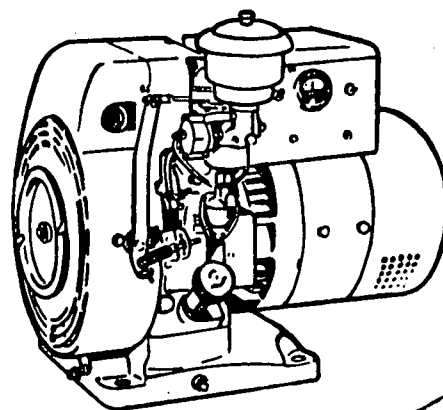


OPERATORS MANUAL AND PARTS CATALOG

FOR
ELECTRIC GENERATING SETS

LK
SERIES

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INTRODUCTION

THIS OPERATOR'S MANUAL CONTAINS INFORMATION PERTAINING TO THE INSTALLATION, OPERATION, AND MAINTENANCE OF YOUR ONAN UNIT. A PARTS CATALOG IS ALSO INCLUDED IN THIS MANUAL.

WE SUGGEST THAT THIS MANUAL AND THE WIRING DIAGRAM WHICH ACCOMPANIES EVERY ONAN UNIT BE RETAINED AND REFERRED TO WHEN MAKING EQUIPMENT ADJUSTMENTS OR ORDERING PARTS. ADDITIONAL COPIES ARE AVAILABLE FOR A NOMINAL CHARGE FROM YOUR ONAN DISTRIBUTOR.

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

FOR MAJOR REPAIR SERVICE, CONTACT YOUR ONAN AUTHORIZED DISTRIBUTOR.

WARNING

ONAN RECOMMENDS THAT ALL SERVICE INCLUDING INSTALLATION OF REPLACEMENT PARTS BE DONE BY QUALIFIED ELECTRICAL AND/OR MECHANICAL SERVICEMEN. FROM THE STANDPOINT OF POSSIBLE INJURY AND/OR EQUIPMENT DAMAGE IT IS IMPERATIVE THAT THE SERVICEMAN IS QUALIFIED.

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IMPORTANT! RETURN WARRANTY CARD ATTACHED TO UNIT.

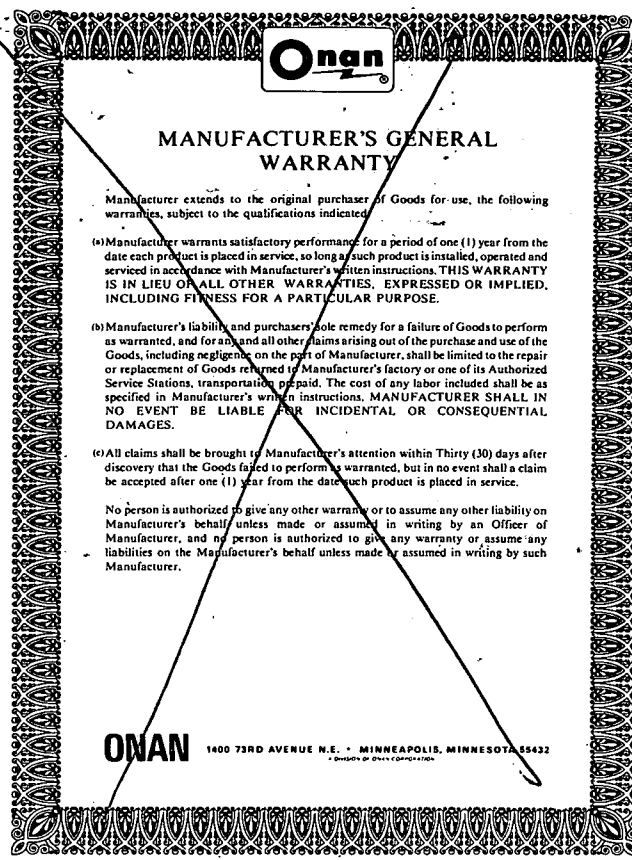
GENERAL INFORMATION

Instructions in this manual may refer to a specific model of generating set. Identify the model by referring to the MODEL and SPECIFICATION NO. as shown on the set nameplate. Electrical characteristics are shown on the lower portion of the set nameplate.

How to interpret MODEL and SPEC NO.

2.5 LK - 3R / 1 K L
 1 2 3 4 5

1. Indicates kilowatt rating.
2. Series identification.
3. Voltage code of generator.
 3 - indicates 120/240 volt
 R - indicates remote electric starting
4. Factory code for designating optional equipment, if any.
5. Specification letter which advances when the factory makes production modifications.



WARNING Onan uses this symbol throughout the text to warn of possible injury or death.

CAUTION This symbol is used to warn of possible equipment damage.

SPECIFICATIONS

M = manual start
R = remote start (electric crank)

MODEL SERIES

2.5LK
1.7LK

	M	R
Nominal dimension of plant (inches)		
Height	21	21
Width	18-5/16	18-5/16
Length	27-1/4	25
Number cylinders	1	1
Displacement (cubic inch)	24.9	24.9
Cylinder bore	3-1/4	3-1/4
Piston stroke	3	3
RPM (60 hertz)	1800	1800
RPM (50 hertz)	1500	1500
Compression ratio	5.5	5.5
Ignition (type)		
Flywheel magneto	Yes	No
Battery voltage (AC plant)	None	12 Volt
Battery size (AC plant):		
SAE group 1H		two 6-Volt in series
Amp/hr. SAE rating — 20 hr. (nominal)		105
Starting by pull rope (recoil) only	Yes	No
Starting by exciter cranking	No	Yes
Battery charge rate (amperes)		8 Maximum
Ventilation required (cfm @ 1800 rpm)		
Engine	300	300
Generator	60	60
Combustion	20	20
Output rating (power factor)	1.0	1.0
Rating (output in watts)		
60 hertz (general utility)	2500	2500
50 hertz (general utility)	1700	1700
AC voltage regulation in \pm %	6	6
AC frequency regulation in %	5	5
Revolving armature generator	Yes	Yes
120/240 volt single phase model reconnectible	No	No

TUNE-UP SPECIFICATIONS

Spark Plug Gap	
Gasoline025"
Gas018"
Ignition breaker point gap (at full separation)020"
Ignition timing	19° BTC
Tappet adjustment	
Intake007" to .009"
Exhaust015" to .017"
Carburetor float adjustment	11/64"
Cylinder head torque	27 to 29 foot lbs.

INSTALLATION

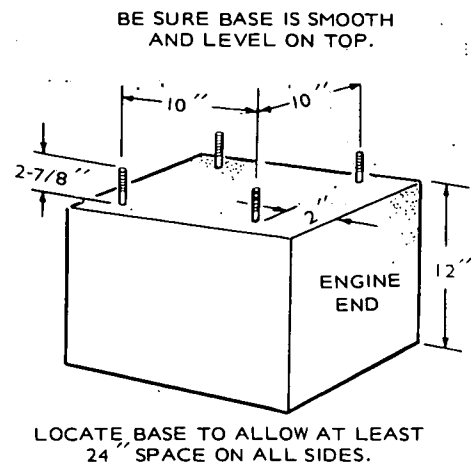
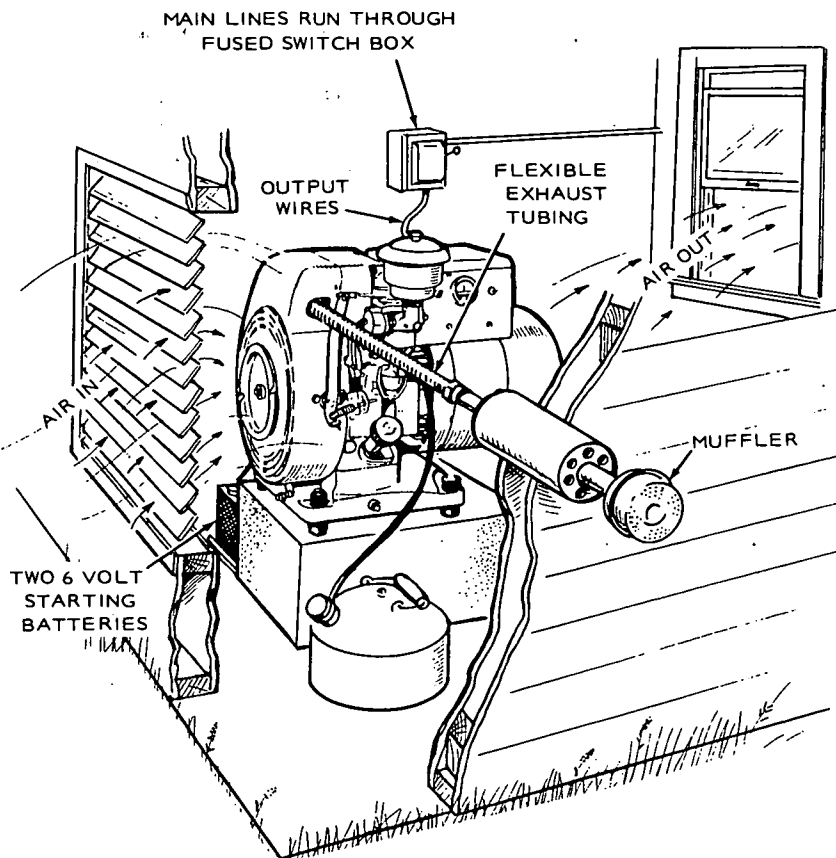
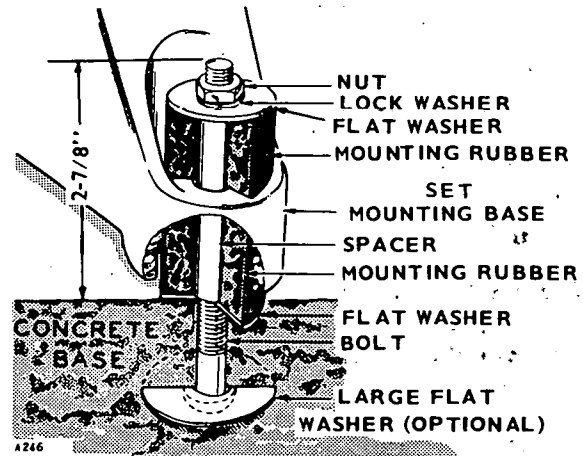
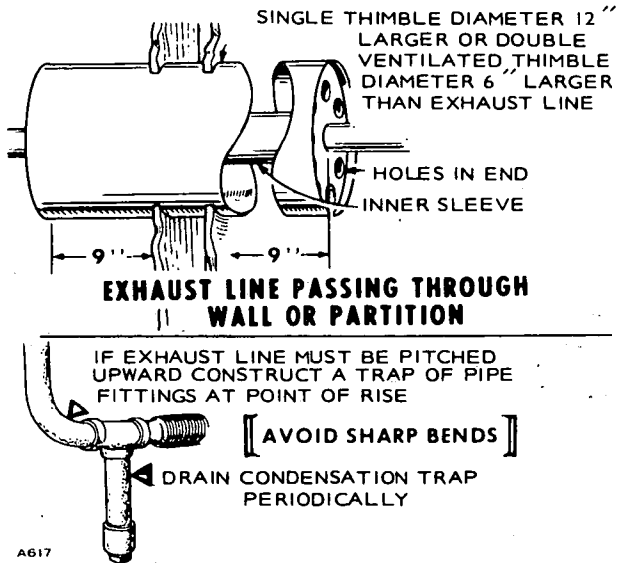


FIGURE 1. TYPICAL INSTALLATION

COOLING AIR

Pressure cooled models require an air inlet opening and an air outlet of 3 square feet. Position the outlet opening above and to the rear of the set, the inlet opening just opposite the blower housing.

VACU-FLO COOLED

Air flow through Vacu-Flo units is reversed. Provide an air inlet of at least 41 square inches for 3000 or 3600 rpm units. Duct the heated air outside. An optional automatic air shutter and air duct is available for use in cold weather.

WARNING Utilizing exhaust manifold heat to warm a room or compartment occupied by people is not recommended due to possible leaking of exhaust gases.

EXHAUST

WARNING Exhaust gases are deadly, poisonous!

Vent exhaust gases outside. Use flexible tubing between the set's exhaust outlet and rigid piping. Shield the line if it passes through a combustible wall or partition. If turns are necessary, use one pipe size larger for each ten feet in length. Position the exhaust outlet away from the plant air intake.

LOCATION

Provide a protected location that is dry, dust-free, and preferably heated in cold weather. For service convenience, provide at least 24 inch clearance around plant.

OIL DRAIN

For convenience in draining oil, remove the oil drain plug and install an extension pipe and coupling.

GENERAL

Important installation points are: sufficient cooling, exhaust gas discharge, electrical and fuel connections, location and mounting.

Each installation must be considered individually — use these instructions as a general guide. Always check local building codes, fire ordinances, etc., for compliance. Provide a location that is protected from the weather and is dry, dust free, and preferably warm in cold weather. The air discharge side of set requires only a 3-inch clearance from wall to permit set to rock on its mounts but at least 24-inch clearance is required around all other sides for service accessibility.

MOUNTING

A permanent installation needs a sturdy, level, mounting base of concrete, heavy wood or structural steel at least 12 inches high to aid oil changing and operating.

Carefully assemble the mounting cushions, washers and spacer bushing (Figure 1). The spacer bushing prevents compression of the snubber (upper rubber cushion). Space the 5/16 inch mounting bolts as shown.

VENTILATION AND COOLING

Air circulation is needed to dissipate heat produced by the engine and generator in normal operation. *Outdoor* installations can rely on natural circulation, but *mobile, indoor or housed* installations need proper size and positioned vents for required air flow. See *Specifications* for the air requirements at 1800 rpm.

Vent sizes depend on variable conditions: (1) size of enclosure, (2) ambient temperature, (3) electrical load, (4) running time, (5) restrictions imposed by screens, louvers, shutters, or filters, and (6) prevailing wind direction.

Remember that a required volume of air must reach the unit, absorb the heat, and be discharged away from the installation.

Pressure cooled sets need an inlet vent with an unrestricted opening of at least 3 square feet for variables. For discharged air, install separate duct from the engine.

Auxiliary fans can be used to increase air flow to units installed in small, poorly ventilated rooms. Fan size and location should be such that the air inlet temperature to the engine does not exceed 120°F when running at full rated load.

GASOLINE TANK

If a separate fuel tank is used, install the tank so the bottom is less than four feet below the fuel pump. The tank top must be below fuel pump level to prevent siphoning. Install a shut-off valve at the tank. When the fuel tank is shared with another engine, use a separate fuel line for each to avoid starving the set.

If fuel lift must exceed four feet, install an auxiliary electric fuel pump at the fuel supply. Wire it in parallel with the ignition coil (ahead of resistor). If an auxiliary reservoir fuel tank is used for a *standby* installation, note that fuel line connections must be changed (Figure 2).

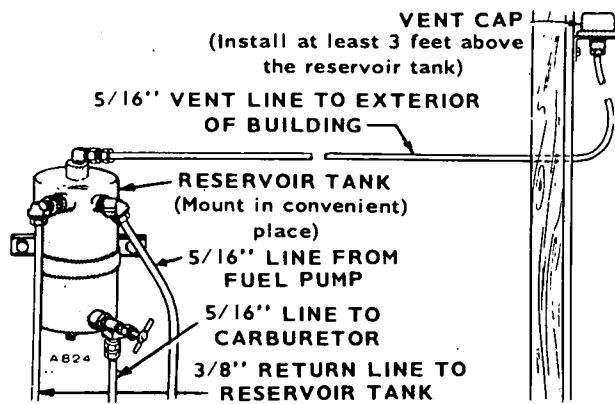


FIGURE 2. AUXILIARY FUEL TANK

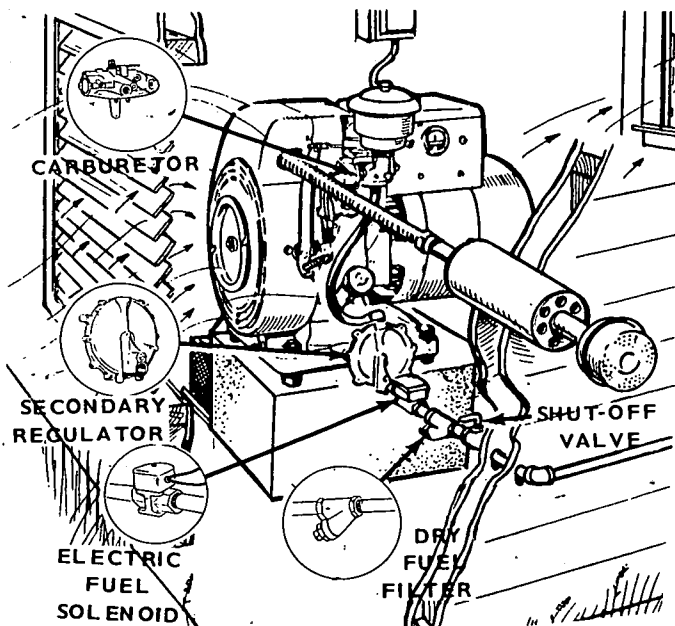


FIGURE 3. FUEL CONNECTIONS (GAS ONLY)

FUEL CONNECTION

For gasoline sets, connect the fuel line to the fuel pump inlet. Pump thread is 1/8-27 NPTF.

Connect the set to the fuel source with a flexible line to avoid line failure due to vibration.

For gaseous sets (see Figure 3) check with the local fuel supplier for gas regulations and line pressure. Provide a manual gas shutoff valve. A filter in the line may be necessary. Electric solenoid shutoff valves in the supply line are usually required for indoor automatic or remote starting installations. Connect solenoid wires to battery ignition circuit (Figure 3) to open valve during running. Install a demand type gas regulator according to instructions and position it near the set to aid starting (regulator line pressure must be within 2 to 8 ounces).

Always use flexible tubing between engine and the gas demand regulator.

Gas-Gasoline sets provide a manual shut-off valve in both fuel supply lines.

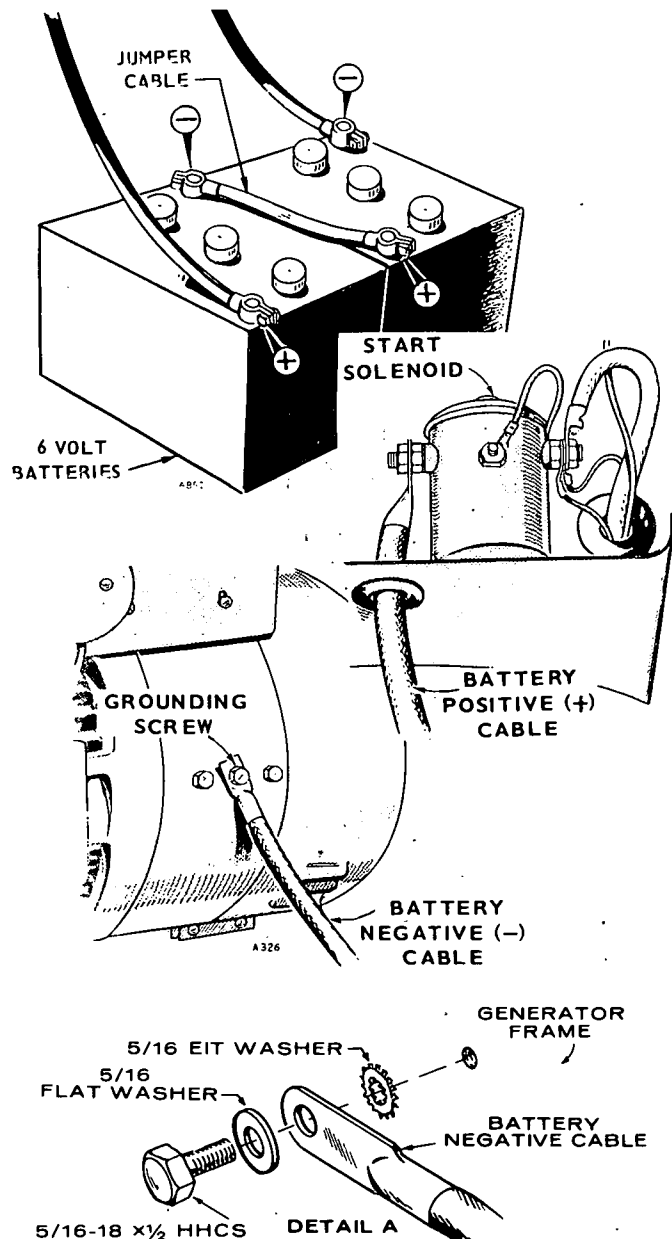


FIGURE 4. BATTERY CONNECTIONS

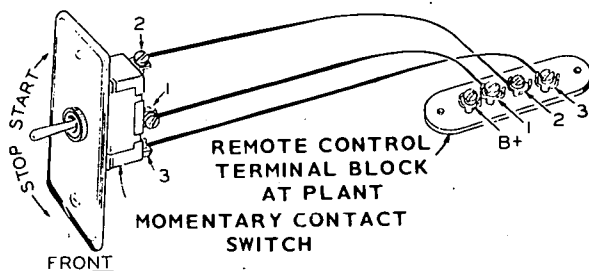
BATTERY CONNECTION

Refer to the wiring diagram and Figure 4.

Provide two 6-volt batteries connected in series (one battery negative to other battery's positive) for a 12-volt source. See *Specifications* for minimum battery amperes.

CAUTION Connect battery positive (+) to the start solenoid (located in the control box). Connect the battery negative (-) to a good ground on the generator frame. Enter control box rear to install battery cable.

CAUTION Do not disconnect starting batteries while set is running. The resulting over-voltage condition will damage the electric choke and other control components.



WIRE SIZE	DISTANCE
#18	to 250 ft.
#16	to 400 ft.
#14	to 630 ft.

FIGURE 5. REMOTE CONTROL

REMOTE START-STOP SWITCH (Optional)

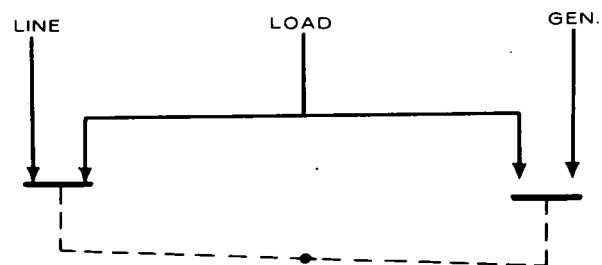
For remote control starting and stopping, use three wires to connect the remote switch (single pole - double throw, momentary contact, center off type) to the terminal block marked B+, 1, 2, 3, in the set's control box using wire sizes listed in Figure 5.

CAUTION

If the installation is for standby service, a double throw transfer switch must always be used. Connect this switch (either automatic or manual) so that it is impossible for commercial power and generator current to be connected to the load at the same time. Instructions for connecting an automatic load transfer control are included with such equipment.

WARNING

Personnel connecting the generator and any such auxiliary equipment must be fully qualified and understand wiring diagrams, circuits, etc.



NOTE: SHOWN WITH LINE CONNECTED TO LOAD.

FIGURE 6. DOUBLE-THROW TRANSFER SWITCH

LOAD WIRE CONNECTIONS

Set nameplate shows the electrical output rating of the set in watts, volts, and hertz. The set wiring diagram shows the electrical circuits and connections necessary for the available output voltage. See Figure 7.

Meet all applicable electrical code requirements. Work should be done by a qualified serviceman or electrician because the installation will be inspected and approved.

The set control box has knockout sections to accommodate load wires. Use flexible conduit and stranded load wires near the set to absorb vibration. Use sufficiently large insulated wires. Strip insulation from wire ends as necessary for clean connections. Connect each load wire to the proper generator output lead inside the set control box. Insulate bare ends of ungrounded wires. Use a bolt (through the control box) to connect the grounded (\perp) generator lead and load wire. Install a fused main switch (or circuit breaker) between the generating set and load.

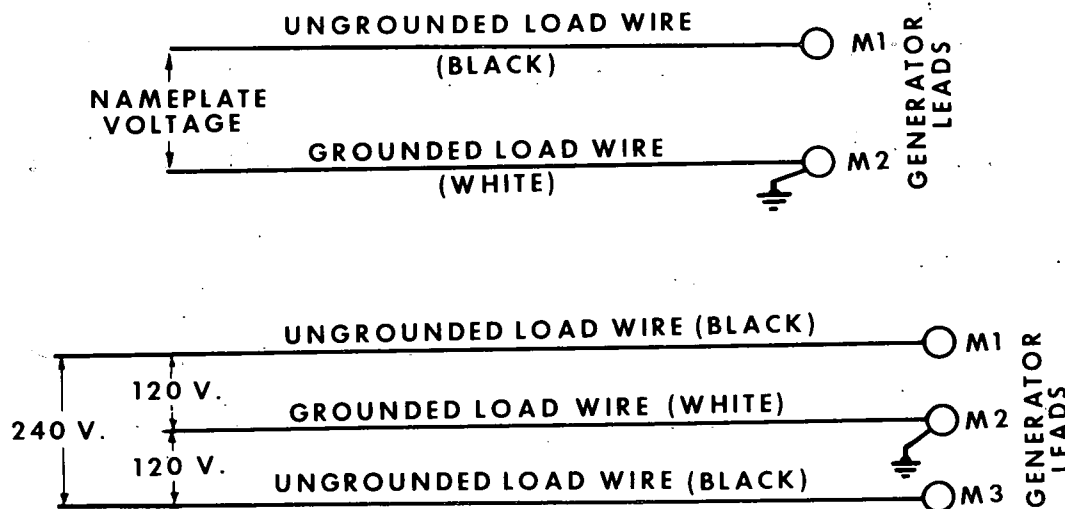


FIGURE 7. LOAD WIRE CONNECTIONS

AC Portable Models: These sets have outlet receptacles of the grounding type which serve for easy connection and disconnection of the load. Matching electrical plugs or caps must be provided on the load wires.

Output Lead Markings Generator leads are marked M1, M2, etc. These identifying marks also appear on the wiring diagram.

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) load wire. On models 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.

OPERATION

INITIAL START

Check the engine to make sure it has been filled with oil and fuel. If engine fails to start at first attempt, inhibitor oil used at the factory may have fouled the spark plugs — remove, 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.

Crankcase Oil: Use a good quality heavy-duty detergent oil that meets the API (American Petroleum Institute) service designations MS, MS/DG, MS/DM, SE, or SE/CC. Oil should be labeled as having passed the MS Sequence Tests and the MIL-L-2104B Tests. Recommended SAE oil numbers for expected ambient temperatures are as follows:

TEMPERATURE	GRADE
Above 32°F	SAE 30
0°F to 32°F	SAE 10W-40, 5W-30
Below 0°F	SAE 5W-30

Do not mix brands nor grades. Refer to *Maintenance Section* for 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, most satisfactory results can be obtained by using unleaded 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 unleaded gasoline.

CAUTION

If lead deposits are not removed from engine before switching from leaded to unleaded gasoline, pre-ignition could occur causing severe damage to the engine.

WARNING

Never fill the tank when the engine is running. Leave some tank space for fuel expansion.

ELECTRIC STARTING

Remote Control, AC Models: Push the *start-stop* switch to its *start* position. Release the switch as soon as the set starts (Figure 8).

MANUAL STARTING

Manual or Portable Models: Adjust the manual carburetor choke as necessary for the temperature conditions. Pull the start rope with a fast, steady pull to crank the engine. Do not jerk. As the set warms up, adjust the choke gradually to its fully open position.

Remote Control, AC Models: If the battery charge condition is too low to crank the engine, the set can be started manually. Set the control box switch (located inside the control box) to its *manual* start position. Pull the rope with a fast, steady pull to crank the engine. Do not jerk. After starting, return the control box switch to the *electric* start position to avoid discharging the battery.

STOPPING

Push *start-stop* switch to *stop* position. Release switch when set stops. If stop circuit fails, close fuel valve.

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.

BATTERY CHARGING

The battery charge rate is controlled by a 2-step voltage regulator and is not adjustable.

INFREQUENT SERVICE

If the set is used infrequently (as in standby service for commercial power) extended shut-down periods can result in difficult starting. Run the set at least 30 minutes every week to eliminate hard starting.

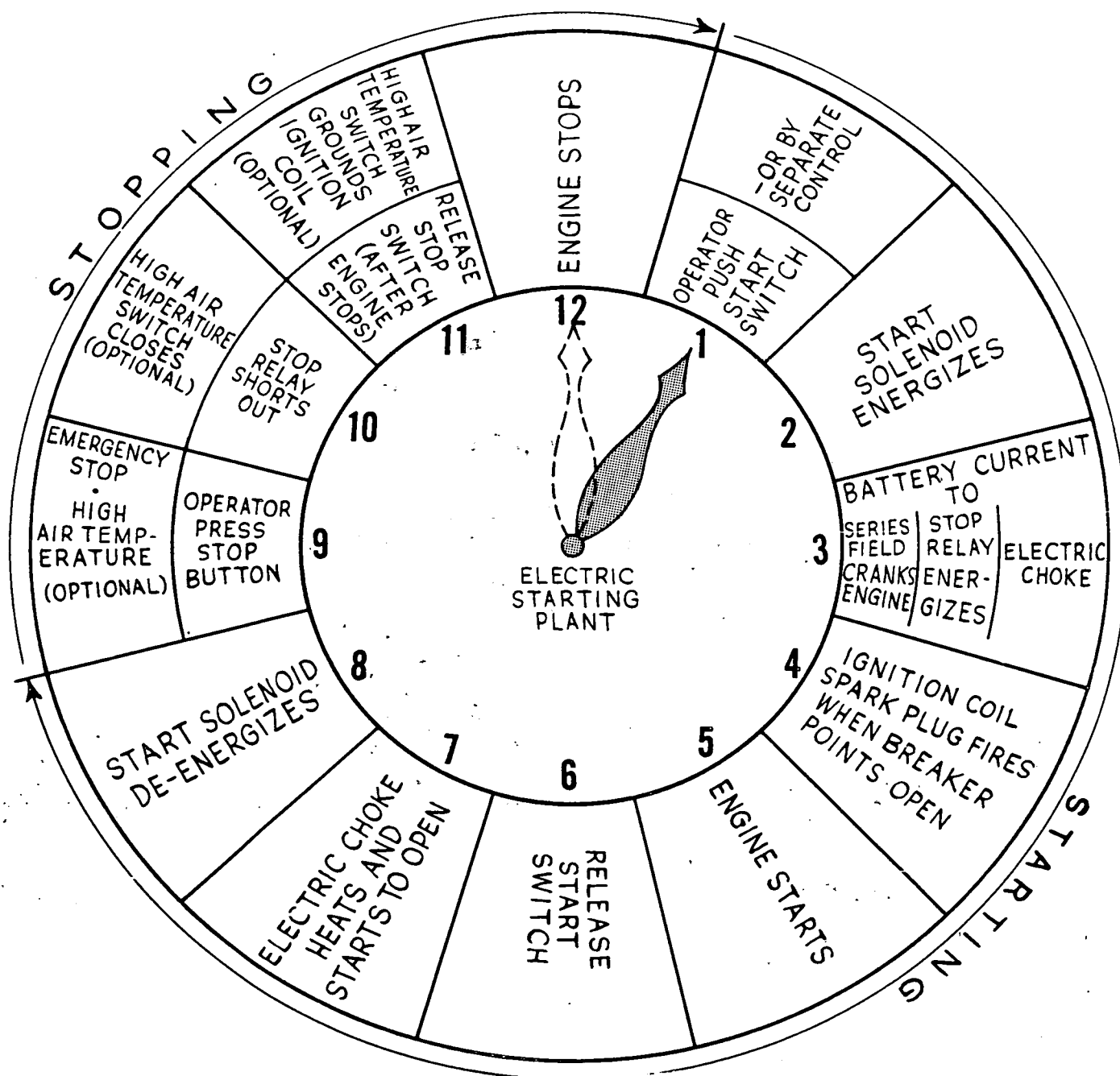


FIGURE 8. STARTING AND STOPPING CYCLE

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 shut-off valve in supply line (the main fuel adjustment valve is not designed to use as a shut-off valve) for gaseous fuel. Set will not operate smoothly with both fuel supply lines turned on at the same time.
2. Open the gasoline fuel shut-off valve.
3. Set the spark plug gap as given in the *Specification Section*.

4. See that the choke is free and works easily. Be sure to release choke lock on sets with electric choke.
5. Start the engine in the manner described. If the engine runs unevenly under half or full load, due to faulty carburetor adjustment, the main jet needs adjusting.

To change back to gaseous fuel, reverse the above procedure and reset the spark plug gap as given in the *Specification Section*. Use all gasoline from the carburetor to avoid stale fuel. If engine is run with one of the fuel supply lines disconnected, plug other inlet to prevent drawing air and dirt.

BREAK-IN PROCEDURE

The unit should be run in the following sequence using MS/DG, DM, SE or SE/CC oil (see oil requirements for correct viscosity).

1. One half hour at half load.
2. One half hour at three quarter load.
3. Full load.

This method of load application speeds piston ring seating. Continuous running at half (light) load for the first few hundred hours usually results in poor piston ring seating, causing higher than normal oil consumption and blowby.

DUST AND DIRT

1. Keep set clean. Keep cooling surfaces clean.
2. Service air cleaner as frequently as necessary.
3. Change crankcase oil every 50 operating hours or sooner.
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.

EXTENDED OUT-OF-SERVICE PROTECTION — GASOLINE ENGINES

Generator sets removed from service for extended periods of time (over 30 days) should be protected from rust and corrosion. Onan recommends the following protective procedure:

1. Run set until thoroughly warm; generator under at least 50 percent load. Stop engine by shutting off fuel supply to allow engine to drain fuel lines and carburetor.
2. Drain oil while still warm. Refill and attach a tag indicating viscosity of oil used.
3. Remove spark plugs. Pour 1-ounce of rust inhibiting oil (or SAE #10 oil) into each cylinder. Crank engine over several times. Install spark plugs.
4. Service air cleaner.
5. Clean throttle and governor linkage, protect by wrapping with a clean cloth.
6. Plug exhaust outlets to prevent entrance of moisture, bugs, dirt, etc.
7. Clean off dirt and dry entire unit. Coat parts likely to rust with a light film of oil or grease.
8. Disconnect battery and follow standard battery storage procedure. Apply a film of non-conductive grease (e.g., vaseline) to battery cable terminal lugs.
9. Fill fuel tank to prevent condensate contamination.
10. Provide a suitable protective cover for the entire unit.

RETURNING UNIT TO SERVICE

1. Remove cover and all protective wrapping. Remove plug from exhaust outlet.
2. Check tag on oil base and verify that oil viscosity is still correct for existing ambient temperature.
3. Clean and check battery. Measure specific gravity (1.260 at 25°C (77°F) and verify level to be at split ring. If specific gravity is low, charge until correct value is obtained. If level is low, add distilled water and charge until specific gravity is correct. DO NOT OVERCHARGE.

WARNING

Do not smoke while servicing batteries. Explosive gases are emitted from batteries in operation. Ignition of these gases can cause severe personal injury.

4. Connect batteries.
5. Verify that no loads are connected to the generator.
6. Start engine.

After engine has started, excessive blue smoke will be exhausted and the engine will run rough until the rust inhibitor or oil has burned away.

7. After start, apply load to at least 50 percent of rated capacity.
8. Check all gauges to be reading correctly. Unit is ready for service.

LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change oil only when engine is warm. If an unexpected temperature drop causes an emergency, move the plant to a warm location or apply heated air (do not use open flame) externally until oil flows freely.
2. Use fresh (not premium) gasoline. Protect against moisture condensation. Below 0°F adjust carburetor main jet for slightly richer fuel mixture.
3. Keep ignition system clean, properly adjusted, and batteries in a well charged condition.
4. Partially restrict cool air flow but use care to avoid overheating.

HIGH TEMPERATURES

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.

HIGH ALTITUDE

For operation at altitudes of 2500 feet above sea level, close carburetor main jet adjustment slightly to maintain proper air-to-fuel ratio (refer to the *Adjustment Section*). Maximum power will be reduced approximately 4 percent for each 1000 feet above sea level, after the first 1000 feet.

ADJUSTMENTS

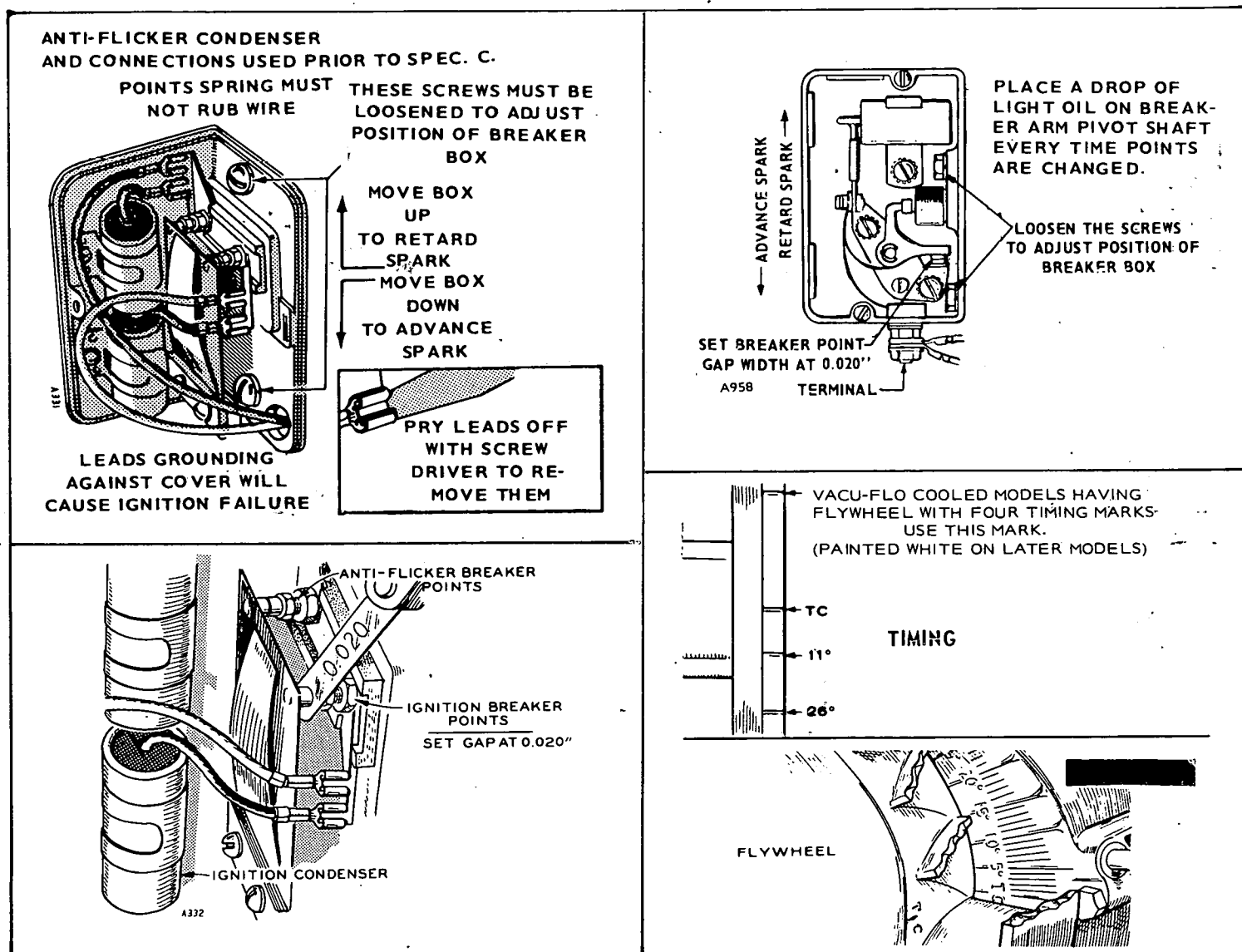


FIGURE 9. IGNITION SYSTEM

CHECK BREAKER POINTS

Replace burnt or faulty points. Measure gap with a feeler gauge and set gap at .020-inches.

CAUTION Always make sure that feeler gauge is free from grease and dirt. (Grease and dirt causes shorter life of points.)

Ignition breaker points must be correctly gapped for top performance (Figure 9). Crank engine to fully open breaker points (1/4 turn after top center). Loosen and move stationary contact to correct the

gap at full separation. Tighten contact and check gap. (Repeat if needed.)

Ignition breaker points should break contact just when the 19 degree timing mark aligns with the flywheel timing mark. Timing is corrected by properly shifting the breaker point box on its mounting and using a timing light.

CAUTION Model should be timed correctly so top performance is achieved.

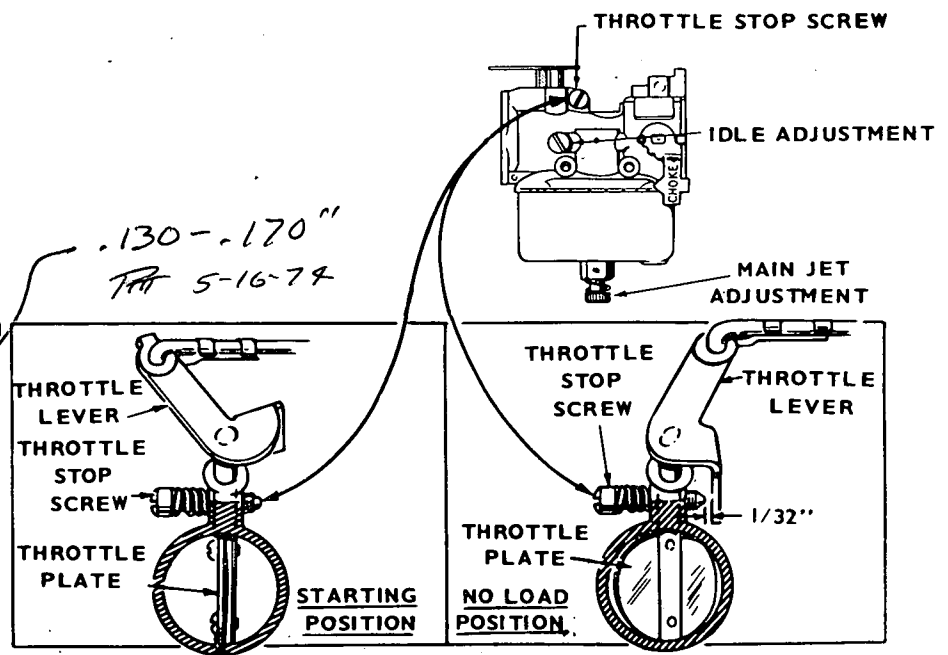
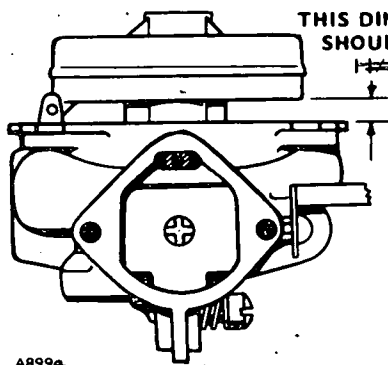
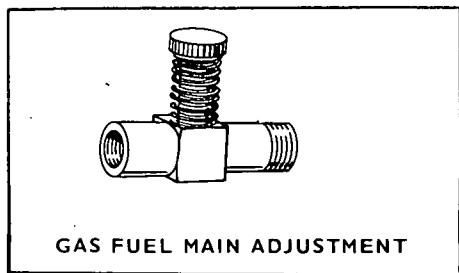


FIGURE 10. CARBURETOR ADJUSTMENTS

CARBURETOR, GASOLINE

The carburetor (Figure 10) has a fuel main (high speed) adjustment and a fuel idle adjustment. The main adjustment affects operation under heavy load conditions. Idle adjustment affects operation at light or no load. Under normal circumstances, factory carburetor adjustments should not be disturbed. If the adjustments have been disturbed, turn needles off their seats, 1 to 1-1/2 turns to permit starting, then re-adjust them for smooth operation.

CAUTION

Forcing the needle against its seat will damage it. The needle does not completely shut off fuel when turned fully in.

Before final adjustment, allow engine to warm up. Make idle adjustment with no load connected to the generator. Use a tachometer (or connect a frequency meter) to generator output. Slowly turn idle adjustment out until engine speed (or generator frequency) drops slightly below normal. Then turn needle in until speed (or frequency) returns to normal.

To set fuel main adjustment, apply a full electrical load to the generator. Carefully turn main adjustment screw in until engine speed (or output frequency) drops slightly below normal. Then turn needle out until speed (or frequency) returns to normal. Proper carburetor adjustment cannot be assured unless the governor is properly adjusted.

Set throttle stop screw (located on carburetor throttle lever) with no load connected and while running at rated speed. Turn the screw to give $1/32$ -inch clearance between the screw and pin (Figure 10).

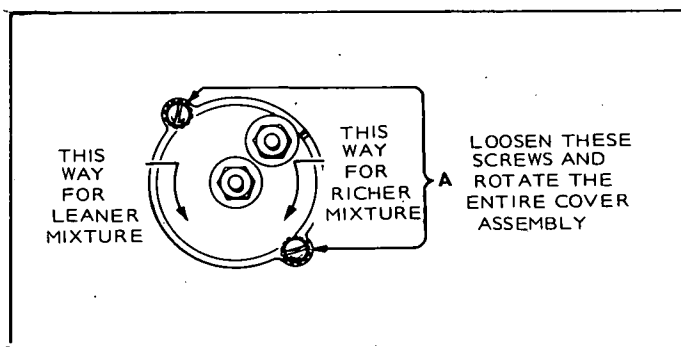


FIGURE 11. CHOKE ADJUSTMENT

ONAN CHOKE

This choke uses a heating element and a heat sensitive bimetal spring to open the choke plate. The choke plate closes according to ambient temperature.

If adjustment is required, use the following instructions. Choke bimetal spring must be at ambient temperature. Allow engine to cool at least one hour, before setting. Adjust choke by turning the choke body, which engages a link connected to a bimetal choke spring. Remove flame arrestor and adapter to expose the carburetor throat. Loosen the screw which secures the choke body. Rotate choke body clockwise to increase choke and counterclockwise to

decrease choke action (leaner mixture). At room temperature (70°F) the choke valve should be almost wide open.

Note that the direction marking "CHOKE" as appears cast on the body of some carburetors is correct for manually choked sets but is wrong for electric choked sets due to the choke valve arrangement. Choking position of the weight lever is vertical, on the shaft of electrically choked sets. Choking position of the lever is horizontal on manually choked sets.

Gas Fuel: Normal choke setting is fully closed with engine not running. Turn adjusting screw (Figure 11) in for less choking, out for more choking.

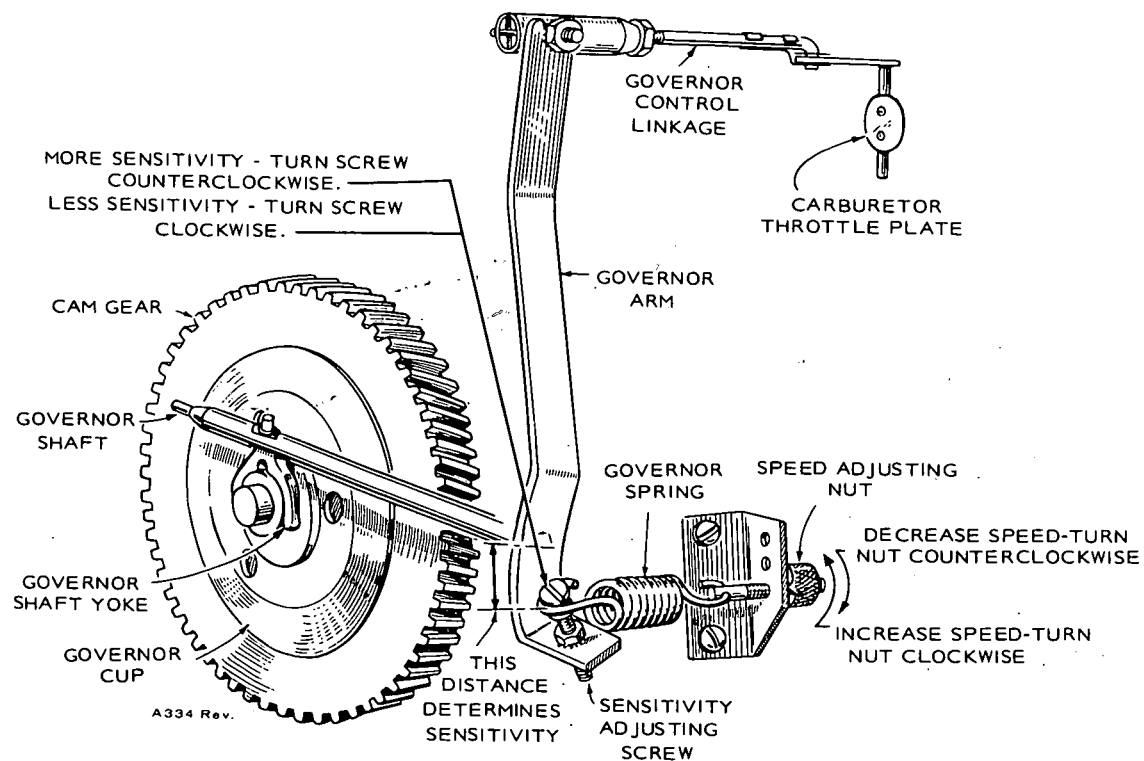


FIGURE 12. GOVERNOR ADJUSTMENT

GOVERNOR

Rated speed and voltage appear on the nameplate (also see *Specifications*). Engine speed equals frequency multiplied by 30, on a 4 pole generator, thus 1800 rpm gives 60 hertz frequency. Preferred speed varies approximately 2 to 3 hertz from no load to full load operation. Be sure throttle, linkage and governor mechanism operate smoothly (Figure 12).

Linkage: The engine starts at wide open throttle. The length of the linkage connecting the governor arm of the throttle arm is adjusted by rotating the ball joint. Adjust length so that with the engine stopped and tension on the governor spring, the stop screw on the carburetor throttle lever is 1/32-inch from stop pin. This setting allows immediate control by the governor after starting and synchronizes travel of the governor arm and the throttle shaft.

Speed Adjustment: With the warmed-up set operating at no load, adjust the tension of the governor spring. Turn the speed adjusting nut to obtain a voltage and speed reading within the limits shown on the nameplate.

Sensitivity Adjustment: Check the voltage and speed, first with no load connected and again with a full load. Adjust the sensitivity so as to give the closest regulation (least speed and voltage difference between no load and full load) without causing a hunting condition.

To increase sensitivity (closer regulation), move the governor spring toward the governor shaft. An adjustment for too much sensitivity will cause alternate increase and decrease of engine speed (hunting).

To decrease sensitivity, move the governor spring toward the outer end of the governor arm. Too little sensitivity will result in too much difference in speed between no load and full load conditions.

Any change in the sensitivity adjustment usually requires a compensating speed (spring tension) adjustment.

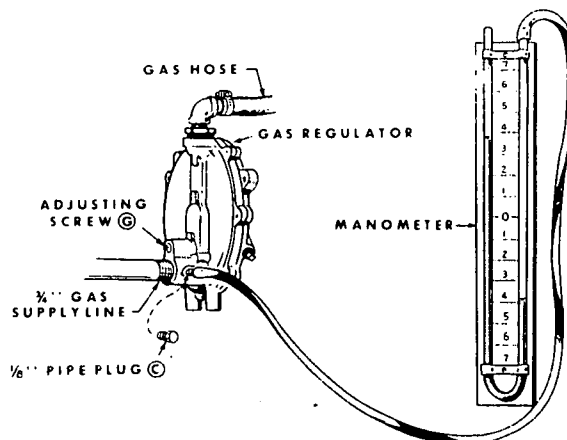


FIGURE 13. GAS REGULATOR

GAS REGULATOR

The regulator was factory adjusted to lock-off at a pressure of four ounces (7-inch water column). It will operate satisfactory at incoming pressures between 2 and 4 ounces. If your gas supply pressure is within these limits, no regulator adjustment is required. If your gas supply pressure is under .2 ounces, the regulator will not operate. If your gas supply pressure is between 4 and 8 ounces, install an appliance regulator set for 2 ounces ahead of the regulator or adjust the regulator as follows:

CAUTION

A soap bubble placed over the regulator outlet will not accurately test the regulator lock-off. The soap bubbles resistance when multiplied by the greater area of the diaphragm, is enough to shut off this very sensitive demand type regulator. A manometer must be used to show complete regulator shut-off.

Gas Regulator Adjustment (Figure 13):

1. Use a manometer which reads up to 14-inch water column.

One ounce per square inch equals 1.73-inch water column. Likewise 1 inch water column equals 0.58 ounces per square inch.

2. Remove 1/8 inch pipe plug (C) and connect manometer.
3. With gas supply on and outlet hose removed, alternately cover and uncover the regulator outlet with your hand. If the regulator shuts off completely, as desired, the manometer will hold a steady reading. If the manometer reading drops slightly each time you remove your hand, the regulator is leaking.

4. When necessary, adjust as follows: Turn the adjusting screw (G) inward just far enough so that manometer reading remains constant when you repeatedly cover and uncover the regulator outlet with your hand.
5. Operate the engine to ensure quick starting results.

CARBURETOR, GASEOUS FUELS

Adjust much the same as gasoline carburetors, using the gas fuel adjustment located in the fuel inlet (Figure 10) to adjust when running on gas. Gas only carburetors have no idle adjustment beginning Spec E.

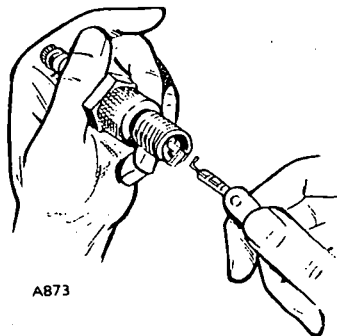
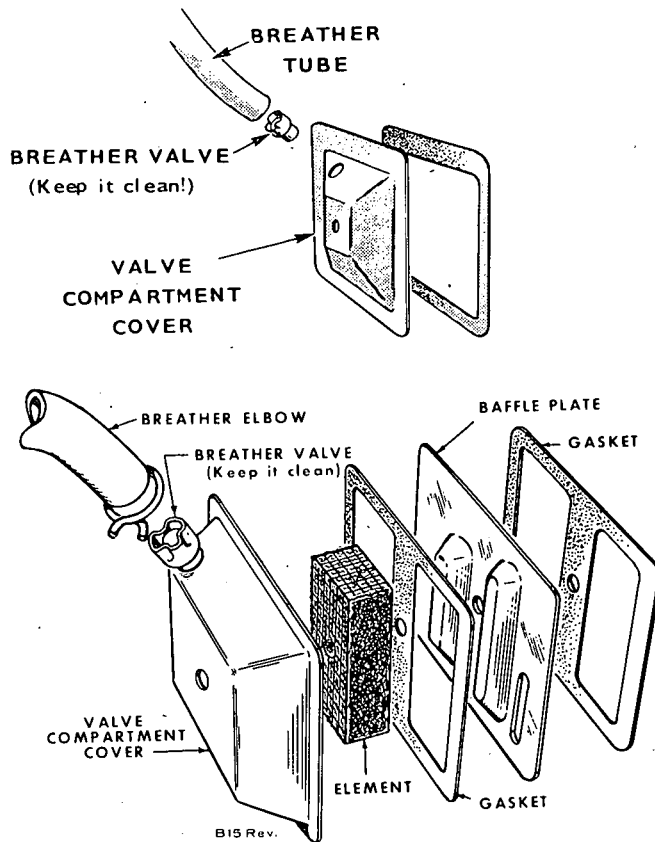
The weighted carburetor choke (Spec A through D) should just close, but must be free to open with the air stream during operation. Some chokes are fitted with an adjusting screw — turn in for less choking action, turn out for more choking action.

GENERAL MAINTENANCE

PERFORM ALL MAINTENANCE DETAILS AS SPECIFIED IN MAINTENANCE SCHEDULE

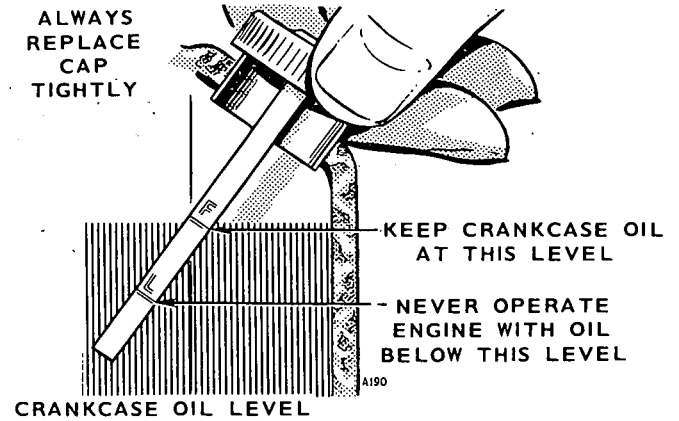
BREATHER VALVE

Remove the hose which carries expelled air from the breather valve at the valve compartment cover, to the air cleaner. Loosen the valve with pliers. Occasionally the valve will lift out and remain inside the hose. Wash the valve (also the element) in a suitable solvent. Dry and replace. The valve must work free and the hose must not be restricted to prevent expelled air from re-entering the crankcase. Install parts removed.



SPARK PLUG GAP
0.025" GASOLINE
0.018" GAS FUEL

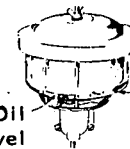
ALWAYS
REPLACE
CAP
TIGHTLY



AIR
CLEANER

OIL BATH TYPE

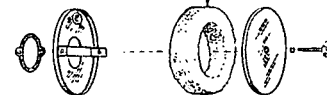
Fill with Oil
to this level



Renew oil before
dirt reaches shelf
in cup

"DRY" TYPE

FILTER ELEMENT

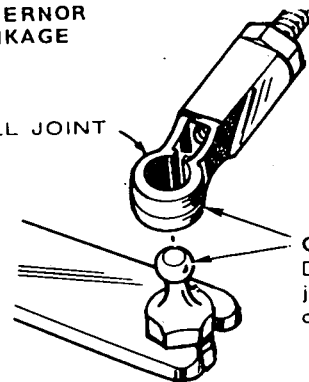


AIR CLEANER SERVICE

NOTE: Wash polyurethane wrapper used on some sets in a suitable solvent. Dip in oil and squeeze as dry as possible.

GOVERNOR
LINKAGE

BALL JOINT



CLEAN JOINT
Do not lubricate plastic ball
joints. They only require
cleaning.

FIGURE 14. MAINTENANCE PROCEDURE

FUEL SEDIMENT

Empty carburetor and fuel filter (strainer) bowls of any accumulated sediment. Clean filter screen thoroughly. Reassemble and check for leaks.

GASOLINE FUEL

Use *regular* grade automobile gasoline. *Do not* use highly leaded *premium* types. Never fill the tank when the engine is running. Leave some tank space for fuel expansion.

PERIODIC SERVICE GUIDE

Regularly scheduled maintenance is the key to lower operating costs and longer service life for the unit. The following schedule can be used as a guide. However, actual operating conditions under which a unit is run 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, the filters, etc. frequently until the proper service time periods can be established.

For any abnormalities in operation, unusual noises from engine or accessories, loss of power, overheating, etc., contact your nearest dealer.

SERVICE THESE ITEMS	AFTER EACH CYCLE OF OPERATING HOURS						
	8	50	100	200	500	1000	5000
Inspect Set	x1						
Check Fuel Supply	x						
Check Oil Level	x						
Check Governor Linkage		x2					
Replace Spark Plug				x			
Change Crankcase Oil			x2				
Clean Crankcase Breather			x				
Check Battery Electrolyte Level				x			
Inspect Magneto Breaker Points				x			
Clean Commutator Collector Rings				x			
Check Brushes				x3			
Check Valve Clearance					x		
Remove Carbon and Lead					x		
Clean Generator						x	
Remove and Clean Oil Base						x	
Grind Valves (If Required)						x	
Clean Carburetor						x	
Complete Reconditioning							x

x1 - With set running, visually and audibly check exhaust system for leaks.

x2 - Perform more often under extremely dusty conditions.

x3 - Replace commutator brushes when worn to 5/8".

SPECIAL UTILITY SECTION

This section applies specifically to the *Utility Truck* models of the LK Series generating sets. These supplementary instructions are to be used, where they apply, instead of the instructions for the standard generating sets.

For instructions not covered in this section, refer to the appropriate section for the standard sets.

The utility set is designed to supply 12 Volt DC output for radio, etc., while the truck is stopped at a service job. At the same time, AC power is available for flood lights, power tools, etc. Thus, the generating set eliminates the necessity of running the truck engine to prevent battery run down at a service job. The generating set can also be used to recharge a low truck battery if AC power requirements are sufficiently reduced. In normal operation, the set supplies DC and AC current for the load, but does not recharge the battery.

The utility set has a relay, which opens the charging circuit in the generator set when the truck engine is running, to prevent the battery from being charged from both sources at the same time. This is necessary to prevent damage to the reverse current relays in both the truck and generator set charging systems as a result of interaction between them.

RATED OUTPUT

Alternating current and direct current are produced at the same time.

Combined AC and DC rated output.... 2,500 Watts
Maximum DC amperes

(automatically limited) 30 Amps

Maximum DC watts (maximum

30 amps x nominal 13 volts) 390 Watts

Available AC output (2500 watts less
watts of DC charging current)

Minimum (while full load DC
connected - truck stopped) 2110 Watts

Maximum (while truck running or
battery charged and no DC

load connected) 2,500 Watts

Open circuit DC voltage

(12 volt battery charging) 15 Volts

Nominal AC voltage

(power for tools, etc.) 120 Volts

CAUTION

Too high a voltage will overcharge and possibly damage the battery. Adjust the governor only to correct the DC voltage output of the generator at operating temperature. If a carburetor adjustment is made, check the governor adjustment also.

Do not become alarmed if the ammeter reads 45 amperes when first starting the set. After a few minutes the current will come down to normal as the generator warms up and the battery voltage comes up.

Consistently high charge rate (after warm up) could be due to a poor battery in the truck or running the set too fast.

Vacu-Flo cooling and remote control starting and stopping make the set suitable for installation in small compartments.

CHARGE RATE

Rated DC output is 30 amperes. A circuit breaker opens the charge circuit to protect the generator if DC output is high. Equal time is consumed by the breaker to cut-in and cut-out and it may go through this cycle several times, each succeeding cycle becoming more rapid, until it acts and sounds like a buzzer, during an overload on the DC output. Generally, the battery will warm up and the charge rate will drop so that the breaker will not reach the buzzing stage.

As the battery reaches a charge condition, its terminal voltage approaches that of the generating set, resulting in a desirable tapering off charge rate. After the battery becomes fully charged, the charge rate equals the DC load (radio, lights, etc.) connected.

The set's charge ammeter reads zero while the truck's engine is running.

AC OVERLOADING

It is not expected that men on the job will determine available load each time before plugging in tools, etc. Overloading is apt to occur especially during night work when both lights and tools are used. If the set speed drops, AC lights will dim, and part of the load must be disconnected. If more AC power is required, simply run the truck's motor to take over the DC load for that interval, and make the full rating available in AC output.

A short circuit across the AC terminals will collapse the field to protect the generator.

GOVERNOR ADJUSTMENT

To check or correct the engine speed, a DC voltmeter is required; the set must be warm and all load disconnected. Proceed as follows:

1. Run set with full AC load connected for at least 1/2 hour to reach operating temperature.
2. With the load alternately removed and connected, adjust the governor sensitivity screw, if necessary, to attain a minimum drop in speed from no-load to full-load operating with no hunting condition.
3. Remove the AC load and stop the set, then disconnect the generator lead A1 at the relay in the set control.
4. Connect the DC voltmeter across lead A1 and ground.
5. Run the set and adjust the speed to deliver 15 volts DC.
6. Remove the voltmeter, reconnect the A1 lead to the relay and replace other parts removed.

TROUBLESHOOTING GUIDE

TROUBLE																				GASOLINE ENGINE TROUBLESHOOTING GUIDE										
Backfire at Carburetor	Bearing Wear	Black Exhaust	Blue Exhaust	Burned Valves	Connecting Rod Wear	Crankshaft Slowly	Cylinder Wear	Engine Stops	Failure to Start	Governor Hunting	High Oil Pressure	Low Oil Pressure	Loss of Coolant (Water Cooled)	Misfiring	Overheating (Water Cooled)	Overheating (Air Cooled)	Piston Wear	Poor Compression	Ring Wear	Sticking Valves	CAUSE									
																				STARTING SYSTEM										
																					Loose or Corroded Battery Connection									
																					Low or Discharged Battery									
																					Faulty Starter									
																					Faulty Start Solenoid									
																				IGNITION SYSTEM										
																					Ignition Timing Wrong									
																					Wrong Spark Plug Gap									
																					Worn Points or Improper Gap Setting									
																					Bad Ignition Coil or Condenser									
																					Faulty Spark Plug Wires									
																				FUEL SYSTEM										
																					Out of Fuel - Check									
																					Lean Fuel Mixture - Readjust									
																					Rich Fuel Mixture or Choke Stuck									
																					Engine Flooded									
																					Poor Quality Fuel									
																					Dirty Carburetor									
																					Dirty Air Cleaner									
																					Dirty Fuel Filter									
																					Defective Fuel Pump									
																				INTERNAL ENGINE										
																					Wrong Valve Clearance									
																					Broken Valve Spring									
																					Valve or Valve Seal Leaking									
																					Piston Rings Worn or Broken									
																					Wrong Bearing Clearance									
																				COOLING SYSTEM (AIR COOLED)										
																					Poor Air Circulation									
																					Dirty or Oily Cooling Fins									
																					Blown Head Gasket									
																				COOLING SYSTEM (WATER COOLED)										
																					Insufficient Coolant									
																					Faulty Thermostat									
																					Worn Water Pump or Pump Seal									
																					Water Passages Restricted									
																					Defective Gaskets									
																					Blown Head Gasket									
																				LUBRICATION SYSTEM										
																					Defective Oil Gauge									
																					Relief Valve Stuck									
																					Faulty Oil Pump									
																					Dirty Oil or Filter									
																					Oil Too Light or Diluted									
																					Oil Level Low									
																					Oil Too Heavy									
																					Dirty Crankcase Breather Valve									
																				THROTTLE AND GOVERNOR										
																					Linkage Out of Adjustment									
																					Linkage Worn or Disconnected									
																					Governor Spring Sensitivity Too Great									
																					Linkage Binding									

PARTS CATALOG

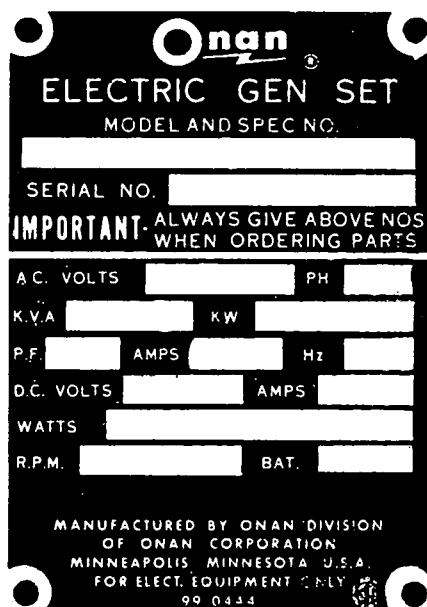
INSTRUCTIONS FOR ORDERING REPAIR PARTS

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.



The image shows a black nameplate for an Onan Electric Gen Set. It contains several fields for technical specifications and identification numbers. The fields are: MODEL AND SPEC NO. (with a blank line), SERIAL NO. (with a blank line), A.C. VOLTS (with a blank line), PH (with a blank line), K.V.A (with a blank line), KW (with a blank line), P.F. (with a blank line), AMPS (with a blank line), Hz (with a blank line), D.C. VOLTS (with a blank line), AMPS (with a blank line), WATTS (with a blank line), R.P.M. (with a blank line), and BAT. (with a blank line). Below these fields, it says 'IMPORTANT. ALWAYS GIVE ABOVE NOS. WHEN ORDERING PARTS'. At the bottom, it says 'MANUFACTURED BY ONAN DIVISION OF ONAN CORPORATION MINNEAPOLIS MINNESOTA U.S.A. FOR ELECT. EQUIPMENT ONLY 99 0444'.

Onan
ELECTRIC GEN SET
MODEL AND SPEC NO. _____
SERIAL NO. _____
IMPORTANT. ALWAYS GIVE ABOVE NOS.
WHEN ORDERING PARTS
A.C. VOLTS _____ PH _____
K.V.A _____ KW _____
P.F. _____ AMPS _____ Hz _____
D.C. VOLTS _____ AMPS _____
WATTS _____
R.P.M. _____ BAT. _____
MANUFACTURED BY ONAN DIVISION
OF ONAN CORPORATION
MINNEAPOLIS MINNESOTA U.S.A.
FOR ELECT. EQUIPMENT ONLY
99 0444

For handy reference, insert YOUR generating set 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 LK Electric 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 below the illustration. Parts illustrations are typical. Using the MODEL and SPEC NO. from the set 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 set sides are determined by FACING the engine end (front) of the set.

ELECTRIC SET DATA TABLE

★ MODEL AND SPEC NO.	TYPE OF STARTING	ELECTRICAL OUTPUT				PARTS KEY NO.
		WATTS	VOLTS**	HERTZ	RPM	
2.0LK-1M/*	MANUAL	2000	120	60	1800	1
2.5LK-1M/*	MANUAL	2500	120	60	1800	1
1.5LK-51M/*	MANUAL	1500	120	60	1500	1
1.7LK-51M/*	MANUAL	1700	120	50	1500	1
2.0LK-2M/*	MANUAL	2000	240	60	1800	2
2.5LK-2M/*	MANUAL	2500	240	60	1800	2
1.5LK-52M/*	MANUAL	1500	240	50	1500	2
1.7LK-52M/*	MANUAL	1700	240	50	1500	2
2.0LK-3M/*	MANUAL	2000	120/240	60	1800	3
2.5LK-3M/*	MANUAL	2500	120/240	60	1800	3
1.5LK-53M/*	MANUAL	1500	120/240	50	1500	3
1.7LK-53M/*	MANUAL	1700	120/240	50	1500	3
2.0LK-1R/*	REMOTE	2000	120	60	1800	5
2.5LK-1R/*	REMOTE	2500	120	60	1800	5
1.5LK-51R/*	REMOTE	1500	120	50	1500	5
1.7LK-51R/*	REMOTE	1700	120	50	1500	5
2.0LK-2R/*	REMOTE	2000	240	60	1800	6
2.5LK-2R/*	REMOTE	2500	240	60	1800	6
1.5LK-52R/*	REMOTE	1500	240	50	1500	6
1.7LK-52R/*	REMOTE	1700	240	50	1500	6
2.0LK-3R/*	REMOTE	2000	120/240	60	1800	7
2.5LK-3R/*	REMOTE	2500	120/240	60	1800	7
1.5LK-53R/*	REMOTE	1500	120/240	50	1500	7
1.7LK-53R/*	REMOTE	1700	120/240	50	1500	7

* - Spec Letter advances with manufacturing changes (A to B, B to C, etc.).

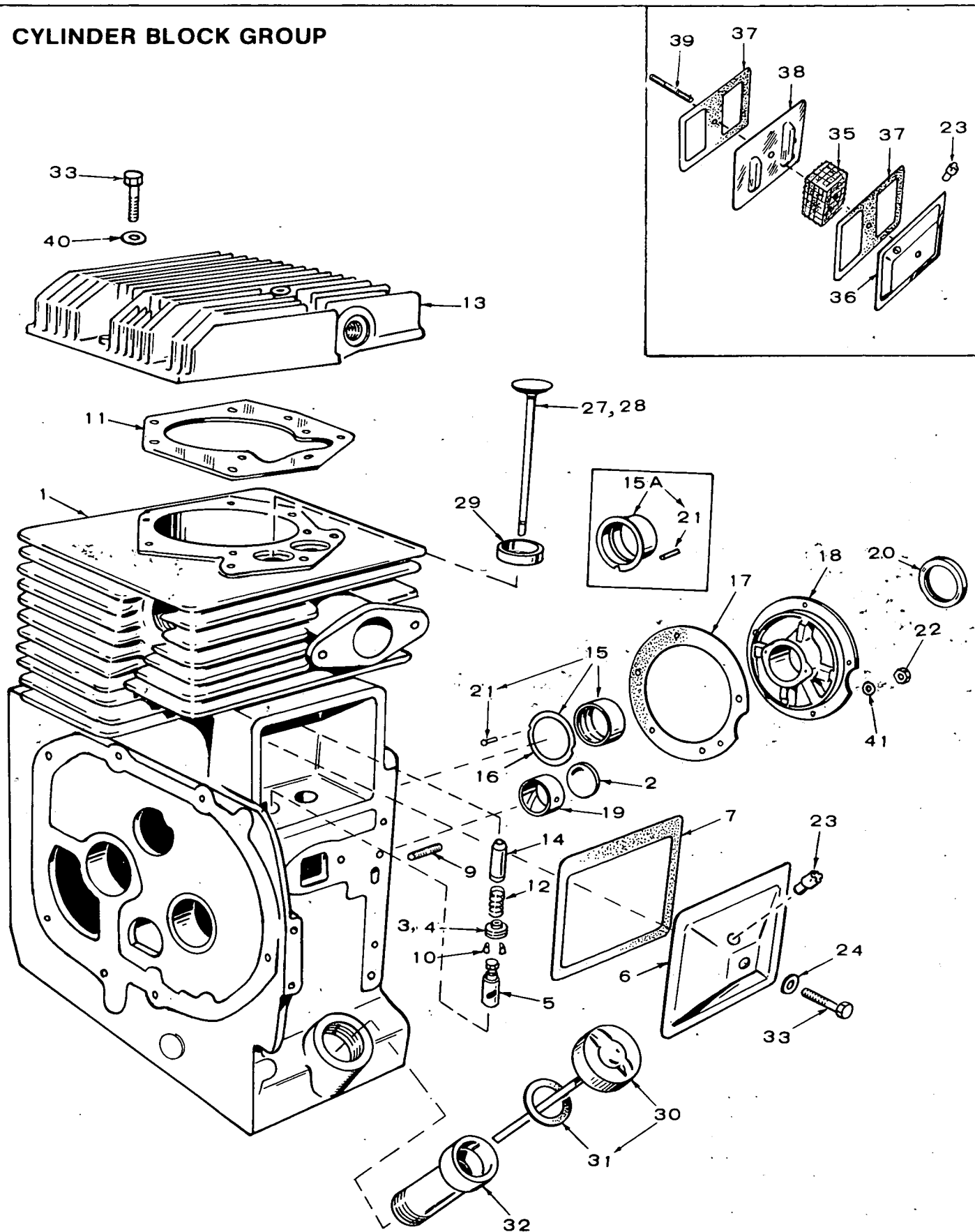
** - Reference to 120, 240, and 120/240 volt also applies to 115, 230, and 115/230 volt.

★ - New model designations shown, begin during 1969. Previous designations did not use a decimal in the KW rating. EXAMPLE: 2.0LK was formerly 2LK and 2.5 LK was formerly 205LK.

Also, previously a V was used in the model to designate Vacu-Flo cooling.

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

CYLINDER BLOCK GROUP

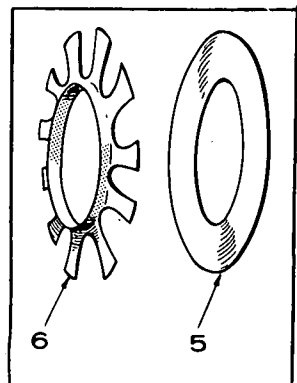
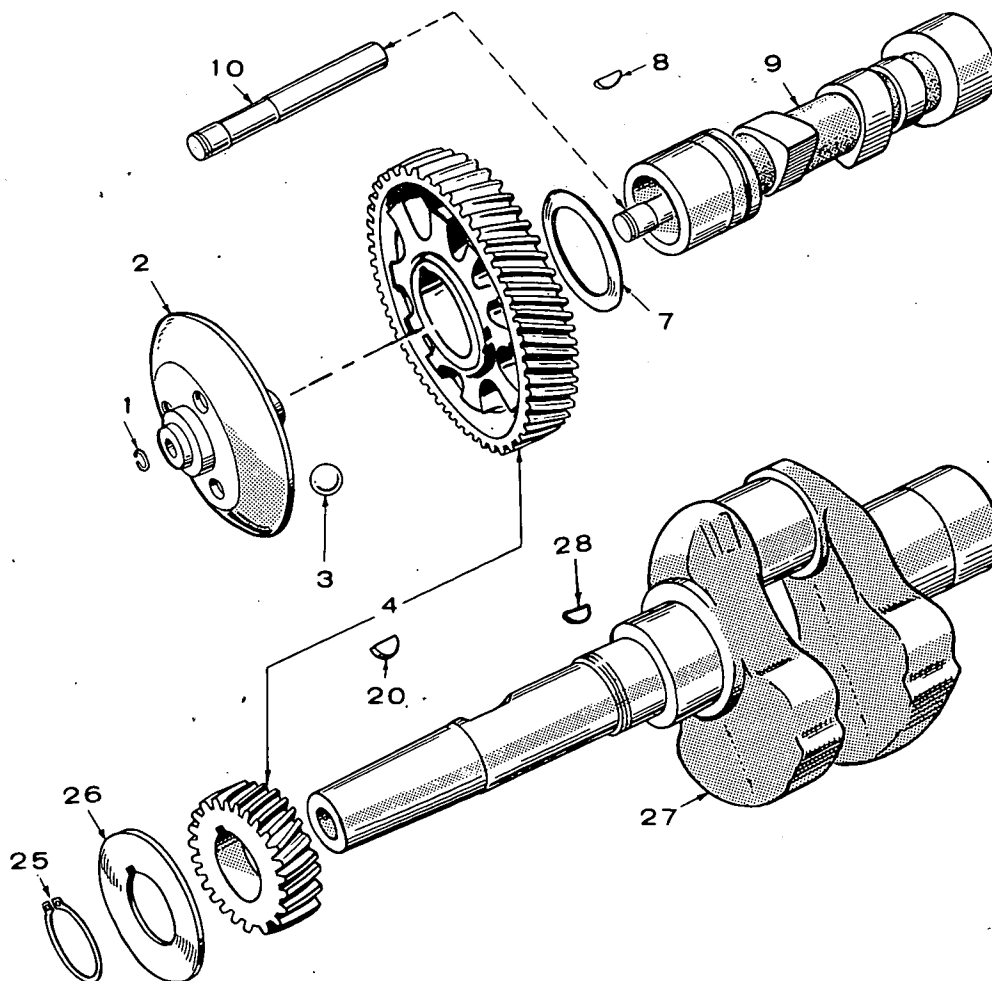
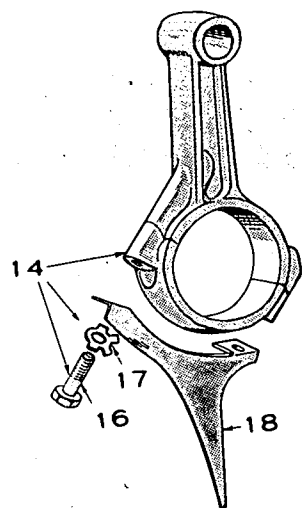
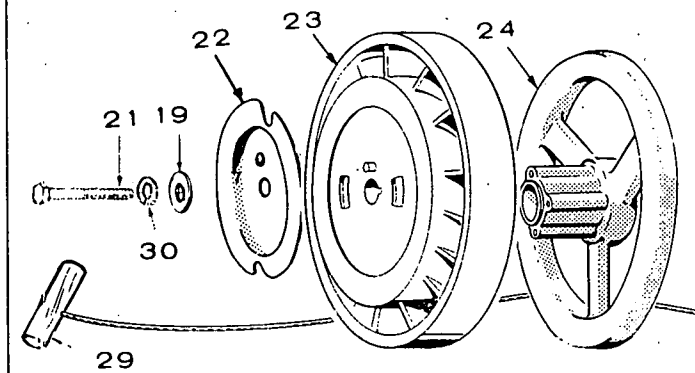
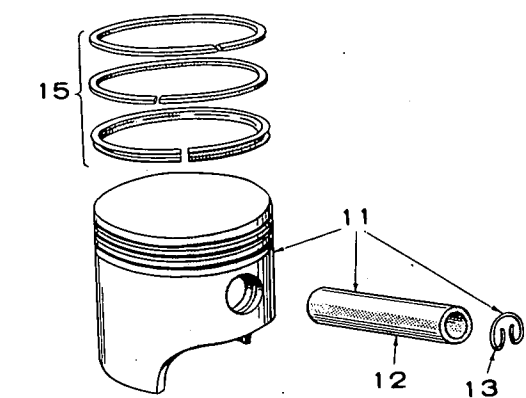


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	110-1622	1	Block Assembly, Cylinder (Includes Parts Marked *)
2	517-0048	1	*Plug, Expansion - Camshaft
3	110-0904	1	Rotocap, Valve - Exhaust
4	110-0893	1	Retainer, Valve Spring - Intake
5	115-0006	2	Tappet, Valve
6	110-1595	1	*Cover, Valve Compartment
7	110-0667	1	Gasket, Valve Cover
9	STUD, REAR BEARING PLATE MOUNTING		
	520-0114	4	5/16 x 1-5/16"
	520-0532	1	5/16 x 1-3/16"
10	110-0639	4	Lock, Valve and Spring Retainer
11	110-0892	1	Gasket, Cylinder Head
12	110-0539	2	Spring, Valve
13	HEAD, CYLINDER		
	110-0891	1	Standard Compression (Gasoline Fuel)
	110-0883	1	Hi-Compression (Gaseous Fuel) - Optional
14	110-0902	2	*Guide, Valve
15	BEARING, CRANKSHAFT - BEGIN SPEC D		
	101-0420	2	Standard
	101-0420-02	2	.002" Undersize
	101-0420-10	2	.010" Undersize
	101-0420-20	2	.020" Undersize
	101-0420-30	2	.030" Undersize
15A	BEARING, CRANKSHAFT - SPEC A THRU C		
	101-0181	2	Standard
	101-0181-02	2	.002" Undersize
	101-0181-10	2	.010" Undersize
	101-0181-20	2	.020" Undersize
	101-0181-30	2	.030" Undersize
16	104-0575	2	*Washer, Crankshaft, Bearing Thrust - Begin Spec D
17	101-0115	1	*Gasket Kit, Bearing Plate
18	PLATE, REAR BEARING (Excludes Bearing)		
	101-0259	1	Spec A through C
	101-0398	1	Begin Spec D
19	101-0367	2	*Bearing, Camshaft Front and Rear (Precision)
20	509-0041	1	Seal, Bearing Plate

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
21	516-0072	4	*Pin, Main Bearing Stop (2 only Spec A thru C)
22	110-0445	5	*Nut, Bearing Plate Stud
23	123-0486	1	Valve, Breather
24	526-0063	1	Washer (Copper), Valve Compartment Cover
27	110-0881	1	Valve, Intake
28	110-0880	1	Valve, Exhaust (Stellite)
29	INSERT, EXHAUST VALVE SEAT (Stellite)		
	110-0872	1	Standard
	110-0872-02	1	.002" Oversize
	110-0872-05	1	.005" Oversize
	110-0872-10	1	.010" Oversize
	110-0872-25	1	.025" Oversize
30	123-0519	1	Cap & Indicator, Oil Fill
31	123-0191	1	Gasket, Oil Fill Cap
32	123-0517	1	Tube, Oil Fill
33	SCREW, HEX HEAD CAP		
	110-0879	4	Cylinder Head (5/16-18 x 1-1/4")
	114-0022	5	Cylinder Head (5/16-18 x 1-3/4")
	800-0014	1	Valve Compartment (1/4-20 x 2-3/4")
35	123-0996	1	Element, Valve Compartment Filter - Optional
36	110-1782	1	Cover, Valve Compartment - Optional
37	110-1791	2	Gasket, Valve Compartment - Optional
38	110-1783	1	Baffle, Valve Compartment - Optional
39	520-0634	1	Stud, Valve Compartment Cover - Optional
40	526-0122	9	Washer, Flat (5/16") - Cylinder Head
41	851-0005	5	*Washer, Lock (5/16") - Bearing Plate

* - Included in Cylinder Block Assembly.

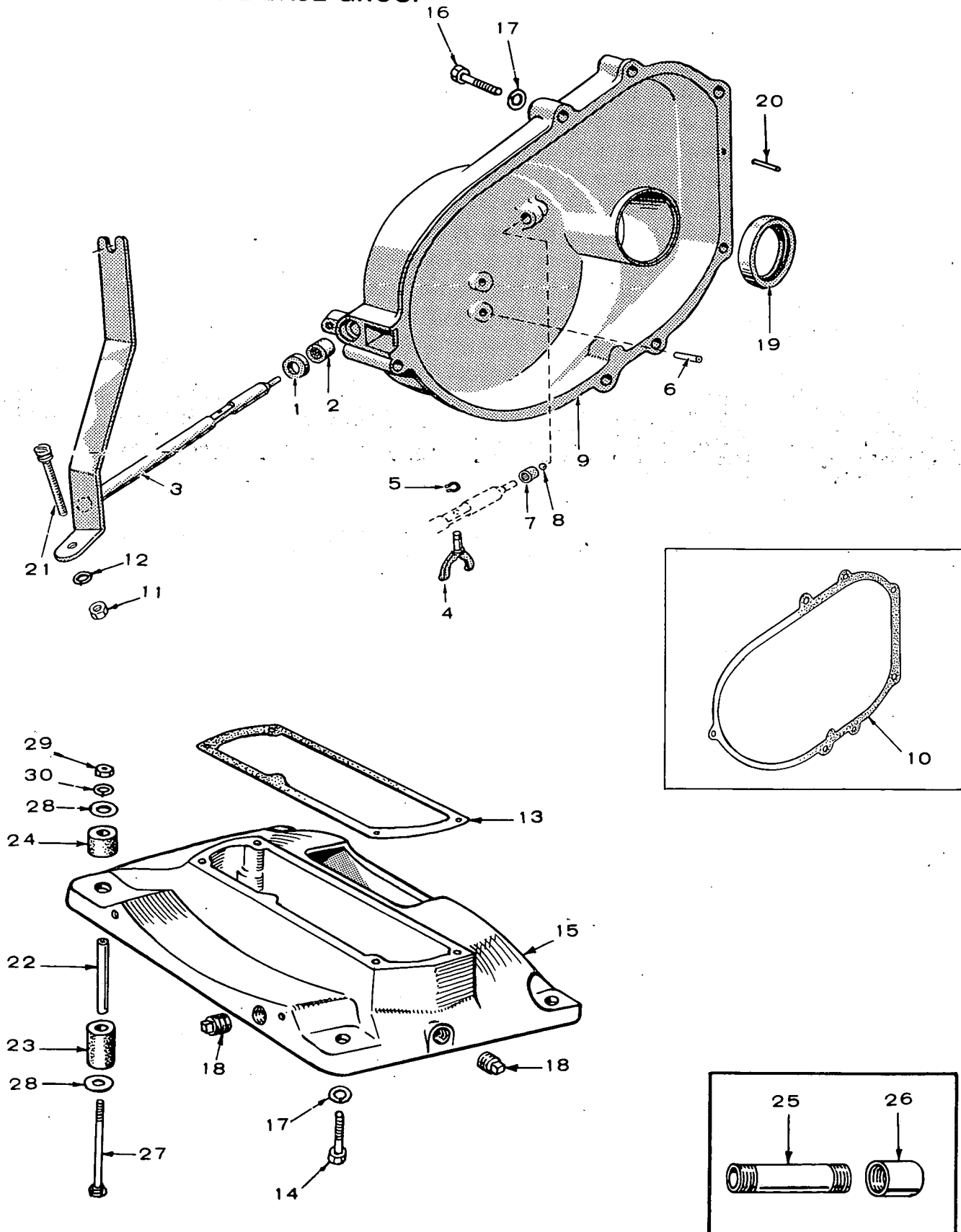
CRANKSHAFT, FLYWHEEL, CAMSHAFT AND PISTON GROUP



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	105-0353	1	Gear Set, Timing (Includes 1 ea. Flyball Spacer and Plate)
5	150-0077	1	Plate, Governor Ball - Spec A through D and Begin Serial #800755
6	SPACER, GOVERNOR FLY BALL		
	150-0085	1	Spec A through D
	150-1257	1	Begin Serial #800755
7	105-0004	1	Washer, Camshaft Gear Thrust
8	515-0001	1	Key, Camshaft Gear Mounting
9	105-0141	1	Camshaft (Includes Center Pin)
10	150-0075	1	Pin, Center, Camshaft
11	PISTON AND PIN (Includes Retainer Rings)		
	112-0071	1	Standard
	112-0071-05	1	.005" Oversize
	112-0071-10	1	.010" Oversize
	112-0071-20	1	.020" Oversize
	112-0071-30	1	.030" Oversize
	112-0071-40	1	.040" Oversize
12	PIN, PISTON		
	112-0069	1	Standard
13	112-0003	2	Ring, Piston Pin Retainer
14	ROD, CONNECTING (Includes Lock Washers and Screws)		
	114-0107	1	Standard
	114-0107-10	1	.010" Undersize
	114-0107-20	1	.020" Undersize
	114-0107-30	1	.030" Undersize
15	RING SET, PISTON		
	113-0087	1	Standard
	113-0087-05	1	.005" Oversize
	113-0087-10	1	.010" Oversize
	113-0087-20	1	.020" Oversize
	113-0087-30	1	.030" Oversize
	113-0087-40	1	.040" Oversize

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
16	110-0284	2	Screw, Hex Cap - Connecting Rod Cap
17	114-0059	2	Washer, Lock - Connecting Rod
18	114-0108	1	Dipper, Oil
19	526-0017	1	Washer, Wheel Mounting
20	515-0002	1	Key, Wheel Mounting
21	104-0170	1	Screw, Wheel Mounting
22	SHEAVE, STARTER ROPE		
	160-0222	1	Key 1, 2, 3, Spec A Only
	192-0291	1	Key 5, 6, 7, Spec A Only - Pressure Cooled
	192-0308	1	All Pressure Cooled Sets - Begin Spec B
	192-0272	1	Vacu-Flo Cooled Sets - Key 5, 6, 7
23	FLYWHEEL, PRESSURE COOLED SETS		
	160-0202	1	Key 1, 2, 3, Spec A Only
	160-0650	1	Key 1, 2, 3, Spec B Only
	160-0975	1	Key 1, 2, 3, Begin Spec C
	134-0591	1	Key 5, 6, 7, Spec A and B
	134-1649	1	Key 5, 6, 7, Begin Spec C
24	FLYWHEEL, VACU-FLO COOLED SETS		
	104-0266	1	Key 5, 6, 7, Spec A and B
	104-0615	1	Key 5, 6, 7, Begin Spec C
25	518-0014	1	Lock, Crankshaft Gear, Washer
26	104-0043	1	Washer, Crankshaft Gear Retainer
27	104-0272	1	Crankshaft
28	515-0001	1	Key, Crankshaft Gear Mounting
29	192-0023	1	Rope, Manual Starting
30	850-0055	1	Washer, Lock (7/16")

GEAR COVER AND OIL BASE GROUP



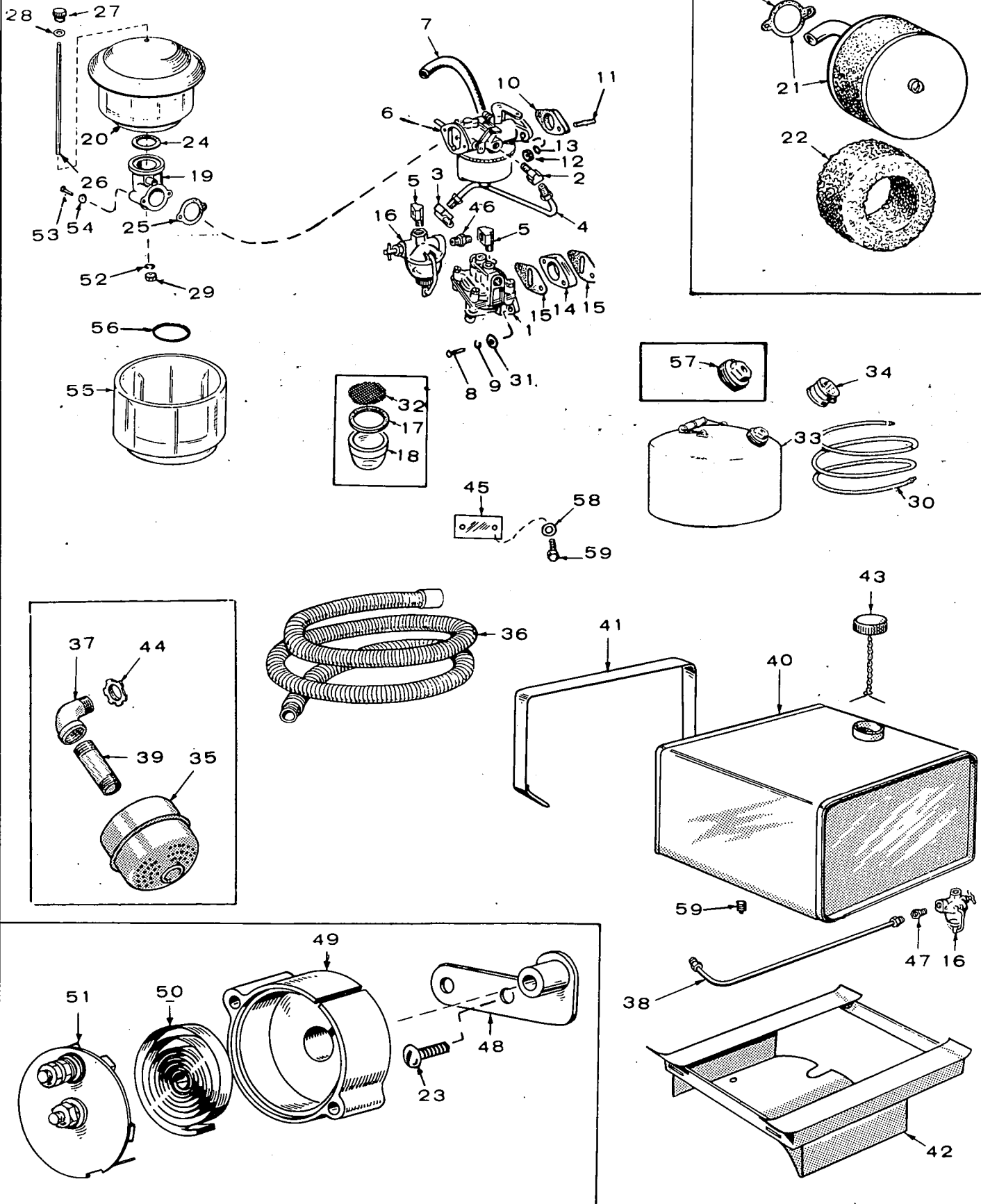
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	509-0008	1	*Seal, Oil, Governor Shaft
2	510-0013	1	*Bearing, Governor Shaft (Upper)
3	150-0610	1	*Shaft and Arm, Governor
4	150-0620	1	*Yoke, Governor Shaft
5	518-0129	1	*Ring, Yoke, Retainer
6	516-0130	1	*Pin, Governor Cup Stop (In Gear Cover)
7	510-0008	1	*Bearing, Governor Shaft (Lower)
8	510-0014	1	*Ball, Bearing, Governor Shaft
9	103-0160	1	*Cover Assembly, Gear (Includes Parts Marked *)
10	103-0011	1	Gasket, Gear Cover
11	870-0053	1	*Nut, Lock (10-32)
12	850-0030	1	*Washer, Lock (#10)
13	102-0107	1	Gasket, Oil Base Mounting
14	800-0056	4	Screw (3/8-16 x 2-1/2") - Oil Base to Block
15	102-0100	1	Base, Oil
16	SCREW, CAP - GEAR COVER MOUNTING		
	800-0034	1	5/16-18 x 2-1/4"
	800-0032	4	5/16-18 x 1-3/4"
17	WASHER, LOCK		
	850-0045	5	Gear Cover (5/16")
	850-0050	4	Oil Base (3/8")

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	505-0110	2	Plug, Oil Drain
19	509-0040	1	*Seal, Gear Cover
20	516-0011	2	Pin, Gear Cover (5/16 x 1-1/8")
21	150-0136	1	*Stud, Governor Sensitivity
22	402-0148	4	†Bushing, Spacer - Mounting Cushions
23	402-0146	4	†Cushion, Mounting - Lower
24	402-0147	4	†Cushion, Mounting - Upper
25	505-0076	1	Nipple, Oil Drain
26	505-0028	1	Coupling, Oil Drain
27	816-0114	4	†Bolt, Carriage (5/16-18 x 4-1/2") - Cushion Mounting
28	526-0076	8	†Washer, Flat (11/32" I.D. x 1-1/2" O.D. x 1/16" Thick)
29	862-0015	4	†Nut, Hex (5/16-18)
30	850-0046	4	†Washer, Lock (5/16")
	402-0149	4	Cushion Assembly, Mounting (Includes Parts Marked †)

* - Included in Gear Cover Assembly.

† - Included in Mounting Cushion Assembly.

FUEL SYSTEM GROUP

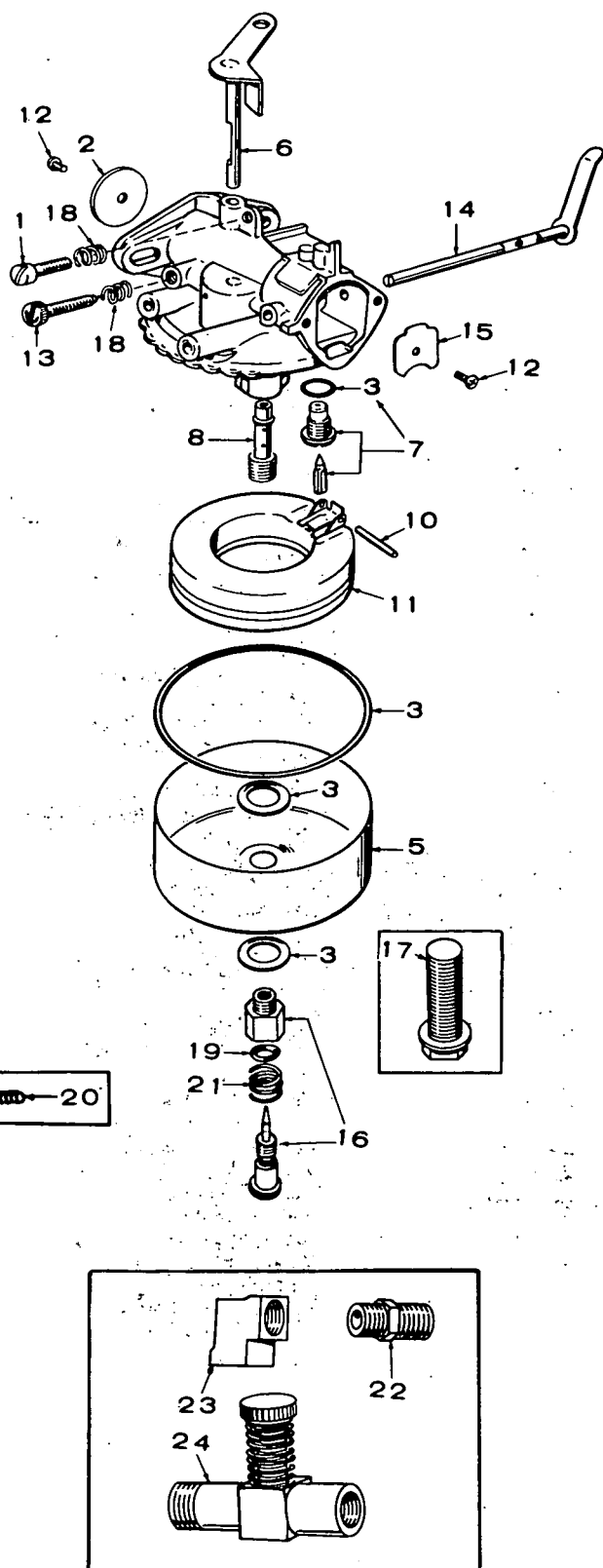


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	149-0526	1	Repair Kit, Fuel Pump - Key 5, 6, 7
1	149-0693	1	Pump, Fuel - Key 5, 6, 7
2	502-0002	1	Elbow, Carburetor Inlet
3	502-0002	1	Elbow, Fuel Pump Outlet - Key 5, 6, 7
4	LINE, FUEL PUMP TO CARBURETOR - KEY 5, 6, 7		
	149-0614	1	Spec A through D
	149-1112	1	Begin Spec E
5	502-0020	2	Elbow (1) Fuel Filter (1) Fuel Pump Inlet - Key 5, 6, 7
6	CARBURETOR, GASOLINE		
	146-0130	1	Key 1, 2, 3 - Spec A thru D
	146-0092	1	Key 1, 2, 3 - Begin Spec E
	146-0131	1	Key 5, 6, 7 - Spec A thru D
	146-0093	1	Key 5, 6, 7 - Begin Spec E
7	503-0271	1	Hose, Breather
8	815-0222	2	Screw, Fillister Head - Fuel Pump Mounting
9	850-0040	2	Washer, Lock (1/4") - Fuel Pump Mounting
10	145-0110	1	Gasket, Carburetor Mounting
11	STUD, CARBURETOR MOUNTING		
	520-0363	2	Spec A through D
	520-0632	2	Begin Spec E
12	868-0001	2	Nut (1/4-28) - Carburetor Mounting
13	853-0013	2	Washer, Shakeproof (1/4)
14	149-0045	1	Spacer, Pump Mounting - Key 5, 6, 7
15	149-0003	2	Gasket, Pump Mounting - Key 5, 6, 7
16	149-0079	1	Filter, Fuel - All Models
17	149-0149	1	Gasket, Filter Bowl - All Models
18	149-0150	1	Bowl, Fuel Filter - All Models
19	140-0493	1	Adapter, Air Cleaner
20	140-0441	1	Cleaner Assembly, Air - Oil Bath - Begin Spec C (Optional Spec A and B)
21	140-0397	1	Cleaner, Air - Dry - Spec A and B (Optional Begin Spec C)
22	140-0408	1	Element, Air Cleaner - Spec A and B (Optional Begin Spec C)
23	815-0190	2	Screw (8-32 x 3/8") - Adapter Mounting
24	140-0443	1	Gasket, Air Cleaner - Begin Spec C (Optional Spec A and B)
25	145-0111	1	Gasket, Adapter to Carburetor
26	520-0538	1	Stud, Air Cleaner - Begin Spec C (Optional Spec A and B)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
27	140-0587	1	Nut, Air Cleaner - Plastic - Begin Spec C (Optional Spec A and B)
28	850-0030	1	Washer, Lock (#10)
29	870-0053	2	Nut, Hex (10-32) - Air Cleaner Stud
30	501-0007	1	Line, Fuel (Flexible) - Key 5, 6, 7
31	526-0063	2	Washer (Copper), Pump Mounting - Key 5, 6, 7
32	149-0202	1	Screen, Fuel Filter - All Models
33	415-0126	1	Tank, Fuel - Key 5, 6, 7
34	415-0124	1	Cap, Rain - Fuel Tank - Key 5, 6, 7
35	155-0484	1	Muffler, Exhaust
36	155-0127	1	Tube, Exhaust (Flexible) - Includes Coupling - Key 5, 6, 7
37	505-0003	1	Elbow, Pipe - Exhaust
38	159-0536	1	Line, Filter to Carburetor - Key 1, 2, 3
39	505-0087	1	Nipple, Exhaust (1 x 3")
39	505-0089	1	Nipple, Exhaust (1 x 5") - All Housed Sets
40	159-0530	1	Tank, Fuel, Mounted - Key 1, 2, 3
41	159-0537	2	Strap, Mounted Fuel Tank - Key 1, 2, 3
42	159-0531	1	Bracket, Mounted Fuel Tank - Key 1, 2, 3
43	159-0020	1	Cap, Mounted Fuel Tank - Key 1, 2, 3
44	331-0053	1	Locknut, Exhaust Elbow
45	149-0136	1	Cover, Fuel Pump Hole (Block)
46	502-0032	1	Nipple, Fuel Filter
47	502-0003	1	Connector, Fuel Filter Line - Key 1, 2, 3
48	ADAPTER, ELECTRIC CHOKE - KEY 5, 6, 7		
	153-0196	1	Spec A through D
	153-0420	1	Begin Spec E
49	153-0058	1	Bracket, Electric Choke - Key 5, 6, 7
50	153-0017	1	Element, Choke Bimetal - Key 5, 6, 7
51	153-0113	1	Cover Assembly, Choke - 12 Volt Element - Key 5, 6, 7
52	854-0010	1	Washer, Lock (#10)
53	812-0082	2	Screw (8-32 x 3/4") - Adapter Mounting
54	850-0025	2	Washer, Lock (#8)
55	140-0469	1	Cup, Oil Bath (Plastic)
56	509-0135	1	Seal, "O" Ring
57	415-0313	1	Cap, Fuel Tank
58	526-0201	2	Washer, Flat (Fuel Pump Hole Cover)
59	812-0148	2	Screw, Round Head (Fuel Pump Hole Cover)

* - See Separate Group for Components.

CARBURETOR (WALBRO) PARTS GROUP (BEGIN SPEC E)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
CARBURETOR, GASOLINE			
149-0092	1	Key 1, 2, 3	
149-0093	1	Key 5, 6, 7	
CARBURETOR, GAS-GASOLINE			
†	1	Manual Choke Units	
146-0132	1	Electric Choke Units	
146-0127	1	Carburetor, Gas	
146-0123	1	Kit, Repair - Carburetor (Includes Parts Marked *), Gasoline & Gas-Gasoline Units	
1	146-0122	1	Screw, Throttle Stop
2	146-0119	1	Valve, Throttle
3	146-0124	1	*Gasket Kit, Carburetor
5	146-0118	1	Bowl, Fuel
6	146-0112	1	Shaft Assembly, Throttle
7	146-0115	1	*Float Valve, Seat and Gasket Assembly (Gasoline & Gas-Gasoline Carb.) - Not used on Rough Service Carburetors
7	146-0145	1	Float Valve, Seat, Spring and Gasket Assembly - For Rough Service Carburetors
8	146-0113	1	Nozzle (Gasoline & Gas-Gasoline Carburetors)
10	146-0111	1	*Shaft, Float (Gasoline & Gas-Gasoline Carburetors)
11	146-0110	1	Float Assembly (Gasoline & Gas-Gasoline Carburetors)
12	146-0109	2	Screw & Washer (One only for Gas Carburetors)
13	146-0116	1	*Needle, Idle (Gasoline & Gas-Gasoline Carburetors)
14	SHAFT ASSEMBLY, CHOKE (Gasoline Carburetor)		
	146-0108	1	Manual Choke
	146-0107	1	Electric Choke (Gasoline Carburetor)
	146-0106	1	Electric Choke (Gas-Gasoline Carburetors)
15	VALVE, CHOKE (Gasoline Carburetors)		
	146-0105	1	Manual Choke
	146-0104	1	Electric Choke
16	146-0102	1	*Needle Assembly, Power (Gasoline & Gas-Gasoline Carburetor)
17	146-0103	1	Screw, Bowl Retainer (Gas Carburetor)
18	146-0121	2	Spring, Throttle Stop Screw and Idle Screw
19	146-0120	1	Seal, "O" Ring - High Speed Needle (Gasoline & Gas-Gasoline Carburetor)
20	146-0114	1	Spring, Choke Stop (Gasoline & Gas-Gasoline Carburetors with Manual Choke)
21	146-0117	1	Spring, High Speed Needle (Gasoline & Gas-Gasoline Carburetor)
22	502-0082	1	Nipple, Gas (Gas or Gas-Gasoline)
23	502-0055	1	Elbow, Gas (Gas or Gas-Gasoline)
24	148-0178	1	Adjustment Assembly, Gas (Gas or Gas-Gasoline)

* - Included in Repair Kit.

† - Order by description, giving complete Model, Spec and Serial Number.

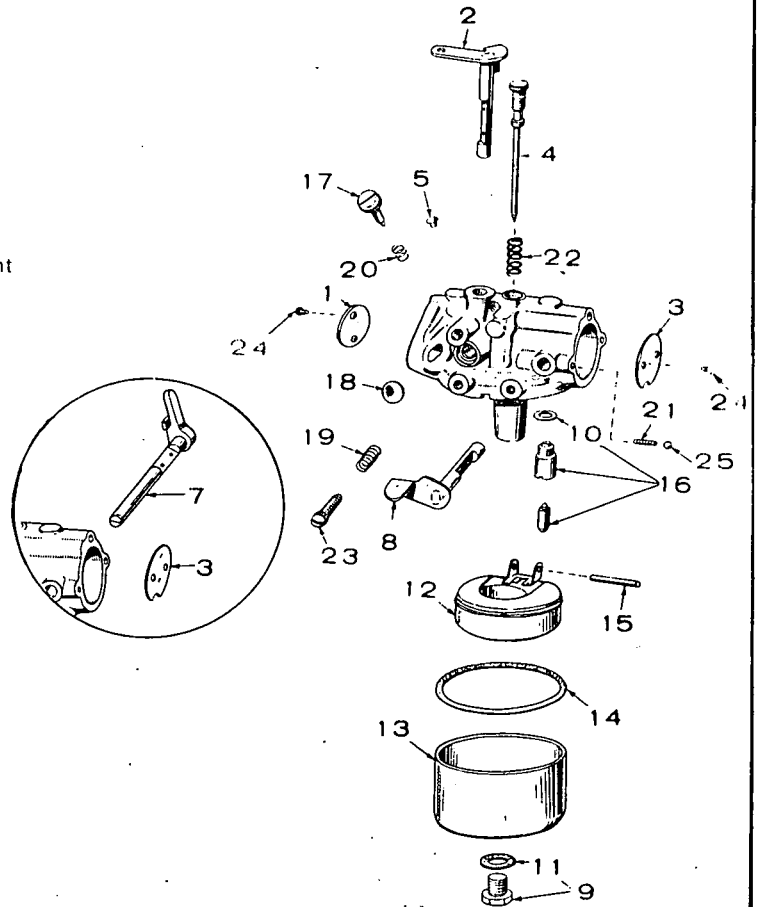
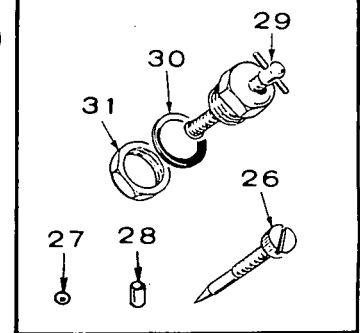
CARBURETOR (CARTER) PARTS GROUP (SPEC A THROUGH D)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
CARBURETOR - REPLACEMENT			
	146-0130	1	Gasoline - Key 1, 2, 3
	146-0131	1	Gasoline - Key 5, 6, 7
	146-0127	1	Gas (only) Fuel
	146-0128	1	Gas-Gasoline - Key 1, 2, 3
	146-0129	1	Gas-Gasoline - Key 5, 6, 7
	143-0081	1	£Kit, Repair (Includes Parts Marked +)
	143-0080	1	£Kit, Gasket (Includes Parts Marked *)
1	143-0097	1	Valve, Throttle
2	143-0098	1	Shaft and Lever, Throttle
3	143-0099	1	£Valve, Choke
4	143-0078	1	£+Needle, Idle Jet and High Speed Adjustment
5	143-0030	1	Plug, Idle Passage
7	143-0100	1	£Shaft & Weight, Choke - Key 5, 6, 7 (Modification note: Customer must drill 3/16 diameter hole through weight at 9/32" from shaft center for choke lock pin for gas operation on Gas-Gasoline model.)
8	143-0101	1	£Shaft & Lever, Choke - Key 1, 2, 3
9	143-0118	1	£Screw and Gasket, Bowl
10	143-0015	1	*£+Gasket, Fuel Inlet Valve
11	143-0036	1	*£+Gasket, Bowl Screw
12	143-0105	1	£Float and Lever
13	143-0119	1	£Bowl
14	143-0077	1	*£+Gasket, Bowl Ring
15	143-0212	1	£Pin, Float Lever
16	143-0341	1	£+Valve, Fuel Inlet
17	143-0109	1	Screw, Idle Adjustment
18	143-0110	1	Plug, Welch
19	143-0111	1	Spring, Throttle Lever Adjusting Screw
20	143-0112	1	Spring, Idle Adjusting Screw
21	143-0113	1	£Spring, Choke Shaft - Key 1, 2, 3
22	143-0114	1	Spring, High Speed Adjusting Needle
23	143-0115	1	Screw, Throttle Lever Adjusting
24	812-0014	4	£+Screw, Round Head Machine (#3-48 x 3/16) - Choke and Throttle Valve Attaching
25	143-0117	1	£Ball, Choke Shaft - Key 1, 2, 3
26	148-0268	1	Needle, Valve (Gas only - carburetor)
27	517-0062	1	Plug, Drop Shot (Gas only Carburetor)
28	516-0120	2	Plug, Choke Shaft Holes - (Gas Only Carburetor)
29	148-0135	1	Lock Assembly, Carburetor Float - Gas-Gasoline Carburetor
30	148-0017	1	Gasket, Float Lock Mounting - Gas-Gasoline Carburetor
31	148-0038	1	Nut, Float Lock Mounting - Gas-Gasoline Carburetor

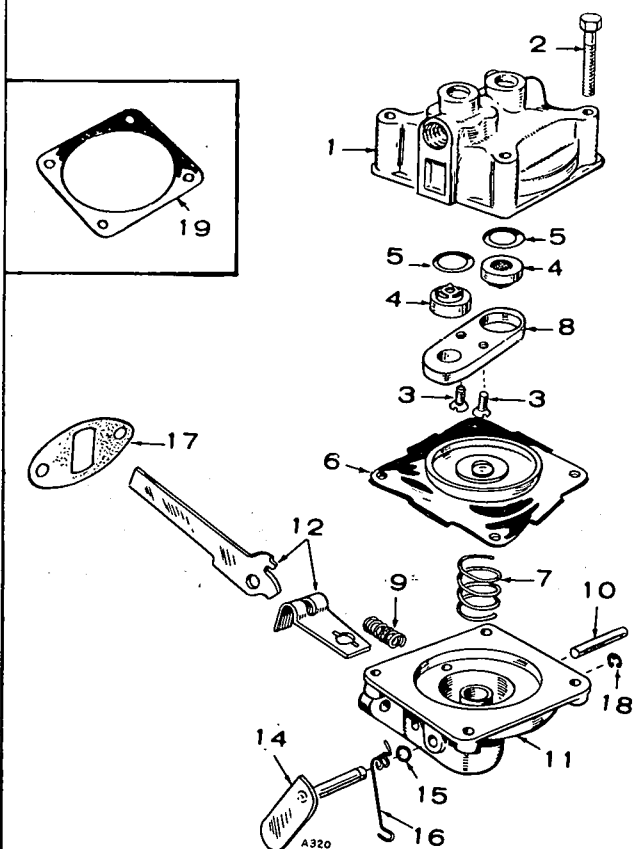
£ - Not used with gas only carburetor.

* - Parts contained in Gasket Kit 143-0080.

+ - Parts contained in Repair Kit 143-0081.

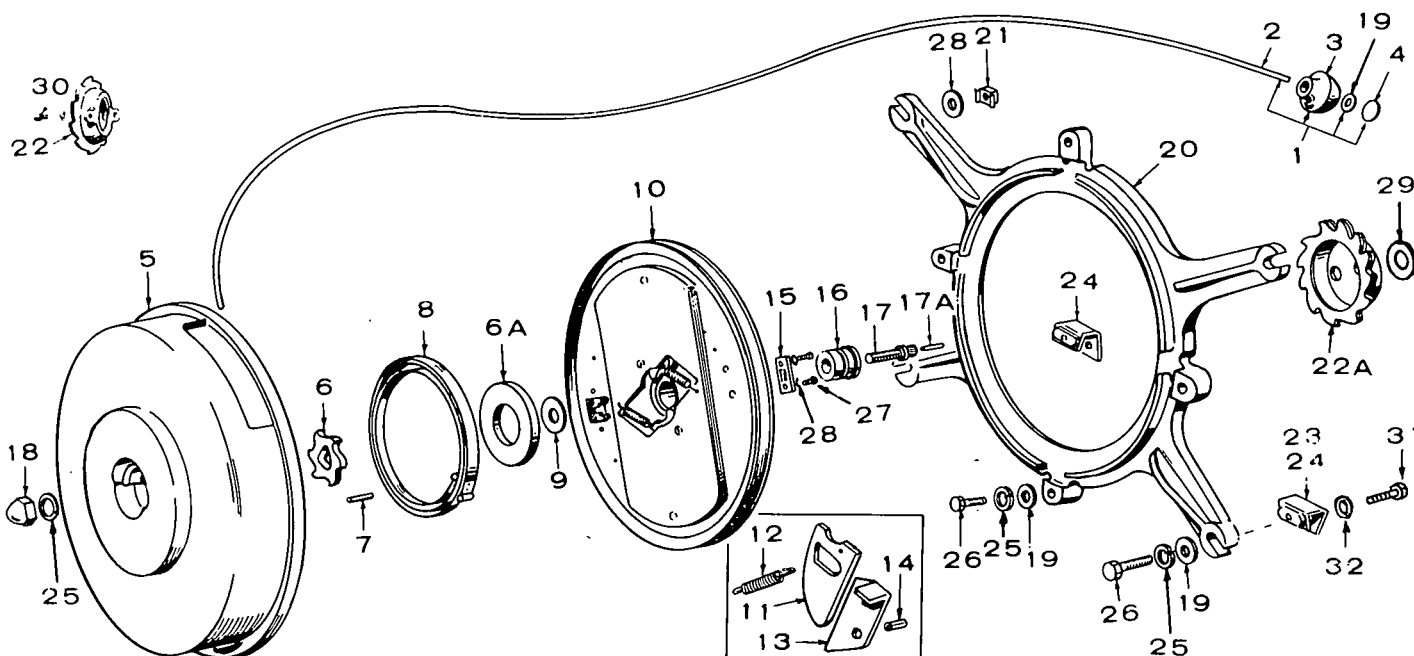


FUEL PUMP PARTS GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	149-0693	1	Pump, Fuel (Complete)
	149-0526	1	Repair Kit (Includes Parts Marked *)
1		1	Body (Not Sold Separately)
2	815-0148	4	Screw, Self Tapping (#8-32 x 7/8")
3	815-0147	2	Screw, Phillips Self Tapping (#6-32 x 5/8") - 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 (Sold Only as a Set)
13	149-0858	1	*Gasket, Diaphragm - Lower Side
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

* - Parts Included in 149-0526 Repair Kit.



READI-PULL STARTER GROUP

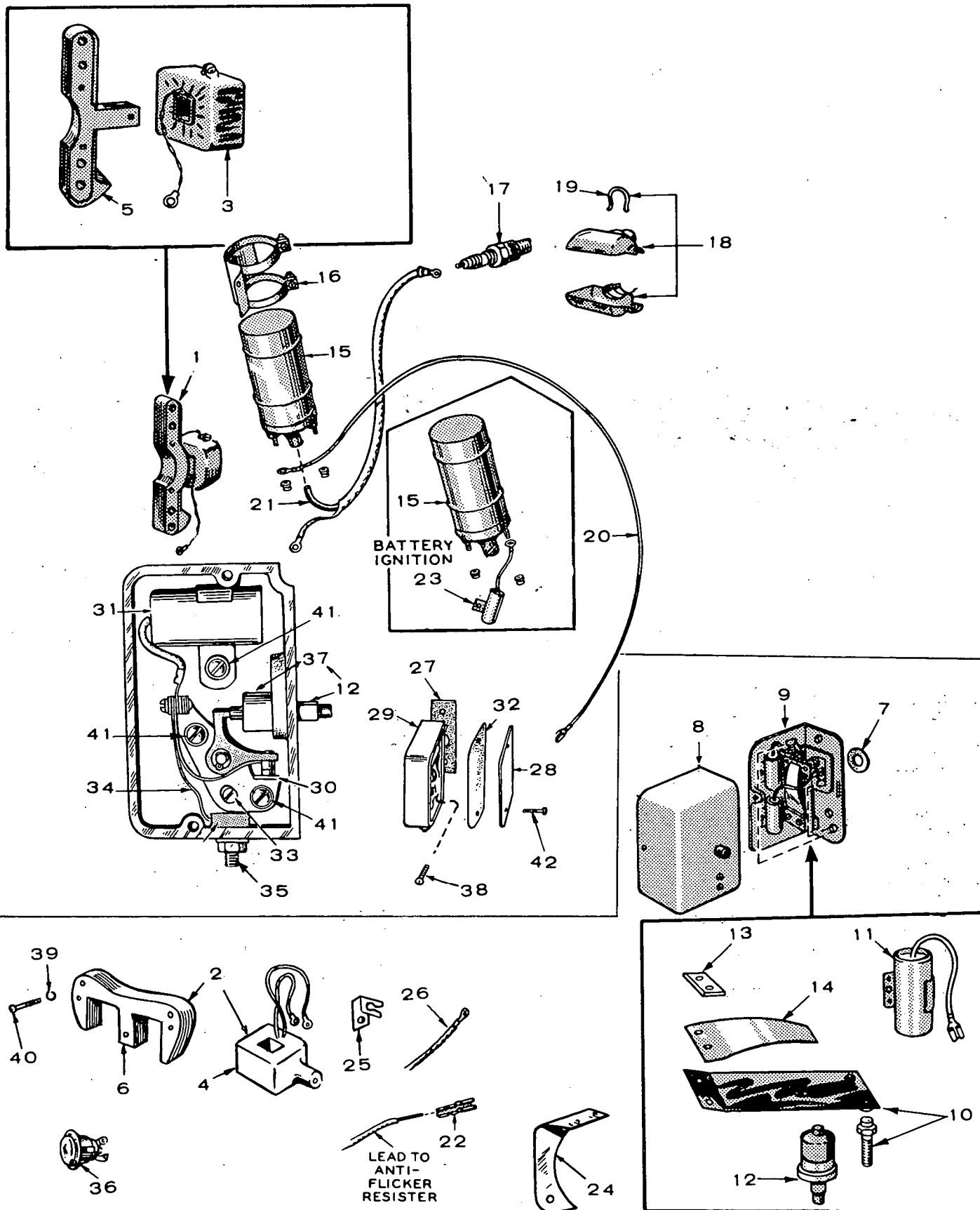
NOTE: Starter does not fit Vacu-Flo cooled sets.
Starter is optional on remote type sets.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
STARTER KIT - INCLUDES MOUNTING RING AND RATCHET WHEEL			
	192-0385	1	Begin Spec B
	192-0215	1	Spec A Only (NOTE: Also order #192-0294 & 192-0295 Brackets)
1	192-0045	1	Rope and Grip Assembly
2	192-0043	1	Rope, Starter, Less Grip, 83" Long
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
6A	526-0168	1	Washer, Spring Retainer
7	516-0138	1	Pin, Roll (3/16 x 9/16") - Recoil Spring
8	192-0039	1	Spring, Recoil
9	526-0123	1	Washer, Thrust
10	192-0180	1	Sheave Assembly, Rope (Includes Parts Marked *)
11	192-0172	2	*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, Socket-Head (3/8-16 x 1-1/2")
17A	516-0132	1	Pin, Spiral (Brass 1/8" x 5/8") Locating
18	862-0003	1	Nut, Bushing to Cover Screw

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
19	WASHER, FLAT		
	526-0180	4	Starter to Mounting Ring
	526-0169	1	Starter Rope Grip
	526-0130	2	Starter Ring to Blower Housing - Top (1/16" Thick)
	526-0158	4	Starter Ring to Blower Housing (1/8" Thick)
20	192-0186	1	Ring, Mounting, Starter to Blower Housing
21	870-0110	2	Nut, Speed Grip, Starter Ring to Blower Housing - Top
WHEEL RATCHET			
22	192-0170	1	Spec A Only
22A	192-0309	1	Begin. Spec B
23	192-0294	1	Bracket, Starter Mounting - Right Hand
24	192-0295	1	Bracket, Starter Mounting - Left Hand
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
28	526-0015	2	Washer, Flat - Rope Clamp Mounting
29	526-0014	1	Washer, Spacer
30	192-0218	2	Screw, Socket Head - Ratchet Wheel - Spec A Only
31	800-1004	2	Screw, Hex Head Starter Bracket Mounting
32	850-1040	2	Washer, Lock - Starter Bracket Mounting

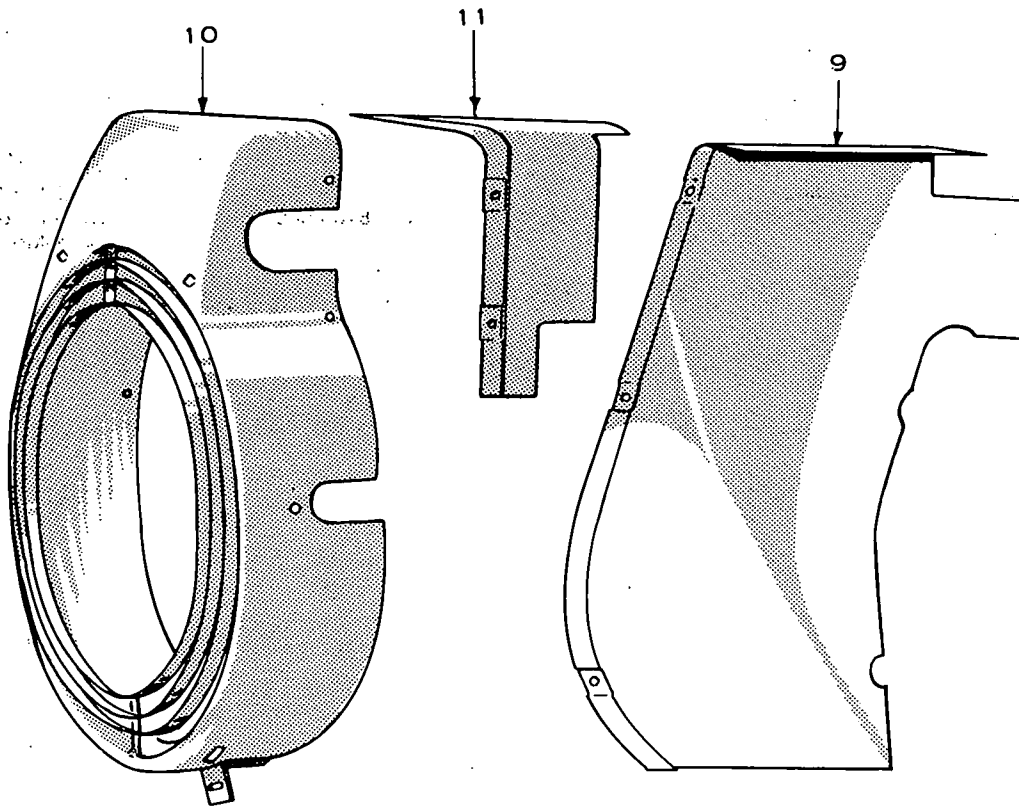
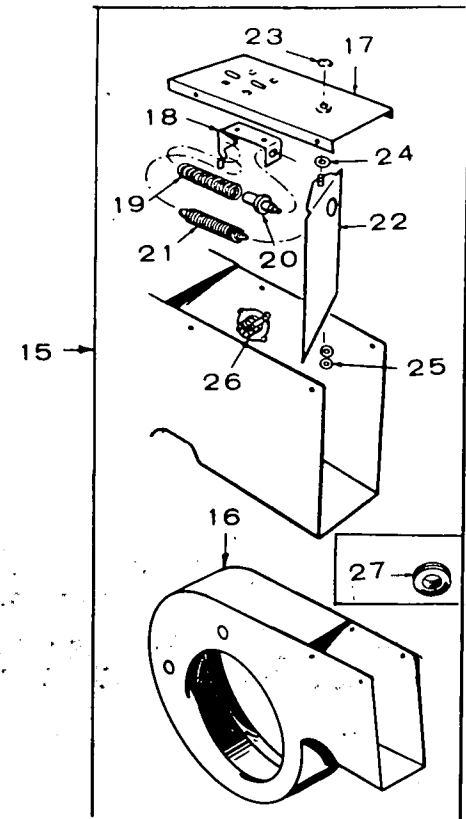
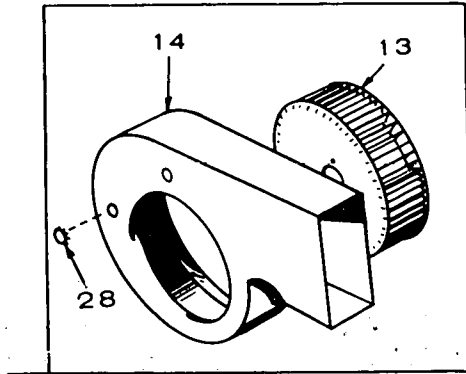
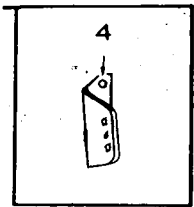
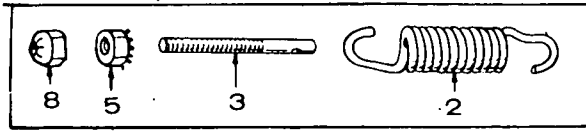
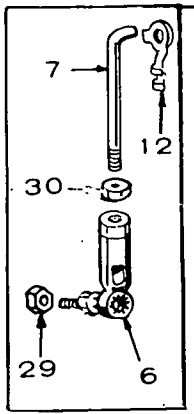
* - Included in #192-0180 Rope Sheave Assembly.

IGNITION AND ANTI-FLICKER GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	160-0722	1	Stator Assembly, Magneto, Key 1, 2, 3 - Spec A and B
2	160-1028	1	Magneto Assembly, Key 1, 2, 3 - Begin Spec C (Includes Spark Plug Cable)
3	160-0282	1	Coil, Magneto Stator, Key 1, 2, 3 - Spec A and B
4	160-1027	1	Coil, Magneto - Key 1, 2, 3 - Begin Spec C
5	160-0281	1	Pole Shoe, Magneto - Key 1, 2, 3 - Spec A and B
6	160-0749	1	Pole Shoe, Magneto - Key 1, 2, 3 - Begin Spec C
7	160-0515	1	Gasket, Breaker Box Mounting - Spec A through D
8	COVER, BREAKER BOX - SPEC A THROUGH D		
	160-0497	1	Key 5, 6, 7
	160-0510	1	Key 1, 2, 3
9	BOX ASSEMBLY, IGNITION BREAKER - LESS COVER		
	160-0498	1	Spec A and B
	160-0976	1	Spec C through D
10	160-0513	1	Contact Point Set - Dual - Ignition & Anti-Flicker - Spec A thru D (NOTE: Use the ignition contacts only Begin Spec C)
11	312-0100	1	Condenser - .05 Mfd. - Ignition - (Spec A and B, use 1 for Anti-Flicker)
12	160-0262	1	Plunger Assembly (Includes Plunger, Diaphragm and Guide)
13	166-0067	1	Strip, Breaker, Dampener
14	166-0049	1	Dampener, Breaker Spring
15	166-0278	1	Coil, Ignition - Key 1, 2, 3 - Spec A and B (Also all Key 5, 6, 7)
16	166-0433	1	Bracket, Coil Mounting - Spec A and B (Also Key 5, 6, 7 - Begin Spec C)
17	167-0241	1	Plug, Spark
18	167-0139	1	Shield, Spark Plug - Includes Clamp

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
19	167-0064	1	Clamp, Spark Plug Shield
20	334-0028	1	Lead (4 ft. piece of wire)
21	CABLE, SPARK PLUG		
	167-1296	1	Key 5, 6, 7 (Also Key 1, 2, 3 Spec A and B)
	167-1487	1	Key 1, 2, 3, Begin Spec C
22	332-0529	2	Terminal, Anti-Flicker Lead
23	312-0058	1	Condenser, 0.1 Mfd. - Ignition Coil - Key 5, 6, 7
24	160-0500	1	Bracket, Timing - Vacu-Flo Set - Key 5, 6, 7
25	167-0188	1	Clip, Spark Plug Cable - Key 1, 2, 3 - Begin Spec C
26	167-1486	1	Lead, High Tension - Ground - Key 1, 2, 3 - Spec C Only
27	160-1152	1	Gasket, Breaker Box Mtg. - Begin Spec E
28	160-0930	1	Cover, Breaker Box - Begin Spec E
29	160-0257	1	Box Assembly, Ignition Breaker - Includes Cover & Gasket - Begin Spec E
30	160-0002	1	Point Set, Breaker - Begin Spec E
31	312-0069	1	Condenser, Breaker Points - Begin Spec E
32	160-0150	1	Gasket, Breaker Box Cover - Begin Spec E
33	160-0075	1	Cam, Point Gap Adjusting - Begin Spec E
34	160-0428	1	Strap, Point Set to Terminal Block - Begin Spec E
35	160-0349	1	Block & Terminal Assembly, Breaker Box - Begin Spec E
36	313-0018	1	Switch, Stop - Key 1, 2, 3
37	160-1143	1	Diaphragm, Breaker Plunger - (For early models only)
38	802-0034	2	Screw (1/4-20 x 3/4) - Breaker Box Mounting
39	850-0040	2	Lockwasher, Stator Mounting
40	812-0155	2	Screw, Stator Mounting
41	518-0049	3	Screw (8-32 x 1/4")
42	812-0077	2	Screw (8-32 x 3/8") - Breaker Box Cover Mounting
43	850-0040	2	Washer, Lock - Breaker Box Mounting



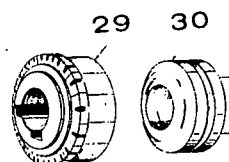
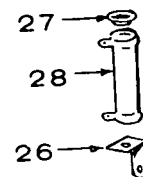
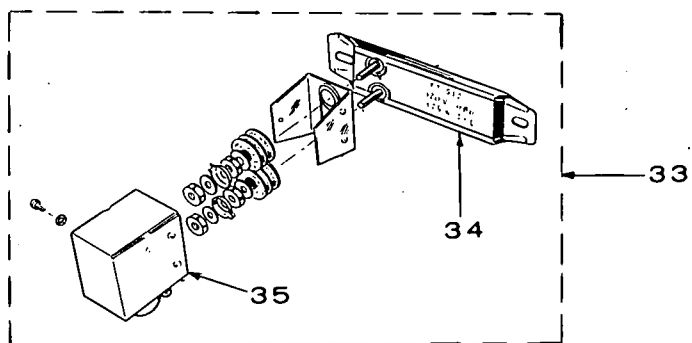
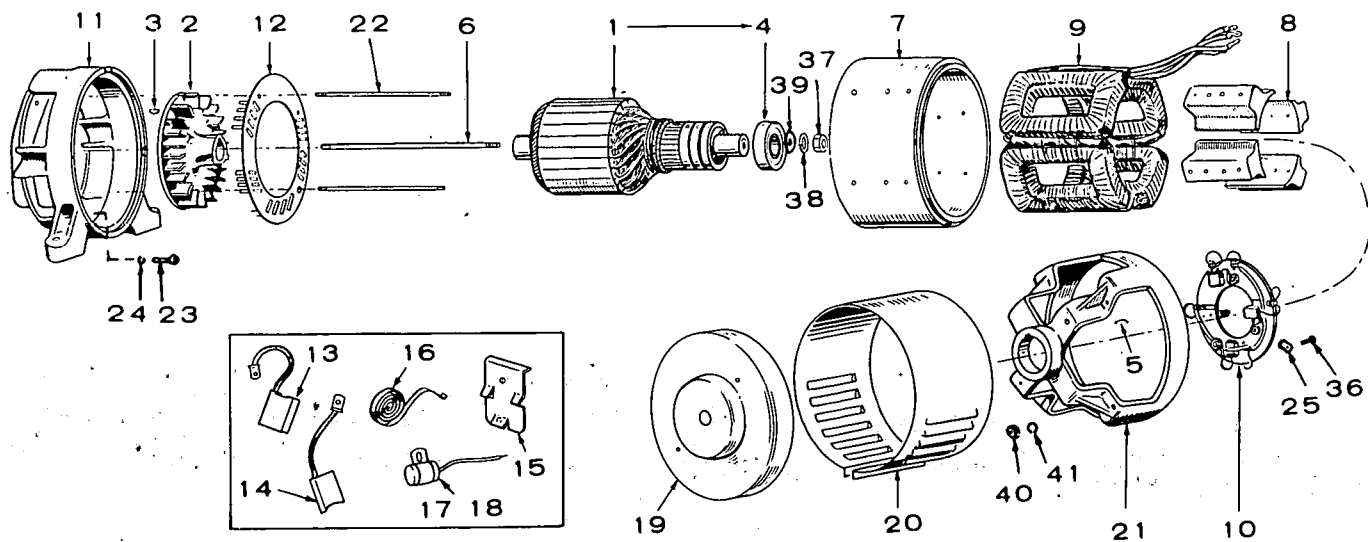
GOVERNOR AND HOUSING GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
2	150-0098	1	Spring, Governor
3	150-0096	1	Stud, Speed Adjustment
4	150-0611	1	Bracket, Speed Stud
5	870-0131	1	Nut, Speed Adjustment
6	150-0974	1	Joint, Ball
7	LINK, THROTTLE		
	150-0732	1	For Sets With Gasoline or Gas-Gasoline Carburetor
	150-0786	1	For Sets With Gas Only Carburetor
8	870-0188	2	Palnut, Locking
9	134-0584	1	Housing, Cylinder Air
10	HOUSING, BLOWER		
	134-0590	1	Pressure Cooled Sets (Prior to Serial 532241, Also order 192-0294 & 192-0295 Brackets)
	134-0618	1	Vacu-Flo Sets - Key 5, 6, 7
11	134-0586	1	Cover, Cylinder Air
12	518-0006	1	Clip, Governor Link to Carburetor
13	134-0565	1	Wheel, Blower - Vacu-Flo Set - Key 5, 6, 7
14	134-0564	1	Scroll, Vacu-Flo Set - Key 5, 6, 7

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
15	134-0816	1	Shutter Assembly, Discharge Air - Optional on Vacu-Flo Cooled Sets - Key 5, 6, 7 (Includes Parts Marked *)
16	134-0815	1	*Scroll, With Provision for Air Shutter
17	134-0661	1	*Plate, Vernatherm Element Mounting
18	134-0660	1	*Bracket, Vernatherm Element Mounting
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, Retainer Shutter Shaft
24	526-0102	1	*Washer, Flat - Large - Spacing
25	526-0016	3	*Washer, Flat - Small - Spacing
26	309-0002	1	*Switch, Hi-Temperature Cut-Off
27	508-0031	1	*Grommet, Rubber
28	517-0021	3	Button, Dot - (2) Air Scroll, (1) Timing Hole - Vacu-Flo Sets - Key 5, 6, 7
29	870-0131	1	Nut, Lock (10-32)
30	870-0053	1	Nut, Hex (10-32)
	405-1059	1	Anti-Vibration Kit (Canvas section to fit 3-1/4 x 10" duct)

* - Parts contained in Shutter Assembly.

GENERATOR GROUP



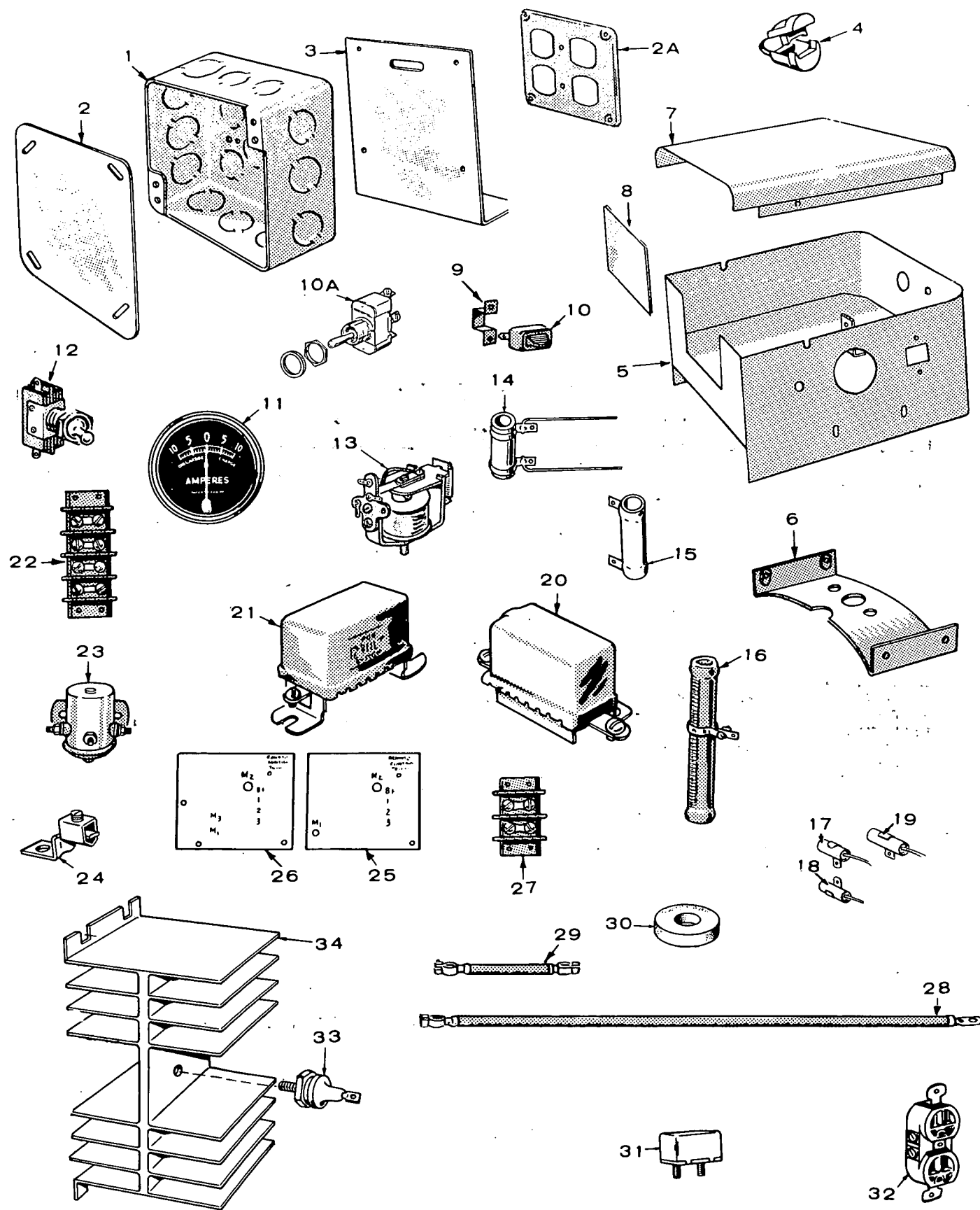
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1		1	Armature Assembly (Includes Parts Marked †)
2	205-0053	1	†Blower, Generator
3	515-0006	1	Key, Blower to Crankshaft
4	510-0047	1	†Bearing (Ball), Armature
5	232-0596	1	Clip, Bearing Stop
6	STUD, ARMATURE THROUGH		
	520-0408	1	Key 1, 2, 5, 6
	520-0527	1	Key 3, 7
7	210-0243	1	Frame Only, Generator (Machined & Drilled, Less Coils & Pole Shoes)
8	221-0086	4	Shoe, Pole - Field Coils
9		1	Coil Assembly, Field (Set of 4 Coils)
10	RIG ASSEMBLY, BRUSH		
	212-0294	1	Key 1, 2, 5, 6
	212-0295	1	Key 3, 7 - Spec A and B
	212-0296	1	Key 3, 7 - Begin Spec C
11	231-1006	1	Adapter, Generator to Engine
12	232-1256	1	Scroll, Air Baffle
13	BRUSH, COLLECTOR RING		
	214-0050	4	Key 1, 2, 5, 6
	214-0032	3	Key 3, 7 - Spec A and B
	214-0050	3	Key 3, 7 - Begin Spec C
14	BRUSH, COMMUTATOR		
	214-0061	4	Key 1, 2, 5, 6
	214-0030	4	Key 3, 7 - Spec A and B
	214-0061	4	Key 3, 7 - Begin Spec C
15	SPRING, BRUSH		
	212-1105	8	Key 1, 2, 5, 6
	212-1105	7	Key 3, 7 - Begin Spec C
16	SPRING, BRUSH KEY 3, 7 - SPEC A AND B		
	212-1004	3	Collector Ring
	212-1003	4	Commutator
17	312-0017	1	Condenser (.5 Mfd.) DC
18	CONDENSER (.1 Mfd.) AC		
	312-0058	1	Key 1, 2, 5, 6
	312-0058	2	Key 3, 7
19	211-0099	1	Cover, End Bell
20	BAND, END BELL		
	234-0002	1	Key 1, 2, 5, 6
	234-0005	1	Key 3, 7
21	BELL, END		
	211-0097	1	Key 1, 2, 5, 6
	211-0098	1	Key 3, 7
22	STUD, GENERATOR THROUGH		
	520-0337	2	Key 1, 2, 5, 6
	520-0329	2	Key 3, 7

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
23	800-0050	4	Screw (3/8-16 x 1") - Adapter Mounting
24	850-0050	4	Washer, Lock (3/8)
25	212-1214	4	Clamp, Brush Rig Assembly
26	304-0323	1	Bracket, Anti-Flicker Resistor Mounting - Spec A and B
27	304-0015	2	Washer, Centering - Resistor Mounting - Spec A and B
28	RESISTOR, ANTI-FLICKER - SPEC A AND B		
	304-0042	1	50 Hertz - Key 1, 2, 5 (Except Utility Models), 6
	304-0377	1	60 Hertz - Key 1, 2, 3, 5 (Except Utility Models, 6, 7
	304-0438	1	Key 5 (Utility Models)
29	203-0008	1	Commutator
30	COLLECTOR RING		
	204-0009	1	Key 1, 2, 5, 6
	204-0010	1	Key 3, 7
33	333-0137	1	Kit, Generator Heater
34	333-0135	1	Heater, Generator
35	333-0136	1	Cover, Heater Terminals
36	800-0004	4	Screw (1/4-20 x 5/8") - Brush Rig Mounting
37	862-0004	1	Nut, Hex (7/16-14) - Armature Stud
38	850-0055	1	Washer, Lock (7/16")
39	526-0032	1	Washer, Flat (7/16")
40	862-0015	2	Nut, Hex (5/16-18) - Generator Through Stud
41	850-0045	2	Washer, Lock (5/16")
42	809-0043	1	Screw, Round Head (#10 x 3/8" long) - Heater Cover Mounting
43	854-1007	1	Washer, Lock - 11/64" Internal Heater Cover Mounting

† - Included in Armature Assembly.

* - Order by description giving complete Model, Spec and
Serial Numbers.

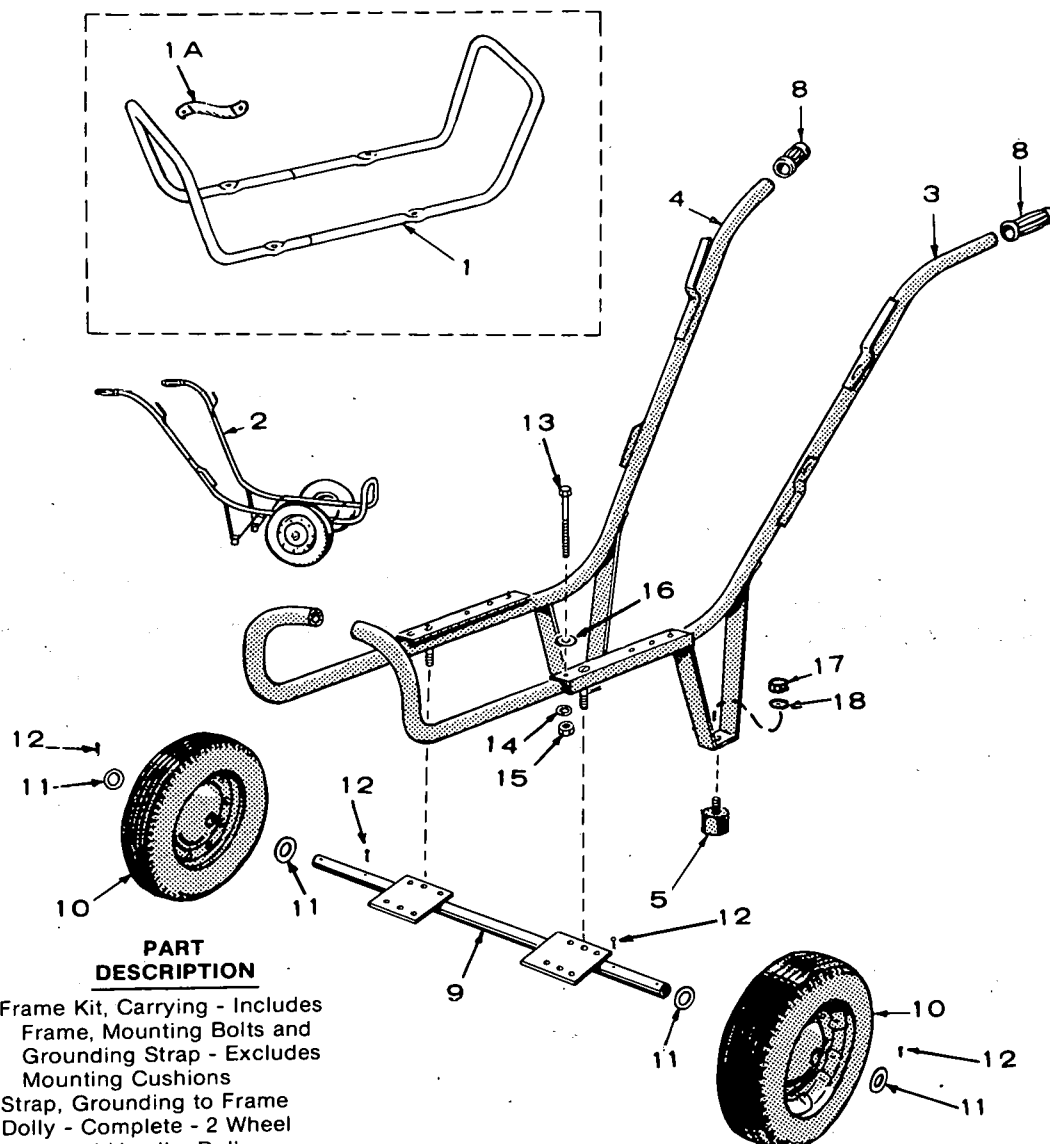
CONTROL GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	330-0028	1	Box, Receptacle, or Junction - Key 1, 2, 3
2	330-0006	1	Cover, Junction Box - Key 1, 2, 3 - Spec A and B
2A	330-0042	1	Cover, Receptacle Box - Key 1, 2, 3
3	301-1276	1	Bracket, Receptacle or Junction Box Mounting - Key 1, 2, 3
4	508-0098	1	Bushing, Insulator - Junction Box - Key 1, 2, 3
5	BOX, CONTROL - INCLUDES PANEL & RESISTOR BRACKET		
	301-1160	1	Key 5 (Except Utility Models), 6, 7
	301-1630	1	Key 5 (Utility Models) - Spec A through J
	301-3432	1	Key 5 (Utility Models) - Begin Spec K
6	301-1198	1	Bracket, Control Box Mounting - Key 5, 6, 7
7	301-1244	1	Cover, Control Box - Key 5, 6, 7
8	301-1271	1	Plate, End - Key 5, 6, 7
9	301-0974	1	Bracket, Start-Stop Switch - Key 5, 6, 7 (Used with #308-0090 Switch Only)
	SWITCH, START-STOP - KEY 5, 6, 7		
10	308-0090	1	Prior to Approximately 2 - 10 - 61 (Use #308-0166 to Replace)
10A	308-0154	1	Begin Approximately 2 - 10 - 61
11	AMMETER, CHARGE		
	302-0058	1	10-0-10 - Key 5 (Except Utility Models), 6, 7
	302-0062	1	45-0-45 - Key 5 (Utility Models)
12	SWITCH, TOGGLE - MANUAL, ELECTRIC START		
	308-0002	1	Key 5 (Except Utility Models), 6, 7
	308-0002	1	Key 5 (Utility Models) - Spec A through J
13	307-0253	1	Relay, Stop - Key 5, 6, 7
14	304-0251	1	Resistor, Fixed (30-Ohm, 5 Watt) - Key 5, 6, 7
15	304-0344	1	Resistor, Fixed (1-Ohm, 25 Watt) - Key 5 (Except Utility Models), 6, 7
16	304-0175	1	Resistor, Adjustable (10-Ohm, 50 Watt) - Key 5 (Except Utility Models), 6, 7

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
17	312-0017	1	Condenser, 0.5 Mfd. - Load Terminal - Key 5
18	312-0058	As Req.	Condenser, 0.1 Mfd. - Load Terminal - Key 6 (1), Key 7 (2)
19	312-0057	1	Condenser, 1 Mfd. - Start Solenoid - Key 5, 6, 7
20	305-0001	1	Regulator, Voltage - Charge Circuit - Key 5 (Except Utility Models), 6, 7
21	RELAY, REVERSE CURRENT		
	307-0180	1	Key 5 (Except Utility Models), 6, 7
	307-0495	1	Key 5 (Utility Models) - Spec A through J
21	307-0454	1	Relay, Charge Disconnect - Key 5 (Utility Models)
22	332-0537	1	Block, Terminal - Remote Control - Key 5, 6, 7
23	307-1046	1	Solenoid, Start - Key 5, 6, 7
24	332-0142	1	Terminal, Solderless - Key 5, 6, 7
25	332-0540	1	Marker, Load Terminal - Key 5, 6, 7
26	332-0539	1	Marker, Load Terminal - Key 7
27	332-0231	1	Block, Terminal - Load - Key 7
28	416-0077	2	Cable, Battery - Key 5 (Except Utility Models), 6, 7
29	416-0004	1	Cable, Battery Jumper - Key 5, 6, 7
30	110-0300	1	Spacer, Junction Box Mounting - Key 1, 2, 3
31	320-0158	1	Breaker, Circuit - Key 5 (Utility Models)
32	RECEPTACLE, DUPLEX - BEGINS SPEC C		
	323-0184	As Req.	2 Parallel Blades, 1 Grounding Pin
	323-0213	As Req.	2 Tandem Blades, 1 Grounding Pin
33	358-0019	1	Rectifier, Diode - Key 5 (Utility Models) - Begin Spec K
34	363-0059	1	Sink, Heat - Rectifier Mounting - Key 5 (Utility Models) - Begin Spec K

CARRYING FRAME AND DOLLY GROUP (OPTIONAL)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	403-0376	1	Frame Kit, Carrying - Includes Frame, Mounting Bolts and Grounding Strap - Excludes Mounting Cushions
1A	337-0036	1	Strap, Grounding to Frame
2	410-0219	1	Dolly - Complete - 2 Wheel
3	410-0216	1	Base and Handle, Dolly - Left Hand
4	410-0215	1	Base and Handle, Dolly - Right Hand
5	402-0040	2	Cushion, Rubber
8	403-0205	2	Grip, Rubber Handle
9	410-0222	1	Axle, Dolly
10	410-0223	2	Wheel & Tire - 10 x 2.50"
11	526-0112	4	Washer, Flat - Wheel Mounting
12	516-0042	4	Pin, Cotter - Wheel Mounting
13	800-0058	4	Screw, Hex Head Cap (3/8-16 x 3") - Oil Base to Dolly
14	850-0050	8	Washer, Lock (3/8") - Oil Base Mounting
15	860-0017	8	Nut, Hex (3/8-16) - Oil Base Mounting
16	526-0030	4	Washer, Flat (3/8) - Oil Base Mounting
17	860-0015	2	Nut, Hex (5/16-18) - Cushion Mounting
18	850-0045	2	Washer, Lock (5/16") - Cushion Mounting
19	526-0123	4	Washer, Flat (3/8) - Dolly Wheel Mounting

OPTIONAL GAS AND GAS-GASOLINE FUEL SYSTEM GROUP
(Not Illustrated)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	148-0336	1	Kit, Gas Conversion (Includes Garretson Regulator, Carburetor, and associated Parts)		505-0017	1	Bushing, Reducer (3/8 x 1/4) - Use with Garretson Regulator
	146-0127	1	Carburetor, Gas Fuel Only		505-0021	1	Bushing, Reducer (1 x 3/4) - Use with Ensign Regulator
	146-0128	1	Carburetor, Gas-Gasoline Fuel - Manual Choke - Spec A through D		505-0099	1	Nipple (1/4 x 7/8") - Use with Garretson Regulator
		1	Carburetor, Gas-Gasoline Fuel - Manual Choke - Begin Spec E		505-0038	1	Elbow (1/4") - Use with Garretson Regulator
	146-0129	1	Carburetor, Gas-Gasoline Fuel - Electric Choke - Spec A through D		505-0302	1	Nipple, Half (1/4 x 1-1/2") - Use with Garretson Regulator
	146-0132	1	Carburetor, Gas-Gasoline Fuel - Electric Choke - Begin Spec E		505-0057	1	Plug, Pipe (1/8)
	148-0428	1	*Regulator, Gas Pressure - (Ensign Manufacturing - Model "F1")		502-0055	1	Elbow, 90° - Gas Inlet - Use with Gas-Gasoline Carburetor
	148-0311	1	*Regulator, Gas Pressure - (Garretson Manufacturing)		505-0061	1	Nipple (1/8 x 2") - Gas Inlet - Use with Gas-Gasoline Carburetor
	501-0025	1	Hose, Regulator to Carburetor (Use with Ensign Regulator)		148-0178	1	Adjusting Assembly, Gas - Use with Gas-Gasoline Carburetor
	503-0315	1	Hose, Regulator to Carburetor (Use with Garretson Regulator)		153-0319	1	Pin Assembly, Choke Lock - Use with Gas-Gasoline Carburetor
	503-0032	2	Clamp, Hose - (Use with Garretson Regulator Only)		148-0390	1	Repair Kit, Gas Regulator - Garretson
	148-0107	1	Vent, Atmospheric (Use with Garretson Regulator Only)		148-0300	1	Repair Kit, Gas Regulator - Ensign Model "F"
	149-0136	1	Cover, Fuel Pump Opening - Gas Fuel Only Units		148-0522	1	Repair Kit, Gas Regulator - Ensign Model "F1"
	149-0003	1	Gasket, Fuel Pump Opening Cover - Gas Fuel Only Units	* - Manufacturer's name appears on Regulator. Order Parts Accordingly. ** - Order by description, giving complete Model, Spec and Serial Number.			
	110-0883	1	Head, Cylinder - High Compression				
	149-0943	1	Line, Fuel - Pump to Carburetor - Use with Gas-Gasoline Carburetor				

OPTIONAL OIL BASE HEATER GROUP
(Not Illustrated)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	333-0100	1	Heater, Oil Base		335-0057	1	Cable, Heater Connection
	309-0029	1	Thermostat, Heater		508-0005	3	Grommet - For 9/16" Hole
	333-0012	1	Box, Thermostat Mounting		503-0019	1	Clamp, Heater Element Guard
	333-0013	1	Cover, Thermostat Mounting Box		520-0446	2	Stud, Thermostat Mounting
	133-0003	1	Guard, Heater Terminal		102-0362	1	Base, Oil (With provision for heater)
	335-0058	1	Cable, Heater Element to Thermostat		134-0707	1	Housing, Blower (With provision for heater)

OPTIONAL RESERVOIR (DAY) TANK GROUP
(Not Illustrated)

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>	<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
	159-0294	1	Tank, Reservoir (Day) - 1 quart		504-0007	1	Valve, Shut-off - Tank Outlet
	159-0041	1	Cap, Reservoir Tank Vent		505-0057	1	Plug (1/8), Pipe - Tank Drain
	159-0556	1	Band, Reservoir Tank Mounting		502-0116	1	Connector (Compression Type) - With Nut & Sleeve - For 5/16" O.D. Vent Line (Top)
	502-0024	1	Elbow, Male (Compression Type) - Tank Vent Line		159-0345	1	Tubing, Copper - Vent Line (12 ft. of 5/16" O.D.)
	159-0557	1	Support, Reservoir Tank Mounting		502-0043	1	Elbow, Inverted Male (For 3/8" O.D. Fuel Return Line)
	415-0055	1	Bracket, Vent Cap Mounting		502-0020	1	Elbow, Street (1/8" Pipe) - Tank Inlet
	501-0005	1	Line, Flexible Fuel (18-1/2")				
	501-0003	1	Line, Flexible Fuel (9")				

SERVICE KITS AND MISCELLANEOUS

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
	98-1100	1	Decal Kit
	168-0065	1	Kit, Gasket - Engine
	KIT, PLANT OVERHAUL		
	522-0217	1	Spec A through D
	522-0240	1	Begin Spec E
	412-0021	1	Cover, Canvas
	405-1041	1	Housing Package - Optional - VACU-FLO Sets Only
	TOUCH-UP PAINT (Pressurized Can)		
	525-0137	As Req.	Metallic Green (16 Oz.)
	525-0305	As Req.	Non-Metallic Green (13 Oz.)

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

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.

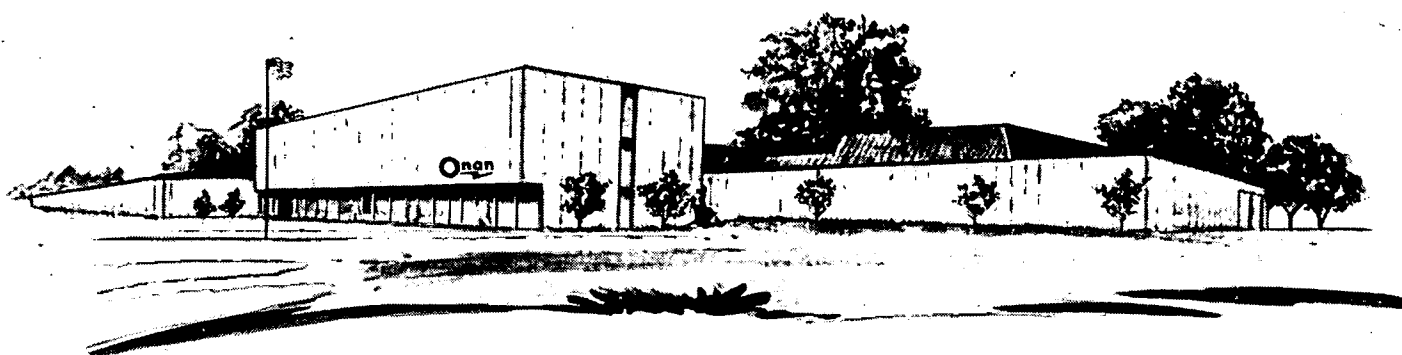
INSTALLATION

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



ONAN 1400 73RD AVENUE N.E. • MINNEAPOLIS, MINNESOTA 55432
A DIVISION OF ONAN CORPORATION

