

Dom LAPELLA

RESTRICTED

TECHNICAL ORDER
No. 03-65B-1

HANDBOOK OF INSTRUCTIONS

WITH

PARTS CATALOG

FOR

AUXILIARY POWER PLANT MODEL HRU-28

MANUFACTURED BY

HOMELITE CORPORATION

PORT CHESTER, N. Y.

Contracts W535 ac-20665
DAW535 ac-252

This Technical Order replaces T. O. No. 03-65B-1, dated April 10, 1942.

NOTE: Reference to the periodic inspections, specified in Section VI, will be entered where applicable on the A. A. F. Form 41A.

Handwritten notes:
 2 Plug 19726
 2 Condenser x 4215
 Contact Plate 4652
 Breaker arm complete 3215
 28035
 37813
 28034
 19568-1



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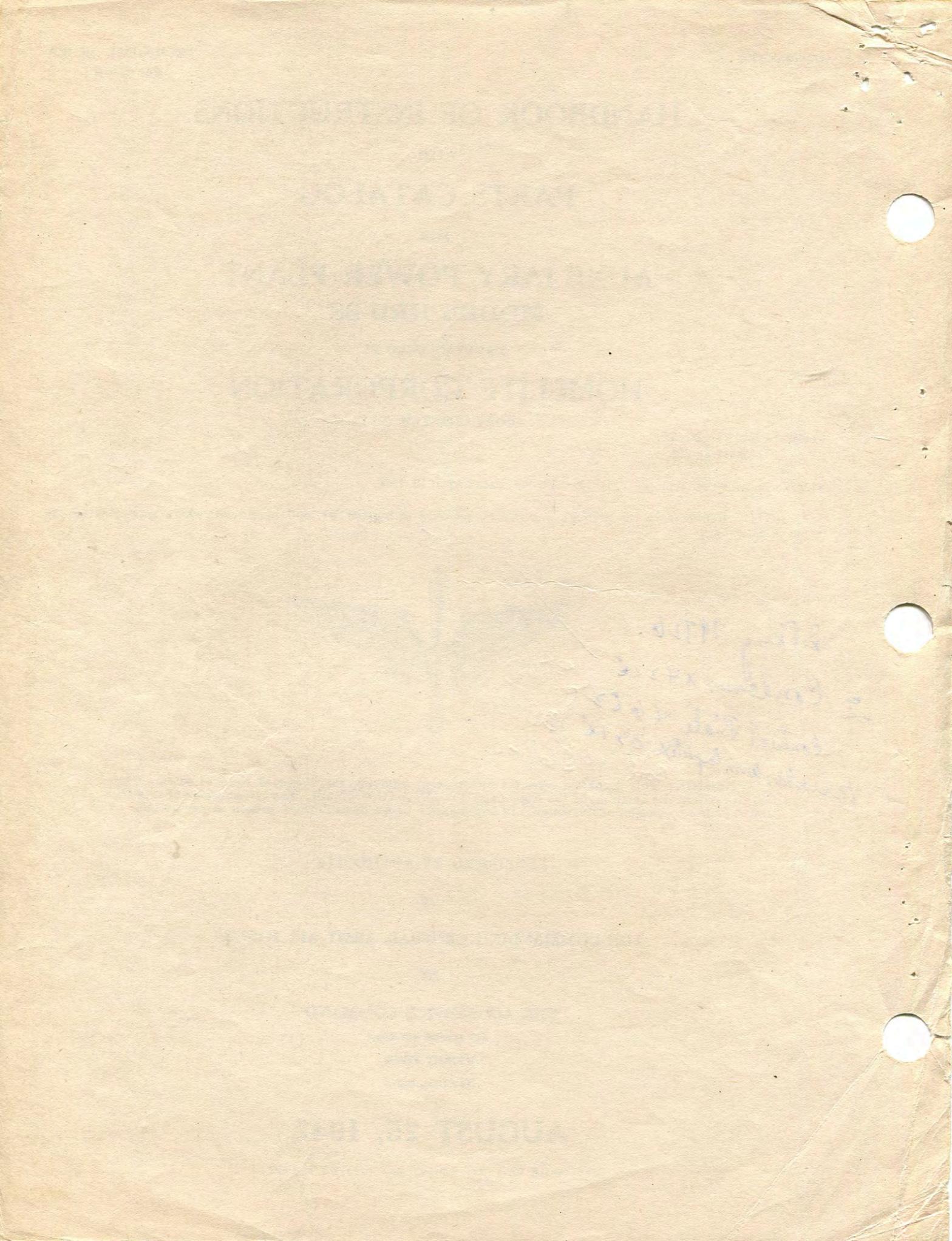


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SECTION IINTRODUCTION

1. This Handbook is issued as the basic Technical Order for the equipment involved.
2. This Handbook contains descriptive data and instructions for Auxiliary Power Plant, known as Homelite model No. HRU-28. It 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. The Power Plant can be used with the batteries alone, or in parallel with the main engine generators.
3. 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 (figure 1).

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

T. O. No.

03-5AD-2 Generator Voltage Regulator and Generator Current Control Switch Relay.

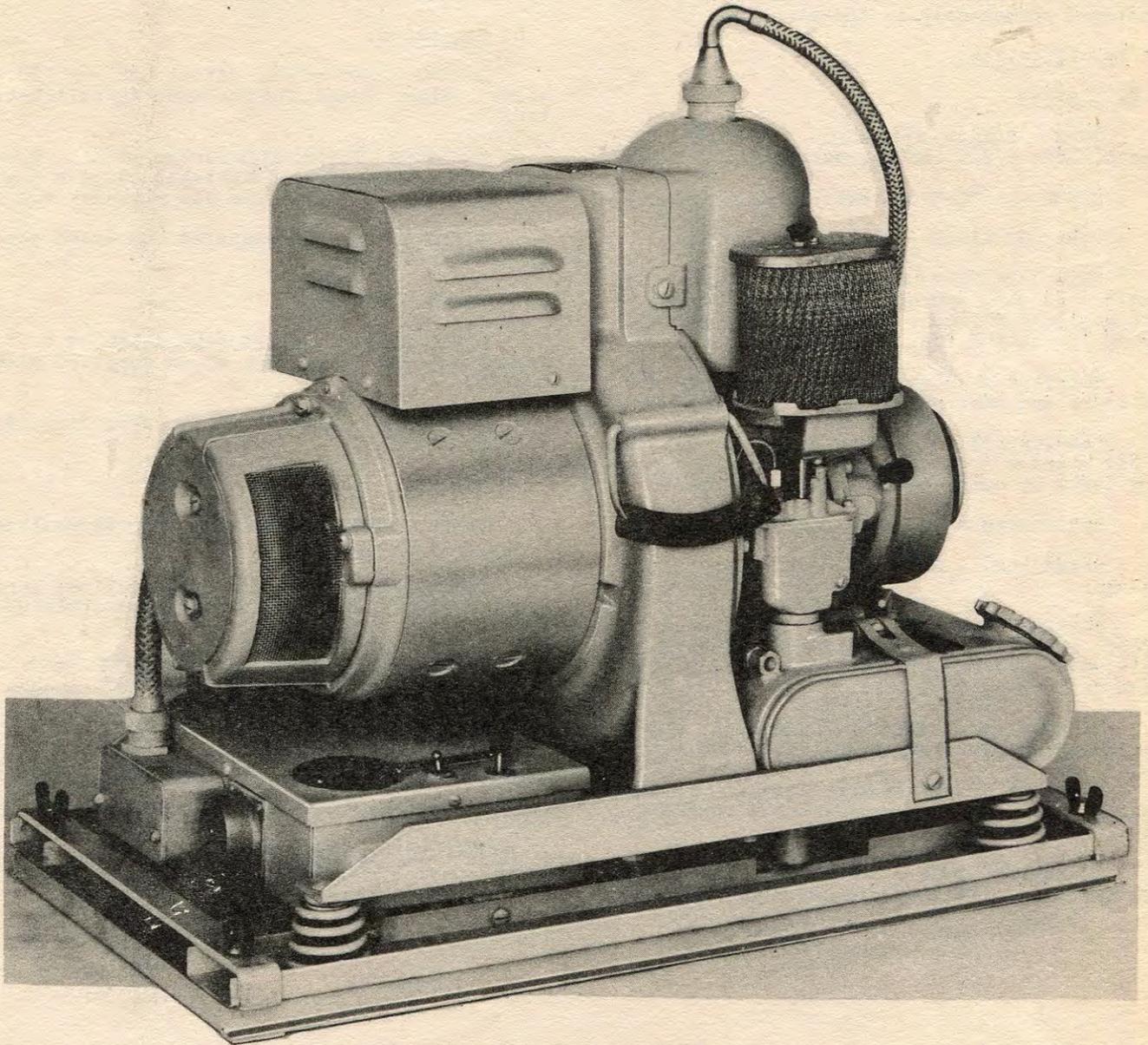


Figure 1 - Model HRU-28 Power Plant Assembly

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 r.p.m., 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.

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

SPEED - 3200-3700 revolutions per minute.

FUEL CONTAINER - Capacity 1 gallon.

FUEL CONSUMPTION - Operates under full rated load for approximately 1-1/2 hours on one gallon gasoline. Suitable for operation on 90-100 octane fuel.

IGNITION - High tension Wico magneto. Moisture and dust proof.

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

CARBURETOR - Homelite fixed jet type.

SPARK PLUG - Champion J-10 Commercial, or HO-14S.

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

CYLINDER and PISTON - Aluminum alloy. Cylinder has cast iron liner shrunk to fit.

BEARINGS - Oversize ball bearings on crankshaft, timer shaft, and crank end of connecting rod.

CONNECTING ROD - Steel. Drop forged and heat treated. Ball bearing at crank end.

CRANKSHAFT - Steel. Drop forged and heat treated. Counterweighted to eliminate vibration.

VALVE - One. Independent rotary disc type. Self-grinding requiring no adjustment.

CRANKCASE and FAN HOUSING - Aluminum alloy.

STARTING - By motorizing generator with battery. Also manual by rope on starting plate.

MOUNTING - Four shock-absorbing foot springs on channel iron base.

b. Generator.

RATING - 2000 watts, direct current, 28.5 volts. Shunt wound, for use with 24-volt batteries.

ARMATURE - Shaft, high carbon steel. Core laminated. Impregnated and baked to give high resistance to oil, moisture and abrasive dust.

FIELD COILS - Impregnated and baked same as armature.

FRAME - Steel.

REGULATION - Voltage regulation by G. E. regulator (only base and cover supplied with model).

MOUNTING - Armature shaft keyed directly to engine shaft.

BEARING - Ball.

BRUSH HOLDERS - Mounted on adjustable ring, easily accessible.

COMMUTATOR - "v" ring construction, hard drawn copper - constructed for high speed operation.

OVERALL DIMENSIONS - Complete unit - height 21-3/4 inches, width 16-7/8 inches, length 24-3/8 inches.

WEIGHT - Complete unit 115 lbs.

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 IIIPACKING AND INSTALLATION1. 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 center 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 I.D. flexible gas tight tubing and fasten to tail pipe with a clamp suitable for 1-1/8 inch O.D. tubing. Do not braze tubing to tail pipe. A satisfactory tubing is type WME made by American Brass Co., Waterbury, Conn.

e. To vent the fuel container outside the plane, connect a length of 3/16 inch O.D. 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) Air Corps Spec. 32313.

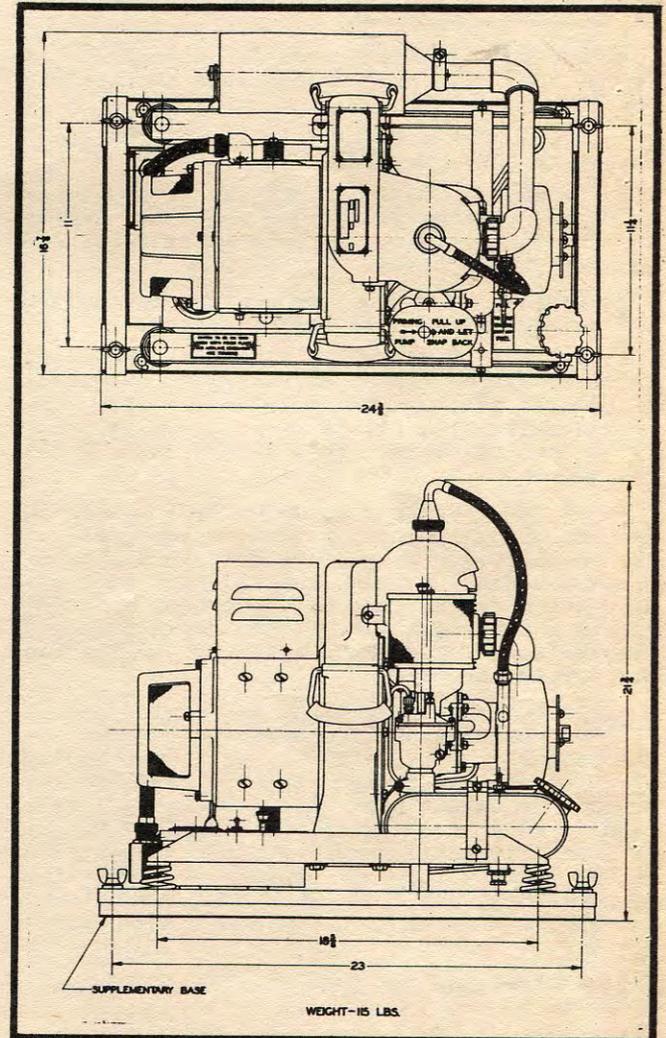


Figure 2 - Dimensional Sketch
Power Plant Assembly

SECTION IV

OPERATION

1. Fuel and Oil.

a. Thoroughly mix 1/2 pint lubricating oil, Spec. 2-91A grade 62 (AN9532 grade 1065) with each gallon of gasoline and then pour into the one gallon fuel container (figure 3). To measure the oil, fill the container cap four times (cap capacity 1/8 pint). Lubrication for the entire engine is obtained by mixing oil with gasoline, and it is extremely important that the oil be thoroughly mixed with the gasoline.

b. The generator end requires no lubrication.

2. Starting (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 5 to 8 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 (figure 3).

a. To stop turn shut-off valve on top of fuel container to "Off" position. The unit will run for approximately one-half 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.

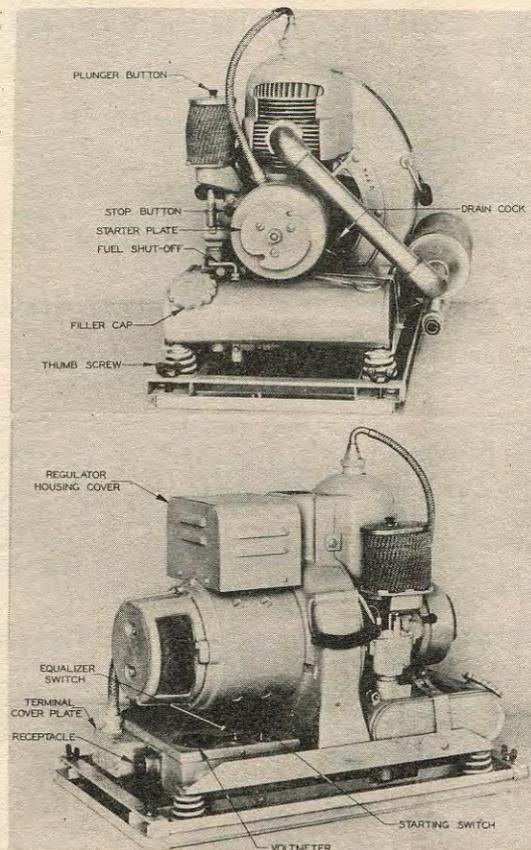


Figure 3 - Starting, Stopping and Operation

SECTION VSERVICE TROUBLES AND REMEDIES1. Generator.

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

<u>Trouble</u>	<u>Possible Cause</u>	<u>Remedy</u>
	(2) Defective wiring	(2) Rewire
	(3) Defective main filter in control box	(3) Replace. (See sect. VI, 2.h.)
	(4) Defective cut-out in control box	(4) Replace. (See sect. VI, 2.h.)
<u>e. Noisy radio reception</u>	(1) Defective filters in control box	(1) Replace. (See sect. 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 sect. VI, 2.h.)

2. Engine.

Fails to start - Hard to start - Runs and stops - Not up to speed (3200-3700 r.p.m.) - 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>
<u>a. Defective Spark Plug</u>	(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 .025 inch
<u>b. Fuel Supply</u>	(1) No fuel in container	(1) Fill
	(2) Shut-off valve in fuel container closed or clogged	(2) Open or clean. (See sect. VI, 2.c.(5))
	(3) Filter in container clogged	(3) Clean. (See sect. VI, 2.c.(5))
	(4) Engine flooded	(4) Drain crankcase by opening drain cock
	(5) Fuel or pressure line clogged	(5) Clean out
	(6) Water or dirt in fuel	(6) Drain and clean
	(7) Drain cock on crankcase open	(7) Close

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

SECTION VI
INSPECTION AND MAINTENANCE

1. Inspection.

Column 22 - Ignition and Electrical.

25-Hour.

Check spark plugs for proper gap and for cleanness (see paragraph 2.a. below).

100-Hour.

Check magneto breaker points for proper gap (see paragraph 2.b.(1) below). 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 (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 S-499 (figure 9). To inspect shielded plugs, unscrew shielded conduit connection from spark plug and remove spark plug with socket wrench

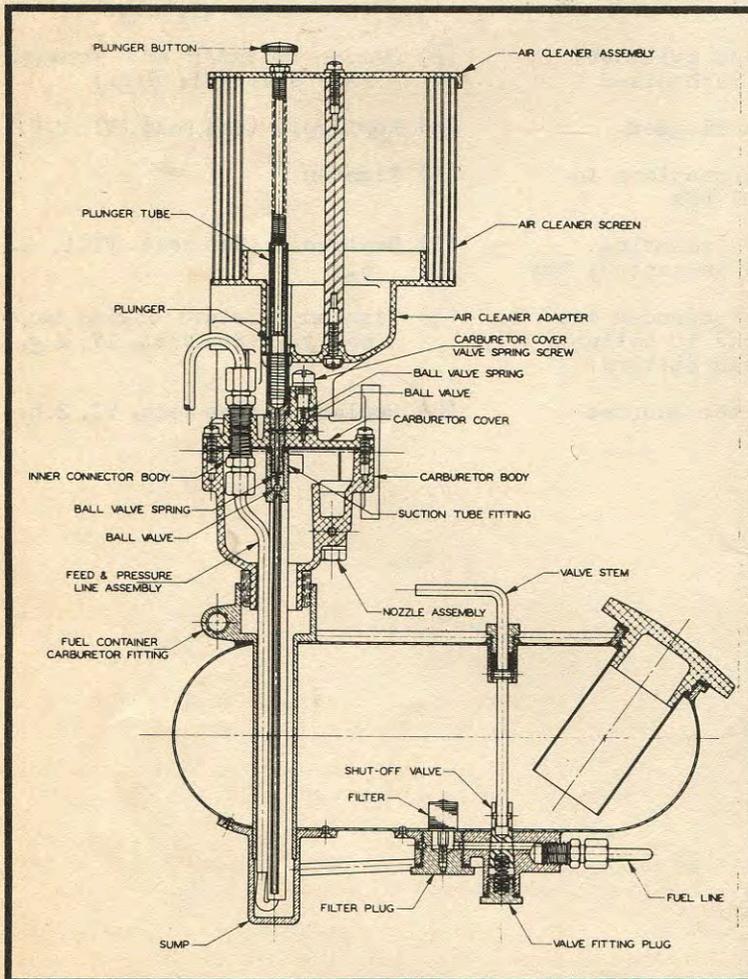
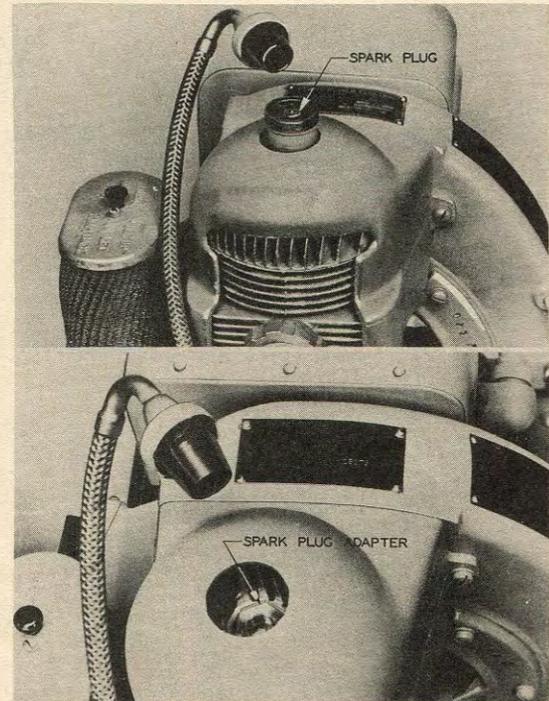


Figure 4 - Carburetor and Fuel Container Assembly

Figure 5 - Spark Plug and Adapter



22074. In removing the plug, the adapter may come out on the plug. If so, remove the plug.

(b) Clean both points and porcelain and adjust to .025 inch. Use gage 22064 (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.

(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.

(d) Note that in replacing plug, the copper gasket goes inside to the metal shield surrounding the plug.

(2) 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 (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 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 hold 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 3 screws holding starter plate to rotor.

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

(c) Turn flywheel slowly in counter-

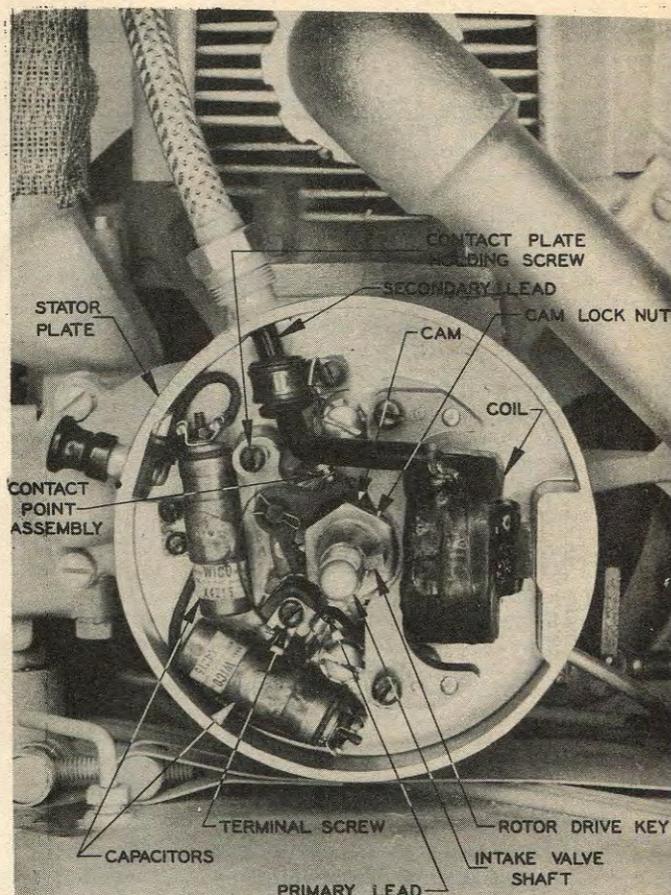


Figure 6 - Contact Point Adjustment

clockwise 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 (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 to decrease.

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

(g) Recheck gap with thickness gage. Re-adjust if necessary. Tightening of set screw 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 following instructions (b) and (c).

(b) To check a capacitor disconnect lead and place an 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 ohms. 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) 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 (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, of 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°. The carburetor bowl is then exposed to view. Operate pump two or three times and observe if fuel is delivered to carburetor bowl. If fuel is not 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 effect 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 next paragraph (5). If proper speed is still not obtained, dismantle carburetor (see 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), 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 screw 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 set screw. Spring goes between valve and hex plug.

(6) Air Cleaner. - Clean air cleaner on carburetor monthly. Take apart and rinse screen in any non-rusting 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 before 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 (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 $\frac{1}{4}$ inch (figure 7). If ports are carbonized over $\frac{3}{32}$ 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 4 cylinder screws with wrench No. S-500 (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° from the point of contact on scale. Apply pressure at 180° 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% of rated capacity and increase an additional 25% at end of each 15-minute running period.

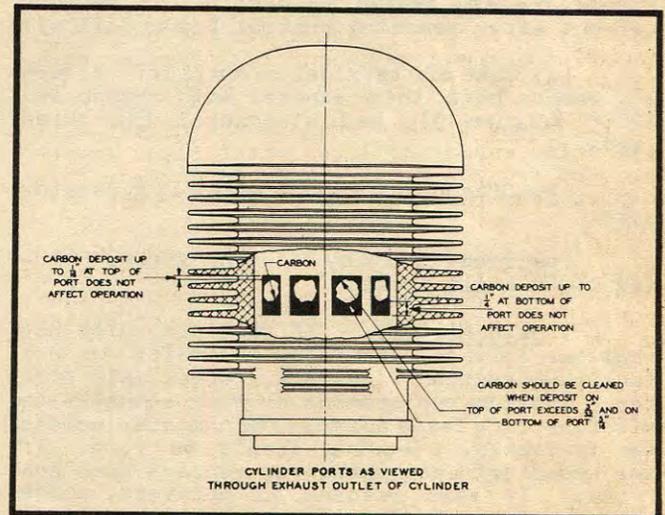


Figure 7 - Exhaust Ports

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 (Figure 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 see 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 con-

tainer. Reading should be infinity. If not, replace with new filter.

(4) Resistor. - If after following preceding instructions 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 r.p.m.

(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/r.p.m. 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 outlined 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) - (4), the trouble lies in the generator. To check, proceed as follows:

(a) Commutator (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 (Figure 8). - Brushes should be inspected every 300 hours, and require replacement only if brush spring rides on brush holder. For inspection, remove brush head cover plates. New brushes are formed to shape of commutator to eliminate arcing and to insure perfect electrical contact. In replac-

ing 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 (Figure 8). - Tension of brush spring should be approximately 17 oz.

(6) Voltage Regulator. - Should the voltmeter register voltage above 30 volts (providing the meter is not faulty - see 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 (see section IV, paragraph 1.) and occasional lubricating of magneto cam follower (see section VI, paragraph 2.b.).

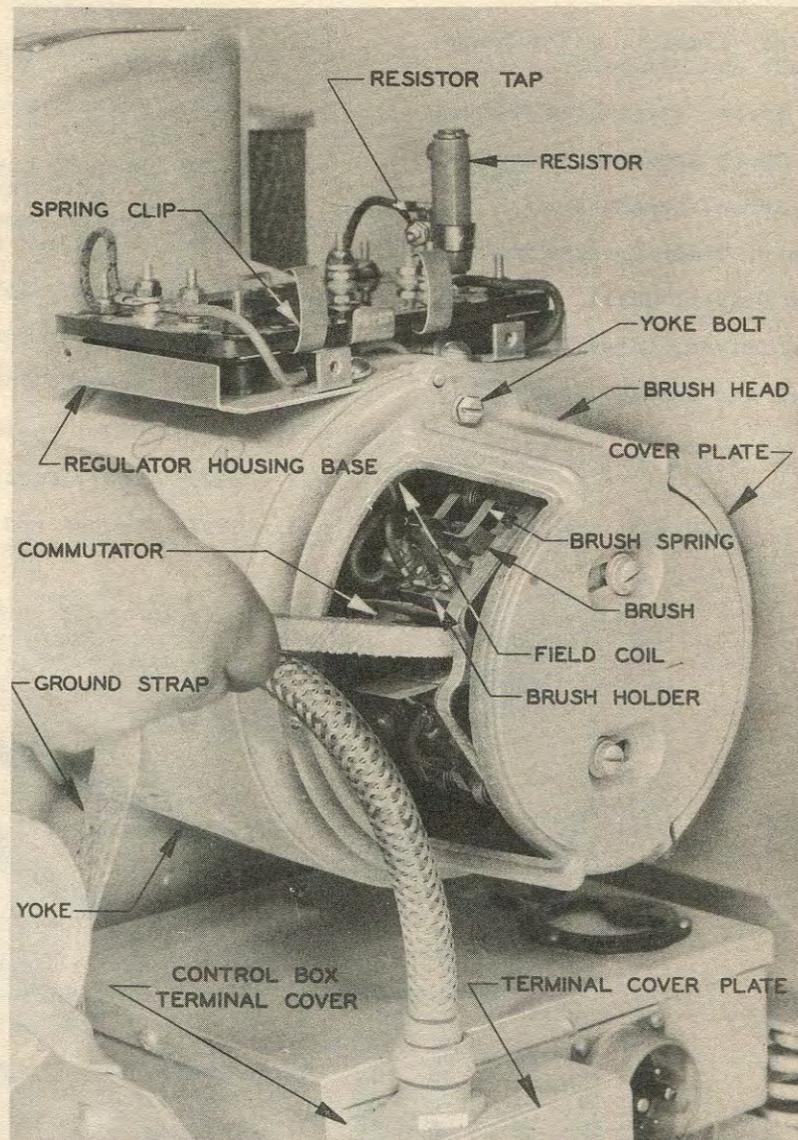


Figure 8 - Commutator Cleaning

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 | p. | S-503 | Wrench, Offset, 1-1/16 inch x 1-1/4 inch |
| b. | AA-140 | Jack Screw, Shaft Puller | q. | S-590-1 | Pin, Long Armature |
| c. | AA-202 | Remover, Flywheel | r. | 19439 | Spanner (for Exhaust Manifold Nut) |
| d. | AA-203 | Puller, Crankpin Bearing | s. | 22005 | Wrench and Handle, Socket 7/8 inch (For Cam Lock Nut and Plug Adapter) |
| e. | AA-204 | Puller, Shaft | t. | 22006 | Wrench, Open End 3/8 inch x 1/2 inch |
| f. | AA-205 | Fixture, Assembling (for Crankshaft and Flywheel) | u. | 22007 | Wrench, Open End 5/8 inch x 7/8 inch |
| g. | AA-229 | Jack Screw, Assembling Fixture | v. | 22008 | Wrench, Open End 9/16 inch x 11/16 inch |
| h. | S-389 | Pin, Short Armature (3 required) | w. | 22056 | Wrench, Socket Head Cap Screw 5/8 inch (For Crankpin Screw) |
| i. | S-394 | Jack Screw, Armature | x. | 22057 | Wrench, Spintite 3/8 inch |
| j. | S-395 | Remover, Timer Bracket Bearing | y. | 22058 | Wrench, Spintite 7/16 inch |
| k. | S-489 | Screw Driver, Small | z. | 22060 | Wrench, Socket 9/16 inch |
| l. | S-498 | Screw Driver, Large (2 required) | a.1. | 22064 | Gage, Feeler |
| m. | S-499 | Wrench and Handle, Spark Plug (14 mm.) | a.2. | 22065 | Tool, Contact Point Dressing |
| n. | S-500 | Wrench, Box and Open End 7/16 inch | a.3. | 22074 | Wrench and Handle, Spark Plug (18 mm.) |
| o. | S-502 | Wrench, Open End, 3/4 inch x 1 inch | | | |

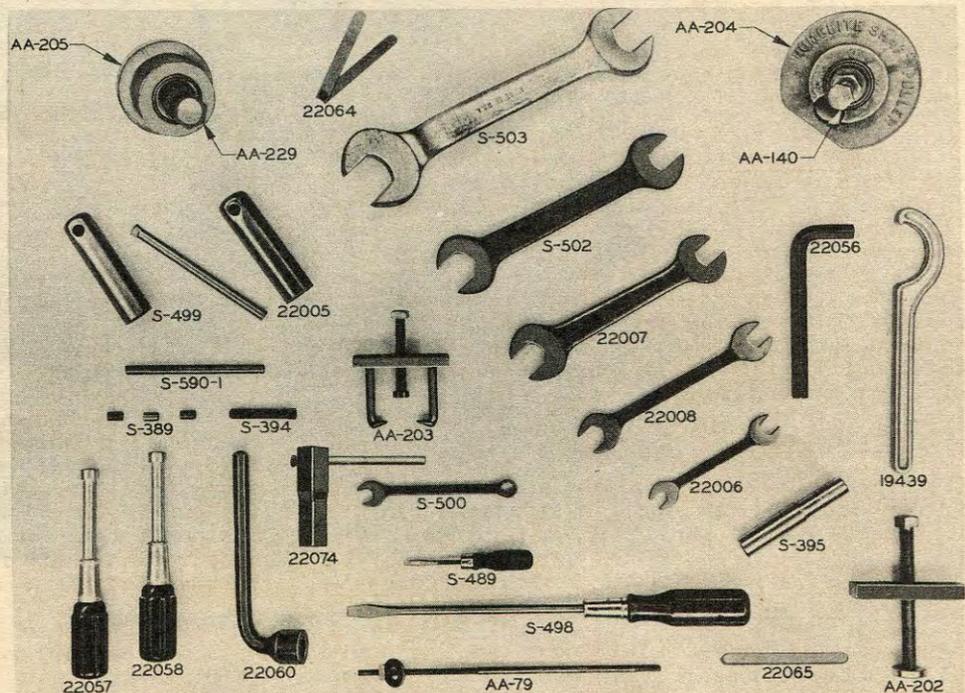


Figure 9 - Service Tools

SECTION VIIIDISMANTLING, REPAIR AND ASSEMBLY

NOTE: To remove Power Plant from plane, reverse installation instructions 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 (Figure 8).(1) To Remove Yoke and Coil Assembly.

(a) Disconnect ground strap where connected to yoke.

(b) Remove 2 screws holding terminal plate and terminal plate cover to control box (figure 3); 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 4 yoke bolts on brush head, insert screw drivers in the 2 notches on sides of fan housing, and gently pry the yoke away. Do not remove the 2 screws in the slots in the face of the brush head.

(2) To Remove Voltage Regulator (Figure 8). The regulator can be removed by taking out 4 screws holding housing cover to base, lifting off cover, and then releasing 2 spring clips holding regulator to base.

(3) To Remove Brush Head from Yoke. - Disconnect, at brush holder four leads coming from yoke and coil assembly. For removal of brush assembly from brush head, take out the 2 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 jack screw No. S-394. Turn up screw as far as threads permit. Remove jack screw 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 (figure 10).

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

(f) Remove carburetor by prying loose with spanner No. 19439 (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 crankthrow at top dead center.

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

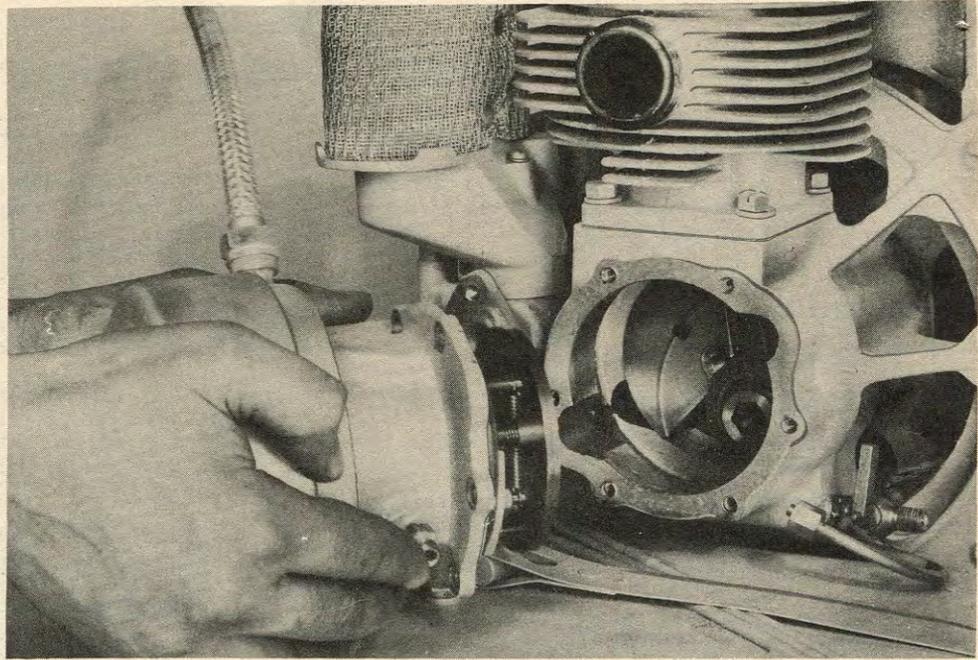
(k) Remove puller, hold bearing forward and turn crankpin to bottom dead center.

(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 (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.

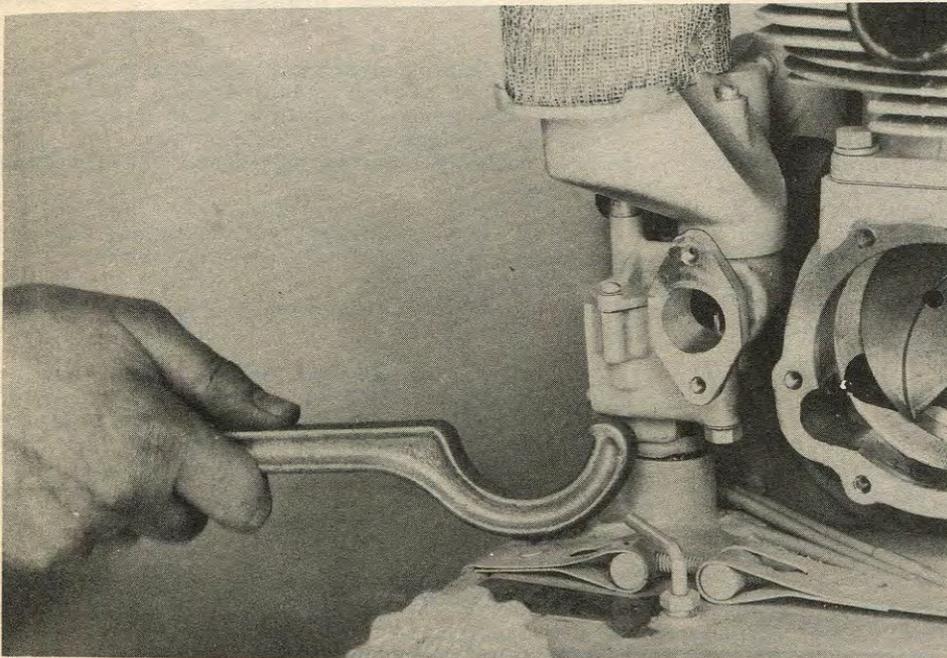


Figure 11-
Removing Carburetor

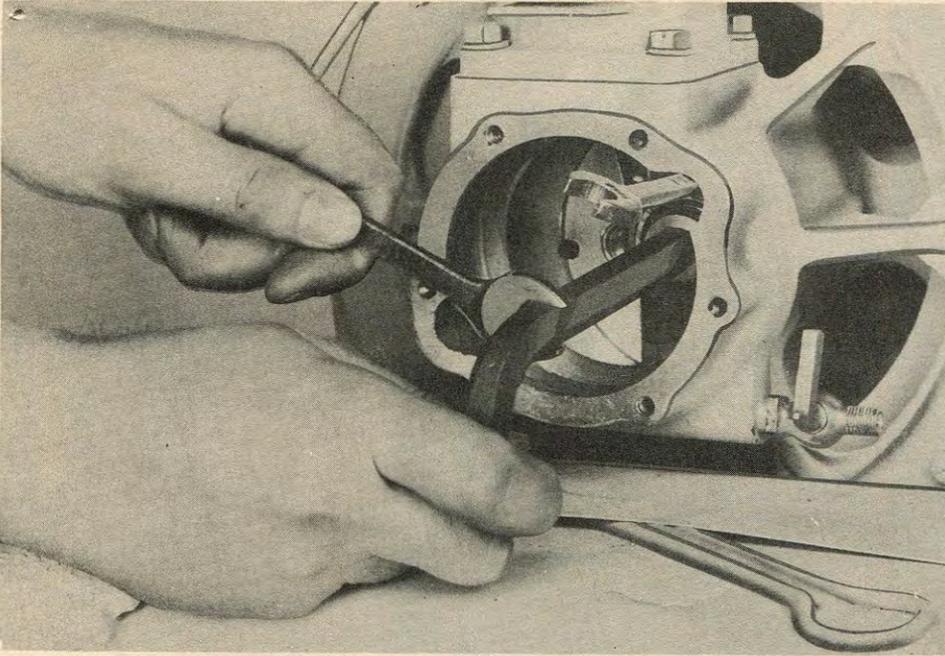


Figure 12-
Removing Crankpin
Screw

(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.)

(3) To Dismantle Carburetor (Figure 4).

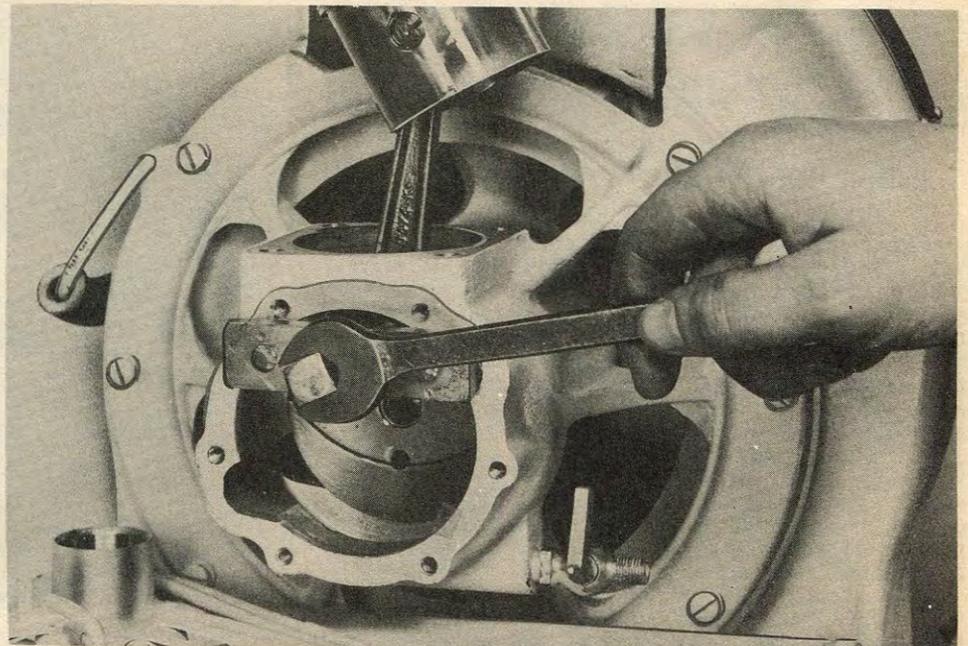
(a) Remove priming pump button and nut above air cleaner and take out holding screw in aluminum cap on top of air cleaner screen. These parts will then come off.

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

(c) Take out the 2 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



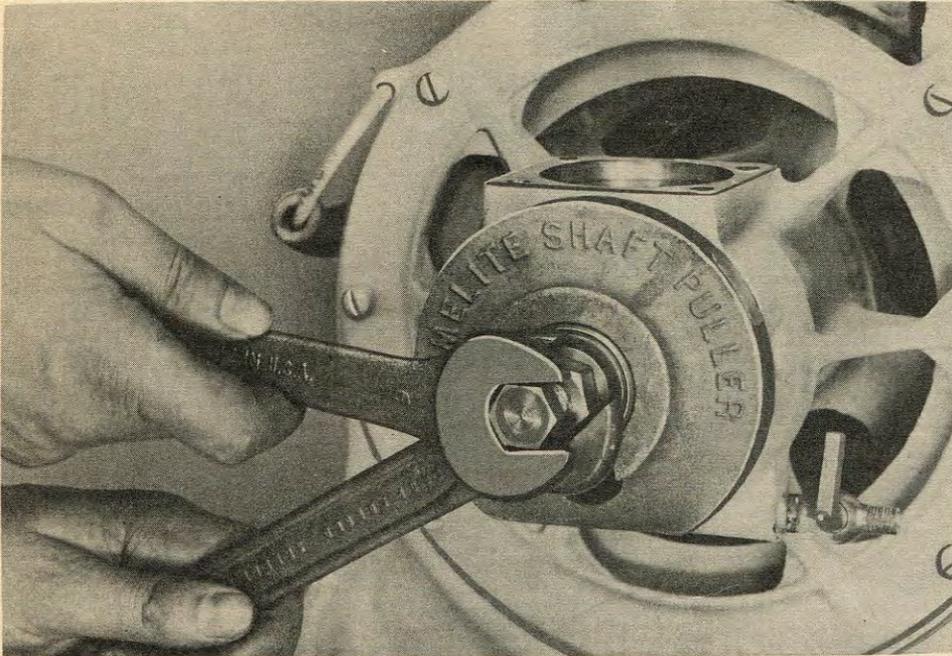


Figure 14-
Removing Crankshaft

(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.

(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 crankthrow, figure 14. Insert the jack screw No. AA-104 and screw it into the center of shaft. Hold head of jack 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 crank case. 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

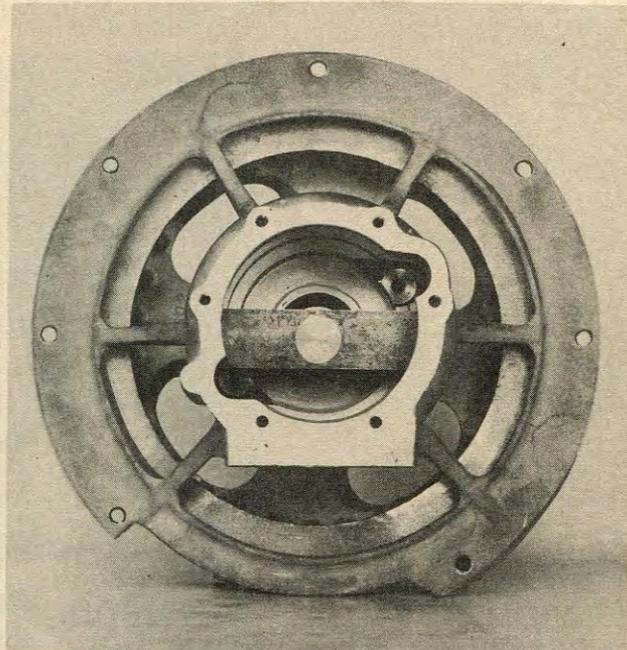


Figure 15 - Removing Flywheel

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.

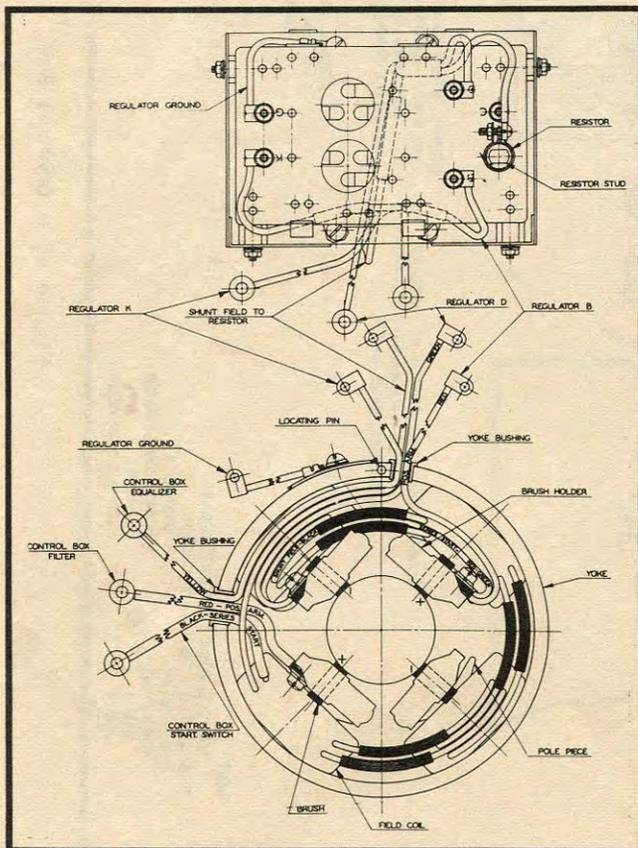
(b) Replace crankshaft spacer in crankcase and place the flywheel remover No. AA-202 so that the crossbar fits into the recess inside the crankcase, and the brass collar passes through openings in the crankcase and comes in contact with the crankshaft spacer, figure 15.

(c) By screwing down on the jack screw, 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. - (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 amps 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 breakdown 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 9). 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 (see 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.)

Figure 16 - Generator Practical Wiring Diagram



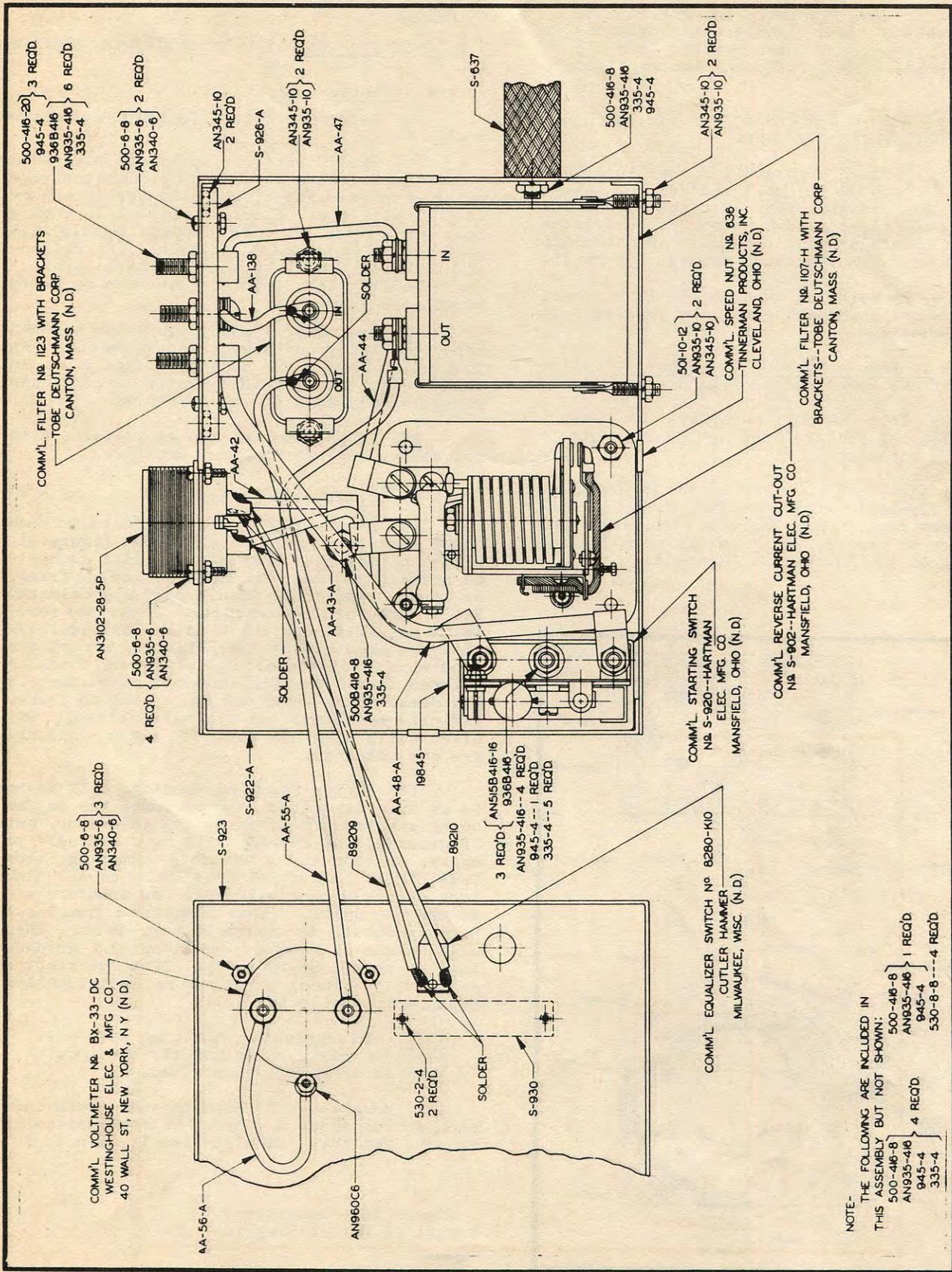


Figure 17 - Control Box, Practical Wiring Diagram

- (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 Homelite 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, paragraph 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 non-acid 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 requires replacement if broken or keyways so worn that it does not fit tightly on shaft.

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

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

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

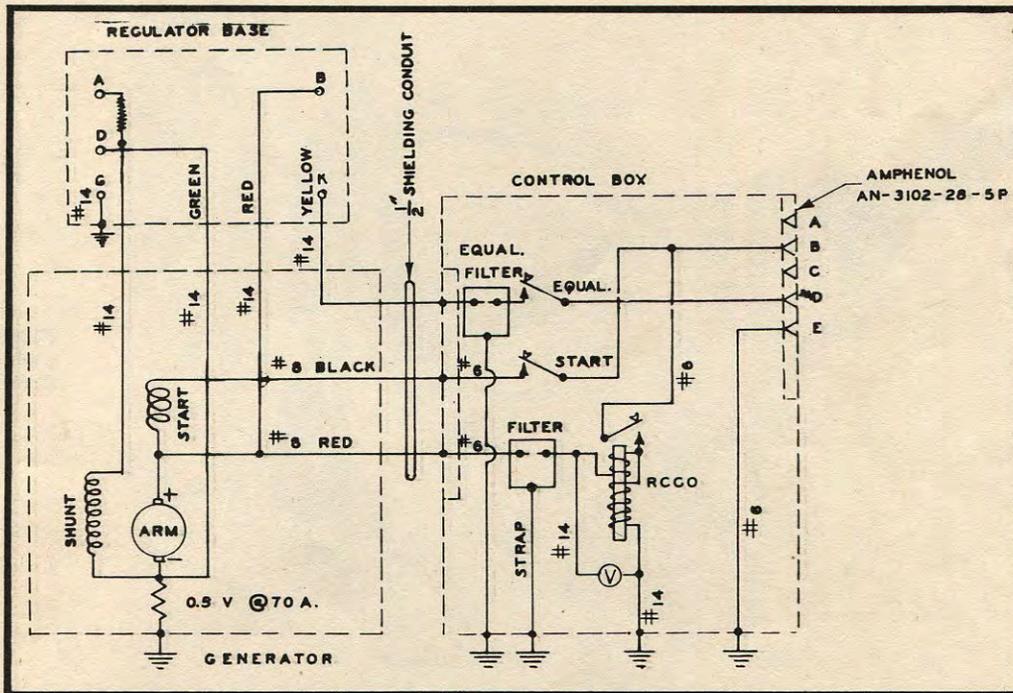


Figure 18 - Generator and Controls, Schematic Wiring Diagram

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 crankthrow. 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, figure 20; insert jack screw 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 jack screw with wrench to keep it from unscrewing from shaft.

(d) Remove fixture and jack screw.

(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 (figure 9). Insert jack screw 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 jack screw head with wrench to keep it from unscrewing from shaft.

(d) Remove fixture and jack screw, 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

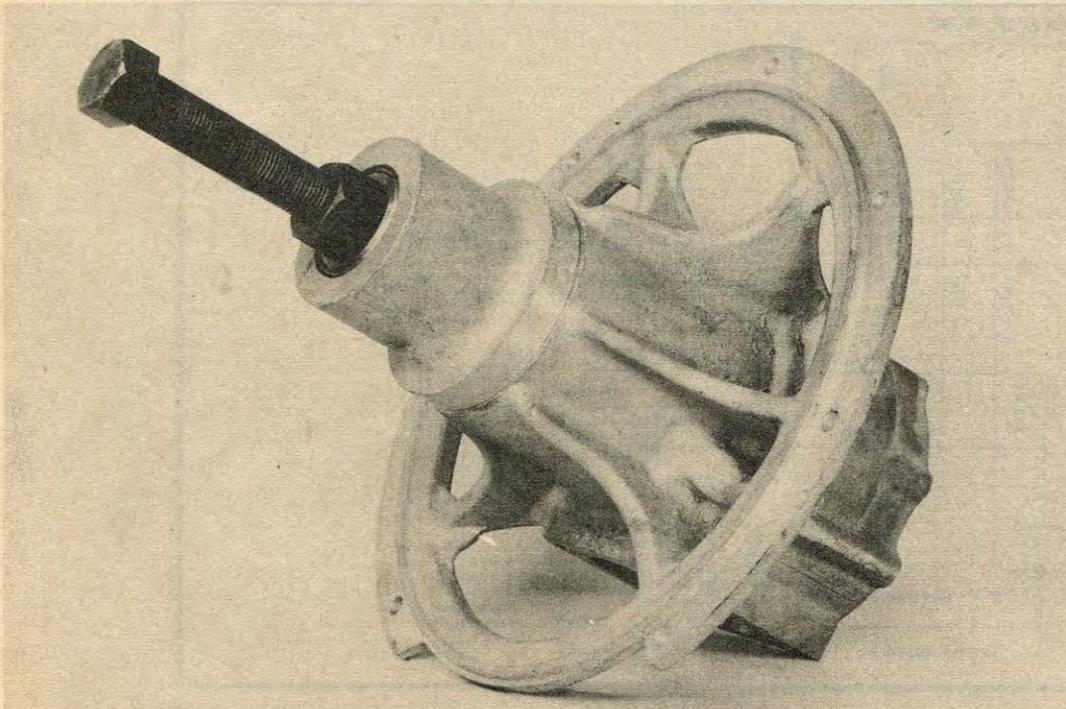


Figure 19 -
Assembling
Crankshaft

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. 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 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.

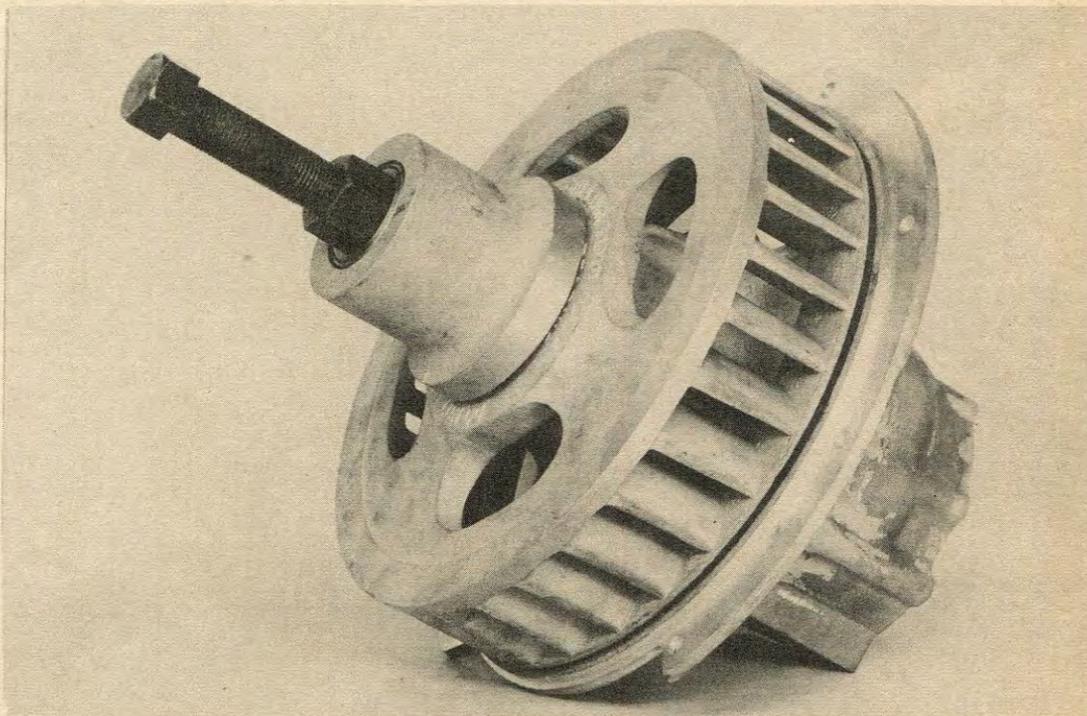
(2) If the armature does not go on shaft readily, push on as far as possible; then screw assembly tool No. AA-79 into center of shaft. Screw down on nut on the assembly tool until armature is in place. Remove tool and replace the armature bolt and washers.

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

(4) For wiring diagrams, see figure 16, 17 and 18.

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

Figure 20 -
Assembling
Flywheel



PARTS CATALOG

FOR THE

AUXILIARY POWER PLANT

MODEL HRU-28

MANUFACTURED BY

HOMELITE CORPORATION

PORT CHESTER, N.Y.

SECTION

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AUGUST 25, 1942

RESTRICTED

PARTS CATALOG

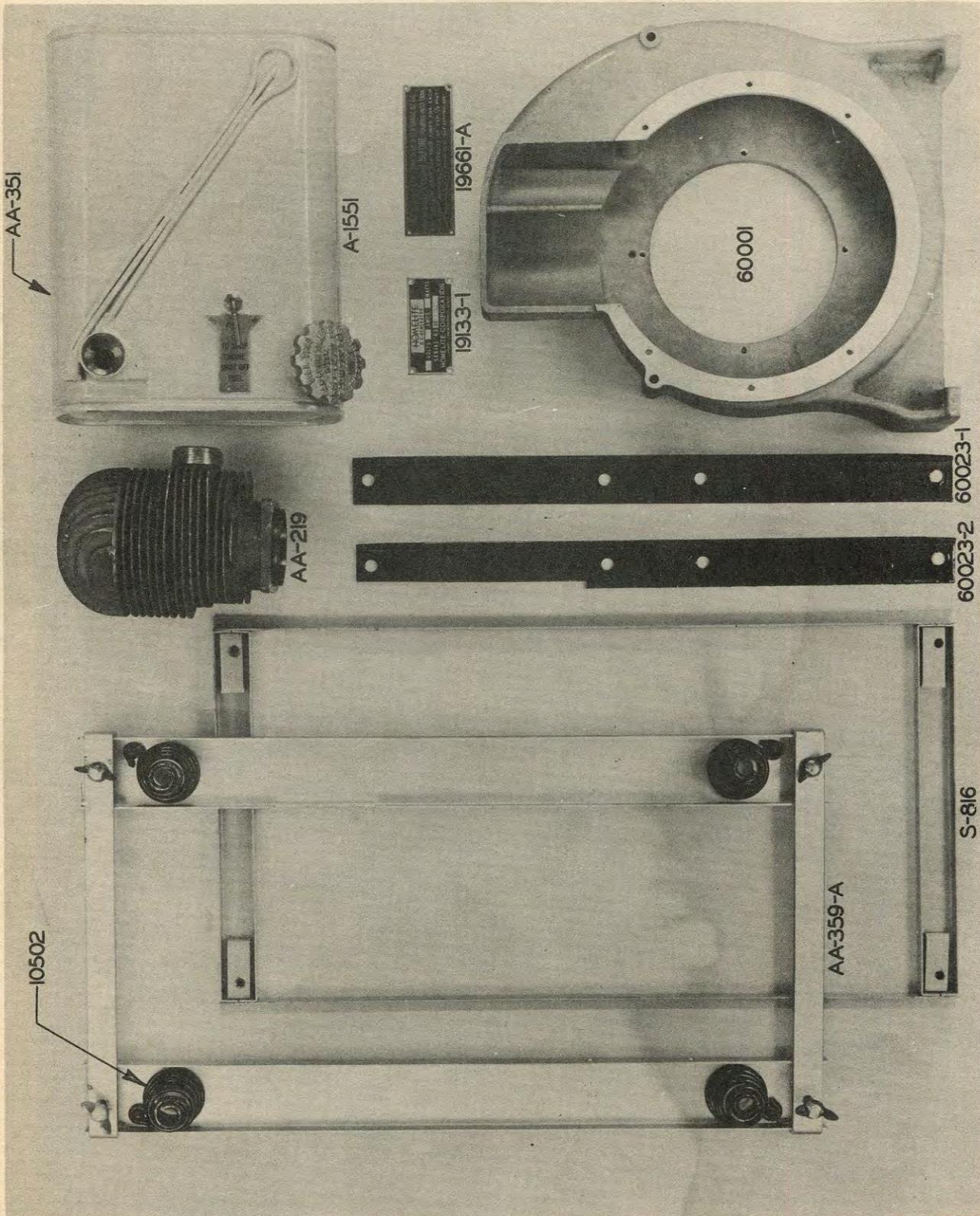
AMERICAN FORD MOTOR CO.

1955 FORD MOTOR CO.

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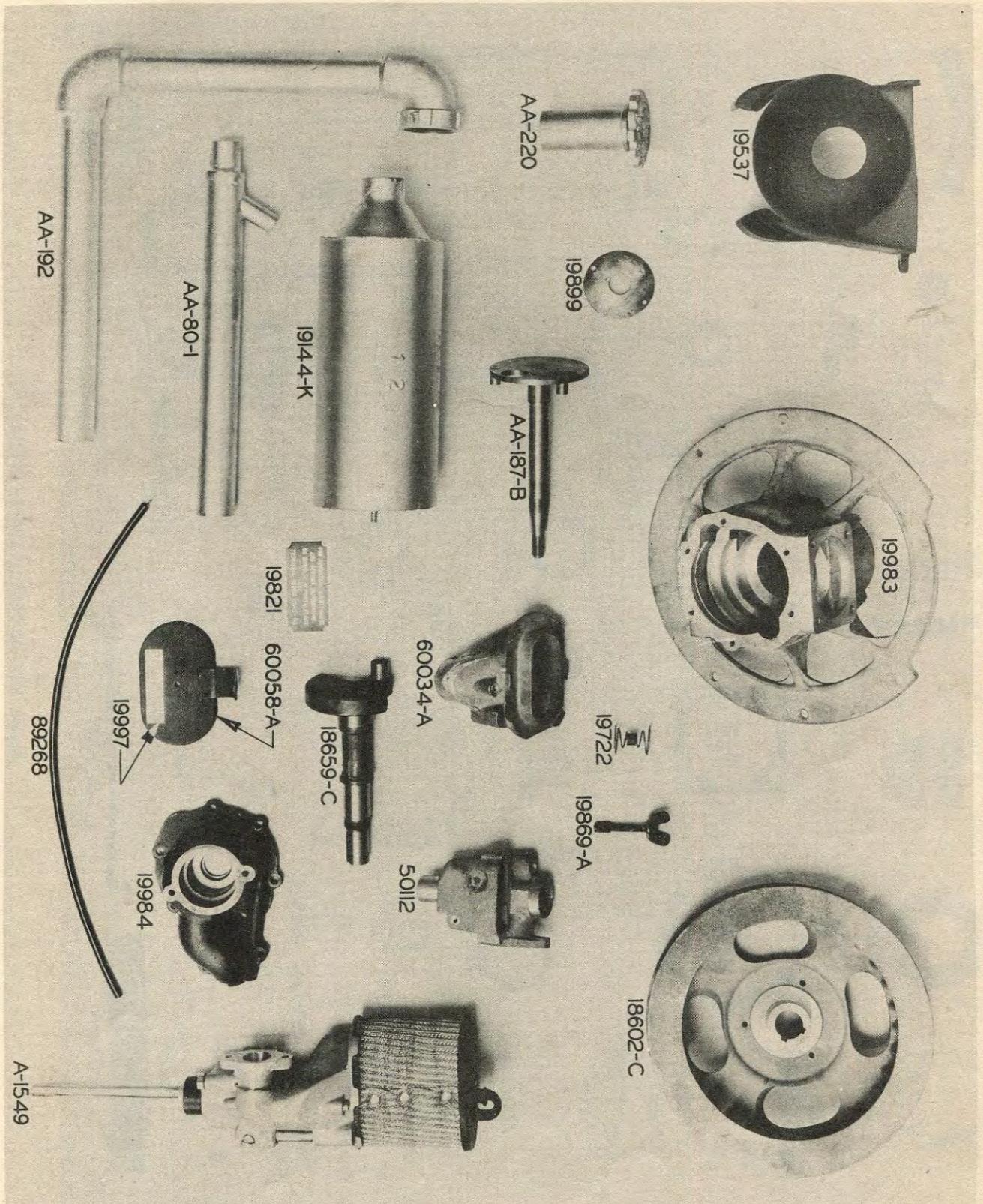
AMERICAN FORD MOTOR CO.

ILLUSTRATED PARTS LIST



Model HRU-28 Power Plant - Engine (A)

ILLUSTRATED PARTS LIST



Model HRU-28 Power Plant - Engine (B)

NUMERICAL PARTS LIST

COMMERCIAL MAGNETO

WICO ELECTRIC CO., SPRINGFIELD, MASSACHUSETTS, F. W. 5-1/4 Spec. 1070B

<u>Part No.</u>	<u>Part Name</u>	<u>Qty.</u>	<u>Part No.</u>	<u>Part Name</u>	<u>Qty.</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, Complete	1
M-90X	Washer - Lock	4			
IXA-256	Washer	1	X-4658	Coil Group	1
1100	Screw - Condenser Clamp	1 4	X-4659 4661	Rotor - Complete Cam	1 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- plete	1	4666 X-4672	Nut - Puller Interlead	1 2
Y-3217	*Block - Spring	1	4676	Washer - Starter Plate Screw Lock	3
3219	Washer - Pivot	1			
3230	Nut	1	X-4726	Group - Stator Replacement	1
3454	Bushing	1			
3455	Clamp	1	4754	Spring - Contact	1
4209	*Pin - Pivot	1	4755	Button - Stop	1
4210	Lock - Spring	1	4759	Screw	1
X-4215	Condenser	2			

* Not supplied separately, but included in X-4726

NUMERICAL PARTS LIST

Commercial Spark Plug Assembly

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

<u>Part No.</u>	<u>Part Name</u>	<u>Qty.</u>	<u>Part No.</u>	<u>Part Name</u>	<u>Qty.</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

NUMERICAL PARTS LIST

POWER PLANT ASSEMBLY - ELECTRIC MODEL HRU-28

<u>Part No.</u>	<u>Ass'y List Page No.</u>	<u>Qty. Req.</u>	<u>Part No.</u>	<u>Ass'y List Page No.</u>	<u>Qty. Req.</u>
AA-4	12	2	10502	8	4
AA-32	12	4	10542	8	1
AA-42	14	1	10546-B	8	1
AA-43-A	14	1	10547	8	2
AA-44-A	14	1	10936-A	10	2
AA-45	13	1	11031	8	1
AA-46-A	13	1	11034-C	8	1
AA-47-A	14	1	11204	10,11	3
AA-48-A	14	1	11569-FV	8	1
AA-49-A	13	1	15008	12	1
AA-50-A	13	1	15080-C	10	1
AA-51-A	13	1	18114-E	9	1
AA-52-A	13	1	18123-A	10	1
AA-53	13	1	18602-C	8	1
AA-55-A	14	1	18659-C	8	1
AA-56-A	14	1	18660	8	1
AA-80-1	11	1	18662	8	1
AA-89	8	2	18680-B	12	1
AA-138	14	1	18905-A-2	8	1
AA-187-B	9	1	19102-3	12	1
AA-188	10	1	19133-1	8	1
AA-189	11	1	19144-K	11	1
AA-190	11	1	19149	10	1
AA-192	11	1	19165-A	10	1
AA-193-A	12	1	19238	8	2
AA-219	8	1	19252	12	2
AA-220	10	1	19265	8	4
AA-224	10	1	19279	9	1
AA-247	10	1	19375-2	11	1
AA-290	12	1	19376	11	3
AA-328	10	1	19377-2	8	1
AA-340	11	1	19380	9	1
AA-351	9	1	19381-B	9	1
AA-359-A	8	1	19385	9	1
S-399-1	11	1	19398	8	2
AA-406	8	1	19409	8	2
S-618-1	13	1	19426	8	4
S-623-1	13	1	19427	8	1
S-637	13	1	19434-A	11	1
S-816	8	1	19454	9	1
S-829-1	13	1	19467	9	3
S-830-1	13	1	19468	9	1
S-864-3	12	1	19484	9	1
S-864-4	12	1	19488	12	1
S-882-A	8	1	19493	12	4
S-913-A	13	1	19495-A	12	1
S-922-A	13	1	19496	12	520
S-923	13	1	19498	12	4
S-925	13	1	19499	12	8
S-926-A	14	1	19502-4	12	8
S-930	13	1	19594	12	16
S-952	12	2	19510	12	8
S-953-1	13	2	19512-A	12	2
S-987-1	13	1	19514	12	1
S-1001	13	1	19515	12	16
S-1030	12	1	19533-A	8	1
S-1034	8	1	19537	9	1
A-1549	10	1	19551-C	10	1
A-1551	9	1	19562-B	12	1
A-2505	12	1	19564	12	20
A-5081-A	13	1	19566	12	20
A-5099	13	1	19567	12	8
A-6017	9	1	19568-1	12	4
S-6942	9	1	19569	11	1
A-9071-A	8	1	19569-1	11	1

NUMERICAL PARTS LIST

POWER PLANT ASSEMBLY - ELECTRIC MODEL HRU-28

<u>Part No.</u>	<u>Ass'y List Page No.</u>	<u>Qty. Req.</u>	<u>Part No.</u>	<u>Ass'y List Page No.</u>	<u>Qty. Req.</u>
19570	12	1	40158	10	1
19571	11	1	40159	11	1
19572	11	1	40176	11	1
19573	12	1	40177	9	1
19575-3	11	1	40203	8	1
19575-4	11	1	40210-A	11	1
19577	8	1	40221	11	1
19579-1	11	1	40222	11	1
19580-1	9	1	40224	11	1
19580-2	9	1	40225	11	1
19593-D	9	1	40228	11	1
19613-A	10	1	40229	11	2
19614-A	10	1	50052	10	1
19617	11	1	50086	10	1
19618	10	1	50106	10	1
19619-A	9	1	50112	11	1
19620	9	1	60001	8	1
19661-A	8	1	60017-F	9	1
19665	11	1	60018-B	9	1
19684-A	9	1	60020-A	11	1
19722	8	4	60022-D	9	1
19748	9	3	60023-1	8	1
19757-A	8	1	60023-2	8	1
19818	8	1	60025-C	8	1
19821	8	1	60026	9	3
19828	12	1	60032-A	10	4
19836-B	10	1	60034-A	10	1
19844	13	1	60037-B	9	1
19845	14	1	60038-C	9	1
19869-A	8	4	60042	10	1
19878	10	1	60044	10	1
19896	10	1	60045	10	1
19899	9	1	60046	11	1
19900	11	1	60047	11	1
19939	10	1	60048-A	11	1
19950-A	11	1	60049-C	11	1
19957	11	1	60051	11	2
19958	10	1	60052-A	10	1
19959	9	1	60054	10	1
19960	10	1	60057	11	1
19961	10	1	60058-A	10	1
19962	10	1	60059	10	1
19982	10	1	60060	10	1
19983	8	1	60061-A	11	1
19984	9	1	60062-A	9	1
19985	11	1	60063-A	9	1
19989	12	1	80074	12	4
19997	10	1	80078	12	1
30510	12	172	80091	12	8
30510-F	12	2	80139	10	1
40043	8	2	81010	9	1
40067	9	1	84012	10	2
40082-3	9	1	89209	14	1
40083	9	1	89210	14	1
40146	11	1	89268	9	1

ASSEMBLY PARTS LIST

Power Plant Assembly - Electric - Homelite Model HRU-28

<u>AN No.</u>	<u>Part No.</u>	1	2	3	4	5	<u>Qty.</u> <u>Req.</u>
	A-9071-A	Power Plant Assembly - Electric Model HRU-28					1
	S-816	Base - Supplementary					1
	AA-359-A	Base Assembly					1
	S-882-A	Base					1
	10502	Spring - Foot					4
		Rivet - Commercial 1/4" x 3/8" round head iron					4
AN935-616	19869-A	Screw - Thumb					4
		Washer					4
	19722	Spring - Bolt retainer					4
	60023-1	Angle Iron - Right base					1
	60023-2	Angle Iron, Right Base					1
70-5-10		Bolt with Nut					4
945-5		Washer					4
	S-1034	Plate - Equalizer instruction					1
AN535-2-3		Screw - Drive					2
	60001	Housing - Fan					1
		Bolt - Commercial 3/8"-16 x 1" hex head					4
AN935-616		Washer					4
	19133-1	Plate - Name					1
	19661-A	Plate - Oil instruction					1
	19821	Plate - Operating instruction					1
AN535-4-5		Screw - Drive					12
	AA-89	Handle Assembly - Carrying					2
	19409	Handle - Side carrying					2
	40043	Grip - Carrying handle					2
	19426	Cap - Carrying handle					4
	19983	Crankcase					1
500-416-10		Screw					6
AN935-416		Washer					6
		Cock - Commercial drain (Imperial Brass Co., Chicago, Illinois 76-EF)					1
	18659-C	Crankshaft					1
AN280-607		Key					2
	18905-A-2	Stud - Crankshaft					1
		Bearing - Commercial (New Departure, Bristol, Conn. No. 47306)					1
	19238	Screw - Main bearing retaining					2
AN935-516		Washer					2
	40203	Gasket - Crankcase sealing					1
	19818	Spacer - Crankshaft					1
	18602-C	Flywheel					1
		Cork - Commercial 1/4" x 5/16"					3
		Bearing - Commercial (New Departure, Bristol, Conn. No. 88507)					1
	18662	Washer - Flywheel					1
	18660	Nut - Crankshaft lock					1
	11034-C	Rod - Connecting					1
	11031	Rod - (See dwg. 11034-C)					1
	10542	Bearing - Piston pin					1
		Bearing - Commercial (SKF, Philadelphia, Pa. No. 5202-R)					1
	60025-C	Screw - Crankpin					1
	10546-B	Pin - Piston					1
	10547	Ring - Piston pin retaining					2
	11569-FV	Piston					1
	19398	Ring - Piston					2
	19427	Gasket - Cylinder					1
	AA-219	Cylinder Complete					1
	19533-A	Cylinder					1
	19377-2	Liner - Cylinder					1
	AA-406	Adapter Assembly - Spark plug					1
	19757-A	Adapter - Spark plug					1
	19577	Baffle - Spark plug					1
		Gasket Commercial - 7/8" Spark plug					1
AN935-516	19265	Screw - Cylinder					4
		Washer					4

ASSEMBLY PARTS LIST

Power Plant Assembly - Electric - Homelite Model HRU-28

<u>AN No.</u>	<u>Part No.</u>	1	2	3	4	5	<u>Qty. Req.</u>
	19537					Shield - Cylinder	1
500-416-10						Screw	2
AN935-416						Washer	2
	19899					Cap - Cylinder shield	1
500-8-6						Screw	2
AN935-8						Washer	2
	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
	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
	40177					Ring - Intake valve shaft snap	1
	19484					Gasket - Timer bracket	1
	19984					Bracket - Timer	1
						Screw - Commercial - 1/4-20 x 5/8" hex head, slotted	4
500-416-10						Screw	2
AN935-416						Washer	6
	19385					Spacer - Timer bracket	1
						Bearing - Commercial (New Departure, Bristol, Conn. No. 3203)	1
	19380					Spacer - Center bearing	1
	19619-A					Ring - Timer bracket seal retaining	1
	19620					Ring - Timer bracket sealing	1
						Bearing - Commercial (New Departure, Bristol, Conn. No. 88603)	1
	19381-B					Spacer - Cam	1
	19454					Nut - Cam lock	1
	S-6942					Magneto - Commercial (Wico Electric Co., Springfield, Mass. FW. 5 1/4 Spec. 1070B)	1
500-416-20						Screw	2
AN936B416						Washer	2
	89268					Cable - High tension	1
						Conduit Assembly - Commercial spark plug (Titeflex Metal Hose Co., Newark, N.J. No. K-21879)	1
						Plug - Commercial spark, 18 mm. (Champion, Toledo, Ohio, HO-14S)	1
	A-1551					Supply Assembly - Fuel	1
	AA-351					Container with Fittings - Fuel	1
	60022-D					Container - Fuel	1
	18114-E					Fitting - Filler cap	1
	60017-F					Fitting - Fuel container carburetor	1
	60018-B					Fitting - Fuel container sump	1
						Screw - Commercial sheet metal (Parker-Kalon) Type A Oval Head No. 4-1/4"	2
	19580-1					Tube - Short fuel container vent	1
	19580-2					Tube - Long fuel container vent	1
	19593-D					Fitting - Shut-off valve	1
						Screw - Commercial sheet metal (Parker-Kalon) Type A Oval Head No. 4-1/4"	3
	19959					Box - Stuffing	1
	19684-A					Indicator - Fuel shut-off	1

ASSEMBLY PARTS LIST

Power Plant Assembly - Electric - Homelite Model HRU-28

<u>AN No.</u>	<u>Part No.</u>	1	2	3	4	5	<u>Qty. Req.</u>
	AA-220					Cap Assembly - Filler	1
	60042					Cap - Fuel container filler	1
	50086					Tube - Filler cap	1
	19165-A					Gasket - Fuel container cap	1
	19878					Plug	1
	11204					Body - Connector	2
	AA-224					Line Assembly - Fuel	1
	40158					Line - Fuel	1
AN805-3						Nut - Union	2
AN800-3						Cone - Union	2
						Filter - Commercial (Zenith Carburetor, Detroit No. F2X)	1
	19962					Gasket - Filter plug	1
	19961					Plug - Filter	1
	19836-B					Stem - Valve	1
	19960					Nut - Packing	1
	19896					Packing - Stuffing box	1
	84012					Burr - Rivet	2
	10936-A					Pin - Valve stem	2
	19551-C					Valve - Shut-off	1
	19982					Screw - Valve stop	1
						Washer - Commercial fiber (Tillotson Mfg. Co., Toledo No. 0162)	1
	105080-C					Spring - Valve	1
	19958					Gasket - Valve fitting plug	1
	19939					Plug - Valve fitting	1
AN535-6-6	60032-A					Spacer - Fuel container	4
						Screw - Drive	2
	AA-247					Strap Assembly - Long fuel container	1
	19613-A					Strap - Long fuel container	1
AN441-4-4						Rivet	1
	AA-328					Strap Assembly - Short fuel container	1
	19614-A					Strap - Short fuel container	1
AN441-4-4						Rivet	1
500-416-6						Screw	2
AN935-416						Washer	2
	18123-A					Stud - Fuel container strap	1
	50052					Stud - Threaded fuel container strap	1
500-416-32						Screw	1
	19149					Gasket - Carburetor flange	1
	A-1549					Carburetor and Air Cleaner Assembly	1
	60058-A					Cap - Air Cleaner	1
500-416-8						Screw	1
AN935-416						Washer	1
945-4						Washer	1
	19997					Plate - Priming pump	1
						Screw - Sheet metal (No. 2-3/16 inch Parker-Kaloh Type Z)	2
						Screen - Commercial air cleaner (Air Maze Corp., Cleveland, Ohio No. 1-STOElement)	1
	60034-A					Adapter - Air cleaner	1
AN935-8	80139					Screw - Air cleaner to carburetor	1
						Washer	1
	60059					Rod - Air cleaner spacer	1
500-8-10						Screw	2
AN935-8						Washer	2
	AA-188					Pump Assembly - Priming	1
A417 -	60054					Tube - Priming pump suction	1
	60044					Fitting - Suction tube	1
	60051					Ball - Steel	1
	40229					Spring - Ball valve	1
	19376					Washer	2
	60060					Fitting - Plunger tube	1
	60052-A					Tube - Plunger	1
	50106					Plunger - Carburetor	1
	19618					Packing - Plunger	1
	60045					Rod - Carburetor plunger	1

A 1123

