long, with an inside diameter large enough to clear the hole and keyways, over the flywheel hole; then press the flywheel into place on the shaft with an arbor press.

(5) Remove the collar and put the flywheel washer and hex nut on crankshaft (left-hand thread).

b. Assemble Piston, Connecting Rod, and Cylinder. (1) Assemble the two needle bearings in the small end of the connecting rod with the stamped face of each bearing on the outside. Line up the piston with the connecting rod and drive the piston-pin into position by inserting a rod in the hollow end. Put two piston-pin retaining rings into place and slide the piston rings into the grooves in the piston.

(2) Slide one formica washer over the crankthrow and turn to bottom dead-center. Place the connecting rod over the crankthrow, *but make sure the intake ports in the piston face toward the fan housing*. Slide the roller bearing into place between the crankthrow and connecting rod. (If the bearing is packed with grease, it will greatly ease assembly by holding the rollers in place.) Place the other formica washer on the outside of the bearing.

(3) Place the cylinder gasket over the cylinder studs in the crankcase and slide the piston into the cylinder. Fasten the cylinder in place with the cylinder nuts and lockwashers.

(4) Replace the cylinder shield and fasten it to the fan housing with two screws and lockwashers. Replace the spark-plug adapter and the spark plug. Gaskets must be installed between the cylinder and the adapter, and between the adapter and the spark plug.

(5) Put the cylinder-flange gasket over the studs; then fasten the manifold to the cylinder with nuts and brass washers. The screws in the muffler straps may now be tightened.

c. Assemble Timer Bracket and Magneto.

(1) Insert the small timer-bracket spacer, place the rear bearing (open) in position, and drive it tight against the spacer. Insert the center bearing spacer, sealing ring (formica), and seal retaining ring with tapered side toward the sealing ring; then drive the front bearing into place.

(2) Fasten the magneto stator-plate assembly to the timer bracket with two screws and lockwashers. *The shielded conduit goes on top (fig. 7)*. Assemble the governor and intake-valve assembly on the intake-valve shaft, if previously removed, and lock with the snap ring. *Be sure the bearings and spacers are in proper alignment in the timer bracket*. Insert the shaft into the timer bracket from the valve face side and drive with a soft mallet *until the shaft is tight against the spacer*.

(3) Place the gasket on the timer bracket so that cut-out sections of the gasket and timer bracket are aligned. The gasket is not reversible, even though the screw holes may match when reversed. Slide the crankthrow through the hole in the head of the intake valve shaft. Fasten with six hex head screws and lockwashers.

(4) Replace the cam spacer (with pin outward), cam key (with bevel down and toward crankcase), and cam on the intake-valve shaft. Make sure the cam fits tightly against the spacer with pin in notched section; then fasten with the cam locknut. Check the point gap to be sure it is exactly 0.020 inch. Slide the rotor key into the shaft and replace the complete rotor assembly. Tighten the puller nut to fasten.

(5) Place the cylinder shield cap and spring assembly on the spark plug. Replace the suppressor adapter and connect the shielded high-tension conduit.

d. Assemble Fuel Container and Carburetor.

(1) Place the fuel container in position on the angle irons and fasten it in place with the fuel-container straps. Make sure the webbed spacer is in place on the angle irons under the container.

(2) Slide the carburetor into the rubber spacer on the sump fitting in the fuel container. Insert the gasket between the carburetor and the timer bracket and fasten with two screws and lockwashers.

(3) Refill the air-cleaner bowl with oil, place the cork gasket on the adapter, and replace the air-cleaner assembly. Connect the vent tube from the fuel container to the carburetor and the priming tube from the carburetor to the cylinder.

(4) Connect the pressure tube from the timer bracket to the carburetor.

e. Assemble Generator. (1) Place the key in the crankshaft; align the keyway in the armature shaft, and slide the armature over the crankshaft until it is flush with the flywheel nut.

(2) If the yoke and control box have been removed from the shell, reassemble them. Note that the brush head and yoke are fastened to the shell by four yoke bolts, and the control box by four screws. *Refer to wiring diagrams (figs. 21 and 22) to make sure that all connections are correct*. Slide the complete yoke, shell, and brush-

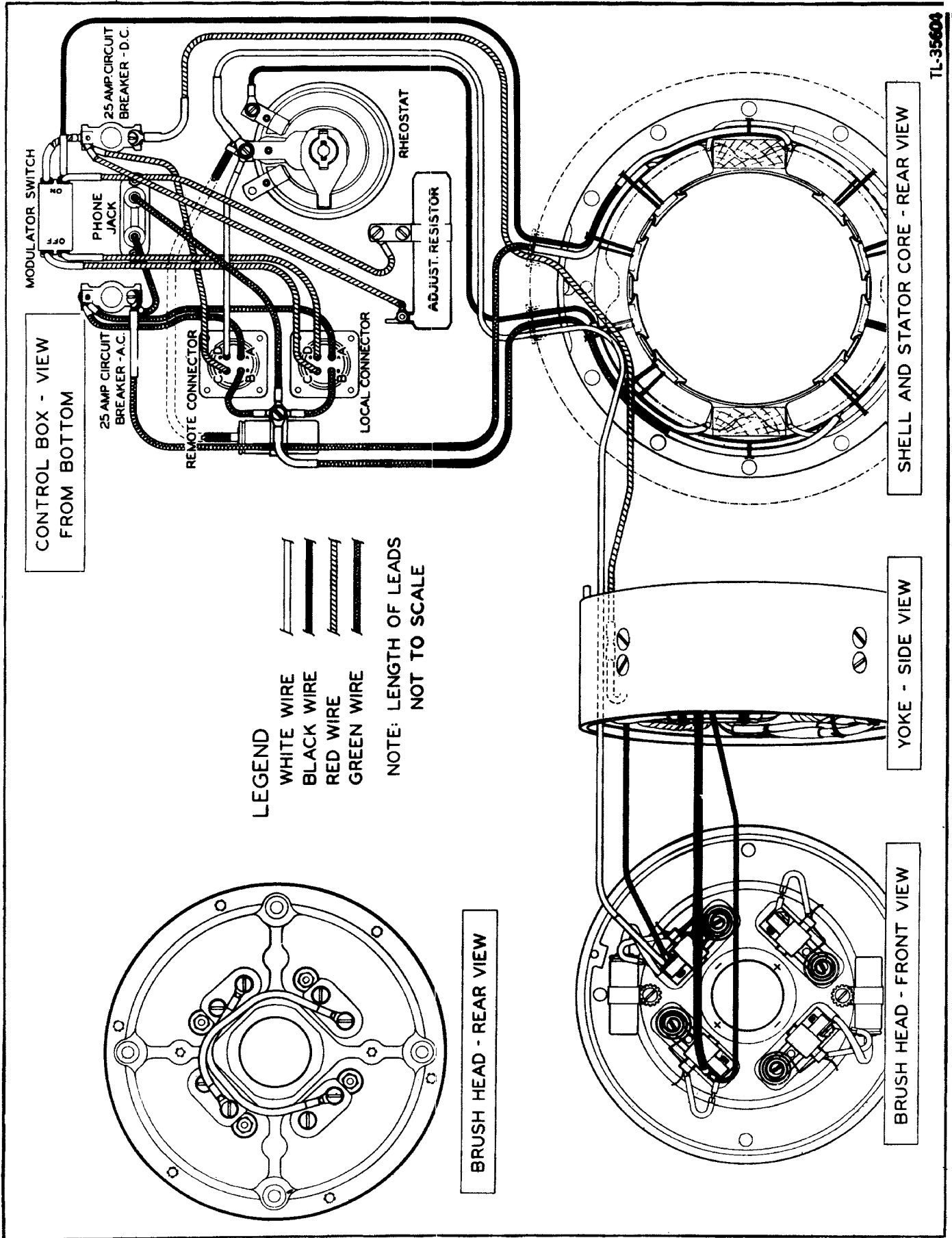


Figure 21. Practical wiring diagram

head assembly over the armature. Fasten it to the fan housing with the four shell bolts and lockwashers.

(3) Tighten the two locknuts on the armature shaft and slide the spark-wheel assembly onto the shaft. Place a lockwasher and the collet washer on the armature bolt; then insert the bolt in the armature shaft and tighten. Fasten the grounding plate to the spark wheel with three

screws and lockwashers. Replace the brushes in their respective holders and fasten the brush-head band in place with the thumb screw provided.

(4) Place the grounding brush in its holder; then assemble the spark-wheel housing on the generator, being careful not to drop out the brush. Fasten with screws through the clamp ring into the brush head.

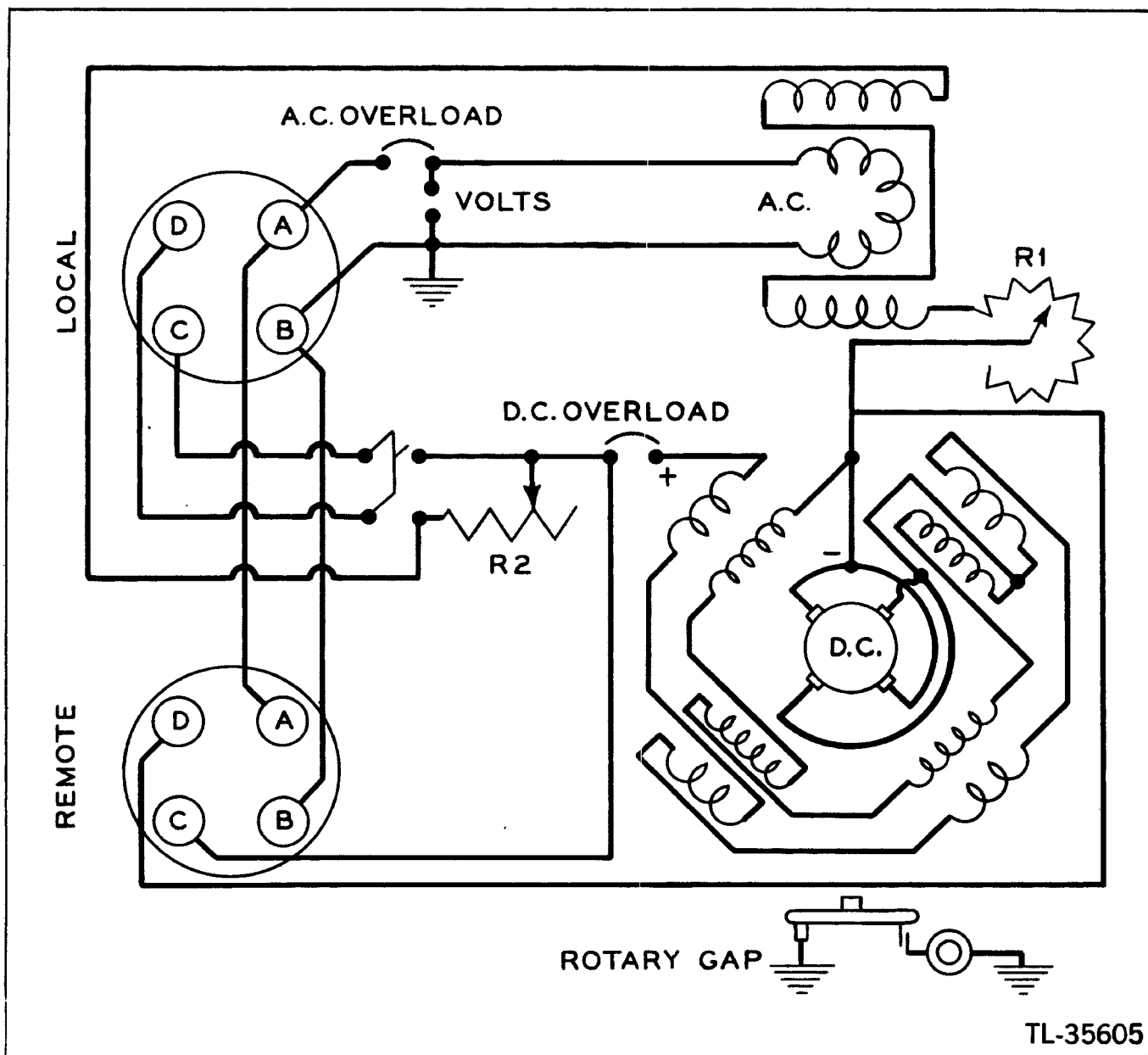


Figure 22. Schematic wiring diagram

16. REFERENCED PHOTOGRAPHS.

The following photographs are exploded views of the main components of Power Unit PU-6/TPS-1. Opposite each photograph is a key to the reference numbers, which

lists the part name and manufacturer's part number. These reference numbers are also used in the maintenance parts list for identification purposes. Since all parts are shown in correct relationship for assembling, these photographs will prove helpful in repairing the power unit.

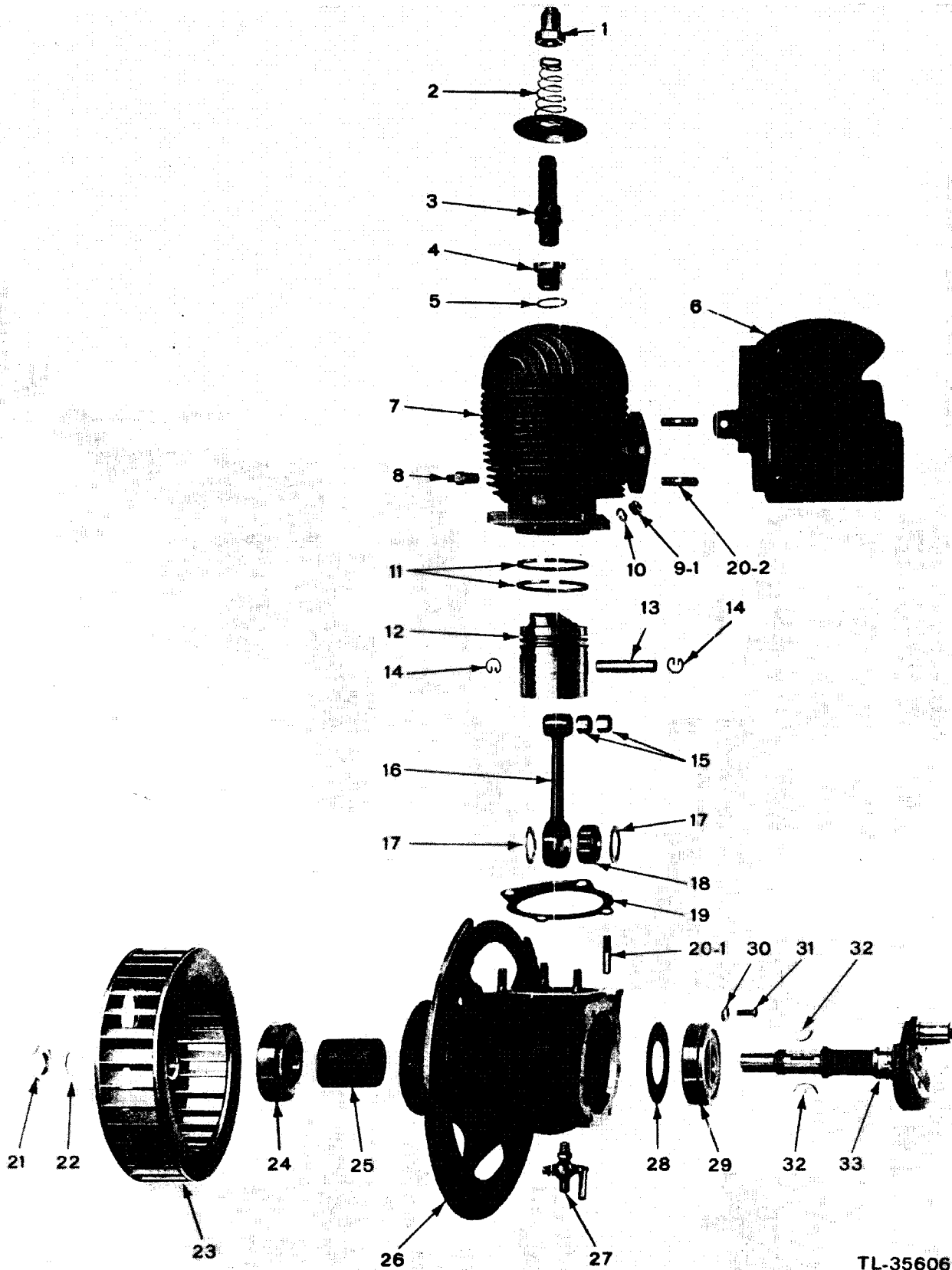
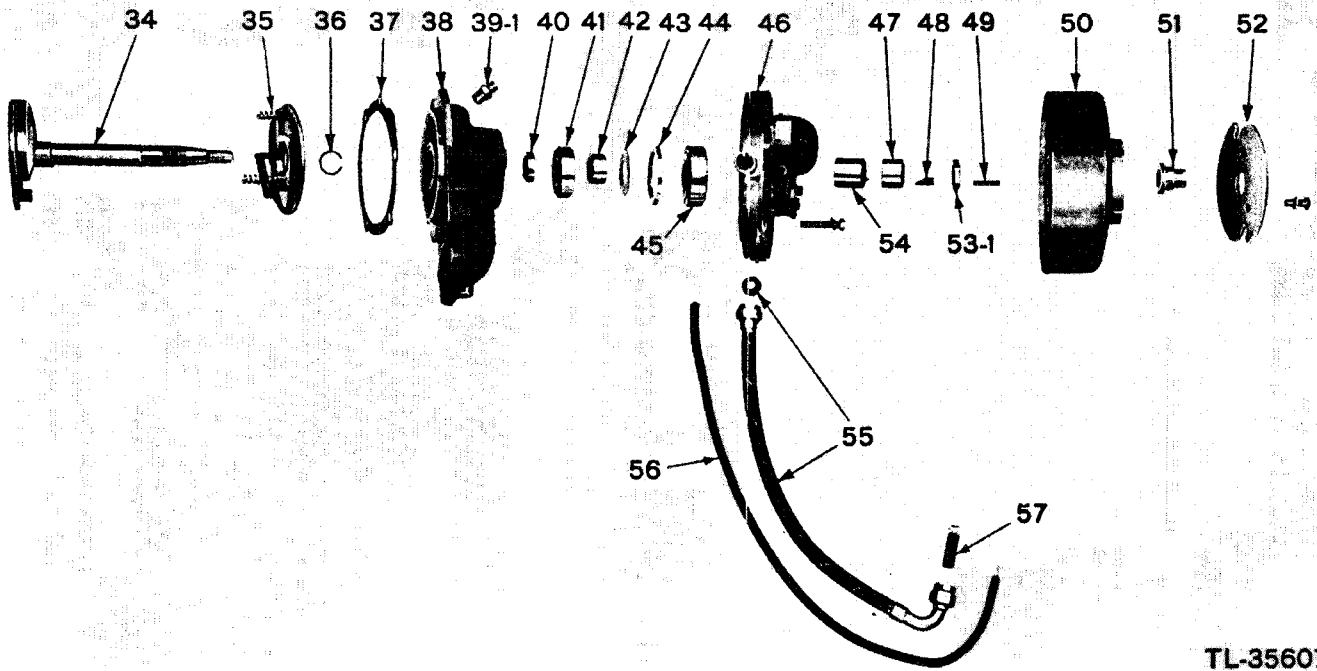


Figure 23. Engine parts

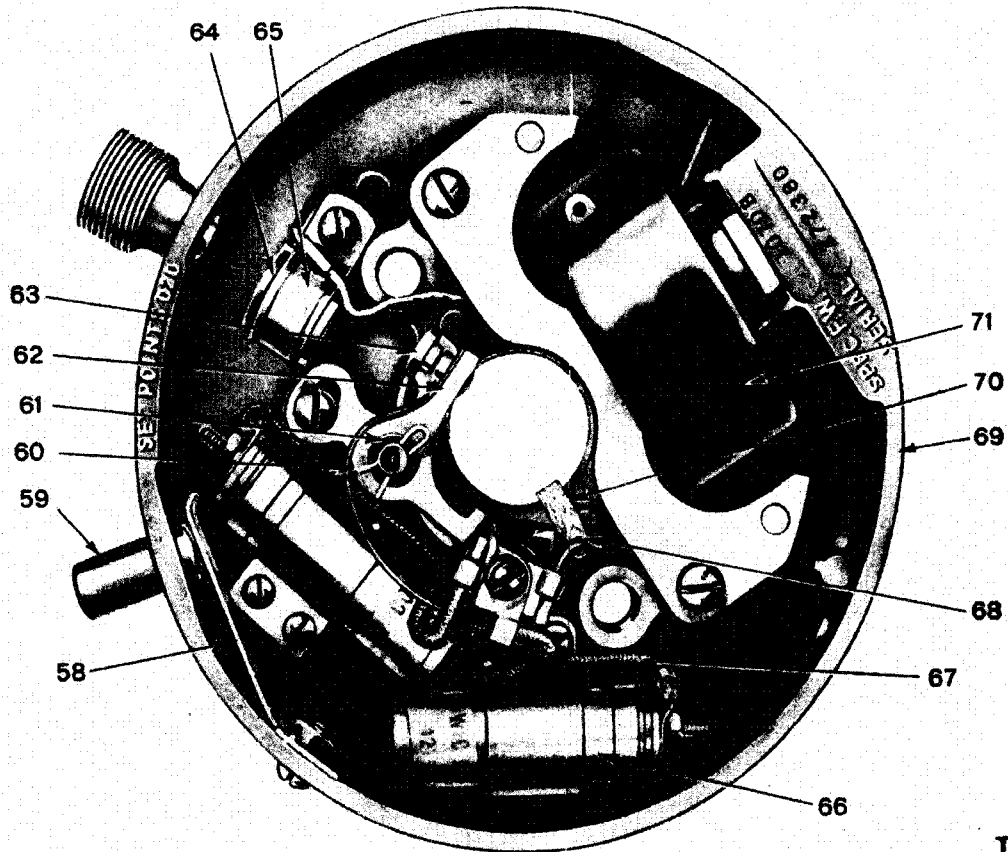
Key to reference numbers in figure 23

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
1	Suppressor Adapter	HL-25951
2	Cylinder Cap Assembly	HL-AA-492
3	Spark Plug	CP-HO-14 S
4	Spark Plug Adapter	HL-AA-406
5	Adapter Gasket	CP-A.472S (19860)
6	Cylinder Shield	HL-19537-B
7	Cylinder	HL-AA-705
8	Priming Connector	HL-60256
9-1	Cylinder Stud Nut	HL-25412
10	Lockwasher	HL-83003
11	Piston Ring	HL-19398
12	Piston	HL-11569-FV
13	Piston Pin	HL-10546-B
14	Retaining Ring	HL-25502
15	Piston Pin Bearing	TR-GB-87-X (60182)
16	Connecting Rod	HL-60216
17	Washer	HL-60183
18	Connecting Rod Bearing	McG Z-100 (40032)
19	Cylinder Gasket	HL-60181
20-1	Cylinder Stud	HL-25411
20-2	Cylinder Stud	HL-25411
21	Crankshaft Locknut	HL-18660
22	Flywheel Washer	HL-18662
23	Flywheel	HL-25944
24	Flywheel Bearing	ND-88507 (19228)
25	Crankshaft Spacer	HL-19818
26	Crankcase	HL-60002
27	Drain Cock	IB 76-EF (18365)
28	Crankcase Sealing Gasket	HL-40203
29	Main Bearing	ND 47306 (19233)
30	Lockwasher	HL-83002
31	Retaining Screw	HL-19238-A
32	Crankshaft Key	WM #11 (10514)
33	Crankshaft	HL-60040-1



TL-35607

Figure 24. Timer bracket and magneto parts



TL-35608

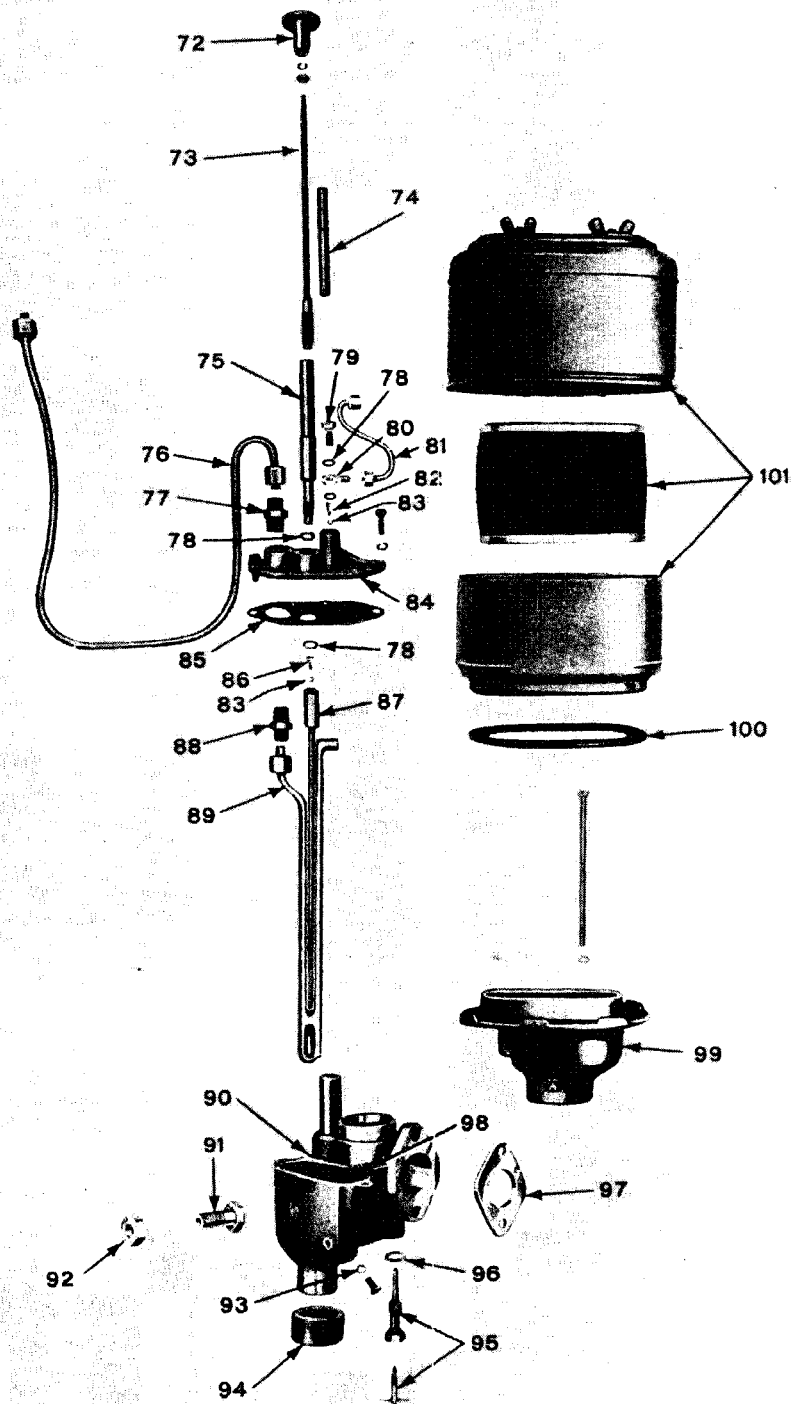
Figure 25. Magneto stator-plate parts

Key to reference numbers in figure 24

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
34	Intake Valve Shaft	HL-AA-878
35	Governor Assembly	HL-A-6020
36	Snap Ring	HL-40177
37	Timer Bracket Gasket	HL-19484
38	Timer Bracket	HL-19984-1
39-1	Connector Body	WH 2200X3 (11204)
40	Timer Bracket Spacer	HL-19385
41	Bearing	ND 3203 (19401)
42	Bearing Spacer	HL-19380
43	Sealing Ring	HL-19620
44	Retaining Ring	HL-19619-A
45	Bearing	ND 88603 (19400)
46	Stator Group	WCE-X4656
47	Cam	WCE-4661
48	Cam Key	WCE-4663
49	Rotor Key	WCE-4662
50	Rotor	WCE-Y4659
51	Puller Nut	WCE-4666
52	Starter Plate	WCE-4664
53-1	Locknut	HL-19454
54	Cam Spacer Assembly	HL-AA-637
55	Conduit Assembly	TMH K-21879
56	High Tension Lead	PC#347-B
57	Suppressor	HL-25950

Key to reference numbers in figure 25

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
58	Grounding Spring	WCE-4754
59	Stop Button	WCE-4755
60	Lock Spring	WCE-4210
61	Pivot Washer	WCE-3219
62	Breaker Arm—Complete	WCE-X3215
63	Contact Plate	WCE-4652
64	Rubber Bushing	WCE-3454
65	Clamp	WCE-3455
66	Capacitor	WCE-4215
67	Lead, Inter	WCE-X4672
68	Cam Wiper Bracket	WCE-5076
69	Stator Plate Group	WCE-4726
70	Felt Cam Wiper	WCE-5077
71	Group-Coil	WCE-X4658



TL-35609

Figure 26. Carburetor and air-cleaner parts

Key to reference numbers in figure 26

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
72	Plunger Knob	HL-60098-A
73	Plunger Assembly	HL-AA-416
74	Plunger Rod Sleeve	HL-19665-A
75	Plunger Tube Assembly	HL-AA-418
76	Pressure Line Assembly	HL-AA-190
77	Outer Pressure Line Connector	HL-S-399-1
78	Gasket	HL-60178
79	Priming Line Screw	HL-60109
80	Priming Line Connector Fitting	HL-60110
81	Priming Line Assembly	HL-AA-960
82	Valve Spring	HL-60028
83	Check Ball	HL-25527
84	Carburetor Cover	HL-19985-1
85	Cover Gasket	HL-60061-B
87	Suction Tube Assembly	HL-AA-1123
88	Inner Pressure Line Connector	HL-40176
89	Feed and Pressure Line Assembly	HL-AA-189
90	Carburetor Body	HL-50112-A
91	Connector	HL-25927
92	Locknut	HL-25928
93	Gasket	TL-07421
94	Spacer	HL-60020-A
95	Adjustable Jet Assembly	HL-AA-523-2
96	Gasket	TL-0676
97	Carburetor Gasket	HL-19149
98	Reservoir Screen	HL-60049-C
99	Air Cleaner Adapter	HL-60034-B
100	Air-Cleaner Gasket Adapter	HL-25430
101	Air Cleaner	AM-HOBS (AA-855)

TL-35610

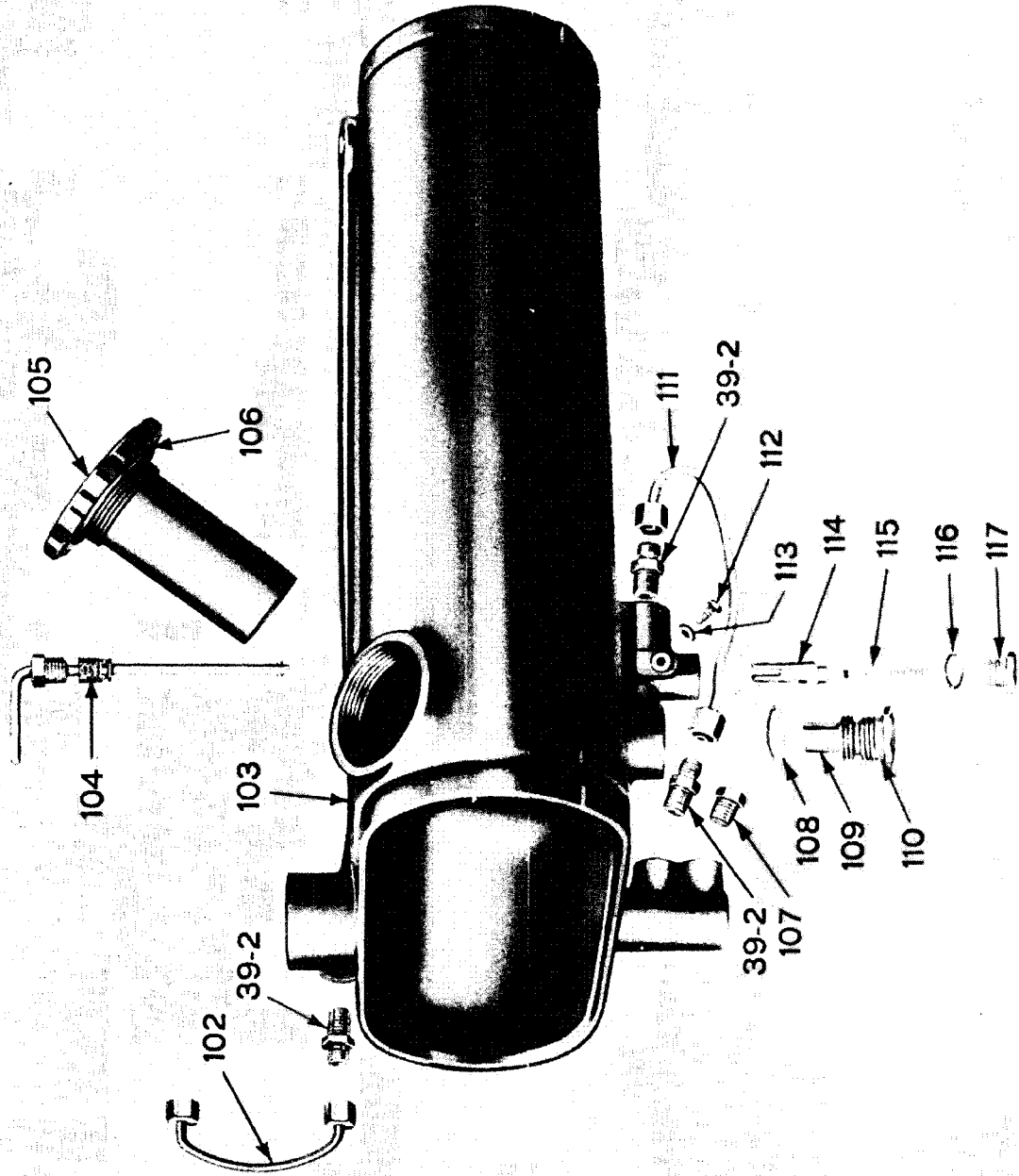


Figure 27. Fuel-container parts

Key to reference numbers in figure 27

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
39-2	Connector Body	WH 2200X3 (11204)
102	Vent Tube Assembly	HL-AA-748
103	Fuel Tank	HL-AA-951
104	Handle Assembly	HL-AA-330
105	Filler Cap	HL-AA-862
106	Filler Cap Gasket	HL-25815
107	Pipe Plug	HL-19878
108	Gasket	HL-19962
109	Filter	ZC F-2X (19876)
110	Filter Plug	HL-19961
111	Fuel Line	HL-AA-224
112	Valve Stop Screw	HL-19982
113	Gasket	TL-07421
114	Shut-Off Valve	HL-19551-D
115	Valve Spring	HL-15080-C
116	Gasket	HL-19958
117	Valve Plug	HL-19939

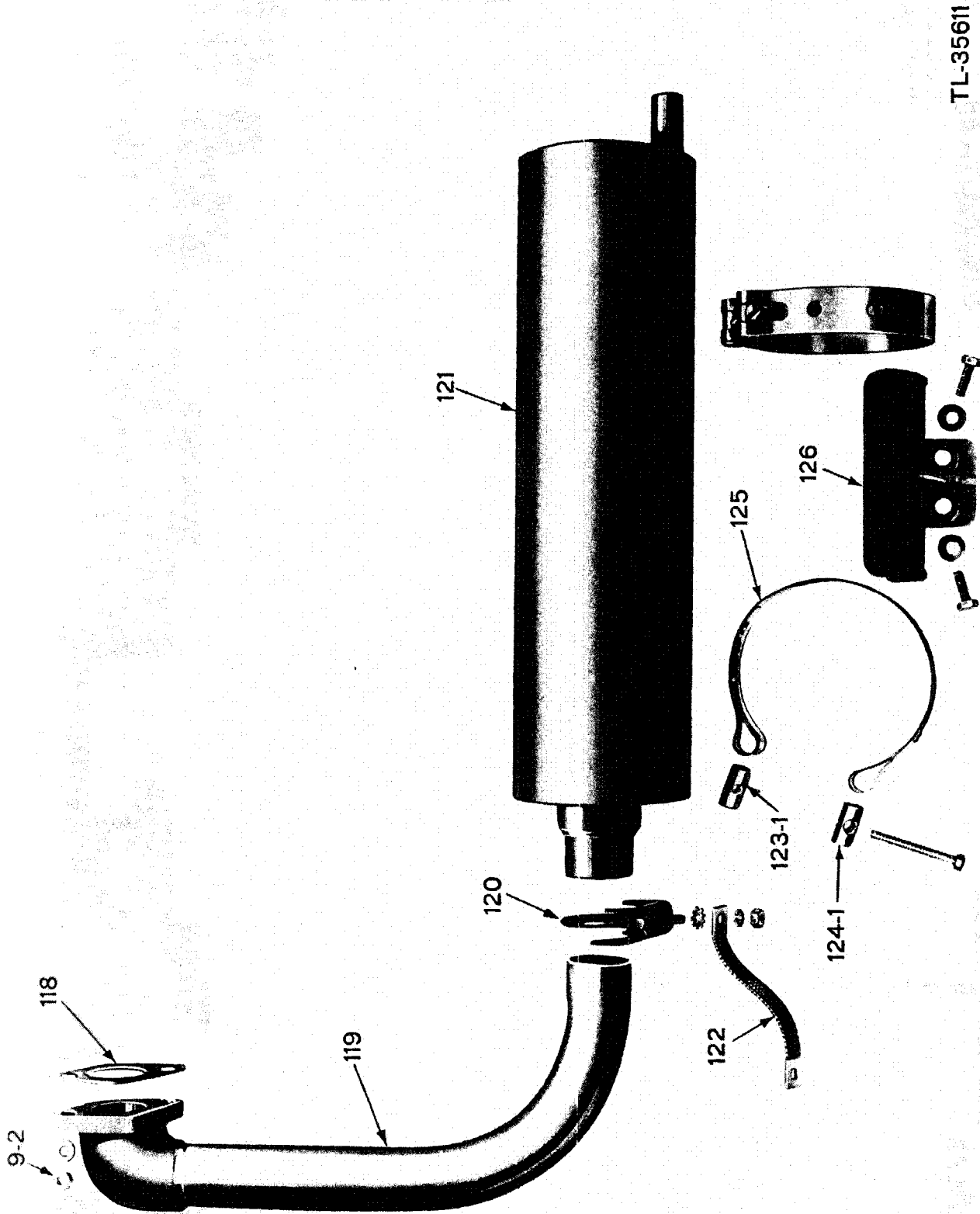
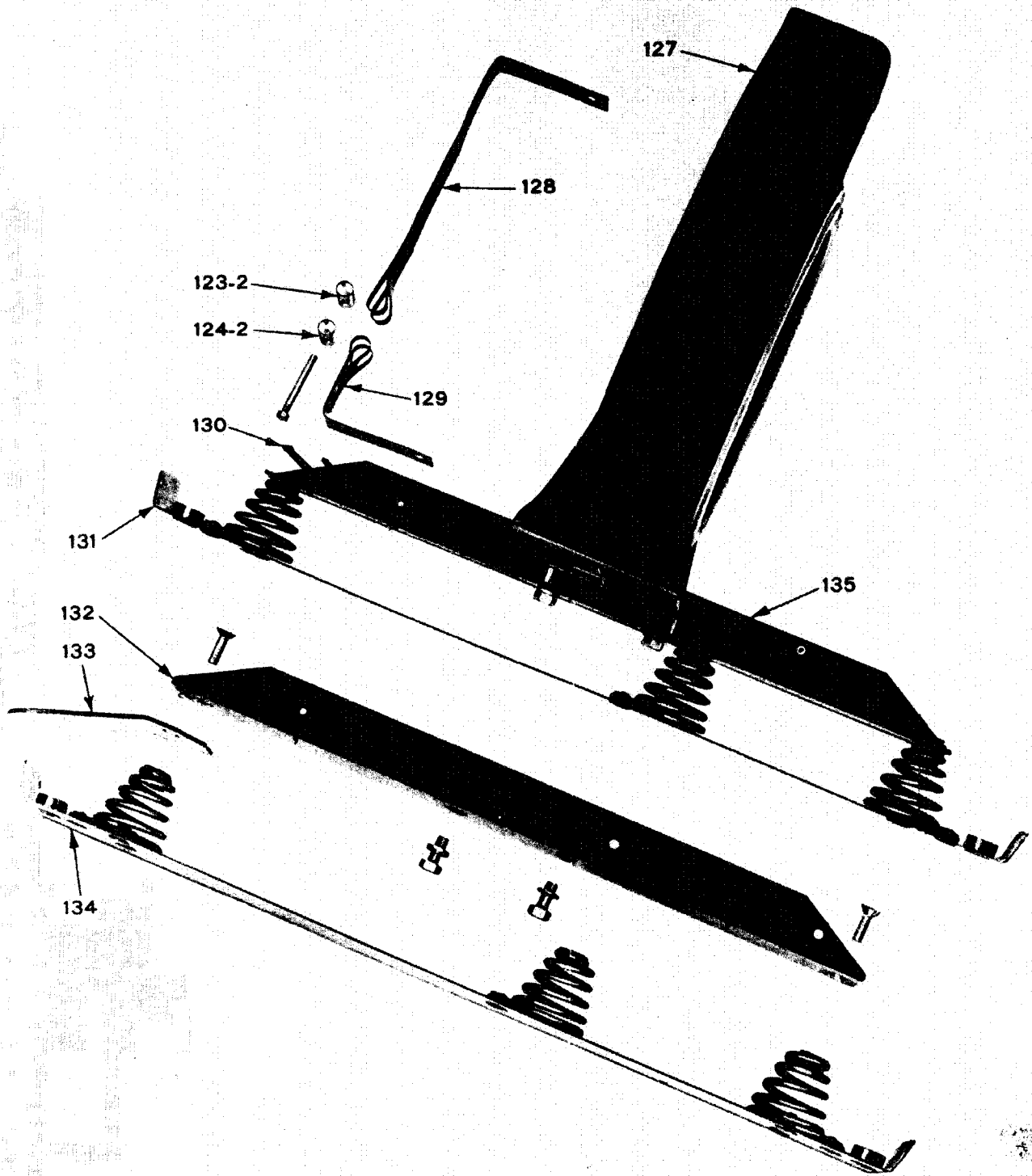


Figure 28. Muffler parts

Key to reference numbers in figure 28

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
9-2	Cylinder Stud Nut	HL-25412
118	Cylinder Flange Gasket	HL-25802
119	Manifold Assembly	HL-AA-723
120	Muffler Clamp	OM CL-4-125 (25236)
121	Muffler	OM HL-43-A (60188)
122	Ground Strap	HL-25945
123-1	Strap Stud	HL-18123-A
124-1	Strap Stud	HL-50052
125	Muffler Strap	HL-AA-938
126	Muffler Bracket	HL-25868

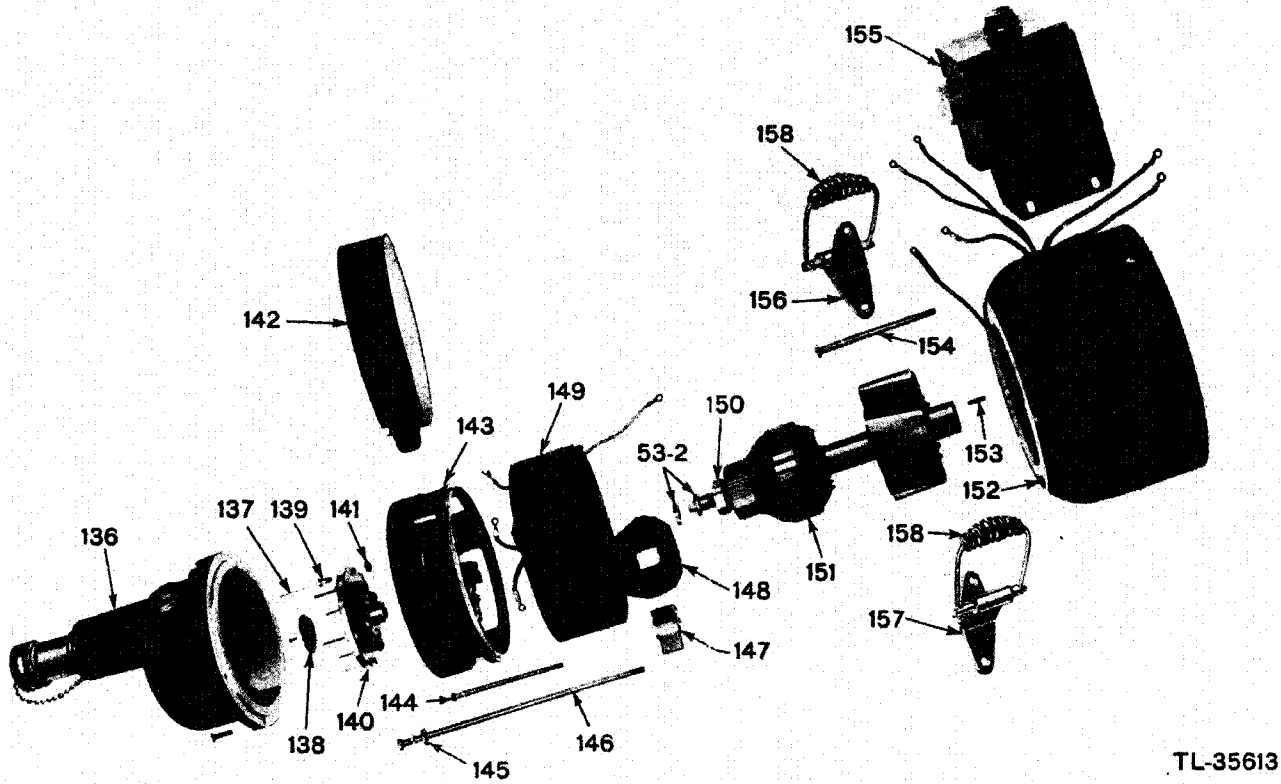


TL-35612

Figure 29. Mounting parts

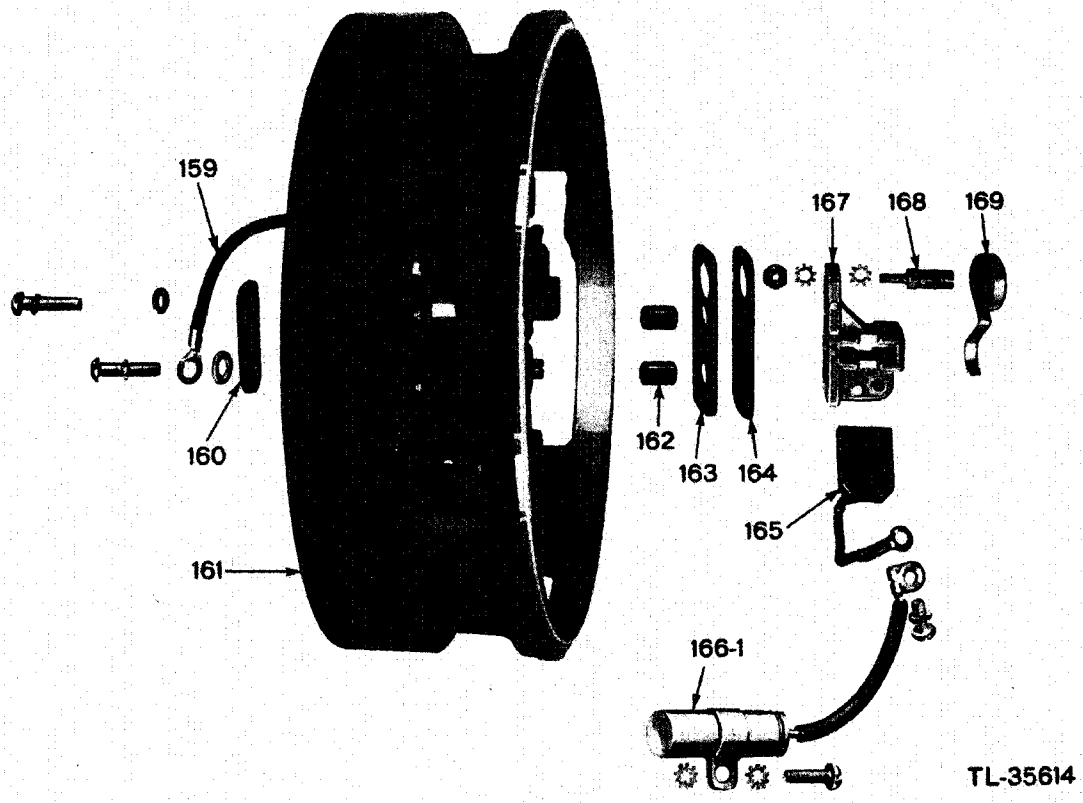
Key to reference numbers in figure 29

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
123-2	Strap Stud	HL-18123-A
124-2	Strap Stud	HL-50052
127	Fan Housing	HL-60148
128	Strap Assembly	HL-AA-968
129	Strap Assembly	HL-AA-969
130	Fuel Tank Spacer	HL-60032-A
131	Left Mounting Skid Assembly	HL-AA-899
132	Angle Iron-Right	HL-60106
133	Step Plate	HL-60242
134	Right Mounting Skid Assembly	HL-AA-898
135	Angle Iron-Left	HL-60107



TL-35613

Figure 30. Generator parts



TL-35614

Figure 31. Brush-head parts

Key to reference numbers in figure 30

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
53-2	Locknut	HL-19454
136	Spark Gap Housing Assembly	HL-AA-804
137	Electrode	HL-25495
138	Brush Plate	HL-25491
139	Collet Screw	HL-25492
140	Spark Wheel Assembly	HL-AA-701
141	Collet Nut	HL-81052
142	Brush Head Band	HL-AA-806
143	Brush Head Assembly	HL-AA-805
144	Brush Head Bolt	HL-80191
145	Collet Washer	HL-25496
146	Armature Bolt	HL-80092
147	Pole Piece	HL-AA-367-B
148	Field Coil	HL-52100
149	Yoke and Coil Assembly	HL-A-2647
150	Generator Bearing	ND 77503 (25489)
151	Armature and Rotor Assembly	HL-60213
152	Shell Assembly	HL-AA-807
153	Armature Key	HL-15008
154	Shell Bolt	HL-80190
155	Control Box Assembly	HL-A-5109
156	Handle Bracket Right	HL-AA-776
157	Handle Bracket Left	HL-AA-777
158	Carrying Handle Assembly	HL-AA-89-1

Key to reference numbers in figure 31

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
159	Brush Jumper	HL-AA-425
160	Brush Head Insulation	HL-52073
161	Brush Head	HL-25460
162	Brush Head Bushing	HL-52074-A
163	Brush Holder Insulation	HL-52071-1
164	Brush Holder Insulation	HL-52071
165	Brush	HL-25198-1
166-1	Capacitor	TD 2354 (25505)
167	Brush Holder	HL-52068-1
168	Brush Spring Post	HL-52070
169	Brush Spring	HL-52069

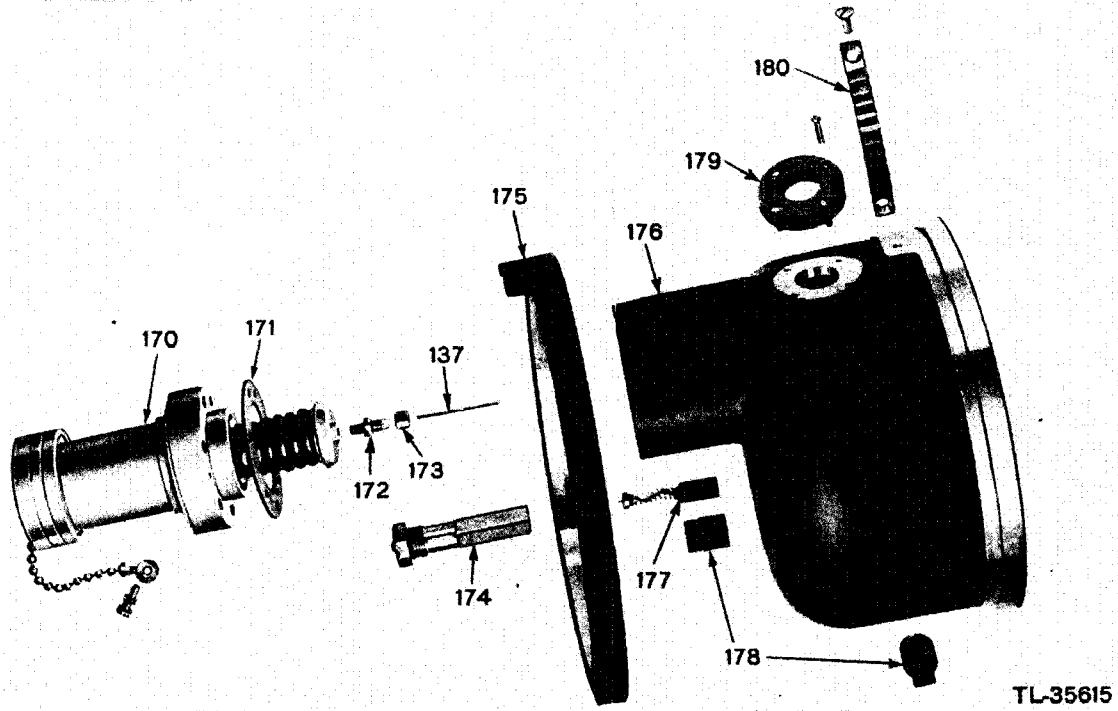


Figure 32. Spark-wheel housing parts

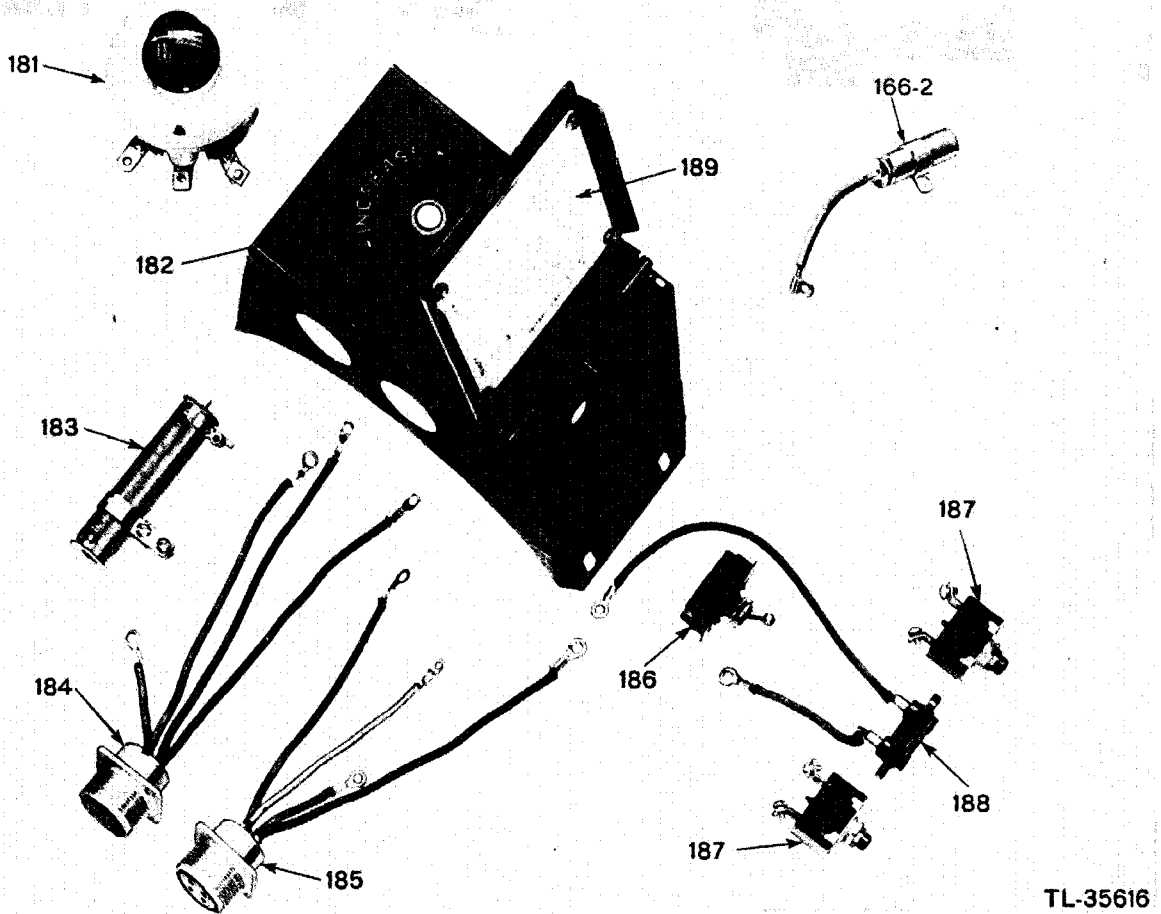


Figure 33. Control-box parts

Key to reference numbers in figure 32

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
137	Electrode	HL-25495
170	Pot Head Assembly	HL-AA-840
171	Pot Head Gasket	HL-25555
172	Electrode Chuck	HL-25554
173	Chuck Nut	HL-25553
174	Brush Holder	HL-AA-710
175	Clamp Ring	HL-25458
176	Spark Gap Housing	HL-25464
177	Grounding Brush Assembly	HL-AA-711
178	Pipe Plug	HL-25509
179	Gits Window	GM 4030 (25490)
180	Phasing Segment	HL-25459

Key to reference numbers in figure 33

<i>Ref. No.</i>	<i>Name of Part</i>	<i>Part Number</i>
166-2	Capacitor	TD 2354 (25505)
181	Rheostat	HL-25475
182	Control Box	HL-25485
183	Resistor Assembly	HL-AA-815
184	Remote Connector Assembly	HL-AA-816
185	Local Connector Assembly	HL-AA-817
186	Switch	AH 1350 (25479)
187	Circuit Breaker	ST PSM-25 (25925)
188	Phone Jack Assembly	HL-AA-818
189	Instruction Plate	HL-60202

17. COMPLETE LIST OF MANUFACTURERS.

- AH—Arrow-Hart & Hegeman Elec. Co.
Hartford, Connecticut
- AM—Air-Maze Corporation
Cleveland, Ohio
- CM—Conn. Malleable Castings Co.
New Haven, Connecticut
- CP—Champion Spark Plug Co.
Toledo, Ohio
- FC—Flexible Carbon Scraper Co.
Pasadena, California
- FS—The Charles Fisher Spring Co.
Brooklyn, New York
- GM—Gits Molding Corporation
Chicago, Illinois
- HL—Homelite Corporation
Port Chester, New York
- IB—Imperial Brass Mfg. Co.
Chicago, Illinois
- IE—Industrial Equipment Co.
Stamford, Connecticut
- McG—McGill Manufacturing Co.
Valparaiso, Indiana
- MI—A. Marchand, Incorporated
Stamford, Connecticut
- MT—MacTool Co.
Norwalk, Connecticut
- ND—New Departure
Bristol, Connecticut
- OM—Oldberg Manufacturing Co.
Grand Haven, Michigan
- PC—Packard Electric
Div. of General Motors
Warren, Ohio
- RM—Rinck - McIlwaine
New York, New York
- ST—Spencer Thermostat Co.
Attleboro, Massachusetts
- TD—Tobe Deutschmann Corporation
Canton, Massachusetts
- TL—Tillotson Mfg. Co.
Toledo, Ohio
- TMH—Titeflex Metal Hose Co.
Newark, New Jersey
- TR—The Torrington Co.
Torrington, Connecticut
- WCE—Wico Electric Co.
Springfield, Massachusetts
- WH—The Weatherhead Co.
Cleveland, Ohio
- WM—Whitney Manufacturing Co.
Hartford, Connecticut
- ZC—Zenith Carburetor
Div. of Bendix Aviation Corporation
Detroit, Michigan

18. MAINTENANCE PARTS LIST, FOR POWER UNIT PU-6/TPS-1.

NOTE: Order maintenance parts by stock number, name and description. Only maintenance parts can be requisitioned.

Ref. Symbol	Signal Corps Stock No.	Name of part and description	Function	Quan. in Equip.	Lowest Maint. Echelon
3	3H4412-14S	SPARK PLUG: special aircraft plug, CP HO-14S		1	Orgn Stock
4	3H1916/A8	SPARK-PLUG ADAPTER: assembly including baffle, HL AA-406	Reduces deposits on spark-plug points	1	Orgn Stock
5	3H1916/G1	ADAPTER GASKET: 7/8" spark-plug gasket, CP A.472S (19860)	Seal between cylinder and spark-plug adapter	1	Orgn Stock
7	3H1916/C50	CYLINDER: aluminum with cast iron liner, HL AA-705		1	3d
8	3H1916/C31	PRIMING CONNECTOR: screws into cylinder, HL 60256	Connector for priming line	1	Orgn Stock
9-1	6L3505-24-8	CYLINDER STUD NUT: 5/16"-24 hex steel, special, HL-25412	Holds cylinder to crankcase	6	Orgn Stock
9-2	6L3505-24-8	CYLINDER STUD NUT: same as 9-1, HL 25412	Fastens manifold to cylinder		
10	6L7221-8-32	LOCKWASHER: special, 5/16", HL 83003	Used with ref. 9	4	Orgn Stock
11	3H4575A/93	PISTON RING: 2-3/8" cast iron, 4-1/2 to 6-1/2 lbs tension, HL 19398		2	3d
12	3H4543/21	PISTON: 2-3/8" vanasil, HL 11569-FV		1	4th
13	3H4543/19	PISTON PIN: special steel, HL 10546-B		1	4th
14	3H1916/R20	RETAINING RING: wire spring clip, HL 25502		2	4th
15	3H321-5	PISTON PIN BEARING: needle, 1/2" ID, 11/16" OD, 7/16" width, TR GB-87-X (60182)	Retainer for piston pin	2	4th
16	3H1916/R50	CONNECTING ROD: steel forging, HL 60216		1	4th
17	3H1916/W1	WASHER: formica, HL 60183	Bearing retainer	2	3d
18	3H4575A/66	CONNECTING ROD BEARING: split retainer, roller, 0.875 ID, 1.375 OD, 0.606 width, McG Z-100 (40032)		1	4th
19	3H1916/G2	CYLINDER GASKET: vellumoid, HL 60181	Seal	1	3d
20-1	3H1916/S50	CYLINDER STUD: 5/16-18 x 5/16-24, steel, HL 25411	Fastens cylinder to crankcase	6	3d
20-2	3H1916/S50	CYLINDER STUD: same as 20-1	Fastens manifold to cylinder		
21	3H4575A/41	CRANKSHAFT LOCKNUT: 7/8"-18 hex steel, left hand, HL 18660	Holds flywheel on crankshaft	1	4th
22	3H4623/50	FLYWHEEL WASHER: 1-3/8" OD, special, HL 18662		1	4th

18. MAINTENANCE PARTS LIST (contd).

Ref. Symbol	Signal Corps Stock No.	Name of part and description	Function	Quan. in Equip.	Lowest Maint. Echelon
24	3H4575A/54	FLYWHEEL BEARING: ball, annular, single row, with double oil shield 1.3780 bore, 2.8346 OD, 0.9843 width, ND 88507 (19228)		1	4th
27	3H1916/C25	DRAIN COCK: IB 76EF (18365)	Drains crankcase	1	3d
28	3H1916/G3	CRANKCASE SEALING GASKET: vellumoid, 2-13/16" OD, HL 40203	Compression seal	1	4th
29	3H4575A/67	MAIN BEARING: ball, annular, single row, with double oil shield and snap ring, 1.1811 bore, 2.8346 OD, 0.7480 width, ND 47306 (19233)		1	4th
30	6L72218-32	LOCKWASHER: special, 5/16", HL 83002	Used with No. 31 screw	2	4th
31	3H4575A/68	RETAINING SCREW: 1/4-20 x 3/8", special, HL 19238-A	Fastens main bearing in place	2	4th
34	3H1916/S15	INTAKE VALVE SHAFT: HL AA-878	Drives intake valve, magneto, and regulates timing of intake gases and ignition	1	3d
35	3H1916/G50	GOVERNOR ASSEMBLY: nonadjustable, HL A-6020	Regulates engine speed	1	3d
36	3H4575A/60	SNAP RING: wire spring clip, HL 40177	Retainer for governor	1	3d
37	3H1916/G4	TIMER-BRACKET GASKET: vellumoid, HL 19494	Compression seal	1	3d
39-1	3H4523-1/C9	CONNECTOR BODY: for 3/16" tubing, WH 2200X3 (11204)	Connection for pressure line	4	Orgn Stock
39-2	3H4523-1/C9	CONNECTOR BODY: same as 39-1, WH 2200X3 (11204)	Connector	1	4th
41	3H4575A/199	BEARING: ball, annular, single row, 0.6693 bore, 1.5748 OD, 0.4724 width (intake-valve shaft, rear) ND 3203 (19401)		1	4th
43	3H1916/R30	SEALING RING: phenolic, HL 19620	Oil retainer	1	3d
45	3H4575A/198	BEARING: ball, annular, single row, with double oil shield, 0.6696 bore, 1.8504 OD, 0.7087 width (intake-valve shaft, front), ND 88603 (19400)		1	4th
51	3H2699-30/N30	PULLER NUT: part of magneto, WCE 4666	Holds rotor on intake valve shaft	1	3d
46-52	3H2699-30	MAGNETO ASSEMBLY: WCE-FW 5-1/4 S-6942		1	Orgn Stock
53-1	6L3681-24S	LOCKNUT: 21/32"-24 hex steel, 7/8" across flats, same as 53-2, HL 19454	Holds cam on intake valve shaft	3	3d
53-2	6L3681-24S	LOCKNUT: same as 53-1, HL 19454	Holds bearing on armature shaft		

18. MAINTENANCE PARTS LIST (cont'd).

Ref. Symbol	Signal Corps Stock No.	Name of part and description	Function	Quan. in Equip.	Lowest Maint. Echelon
56	3H1916/L10	HIGH-TENSION LEAD: 19-inch cable, PC #347-B		1	Orgn Stock
57	2Z9054.15	SUPPRESSOR: fits inside spark plug, HL 25950	Eliminate radio interference	1	Orgn Stock
60	3H2699-30/S31	LOCK SPRING: part of magneto, WCE 4210	Retains breaker arm	1	Orgn Stock
61	3H2699-30/W1	PIVOT WASHER: part of magneto, WCE 3219	Retains breaker arm	1	3d
62	3H2699-30/A1	BREAKER ARM, COMPLETE: with contact, rides on cam, part of magneto, WCE X3215	Opens and closes points at proper intervals	1	Orgn Stock
63	3H2699-30/P30	CONTACT PLATE: fixed contact with slot adjustment, part of magneto, WCE 4652	Adjusts point setting	1	Orgn Stock
66	3H2699-30/C10	CAPACITOR: special 0.16 to 0.18 uf, part of magneto, WCE 4215	Prevents arcing across contact points when open	1	3d
67	3H2699-30/L20	LEAD, INTER: part of magneto, WCE X-4672	Connects capacitor to points	1	3d
70	3H2699-30/W20	FELT CAM WIPER: part of magneto, WCE 5077	Lubricates cam	1	Orgn Stock
71	3H2699-30/C30	GROUP, COIL: consists of a primary winding and a secondary winding, one end of each being connected, part of magneto, WCE X4658	Transformer to supply high voltage for spark plug	1	3d
73	3H1916/P40	PLUNGER ASSEMBLY: steel rod with packing, HL AA-416	Primes engine	1	Orgn Stock
76	3H1916/L30	PRESSURE-LINE ASSEMBLY: brass tubing and connectors, HL AA-190	Feeds pressure to carburetor	1	Orgn Stock
78	3H1916/G7	GASKET: fibre 1/4" ID x 7/16" OD x 1/16" thick, HL 60178	Seal	4	Orgn Stock
81	3H1916/L33	PRIMING-LINE ASSEMBLY: tube with connectors, HL AA-960	Primes cylinder	1	3d
82	3H1916/S41	VALVE SPRING: special steel, HL 60028	Retains check ball	1	Stock
83	3H1916/B1	CHECK BALL: 5/32" diameter, steel, HL 25527	Valve	2	3d
85	3H1916/G6	COVER GASKET: vellumoid, HL 60061-B	Seals carburetor	1	3d
95	3H1916/J10	ADJUSTABLE-JET ASSEMBLY: assembly of nozzle and adjusting needle, HL AA-523-2	Vaporizes fuel	1	Orgn Stock
96	6H6226/S7	GASKET: fibre, TL 0676	Seal	1	3d
97	3H4523-1/G3	CARBURETOR GASKET: vellumoid, HL 19149	Seal	1	Orgn Stock
100	3H1916/G5	AIR-CLEANER GASKET: cork gasket, HL 25430	Seal	1	3d

18. MAINTENANCE PARTS LIST (contd).

Ref. Symbol	Signal Corps Stock No.	Name of part and description	Function	Quan. in Equip.	Lowest Maint. Echelon
72-101	3H1916/C5	CARBURETOR: complete assembly with air cleaner, HL A-1696	Vent fuel tank	1	Orgn Stock
102	3H1916/T30	VENT-TUBE ASSEMBLY: tube with connectors, HL AA-748	Seal	1	Orgn Stock
106	3H1916/G12	FILLER CAP GASKET: vellumoid, HL 25815	Seals filter plug	1	Orgn Stock
108	3H1916/G10	GASKET: fibre, HL 19962	Filters fuel	1	Orgn Stock
109	3H1916/F20	FILTER: commercial filter, ZCF-2X (19876)	Feeds fuel to sump	1	3d
111	3H1916/L32	FUEL LINE: tubing with connectors, HL AA-224	Gasket	1	Orgn Stock
118	3H1916/G11	CYLINDER-FLANGE GASKET: asbestos gasket, HL 25802	Fastens muffler to manifold	1	3d
119	3H1916/M1	MANIFOLD ASSEMBLY: elbow and steel tubing, HL AA-723	Silencer	1	3d
120	3H1916/C16	MUFFLER CLAMP: OMCL-4-125 (25236)	Spark gap	7	Orgn Stock
121	3H1916/M30	MUFFLER: special, OMHL-43-A (60188)	Ground return	1	3d
137	3H1916/E25	ELECTRODE: tungsten rod, HL 25495	Retains electrode	1	3d
138	3H1916/P16	BRUSH PLATE: copper disc, HL 25491	Locks collet screw	1	3d
139	3H1916/S12	COLLET SCREW: special brass, nickle-plated, HL 25492	Guides outboard end of armature	1	3d
141	3H1916/N20	COLLET NUT: special, brass, nickle-plated, HL 81052	Houses controls	1	Orgn Stock
150	3H2342B/B2	GENERATOR BEARING: single row, double oil shield, 0.669 bore, 1.5748 OD, 0.4724 width, 8 balls 9/32 diam., ND 77503 (25489)	Collects load current	4	3d
155	3H2422/B50	CONTROL-BOX ASSEMBLY: HL A-5109	Suppresses radio interference (used on negative brushes)	3	3d
165	3H2422/B30	BRUSH: Morganite grade CM-9, HL 25198-1	Same as 166-1 (in control box)		
166-1	3DA100/205	CAPACITOR: fixed, 0.1 uf ±10%, 40 volts, oil impregnated and oil filled, tubular 5/8" diam. x 1 3/4" long, #22 wire lead 27/8" long with flag terminal with 3/32" hole, TD 2354 (25505)	Holds electrode	1	3d
166-2	3DA100/205	CAPACITOR: same as 166-1, TD 2354 (25505)	Locks chuck	1	3d
172	3H2422/C20	ELECTRODE CHUCK: special brass clamp, HL 25554	Grounds rotor assembly	1	Orgn Stock
173	3H2422/N10	CHUCK NUT: special brass nut, HL 25553			
177	3H2422/B31	GROUNDING-BRUSH ASSEMBLY: with pressure spring and shunt, HL AA-711			

18. MAINTENANCE PARTS LIST (contd).

Ref. Symbol	Signal Corps Stock No.	Name of part and description	Function	Quan. in Equip.	Lowest Maint. Echelon
178	3H2422/P10	PIPE PLUG: 3/8" —plastic, HL 25509	Temporary seal in spark gap housing	2	3d
181	3Z7010-10	RHEOSTAT: wire wound, 10-ohm, 100 watt, tapered, 3-1/8" diam. x 1-3/4" deep, Ohmite Mfg. Co. model K, HL 25475	Adjust a-c voltage output	1	3d
183	3Z4805-9	RESISTOR ASSEMBLY: 5-ohm adjustable with mounting parts, 3-1/2" long, HL AA-815	Compensates for modulator load	1	3d
191	3H1916/R60	STARTING ROPE: 35' length of rope with handle, HL AA-290	Starts unit	1	Orgn Stock
	6L3106-32	NUT, hex, #6-32 NC, brass		6	4th
	6L3504-20S	NUT, hex, 1/4-20 NC, steel		1	3d
	6L2756-32S	NUT, speed, Tinnerman, #6-32 NC, steel		2	4th
	6L4904-8-20.3	SCREW, cap, fillister head, 1/4-20 NC, 1/2" steel		8	3d
	6L7920-4-10.3S	SCREW, cap, fillister head, 1/4-20 NC, 5/8" steel		10	3d
	6L7920-4-20.1S	SCREW, cap, fillister head, 1/4-20 NC, 1 1/4" steel		2	3d
	6L7920-4-32.12S	SCREW, cap, fillister head, 1/4-20 NC, 2" steel		2	3d
	6L4904-10.20	SCREW, cap, hex head, 1/4-20 NC, 5/8" steel		5	3d
	6L4904-30	SCREW, cap, hex head, 1/4-20 NC, 1 7/8" steel		1	3d
	6L4905-12.24	SCREW, cap, hex head, 5/16-24 NF, 3/4" steel		1	3d
	6L6832-6.3S	SCREW, machine, flat head, #8-32 NC, 3/8" steel		2	3d
	6L7920-4-16SP	SCREW, machine, flat head, 1/4-20 NC, 1" steel		6	3d
	6L6632-4.3	SCREW, machine, fillister head, #6-32 NC, 1/4" brass		8	3d
	6L6632-7.3	SCREW, machine, fillister head, #6-32 NC, 7/16" brass		4	3d
	6L6632-8.3	SCREW, machine, fillister head, #8-32 NC, 1/2" brass		3	3d
	6L7032-44.3S	SCREW, machine, fillister head, #10-32 NF, 2 3/4" steel		1	3d
	6L6632-5/1S	SCREW, machine, round head, #6-32 NC, 5/16" steel		3	3d
	6L6832-7.1S	SCREW, machine, round head, #8-32 NC, 7/16" steel		4	Orgn Stock
	6L7032-14.1S	SCREW, machine, round head, #10-32 NF, 7/8" steel		8	3d
	6L50220	WASHER, flat, #10, steel		10	3d
	6L50103-2	WASHER, flat, brass, 3/8 ID x 3/4 OD x 1/16 thick		2	3d
	6L72215	WASHER, lock, external teeth, 1/4" steel		2	3d
	6L70006-1	WASHER, lock, standard, #6 steel		20	3d
	6L70008P	WASHER, lock, standard, #8 steel		7	Orgn Stock
	6L70010-2	WASHER, lock, standard, #10 steel		15	3d
	6L71004	WASHER, lock, standard, 1/4" steel		35	3d
	6L71005P	WASHER, lock, standard, 5/16" steel		6	3d

WAR DEPARTMENT LUBRICATION ORDER No. 3055

WAR DEPARTMENT, WASHINGTON 25, D. C., 4 MAY 1944

POWER UNIT PU-6/TPS-1

Lubricant • Operating Hours

Air Cleaner OE 8

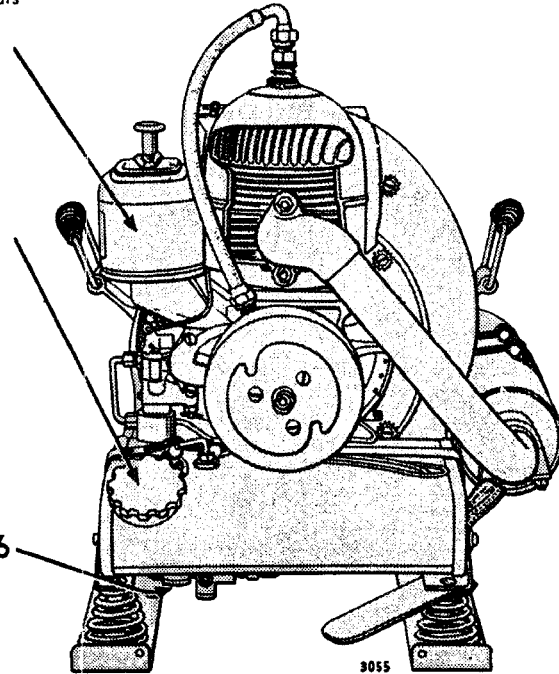
Check level and refill to level mark. Every 24 hours, remove, drain, clean and refill. Every 256 hours, remove and wash all parts. NOTE: On some models, to re-install priming pump plunger in tube, slightly raise entire air cleaner.

Fuel Tank

Fuel mixture—1 part oil to 16 parts gasoline. For normal operating conditions use OE—OIL, engine SAE 10; for extremely hot weather, or where proper circulation of air is lacking use OE—OIL, engine SAE 30. Oil measure is attached to fuel tank cap. Use 4 full measures of oil for each 1 gallon of gasoline. Mix oil and gasoline thoroughly before pouring into fuel tank. Replace cap securely to prevent air entering fuel tank. Every 256 hours, flush fuel tank and fuel line. CAUTION: Do not use gasoline only. Capacity approx. 1 gal.

Fuel Filter 256

Remove plug, unscrew filter attached to plug, clean filter and re-install. NOTE: Some models are equipped with 2 plugs, each having a filter attached.



KEY

LUBRICANTS	LOWEST EXPECTED AIR TEMPERATURE		
	above +32°F.	+32°F. to 0°F.	below 0°F.
OE—OIL, engine			
Air Cleaner	OE SAE 30	OE SAE 10	PS
PS—OIL, lubricating, preservative, special			

HOURS—Reduce hours under severe operating conditions.

CLEAN parts with SOLVENT, dry-cleaning, or OIL, fuel, Diesel. Allow parts to dry thoroughly before lubricating.

DO NOT LUBRICATE—Generator Bearings.

LUBRICATED BY MAINTENANCE PERSONNEL—Magneto.

Requisition LUBRICATION ORDER from Lexington Signal Depot, Lexington, Kentucky, or Halabird Signal Depot, Baltimore, Maryland, by Signal Corps Stock No. 6D10113-55

No. 3055

REFERENCE—Technical Manual TM 11-933.

Copy of this Lubrication Order will remain with the equipment at all times. Instructions contained therein are mandatory and supersede all conflicting lubrication instructions dated prior to 4 May 1944.

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

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