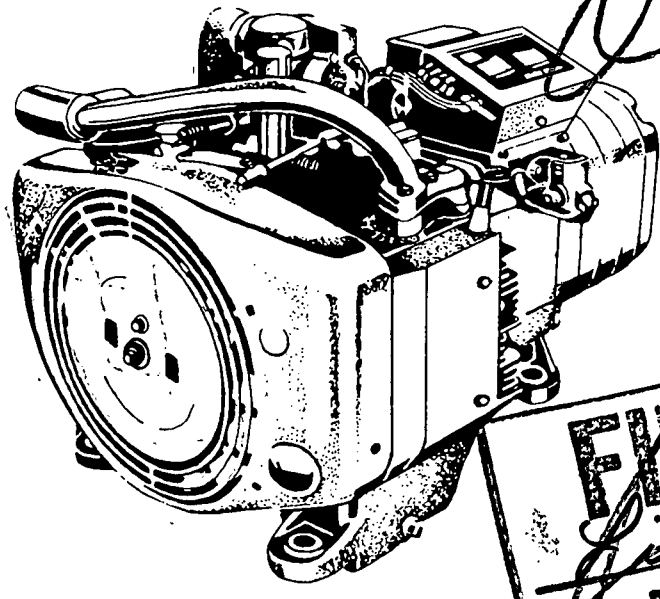
Onan®

# OPERATOR'S MANUAL AND PARTS CATALOG

FOR

# CCK SERIES

## ELECTRIC GENERATING SETS





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# INTRODUCTION

**THIS OPERATOR'S MANUAL CONTAINS INFORMATION PERTAINING TO THE OPERATION AND MAINTENANCE OF YOUR UNIT.**

**WE SUGGEST YOU KEEP THE MANUAL AND THE WIRING DIAGRAM WHICH ACCOMPANIES EVERY UNIT AND REFER TO IT WHEN MAKING EQUIPMENT ADJUSTMENTS OR ORDERING PARTS. ADDITIONAL COPIES ARE AVAILABLE FOR A NOMINAL CHARGE FROM YOUR DISTRIBUTOR.**

**WHEN ORDERING PARTS, REMEMBER TO INCLUDE THE MODEL, SPECIFICATION LETTER, AND SERIAL NUMBER LOCATED ON THE UNIT NAMEPLATE. THIS IS ESSENTIAL TO ENSURE THE CORRECT PART IS SHIPPED TO YOU.**

**FOR REPAIR SERVICE, CONTACT YOUR AUTHORIZED SERVICE REPRESENTATIVE.**

*WARNING*

*TO AVOID POSSIBLE PERSONAL INJURY OR EQUIPMENT DAMAGE, A QUALIFIED ELECTRICIAN OR AN AUTHORIZED SERVICE REPRESENTATIVE MUST PERFORM INSTALLATION AND ALL SERVICE.*

# TABLE OF CONTENTS

# SAFETY PRECAUTIONS

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

**WARNING** **Onan uses this symbol throughout this manual to warn of possible serious personal injury.**

**CAUTION** **This symbol refers to possible equipment damage.**

Fuels, electrical equipment, batteries, exhaust gases and moving parts present potential hazards that could result in serious, personal injury. Take care in following these recommended procedures.

- **Use Extreme Caution Near Gasoline, Gaseous Fuel And Diesel Fuel. A constant potential explosive or fire hazard exists.**

  Do not fill fuel tank near unit with engine running. Do not smoke or use open flame near the unit or the fuel tank.

  Be sure all fuel supplies have a positive shutoff valve.

  Fuel lines must be of steel piping, adequately secured and free from leaks. Do not use copper piping on flexible lines as copper becomes hardened and brittle. Use black pipe on natural gas or gaseous fuels, not on gasoline or diesel fuels. Piping at the engine should be approved flexible line.

  Have a fire extinguisher nearby. Be sure extinguisher is properly maintained and be familiar with its proper use. Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.

- **Guard Against Electric Shock**

  Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling electrical equipment.

  Jewelry is a good conductor of electricity and should be removed when working on electrical equipment.

  Use extreme caution when working on electrical components. High voltages cause injury or death.

  Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician.

- **Do Not Smoke While Servicing Batteries**

  Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.

- **Exhaust Gases Are Toxic**

  Provide an adequate exhaust system to properly expel discharged gases. Check exhaust system regularly for leaks. Ensure that exhaust manifolds are secure and not warped.

  Be sure the unit is well ventilated.

- **Keep The Unit And Surrounding Area Clean.**

  Remove all oil deposits. Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and subsequent engine damage and may present a potential fire hazard.

  Dispose of oily rags. Keep the floor clean and dry.

- **Protect Against Moving Parts.**

  Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be permitted because of the danger of becoming caught in moving parts.

  Make sure all nuts and bolts are secure. Keep power shields and guards in position.

  If adjustments *must* be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

  Do not work on this equipment when mentally or physically fatigued.

# GENERAL INFORMATION

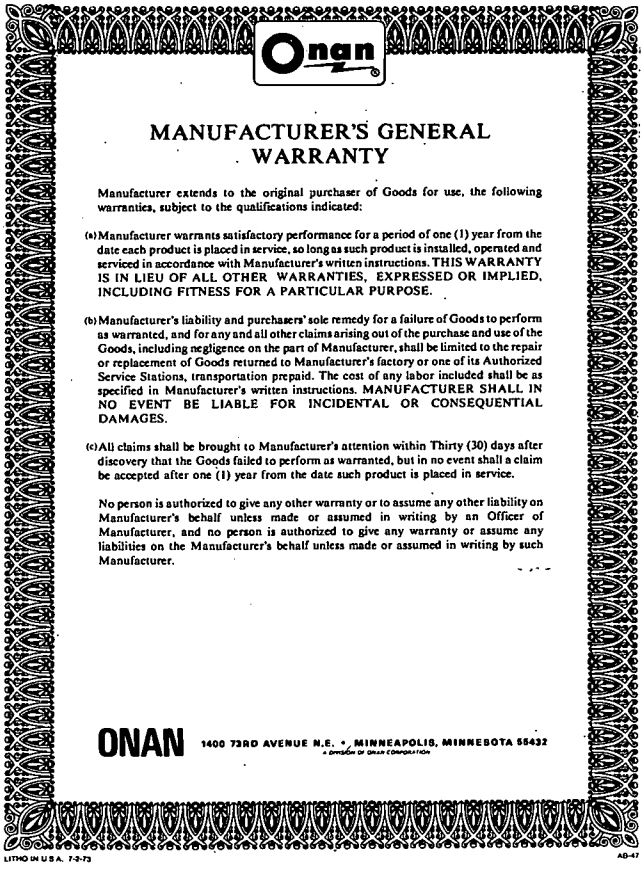
## YOUR MANUAL

This manual contains installation, operation, and other information to properly maintain, service, and make adjustments on your CCK generator set. Study and follow the instructions carefully. A well-planned service and maintenance program will result in longer unit life and better performance. Because the most important part of repair is diagnosis, a troubleshooting chart is included.

Throughout the manual, engine end of the generator set is the front. Left and right sides are determined when facing the engine (front) end.

**Metric equivalent values are included throughout this manual. These values are shown in parentheses ( ) after English value.**

When contacting your Onan dealer, distributor, or the factory about the generator set, always supply the complete model number and serial number as shown on the nameplate (see *Model Designation* following). This information is necessary to identify your generator set among the many types manufactured by Onan.



Onan

MANUFACTURER'S GENERAL WARRANTY

Manufacturer extends to the original purchaser of Goods for use, the following warranties, subject to the qualifications indicated:

(a) Manufacturer warrants satisfactory performance for a period of one (1) year from the date each product is placed in service, so long as such product is installed, operated and serviced in accordance with Manufacturer's written instructions. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING FITNESS FOR A PARTICULAR PURPOSE.

(b) Manufacturer's liability and purchasers' sole remedy for a failure of Goods to perform as warranted, and for any and all other claims arising out of the purchase and use of the Goods, including negligence on the part of Manufacturer, shall be limited to the repair or replacement of Goods returned to Manufacturer's factory or one of its Authorized Service Stations, transportation prepaid. The cost of any labor included shall be as specified in Manufacturer's written instructions. MANUFACTURER SHALL IN NO EVENT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

(c) All claims shall be brought to Manufacturer's attention within Thirty (30) days after discovery that the Goods failed to perform as warranted, but in no event shall a claim be accepted after one (1) year from the date such product is placed in service.

No person is authorized to give any other warranty or to assume any other liability on Manufacturer's behalf unless made or assumed in writing by an Officer of Manufacturer, and no person is authorized to give any warranty or assume any liabilities on the Manufacturer's behalf unless made or assumed in writing by such Manufacturer.

ONAN 1400 73RD AVENUE N.E. • MINNEAPOLIS, MINNESOTA 55432

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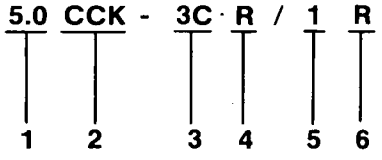
## MODEL DESIGNATION

The following typical model number is broken down into code segments used by Onan Corporation.




1. Indicates kilowatt rating.
2. Series Identification.
3. Voltage code of the generator.
   - 3C = 120/240 volts, single phase, reconnectible
   - 4 = 120/208 volts, three phase
   - 5D = 120/240 volts, three phase
   - 4X = 277/480 volts, three phase
4. Method of starting: R - remote electric starting, P - portable unit with manual starting, and E - electric starting.
5. Factory code for designating optional equipment, if any.
6. Specification letter which advances when the factory makes production modifications.

# SPECIFICATIONS

| | | |
|---|---|---|
| **GENERAL** | | |
| Nominal Dimensions of Set* | **4.0CCK** | **5.0CCK** |
| Height | 20-1/8 in. (511 mm) | 20-1/8 in. (511 mm) |
| Weight | 19-1/2 in. (495 mm) | 19-1/2 in. (495 mm) |
| Length | 26-1/16 in. (662 mm) | 28-7/16 in. (722 mm) |
| **ENGINE DETAILS** | | |
| Number of Cylinders | | Two |
| Displacement | | 49.8 in³ (816.22 cm³) |
| Cylinder Bore | | 3.25 in. (82.55 mm) |
| Piston Stroke | | 3.00 in. (76.20 mm) |
| Compression Ratio - Standard | | 5.5 to 1.0 |
| Compression Ratio - High Compression | | 7.0 to 1.0 |
| Compression - At Cranking Speed, Approx. 500 rpm | | |
| Standard | | 105-110 psi (725-759 kPa) |
| High Compression | | 130-135 psi (897-931 kPa) |
| Engine Speed | | |
| 60 Hertz Operation | | 1800 rpm |
| 50 Hertz Operation | | 1500 rpm |
| Ignition | | |
| Standard Models | | Battery |
| Portable and Contractor's Models | | Magneto |
| Starting | | |
| Standard and Contractor's Models | | Exciter Cranking (Generator) |
| Portable Models | | Manual (Recoil Pull Rope) |
| **CAPACITIES AND REQUIREMENTS** | | |
| Oil Capacity | | 4 Qt. (3.78 lit) |
| Fuel Tank Capacity - Portable and Contractor's Models | | 4 Gal. (15.16 lit) |
| Recommended Battery - Electric Start | | 12 Volts |
| Amp/Hr. SAE 20 Hr. Minimum | | 74 |
| Battery Charge Rate | | |
| Maximum | | 6.0 Amp |
| Minimum | | 1.5 Amp |
| Ventilation Requirements at 1800 rpm | | |
| Engine - Pressure Cooled | | 500 CFM (0.236 m³/sec) |
| Engine - Vacu-Flo Cooled | | 550 CFM (0.259 m³/sec) |
| Combustion Air | | 21 CFM (0.010 m³/sec) |
| Generator Cooling Air | | 75 CFM (0.035 m³/sec) |
| **GENERATOR DETAILS**** | | |
| Rating in Watts (Unity Power Factor) | | |
| 3.5 CCK | | 3500 |
| 4.0 CCK | | 4000 |
| 5.0 CCK | | 5000 |

* - Portable and Contractors Models — 22-7/8 H, 25-5/8 W, 39-1/4 L.

** - See nameplate for voltage, current rating, and other electrical details.

## TUNE-UP SPECIFICATIONS

| | |
|---|---|
| Breaker Point Gap (Full Separation) | 0.020 inch (0.508 mm) |
| Spark Plug Gap | |
| Gasoline Fueled Models | 0.025 inch (0.635 mm) |
| Gaseous Fueled Models | 0.018 inch (0.457 mm) |
| Ignition Timing | |
| Gasoline Fueled Models | 19° BTC |
| Gaseous Fueled Models | 24° BTC |
| Carburetor Float Clearance - Between Float and Gasket | 1/4 inch (6.35 mm) |
| Cylinder Head Bolt Torque | 29-31 lb. ft. (39-42 N•m) |

# INSTALLATION

## LOCATION

The CCK generator set can only operate properly if installed correctly. Each installation must be considered individually and their instructions applied as a general guide. Important installation points are mounting, ventilation, exhaust, fuel and electrical connections.

Choose a location for the CCK generator set which is protected from the weather, dry, dust free and preferably warm in cold weather. Provide at least 24 inches around the generator set for service and routine maintenance. Figure 1 shows a typical installation for a pressure-cooled generator set.

## MOUNTING

Permanent installations need a sturdy, level mounting base of concrete, heavy wood, structural steel or other sturdy support at least 12 inches high to aid routine maintenance, operation and service.

Assemble the vibration isolators in the order as shown in Figure 2. The spacer bushing prevents compression of the snubber or upper rubber cushion. Two vibration isolators are for engine end only and two vibration isolators for generator end only. Use them for their respective positions or undesirable cushioning will result.

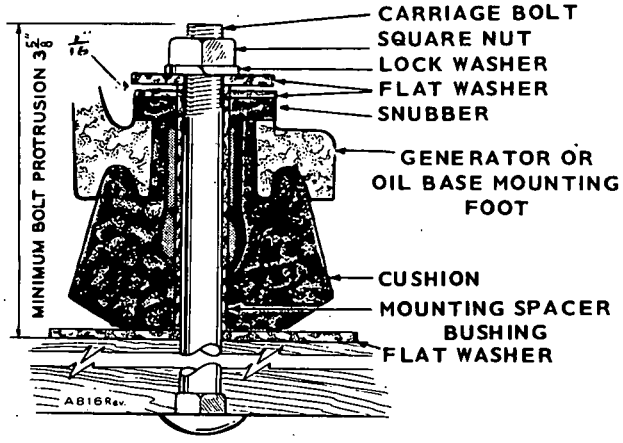



**FIGURE 2. VIBRATION ISOLATOR**

INSTALLATION WITH PRESSURE COOLING

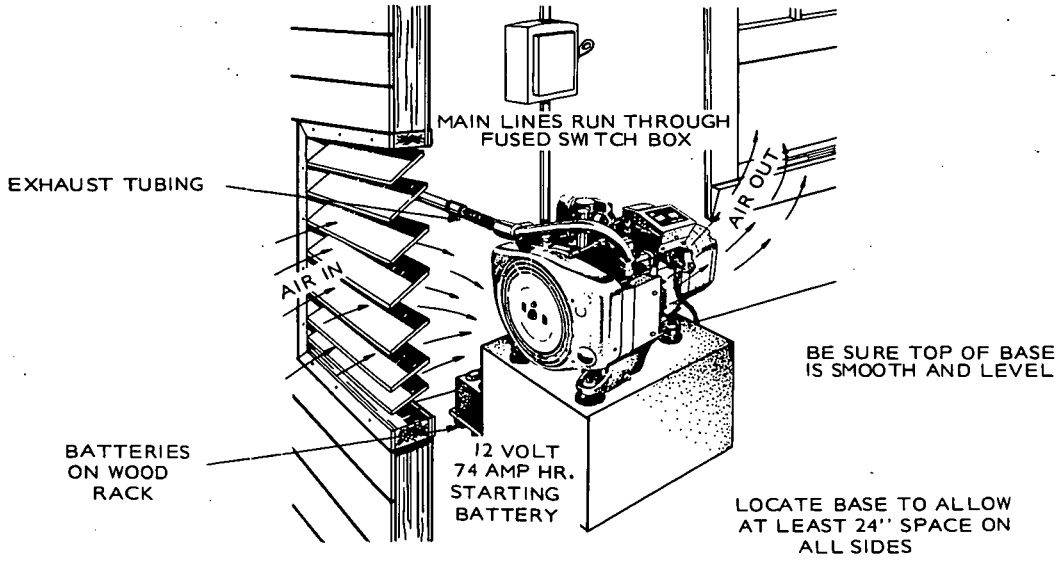



**FIGURE 1. TYPICAL CCK GENERATOR SET INSTALLATION**

## VENTILATION AND COOLING

Ventilation and cooling for outdoor installations usually present no problems. Indoor installations, however, require properly sized and located vents for both inlet and outlet vents. See *SPECIFICATIONS* section for required airflow. The outlet should be slightly higher than the inlet for convection airflow.

The required amount of air must reach the unit, absorb the heat and be discharged away from the installation area. When determining vent sizes, consider the following:

1. Size of enclosure.
2. Ambient temperature.
3. Electric load.
4. Running time.
5. Restrictions — screens, filters, etc.
6. Prevailing wind direction.

If the generator set is enclosed in a small, poorly ventilated enclosure, auxiliary fans can be used to increase airflow. The air inlet to the engine must not exceed 120° F (49° C) when running at full load. If inlet air is 10° F (-12° C) above ambient air, there is a good possibility that cooling air is recirculating.

### Pressure Cooling

These units need an inlet vent with unrestricted opening of 2-1/2 square feet for variables. For the discharged air, install a separate duct from the engine.

The discharge duct must be at least as large as the inlet vent. If a screen is used in the duct, increase the duct size proportionately to the screen restriction. Use large, radius elbows for bends and increase the duct size for runs for over 5 feet (1.55 m). A canvas section in the duct prevents transmission of vibration. A slight pitch upward in the duct lets heat escape when the unit is stopped and minimizes vapor lock.

### Vacu-Flo Cooling

Provide an air inlet area of 1 square foot (929 $cm^2$). Duct the heated air from the Vacu-Flo scroll outside. It should be at least as large as the scroll outlet.

**WARNING** **Do not used discharged Vacu-Flo air for heating since it may contain poisonous gases.**

### Thermostatically-Controlled Shutters

These optional shutters can be used to speed warm-up after starting and keeps cold air out during shutdown. The shutters start to open at 120° F (49° C) and are completely open at 140° F (60° C). Onan recommends the optional high temperature shutdown switch be used with air shutters.

## EXHAUST

**WARNING** **Plan the exhaust system carefully. Exhaust gases are poisonous!**

Vent all exhaust gases outside. The exhaust outlet must not terminate near air inlet vents or combustible materials. Avoid sharp bends and use large radius elbows in the exhaust piping. If the piping cannot be pitched downward, install a condensation trap in the system where a rise begins (Figure 3). The exhaust line connects to a one-inch pipe thread outlet at engine.

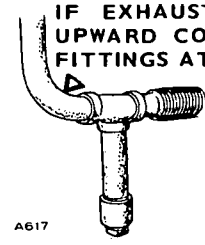



**FIGURE 3. CONDENSATION TRAP**

Exhaust piping must not come closer than 9 inches (229 mm) to combustible material. Where the system leaves the building, install a thimble. See Figure 4.

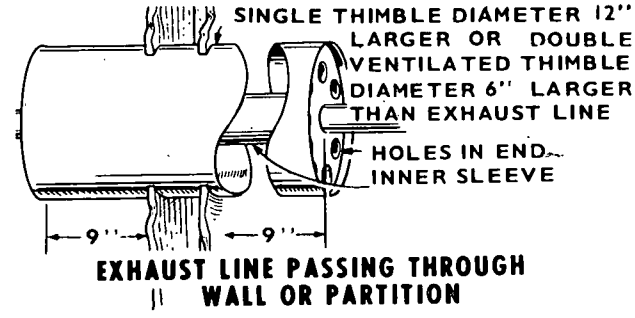



**FIGURE 4. EXHAUST THIMBLE**

## FUEL

### Fuel Connection

For gasoline-fueled generator sets other than the contractor and portable models which have their own fuel tank, connect a fuel line to the fuel pump inlet which is threaded 1/8-inch NPTF (National Pipe Thread Female). Use a flexible line next to the unit to prevent transmission of vibration to the fuel line.

For gaseous-fueled generator sets, check with your local supplier for gas regulations and pressure. See Figure 5. Provide a manual gas shutoff. A filter in the line may also be necessary. Electric solenoid shutoff valves are usually required for indoor automatic or remote starting installations. Connect the solenoid wires to the battery circuit to open the valve while the unit is running. Also install a demand-type regulator according to instructions and locate it near the generator set to aid starting (regulator line pressure must be within 2 to 8 ounces, 0.86 - 3.45 kPa).

**Always use flexible tubing between engine and gas-demand regulator.**

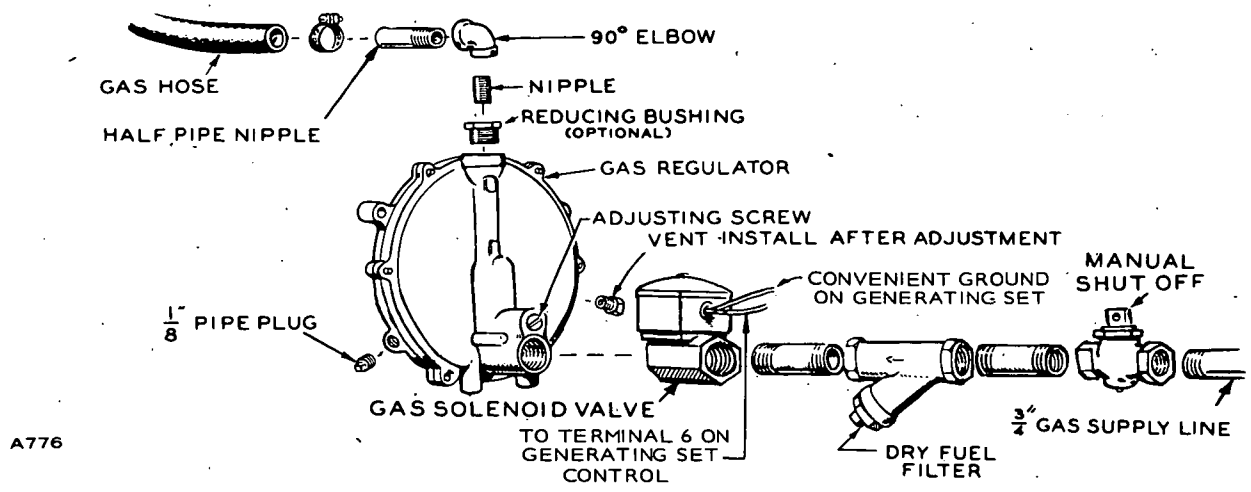



**FIGURE 5. CONNECTIONS FOR GAS LINE TO CCK**

## Gasoline Tank

If a separate fuel tank is used, install the tank so its bottom is less than 4 feet (1.24 m) below the fuel pump. The tank top must also be below the fuel pump level to prevent siphoning. If the fuel tank is shared with another engine, use a separate fuel line.

If the fuel pump lift exceeds four feet (1.24 m), install an auxiliary electric fuel pump at the fuel supply (not used with contractor and portable models). See *Control Board Remote Wiring.*

An auxiliary reservoir fuel tank is often used for standby installations. For these installations, the fuel line connections must be changed (Figure 6).

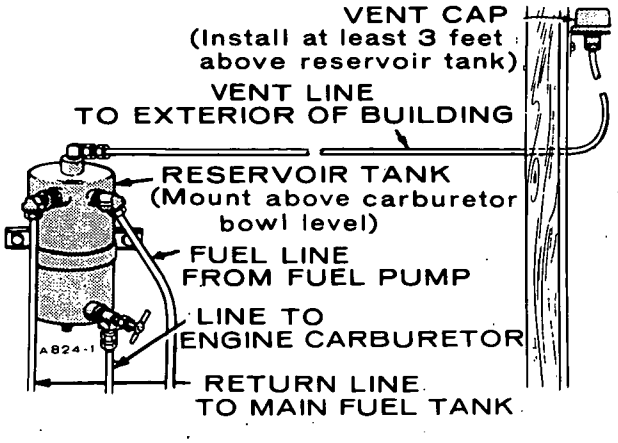



**FIGURE 6. AUXILIARY RESERVOIR FUEL TANK**

## LOAD WIRE CONNECTIONS

The generator set nameplate shows the electrical output rating of the set in watts, volts and hertz. The contractor and portable models are prewired and have a receptacle box with two duplex 120-volt (15-ampere), grounding receptacles and two 240-volt (20-ampere), twist-lock receptacles. For the other generator sets, the wiring diagram shows the electrical circuits and necessary connections for the available output voltage.

Meet all applicable code requirements. A qualified serviceman or electrician should make the installation and the installation should be inspected and approved. The AC output box has provisions to accommodate load wires (Figure 9). Use flexible conduit and stranded load wires near the set to absorb vibration. Use sufficiently large insulated wires. Strip the insulation from the wire ends as necessary for clean connections. Connect each load wire to the proper generator output lead inside the AC output box. Insulate bare ends of ungrounded wires. Install a fused main switch (or circuit breaker) between the generator set and the load.

### Reconnectible, Single-Phase Generator

Voltage selection on reconnectible single-phase generators is for use as 120/240 volts, 3 wire; 120 volts, 2 wire; or, 240 volts, 2 wire (Figure 7). Use the connection for two-wire service when one load exceeds one-half the rated capacity. Balance the load when connecting for three-wire service. Current for any one output lead must not exceed nameplate rating. Serious overloading can damage the generator windings. When two or more single-phase circuits are available, divide the load equally between them.

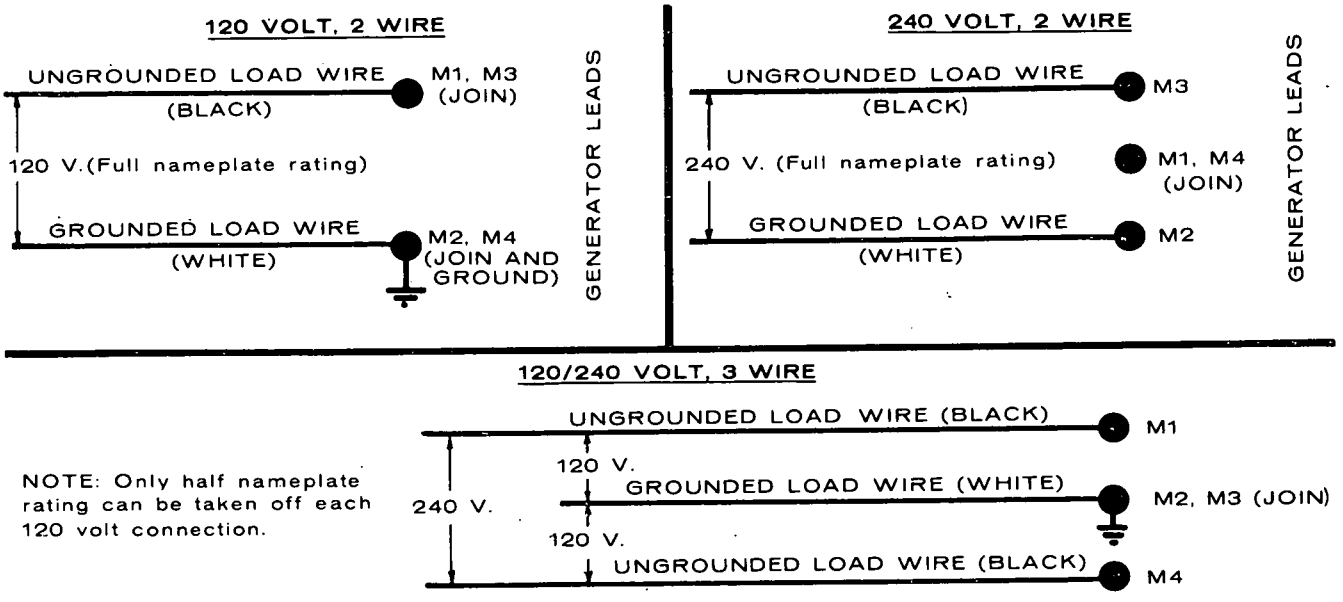



FIGURE 7. SINGLE-PHASE, "-3C" VOLTAGE CODE GENERATOR CONNECTIONS

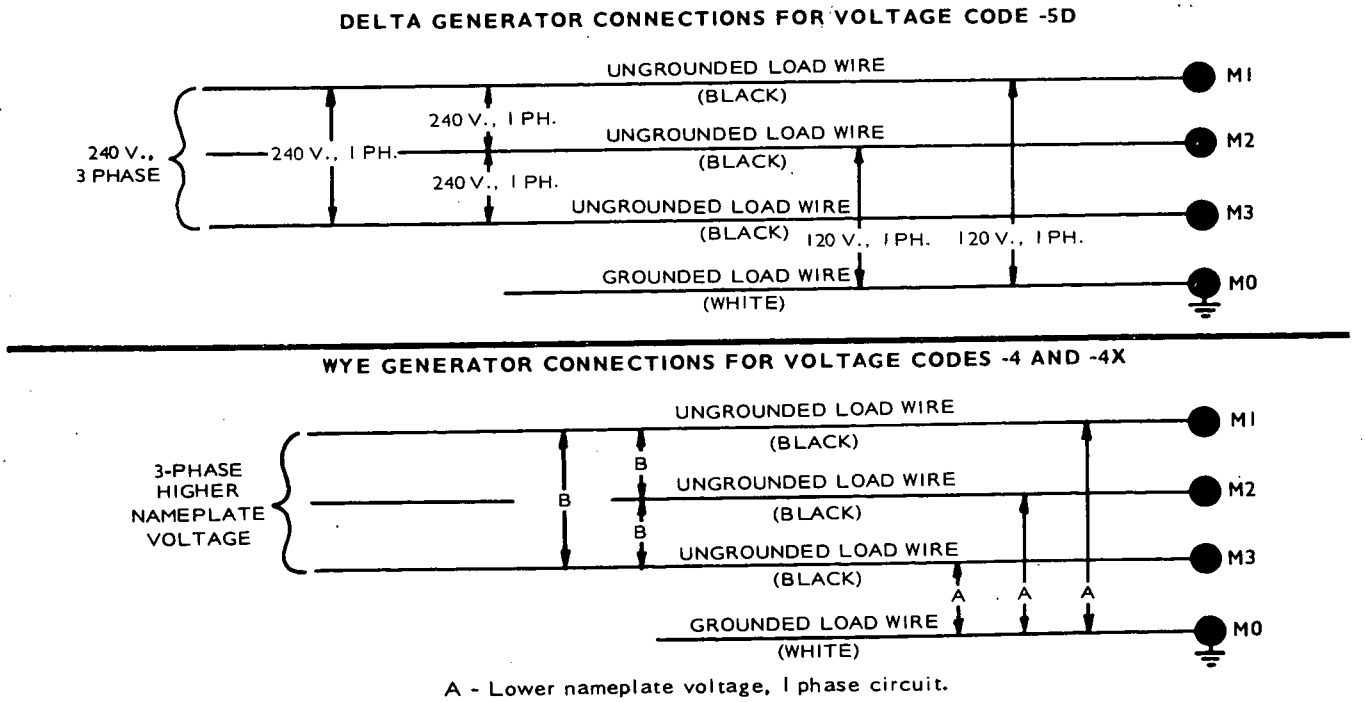
## Three-Phase, Four-Wire, Wye Connected Generators

A three-phase, four-wire generating set produces single-phase current of the lower nameplate voltage and three-phase current of the higher nameplate voltage (Figure 8).

For single-phase current, connect the neutral (white) load wire to the grounded M0 terminal. Connect the "hot" (black) load wire to any one of the other three terminals . . . M1, M2 or M3. Three separate single-phase circuits are available, with not more than one-third the rated capacity of the generator set from any one circuit.

For three-phase current, connect separate load wires to each of the generator terminals M1, M2 and M3. Single-phase current of the higher nameplate voltage is obtained between any two three-phase terminals.

**CAUTION** **Any combination of single-phase and three-phase loads can be used as long as the current in each load line of the generator does not exceed rated current.**




A - Lower nameplate voltage, 1 phase circuit.
B - Higher nameplate voltage, 1 phase circuit.

FIGURE 8. THREE-PHASE, FOUR WIRE GENERATORS

## 120/240-Volt, Three-Phase, Four-Wire Delta Connected Generator

Three-phase (delta) connected generator sets are designed to supply 120-volt, single-phase current; 240-volt, single-phase current; or 240-volt, three-phase current (Figure 8).

For three-phase 240 volt operation, connect the three load wires to the three terminals M1, M2 and M3 . . . . one wire to each terminal. M0 is the neutral wire and is not used for three-phase operation.

Connect the "hot" (black) load wire to either the M1 or M2 terminal for 120-volt, single-phase service. Connect the neutral (white) wire to the M0 terminal. Two 120-volt circuits are available.

**CAUTION** **Do not use M0 and M3 as a 120-volt circuit.**

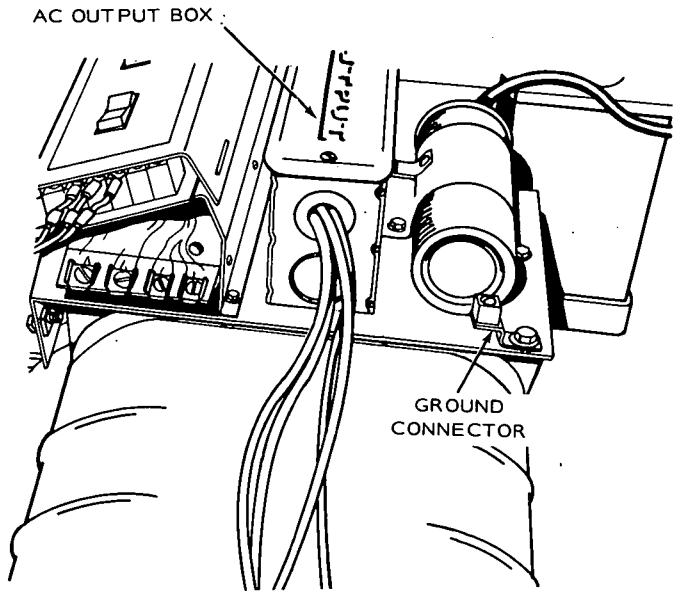



**FIGURE 9. LOCATION OF AC OUTPUT BOX AND GROUND CONNECTION**

For single-phase, 240-volt service, connect the load circuit between M1 and M2, or between M2 and M3, or between M1 and M3 (three circuits available). The M0 terminal is not used.

Any combination of single-phase and three-phase loading can be used at the same time as long as no terminal current exceeds the nameplate rating of the generator. Single-phase loads up to two-thirds the three-phase rating can be used if there is no other load on the generator.

### Standby Installation

If the installation is for standby service, install a double-throw transfer switch (either manual or automatic) to prevent feeding generator output into the normal power source lines and to also prevent commercial power and generator output from being connected to the load at the same time. Instructions for connecting an automatic transfer switch are included with such equipment.

### Switchboard

When an optional wall mounted switchboard containing ammeters, voltmeters, circuit breakers, is used, these load wire connections apply: Connect to the unused terminal of each ammeter, one ungrounded (hot) generator lead. Connect to the ground stud in the switchboard, generator leads and load wires which are to be grounded - if any. Connect to the unused terminal of each circuit breaker, one ungrounded (hot) lead wire. On generator sets which generate more than one voltage, the voltmeter reads the higher voltage shown on the nameplate. The lower voltage is correct when the higher voltage is correct.

## GROUNDING

**WARNING** **Be sure to ground the generator set to prevent shock hazard!**

Connect a number 8 wire or larger between:

1. a separate ground pipe or rod penetrating into moist earth, and
2. the solderless connector located on the top of generator (Figure 9) or on the receptacle box for the contractor and portable models (Figure 10).

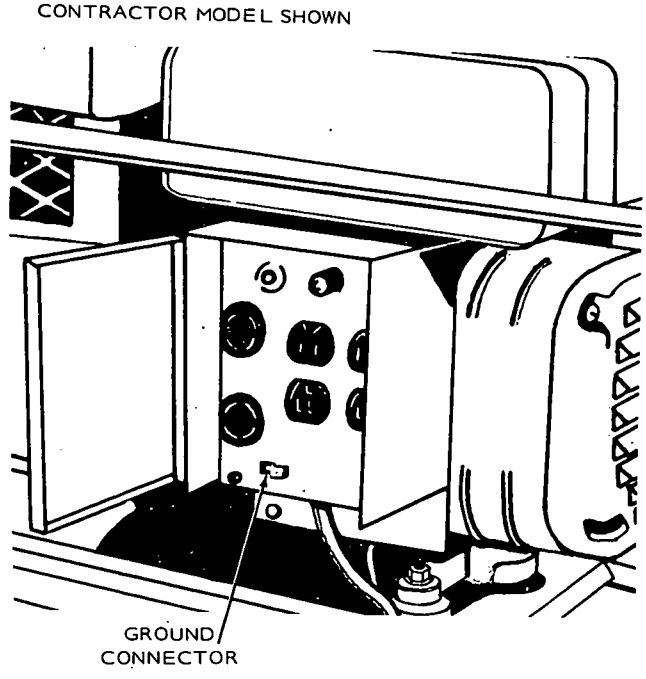



**FIGURE 10. GROUND CONNECTOR ON CONTRACTOR AND PORTABLE MODELS**

## CONTROL BOARD REMOTE WIRING

The printed circuit board (not used on contractor and portable models) is the "heart" of the generator set's control system. Terminals 1 through 9, on the left side of printed circuit board, (Figure 11) connect to engine components such as:

- Ignition Points
- Ignition Coil
- Start Solenoid
- Charging Resistors
- Low Oil Pressure Shutdown Switch
- Choke

Terminals 10 through 18, located on right side of printed circuit board (Figure 11), are for connection to a remote control station. These include the following:

- DC Voltmeter
- Charging Ammeter
- Running Time Meter
- Generator "On" Light

These instruments can be connected to the printed circuit board for remote monitoring using the appropriate following instructions.

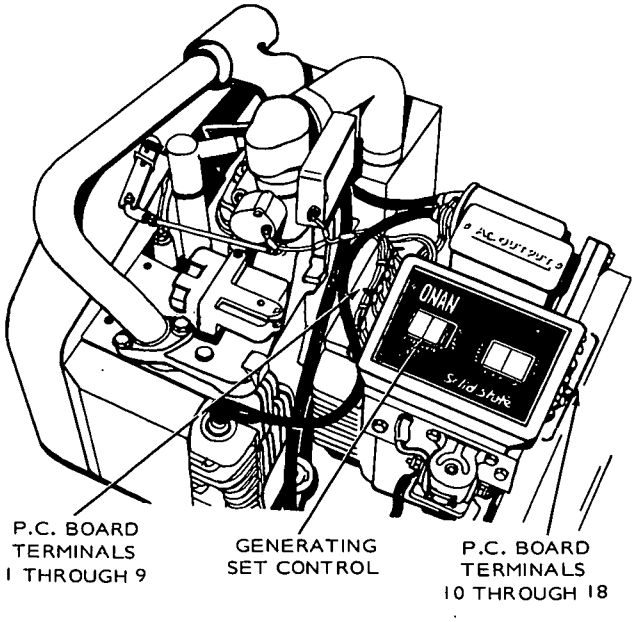



FIGURE 11. GENERATOR SET CONTROL ASSEMBLY

### Electric Fuel Pump for Gas Solenoid Valve

Connect one wire lead to terminal 6 of the printed circuit board (Figure 11 and 16) using number 18 wire. If not grounded directly to the generator set, connect a common wire ground lead from the pump or solenoid valve to the set.

### DC Ammeter

Connect a direct reading 0 to 10 ampere ammeter (Onan number 302-0561) to terminals 17 (+) and 18 (-). For distances up to 10 feet, make connections with no smaller than number 18 wire. When installed, Jumper W1 must be removed from the printed circuit board. See Figures 12 and 16. Jumper W1 is located near the 1-1/4 x 2-inch copper heat sink.

**CAUTION** **Terminal 13 is the ground connection for the printed circuit board and must always be connected.**

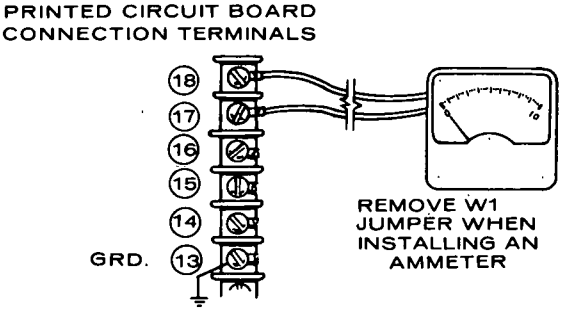



FIGURE 12. CONNECTION OF DC AMMETER TO CONTROL

### DC Voltmeter

Connect DC voltmeter (Onan number 302-0562) between terminals 15 and 13 (ground) using number 18 wire. See Figure 13.

### Running Time Meter

Connect running time meter (Onan number 302-0885) to terminals 10 and 13 (ground) using number 18 or larger wire. Terminal 10 operates at approximately 30 volts during normal operation. See Figure 13.

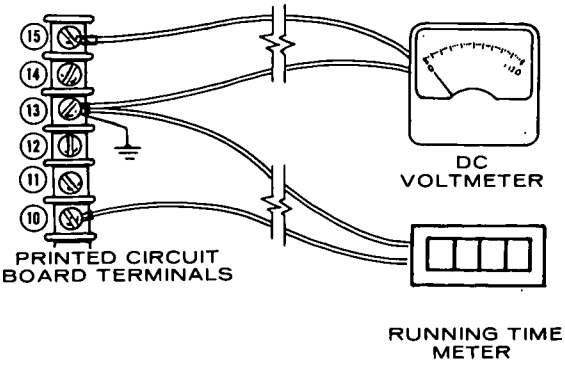



FIGURE 13. CONNECTING DC VOLTMETER AND RUNNING TIME METER TO CONTROL BOARD

## 24-Volt Generating Lamp

Connect a 24-volt generating lamp between terminals 10 and 15 (Figure 14 and 16). Use a diode (IN4004) in series as shown.

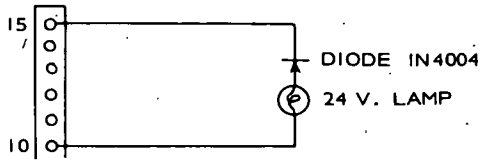



**FIGURE 14. 24-VOLT GENERATING LAMP CONNECTION TO CONTROL BOARD**

## 12-Volt Generating Lamp

Connect a 12-volt generating lamp between terminals 10 and 15 (Figure 15). Connect a diode (IN4004) on one end of lamp and a 5-watt, 6-volt zener diode (IN5340) on the other end.

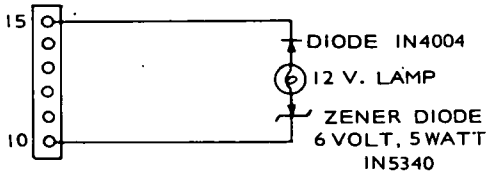



**FIGURE 15. 12-VOLT GENERATING LAMP CONNECTION TO CONTROL BOARD**

## Fused Connections

A small 9-ampere fuse (F1), used to protect the circuit against reversed battery connections, is located in the wiring harness between terminal 5 (on printed circuit board) and battery. If the fuse is damaged (caused by connecting battery backwards), replace with an SFE9 automotive type fuse. See Figure 16.

Terminal 5 has a PC fuse connection (F2) in the battery lead to protect the printed circuit board from any shorts on the board or from external remote connections. Terminal 10 has a PC fuse connection (F3) in the generator lead to protect the printed circuit board from any external shorts when using the remote connections. If F2 or F3 printed circuit board path is "blown", replace either with number 22 wire, one inch long and solder into circuit.

**CAUTION** **Do not attempt to check for current flow on the printed circuit board by jumpering across components with a screwdriver, wire, etc. Always have these boards checked by an authorized Onan service center or a qualified electrician using the proper instruments (e.g. voltmeter, ohmmeter, or multimeter).**

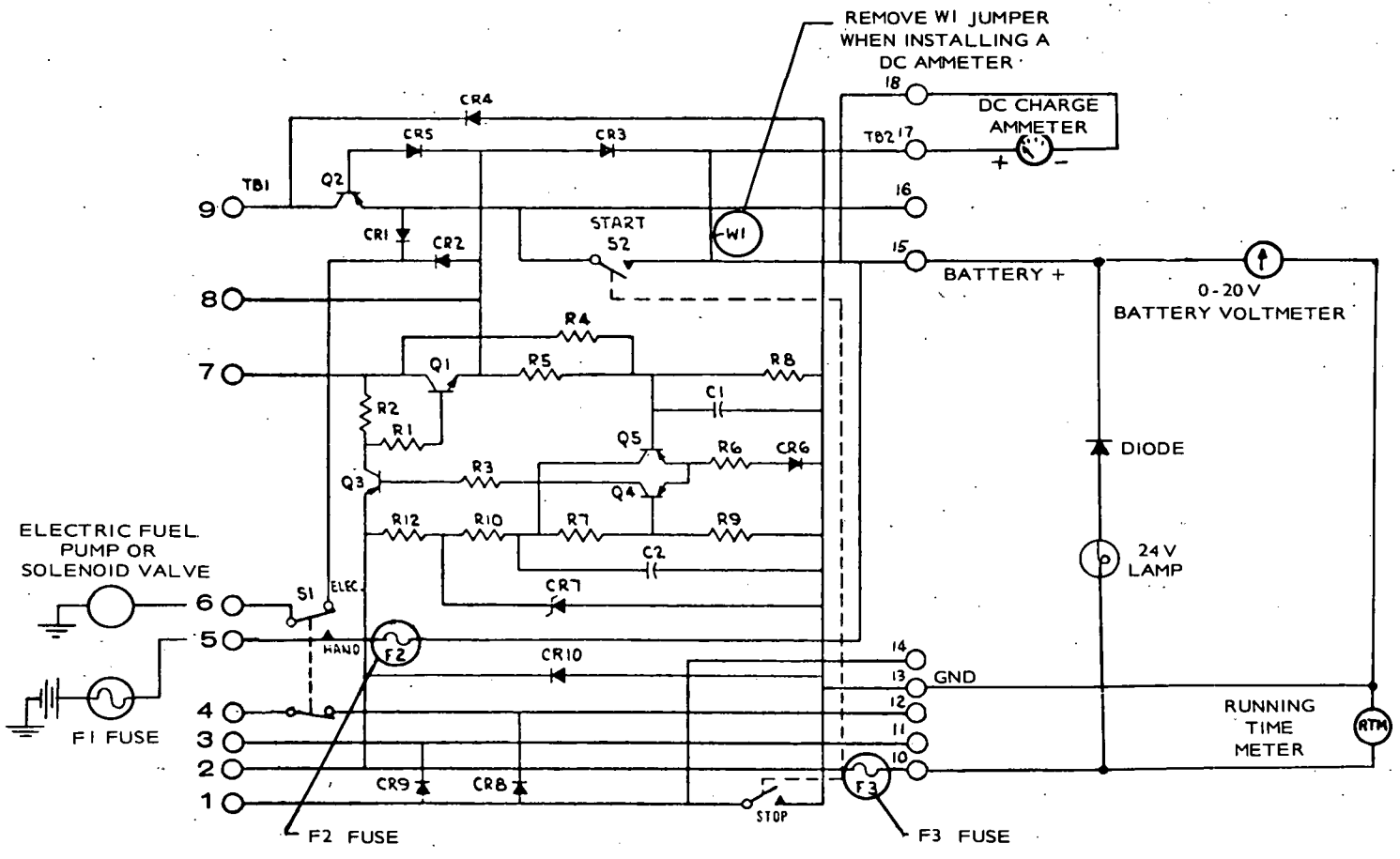



**FIGURE 16. CONTROL BOARD SCHEMATIC WITH EQUIPMENT CONNECTIONS**

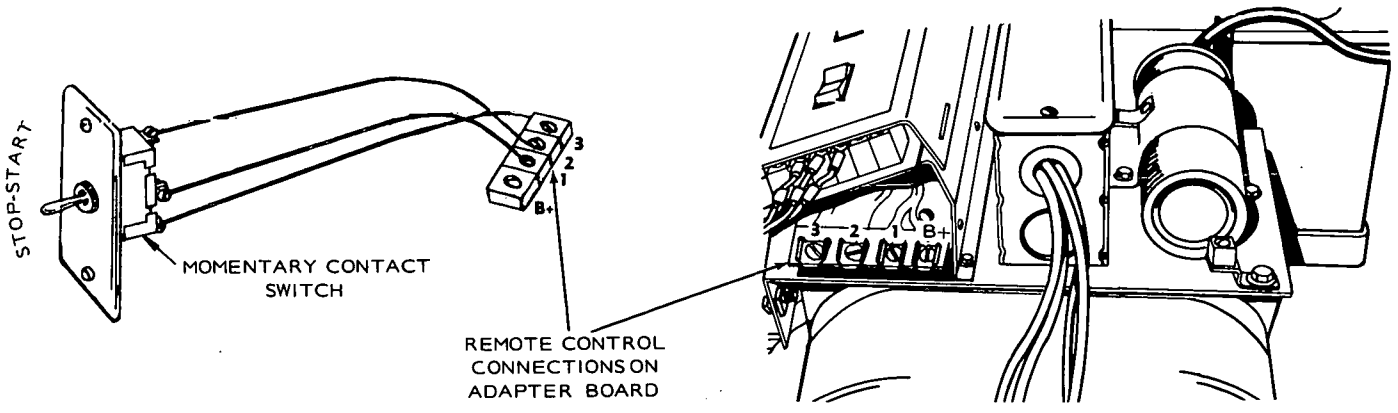



FIGURE 17. CONNECTIONS FOR REMOTE START-STOP SWITCH

## REMOTE START-STOP SWITCH

The CCK generator sets (except contractor and portable models) can be remote connected for starting and stopping. Use a single-pole, double-throw, momentary contact, center-off type switch. Connect the switch and wire leads to the generator set as shown in Figure 17.

**CAUTION** **Be sure the start-stop switch makes momentary contact only. A longer contact will damage the start solenoid.**

Use number 18 wire for distances up to 250 feet (78 m). Remote starting and stopping can be controlled from several locations by connecting the switches in parallel.

## BATTERY CONNECTIONS

### Contractor Models

Remove the cover panel for the outlet receptacles by taking out the four screws (Figure 18). Connect the positive (+) battery cable to the unused terminal on the start switch. Connect the negative (-) battery cable to the generator through-bolt as shown.

### Other Models

Connect the positive (+) battery cable to the start solenoid. Connect the negative (-) battery cable to the generator through-bolt. See Figure 19.

If the battery connections are accidently reversed, fuse F1 (9 ampere) will burn out and protect the components on the printed circuit board. It is located between terminal 5 on the printed circuit board and the battery. Replace with an SFE9 automotive type fuse. See Figure 16.

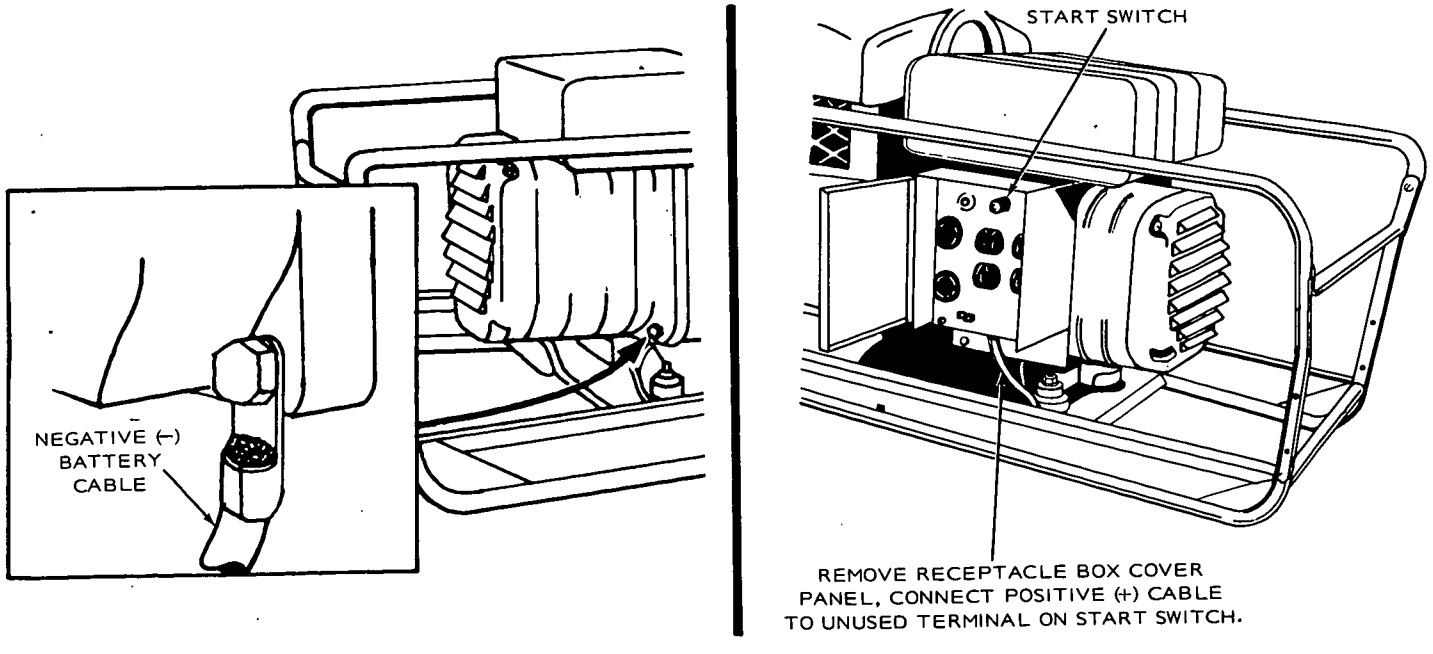



FIGURE 18. BATTERY CONNECTIONS ON CONTRACTOR MODELS

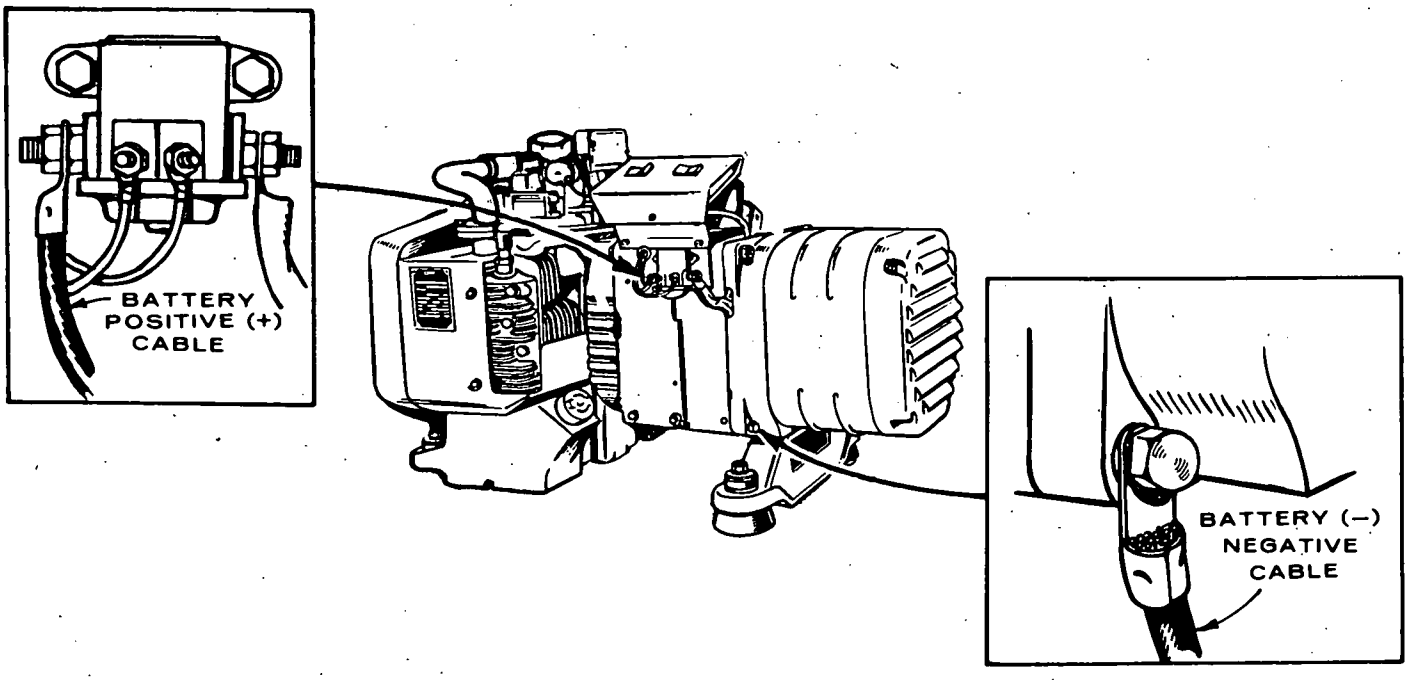



FIGURE 19. BATTERY CONNECTIONS ON OTHER MODELS

# OPERATION

## BEFORE STARTING

### Crankcase Oil

Be sure the crankcase has been filled with oil to the "FULL" mark on the oil level indicator. Refer to the *MAINTENANCE* section for the recommended oil changes and complete lubricating oil recommendations.

### Recommended Fuel

Use clean, fresh, regular grade, automotive gasoline. Do not use highly-leaded premium types.

For new engines, the most satisfactory results are obtained by using nonleaded gasoline. For older engines that have previously used leaded gasoline, heads must be taken off and all lead deposits removed from engine before switching to nonleaded gasoline.

**CAUTION** **If lead deposits are not removed from engine before switching from leaded to nonleaded gasoline, preignition could occur causing severe damage to the engine.**

## STARTING AND STOPPING

If the engine fails to start at first, using the following procedures, inhibitor oil used at the factory may have fouled the spark plugs. Remove the plugs, clean in a suitable solvent, dry thoroughly and install. Heavy exhaust smoke when the engine is first started is normal and is caused by the inhibitor oil.

### Contractor's Models

This model has electric starting and a pull rope recoil starter for manual starting if the battery charge condition is too low for cranking.

1. Close the manual choke about three-quarters way or as necessary according to temperature conditions.

   If the generator set has run out of fuel, it may be necessary to remove the engine hood and operate the fuel primer a few times. See Figure 20.
2. Push the "START" button. Release the button as soon as the engine starts.
3. To stop, push and hold the "STOP" button until the engine is completely stopped.

**If manual starting is required, use procedure for portable models.**

### Portable Models

1. Close the manual choke about three-quarters way or as necessary according to temperature conditions.

   If the set has run out of fuel, it may be necessary to remove the engine hood and operate the fuel primer a few times. See Figure 20.
2. With a firm grip on the recoil starter handle, pull the rope out quickly and evenly. Do *not* jerk.
3. To stop, push and hold the "STOP" button until the engine is completely stopped.

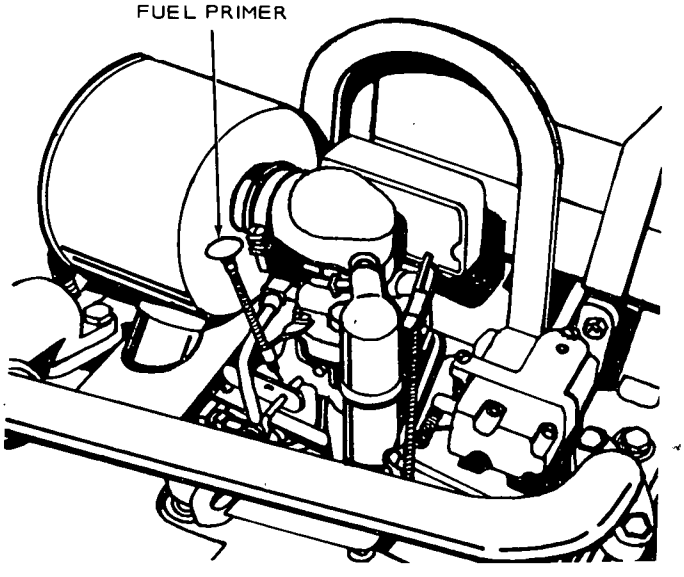



FIGURE 20. FUEL PRIMER ON PORTABLE AND CONTRACTOR'S MODELS

### Other Models

1. Push the start-stop switch on the generator set control to "START". Release the switch as soon as the engine starts.
2. Stop the generator set by pushing the start-stop switch to "STOP". Hold closed until generator set stops.

## APPLYING LOAD

If practical, allow set to warm up before connecting a heavy load. Continuous generator overloading may cause high operating temperatures that can damage the windings. Keep the load within nameplate rating.

## BREAK-IN PROCEDURE

Controlled break-in with the proper oil and a conscientiously applied maintenance program will help to assure satisfactory service from your Onan electric generator set. Break-in as follows:

1. One half hour at 1/2 load.
2. One half hour at 3/4 load.
3. Full load.
4. Change crankcase oil after the first 50 hours of operation.

## GAS-GASOLINE CONVERSION

Engines having a combination gas-gasoline carburetor can be switched to gasoline operation by the following procedure:

1. Close the manual fuel shutoff valve in supply line for natural gas or propane-butane vapor, wherever located.
2. Open the gasoline fuel shutoff valve, wherever located.
3. Reset the spark plug gap as given in the *SPECIFICATIONS* section.
4. See that the choke is free and works easily (be sure to release choke lock on units with electric choke).
5. Start the engine in the manner described for the engine. If the engine runs unevenly under half or full load due to faulty carburetor adjustment, the main jet needs adjusting. This is not the same main adjusting screw used for gaseous fuel. Another adjusting screw is provided for this purpose (refer to *ADJUSTMENTS* section).

**To change back to natural or propane-butane operation, reverse the above procedure and reset the spark plug gap.**

## EXERCISE

Infrequent use results in hard starting. Operate the generator set one 30-minute period each week. Run longer if battery needs charging. Exercising for one long period each week is better than several short periods.

## BATTERY CHARGING

The battery charge rate is automatically controlled by a solid-state voltage regulator. The high charge rate was set at the factory for average operating conditions.

## HIGH OPERATING TEMPERATURE CONDITIONS

1. See that nothing obstructs air flow to and from the set.
2. Keep cooling fins clean. Air housing should be properly installed and undamaged.
3. Keep ignition timing properly adjusted.

## LOW OPERATING TEMPERATURE CONDITIONS

1. Use correct SAE oil for temperature conditions.Change oil only when engine is warm. If an unexpected temperature drop causes an emergency, move the set to a warm location.
2. Use fresh gasoline. Protect against moisture condensation. Below 0°F (-18°C), adjust carburetor main jet for a slightly richer fuel mixture.
3. Keep ignition system clean, properly adjusted and batteries in a well charged condition.
4. Partially restrict cool airflow, but use care to avoid overheating.

## EXTREMELY DUSTY AND DIRTY CONDITIONS

1. Keep unit clean. Keep cooling surfaces clean.
2. Service air cleaner as frequently as necessary.
3. Change crankcase oil every 50 operating hours.
4. Keep oil and gasoline in dust-tight containers.
5. Keep governor linkage clean.
6. Clean generator brushes, slip rings, and commutator, do *not* remove normal dark brown film. Do *not* polish.

## HIGH ALTITUDE OPERATION

For operation at altitudes of 2500 feet (775 m) above sea level, close carburetor main jet adjustment slightly to maintain proper air-to-fuel ratio (refer to the *ADJUSTMENTS* section). Maximum power will be reduced approximately four percent for each 1000 feet (310 m) above sea level after the first 1000 feet.

## OUT-OF-SERVICE PROTECTION

Protect a generator set that will be out-of-service for more than 30 days as follows:

1. Run unit until thoroughly warm.
2. Turn off fuel supply and run until the set stops.
3. Drain oil from oil base while still warm. Refill and attach a warning tag stating oil viscosity used.
4. Remove each spark plug. Spray 1 ounce (28 g) of rust inhibitor (or SAE number 50 oil) into each cylinder. Crank engine slowly (by hand) several times. Install spark plugs.
5. Service air cleaner as outlined in *MAINTENANCE* section.
6. Plug exhaust outlet to prevent entrance of moisture, dirt, bugs, etc.
7. Wipe generator brushes, slip rings, etc. Do not apply lubricant or preservative.
8. Provide a suitable cover for the entire unit.
9. If battery is used, disconnect and follow standard battery storage procedure.

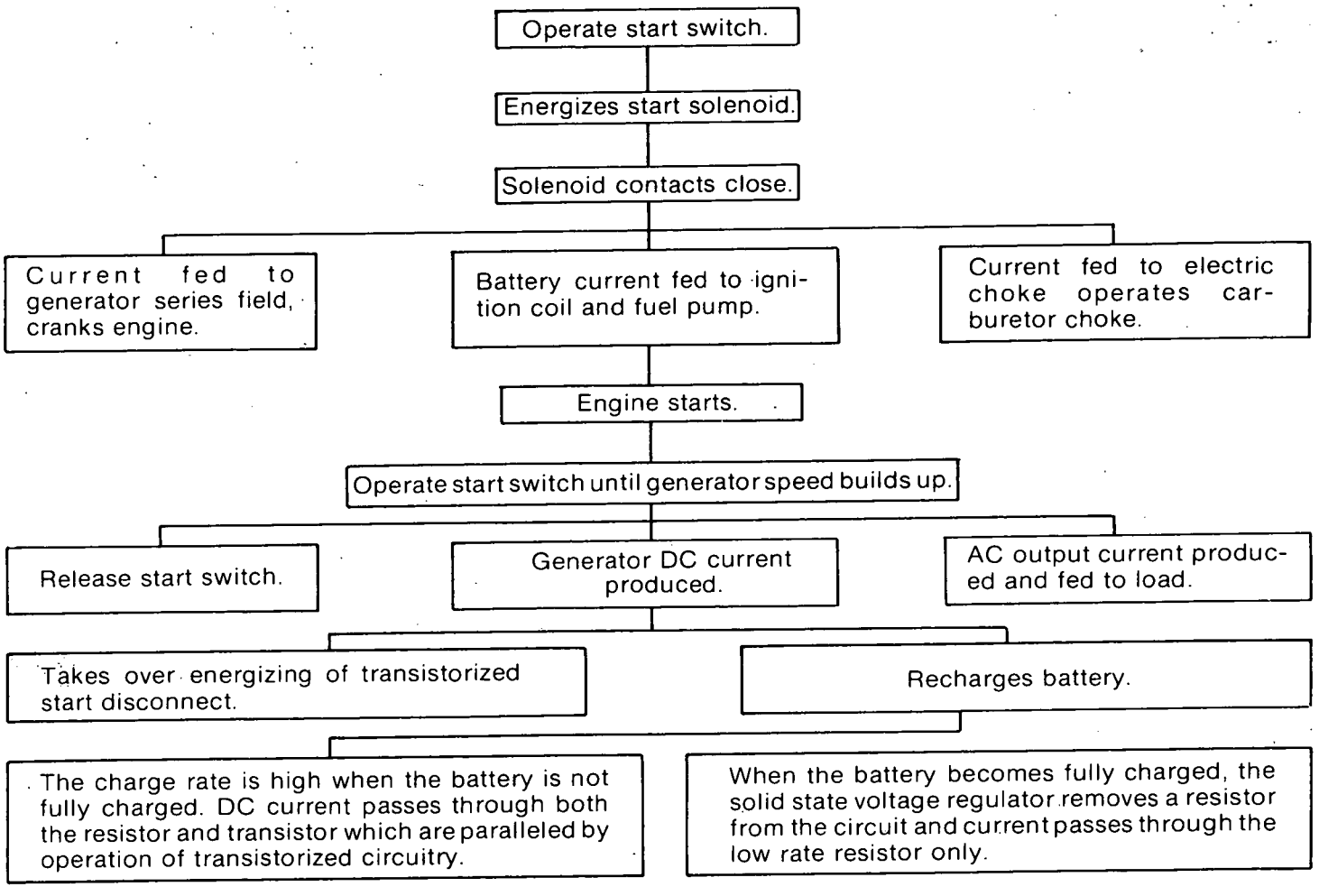



**FIGURE 21. SEQUENCE OF OPERATION**

## SEQUENCE OF OPERATION

Figure 21 shows the operation sequence of the CCK electric generator set (except for portable and contractor models).

# MAINTENANCE

## PERIODIC MAINTENANCE SCHEDULE

Regularly scheduled maintenance is the key to lower operating costs and longer service life for the unit. The schedules can be used as a guide. However, actual operating conditions should be the determining factor in establishing a maintenance schedule. When operating in very dusty or dirty conditions, some of the service periods may have to be reduced. Check the condition of the crankcase oil, fuel filters, etc. frequently until the proper service time periods can be established.

When any abnormalities occur in operation — unusual noises from engine or accessories, loss of power, overheating, etc. — contact your Onan dealer.

### OPERATOR MAINTENANCE SCHEDULE
### (Performed by Owner)

| MAINTENANCE ITEMS | OPERATIONAL HOURS | | | |
|---|---|---|---|---|
| | 8 | 50 | 100 | 200 |
| Inspect Set Generally | x[2] | | | |
| Check Fuel Supply | x | | | |
| Check Oil Level | x | | | |
| Clean Air Cleaner | | x[1] | | |
| Clean Governor Linkage | | x[1] | | |
| Check Spark Plugs | | | x[3] | |
| Change Crankcase Oil | | | x[1] | |
| Clean Crankcase Breather | | | | x |
| Clean Fuel System | | | | x |
| Check Battery | | | | x |

x[1] - Perform more often in extremely dusty conditions.
x[2] - Check for exhaust leaks, fuel leaks, etc.
x[3] - Replace spark plugs every 250 hours.

### CRITICAL MAINTENANCE SCHEDULE
### (Performed by Onan Service Center)

| MAINTENANCE ITEMS | OPERATIONAL HOURS | | | |
|---|---|---|---|---|
| | 200 | 500 | 1000 | 5000 |
| Check Breaker Points | x | | | |
| Check Brushes | | x | | |
| Remove Carbon & Lead | | x | | |
| Check Valve Clearance | | x | | |
| Clean Commutator and Collector Rings | | | x[1] | |
| Clean Generator | | | x[1] | |
| Remove & Clean Oil Base | | | x | |
| Grind Valves | | | x | |
| General Overhaul | | | | x |

x[1] - Perform more often in extremely dusty conditions.

## CRANKCASE OIL

Oil capacity of the CCK generator set is four U.S. quarts (3.78 lit). Fill the crankcase until the oil reaches the "FULL" mark on the oil level indicator (Figure 22).

Use a good quality, heavy duty oil with the API (American Petroleum Institute) designation SE or SE/CC (gasoline operation only). If this oil is not available, SD or SD/CC designated oil can be used. For gaseous fuel operation, use an ashless or low-ash detergent oil specifically made for gaseous fueled engines.

Check oil level daily and change oil every 100 normal operating hours. If operating in extremely dusty or dirty conditions, the oil might have to be changed sooner. When adding oil between changes, use the same brand as in the crankcase. Various brands of oil might not be compatible when mixed.

| TEMPERATURE | GRADE |
|---|---|
| Below 0° F (-18° C) | 5W or 5W-30 |
| 0° to 32° F (-18° C to 0° C) | 10W or 10W-40 |
| Above 32° F (0° C) | 30 |

Oil consumption may be higher with a multigrade oil than with a single-grade oil if both oils have comparable viscosities at 210° F (99° C). Therefore, single grade oils are generally more desirable unless anticipating a wide range of temperatures. Use the proper grade oil for the expected conditions.

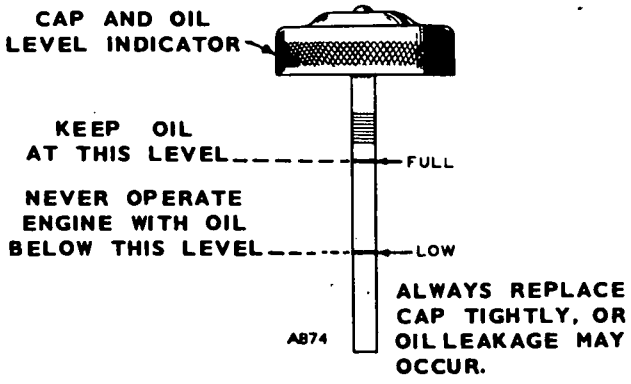



FIGURE 22. CHECKING OIL LEVEL

## AIR CLEANER

Proper maintenance of the air cleaner is extremely important. Negligence of regular routine maintenance will result in reduced engine life.

For the oil-bath air cleaners, remove the oil cup on the bottom of the air breather (Figure 23). Every 50 hours, empty existing oil, and thoroughly clean cup and screen in a suitable solvent. Dry the cup and screen, fill cup with oil(same weight oil as in crankcase) to oil level mark.

Portable and contractor model generator sets have a replaceable air cleaner cartridge. Remove the cartridge and shake out every 50 hours. Remove the foam wrap, clean with mild detergent and luke warm water, squeeze dry, and reinstall. After 500 hours of operation, remove the air cleaner cartridge element and replace with a new one.

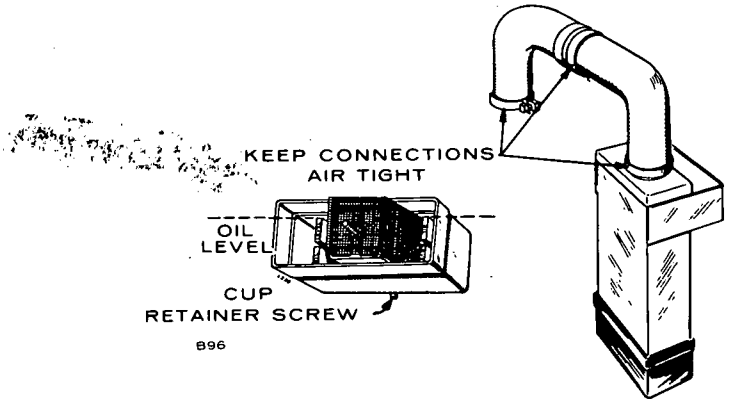



FIGURE 23. OIL BATH AIR CLEANER

## CRANKCASE BREATHER

Lift off the rubber breather cap and carefully pry valve from cap (Figure 24). Wash and rinse the whole valve in a suitable solvent. Dry the valve and re-insert. Be sure the valve flapper is toward the engine.

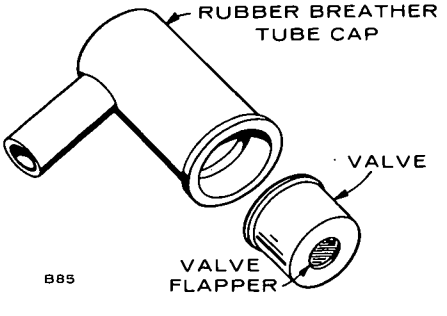



FIGURE 24. CRANKCASE BREATHER

## FUEL FILTER (where applicable)

Every 200 hours, remove the fuel sediment bowl, empty, clean and dry (Figure 25). Remove the screen and clean any particulate trapped. When replacing the sediment bowl, be sure the screen and gasket are in place.

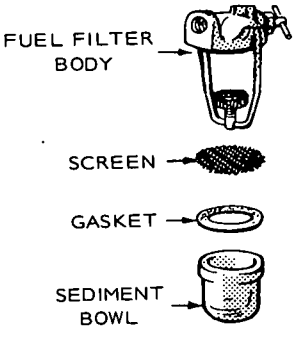



FIGURE 25. FUEL FILTER ASSEMBLY

## VACUUM SPEED BOOSTER

Use a fine wire to clean the small hole in the short vacuum tube which fits into the hole in the top of the engine intake manifold (Figure 26). Do not enlarge this hole.

If there is tension on the external spring when the generator set is operating at no load or light load, it may be due to improper adjustment, restricted hole in the small vacuum tube, or a leak in the booster diaphragm or gasket.

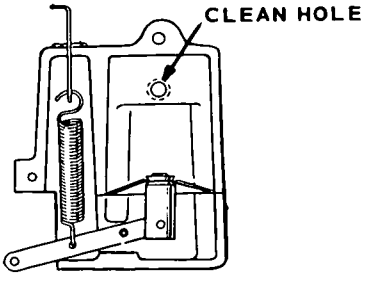



FIGURE 26. VACUUM SPEED BOOSTER

## GOVERNOR LINKAGE

The linkage must be able to move freely through its entire travel. Every 50 hours of operation, clean the joints and lubricate as shown in Figure 27. Also inspect the linkage for binding, excessive slack and wear.

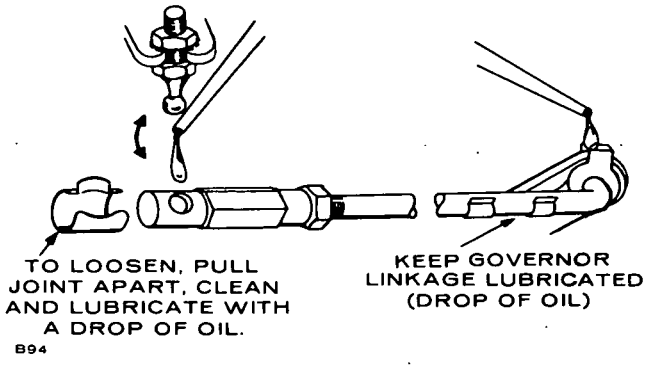



FIGURE 27. GOVERNOR LINKAGE

## SPARK PLUGS

Each time the spark plugs are removed, inspect, clean and regap (Figure 28). If the plug looks discolored or has fouled, replace it.

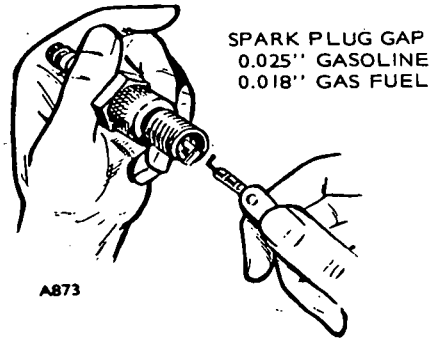
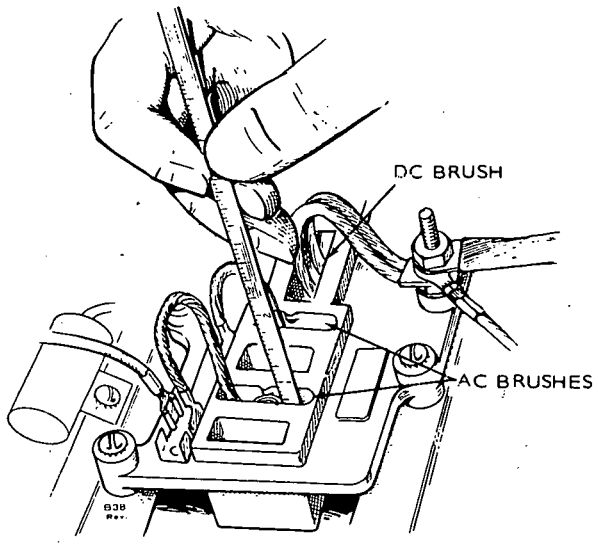



FIGURE 28. CHECKING SPARK PLUG GAP

## GENERATOR MAINTENANCE

The generator normally needs little care other than a periodic check of the brushes, commutator and collector rings. If a major repair job on the generator should become necessary, have the equipment checked by a competent electrician who is thoroughly familiar with the operation of electric generator equipment.




MEASURE FROM TOP FACE OF BRUSH BLOCK TO TOP OF BRUSH

| | DC | AC |
|---|---|---|
| NEW | 5/8" | 11/16" |
| ½ WEAR | 13/16" | 7/8" |
| REPLACE | 1" | 1 1/16" |

FIGURE 29. MEASURING BRUSH WEAR

### Brush Replacement

Install new brushes when the old ones are worn to the dimensions shown in Figure 29.Remove the end bell band to expose the brush holders. Remove the three screws holding each brush holder in place (Figure 30). Remove the old brushes and clean the holders so the new brushes can move easily in their holders. Install the new brushes in the same manner as the old ones. Always use the correct brush as listed in the *PARTS CATALOG* section. Never substitute a brush which may appear to be the same for it may have different characteristics. New brushes are shaped to fit and seldom need sanding to seat properly. If some brush sparking occurs after replacing brushes, run the set under a light load until the brushes wear to a good seat.

Collector rings acquire a glossy brown finish in normal operation. Do not attempt to maintain a bright newly machined appearing surface. Ordinary cleaning with a dry, lint free cloth is usually sufficient. Very fine sandpaper (#00) may be used to remove slight roughness. Use only light pressure on the sandpaper, while the unit is operating. Do not use emery, carborundum paper or cloth. Clean out all carbon dust from the generator.

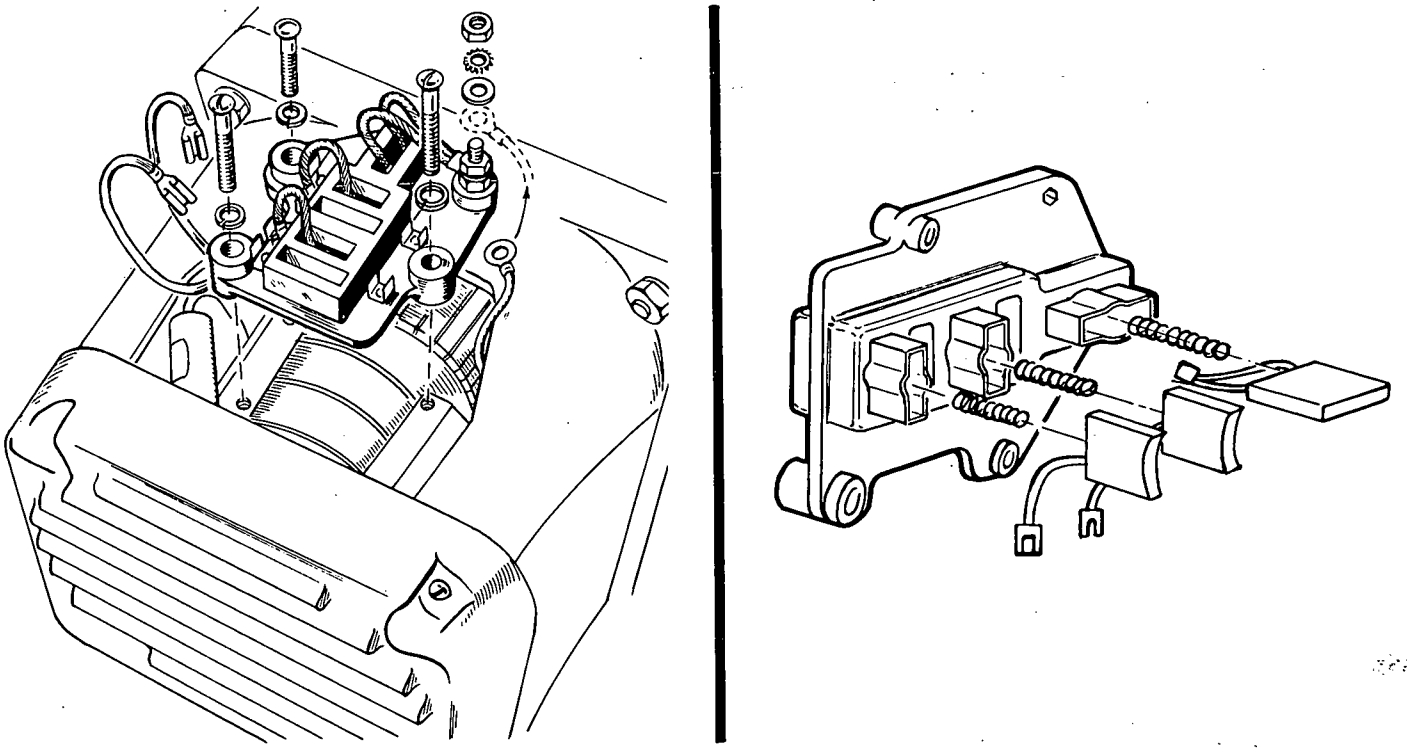
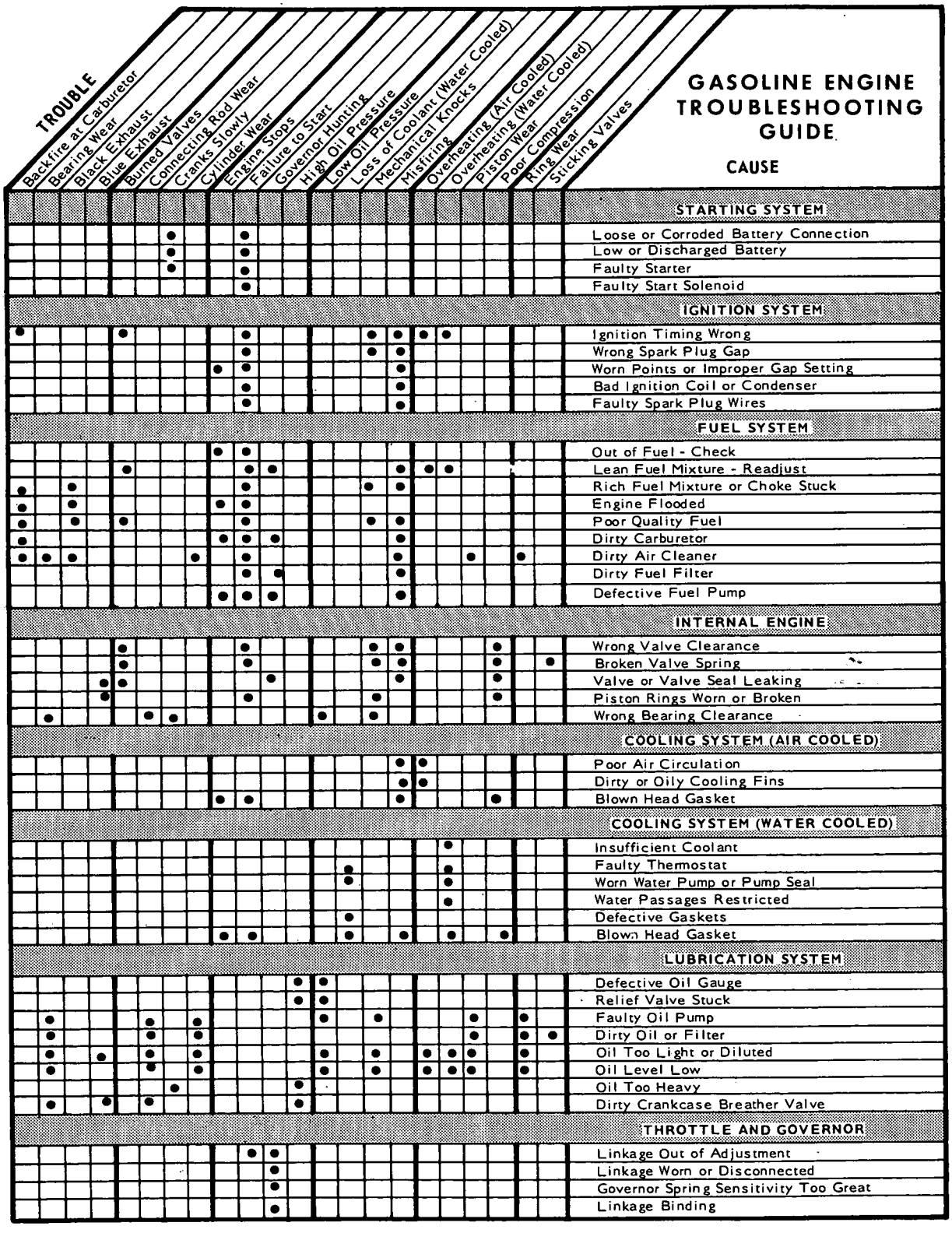


FIGURE 30. BRUSH REMOVAL

# ENGINE TROUBLESHOOTING



# ADJUSTMENTS

## GENERAL

Satisfactory engine performance is largely dependent upon correct fuel system adjustments. However, adjustments cannot fully compensate for low engine power due to wear, etc. If trouble develops, follow an orderly procedure to determine the cause before making any adjustment.

Adjusting the carburetor is a way of obtaining the correct fuel-to-air mixture for smooth, efficient operation. Always adjust in two steps, first the load adjustment and then the idle adjustment.

## CARBURETOR ADJUSTMENTS

Before adjusting the carburetor be sure the ignition system is working properly and the governor is adjusted. Allow the engine to warm before making carburetor adjustments.

**If carburetor is completely out of adjustment so the engine will not run, open both needles 1 to 1-1/2 turns off their seats to permit starting. Do not force the needles against their seats. This can bend the needle.**

### Gasoline and Gas-Gasoline Carburetor

If operating on gas fuel with the gas-gasoline carburetors, be sure to lock the electric choke open (where used). The carburetors are factory set for gas rated approximately 1000 BTU. If fuel rating to be used is substantially different, a readjustment of the fuel mixture is required. The same adjustment procedures can be used for gas or gasoline.

1. Apply a full load to engine.
2. Turn in load needle (Figure 31) until engine speed drops. Then turn out needle until engine speed returns to normal.
3. Remove load from the engine.
4. Turn idle needle out until engine speed drops slightly. Then turn the needle in until speed returns to normal.

*ALTERNATE METHOD (No Load adjustment possible)*

1. Start the engine and allow it to warm up.
2. Push in on the governor mechanism to slow the unit down to about 400 to 500 rpm.
3. Release the governor mechanism to allow the engine to accelerate. If the engine accelerates evenly and without a lag, the load needle setting is correct. If not, adjust the needle outward about 1/2 turn and again slow down the engine and release the mechanism. Continue until the engine accelerates evenly and without a time lag after releasing the governor.

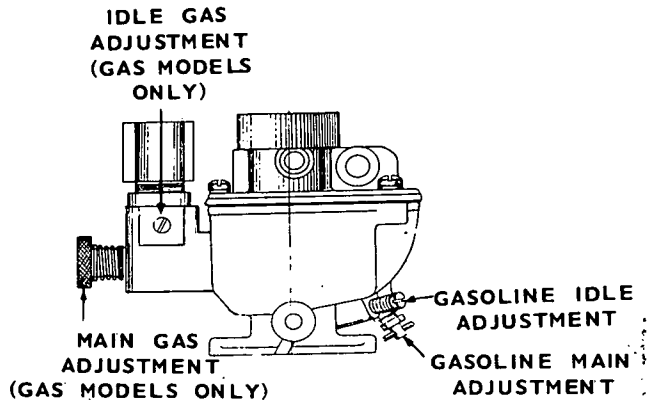



FIGURE 31. CARBURETOR FUEL MIXTURE ADJUSTMENTS

4. Push in on the governor mechanism to slow the unit to 400 to 500 rpm. Set the idle needle for even operation so the engine is firing on both cylinders and running smoothly.

### Gas-Fueled Carburetor

Allow the engine to warm up if preliminary adjustments are satisfactory for initial startup. If the engine won't start, turn both fuel needles out 1-1/2 turns (3 turns for only 800 BTU gas). These settings should be adequate for starting. The gas carburetor is very similar to the carburetor shown in Figure 31 except for the gasoline adjustment needles.

1. Apply a full load to the engine.
2. Turn load needle in until engine loses power. Slowly back out needle until engine carries full load smoothly.
3. Remove load from the engine.
4. Turn idle needle out until engine speed drops, then turn in until speed increases to maximum.

### Carburetor Float Adjustment

1. Disconnect throttle control, choke cable and fuel line from carburetor.
2. With a screwdriver, remove the three screws on the top of the carburetor and lift off.
3. With the carburetor casting inverted and the float resting lightly against the needle and seat, there should be 1/4-inch (6.35 mm) clearance between the bowl cover gasket and the free end of the float (side opposite needle and seat). See Figure 32.
4. If it is necessary to reset the float level, bend the float near the shaft to obtain the correct level.

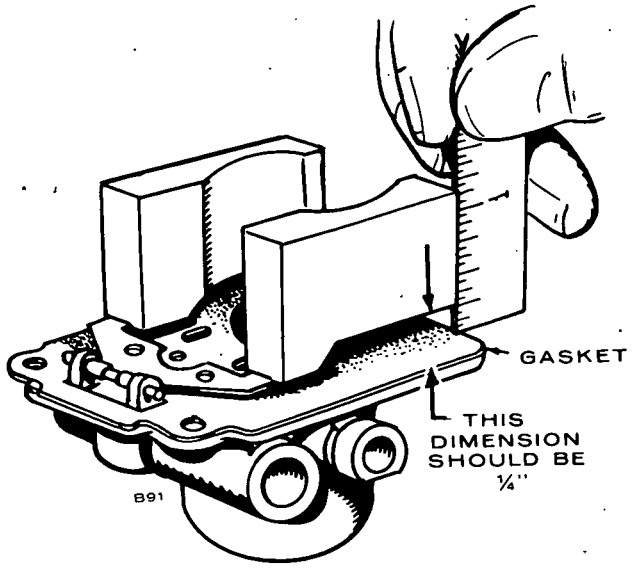



FIGURE 32. CARBURETOR FLOAT SETTING

## Throttle Stop Screw

The throttle stop screw is located on the throttle shaft lever (side of carburetor by ignition coil). It must be adjusted and set for 1/32-inch (0.79 mm) clearance over the manifold surface when the generator set is running with no load. See Figure 33.

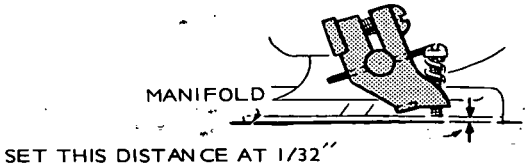
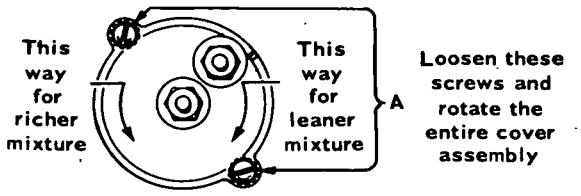



FIGURE 33. THROTTLE STOP SCREW SETTING

## ELECTRIC CHOKE

If extremes in-starting temperatures require a readjustment of the choke, loosen slightly the two cover retaining screws. See Figure 34. For less choking action, turn the cover assembly a few degrees in a clockwise direction. For more choking action, turn counterclockwise. Retighten the cover screws.

**If the engine starts sooner than 6 seconds of cranking, and runs roughly after a minute or two of operation, the choke is set too rich. If the engine starts between 6 and 15 seconds of crankings, the choke is properly adjusted. If the engine starts after 15 seconds of cranking, and assuming that fuel, ignition and compression are adequate, but the engine sputters or stops before it warms up, the choke is set too lean.**




| AVERAGE CHOKE SETTING | |
|---|---|
| AMBIENT TEMP (F°) | CHOKE OPENING |
| 58 (14° C) | closed |
| 66 (19° C) | 1/4 open |
| 72 (22° C) | 1/2 open |
| 76 (24° C) | 3/4 open |
| 82 (28° C) | open |

FIGURE 34. ELECTRIC CHOKE

## GOVERNOR

Before making any governor adjustments, run the generator set for at least 10 minutes to allow the engine to come up to operating temperature. Be sure the carburetor is adjusted before attempting to adjust governor. Also be sure to clean, check and lubricate the governor linkage before making any adjustments. Binding in the linkage joints can cause erratic operation.

**If carburetor and the following governor adjustments have already been made and the governor action is still erratic, replace the governor spring (Figure 35) with a new one and readjust the governor. Springs lose their calibrated tension through fatigue after long usage.**

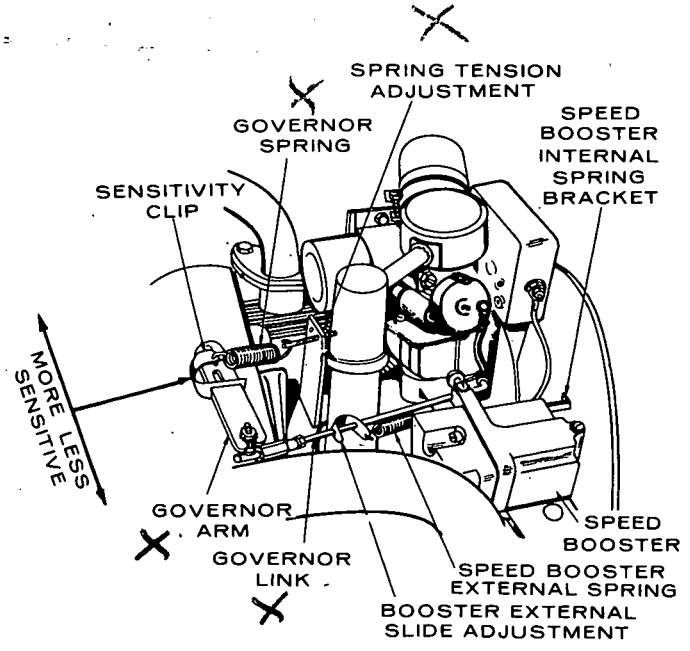



FIGURE 35. GOVERNOR AND SPEED BOOSTER LINKAGE

## Speed Adjustment

1. Start generator set and allow to warm up without load.
2. Remove the speed booster external spring from the bracket slide on the governor link (Figure 35).
3. Refer to the voltage and speed charts. If needed, increase the speed by increasing tension on the governor spring. Decrease tension on the governor spring to reduce speed.
4. Add a full-rated load to the generator set and compare lower speed and voltage with those shown in the charts. If operation does not remain in these limits, check governor linkage and governor spring, and, if necessary, follow procedure again.
5. Check and, if necessary, adjust governor sensitivity *(Sensitivity Adjustment).*

**SPEED CHART**
**FOR CHECKING GOVERNOR REGULATION**

| AC GENERATOR SETS | 60 HERTZ | 50 HERTZ |
|---|---|---|
| Maximum No-Load Speed<br>RPM<br>Hertz (Frequency) | <br>1890<br>63 | <br>1560<br>52 |
| Minimum Full-Load Speed<br>(Without Booster)<br>RPM<br>Hertz (Frequency) | <br><br>1770<br>59 | <br><br>1490<br>49 |

**VOLTAGE CHART**
**FOR CHECKING GOVERNOR REGULATION**

| AC GENERATOR SETS | 120 Volt (1 PH, 2 W) Or 120/240 V (1 PH, 3W) | 240 Volt (1 PH, 2 W) Or 240 Volt (3 PH, 3W) |
|---|---|---|
| Maximum No-Load Volts | 126 | 252 |
| Minimum Full-Load Volts (Without Booster) | 110 | 220 |

**NOTE:** Output rating is at UNITY power factor load.

## Sensitivity Adjustment

1. Start generator set and allow to warm up.
2. Check voltage and speed, first without load and then with a full load. See voltage and speed charts.
3. Increase sensitivity (closer regulation) by shifting adjusting clip toward governor shaft (Figure 35). Move clip away from governor shaft to decrease sensitivity.

   **Too much sensitivity causes the engine to hunt. Too little sensitivity results in too much speed difference between no-load and full-load conditions.**
4. A change in sensitivity adjustment usually requires a compensating speed adjustment (spring tension). Then proceed to *Speed Booster.*

## Speed Booster

1. After sensitivity adjustment, connect booster external spring to slide on governor link (Figure 36).
2. With generator set running at no load, move adjustable slide to point where there is no tension on spring.
3. Apply full-rated load to generator set.
4. If the speed increases more than the no-load frequency when the load is applied, lessen the speed booster's internal spring tension. To change tension, pull out the spring bracket and move the pin to a different hole (Figure 36). If speed decreases when the load is applied, increase the booster's internal spring tension.

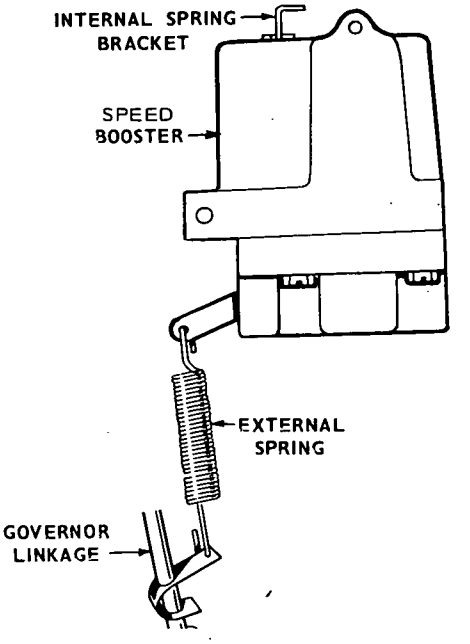



**FIGURE 36. SPEED BOOSTER**

## BREAKER POINTS

1. Remove the two screws and the cover on the breaker box.
2. Remove the two spark plugs so engine can be easily rotated by hand.
3. Turn flywheel in a clockwise direction approximately 1/4 turn after top center (TC).
4. To adjust gap, refer to Figure 37. Loosen screws (A) and turn cam (B) until point gap measures .020 inch with a flat thickness gauge. Retighten screws (A) and recheck gap.
5. If points are slightly burned, dress smooth with a file or fine stone. If points appear to be burned and pitted, replace with a new set.

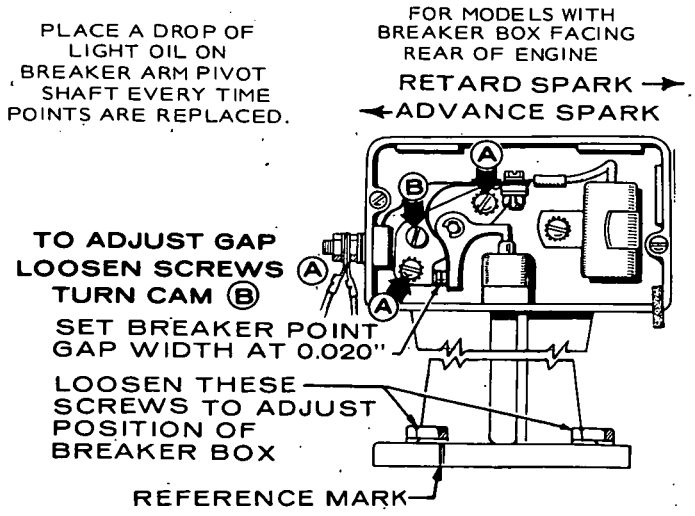



FIGURE 37. BREAKER POINTS

6. Replace spark plugs and breaker box cover.

Always check timing after replacing ignition points or if noticing poor engine performance. Proceed to *Ignition Timing.*

## IGNITION TIMING

Both spark plugs on the CCK fire simultaneously, thus the need for a distributor is eliminated. Spark advance is set at 19° BTC (before top center) for gasoline generator sets, 24° BTC for gaseous-fueled sets. This timing should be maintained for best engine performance (Figure 38).

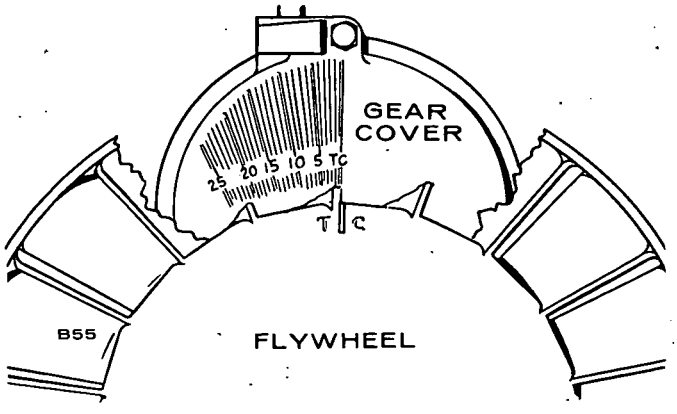
### Timing Procedure — Engine Running

1. To accurately check the ignition timing, use a timing light when the engine is running. Connect the timing light according to its manufacturer's instructions. Either spark plug can be used as they fire simultaneously.
2. If Vacu-Flo cooled, remove plug from the timing hole (Figure 38).
3. Start the engine and check the timing. The mark on the flywheel should line up with the correct timing mark.
4. If timing needs adjustment, loosen the mounting screws on breaker box and move left to advance or right to retard the timing (when facing rear of engine).
5. Start engine to be sure mark on flywheel lines up with the correct timing mark.
6. Tighten all screws, replace timing plug (where used).

### Timing Procedure — Engine Not Running

1. Connect a continuity test lamp set across the ignition breaker points. Touch one test prod to the breaker box terminal to which the coil lead is connected and touch the other test prod to a good ground on the engine.
2. Turn crankshaft against rotation (counterclockwise) until the points close. Then slowly turn the crankshaft with rotation (clockwise).
3. The lamp should go out just as the points break which is the time at which ignition occurs (timing marks should align).
4. If timing needs adjustment, loosen the mounting screws on the breaker box and move left to advance or right to retard the timing (when facing rear of engine).

MODELS WITH STANDARD COOLING




MODELS WITH VACU-FLO COOLING

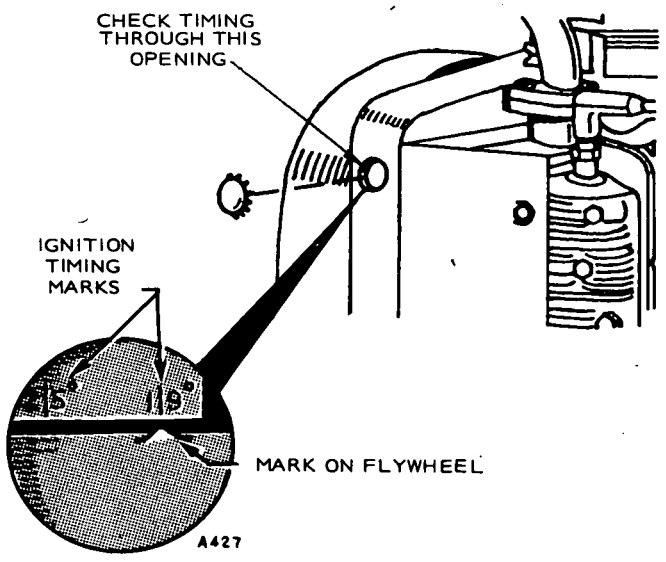



FIGURE 38. IGNITION TIMING MARKS

# PARTS CATALOG

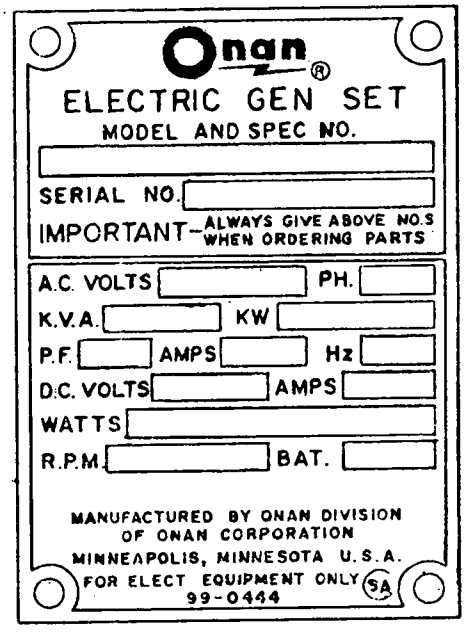
## INSTRUCTIONS FOR ORDERING REPAIR PARTS

For parts or service, contact the dealer from whom you purchased this equipment or refer to your Nearest Authorized Onan Parts and Service Center.

To avoid errors or delay in filling your parts order, please furnish all information requested.

Always refer to the nameplate on your unit:

1. Always give the MODEL and SPEC NO. and SERIAL NO.




For handy reference, insert "YOUR" nameplate information in the spaces above.

2. Do not order by reference number or group number; always use part number and description.
3. Give the part number, description and quantity needed of each item. If an older part cannot be identified, return the part prepaid to your dealer or nearest AUTHORIZED SERVICE STATION. Print your name and address plainly on the package. Write a letter to the same address stating the reason for returning the part.
4. State definite shipping instructions. Any claim for loss or damage to your unit in transit should be filed promptly against the transportation company making the delivery. Shipments are complete unless the packing list indicates items are back ordered.

Prices are purposely omitted from this Parts Catalog due to the confusion resulting from fluctuating costs, import duties, sales taxes, exchange rates, etc.

For current parts prices, consult your Onan Dealer, Distributor or Parts and Service Center.

"En esta lista de partes los precios se omiten de proposito, ya que bastante confusion resulto de fluctuaciones de los precios, derechos aduanales, impuestos de venta, cambios extranjeros, etc."

Consiga los precios vigentes de su distribuidor de productos "ONAN".

This catalog applies to the standard CCK Generating Sets as listed below. Parts are arranged in groups of related items. Each illustrated part is identified by a reference number corresponding to the same reference number in the parts list for that group. Parts illustrations are typical. Using the *Model* and *Spec No.* from the nameplate, select the *Parts Key No.* (1, 2, etc., in the last column) that applies to your set *Model* and *Spec No.* This *Parts Key No.* represents parts that differ between models. Unless otherwise mentioned in the description, parts are interchangeable between models. Right and left sides are determined by facing the blower end (front) of the engine.

## GENERATING SET DATA TABLE

| MODEL & SPEC £ | TYPE | ELECTRICAL DATA | | | | | PARTS KEY NO. |
|---|---|---|---|---|---|---|---|
| | | WATTS | VOLTS | HERTZ | WIRE | PHASE | |
| 3.5CCK-53BP/* | Portable | 3500 | 110/220 | 50 | 4 | 1 | 1 |
| 3.5CCK-53CP/* | Portable | 3500 | 120/240 | 50 | 4† | 1 | 1 |
| 3.5CCK-53BR/* | Remote | 3500 | 110/220 | 50 | 4 | 1 | 2 |
| 3.5CCK-53CR/* | Remote | 3500 | 120/240 | 50 | 4† | 1 | 2 |
| 4.2CCK-53CE/* | Electric | 4250 | 120/240 | 50 | 4† | 1 | # |
| 4.2CCK-53CP/* | Portable | 4250 | 120/240 | 50 | 4† | 1 | 3 |
| 4.2CCK-53BR/* | Remote | 4250 | 110/220 | 50 | 4 | 1 | 3 |
| 4.2CCK-53CR/* | Remote | 4250 | 120/240 | 50 | 4† | 1 | 3 |
| 4.2CCK-55DR/* | Remote | 4250 | 120/240 | 50 | 4 | 3 | 3 |
| 4.2CCK-57R/* | Remote | 4250 | 220/380 | 50 | 4 | 3 | 3 |
| 4.0CCK-3CE/* | Electric | 4000 | 120/240 | 60 | 4† | 1 | # |
| 4.0CCK-3CP/* | Portable | 4000 | 120/240 | 60 | 4† | 1 | 4 |
| 4.0CCK-3CR/* | Remote | 4000 | 120/240 | 60 | 4† | 1 | 5 |
| 4.0CCK-4R/* | Remote | 4000 | 120/208 | 60 | 4 | 3 | 5 |
| 5.0CCK-3CE/* | Electric | 5000 | 120/240 | 60 | 4† | 1 | # |
| 5.0CCK-3CP/* | Portable | 5000 | 120/240 | 60 | 4† | 1 | 6 |
| 5.0CCK-3CR/* | Remote | 5000 | 120/240 | 60 | 4† | 1 | 7 |
| 5.0CCK-4R/* | Remote | 5000 | 120/208 | 60 | 4 | 3 | 7 |
| 5.0CCK-4XR/* | Remote | 5000 | 277/480 | 60 | 4 | 3 | 7 |
| 5.0CCK-5DR/* | Remote | 5000 | 120/240 | 60 | 4 | 3 | 7 |

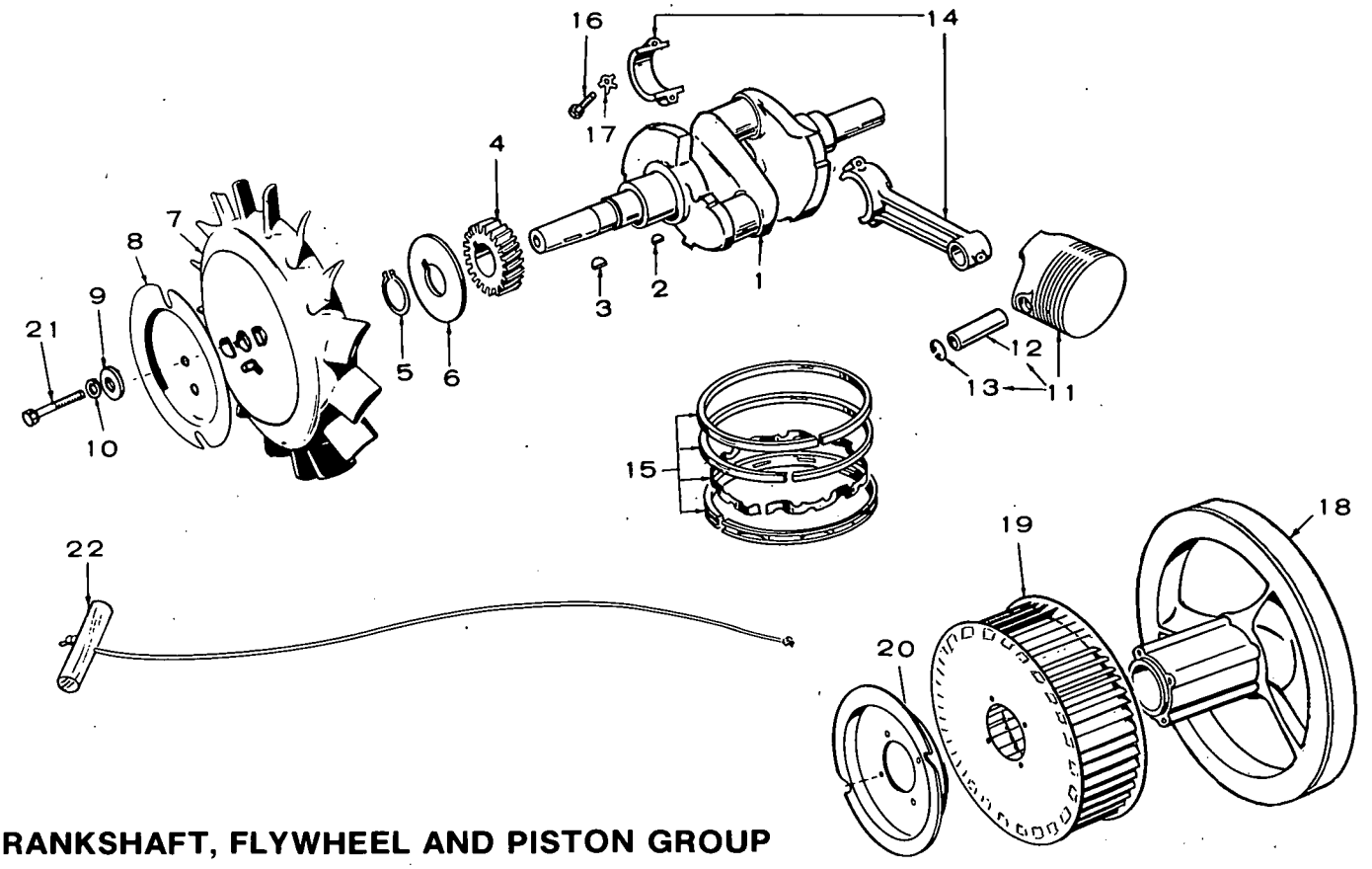
£ - The Specification Letter Advances (A to B, B to C, etc.) with manufacturing changes.

* - The factory code number portion of the specification number indicates standard equipped engines and/or customer selected optional equipment.

† - Set is reconnectible for 120 volt 2 wire; 240 volt 2 wire or 120/240 volt 3 wire service.

\# - A Special Parts Section is provided at back of Parts Catalog for these Contractor Models.

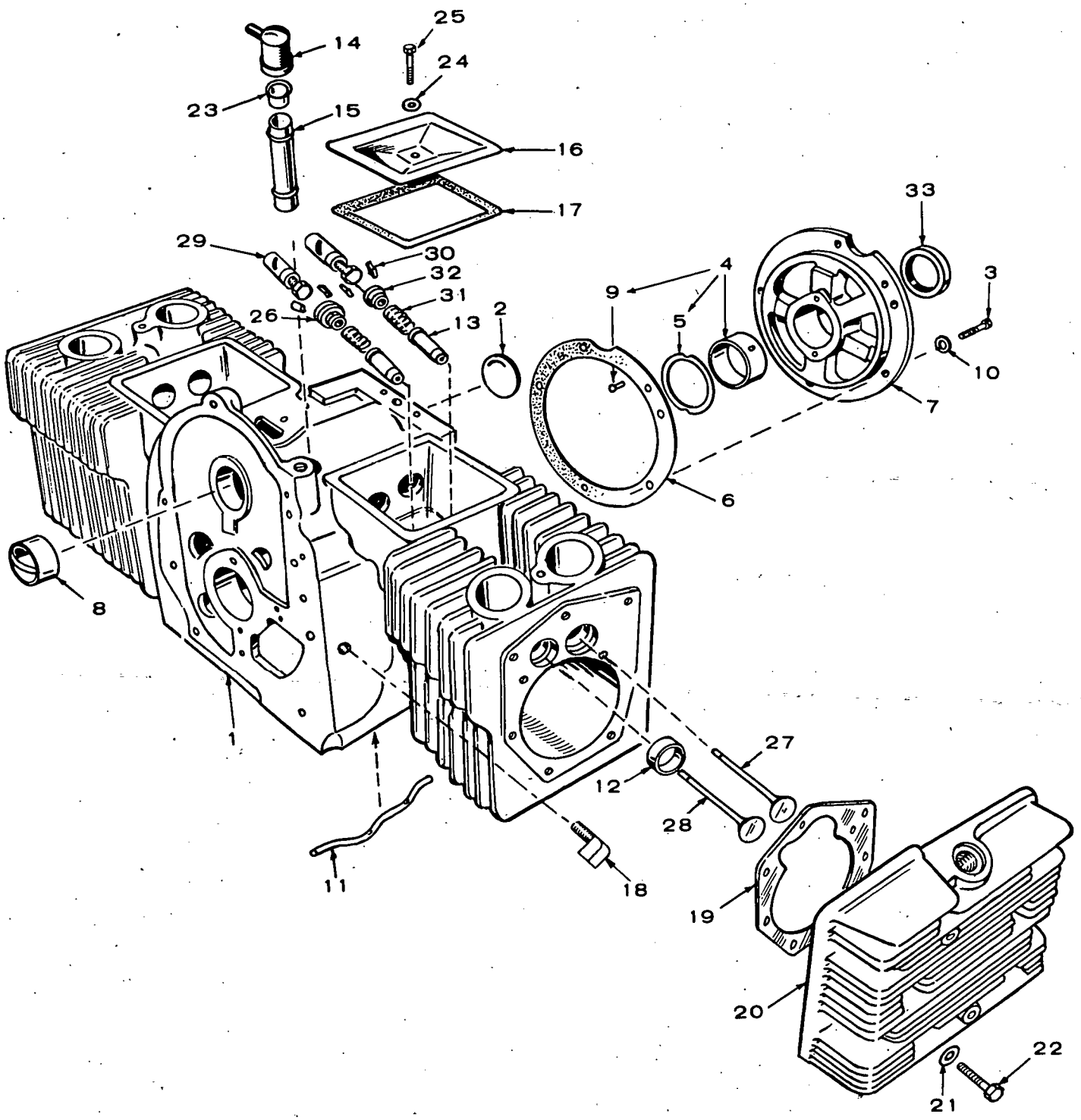
**NOTE:** Hertz is a unit of frequency equal to one cycle per second.




## CRANKSHAFT, FLYWHEEL AND PISTON GROUP

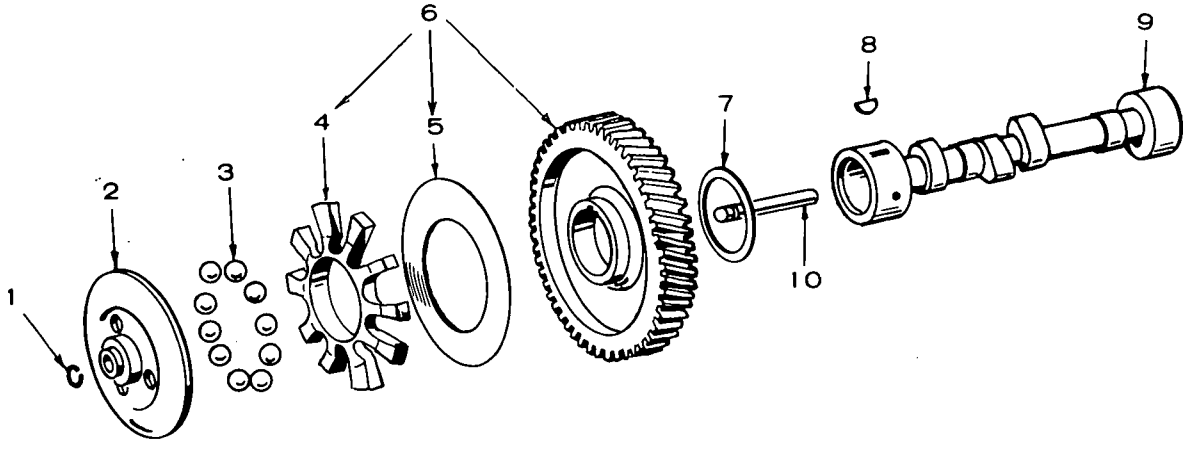
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 104-0578 | 1 | Crankshaft |
| 2 | 515-0001 | 1 | Key, Crankshaft Gear Mounting |
| 3 | 515-0002 | 1 | Key, Flywheel Mounting |
| 4 | 104-0032 | 1 | Gear, Crankshaft |
| 5 | 518-0014 | 1 | Lock, Crankshaft Gear Washer |
| 6 | 104-0043 | 1 | Washer, Crankshaft Gear Retainer |
| 7 | FLYWHEEL | | |
| | 160-0937 | 1 | Key 1, 4, 6 |
| | 134-0591 | 1 | Key 2, 3, 5, 7 |
| 8 | 192-0308 | 1 | Sheave, Rope - Pressure Cooled Sets - Key 1, 4, 6- Optional |
| 9 | 526-0128 | 1 | Washer, Flywheel Mounting - Key 2, 3, 5, 7 |
| 10 | 850-0055 | 1 | Washer, Lock - Flywheel Mounting (7/16") |
| 11 | PISTON AND PIN (Includes Retaining Rings) | | |
| | 112-0136 | 2 | Standard |
| | 112-0136-10 | 2 | .010" Oversize |
| | 112-0136-20 | 2 | .020" Oversize |
| | 112-0136-30 | 2 | .030" Oversize |
| | 112-0136-40 | 2 | .040" Oversize |
| 12 | PIN, PISTON | | |
| | 112-0069 | 2 | Standard |
| | 112-0069-02 | 2 | .002" Oversize |
| 13 | 112-0003 | 4 | Ring, Piston Pin Retainer |
| 14 | ROD, CONNECTING | | |
| | 114-0098 | 2 | Standard |
| | 114-0098-10 | 2 | .010" Undersize |
| | 114-0098-20 | 2 | .020" Undersize |
| | 114-0098-30 | 2 | .030" Undersize |
| 15 | RING SET, PISTON | | |
| | 113-0152 | 2 | Standard |
| | 113-0152-10 | 2 | .010" Oversize |
| | 113-0152-20 | 2 | .020" Oversize |
| | 113-0152-30 | 2 | .030" Oversize |
| | 113-0152-40 | 2 | .040" Oversize |
| 16 | 110-0284 | 4 | Screw, Hex Cap - Connecting Rod |
| 17 | 114-0059 | 4 | Washer, Lock - Connecting Rod Cap Screw |
| 18 | 104-0499 | 1 | Flywheel, Vacu-Flo Cooled Sets - Key 2, 3, 5, 7 |
| 19 | 192-0272 | 1 | Sheave, Rope - Vacu-Flo Cooled Sets - Key 2, 3, 5, 7 - Optional |
| 20 | 134-0565 | 1 | Wheel, Blower - Vacu-Flo Cooled Sets - Key 2, 3, 5, 7 |
| 21 | 104-0170 | 1 | Screw, Flywheel Mounting |
| 22 | 102-0083 | 1 | Rope Starting - Optional |

## CYLINDER BLOCK GROUP



| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 110-0915 | 1 | Block Assembly, Cylinder (Includes Parts Marked *) |
| 2 | 517-0048 | 1 | *Plug, Camshaft Expansion |
| 3 | 800-0512 | 5 | *Screw, Hex Cap - Rear Bearing Plate Mounting (5/16-18 x 1") |
| 4 | *BEARING, CRANKSHAFT (Includes Thrust Washer and Stop Pins) | | |
| | 101-0450 | 2 | Standard |
| | 101-0450-02 | 2 | .002" Undersize |
| | 101-0450-10 | 2 | .010" Undersize |
| | 101-0450-20 | 2 | .020" Undersize |
| | 101-0450-30 | 2 | .030" Undersize |
| 5 | 104-0575 | 2 | *Washer, Crankshaft Bearing Thrust |
| 6 | 101-0115 | 1 | *Gasket Kit, Bearing Plate |
| 7 | 101-0316 | 1 | *Plate, Rear Bearing (Excludes Bearing) |
| 8 | 101-0367 | 2 | *Bearing, Camshaft Front & Rear (Precision) |
| 9 | 516-0072 | 4 | *Pin, Main Bearing Stop |
| 10 | 850-0045 | 5 | *Washer, Lock (5/16) Rear Bearing Plate |
| 11 | 120-0386 | 1 | *Tube, Crankcase Oil |
| 12 | *INSERT, EXHAUST VALVE SEAT (Stellite) | | |
| | 110-0872 | 2 | Standard |
| | 110-0872-02 | 2 | .002" Oversize |
| | 110-0872-05 | 2 | .005" Oversize |
| | 110-0872-10 | 2 | .010" Oversize |
| | 110-0872-25 | 2 | .025" Oversize |
| 13 | 110-0902 | 4 | *Guide, Valve |
| 14 | 123-0293 | 1 | Cap, Breather Tube (Rubber) |
| 15 | 123-0129 | 1 | Tube, Breather (Includes Steel Baffles) |
| 16 | 110-0666 | 2 | Cover, Valve Compartment |
| 17 | 110-0667 | 2 | Gasket, Valve Cover |
| 18 | 502-0020 | 1 | Elbow, Street, Oil Line |
| 19 | 110-0892 | 2 | Gasket, Cylinder Head |
| 20 | HEAD, CYLINDER | | |
| | | | Right Side - #2 Cylinder |
| | 110-0890 | 1 | Standard Compression |
| | 110-0884 | 1 | Hi-Compression (Gas Fuel Models) |
| | | | Left Side - #1 Cylinder |
| | 110-0891 | 1 | Standard Compression |
| | 110-0883 | 1 | Hi-Compression (Gas Fuel Models) |
| 21 | 526-0122 | 18 | Washer (Flat), Cylinder Head Screws |
| 22 | SCREW, HEX HEAD CAP (Hardened) | | |
| | 110-0879 | 8 | Cylinder Head (5/16-18 x 1-1/4") |
| | 114-0022 | 10 | Cylinder Head (5/16-18 x 1-3/4") |
| 23 | 123-0104 | 1 | Valve, Breather Tube |
| 24 | 526-0063 | 2 | Washer (Copper), Valve Cover |
| 25 | 800-0012 | 2 | Screw (1/4-20 x 2-1/4") - Valve Cover |
| 26 | 110-0904 | 2 | Rotocap, Exhaust Valve |
| 27 | 110-0881 | 2 | Valve, Intake (Steel) |
| 28 | 110-0880 | 2 | Valve, Exhaust (Stellite) |
| 29 | TAPPET, VALVE | | |
| | 115-0006 | 4 | Standard |
| | 115-0005 | 4 | .005" Oversize |
| 30 | 110-0639 | 8 | Lock, Valve & Spring Retainer |
| 31 | 110-0539 | 4 | Spring, Valve |
| 32 | 110-0893 | 2 | Washer, Valve Spring Retainer, Intake |
| 33 | 509-0041 | 1 | Seal, Bearing Plate |

* - Included in 110-0915 Cylinder Block Assembly.



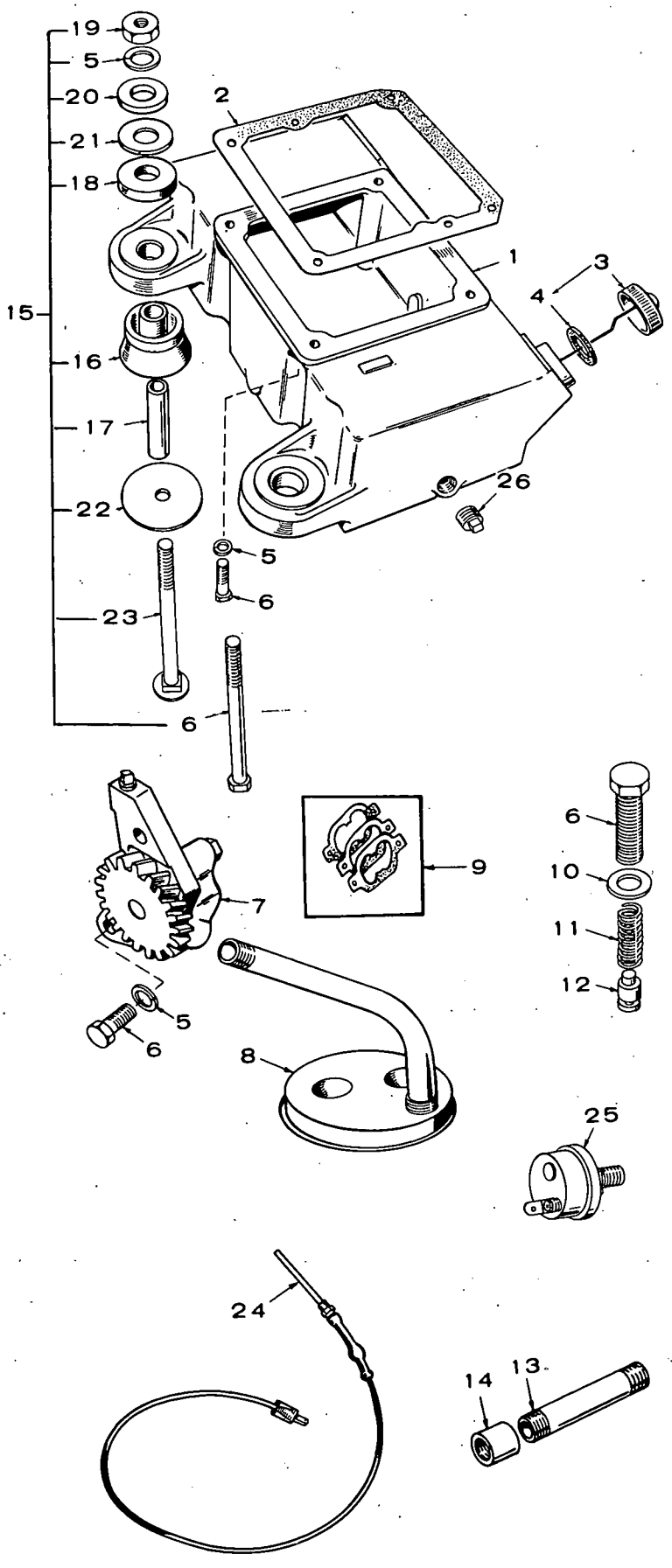

## CAMSHAFT GROUP

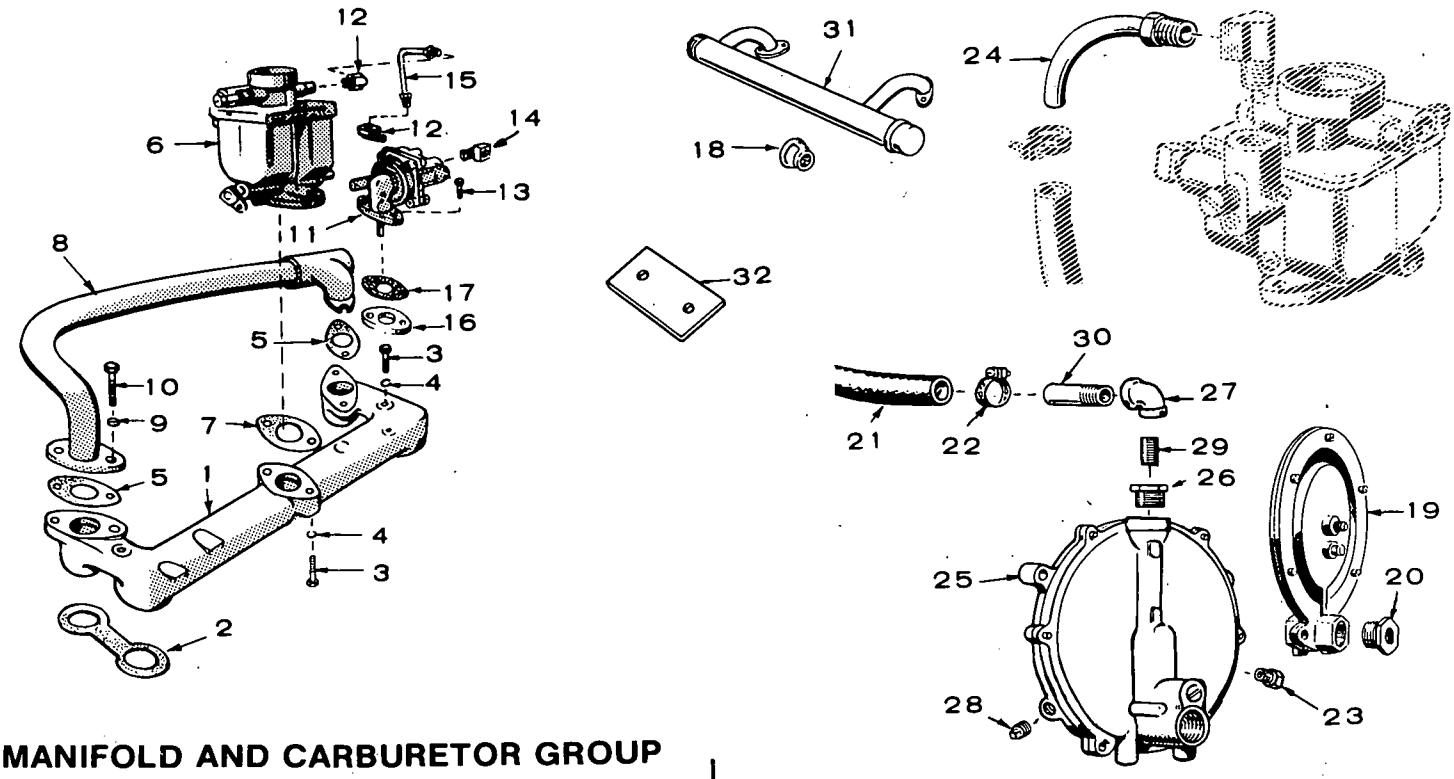
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 150-0078 | 1 | Ring, Camshaft Center Pin |
| 2 | 150-0612 | 1 | Cup, Governor |
| 3 | 510-0015 | 10 | Ball, Fly - Governor |
| 4 | 150-1257 | 1 | Spacer, Governor Fly Ball |
| 5 | 150-0077 | 1 | Plate, Governor Fly Ball |
| 6 | 105-0332 | 1 | Gear, Camshaft (Includes Flyball Spacer & Plate) |
| 7 | 105-0004 | 1 | Washer, Camshaft Gear Thrust |
| 8 | 515-0001 | 1 | Key, Camshaft Gear Mounting |
| 9 | 105-0140 | 1 | Camshaft (Includes Center Pin) |
| 10 | 150-0075 | 1 | Pin, Camshaft Center |

## OIL SYSTEM GROUP

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | BASE, OIL | | |
| | 102-0686 | 1 | Key 1, 4, 6 |
| | 102-0579 | 1 | Key 2, 3, 5, 7 |
| 2 | 102-0158 | 1 | Gasket, Oil Base Mounting |
| 3 | 123-0489 | 1 | Indicator, Oil Fill |
| 4 | 123-0191 | 1 | Gasket, Oil Fill Cap |
| 5 | WASHER, LOCK | | |
| | 850-0050 | 4 | Oil Base Mounting (3/8") |
| | 850-0040 | 2 | Oil Pump Mounting (1/4") |
| | 850-0055 | 4 | *Vibration Mounts (7/16") |
| 6 | SCREW, HEX CAP | | |
| | 102-0455 | 4 | Oil Base Mounting (Special) |
| | 800-0007 | 2 | Oil Pump Mounting (1/4-20 x 1") |
| | 801-0048 | 1 | Oil By-Pass (3/8-24 x 3/4") |
| | 800-0082 | 4 | *Vibration Mounts - Key 1, 4, 6 (7/16-14 x 3-3/4") |
| 7 | 120-0491 | 1 | Pump, Oil, Complete (Internal parts not sold separately) |
| 8 | 120-0400 | 1 | Cup, Oil Pump Intake (Includes Cup, Pipe & Screen) |
| 9 | 120-0161 | 1 | Gasket Kit, Oil Pump |
| 10 | 526-0066 | 1 | Washer, Oil Pressure Relief |
| 11 | 120-0140 | 1 | Spring, By-Pass Valve |
| 12 | 120-0398 | 1 | Valve, By-Pass |
| 13 | 505-0081 | 1 | Nipple, Oil Drain - Key 1, 4, 6 |
| 14 | 505-0014 | 1 | Coupling, Oil Drain - Key 1, 4, 6 |
| 15 | MOUNTING PACKAGE (Includes Parts Marked *) | | |
| | 402-0407 | 1 | Key 1, 4, 6 |
| | 402-0408 | 1 | Key 2, 3, 5, 7 |
| 16 | 402-0283 | 4 | *Cushion, Vibration |
| 17 | 402-0290 | 4 | *Bushing, Mounting |
| 18 | 402-0282 | 4 | *Snubber, Shock Mounting |
| 19 | 862-0004 | 4 | *Nut, Hex - Vibration Mounting |
| 20 | 526-0014 | 4 | *Washer, Flat - Vibration Mounting (29/64" I.D. x 1-1/2" O.D. x 1/8") |
| 21 | 526-0198 | 8 | *Washer, Flat - Vibration Mounting (5/8" I.D. x 1-1/2" O.D. x 1/16") |
| 22 | 526-0195 | 4 | *Washer, Flat - Vibration Mounting (29/64" I.D. x 3-1/4" O.D. x 1/8") - Key 2, 3, 5, 7 |
| 23 | 816-0212 | 4 | *Bolt, Carriage - Vibration Mounting - Key 2, 3, 5, 7 |
| 24 | 102-0558 | 1 | Heater, Oil Base (Optional) |
| 25 | 309-0010 | 1 | Switch, Low Oil Pressure (Optional) |
| 26 | 505-0056 | 1 | Plug, Oil Drain (1/2") |

* - Included in the mounting package.





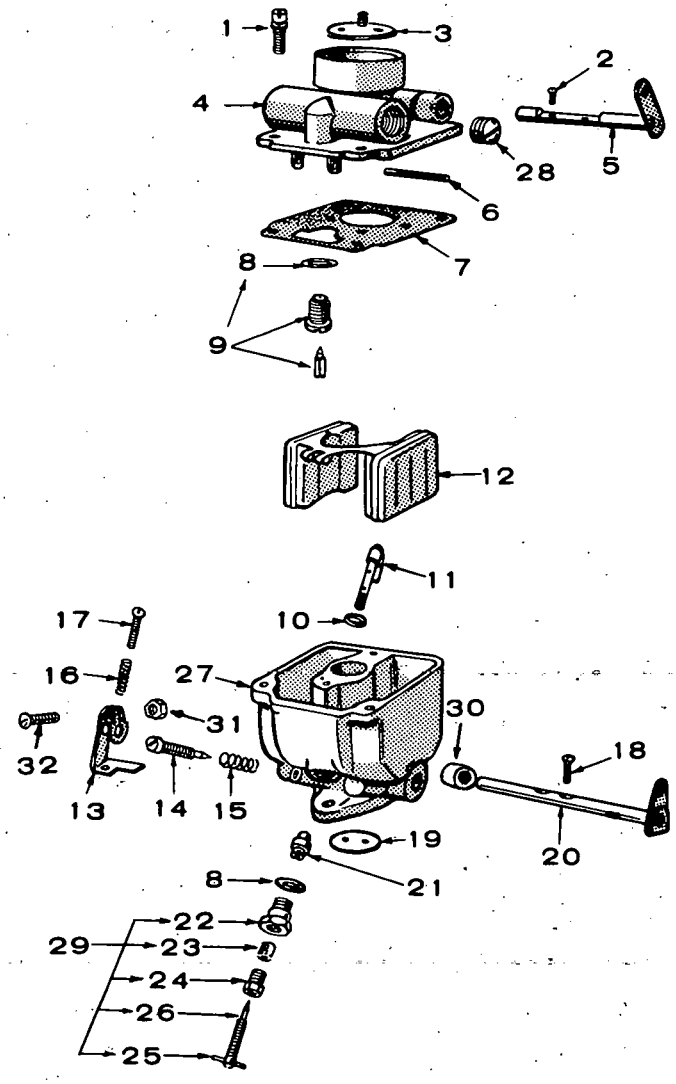

## MANIFOLD AND CARBURETOR GROUP

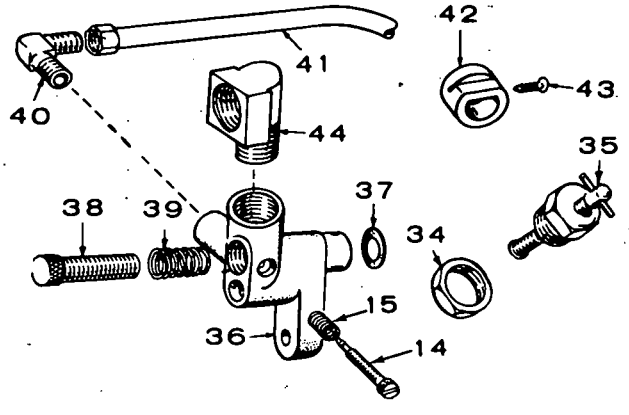
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 154-0383 | 1 | Manifold, Intake |
| 2 | 154-0013 | 2 | Gasket, Intake Manifold |
| 3 | SCREW, HEX CAP | | |
| | 800-0054 | 2 | Intake Manifold Mounting (3/8-16 x 2") |
| | 800-0009 | 2 | Carburetor Mounting (1/4-20 x 1-1/2") |
| 4 | WASHER, LOCK | | |
| | 850-0050 | 2 | Intake Manifold Mounting (3/8") |
| | 850-0040 | 2 | Carburetor Mounting (1/4") |
| 5 | 154-0360 | 2 | Gasket, Exhaust Manifold or Muffler Mounting |
| 6 | *CARBURETOR | | |
| | | | Gasoline |
| | 142-0363 | 1 | Manual Choke - Key 1, 4, 6 |
| | 142-0364 | 1 | Electric Choke - Key 2, 3, 5, 7 |
| | | | Gas-Gasoline |
| | 142-0367 | 1 | Manual Choke - Key 1, 4, 6 |
| | 142-0366 | 1 | Electric Choke - Key 2, 3, 5, 7 |
| | 142-0372 | 1 | Gas Only |
| 7 | 141-0078 | 1 | Gasket, Carburetor Mounting |
| 8 | 154-0526 | 1 | Manifold, Exhaust - Pressure Cooled Sets |
| 9 | 850-0045 | 4 | Washer, Flat (5/16") - Exhaust Manifold Mounting |
| 10 | 800-0028 | 4 | Screw - Exhaust Manifold Mounting (5/16-18 x 1") |
| 11 | 149-0693 | 1 | Pump, Fuel |
| 12 | 502-0002 | 2 | Elbow (Inverted Male) - (1) Fuel Pump Outlet (1) Carburetor Inlet |
| 13 | 806-0009 | 2 | Screw (1/4-20 x 1-1/4") - Fuel Pump Mounting |
| 14 | ELBOW, FUEL PUMP INLET | | |
| | 502-0002 | 1 | Key 2, 3, 5, 7 |
| | 502-0313 | 1 | Key 1, 4, 6 |
| 15 | 149-0611 | 1 | Line, Fuel Pump to Carburetor |
| 16 | 149-0045 | 1 | Spacer, Fuel Pump |

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 17 | 149-0003 | 2 | Gasket, Fuel Pump & Spacer Mounting |
| 18 | 505-0138 | 1 | Coupling (Reducer), Exhaust Manifold, Vacu-Flo Cooled Sets - Key 2, 3, 5, 7 |
| 19 | 148-0428 | 1 | Regulator, Ensign, Gas (Optional) Sets with Gas-Gasoline Carburetor |
| 20 | 505-0021 | 1 | Bushing, Reducer (3/4 x 1/2") Ensign Regulator Outlet (Optional) |
| 21 | 503-0315 | 1 | Hose, Regulator to Carburetor (Optional) |
| 22 | 503-0032 | 2 | Clamp, Hose (Optional) |
| 23 | 148-0107 | 1 | Vent (Optional) |
| 24 | PIPE, FUEL (Optional) | | |
| | 148-0633 | 1 | Pressure Cooled Sets |
| | 148-0147 | 1 | Vacu-Flo Cooled Sets |
| 25 | 148-0311 | 1 | Regulator, Garretson (Optional) |
| 26 | 505-0017 | 1 | Bushing, Reducer - 3/8 x 1/4" (Optional) |
| 27 | 505-0038 | 1 | Elbow, 1/4" (Optional) |
| 28 | 505-0057 | 1 | Plug, Pipe - 1/8" (Optional) |
| 29 | 505-0099 | 1 | Nipple, 1/4 x 7/8" (Optional) |
| 30 | 505-0302 | 1 | Nipple, Half (Optional) |
| 31 | 154-0377 | 1 | Manifold, Exhaust Vacu-Flo Cooled Sets, Key 2, 3, 5, 7 |
| 32 | 149-0136 | 1 | Cover, Fuel Pump Hole (Used on Gas Only Models) |
| | 148-0522 | 1 | Repair Kit, Gas Regulator (Ensign Model F1) |
| | 148-0609 | 1 | Conversion Kit, Gas-Gasoline (Accessory), Key 1, 4, 6 |
| | 148-0610 | 1 | Conversion Kit, Gas-Gasoline (Accessory), Key 2, 3, 5, 7 |
| | 148-0617 | 1 | Conversion Kit, Gas Only |

* - See separate groups for component parts.

## CARBURETOR PARTS GROUP

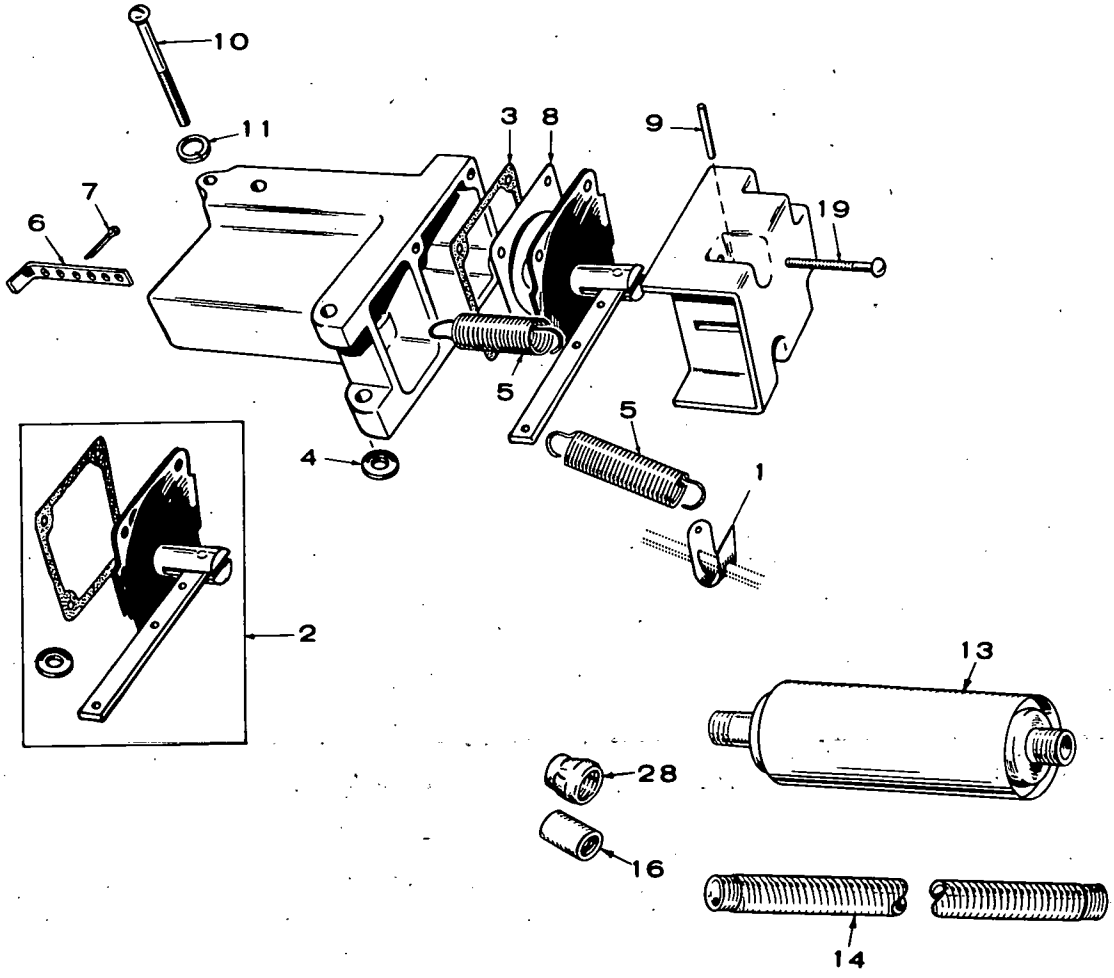


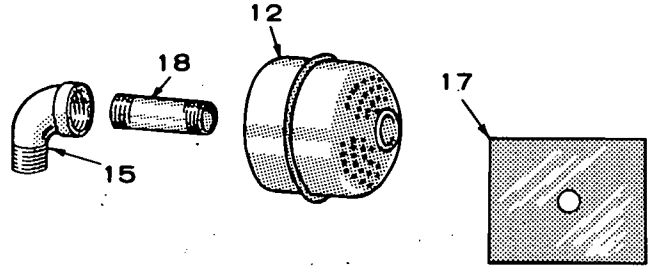



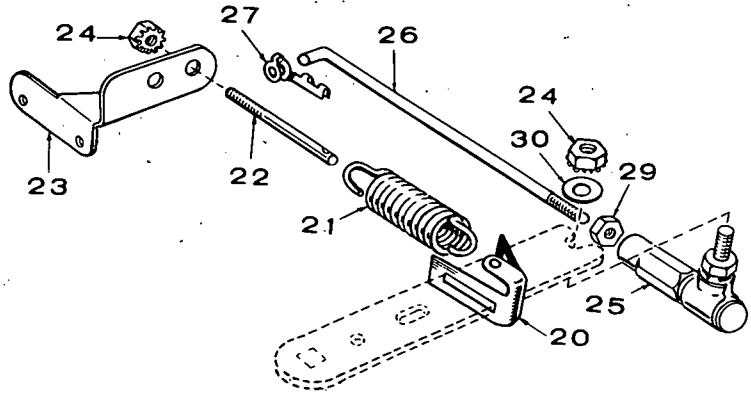
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| | CARBURETOR, GASOLINE | | |
| | 142-0363 | 1 | Key 1, 4, 6 |
| | 142-0364 | 1 | Key 2, 3, 5, 7 |
| | CARBURETOR, GAS-GASOLINE (Optional) | | |
| | 142-0367 | 1 | Key 1, 4, 6 |
| | 142-0366 | 1 | Key 2, 3, 5, 7 |
| | 142-0372 | 1 | Carburetor, Gas Only (Optional) |
| 1 | SCREW, BOWL COVER | | |
| | 815-0103 | 1 | 10-24 x 1/2" |
| | 815-0109 | 2 | 10-24 x 5/8" |
| 2 | 815-0091 | 2 | +Screw, Choke Fly (4-40 x 3/16") - Gas and Gas-Gasoline |
| 3 | FLY, CHOKE - GASOLINE AND GAS-GASOLINE | | |
| | 142-0055 | 1 | Key 1, 4, 6 |
| | 142-0037 | 1 | Key 2, 3, 5, 7 |
| 4 | 142-0205 | 1 | Sleeve Assembly, Choke (Cover) |
| 5 | SHAFT ASSEMBLY, CHOKE - GASOLINE AND GAS-GASOLINE | | |
| | 142-0217 | 1 | Key 1, 4, 6 |
| | 142-0183 | 1 | Key 2, 3, 5, 7 |
| 6 | 142-0039 | 1 | +Shaft, Float - Gasoline and Gas-Gasoline |
| 7 | 142-0031 | 1 | *Gasket, Body to Bowl |
| 8 | 148-0017 | 2 | *Gasket, (1) Float Valve Seat, (1) Main Adjusting Needle Retainer |
| 9 | 142-0049 | 1 | +Valve & Seat Assembly |
| 10 | 142-0032 | 1 | *Gasket, Nozzle |
| 11 | 142-0285 | 1 | Nozzle Assembly |
| 12 | 142-0361 | 1 | Float & Lever Assembly, Gasoline and Gas-Gasoline |
| 13 | 145-0008 | 1 | Lever, Idle Stop |
| 14 | 142-0040 | 1 | +Needle, Idle Adjusting - Gasoline and 2 on Gas-Gasoline |
| 15 | 142-0282 | 1 | Spring, Idle Needle Adjusting - Gasoline and 2 on Gas-Gasoline |
| 16 | 142-0035 | 1 | Spring, Throttle Stop Adjusting Screw |
| 17 | 812-0063 | 1 | Screw, Throttle Stop Adjusting (#6-32 x 1/2") |
| 18 | 815-0072 | 2 | +Screw, Throttle Fly (#4-40 x 1/4") |
| 19 | 142-0369 | 1 | Fly, Throttle |
| 20 | 142-0368 | 1 | +Shaft Assembly, Throttle |
| 21 | 142-0370 | 1 | Nut & Jet, Nozzle |
| 22 | 142-0046 | 1 | Retainer, Main Adjusting Needle |
| 23 | 142-0206 | 1 | *Packing, Main Adjusting Needle |
| 24 | 142-0045 | 1 | Retainer, Main Adjusting Needle Packing |
| 25 | 516-0027 | 1 | Pin, Main Adjusting Needle |
| 26 | 142-0041 | 1 | +Needle, Main Adjusting |
| 27 | | 1 | Body Assembly (Not Sold Separately) |
| 28 | 505-0053 | 1 | Plug, Gas Inlet |
| 29 | 142-0042 | 1 | Needle Assembly (Includes Packing, Nut & Retainer) |
| 30 | 142-0343 | 2 | Bushing, Throttle Shaft |
| 31 | 870-0053 | 1 | Nut, Throttle Stop |
| 32 | 813-0102 | 1 | Screw, Throttle Stop Clamp |
| 34 | 148-0038 | 1 | Nut, Hex (3/8-32) Float Lock Retainer (Gas-Gasoline) |
| 35 | 148-0135 | 1 | Lock Assembly, Float (Gas-Gasoline) |
| 36 | 148-0126 | 1 | Adapter, Carburetor - Gas and Gas-Gasoline |
| 37 | 509-0091 | 1 | Gasket, Adapter Mounting - Gas and Gas-Gasoline |
| 38 | 148-0131 | 1 | Screw, Adapter Adjusting - Gas and Gas-Gasoline |
| 39 | 148-0010 | 1 | Spring, Adapter Adjusting Screw - Gas and Gas-Gasoline |
| 40 | 502-0034 | 1 | Elbow, Idle Line to Adapter - Gas and Gas-Gasoline |
| 41 | 149-0030 | 1 | Line, Idle Fuel - Gas and Gas-Gasoline |
| 42 | 148-0008 | 1 | Lock, Choke (Gas-Gasoline) Key 2, 3, 5, 7 |
| 43 | 518-0075 | 1 | Screw, Choke Lock (Gas-Gasoline) Key 2, 3, 5, 7 |
| 44 | 502-0074 | 1 | Elbow, Inverted, Adapter - Gas and Gas-Gasoline |
| | 142-0033 | 1 | +Gasket Kit, Carburetor (Includes Parts Marked *) |
| | 142-0371 | 1 | Repair Kit, Carburetor (Includes Parts Marked +) - Gasoline and Gas-Gasoline Carburetor |

* - Parts contained in 142-0033 Gasket Kit.
\+ - Parts contained in 142-0371 Repair Kit.

## VACUUM SPEED BOOSTER, GOVERNOR, AND MUFFLER GROUP



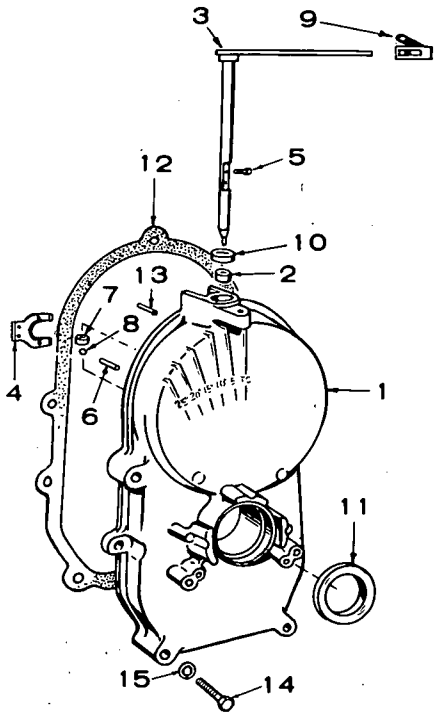



| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| | 150-0433 | 1 | Kit, Vacuum Speed Booster Replacement (Includes Parts Marked *) |
| 1 | 150-0430 | 1 | Bracket, Spring to Governor Link |
| 2 | 150-0434 | 1 | *Kit, Diaphragm Replacement (Includes Parts Marked +) |
| 3 | 150-0668 | 1 | +*Gasket, Diaphragm Plate |
| 4 | 150-0425 | 1 | +*Gasket, Booster to Manifold |
| 5 | 150-0366 | 2 | *Spring, Internal & External |
| 6 | 150-0376 | 1 | *Bracket, Internal Spring Adjusting |
| 7 | 516-0039 | 1 | *Pin, Cotter (3/32 x 5/8") Adjusting Bracket |
| 8 | 150-0666 | 1 | *Plate, Diaphragm |
| 9 | 516-0085 | 1 | *Pin (3/32 x 3/4") Diaphragm Lever Pivot |
| 10 | 813-0110 | 2 | Screw (10-32 x 2") - Vacuum Booster Mounting |
| 11 | 853-0008 | 2 | Washer, Lock (#10) |
| 12 | 155-0484 | 1 | Muffler, Exhaust - Key 1, 4, 6 |
| 13 | 155-0076 | 1 | Muffler, Exhaust - Key 2, 3, 5, 7 |
| 14 | 155-0491 | 1 | Tubing, Flexible Exhaust (36") - Key 2, 3, 5, 7 |
| 15 | 505-0333 | 1 | Elbow, Street, Exhaust Outlet - Key 1, 4, 6 |
| 16 | 505-0030 | 1 | Coupling (Pipe 1") Exhaust - Key 2, 3, 5, 7 |
| 17 | 155-0295 | 1 | Plate, Exhaust Wall - Key 2, 3, 5, 7 |
| 18 | 505-0004 | 1 | Nipple, Exhaust (1-1/2 x Close) Key 1, 4, 6 |
| 19 | 815-0148 | 4 | *Screw (8-32 x 7/8") - Cover Mounting |
| 20 | 150-0678 | 1 | Clip, Governor Sensitivity Adjusting |
| 21 | 150-0098 | 1 | Spring, Governor |
| 22 | 150-0096 | 1 | Stud, Governor Speed Adjustment |
| 23 | 150-0040 | 1 | Bracket, Governor Spring |
| 24 | 870-0131 | 2 | Nut, Keps (1) Governor Speed Adjusting (1) Ball Joint |
| 25 | 150-0639 | 1 | Joint, Ball |
| 26 | 150-0629 | 1 | Link, Governor Arm to Carburetor |
| 27 | 518-0006 | 1 | Clip, Rod End |
| 28 | 505-0138 | 1 | Coupling, Reducer (1-1/4" x 1) - Vacu-Flo Cooled Sets |
| 29 | 870-0053 | 1 | Nut, Hex (10-32) |
| 30 | 526-0196 | 1 | Washer, Flat (#10) |

* - Included in 150-0433 Vacuum Speed Booster Replacement Kit.

+ - Included in 150-0434 Diaphragm Replacement Kit.

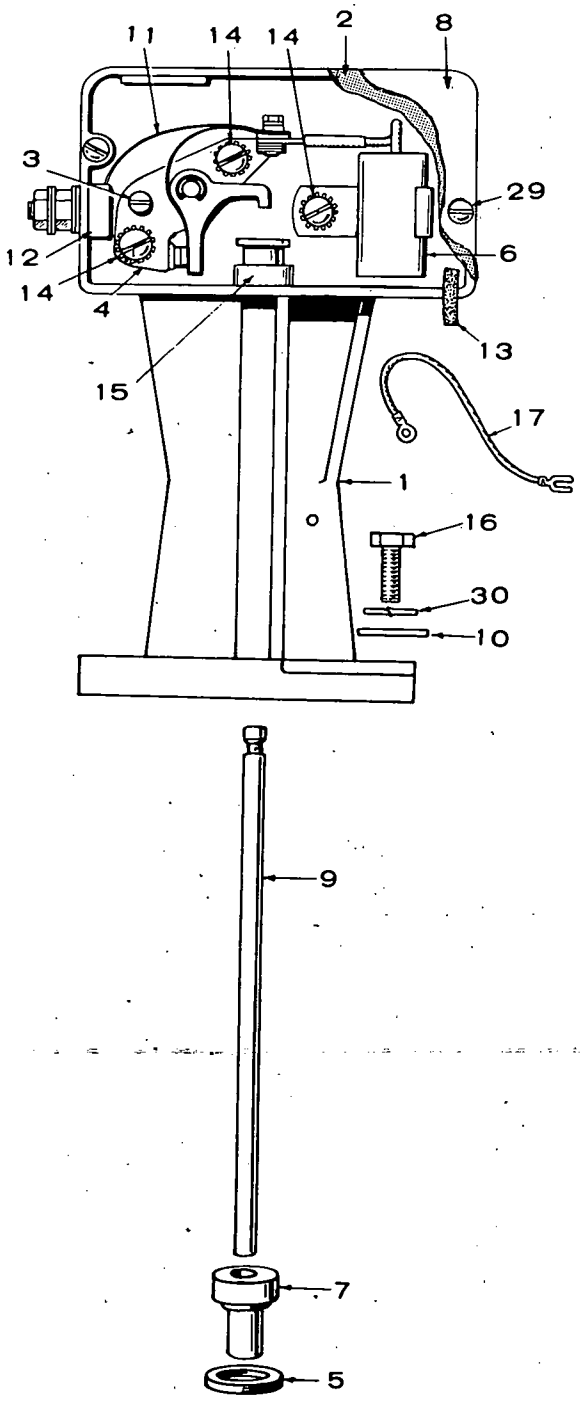
## GEAR COVER GROUP

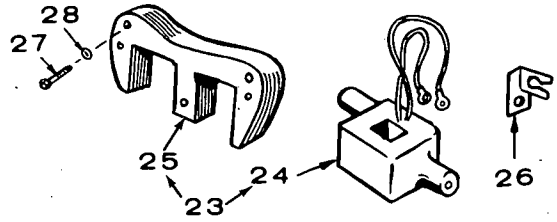


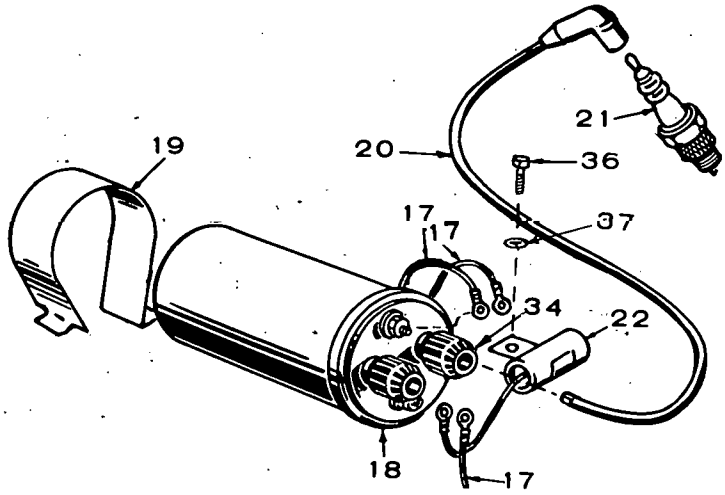

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 103-0357 | 1 | Cover Assembly, Gear (Includes Parts Marked *) |
| 2 | 510-0013 | 1 | *Bearing, Governor Shaft (Upper) |
| 3 | 150-1286 | 1 | *Shaft & Arm, Governor |
| 4 | 150-1187 | 1 | *Yoke, Governor Shaft |
| 5 | 815-0046 | 2 | *Screw, Yoke Mounting |
| 6 | 516-0130 | 1 | *Pin, Governor Cup Stop (In Gear Cover) |
| 7 | 510-0008 | 1 | *Bearing, Governor Shaft (Lower) |
| 8 | 510-0014 | 1 | *Ball, Bearing - Governor Shaft |
| 9 | 150-0678 | 1 | *Clip, Governor Sensitivity Adjustment |
| 10 | 509-0008 | 1 | *Seal, Oil |
| 11 | 509-0040 | 1 | *Seal, Gear Cover |
| 12 | 103-0011 | 1 | Gasket, Gear Cover |
| 13 | 516-0011 | 2 | Pin, Gear Cover (5/16 x 1-1/8") |
| 14 | SCREW, HEX CAP | | |
| | 800-0032 | 4 | Gear Cover Mounting (5/16-18 x 1-3/4") |
| | 800-0034 | 1 | Gear Cover Mounting (5/16-18 x 2-1/4") |
| 15 | 850-0045 | 5 | Washer, Lock - Gear Cover Mounting (5/16") |

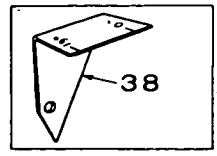
* - Included in Gear Cover Assembly.

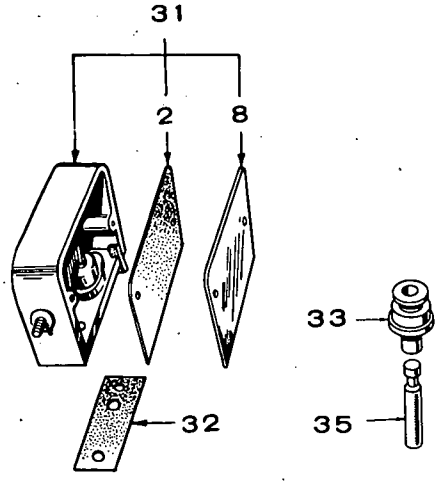
## IGNITION GROUP



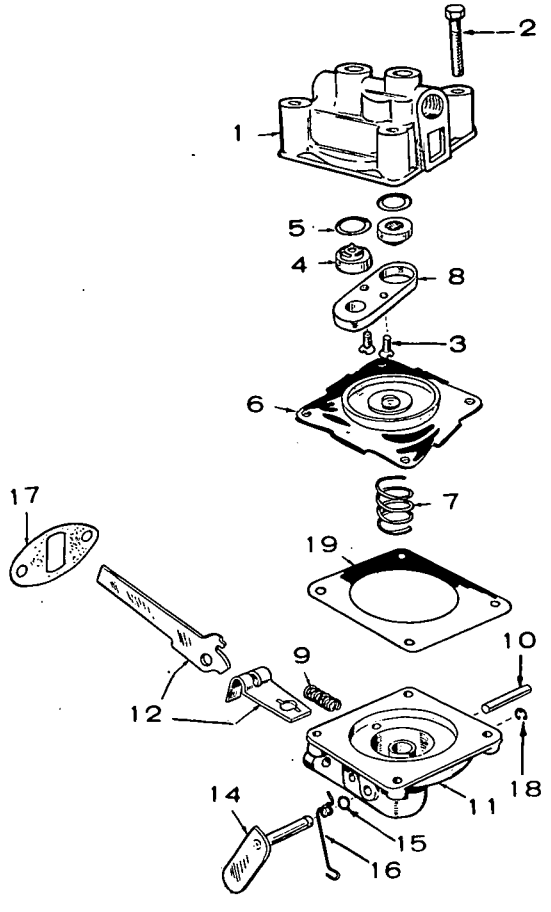
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 160-1135 | 1 | Box Assembly, Ignition Breaker - Gasoline Sets (Includes Parts Marked *) |
| 2 | 160-0150 | 1 | +*Gasket, Breaker Box Cover |
| 3 | 160-0075 | 1 | +*Pivot, Breaker Arm |
| 4 | 160-0002 | 1 | +*Point Set, Breaker |
| 5 | 160-1040 | 1 | *Gasket, Breaker Box Mounting - Gasoline Sets |
| 6 | 312-0069 | 1 | +*Condenser, Breaker Box (.3 Mfd.) |
| 7 | 160-1041 | 1 | *Bushing, Breaker Box - Gasoline Sets |
| 8 | 160-0930 | 1 | +*Cover, Breaker Box |
| 9 | 160-0723 | 1 | *Plunger, Breaker - Gasoline Sets |
| 10 | 526-0214 | 2 | Washer, Flat (1/4) |
| 11 | 160-0428 | 1 | +*Strap, Point Set to Breaker Box Terminal Block |
| 12 | 160-0349 | 1 | +*Block & Terminal Assembly, Breaker Box |
| 13 | 160-0261 | 1 | +*Wick, Breaker Box |
| 14 | SCREW WITH LOCKWASHER - BREAKER POINTS AND CONDENSER | | |
| | 815-0285 | 3 | *Gasoline Sets (8-32 x 5/16") |
| | 518-0049 | 3 | +Gas and Gas-Gasoline Sets (8-32 x 1/4") |
| 15 | 160-0931 | 1 | *Guide, Plunger - Gasoline Sets |
| 16 | SCREW, BREAKER BOX MOUNTING | | |
| | 802-0035 | 2 | *Gasoline Sets (1/4-20 x 7/8") |
| | 802-0034 | 2 | +Gas and Gas-Gasoline Sets (1/4-20 x 3/4") |
| 17 | 334-0028 | 1 | Lead (4 ft. Piece of Bulk Wire) |
| 18 | 166-0535 | 1 | Coil, Ignition - Key 2, 3, 5, 7 |
| 19 | 166-0588 | 1 | Clamp, Ignition Coil - Key 2, 3, 5, 7 |
| 20 | CABLE, SPARK PLUG | | |
| | 167-1557 | 1 | 16-3/4" Long |
| | 167-1558 | 1 | 12" Long - Key 2, 3, 5, 7 |
| | 167-1559 | 1 | 19" Long - Key 1, 4, 6 |
| 21 | 167-0241 | 2 | Plug, Spark |
| 22 | 312-0027 | 1 | Condenser, Ignition Coil Suppression (.1 Mfd.) - Key 2, 3, 5, 7 |
| 23 | 160-0752 | 1 | Stator Assembly, Magneto (Includes Coil and Pole Shoe) - Key 1, 4, 6 |
| 24 | 160-0750 | 1 | Coil, Magneto Stator - Key 1, 4, 6 |
| 25 | 160-0749 | 1 | Pole Shoe, Magneto Stator - Key 1, 4, 6 |
| 26 | 167-0188 | 4 | Clip, Magneto Lead - Key 1, 4, 6 |
| 27 | 815-0259 | 2 | Screw, Stator Mounting - Key 1, 4, 6 (1/4-20 x 1-1/4") |
| 28 | 526-0015 | 2 | Washer, Flat - Stator Mounting - Key 1, 4, 6 |
| 29 | 812-0077 | 2 | Screw, Breaker Box Cover (8-32 x 3/8") |
| 30 | 850-0040 | 2 | Lockwasher - (1/4) |
| 31 | 160-1171 | 1 | Box Assembly, Ignition Breaker - Gas and Gas-Gasoline Sets (Includes Parts Marked +) |
| 32 | 160-0043 | 1 | Gasket, Breaker Box Mounting - Gas and Gas-Gasoline Sets |
| 33 | 160-0264 | 1 | +Guide, Plunger |
| 34 | 166-0604 | 2 | Nut, Coil (Part of 166-0535 Coil) |
| 35 | 160-0265 | 1 | +Plunger |
| 36 | 815-0350 | 2 | Screw, Slotted, Hex Head (10-32 x 3/8) |
| 37 | 856-0003 | 1 | Lockwasher (#10) |
| 38 | 166-0159 | 1 | Bracket, Timing (Vacu-Flo Sets) |

* - Included in 160-1135 Breaker Box.
+ - Included in 160-1171 Breaker Box.

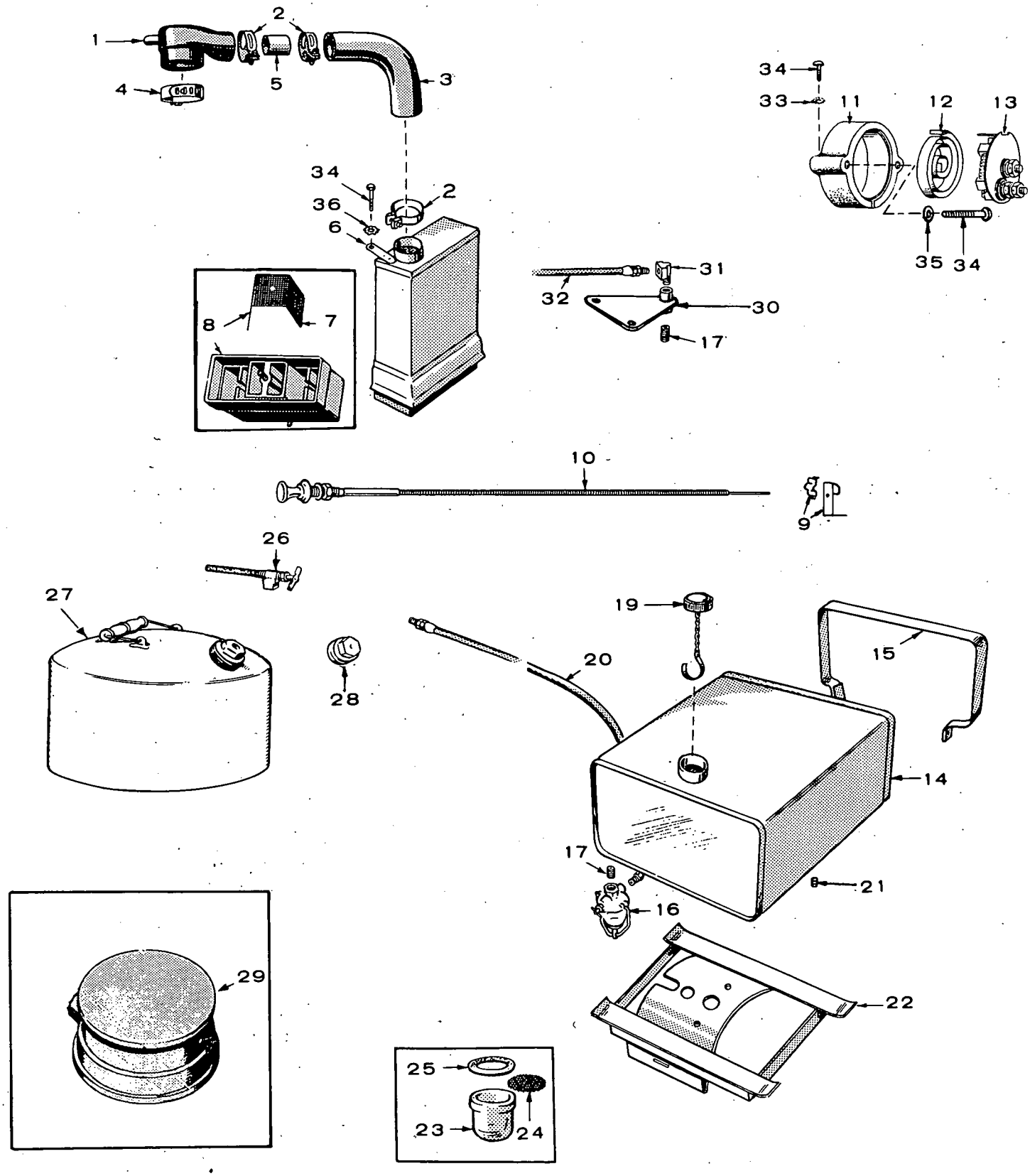
## FUEL PUMP PARTS GROUP

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| | 149-0693 | 1 | Pump, Fuel (Illustrated in Fuel System Group) |
| | 149-0526 | 1 | Repair Parts Kit (Includes Parts Marked *) |
| 1 | | 1 | Body, Not Sold Separately |
| 2 | SCREW, MACHINE | | |
| | 815-0148 | 2 | #8-32 x 7/8" |
| | 815-0150 | 2 | #8-32 x 1" |
| 3 | 815-0147 | 2 | Screw, Phillips Self Tapping, #6-32 x 5/8", Valve Retainer |
| 4 | 149-0096 | 2 | *Valve and Cage |
| 5 | 149-0095 | 2 | *Gasket, Valve |
| 6 | 149-0582 | 1 | *Diaphragm Assembly |
| 7 | 149-0672 | 1 | *Spring |
| 8 | 149-0539 | 1 | Retainer, Valve Cage |
| 9 | 149-0675 | 1 | *Spring |
| 10 | 516-0113 | 1 | Pin, Rocker Arm |
| 11 | | 1 | Body, Not Sold Separately |
| 12 | 149-0710 | 1 | Link and Arm, Rocker (Only as a Set) |
| 14 | 149-0551 | 1 | Lever, Primer |
| 15 | 509-0065 | 2 | Seal, "O" Ring |
| 16 | 149-0404 | 1 | Spring, Primer Lever |
| 17 | 149-0003 | 1 | *Gasket, Pump Mounting |
| 18 | 518-0129 | 1 | Ring, Retainer, Primer Lever |
| 19 | 149-0858 | 1 | *Gasket, Diaphragm - Lower Side |

* - Included in 149-0526 Repair Parts Kit.



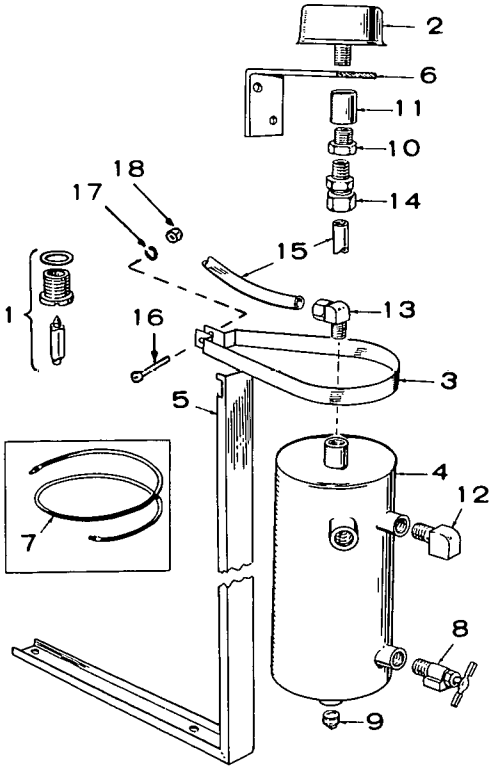
## FUEL TANKS, CHOKE, AND AIR CLEANER GROUP



| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 145-0080 | 1 | Inlet, Carburetor Air |
| 2 | 503-0280 | 3 | Clamp, Air Cleaner Hose |
| 3 | 503-0286 | 1 | Hose, Air Cleaner |
| 4 | 503-0107 | 1 | Clamp, Air Inlet to Carburetor |
| 5 | 140-0211 | 1 | Sleeve, Air Cleaner Hose |
| 6 | 140-0399 | 1 | Cleaner, Air |
| 7 | 140-0068 | 1 | Screen, Air Cleaner |
| 8 | 140-0403 | 1 | Cup Assembly, Air Cleaner, Includes Screen |
| 9 | 153-0263 | 1 | Bracket & Clip, Choke - Key 1, 4, 6 |
| 10 | 153-0097 | 1 | Choke, Manual - Key 1, 4, 6 |
| 11 | 153-0440 | 1 | Housing, Electric Choke - Key 2, 3, 5, 7 |
| 12 | 153-0017 | 1 | Element, Choke Bi-Metal - Key 2, 3, 5, 7 |
| 13 | 153-0114 | 1 | Cover, Electric Choke - Key 2, 3, 5, 7 |
| 14 | 159-0546 | 1 | Tank, Fuel (4 Gal.) Mounted - Key 1, 4, 6 |
| 15 | 159-1010 | 2 | Strap, Fuel Tank Mounting - Key 1, 4, 6 |
| 16 | 149-0079 | 1 | Filter, Fuel |
| 17 | NIPPLE (1/8 x 3/4") BRASS | | |
| | 502-0046 | 1 | Bracket to Filter Inlet - Key 2, 3, 5, 7 |
| | 502-0046 | 1 | Tank to Filter Inlet - Key 1, 4, 6 |
| 19 | 159-0020 | 1 | Cap, Fuel Tank - Key 1, 4, 6 |
| 20 | 501-0005 | 1 | Hose, Fuel Filter to Fuel Pump - Key 1, 4, 6 |
| 21 | 505-0274 | 2 | Plug, Tank Drain - Key 1, 4, 6 |
| 22 | 159-0531 | 1 | Bracket, Fuel Tank Mounting - Key 1, 4, 6 |

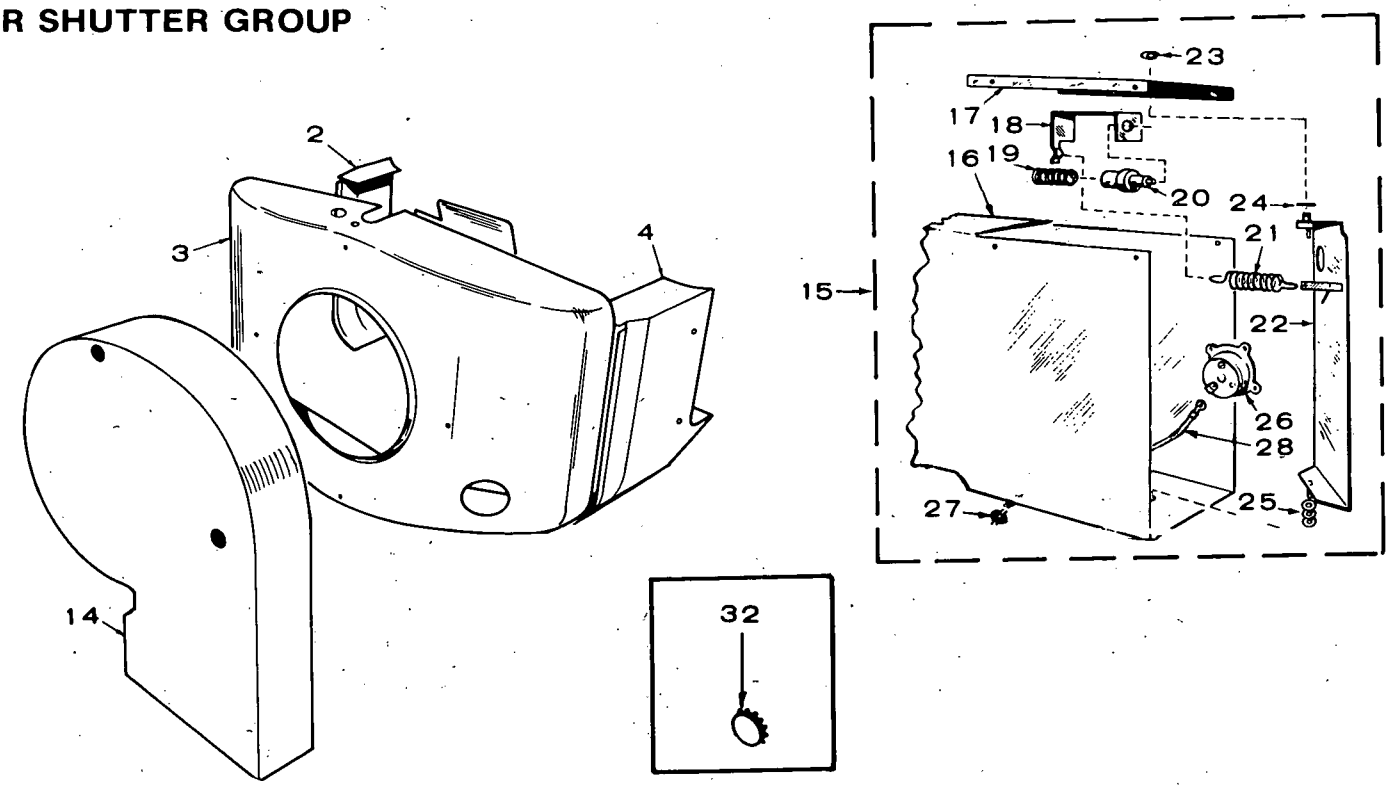
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 23 | 149-0150 | 1 | Bowl, Fuel Filter |
| 24 | 149-0202 | 1 | Screen, Fuel Filter |
| 25 | 149-0149 | 1 | Gasket, Fuel Filter Bowl |
| 26 | 504-0013 | 1 | Valve, Fuel Tank Shut-off - Optional - Key 2, 3, 5, 7 |
| 27 | 415-0126 | 1 | Tank, Fuel - 5 Gallon - Optional - Key 2, 3, 5, 7 |
| 28 | 415-0313 | 1 | Cap, Fuel Tank |
| 29 | 415-0124 | 1 | Cap, Rain - Fuel Tank |
| 30 | 149-1311 | 1 | Bracket, Fuel Filter - Key 2, 3, 5, 7 |
| 31 | 502-0020 | 1 | Elbow, Street, Filter Bracket- Key 2, 3, 5, 7 |
| 32 | LINE, FUEL, FLEXIBLE - TANK TO UNIT (Optional) KEY 2, 3, 5, 7 | | |
| | 501-0007 | 1 | 24" |
| | 501-0009 | 1 | 36" |
| | 501-0027 | 1 | 48" |
| 33 | 850-0030 | 1 | Washer, Lock - Choke Mounting (#10) - Key 2, 3, 5, 7 |
| 34 | SCREW | | |
| | 815-0110 | 1 | Choke Mounting (10-32 x 7/8") - Key 2, 3, 5, 7 |
| | 815-0285 | 2 | Choke Cover Mounting (10-32 x 5/16") - Key 2, 3, 5, 7 |
| | 821-0004 | 1 | Air Cleaner Mounting (10-32 x 3/8") |
| 35 | 526-0062 | 2 | Washer, Flat - Choke Cover Mounting |
| 36 | 856-0003 | 1 | Washer, Shakeproof - Air Cleaner Mounting |

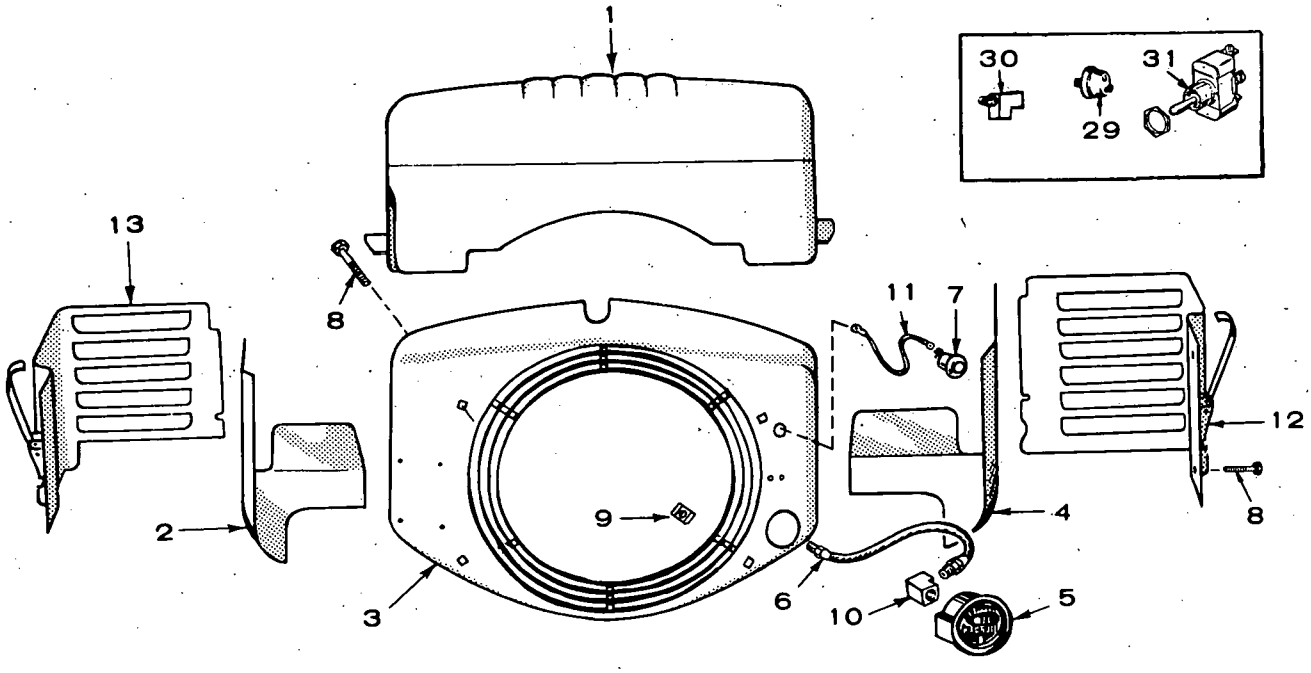
## RESERVOIR (DAY) TANK GROUP (OPTIONAL)




| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| | TANK KIT, RESERVOIR (Day) | | |
| | 159-0591 | 1 | One Quart |
| | 159-0942 | 1 | Two Quart |
| 1 | 142-0356 | 1 | Valve, Fuel, Carburetor Fuel Inlet |
| 2 | 159-0041 | 1 | Cap, Vent |
| 3 | BAND, TANK MOUNTING | | |
| | 159-0556 | 1 | One Quart |
| | 159-0936 | 1 | Two Quart |
| 4 | TANK, RESERVOIR | | |
| | 159-0294 | 1 | One Quart |
| | 159-0746 | 1 | Two Quart |
| 5 | 159-0612 | 1 | Bracket, Reservoir Tank Mounting |
| 6 | 415-0055 | 1 | Bracket, Vent Cap |
| 7 | LINE, FUEL, FLEXIBLE | | |
| | 501-0005 | 1 | 18" Long |
| | 501-0007 | 1 | 24" Long |
| 8 | 504-0086 | 1 | Valve, Shut-off |
| 9 | 505-0057 | 1 | Plug, Tank Drain |
| 10 | 505-0016 | 1 | Bushing, Reducer (3/8 x 1/8") |
| 11 | 505-0028 | 1 | Coupling |
| 12 | 502-0020 | 1 | Elbow, Street (90°) |
| 13 | 502-0024 | 1 | Elbow (90°) |
| 14 | 502-0116 | 1 | Connector |
| 15 | 159-0345 | 1 | Tubing, Copper (5/16" x 12") |
| 16 | 812-0156 | 1 | Screw, Right Hand (1/4-20 x 1-1/2") |
| 17 | 850-0040 | 1 | Washer, Lock (1/4") |
| 18 | 861-0011 | 1 | Nut, Square (1/4-20) |

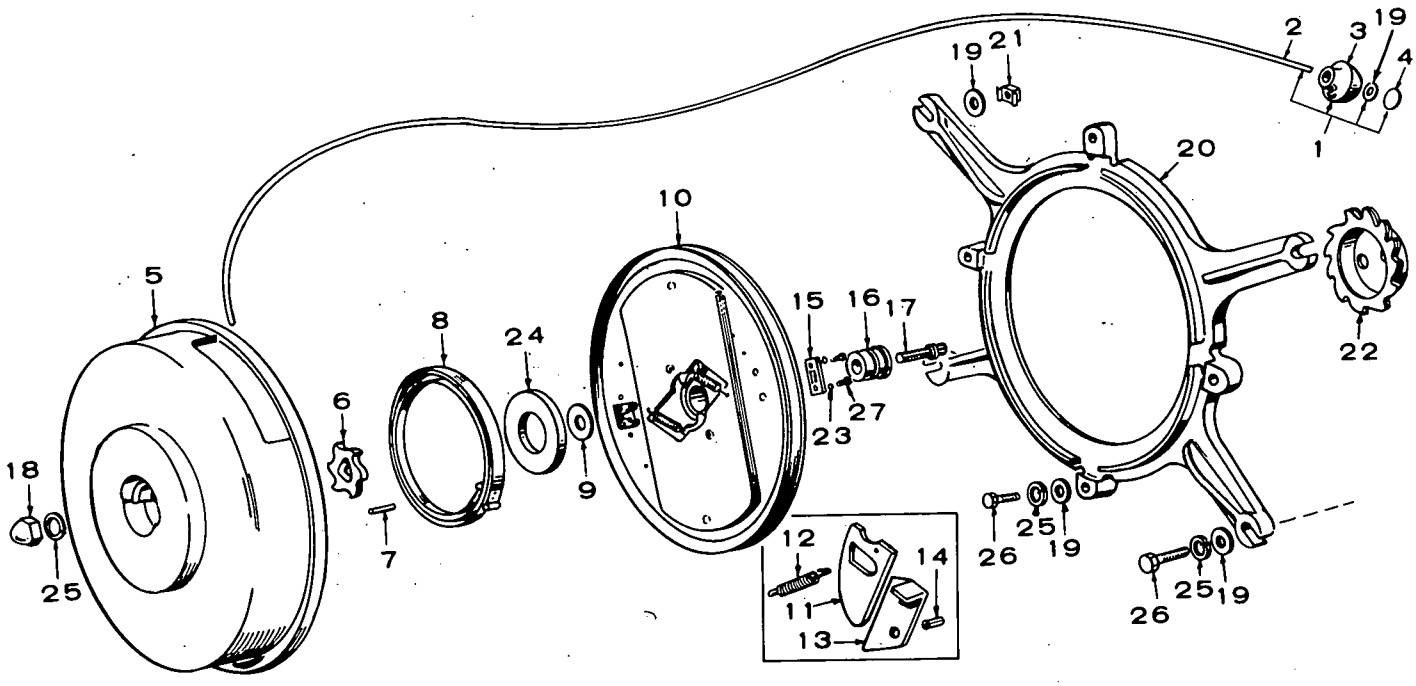
## AIR HOUSING AND OPTIONAL AIR SHUTTER GROUP



| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 405-1013 | 1 | Hood, Engine - Key 1, 4, 6 |
| 2 | 134-0589 | 1 | Housing, Cylinder Air, Left (No. 1 Cylinder) |
| 3 | HOUSING, BLOWER | | |
| | 134-1579 | 1 | Pressure Cooled Sets - Key 1, 4, 6 |
| | 134-1566 | 1 | Pressure Cooled Sets - Key 2, 3, 5, 7 |
| | 134-2015 | 1 | Vacu-Flo Cooled Sets - Key 2, 3, 5, 7 |
| 4 | 134-0588 | 1 | Housing, Cylinder Air - Right (No. 2 Cylinder) |
| 5 | 193-0068 | 1 | Gauge, Oil Pressure |
| 6 | 501-0004 | 1 | Line, Flexible Oil |
| 7 | 313-0018 | 1 | Button, Stop, Key 1, 4, 6 |
| 8 | SCREW, HEX CAP | | |
| | 821-0010 | 3 | Blower Housing Mounting (1/4-20 x 1/2") |
| | 815-0261 | 4 | Cylinder Air Housing Mounting (1/4-20 x 1/2") |
| 9 | NUT, SPEED GRIP | | |
| | 870-0110 | 4 | Key 1, 4, 6 (Readi-Pull Starter Mounting) |
| | 870-0110 | 4 | Vacu-Flo Cooled Sets, Key 2, 3, 5, 7 (Air Scroll Mounting) |
| 10 | 502-0005 | 1 | Elbow, Inverted Female, Oil Gauge |
| 11 | 334-0028 | 1 | Lead, Stop (4 ft. Piece of Bulk Wire) |
| 12 | 134-0662 | 1 | Cover, Cylinder No. 2, Right (**NOTE:** Not used on Vacu-Flo Cooled Sets) |
| 13 | 134-0663 | 1 | Cover, Cylinder No. 1, Left (**NOTE:** Not used on Vacu-Flo Cooled Sets) |
| 14 | 134-0768 | 1 | Scroll, Air (Vacu-Flo Cooled Sets) - Key 2, 3, 5, 7 |
| 15 | 134-0816 | 1 | Shutter Assembly, Discharge Air (Optional on Vacu-Flo Cooled Sets), Key 2, 3, 5, 7 (Includes Parts Marked *) |
| 16 | 134-0815 | 1 | *Scroll, Air Duct (With Provision for Air Shutter) |
| 17 | 134-0661 | 1 | *Plate, Vernatherm Element Mounting |
| 18 | 134-0660 | 1 | *Bracket, Vernatherm Element |
| 19 | 134-0656 | 1 | *Spring, Vernatherm Element |
| 20 | 309-0085 | 1 | *Element, Vernatherm |
| 21 | 134-0658 | 1 | *Spring, Shutter |
| 22 | 134-0655 | 1 | *Shutter, Circulated Air Control |
| 23 | 518-0074 | 1 | *Ring, Extension Retainer, Shutter Shaft |
| 24 | 526-0102 | 1 | *Washer (Large), Shutter Spacing |
| 25 | 526-0016 | 3 | *Washer (Small), Shutter Spacing |
| 26 | 309-0002 | 1 | *Switch, Hi-Temperature Cut-Off |
| 27 | 508-0031 | 1 | *Grommet, Rubber |
| 28 | 336-1061 | 1 | *Lead, Hi-Temperature Cut-Off Switch |
| 29 | 309-0010 | 1 | Switch, Low Oil Pressure (Optional) |
| 30 | 502-0058 | 1 | Tee, Oil Line (Optional) |
| 31 | 308-0097 | 1 | Switch, Momentary Contact |
| 32 | 517-0021 | 1 | Plug, Dot Button (7/8" Hole), Key 2, 3, 5, 7 |
| | 405-1059 | 1 | Canvass - Anti-Vibration (3-1/4 x 10) Vacu-Flo Cooled Sets |

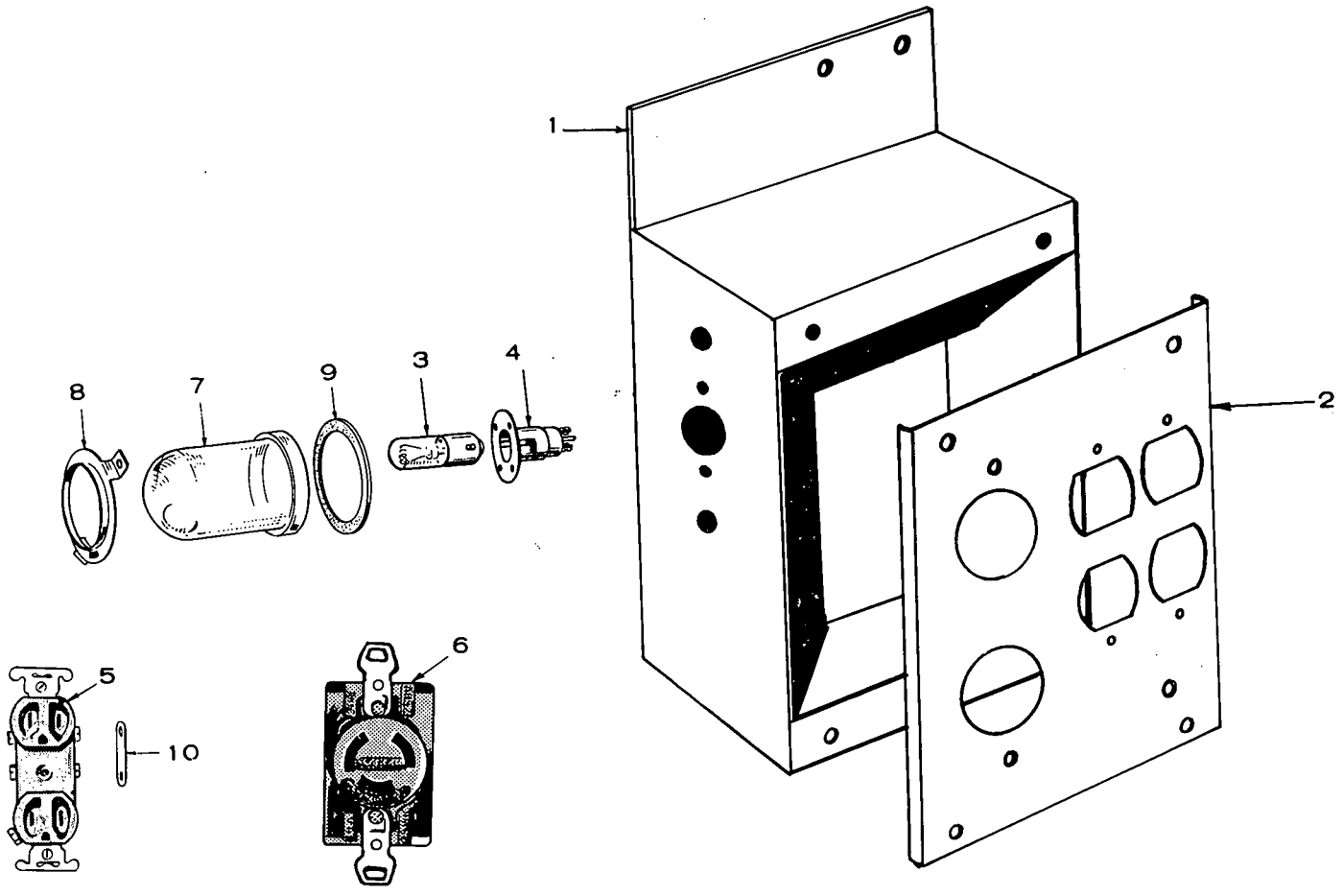
* - Parts contained in Shutter Assembly.




## READI-PULL STARTER GROUP—KEY 1, 4, 6

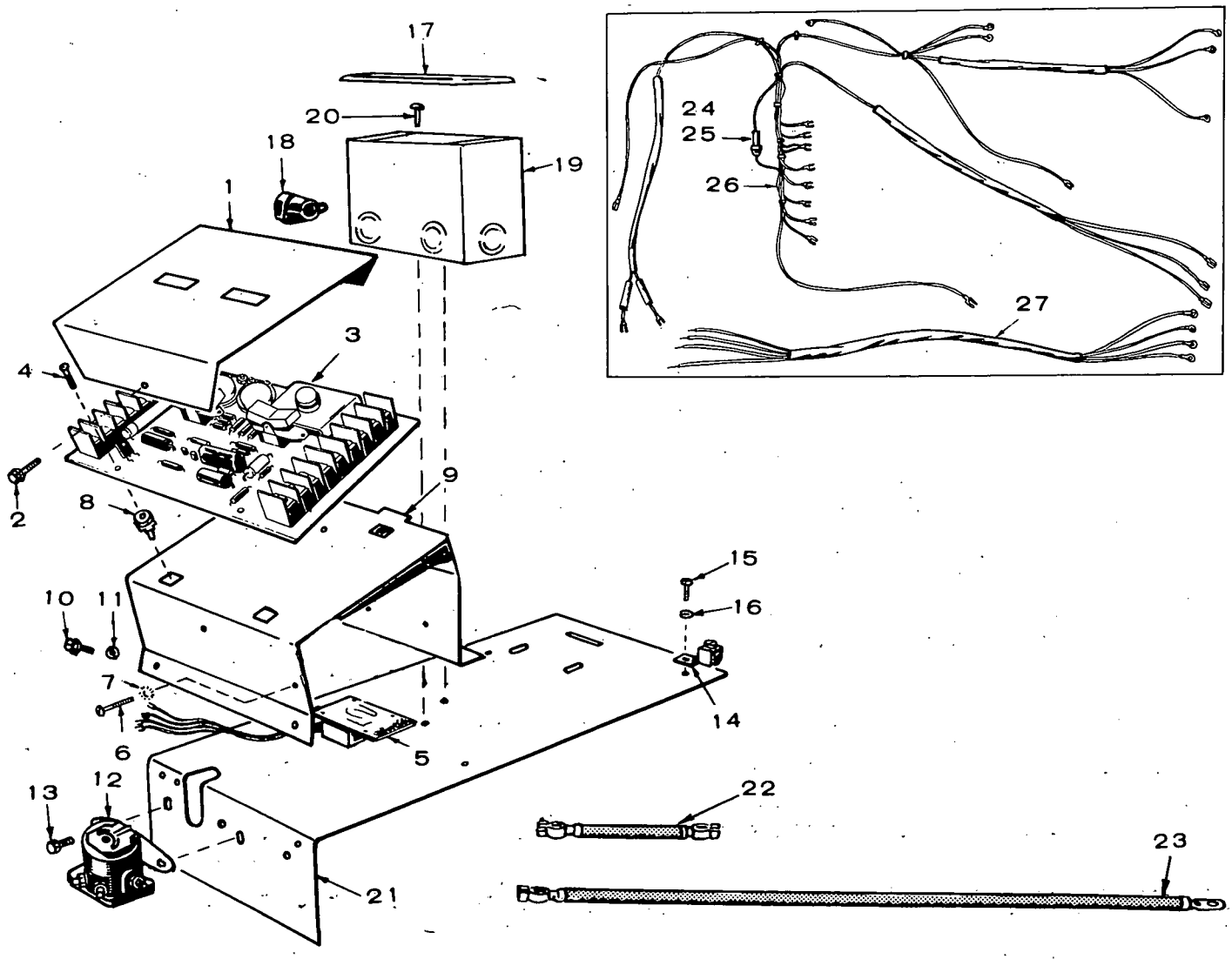
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| | 192-0325 | 1 | Starter Kit, Complete - Includes Mounting Ring and Ratchet Wheel |
| 1 | 192-0045 | 1 | Rope & Grip Assembly |
| 2 | 192-0043 | 1 | Rope, Starter, Less Grip (83") |
| 3 | 192-0044 | 1 | Grip, Starter Rope - Rubber |
| 4 | 517-0025 | 1 | Plug, Starter Rope Grip |
| 5 | 192-0152 | 1 | Cover, Starter |
| 6 | 192-0153 | 1 | Wheel, Cog-Anti-Backlash |
| 7 | 516-0138 | 1 | Pin (3/16 x 5/8") Recoil Spring |
| 8 | 192-0039 | 1 | Spring, Recoil |
| 9 | 526-0123 | 1 | Washer, Thrust (Sheave Bushing to Cover) |
| 10 | 192-0180 | 1 | Sheave, Rope (Includes Parts Marked *) |
| 11 | 192-0172 | 1 | *Pawl |
| 12 | 192-0165 | 2 | *Spring, Pawl |
| 13 | 192-0168 | 2 | *Arm, Ratchet |
| 14 | 516-0110 | 4 | *Pin, Roll (5/16 x 1/2") - (2) Ratchet Arm, (2) Pawl |
| 15 | 192-0167 | 1 | *Clamp, Rope |
| 16 | 192-0163 | 1 | Bearing, Sheave Hub (Bronze) |
| 17 | 192-0323 | 1 | Capscrew (3/8-16 x 1-1/2") |
| 18 | 862-0003 | 1 | Nut, Bushing to Cover Screw |
| 19 | WASHER, FLAT | | |
| | 526-0180 | 4 | Starter to Mounting Ring |
| | 526-0169 | 1 | Starter Rope Grip |
| | 526-0130 | 4 | Starter Ring to Blower Housing (1/8" Thick) |
| 20 | 192-0186 | 1 | Ring, Starter to Blower Housing Mounting |
| 21 | 870-0110 | 4 | Nut, Grip, Starter Ring to Blower Housing |
| 22 | 192-0309 | 1 | Wheel, Ratchet |
| 23 | 526-0015 | 2 | *Washer, Flat - Rope Clamp Mounting |
| 24 | 526-0168 | 1 | Washer, Recoil Spring Retainer |
| 25 | WASHER, LOCK | | |
| | 850-0050 | 1 | Cover Nut |
| | 850-0040 | 4 | Starter Ring to Blower Housing |
| | 850-0040 | 4 | Starter to Mounting Ring |
| 26 | SCREW, HEX CAP | | |
| | 800-0007 | 4 | Starter Ring to Blower Housing |
| | 815-0137 | 4 | Starter to Mounting Ring |
| 27 | 815-0137 | 2 | *Screw, Hex Cap - Rope Clamp Mounting |

* - Included in 192-0180 Rope Sheave Assembly.



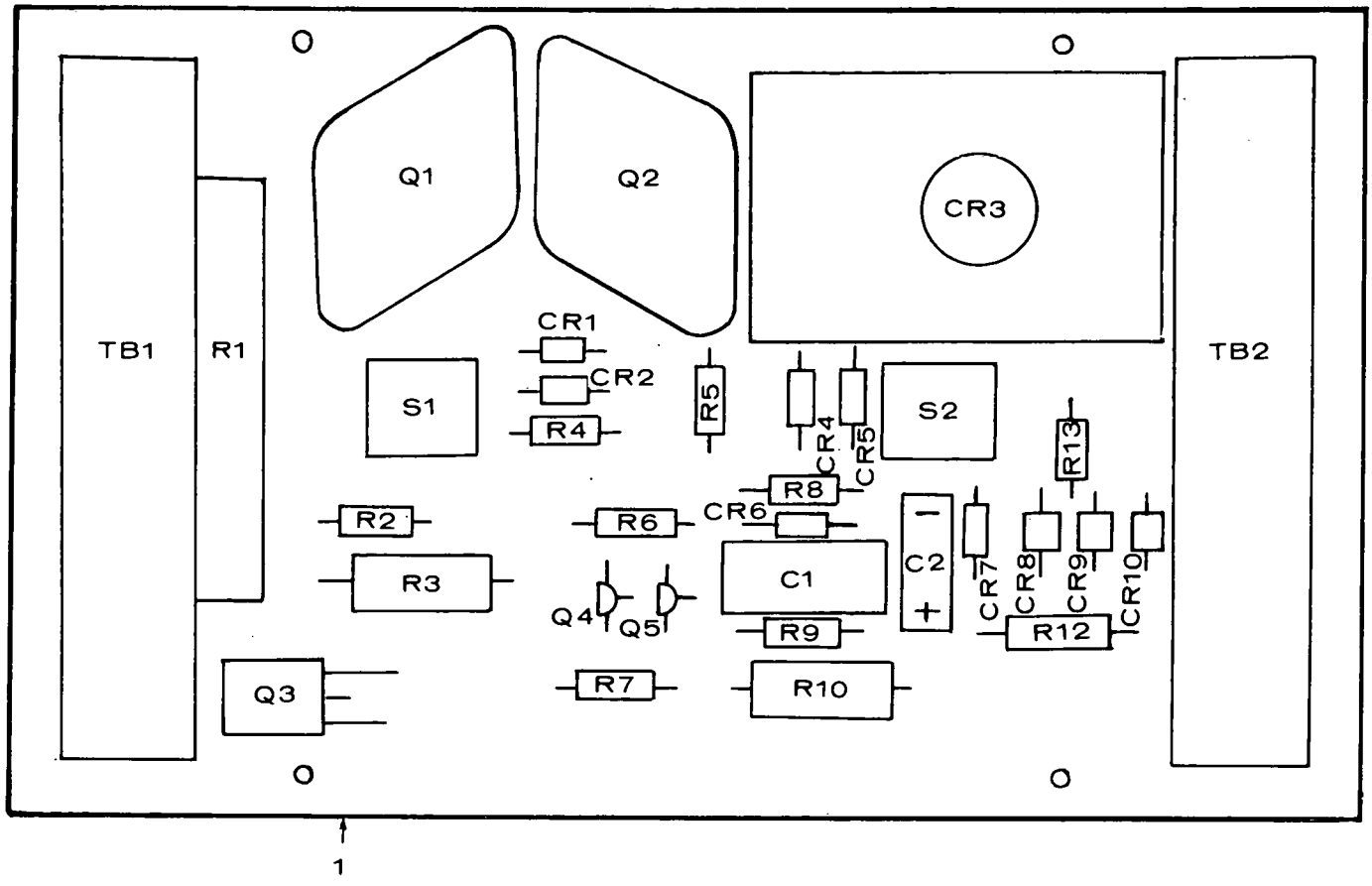

## CONTROL GROUP—KEY 1, 4, 6

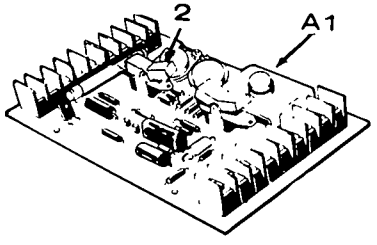
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 301-3573 | 1 | Box, Receptacle |
| 2 | 301-3574 | 1 | Panel, Receptacle Box |
| 3 | 322-0011 | 1 | Lamp, Receptacle Pilot Light |
| 4 | 322-0021 | 1 | Receptacle, Pilot Light |
| 5 | 323-0184 | 2 | Receptacle, Duplex |
| 6 | 323-0855 | 2 | Receptacle, Twistlock |
| 7 | 149-0234 | 1 | Guard, Pilot Light |
| 8 | 301-1902 | 1 | Clamp, Guard |
| 9 | 149-0156 | 1 | Gasket, Pilot Light Guard |
| 10 | 306-0003 | 2 | Jumper |




## CONTROL GROUP—KEY 2, 3, 5, 7

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 301-3484 | 1 | Cover, Control |
| 2 | 815-0350 | 3 | Screw, Hex Head, Self-Tapping (10-32 x 3/8") |
| 3 | 300-0859 | 1 | Control Assembly (See Separate Group for Components) |
| 4 | 815-0365 | 4 | Screw, Sheet Metal (No. 8 x 3/4") |
| 5 | 300-0935 | 1 | Adapter, Start Control |
| 6 | 812-0077 | 2 | Screw, Round Head (8-32 x 3/8") |
| 7 | 853-0005 | 2 | Lockwasher (No. 8) |
| 8 | 870-0263 | 4 | Nut, Insulator |
| 9 | 301-3481 | 1 | Bracket, Control Mounting |
| 10 | 815-0350 | 4 | Screw, Hex Head, Self-Tapping (10-32 x 3/8") |
| 11 | 856-0003 | 4 | Lockwasher (No. 10) |
| 12 | 307-1166 | 1 | Solenoid, Start |
| 13 | 821-0009 | 1 | Screw, Hex Head (1/4-20 x 3/8") |
| 14 | 332-0142 | 1 | Terminal, Lug |
| 15 | 821-0010 | 1 | Screw, Hex Head (1/4-20 x 1/4") |
| 16 | 856-0006 | 1 | Lockwasher (1/4) |
| 17 | 330-0004 | 1 | Cover, Outlet Box |
| 18 | 508-0179 | 1 | Grommet, Outlet Box |
| 19 | 330-0074 | 1 | Box, Outlet |
| 20 | 815-0350 | 2 | Screw, Sheet Metal (No. 8 x 3/4") |
| 21 | 301-3560 | 1 | Panel, Control Mounting |
| 22 | 416-0004 | 1 | Cable, Jumper, Battery |
| 23 | 416-0077 | 2 | Cable, Battery (28") |
| 24 | 321-0194 | 1 | Fuse, 9 Amperes |
| 25 | 321-0193 | 1 | Fuse Holder |
| 26 | 338-0682 | 1 | Wiring Harness, Engine Control |
| 27 | 338-0680 | 1 | Wiring Harness, Start Adapter Control |



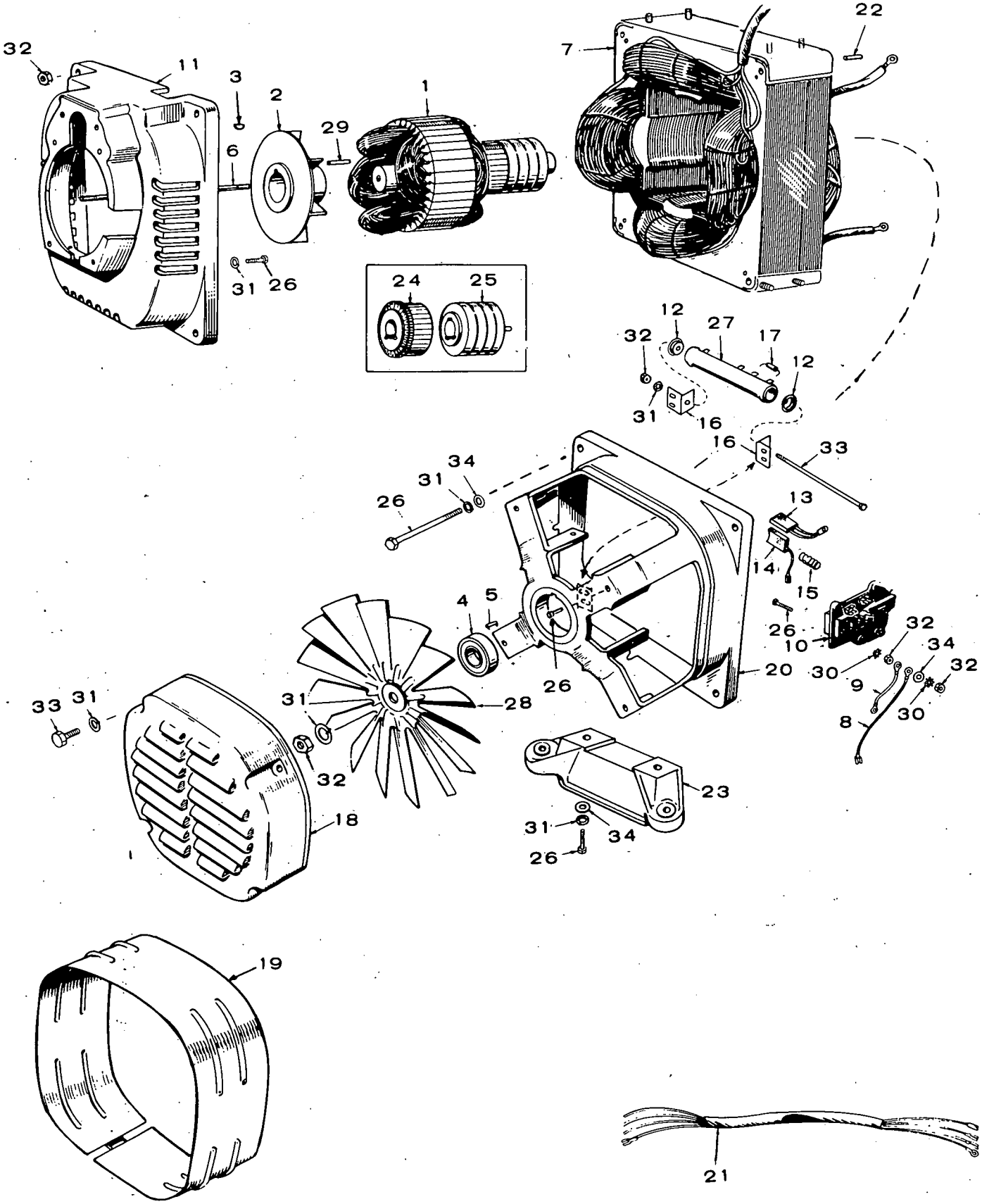




## CONTROL ASSEMBLY GROUP 300-0859

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| A1 | 300-0859 | 1 | Control Assembly |
| A1C1 | 355-0026 | 1 | Capacitor, .47 Mfd. |
| A1C2 | 356-0046 | 1 | Capacitor, Electrolytic - 5 Mfd. |
| A1CR1 | 357-0013 | 1 | Rectifier |
| A1CR2 | 357-0013 | 1 | Rectifier |
| A1CR3 | 358-0054 | 1 | Diode and Heat Sink |
| A1CR4 | 357-0004 | 1 | Rectifier |
| A1CR5 | 357-0004 | 1 | Rectifier |
| A1CR6 | 357-0004 | 1 | Rectifier |
| A1CR7 | 359-0026 | 1 | Diode |
| A1CR8 | 357-0017 | 1 | Rectifier |
| A1CR9 | 357-0017 | 1 | Rectifier |
| A1CR10 | 357-0013 | 1 | Rectifier |
| A1Q1 | 362-0018 | 1 | Transistor |
| A1Q2 | 362-0033 | 1 | Transistor |
| A1Q3 | 362-0028 | 1 | Transistor |
| A1Q4 | 362-0011 | 1 | Transistor |
| A1Q5 | 362-0011 | 1 | Transistor |

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| A1R1 | 353-0043 | 1 | Resistor - 35-Ohm, 10 Watt |
| A1R2 | 350-0437 | 1 | Resistor - 120K-Ohm, 1/2 W, 5% |
| A1R3 | 350-0977 | 1 | Resistor - 390-Ohm, 2 W, 5% |
| A1R4 | 350-0427 | 1 | Resistor - 47K-Ohm, 1/2 W, 5% |
| A1R5 | 350-0404 | 1 | Resistor - 5.1K-Ohm, 1/2 W, 5% |
| A1R6 | 350-0315 | 1 | Resistor - 1-Ohm, 1/2 W, 5% |
| A1R7 | 350-0355 | 1 | Resistor - 47-Ohm, 1/2 W, 5% |
| A1R8 | 350-0379 | 1 | Resistor - 470-Ohm, 1/2 W, 5% |
| A1R9 | 350-0530 | 1 | Resistor - 330-Ohm, 1/2 W, 5% |
| A1R10 | 350-0983 | 1 | Resistor - 680-Ohm, 2 W, 5% |
| A1R12 | 350-0673 | 1 | Resistor - 270-Ohm, 1 W, 5% |
| A1R13 | 350-0404 | 1 | Resistor - 5.1K-Ohm, 1/2 W, 5% |
| A1S1 | 308-0323 | 1 | Switch - Double Pole, Double Throw |
| A1S2 | 308-0320 | 1 | Switch - Double Pole, Double Throw |
| A1TB1 | 332-1450 | 1 | Terminal Block |
| A1TB2 | 332-1450 | 1 | Terminal Block |
| 1 | 332-1454 | 1 | Printed Wiring Board |
| 2 | 308-0378 | 1 | Rocker and Spring (Replaceable part of switch A1S1) |

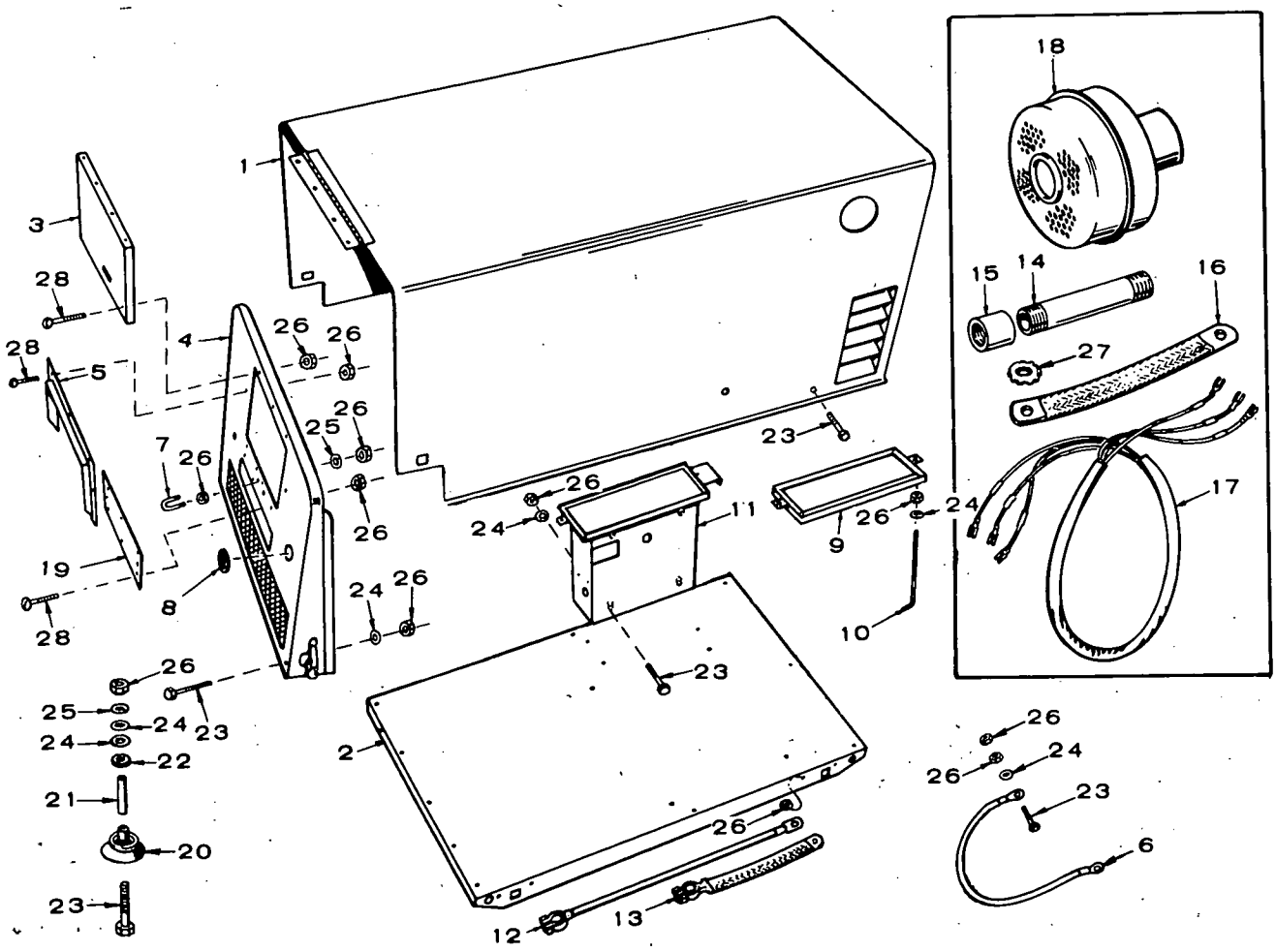
## GENERATOR GROUP



| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | * | 1 | Rotor Assembly, Wound |
| 2 | 232-2316 | 1 | Hub, Drive |
| 3 | 515-0006 | 1 | Key, Rotor to Crankshaft |
| 4 | 510-0047 | 1 | Bearing (Ball), Rotor |
| 5 | 232-0596 | 1 | Clip, Bearing Stop |
| 6 | STUD, ROTOR THROUGH | | |
| | 520-0732 | 1 | Key 1, 2, 4, 5 |
| | 520-0733 | 1 | Key 3, 6, 7 |
| 7 | * | 1 | Stator Assembly, Wound |
| 8 | LEAD ASSEMBLY, BRUSH | | |
| | 336-1891 | 4 | Blade Type Terminals (9") |
| | 336-1890 | 4 | Blade Type and Round Type Terminal (4") |
| 9 | 336-0186 | 3 | Jumper, Ground (3-1/2") |
| 10 | BLOCK ASSEMBLY, BRUSH (Includes Parts Marked †) | | |
| | 212-0352 | 1 | Lower |
| | 212-0345 | 1 | Right |
| | 212-0346 | 1 | Upper |
| | 212-0353 | 1 | Left |
| 11 | 231-0164 | 1 | Adapter, Generator to Engine |
| 12 | 304-0015 | 2 | Washer, Centering Resistor |
| 13 | 214-0095 | 4 | †Brush, Commutator |
| 14 | 214-0096 | 8 | †Brush, Collector |
| 15 | 212-1232 | 12 | †Spring, Brush |
| 16 | 304-0706 | 2 | Bracket, Resistor Mounting |
| 17 | 357-0020 | 1 | Diode |
| 18 | 232-2107 | 1 | Cover, Generator Fan |
| 19 | 234-0362 | 1 | Wrapper, End Bell |
| 20 | 211-0187 | 1 | Bell, End |
| 21 | WIRING HARNESS | | |
| | 338-0642 | 1 | Single Phase |
| | 338-0643 | 1 | Three Phase |
| 22 | 516-0182 | 8 | Pin, Roll - Generator Frame (1/4 x 3/4") |
| 23 | 232-2321 | 1 | Support, Generator |
| 24 | COMMUTATOR | | |
| | 203-0153 | 1 | Key 1, 2, 4, 5 |
| | 203-0152 | 1 | Key 3, 6, 7 |
| 25 | 204-0110 | 1 | Collector Ring |
| 26 | SCREW, HEX CAP | | |
| | 800-0051 | 2 | Generator Support Mounting |
| | 800-0050 | 4 | Generator Adapter Mounting (3/8-16 x 1-1/4") |
| | 800-0043 | 4 | Generator Through - Key 1, 2 4, 5 |
| | 800-0044 | 4 | Generator Through - Key 3, 6, 7 |
| | 815-0359 | 17 | Brush Block Mounting, Grounding, and Resistor Bracket Mounting (Includes Shakeproof Washer) |
| | 815-0341 | 4 | Brush Block Terminal - Brass |
| 27 | 353-0047 | 1 | Resistor, Tapped |
| 28 | 205-0090 | 1 | Fan, Generator |
| 29 | 515-0007 | 1 | Key, Drive Hub |
| 30 | 853-0008 | 8 | Washer, Shakeproof - Brush Block Terminal |
| 31 | WASHER, LOCK | | |
| | 850-0050 | 2 | Generator Support Mounting |
| | 850-0055 | 1 | Fan Mounting |
| | 850-0040 | 4 | Fan Cover Mounting |
| | 850-0050 | 5 | Generator Adapter Mounting |
| | 850-0045 | 4 | Generator Through Screw |
| | 850-0030 | 1 | Resistor Mounting |
| 32 | NUT, HEX | | |
| | 867-0004 | 1 | Fan Mounting |
| | 860-0011 | 1 | Resistor Mounting |
| | 862-0015 | 4 | Generator Through Screw |
| | 871-0010 | 8 | Brush Block Terminal |
| 33 | SCREW, ROUND HEAD | | |
| | 812-0156 | 4 | Fan Cover Mounting |
| | 812-0118 | 1 | Resistor Mounting |
| 34 | WASHER, FLAT | | |
| | 526-0030 | 2 | Generator Support Mounting |
| | 526-0115 | 4 | Generator Through Screw |
| | 526-0049 | 4 | Brush Block Terminal |

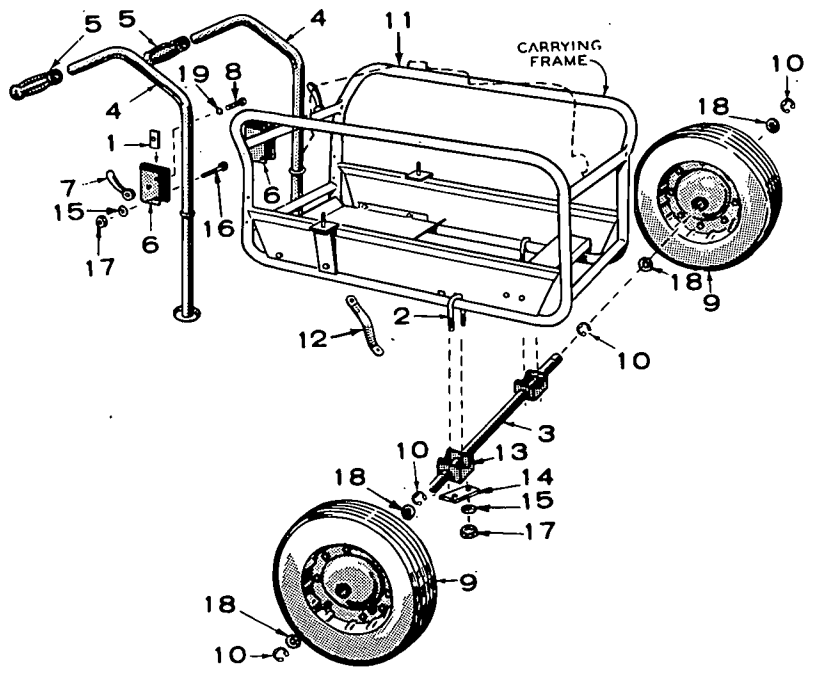
* - Order by description, giving complete Model, Spec and Serial Number from nameplate.

† - Contained in the Brush Block Assembly.



## HOUSING GROUP—(OPTIONAL EQUIPMENT)

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 405-1001 | 1 | Cover, Hinged - Sides & Top |
| 2 | 403-0358 | 1 | Skid, Mounting |
| 3 | 301-1378 | 1 | Cover, Instrument Cover |
| 4 | 405-1000 | 1 | Panel, Housing - Rear |
| 5 | 405-1035 | 1 | Shield, Rain |
| 6 | 405-1134 | 2 | Rope, Door Stop |
| 7 | 405-0992 | 1 | Bolt, U |
| 8 | 508-0001 | 1 | Grommet, Rubber (For 1-1/16" Hole) |
| 9 | 416-0612 | 1 | Frame, Battery Holddown |
| 10 | 416-0541 | 2 | Stud, Battery Holddown |
| 11 | 416-0838 | 1 | Tray, Battery Mounting |
| 12 | 416-0014 | 1 | Cable, Battery (15") Negative |
| 13 | 416-0007 | 1 | Cable, Battery (9") Positive |
| 14 | 505-0210 | 1 | Nipple, Oil Drain (1/2 x 2") |
| 15 | 505-0014 | 1 | Coupling, Oil Drain (1/2") |
| 16 | 337-0091 | 1 | Strap, Bond - Grounding |
| 17 | 338-0520 | 1 | Harness, Start-Stop Switch |
| 18 | 155-0522 | 1 | Muffler, Exhaust |
| 19 | 301-1386 | 1 | Panel, Blank (Receptacle) |
| 20 | 402-0283 | 4 | Cushion, Vibration |
| 21 | 402-0290 | 4 | Bushing, Vibration Mounting |
| 22 | 402-0282 | 4 | Snubber, Shock Mounting |
| 23 | SCREW, HEX CAP | | |
| | 800-0082 | 4 | Vibration Mounting (7/16-14 x 3-3/4") |
| | 800-0026 | 12 | Housing Mounting (5/16-18 x 3/4") |
| | 800-0005 | 2 | Door Stop Cord (1/4-20 x 3/4") |
| 24 | WASHER, FLAT | | |
| | 526-0198 | As Req. | Vibration Mounting (1/16" Thick) |
| | 526-0014 | 4 | Vibration Mounting (1/8" Thick) |
| | 526-0115 | 9 | Housing Mounting |
| | 526-0130 | 2 | Door Stop Cord |
| 25 | WASHER, LOCK | | |
| | 850-0055 | 4 | Vibration Mounting (7/16") |
| | 850-0040 | 2 | U Bolt Mounting (1/4") |
| 26 | NUT, HEX | | |
| | 862-0004 | 4 | Vibration Mounting (7/16-14) |
| | 870-0257 | 14 | Housing Mounting - Self Locking (5/16-18) |
| | 870-0212 | 2 | Door Stop Cord - Self Locking (1/4-20) |
| | 870-0065 | 2 | Door Stop Cord - Huglock (1/4-20) |
| | 870-0131 | 20 | Panel Mounting |
| | 862-0001 | 4 | U Bolt Mounting |
| 27 | 856-0012 | 2 | Lockwasher (7/16) - Ground Strap |
| 28 | 813-0098 | 20 | Screw, Round Head - Panel Mounting (10-32 x 3/8") |




## CARRYING FRAME AND DOLLY GROUP—(OPTIONAL EQUIPMENT)

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| | 410-0235 | 1 | Dolly Assembly, Complete |
| 1 | 410-0238 | 2 | Lock, Handle |
| 2 | 410-0148 | 2 | Bolt, "U" |
| 3 | 410-0233 | 1 | Axle, Dolly |
| 4 | 410-0147 | 2 | Handle, Dolly |
| 5 | 403-0205 | 2 | Grip, Handle |
| 6 | 410-0179 | 2 | Channels, "U" |
| 7 | 406-0062 | 2 | Nut, Handle |
| 8 | 800-0052 | 2 | Bolt, Wedge |
| 9 | 410-0236 | 2 | Wheel & Tire Assembly (16 x 4.00) |
| 10 | 518-0130 | 4 | Ring, "E" Retaining, Wheel to Axle |
| 11 | 403-1015 | 1 | Frame, Carrying - Standard for Key 1, 4, 6 |
| 12 | 337-0050 | 1 | Strap, Ground - Standard |
| 13 | 410-0283 | 2 | Support, Axle |
| 14 | 410-0284 | 2 | Plate, Axle Support |
| 15 | WASHER, LOCK | | |
| | 850-0050 | 4 | Axle Mounting (3/8") |
| | 850-0045 | 4 | Channel Mounting (5/16") |
| 16 | 800-0032 | 4 | Screw, Hex Cap - Channel Mounting (5/16-18 x 1-3/4") |
| 17 | NUT, HEX | | |
| | 860-0017 | 4 | Axle Mounting (3/8-16) |
| | 860-0015 | 4 | Channel Mounting (5/16-18) |
| 18 | 526-0081 | 4 | Washer, Flat - Wheel Mounting |
| 19 | 854-0020 | 2 | Lockwasher - Handle (3/8) |

### SERVICE KITS AND MISCELLANEOUS

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| | 98-1100 | 1 | Decal Kit |
| | 160-0836 | 1 | Ignition Tune-up Kit |
| | 168-0103 | 1 | Gasket Kit, Plant |
| | 168-0095 | 1 | Carbon Removal Gasket Kit |
| | 412-0028 | 1 | Cover, Canvas |
| | 522-0164 | 1 | Overhaul Kit |
| | 525-0305 | 1 | Paint, Touch-up (Pressurized 13 oz. can) Non-Metallic Green Enamel |

**NOTE:** For other Kits, refer to the Group for the part in question.

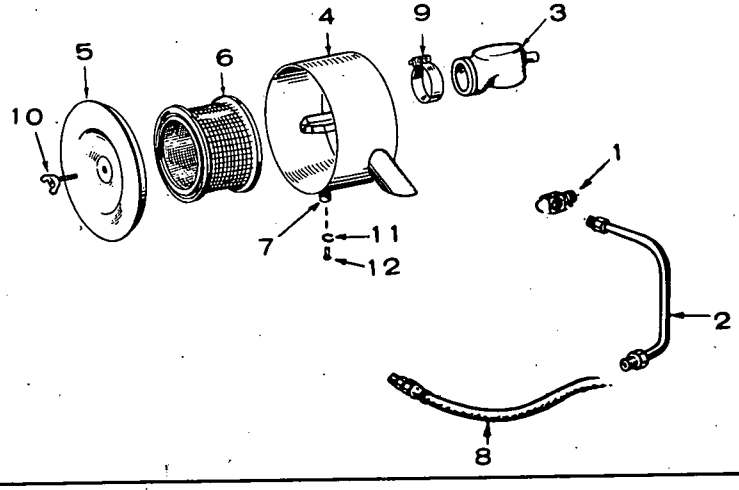
# SPECIAL PARTS SECTION

## FOR 4.0CCK-3CE/ & 5.0CCK-3CE/ CONTRACTORS MODELS

Parts not listed in this section, refer to the standard parts groups. Use Key 4 for 4.0CCK and Key 6 for 5.0CCK.

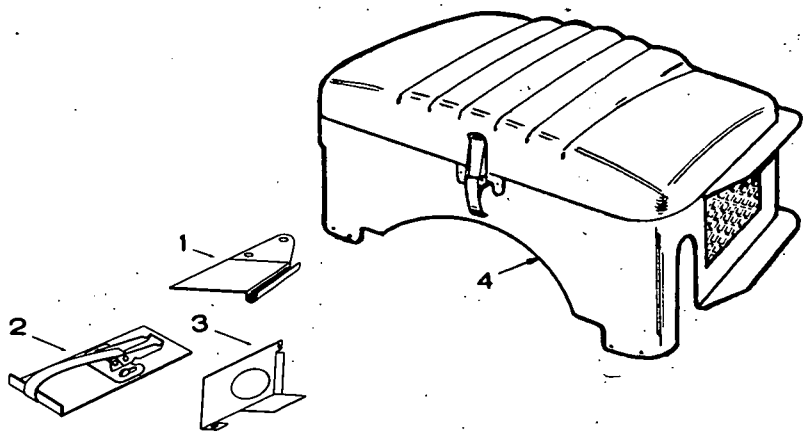
## FUEL SYSTEM GROUP

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 502-0138 | 1 | Elbow, Fuel Pump Inlet |
| 2 | 149-0775 | 1 | Line, Fuel |
| 3 | 145-0094 | 1 | Inlet, Carburetor Air |
| 4 | 140-0537 | 1 | Housing, Air Cleaner |
| 5 | 140-0538 | 1 | Cover, Air Cleaner |
| 6 | 140-0495 | 1 | Cartridge, Air Cleaner |
| 7 | 140-0596 | 1 | Spacer, Air Cleaner Mounting Screw |
| 8 | 501-0153 | 1 | Line, Fuel (Pump to Filter) |
| 9 | 503-0280 | 1 | Clamp, Air Inlet to Cleaner |
| 10 | 518-0056 | 1 | Wingscrew |
| 11 | 856-0003 | 1 | Lockwasher (No. 10) |
| 12 | 808-0032 | 1 | Screw, Sheet Metal (No. 10 x 1/2") |



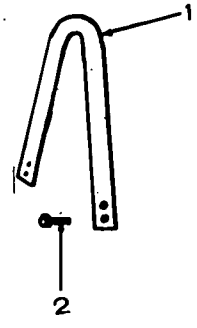

## AIR HOUSING AND OPTIONAL AIR SHUTTER GROUP

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 405-1663 | 1 | Support, Hood |
| 2 | 134-1469 | 2 | Fastener, Hood |
| 3 | 134-1144 | 1 | Baffle, Fuel Pump Air |
| 4 | 405-1662 | 1 | Hood, Engine |




## GENERATOR GROUP

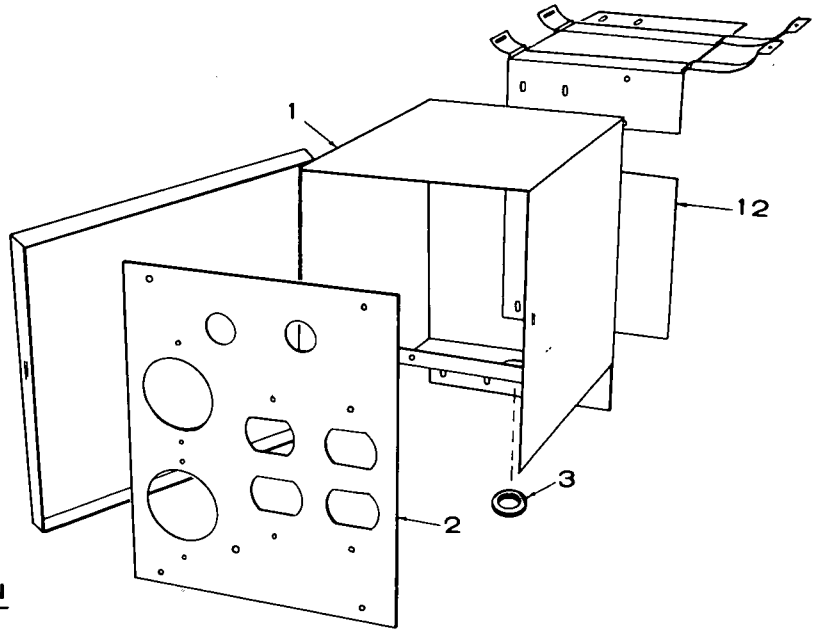
| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 403-0934 | 1 | Bracket, Lifting |
| 2 | 821-0020 | 4 | Screw, Self-Locking (5/16-18 x 7/8") Lifting Bracket Mounting |



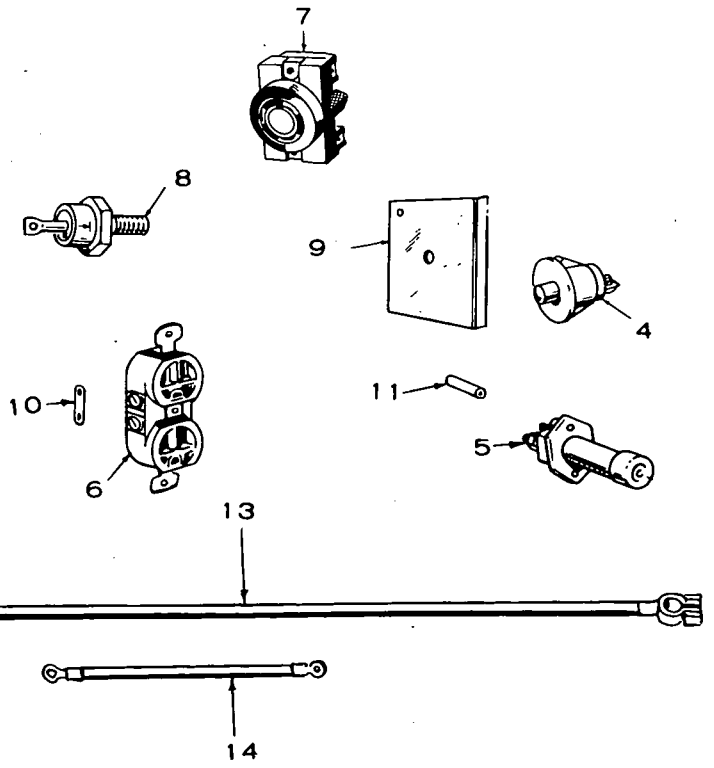
## HOUSING GROUP—OPTIONAL EQUIPMENT

| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 337-0085 | 1 | Strap, Bond - Grounding |


## CONTROL GROUP




| REF. NO. | PART NO. | QTY. USED | PART DESCRIPTION |
|---|---|---|---|
| 1 | 301-3576 | 1 | Control Box |
| 2 | 301-3577 | 1 | Panel, Control |
| 3 | 508-0008 | 1 | Grommet, Rubber |
| 4 | 313-0018 | 1 | Switch, Stop |
| 5 | 308-0028 | 1 | Switch, Start |
| 6 | 323-0184 | 2 | Receptacle, Duplex - 120 Volt |
| 7 | 323-0855 | 2 | Receptacle, Duplex - 240 Volt |
| 8 | 305-0235 | 1 | Rectifier |
| 9 | 305-0254 | 1 | Bracket, Rectifier |
| 10 | 306-0003 | 2 | Jumper |
| 11 | 301-3591 | 1 | Spacer, Switch Mounting |
| 12 | 301-3571 | 1 | Bracket, Control Box Mounting |
| 13 | 416-0021 | 1 | Cable, Battery (21") |
| 14 | 416-0657 | 1 | Cable, Battery (7-1/2") B+ Start Solenoid |



# CUSTOMER SERVICES

**OWNER'S WARRANTY SERVICE - ENGINE DRIVEN ELECTRIC GENERATOR SETS, SEPARATE GENERATORS, INDUSTRIAL ENGINES**

## QUALITY OF PRODUCT

Onan products are engineered and designed to perform as stated on product nameplate and published specification. With proper installation and operation, regular maintenance and periodic repair service, the equipment will provide reliable service.

## GENERAL WARRANTY PRACTICES

All Onan-manufactured engine-driven electric generator sets, separate generators, and industrial engines are sold with a full one-year warranty. This warranty is issued only to the original user and promises satisfactory performance of the product when properly installed, serviced, and operated under normal conditions, according to the manufacturer's instructions. The text of the Onan published warranty appears in the Onan Operator's Manual sent with the product.

**Warranty Registration:** A Warranty Registration card accompanies each Onan Product. This card must be properly filled out and returned to the Onan Factory in order to qualify for warranty consideration as covered in this bulletin. When requesting warranty repair work you must provide the purchase date, Onan model, and serial number of the equipment.

**Warranty Authorization:** Warranty service must be performed by Onan Factory or Onan Authorized Distributors or their Approved and Registered Service Dealers. A complete listing of these Onan Authorized Parts and Service Centers is provided in our brochure F-115, a copy of which is supplied with each Onan Product. These Onan Authorized Service Centers have trained service personnel, parts stock, and the necessary facilities and tools for the service and repair of Onan equipment.

**Material Allowances:** Onan will allow credit or furnish free of charge to the Onan Authorized Service Station or his Approved Service Dealer, all genuine Onan parts used in a warranty repair of these products which fail to perform as warranted.

**Labor Allowance:** Onan will allow warranty repair credit to the Onan Authorized Parts and Service Center and his Approved Dealer at straight time labor when the cause of failure is determined to be defective material or factory workmanship. This labor allowance will be based on the factory's standard time schedule of published flat rate labor allowances, or, otherwise a time judged reasonable by the factory. Repair work not covered by warranty will be charged to the owner. The Onan's Warranty practice does not provide for allowance of expenses such as start-up charges, communication charges, transportation charges, travel time and/or mileage, unit removal or installation expense, cost of fuel, oil, normal maintenance adjustments, tune-up adjustments or parts maintenance items, and does not cover incidental or consequential damages.

**Administration:** Warranty of Onan Products is administered through Onan Authorized Distributors in whose territory the equipment is located. These Distributors and their Approved or Registered Onan Service Dealers are authorized to make settlement of all customer warranty claims within the limits of the manufacturer's warranty policy as described herein.

Onan reserves the right to change warranty practices without prior notice.

## MAINTENANCE

A Planned Preventive Maintenance Program is extremely important if you are to receive efficient operation and long service life from your Onan unit. Neglecting routine maintenance can result in premature failure or permanent damage to your equipment. The Onan Operator's Manual sent with the product contains recommended maintenance schedules and procedures.

Maintenance is divided into two categories:

1. Operator Maintenance . . . . . performed by the operator.
2. Critical Maintenance . . . . . performed only by qualified service personnel.

Regular maintenance will help you avoid sudden and costly repairs in the future. Adequate evidence of this scheduled maintenance must be offered when applying for a warranty claim.

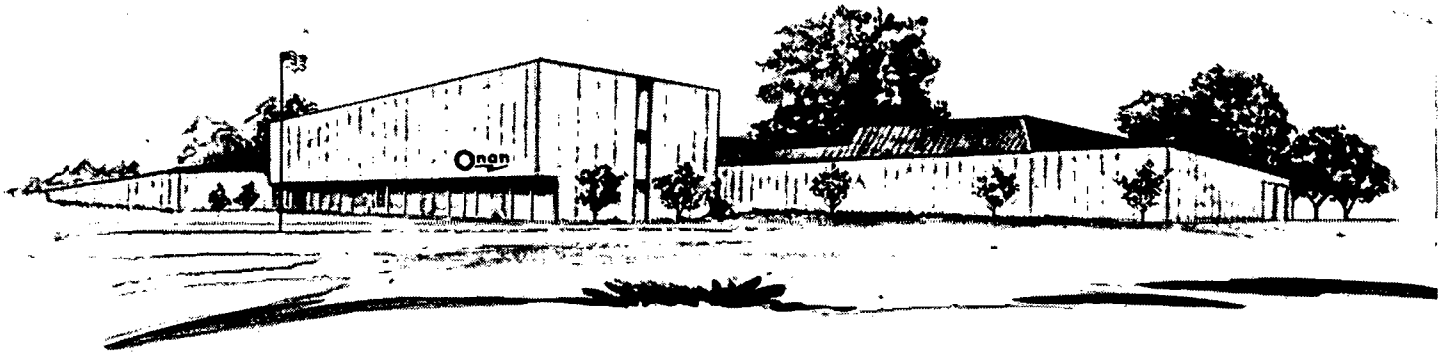
## INSTALLATION

Installation is extremely important and all Onan Products should be installed in accordance with the manufacturer's recommendations. If the owner experiences any difficulty with such items as mounting, ventilation, exhaust location, fuel lines, wiring, etc., he should immediately contact the company from whom he purchased the equipment so that corrective action can be taken. Although the Onan Authorized Distributor and his Approved or Registered Service Dealers may be able to remedy certain installation difficulties, such repair work is not considered Onan warranty and there will be a charge for this service.

Onan

Minneapolis, Minnesota 55432

MSS-22B
Replaces 23B054 and MSS-22A
Rev. 7-2-73

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