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U.S. Army
WAR DEPARTMENT
TECHNICAL MANUAL
POWER UNIT PE-214-A
June 22, 1943

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POWER UNIT PE-214-A

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DESTRUCTION NOTICE



WHY—

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

WHEN—

When ordered by your commander, or when you are in immediate danger of capture.

HOW—

1. Smash—Use sledges, axes, hand-axes, pick-axes, hammers, crowbars, heavy tools, etc.
2. Cut—Use axes, hand-axes, machete, etc.
3. Burn—Use gasoline, kerosene, oil, flame-throwers, incendiary grenades, etc.
4. Explosives—Use firearms, grenades, TNT, etc.
5. Disposal—Bury in slit trenches, fox-holes, other holes. Throw in streams. Scatter.
6. USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—

1. Smash—Thoroughly smash the entire unit with a sledge, axe, crowbar, or other heavy object, or by running over it with a tank or half track.
2. Cut—Cut all connecting wires and cables.
3. Burn—All instruction books, documents and shipping cases.
4. Bury or scatter—Any or all of the above pieces after breaking.

DESTROY EVERYTHING**SAFETY NOTICE**

This equipment employs high voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working on the equipment.

OBSERVE ALL PRECAUTIONS AND SAFETY REGULATIONS.

If Power Unit PE-214-A is operated within a building, make certain that all exhaust connections are gas tight and that room is properly ventilated.

Stop the unit before attempting to work on it or removing gasoline tank filler cap. Avoid spilling gasoline on a hot engine. Carbon monoxide, contained in exhaust gases, is tasteless, odorless, and a deadly poison.

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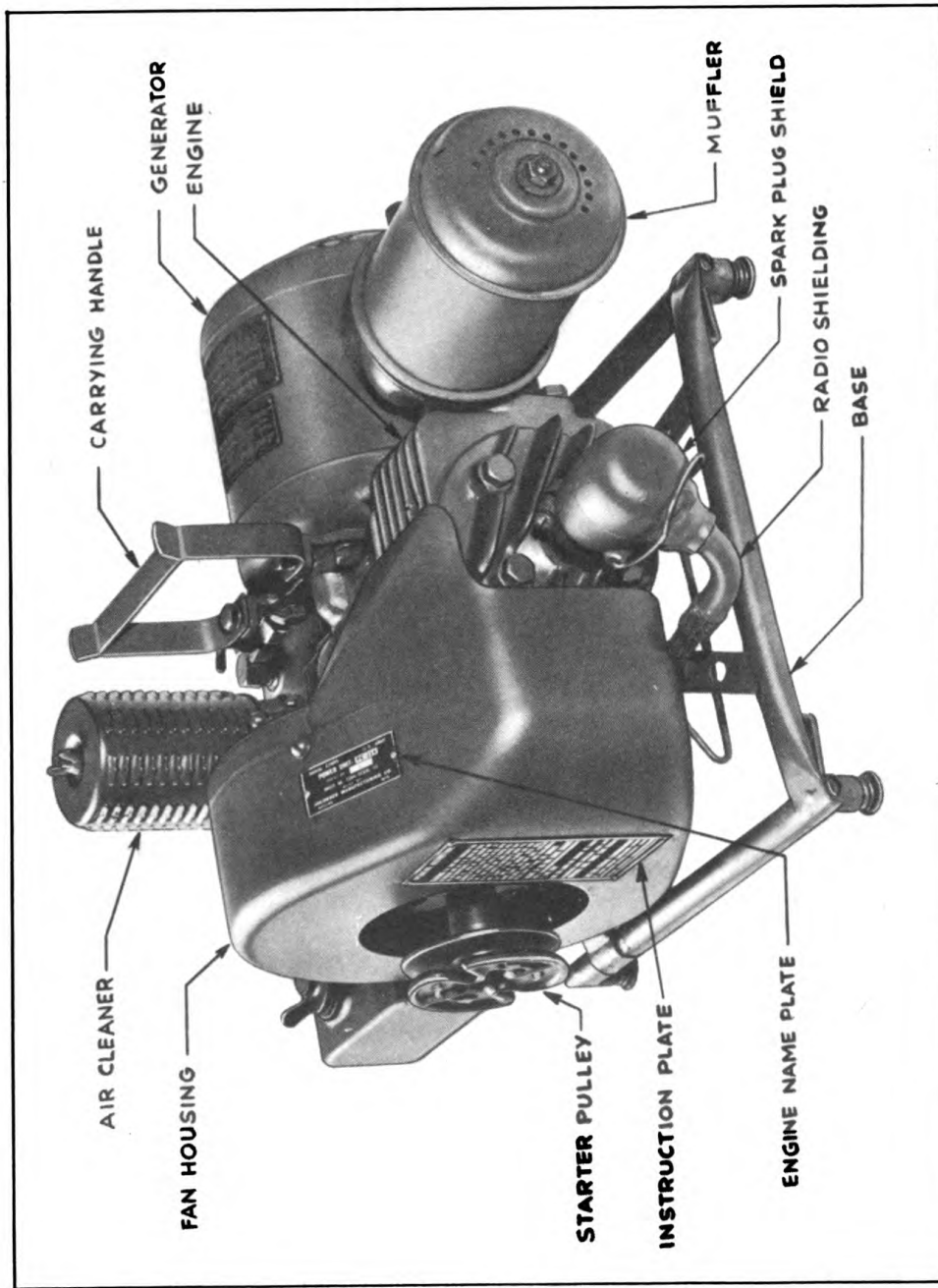


FIG. 1—POWER UNIT PE-214-A—FRONT VIEW

SECTION I DESCRIPTION

1. General.—

Power Unit PE-214-A is a compact, lightweight, gasoline engine driven generator, of the manual starting type, with an output of 300 Watts, 120-240 Volt, 60-cycle, single phase alternating current. It is driven by a single cylinder, air cooled, two cycle gasoline engine, developing 1 hp at 3600 rpm.

The generator is of the revolving field type, directly coupled to the engine crankshaft, by means of a female spline coupling (153) which matches the splined extension on the engine crankshaft (9). A single 20-ampere twist-lock receptacle is located in the outer end casting of the generator along with three binding posts, two output and one ground marked G. **Do not use pliers on these posts.**

Tank M-343-A (181) with related fittings may also be issued with Power Unit PE-214-A. This component is supplied for use where the application calls for a longer continuous period of operation than permitted by the normal supply.

A carrying case (160), constructed of plywood, is provided for protection of the unit during transportation. Tool box and spare parts box are located in the carrying case. The entire equipment is painted olive drab.

Overall dimensions of the complete unit are:

| Length | Width | Height |
|-----------------|-----------------|--------|
| $23\frac{1}{4}$ | $19\frac{1}{4}$ | 16 |

The net weight of the power unit only as it is ready for field service is $39\frac{3}{4}$ lbs. with fuel tank empty.

The net weight of the complete power unit, including tools, spares and case is $86\frac{3}{4}$ lbs.

2. Components.—

Power Unit PE-214-A is comprised of the following components:

| | |
|------------------|---------|
| A. Carrying Case | CS-98 |
| B. Engine | GE-12 |
| C. Generator | GN-51 |
| D. *Tank | M-343-A |

*Tank M-343-A is part of power unit PE-214-A only when specified on the order.

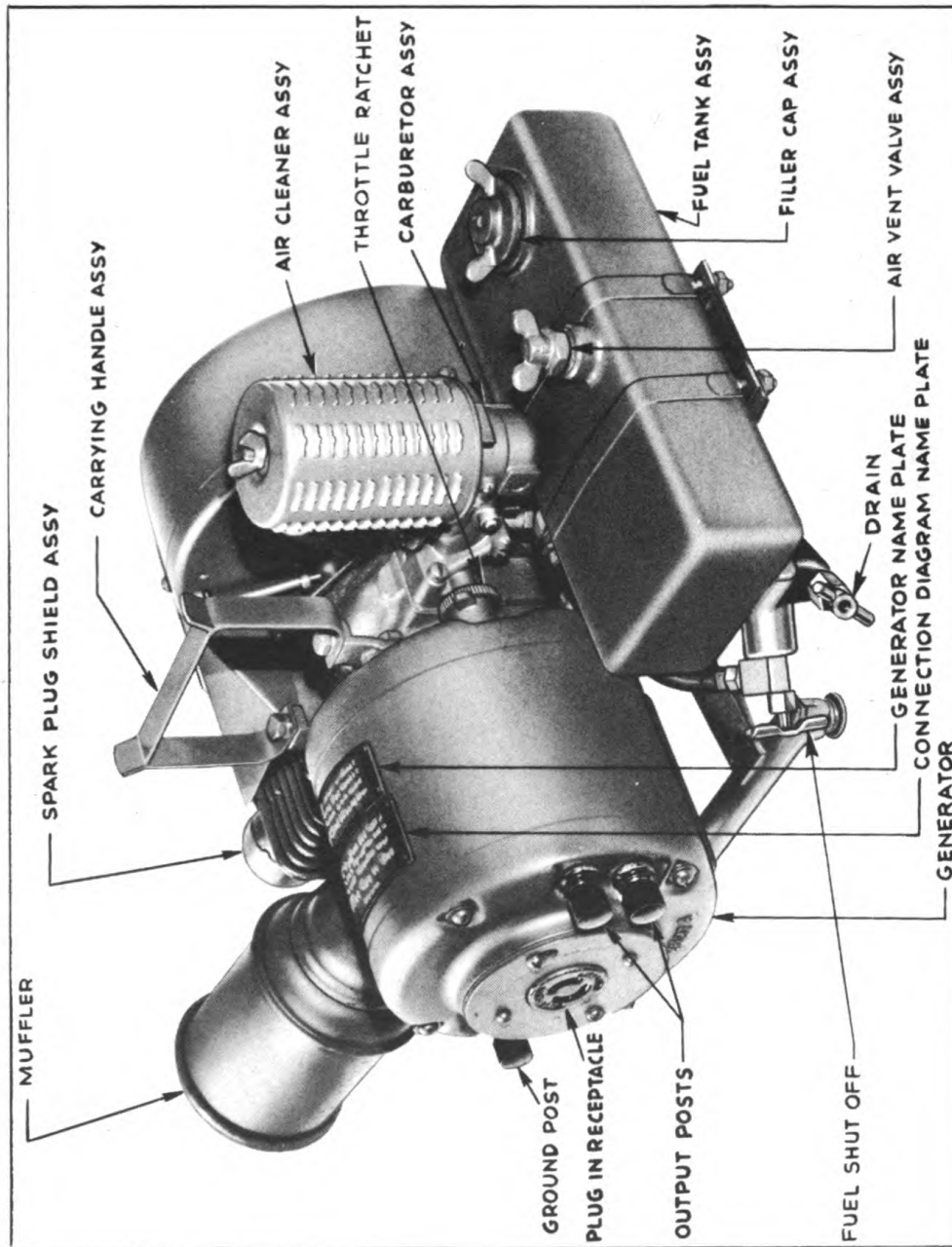


FIG. 2—POWER UNIT PE-214-A—REAR VIEW

3. Weights And Dimensions.—

| Quantity | Item | Dimensions | Weight (Pounds) |
|----------|---------------------------------|------------------------------------------------------------|----------------------|
| 1 | Power Unit PE-214-A Complete | 23 $\frac{1}{4}$ x 19 $\frac{1}{4}$ x 16 | 86 $\frac{3}{4}$ lb. |
| 1 | Power Unit only | 18 $\frac{5}{16}$ x 14 $\frac{1}{32}$ x 10 $\frac{29}{32}$ | 39 $\frac{3}{4}$ lb. |
| 1 | Engine GE-12 | 18 $\frac{5}{16}$ x 12 x 10 $\frac{29}{32}$ | 20 lb.-6 oz. |
| 1 | Generator GN-51 | 6 x 6 | 19 lb.-6 oz. |
| 1 | Carrying Case CS-98 | 23 $\frac{1}{4}$ x 19 $\frac{1}{4}$ x 16 | 42 lb. |
| 1 | Tank M-343-A | 4 $\frac{1}{8}$ x 6 $\frac{5}{8}$ x 10 $\frac{1}{4}$ | 1 lb. |

SPARE PARTS

| Quantity | Item |
|----------|------------------------------------|
| 1 | Piston and Connecting Rod Assembly |
| 1 | Set (3) Piston rings |
| 2 | Sets—all gaskets |
| 1 | Set—magneto breaker points |
| 2 | Magneto Capacitor |
| 5 | Spark Plugs |
| 2 | Air Filter Cartridges |
| 1 | Spark Plug Cable |
| 2 | Carburetor Reed Valves |
| 1 | Spare Starting Rope |
| 1 | Magneto Breaker arm |

TOOLS

| Quantity | Item |
|----------|-------------------------------------------------|
| 1 | Pliers 6" |
| 1 | Open end wrench $\frac{3}{8}$ x $\frac{7}{16}$ |
| 1 | Open end wrench $\frac{1}{2}$ x $\frac{11}{16}$ |
| 1 | No. 8 Allen wrench |
| 1 | Double end feeler gauge .020-.030 |
| 1 | Combination screw driver and socket wrench |
| 1 | One pint oil container |
| 1 | One quart fuel mixing can |
| 1 | Flywheel puller |

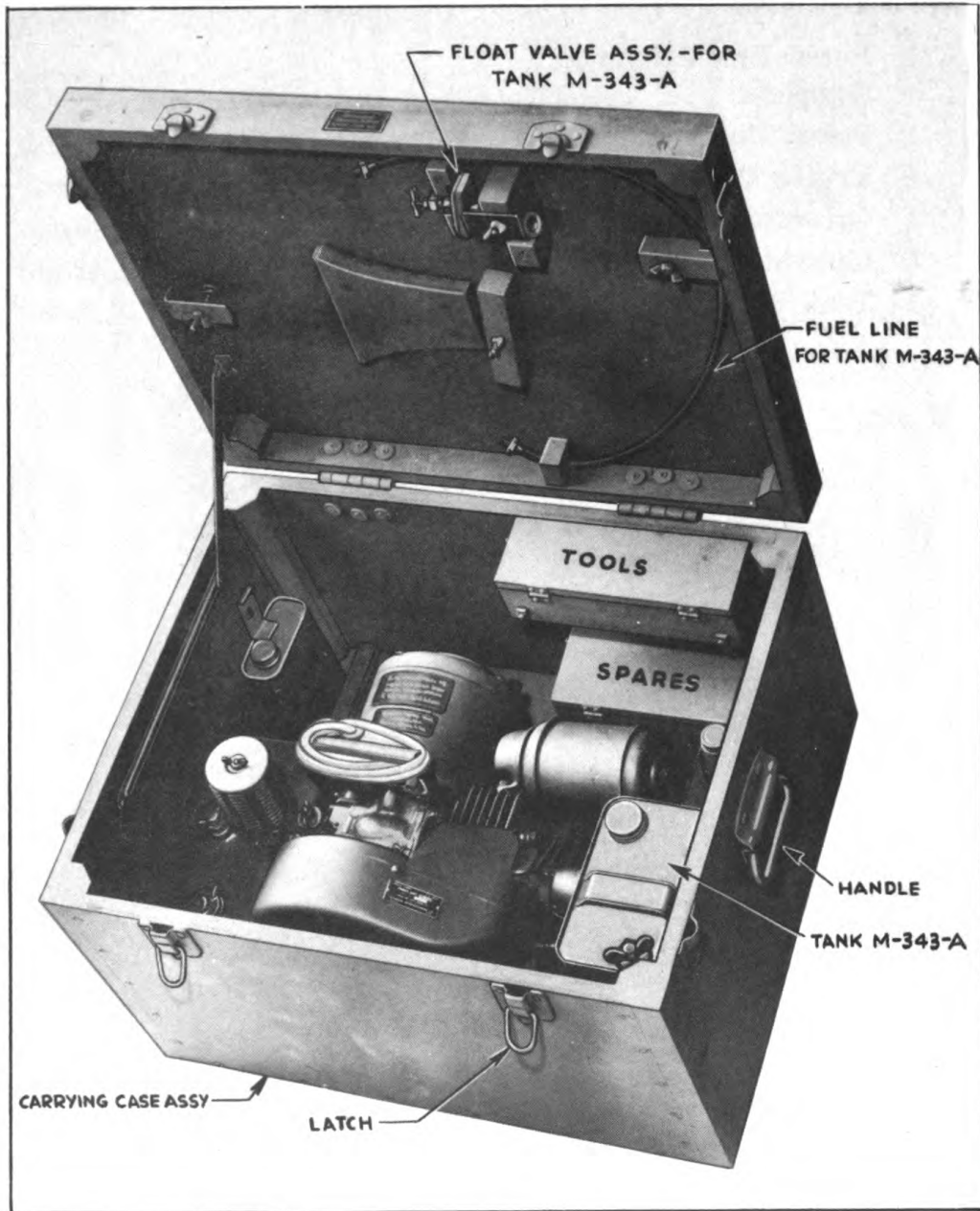


FIG. 3—POWER UNIT PE-214-A, IN CARRYING CASE

4. Sources of Power.—

a. Engine.—The prime mover is Engine GE-12-A. It is a single cylinder, two cycle, air cooled unit, with 2" bore, 1½" stroke, and delivers 1 hp at 3600 rpm. Piston displacement is 4.72 cubic inches. It is designed to operate satisfactorily on commercial gasolines with octane rating as low as 72. The unit will operate approximately two and one-half hours on one filling of the standard gasoline tank (75) or seven and one-half hours on Tank M-343-A (181).

b. Generator.—The driven unit is Generator GN-51-A. It is the revolving field type, with output of 300 watts, (100% pf) 120-240 volts,—60-cycle, single phase, alternating current. The generator will deliver between 112 and 128 volts at its rated speed of 3600 rpm when connected for 120 volts.

The voltage output without load should be approximately 128 volts; while at full load of 300 watts (100% pf), the voltage output will be approximately 112 volts. The output will vary between these values, depending upon the applied load.

When connected for 240 volts, the output will vary correspondingly.

The generator consists of a moving and a stationary member. The stator [(158) (stationary member)] consists of a stack of sheet steel punchings, slotted to receive windings of copper wire. Alternating current is generated in this winding through the rotation within its field of the rotor [(156) (moving member)] which consists of cylindrical permanent magnet, mounted on a shaft and supported in the center of the field made up of the stationary member of the generator.

c. Magneto.—Ignition is supplied by a high tension flywheel type magneto. This consists of a rotor [(34) (moving member)] and stator plate [(35) (stationary member)] mounted directly on the engine crankcase.

d. Carburetor.—The carburetor (89) is of the vacuum lift type, drawing fuel through a connecting line directly from the gasoline tank.

e. Air Cleaner.—The air cleaner (72) is of the replaceable cartridge type. Its function is to prevent the entry of foreign matter into the engine.

f. Governor.—The governor is of the pneumatic type and is operated by an air blast created by the magneto rotor fins. The governor vane (3), located over the rotor fins, is actuated in movement by the air current, and in turn, influences control of the carburetor butterfly valve through a linkage coupling arrangement to the carburetor throttle lever.

SECTION II INSTALLATION AND OPERATION

NOTE. ALL DIRECTIONAL MOVEMENTS ARE TO BE MADE AS OBSERVED FROM REAR (FUEL TANK END) OF EQUIPMENT.

5. Installation.—

As soon as the packing has been removed, inspect the case and equipment for any damage that might have occurred during shipment. Should any items be unserviceable, report this fact immediately and procure replacements.

To remove power unit PE-214-A first release the two catches located at the front of the carrying case and lift up cover. Then unscrew the two wing nuts located on magneto side of engine mounting base (78). Lift unit straight up until it clears carrying case.

6. Preparation For Use.—

a. Fuel and Lubrication.—Lubrication of the entire engine is obtained by mixing the oil with the gasoline. The oil in the fuel mixture is carried into the cylinder where it lubricates cylinder wall, piston, piston rings, piston pin, connecting rod, and main bearings.

To prepare fuel, mix one-half pint S.A.E. 10 oil to one gallon of gasoline. (In this ratio, the proportion is 16 parts gasoline to one part oil.) Stir mixture thoroughly before pouring into gasoline tank. For single filling of fuel tank, fill the combination fuel tank cap and measuring device to the top with oil. Pour oil into fuel mixing can (123) and then fill can with gasoline. Stir contents or shake can well before pouring mixture into the fuel tank. Under no conditions are the oil and gasoline to be poured into fuel tank separately. **Never attempt to fill tank while unit is operating.**

b. Starting.—Check to make sure magneto high tension wire (25) is attached to spark plug. Open air-vent wing nut (162) and fuel line shut-off (83). Then with fuel in the gasoline tank follow these directions:

(1) Turn carburetor needle valve (60) counter-clockwise (to the left) to No. 5, or half open position.

(2) Move choke lever (66) to vertical position. Stand behind unit.

(3) Slip knotted end of starting rope (136) into notch on starter pulley (99) and wind around clockwise (to the right).

(4) Pull rope up sharply to the rear steadying unit with left hand on fan housing. Repeat until engine starts. (NOTE: If engine does not start on the 4th or 5th cranking, refer to Trouble Chart, pages 15 and 16.)

(5) Then move choke lever (66) to horizontal position. When engine is warm adjust needle valve (60) so engine runs smoothly. Under load it may be necessary to make a slight compensating adjustment on the needle valve.

For subsequent starting, the carburetor needle valve will not have to be disturbed. Merely use choke as described in starting instructions. This does not apply, however, where climatic conditions are extremely cold. In that case, the needle valve should be opened fully for starting.

c. Flooded Engine.—Choking the engine too much when starting will flood it. This is particularly true when starting a warm engine. To overcome a flooded condition, first close fuel line shut-off (83). Open drain cock (133) underneath crankcase and crank engine over a few times. When drained, close drain cock (133) and open fuel line shut-off (83) before cranking. Remove and dry spark plug before again attempting to start the unit.

d. Stopping.—To stop engine, close fuel line shut-off (83).

e. Tank M-343-A Installation.—Carried in the top of case (160) when Tank M-343-A is furnished is float valve assembly (170) and fuel line (180). To install these items, remove filler cap assembly (169) from standard fuel tank and screw float valve assembly (170) in its place. Connect one end of fuel line (180) to shut-off cock (178) in float valve assembly, the other end in shut-off at base of Tank M-343-A (181). Be sure to open shut-off valves and air vent on top of Tank M-343-A (181). For illustration of Tank M-343-A (181) installed see Figure 4, Page 12.

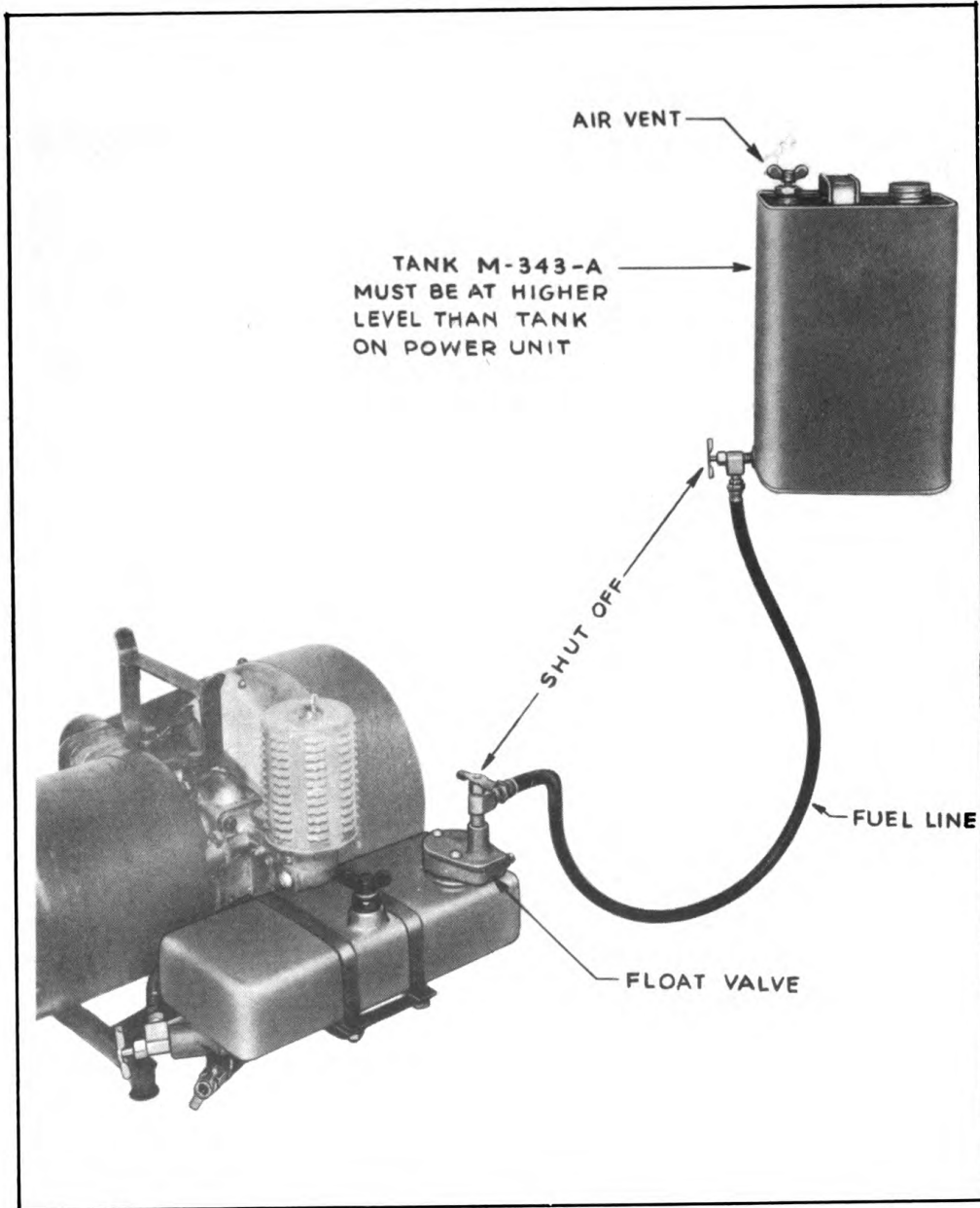


FIG. 4—TANK M-343-A CONNECTED UP

ALWAYS CLOSE FUEL LINE SHUT-OFF WHEN TRANSPORTING EQUIPMENT.

Note. Except in cases of extreme emergency, under low temperature conditions, always operate equipment without load for warm up period of about five minutes before applying load.

7. Operation.—

Power Unit PE-214-A is intended to furnish power for field communications equipment and is designed to deliver 300 watts, alternating current at 120-240 volts, 60-cycle, single phase. The unit should not be overloaded more than ten percent and should not be operated continuously at any overload.

To operate field communications equipment, cord from equipment should be plugged into receptacle in end of generator. (See Fig. 2, Page 6.)

a. *Engine Operation.*—(See paragraph 6, Page 10.)

b. *Generator Operation.*—CAUTION:—BE SURE GENERATOR IS CONNECTED FOR DESIRED VOLTAGE BEFORE OPERATING. (See Fig. 5, Page 14.)

There are only two precautions that need be observed in operating the generator:

(1) Be sure that the connections in the outlet box are properly made for the desired voltage according to diagram. (Fig. 5, Page 14.)

(2) Be sure that generator is not overloaded or short circuited for long periods of time. The generator will stand short periods of overload and may even be loaded continuously to 350 watts without damage, but greater overloads or short circuits for long periods of time will overheat and destroy the windings.

c. *Voltage Change Instructions.*—The windings of the generator are so arranged that by reconnection (See Fig. 5, Page 14) either 120 or 240 volts may be obtained. To change the voltage, first remove outlet cover (155) on the end of generator by loosening the two fastening screws (197). Then follow these directions:

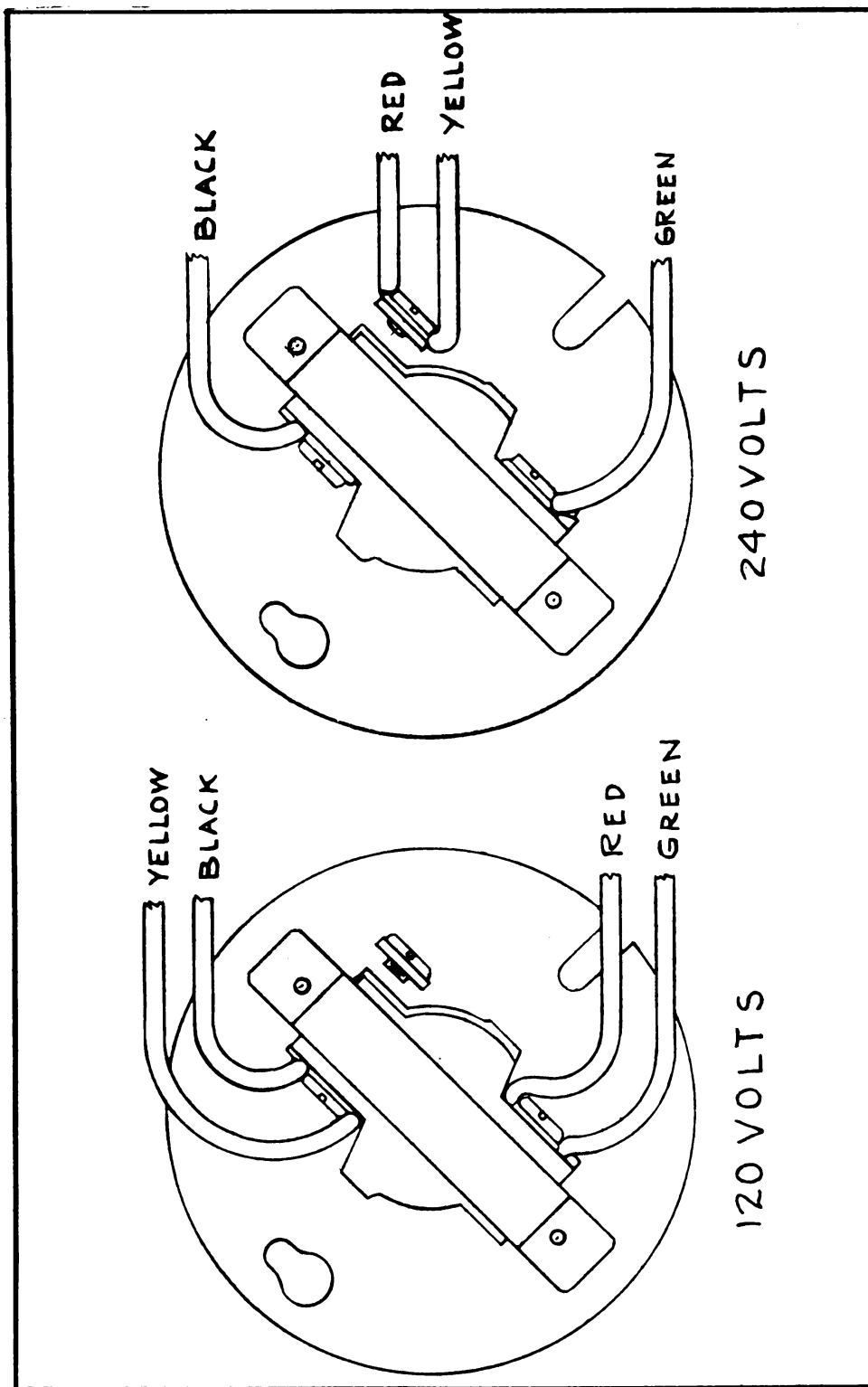


FIG. 5—POWER UNIT PE-214-A, VOLTAGE RECONNECTION DIAGRAM

(1) If generator is connected for 120 volts and 240 volts is desired, loosen the two screws (199) on the outlet on the back of the cover and remove the Red and Yellow leads. (These are the only leads which have open type terminals and can be removed without removing terminal screws.) Place both Red and Yellow leads under the head of the extra terminal screw beside the outlet and tighten all three screws.

(2) If generator is connected for 240 volts and 120 volts are desired remove the Red and Yellow leads from the extra terminal screw beside the outlet. Fasten the Red lead under the head of the screw on the outlet to which the Green lead is fastened. Fasten the Yellow lead under the screwhead on the outlet to which the Black lead is fastened.

Tighten all three screws before replacing outlet plate.

8. Troubles, Causes, Remedies.—

Engine troubles usually are: fails to start, hard to start, runs and stops, not up to speed (3600 rpm), overheats and loss of power. In locating engine trouble it is always advisable to install a new spark plug first to see if this corrects the difficulty. If it does not, leave new plug in while checking further.

| SYMPTOM | POSSIBLE CAUSE | CHECK | REMEDY |
|---------------------------------|-----------------------------------------|-----------------------|---------------------------------|
| <i>a. Engine</i> | | | |
| Fails to start or hard to start | No fuel in tank | Fuel tank | Fill |
| | Fuel line shut-off not open | Shut-off valve | Open |
| | Air vent not open | Air vent | Open |
| | Defective spark plug | Spark plug | Replace |
| | Carbon across spark plug electrodes | Spark plug | Clean |
| | Spark plug point gap too wide | Spark plug | Adjust to .030 |
| | Obstruction under carburetor air valve | Carburetor air valve | Remove See Para. 11, Page 26 |
| | Obstruction under Carburetor reed valve | Carburetor reed valve | Remove See Para. 11, Page 26 |
| | Wet spark plug | Spark plug | Dry |
| | Water or dirt in fuel | Fuel tank | Drain, clean and refill |
| | Carburetor nozzle clogged | Carburetor | Clean out |
| | Cylinder port holes plugged | Cylinder | Clean out See Para. 11, Page 30 |
| | Muffler plugged | Muffler | Clean out See Para. 11, Page 30 |

| SYMPTOM | POSSIBLE CAUSE | CHECK | REMEDY |
|-----------------------------------------------------------------------------|--------------------------------------------------|------------------------------|--------------------------------------------------------|
| Engine Overheats and lacks power | Magneto points out of adjustment | Magneto | Adjust gap to .020 See Para. 11, Page 22 |
| | Broken high tension cable | Magneto Cable | Replace See Para. 11, Page 25 |
| | Defective capacitor | Magneto | Replace See Para. 11, Page 25 |
| | Defective coil | Coil | Replace See Para. 11, Page 25 |
| | Engine flooded | Crankcase drain valve | Open and drain See Para. 6, Page 11 |
| | Engine not up to speed | Engine speed | Increase to 3600 rpm See Para. 11 Page 27 |
| | Incorrect fuel mixture | Gas tank | Drain and refill |
| | Spark plug gap too wide | Spark plug | Adjust to .030 |
| | Engine port holes partially plugged | Cylinder | Clean out See Para. 11, Page 30 |
| | Muffler partially plugged | Muffler | Clean out See Para. 11, Page 30 |
| | Carburetor needle valve not properly adjusted | Needle valve | Reset See Para. 6, Page 11 |
| | Carburetor choke lever not in running position | Choke lever | Move to horizontal position See Para. 6, Page 11 |
| | Port holes plugged | Cylinder | Clean out See Para. 11, Page 30 |
| | Muffler plugged | Muffler | Clean out See Para. 11, Page 30 |
| b. Generator Fails to generate current Fails to generate rated output | Piston and cylinder head carbonized | Cylinder and piston head | Clean |
| | Wrong type spark plug | Spark plug | Use Champion J5 or equivalent |
| | Carburetor needle valve improperly adjusted | Needle valve | Readjust See Para. 6, Page 11 |
| | Overload on generator | Engine speed | Increase to 3600 rpm |
| | | | Replace |
| | Engine not up to speed | Engine speed | Increase to 3600 rpm |
| | Wires not connected properly for desired voltage | Connections in outlet box | Re-connect See Para. 7, Page 13 |

SECTION III

FUNCTIONING OF PARTS

9. Generator Theory.—

The generator of Power Unit PE-214-A is of the 60-cycle alternating current type. This is an electric current which starts at zero, increases to a maximum in one direction, decreases to zero, increases to a maximum in the opposite direction, decreases to zero and repeats this cycle 60 times in one second.

This generator is known as the rotating field type and requires no commutator or brushes.

The rotor of the generator is a permanent magnet in the form of a cylinder and is made of a material which will take a strong magnetic charge. This magnet is surrounded by a copper structure which prevents it from losing its magnetism if the generator is accidentally short circuited.

Fig. 6, Page 18, is a simplified picture of the rotor showing the lines of magnetic flux leaving the north pole and entering the south pole. When such a rotor is placed in a stator with copper wire windings in its slots (as shown in Fig. 7, Page 18), the magnetic flux lines pass through the iron of the stator and between its wires. When the rotor is turned by the engine, these magnetic flux lines sweep past the wires and generate a voltage in them, the value of which depends on:

- a. Strength of the magnet
- b. Number of turns of wire
- c. Speed of rotation

The direction of the voltage generated in the wires depends on whether a north or south pole is sweeping past them. This is the reason for reversal of current each cycle mentioned in the first paragraph. If the rotor makes 60 revolutions in one second there will be 60 reversals or 60 cycles. That is what takes place when the engine runs at 3600 revolutions per minute.

10. Principle of the Two Cycle Engine.—(See Fig. 8, Page 19.)

Figure A. The piston, on its up-stroke (compression) draws a charge of fuel into the crankcase through a reed valve attached to rear of the carburetor. At the same time, a charge previously drawn into the crankcase and by-passed into the combustion chamber is compressed.

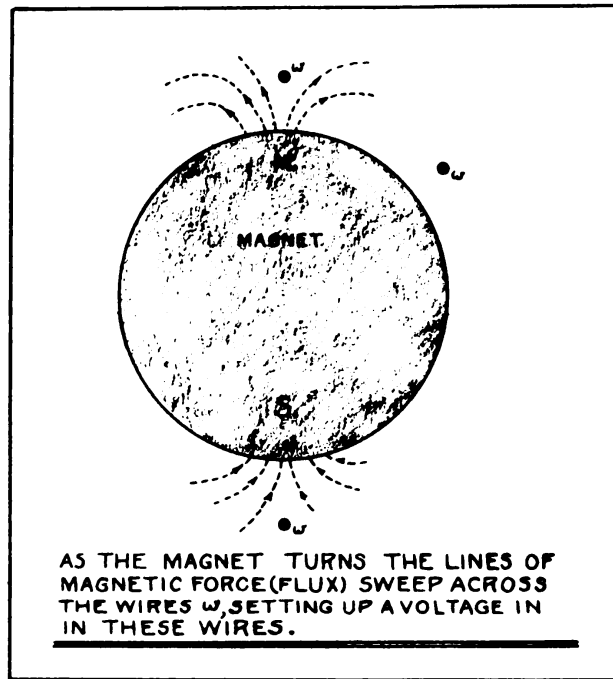


FIG. 6

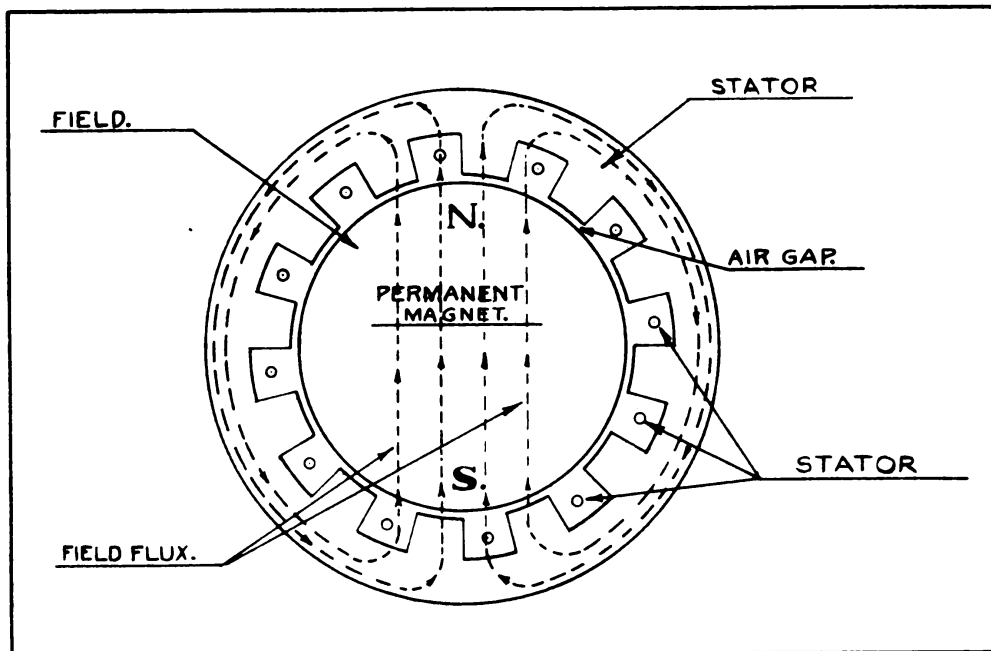


FIG. 7

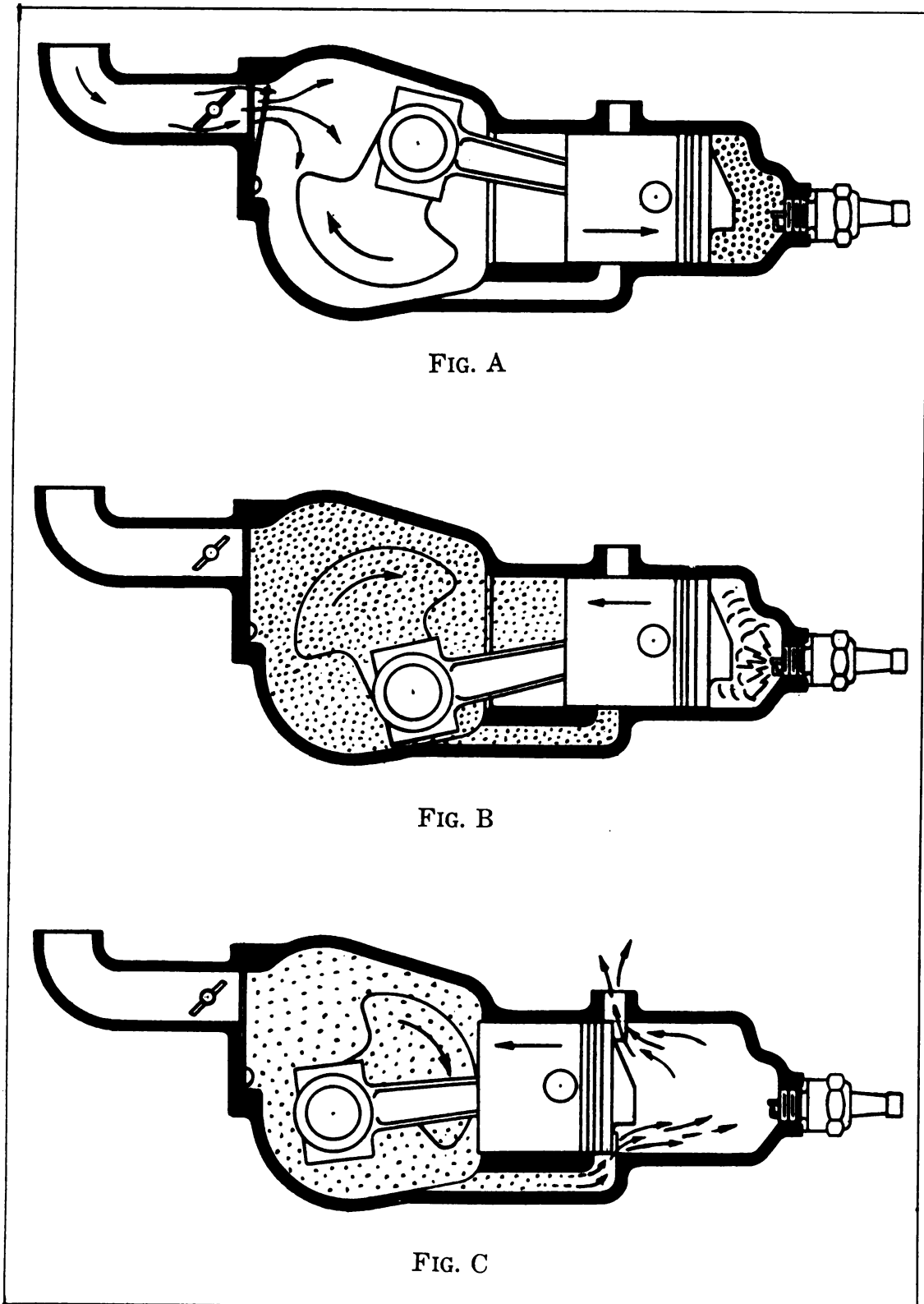


FIG. 8—PRINCIPLE OF 2 CYCLE ENGINE

Figure B. The charge in the combustion chamber is ignited when the piston is $\frac{1}{8}$ inch from top dead center. The expansion of the burning gases forces the piston down on its power stroke. The descending piston compresses the charge previously drawn into the crankcase.

Figure C. Near the bottom of its downward (power) stroke the piston uncovers the exhaust ports, releasing the exhaust gases. At almost the same moment, the piston uncovers the intake ports, permitting the fuel charge compressed in the crankcase to rush through into the combustion chamber.

One power stroke is accomplished to every revolution of the crankshaft or two strokes (1 up and 1 down) of the piston.

SECTION IV MAINTENANCE

11. Engine.—

This section deals mainly with minor points of inspection and adjustment that can be performed in the field. To insure satisfactory operation of the unit, follow directions thoroughly.

a. Spark Plug.—If engine fails to start, starts hard or misses, the spark plug may be damaged or dirty. Remove from cylinder head and shield (92), first disconnecting magneto high tension wire (25). Then reattach high tension wire to spark plug and lay plug on the cylinder. Spin motor to check spark. If no spark occurs at the spark plug points, clean out plug or install a new one.

Always use Champion J5 spark plug, or one in equivalent heat range. Point gap should be .030. Make certain gasket (108) is on spark plug when installing in engine. (See Fig. 9, Page 20.)

It is extremely important when plug is dirty to thoroughly scrape out all carbon, brownish lead deposits and loose particles.

b. Magneto.—It is recommended, if there is an indication the magneto is causing trouble, that a test be made before attempting to repair it. If the engine refuses to start after it is determined the spark plug is all right, check magneto by holding high tension wire (25) $\frac{3}{16}$ " away from a point on the engine (See Fig. 10, Page 21). When the engine is cranked in the usual manner, a properly performing magneto will have a spark output strong enough to jump the prescribed gap.

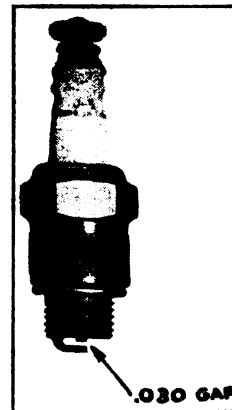


FIG. 9—
SPARK PLUG

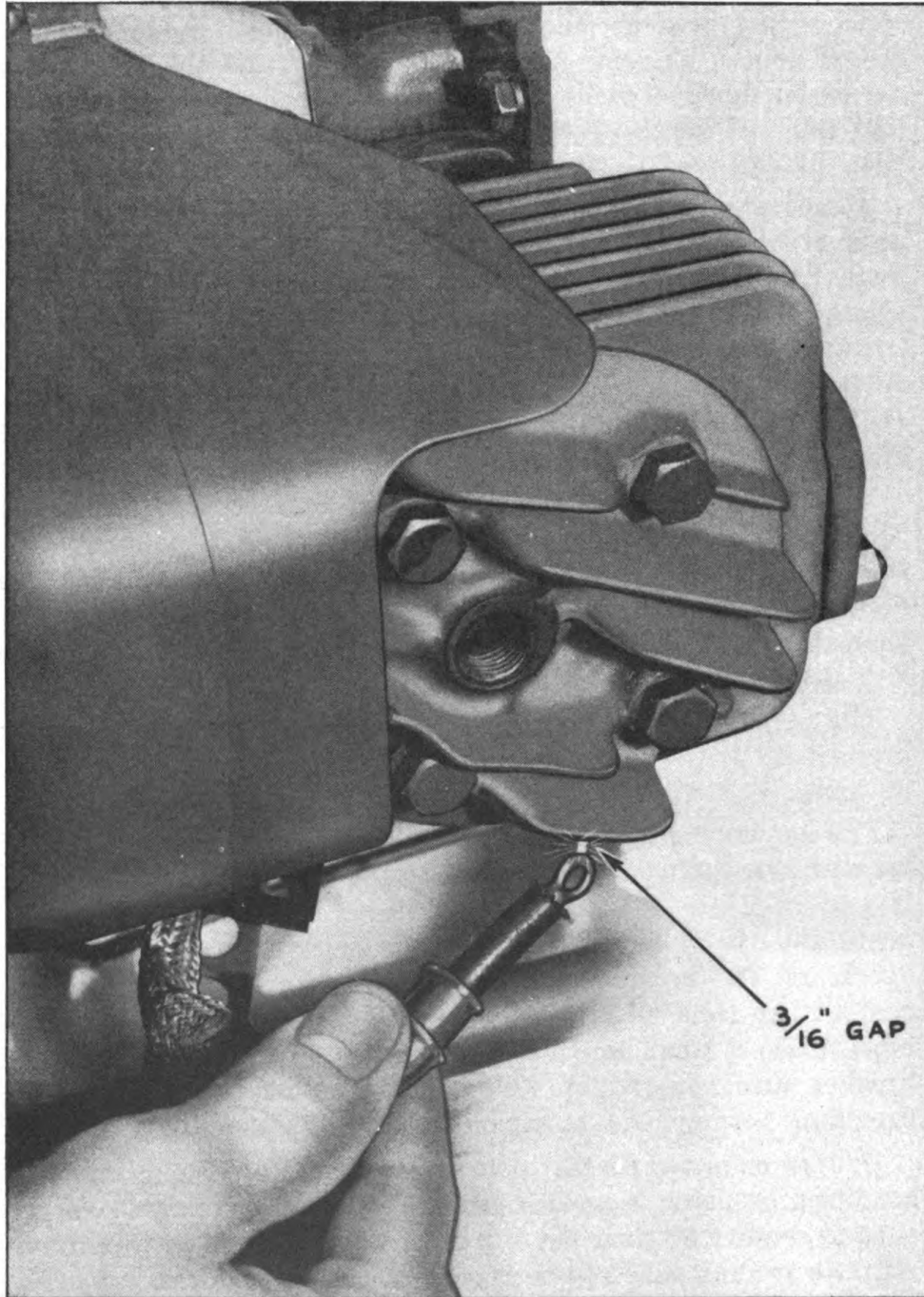


FIG. 10—TEST FOR SPARK OUTPUT

The only adjustable part on the magneto is the breaker plate (31) which provides adjustment for the breaker points.

To adjust breaker points, first remove housing (1). Then to adjust points, unscrew starter pulley (99) from the crankshaft. Screw on flywheel removal tool (119) supplied with equipment and tap tool on the end to loosen flywheel (34), which should then be removed to provide access to points.

To adjust points, turn engine clockwise (to the right) by hand, until breaker points are fully open. Check opening (See Fig. 11, Page 23) with feeler gauge (125). Correct opening is .020". (Note: Although contact points remain open during the entire travel of the cam (21) from the breaking edge, being closed only while the flat section of the cam is passing the breaker arm (20) fibre, the cam must be positioned so the breaker arm fibre rests on the highest point of cam when gauging point opening.)

If points need resetting, bend down contact plate lock (27) (See Fig. 11, Page 23), loosen lock nut (30) which holds breaker plate (31) in position, and move plate up or down as might be necessary to obtain proper point opening. After setting is accomplished, be sure to tighten lock nut (30) and bend ear of plate lock against flat of lock nut so it can not loosen up.

The breaker plate setting should be made only in the manner prescribed. At no time should the fixed contact (On plate 31) be loosened or breaker arm (20) bent to provide adjustment.

The moving contact is integral with breaker arm. In replacing breaker arm (20), make certain breaker arm bushing is in place. If one or other of contact points needs replacing, it is recommended both be changed at same time to insure satisfactory operation. The breaker arm bearing is packed with a cam lubricant at the time of assembly and should not require additional lubrication. A small amount of this lubricant is also packed on the breaker arm cam wiper (36) and wipes off on cam surface, providing permanent lubrication between these rubbing surfaces.

Uneven or pitted contact points may be restored to a true even condition by using a smooth carborundum or dressing stone. Be sure to remove all dust particles. However, points in this condition are recommended to be replaced. For minor dressing, a fine grain sandpaper such as No. 00 can be used.

c. To Time Magneto.—If for any reason, the magneto assembly is removed from the engine, these directions covering timing should be followed.

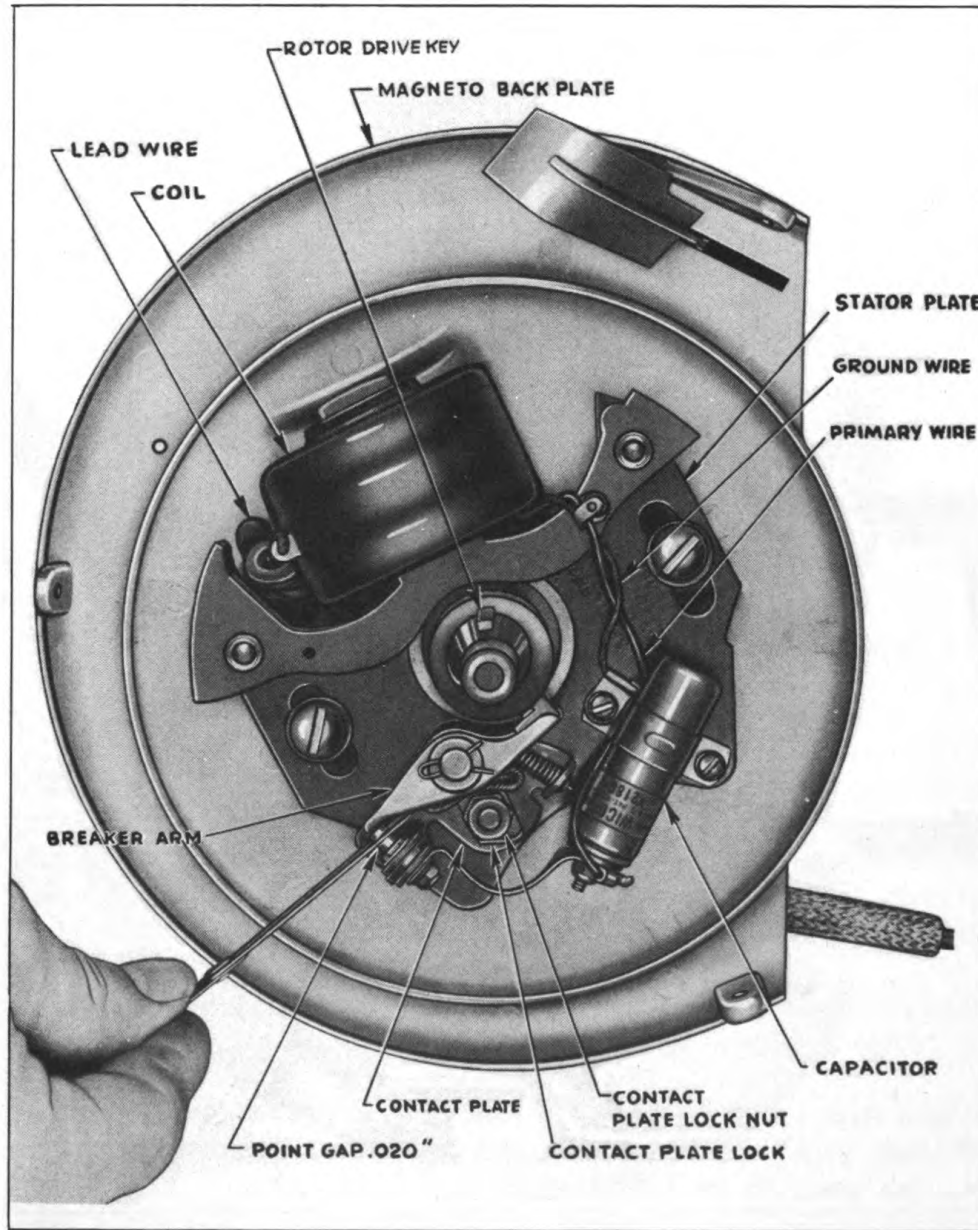


FIG. 11—MAGNETO POINT ADJUSTMENT

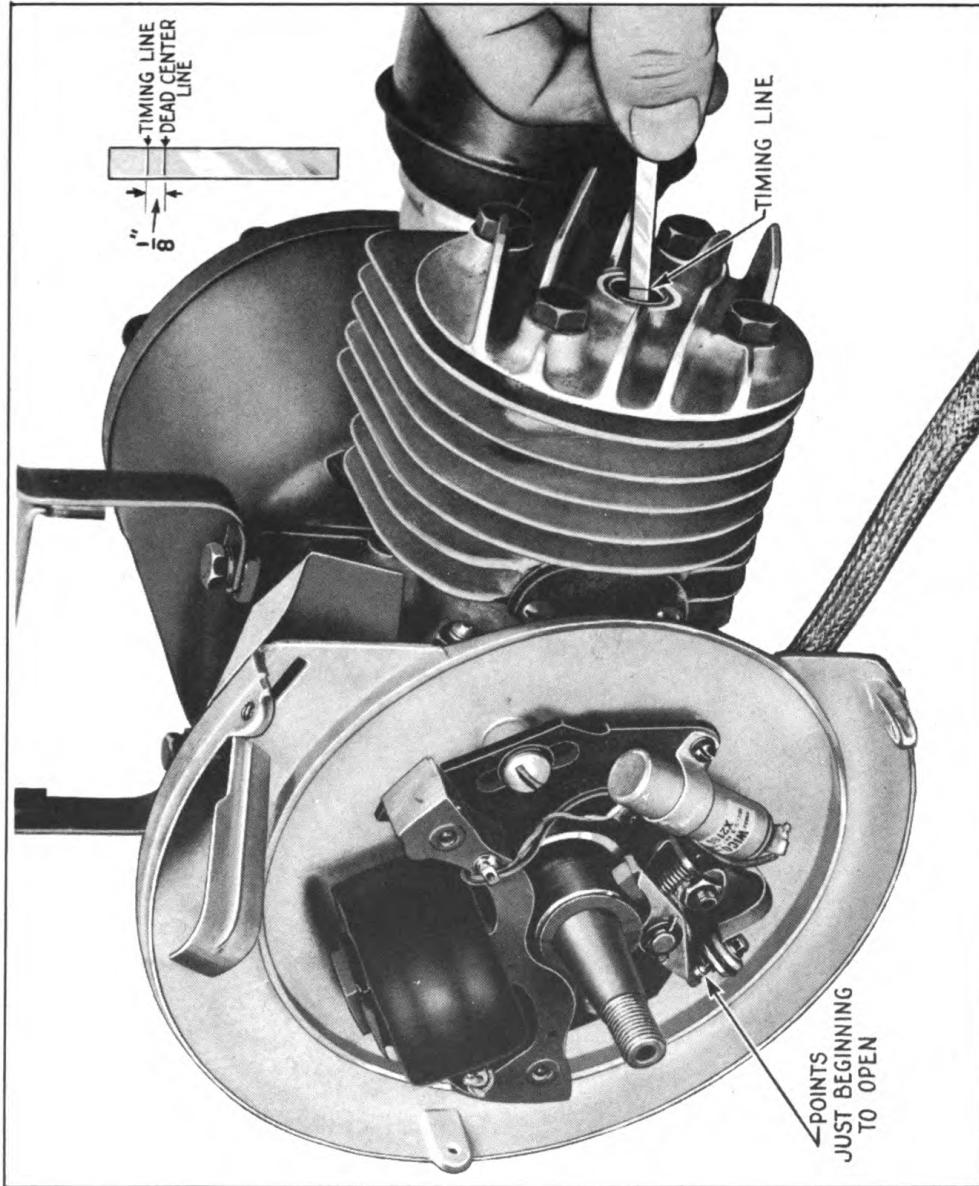


FIG. 12—MAGNETO TIMING

(1) Check point opening as outlined under magneto directions (Paragraph 11, Page 22). Remove spark plug. Turn crankshaft (9) in direction of engine rotation (to the right) until piston reaches top dead center.

(2) Insert a small rod through spark plug hole in cylinder head (97) until it touches top of piston. Scribe a line on the rod flush with top of spark plug hole. Then withdraw rod and scribe another line up $\frac{1}{8}$ " from dead center mark (See Fig. 12, Page 24). Next, turn engine in opposite direction of rotation (to the left) about one-quarter turn.

(3) The rod should again be inserted through spark plug hole until it touches top of piston. Then turn engine in direction of rotation (to the right) until top mark on rod is flush with top of spark plug hole.

(4) Move stator plate (35) until points just begin to break. Tighten plate by means of the two round head screws, which lock plate in place. Recheck to determine if piston is $\frac{1}{8}$ " from top dead center when points just begin to break. If setting is exactly as described, the timing is then so a spark occurs when piston is $\frac{1}{8}$ " from top dead center.

(5) Replacing high tension wire. A chafed or broken cable (25) which is a cause for continuous or intermittent misfiring, should be replaced. The high tension cable should be stripped back about $\frac{1}{2}$ " on the magneto end, twist strands together and slip through hole in bracket attached to coil. Bend strands around bracket so cable cannot work out (See Fig. 11, Page 23).

It is essential that the bare end be kept short and close to each surface after cable is in place. (Do not solder cable to coil.)

(6) Coil and Capacitor. If no spark or a weak spark occurs after adjusting the contact points, the trouble is likely to be in the coil (33) or capacitor (22), although failure of these parts is not a common cause of difficulty. Replace either one or both to obtain a strong spark only after checking the spark plug, high tension wire connection and magneto contact points. (Coil is furnished as assembly only with laminated core.) In replacing the coil assembly, the three machined faces of the laminations must line up exactly with the three machined bosses of the stator. Screws must be tightened securely.

(7) Magnet. Integrally cast in the rim of the rotor (34) is the magnetic unit, which concentrates a powerful magnetic charge within a small volume. By virtue of its ability to retain indefinitely this high magnetic concentration, the unit is able to provide the magneto with extraordinary high spark output through its entire life. Therefore, no trouble should be experienced with the magnet.

(8) Lubrication. The magneto should require no lubrication for a long period of service. For cam lubrication add a little vasoline or petrolatum to the cam wiper (36) after approximately 200 hours of operation. Do not use oil or a fluid lubricant as either can get on the breaker points and short them out.

d. Carburetor.—The carburetor needle valve (56) is correctly set at the time of assembly and should require no attention for some time. However, if, for any reason, the needle valve must be removed, follow these directions:

(1) Hold adjustment knob (60) with one hand, then loosen and remove hex acorn-nut (55) atop the knob with a wrench or pair of pliers. Unscrew adjustment valve by turning in counter-clockwise direction (to the left).

(2) When reassembling valve (56) to carburetor, turn it in a clockwise direction (to the right) in seat as far as it will go. Do not tighten hard against seat or damage might occur to seat and valve.

(3) With valve in seat as far as it will go, turn it back about one-quarter turn from this closed position. Replace spring (45) and valve adjustment knob with wing of knob against left hand side of stop. Screw on acorn-nut and tighten making sure valve does not move while this is being done.

If engine idles improperly or will not keep running, first check the fuel mixture for proper ratio of oil to gasoline; then muffler, exhaust and intake port holes for carbon accumulation. (See Para. 11, Page 30 and Figs. 13-14, Pages 28-29.)

If there is no restriction due to carbon and the carburetor is properly adjusted, and spark plug and magneto points correctly adjusted, remove the air cleaner (72) and examine the air check (67) located in carburetor bowl to see that small particles of foreign matter are not preventing the valve from closing. Should the air check valve be functioning properly, remove the carburetor and examine the reed valve (90) attached to carburetor on the back. Make certain that no foreign matter prevents this valve from closing or seating properly.

In reattaching carburetor make sure all connections are tight to prevent air leakage.

e. Air Cleaner.—The air cleaner (72) serves to prevent dust and grit from entering the engine and causing wear to moving parts. If equipment is operated under extremely severe and dusty conditions, the felt core (137) should be removed and washed out in gasoline, naphtha or acetone after about 30 hours of operation or oftener if conditions warrant. The filter core (137), after cleaning should be dipped in oil. Permit oil to drain off before assembling to cleaner. The filter core should also be examined periodically to see that no openings are present to permit entry of foreign matter. A leaky core should be replaced.

f. Governor.—No adjustments should be necessary to the governor, as it is correctly set for the requirements of the unit at the factory. No attention should be required except if governor housing (70) is removed for spring (64) replacement.

To remove governor housing and install new spring follow these directions:

(1) Remove governor link guard (128) by taking out the two screws holding it to magneto back plate.

(2) Disconnect fuel line (167) and then remove gas tank from unit mounting base.

(3) Uncouple governor link (130) and remove carburetor from engine.

(4) Loosen headless set screw (59) in governor spring barrel with wrench (134) and slip assembly from throttle shaft (65).

(5) In replacing governor spring, insert one end of spring into hole in governor housing. Slide the housing onto throttle shaft. Then line up other end of spring with hole in knurled speed adjusting wheel (61). Hold extension on governor housing in vertical position. Next hold throttle lever (65) extension up against stop or in wide open position. Then tighten headless screw in governor housing.

Check governor housing to determine no bind exists. It should move freely through entire range of travel.

If engine speed requires changing, turn knurled speed regulator (61) toward cylinder (counter-clockwise) to increase speed; the opposite direction (clockwise) to increase speed.

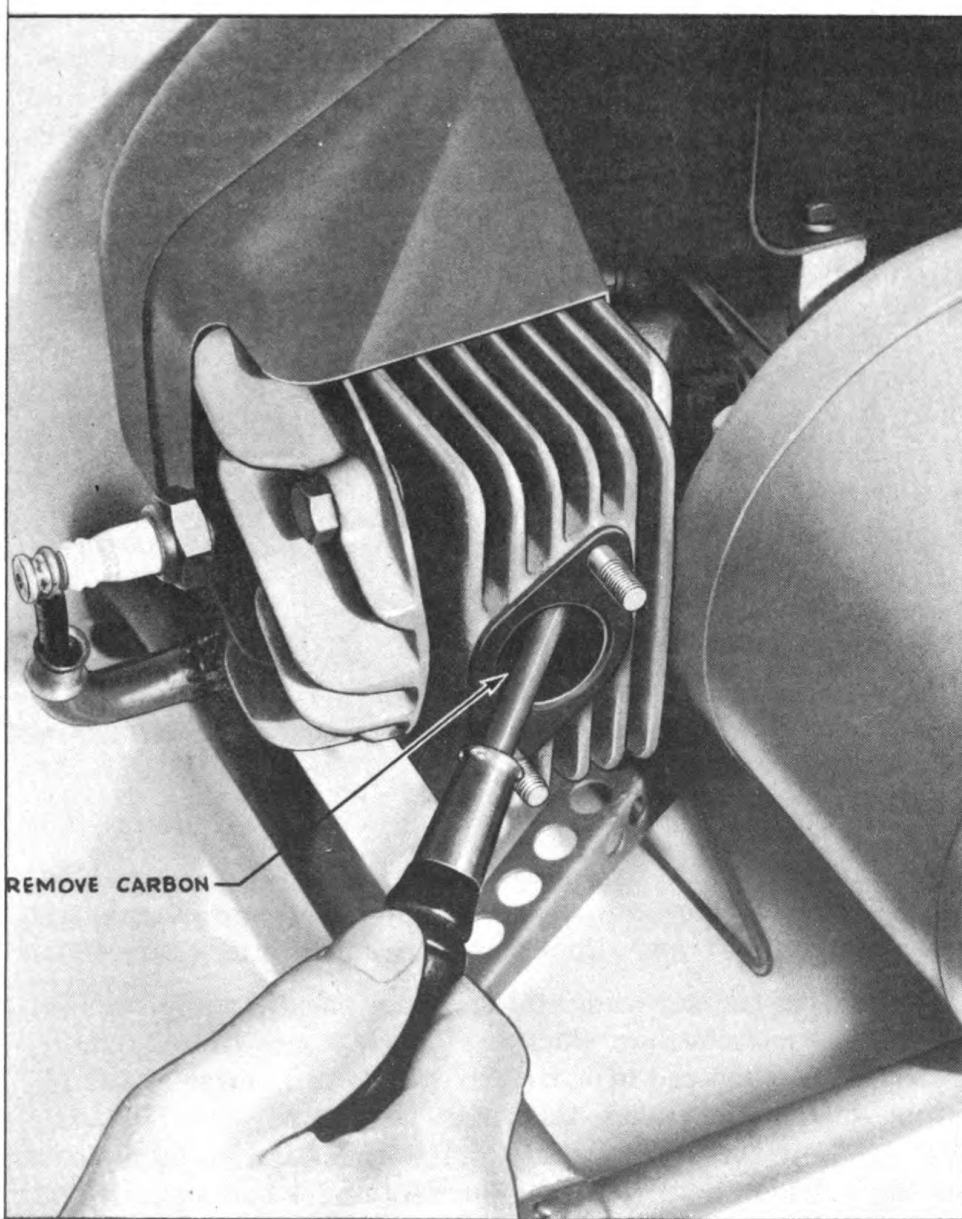


FIG. 13—CARBON REMOVAL—EXHAUST PORTS

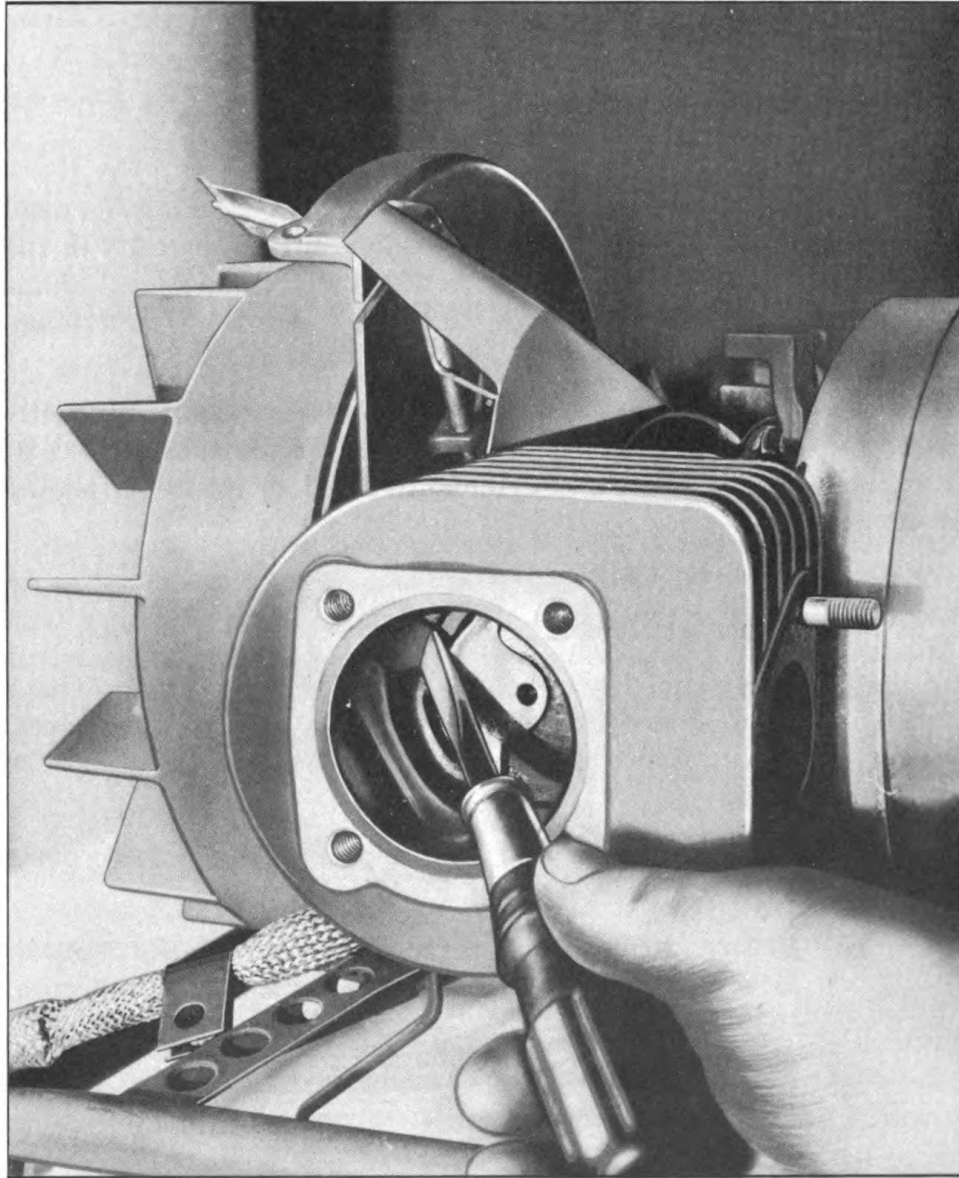


FIG. 14—CARBON REMOVAL—INTAKE PORTS

g. Carbon Removal.—It is advisable to make a periodic check of the engine exhaust and intake port holes, also muffler assembly, to determine that no carbon has built up at those points to restrict scavenging of exhaust gases from the cylinder and reduce power output. To check and remove carbon, follow these directions:

(1) Remove spark plug.

(2) Remove muffler.

(3) Turn engine over by hand until piston reaches bottom dead center. Examine exhaust ports. Carbon and lead deposits in the exhaust ports can be removed with screw driver or some similar instrument. (See Fig. 13, Page 28.) Be careful not to damage the piston when removing the deposits from ports.

(4) It is preferable when exhaust ports are found partially closed by carbon and lead deposits, to make a thorough check of the piston, intake port, and cylinder head. The following should be done:

(1) Remove the fan housing (1).

(2) Remove cylinder head (97).

(3) Scrape off carbon and lead deposits from cylinder head, inside of cylinder and top of piston. A screw driver, knife or other similar instrument should be used.

(4) Remove carbon and lead deposits from intake ports with screw driver (See Fig. 14, Page 29).

(5) Before reassembling the cylinder head make sure all loose particles of carbon and lead are removed from the engine.

NOTE: Small particles of carbon and lead if left in the engine may foul the spark plug in restarting.

(5) The muffler (37) can be disassembled by removing nut (185) and separating muffler shell (41) from head (38). Scrape carbon from inside the head. Clean carbon out of all inner and outer holes of shell. Make certain gasket (39) is all right before reassembly of muffler.

(6) Crank engine a few times before reinstalling muffler, to give carbon chips an opportunity to pass out of engine.

h. When Engine Fails to Start.—If, at any time, the engine should fail to start, check the following possibilities:

(1) Make sure there is at least one inch of gasoline in the fuel tank.

(2) Make sure that the air vent wing nut (162) is open and the vent clear.

(3) Damaged or dirty spark plug: Remove the spark plug. Lay it on the motor base with the high tension wire connected and spin motor to check spark. If no spark occurs at the points, clean out plug or replace it with a new one. The spark plug points should have a gap of approximately .030".

(4) Weak or intermittent spark: A weak spark is generally due to improper adjustment of the magneto points. Check point adjustment as directed in Magneto Adjustment instructions. (Para. 11, Page 22.)

(5) Loose gasoline line connection: Gas line packing nuts and all connections must be absolutely tight, as an air leak will prevent a full charge of gasoline from entering the motor and affect carburetion. Check all connections, including fuel line shut-off. Periodically tighten all connections. Draw up the packing nuts of the fuel line and shut-off if necessary.

12. Generator.—

Should the generator at any time fail to generate current it is recommended it be substituted with a new unit rather than attempt any field service.

Because Generator GN-51-A does not require the use of commutator, brushes, collector ring, etc., no maintenance instructions are necessary. However, if, at any time, the generator might require complete disassembly, follow directions as shown in Para. 15, Page 34.

13. Lubrication.—

Power Unit PE-214-A requires no lubrication other than the oil mixed with gasoline for the engine (See Para. 6, Page 10) and occasional lubricating of magneto cam (21) with vaseline or petrolatum. Do not use a fluid lubricant.

14. Procedure in case of failure.—

When the engine fails to operate and there is fuel in the gasoline tank, the spark plug, ignition and carburetor should be checked in the order named.

In locating engine trouble, replace the spark plug. If this does not correct the difficulty, leave it in place while checking further. Failure of the spark plug may be due to improper point gap or a cracked or dirty porcelain. Correct point gap is .030". Carbon or lead deposits on points may cause failure by shorting the spark plug.

Spark plugs are made in a variety of heat ranges to fit the requirements of different engines. For maximum operating efficiency it is important that Champion J5 spark plug or equal ($1\frac{3}{16}$ Hex. body) be used.

If the spark plug points are wet, it is an indication the engine is being operated with too rich a fuel mixture or the ratio of gasoline to oil is not correct.

15. Dismantling.—

a. Engine.—To disassemble the engine for major repairs it is first necessary to remove the generator. This is accomplished by first removing the three hex. head cap screws (182) from back of mounting flange (98) and sliding the generator off engine crankshaft. Then for complete dismantling of engine follow these directions:

(1) Remove spark plug shield (92), then magneto high-tension wire (25) from spark plug (109). Next remove muffler assembly (37).

(2) The magneto housing (1) is next removed and then the starter pulley (99). Be sure to use flywheel removal tool (119) for this operation.

(3) Next remove stator plate (35) and magneto back plate (87).

(4) Uncouple governor connecting link (130). Disconnect gas line (167) and remove fuel tank (75) from mounting base (78). Take off carburetor (89).

(5) Remove cap screws (184) holding cylinder head in place. Then remove the four nuts (189) bolting cylinder (4) to crankcase. Remove cylinder.

(6) Removal of the piston and connecting rod assembly (79) is accomplished by removing the two cap screws (11) from connecting-rod bearing cap. This is done through the opening in crankcase where carburetor is attached.

(7) Remove cap screws (183) bolting adapter (98) to crankcase. Before proceeding further remove balance of engine from mounting base (78). To remove adapter (98) from crankcase (86) turn assembly over, screw on flywheel puller (119) and tap crankshaft puller lightly with a hammer.

(8) The piston (81) is removed from connecting rod by removing the cotter pin (215) which holds the piston pin in place. This cotter pin passes through the boss on the inside of the piston and through the piston pin. Piston pin (82) can then be tapped out from either end of piston.

When reinstalling piston to connecting rod a new cotter pin should be used. Be sure to spread the center of the cotter pin with a sharp V shaped tool. The piston pin should be a tap fit in the piston. If the piston pin is loose, it will shear the cotter pin, which in turn will permit movement of the piston pin to the extent it will contact and cut grooves in the cylinder liner (6).

Should the connecting rod (10) ever become loose on the crankshaft pin and require taking up, it will be necessary to file the bearing cap. The connecting-rod bearing should be fitted to the crankshaft, just tight enough so that the piston and rod assembly will drop of its own weight when released from horizontal position. This bearing should be fitted before the crankshaft is installed in the crankcase.

In reassembling piston assembly to cylinder, **be sure the hump or intake side of the piston is on the same side as the intake port holes in the cylinder.** This is the side opposite to that on which the muffler is attached. To break in new piston rings, the engine should be run at least one hour before applying any load.

Piston rings should make contact with the cylinder wall all around its circumference. If the ring end gap, when piston rings are in the cylinder, exceeds .020" or if the rings are stuck tightly in the piston they should be replaced. Before installing new rings, be sure piston ring grooves are clean and free of carbon. End gap of new rings should be approximately .010". Side clearance in grooves for new rings should be .002" to .003".

While the engine is disassembled, all carbon and lead deposits should be removed from exhaust and intake ports, as well as from top of piston and the cylinder head. Be sure all gaskets are in good condition or replace them before unit is reassembled.

b. Generator.—If it should ever be necessary to dismantle the generator, proceed as follows:

(1) Remove the four lock nuts (191) and main nuts (187) from the generator through-bolts (143) at the engine end bell by unscrewing the through-bolts from the opposite end.

(2) Remove engine end flange (142) by tapping at the outside edge with a block of wood or soft metal. Avoid damaging machined surfaces.

(3) Now remove electrical outlet cover (155) on opposite end. This will expose the lead guard (152), which may be removed by taking out the two screws (199) at the bottom of the outlet cavity.

(4) After removing the lead guard (152), loosen the hex. head shaft screw (147). Keep the shaft from turning by holding the coupling on the engine end, with a wrench or pair of pliers. When this screw (147) has been removed, the rotor shaft will slip out of the bearing (159), leaving the bearing in its housing in the end bell (139).

(5) Unless necessary, it is best not to disturb the outlet end bell (139). If, however, the end bell must be removed, remember there are leads fastened to it on the inside, and it must be removed carefully so these leads will not be broken. Unsolder the lead clips in the outlet cavity after removing the lead clips from their terminals, and slip leads through the holes in the end bell (139). Then tap the end bell where it is joined to the stator shell with a block of wood or soft metal to remove it from the shell. Unsolder leads from binding posts on the inside of the end bell.

(6) To remove bearing (159) from end bell (139), remove countersunk screws (200) from inside bearing retainer washer (140), which will loosen both internal (141) and external (140) retainer washers. Tap bearing carefully on outside edge, working around it to distribute the pressure equally, until it falls out.

CAUTION: Be sure to restake countersunk screws (200) which hold bearing retainer washers.

16. Assembly.—To reassemble engine and generator, reverse sequence described in the instructions covering disassembly of each one.

SECTION V SUPPLEMENTARY DATA

17. List of Replaceable Parts.

18. Names and Addresses of Manufacturers.

17. TABLE OF REPLACEABLE PARTS

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|-------------------------------------------------|--------------------------------------|----------------|------|
| 1 | | 1 | (See Fig. 15) Fan Housing Assembly | Provides Cooling Draft for Cylinder | A-1601-B | 3 |
| 2 | | 1 | Fan Housing | | 05268 | |
| 3 | | 1 | Governor Vane Assembly | Maintains Predetermined Engine Speed | A-1641-B | 3 |
| | | | Governor Vane Mtg. Arm Bushing | | | |
| | | | Governor Vane | | | |
| | | | Governor Vane Mtg. Arm | | | |
| 4 | | 1 | Cylinder Assembly | | A-2121 | 3 |
| 5 | | 1 | Cylinder | | | 3 |
| 6 | | 1 | Cylinder Liner | | | 3 |
| 7 | | 1 | Intake Passage Cover | | 05472 | 3 |
| 8 | | 1 | Intake Passage Gasket | | 05471 | 3 |
| 9 | | 1 | Crankshaft Assembly | | A-2122-A | 3 |
| | | | Crankshaft Counterweight | | | |
| | | | Crankshaft Counterweight Rivet | | | |
| | | | Crankshaft | | | |
| 10 | | 1 | Connecting Rod Assembly | | A-2123 | 3 |
| | | | Connecting Rod | | | |
| 11 | | 2 | Connecting Rod Screw | | 03301 | 3 |
| 12 | | 2 | Lockwasher | | C-2530 | 3 |
| 13 | | 1 | Piston Pin Bearing | | 05212 | 8 |
| 14 | | 1 | Magneto Assembly Complete (Wico No. FW 1653) | Provides Spark for Ignition | A-2125 | 10 |

| Ref. No. | S. C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|-----------------|-------|-------------------------------------------------------------|--------------------------------------|----------------|------|
| 15 | | 1 | (See Fig. 18 and 19) Condenser Connecting Nut Lockwasher | Used with Ref. #92 | M-52X | 10 |
| 16 | | 1 | Breaker Plate Clamp Screw Lockwasher | Used with Ref. #18 | M-58X | 10 |
| 17 | | 2 | Condenser Clamp Screw Lockwasher | Used with Ref. #28 | M-90X | 10 |
| 18 | | 1 | Breaker Plate Clamp Screw | Secures Breaker Plate in Place | 1085 | 10 |
| 19 | | 1 | Breaker Arm Spring | Maintains Tension to Breaker Arm | 2145 | 10 |
| 20 | | 1 | Breaker Arm | To Interrupt Primary Circuit | X-2151 | 10 |
| 21 | | 1 | Breaker Cam | Makes and Breaks Magneto Points | 2176B | 10 |
| 22 | | 1 | Condenser Assembly | Reduce Breaker Point Arcing | X-2186 | 10 |
| 23 | | 2 | Coil Wedge | Fastens Coil to Field | 2264B | 10 |
| 24 | | 2 | Breaker Arm Washer | Spacer for Breaker Arm | 2357 | 10 |
| 25 | | 1 | High Tension Wire Assembly | Conduct Electrical Energy to Plug | X3377 | 10 |
| 26 | | 1 | Condenser Clamp Screw Nut Lock Plate | Locks Nut to Stator Plate | 4579 | 10 |
| 27 | | 1 | Breaker Arm Lock | Locks Breaker Arm to Shaft | 4585 | 10 |
| 28 | | 2 | Condenser Assembly Clamp Screw | Fastens Condenser Clamp | 4586 | 10 |
| 29 | | 2 | Condenser Clamp Screw Lock Nut | Used with Ref. #28 | 4587 | 10 |
| 30 | | 1 | Breaker Plate Clamp Nut | Locks Breaker Plate to Stator | 4589 | 10 |
| 31 | | 1 | Breaker Plate Group | Mounts Fixed Contact and Breaker Arm | X-4594 | 10 |
| 32 | | 1 | Condenser Connection Nut | Fastens Primary Wire to Condenser | 4597 | 10 |
| 33 | | 1 | Coil Unit | Induce High Voltage to Spark Plug | X-4943 | 10 |
| 34 | | 1 | Rotor (6½") | Create Air Blast to Cool Engine | Y-4988 | 10 |
| 35 | | 1 | Stator Plate Assembly Complete | | X-4989 | 10 |
| 36 | | 1 | Cam Wiper | Lubricate Cam | 5146 | 10 |
| 37 | | 1 | (See Fig. 15) Muffler Assembly | Muffle Exhaust Noise | A-2126-A | 3 |
| 38 | | 1 | Muffler Head | | 2555-A | |
| 39 | | 1 | Muffler Gasket | | 05218 | |

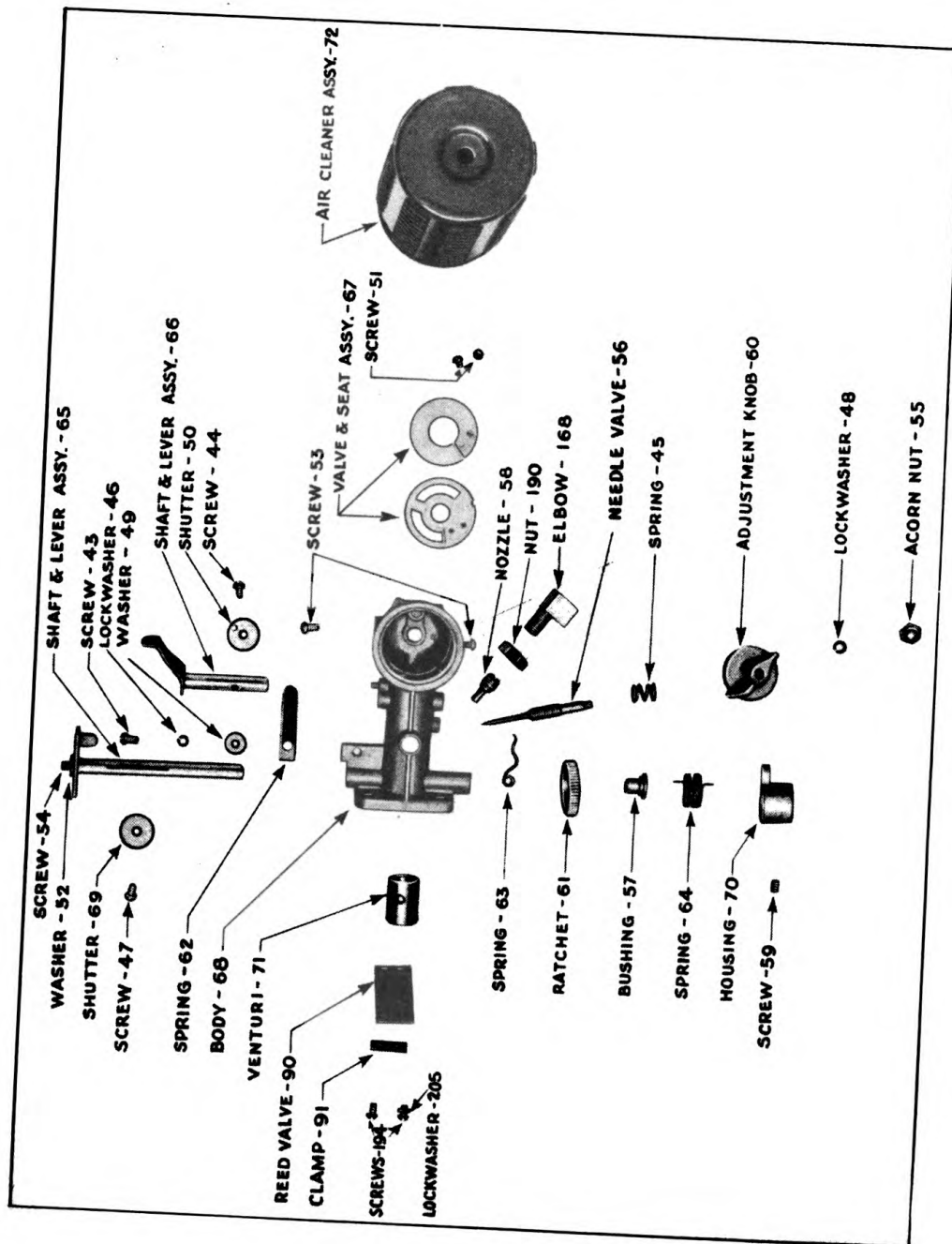


FIG. 16—CARBURETOR PARTS

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|----------------------------------------|-------------------------------------------------------|------------------|--------|
| 40 | | 1 | Muffler Stud | | 05219 | |
| 41 | | 1 | Muffler (See Fig. 16) | | 05269-A | |
| 42 | | 1 | Carburetor Assembly—Less Reed Valve | Provides Combustible Mixture of Gas and Air to Engine | A-2127 | 7 |
| 43 | | 2 | Choke Friction Spring Screw | Holds Choke Friction Spring in Place | Tillotson #B-5A | 7 |
| 44 | | 1 | Choke Shutter Screw | Holds Choke Shutter to Shaft | 056T | 7 |
| 45 | | 1 | Adjustment Screw Spring | Holds Needle Valve in Proper Adjustment | 0120T | 7 |
| 46 | | 1 | Choke Friction Spring Screw Lockwasher | Used with Reference #44 | 0737T | 7 |
| 47 | | 1 | Throttle Shutter Screw | Holds Throttle Shutter to Throttle Shaft | 0992T | 7 |
| 48 | | 2 | Lockwasher for 06953T and 06804T | Used with Refer. #55 and #58 | 01462T | 7 |
| 49 | | 1 | Choke Friction Spring Screw Washer | Retains Friction Spring | 01675T | 7 |
| 50 | | 1 | Choke Shutter | Facilitates Starting of Motor | 04920T | 7 |
| 51 | | 2 | Check Valve Retaining Screw | Holds Check Valve in Place | 05200T | 7 |
| 52 | | 1 | Governor Lever Screw Washer | Used with Refer. #55 | 05204T | 7 |
| 53 | | 2 | Check Valve Seat Retaining Screw | Fastens Check Valve to Seat | 05413T | 7 |
| 54 | | 1 | Governor Lever Screw | Fastens Governor Lever to Throttle Shaft | 06303T | 7 |
| 55 | | 1 | Adjustment Screw Acorn Nut | Fastens Adjustment Knob to Adjustment Screw | 06804T | 7 |
| 56 | | 1 | Adjustment Screw | To adjust Carburetor Setting | 06924T | 7 |
| 57 | | 1 | Throttle Ratchet Retaining Bushing | Retains Throttle Ratchet to Carburetor Body | 06953T | 7 |
| 58 | | 1 | Nozzle | Provides Seat for Adjusting Needle Valve | 06956T | 7 |
| 59 | | 1 | Governor Spring Housing Set Screw | Fastens Governor Housing to Shaft | 06966T 06969T | 7 7 |

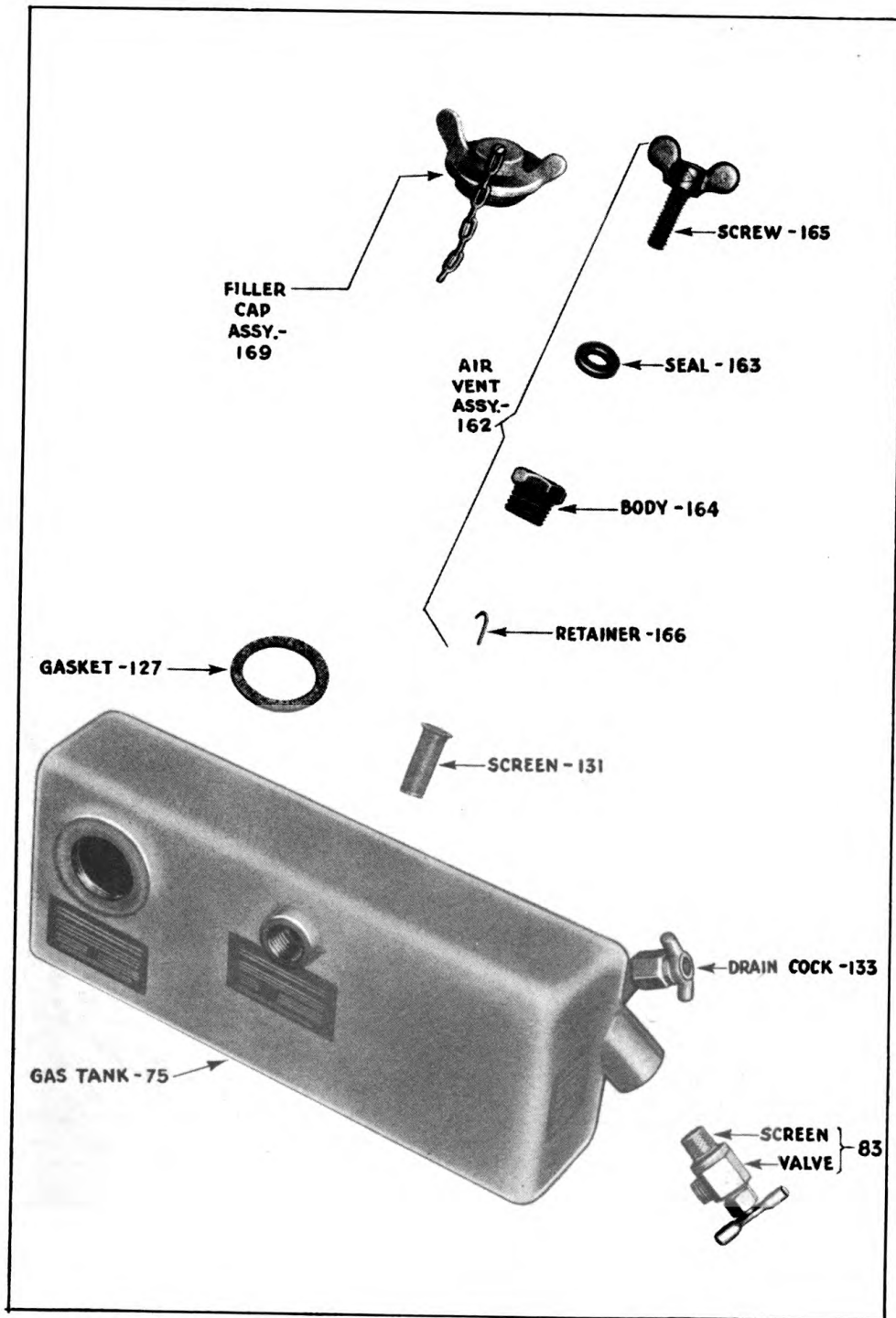


FIG. 17—FUEL TANK ASSEMBLY

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|-------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------|------|
| 60 | | 1 | Adjustment Screw Knob | Used for Hand Adjustment of Needle Valve | 07360T | 7 |
| 61 | | 1 | Throttle Ratchet | Provides Adjustment for Speed | 07362T | 7 |
| 62 | | 1 | Choke Friction Spring | Holds Choke in position | 07365T | 7 |
| 63 | | 1 | Throttle Ratchet Position Spring | Maintains Speed Adjustment | 07366T | 7 |
| 64 | | 1 | Governor Spring | Balance Air Pressure in Governor Vane | 07367T | 7 |
| 65 | | 1 | Throttle Shaft and Governor Lever Assembly | Mount Throttle Shutter and Governor Parts | 07469T | 7 |
| 66 | | 1 | Choke Shaft and Lever | Mount Choke Shutter | 07387T | 7 |
| 67 | | 1 | Check Valve and Seat Assembly | Meter Air to Carburetor | 07388T | 7 |
| 68 | | 1 | Body—only | | 07390T | 7 |
| 69 | | 1 | Throttle Shutter | Controls Flow of Air to Engine | 07391T | 7 |
| 70 | | 1 | Governor Spring Housing | Provides Means to Hold Governor Spring to Shaft | 07418T | 7 |
| 71 | | 1 | Venturi (See Fig. 15) | Aids in proper Mixture of Fuel | 07425T | 7 |
| 72 | | 1 | Air Cleaner Assembly | Filters Air to Carburetor | A-2129 | 6 |
| 73 | | 1 | Air Cleaner Body | | 05514 | |
| 74 | | 1 | Air Cleaner Base (See Fig. 17) | | 05515 | |
| 75 | | 1 | Fuel Tank Assembly Fuel Tank Sump Fuel Tube Flange (Filler Cap Mtg.) Air Valve Adapter | Fuel Supply for Engine | A-2130-B | 3 |

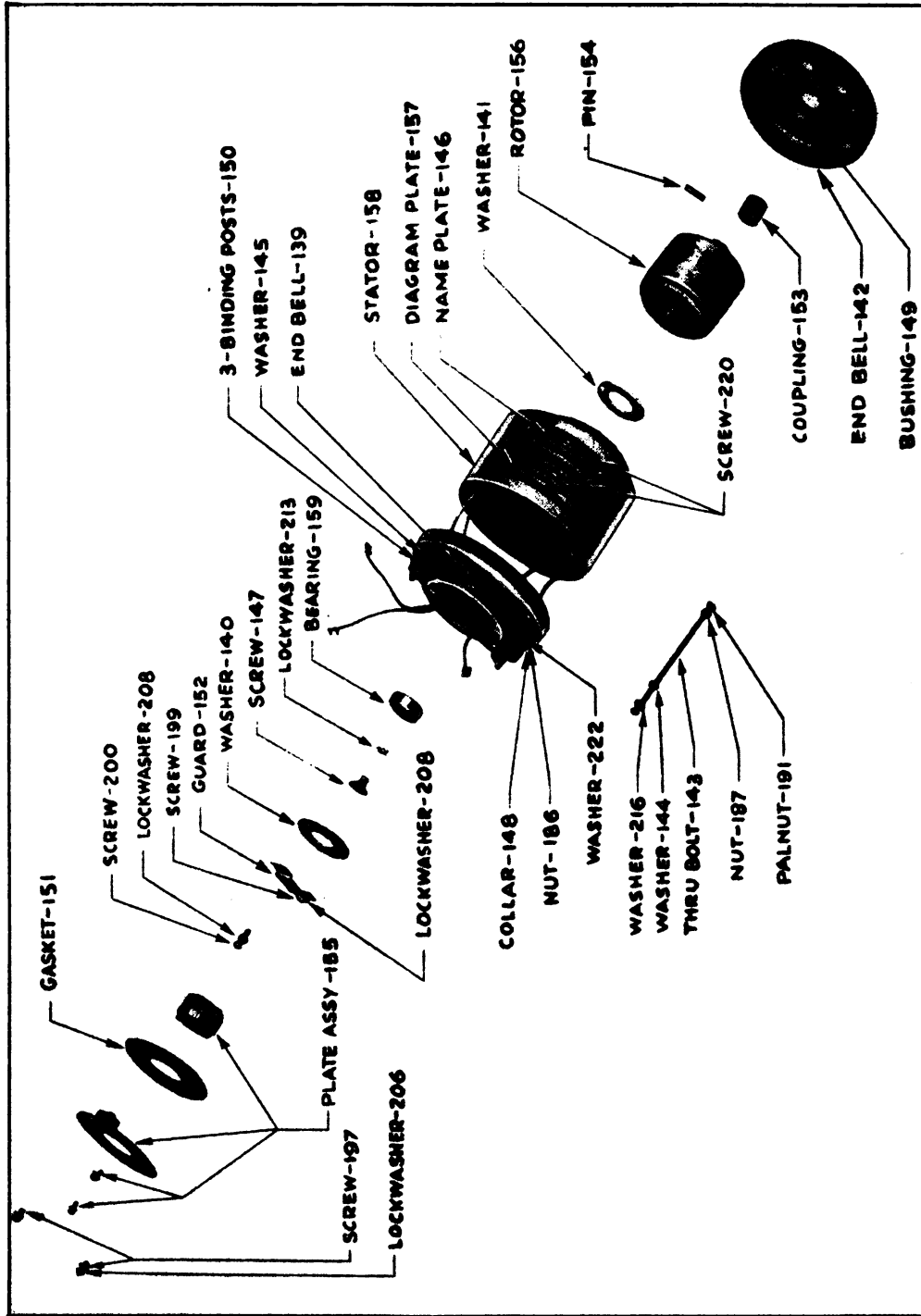


FIG. 18—GENERATOR ASSEMBLY

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------|------|
| 76 | | 1 | (See Fig. 15) Radio Shielding Assembly Radio Shielding Radio Shielding Clip Radio Shielding Collar Radio Shielding Elbow | Eliminates Radio Interference | A-2136 | 3 |
| 77 | | 1 | Carrying Handle Assembly Carrying Handle Grip Carrying Handle Side | To lift unit from Carrying Case | A-2137-B | 3 |
| 78 | | 1 | Motor Base Assembly | For Mounting of Engine, Generator, and Gas Tank | A-2138 | 3 |
| 79 | | 1 | Piston and Connecting Rod Assembly | See Ref. #10 | A-2141 | 3 |
| 80 | | 1 | Connecting Rod Assembly | | A-2123 | 3 |
| 81 | | 3 | Piston Ring | | 2359 | 3 |
| 82 | | 1 | Piston | | 2551 | 3 |
| | | 1 | Piston Pin | | 05213 | 3 |
| 83 | | 1 | (See Fig. 16) Shut-off Valve Assembly | Shuts off Fuel Supply to Carburetor | A-2254 | 3 |
| 84 | | 1 | Engine Name Plate | | 05502 | 3 |
| 85 | | 1 | Carrying Case Name Plate | | 05503 | 3 |
| 86 | | 1 | Crankcase and Insert Assembly | | A-2215 | 3 |
| 87 | | 1 | (See Fig. 15) Fan Housing Plate Assembly Fan Housing Plate | Back Plate for Magneto | A-2226 | 3 |
| 88 | | 2 | Crankshaft Oil Seal | | 04899 | 5 |

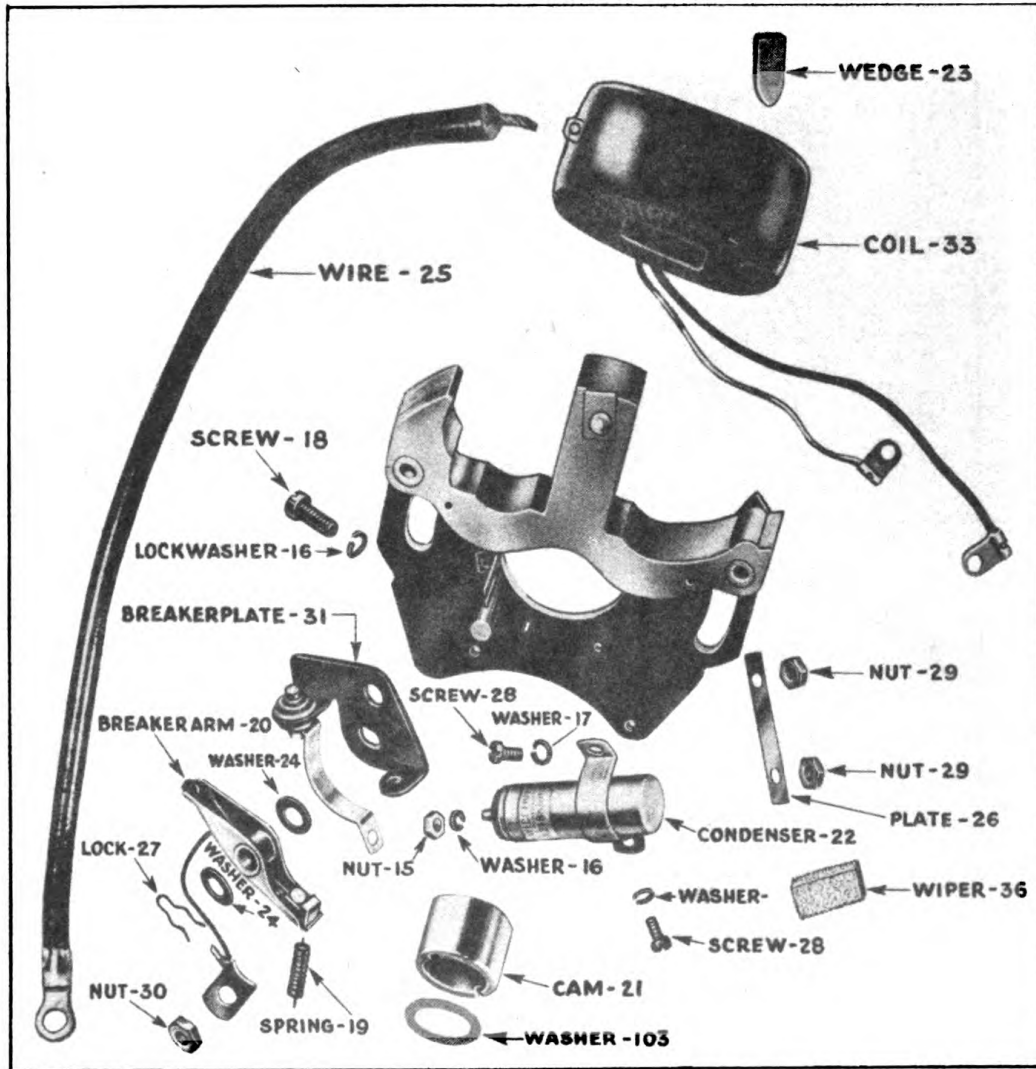


FIG. 19—MAGNETO STATOR PLATE ASSEMBLY

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|-----------------------------------------------|--------------------------------------------------|----------------|------|
| 89 | | 1 | (See Fig. 16) Carburetor Assembly Complete | See Ref. #42 | A-2228 | 3 |
| 90 | | 1 | Tillotson Carburetor | See Ref. #42 | A-2127 | 7 |
| 91 | | 1 | Reed Valve | | 04049-A | 3 |
| | | 1 | Reed Valve Clamp | | 04050 | 3 |
| | | 2 | Reed Valve Screw | | C-2582 | 3 |
| 92 | | 1 | (See Fig. 15) Spark Plug Shield Assembly | To Shield from Radio Interference | A2235 | 3 |
| 94 | | 1 | Spark Plug Shield Body | | 2558 | 3 |
| 95 | | 1 | Spark Plug Shield Cap | | 2559 | 3 |
| 96 | | 1 | Spark Plug Shield Cap Retainer | | 05237 | 3 |
| | | 2 | Fillister Hd. Machine Screws | | C1615 | 3 |
| | | 2 | Lockwasher | | C2530 | 3 |
| 97 | | 1 | Motor Assembly Complete | | A-2143 | 3 |
| 98 | | 1 | Cylinder Head | To Mount Generator | 2548 | 3 |
| 99 | | 1 | Crankcase Bearing Adapter | To Start Engine | 2552-A | 3 |
| | | 1 | Starter Pulley | | 2554 | 3 |
| 101 | | 4 | Cylinder Mounting Stud | Mount Cylinder to Crankcase | 03318 | 3 |
| 102 | | 1 | Cylinder Mounting Gasket | Seal Cylinder to Crankcase | 03322 | 3 |
| 103 | | 1 | Magneto Cam Spring Washer | Retains Tension to Magneto Cam | 03950 | 3 |
| 104 | | 1 | Carburetor Gasket | Seal for Carburetor and Cylinder | 04060 | 3 |
| 105 | | 1 | Cylinder Head Gasket | Seal for Cylinder Head and Cylinder | 04371 | 3 |
| 106 | | 1 | Crankcase Head Gasket | Seal for Crankcase and Crankcase Bearing Adapter | 04377 | 3 |
| 107 | | 2 | Fan Housing Gasket | Seal for Crankcase and Fan Housing Plate | 04378 | 3 |
| 108 | | 1 | Spark Plug Gasket | Seal for Spark Plug | 05535 | 1 |
| 109 | | 1 | Spark Plug | To Provide Spark to Engine | 04425 | 1 |

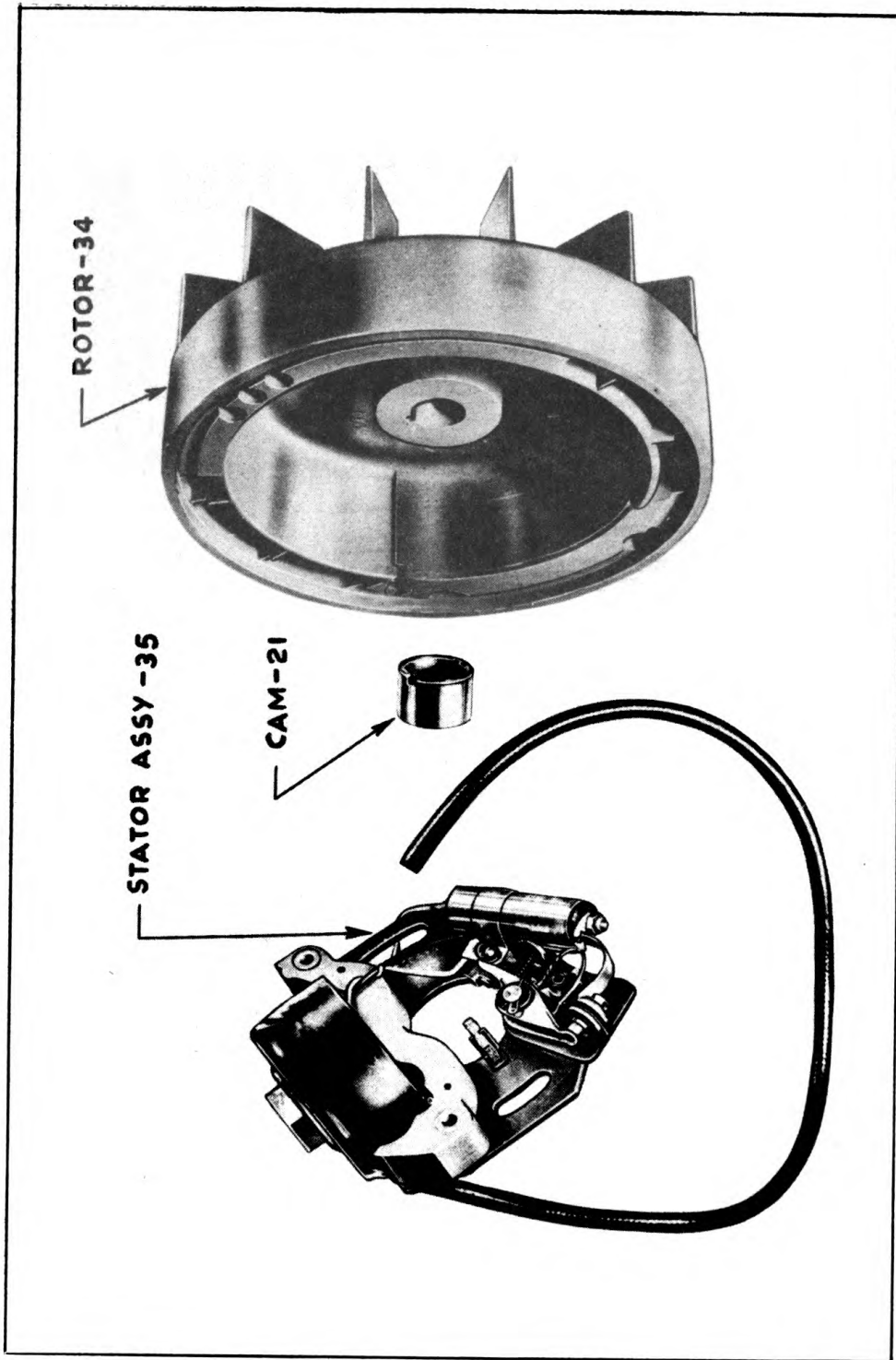


FIG. 20—MAGNETO ASSEMBLY

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|-------------------------------------------------|------------------------------------------------------|----------------|------|
| 110 | | 1 | Governor Vane Mounting Pin | To Mount Governor Vane | 04455 | 3 |
| 111 | | 1 | Name Plate (Generator) | Identification | 05501 | 3 |
| 112 | | 2 | Crankshaft Spacer | Crankshaft Bearing Thrust Washer | 05211 | 3 |
| 113 | | 2 | Crankshaft Bearing | | 03566 | 5 |
| 114 | | 1 | Muffler Head Mounting Gasket | Seal for Muffler Head and Cylinder | 05220-A | 3 |
| 115 | | 2 | Muffler Head Mounting Stud | Mounts Muffler Head to Cylinder | 05221 | 3 |
| 116 | | 1 | Air Cleaner Mounting Gasket | Seal for Air Cleaner and Air Cleaner Mounting Washer | 05225 | 3 |
| 117 | | 1 | Air Cleaner Mounting Stud | Mounts Air Cleaner to Carburetor | 05226 | 3 |
| 118 | | 1 | Air Cleaner Mounting Washer (See Fig. 27) | Seal for Air Cleaner Mounting Gasket and Carburetor | 05227 | 3 |
| 119 | | 1 | Flywheel Puller | To Remove Flywheel | 05250 | 3 |
| 120 | | 1 | $\frac{3}{8}$ - $\frac{7}{16}$ Open End Wrench | | 05252 | 9 |
| 121 | | 1 | Screwdriver Socket Wrench | | 05253 | 9 |
| 122 | | 1 | $\frac{1}{2}$ - $\frac{11}{16}$ Open End Wrench | | 05254 | 9 |
| 123 | | 1 | Fuel Mixing Can 1 Qt. | Mix Fuel | 05255 | 3 |
| 125 | | 1 | Feeler Gauge | To Gauge Magneto and Spark Plug Point Gaps | 05257 | 3 |
| 126 | | 1 | Cil Container 1 Pt. | | 05258 | 3 |
| 127 | | 1 | Filler Cap Gasket | Seal for Filler Cap to Fuel Tank | 05266 | 3 |
| 128 | | 1 | Governor Link Guard | To Protect Governor Link | 05267 | 3 |
| 129 | | 1 | Pliers | | 05370 | 9 |
| 130 | | 1 | Governor Link | Connects Carburetor Throttle Arm to Governor Vane | 05377 | 3 |
| 131 | | 1 | Air Vent Screen | To Keep Dirt from Getting into Fuel Tank | 05445 | 3 |
| 132 | | 2 | Fuel Tank Cushion Strap | Cushion Between Fuel Tank and Base | 05450 | 3 |

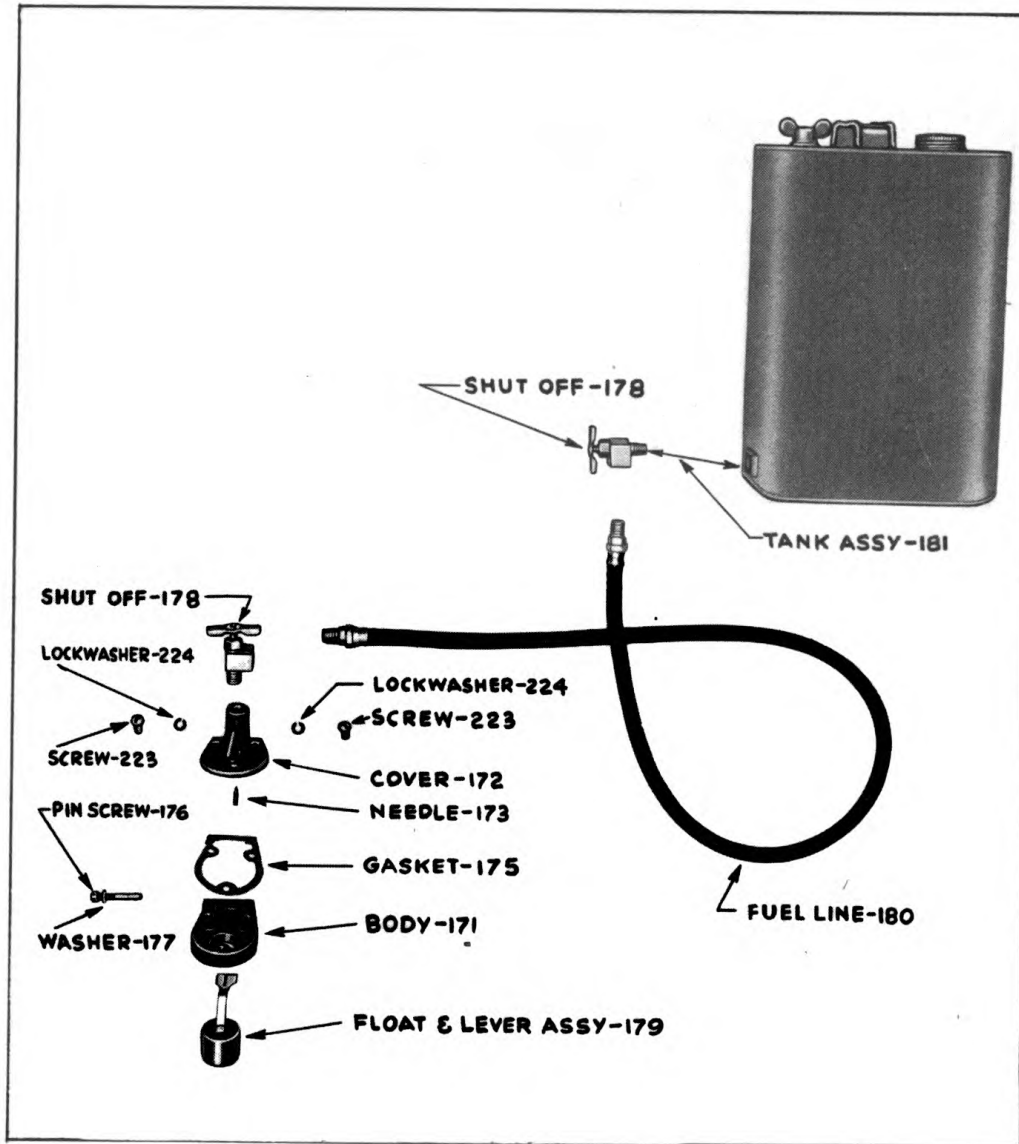


FIG. 21—TANK M-343-A ASSEMBLY

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|--------------------------------------------------------------------------------------|-----------------------------------------------|----------------|-------------|
| 133 | | 2 | Fuel Tank and Crankcase Draincocks | To Drain Crankcase and Fuel Tank | 05459 | 3 |
| 134 | | 1 | #8 Allen Wrench | To Loosen Set Screw on Governor Housing | C5403 | 3 |
| 135 | | 1 | (See Fig. 15) Fuel Tank Strap Assembly Fuel Tank Strap Fuel Tank Strap Stud | Mount Fuel Tank to Base | A-2144 | 3 3 3 |
| 136 | | 1 | Starter Rope Assembly Starter Rope Starter Rope Grip | To Start Engine | A-2145-A | 3 |
| 137 | | 1 | Air Filter Cartridge | Filter Air to Carburetor | A-2147 | 6 |
| 138 | | 1 | (See Fig. 18) Generator Assembly | Furnishes A. C. Power | A-2173 | 2 |
| 139 | | 1 | Outer End Bell | | EMS-14 | 2 |
| 140 | | 1 | Ball Bearing Retaining Washer (Outer) | | EMS-17 | 2 |
| 141 | | 1 | Ball Bearing Retaining Washer-Inner | | EMS-18 | 2 |
| 142 | | 1 | Engine End Bell | | EMS-19 | 2 |
| 143 | | 4 | Thru Bolts | | EMS-20 | 2 |
| 144 | | 4 | Thru Bolt Insulation Washers | Hold Generator Together | EMS-21 | 2 |
| 145 | | 3 | Binding Post Insulating Washers | | EMS-23 | 2 |
| 146 | | 1 | Name Plate | Identification | EMS-24 | 2 |
| 147 | | 1 | Rotor Bearing Retaining Screw | | EMS-35 | 2 |
| 148 | | 3 | Binding Post Insulating Collar | | EMS-36 | 2 |
| 149 | | 3 | Engine End Bell Bushings | | EMS-42 | 2 |
| 150 | | 3 | Binding Posts | Two for Emergency Power Outlet— One Ground | EMS-43 | 2 |

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|----------------------------------------------------------------------------------------------------------|------------------------------------------|----------------|------|
| 151 | | 1 | Outlet Plate Gasket | Seal | EMS-44 | 2 |
| 152 | | 1 | Lead Guard | | EMS-45 | 2 |
| 153 | | 1 | Spline Coupling | Couple Generator to Engine | EMS-49 | 2 |
| 154 | | 1 | Spline Coupling Pin | Retain Coupling to Rotor Shaft | EMS-50 | 2 |
| 155 | | 1 | Outlet Plate Assembly | Power Outlet | EMS-54 | 2 |
| 156 | | 1 | Rotor Assembly | | EMS-56 | 2 |
| 157 | | 1 | Connection Nameplate | | EMS-57 | 2 |
| 158 | | 1 | Stator | | EMS-58 | 2 |
| 159 | | 1 | Ball Bearing | | EMS-59 | 5 |
| 160 | | 1 | Carrying Case Assembly Complete | To Transport Unit | A-2174 | 4 |
| 161 | | 1 | Carton for Carrying Case | To Cover Carrying Case | 05496 | 3 |
| 162 | | 1 | (See Fig. 17) Gas Tank Air Vent Assembly | To Adjust Air Through Fuel Tank | A-2184 | 3 |
| 163 | | 1 | Air Vent Seal | | 05432 | 3 |
| 164 | | 1 | Air Vent Body | | 05433 | 3 |
| 165 | | 1 | Air Vent Screw | | 05434 | 3 |
| 166 | | 1 | Air Vent Screw Retainer | | 05444 | 3 |
| 167 | | 1 | (See Fig. 15) Fuel Line Assembly | To Transfer Fuel from Tank to Carburetor | A-2201 | 3 |
| 168 | | 1 | Fuel Line Elbow | | 2515 | 3 |
| 169 | | 1 | Filler Cap Assembly Filler Cap Filler Cap Lock Chain Filler Cap Lock Bar Rd. Hd. Mach. Screw | Connects Fuel Line to Carburetor | A-2207 | 3 |
| | | | | | 05231 | |
| | | | | | C817 | |

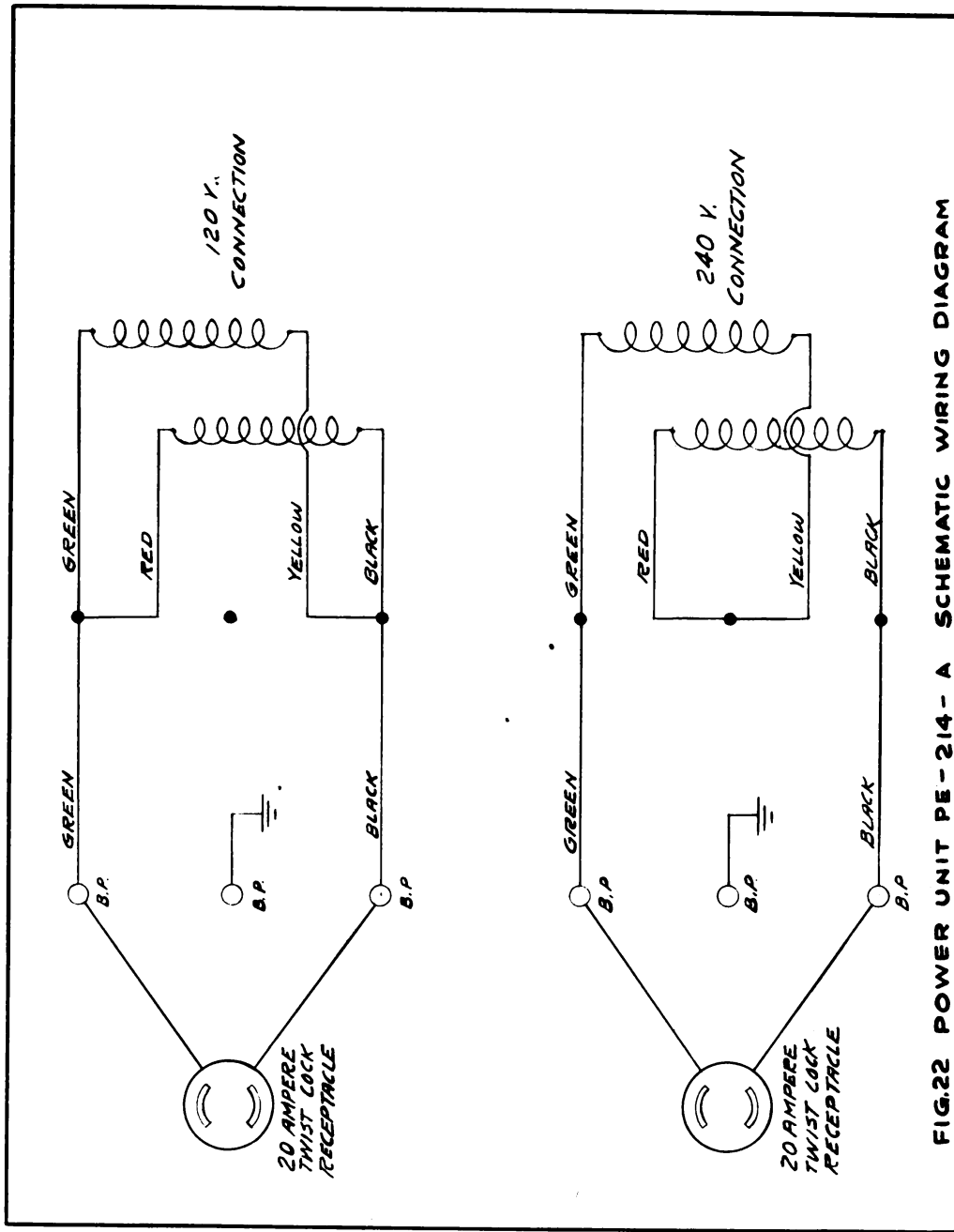


FIG.22 POWER UNIT PE-214-A SCHEMATIC WIRING DIAGRAM

FIG. 22—POWER UNIT PE-214-A SCHEMATIC WIRING DIAGRAM

| Ref. No. | S.C. Stock No. | Quan. | Description | Function | Mfg's Part No. | Mfg. |
|----------|----------------|-------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------|
| 170 | | 1 | (See Fig. 21) Float Valve Assembly | Provided for Feeding Fuel to Unit Tank Keeping Fuel at a Steady Level See Ref. 179 | A-2237 A-2238 2600 2601 05485 05489 05490 05492 05493 A-2239 | 3 3 3 3 3 3 3 3 3 3 |
| 171 | | 1 | Float and Lever Assembly | To Maintain Fuel Level in Carburetor | A-2238 05487 05488 05491 C-4419 | 3 3 3 3 3 |
| 172 | | 1 | Float Valve Body | | | |
| 173 | | 1 | Float Valve Body Cover | | | |
| 174 | | 1 | Needle Valve | | | |
| 175 | | 1 | Thread Protector Sleeve | | | |
| 176 | | 1 | Valve Cover Gasket | | | |
| 177 | | 1 | Float Lever Pin Screw | | | |
| 178 | | 1 | Float Lever Pin Washer | | | |
| | | 1 | Shut Off Cock | | | |
| 179 | | 1 | Float and Lever Assembly | | | |
| 180 | | 1 | Float Lever Cork Float Float Support Pin #3-1/4 O.D. x .105 I.D. x .020 Brass Riveting Burr | Transfer Fuel from Tank Thru Float Assembly to Std. Tank Provides Additional Reserve Supply of Fuel | A-2240 A-2241 | 3 3 |
| 181 | | 1 | Fuel Line Assembly Auxiliary Fuel Tank Assembly | | | |
| | | 1 | Air Vent Flange Fuel Line Boss Fuel Tank Can Shut Off Cock | See Ref. #178 | A-2239 | 3 |

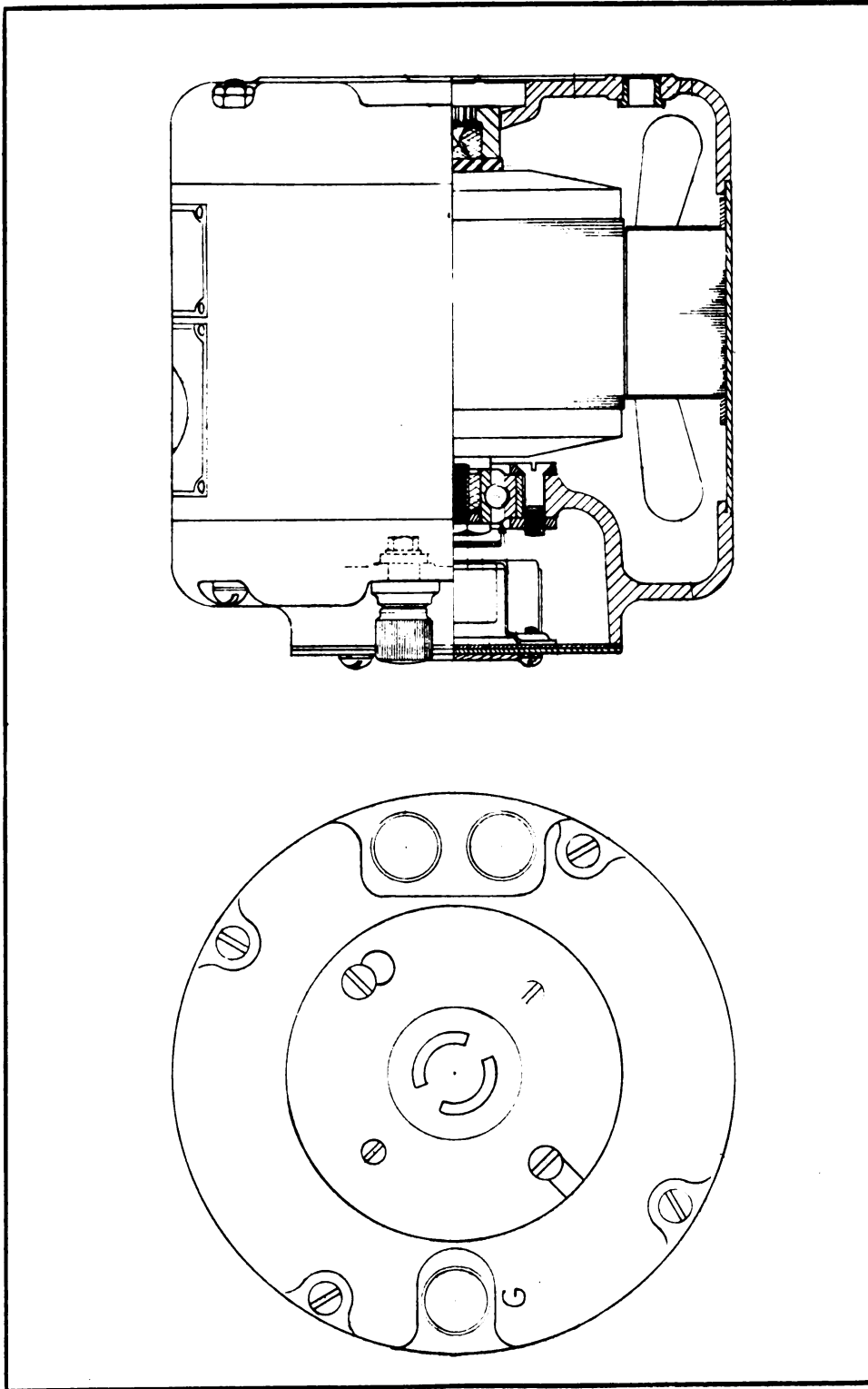


FIG. 23—POWER UNIT PE-214-A—CROSS SECTION DRAWING OF GENERATOR GN-51-A

TABLE OF BOLTS, NUTS, AND WASHERS

| Ref. No. | Quan. | Size | Lgth. | Thread | Description | Function |
|----------|-------|------|-------|--------|-------------------------|------------------------------------------------------------------------|
| 182 | 5 | 1/4 | 1/2 | USS 20 | Hex. Hd. Cap Screw | 2—For Mounting Carrying Handle |
| 183 | 7 | 5/16 | 5/8 | USS 18 | Hex. Hd. Cap Screw | 3—For Mounting Crankcase to Generator 3—For Mounting Crankcase Head |
| 184 | 4 | 5/16 | 1 | USS 18 | Hex. Hd. Cap Screw | 4—For Mounting Engine to Base For Mounting Cylinder Head |
| 185 | 3 | 1/4 | SAE | SAE 28 | Hex. Nut Brass | 2—For Mounting Muffler 1—For Mounting Muffler Head |
| 186 | 3 | #8 | | NC 32 | Hex. Nut Brass | Mounts Binding Posts to Generator |
| 187 | 4 | #10 | | NC 24 | Hex. Nut | Mounts Thru Bolt to Generator |
| 188 | 4 | #12 | | NC 24 | Hex. Nut | For Mounting Fuel Tank |
| 189 | 4 | 5/16 | | SAE 24 | Hex. Nut | For Mounting Cylinder to Crankcase |
| 190 | 1 | 5/16 | | SAE 24 | Hex. Jam Nut | For Locking Fuel Line Elbow to Carburetor |
| 191 | 4 | #10 | | | Palnut | Mounts Thru Bolt-Generator |
| 192 | 1 | #12 | | NC 24 | Std. Wing Nut | For Retaining Air Cleaner to Carburetor |
| 194 | 2 | #6 | 1/4 | NC 32 | Rd. Hd. Machine Screw | For Mounting Reed Valve |
| 195 | 2 | #8 | 3/16 | NC 32 | Rd. Hd. Machine Screw | For Mounting Governor Link Guard |
| 196 | 4 | #8 | 5/16 | NC 32 | Rd. Hd. Machine Screw | For Mounting Intake Passage Cover to Cylinder |
| 197 | 2 | #8 | 3/8 | NC 32 | Rd. Hd. Machine Screw | For Mounting Outlet Cover to Generator |
| 198 | 3 | #10 | 1/4 | NC 24 | Rd. Hd. Machine Screw | For Mounting Fan Housing |
| 199 | 2 | #10 | 3/4 | NF 32 | Rd. Hd. Machine Screw | Fastens Lead Guard to Generator |
| 200 | 2 | #10 | 3/4 | NF 32 | Flat Head Machine Screw | Fastens Inner Bearing Retainer |
| 201 | 4 | #12 | 5/8 | NC 24 | Fil. Head Machine Screw | For Mounting Carburetor |
| 202 | 2 | #12 | 3/4 | NC 24 | Fil. Head Machine Screw | For Mounting Shield to Spark Plug |

| Ref. No. | Quan. | Size | Lgth. | Thread | Description | Function |
|----------|-------|------|-------|--------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 203 | 2 | #12 | 7/8 | NC 20 | Fil. Head Cap Screw | For Mounting Fan Housing Plate |
| 204 | 2 | #12 | 5/8 | NC 20 | Rd. Head Cap Screw | For Mounting Magneto to Fan Housing Plate |
| 205 | 2 | #6 | | | Shakeproof Lockwasher | For Mounting Reed Valve |
| 206 | 2 | #8 | | | Shakeproof Lockwasher | For Fastening Outlet Cover |
| 207 | 6 | #8 | | | Lockwasher Light Section | 2—For Mounting Governor Link Guard 4—For Mounting Intake Passage Gasket to Cylinder |
| 208 | 5 | #10 | | | Lockwasher Light Section | 3—For Mounting Fan Housing 2—For Fastening Lead Guard to Generator |
| 209 | 6 | #12 | | | Lockwasher Light Section | 4—For Mounting Carburetor |
| 210 | 4 | #12 | | | Lockwasher Heavy Section | 2—For Mounting Shield to Spark Plug |
| 211 | 4 | 1/4 | | | Lockwasher Light Section | For Mounting Fuel Tank to Base |
| 212 | 8 | 1/4 | | | Lockwasher Heavy Section | 2—For Mounting Carrying Handle 2—For Mounting Muffler Head |
| 213 | 12 | 5/16 | | | Lockwasher Light Section | 2—For Mounting Fan Housing Plate |
| 214 | | | | | Lockwasher Light Section | 2—For Mounting Magneto to Fan Housing Plate |
| 215 | 1 | 3/32 | 3/4 | | Cotter Pin | 1—For Securing Ignition Cable Clip |
| 216 | 6 | 3/16 | | | Riveting Burr | 3—For Mounting Crankcase to Generator 4—For Mounting Crankcase Head Adapter |
| 217 | 2 | 1/4 | | | Riveting Burr | 4—For Mounting Cylinder to Crankcase 1—For Mounting Base For Mounting Bearing Rotor to Generator For Mounting Starter Pulley |
| | | | | | | Lock Piston Pin in Piston |
| | | | | | | 4—For Mounting Thru Bolt to Generator 2—For Mounting Muffler and Air Filter |
| | | | | | | For Mounting Magneto to Fan Housing Plate |

| Ref. No. | Quan. | Size | Lgth. | Thread | Description | Function |
|---------------------------------------------------------------------------|-------|---------------|----------------|--------|-------------------------------------------------|---------------------------------------------------------------|
| 218 | 1 | #7 | | | Woodruff Key | For Mounting Magneto |
| 219 | 1 | #14 | $\frac{3}{8}$ | | Parker-Kalon Rd. Hd. Self Tap Sheet Metal Screw | For Mounting Ignition Cable Clip |
| 220 | 8 | #0 | $\frac{3}{16}$ | | Parker-Kalon Rd. Hd. Self Tap Sheet Metal Screw | For Mounting Name Plates to Generator |
| 221 | 8 | #16 | $\frac{3}{16}$ | | Rd. Hd. Steel Rivet | For Mounting Name Plate and Instruction Plate |
| 222 | 2 | #8 | | | Std. Brass Washer | For Mounting Over Binding Post Insulating Washer to Generator |
| TABLE OF BOLTS, NUTS, AND WASHERS For Auxiliary Fuel Tank Unit | | | | | | |
| 223 | 3 | #10 | $\frac{3}{8}$ | NC 24 | Fl. Head Machine Screw Brass | For Connecting Body and Cover |
| 224 | 3 | #10 | | | Lockwasher Light Section | For Connecting Body and Cover |
| 225 | 1 | $\frac{1}{4}$ | | | #3 Riveting Burr Brass | For Mounting Cork Float to Pin |

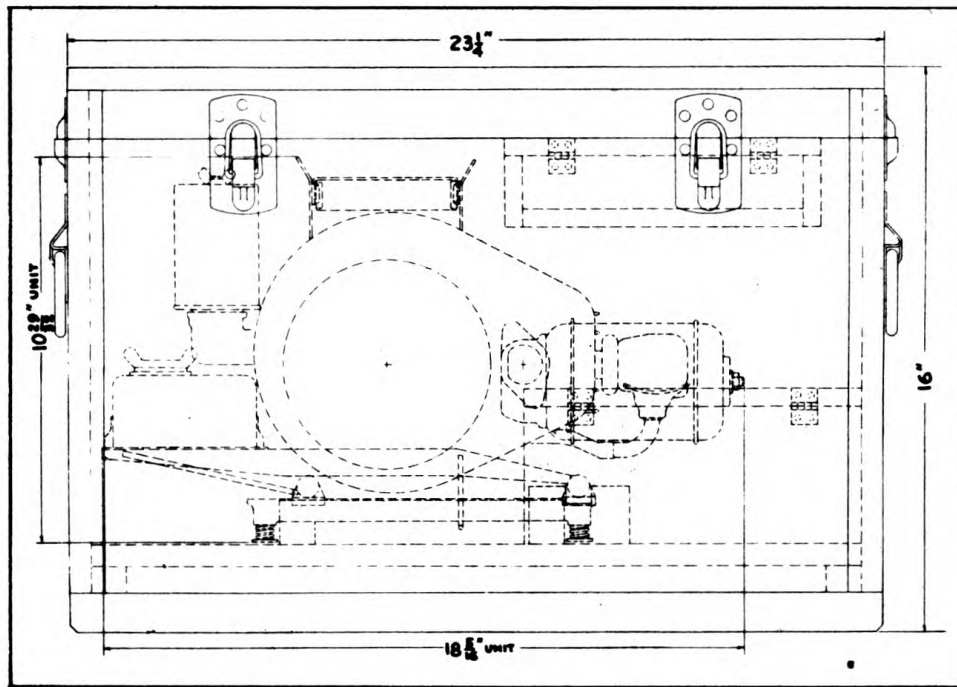


FIG. 25—POWER UNIT PE-214-A—OVERALL DIMENSIONS

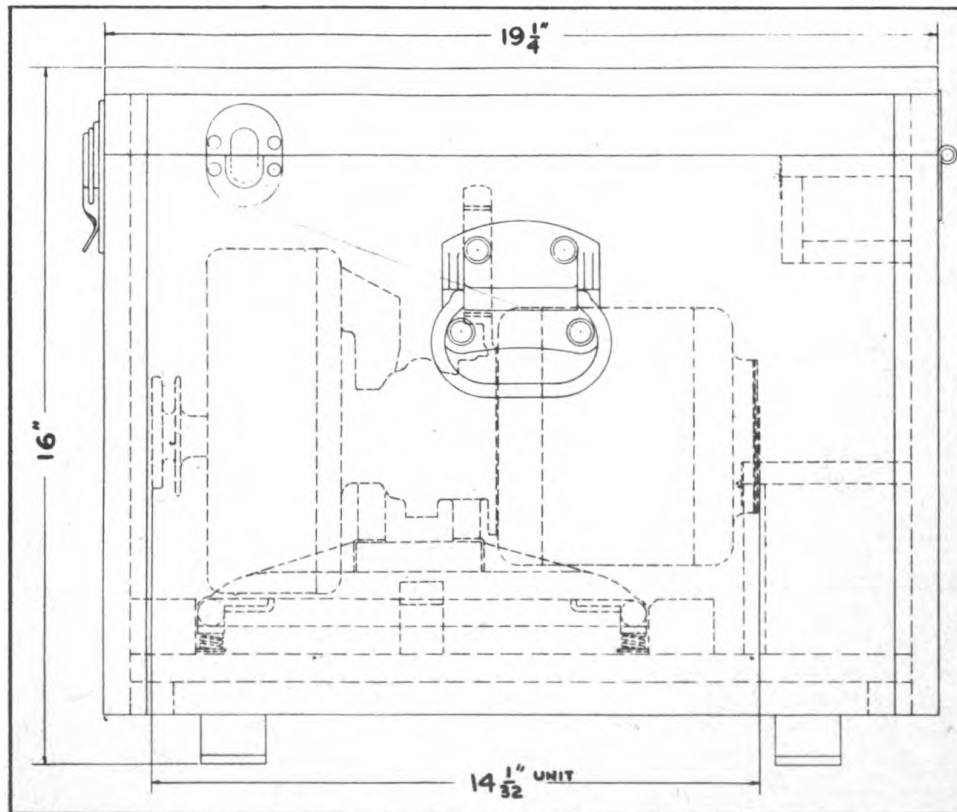


FIG. 26—POWER UNIT PE-214-A—OVERALL DIMENSIONS

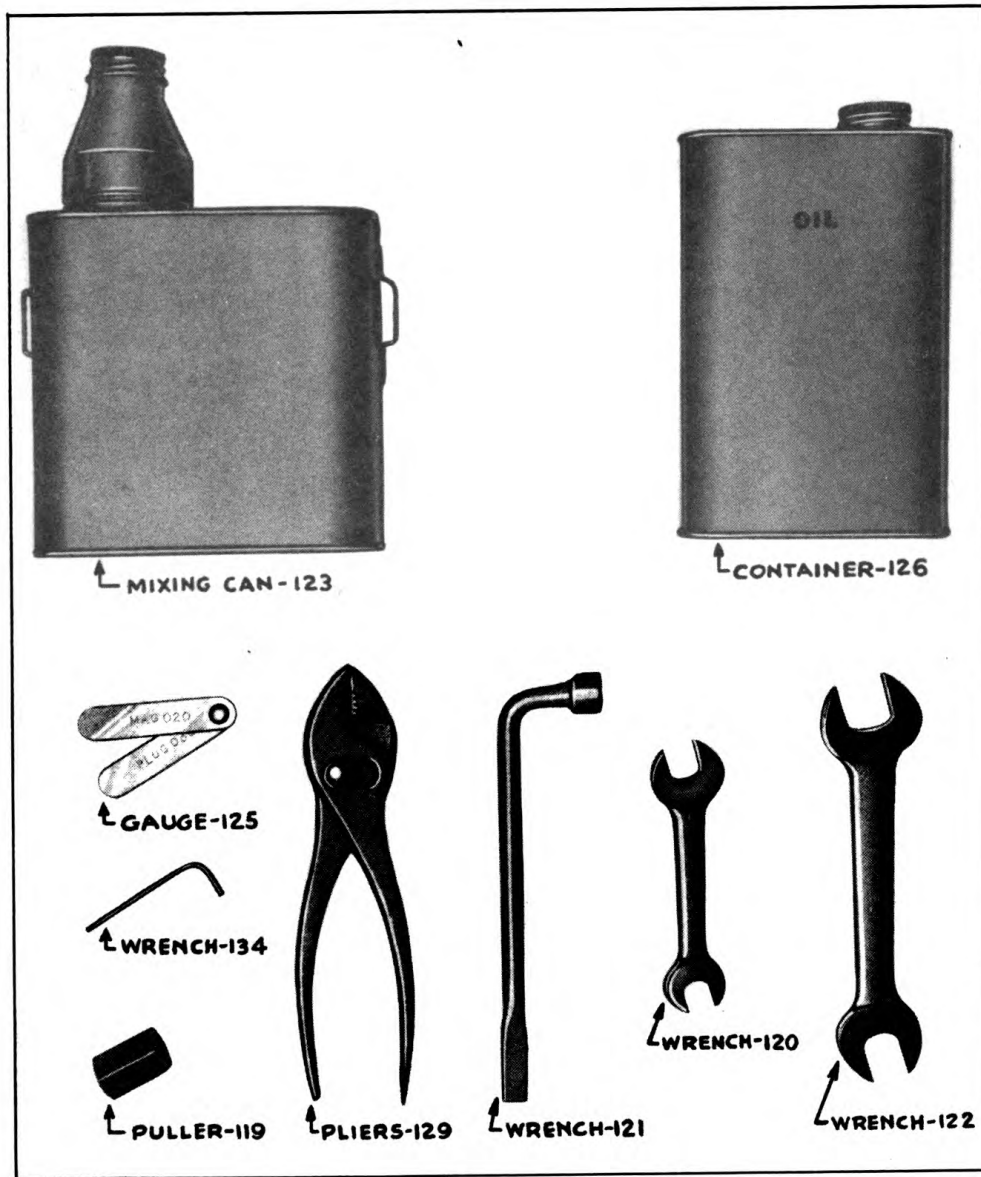


FIG. 27—TOOLS

18. NAMES AND ADDRESSES OF MANUFACTURERS

- 1. Champion Spark Plug Company Toledo, Ohio
- 2. Electric Motors & Specialties Company . Fort Wayne, Ind.
- 3. Jacobsen Manufacturing Company . . Racine, Wisconsin
- 4. M. L. Naken Company Chicago, Illinois
- 5. New Departure Company Bristol, Connecticut
- 6. Staynew Filter Company Rochester, New York
- 7. Tillotson Manufacturing Company Toledo, Ohio
- 8. Torrington Company Torrington, Connecticut
- 9. Vlecek Tool Company Cleveland, Ohio
- 10. Wico Electric Company . . . Springfield, Massachusetts

TM11-913

[A.G.062.11 (10-7-42.)]

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(For explanation of symbols see FM21-6)

