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T. O. NO. 19-45-11

*HANDBOOK OF INSTRUCTIONS  
WITH PARTS CATALOG*

**HRU-28**  
**AUXILIARY POWER PLANT**

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LIST OF REVISED PAGES ISSUED

| Page         | Latest Revised Date |
|--------------|---------------------|
| A . . . . .  | July 30, 1943       |
| B . . . . .  | July 30, 1943       |
| C . . . . .  | July 30, 1943       |
| 14 . . . . . | July 30, 1943       |

NOTE: A heavy black vertical line, to the left of the text on revised pages, indicates the extent of the revision. This is omitted where more than 50 percent of the page is revised.

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Published by the authority of the  
Commanding General, Army Air  
Forces, and accepted by the Chief  
of the Bureau of Aeronautics  
and the Air Council of the United  
Kingdom. As the text was pre-  
pared prior to the adoption of  
AN Handbook specifications, a  
Technical Order number is used  
in lieu of an AN number.

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SECTION IINTRODUCTION

1. This Technical Order is the Handbook of Instructions with Parts Catalog for the Auxiliary Power Plant, Model HRU-28, manufactured by the Homelite Corporation, Port Chester, New York, on Contracts W535 ac-20665, DAW535 ac-252, W535 ac-33484, and W535 ac-34459. It contains instructions for the Installation, Operation, Servicing, Inspection, and Repair of the Power Plant.

2. The Technical Order number of this Handbook has been changed from 03-65B-1 to T. O. No. 19-45-11 to conform to the new stock classification to which these power plants have been assigned.

3. The model HRU-28 is designed as an auxiliary power supply for installation in bombers to operate in parallel with the 24-volt batteries when the airplane is

grounded. It can be used with the batteries alone, or in parallel with the main engine generators.

4. The following text applies to an integral, self-contained gasoline engine-driven d-c generator, with controls, having an output of 2000 watts rating 28.5 volts. (See figure 1.)

5. Reference has been made in this Handbook to the following Technical Order which contains applicable data and instructions:

T. O. No.

03-5AD-2 Handbook of Instructions with Parts Catalog - Generator Voltage. Regulator and Generator Current Control Switch Relay.

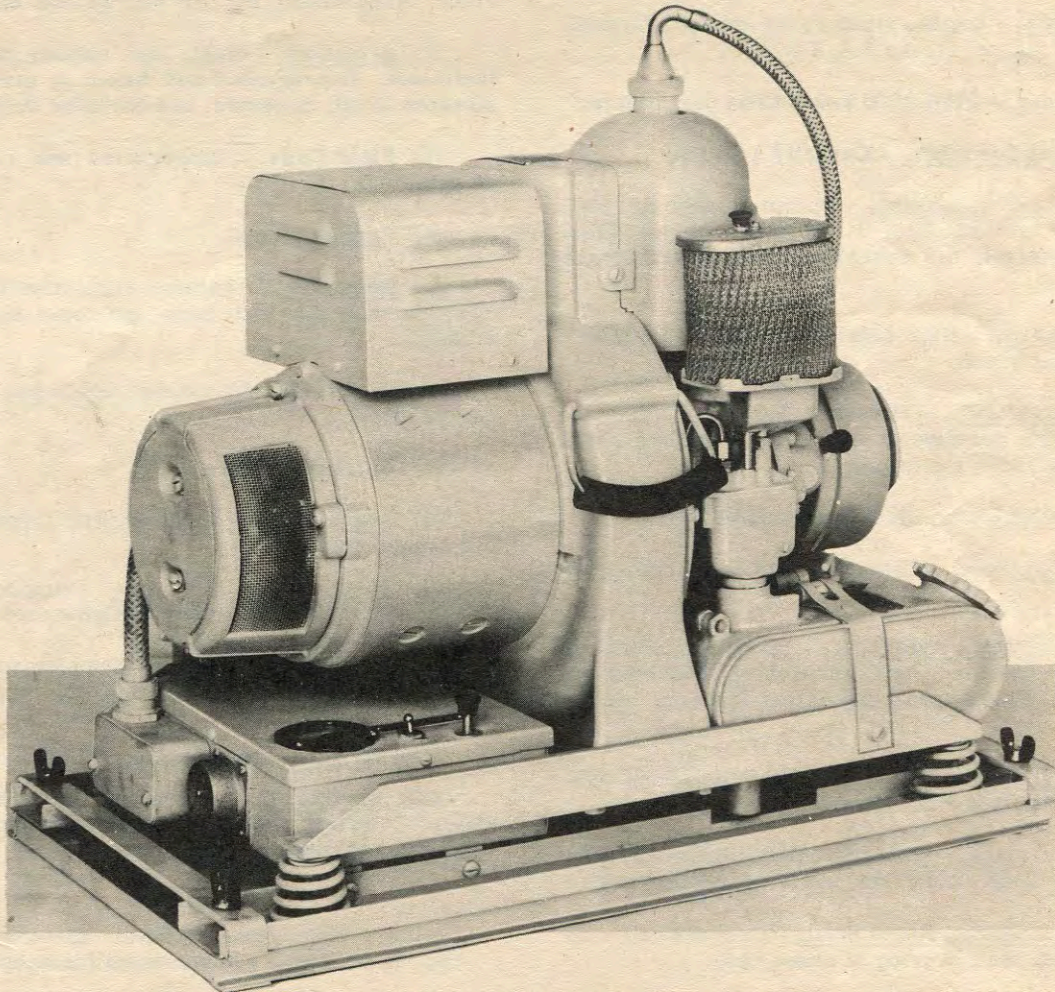


Figure 1 - Model HRU-28 Power Plant Assembly

SECTION IIGENERAL DESCRIPTION AND SPECIFICATIONS1. Description.

The complete model HRU-28 power plant consists of a single-cylinder air-cooled 2-cycle gasoline engine governed for speeds between 3200 and 3700 rpm, directly connected to a d-c generator of 2000 watts rating 28.5 volts to form an integral unit. Mounted on the generator yoke is an automatic voltage regulator (not a part of model HRU-28), and beneath the yoke a control box containing switches, voltmeter, and radio filters. This entire assembly is mounted on four shock-absorbing foot springs attached to a channel iron base having thumb screws for attachment to the supplementary base fastened permanently in the airplane.

2. Specifications.a. Engine.

(1) Type. - Single cylinder, air-cooled, 2-cycle, bore 2-3/8 inches, stroke 2-1/8 inches.

(2) Speed. - 3200-3700 revolutions per minute.

(3) Fuel Container. - Capacity 1 gallon.

(4) Fuel Consumption. - Operates under full rated load for approximately 1-1/2 hours on one gallon gasoline. Suitable for operation on 91 to 100 octane fuel.

(5) Ignition. - High tension Wico magneto. Moisture and dust proof.

(6) Lubrication. - Pressure vapor oil system - oil mixed with gasoline is forced to all moving parts by compression in the crankcase.

(7) Carburetor. - Homelite fixed jet type.

(8) Spark Plug. - Champion J-10 commercial, or HO-14S.

(9) Governor - Automatic. - Built-in mechanical type. Fully enclosed. Self-lubricating, requiring no adjustment. Close speed regulation from no load to full load.

(10) Cylinder and Piston. - Aluminum-alloy. Cylinder has cast iron liner shrunk to fit.

(11) Bearings. - Oversize ball bearings on crankshaft, timer shaft, and crank end of connecting rod.

(12) Connecting Rod - Steel. - Drop-forged and heat-treated. Ball bearing at crank end.

(13) Crankshaft - Steel. - Drop-forged and heat-treated. Counterweighted to eliminate vibration.

(14) Valve - One. - Independent rotary disc type. Self-grinding requiring no adjustment.

(15) Crankcase and Fan Housing. - Aluminum-alloy.

(16) Starting. - By motorizing generator with battery. Also manual by rope on starting plate.

(17) Mounting. - Four shock-absorbing foot springs on channel iron base.

b. Generator.

(1) Rating. - 2000 watts, direct current, 28.5 volts. Shunt wound, for use with 24-volt batteries.

(2) Armature. - Shaft, high carbon steel. Core laminated. Impregnated and baked to give high resistance to oil, moisture, and abrasive dust.

(3) Field Coils. - Impregnated and baked same as armature.

(4) Frame. - Steel.

(5) Regulation. - Voltage regulation by General Electric regulator (only base and cover supplied with model).

(6) Mounting. - Armature shaft keyed directly to engine shaft.

(7) Bearing. - Ball.

(8) Brush Holders. - Mounted on adjustable ring, easily accessible.

(9) Commutator. - "V" ring construction, hard drawn copper - constructed for high-speed operation.

(10) Overall Dimensions. - Complete unit - height 21-3/4 inches, width 16-7/8 inches, length 24-3/8 inches.

(11) Weight. - Complete unit 115 pounds.

(12) Control Box. - Contains reverse current cut-out, starting switch, voltmeter, power outlet receptacle, equalizer switch, radio filters.

## NOTE

Voltage Regulator, General Electric model No. 3GBD2B4 is a government furnished item.



SECTION III  
PACKING AND INSTALLATION

1. Packing.

Power plants are packed in wood cases measuring 27-1/2 inches x 21-1/4 inches x 26 inches for shipment either within the United States or for overseas. The unit is rigidly fastened to the base by cleats and is also braced on the top and two sides. Gross weight of the plant packed in case averages 175 pounds.

2. Installation.

a. Take out nails holding base to packing case and remove case from base. Be sure to take out the cleat placed between the base (figure 2) and supplementary base as the unit must be free to "float" on the four shock-absorbing foot springs.

b. Install the supplementary base in the following manner. (See figure 2.)

(1) Base is to be installed, open side of channel up, so that power plant will be level when airplane is in taxiing position.

(2) Drill four mounting holes in channels of supplementary base, locating these holes as necessary to meet airplane structural members.

NOTE

A locating fixture shall be used to hold supplementary base in position while fastening in place. This fixture should be designed for attachment to the supplementary base by means of the four tapped holes (11-1/4 inches to center width, and 23 inches to center length) as supplementary base is not sufficiently rigid to maintain these dimensions before being fastened in place.

(3) Fasten supplementary base in position.

c. Place unit in position on supplementary base and fasten with four thumb screws.

d. Connect a flexible exhaust line (not a part of power plant) to tail pipe of auxiliary muffler to lead exhaust gases outside. Use 1-inch ID flexible gas-tight tubing and fasten to tail pipe with a clamp suitable for 1-1/8 inch OD tubing. Do not braze tubing to tail pipe.

e. To vent the fuel container outside the plane, connect a length of 3/16-inch OD tubing with a connector to the fuel container carburetor fitting on top of the container. This fitting has 1/8-inch female pipe thread. For location of this part, see figure 4.

f. Remove voltage regulator housing cover (figure 3) and attach voltage regulator (not a part of power

plant) by inserting prongs in clips at front, or engine end, and snap rear clips in place. For adjustment see T. O. No. 03-5AD-2. Replace cover.

g. Connect receptacles on power plant (figure 3) to plane wiring in accordance with Wiring Diagram (figure 3) of Air Corps Specification No. 32313.

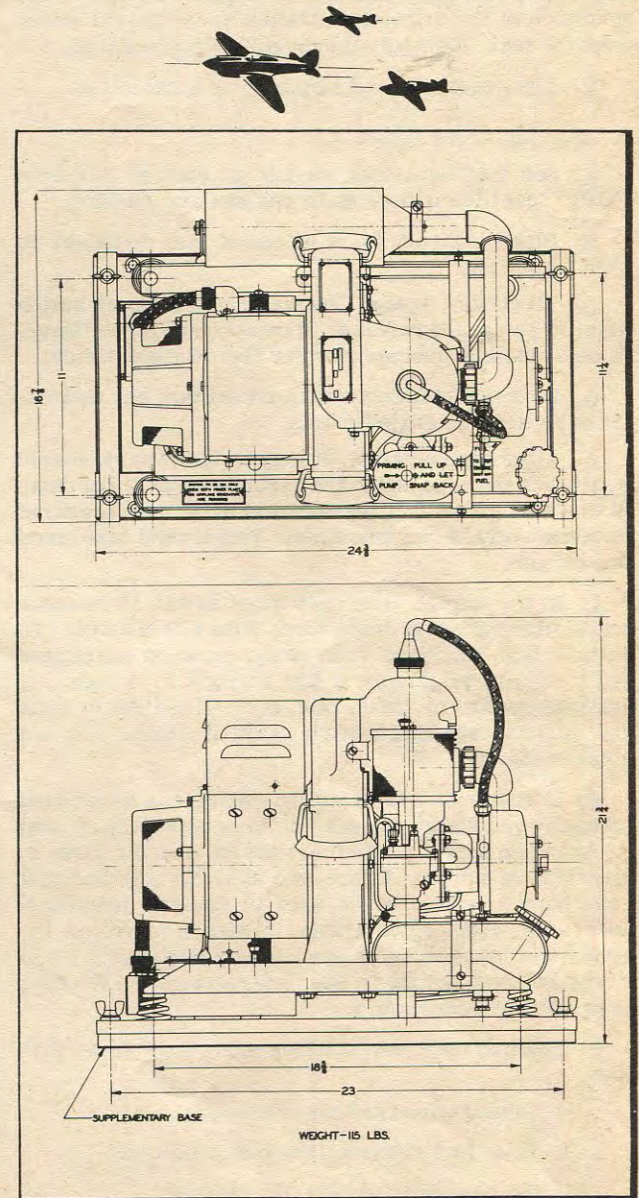


Figure 2 - Dimensional Sketch Power Plant Assembly

SECTION IV  
OPERATION

1. Fuel and Oil.

a. With each gallon of 91 or 100 octane gasoline thoroughly mix 1/2 pint lubricating oil, Specification No. AN-VV-O-446, grade 1065A. These instructions should be stenciled in a conspicuous place near the fuel tank filler cap. To measure oil, fill the container cap four times (cap capacity 1/8 pint). Complete lubrication of the engine is obtained from the oil mixed with the fuel. Use only thoroughly premixed fuel.

b. The generator end requires no lubrication.

2. Starting. (See figure 3.)

a. See that equalizer switch on control box is in "OFF" position unless main engines are running.

b. Place shut-off valve on top of fuel container to "ON" position.

c. To choke: Pull all the way up on plunger button priming pump, and release. Repeat two or three times. In cold weather operate plunger five to eight times.

d. Depress starting switch on control box and release as soon as engine starts.

e. After engine starts, it may be necessary in cold weather to keep operating the carburetor priming pump at short intervals when the engine falters, until it warms up sufficiently to run smoothly. This should take about one minute.

f. If the engine does not start within 10 seconds after following above procedure, it may be flooded. To relieve this condition open drain cock on crankcase and turn over engine for a few seconds by depressing starting switch to expel raw gas. Close drain cock and depress starting switch again if engine has not already started.

g. If batteries are dead, the engine can be started manually by following preceding instructions a., b., and c., and then winding starting rope on starter plate in direction of arrow. Brace one hand on unit and pull rope hard to give a quick spin to engine. Repeat, if necessary, until engine starts. If required, follow instructions on choking in preceding paragraph e., and if engine does not start, see instructions on flooding in preceding paragraph f.

h. Summarized, the starting procedure is as follows:

- (1) Prepare fuel and oil mixture.
- (2) Pour fuel mixture into fuel container.
- (3) Set equalizer switch, if required.
- (4) Place shut-off valve in "ON" position.
- (5) Choke.

(6) Depress starting switch or start with rope manually.

3. To Obtain Current.

After the power plant is started it should require no further attention other than refueling and setting equalizer switch to "ON" position if it is desired to charge batteries in parallel with main engine generators while main engines are running. If main engines are not running keep switch in "OFF" position. Correct voltage is maintained automatically by the voltage regulator mounted above generator yoke. (For any adjustment on regulator see T. O. No. 03-5AD-2.) In normal operation the voltmeter will register approximately 28.5 volts but if batteries are under a heavy load, a lower voltage will be registered.

4. Stopping. (See figure 3.)

a. To stop, turn shut-off valve on top of fuel container to "OFF" position. The unit will run for approximately 1/2 minute until fuel is consumed in carburetor and sump on bottom of fuel container.

b. For emergency stopping or if unit is to be restarted soon, press red stop button on magneto stator plate and hold firmly until engine stops.

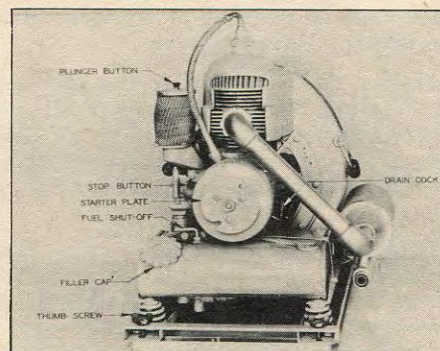
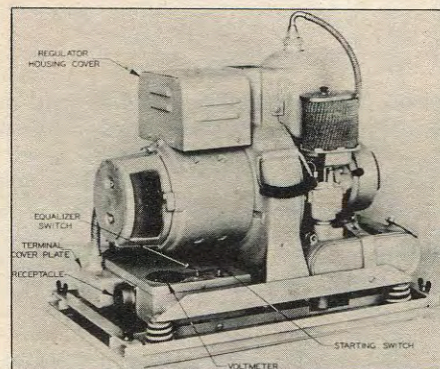


Figure 3 - Starting, Stopping and Operation

SECTION V  
SERVICE TROUBLES AND REMEDIES

1. Generator.

| <u>Trouble</u>   | <u>Possible Cause</u>                                | <u>Remedy</u>                                      |
|--|--|--|
| a. Arcing at brushes   | (1) Dirty commutator                                 | (1) Clean. (See section VI, 2.h.)                  |
|  | (2) Worn-out brushes                                 | (2) Replace. (See section VI, 2.h.)                |
|  | (3) Brushes stuck in holders                         | (3) Loosen   |
|  | (4) Brushes not properly seated                      | (4) See section VI, 2.h.                           |
|  | (5) Short circuit in system                          | (5) Check connections                              |
|  | (6) Brushes reversed in holders                      | (6) Reverse  |
|  | (7) Shorted field coil                               | (7) See section VIII, 2.a.                         |
|  | (8) Open or shorted coil in armature                 | (8) See section VIII, 2.a.                         |
| b. Fails to generate current                                 | (1) Brushes stuck in holders                         | (1) Loosen   |
|  | (2) Worn-out brushes                                 | (2) Replace. (See section VI, 2.h.)                |
|  | (3) Dirty commutator                                 | (3) Clean. (See section VI, 2.h.)                  |
|  | (4) Broken connections                               | (4) Rewire   |
|  | (5) Defective armature                               | (5) Replace. (See section VIII, 1. a., 2.a., 3.b.) |
|  | (6) Defective coils                                  | (6) Replace. (See section VIII, 1. a., 2.a.)       |
|  | (7) Defective main filter in control box             | (7) Replace. (See section VI, 2.h.)                |
|  | (8) Defective cut-out in control box                 | (8) Replace. (See section VI, 2.h.)                |
|  | (9) Defective resistor on voltage regulator assembly | (9) Replace. (See section VI, 2.h.)                |
|  | (10) Brushes reversed in holders                     | (10) Reverse                                       |
| c. Fails to deliver rated output<br>2000 watts at 28.5 volts | (1) Engine not up to speed                           | (1) See paragraph 2.                               |
|  | (2) Dirty commutator                                 | (2) Clean. (See section VI, 2.h.)                  |
|  | (3) Worn-out brushes                                 | (3) Replace. (See section VI, 2.h.)                |
|  | (4) Brushes not properly seated                      | (4) See section VI, 2.h.                           |
|  | (5) Short circuit in system                          | (5) Check connections                              |

| <u>Trouble</u>                   | <u>Possible Cause</u>                                 | <u>Remedy</u>                       |
|----------------------------------|---|-------------------------------------|
| d. Batteries fail to take charge | (1) Dead cell in battery                              | (1) Replace                         |
|                                  | (2) Defective wiring                                  | (2) Rewire                          |
|                                  | (3) Defective main filter in control box              | (3) Replace. (See section VI, 2.h.) |
|                                  | (4) Defective cut-out in control box                  | (4) Replace. (See section VI, 2.h.) |
| e. Noisy radio reception         | (1) Defective filters in control box                  | (1) Replace. (See section VI, 2.h.) |
|                                  | (2) Loose connections                                 | (2) Tighten                         |
|                                  | (3) Loose or dirty yoke shielding conduit connections | (3) Tighten or clean                |
|                                  | (4) Loose or dirty spark plug shielding assembly      | (4) Tighten or clean                |
|                                  | (5) Excessively dirty commutator                      | (5) Clean. (See section VI, 2.h.)   |

2. Engine.

Fails to start; hard to start; runs and stops; not up to speed (3200-3700 rpm); overheats; loss of power.

NOTE: In locating engine trouble it is always advisable to install a new spark plug first, to see if this corrects difficulty. If it does not, leave new plug in while checking further.

| <u>Trouble</u>          | <u>Possible Cause</u>                                  | <u>Remedy</u>  |
|-------------------------|--|--|
| a. Defective spark plug | (1) Carbon or lead deposit across points               | (1) Remove and clean                                     |
|                         | (2) Points badly worn                                  | (2) Replace  |
|                         | (3) Wrong type   | (3) Use Champion J-10 commercial or HO-14S or equivalent |
|                         | (4) Cracked or dirty porcelain                         | (4) Replace  |
|                         | (5) Points too wide or too close                       | (5) Adjust to .024 inch                                  |
| b. Fuel supply          | (1) No fuel in container                               | (1) Fill   |
|                         | (2) Shut-off valve in fuel container closed or clogged | (2) Open or clean. (See section VI, 2.c.(5).)            |
|                         | (3) Filter in container clogged                        | (3) Clean. (See section VI, 2.c.(5).)                    |
|                         | (4) Engine flooded                                     | (4) Drain crankcase by opening drain cock                |

| <u>Trouble</u>       | <u>Possible Cause</u>  | <u>Remedy</u>  |
|----------------------|--|--|
|                      | (5) Fuel or pressure line clogged                              | (5) Clean out  |
|                      | (6) Water or dirt in fuel                                      | (6) Drain and clean  |
|                      | (7) Drain cock on crank-case open                              | (7) Close  |
| <u>c. Carburetor</u> | (1) Nozzle clogged   | (1) Remove and clean. (See section VI, 2.c.)                 |
|                      | (2) Pressure tubes clogged or broken                           | (2) Clean or replace. (See section VIII, 1.b.)               |
|                      | (3) Gasoline line clogged                                      | (3) Clean. (See section VIII, 1.b.)                          |
|                      | (4) Priming pump inoperative                                   | (4) See section VI, 2.c.                                     |
| <u>d. Ignition</u>   | (1) Contact points out of adjustment                           | (1) Adjust to .020 inch. (See section VI, 2.b.)              |
|                      | (2) Contact points pitted                                      | (2) Hone or replace. (See section VI, 2.b.)                  |
|                      | (3) Broken high tension cable                                  | (3) Replace. (See section VI, 2.b.)                          |
|                      | (4) Loose connections  | (4) Tighten  |
|                      | (5) Coil defective   | (5) Replace. (See section VI, 2.b.)                          |
|                      | (6) Magnet weak - rare   | (6) Replace  |
|                      | (7) Capacitor defective  | (7) Replace. (See section VI, 2.b.)                          |
| <u>e. Carbon</u>     | (1) Cylinder ports clogged                                     | (1) Remove cylinder and scrape. (See section VI, 2.d.)       |
|                      | (2) Piston and cylinder heads carbonized                       | (2) Remove cylinder and scrape. (See section VI, 2.d.)       |
|                      | (3) Mufflers clogged   | (3) Replace. (See section VI, 2.d.)                          |
| <u>f. Controls</u>   | (1) Loose connections in control box                           | (1) Tighten  |
|                      | (2) Defective starting switch in control box                   | (2) Replace. (See section VIII, 2.a.)                        |
|                      | (3) Loose or corroded connections at battery (or dead battery) | (3) Tighten or start engine manually. (See section IV, 2.g.) |
|                      | (4) Main filter shorted  | (4) Replace. (See section VI, 2.h.)                          |

SECTION VI

INSPECTION AND MAINTENANCE

1. Inspection.

NOTE

In accordance with T. O. No. 00-20A-2, a summary of the periodic inspection prescribed herein will be entered on the Master Airplane Maintenance Instruction Forms maintained in the back of AAF Form 41-B for the airplane affected.

Column 22 - Ignition and Electrical.

25-Hour.

Check spark plugs for proper gap and for cleanness. (See paragraph 2.a. following.)

100-Hour.

Check magneto breaker points for proper gap. (See paragraph 2.b.(1) following. Check for excessive carbon and lead deposits in cylinders.

The complete power plant will be inspected every 100 hours for general condition, cleanliness and proper operation. If operation is found to be faulty, and output of 2000 watts at 28.5 volts is not obtained, consult Trouble Chart, section V, and following service maintenance for possible cause and remedy.

2. Maintenance.

NOTE

The most important things to insure proper engine performance are ignition, carburetion, and compression. If trouble develops, look for it in this order, but always examine the spark plug first.

a. Spark Plug and Adapter. (See figure 5.)

(1) Inspection.

(a) Inspect spark plug every 25 hours of operation, shielded plugs every 50 hours of operation for cleanliness and adjustment, or if engine does not start or perform properly. To inspect plug remove cap from spark plug shield and take out plug with socket wrench No. S-499. (See figure 9.) To inspect shielded plugs, unscrew shielded conduit connection from spark plug and remove spark plug with socket wrench No. 22074. In removing the plug, the adapter may come out on the plug. If so, remove the plug.

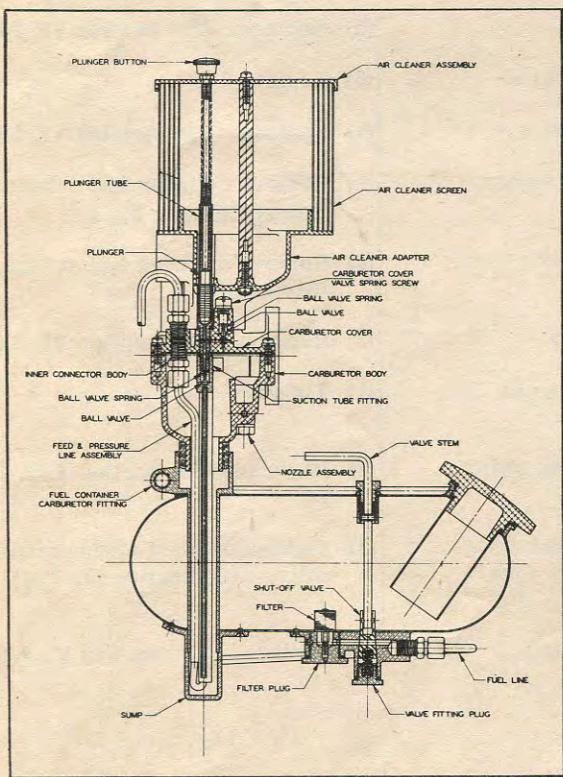


Figure 4 - Carburetor and Fuel Container Assembly

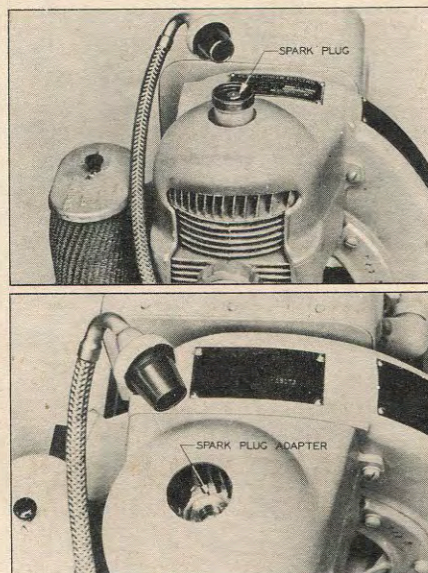


Figure 5 - Spark Plug and Adapter

(b) Clean both points and porcelain, and adjust to .025 inch. Use gage, No. 22064. (See figure 9.) If points are badly worn, replace with new plug, using a Champion J-10 commercial or HO-14S, depending upon the plug being replaced. Failure of a plug may also be caused by a piece of carbon or lead deposit across the points.

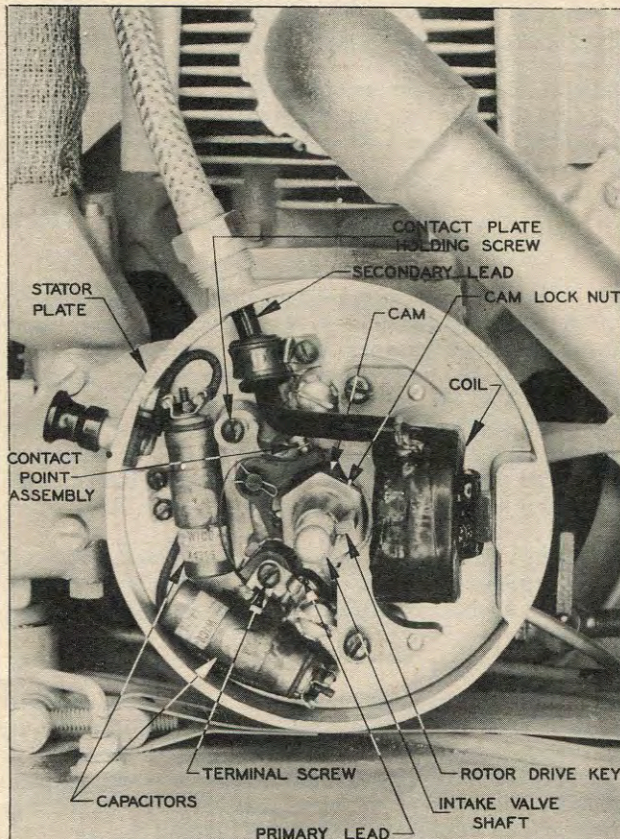


Figure 6 - Contact Point Adjustment

(c) When the plug is removed, the adapter is to be inspected. If any of the six holes are plugged with carbon, remove for cleaning. Use socket wrench No. 22005 on unshielded plugs, and socket wrench No. 22074 on shielded plugs. It is important to scrape out thoroughly all carbon, brownish lead deposits, and loose particles on both sides of the adapter. Use a new gasket when replacing adapter. Note that in replacing plug, the copper gasket goes inside to the metal shield surrounding the plug.

(2) Correcting Burning in Piston Head. - When a power plant is operated in conditions of high atmospheric temperatures, a hole may be burned in the pis-

ton head on those engines equipped with a spark plug adapter having six or nine holes in the adapter baffle. In such cases, after the piston has been replaced, the following corrective measures are to be taken to prevent a recurrence of the trouble.

(a) Replace adapter with one having 12 holes or if one is not available, drill additional 3/64-inch holes in original baffle around the undrilled part of the outer section. To prevent the drill from breaking, lubricate with carbon tetrachloride or "Carbona."

(b) Increasing the number of holes in the baffle necessitates larger drill holes in the side of the carburetor nozzle. (See figures 4 and 5.) The size of the drill hole is stamped on the hex head of the nozzle. Replace with nozzle stamped two numbers lower or drill out two drill sizes larger.

(c) After engine is reassembled, start and operate with at least 50-ampere load. Check to see if mixture is correct by operating carburetor priming pump.

1. Pull up on plunger button about one inch, two or three times. If the mixture is too lean, engine speed will increase. If this occurs, again drill out nozzle hole one size larger. Repeat once again if necessary.

2. If, after operating priming pump as explained above, the speed falls off and then returns to former speed, the mixture is correct.

3. To check for too rich a mixture, pull all the way up on the plunger, repeat if necessary until engine almost stalls. If engine continues to falter and does not return to former speed, mixture is too rich. Replace with nozzle having smaller holes and recheck as in preceding instructions.

(3) Installing 12-Hole Adapter. - When a 6- or 9-hole adapter is replaced with a 12-hole adapter follow instructions given in paragraphs 2.a., (2)(b) and (2)(c), preceding.

(4) Type. - Spark plugs are made in a wide range of types to suit the temperature requirements of different engines. It is extremely important that a spark plug of proper heat range be used with the HRU engine. The Champion J-10 commercial or HO-14S, or equal, is always to be used.

#### NOTE

If a new spark plug fails to correct trouble, look for difficulty due to weak ignition in paragraph 2.b., this section. Always leave a new spark plug in while checking further.

b. Ignition. (See figure 6.) - The ignition of the model HRU engine is a high tension flywheel type magneto mounted as a complete assembly at the end of the intake valve shaft assembly. This consists of a magnet mounted in the rotor, and a high tension coil with laminated core mounted on the stator plate, together with the contact point assembly and capacitors. To determine if the ignition is functioning, disconnect the shielded high tension lead at the spark plug and hole 1/4 inch from cylinder shield. Depress starting switch. If no spark, or only a weak one, is obtained, check following items:

(1) Contact Points. - The only magneto adjustment is at the contact points which should be inspected every 100 hours of operation to see that the gap is exactly .020 inch. To adjust, proceed as follows:

(a) Remove magneto rotor by loosening rotor nut. The points are then exposed for adjustment.

#### NOTE

Do not remove the three screws holding starter plate to rotor.

(b) Remove spark plug to relieve engine compression and permit turning the flywheel.

(c) Turn flywheel slowly in counterclockwise direction until breaker arm fiber rests on highest point of cam - approximately 1/8 inch past breaking edge of cam. Check gap (correct setting .020 inch) with thickness gage No. 22064. (See figure 9.)

#### CAUTION

It is highly important in inserting gage to separate the points by hand and then place gage between surfaces. In removing gage, follow same procedure. To prevent damaging contact point surfaces, do NOT withdraw gage without first separating points.

(d) If necessary to adjust gap, slightly loosen the screw which fastens contact plate to stator plate.

(e) Move the contact plate away from cam to increase gap, toward cam to decrease gap.

(f) After adjusting, tighten contact plate, fastening screw securely.

(g) Recheck gap with thickness gage. Readjust if necessary. Tightening of setscrew sometimes changes adjustment.

(h) Uneven or pitted contact points can be restored to a true even condition by using contact point dressing tool No. 22065 (figure 9), after which all dust

particles should be removed with a dry cloth. However, if points are in this condition, a new set is recommended. Do not use a steel file on contact point surfaces. Stiff paper or cardboard will remove the oxide formation on contact points resulting from long idleness.

(2) Cables. - Chafed or broken cables which are a cause of continuous or intermittent misfiring should be replaced. On high tension cable, strip magneto end 1/2 inch, twist strands together, and attach to coil. It is essential that bare end be kept short and folded down close to coil surface after cable is in place. It is unnecessary to solder cable to the coil. On the spark plug end, strip cable 1/4 inch, and insert in the moulded tube so that the bare end of the wire protrudes through the brass insert at the base of the spring. Fan out the strands of bare wire to hold it in place. Do not solder the wire.

#### (3) Coil and Capacitors.

(a) If no spark, or only a weak one, is obtained after adjusting the points, the trouble is most likely to be in the capacitors or coil, although failure of these parts is not a common cause of trouble. Replace either one or all, to obtain a strong spark only after checking spark plug, cables, connections, and contact points. Have coil and capacitors checked at depot or check in accordance with the following instructions (b) and (c), below.

(b) To check a capacitor disconnect lead and place ohmmeter from terminal to condenser case. Reading should be infinite. If zero, replace with new condenser.

(c) To check primary coil winding, disconnect lead at terminal screw, and place ohmmeter on end of lead and magneto stator. Reading should be approximately .2 ohm. To check secondary winding, connect ohmmeter at end of disconnected lead and secondary lead at coil connection. Reading should be approximately 3500 ohms. If both of above readings were not obtained, replace with new coil.

(d) If a new coil is to be installed, remove the coil and core from the stator plate by disconnecting leads and taking out the two holding screws. With a screw driver pry off core from dowel pins, being careful not to bend the dowels. Then bend down the lamination securing the coil. Since the coil is held to the core by wood wedges, it is necessary to press with considerable force to remove the coil.

#### CAUTION

In installing a new coil use extreme care to avoid damage to the windings. Before inserting the coil wedge, or wedges, be sure the secondary terminal of the coil is correctly located. (See figure 6.) In replacing coil core, use great



care that the dowels are not bent and that the laminations are not disturbed as it is essential that the coil core be replaced in exactly the original position. However, pry up the one lamination to hold coil securely.

(e) Coil is not furnished separately, but only as assembly with laminated core. In replacing coil and core assembly, tighten holding screws securely.

(4) Magnet. - In normal use the magnet will retain its magnetism indefinitely, and therefore, no trouble should be expected from this source. For recharging, return to depot.

(5) Lubrication. - The magneto should require no lubrication for a long period of service. For cam lubrication place a small amount of fiber grease on the cam follower breaker arm every 100 hours of operation.

c. Carburetor Assembly and Fuel Container. (See figure 4.)

(1) Type. - The carburetor is a fixed jet type and requires no adjustment.

(2) Operating Principle. - Fuel is fed to the carburetor from the fuel container sump by crankcase pressure which forces the fuel through the feed line inside the carburetor to the venturi where it is vaporized and drawn into the cylinder.

(3) Priming Pump. - Choking or priming the carburetor is accomplished by pulling up and releasing the black plunger button above air cleaner on the priming pump assembly. If the engine fails to start (providing the fuel shut-off valve is open) the priming pump may not be delivering fuel to the carburetor. To check this, take out screw holding air cleaner adapter to carburetor body, lift up air cleaner assembly to clear collar on carburetor body, and rotate approximately 180 degrees. The carburetor bowl is then exposed to view. Operate pump two or three times and observe if fuel is delivered, lift off the air cleaner assembly, and put a few drops of oil in tube. Replace and recheck. If pump still does not operate, remove pressure line from carburetor cover and take off cover. Disconnect suction tube fitting on under side of cover, using care not to lose the ball valve and spring within this fitting. Clean and reassemble by replacing ball first and then spring, tapered end down. Also remove carburetor cover valve spring screw and clean ball valve and seat. Reassemble ball and spring the same as in the suction tube fitting. If pump does not work after reassembly, see following instructions, paragraph (5).

(4) Nozzle, Feed and Pressure Lines.

(a) If engine runs irregularly, or below governed speed, check carburetion by operating plunger pump until engine loads up.

(b) If engine does not maintain higher operating speed, after momentary faltering due to priming, take out nozzle and clean by blowing through it. Do not use a wire as scratches or burrs on nozzles are damaging and will affect carburetion. If nozzle is burred, replace. When replacing nozzle, be sure to use nozzle with same number stamped on hex head. (The number indicates the drill size of the hole.)

(c) If, after cleaning nozzle, proper operating speed is not maintained follow instructions in paragraph (5), below. If proper speed is still not obtained, dismantle carburetor (section VIII, 1.b.) and clean out feed pressure line assembly.

(5) Filter and Fuel Line.

(a) With shut-off valve on, if no fuel is delivered to carburetor bowl when operating priming pump as in preceding instructions, paragraph (3) above, disconnect fuel line at carburetor sump to determine if there is a free flow of fuel to that point.

(b) If fuel does not flow freely, first syphon out tank through filler opening and then remove filter and valve in fuel container. These parts can be taken out by removing the two hex and valve stop screws in valve fitting on bottom of container. Clean filter and valve, reassemble. Note that in replacing valve, the cut-out section on large or bottom end is to face front to permit installation of setscrew. Spring goes between valve and hex plug.

(6) Air Cleaner. - Clean air cleaner on carburetor monthly. Take apart and rinse screen in any nonrusting cleaning fluid. Then dip upper end of screen in engine oil, grade 1080, and reassemble.

d. Carbon and Lead Deposits.

(1) The necessity for cleaning off carbon and lead deposits from the cylinder head depends upon the average temperature in which the unit operates. In cool or cold weather deposits do not build up rapidly, and the need for cleaning is unlikely in less than 150 hours of operation. In hot weather it may be necessary to clean the deposits every 100 hours of operation. The necessity for cleaning off the lead deposit in the cylinder head will be indicated by a sharp knock or pre-ignition ping in the engine, especially under heavy loads, or if the engine runs unevenly, or if there is a loss of power. This condition sometimes occurs be-

fore clogging of the exhaust ports which materially reduces the engine power.

(2) Before removing cylinder and inspecting exhaust ports for carbon and lead deposits, first check the spark plug and baffle, ignition, carburetor, and air cleaner.

(3) To inspect exhaust ports, remove the exhaust manifold, by first taking off nut holding bracket on rear of large muffler. It is unnecessary to remove the bracket. Then disconnect the exhaust manifold nut on cylinder with spanner No. 19439. (See figure 9.)

(4) Carbon formation on the bottom edge of the ports does not materially affect the power of the engine until such deposits project up over 1/4 inch. (See figure 7.) If ports are carbonized over 3/32 inch below the top edge, remove the cylinder for cleaning, as follows: Remove carburetor air cleaner assembly by taking out air cleaner adapter holding screw. Disconnect shielding assembly at spark plug, remove plug with wrench No. S-499 (figure 9), also remove cylinder shield. Take out four cylinder screws with wrench No. S-500. (See figure 9.) Cylinder can now be taken off.

(5) It is important that all deposits be scraped off the cylinder, piston head and exhaust ports. In cleaning exhaust ports use care not to break or burr edges as these are finely beveled.

(6) The muffler assembly does not readily become plugged up and will not ordinarily require replacement when the cylinder ports are cleaned. Checking mufflers for carbonization can best be done by installing a new assembly. For dismantling instructions see section VIII, 1.b. If power is increased with new assembly, replace both mufflers.

#### e. Piston Rings.

(1) Rings should make contact with cylinder wall around entire circumference. If the end clearance, when in the cylinder, exceeds .020 inch or if rings are stuck in grooves, replace rings. New rings should have end clearance of .008-.013 inch.

(2) Before replacing rings clean carbon from grooves carefully. The side clearance in grooves for replacement rings should be between .002 inch and .0035 inch - determine with thickness gage; .002-inch feeler should enter freely and .003 inch fit snugly.

(3) The ring tension should not be below 3 pounds on worn rings nor above 5 pounds on new replacement rings. The tension may be determined by the pressure required to close the end gap when one side of the ring is placed on the platform of a spring scale with the gap 90 degrees from the point of contact on

scale. Apply pressure at 180 degrees from contact point on scale.

(4) In reassembling piston assembly in cylinder make sure that the intake ports of piston are on the same side as the intake ports in cylinder. To break in new piston rings, see instructions in following paragraph f.

#### f. Piston and Pin.

(1) These parts are furnished only as an assembly, since pins are selectively fitted to pistons to give very light press fit.

(2) Piston wear is negligible. Replace only if scored, if ring grooves are damaged, or if piston pin is loose in bosses.

(3) After replacing piston, rings or cylinder, the engine is to be run for a period of at least one hour at idling speed (generator disconnected from batteries) before applying load to generator. The automatic governor will prevent engine from racing. At end of first hour apply load by resistance method - 25 percent of rated capacity and increase an additional 25 percent at end of each 15-minute running period.

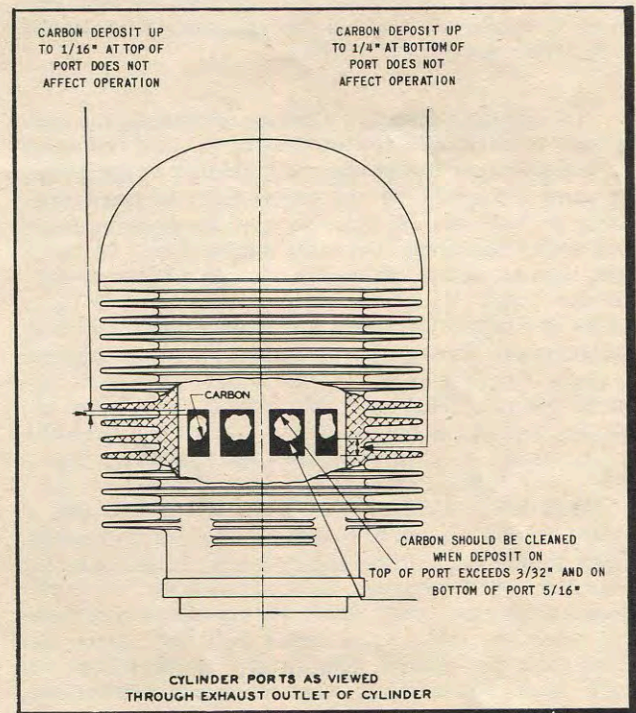


Figure 7 - Exhaust Ports

g. Governor.

(1) No adjustments are to be made on the governor. Each governor is set exactly for the requirements of the individual unit and should not require any attention during the life of the engine. Although to all appearances governors may look the same, there is, nevertheless, a difference in the weights and springs used which control the engine speed. The springs are not common springs which may be purchased readily, but are special heat-treated springs individually tested. Do not tamper with the governor spring. Use extreme care that the governor assembly is not damaged in any manner.

(2) Governors must be ordered as complete assemblies. It is necessary to give the serial number of the generator for which the governor is required.

h. Voltage - Electrical Output. (See figures 16, 17, and 18.) - Normal operating voltage as registered on the voltmeter (figure 3) is 28.5 except that if batteries are under heavy load a lower voltage will be registered.

(1) Connections. - If correct voltage is registered and no current is being delivered, check connections between batteries and receptacle on control box, paying particular attention that the connection at the receptacle is tight.

(2) Reverse Current Cut-out. - If, after following instructions in preceding paragraph (1), the trouble is not corrected, check the cut-out contact points. The contact points can be checked without removing the control box by first taking out the receptacle plug on control box. Then start engine and place either a voltmeter or 24-volt test lamp between ground and terminal "B" of receptacle. If lamp lights to full brilliance or voltage is registered on meter, points are operating. If these results are not obtained, and voltmeter on control box registers correct voltage, there is either an open circuit between the cut-out and "B" receptacle terminal, or cut-out is defective. Either repair broken connection or replace cut-out after removing control box as follows:

(a) Take off terminal cover plate (figure 3), remove nuts then exposed with wrench No. 22058 (figure 9), and disconnect the three leads.

(b) Disconnect ground strap at generator yoke.

(c) Take off box by removing screws holding it to angle irons.

(3) Main Filter. - If voltmeter does not register voltage (providing voltmeter is not faulty, section VIII, 2.a.) check main filter. Check by replacement or with ohmmeter by disconnecting leads and placing ohmmeter

across two terminals. Reading should be zero. If zero reading is not obtained, replace with new filter. If zero reading is obtained, place ohmmeter from one terminal to the filter container. Reading should be infinity. If not, replace with new filter.

(4) Resistor. - If, after following instructions in preceding paragraph (3), no voltage is registered, check the resistor which is mounted on the voltage regulator assembly (for location see figure 8) by starting unit and shorting out the resistor between its tap and bottom terminal. If voltmeter then registers correct voltage, install new resistor and adjust tap in accordance with the following instructions.

(a) Set the tap on the resistor as close as possible to the "A" terminal on the voltage regulator base. With the voltage regulator in place, start the engine and run at no load (disconnected from batteries). Set the voltage regulator at 28.5 volts. (See T. O. No. 03-5AD-2.) Record the no-load speed, which should be between 3500 and 3700 rpm.

(b) Apply a resistance load of 2000 watts to the generator. Note and record voltage and speed. If the speed at 2000-watt load drops more than 200/rpm below no-load speed just recorded, the engine is not operating properly. Check ignition, carburetion, and for carbon and lead deposits. See preceding instructions in this section.

(c) Run the engine at 2000-watt load for approximately one hour at an ambient temperature of about 25 C (77 F). With the engine still running under full load, slide the tap on the resistor away from the "A" terminal until the voltage just starts to decrease. Clamp the variable tap on the resistor at this point.

(d) Recheck the setting just obtained by releasing the load and then applying it gradually up to 2000 watts. Note the voltage, which should be the same as obtained by the test out-lined in the preceding paragraph. If additional load is applied to the generator, the voltage should decrease rapidly.

(5) Generator. - If no voltage is registered on the voltmeter and all parts checked correct as in preceding paragraphs (1) and (4), the trouble lies in the generator. To check, proceed as follows:

(a) Commutator. (See figure 8.) - To inspect commutator remove brush head cover plates. The commutator should require no cleaning for several hundred hours of operation. It need be cleaned only when excessively carbonized, when too much arcing occurs, or if scored. To clean commutator, first start engine and then place a strip of very fine sandpaper (00 to 8/0) (not emery) on the commutator and hold down with a stick of wood until commutator is clean.

(b) Brush Replacement. (See figure 8.) - Brushes should be inspected every 300 hours, and require replacement only if brush spring rides within 1/16 inch of brush holder. For inspection, remove brush head cover plates. If any brushes require replacing, requisition an entire set of 8. Brushes will be shipped as a set in an envelope. However, if loose brushes are received from depot stock, check the manufacturer's markings before installation to make certain that all brushes are from the same manufacturer. These markings are: (1) Morganite - "CM-9" (2) Henrite - "2885" (3) LeCarbone - "P-368." Using mixed brushes causes greatly reduced brush life and possible damage to commutator. A sufficient number of brushes are not obtainable from one manufacturer and the material in the brushes supplied is not identical. New brushes are formed to shape of commutator to eliminate arcing and to insure perfect electrical contact. In replacing brushes, no special care in wearing in is required. Note that wearing surface of brush is so formed as to fit contour of commutator, and must be

installed in only one position to seat properly. The two screws in the end of the brush head should be so located as to give the best commutation.

(c) Brush Springs. (See figure 8.) - Tension of brush spring should be approximately 17 ounces.

(6) Voltage Regulator. - Should the voltmeter register voltage above 30 volts (providing the meter is not faulty, section VIII, 2.a.(8)(d)) the trouble lies in the voltage regulator mounted on the generator yoke, its connections, or setting. Remove voltage regulator housing cover (figure 3) by taking out screws. Check connections. For instructions on voltage regulator (not a part of Homelite model HRU-28) see T. O. No. 03-5AD-2.

i. Lubrication. - Power plant model HRU-28 requires no lubrication other than oil mixed with the gasoline (section IV, paragraph 1.) and occasional lubricating of magneto cam follower, (section VI, paragraph 2.b.).

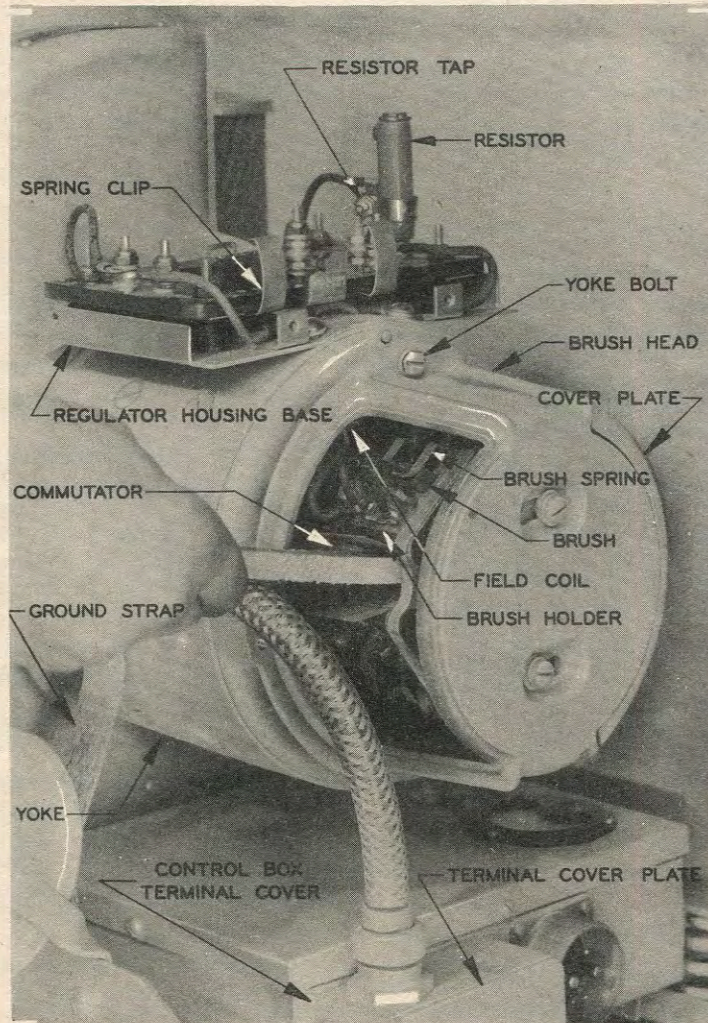


Figure 8 - Commutator Cleaning

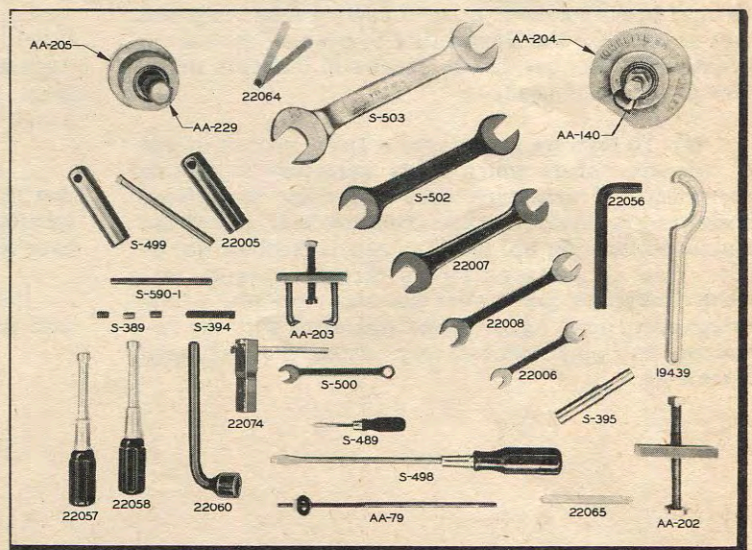
SECTION VII  
SERVICE TOOLS

1. The following tools comprise a full kit for complete dismantling, and assembly operations (figure 9):

- a. AA-79 Tool, Armature Assembly
- b. AA-140 Jackscrew, Shaft Puller
- c. AA-202 Remover, Flywheel
- d. AA-203 Puller, Crankpin Bearing
- e. AA-204 Puller, Shaft
- f. AA-205 Fixture, Assembling (for crankshaft and flywheel)
- g. AA-229 Jackscrew, Assembling Fixture
- h. S-389 Pin, Short Armature (3 required)
- i. S-394 Jackscrew, Armature
- j. S-395 Remover, Timer Bracket Bearing
- k. S-489 Screw Driver, Small
- l. S-498 Screw Driver, Large (2 required)
- m. S-499 Wrench and Handle, Spark Plug (14 mm)
- n. S-500 Wrench, Box and Open End 7/16-inch
- o. S-502 Wrench, Open End, 3/4-inch x 1-inch

- p. S-503 Wrench, Offset, 1-1/16 inch x 1-1/4 inch
- q. S-590-1 Pin, Long Armature
- r. 19439 Spanner (for exhaust manifold nut)
- s. 22005 Wrench and Handle, Socket 7/8-inch (for cam lock nut and plug adapter)
- t. 22006 Wrench, Open End 3/8-inch x 1/2-inch
- u. 22007 Wrench, Open End 5/8-inch x 7/8-inch
- v. 22008 Wrench, Open End 9/16-inch x 11/16-inch
- w. 22056 Wrench, Socket Head Cap Screw 5/8-inch (for crankpin screw)
- x. 22057 Wrench, Spintite 3/8-inch
- y. 22058 Wrench, Spintite 7/16-inch
- z. 22060 Wrench, Socket 9/16-inch
- aa. 22064 Gage, Feeler
- ab. 22065 Tool, Contact Point Dressing
- ac. 22074 Wrench and Handle, Spark Plug (18 mm)

Figure 9 - Service Tools



SECTION VIIIDISMANTLING, REPAIR, AND ASSEMBLY

## NOTE

To remove power plant from plane, reverse installation instructions. (See section III, 2.c., e., and g.) All tools referred to in this section are listed in section VII, and illustrated in figure 9.

1. Dismantling.a. Generator End. (See figure 8.)(1) To Remove Yoke and Coil Assembly.

(a) Disconnect ground strap where connected to yoke.

(b) Remove two screws holding terminal plate and terminal plate cover to control box. (See figure 8.) Remove nuts then exposed with wrench No. 22058 and disconnect three leads.

(c) Take off brush head cover plates and lift brushes out of sockets.

(d) Unscrew four yoke bolts on brush head, insert screw drivers in the two notches on sides of fan housing, and gently pry the yoke away. Do not remove the two screws in the slots in the face of the brush head.

(2) To Remove Voltage Regulator. (See figure 8.) The regulator can be removed by taking out four screws holding housing cover to base, lifting off cover, and then releasing two spring clips holding regulator to base.

(3) To Remove Brush Head from Yoke. - Disconnect, at brushholder four leads coming from yoke and coil assembly. For removal of brush assembly from brush head, take out the two screws in the slots in the face of the brush head.

(4) To Remove Armature. - Take out bolt at end of armature shaft which holds armature to engine crankshaft. If armature does not come free from shaft readily, in place of the armature bolt, insert the long armature pin No. S-590-1 and jackscrew No. S-394. Turn up screw as far as threads permit. Remove jackscrew and insert one short pin No. S-389; repeat operation. Again repeat operation with the remaining two pins successively. Armature will then come free.

b. Engine End.

## NOTE

Before dismantling engine look for minor troubles as indicated in Trouble Chart, section V, paragraph 2.

(1) To Remove Cylinder Piston and Connecting Rod Assembly.

(a) Disconnect shielding assembly at spark plug and take out spark plug with socket wrench No. S-499.

(b) Remove cylinder shield.

(c) Remove muffler assembly by first taking off nut holding bracket on rear of large muffler. It is unnecessary to remove the bracket. Use spanner No. 19439 to take off exhaust manifold nut on cylinder.

(d) Disconnect, at both ends, pressure line running from timer bracket to carburetor.

(e) Remove timer bracket screws including those attaching carburetor. Use wrench No. S-500 for screws with hex head. The magneto and timer bracket can then be removed as an assembly. (See figure 10.)

## NOTE

If the magneto and magneto assembly is to be dismantled, follow instructions in paragraph (2) before removing assembly from unit.

(f) Remove carburetor by prying loose with spanner No. 19439. (See figure 11.) Cover up carburetor fitting on top of fuel container to prevent foreign matter from falling in container. (For instructions on dismantling carburetor, see following paragraph (3).)

(g) Remove crankpin screw from crankpin (figure 12) with wrench No. 22056. To prevent shaft from turning, insert a wrench in cut-out section of crankcase as illustrated.

(h) Remove the four screws holding cylinder, with wrench No. S-500 and lift off cylinder.

(i) Place the crank throw at top dead center.

(j) Insert crankpin bearing puller No. AA-203 so that prongs extend around ball bearing and jackscrew comes in contact with crank throw pin. (See figure 13.) Screw down on jackscrew, pulling connecting rod and bearing from crankpin.

(k) Remove puller, hold bearing forward and turn crankpin to bottom dead center.

(l) Remove piston and connecting rod assembly together.

(m) Carbon and lead deposits can then be cleaned from exhaust ports, piston and cylinder heads. (See section VI, 2.d.) If rings are stuck or not seating properly, replace, according to instructions in section VI, 2.e. If piston is badly worn, or pin is loose in piston, replace with a new piston and pin. (See instructions in section VI, 2.f.)

(n) Further dismantling of the engine is seldom necessary and is required only in case of replacing main ball bearings, crankshaft, flywheel, or crankcase.

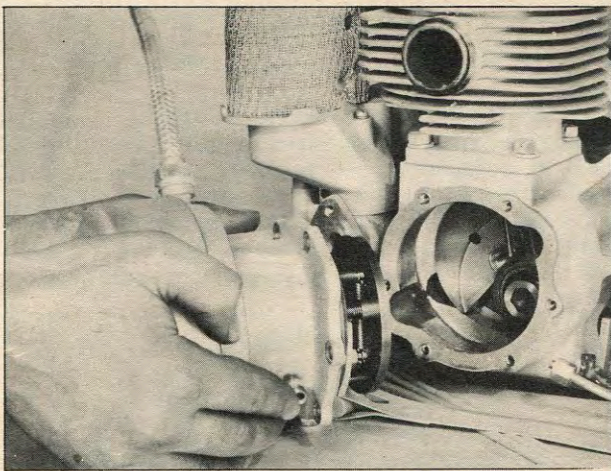


Figure 10 - Removing Magneto and Timer Bracket

(2) To Dismantle Magneto and Timer Bracket Assembly. (See figure 6.)

(a) Remove magneto rotor by loosening rotor nut. Do not remove the three screws holding starting plate to rotor.

(b) Remove rotor drive key and then cam lock nut with wrench No. 22005.

(c) Remove magneto stator plate (back plate) by taking out the two holding screws.

(d) Take off cam, cam key, and cam spacer.

(e) Remove timer bracket and drive out intake valve shaft by striking on threaded end with wood or lead mallet. Use extreme care that the governor assembly is not damaged in this operation. The governor assembly can be removed from the shaft by releasing the snap ring. Insert knife point in notch in retaining ring groove to remove ring.

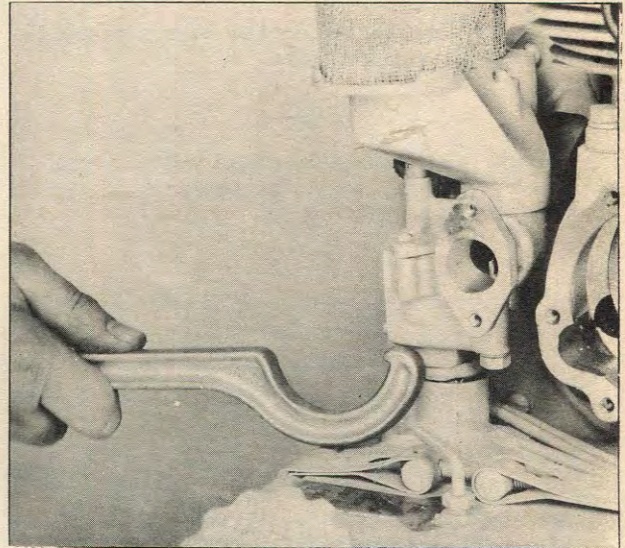


Figure 11 - Removing Carburetor

(f) Remove both bearings by inserting the bearing remover No. S-395 through the rear bearing and drive out. (Do not disturb the bearings unless worn.)

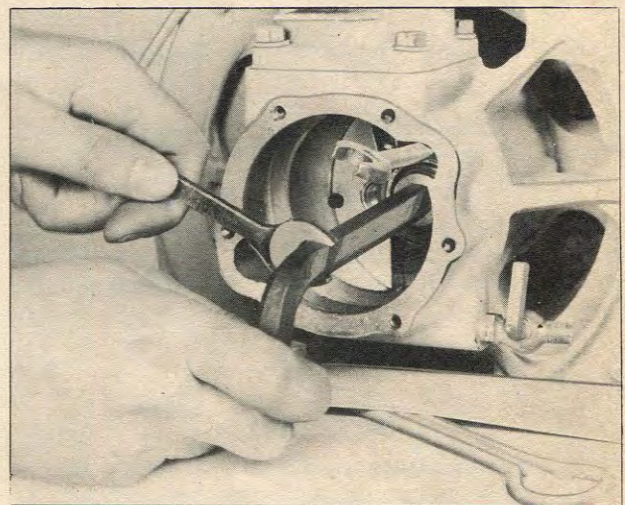


Figure 12 - Removing Crankpin Screw

(3) To Dismantle Carburetor. (See figure 4.)

(a) Remove priming pump button and nut above air cleaner and take out holding screw in aluminum cap on top of air cleaner screen. These parts will then come off.

(b) Take out screw fastening air cleaner adapter to carburetor body to remove this part.

(c) Take out the two screws holding carburetor cover to body to remove cover.

**NOTE**

Beneath the carburetor cover valve spring screw is a small spring and steel ball. Use care not to lose these parts.

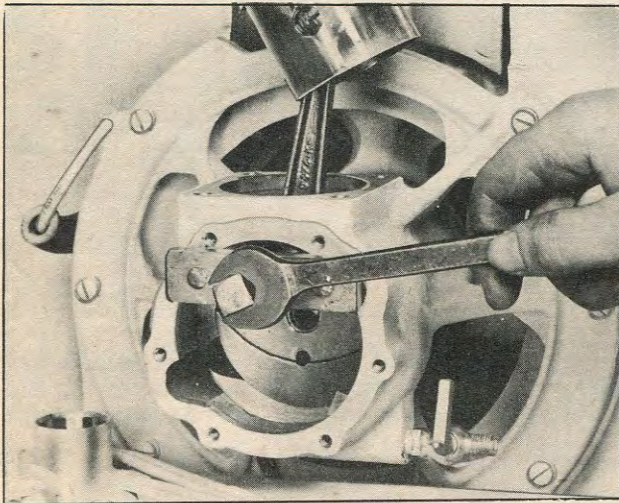


Figure 13 - Removing Connecting Rod and Bearing

(d) The feed and pressure line assembly can be removed by loosening the connector nut on inner connector body.

(e) The priming pump assembly can be dismantled by loosening fitting beneath carburetor cover. Note that there is another small spring and ball inside.

(4) To Remove Crankshaft.**IMPORTANT**

Before dismantling crankshaft, dismantle the generator end as in preceding instructions. Also remove fuel container by taking out screw holding container straps together.

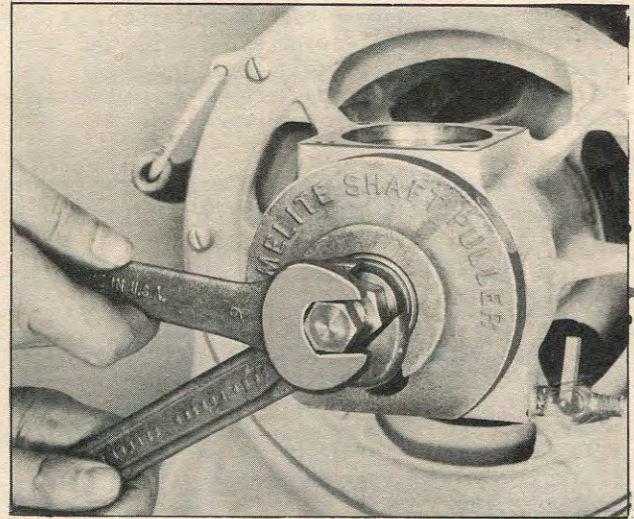


Figure 14 - Removing Crankshaft

(a) Remove large hex nut, with wrench No. S-503. Also remove washer from rear of the flywheel.

**NOTE**

This has a left-hand thread.

(b) The front main bearing is held in crankcase by two special 1/4-inch screws and washers. These must be removed before the shaft puller is applied. Place the shaft puller No. AA-204 on the end of the crankcase so that it fits over the crank throw. (See figure 14.) Insert the jackscrew No. AA-104 and screw it into the center of shaft. Hold head of jack-

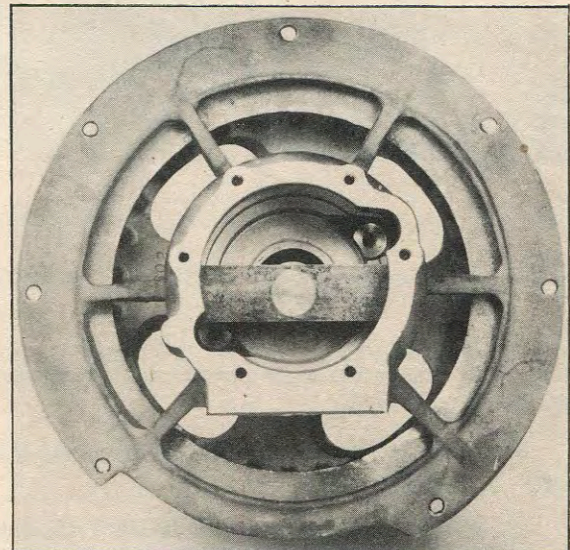


Figure 15 - Removing Flywheel



screw with wrench to keep shaft from turning, and turn down the nut. The crankshaft will be drawn free from the crankcase, leaving the flywheel still securely in place in the crankcase. The front main bearing will usually come out on the shaft. Should this bearing remain in the crankcase, it may be removed as in following instructions (c).

(c) Remove the flywheel as in following instructions (5). After the flywheel has been removed leave the bearing spacer in the crankcase. Place a block of wood on this spacer on the flywheel side. By tapping this block with a hammer, the bearing will be driven out.

(5) To Remove Flywheel From Crankcase.

CAUTION

The three holes in the face of the flywheel are not to be used in removing the flywheel, but are for the removal of the flywheel bearing after the flywheel has been removed from the crankcase. (See following instructions (6)).

(a) Remove crankcase from the fan housing if not previously done.

(b) Replace crankshaft spacer in crankcase and place the flywheel remover No. AA-202 so that the cross bar fits into the recess inside the crankcase, and the brass collar passes through openings in the crankcase and comes in contact with the crankshaft spacer. (See figure 15.)

(c) By screwing down on the jackscrew, the flywheel and bearing will be pressed from the crankcase.

(6) To Remove Bearing From Flywheel (after flywheel has been removed from crankcase).

NOTE

This is only necessary in case of bearing failure when new bearing has to be installed.

Use three 1/4-inch -20 screws in the holes in the flywheel (after removing cork fillers) and screw down, being careful to have equal pressure on each screw to avoid cramping the bearing on the hub of the flywheel.

2. Repair.

a. Generator End. - (See Wiring Diagram, figures 16, 17, and 18.)

(1) Armature.

(a) Short Circuit. - Test by use of growler.

(b) Open Circuit. - Apply not more than 5 amperes at 24 volts to adjacent commutator segments with the axis of the armature in a horizontal position. Place a compass 1/16-inch above armature core. The compass needle will pull down if winding is continuous. No deflection of needle will be seen 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.

(d) If any one of the above tests does not check, replace with new armature.

(2) Field Coils.

(a) Shunt Winding. - Disconnect lead from fixed resistor tap. (For location, see figure 16.) With an ohmmeter or wheatstone bridge connected between the lead just disconnected and frame, or yoke, resistance should read approximately 7-1/2 ohms for the four coils. If correct reading is not obtained, check coils individually. With the shunt leads (the lighter two of the four wires) disconnected, place an ohmmeter between them. Reading should be approximately 1.9 ohms. Then check one shunt lead to frame. Infinite resistance should be obtained. Replace coils with new ones if above readings are not obtained.

(b) Series Starting Winding. - If there is an open circuit it only prevents the engine being started by motorizing the generator, but if grounded, no current will be obtained. To check, disconnect the two series starting leads (figure 16), if not previously done. (This test cannot be made with yoke and armature assembled on unit.) Place ohmmeter across leads. Reading should be approximately zero. Then place ohmmeter between one lead and ground. Reading should be infinity. If above reading was not obtained, check coils individually. Replace any defective coil.

NOTE

In replacing coil be sure pole shoe is replaced in exactly same position as originally installed.

(3) Brushes. - If worn so that brush tension spring rides on brush holder instead of brush, replace. (See section VI, 2.h.)

(4) Brush Springs. - (See section VI, 2.h.)

(5) Connections. - Check all connections. If defective, replace.

(6) Resistor. - Check by placing ohmmeter across terminals. Reading should be approximately 5 ohms. Place meter across either terminal and tap on side. Reading should be less than 5 ohms. If reading is infinity, replace.

(7) Voltage Regulator. - Not a part of the Home-lite model HRU-28. (See T. O. No. 03-5AD-2.)

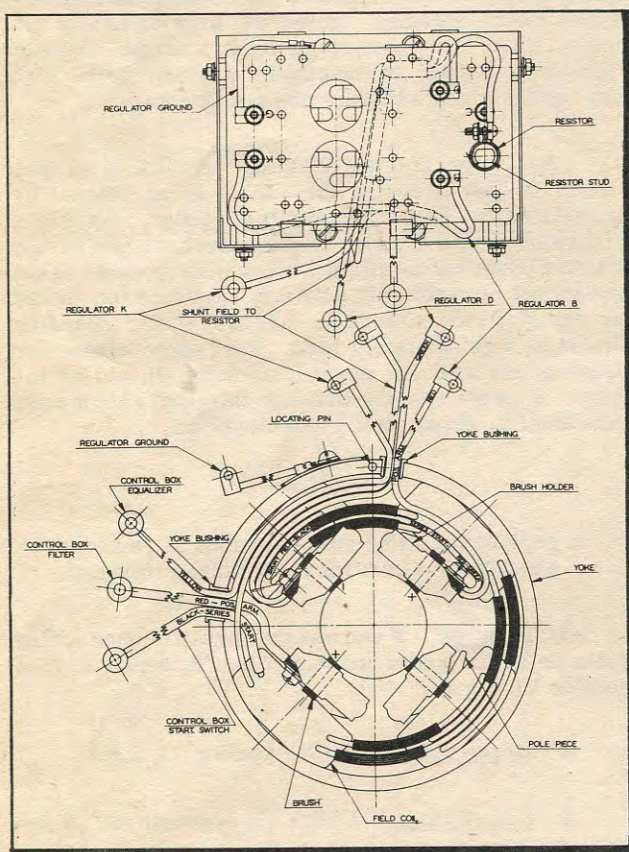
(8) Control Box.

(a) Filters. - (See section VI, 2.h.)

(b) Reverse Current Cut-out. - (See section VI, 2.h.)

(c) Starting Switch and Toggle Switch. - Place ohmmeter across two terminals. Reading should show zero resistance when switch is on; infinite resistance when switch is off. Replace with new switch if above readings are not obtained.

(d) Voltmeter. - Place in line across live 24-volt battery. Reading should be between 15 to 26 volts dependent upon condition of battery. If no reading is obtained, replace with new voltmeter.



b. Engine End.

(1) Piston and Cylinder. - Minimum clearances .002 inch, maximum .005. If greater, replace cylinder. If piston scored, replace.

(2) Piston Rings. - Replace if stuck in grooves or worn. (See section VI, 2.e.)

(3) Piston Pin Bushing. - In connecting rod, replace rod if play at this point.

(4) Ball Bearings. - Clean all open bearings thoroughly with solvent, and oil with a nonacid engine oil immediately. Wrap in paper until ready for assembly. Bearings should rotate smoothly. If a bearing is rough turning or has excessive radial play, replace.

(5) Mufflers. - If engine speeds up when removed, indicates plugged with carbon, replace.

(6) Governor. - Replace whole assembly if broken.

(7) Crankshaft. - Only requires replacement if keyways worn or threads on ends stripped.

(8) Flywheel. - Only required replacement if broken or keyways so worn that it does not fit tightly on shaft.

(9) Carburetor and Fuel Container. - (See section VI, 2.c.)

(10) Ignition. - (See section VI, 2.b.)

(11) Spark Plug. - (See section VI, 2.a.)

3. Assembly.

a. Engine End.

(1) To Assemble Crankshaft in Crankcase.

(a) The main bearing at cylinder end of crankcase should first be assembled on crankshaft, shielded side of bearing next to the crank throw. Put crankcase sealing gasket next to bearing.

(b) Place the crankshaft through the crankcase as far as possible by hand.

(c) Place assembling fixture No. AA-205 on the flywheel end of crankcase. (See figure 20.) Insert jackscrew No. AA-229 and screw it onto the stud in the end of crankshaft. (Note this has a left-hand thread.) Then by screwing down on nut, the crankshaft will be drawn into place. Hold head of jackscrew

← Figure 16 - Generator Practical Wiring Diagram

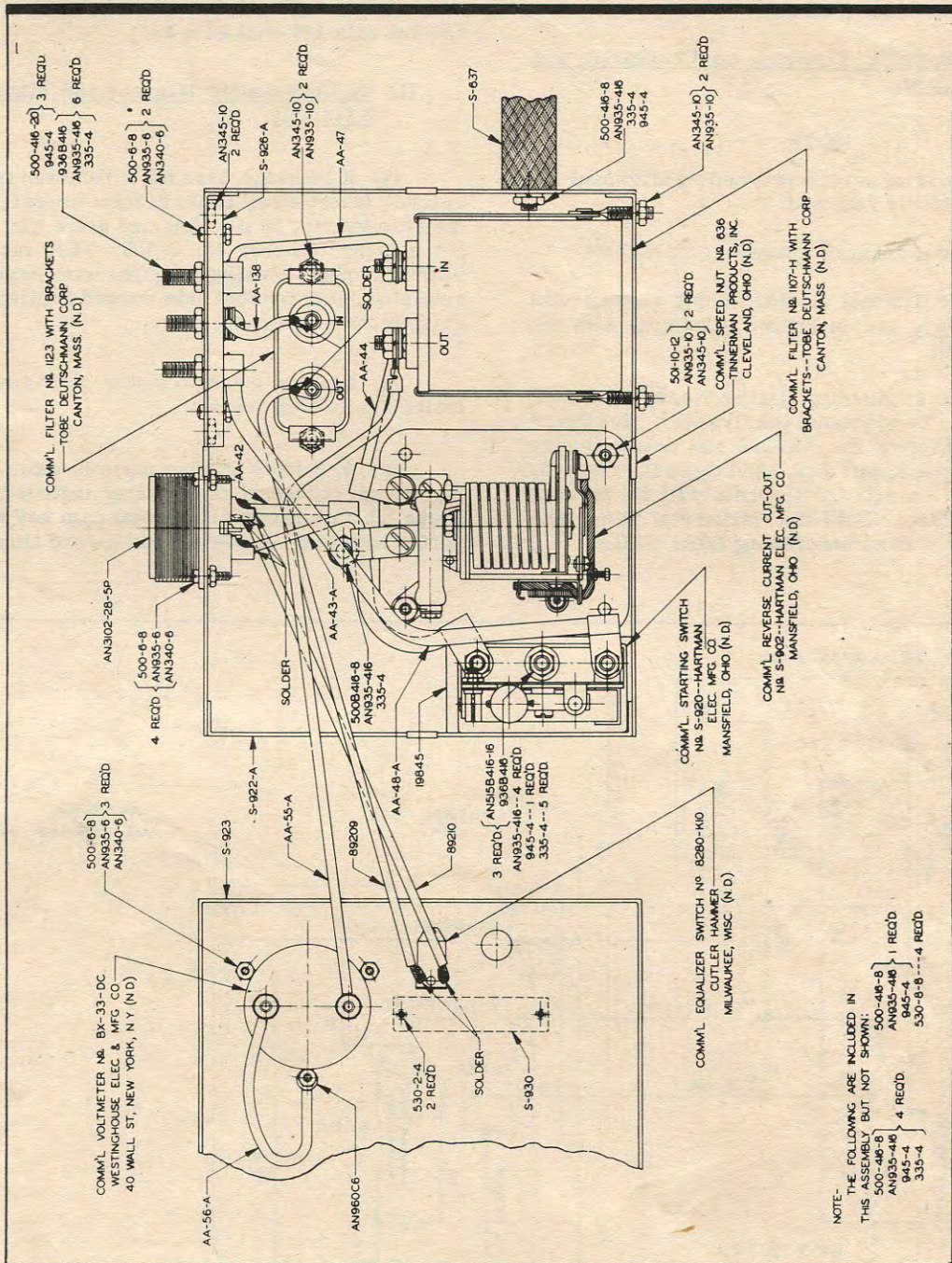


Figure 17 - Control Box, Practical Wiring Diagram

with wrench to keep it from unscrewing from shaft.

(d) Remove fixture and jackscrew.

(e) Fasten main front bearing in place with the two special screws and washers.

(2) To Assemble Flywheel on Crankshaft and Crankcase.

NOTE

Flywheel bearing is to be pressed onto flywheel hub if previously removed.

(a) Place crankshaft spacer on crankshaft.

(b) Place flywheel on shaft, being very careful that both keyways are in proper alignment with the keys in the shaft.

(c) Place assembling fixture No. AA-205 over end of crankshaft and against the flywheel. (See figure 9.) Insert jackscrew No. AA-229 and screw it onto stud in end of crankshaft (left-hand thread). Then, by screwing down on nut, the flywheel will be pressed solidly into place. Hold the jackscrew head with wrench to keep it from unscrewing from shaft.

(d) Remove fixture and jackscrew, and put flywheel washer and nut on the crankshaft (left-hand thread).

(3) To Replace Engine Assembly in Fan Housing. Place in position and fasten the crankcase to the fan housing with 1/4-inch screws.

(4) To Reassemble Magneto and Timer Bracket Assembly.

(a) If bearings have been removed from timer bracket, insert small timer bracket spacer, then place the rear bearing in position, and drive into place with the bearing remover No. S-395. Then insert center bearings spacer, sealing ring (phenolic material), seal retaining ring, beveled side toward sealing ring, and drive front bearing into place.

(b) Replace magneto stator plate assembly and fasten the holding screws.

(c) Assembly of other parts is made by reversing the procedure of dismantling instructions, paragraph 1.b. this section. Note that cam key is to be inserted bevel side in keyway and toward timer bracket.

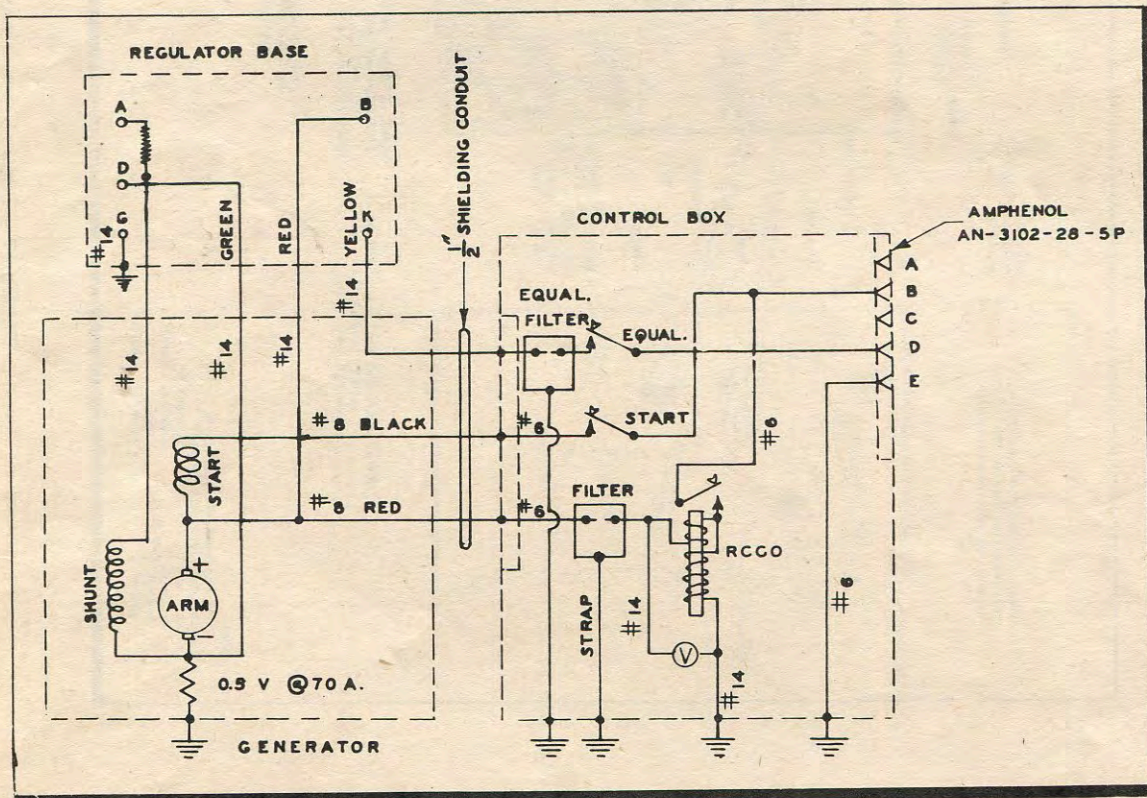


Figure 18 - Generator and Controls, Schematic Wiring Diagram

In replacing timer bracket gasket see that cut-out sections align properly with crankcase cut-outs as the gasket is not reversible in this respect, although screw holes will line up correctly when gasket is reversed.

(5) To Replace Piston, Connecting Rod Assembly and Cylinder.

(a) These parts may now be assembled in place by reversing engine dismantling operations, paragraph 1.b. this section.

(b) In reassembling piston in cylinder, make sure intake ports of piston are on the same side as intake ports in cylinder.

(c) In tightening crankpin screw, do not strike wrench with hammer. To prevent shaft from turning

insert a wrench in lower cut-out section of crankcase following same procedure as in dismantling as shown in figure 12.

(d) Use care in assembling governor and valve driver assembly so as not to damage the governor. These parts can be assembled in only one position.

(e) When replacing timer bracket and valve driver assembly, place the hole in the head of the shaft over the crankpin screw.

(f) When installing spark plug, place gasket on it before putting plug through the metal shield.

(6) To Assemble Fuel Container. - Before replacing fuel container be sure that the two web spacers

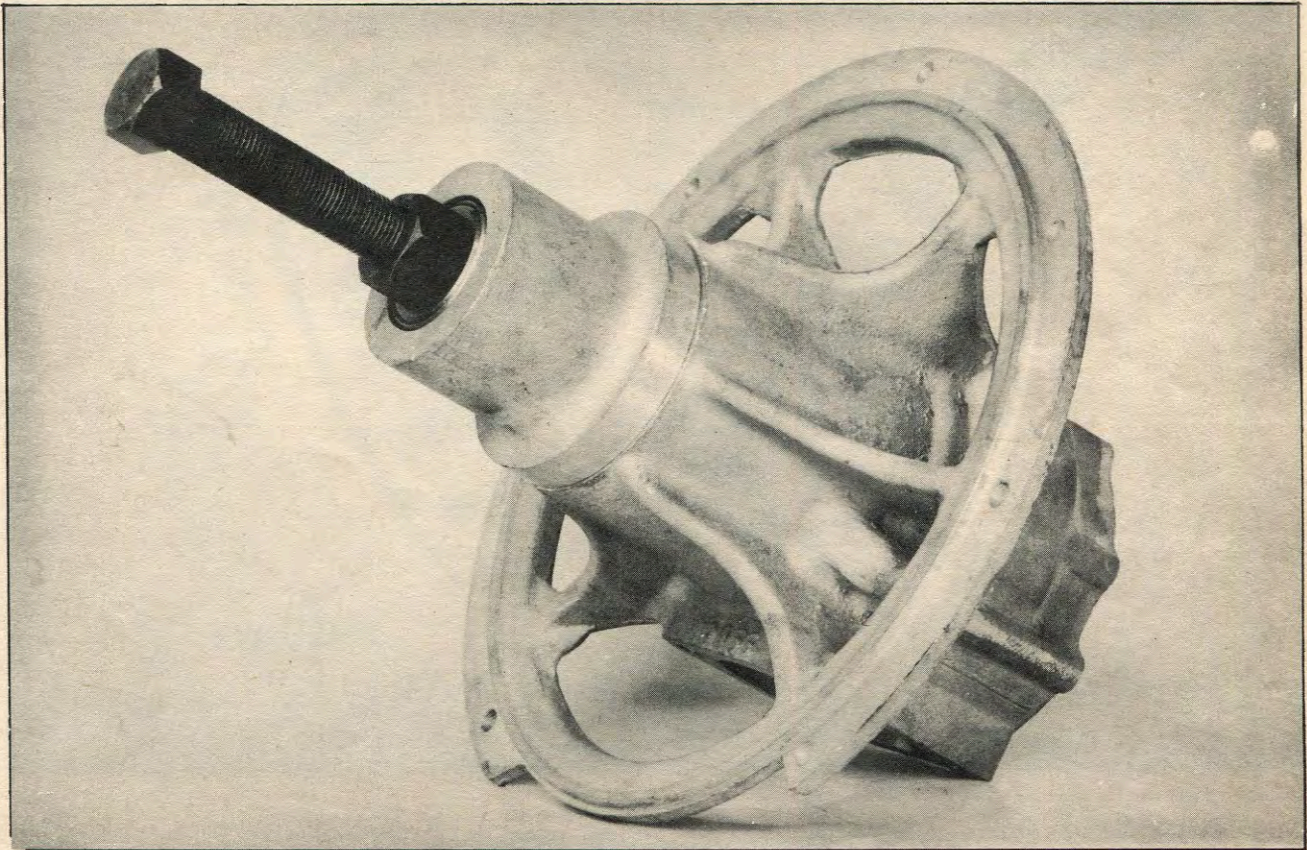


Figure 19 - Assembling Crankshaft

are in position on the angle irons to insure rigid anchoring of container when container straps are tightened.

(7) To Assemble Carburetor. - Assemble carburetor by reversing dismantling instructions, paragraph 1.b.(3), this section. Note that the two ball valves are inserted with the springs above them, tapered side down. (See figure 4.) Push carburetor securely into fitting on fuel container and connect to timer bracket. Replace pressure line from carburetor to crankcase.

b. Generator End.

(1) Reverse dismantling instructions as in paragraph 1.a., this section, making sure key is in place in the crankshaft keyway before replacing armature on shaft.

(2) If the armature does not go on shaft readily, push on as far as possible; then screw assembly tool No. AA-79 into center of shaft. Screw down on nut on the assembly tool until armature is in place. Remove tool and replace the armature bolt and washers.

(3) See that screws in slots in face of brush head are so located as to give best commutation.

(4) For Wiring Diagrams, see figures 16, 17, and 18.

NOTE

If proper operation is not obtained, consult Trouble Chart, section V.

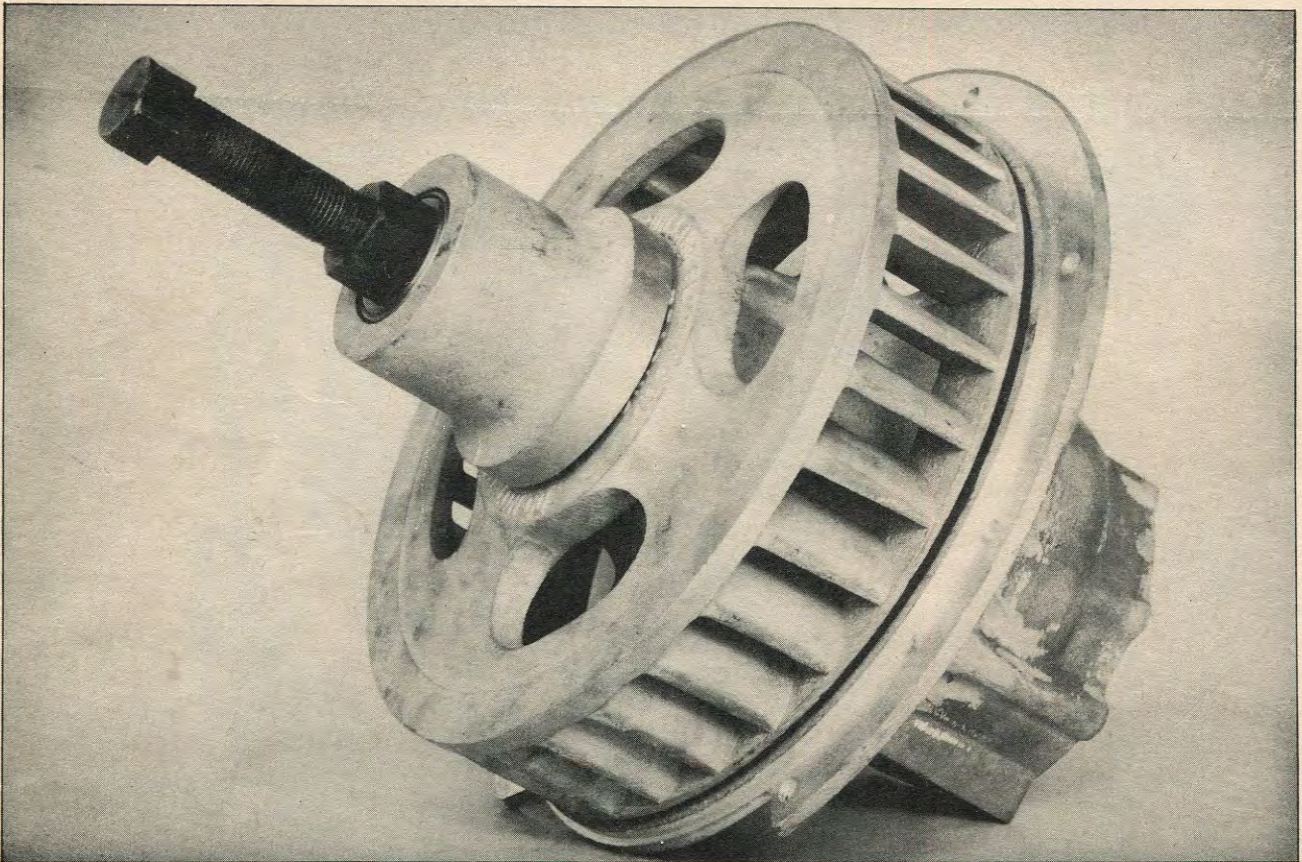


Figure 20 - Assembling Flywheel

# PARTS CATALOG

## SECTION I

### INTRODUCTION

#### 1. Notes.

a. The Parts Catalog refers only to the Model HRU-28 Power Plant, manufactured by the Homelite Corporation.

b. The Group Assembly Parts List is not divided into separate subassemblies, but lists the parts as being under a complete assembly.

c. The Cross-Reference page numbers in the Numerical Parts List, referring to the Group Assembly page number, denotes the page number in the Group Assembly Parts List where that particular item can be accurately located.

d. The Illustrations are located, as nearly as practicable, next to the item or items to which they refer.

#### 2. Code Symbols Used in Parts Catalog.

a. The parts marked with one asterisk indicate those parts which are not procured separately.

b. Two asterisks indicate parts furnished by the Wico Electric Co., Springfield, Massachusetts, F.W. 5-1/4, Specification No. 1070B.

c. Three asterisks indicate parts furnished by the Titeflex Metal Hose Co., Newark, N.J., No. 21305.

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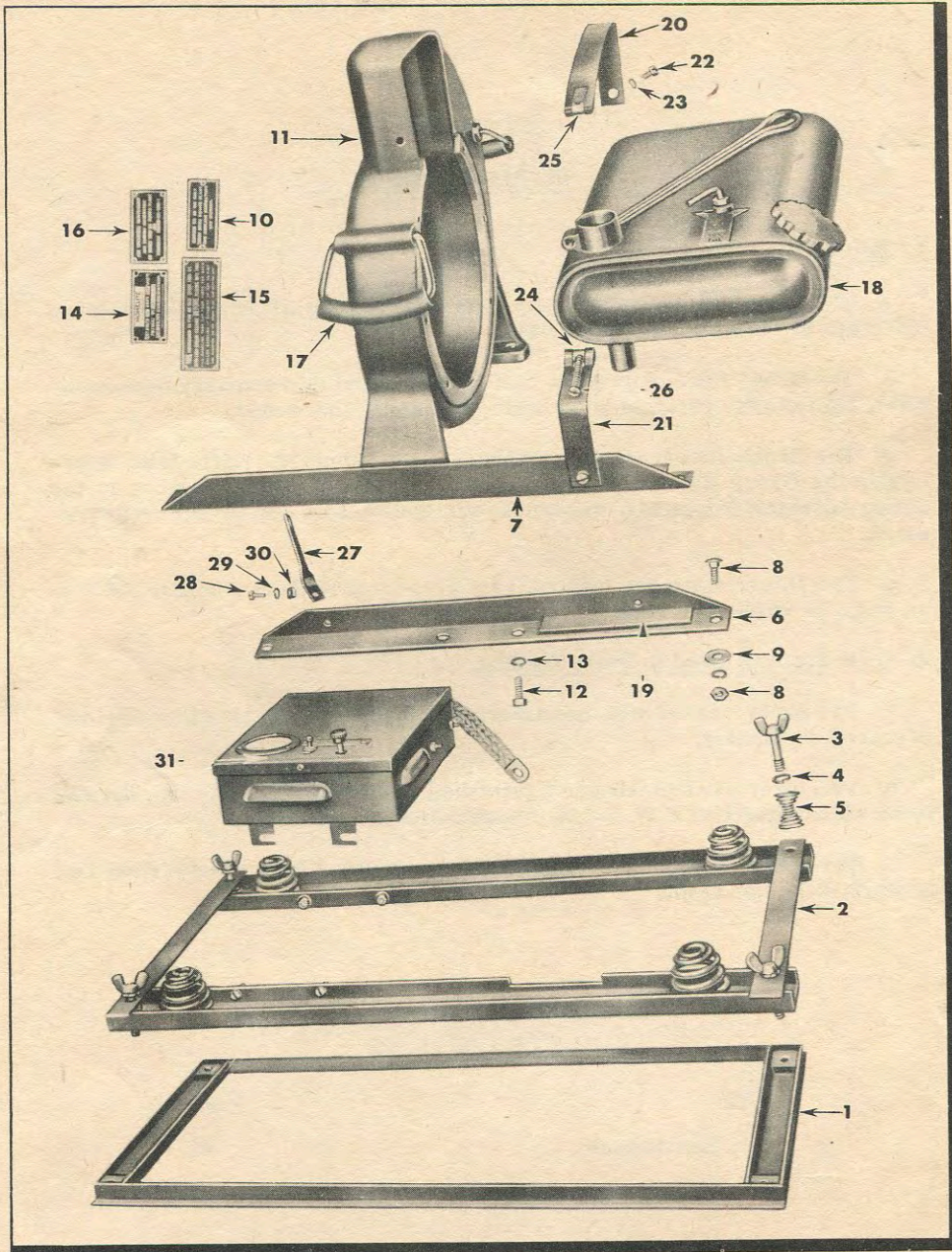


Figure 1 - Mounting Parts



SECTION II  
ASSEMBLY PARTS LIST

| <u>Fig No.</u> | <u>Ref No.</u> | <u>Part No.</u> | 1   | 2 | 3 | 4 | 5 | <u>Qty Req</u> |
|----------------|----------------|-----------------|---|---|---|---|---|----------------|
|                |                | A-9071-A        | Power Plant Assembly - Electric model HRU-28              |   |   |   |   | 1              |
| 1              | 1              | S-816           | Base - Supplementary                                      |   |   |   |   | 1              |
| 1              | 2              | AA-359-A        | Base Assembly   |   |   |   |   | 1              |
|                |                | *S-882-A        | Base  |   |   |   |   | 1              |
|                |                | 10502           | Spring - Foot   |   |   |   |   | 4              |
|                |                |                 | Rivet - Coml 1/4 inch x 3/8 inch round-head iron          |   |   |   |   | 4              |
| 1              | 3              | 19869-A         | Screw - Thumb   |   |   |   |   | 4              |
| 1              | 4              | AN935-616       | Washer  |   |   |   |   | 4              |
| 1              | 5              | 19722           | Spring - Bolt retainer                                    |   |   |   |   | 4              |
| 1              | 6              | 60023-1         | Angle Iron - Right base                                   |   |   |   |   | 1              |
| 1              | 7              | 60023-2         | Angle Iron - Left base                                    |   |   |   |   | 1              |
| 1              | 8              | 70-5-10         | Bolt With Nut   |   |   |   |   | 4              |
| 1              | 9              | 945-5           | Washer  |   |   |   |   | 4              |
| 1              | 10             | S-1034          | Plate - Equalizer instruction                             |   |   |   |   | 1              |
|                |                | AN535-2-3       | Screw - Drive   |   |   |   |   | 2              |
| 1              | 11             | 60001           | Housing - Fan   |   |   |   |   | 1              |
| 1              | 12             |                 | Bolt - Coml 3/8 inch - 16 x 1 inch hex head               |   |   |   |   | 4              |
| 1              | 13             | AN935-616       | Washer  |   |   |   |   | 4              |
| 1              | 14             | *19133-1        | Plate - Name  |   |   |   |   | 1              |
| 1              | 15             | 19661-A         | Plate - Oil instruction                                   |   |   |   |   | 1              |
| 1              | 16             | 19821           | Plate - Operating instruction                             |   |   |   |   | 1              |
|                |                | AN535-4-5       | Screw - Drive   |   |   |   |   | 12             |
| 1              | 17             | AA-89           | Handle Assembly - Carrying                                |   |   |   |   | 2              |
|                |                | *19409          | Handle - Side carrying                                    |   |   |   |   | 2              |
|                |                | *40043          | Grip - Carrying handle                                    |   |   |   |   | 2              |
|                |                | 19426           | Cap - Carrying handle                                     |   |   |   |   | 4              |
| 2              | 1              | 19983           | Crankcase   |   |   |   |   | 1              |
|                |                | 500-416-10      | Screw   |   |   |   |   | 6              |
|                |                | AN935-416       | Washer  |   |   |   |   | 6              |
| 2              | 2              | 76-EF           | Cock - Coml drain (Imperial Brass Co., Chicago, Illinois) |   |   |   |   | 1              |
| 2              | 3              | 18659-C         | Crankshaft  |   |   |   |   | 1              |
| 2              | 4              | AN280-607       | Key   |   |   |   |   | 2              |
| 2              | 5              | 18905-A-2       | Stud - Crankshaft   |   |   |   |   | 1              |
| 2              | 6              | 47306           | Bearing - Coml (New Departure, Bristol, Conn.)            |   |   |   |   | 1              |
| 2              | 7              | 19238           | Screw - Main bearing retaining                            |   |   |   |   | 2              |
| 2              | 8              | AN935-516       | Washer  |   |   |   |   | 2              |
| 2              | 9              | 40203           | Gasket - Crankcase sealing                                |   |   |   |   | 1              |
| 2              | 10             | 19818           | Spacer - Crankshaft                                       |   |   |   |   | 1              |
| 2              | 11             | 18602-C         | Flywheel  |   |   |   |   | 1              |
|                |                |                 | Cork - Coml 1/4 inch x 5/16 inch                          |   |   |   |   | 3              |
| 2              | 12             | 88507           | Bearing - Coml (New Departure, Bristol, Conn.)            |   |   |   |   | 1              |
| 2              | 13             | 18662           | Washer - Flywheel   |   |   |   |   | 1              |
| 2              | 14             | 18660           | Nut - Crankshaft lock                                     |   |   |   |   | 1              |
| 2              | 15             | 11034-C         | Rod - Connecting  |   |   |   |   | 1              |
|                |                | *11031          | Rod - (See dwg 11034-C)                                   |   |   |   |   | 1              |
|                |                | *10542          | Bearing - Piston pin                                      |   |   |   |   | 1              |
| 2              | 16             | 5202-R          | Bearing - Coml (SKF, Philadelphia, Pa.)                   |   |   |   |   | 1              |
| 2              | 17             | 60025-C         | Screw - Crankpin  |   |   |   |   | 1              |
| 2              | 18             | *10546-B        | Pin - Piston  |   |   |   |   | 1              |
| 2              | 19             | 10547           | Ring - Piston pin retaining                               |   |   |   |   | 2              |
| 2              | 20             | 11569-FV        | Piston  |   |   |   |   | 1              |
| 2              | 21             | 19398           | Ring - Piston   |   |   |   |   | 2              |

\* Not procurable separately.

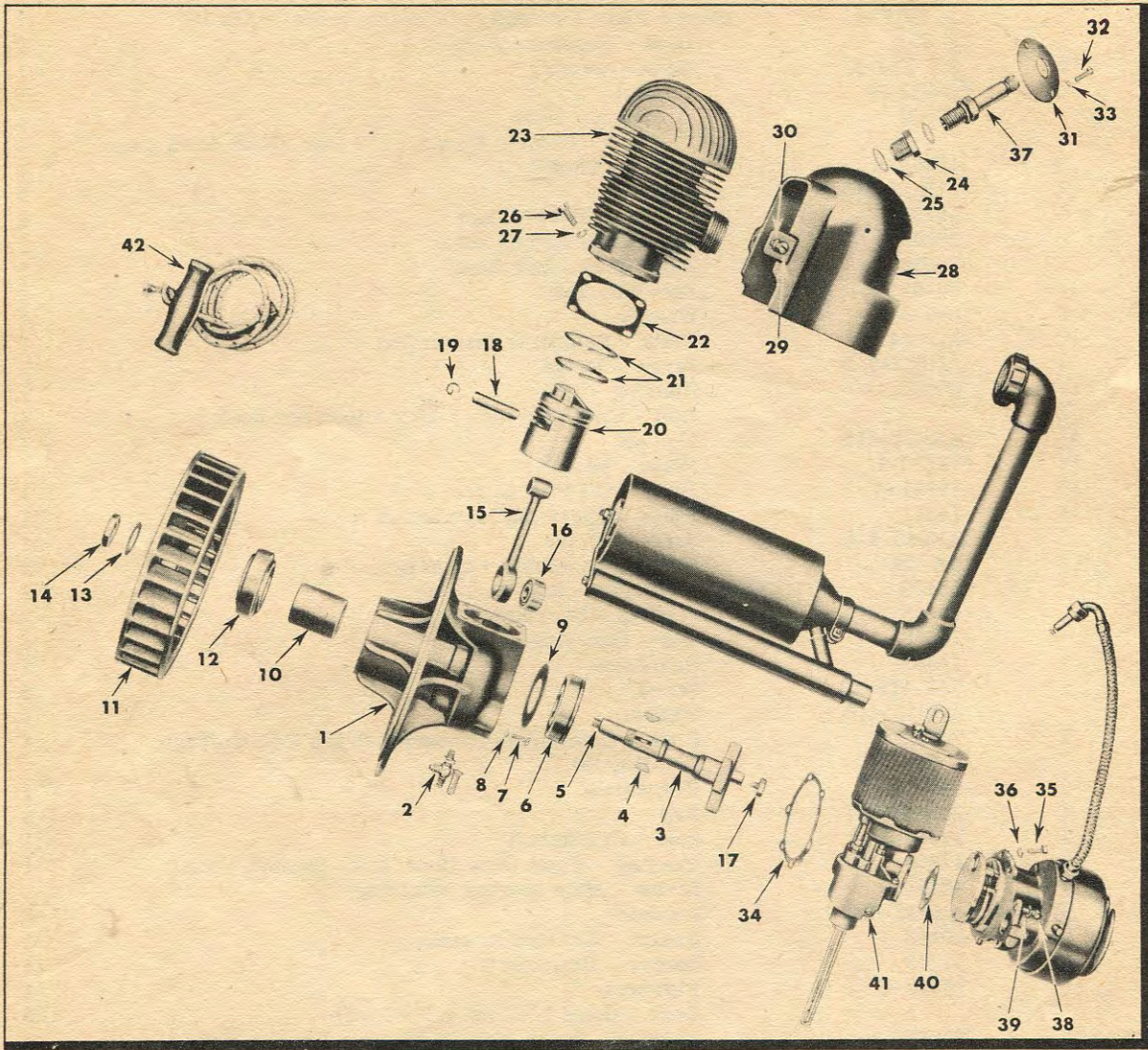


Figure 2 - Engine Parts

| Fig. No. | Ref No. | Part No.   | 1 | 2 | 3 | 4 | 5  | Qty Req |
|----------|---------|------------|---|---|---|---|--|---------|
| 2        | 22      | 19427      |   |   |   |   | Gasket - Cylinder  | 1       |
| 2        | 23      | AA-219     |   |   |   |   | Cylinder Complete  | 1       |
|          |         | *19533-A   |   |   |   |   | Cylinder   | 1       |
|          |         | *19377-2   |   |   |   |   | Liner - Cylinder   | 1       |
| 2        | 24      | AA-406     |   |   |   |   | Adapter Assembly - Spark plug  | 1       |
|          |         | *19757-A   |   |   |   |   | Adapter - Spark plug   | 1       |
|          |         | *19577     |   |   |   |   | Baffle - Spark plug  | 1       |
| 2        | 25      |            |   |   |   |   | Gasket Coml - 7/8 inch spark plug  | 1       |
| 2        | 26      | 19265      |   |   |   |   | Screw - Cylinder   | 4       |
| 2        | 27      | AN935-516  |   |   |   |   | Washer   | 4       |
| 2        | 28      | 19537      |   |   |   |   | Shield - Cylinder  | 1       |
| 2        | 29      | 500-416-10 |   |   |   |   | Screw  | 2       |
| 2        | 30      | AN935-416  |   |   |   |   | Washer   | 2       |
| 2        | 31      | 19899      |   |   |   |   | Cap - Cylinder shield  | 1       |
| 2        | 32      | 500-8-6    |   |   |   |   | Screw  | 2       |
| 2        | 33      | AN935-8    |   |   |   |   | Washer   | 2       |
| 3        | 1       | AA-187-B   |   |   |   |   | Shaft Assembly - Intake valve  | 1       |
|          |         | *60062-A   |   |   |   |   | Shaft - Intake valve   | 1       |
|          |         | *60026     |   |   |   |   | Stud - Intake valve shaft  | 3       |
|          |         | *60063-A   |   |   |   |   | Head - Intake valve shaft  | 1       |
| 3        | 2       | A-6017     |   |   |   |   | Governor and Intake Valve Assembly   | 1       |
|          |         | *60038-C   |   |   |   |   | Valve - Intake   | 1       |
|          |         | *19467     |   |   |   |   | Pin - Intake valve spring  | 3       |
|          |         | *19468     |   |   |   |   | Pin - Governor valve spring  | 1       |
|          |         | *40083     |   |   |   |   | Pin - Governor weight  | 1       |
|          |         | *60037-B   |   |   |   |   | Weight - Governor  | 1       |
|          |         | *40082-3   |   |   |   |   | Sleeve - Governor weight   | 1       |
|          |         | *40067     |   |   |   |   | Screw - Governor weight  | 1       |
|          |         | *81010     |   |   |   |   | Nut  | 1       |
|          |         | *19279     |   |   |   |   | Spring - Governor  | 1       |
|          |         | *19748     |   |   |   |   | Spring - Intake valve  | 3       |
|          |         | AN520-6-6  |   |   |   |   | Screw  | 1       |
|          |         | AN960C6    |   |   |   |   | Washer   | 3       |
|          |         |            |   |   |   |   | Shim - No. 6 .003 and/or .005  | 2       |
| 3        | 3       | 40177      |   |   |   |   | Ring - Intake valve shaft snap   | 1       |
| 2        | 34      | 19484      |   |   |   |   | Gasket - Timer bracket   | 1       |
| 3        | 4       | 19984      |   |   |   |   | Bracket - Timer  | 1       |
| 2        | 35      |            |   |   |   |   | Screw - Coml, 1/4-20 x 5/8 inch hex head, slotted  | 4       |
|          |         | 500-416-10 |   |   |   |   | Screw  | 2       |
| 2        | 36      | AN935-416  |   |   |   |   | Washer   | 6       |
| 3        | 5       | 19385      |   |   |   |   | Spacer - Timer bracket   | 1       |
| 3        | 6       | 3203       |   |   |   |   | Bearing - Coml (New Departure, Bristol, Conn.)   | 1       |
| 3        | 7       | 19380      |   |   |   |   | Spacer - Center bearing  | 1       |
| 3        | 8       | 19619-A    |   |   |   |   | Ring - Timer bracket seal retaining  | 1       |
| 3        | 9       | 19620      |   |   |   |   | Ring - Timer bracket sealing   | 1       |
| 3        | 10      | 88603      |   |   |   |   | Bearing - Coml (New Departure, Bristol, Conn.)   | 1       |
| 3        | 11      | 19381-B    |   |   |   |   | Spacer - Cam   | 1       |
| 3        | 12      | 19454      |   |   |   |   | Nut - Cam lock   | 1       |
|          |         | S-6942     |   |   |   |   | Magneto - Coml (Wico Elec. Co. Springfield, Mass.<br>F.W. 5-1/4 Specification No. 1070B) | 1       |
| 3        | 13      | X-4656     |   |   |   |   | Group - Stator replacement   | 1       |
| 4        | 1       | X-4726     |   |   |   |   | Plate - Stator, complete   | 1       |
|          |         | *4655      |   |   |   |   | Plate - Stator   | 1       |

\* Not procurable separately.

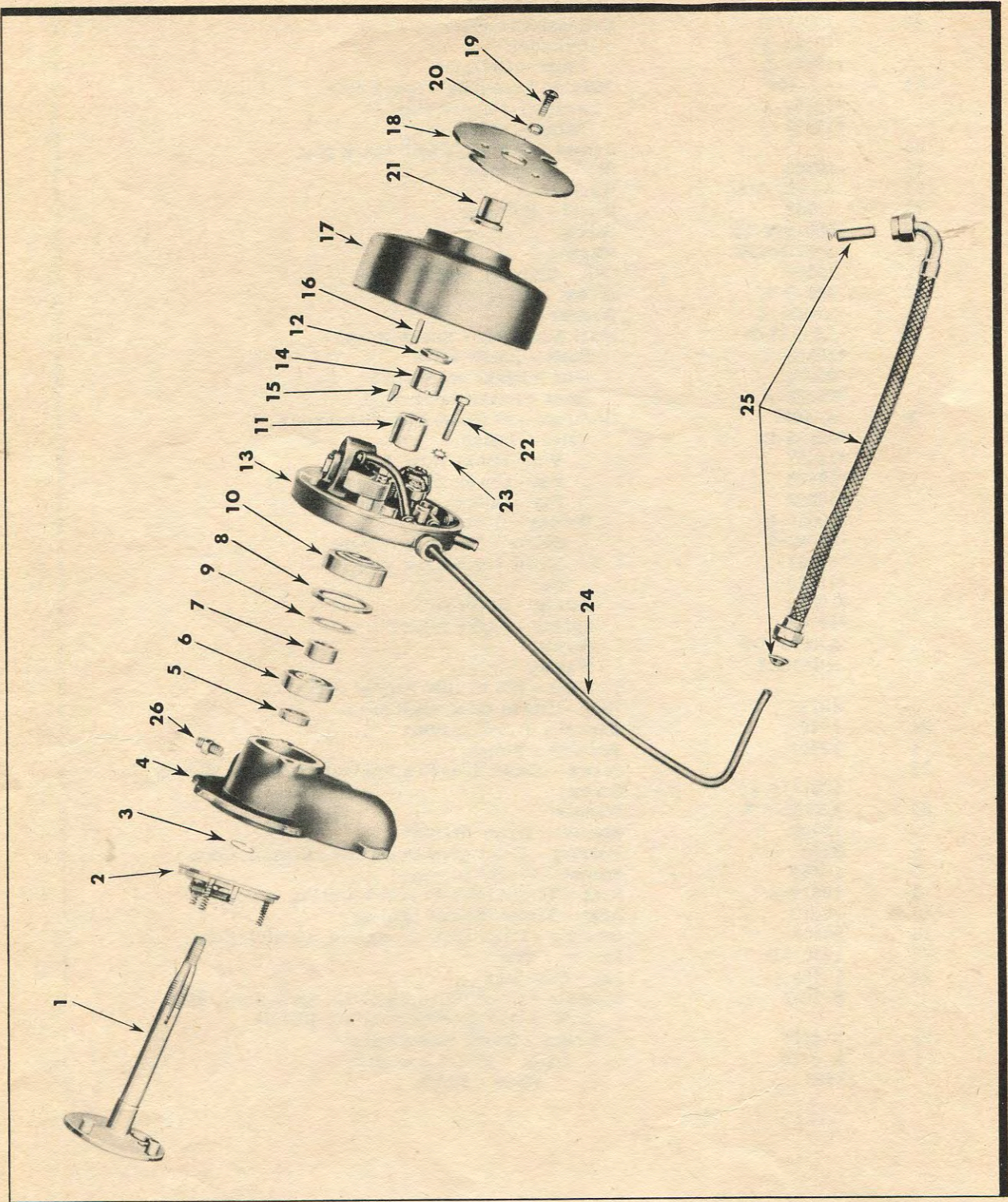


Figure 3 - Timer Bracket Parts

| Fig. No. | Ref No. | Part No.     | 1 | 2 | 3 | 4 | 5   | Qty Req |
|----------|---------|--------------|---|---|---|---|---|---------|
|          |         | *4653        |   |   |   |   | Seal - Felt   | 1       |
|          |         | *4654        |   |   |   |   | Retainer - Seal   | 1       |
|          |         | *2329        |   |   |   |   | Pin - Dowel   | 2       |
|          |         | X-3099       |   |   |   |   | Group - Core  | 1       |
|          |         | *4216        |   |   |   |   | Screw   | 2       |
|          |         | *M-58X       |   |   |   |   | Washer  | 2       |
|          |         | *Y-3217      |   |   |   |   | Block - Spring  | 1       |
|          |         | *4209        |   |   |   |   | Pin - Pivot   | 1       |
| 4        | 2       | X-4658       |   |   |   |   | Group - Coil  | 1       |
|          |         | *2264-A or B |   |   |   |   | Wedge - Coil  | 1 or 2  |
| 4        | 3       | 3454         |   |   |   |   | Bushing - Rubber  | 1       |
| 4        | 4       | 3455         |   |   |   |   | Clamp   | 1       |
| 4        | 5       | *M-87X       |   |   |   |   | Screw   | 1       |
|          |         | *M-55XA      |   |   |   |   | Washer - Lock   | 1       |
| 4        | 6       | 4652         |   |   |   |   | Plate - Contact   | 1       |
|          |         | *IXA-256     |   |   |   |   | Washer  | 1       |
|          |         | *M-55XA      |   |   |   |   | Washer - Lock   | 1       |
| 4        | 7       | *M-31X       |   |   |   |   | Screw   | 1       |
| 4        | 8       | X-3215       |   |   |   |   | Breaker Arm - Complete  | 1       |
| 4        | 9       | *3219        |   |   |   |   | Washer - Pivot  | 1       |
| 4        | 10      | 4210         |   |   |   |   | Lock - Spring   | 1       |
| 4        | 11      | X-4215       |   |   |   |   | Condenser   | 2       |
| 4        | 12      | *M-71X       |   |   |   |   | Nut   | 2       |
| 4        | 13      | *M-52X       |   |   |   |   | Washer - Lock   | 2       |
| 4        | 14      | *1100        |   |   |   |   | Screw - Condenser clamp   | 4       |
|          |         | *M-90X       |   |   |   |   | Washer - Lock   | 4       |
| 4        | 15      | X-4672       |   |   |   |   | Lead - Inter  | 2       |
| 4        | 16      | M-31X        |   |   |   |   | Screw   | 1       |
|          |         | *M-55XA      |   |   |   |   | Washer - Lock   | 1       |
| 4        | 17      | 4754         |   |   |   |   | Spring - Contact  | 1       |
| 4        | 18      | *4759        |   |   |   |   | Screw   | 1       |
|          |         | *M-55XA      |   |   |   |   | Washer - Lock   | 1       |
| 4        | 19      | *M-72X       |   |   |   |   | Nut   | 1       |
| 4        | 20      | 4755         |   |   |   |   | Button - Stop   | 1       |
| 3        | 14      | 4661         |   |   |   |   | Cam   | 1       |
| 3        | 15      | 4663         |   |   |   |   | Key - Cam   | 1       |
| 3        | 16      | 4662         |   |   |   |   | Key - Rotor   | 1       |
| 3        | 17      | Y-4659       |   |   |   |   | Rotor - Complete  | 1       |
| 3        | 18      | 4664         |   |   |   |   | Plate - Starter   | 1       |
| 3        | 19      | AN515-416-10 |   |   |   |   | Screw   | 3       |
| 3        | 20      | AN935-416    |   |   |   |   | Washer  | 3       |
| 3        | 21      | 4666         |   |   |   |   | Nut - Puller  | 1       |
| 3        | 22      | 500-416-20   |   |   |   |   | Screw   | 2       |
| 3        | 23      | AN936B416    |   |   |   |   | Washer  | 2       |
| 3        | 24      | 89268        |   |   |   |   | Cable - High tension  | 1       |
| 3        | 25      | K-21879      |   |   |   |   | Conduit Assy - Coml spark plug (Titeflex Metal Hose Co., Newark, N. J.) | 1       |
| 2        | 37      | HO-14S       |   |   |   |   | Plug - Coml Spark 18-mm (Champion, Toledo, Ohio)                        | 1       |
| 1        | 18      | A-1551       |   |   |   |   | Supply Assembly - Fuel  | 1       |
| 5        | 1       | AA-351       |   |   |   |   | Container With Fittings - Fuel  | 1       |
|          |         | 60022-D      |   |   |   |   | Container - Fuel  | 1       |
|          |         | *18114-E     |   |   |   |   | Fitting - Filler cap  | 1       |
|          |         | 60017-F      |   |   |   |   | Fitting - Fuel container carbureto                                      | 1       |

\* Not procurable separately.

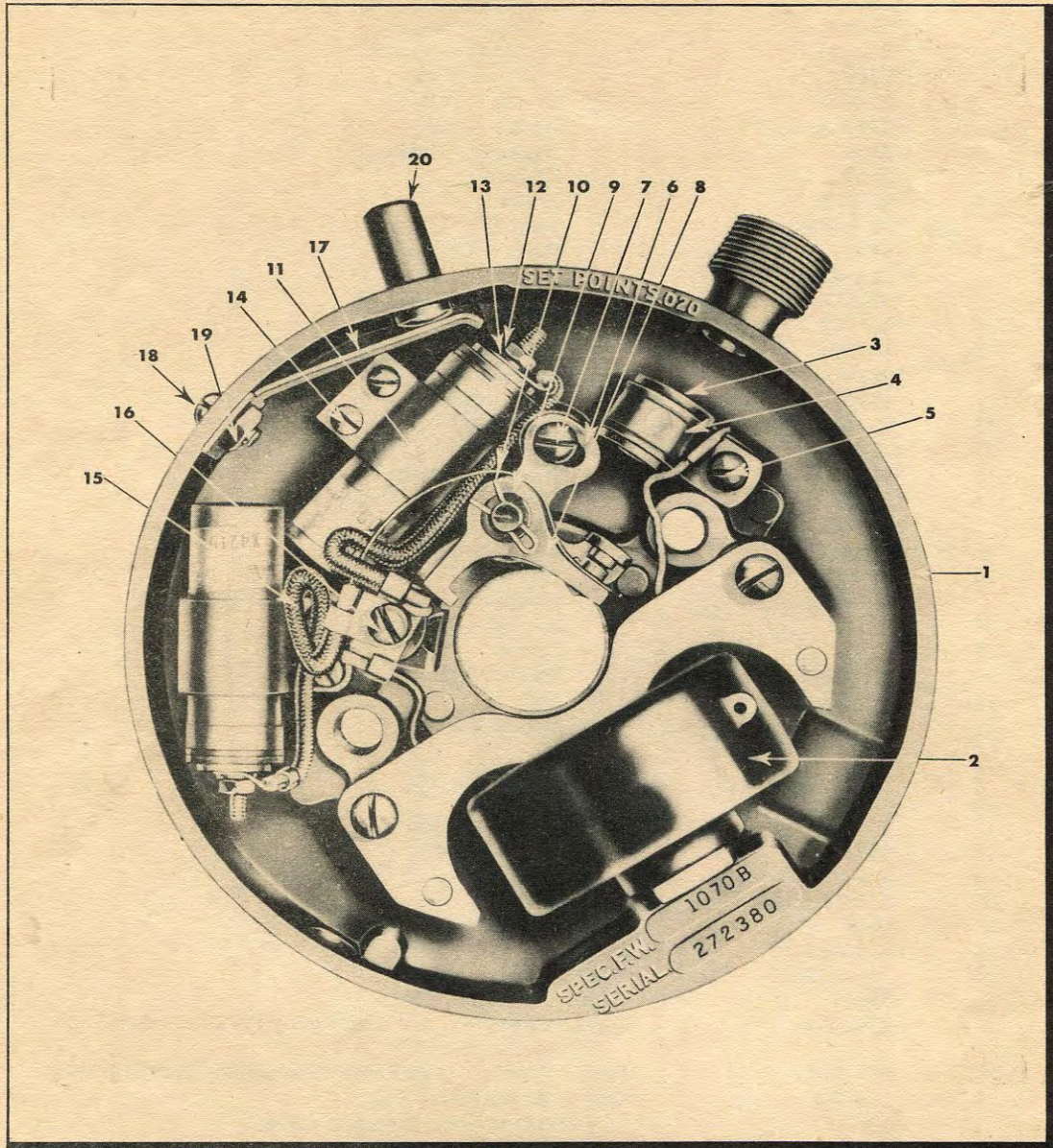


Figure 4 - Magneto Starter Parts

| Fig. No. | Ref No. | Part No.   | 1 | 2 | 3 | 4 | 5   | Qty | Req |
|----------|---------|------------|---|---|---|---|---|-----|-----|
|          |         | 60018-B    |   |   |   |   | Fitting - Fuel container sump   | 1   |     |
|          |         |            |   |   |   |   | Screw - Coml sheet metal (Parker-Kalon type A oval head No. 4-1/4 inches) | 2   |     |
|          |         | *19580-1   |   |   |   |   | Tube - Short fuel container vent  | 1   |     |
|          |         | *19580-2   |   |   |   |   | Tube - Long fuel container vent   | 1   |     |
|          |         | *19593-E   |   |   |   |   | Fitting - Shut-off valve  | 1   |     |
|          |         |            |   |   |   |   | Screw - Coml sheet metal (Parker-Kalon type A oval head No. 4-1/4 inches) | 3   |     |
|          |         | *19959     |   |   |   |   | Box - Stuffing  | 1   |     |
|          |         | *19684-A   |   |   |   |   | Indicator - Fuel shut-off   | 1   |     |
| 5        | 2       | AA-220     |   |   |   |   | Cap Assembly - Filler   | 1   |     |
|          |         | *60042     |   |   |   |   | Cap - Fuel container filler   | 1   |     |
|          |         | *50086     |   |   |   |   | Tube - Filler cap   | 1   |     |
| 5        | 3       | 19165-A    |   |   |   |   | Gasket - Fuel container cap   | 1   |     |
| 5        | 4       | 19878      |   |   |   |   | Plug  | 1   |     |
| 5        | 5       | 11204      |   |   |   |   | Body - Connector  | 2   |     |
| 5        | 6       | AA-224     |   |   |   |   | Line Assembly - Fuel  | 1   |     |
|          |         | *40158     |   |   |   |   | Line - Fuel   | 1   |     |
|          |         | AN-805-3   |   |   |   |   | Nut - Union   | 2   |     |
|          |         | AN800-3    |   |   |   |   | Cone - Union  | 2   |     |
| 5        | 7       | F2X        |   |   |   |   | Filter - Coml (Zenith Carburetor, Detroit)                                | 1   |     |
| 5        | 8       | 19962      |   |   |   |   | Gasket - Filter plug  | 1   |     |
| 5        | 9       | 19961      |   |   |   |   | Plug - Filter   | 1   |     |
| 5        | 10      | 19836-B    |   |   |   |   | Stem - Valve  | 1   |     |
| 5        | 11      | 19960      |   |   |   |   | Nut - Packing   | 1   |     |
| 5        | 12      | 19896      |   |   |   |   | Packing - Stuffing box  | 1   |     |
| 5        | 13      | *84012     |   |   |   |   | Burr - Rivet  | 2   |     |
| 5        | 14      | *10936-A   |   |   |   |   | Pin - Valve stem  | 2   |     |
| 5        | 15      | 19551-D    |   |   |   |   | Valve - Shut-off  | 1   |     |
| 5        | 16      | 19982      |   |   |   |   | Screw - Valve stop  | 1   |     |
| 5        | 17      | 0162       |   |   |   |   | Washer - Coml fiber (Tillotson Mfg. Co., Toledo)                          | 1   |     |
| 5        | 18      | 15080-C    |   |   |   |   | Spring - Valve  | 1   |     |
| 5        | 19      | 19958      |   |   |   |   | Gasket - Valve fitting plug   | 1   |     |
| 5        | 20      | 19939      |   |   |   |   | Plug - Valve fitting  | 1   |     |
| 1        | 19      | 60032-A    |   |   |   |   | Spacer - Fuel container   | 4   |     |
|          |         | AN535-6-6  |   |   |   |   | Screw - Drive   | 2   |     |
| 1        | 20      | AA-247     |   |   |   |   | Strap Assembly - Long fuel container                                      | 1   |     |
|          |         | *19613-A   |   |   |   |   | Strap - Long fuel container   | 1   |     |
|          |         | AN441-4-4  |   |   |   |   | Rivet   | 1   |     |
| 1        | 21      | AA-328     |   |   |   |   | Strap Assembly - Short fuel container                                     | 1   |     |
|          |         | *19614-A   |   |   |   |   | Strap - Short fuel container  | 1   |     |
|          |         | AN441-4-4  |   |   |   |   | Rivet   | 1   |     |
| 1        | 22      | 500-416-16 |   |   |   |   | Screw   | 2   |     |
| 1        | 23      | AN935-416  |   |   |   |   | Washer  | 2   |     |
| 1        | 24      | 18123-A    |   |   |   |   | Stud - Fuel container strap   | 1   |     |
| 1        | 25      | 50052      |   |   |   |   | Stud - Threaded fuel container strap                                      | 1   |     |
| 1        | 26      | 500-416-32 |   |   |   |   | Screw   | 1   |     |
| 2        | 40      | 19149      |   |   |   |   | Gasket - Carburetor flange  | 1   |     |
| 2        | 41      | A-1549     |   |   |   |   | Carburetor and Air Cleaner Assembly                                       | 1   |     |
| 6        | 1       | 60058-A    |   |   |   |   | Cap - Air cleaner   | 1   |     |
| 6        | 2       | 500-416-8  |   |   |   |   | Screw - 1/4-20 x 1/2 inch   | 1   |     |
| 6        | 3       | AN935-416  |   |   |   |   | Washer - 1/4 inch lock  | 1   |     |
| 6        | 4       | 945-4      |   |   |   |   | Washer - 1/4 inch flat  | 1   |     |

\* Not procurable separately.

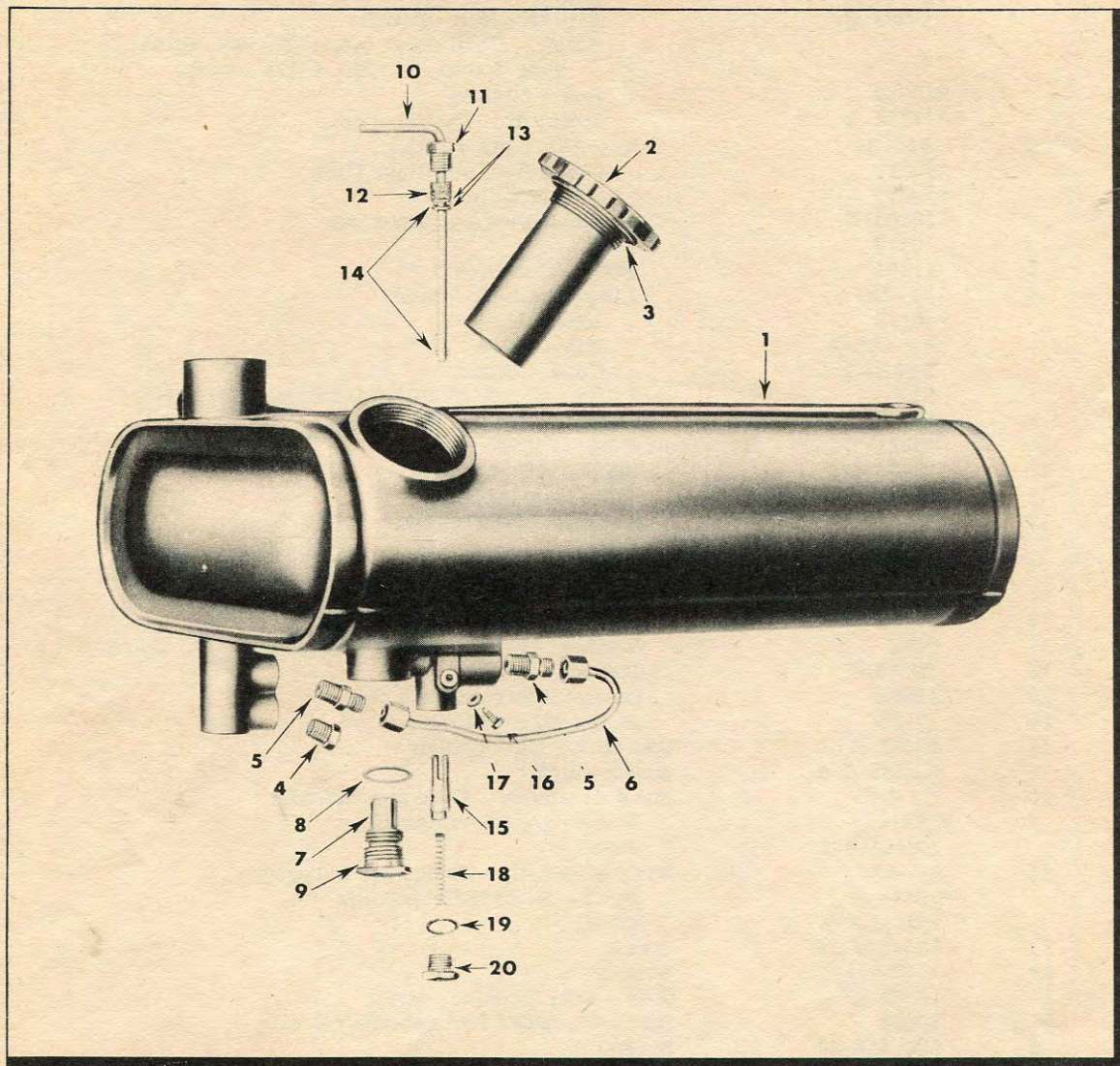


Figure 5 - Fuel Tank Assembly Parts



| Fig. No. | Ref No. | Part No.   | 1 | 2 | 3 | 4 | 5   | Qty Req |
|----------|---------|------------|---|---|---|---|---|---------|
| 6        | 5       | 19997      |   |   |   |   | Plate - Priming pump  | 1       |
| 6        | 6       |            |   |   |   |   | Screw - Sheet metal (No. 2-3/16 inches Parker-Kalon type Z)       | 2       |
| 6        | 7       | *1-ST      |   |   |   |   | Screen - Coml air cleaner (Air Maze Corp., Cleveland, Ohio)       | 1       |
| 6        | 8       | 60034-A    |   |   |   |   | Adapter - Air cleaner   | 1       |
| 6        | 9       | 80139      |   |   |   |   | Screw - Air cleaner to carburetor                                 | 1       |
| 6        | 10      | AN935-8    |   |   |   |   | Washer - No. 8 lock   | 1       |
| 6        | 11      | 60059      |   |   |   |   | Rod - Air cleaner spacer  | 1       |
| 6        | 12      | 500-8-10   |   |   |   |   | Screw - No. 8-32 x 5/8 inches                                     | 2       |
| 6        | 13      | AN935-8    |   |   |   |   | Washer - No. 8 lock   | 2       |
|          |         | AA-188     |   |   |   |   | Pump Assembly - Priming   | 1       |
| 6        | 14      | *60054     |   |   |   |   | Tube - Priming pump suction                                       | 1       |
| 6        | 15      | *60044     |   |   |   |   | Fitting - Suction tube  | 1       |
| 6        | 16      | 60051      |   |   |   |   | Ball - Steel  | 1       |
| 6        | 17      | 40229      |   |   |   |   | Spring - Ball valve   | 1       |
| 6        | 18      | 19376      |   |   |   |   | Washer  | 2       |
| 6        | 19      | *60060     |   |   |   |   | Fitting - Plunger tube  | 1       |
| 6        | 20      | *60052-A   |   |   |   |   | Tube - Plunger  | 1       |
| 6        | 21      | 50106      |   |   |   |   | Plunger - Carburetor  | 1       |
| 6        | 22      | *19618     |   |   |   |   | Packing - Plunger   | 1       |
| 6        | 23      | *60045     |   |   |   |   | Rod - Carburetor plunger  | 1       |
| 6        | 24      | 19665      |   |   |   |   | Sleeve - Plunger rod  | 1       |
| 6        | 25      | AN960-6    |   |   |   |   | Washer - No. 6 plain  | 1       |
| 6        | 26      | 60048-A    |   |   |   |   | Spring - Carburetor plunger                                       | 1       |
| 6        | 27      | AN935-6    |   |   |   |   | Washer - No. 6 lock   | 1       |
| 6        | 28      | AN340-6    |   |   |   |   | Nut - 6-32 hex  | 1       |
| 6        | 29      | 40146      |   |   |   |   | Button - Plunger  | 1       |
| 6        | 30      | 19985      |   |   |   |   | Cover - Carburetor  | 1       |
| 6        | 31      | 500-8-8    |   |   |   |   | Screw - 8-32 x 1/2 inch   | 2       |
| 6        | 32      | AN935-8    |   |   |   |   | Washer - No. 8 lock   | 2       |
| 6        | 33      | 60051      |   |   |   |   | Ball - Steel  | 1       |
| 6        | 34      | 40229      |   |   |   |   | Spring - Ball valve   | 1       |
| 6        | 35      | 60057      |   |   |   |   | Screw - Carburetor cover valve spring                             | 1       |
| 6        | 36      | 19376      |   |   |   |   | Washer  | 1       |
| 6        | 37      | S-399-1    |   |   |   |   | Body - Outer carburetor pressure line connector                   | 1       |
| 6        | 38      | 40176      |   |   |   |   | Body - Inner carburetor pressure line connector                   | 1       |
| 6        | 39      | 60061-A    |   |   |   |   | Gasket - Carburetor cover   | 1       |
|          |         | 02744      |   |   |   |   | Plug - Coml 1/8 inch headless, (Tillotson Mfg. Co., Toledo, Ohio) | 1       |
| 6        | 40      | 50112      |   |   |   |   | Body - Carburetor   | 1       |
| 2        | 38      | 500-416-12 |   |   |   |   | Screw - 1/4-20 x 3/4 inch   | 2       |
| 2        | 39      | AN935-416  |   |   |   |   | Washer - 1/4 inch lock  | 2       |
|          |         | 19900      |   |   |   |   | Tube - Vent   | 1       |
| 6        | 41      | 60049-C    |   |   |   |   | Screen - Reservoir  | 1       |
| 6        | 42      | 500-8-4    |   |   |   |   | Screw - 8-32 x 1/4 inch   | 1       |
| 6        | 43      | 0162       |   |   |   |   | Gasket - Coml fiber (Tillotson Mfg. Co., Toledo, Ohio)            | 1       |
|          |         | AA-340     |   |   |   |   | Nozzle Assembly - Carburetor                                      | 1       |
| 6        | 44      | *19575-4   |   |   |   |   | Nozzle - Vertical carburetor                                      | 1       |
|          |         | *19579-1   |   |   |   |   | Tube - Carburetor nozzle outlet                                   | 1       |
|          |         | *19575-3   |   |   |   |   | Base - Carburetor nozzle outlet                                   | 1       |
| 6        | 45      | 0676       |   |   |   |   | Gasket - Coml fiber (Tillotson Mfg. Co., Toledo, Ohio)            | 1       |

\* Not procurable separately.

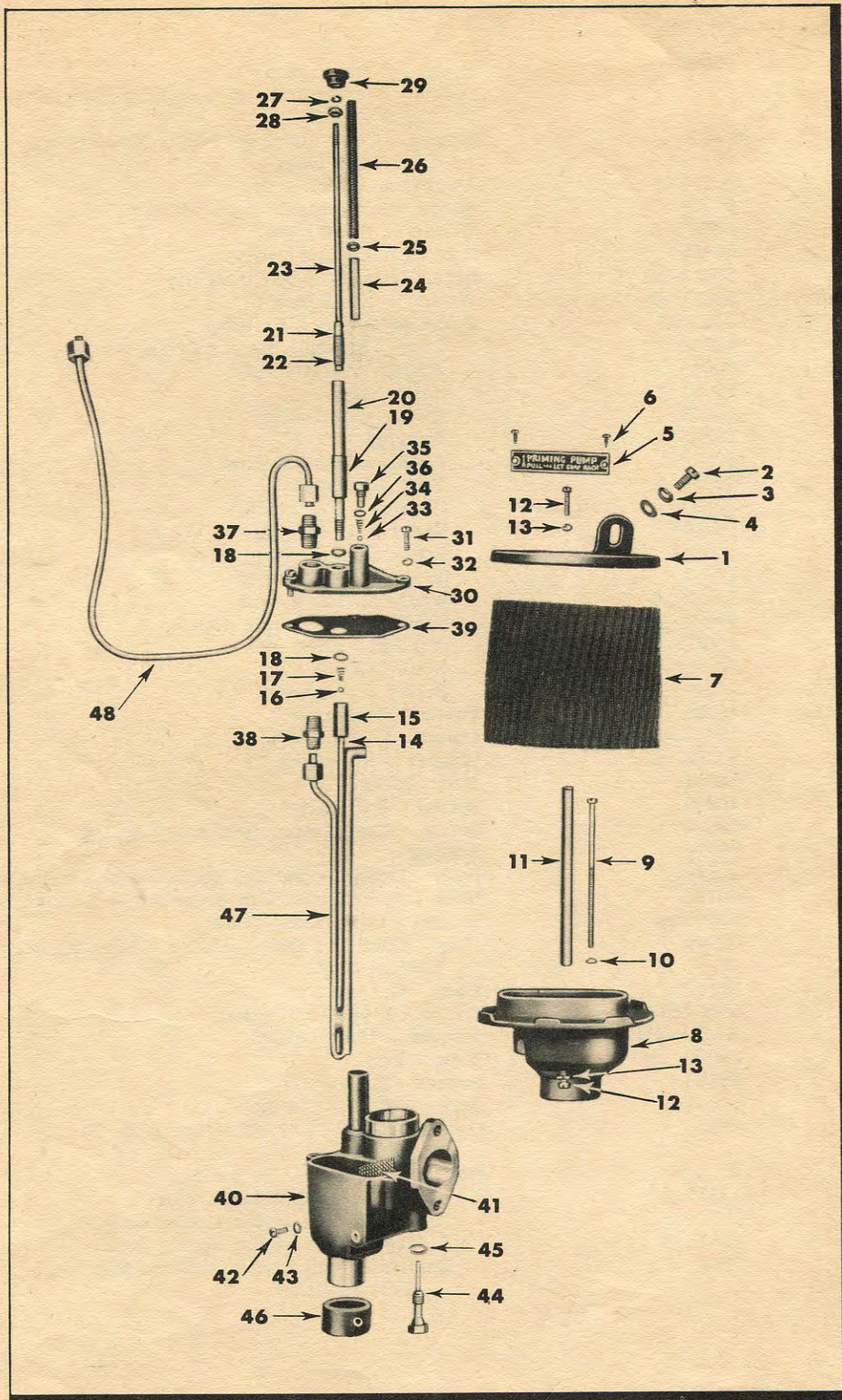


Figure 6 - Carburetor and Air Filter Parts

| Fig. No. | Ref No. | Part No.   | 1 | 2 | 3 | 4 | 5                                     | Qty Req |
|----------|---------|------------|---|---|---|---|---------------------------------------|---------|
| 6        | 46      | 60020-A    |   |   |   |   | Spacer - Carburetor to fuel container | 1       |
| 6        | 47      | AA-189     |   |   |   |   | Line Assembly - Feed and pressure     | 1       |
|          |         | *60047     |   |   |   |   | Tube - Carburetor pressure            | 1       |
|          |         | *40159     |   |   |   |   | Tube - Gasoline feed                  | 1       |
|          |         | *60046     |   |   |   |   | Tube - Carburetor gasoline feed       | 1       |
|          |         | AN805-3    |   |   |   |   | Nut - Union                           | 1       |
|          |         | AN800-3    |   |   |   |   | Cone - Union                          | 1       |
| 6        | 48      | AA-190     |   |   |   |   | Line Assembly - Pressure              | 1       |
|          |         | *19957     |   |   |   |   | Tube - Pressure line                  | 1       |
|          |         | AN805-3    |   |   |   |   | Nut - Union                           | 2       |
|          |         | AN800-3    |   |   |   |   | Cone - Union                          | 2       |
| 3        | 26      | 11204      |   |   |   |   | Body - Connector                      | 1       |
| 7        | 1       | AA-192     |   |   |   |   | Manifold Assembly                     | 1       |
|          |         | *19571     |   |   |   |   | Tube - Exhaust manifold               | 1       |
|          |         | *19572     |   |   |   |   | Tube - Muffler inlet                  | 1       |
|          |         | *19569-1   |   |   |   |   | Elbow - Exhaust tubing                | 1       |
|          |         | *19569     |   |   |   |   | Elbow - Exhaust tubing                | 1       |
|          |         | *19617     |   |   |   |   | Clip - Exhaust tubing nut retainer    | 1       |
|          |         | *19375-2   |   |   |   |   | Nut - Exhaust elbow                   | 1       |
|          |         | AN535-4-5  |   |   |   |   | Screw - Drive                         | 1       |
| 7        | 2       | 19434-A    |   |   |   |   | Clamp - Muffler                       | 1       |
| 7        | 3       | 500-416-16 |   |   |   |   | Screw                                 | 1       |
| 7        | 4       |            |   |   |   |   | Nut - Coml square brass 1/4-20        | 1       |
| 7        | 5       | 19144-K    |   |   |   |   | Muffler                               | 1       |
| 7        | 6       | AA-80-1    |   |   |   |   | Muffler Assembly - Auxiliary          | 1       |
|          |         | *40222     |   |   |   |   | Tube - Outer auxiliary muffler        | 1       |
|          |         | *40224     |   |   |   |   | Tube - Inner auxiliary muffler        | 1       |
|          |         | *40225     |   |   |   |   | Washer - Back auxiliary muffler       | 1       |
|          |         | *40228     |   |   |   |   | Tube - Auxiliary muffler connector    | 1       |
|          |         | *40221     |   |   |   |   | Washer - Front auxiliary muffler      | 1       |
|          |         | *19950-A   |   |   |   |   | Tube Outlet                           | 1       |
| 7        | 7       | 40210-A    |   |   |   |   | Bracket - Auxiliary muffler           | 1       |
| 7        | 8       | 500-416-8  |   |   |   |   | Screw                                 | 1       |
| 7        | 9       | AN935-416  |   |   |   |   | Washer                                | 2       |
| 7        | 10      |            |   |   |   |   | Nut - Coml square brass 1/4-20        | 1       |
| 1        | 27      | 19573      |   |   |   |   | Bracket - Muffler                     | 1       |
| 1        | 28      | 500-416-10 |   |   |   |   | Screw                                 | 1       |
| 1        | 29      | AN935-416  |   |   |   |   | Washer                                | 1       |
| 1        | 30      |            |   |   |   |   | Nut - Coml square 1/4-20              | 1       |
| 2        | 42      | AA-290     |   |   |   |   | Rope Assembly - Starting              | 1       |
|          |         | *18680-B   |   |   |   |   | Handle - Starting rope                | 1       |
|          |         | *19828     |   |   |   |   | Rope - Starting                       | 1       |
| 8        | 1       | A-2505     |   |   |   |   | Armature                              | 1       |
|          |         | *19488     |   |   |   |   | Shaft - Armature                      | 1       |
|          |         | *S-864-4   |   |   |   |   | Insulation - Front shaft              | 1       |
|          |         | *S-864-3   |   |   |   |   | Insulation - Rear shaft               | 1       |
|          |         | *19514     |   |   |   |   | Washer - Fiberoid                     | 1       |
|          |         | *30510-F   |   |   |   |   | End - Fiber                           | 2       |
|          |         | *30510     |   |   |   |   | Lamination                            | 172     |
|          |         | *19566     |   |   |   |   | Insulation - Slot                     | 20      |
|          |         | *19564     |   |   |   |   | Wedge - Slot                          | 20      |
|          |         | *19570     |   |   |   |   | Commutator                            | 1       |
| 8        | 2       | 15008      |   |   |   |   | Key - Armature                        | 1       |

\* Not procurable separately.

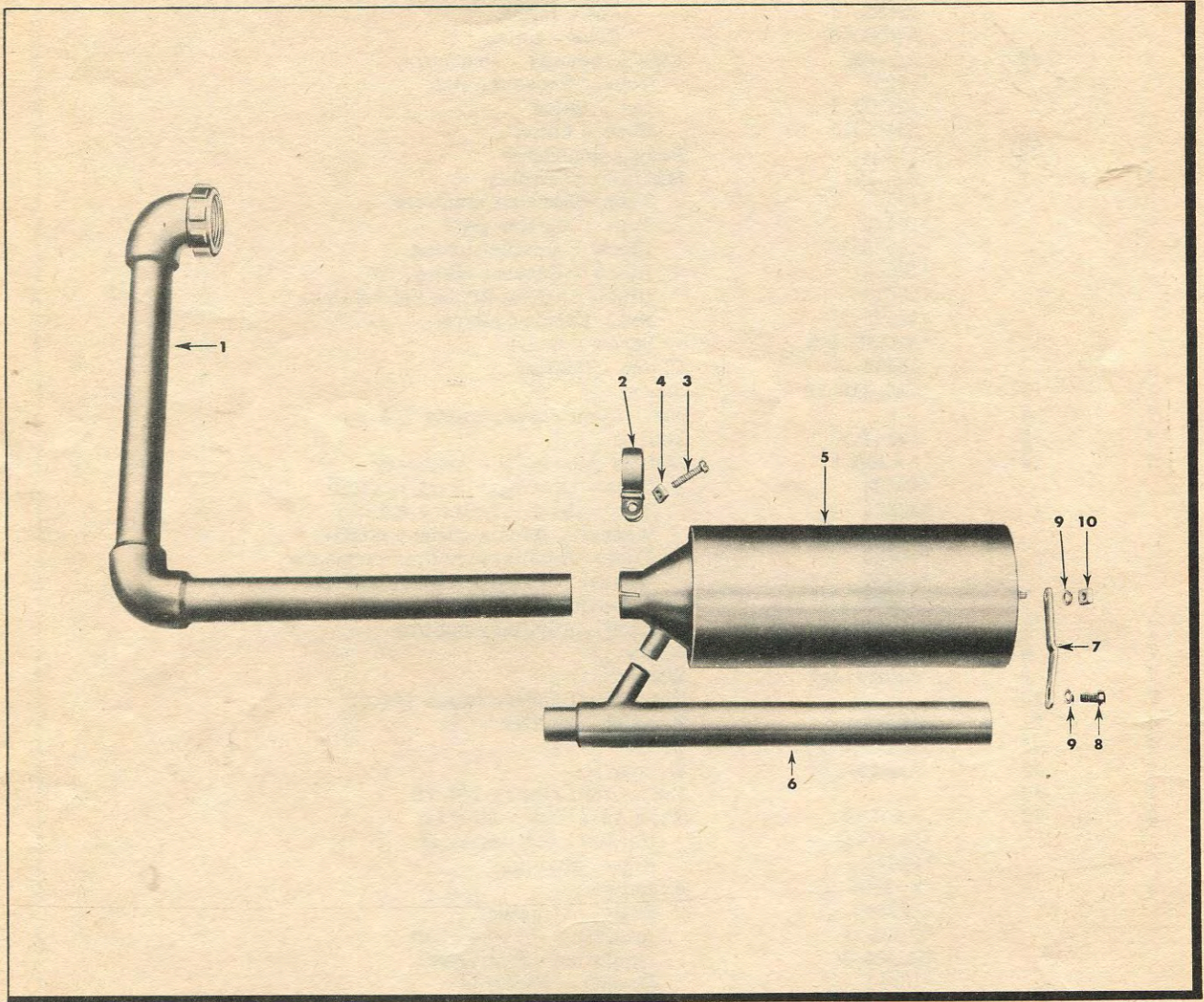


Figure 7 - Muffler Parts

| <u>Fig. No.</u> | <u>Ref No.</u> | <u>Part No.</u> | 1 | 2 | 3 | 4 | 5  | <u>Qty Req</u> |
|-----------------|----------------|-----------------|---|---|---|---|--|----------------|
| 8               | 3              | 77502           |   |   |   |   | Bearing - Coml (New Departure, Bristol, Conn.)                               | 1              |
| 8               | 4              | 80078           |   |   |   |   | Bolt - Armature  | 1              |
| 8               | 5              | AN935-416       |   |   |   |   | Washer   | 1              |
| 8               | 6              | 945-4           |   |   |   |   | Washer   | 1              |
| 8               | 7              | 19102-3         |   |   |   |   | Yoke   | 1              |
| 8               | 8              | AA-32           |   |   |   |   | Pole Piece   | 4              |
|                 |                | *19496          |   |   |   |   | Lamination - Pole piece  | 520            |
|                 |                | *19504          |   |   |   |   | Rivet  | 16             |
|                 |                | *19515          |   |   |   |   | Burr   | 16             |
| 8               | 9              | 80091           |   |   |   |   | Screw  | 8              |
| 8               | 10             | 19252           |   |   |   |   | Pin - Locating   | 2              |
| 8               | 11             | S-1030          |   |   |   |   | Bushing - Insulating yoke  | 1              |
| 8               | 12             | S-952           |   |   |   |   | Bushing - Insulating yoke  | 2              |
| 8               | 13             | 19568-1         |   |   |   |   | Coil - Field   | 4              |
| 8               | 14             | AA-193-A        |   |   |   |   | Holder Assembly - Brush  | 1              |
| 9               | 1              | 19562-B         |   |   |   |   | Ring - Brush holder  | 1              |
| 9               | 2              | 19567           |   |   |   |   | Insulation - Brush holder  | 8              |
| 9               | 3              | 19510           |   |   |   |   | Tube - Brush head insulating   | 8              |
| 9               | 4              | AA-4            |   |   |   |   | Jumper - Brush   | 2              |
| 9               | 5              | 19493           |   |   |   |   | Holder - Brush   | 4              |
| 9               | 6              | 500-416-14      |   |   |   |   | Screw  | 4              |
| 9               | 7              | 500-416-12      |   |   |   |   | Screw  | 4              |
| 9               | 8              | 500-416-8       |   |   |   |   | Screw  | 4              |
| 9               | 9              | AN935-416       |   |   |   |   | Washer   | 12             |
| 9               | 10             | AN960-416L      |   |   |   |   | Washer   | 16             |
| 9               | 11             | 19502-4         |   |   |   |   | Brush  | 8              |
| 9               | 12             | AN515-8-7       |   |   |   |   | Screw  | 4              |
| 9               | 13             | AN935-8         |   |   |   |   | Washer   | 4              |
| 9               | 14             | *19498          |   |   |   |   | Post - Brush spring  | 4              |
| 9               | 15             | 566C8-4         |   |   |   |   | Screw - Set  | 4              |
| 9               | 16             | 19499           |   |   |   |   | Spring - Brush   | 8              |
| 9               | 17             | 19989           |   |   |   |   | Equalizer - Resistor   | 1              |
| 9               | 18             | 501-10-10       |   |   |   |   | Screw  | 1              |
| 9               | 19             | AN960-10L       |   |   |   |   | Washer   | 2              |
| 9               | 20             | AN935-10        |   |   |   |   | Washer   | 1              |
| 9               | 21             | AN345-10        |   |   |   |   | Nut  | 1              |
| 8               | 15             | 19495-A         |   |   |   |   | Head - Brush   | 1              |
| 8               | 16             | 80074           |   |   |   |   | Bolt - Yoke  | 4              |
| 8               | 17             | AN935-416       |   |   |   |   | Washer   | 4              |
| 8               | 18             | 500-416-16      |   |   |   |   | Screw  | 2              |
| 8               | 19             | AN935-416       |   |   |   |   | Washer   | 2              |
| 8               | 20             | AN960-416       |   |   |   |   | Washer   | 2              |
| 8               | 21             | 19512-A         |   |   |   |   | Plate - Brush head cover   | 2              |
| 8               | 22             | 500-416-8       |   |   |   |   | Screw  | 2              |
| 8               | 23             | AN935-416       |   |   |   |   | Washer   | 2              |
|                 |                | *A-5099         |   |   |   |   | Housing Assembly - Voltage regulator   | 1              |
| 8               | 24             | S-830-1         |   |   |   |   | Base - Regulator housing   | 1              |
| 8               | 25             | AN515-416-8     |   |   |   |   | Screw  | 4              |
| 8               | 26             | AN936B416       |   |   |   |   | Washer   | 4              |
| 8               | 27             | S-953-1         |   |   |   |   | Clip - Wire  | 2              |
|                 |                | S-987-1         |   |   |   |   | Clip - Wire  | 1              |
| 8               | 28             | 19914-A         |   |   |   |   | Base Assembly - Coml regulator (Aurora Elec. Co.<br>333 Berry St., Brooklyn) | 1              |

\* Not procurable separately.

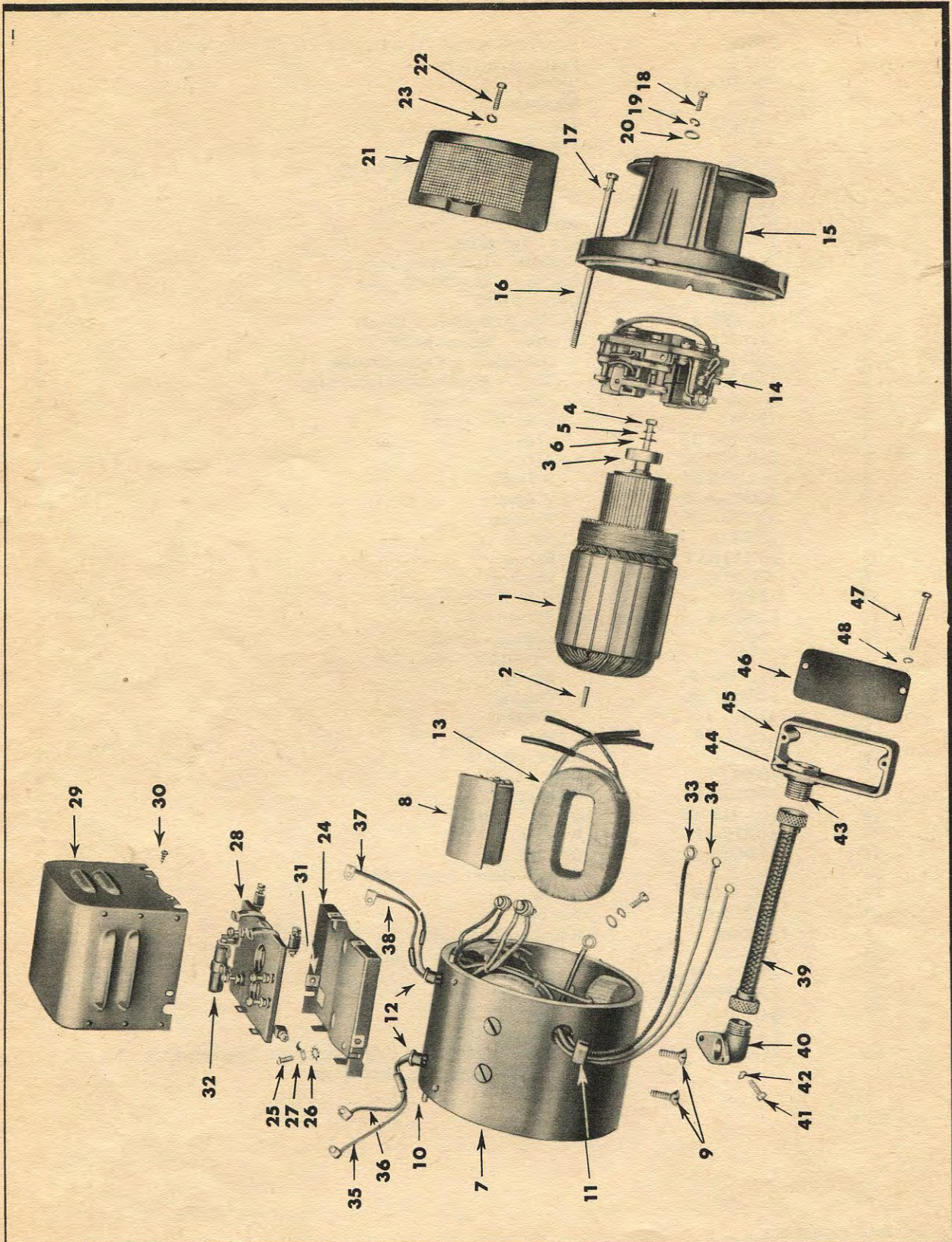


Figure 8 - Generator Parts

| Fig. No. | Ref No. | Part No.    | 1 | 2 | 3 | 4 | 5  | Qty | Req |
|----------|---------|-------------|---|---|---|---|--|-----|-----|
|          |         | AA-46-A     |   |   |   |   | Lead - Regulator ground  |     | 1   |
| 8        | 29      | S-829-1     |   |   |   |   | Cover - Regulator housing  |     | 1   |
| 8        | 30      | 530-8-6     |   |   |   |   | Screw - Sheet metal  |     | 4   |
| 8        | 31      | 636         |   |   |   |   | Nut - Coml speed (Tinnerman Products Inc.,<br>Cleveland, Ohio)                                   |     | 4   |
| 8        | 32      | 2T-4.2      |   |   |   |   | Resistor - Coml 25-watt 4.2-ohm with No. 604 band<br>(Ward Leonard Elec. Co., Mt. Vernon, N. Y.) |     | 1   |
|          |         | 19844       |   |   |   |   | Stud - Resistor  |     | 1   |
|          |         | AN960-10L   |   |   |   |   | Washer   |     | 1   |
| 8        | 33      | AA-45       |   |   |   |   | Lead - Positive generator  |     | 1   |
| 8        | 34      | AA-53       |   |   |   |   | Lead - Starting coil   |     | 1   |
| 8        | 35      | AA-52-A     |   |   |   |   | Lead - Regulator "K"   |     | 1   |
| 8        | 36      | AA-50-A     |   |   |   |   | Lead - Regulator "B"   |     | 1   |
| 8        | 37      | AA-51-A     |   |   |   |   | Lead - Regulator "D"   |     | 1   |
| 8        | 38      | AA-49-A     |   |   |   |   | Lead - Regulator "A"   |     | 1   |
| 8        | 39      | S-310-704   |   |   |   |   | Conduit Assembly - Coml yoke shielding (Titeflex<br>Metal Hose Co., Newark)                      |     | 1   |
| 8        | 40      | S-1001      |   |   |   |   | Elbow - 90°  |     | 1   |
| 8        | 41      | 500-416-8   |   |   |   |   | Screw  |     | 2   |
| 8        | 42      | AN935-416   |   |   |   |   | Washer   |     | 2   |
| 8        | 43      | S-618-1     |   |   |   |   | Connector - Bulkhead   |     | 1   |
| 8        | 44      | S-623-1     |   |   |   |   | Nut - Lock   |     | 1   |
| 8        | 45      | S-913-A     |   |   |   |   | Cover - Control box terminal   |     | 1   |
| 8        | 46      | S-925       |   |   |   |   | Plate - Terminal cover   |     | 1   |
| 8        | 47      | 501-10-32   |   |   |   |   | Screw  |     | 2   |
| 8        | 48      | AN935-10    |   |   |   |   | Washer   |     | 2   |
| 1        | 31      | A-5081-A    |   |   |   |   | Box Assembly - Control   |     | 1   |
| 10       | 1       | S-922-A     |   |   |   |   | Box - Control  |     | 1   |
|          |         | 500-416-10  |   |   |   |   | Screw  |     | 4   |
|          |         | AN935-416   |   |   |   |   | Washer   |     | 4   |
|          |         | 945-4       |   |   |   |   | Washer   |     | 4   |
|          |         | 335-4       |   |   |   |   | Nut  |     | 4   |
| 10       | 2       | S-637       |   |   |   |   | Strap - Ground   |     | 1   |
|          |         | 500-416-8   |   |   |   |   | Screw  |     | 1   |
|          |         | AN935-416   |   |   |   |   | Washer   |     | 1   |
|          |         | AN936B416   |   |   |   |   | Washer   |     | 1   |
|          |         | AN515-416-8 |   |   |   |   | Screw  |     | 1   |
|          |         | 945-4       |   |   |   |   | Washer   |     | 2   |
|          |         | 335-4       |   |   |   |   | Nut  |     | 1   |
| 10       | 3       | S-923       |   |   |   |   | Cover - Control box  |     | 1   |
| 10       | 4       | 530-8-8     |   |   |   |   | Screw - Sheet metal  |     | 4   |
| 10       | 5       | 636         |   |   |   |   | Nut - Coml speed (Tinnerman Products, Inc.,<br>Cleveland, Ohio)                                  |     | 4   |
| 10       | 6       | S-930       |   |   |   |   | Plate - "Equalizer - Starter"  |     | 1   |
| 10       | 7       | 530-2-4     |   |   |   |   | Screw - Sheet metal  |     | 2   |
| 10       | 8       | 8280-K10    |   |   |   |   | Switch - Coml equalizer (Cutler Hammer,<br>Milwaukee, Wisc.)                                     |     | 1   |
| 10       | 9       | BX-33-DC    |   |   |   |   | Voltmeter - Coml (Westinghouse Elec. & Mfg. Co.,<br>40 Wall St. N. Y.)                           |     | 1   |
|          |         |             |   |   |   |   | Screw - Fillister-head 4-36 x 5/6 inch   |     | 3   |
|          |         | AN935-4     |   |   |   |   | Washer   |     | 3   |
|          |         | AN960-4     |   |   |   |   | Washer   |     | 1   |
|          |         |             |   |   |   |   | Nut - Hex 4-36   |     | 3   |

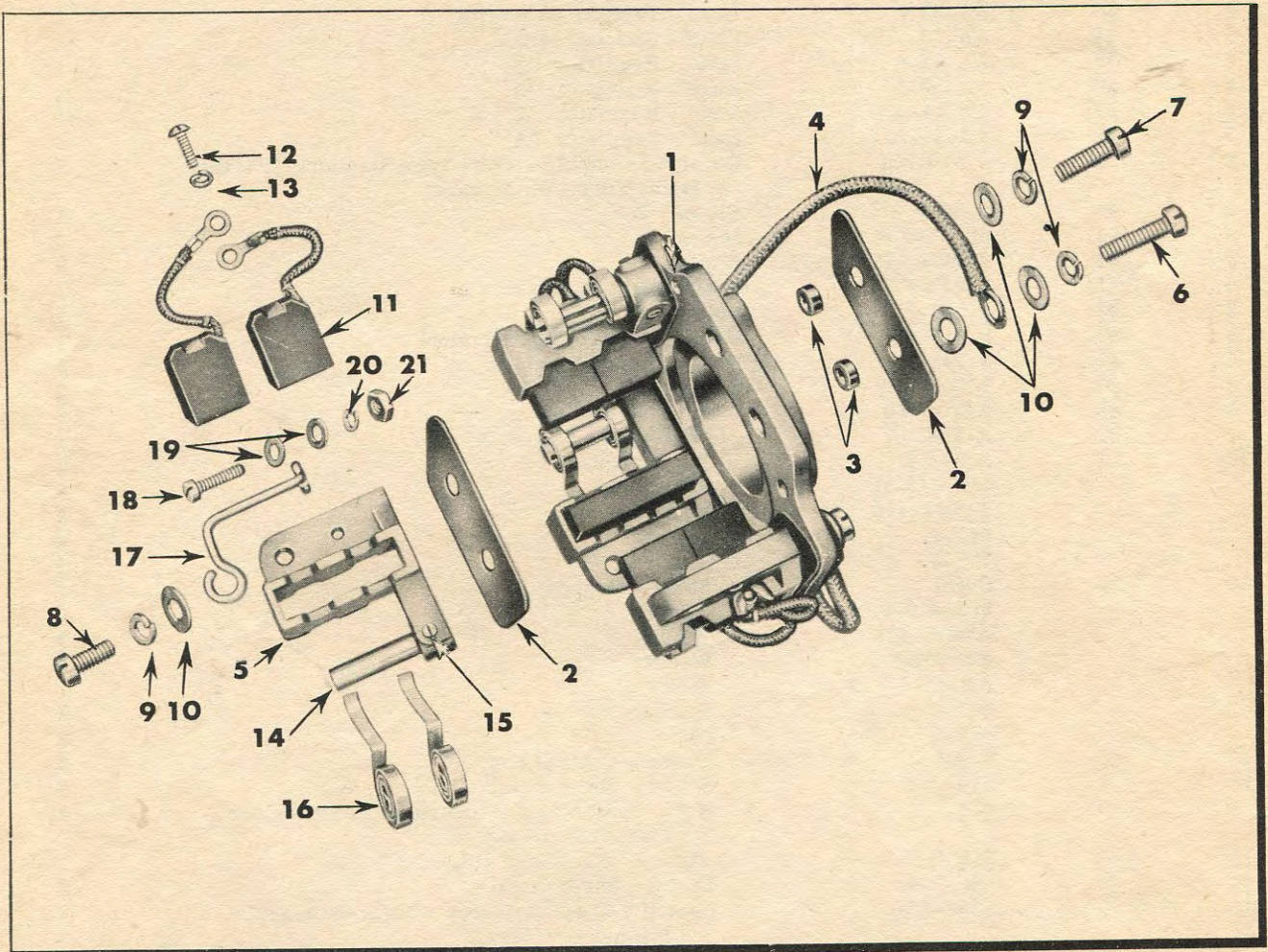


Figure 9 - Brush Holder Parts



| <u>Fig. No.</u> | <u>Ref No.</u> | <u>Part No.</u> | 1 | 2 | 3 | 4 | 5  | <u>Qty Req</u> |
|-----------------|----------------|-----------------|---|---|---|---|--|----------------|
| 10              | 10             | AA-56-A         |   |   |   |   | Lead - Voltmeter negative  | 1              |
| 10              | 11             | AA-55-A         |   |   |   |   | Lead - Voltmeter positive  | 1              |
| 10              | 12             | 89210           |   |   |   |   | Lead - AN connector "D"  | 1              |
| 10              | 13             | 89209           |   |   |   |   | Lead - Equalizer switch to equalizer filter "Out"                        | 1              |
| 10              | 14             | AN3102-28-5P    |   |   |   |   | Receptacle   | 1              |
|                 |                | 500-6-8         |   |   |   |   | Screw  | 4              |
|                 |                | AN936B6         |   |   |   |   | Washer   | 4              |
|                 |                | AN340-6         |   |   |   |   | Nut  | 4              |
| 10              | 15             | AA-42           |   |   |   |   | Lead - AN connector "E"  | 1              |
|                 |                | 500-416-8       |   |   |   |   | Screw  | 1              |
|                 |                | AN936B416       |   |   |   |   | Washer   | 1              |
|                 |                | 335-4           |   |   |   |   | Nut  | 1              |
| 10              | 16             | AA-43-A         |   |   |   |   | Lead - AN connector "B"  | 1              |
| 10              | 17             | S-902           |   |   |   |   | Cut-out - Coml reverse current (Hartman Elec. Mfg. Co., Mansfield, Ohio) | 1              |
|                 |                | 501-10-10       |   |   |   |   | Screw  | 2              |
|                 |                | AN936B10        |   |   |   |   | Washer   | 2              |
|                 |                | AN345-10        |   |   |   |   | Nut  | 2              |
| 10              | 18             | S-920           |   |   |   |   | Switch - Coml starting (Hartman Elec. Mfg. Co., Mansfield, Ohio)         | 1              |
| 10              | 19             | 19845           |   |   |   |   | Insulation - Starting switch   | 1              |
|                 |                | AN515-416-16    |   |   |   |   | Screw  | 3              |
|                 |                | AN936B416       |   |   |   |   | Washer   | 3              |
|                 |                | AN935-416       |   |   |   |   | Washer   | 4              |
|                 |                | 945-4           |   |   |   |   | Washer   | 1              |
|                 |                | 335-4           |   |   |   |   | Nut  | 5              |
| 10              | 20             | AA-48-A         |   |   |   |   | Lead - Insulation block to starting switch                               | 1              |
| 10              | 21             | AA-44-A         |   |   |   |   | Lead - Filter "Out" to reverse current cut-out                           | 1              |
| 10              | 22             | 1107-L          |   |   |   |   | Filter With Brackets - Coml (Tobe Deutschmann Corp., Canton, Mass.)      | 1              |
| 10              | 23             | AN345-10        |   |   |   |   | Nut  | 2              |
|                 |                | AN936B10        |   |   |   |   | Washer   | 2              |
| 10              | 24             | AA-47-A         |   |   |   |   | Lead - Insulation block to main filter "In"                              | 1              |
| 10              | 25             | 1123            |   |   |   |   | Filter With Brackets - Coml (Tobe Deutschmann Corp., Canton, Mass.)      | 1              |
|                 |                | AN345-10        |   |   |   |   | Nut  | 2              |
|                 |                | AN936B10        |   |   |   |   | Washer   | 2              |
| 10              | 26             | AA-138          |   |   |   |   | Lead - Equalizer filter "In" to insulation block                         | 1              |
| 10              | 27             | S-926-A         |   |   |   |   | Block - Terminal insulating  | 1              |
|                 |                | AN345-10        |   |   |   |   | Nut  | 2              |
|                 |                | 500-6-8         |   |   |   |   | Screw  | 2              |
|                 |                | AN935-6         |   |   |   |   | Washer   | 2              |
|                 |                | AN340-6         |   |   |   |   | Nut  | 2              |
|                 |                | 500-416-20      |   |   |   |   | Screw  | 3              |
|                 |                | AN936B416       |   |   |   |   | Washer   | 6              |
|                 |                | 945-4           |   |   |   |   | Washer   | 6              |
|                 |                | AN935-416       |   |   |   |   | Washer   | 6              |
|                 |                | 335-4           |   |   |   |   | Nut  | 6              |

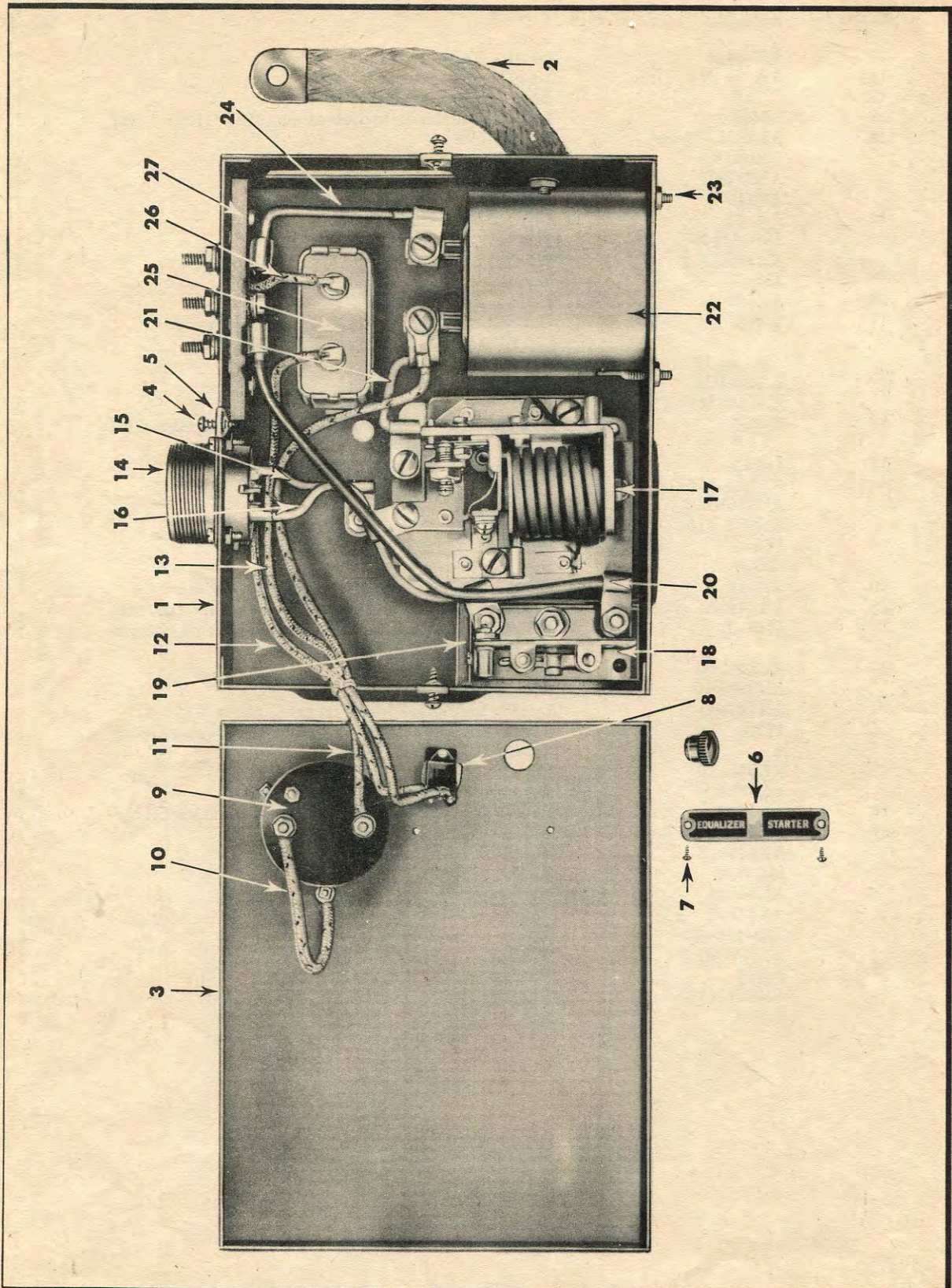


Figure 10 - Control Box Parts

SECTION IIINUMERICAL PARTS LIST**\*\* COMMERCIAL MAGNETO ASSEMBLY**

| <u>Part No.</u> | <u>Part Name</u>            | <u>Qty Req</u> | <u>Part No.</u> | <u>Part Name</u>                     | <u>Qty Req</u> |
|-----------------|-----------------------------|----------------|-----------------|--------------------------------------|----------------|
| M-31X           | Screw                       | 2              | 4216            | Screw                                | 2              |
| M-52X           | Washer - Lock               | 2              | 4652            | Plate - Contact                      | 1              |
| M-55XA          | Washer - Lock               | 3              | *4653           | Seal - Felt                          | 1              |
| M-58X           | Washer - Lock               | 2              | *4654           | Retainer - Seal                      | 1              |
| M-71X           | Nut                         | 2              | *4655           | Plate - Stator                       | 1              |
| M-87X           | Screw                       | 1              | X-4656          | Plate - Stator, com-<br>plete        | 1              |
| M-90X           | Washer - Lock               | 4              | X-4658          | Coil Group                           | 1              |
| IXA-256         | Washer                      | 1              | X-4659          | Rotor - Complete                     | 1              |
| 1100            | Screw - Condenser<br>clamp  | 4              | 4661            | Cam                                  | 1              |
| 2264A or B      | Wedge - Coil                | 1 or 2         | 4662            | Key - Rotor                          | 1              |
| *2329           | Pin - Dowel                 | 2              | 4663            | Key - Cam                            | 1              |
| 2573            | Washer - Lock               | 1              | 4664            | Plate - Starter                      | 1              |
| *X-3099         | Core Group                  | 1              | 4665            | Screw - Starter plate                | 3              |
| X-3215          | Breaker Arm - Com-<br>plete | 1              | 4666            | Nut - Puller                         | 1              |
| *Y-3217         | Block - Spring              | 1              | X-4672          | Interlead                            | 2              |
| 3219            | Washer - Pivot              | 1              | 4676            | Washer - Starter<br>plate screw lock | 3              |
| 3230            | Nut                         | 1              | X-4726          | Group - Stator<br>replacement        | 1              |
| 3454            | Bushing                     | 1              | 4754            | Spring - Contact                     | 1              |
| 3455            | Clamp                       | 1              | 4755            | Button - Stop                        | 1              |
| *4209           | Pin - Pivot                 | 1              | 4759            | Screw                                | 1              |
| 4210            | Lock - Spring               | 1              |                 |                                      |                |
| X-4215          | Condenser                   | 2              |                 |                                      |                |

**\*\*\* COMMERCIAL SPARK PLUG ASSEMBLY**

| <u>Part No.</u> | <u>Part Name</u> | <u>Qty Req</u> | <u>Part No.</u> | <u>Part Name</u>     | <u>Qty Req</u> |
|-----------------|------------------|----------------|-----------------|----------------------|----------------|
| 213-1100        | Conduit Assembly | 1              | A-21337         | Shield - Spark plug  | 1              |
| A-20343         | Gasket           | 1              | A-21535         | Nut 1-5/16-24 thread | 1              |
| A-22706         | Connector        | 1              | A-27487         | Insulator            | 1              |

\* Not supplied separately, but included in X-4726.

\*\* Wico Electric Co., Springfield, Massachusetts, F. W. 5-1/4 Specification No. 1070B.

\*\*\* Titeflex Metal Hose Co., Newark, N. J. No. 21305.

POWER PLANT ASSEMBLY

| <u>Part No.</u> | <u>Assy List<br/>Page No.</u> | <u>Qty<br/>Req</u> | <u>Part No.</u> | <u>Assy List<br/>Page No.</u> | <u>Qty<br/>Req</u> |
|-----------------|-------------------------------|--------------------|-----------------|-------------------------------|--------------------|
| *1 ST           | 33                            | 1                  | 0676            | 35                            | 1                  |
| F2X             | 43                            | 1                  | S-81f           | 27                            | 1                  |
| 2T-4.2          | 41                            | 1                  | S-829-1         | 41                            | 1                  |
| AA-4            | 39                            | 2                  | S-830-1         | 39                            | 1                  |
| HO-14S          | 31                            | 1                  | *S-864-3        | 37                            | 1                  |
| *M-31X          | 31                            | 2                  | *S-864-4        | 37                            | 1                  |
| AA-32           | 39                            | 4                  | *S-882-A        | 27                            | 1                  |
| BX-33DC         | 41                            | 1                  | S-902           | 43                            | 1                  |
| AA-42           | 43                            | 1                  | S-913-A         | 41                            | 1                  |
| AA-43-A         | 43                            | 1                  | S-920           | 43                            | 1                  |
| AA-44-A         | 43                            | 1                  | S-922-A         | 41                            | 1                  |
| AA-45           | 41                            | 1                  | S-923           | 41                            | 1                  |
| AA-46-A         | 41                            | 1                  | S-925           | 41                            | 1                  |
| AA-47-A         | 43                            | 1                  | S-926-A         | 43                            | 1                  |
| AA-48-A         | 43                            | 1                  | S-930           | 41                            | 1                  |
| AA-49-A         | 41                            | 1                  | S-952           | 39                            | 2                  |
| AA-50-A         | 41                            | 1                  | S-953-1         | 39                            | 2                  |
| AA-51-A         | 41                            | 1                  | S-987-1         | 39                            | 1                  |
| AA-52-A         | 41                            | 1                  | S-1001          | 41                            | 1                  |
| *M-52X          | 31                            | 2                  | S-1030          | 39                            | 1                  |
| AA-53           | 41                            | 1                  | S-1034          | 27                            | 1                  |
| AA-55-A         | 43                            | 1                  | *1100           | 31                            | 4                  |
| *M-55XA         | 31                            | 4                  | 1107-L          | 43                            | 1                  |
| AA-56-A         | 43                            | 1                  | 1123            | 43                            | 1                  |
| *M-58X          | 31                            | 2                  | A-1549          | 33                            | 1                  |
| *M-71X          | 31                            | 2                  | A-1551          | 31                            | 1                  |
| *M-72X          | 31                            | 1                  | *2264-A or B    | 31                            | 1 or 2             |
| 76-EF           | 27                            | 1                  | *2329           | 31                            | 2                  |
| AA-80-1         | 37                            | 1                  | A-2505          | 37                            | 1                  |
| *M-87X          | 31                            | 1                  | 02744           | 35                            | 1                  |
| AA-89           | 27                            | 2                  | X-3099          | 31                            | 1                  |
| *M-90X          | 31                            | 4                  | 3203            | 29                            | 1                  |
| AA-138          | 43                            | 1                  | X-3215          | 31                            | 1                  |
| 0162            | 33,35                         | 2                  | *Y-3217         | 31                            | 1                  |
| AA-187-B        | 29                            | 1                  | *3219           | 31                            | 1                  |
| AA-188          | 35                            | 1                  | 3454            | 31                            | 1                  |
| AA-189          | 37                            | 1                  | 3455            | 31                            | 1                  |
| AA-190          | 37                            | 1                  | *4209           | 31                            | 1                  |
| AA-192          | 37                            | 1                  | 4210            | 31                            | 1                  |
| AA-193-A        | 39                            | 1                  | X-4215          | 31                            | 2                  |
| AA-219          | 29                            | 1                  | *4216           | 31                            | 1                  |
| AA-220          | 33                            | 1                  | 4652            | 31                            | 1                  |
| AA-224          | 33                            | 1                  | *4653           | 31                            | 1                  |
| AA-247          | 33                            | 1                  | *4654           | 31                            | 1                  |
| *1XA-256        | 31                            | 1                  | *4655           | 29                            | 1                  |
| AA-290          | 37                            | 1                  | X-4656          | 29                            | 1                  |
| S-310-704       | 41                            | 1                  | X-4658          | 31                            | 1                  |
| AA-328          | 33                            | 1                  | Y-4659          | 31                            | 1                  |
| AA-340          | 35                            | 1                  | 4661            | 31                            | 1                  |
| AA-351          | 31                            | 1                  | 4662            | 31                            | 1                  |
| AA-359-A        | 27                            | 1                  | 4663            | 31                            | 1                  |
| S-399-1         | 35                            | 1                  | 4664            | 31                            | 1                  |
| AA-406          | 29                            | 1                  | 4666            | 31                            | 1                  |
| S-618-1         | 41                            | 1                  | X-4672          | 31                            | 2                  |
| S-623-1         | 41                            | 1                  | X-4726          | 29                            | 1                  |
| 636             | 41                            | 8                  | 4754            | 31                            | 1                  |
| S-637           | 41                            | 1                  | 4755            | 31                            | 1                  |

\*Not procurable separately.

| <u>Part No.</u> | <u>Assy List<br/>Page No.</u> | <u>Qty<br/>Req</u> | <u>Part No.</u> | <u>Assy List<br/>Page No.</u> | <u>Qty<br/>Req</u> |
|-----------------|-------------------------------|--------------------|-----------------|-------------------------------|--------------------|
| *4759           | 31                            | 1                  | *19514          | 37                            | 1                  |
| A-5081-A        | 41                            | 1                  | *19515          | 39                            | 16                 |
| *A-5099         | 39                            | 1                  | *19533-A        | 29                            | 1                  |
| 5202-R          | 27                            | 1                  | 19537           | 29                            | 1                  |
| A-6017          | 29                            | 1                  | 19551-D         | 33                            | 1                  |
| S-6942          | 29                            | 1                  | 19562-B         | 39                            | 1                  |
| 8280-K-10       | 41                            | 1                  | *19564          | 37                            | 20                 |
| A-9071-A        | 27                            | 1                  | *19566          | 37                            | 20                 |
| 10502           | 27                            | 4                  | 19567           | 39                            | 8                  |
| *10542          | 27                            | 1                  | 19568-1         | 39                            | 4                  |
| *10546-B        | 27                            | 1                  | *19569          | 37                            | 1                  |
| 10547           | 27                            | 2                  | *19569-1        | 37                            | 1                  |
| *10936-A        | 33                            | 2                  | *19570          | 37                            | 1                  |
| *11031          | 27                            | 1                  | *19571          | 37                            | 1                  |
| 11034-C         | 27                            | 1                  | *19572          | 37                            | 1                  |
| 11204           | 33,37                         | 3                  | 19573           | 37                            | 1                  |
| 11569-FV        | 27                            | 1                  | *19575-3        | 35                            | 1                  |
| 15008           | 37                            | 1                  | *19575-4        | 35                            | 1                  |
| 15080-C         | 33                            | 1                  | *19577          | 29                            | 1                  |
| *18114-E        | 31                            | 1                  | *19579-1        | 35                            | 1                  |
| 18123-A         | 33                            | 1                  | *19580-1        | 33                            | 1                  |
| 18602-C         | 27                            | 1                  | *19580-2        | 33                            | 1                  |
| 18659-C         | 27                            | 1                  | *19593-E        | 33                            | 1                  |
| 18660           | 27                            | 1                  | *19613-A        | 33                            | 1                  |
| 18662           | 27                            | 1                  | *19614-A        | 33                            | 1                  |
| *18680-B        | 37                            | 1                  | *19617          | 37                            | 1                  |
| 18905-A-2       | 27                            | 1                  | *19618          | 35                            | 1                  |
| 19102-3         | 39                            | 1                  | 19619-A         | 29                            | 1                  |
| *19133-1        | 27                            | 1                  | 19620           | 29                            | 1                  |
| 19144-K         | 37                            | 1                  | 19661-A         | 27                            | 1                  |
| 19149           | 33                            | 1                  | 19665           | 35                            | 1                  |
| 19165-A         | 33                            | 1                  | *19684-A        | 33                            | 1                  |
| 19238           | 27                            | 2                  | 19722           | 27                            | 4                  |
| 19252           | 39                            | 2                  | *19748          | 29                            | 3                  |
| 19265           | 29                            | 4                  | *19757-A        | 29                            | 1                  |
| *19279          | 29                            | 1                  | 19818           | 27                            | 1                  |
| *19375-2        | 37                            | 1                  | 19821           | 27                            | 1                  |
| 19376           | 35                            | 3                  | *19828          | 37                            | 1                  |
| *19377-2        | 29                            | 1                  | 19836-B         | 33                            | 1                  |
| 19380           | 29                            | 1                  | 19844           | 41                            | 1                  |
| 19381-B         | 29                            | 1                  | 19845           | 43                            | 1                  |
| 19385           | 29                            | 1                  | 19869-A         | 27                            | 4                  |
| 19398           | 27                            | 2                  | 19878           | 33                            | 1                  |
| *19409          | 27                            | 2                  | 19896           | 33                            | 1                  |
| 19426           | 27                            | 4                  | 19899           | 29                            | 1                  |
| 19427           | 29                            | 1                  | 19900           | 35                            | 1                  |
| 19434-A         | 37                            | 1                  | 19914-A         | 39                            | 1                  |
| 19454           | 29                            | 1                  | 19939           | 33                            | 1                  |
| *19467          | 29                            | 3                  | *19950-A        | 37                            | 1                  |
| *19468          | 29                            | 1                  | *19957          | 37                            | 1                  |
| 19484           | 29                            | 1                  | 19958           | 33                            | 1                  |
| *19488          | 37                            | 1                  | *19959          | 33                            | 1                  |
| 19493           | 39                            | 4                  | 19960           | 33                            | 1                  |
| 19495-A         | 39                            | 1                  | 19961           | 33                            | 1                  |
| *19496          | 39                            | 520                | 19962           | 33                            | 1                  |
| *19498          | 39                            | 4                  | 19982           | 33                            | 1                  |
| 19499           | 39                            | 8                  | 19983           | 27                            | 1                  |
| 19502-4         | 39                            | 8                  | 19984           | 29                            | 1                  |
| *19504          | 39                            | 16                 | 19985           | 35                            | 1                  |
| 19510           | 39                            | 8                  | 19989           | 39                            | 1                  |
| 19512-A         | 39                            | 2                  |                 |                               |                    |

\*Not procurable separately.

| <u>Part No.</u> | <u>Assy List Page No.</u> | <u>Qty Req</u> | <u>Part No.</u> | <u>Assy List Page No.</u> | <u>Qty Req</u> |
|-----------------|---------------------------|----------------|-----------------|---------------------------|----------------|
| 19997           | 35                        | 1              | *60026          | 29                        | 3              |
| K-21879         | 31                        | 1              | 60032-A         | 33                        | 4              |
| *30510          | 37                        | 172            | 60034-A         | 35                        | 1              |
| *30510-F        | 37                        | 2              | *60037-B        | 29                        | 1              |
| *40043          | 27                        | 2              | *60038-C        | 29                        | 1              |
| *40067          | 29                        | 1              | *60042          | 33                        | 1              |
| *40082-3        | 29                        | 1              | *60044          | 35                        | 1              |
| *40083          | 29                        | 1              | *60045          | 35                        | 1              |
| 40146           | 35                        | 1              | *60046          | 37                        | 1              |
| *40158          | 33                        | 1              | *60047          | 37                        | 1              |
| *40159          | 37                        | 1              | 60048-A         | 35                        | 1              |
| 40176           | 35                        | 1              | 60049-C         | 35                        | 1              |
| 40177           | 29                        | 1              | 60051           | 35                        | 2              |
| 40203           | 27                        | 1              | *60052-A        | 35                        | 1              |
| 40210-A         | 37                        | 1              | *60054          | 35                        | 1              |
| *40221          | 37                        | 1              | 60057           | 35                        | 1              |
| *40222          | 37                        | 1              | 60058-A         | 33                        | 1              |
| *40224          | 37                        | 1              | 60059           | 35                        | 1              |
| *40225          | 37                        | 1              | *60060          | 35                        | 1              |
| *40228          | 37                        | 1              | 60061-A         | 35                        | 1              |
| 40229           | 35                        | 2              | *60062-A        | 29                        | 1              |
| 47306           | 27                        | 1              | *60063-A        | 29                        | 1              |
| 50052           | 33                        | 1              | 77502           | 39                        | 1              |
| *50086          | 33                        | 1              | 80074           | 39                        | 4              |
| 50106           | 35                        | 1              | 80078           | 39                        | 1              |
| 50112           | 35                        | 1              | 80091           | 39                        | 8              |
| 60001           | 27                        | 1              | 80139           | 35                        | 1              |
| 60017-F         | 31                        | 1              | *81010          | 29                        | 1              |
| 60018-B         | 33                        | 1              | *84012-         | 33                        | 2              |
| 60020-A         | 37                        | 1              | 88507           | 27                        | 1              |
| 60022-D         | 31                        | 1              | 88603           | 29                        | 1              |
| 60023-1         | 27                        | 1              | 89209           | 43                        | 1              |
| 60023-2         | 27                        | 1              | 89210           | 43                        | 1              |
| 60025-C         | 27                        | 1              | 89268           | 31                        | 1              |

\*Not procurable separately.



