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ONAN
ELECTRIC GENERATING PLANTS
LKB
SERIES

930-302 1A71

PERFORMANCE CERTIFIED

We certify that when properly installed and operated this Onan electric plant will deliver the full power and the voltage and frequency regulation promised by its nameplate and published specifications. This plant has undergone several hours of running-in and testing under realistic load conditions, in accordance with procedures certified by an independent testing laboratory.

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

IMPORTANT...RETURN WARRANTY CARD ATTACHED TO UNIT

Onan®

OPERATORS MANUAL AND PARTS CATALOG

[redacted]

[redacted]

Printed in U.S.A.

ONAN

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

A DIVISION OF STUDEBAKER CORPORATION

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.

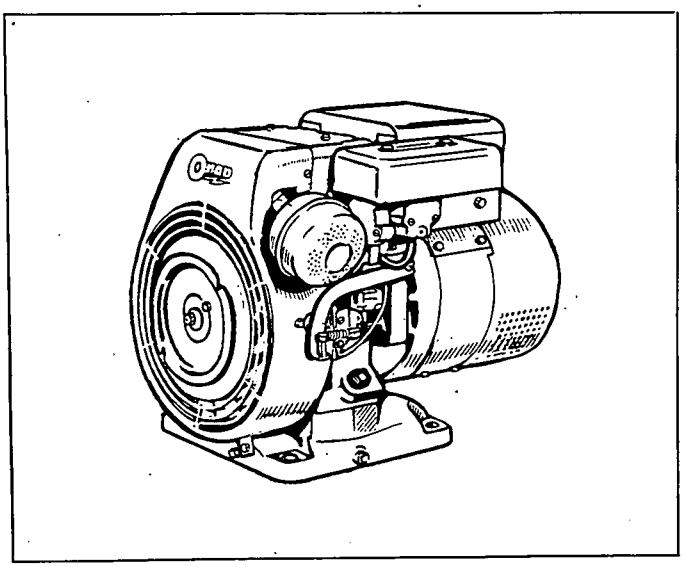
WE SUGGEST THAT THIS MANUAL AND THE WIRING DIAGRAM WHICH ACCOMPANIES EVERY ONAN UNIT BE RETAINED AND REFERRED TO WHEN MAKING EQUIPMENT ADJUSTMENTS OR ORDERING PARTS. ADDITIONAL COPIES ARE AVAILABLE FOR A NOMINAL CHARGE FROM YOUR ONAN DISTRIBUTOR.

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.

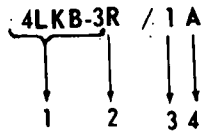
GENERAL INFORMATION

Instructions in this manual may refer to a specific model of generating plant, identify the model by referring to the *MODEL AND SPECIFICATION NO.* as shown on the plant nameplate. Electrical characteristics are shown on the lower portion of the plant nameplate.



TYPICAL MODEL LKB

How to interpret MODEL and SPEC. NO.



1. Factory code for general identification.
2. Specific Type:
   M - MANUAL. Manually cranked. For permanent or portable installations.
   R - REMOTE. Electric starting. For permanent installation, can be connected to optional accessory equipment for remote or automatic control of starting and stopping.
3. Factory code for optional equipment.
4. Specification (Spec.) letter (advances when factory makes production modifications).

MANUFACTURER'S WARRANTY

The Manufacturer warrants, to the original user, that each product of its manufacture is free from defects in material and factory workmanship if properly installed, serviced and operated under normal conditions according to the Manufacturer's instructions.

Manufacturer's obligation under this warranty is limited to correcting without charge at its factory any part or parts thereof which shall be returned to its factory or one of its Authorized Service Stations, transportation charges prepaid, within one year after being put into service by the original user, and which upon examination shall disclose to the Manufacturer's satisfaction to have been originally defective. Correction of such defects by repair to, or supplying of replacements for defective parts, shall constitute fulfillment of all obligations to original user.

This warranty shall not apply to any of the Manufacturer's products which must be replaced because of normal wear, which have been subject to misuse, negligence or accident or which shall have been repaired or altered outside of the Manufacturer's factory unless authorized by the Manufacturer.

Manufacturer shall not be liable for loss, damage or expense directly or indirectly from the use of its product or from any other cause.

The above warranty supersedes and is in lieu of all other warranties, expressed or implied, and of all other liabilities or obligations on part of Manufacturer. No person, agent or dealer is authorized to give any warranties on behalf of the Manufacturer nor to assume for the Manufacturer any other liability in connection with any of its products unless made in writing and signed by an officer of the Manufacturer.

SPECIFICATIONS

M = manual start R = remote start (electric crank)	Model Series 305LKB 4LKB M	 R
Nominal dimension of plant (inches)		
Height	21	20
Width	19	18
Length	28-1/4	26-5/8
Number cylinders	1	1
Displacement (cubic inch)	25	25
Cylinder bore	3-1/4	3-1/4
Piston stroke	3	3
RPM (for 60-cycle)	3600	3600
RPM (for 50-cycle)	3000	3000
Compression ratio	7:1	7:1
Ignition (type)		
Flywheel magneto	Yes	Yes
Battery voltage (ac plant)	None	12-V
Battery size (ac plant):		
SAE group 1H		two 6-V 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		2-Max.
Ventilation Required (cfm 3600 rpm)		
Engine	600	600
Generator	125	125
Combustion	30	30
Output rated at unity power factor load	All	All
Rating (output in watts)		
50-cycle AC continuous service	3,500	3,500
60-cycle AC continuous service	4,000	4,000
AC voltage regulation in ± %	6	6
AC frequency regulation in %	5	5
Revolving armature type generator	Yes	Yes
120/240-volt single-phase model reconnectible	No	No
Oil Capacity in U.S. quarts (Refill)	2	2

OPTIONAL EQUIPMENT

1. **GAS-GASOLINE CARBURETOR:**
   A combination carburetor for burning gasoline or gaseous fuel.

2. **SWITCHBOARD:**
   Contains instruments to measure AC amperes, AC volts, and break over-loaded AC circuit. For wall mounting.

3. **OIL BASE HEATER AND THERMOSTAT:**
   Electric heater aids cold starting.

4. **AUTOMATIC DEMAND CONTROL:**
   Starts and stops plant automatically.

5. **LOAD TRANSFER CONTROL:**
   Controls running of plant and transfers load.

6. **SEPARATE FUEL TANK:**
   Various sizes.

7. **REMOTE START-STOP SWITCH:**
   SPDT, momentary contact, center off type.

8. **LOW OIL PRESSURE CUT-OUT SWITCH**
   Engine stops if oil pressure drops to a dangerous level.

9. **OTHER:**
   There is a series of other optional items that your dealer will discuss with you. Ask about them.

INSTALLATION

GENERAL

Important installation points are: sufficient cooling, exhaust gas discharge, electrical and fuel connections, location and mounting, and protection from road dust and shocks during transit (mobile applications).

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, dry, dust free, and preferably warm in cold weather. The air discharge side of plant requires only 3" clearance from wall to permit plant to rock on its mounts but at least 24" clearance is required around all other sides for service accessibility.

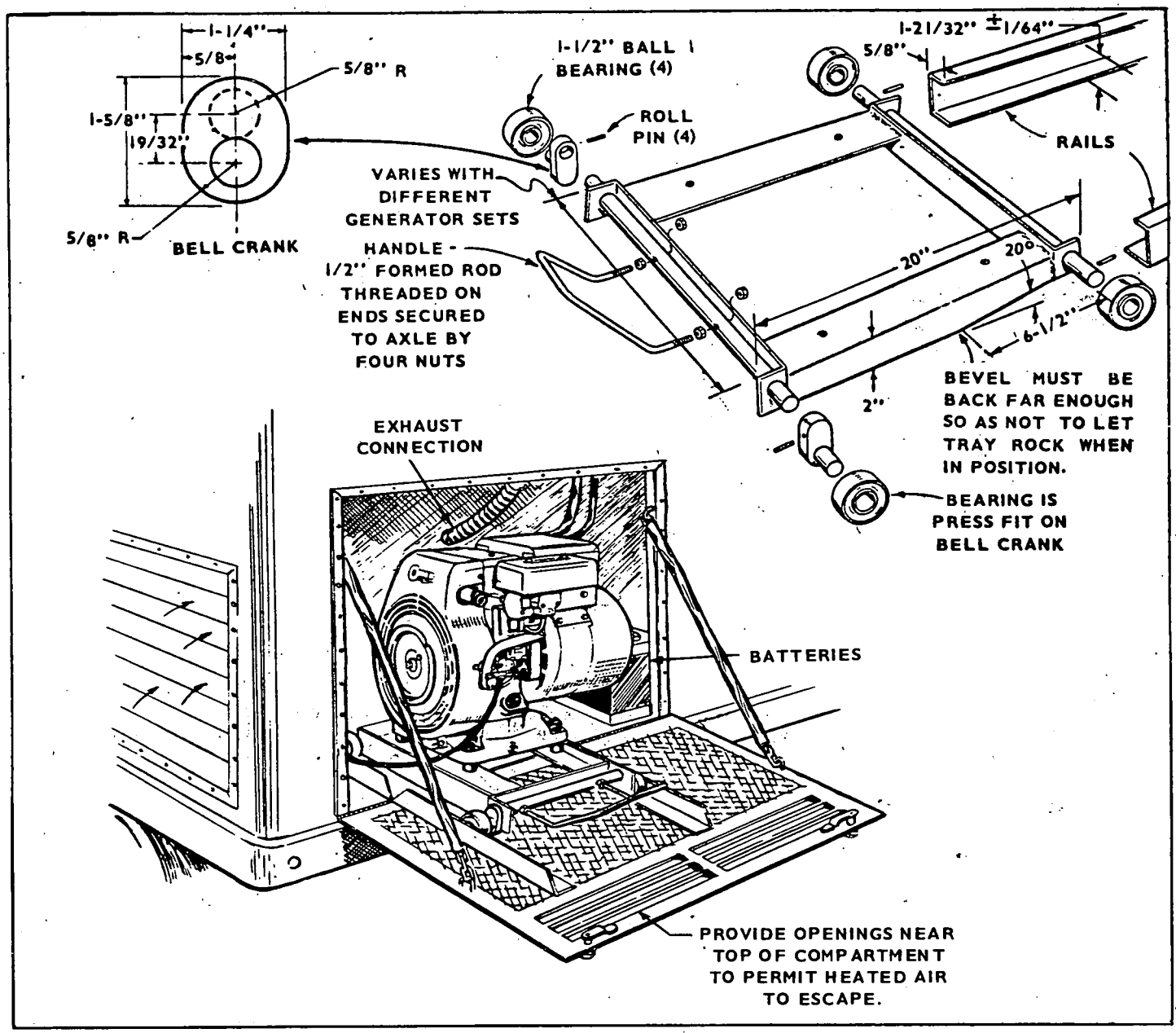
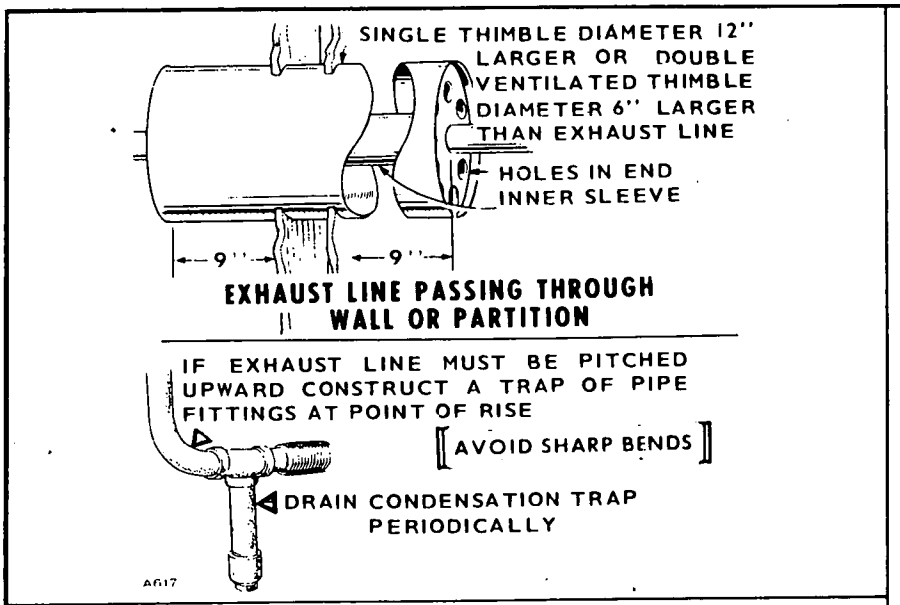
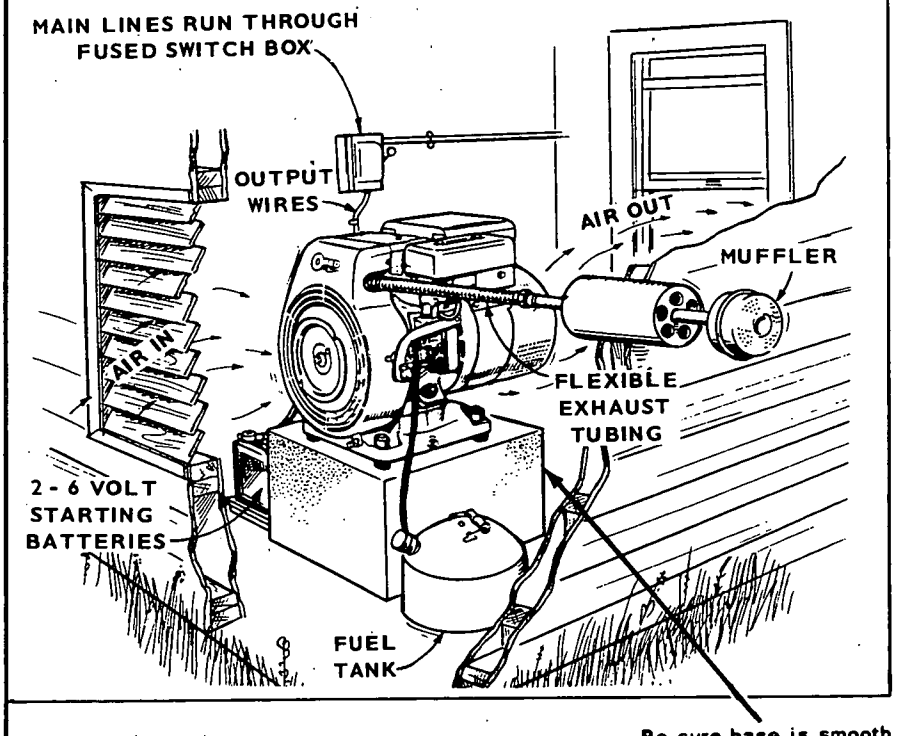
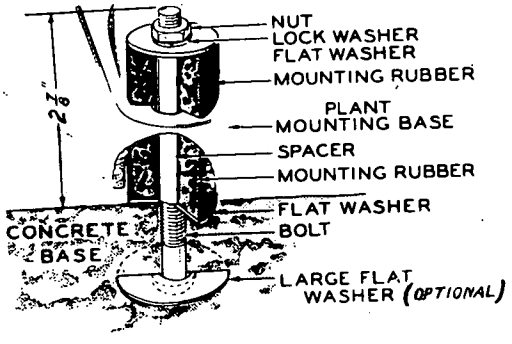
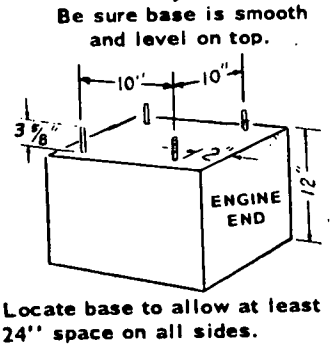


FIGURE 1.









MOUNTING CUSHIONS

COOLING AIR

Pressure cooled plants require an air inlet opening and an air outlet of 4 sq. ft. Position the outlet opening above and to the rear of the plant, the inlet opening just opposite the blower housing.

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

EXHAUST

WARNING *EXHAUST GASES ARE DEADLY POISONOUS!*

Vent exhaust gases outside. Use flexible tubing between the plant exhaust outlet and rigid piping. Shield the line if it passes through a combustible wall or partition. If turns are necessary, use long sweeping type elbows. 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" clearance around plant.

OIL DRAIN

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

MOBILE INSTALLATIONS

Bolt the plant in place using the mounting cushions. Provide proper ventilation, cooling, service accessibility, etc. Protect against road dust, vibration, and road shock. Follow the principles of installation for a permanent installation. Do not connect to truck engine fuel supply line, provide a separate fuel line to fuel tank. Do not exceed 4 ft. lift from tank bottom to fuel pump.

FIGURE 2.

MOUNTING (See Fig. 2)

A permanent installation needs a sturdy, level, mounting base of concrete, heavy wood or structural steel at least 12" high to aid oil changing and operating. For mobile applications (trucks or trailers) install slide-out rails or some other means (such as doors) to provide service accessibility (See Fig. 1).

Carefully assemble the mounting cushions, washers and spacer bushing (Fig. 2). The spacer bushing prevents compression of the snubber (upper rubber cushion). Space the 5/16" mounting bolts as shown in Fig. 2.

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 sized and positioned vents for required air flow. See specifications for air requirements at 3,600-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, or filters, (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 units need an inlet vent with an unrestricted opening of at least 4 sq. ft.

CAUTION *Do not install cooling ducts, shutters, or housings on this plant as overheating will occur.*

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 doesn't exceed 120°F when running at full rated load.

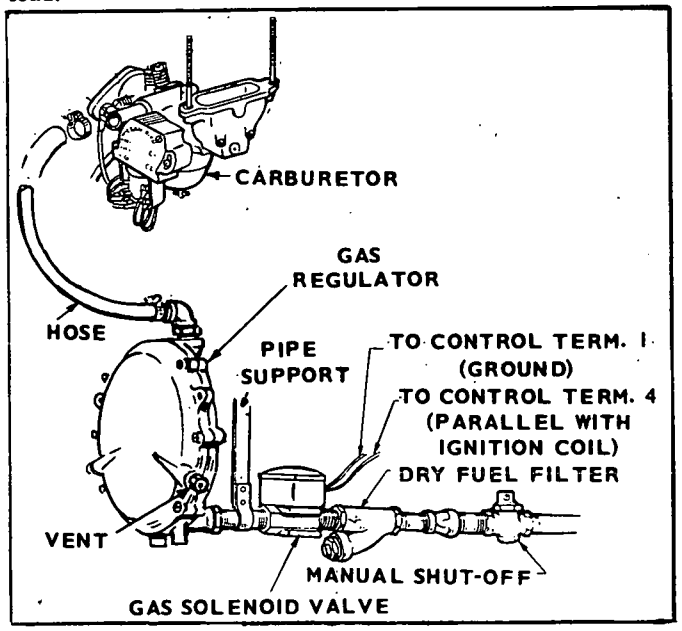


FIGURE 3.

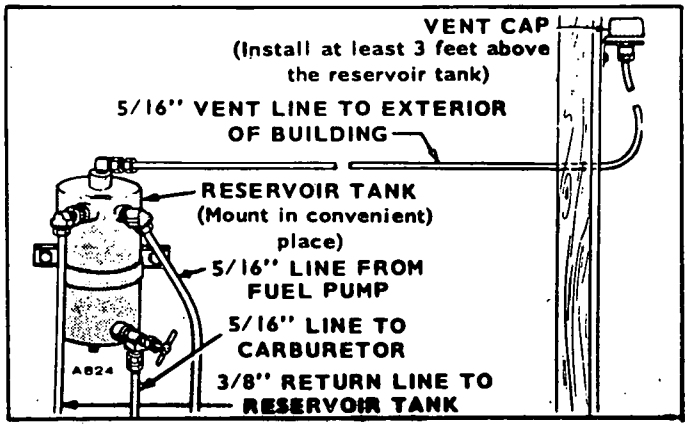


FIGURE 4.

EXHAUST

Pipe *POISONOUS* exhaust gas outside enclosure. Locate exhaust outlet far from air inlet to avoid recirculation. The engine exhaust is tapped for 1-1/4" thread. Use flexible tubing to connect the engine exhaust to rigid pipe or muffler. Shield the line if it passes through a combustible wall

GASOLINE TANK

If a separate fuel tank is used, install the tank so the bottom is less than 4-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 plant.

If fuel lift *must exceed 4-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 (Fig. 4).

FUEL CONNECTION

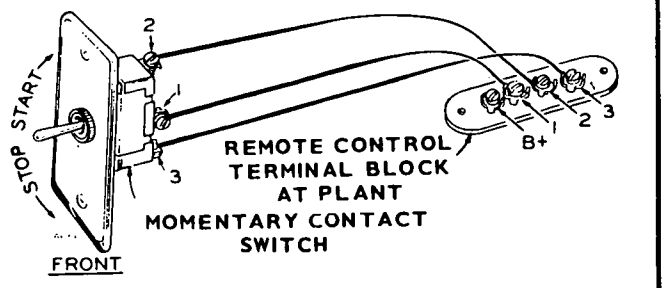
For gasoline plants, connect the fuel line to the fuel pump inlet. Pump is threaded 1/8-27 NPTF (American Standard Internal Tapered Pipe Thread). **Important:** *Connect the plant to the fuel source with a flexible line to avoid line failure due to vibration.*

For gaseous plants (see Fig. 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 shut-off valves in the supply line are usually required for indoor automatic or remote starting installations. Connect solenoid wires to battery ignition circuit (Fig. 3) to open valve during running. Install a demand type gas regulator according to instructions and position it near the plant to aid starting (regulator line pressure must be within 2 to 8 oz.).

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

REMOTE START-STOP SWITCH (OPTIONAL)

For remote control starting and stopping, use 3-wires to connect the remote switch (SPDT, momentary contact, center-off type) to the terminal block marked B+, 1, 2, 3, in the plant control box using wire sizes as listed in Fig. 5.



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

FIGURE 5.

BATTERY CONNECTION

Exciter Cranked Plant: Refer to the wiring diagram and Figure 6.

Provide *two* 6 volt batteries connected in series (Fig. 6) 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 plant is running. The resulting overvoltage condition will damage electric choke and may damage control components.*

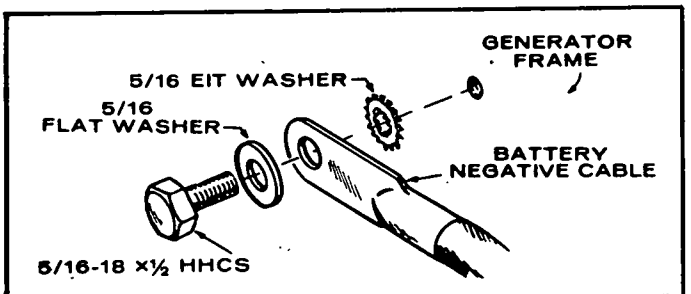
LOAD WIRE CONNECTIONS

Plant nameplate shows the electrical output rating of the plant in watts, volts, and cycles. The plant wiring diagram shows the electrical circuits and connections necessary for the available output voltage. Also see Fig. 7 and 8.

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 plant control box has knockout sections to accommodate load wires. Use flexible conduit and stranded load wires near the plant 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 plant box. Insulate bare ends of ungrounded wires. Use a bolt (through the control box) to connect the grounded (⏚) generator lead and load wire. Install a fused main switch (or circuit breaker) between the generating plant and load.

Standby: If the installation is for standby service, install a double-throw transfer switch (either manual or automatic) to prevent feeding generator output into the normal power source lines and to also prevent commercial power and generator output from being connected *at the same time to*



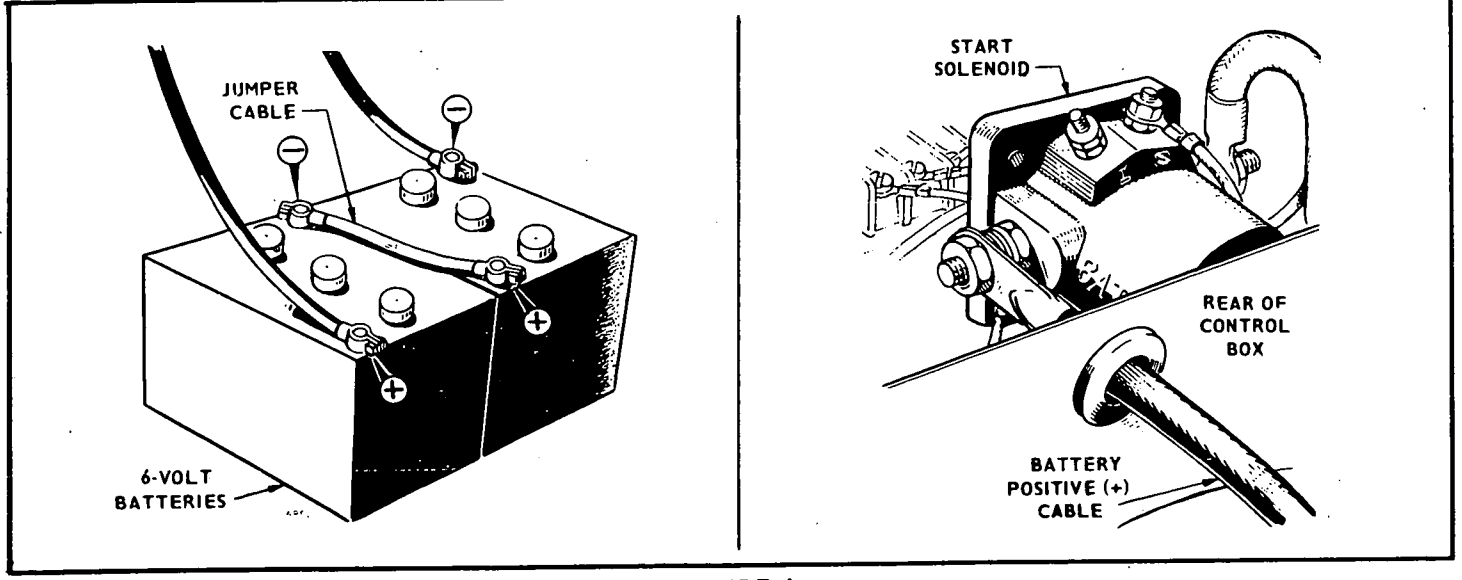


FIGURE 6.

the load. Instructions for connecting an automatic load transfer switch is included with such equipment. See Fig. 2.

AC Portable Plants: These plants 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: Revolving armature 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 plants 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.

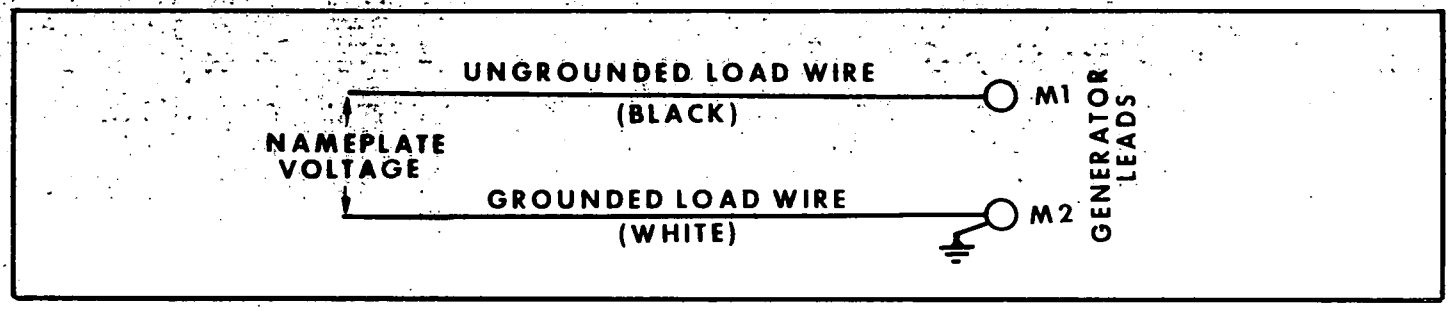


FIGURE 7.

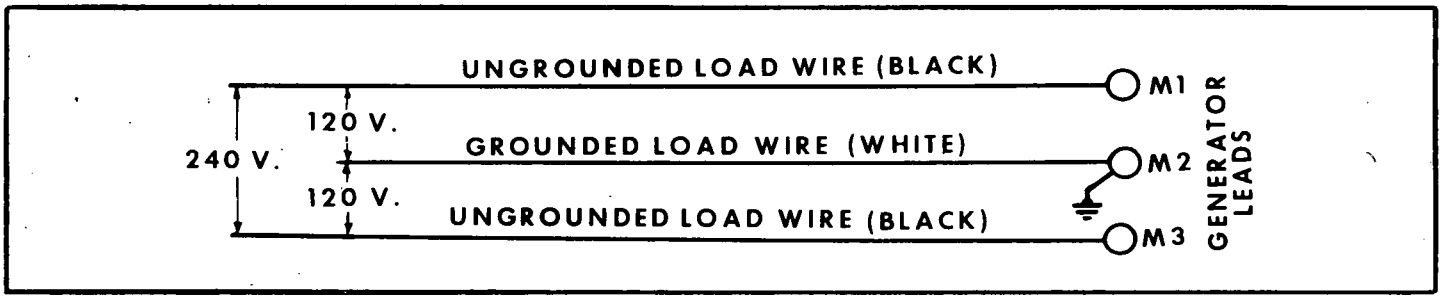


FIGURE 8.

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, or MS/DM. Oil should be labeled as having passed the MS Sequence Tests (also known as the ASTM-G-IV Sequence Tests) and the MIL-L-2104B Tests. Recommended SAE oil numbers for expected ambient temperatures are as follows:

Above 30°F	SAE 30
0°F to 30°F	SAE 10W
Below 0°F	SAE 5W

Do not use service DS oil. Do not mix brands or 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.

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

ELECTRIC STARTING

Remote Control, AC Plant: Push the *start-stop* switch to its *start* position. Release the switch as soon as the plant starts.

MANUAL STARTING

Manual or Portable Plant: 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 plant warms up, adjust the choke gradually to its fully open position.

Remote Control, AC Plant: If the battery charge condition is too low to crank the engine, the plant 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.

Starting: (Figure 9)

1. Push *start-stop* switch to *start* position.
2. Release the switch after engine starts and reaches speed.

Stopping:

(1) Push *start-stop* switch to *stop* position.

(2) Release switch when plant stops. If stop circuit fails, close fuel valve.

APPLYING LOAD

If practical, allow plant 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 fixed charge resistor and is not adjustable.

INFREQUENT SERVICE

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

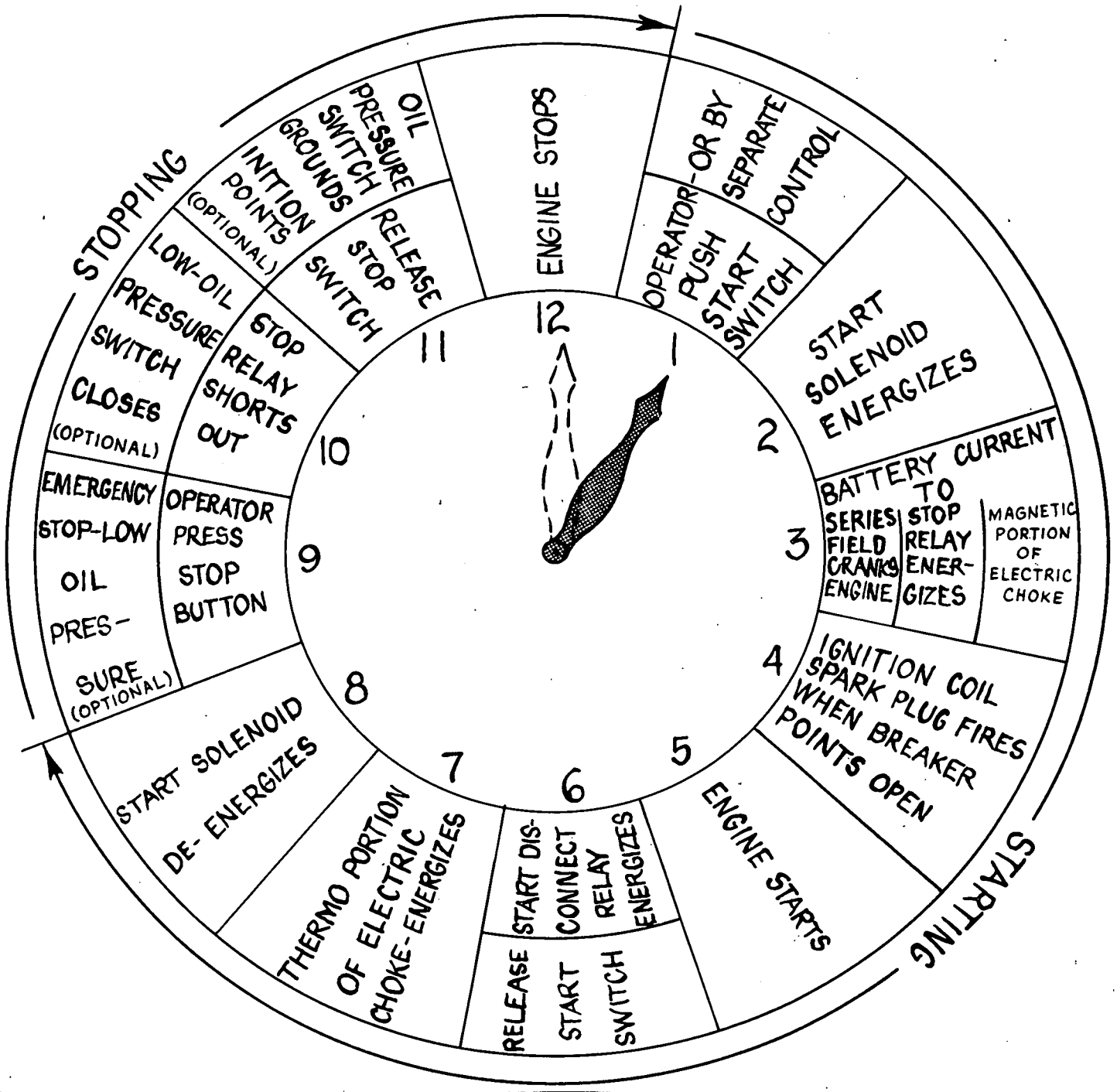


FIGURE 9.

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 for natural gas or Propane-Butane vapor; (2) Open the gasoline fuel shut-off valve; (3) Set the spark plug gap as given in the Table of Clearances; (4) See that the choke is free and works easily (be sure to release choke lock on plants with 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. This is not the same main adjusting screw used for gaseous fuel. Another adjusting screw is provided for this purpose (refer to Adjustment Section).

BREAK-IN PROCEDURE

No matter how carefully engine parts are manufactured or expertly assembled, there are always microscopic variations in fit between metal parts such as pistons, rings, main and connecting rod bearings.

Break-in or ideal fitting of all internal moving metal parts can best be achieved by maintaining proper cooling and correct lubrication during the running-in period. ***Break-in***

can take as little as ten operating hours or it may take many hundreds of hours. Extended periods of very heavy engine loading (above rated horsepower or electrical output) during this initial service period can cause severe cylinder scoring or bearing galling. On the other hand extended periods of very light loading during initial break-in may cause cylinder wall glazing and/or poor piston ring seating. Engine parts damage can also be caused by using the wrong type and viscosity oil and high engine operating temperatures during break-in.

All engines use more oil than normal during the first hours of operation. As internal moving parts are run-in by controlled operation, oil consumption should gradually decrease until the rate of consumption is stabilized. It is extremely rare that oil consumption drops to zero. All engines use some oil even when in perfect condition and properly broken-in. Oil consumption varies according to engine design, engine (piston) speed, size of engine, type of oil, oil viscosity, length of operating periods, operating temperatures, engine loading, etc. As engine operation is continued, clearance between moving parts increase slightly due to normal wear of piston rings, cylinder walls, valve guides, oil seals, etc. These clearances increase until oil consumption is excessive and engine parts have to be replaced and/or refitted. This usually takes thousands of hours.

Each Onan engine is *run-in* at the Onan factory for a minimum of three hours. This is not enough running time to completely *break-in* the engine. Proper completion of the *break-in* period is up to the customer.

Generator sets manufactured by Onan can be loaded to full nameplate rated output (not until they *bog down*) as soon as they are put into operation. It is recommended during these first few hours of operation that generator sets be loaded to 80% of rated capacity. Initial heavy loading helps seat piston rings and brings oil consumption to normal in the shortest time.

During *break-in,* check oil level at least every eight (8) operational hours. Add oil if the level is at *low* on the dipstick. Never over-fill. This may cause oil to foam and enter the breather system.

Drain the initial oil fill after 50-hours of operation while the engine is hot.

Controlled *break-in* with proper oil and a conscientiously applied maintenance program will help assure satisfactory service for thousands of hours from your Onan electric plant.

OUT-OF-SERVICE PROTECTION

Protect a plant that is to be out-of-service for more than 30 days as follows:

1. Run plant until thoroughly warm.
2. Turn off fuel supply and run until plant stops.
3. Drain oil from oil base while still warm. Refill and attach a warning tag stating oil viscosity used.
4. Remove spark plug. Pour 1 oz. (two tablespoons) of rust inhibitor (or SAE #50 oil) into cylinder. Crank engine slowly (by hand) several times. Install spark plug.
5. Service air cleaner.
6. Clean governor linkage and protect by wrapping with a clean cloth.
7. Plug exhaust outlet to prevent entrance of moisture, dirt, bugs, etc.
8. Wipe generator brushes, slip rings, etc. Do not apply lubricant or preservative.
9. Wipe entire unit. Coat rustable parts with a light film of grease or oil.
10. Provide a suitable cover for the entire unit.
11. If battery is used, disconnect and follow standard battery storage procedure.

HIGH TEMPERATURES

1. See that nothing obstructs air flow to-and-from the plant.
2. Keep cooling system clean.
3. Keep ignition timing properly adjusted.

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 heat externally until oil flows freely.
2. Use fresh, regular grade (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.

DUST AND DIRT

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

HIGH ALTITUDE

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 *Adjustments Section*). Maximum power will be reduced approximately 4% for each 1000 feet above sea level, after the first 1000 feet.

ADJUSTMENTS

CHECK BREAKER POINTS

Replace burned or faulty points. If only slightly burned, dress smooth with file or fine stone. Measure gap with thickness gauge, gap points at .020".

Ignition breaker points (Fig. 10), must be correctly gapped. 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.

Ignition points should break contact just when the 24° (remote) 5° (manual) timing mark aligns with the flywheel timing mark. Final timing is corrected by properly shifting the breaker point box on its mounting and using a timing light. If specified timing cannot be obtained by moving the breaker box, check to be sure timing marks on gears are aligned. Timing procedures appear in separate service manual.

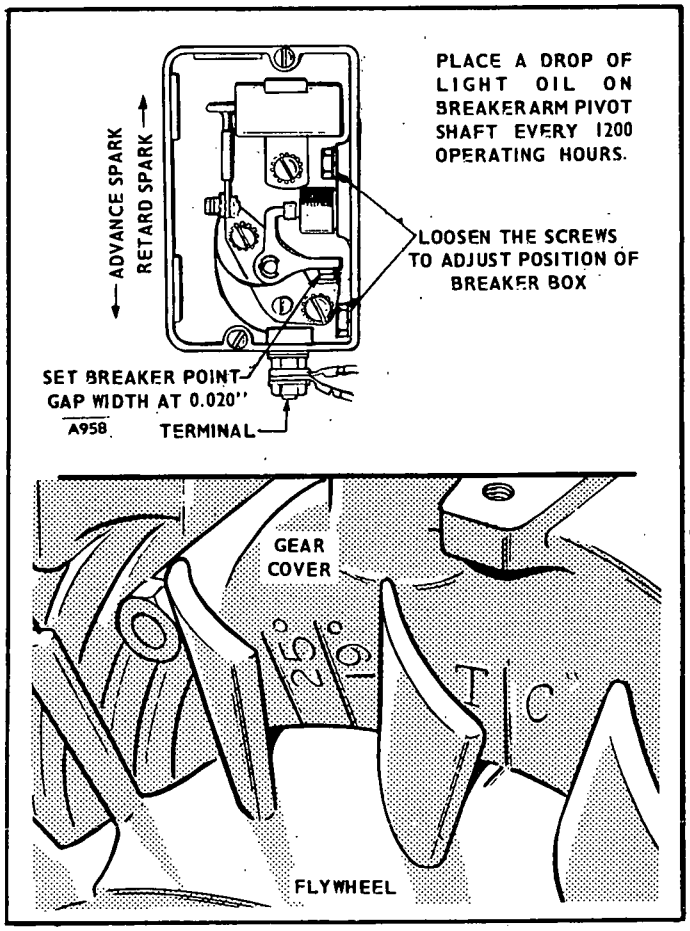


FIGURE 10.

CARBURETOR, GASOLINE

The carburetor (Fig. 11) has a fuel main (high speed) adjustment (needle A) and a fuel idle adjustment (needle B). The main adjustment (needle A) 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 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" clearance between the screw and pin (Fig. 11).

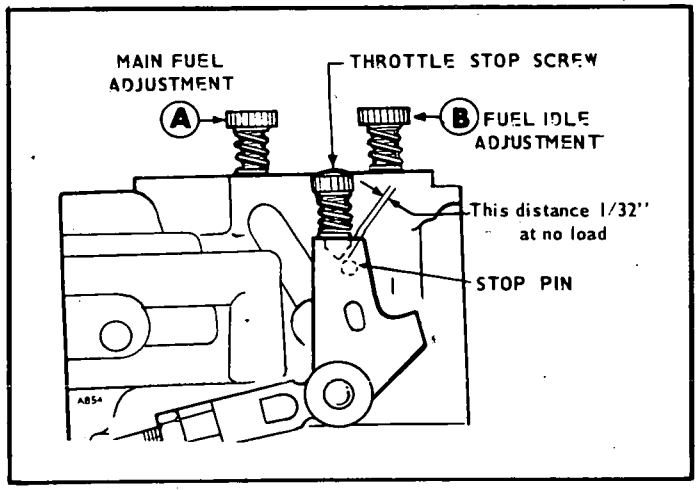


FIGURE 11.

AMBIENT TEMP. (°F)	60	65	70	75	80	85	90	95	100
CHOKE OPENING (Inches)	1/8	9/64	5/32	11/64	3/16	13/64	7/32	15/64	1/4

FIGURE 12.

ONAN THERMO-MAGNETIC CHOKE

This choke uses a heating element and a heat sensitive bimetal spring to open the choke plate. The choke solenoid, actuated during engine cranking only, closes the choke plate 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 air cleaner and adapter to expose the carburetor throat. Loosen the screw which secures the choke body. Rotate choke body clockwise to increase choking and counterclockwise to decrease choking action (leaner mixture). Refer to Fig. 12 for correct choke setting according to ambient temperature. Use drill rod or shank of drill bit to measure choke opening (Fig. 12).

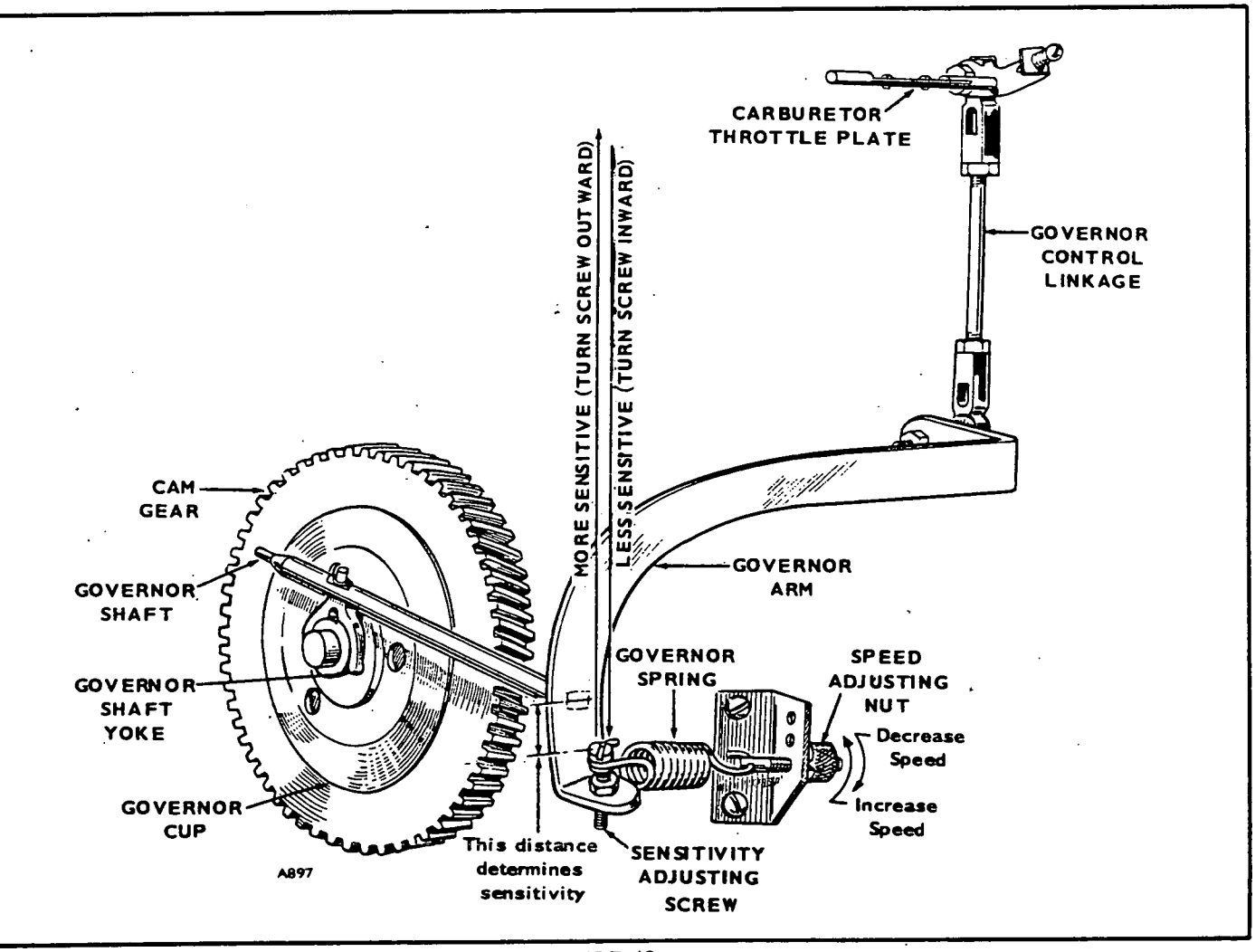


FIGURE 13.

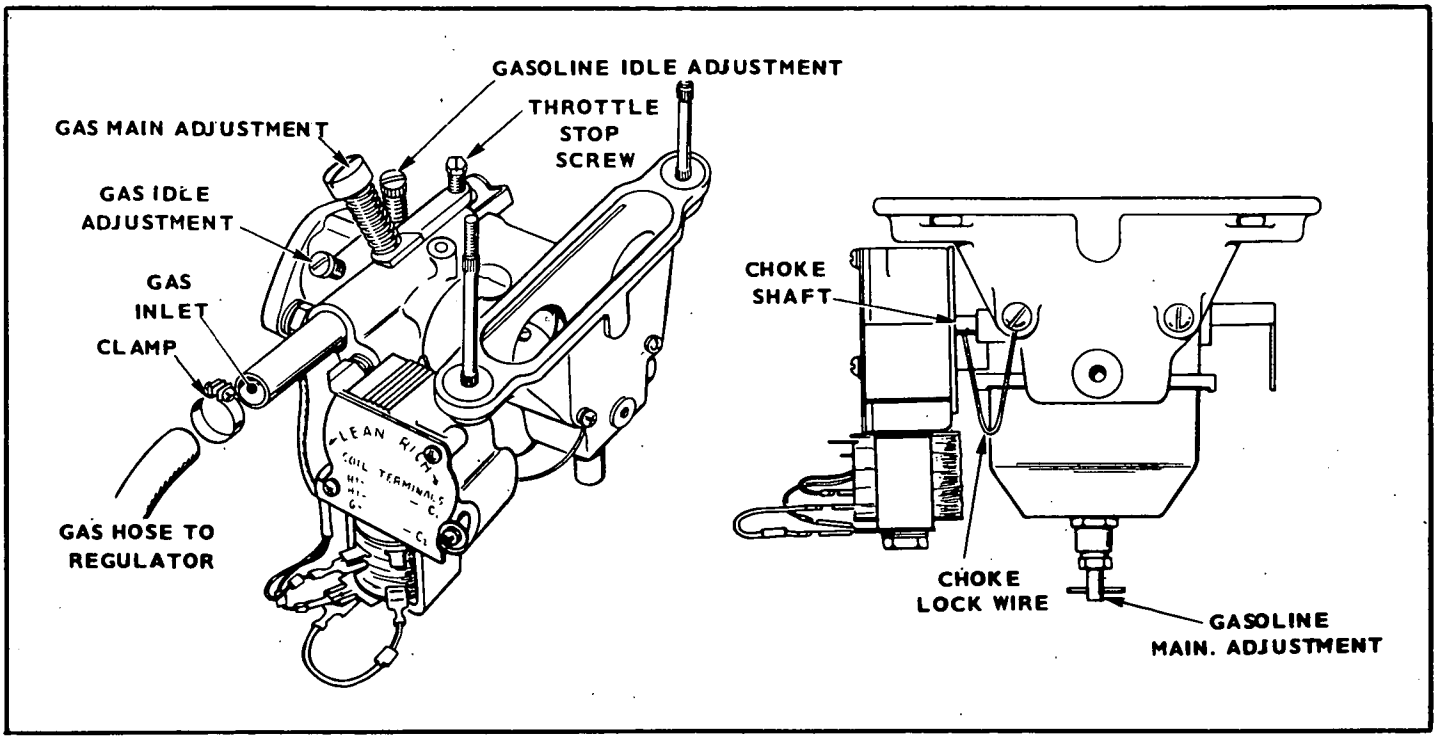


FIGURE 14.

GOVERNOR

Rated speed and voltage appear on the nameplate (see also Specifications). Engine speed equals frequency multiplied by 60, on a 2-pole generator, thus 3,600-rpm gives 60-cycle frequency. Preferred speed varies approximately 2-1/2-cycles from no-load to full-load operation. Be sure throttle, linkage, and governor mechanism operate smoothly (Fig. 13).

Linkage: The engine starts at wide open throttle. The length of the linkage connecting the governor arm fo 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" 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 plant operating at no load, turn the speed adjusting nut to obtain a desirable voltage and speed reading.

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), turn the sensitivity adjusting screw slightly outward. An adjustment for too much sensitivity will cause alternate increase and decrease of engine speed (hunting).

To decrease sensitivity, turn the sensitivity adjusting screw slightly inward. Too little sensitivity will result in too much difference in speed between no-load and full-load conditions.

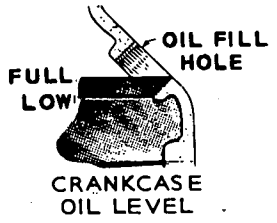
Any change in the sensitivity adjustment usually requires a compensating speed (spring tension) adjustment.

CARBURETOR, GAS FUEL

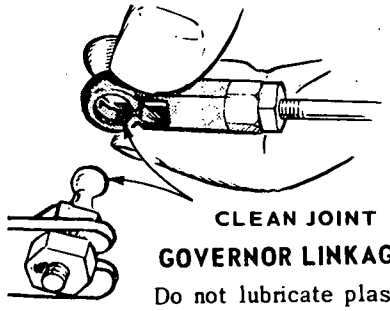
When operating on gas fuel, follow the procedure given for gasoline fuel, using the gas fuel adjusting screws. Always be sure the carburetor choke is locked in its wide open position. See Fig. 14 for adjusting screws.

GENERAL MAINTENANCE

PERFORM ALL MAINTENANCE DETAILS AS SPECIFIED IN THE MAINTENANCE SCHEDULE



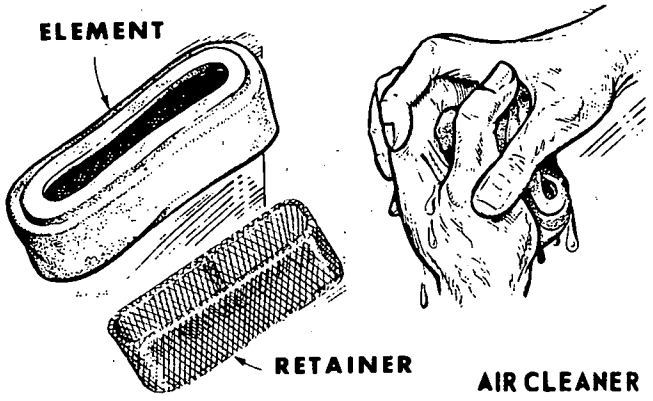
FILL TO THE TOP THREADS OF THE OIL FILL HOLE.



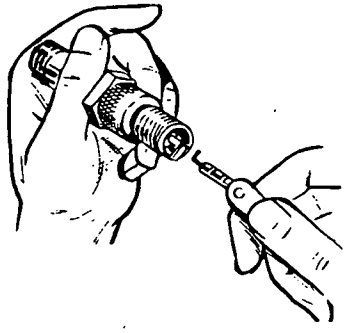
GOVERNOR LINKAGE

Do not lubricate plastic ball joints, they only require cleaning.

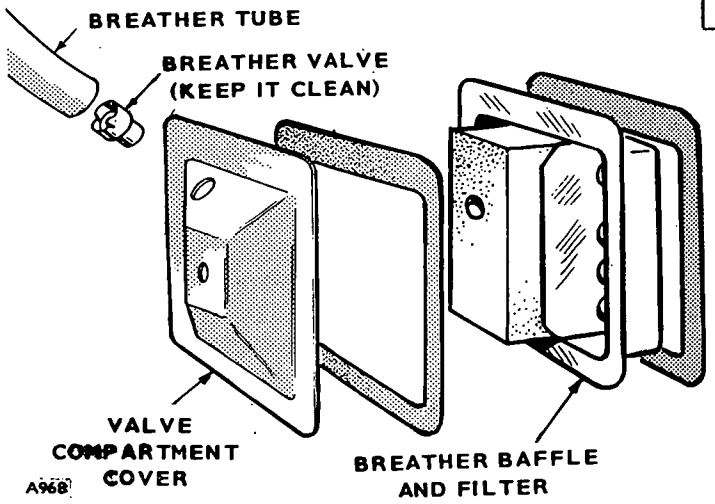
AFTER WASHING ELEMENT DIP IN OIL AND SQUEEZE AS DRY AS POSSIBLE.



AIR CLEANER



SPARK PLUG GAP
0.025" Gasoline
0.018" Gaseous Fuel



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 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.

FIGURE 15.

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.

MAINTENANCE SCHEDULE

Use this factory recommended maintenance schedule (based on favorable operating conditions) to serve as a guide to get long and efficient plant life. Neglecting routine maintenance can result in failure or permanent damage to the plant. Maintenance is divided into two categories: (1) *operator maintenance* – performed by the operator and (2) *critical maintenance* performed by qualified service personnel (*Onan* dealer).

OPERATOR MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	8	50	100	200
Inspect Plant	x			
Check Fuel	x			
Check Oil Level	x			
Check Air Cleaner		x		
Clean Governor Linkage			x1	
Check Spark Plug			x	
Change Crankcase Oil			x1	
Clean Crankcase Breather				x
Clean Fuel System				x
Check Battery				x

x1 - Perform more often in extremely dusty conditions.

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

CRITICAL MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	200	500	1000	5000
Check Breaker Points	x			
Clean Commutator and Collector Rings (Do not remove Film).	x1			
Check Brushes	x2			
Remove Carbon & Lead		x		
Check Valve Clearance		x		
Clean Carburetor		x		
Clean Generator			x	
Remove & Clean Oil Base			x	
Grind Valves			x	
General Overhaul				x

x1 - Perform more often in extremely dusty conditions.
x2 - Replace brushes when worn to 5/8" or less.

BOLT TORQUES	FT-LB
Spark Plugs	25-30
Cylinder Head	28-30
Oil Base Mounting	43-48
Spark Plug Gap — Gas 0.018"	Gasoline 0.025"

Tappets (Intake & Exhaust)	0.010" to 0.012"
Ignition Breaker Points Gap	0.020"
Ignition Timing (Running) Remote	24° BTC
Ignition Timing (Stopped) Remote	24° BTC
Ignition Timing (Stopped) Manual	5° BTC
Ignition Timing (Running) Manual	24° BTC

TROUBLE-SHOOTING GUIDE

OPERATOR'S TROUBLE-SHOOTING GUIDE for ONAN GASOLINE ENGINES (Air Cooled)

CAUSE	TROUBLE	Hard Starting or Failure to Start	Starter Motor Doesn't Turn	Engine Misfires	Speed Too High	Speed Too Low	Hunting Condition	No Governor Control	Poor Sensitivity	Excessive Oil Consumption	Excessive Fuel Consumption	Low Oil Pressure	High Oil Pressure	Engine Backfires at Carburetor	Engine Overheats	Mechanical Knocks	Black Smoky Exhaust	Blue Smoky Exhaust
COOLING SYSTEM	Blown Head Gasket	●		●														
	Overheating									●		●			●	●	●	
	Dirt on Cooling Fins														●			
	Inadequate Air Circulation (Ventilation)									●					●			
FUEL SYSTEM	Out of Fuel, or Shut-off Valve Closed	●																
	Poor Quality Fuel	●		●							●					●		
	Dirty Fuel Filter	●		●														
	Fuel Line Leaks	●		●			●				●							
	Mixture Too Rich	●		●							●			●			●	
	Mixture Too Lean	●		●											●			
	Engine Flooded	●												●				
	Run for Long Periods of Time at No Load			●														
	Restricted Air Intake, Dirty Air Filter	●		●							●						●	
GOVERNOR SYSTEM	Linkage Loose or Disconnected							●										
	Linkage Binding					●	●	●										
	Excessive Wear in Linkage						●	●	●									
	Incorrect Governor Adjustment				●	●			●									
	Spring Sensitivity Too Great				●		●											
LUBRICATION SYSTEM	Low Oil Supply											●			●	●		
	Defective Gauge											●	●					
	Excess Oil in Crankcase									●		●						●
	Oil Leaks From Engine Base or Connections									●								
	Crankcase Oil Too Light or Diluted									●		●			●	●		●
	Crankcase Oil Too Heavy	●											●					
STARTING SYSTEM AND IGNITION SYSTEM	Battery Discharged or Defective	●	●															
	Loose Battery Connections	●	●															
	Load Connected When Starting	●																
	Open Solenoid	●	●															
	Defective Starter	●	●															
	Wrong Plug or Point Setting	●		●														
	Incorrect Timing	●		●							●			●	●	●	●	
	Spark Too Far Advanced													●	●			

PARTS CATALOG

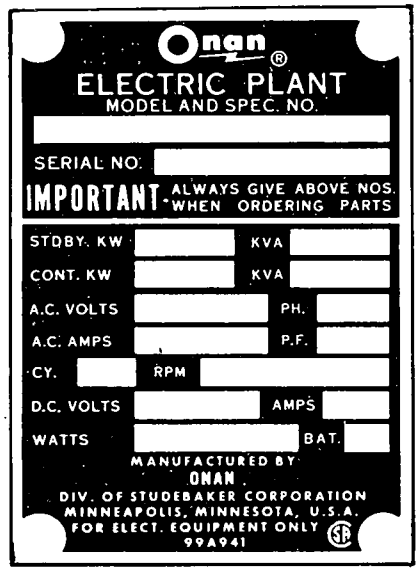
INSTRUCTIONS FOR ORDERING REPAIR PARTS

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

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

Always refer to the nameplate on your unit:

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



For handy reference, copy 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".

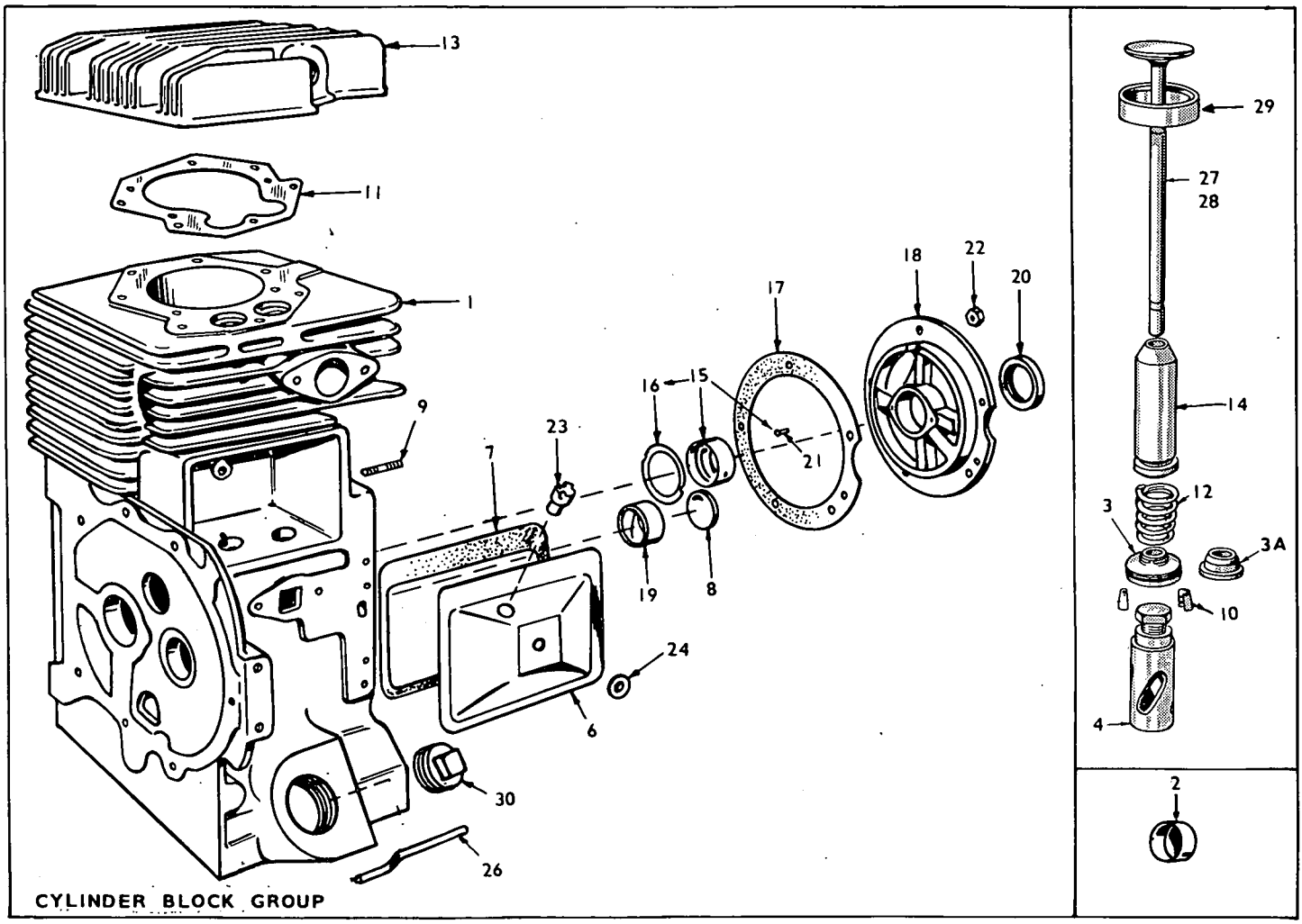
This catalog applies to the standard LKB Plants as listed below. Parts are arranged in groups of related items. Each illustrated part is identified by a reference number corresponding to the same reference number below the illustration. Parts illustrations are typical. Using the MODEL and SPEC NO. from the plant nameplate, select the Parts Key No. (1, 2, etc. in the last column) that applies to your Plant 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 plant sides are determined by FACING the engine end (front) of the plant.

PLANT DATA TABLE

MODEL & SPEC.*	STARTING	ELECTRICAL DATA			RPM	PARTS KEY NO.
		WATTS	VOLTS	HERTZ		
305LKB-51M/ 4LKB-1M/	Manual Manual	3500 4000	120 120	50 60	3000 3600	1 1
305LKB-52M/ 4LKB-2M/	Manual Manual	3500 4000	240 240	50 60	3000 3600	2 2
305LKB-53M/ 4LKB-3M/	Manual Manual	3500 4000	120/240 120/240	50 60	3000 3600	3 3
305LKB-51R/ 4LKB-1R/	Remote Remote	3500 4000	120 120	50 60	3000 3600	4 4
305LKB-52R/ 4LKB-2R/	Remote Remote	3500 4000	240 240	50 60	3000 3600	5 5
305LKB-53R/ 4LKB-3R/	Remote Remote	3500 4000	120/240 120/240	50 60	3000 3600	6 6

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

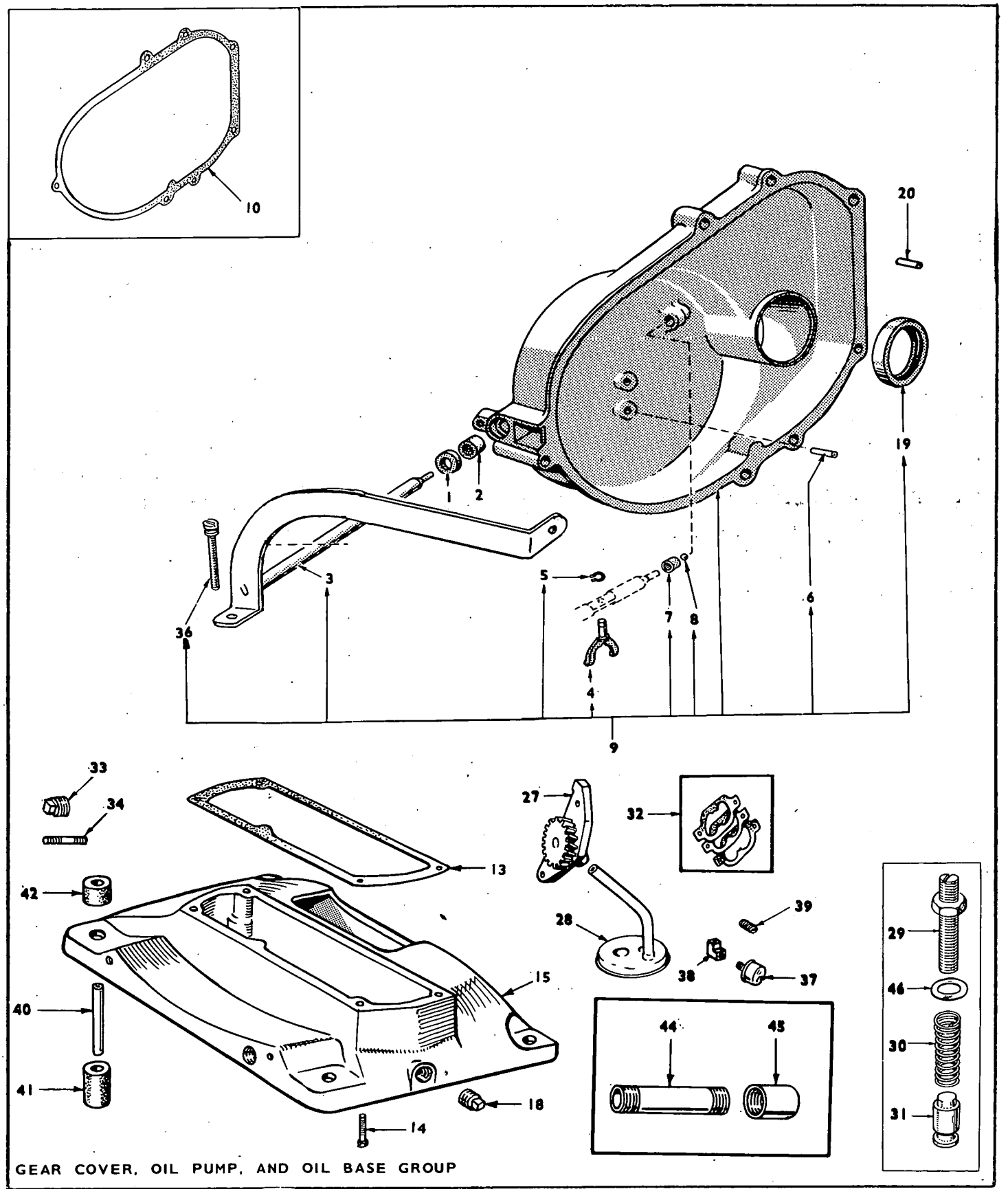
NOTE: Hertz is a unit of frequency equal to one cycle per second.



CYLINDER BLOCK GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	110A1623	1	Block Assy., Cylinder (Includes Parts Marked *)
2	110A1283	1	*Cover, Timing Control (Also in Camshaft Group) - Key 1, 2, 3
3	110A904	2	Rotocap, Valve - Gasoline Plts.
3A	110A893	2	Washer, Valve Spring Retainer - Gas & Gas-Gasoline Plants
4	TAPPET, VALVE		
	115A6	2	Standard
	115A6-05	2	.005" Oversize
6	110A1595	1	Cover, Valve Compartment
7	110A1791	1	Gasket, Valve Cover
8	517-48	1	*Plug, Camshaft Expansion, Key 4, 5, 6
9	*STUD, REAR BEARING PLATE MOUNTING		
	520A114	4	5/16 x 1-5/16"
	520A532	1	5/16 x 1-3/16"
10	110A639	4	Lock, Valve & Springs Ret.
11	GASKET, CYLINDER HEAD		
	110A892	1	Gasoline Plants
	110B1656	1	Gas Fuel Plants
12	110A539	2	Spring, Valve
13	110D883	1	Head, Cylinder
14	110A902	2	*Guide, Valve
15	BEARING, CRANKSHAFT - FRONT & REAR		
	101K389	2	Standard
	101K389-02	2	.002" Undersize
	101K389-10	2	.010" Undersize
	101K389-20	2	.020" Undersize
	101K389-30	2	.030" Undersize
16	104A575	2	*Washer, Crankshaft Bearing Thrust
17	101K115	1	*Gasket Kit, Bearing Plate
18	101C396	1	*Plate, Rear Bearing (Excludes Bearing)
19	101A367	2	*Bearing, Camshaft Front & Rear (Precision)
20	509A41	1	Seal, Bearing Plate
21	516A72	4	*Pin, Main Bearing Stop
22	110A445	5	*Nut, Bearing Plate Stud
23	123A486	1	Valve, Breather
24	526-63	1	Washer (Copper), Valve Compartment Cover
26	120B415	1	*Tube, Crankcase Oil
27	110B1037	1	Valve, Intake (Stellite)
28	110B880	1	Valve, Exhaust (Stellite)
29	*INSERT, VALVE SEAT (STELLITE)		
			Exhaust
	110A872	1	Standard
	110A872-02	1	.002" Oversize
	110A872-05	1	.005" Oversize
	110A872-10	1	.010" Oversize
	110A872-25	1	.025" Oversize
			Intake
	110A1000	1	Standard
	110A1000-02	1	.002" Oversize
	110A1000-05	1	.005" Oversize
	110A1000-10	1	.010" Oversize
	110A1000-25	1	.025" Oversize
30	505-140	1	Plug, Oil Fill (1")
	SCREW, HEX HEAD CAP		
	110A879	4	Cyl. Hd. (5/16-18 x 1-1/4")
	114A22	5	Cyl. Hd. (5/16-18 x 1-3/4")

* - Includes Parts in Cylinder Block Assembly.

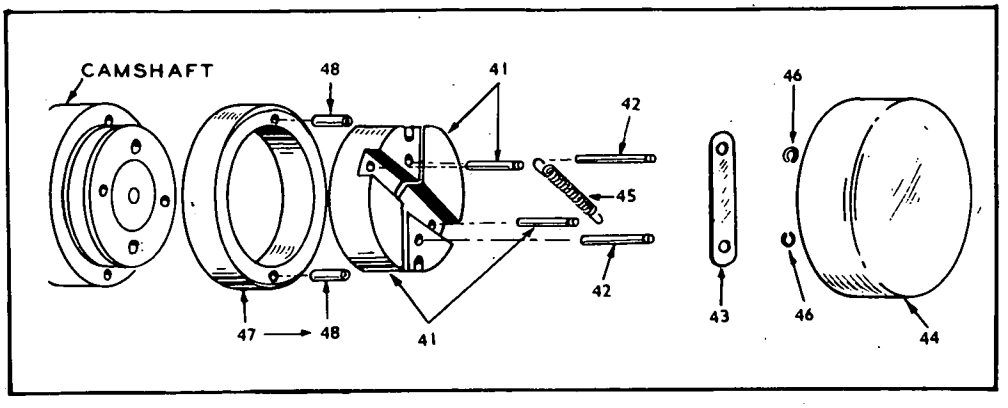


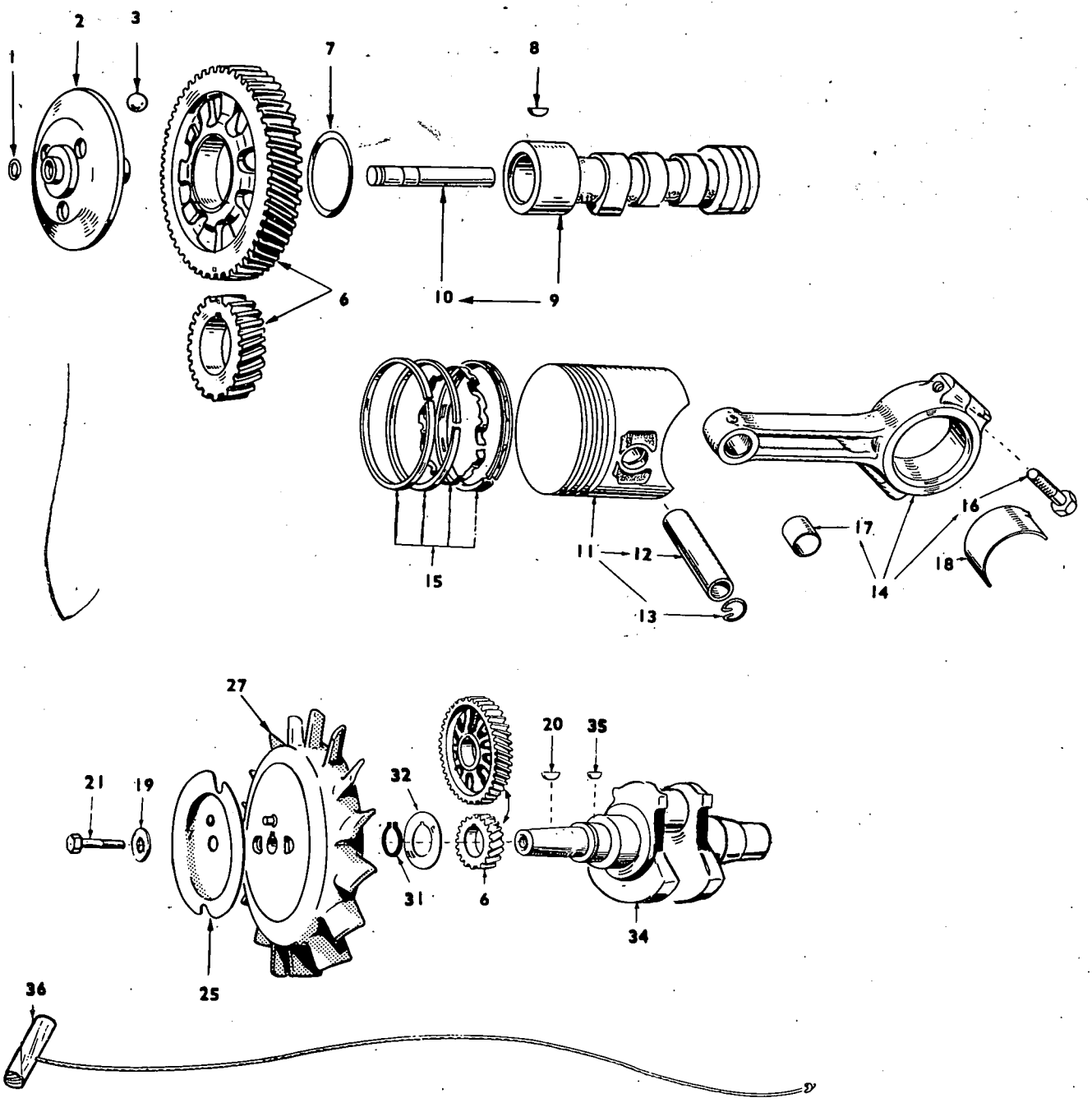
GEAR COVER, OIL PUMP, AND OIL BASE GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	509P8	1	Seal, Oil, Governor Shaft
2	510P13	1	Bearing, Gov. Shaft (Upper)
3	150B1137	1	*Shaft & Arm, Governor
4	150A620	1	*Yoke, Governor Shaft
5	518-129	1	*Ring, Yoke, Retainer
6	516-130	1	*Pin, Governor, Cup Stop (In Gear Cover)
7	510A8	1	*Bearing, Governor Shaft (Lower)
8	510P14	1	*Ball, Bearing, Governor Shaft
9	103B294	1	Cover Assembly, Gear (Includes Parts Marked *)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
10	103B11	1	Gasket, Gear Cover
13	102B107	1	Gasket, Oil Base Mtg.
14	800-56	4	Screw, Cap - Oil Base to Blk.
15	102D362	1	Base, Oil
18	505-110	2	Plug, Oil Drain (3/8")
19	509A40	1	*Seal, Gear Cover
20	516A11	2	Pin, Gear Cover (5/16 x 1-1/8")
27	120A651	1	Pump, Oil (Components not sold separately)
28	120B666	1	Intake, Oil Pump - Incl. Cup Screen & Pipe
29	801-54	1	Screw By-Pass Adj. (Incl. Nut)
30	120A140	1	Spring, By-Pass Valve
31	120A398	1	Valve, By-Pass
32	120K161	1	Gasket Kit, Oil Pump
33	505-13	1	Plug, Pipe (1/2") Oil Base Heater opening - Key 4, 5, 6
34	520A446	2	Stud, Oil Base Heater Switch Mounting - Key 4, 5, 6
36	150A136	1	*Stud, Gov. Sensitivity
37	309B10	1	Switch, Low Oil Pressure Cut-off
38	502-55	1	Elbow, Low oil pressure Switch
39	502-46	1	Nipple, Low oil pressure Switch
40	402A46	4	Bushing, Spacer Mounting Cushions
41	402A38	4	Cushion, Mounting- Lower
42	402A36	4	Cushion, Mounting - Upper
44	505-76	1	Nipple, Oil Drain
45	505-28	1	Coupling, Oil Drain
46	526-66	1	Washer, Oil Pressure Relief Valve Adjusting Screw

* - Includes Parts in Gear Cover Assembly.

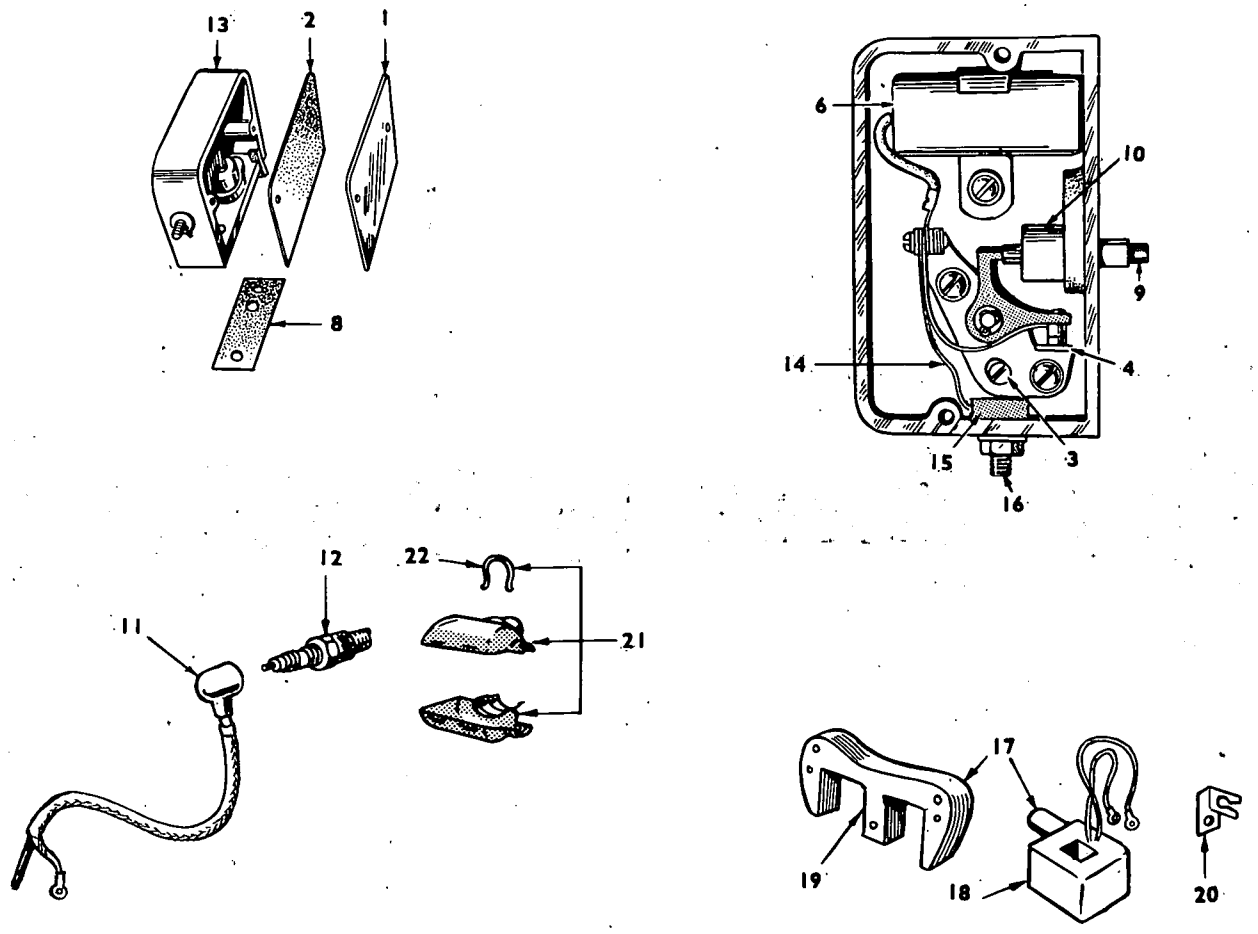




CRANKSHAFT, FLYWHEEL, CAMSHAFT AND PISTON GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	150A78	1	Ring, Camshaft Center Pin
2	150A612	1	Cup, Governor
3	510-15	5	Ball, Fly, Governor
6	105-192	1	Gear Set, Timing, Includes 1 ea. Crankshaft & Camshaft Gears (Includes Flyball Spacer & Plate)
7	105A4	1	Washer, Camshaft Gear Thrust
8	515-1	1	Key, Camshaft Gear Mounting
9	CAMSHAFT		
	105A280	1	Key 4, 5, 6 Incl. Center Pin
	105B281	1	Key 1, 2, 3 (Includes Center Pin & Spark Advance Mech. Pins)
10	150A75	1	Pin, Center, Camshaft
11	PISTON & PIN (INCLUDES RETAINING RINGS)		
	112-73	1	Standard
	112-73-10	1	.010″ Oversize
	112-73-20	1	.020″ Oversize
	112-73-30	1	.030″ Oversize
	112-73-40	1	.040″ Oversize
12	PIN, PISTON		
	112A69	1	Standard
	112A69-02	1	.002″ Oversize
13	112A3	2	Ring, Piston Pin Retaining
14	114B144	1	Rod, Connecting (Includes Bushing & Bolts)
15	RING SET, PISTON		
	113A126	1	Standard
	113A126-10	1	.010″ Oversize
	113A126-20	1	.020″ Oversize
	113A126-30	1	.030″ Oversize
	113A126-40	1	.040″ Oversize
16	805-10	2	Bolt, Place - Connecting Rod Cap
17	114A36	1	Bushing, Piston Pin - Connecting Rod

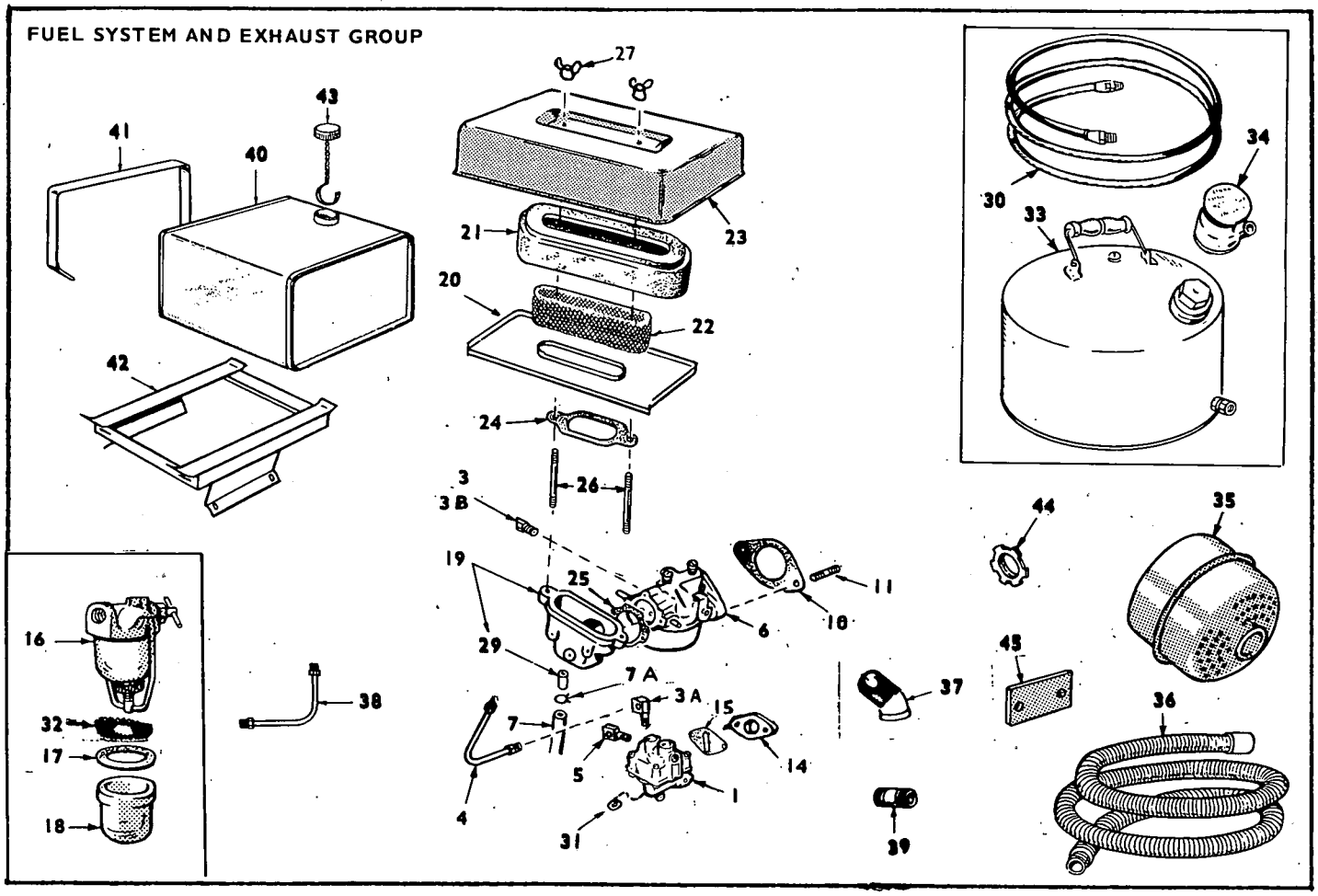
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	BEARING HALF, CONNECTING ROD		
	114B188	2	Standard
	114B188-02	2	.002″ Undersize
	114B188-10	2	.010″ Undersize
	114B188-20	2	.020″ Undersize
	114B188-30	2	.030″ Undersize
19	526A17	1	Washer, Wheel Mounting
20	515-2	1	Key, Wheel Mounting
21	104A170	1	Screw, Wheel Mounting
25	192B308	1	Sheave, Starter Rope
27	FLYWHEEL		
	160B1007	1	Key 1, 2, 3
	160B1005	1	Key 4, 5, 6
31	518-14	1	Lock, Crankshaft Gear Washer
32	104A43	1	Washer, Crankshaft Gear Retainer
34	104D649	1	Crankshaft
35	515-1	1	Key, Crankshaft Gear Mtg.
36	192A23	1	Rope, Manual Starting
41	160A789	2	Weight Assy., Timing Cont. Includes Pins, Key 1, 2, 3
42	516A146	2	Pin, Groove (1″) Timing Cont. Key 1, 2, 3
43	160A726	1	Retainer, Timing Control, Key 1, 2, 3
44	110A1283	1	Cover, Timing Control (Also in Cylinder Block Group) Key 1, 2, 3
45	160A727	1	Spring, Timing Control, Key 1, 2, 3
46	518-185	2	Lock, Timing Control Ret., Key 1, 2, 3
47	160A791	1	Cam, Timing Control, Key 1, 2, 3
48	516-144	4	Pin, Roll (7/16″) Camshaft & Timing Cont. Cam., Key 1, 2, 3



IGNITION GROUP

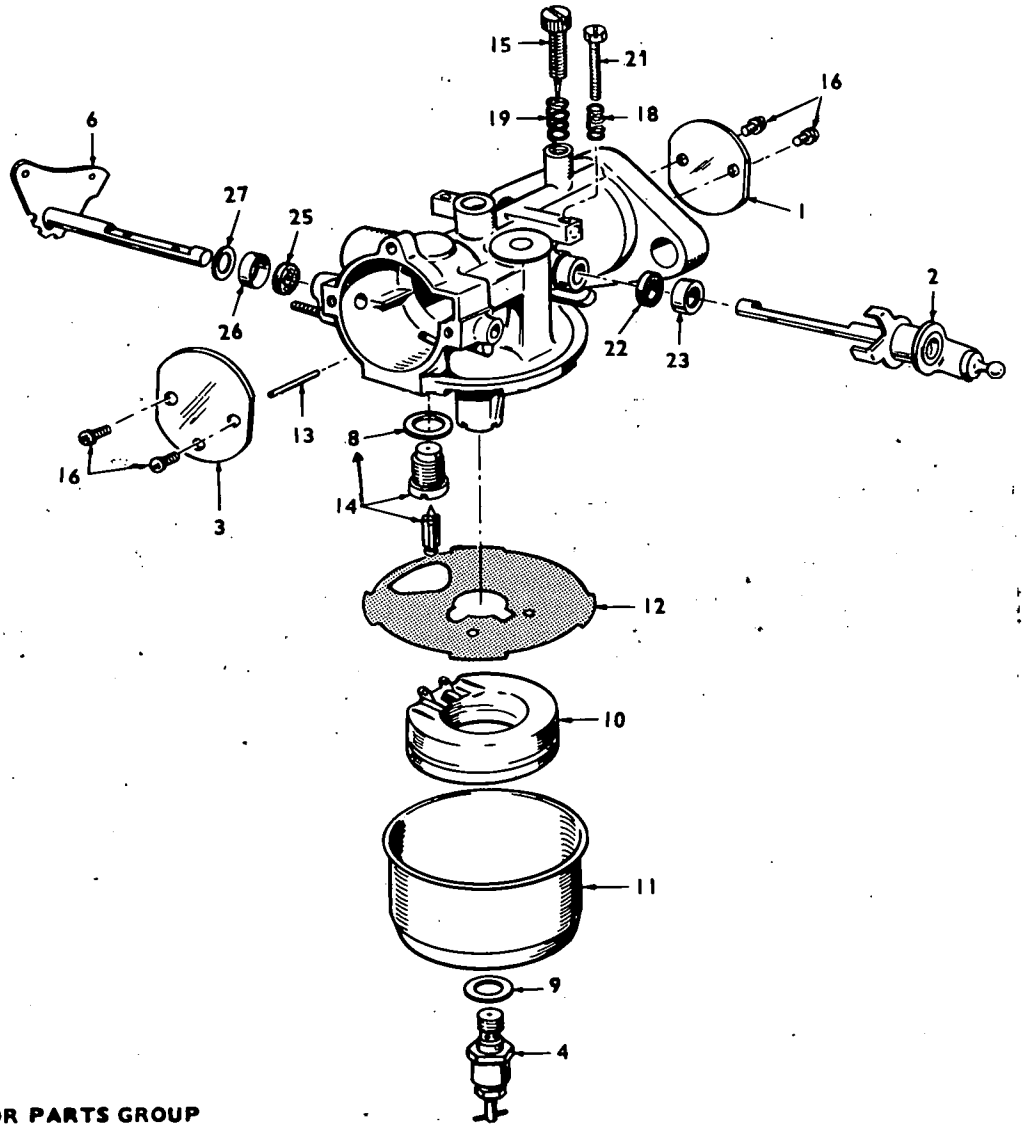
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	160A930	1	Cover, Breaker Box
2	160A150	1	Gasket, Breaker Box Cover
3	160A75	1	Cam, Point Gap Adjusting
4	160A2	1	Point Set, Breaker
6	312A69	1	Condenser
8	160A43	1	Gasket, Breaker Box Mtg.
9	160A262	1	Plunger Assy., Incl Diaph. & Guide
10	160A263	1	Diaphragm, Breaker Box
11	167A1506	1	Cable, Spark Plug
12	167-28	1	Plug, Spark
13	160A257	1	Box, Breaker (Incl. Points, Cond. Cover & Gasket.)
14	160A428	1	Strap, Point Set to Term. Blk.
15	332A319	1	Block, Insulator, Term.
16	332A284	1	Screw, Terminal
17	160A1016	1	Magneto Stator Assy.
18	160B1002	1	Coil, Mag. Stator
19	160B749	1	Pole Shoe, Mag. Stator
20	167A188	1	Clip, Spark Plug Cable
21	167A225	1	Shield, Spk. Plug (Incl. Clamp)
22	167A64	1	Clamp, Spk. Plug Shield

FUEL SYSTEM AND EXHAUST GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	149K526	1	Repair Kit, Fuel Pump - Key 4, 5, 6
1	149D693	1	Pump, Fuel, Key 4, 5, 6
3	502-65	1	Elbow, Carburetor Inlet Key 4, 5, 6
3A	502-2	1	Elbow, Fuel Pump Out - Key 4, 5, 6
3B	502-313	1	Elbow, Carburetor Inlet - Key 1, 2, 3
4	149A1082	1	Line, Fuel, Pump to Carburetor
5	502-20	2	Elbow (1) Fuel Filter (1) Fuel Pump In - Key 4, 5, 6
6	CARBURETOR, GASOLINE (Separate Group For Components)		
	141D682	1	Key 1, 2, 3
	141D681	1	Key 4, 5, 6
7	503A516	1	Hose, Breather
7A	503-171	1	Clamp, Breather Hose
10	154A733	1	Gasket, Carburetor Mounting
11	520A223	2	Stud, Carburetor Mounting
14	149A45	1	Spacer, Fuel Pump Mounting - Key 4, 5, 6
15	149A3	2	Gasket, Fuel Pump Mounting - Key 4, 5, 6
16	149B79	1	Filter, Fuel (Optional)
17	149-149	1	Gasket, Filter Bowl (Optional)
18	149-150	1	Bowl, Fuel Filter (Optional)
19	140A933	1	Adapter, Air Cleaner
20	PAN, AIR CLEANER		
	140A791	1	Gasoline Plants
	140C595	1	Gas Fuel Plants
21	140B640	1	Element, Air Cleaner
22	140B641	1	Retainer, Air Cleaner Element

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
23	COVER, AIR CLEANER		
	140C650	1	Gasoline Plants
	140C594	1	Gas Fuel Plants
24	140A584	1	Gasket, Air Cleaner
25	140A585	1	Gasket, Adapter to Carburetor
26	520A621	2	Stud, Air Cleaner
27	865-20	2	Nut, Wing - Air Cleaner
29	123A732	1	Tube, Adapter to Breather Hose
30	501A27	1	Line, Fuel, Flexible - Key 4, 5, 6
31	526-63	2	Washer (Copper), Pump Mtg. - Key 4, 5, 6
32	149-202	1	Screen, Fuel Filter
33	415A126	1	Tank, Fuel - Key 4, 5, 6
34	415A124	1	Cap, Rain, Fuel Tank - Key 4, 5, 6
35	155B484	1	Muffler, Exhaust
36	155B491	1	Tube, Exhaust, Flexible (36″) - Key 4, 5, 6
37	505-333	1	Elbow, Pipe (1″ x 45°) - Exh.
38	159B884	1	Line, Filter to Pump
39	505-87	1	Nipple, Exhaust (1 x 3″)
40	159C530	1	Tank, Fuel, Mtd. - Key 1, 2, 3
41	159A537	2	Strap, Mtd. Fuel Tank - Key 1, 2, 3
42	159B882	1	Bracket, Mtd. Fuel Tank - Key 1, 2, 3
43	159B20	1	Cap, Mtd. Fuel Tank - Key 1, 2, 3
44	331-53	1	Locknut, Exhaust Elbow
45	149A136	1	Cover, Fuel Pump Hole (Block) Key 1, 2, 3



CARBURETOR PARTS GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	CARBURETOR, GASOLINE		
	141D682	1	Key 1, 2, 3
	141D681	1	Key 4, 5, 6
	141P747	1	Repair Kit, Includes Parts Marked ★
	141K748	1	★Gasket Kit, Includes Parts Marked †
	141A281	1	†★Gasket, Carburetor Flange
1	141P706	1	Valve, Throttle
2	141P709	1	Shaft & Lever, Throttle
3	141P707	1	Valve, Choke
4	141P712	1	Main Jet and Adjusting Assy.
6	SHAFT, CHOKE		
	141-742	1	Key 1, 2, 3
	141B679	1	Key 4, 5, 6
8	141P696	1	†Gasket, Fuel Inlet Valve
9	141A77	1	†★Gasket, Main Jet
10	141P702	1	Float & Lever
11	141P708	1	Bowl
12	141P701	1	†★Gasket, Bowl Ring

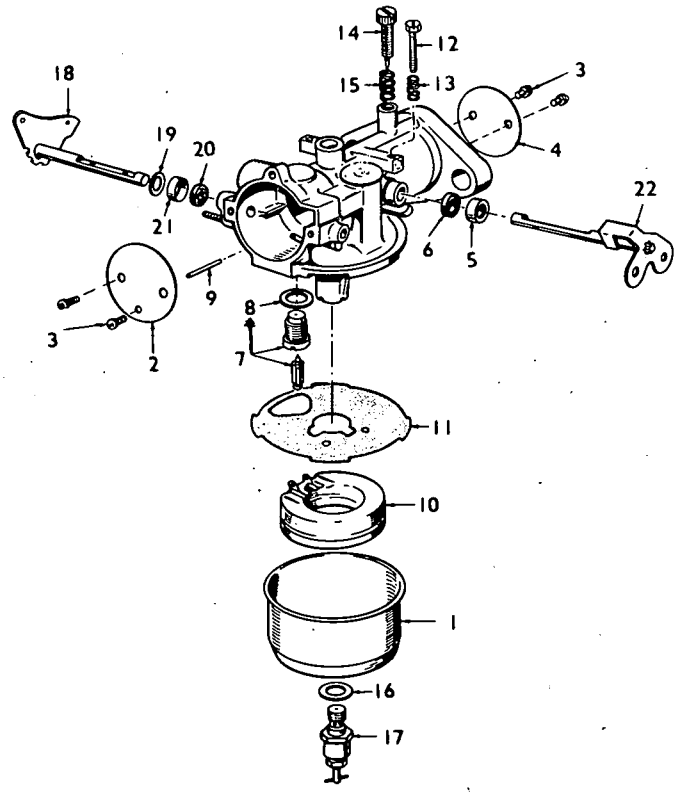
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
13	141P703	1	★Pin, Float Lever
14	141P704	1	★Valve, Fuel Inlet
15	141P713	1	Screw, Idle Adjustment
16	141P698	4	Screw & Washer, Choke & Throttle Valve
18	141P711	1	Spring, Throttle Adjust. Screw
19	141P710	1	Spring, Idle Adj. Screw
21	141P700	1	Screw, Throttle Lever Adj.
22	141P661	1	†★Seal, Rubber, Throttle Shaft
23	141P705	1	★Retainer, Seal, Throttle Shaft
25	141P697	1	†★Seal, Felt - Choke Shaft - Key 1, 2, 3
26	141-203	1	★Retainer, Seal - Choke Shaft Key 1, 2, 3
27	141P699	1	Washer, Spacer - Choke Shaft Key 1, 2, 3

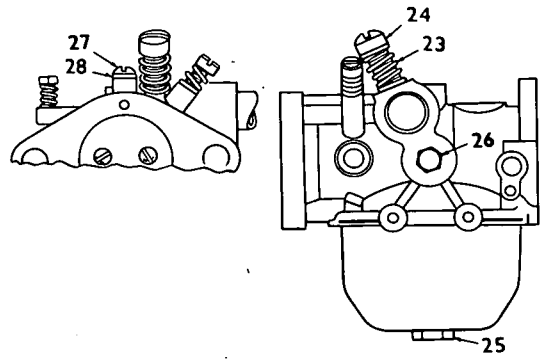
★ - Contained in Repair Kit.
† - Contained in Gasket Kit.

CARBURETOR PARTS GROUP (GAS AND GAS-GASOLINE)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	CARBURETOR, GAS-GASOLINE		
	141D723	1	Key 1, 2, 3
	141D724	1	Key 4, 5, 6
	141D726	1	Carburetor, Gas Only
	141P747	1	Repair, Kit (Includes Parts Marked ★)
	141K748	1	★Gasket Kit (Includes Parts Marked †)
	141A281	1	★† Gasket, Carburetor Flange
1	141P708	1	Bowl, Fuel
2	141P740	1	Plate, Choke - Gas-Gasoline
3	141P698	4	Screw & Washer, Choke & Throttle Plate Mounting (2 used on Gas only)
4	141P706	1	Plate, Throttle
5	141P705	1	★Retainer, Seal
6	141-661	1	†★Seal, Rubber
7	141P704	1	★Valve Seat Assembly - Gas-Gasoline
8	141P696	1	†Washer, Fuel Valve Seat - Gas-Gasoline
9	141P703	1	★Shaft, Float - Gas-Gasoline
10	141P702	1	Float Assy. - Gas-Gasoline
11	141P701	1	†★Gasket, Bowl to Body
12	141P700	1	Screw, Throttle Stop
13	141P711	1	Spring, Throttle Stop
14	NEEDLE, IDLE ADJUSTING		
	141P713	1	Gas Only
	141P713	2	Gas-Gasoline
15	SPRING, IDLE NEEDLE		
	141P710	1	Gas Only
	141P710	2	Gas-Gasoline
16	141A77	1	†★Washer, Main Jet Assembly
17	141-712	1	Jet Assy., Main (Adjustable) - Gas-Gasoline
18	SHAFT, CHOKE - GAS-GASOLINE		
	141-742	1	Key 1, 2, 3
	141B716	1	Key 4, 5, 6
19	141P699	1	Washer, Gas-Gasoline - Key 1, 2, 3
20	141P697	1	★†Seal, Felt - Gas-Gasoline - Key 1, 2, 3
21	141P203	1	★Retainer, Felt Seal - Gas-Gasoline - Key 1, 2, 3
22	141P709	1	Shaft & Lever, Throttle
23	141-733	1	Spring, Main Gas Needle
24	141-734	1	Needle, Main Gas Adjusting
25	141-736	1	Nut, Bowl - Gas Only
26	141-737	1	Plug, Pipe (1/8″) - Gas Only
27	141-738	1	Screw, #10-32 - Gas Only
28	141-739	1	Washer, Gas Only

★ - Included in Carburetor Repair Kit (141K747).
† - Included in Carburetor Gasket Kit (141K748).

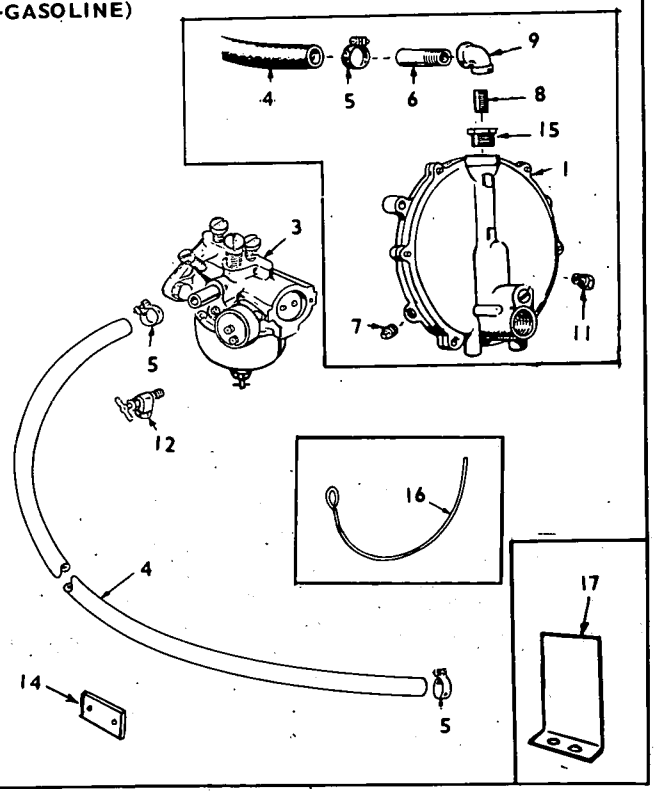


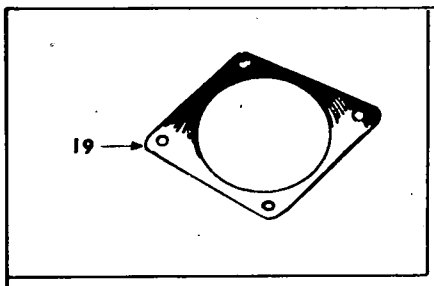


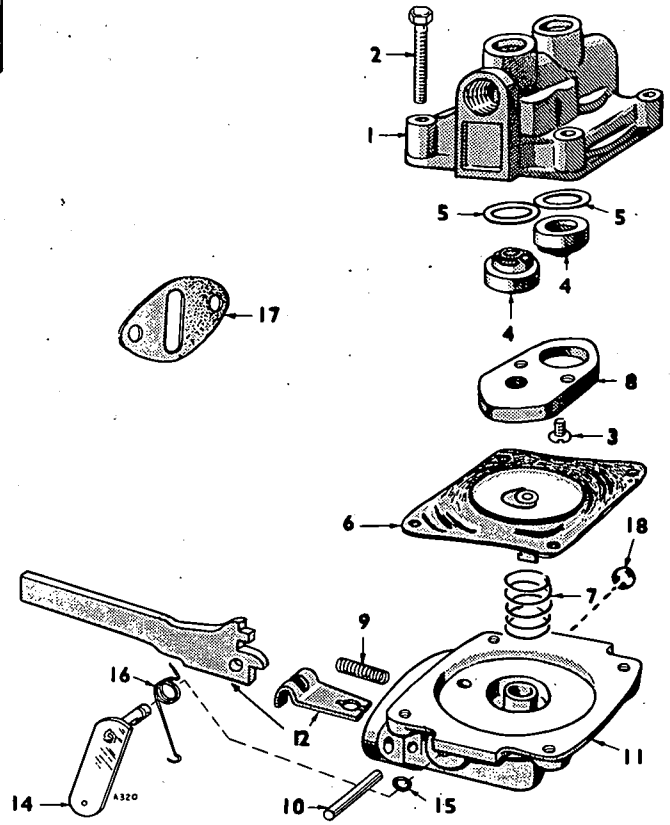
OPTIONAL FUEL SYSTEM GROUP (GAS AND COMBINATION GAS-GASOLINE)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	148C311	1	Regulator, Gas
3	*CARBURETOR, GAS-GASOLINE		
	141D723	1	Key 1, 2, 3
	141D724	1	Key 4, 5, 6
3	141D726	1	Carburetor, Gas
4	503-315	1	Hose, Regulator to Carb.
5	503P32	2	Clamp, Hose
6	505-302	1	Nipple, Half (1/4 x 1-1/2")
7	505-57	1	Plug, 1/8", Regulator
8	505-99	1	Nipple, (1/4 x 1/8"), Regulator Outlet
9	505-38	1	Elbow, (1/4") Regulator Out.
11	148A107	1	Vent, Regulator
12	504-7	1	Valve, Shut-off (Fuel Pump Inlet) - Gas-Gasoline
14	149A136	1	Plate, Fuel Pump Hole Crankcase
15	505-17	1	Bushing, Reducer (3/8 x 1/4")
16	143A231	1	Wire, Choke Lock - Gas-Gasoline
17	149A1160	1	Shield, Heat - Fuel Line

* - See separate group for components and gasket kit.

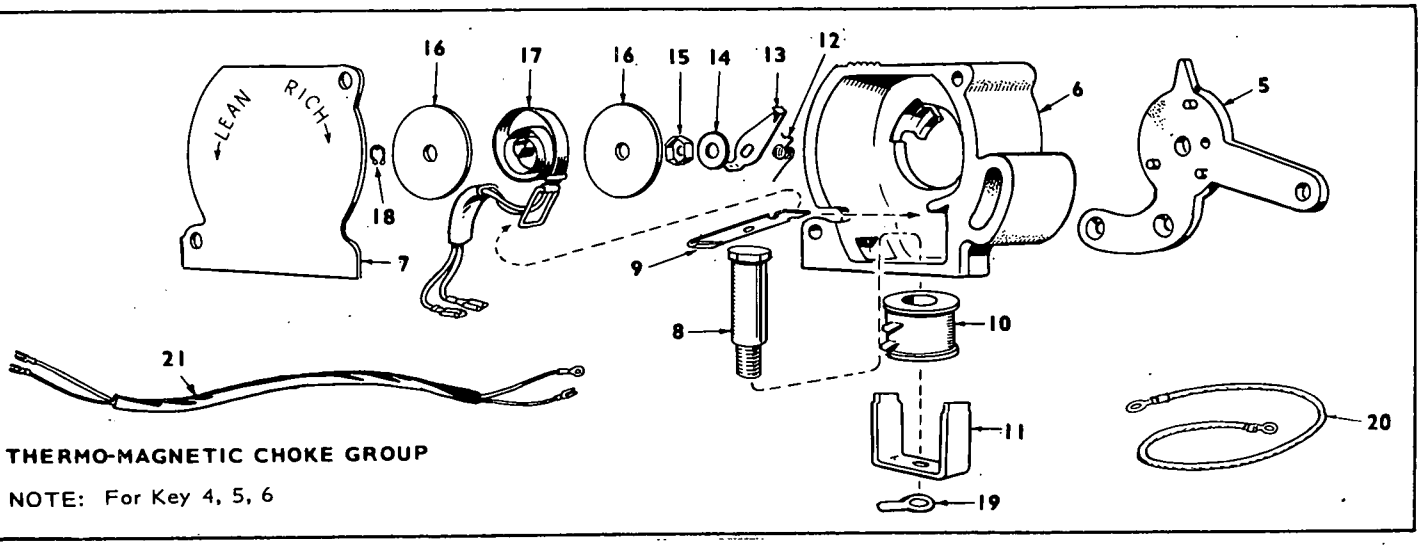






FUEL PUMP PARTS GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	149D693	1	Pump, Fuel
	149K526	1	Kit, Fuel Pump Repair - Incl. Parts marked (*).
1			Body, Upper (Not Sold Separately)
2	815-148	4	Screw, H. H. (3-32 x 7/8)
3	815-147	2	Screw, Phillips Flat Hd. (#6-32 x 5/8)
4	149-96	2	*Valve and Cage.
5	149A95	2	*Gasket, Valve.
6	149A582	1	*Diaphragm Assy.
7	149A672	1	Spring, Diaph.
8	149A539	1	Retainer, Valve Cage.
9	149A675	1	*Spring, Rocker Arm
10	516A113	1	Pin, Rocker Arm.
11			Body, Lower - (Not Sold Separately)
12	149-710	1	Arm and Link, Rocker
14	149A551	1	Lever, Hand Primer.
15	509-65	2	Seal, "O" Ring.
16	149A404	1	Spring, Priming Lever.
17	149A3	1	*Gasket, Fuel Pump Mtg.
18	518-129	1	Ring, Retainer - Primer Lever.
19	149A858	1	Gasket, Diaphragm.



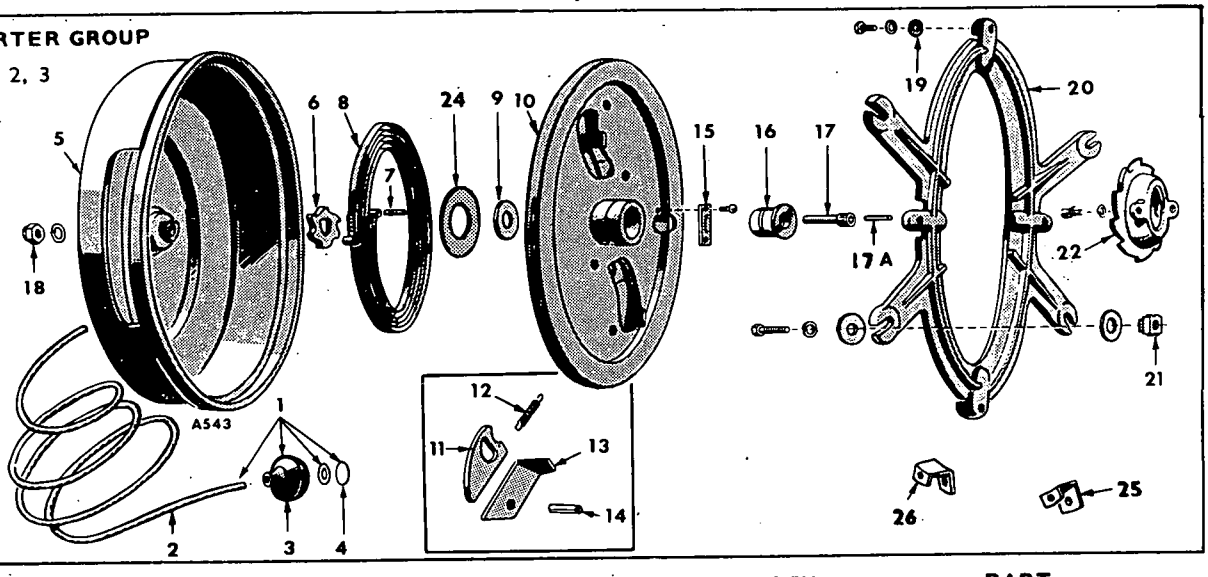
THERMO-MAGNETIC CHOKE GROUP

NOTE: For Key 4, 5, 6

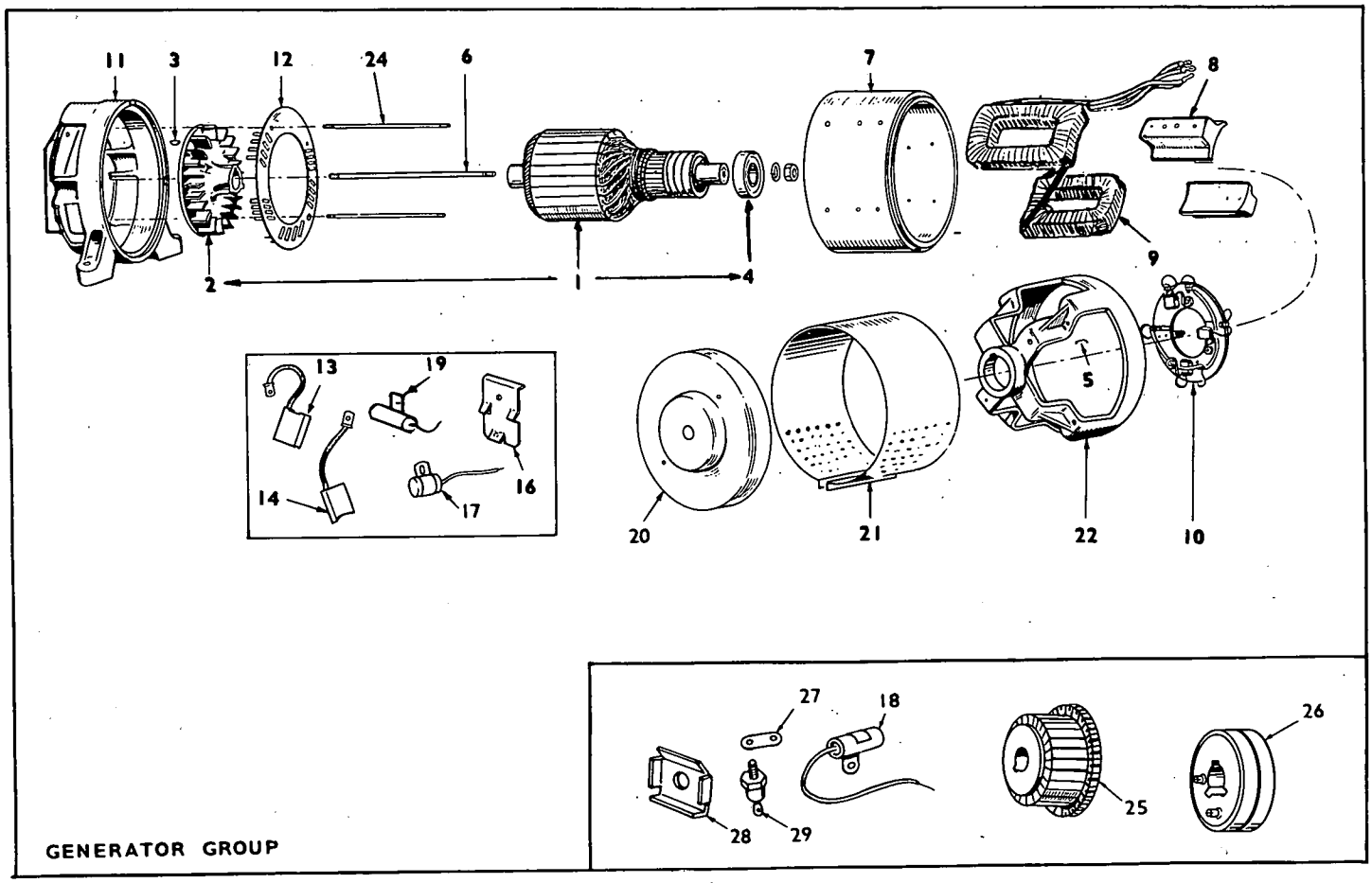
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
5	153C385	1	Plate, Mtg.
6	153D386	1	Body
7	153C389	1	Cover
8	153B391	1	Core, Solenoid
9	153A395	1	Armature
10	307B801	1	Coil, Solenoid Assy.
11	153B392	1	Frame, Solenoid
12	153B387	1	Spring
13	153B390	1	Lever, Thermostat
14	526-18	1	Washer (17/64" I.D. x 5/8" O.D. x 1/16")
15	870-134	1	Palnut (1/4-20)
16	153A399	2	Insulator
17	153B400	1	Heater Assembly
18	518-129	1	Ring, Retaining
19	332A876	1	Terminal Ground
20	336A1550	1	Lead, Choke to Ground
21	338B387	1	Harness, Choke to Control

READI-PULL STARTER GROUP

NOTE: For Key 1, 2, 3



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	192K385	1	Starter Kit, Complete (Incl. Mtg. Ring & Ratchet Wheel
1	192A45	1	Rope & Grip Assembly
2	192A43	1	Rope, Starter, Less Grip (83")
3	192A44	1	Grip, Starter Rope - Rubber
4	517A25	1	Plug, Starter Rope Grip
5	192C152	1	Cover, Starter
6	192A153	1	Wheel, Cog-Anti-Backlash
7	516-138	1	Pin (3/16 x 5/8") Recoil Sprg.
8	192A39	1	Spring, Recoil
9	526A123	1	Washer, Thrust (Sheave Bush. to Cover)
10	192B180	1	Sheave, Rope
11	192A172	2	Pawl
12	192A165	2	Spring, Pawl
13	192A168	2	Arm, Ratchet
14	516-110	4	Pin, Roll (5/16 x 1/2") (2) Ratchet Arm, (2) Pawl
15	192A167	1	Clamp, Rope
16	192A163	1	Bearing, Sheave Hub (Bronze)
17	192A323	1	Capscrew (3/8-16 x 1-1/2")
17A	516-132	1	Pin, Spirol, Locating
18	870-138	1	Nut, Bushing to Cover Screw
19	WASHER, FLAT		
	526A21	4	Starter to Mounting Ring
	526A21	1	Starter Rope Grip
20	192C186	1	Ring, Starter to Blower Hsg. Mounting
21	870-110	4	Nut, Spd. Grip, Starter Ring to Blower Housing
22	192B309	1	Wheel, Ratchet
24	526-168	1	Washer Recoil Sprg. Ret.
25	122A294	1	Bracket, Starter Mtg. - R Lower
26	192A295	1	Bracket, Starter Mtg. - L Lower



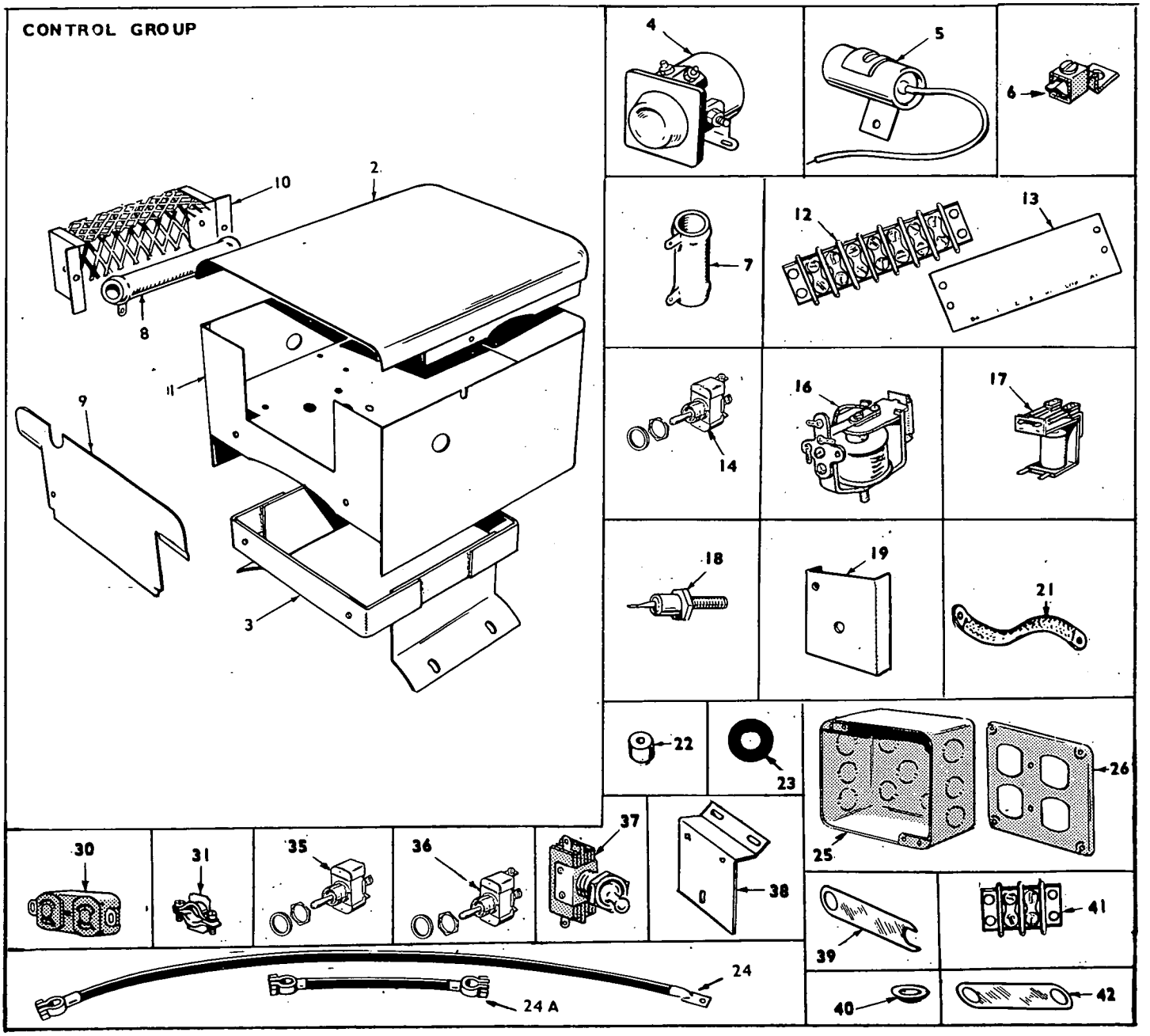
GENERATOR GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	*	1	Armature Assembly, Includes Bearing & Blower
2	205C53	1	Blower, Generator
3	515-6	1	Key, Blower to Crankshaft
4	510A47	1	Bearing (Ball), Armature
5	232A596	1	Clip, Bearing Stop
6	STUD, ARMATURE THROUGH		
	520A491	1	Key 1, 2, 3, 4, 5
	520A525	1	Key 6
7	210C386	1	Frame Only, Generator (Machined & Drilled, Less Coils & Pole Shoe)
8	221B147	2	Shoe, Pole, Field
9	*	1	Coil Assembly, Field (Set of 2 Coils)
10	RIG ASSEMBLY, BRUSH		
	212C323	1	Key 1
	212C324	1	Key 2
	212C322	1	Key 3
	212C311	1	Key 4, 5
	212C313	1	Key 6
11	231B131	1	Adapter, Generator to Engine
12	232B1256	1	Scroll, Air Baffle
13	214A61	4	Brush, Commutator - Key 4, 5, 6
14	BRUSH, COLLECTOR RING		
	214A86	4	Key 6
	214A87	2	Key 6
	214A56	4	Key 1, 2, 4, 5
	214A56	6	Key 3
16	SPRING, BRUSH		
	212B1105	10	Key 6
	212B1105	8	Key 4, 5
	212B1105	6	Key 3
	212B1105	4	Key 1, 2

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
17	CONDENSER (.1 MFD.) AC		
	312A58	1	Key 1, 2, 4, 5
	312A58	2	Key 3, 6
18	312A17	1	Condenser (.5 MFD) DC - Key 4, 5
19	312A27	1	Condenser (.5 MFD) DC - Key 6
20	211C99	1	Cover, End Bell
21	BAND, END BELL		
	234C255	1	Key 1, 2, 3, 4, 5
	234B5	1	Key 6
22	BELL, END		
	211D97	1	Key 1, 2, 5
	211D160	1	Key 3, 4
	211D98	1	Key 6
24	520A502	2	Stud, Generator Through
25	203A146	1	Commutator - Key 4, 5, 6
26	COLLECTOR RING		
	204A9	1	Key 1, 2, 4, 5
	204A10	1	Key 3, 6
27	332A878	1	Strip, Connector, Rectifier - Key 1, 2, 3
28	212A1214	4	Clamp, Brush Rig
29	RECTIFIER		
	305A448	1	3-1/2" Lead - Key 1, 3
	305A473	1	5-1/2" Lead - Key 1, 3
	305A449	1	3-1/2" Lead - Key 2
	305A474	1	5-1/2" Lead - Key 2

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

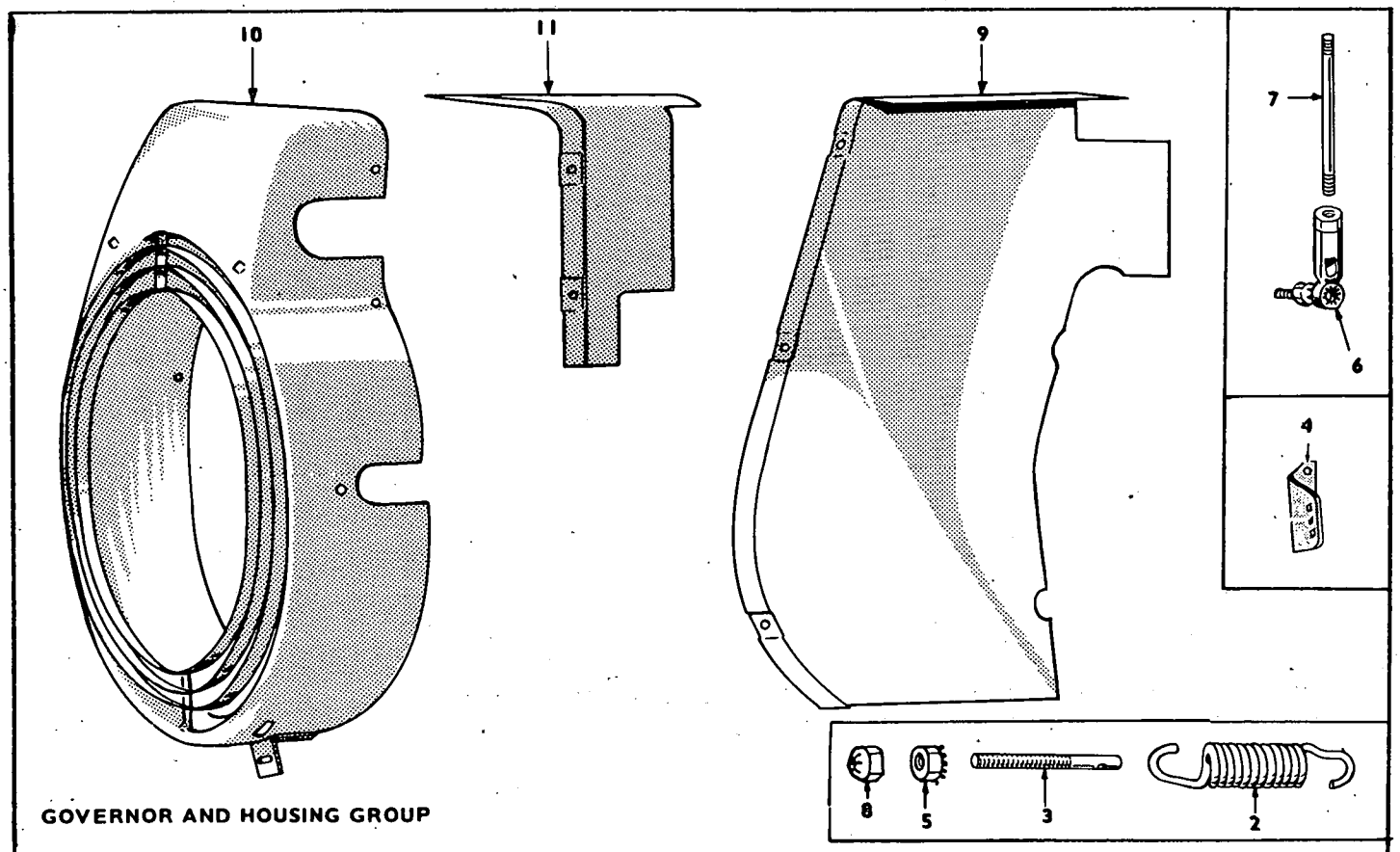
CONTROL GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301B2968	1	Box, Control, Key 4, 5, 6
2	301C1244	1	Cover, Cont. Box, Key 4, 5, 6
3	301C2965	1	Bracket, Cont. Box Mtg., Key 4, 5, 6
4	307B845	1	Solenoid, Start, Key 4, 5, 6
5	312A57	1	Condenser (.1 Mfd.) Start Sol. Supp., Key 4, 5, 6
6	332-142	1	Terminal
7	304A251	1	Resistor, Fixed Key 4, 5, 6
8	353A16	2	Resistor, (Mts. Outside Cont. Box), Key 4, 5, 6
9	301B2597	1	Plate, Cont. Box End, Key 4, 5, 6
10	301B2528	1	Box, Resistor Mtg., Key 4, 5, 6
12	332A745	1	Block, Term. Remote Cont., Key 4, 5, 6
13	332A946	1	Strip, Marker, Key 4, 5, 6
14	308P154	1	Switch, Start-Stop, Key 4,5,6
16	307B253	1	Relay, Stop, Key 4, 5, 6
17	307B642	1	Relay, Start-Disc., Key 4, 5, 6
18	305B235	1	Rectifier, Key 4, 5, 6

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
19	305A254	1	Bracket, Heat Sink, Rectifier, Key 4, 5, 6
21	337A52	1	Strap, Ground, Key 4, 5, 6
22	402A78	4	Cushion, Mtg., Key 4, 5, 6
23	GROMMET, KEY 4, 5, 6		
	508-1	2	For 1-1/16" Hole
	508-2	3	For 1/2" Hole
	508-4	1	For 1-3/8" Hole
24	CABLE, BATTERY, KEY 4, 5, 6		
	416A77	2	28"
24A	416A4	1	6-3/4", Jumper
25	330-28	1	Box, Recpt., Key 1, 2, 3
26	330-42	1	Panel, Bx., Key 1, 2, 3
30	RECEPTACLE, DUPLEX		
	323P213	2	Key 2 (2 Tandem Blades & Grounding Pin)
	323P213	1	Key 3 (2 Tandem Blades & Grounding Pin
	323P184	2	Key 1 (2 Parallel Blades & Grounding Pin
	323P184	1	Key 3 (2 Parallel Blades & Grounding Pin

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
31	331-27	1	Connector, Key 1, 2, 3
35	308-97	1	Switch, Hand Crank (Located in Cylinder Air Housing) - Key 4, 5, 6
36	308-155	1	Switch, Stop (Located in Cyl. Air Housing) - Key 1, 2, 3
37	SWITCH, MANUAL OR ELECTRIC START		
	308-2	1	Gasoline Plants - Key 4, 5, 6
	308P6	1	Gas Fuel Plants - Key 4, 5, 6
38	301C2683	1	Bracket, Receptacle Box Mounting - Key 1, 2, 3
39	JUMPER, RECEPTACLE GROUND		
	160A144	1	Key 3
	160A144	2	Key 1, 2
40	304A14	4	Washer, Resistor Centering - Key 4, 5, 6
41	BLOCK, TERMINAL		
	332A609	1	Gasoline Plants - Key 4, 5, 6
	332A611	1	Gas Fuel Plants - Key 4, 5, 6
42	332A592	2	Jumper, Terminal Block - Key 4, 5, 6



GOVERNOR AND HOUSING GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
2	150A1044	1	Spring, Gov.
3	150A96	1	Stud, Speed Adj.
4	150A611	1	Bracket, Speed Stud
5	870-131	1	Nut, Speed Adj.
6	150A1081	2	Joint, Ball
7	150A883	1	Link, Throttle
8	870P188	2	Palnut, Locking
9	134D584	1	Housing, Cyl. Air
10	134D590	1	Housing, Blower
11	134C586	1	Cover, Cyl. Air

SERVICE KITS AND MISCELLANEOUS

PART NO.	QTY. USED	PART DESCRIPTION
98C1100	1	Decal Kit
168K105	1	Gasket Kit, Engine
522K228	1	Engine Overhaul Kit
333K126	1	Heater Kit, Oil Base (75 Watt, 120 Volt)
525P137	As Req.	Touch-up Paint (Pressurized Can) 16 Ounce, Green Enamel
525P90	As Req.	Touch-up Paint (Pressurized Can) 12 oz. Mouse Grey Enamel

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