

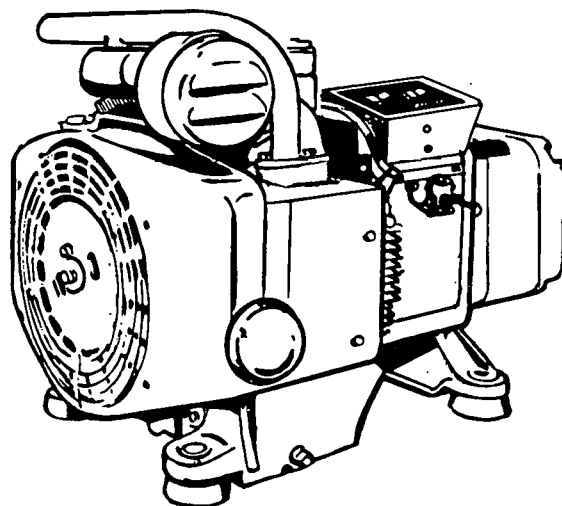
OPERATOR'S MANUAL AND PARTS CATALOG

FOR

NH

SERIES

ELECTRIC GENERATING SETS



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.

GENERAL INFORMATION

This manual contains installation and operation instructions as well as information required for proper maintenance, adjustment and repair of the NH generating set. Because the first and most important part of repair work is the correct diagnosis of the trouble, this manual includes a troubleshooting chart.

Study and follow the instructions carefully. Proper service and maintenance will result in longer unit life and better performance.

How to interpret MODEL and SPEC NO.


6.5 NH - 3CR / 1 F

1	2	3	4	5

1. Kilowatt rating of the unit.
2. Factory code for SERIES identification.
3. Combines with number 1 and 2 to identify model. Indicates model, output voltage, method of starting:
E - ELECTRIC starting; R - REMOTE electric starting.
4. Factory code for designating optional equipment.
5. Specification letter (advances when 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.



MANUFACTURER'S GENERAL WARRANTY

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

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

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

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

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

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

LITHO IN U.S.A. 7-73 48-47

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SPECIFICATIONS

Nominal dimensions of set (inches)	
6.5 NH (Prior Spec D)	20-13/16" H x 20-9/16" W x 29-9/16" L
6.5 NH (Begin Spec D)	20-13/16" H x 20-9/16" W x 29-5/8" L
6.5 NH (Contractor Model)	31" H x 28" W x 36" L
Number of cylinders (horizontally opposed)	2
Cubic inch displacement	60
Cylinder bore (inches)	3.562
Piston stroke (inches)	3.000
RPM (60 hertz)	1800
RPM (50 hertz)	1500
Compression ratio	7:1
Oil capacity (quarts)	4
with filter	4.5
Ignition	
Remote starting	Battery
Electric starting	Flywheel magneto
Battery voltage	12
Battery size	72 AH
Battery charge rate (amperes) Prior Spec D	5-Hi
Begin Spec D	1.5 to 6
Contractor Model	1.5 to 2
Ventilation Required (cfm 1800 rpm)	
Engine (Pressure cooling)	570
Engine (Vacu-Flo cooling)	650
Generator	100
Combustion	25
AC voltage regulation in $\pm\%$	7
AC frequency regulation in %	5
Rating (output in watts)	
50 hertz (General utility rating)	5500
60 hertz (General utility rating)	6500
Spark Plug Gap — Gasoline	0.025
Spark Plug Gap — Gaseous Fuel	0.018

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

TUNE-UP SPECIFICATIONS

Spark Plug Gap	
Gasoline	.025"
Gaseous	.018"
Breaker Point Gap	.020"
Ignition Timing	22°
Tappet Adjustment (engine cold)	
Intake	.003"
Exhaust	.010"

INSTALLATION

Consider each installation individually. Use these instructions as a guide in obtaining a safe and efficient installation. Consult your local building inspector for information on local building codes, fire ordinances, etc. before installing your generating set. Some important installation considerations are:

- Location and Mounting
- Sufficient ventilation and cooling
- Fuel and electrical connections
- Exhaust gas discharge

LOCATION AND MOUNTING

Provide a protected location that is dry, dust-free and, preferably, heated in cold weather. Allow at least 24 inches around the installation for service and maintenance of the unit. Figure 1 illustrates a typical installation for a pressure-cooled generating set.

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

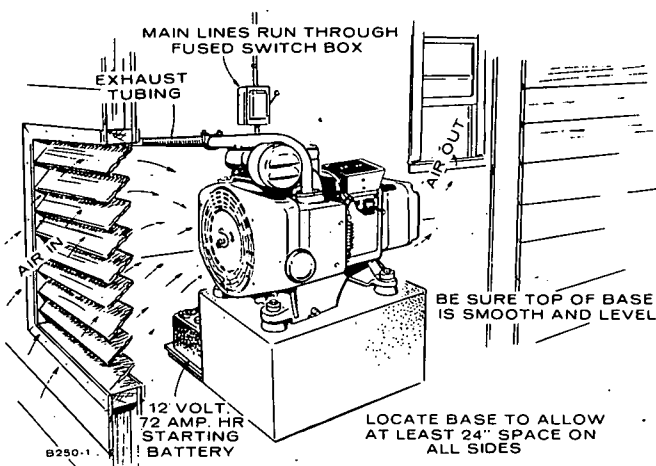


FIGURE 1. TYPICAL INSTALLATION

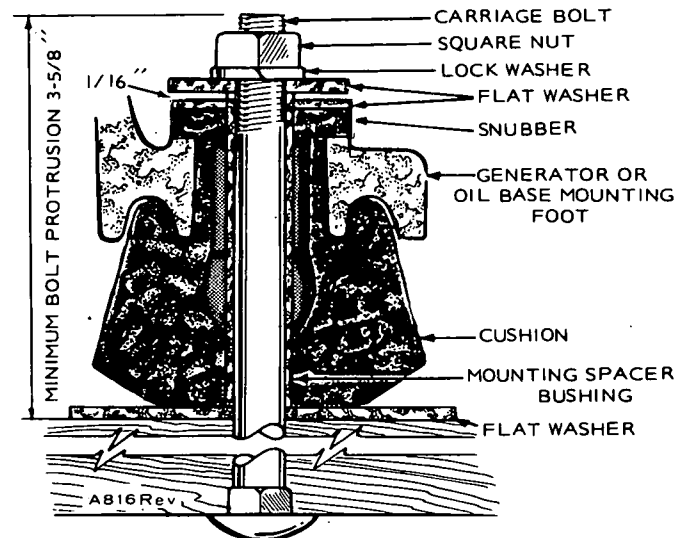


FIGURE 2. VIBRATION ISOLATOR

Assemble the vibration isolators as shown in Figure 2. The spacer bushing prevents compression of the snubber or upper rubber cushion. Two vibration isolators are for the engine-end only and two are for the generator-end only. Use them in their respective positions to avoid undesirable vibration resulting from improper cushioning. The spacing for the mounting bolts is 18-5/16" x 12" prior to Spec D; begin Spec D, spacing is 17-5/16" x 12".

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 indoor or housed installations need properly sized and positioned vents for required air flow. See *Specifications* for the air requirements.

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
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 two square feet. Use auxiliary fans to increase air flow to units installed in small, poorly ventilated rooms. The fan size and location should be such that the air inlet to the engine does not exceed 120°F when running at full rated load.

Pressure Cooling: These units need an unrestricted air inlet opening of 2-1/2 square feet. Install a separate duct to accommodate the discharge air. The discharge duct must be at least as large as the inlet vent. If a screen is used in the duct, increase the duct size proportionately to the screen's restriction. Use large, radius elbows for bends and increase the duct size for runs of over 5 feet. A canvas section in the duct prevents transmission of vibration. A slight upward pitch in the duct lets heat escape when the unit is stopped and minimizes vapor lock. See Figure 1.

Vacu-Flo Cooling: Provide an air inlet area of 2-1/2 square feet. Duct the heated air from the Vacu-Flo scroll. It should be at least as large as the scroll outlet (Figure 3).

WARNING Do not use discharge Vacu-Flo air for heating because it may contain poisonous gases.

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

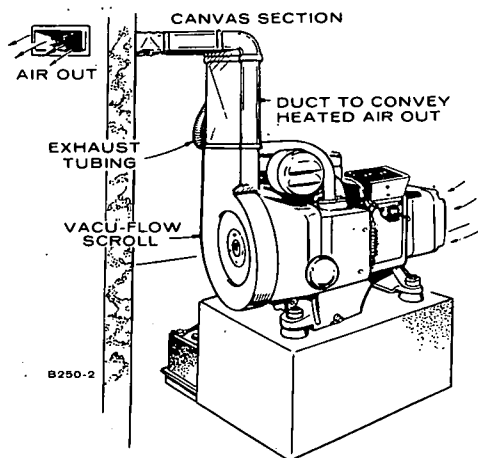


FIGURE 3. VACU-FLO COOLING

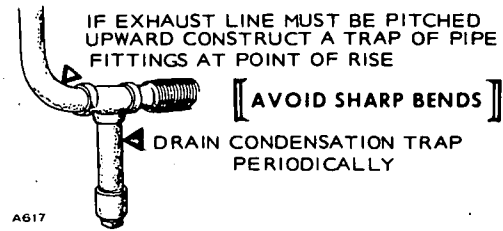


FIGURE 4. CONDENSATION TRAP

Vent all exhaust gases outside. The exhaust outlet must not terminate near air inlet vents or combustible materials. Avoid sharp bends and use large radius elbows in the exhaust piping. If the piping cannot be pitched downward, install a condensation trap in the system where a rise begins (Figure 4). The exhaust line connects to a 1-inch NPTF outlet at the engine.

Exhaust piping must not come closer than 9-inches to combustible material. Where the system leaves the building or enclosure, install a thimble (Figure 5).

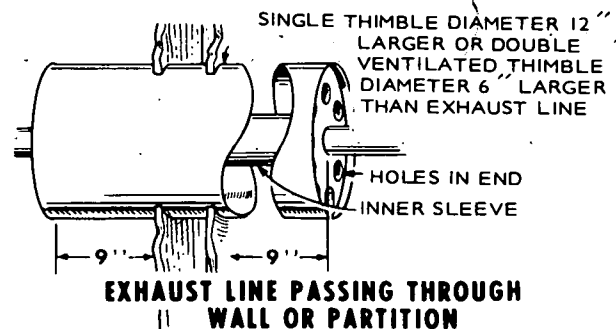


FIGURE 5. EXHAUST THIMBLE

Automatic Emergency Stopping: The optional emergency stopping system includes two separate devices, the high temperature cut-off and low oil pressure cut-off. Both devices are optional equipment.

The High Temperature Cut-off Switch (optional) is located in the optional air shutter or air duct. Normally closed, it opens when the air temperature reaches 240°F ± 6 and closes again when the temperature drops to 195°F ± 8. The engine cannot be started again until the switch closes.

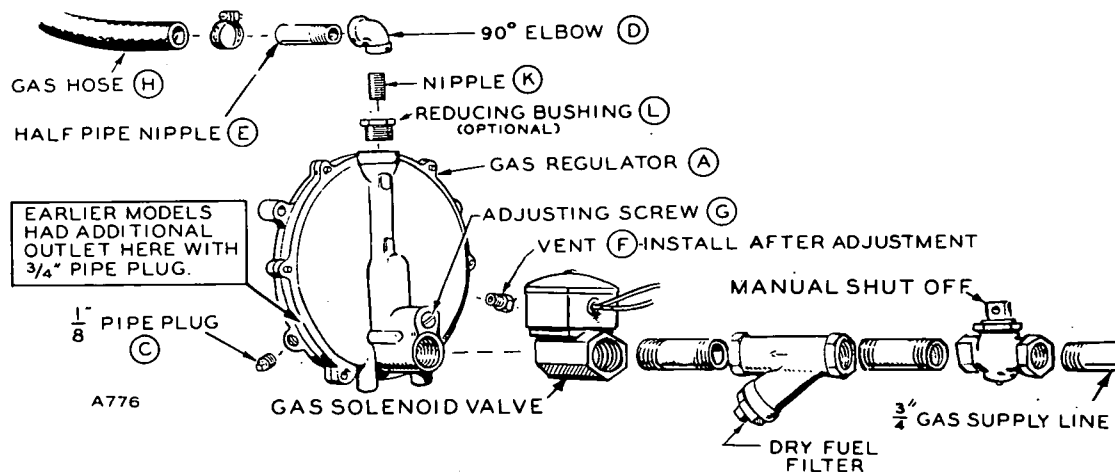


FIGURE 6. CONNECTIONS FOR GAS LINE

The Low Oil Pressure Circuit (optional) includes a non-adjustable low oil pressure switch and centrifugal switch located on the engine and a latching relay in the control box. The circuit shuts the engine down if oil pressure drops below 7 ± 1 psi and prevents it from restarting until the operator pushes a reset button on the control box.

If low oil pressure occurs, the pressure switch closes, completing the relay coil circuit. The relay pulls in and latches after 15 to 20 seconds. The centrifugal switch is required to prevent the circuit from latching during the engine starting cycle, before oil pressure builds up.

FUEL

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

For gaseous-fueled generating sets, check with your local supplier for gas regulations and pressure. See Figure 6. Provide a manual gas shutoff and a "dry gas" filter in the line. Electric solenoid shutoff valves are usually required for indoor automatic or remote starting installations (see "Gas Solenoid Valve" following). Also install a demand-type regulator according to instructions and locate it near the generating set to aid starting (regulator line pressure must be within 2 to 8 ounces).

Always use flexible tubing between the engine and gas-demand regulator. Use the shortest possible hose between the regulator and carburetor for best starting.

Seal gas line connections with shellac or some other compound approved for use in gaseous fuel systems. Thread-sealing compounds with a lead base are not satisfactory.

Gas Solenoid Valve: Connect one wire lead to terminal 6 of the printed circuit board using number 18 wire. See Figure 7. If not grounded directly to the generating set, connect a common wire ground lead from the solenoid valve to the generating set.

Gas Vacuum Switch (When Used): If a vacuum switch is used in conjunction with the gas solenoid valve, first connect one wire of the gas solenoid to ground of the generating set and the other solenoid lead to terminal "VALVE" of the vacuum switch (on intake manifold). See Figure 7. The terminal marked

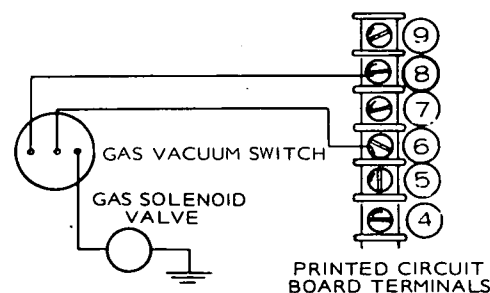


FIGURE 7. VACUUM SWITCH CONNECTIONS

"START" of the vacuum switch connects to terminal 8 of the generating set control. Terminal "IGN" of the vacuum switch connects to terminal 6 (ignition circuit) of the generating set control.

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

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

An auxiliary reservoir fuel tank is often used for standby installations. For these installations, the fuel line connections must be changed (Figure 8).

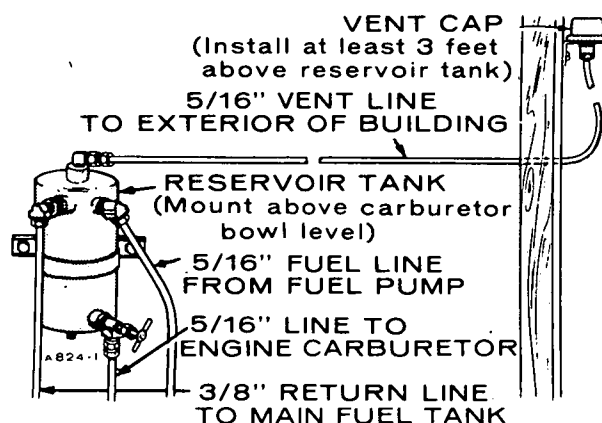
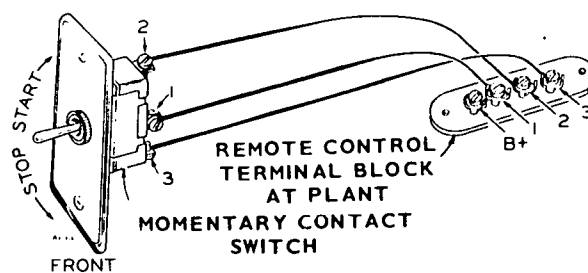


FIGURE 8. AUXILIARY RESERVOIR FUEL TANK

REMOTE START-STOP CONTROLS

Standard start-stop controls for Onan remote starting generating set consist of a single-pole, double-throw, momentary contact switch connected by three wires to the set's remote control terminal block. Pushing the switch up engages the starter; the center switch position is for running; pushing switch down stops the plant.

To control the generating set from several locations, install separate switches and wire them in parallel (Figure 9). Any number of switches may be used.



WIRE SIZE	DISTANCE
#18	to 125 ft.
#16	to 200 ft.
#14	to 300 ft.
#12	to 500 ft.

FIGURE 9. REMOTE SWITCH CONNECTIONS

SOLID STATE CONTROL SYSTEM — BEGIN SPEC D

The NH electric generating sets beginning with Spec D have a solid state control system located on top of the generator (Figure 10) for starting, stopping, battery charging, and low oil pressure shutdown.

The electric generating set control, comprised basically of a printed circuit board about 4 inches by 7 inches, has two control switches. Start-stop switch is located on the right side of the control. ROPE START switch (called HAND CRANK — ELECTRIC or NON-FUNCTIONAL on some models) is located on the left side.

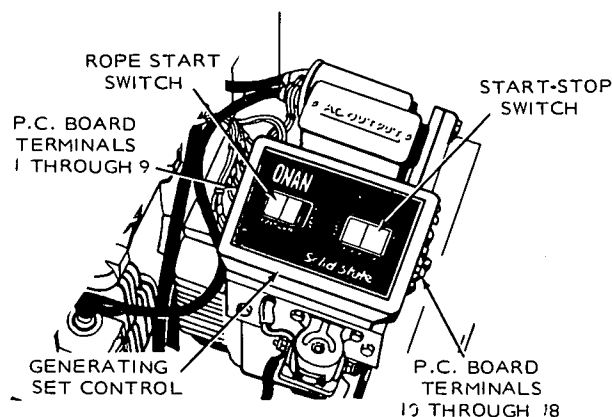


FIGURE 10. GENERATOR SET CONTROL ASSEMBLY

The start-stop switch is pressed to START until the generator set starts. The switch is pressed to STOP until the generator set stops. Models with switch indicated as ROPE START or HAND CRANK — ELECTRIC, use the switch for manual rope starting (models with rope sheave). Terminals 1 through 9 on the left side of the control connect to the following components:

- a. Ignition Points — 6
- b. Ignition Coil — 6
- c. Start Solenoid — 9
- d. Low Oil Pressure Shutdown — 4
- e. Choke — 2
- f. Battery Charging Resistors — 7 and 8

Terminals 10 through 18 on the right side are for control connections of a remote control station including:

- a. DC Voltmeter — 13 and 15
- b. DC Battery Charging Ammeter — 17 and 18
- c. Running Time Meter — 10 and 13
- d. Generator "ON" Light — 10 and 15

LOAD WIRE CONNECTIONS

The generating set nameplate shows the electrical output rating of the set in watts, volts and hertz. The

contractor and portable models are prewired and have a receptacle box with two duplex 120-volt (15 ampere) grounding receptacles and two 240-volt (20 ampere) twist lock receptacles. For the other generating sets, the wiring diagram shows the electrical circuits and necessary connections for the available output voltage. The AC output box has provisions to accommodate load wires and is located on top of the generator (begin Spec D). See Figure 11.

Meet all applicable code requirements. A qualified serviceman or electrician should make the installation and the installation should be approved by your local building inspector.

Use flexible conduit and stranded load wires near the set to absorb vibration. Use sufficiently large insulated wires. Strip the insulation from the wire ends as necessary for clean connections. Connect each load wire to the proper generator output lead inside the AC output box. Insulate the bare ends of ungrounded wires. Install a fused main switch (or circuit breaker) between the generating set and the load.

Reconnectable, Single-Phase Generator: Voltage selection on reconnectable single-phase generators is for use as 120/240 volts, 3 wire; 120 volts, 2 wire; or, 240 volts, 2 wire (Figure 12). Use the connection for two-wire service when one load exceeds one-half the rated capacity. Balance the load when connecting for three-wire service. Current for any one output lead must not exceed nameplate rating. Serious

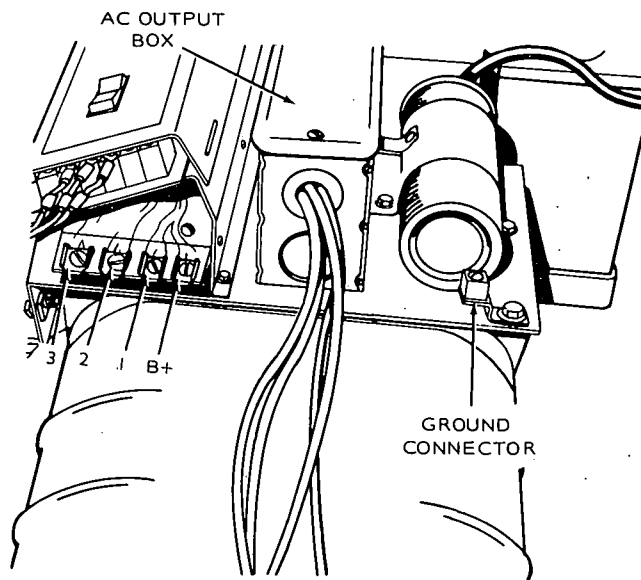


FIGURE 11. LOCATION OF AC OUTPUT BOX AND GROUND CONNECTION

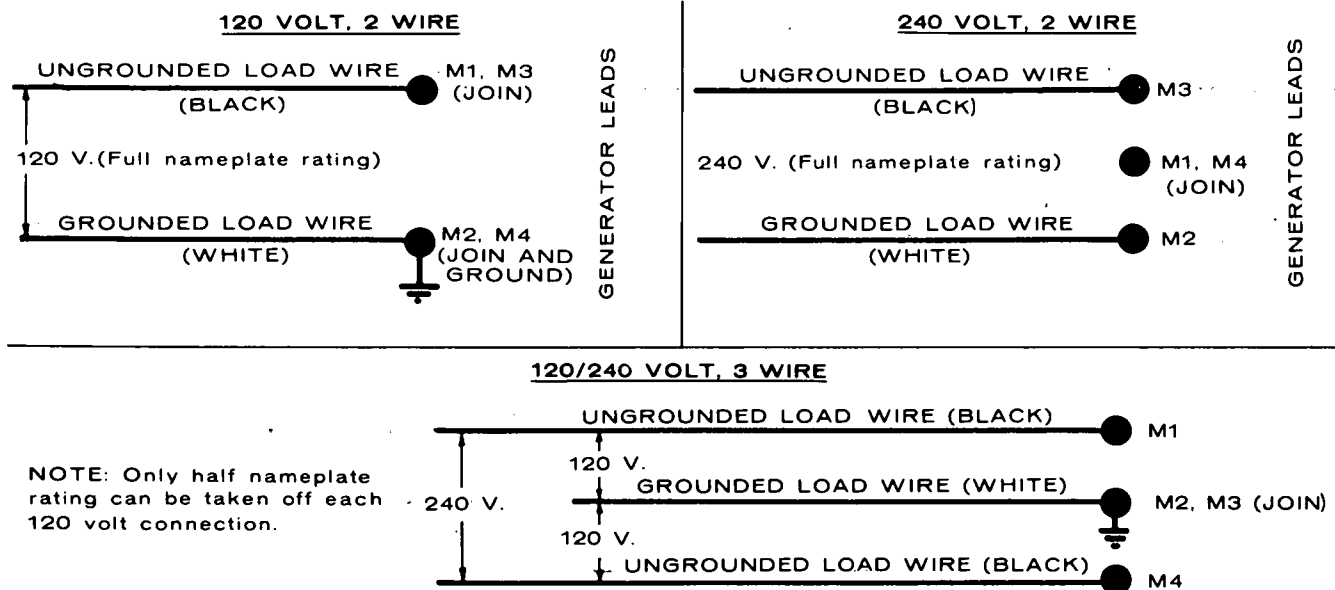


FIGURE 12. SINGLE-PHASE, VOLTAGE CODE "-3C" GENERATOR CONNECTIONS

overloading can damage the generator windings. When two or more single-phase circuits are available, divide the load equally between them.

Three-Phase, Four-Wire, Wye Connected Generators: A three-phase, four-wire generating set produces single-phase current of one voltage and three-phase current of a different voltage. The single-phase voltage is the lower voltage as noted on the nameplate, and the three-phase voltage is the higher nameplate voltage. See Figure 13.

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

For three-phase current, connect separate load wires to each of the generator terminals M1, M2 and M3. Single-phase current is obtained between any two three-phase terminals. If single-phase and three-phase current are to be used at the same time, use care to properly balance the single-phase load.

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

120/240-Volt, Three-Phase, Four-Wire Delta Connected Generator: Three-phase delta connected generating sets are designed to supply 120-volt, single-phase current; 240-volt, single-phase current; or 240-volt, three-phase current. See Figure 13.

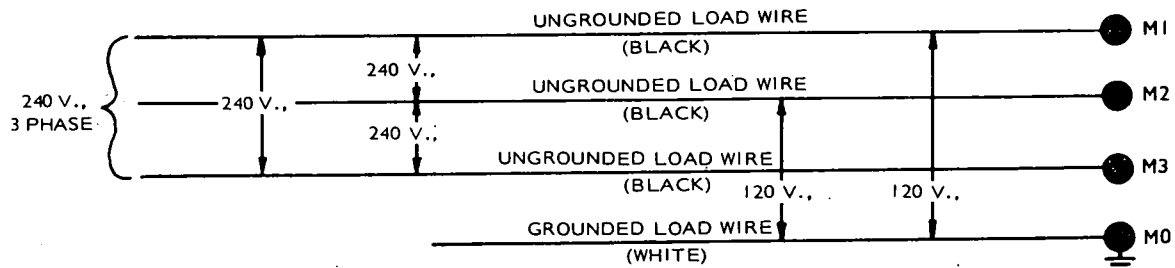
For three-phase operation, connect the three load wires to the three terminals M1, M2 and M3 . . . one wire to each terminal. M0 is the neutral wire and is not used for three-phase operation.

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

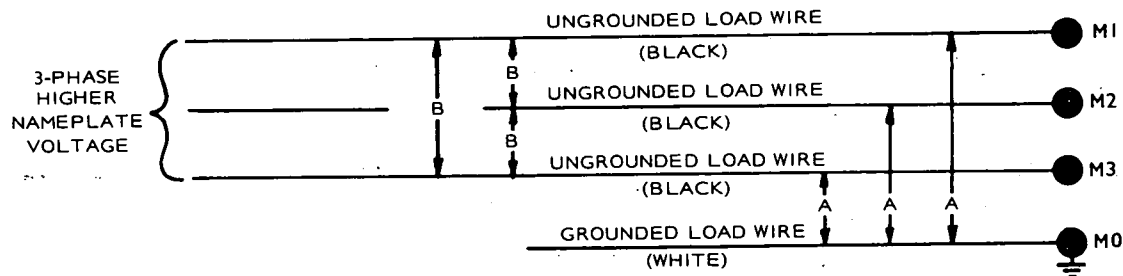
CAUTION Do not use M0 and M3 as a 120-volt circuit.

For single-phase, 240-volt service, connect the load circuit between M1 and M2, or between M2 and M3, or between M1 and M3 (three circuits available). The M0

DELTA GENERATOR CONNECTIONS FOR VOLTAGE CODE -5D



WYE GENERATOR CONNECTIONS FOR VOLTAGE CODES -4 AND -4X



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

FIGURE 13. THREE-PHASE, FOUR-WIRE GENERATOR CONNECTIONS

terminal is not used. Any combination of single-phase and three-phase loading can be used at the same time as long as no terminal current exceeds the nameplate rating of the generator.

Single-phase loads up to two-thirds of the three-phase rating can be used if there is no other load on the generator.

Balancing the Load: Current for any one output lead must not exceed nameplate rating. Serious overloading can damage the generator windings. When two or more single phase circuits are available, divide the load equally between them.

Switchboard: When an optional wall mounted switchboard containing ammeters, voltmeters and circuit breakers is used, these load wire connections apply. Connect one ungrounded (hot) generator lead to the unused terminal of each ammeter. Connect any generator leads and lead wires which are to be grounded to the ground stud in the switchboard. On sets that 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.

Standby: If the installation is for standby power service, install a double-throw transfer switch (either

manual or automatic) to prevent feeding generator output into the normal power source lines and to also prevent commercial power and generator output from being connected to the load at the same time. Instructions for connecting an automatic load transfer switch are included with such equipment.

GROUNDING

WARNING

Be sure to ground the generating set to prevent shock hazard!

Connect a number 8 wire or larger between:

1. a separate ground pipe or rod penetrating into moist earth, and
2. the solderless connector located on the generator (Figure 10) or on the receptacle box for the contractor and portable models (Figure 14).

CONTROL BOARD

The printed circuit board (not used on contractor and portable models) is the "heart" of the generating set's control system. Terminals 1 through 9, on the left side of printed circuit board (Figure 15), connect to engine components such as:

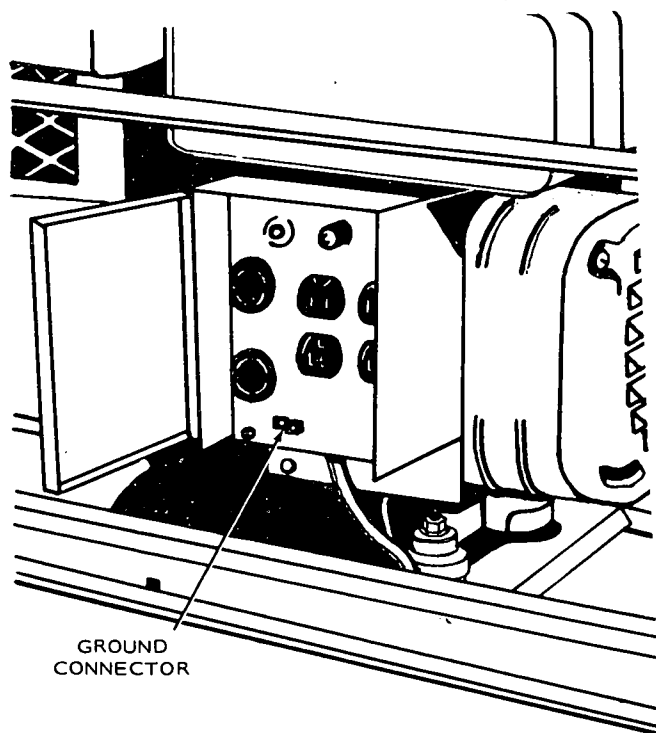


FIGURE 14. GROUND CONNECTOR ON CONTRACTOR AND PORTABLE MODELS

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

Terminals 10 through 18, located on right side of printed circuit board (Figure 15), are for connection to a remote control station. These include the following:

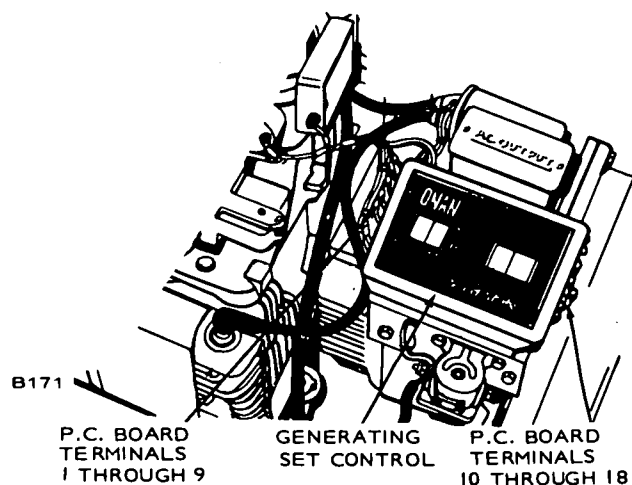


FIGURE 15. GENERATING SET CONTROL ASSEMBLY

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

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

DC Ammeter: Connect a direct reading 0 to 10-ampere ammeter to terminals 17 (+) and 18 (-). For distances up to 10 feet, make connections with no smaller than number 18 wire. When installed, Jumper W1 must be removed from the printed circuit board. See Figures 16 and 20. Jumper W1 is located near the 1-1/4 x 2 inch copper heat sink.

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

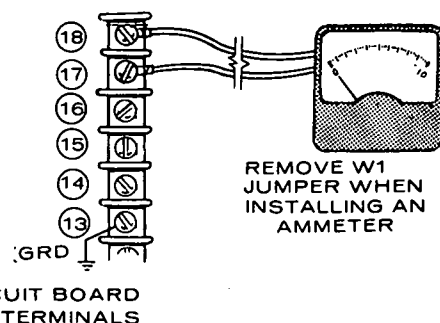


FIGURE 16. CONNECTION OF DC AMMETER TO CONTROL

DC Voltmeter: Connect DC voltmeter between terminals 15 and 13 (ground) using number 18 wire. See Figure 17.

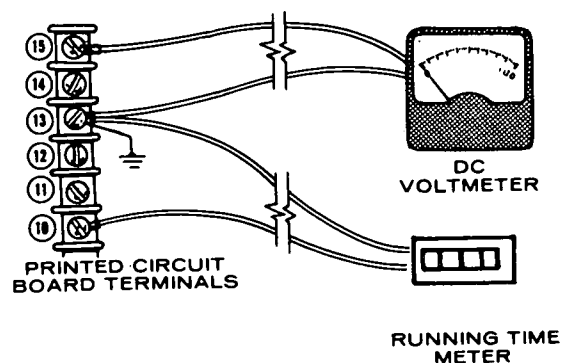


FIGURE 17. CONNECTION OF DC VOLTMETER AND RUNNING TIME METER TO CONTROL

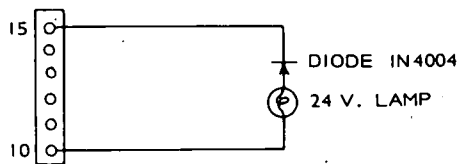


FIGURE 18. CONNECTION OF 24-VOLT GENERATING LAMP TO CONTROL

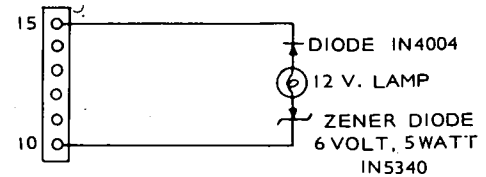


FIGURE 19. CONNECTION OF 12-VOLT GENERATING LAMP TO CONTROL

Running Time Meter: Connect running time meter to terminals 10 and 13 (ground) using number 18 or larger wire. Terminal 10 operates at approximately 30 volts during normal operation. See Figures 17 and 20.

24-Volt Generating Lamp: Connect a 24-volt generating lamp between terminals 10 and 15 (Figures 18 and 20). Use a diode (IN4004) in series as shown.

12-Volt Generating Lamp: Connect a 12-volt generating lamp between terminals 10 and 15 (Figure 18). Connect a diode (IN4004) on one end of lamp and a 5-watt, 6-volt zener diode (IN5340) on the other end.

Fused Connections: A small 9-ampere fuse (F1), used to protect the circuit against reversed battery connections, is located in the wiring harness between terminal 5 (on printed circuit board) and battery. If the

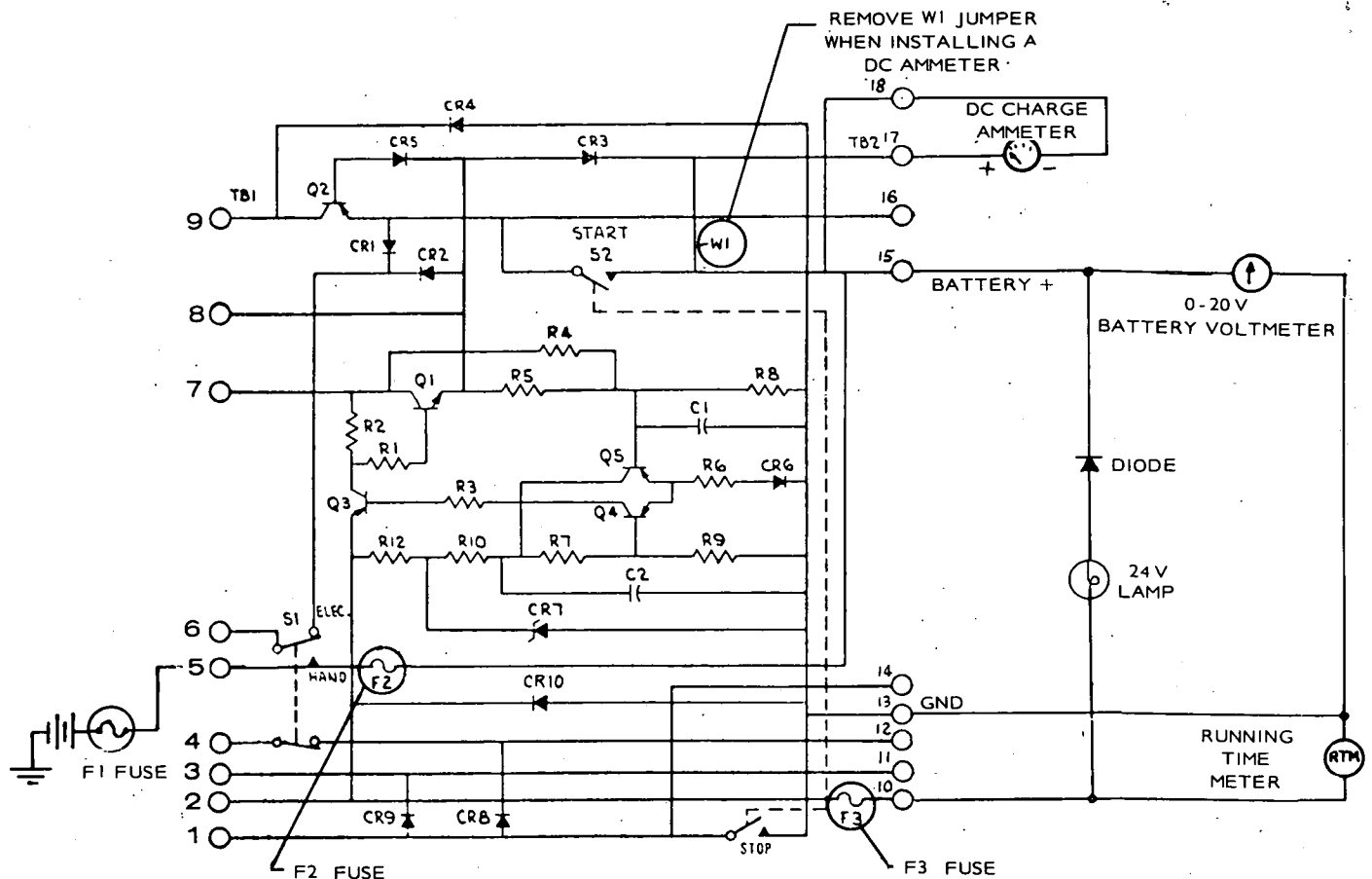


FIGURE 20. GENERATING SET CONTROL WITH EQUIPMENT CONNECTIONS

fuse is damaged (caused by connecting the battery backwards), replace with an SFE9 automotive type fuse. See Figure 20.

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

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

BATTERY CONNECTION (Prior Spec D)

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 side to install battery cable (Figure 21).

CAUTION Do not disconnect starting batteries while the set is running. The resulting overvoltage condition will damage the electric choke and may damage control components.

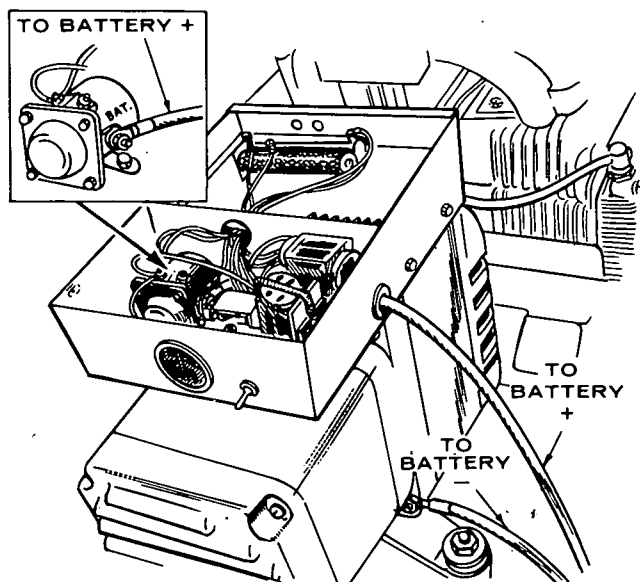


FIGURE 21. BATTERY CONNECTIONS (PRIOR SPEC D)

BATTERY CONNECTIONS (Begin Spec D)

Connect the positive (+) battery cable to the start solenoid. Connect the negative (-) battery cable to the generator through-bolt (Figure 22). If the battery connections are accidentally reversed, fuse F1 (9

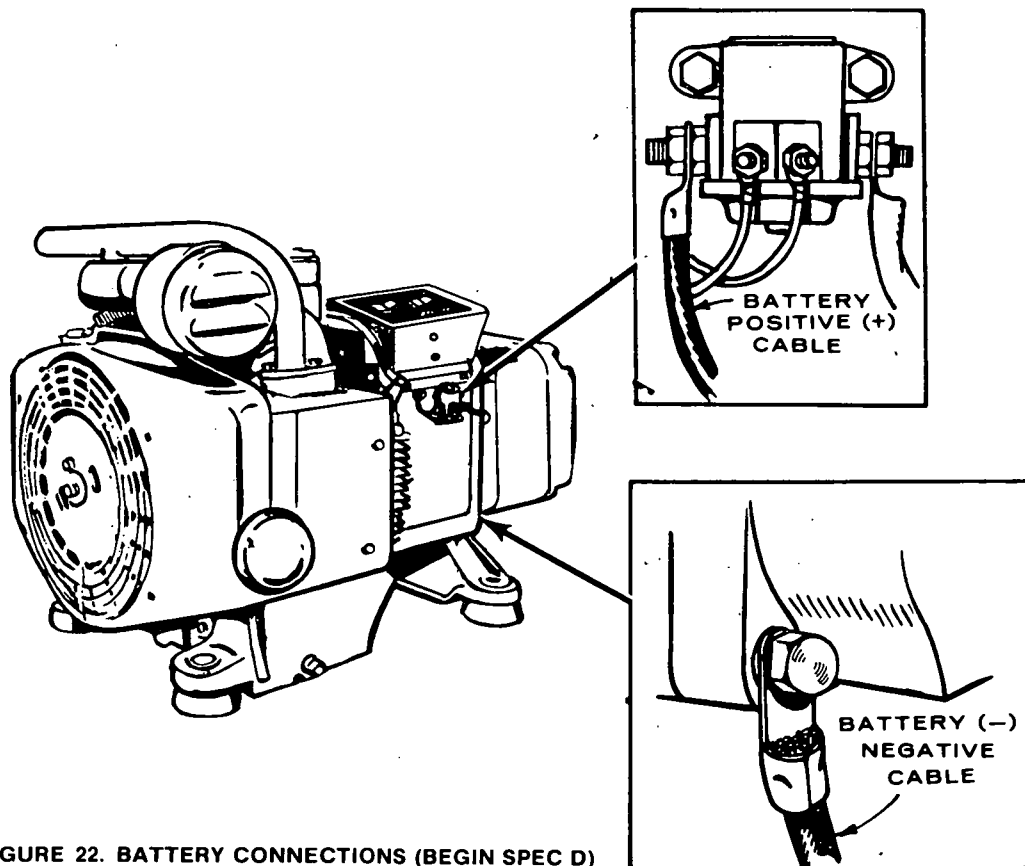


FIGURE 22. BATTERY CONNECTIONS (BEGIN SPEC D)

ampere) will burn out (Figure 20) and protect the components on the printed circuit board. It is located between terminal 5 on the printed circuit board and the battery. Replace with an SFE9 automotive type fuse.

For contractors models, remove the cover for the outlet receptacles by taking out the four screws. Connect the positive (+) battery cable to the unused terminal on the start switch. Connect the negative (-) battery cable to the generator through-bolt as marked on the generator.

OPERATION

BEFORE STARTING

Be sure the generating set is properly filled with oil and fuel.

Crankcase Oil: Fill the crankcase with oil to the FULL mark on the oil level indicator. *Do not overfill!* Oil capacity is 4 quarts (4-1/2 quarts with filter). Use a good quality oil with the API (American Petroleum Institute) designation SE or SE/CC. Do not use an oil with the designation CD unless it is also designated SE and the oil manufacturer certifies it will perform satisfactorily in gasoline engines. Use the following as a guide for the proper oil according to temperature ranges:

Temperature	Recommended Oil
Above 30°F	SAE 30
Between 0°F & 30°F	SAE 5W30 or 10W40
Below 0°F	SAE 5W30

Recommended Fuel: Use clean, fresh, no lead or low lead gasoline. Regular grade gasoline may also be used but do not use highly leaded premium grades of fuel.

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

WARNING

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

STARTING AND STOPPING

Push the Start-Stop switch on the generating set control to "Start". Release the switch as soon as the engine starts.

To stop the generating set, push the Start-Stop switch to "Stop". Hold the switch closed until the generating set stops completely.

BREAK-IN PROCEDURE

Break in a new or reconditioned unit using the recommended oil and following this sequence:

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

This method of breaking in the unit 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.

APPLYING LOAD

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

BATTERY CHARGING

A charge regulator controls the battery charge rate. The regulator is set to allow the proper rate of charge at operating speed. Do not attempt to change this adjustment.

EMERGENCY OPERATION IF BATTERY FAILS

The remote-controlled revolving armature generating set needs a battery for electric choke and ignition. If the battery fails completely and the set must be operated during an emergency, a battery can be shared with other equipment.

HIGH TEMPERATURES

Be sure nothing obstructs air flow to and from the generating set. Keep the cooling fins clean. The air housings must be properly installed and undamaged.

LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change the oil only when the set is warm.
2. Use fresh fuel. Protect against moisture condensation.
3. Keep fuel system clean and batteries in a well charged condition.
4. Partially restrict cool air flow but use care to avoid overheating.

DUSTY AND DIRTY CONDITIONS

1. Keep the unit clean. Clean the cooling system frequently.
2. Service the air cleaner as frequently as required.
3. Keep oil and fuel in dust-tight containers. Change oil more frequently.
4. Keep the governor linkage clean.

HIGH ALTITUDES

When operating the generating set at altitudes of 2500 feet above sea level, close the 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.

OUT-OF-SERVICE PROTECTION

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

1. Run the unit until it reaches normal operating temperature.
2. Turn off the fuel supply and run the set until it stops.
3. Drain oil from the engine while it's still warm.
4. Remove each spark plug. Pour one ounce (two tablespoons) of rust inhibitor (or SAE #50 oil) into each cylinder. Crank the engine slowly by hand several times. Install spark plug.
5. Service the 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 entire unit. Coat rustable parts with a light film of grease or oil.
9. Provide a suitable cover for the unit.
10. If a battery is used, disconnect and follow standard battery storage procedures.

EXERCISE STANDBY UNITS

Infrequent use of the generating set results in starting difficulties. Operate standby power units one 30-minute period each week. Run the unit longer if the battery needs charging.

MAINTENANCE

Regular scheduled maintenance lowers operating costs and lengthens the service life of the generating set. Use the following guide to establish effective service periods. However, actual conditions under which the unit operates is the determining factor in establishing a maintenance program. When operating the unit 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 proper service time intervals can be established.

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

PERIODIC MAINTENANCE SCHEDULE

SERVICE THESE ITEMS	AFTER EACH CYCLE OF INDICATED HOURS					
	8	50	100	200	400	1000
General Inspection	x					
Check Oil Level	x					
Check Battery (If so equipped)		x				
Change Crankcase Oil			x1			
Check Air Cleaner			x1			
Check Breaker Points			x3			
Check Spark Plugs			x			
Change Oil Filter				x1		
Clean Cooling Fins			x1			
Clean Crankcase Breather				x2		
Replace Breaker Points				x2		
Fuel Filter					x3	
Adjust Tappets					x2	
Replace Air Cleaner					x1	
Remove Carbon From Heads					x2	
Check Generator Brushes (For Sticking)		x				
Complete Reconditioning (If Required)						x2
Check Generator Brushes (For Wear)						x2

x1 - Perform more often in extremely dusty conditions.

x2 - For detailed maintenance, contact your dealer.

x3 - Replace if necessary.

OIL LEVEL

Check the oil level daily or at least every eight hours of operating time. Check more often on a new unit as oil consumption is higher until the piston rings seat properly.

OIL CHANGE

Initial oil change should be made after the first 25 operating hours; change every 100 hours after that. If operating in extremely dusty conditions or in cold weather, change oil more frequently.

Oil capacity is 4 quarts, 4-1/2 quarts if replacing the oil filter too. Do not mix brands or grades of motor oil. Use only a good quality oil with the designation SE/CC (former designation was MS, MS/DG). If necessary to add oil between changes, use the same brand and grade of oil as is already present in the crankcase.

OIL FILTER

Change the crankcase oil filter every 200 hours; change more frequently in extremely dusty conditions. Remove the filter by turning counterclockwise with a filter wrench. Before installing a new filter, coat the gasket on the filter base with a light film of new oil. Install by turning clockwise until a light friction is noted, then turn an additional 1/2 turn. See Figure 23.

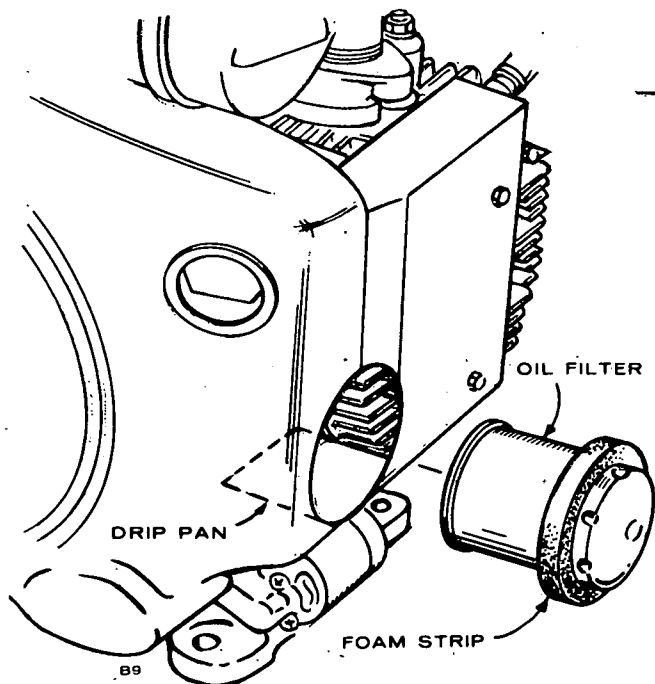


FIGURE 23. OIL FILTER

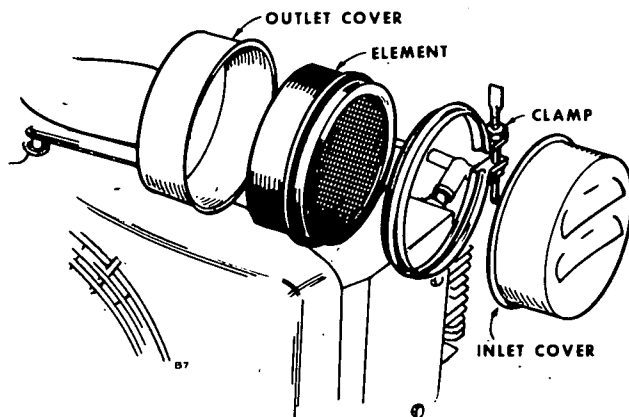


FIGURE 24. AIR CLEANER

CAUTION

Do not overtighten the filter as damage may occur to the rubber gasket which will cause the filter to leak. Be sure to install sealing ring around the filter; this ring is an air seal to prevent cooling air loss.

AIR CLEANER ELEMENT

Check element every 100 hours. Clean by tapping base gently on a flat surface. Replace the element every 400 operating hours; clean or replace more frequently in dusty conditions (Figure 24).

SPARK PLUGS

Check, clean and reset spark plugs every 100 hours of operation. Replace spark plugs that show signs of fouling or electrode erosion. Spark plug gap for gasoline-fueled units is .025", for gaseous-fueled units, gap is .018". Replace plug at least every 250 hours of operation.

CRANKCASE BREATHER

The engine is equipped with a ball check valve for maintaining crankcase vacuum. No maintenance is generally required. Should the crankcase become pressurized, as evidenced by oil leaks at the seals or around the cap of the oil level indicator, clean the baffle in suitable solvent.

CARBURETOR BOWL

Remove the carburetor bowl from the carburetor every 400 hours and clean the screen in a suitable solvent. Blow out with low pressure, compressed air and reassemble, making sure gaskets are in place.

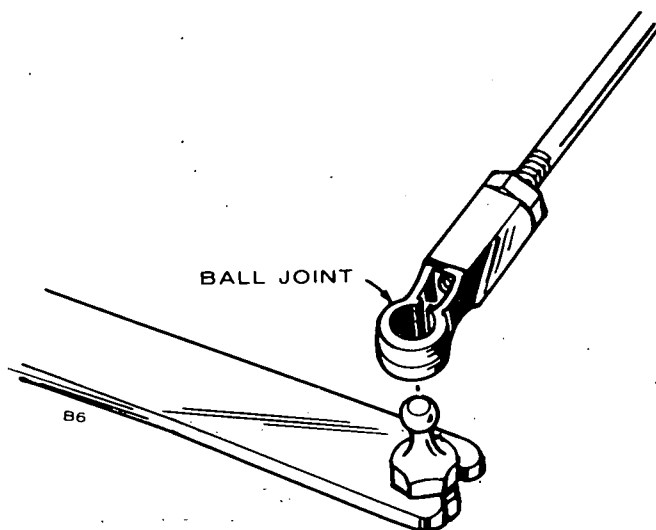


FIGURE 25. GOVERNOR LINKAGE

Replace with new gaskets if necessary. A leaky or broken gasket can cause starting problems.

GOVERNOR LINKAGE

The governor controls the engine speed by opening or closing the throttle according to the load to the set. Every 50 hours of operation, check for freedom of movement through its entire travel. Clean the plastic joints (Figure 25). **DO NOT LUBRICATE!**

COOLING SYSTEM

The generating set is cooled by a flywheel blower fan which pulls air through the generator and over the cylinders and cooling fins. The air path is directed by sheet metal shrouds and plates. The shrouds and plates must always be installed properly so the unit does not overheat.

Check and clean the cooling fins at least every 100 hours of operation. Remove any dust, dirt or oil which may have accumulated. Check the air inlet and air outlet for buildup of dirt, etc.

BATTERY CHECK

Check the specific gravity of the battery with a hydrometer. A fully charged battery provides a reading of 1.240 to 1.270 at 77°F.

If one or more cells are low on water, add distilled water and recharge.

Keep the battery case clean and dry. An accumulation of moisture will lead to a more rapid discharge and battery failure.

Keep the battery terminals clean and tight. After making connections, coat the terminals with a light application of petroleum jelly or grease to retard corrosion.

VACUUM BOOSTER

Use a fine wire to clean the small hole in the short vacuum tube which fits into the hole in the top of the engine intake manifold (Figure 26). Do not enlarge this hole. If there is tension on the external spring when the set is operating at no load or light load, it may be due to improper adjustment, a restricted hole in the small vacuum tube or a leak in the booster diaphragm or gasket.

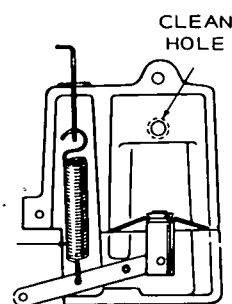


FIGURE 26. VACUUM BOOSTER

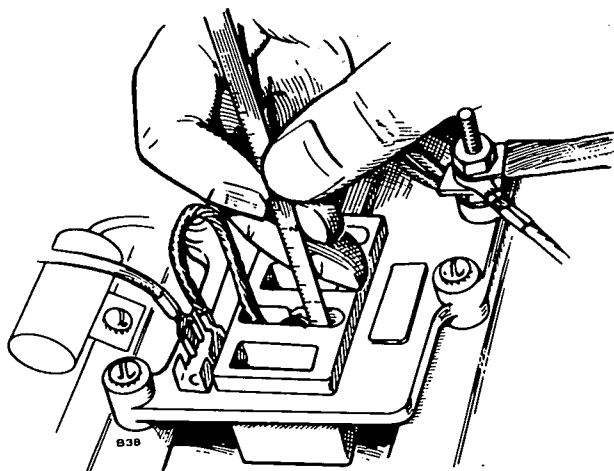
GENERATOR MAINTENANCE

The generator normally requires little care other than a periodic check of the brushes, commutator and the collector rings. Check the brushes every 500 hours of operation to be sure they can easily move in their holders. Remove any dust or dirt that could prevent movement.

Check the brushes for wear as illustrated in Figure 27. It is not necessary to remove the brush holder unless the brushes and/or brush springs must be replaced. See Figure 28. Always use the brushes recommended in the *Parts Catalog* of this manual. Never substitute a brush which may appear to be the same — it may have

entirely different electrical characteristics. New brushes are shaped to fit and seldom need sanding to seat properly. If some brush sparking occurs after replacing the brushes, run the plant under a light load until the brushes wear to a good seat.

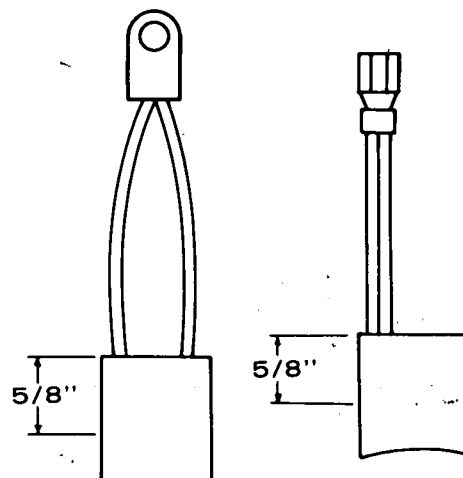
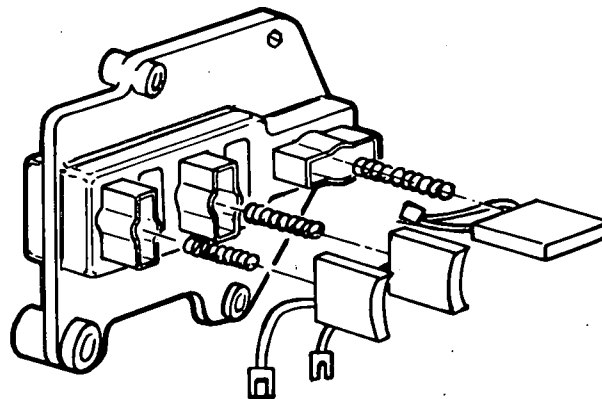
Collector rings acquire a glossy brown finish in normal operation. Do not attempt to maintain a bright, newly machined appearing surface. Ordinary cleaning with a dry, lint free cloth is usually sufficient. Very fine sandpaper (#400) may be used to remove slight roughness. Use only light pressure on the sandpaper while the unit is operating. Do not use emery or carborundum paper or cloth. Clean out all carbon dust from the generator.



MEASURE FROM TOP FACE OF
BRUSH BLOCK TO TOP OF BRUSH

	DC	AC
NEW	5/8"	11/16"
1/2 WEAR	13/16"	7/8"
REPLACE	1"	1 1/16"

FIGURE 27. MEASURING BRUSH WEAR



REPLACE WHEN WORN TO 5/8"

FIGURE 28. GENERATOR BRUSHES

ADJUSTMENTS

Satisfactory generating set performance relies on correct adjustment of the carburetor, governor, breaker points, tappets and oil pressure relief valve. If trouble develops, follow an orderly procedure to determine the cause before making the adjustment. Refer to the *Troubleshooting* chart for help in diagnosing the problem.

CARBURETOR ADJUSTMENTS

Adjust the carburetor to obtain the correct fuel-to-air mixture for smooth, efficient operation. Perform carburetor adjustments concurrently with governor adjustments.

Throttle Stop: Remove all AC load. Connect a voltmeter to the AC leads or plug the meter into one of the unit's receptacles (if available). Hold the governor arm to minimum speed and adjust the stop screw so the voltmeter indicates 75-80 volts.

Idle Jet: Leave the voltmeter connected as for the throttle stop adjustment. Hold the governor arm

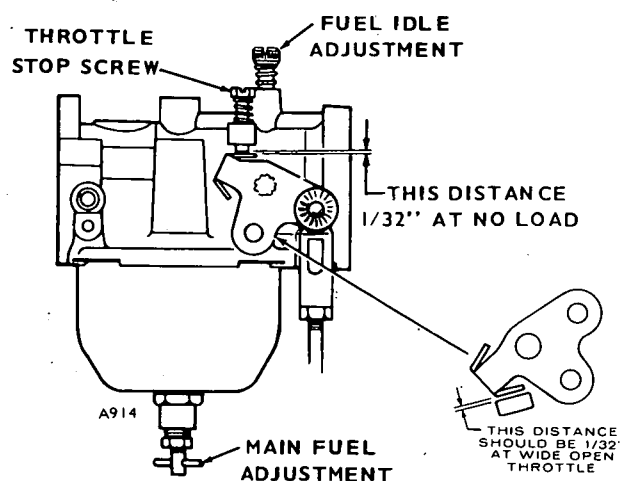


FIGURE 29. GASOLINE CARBURETOR

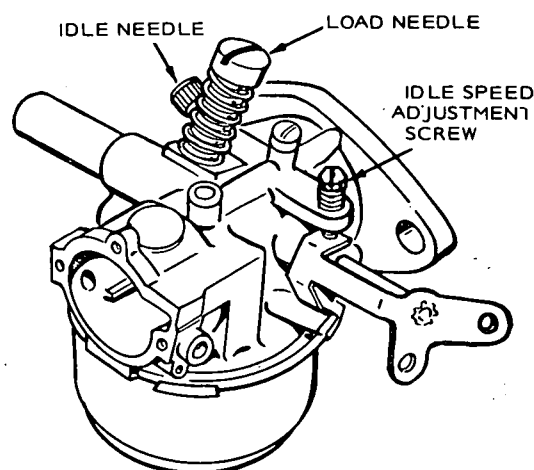


FIGURE 30. GAS CARBURETOR

against the throttle stop and turn the idle jet in until the highest voltage is obtained. Release the governor arm. The engine should accelerate to governed speed and become stable.

Main Jet: Connect the AC leads to a suitable load test panel or connect appliances obtaining a full load condition on the generating set. With a rated load applied, adjust the main jet to achieve the highest voltage. Remove the connected load and hold the governor arm to minimum speed. Release the governor arm and observe acceleration. If surging occurs at governed speed, open the main jet slightly. However, do not exceed one-half turn beyond the full load point. If surging continues, adjust the governor sensitivity.

GASEOUS CARBURETOR

When operating on gaseous fuel, follow the same procedure given for gasoline operation except for using the gas fuel adjustment needles. Figure 31 shows the gas carburetor with the fuel adjustment needles and the idle speed adjustment.

Be sure to lock the choke open when operating on gaseous fuel. If ratings of the two fuels are substantially different, a readjustment of the fuel mixture is required.

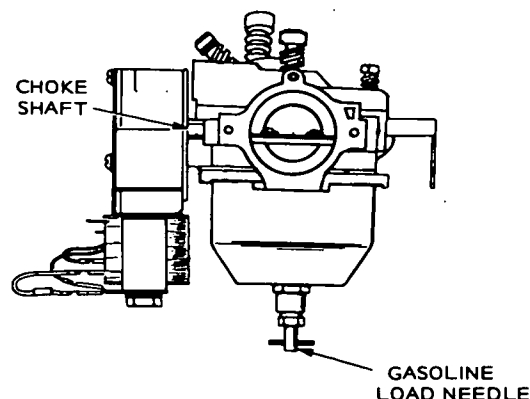
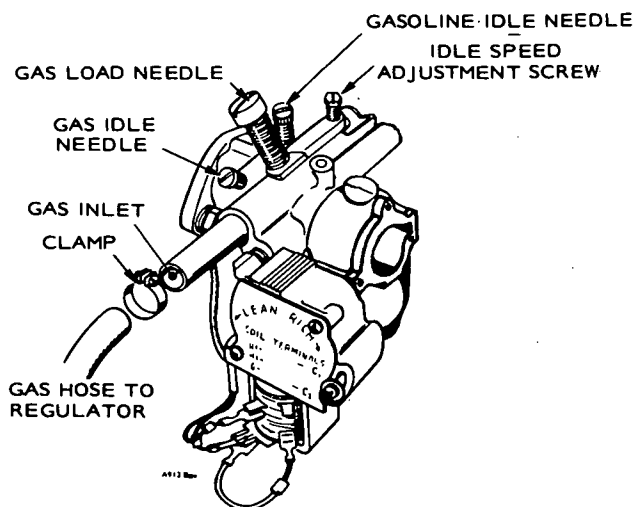


FIGURE 31. GAS-GASOLINE CARBURETOR

GAS-GASOLINE CONVERSION (All Specs)

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

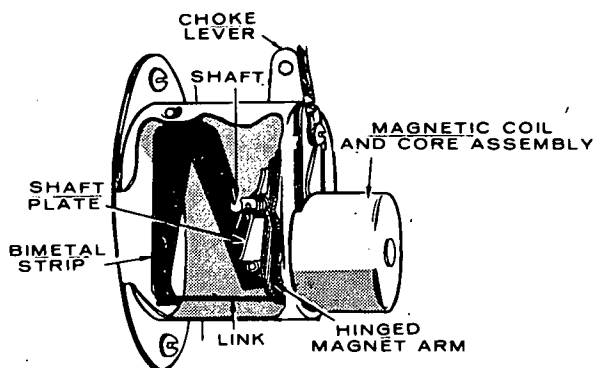
1. Close the manual fuel shutoff valve in supply line for natural gas or propane-butane vapor, wherever located.
2. Open the gasoline fuel shutoff valve, wherever located.
3. Set the spark plug gap to .025".
4. See that the choke is free and works easily. Be sure to release choke lock on electric choke.
5. Start the engine in the manner described for the

engine. If the engine runs unevenly under half or full load due to faulty carburetor adjustment, the load needle needs adjusting. This is not the same load adjusting needle used for gaseous fuel. Another adjusting needle is provided for this purpose (refer to *Adjustments*).

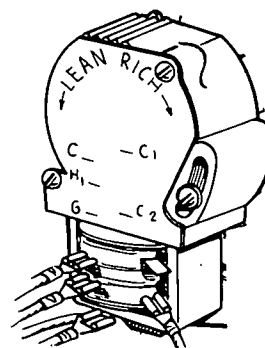
To change back to gaseous operation, reverse the above procedure and reset the spark plug gap to .018".

CHOKE ADJUSTMENT

Despite choke design, all chokes perform the same function: control the amount of air intake to the carburetor venturi. When the engine is first started, the choke is closed but gradually opens as the engine



SISSON



THERMO-MAGNETIC

FIGURE 32. CHOKE ADJUSTMENTS

warms up. Rough operation of a cold engine indicates the need of a choke adjustment. See Figure 32.

Sisson Choke: Adjust the Sisson choke by loosening the screw holding the choke wire and repositioning it to obtain smooth cold engine performance.

Thermo-Magnetic Choke: Adjust the thermo-magnetic choke by loosening the screw and rotating the entire assembly to obtain smooth cold engine operation.

GOVERNOR ADJUSTMENTS

The governor system automatically regulates the engine speed regardless of load conditions; the

engine speed, in turn, determines the voltage and frequency of the generator current. Onan uses a standard 10-ball governor on NH generating sets.

Always perform governor adjustments concurrently with carburetor adjustments. The proper frequency at no load is 61 hertz and at full load is 59 hertz. The frequency spread can be reduced as long as no surging develops.

Check the governor arm, linkage, throttle shaft and lever for binding or excessive wear at connecting points. A binding condition at any point will cause the governor to act slowly and regulation will be poor. Excessive looseness will cause a hunting condition and regulation will be erratic. Work the arm back and forth several times by hand while the engine is idle. If either of these conditions exists, determine the cause and adjust or replace parts as necessary. See Figure 33.

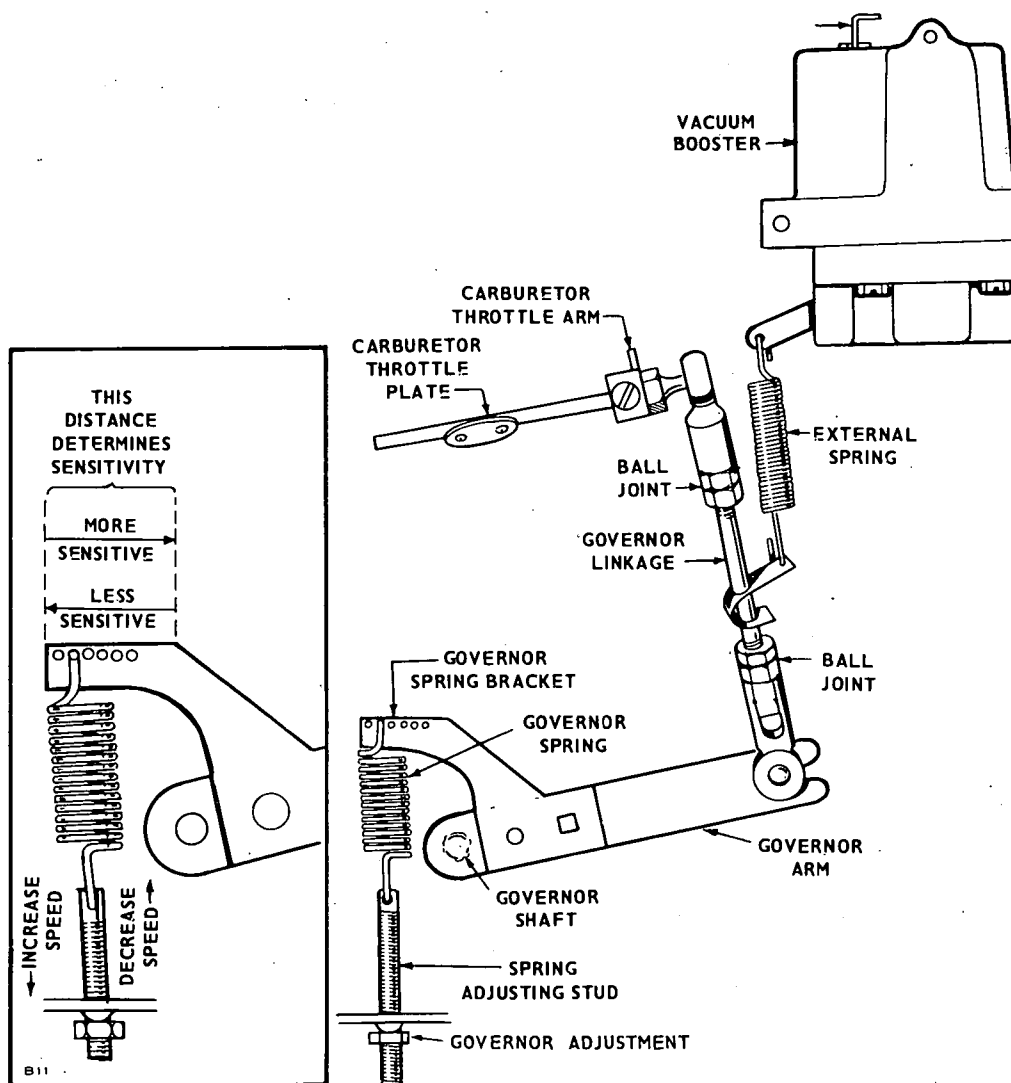


FIGURE 33. GOVERNOR ADJUSTMENTS

Linkage: The engine starts at wide open throttle. Rotate the ball joint housing to adjust the length of the linkage connecting the governor arm to the throttle arm. Adjust the length so that with the engine stopped and the carburetor wide open, the ball joint housing is even with the governor arm ball joint. This setting allows immediate control by the governor after starting and synchronizes travel of the governor arm and the throttle shaft.

Speed Adjustment: The tension applied to the governor spring determines the speed at which the engine operates: Increasing spring tension increases engine speed; decreasing tension decreases engine speed. The no-load speed of the engine should be slightly higher than the speed requirements of the connected load.

For example: If the connected load is to turn at 1800 rpm, set the no-load speed of the engine at 1875 rpm. Check the speed with a tachometer.

If the engine needs a speed adjustment, turn the speed adjusting nut in to increase the speed or out to decrease the speed.

The engine speed droop from no-load to full-load should be not less than 60 rpm. Check the engine speed with no-load connected and again after connecting to full load.

Sensitivity Adjustment: After adjusting the carburetor and the governor, adjust the governor sensitivity (Figure 33). Sensitivity affects the rpm from no load to full load. Moving the governor spring closer to the shaft makes the governor more sensitive to load change and decreases the speed change from no load to full load. Observing a frequency meter, adjust the sensitivity for as close a cycle range as possible without hunting.

Vacuum Booster: The vacuum speed booster is a separate auxiliary device that supplements governor

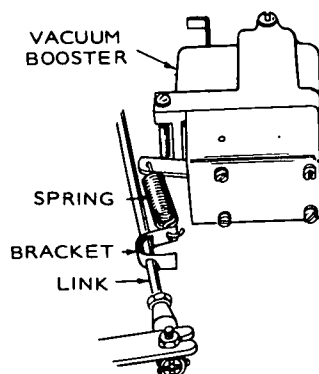


FIGURE 34. VACUUM BOOSTER ADJUSTMENT

action. As the generator load increases, the booster helps the governor by producing a slight increase in engine speed. This results in nearly a constant output voltage.

Adjust the booster after satisfactory performance under various load conditions has been obtained by governor adjustments without the booster (Figure 34). Connect the booster external spring to the bracket on the governor link. With the unit operating at no load, slide the bracket on the governor link just to the position where there is no tension on the external spring. Apply full load and observe the action of the booster. To increase or decrease response, change the cotter pin to another hole in the return spring strap. The booster is correctly adjusted when the speed does not drop more than 4 cycles with a sudden load application and recovers rapidly. Tighten the hold-down screws of the booster at each tune-up.

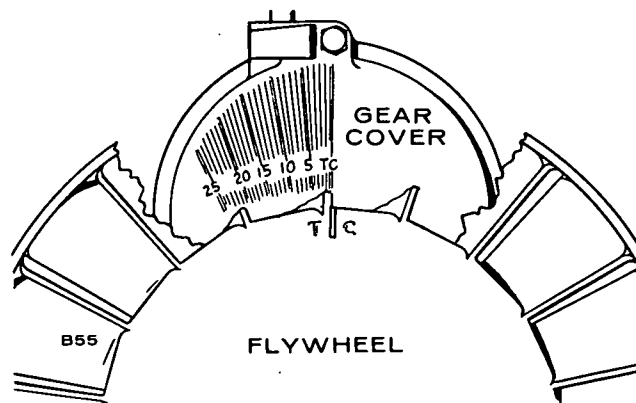
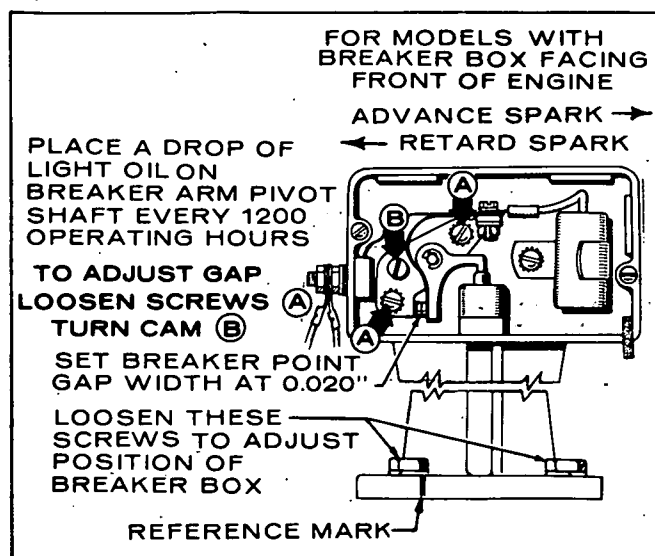


FIGURE 35. IGNITION TIMING

BREAKER POINTS

Ignition points must be gapped correctly. Crank the engine to fully open the breaker points (1/4 turn after

top center). Loosen and move the stationary contact to correct the gap at full point separation. Secure points and check for correct gap (Figure 35).

Ignition points should break contact just when the 22 degree timing mark aligns with the flywheel timing mark. Final timing is corrected by shifting the breaker box on its mounting base and using a timing light.

For NH engines with optional VacuFlo cooling, the timing plate, located just above the oil filter, can be seen by removing the dot button plug.

Replace burned or faulty points. If only slightly burned, dress smooth with a file or fine stone. Measure the gap with a thickness gauge. Be sure to wipe the gauge before measuring to remove any accumulated oil or foreign material that could stick to the breaker points and cause ignition failure. Set the point gap at .020".

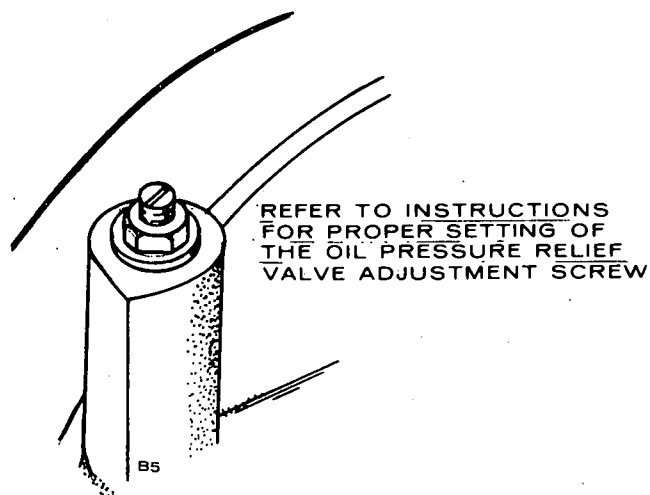


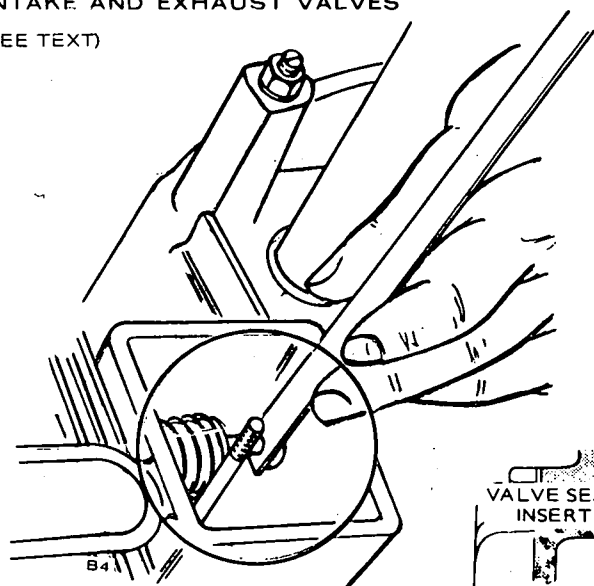
FIGURE 37. OIL PRESSURE RELIEF VALVE ADJUSTMENT

TAPPET ADJUSTMENT

The engine has adjustable tappets. To make a valve adjustment, first remove the valve cover. Crank the engine slowly by hand until the left intake valve (when facing the flywheel) opens and closes. Continue about 1/4 turn until the mark on the flywheel and the TC mark on the gear cover are in line. This should place the left piston in the necessary position to obtain correct valve adjustment.

Correct valve clearances are .003" for intake and .010" for exhaust. For each valve, the gauge should just pass between the valve stem and the valve tappet (Figure 36). To correct the valve clearance, turn the adjusting screw as needed to obtain the right clearance. The screw is self-locking.

INTAKE AND EXHAUST VALVES (SEE TEXT)



NOTE: USE A STANDARD AUTOMOTIVE-TYPE WRENCH TO ADJUST THE TAPPETS.

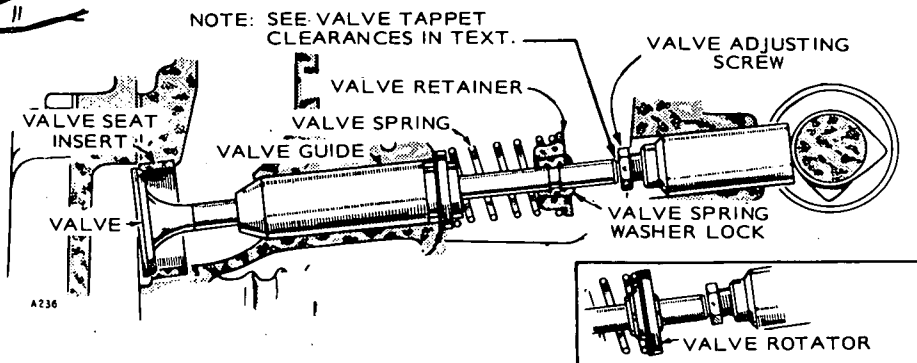


FIGURE 36. TAPPET ADJUSTMENT

To adjust the valves on the right cylinder, crank the engine over one complete revolution and again line up the mark on the flywheel and the TC mark on the gear cover. Then follow the adjustment given for the valves of the left cylinder.

OIL PRESSURE RELIEF VALVE ADJUSTMENT

Begin Spec D, the NH generating sets have a fixed oil pressure bypass. Oil pressure cannot be adjusted.

Prior Spec D, adjust the engine oil pressure by means of the slotted stud and locknut located near the

breather tube. See Figure 37. When the engine has reached normal operating temperature, oil pressure readings should be between 30 and 35 lbs. To increase oil pressure, loosen the locknut and turn the stud inward. To decrease oil pressure, loosen the locknut and turn the stud outward. Be sure to tighten the locknut securely after making an adjustment. The spring and plunger can be removed and cleaned.

Low oil pressure may indicate worn main or connecting rod bearings, improper clearance at these points, a weak or broken bypass spring, an improperly adjusted bypass or a defective gauge. Check the oil pressure gauge before making any other test; it too may be defective.

PARTS CATALOG

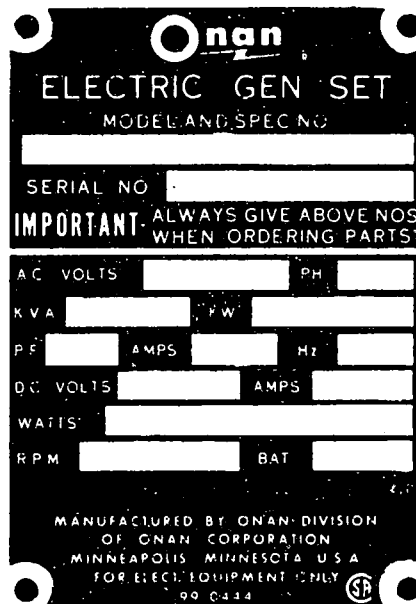
INSTRUCTIONS FOR ORDERING REPAIR PARTS

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 rectangular nameplate for an Onan Electric Gen Set. At the top is the Onan logo. Below it, the text 'ELECTRIC GEN SET' is printed. Underneath, there are two lines for 'MODEL AND SPEC NO.' and 'SERIAL NO.', each followed by a blank space. A bolded section labeled 'IMPORTANT' states: 'ALWAYS GIVE ABOVE NOS. WHEN ORDERING PARTS'. Below this, there are several rows of labels with blank spaces for recording specifications: 'AC VOLTS', 'PH', 'KVA', 'FW', 'PF', 'AMPS', 'Hz', 'DC VOLTS', 'AMPS', 'WATTS', 'RPM', and 'BAT'. At the bottom, it says 'MANUFACTURED BY ONAN DIVISION OF ONAN CORPORATION MINNEAPOLIS MINNESOTA U.S.A. FOR ELECT. EQUIPMENT ONLY' followed by the number '99 0434' and a small circular logo.

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 NH Generating Sets as listed below. Parts are arranged in groups of related items and are identified by a reference number. Parts illustrations are typical. Using the MODEL and SPEC NO. from the Onan nameplate, select parts from this catalog that apply to your unit. Unless otherwise mentioned in the description, parts are interchangeable between models. Right and left sides are determined by FACING the engine end (front) of the unit.

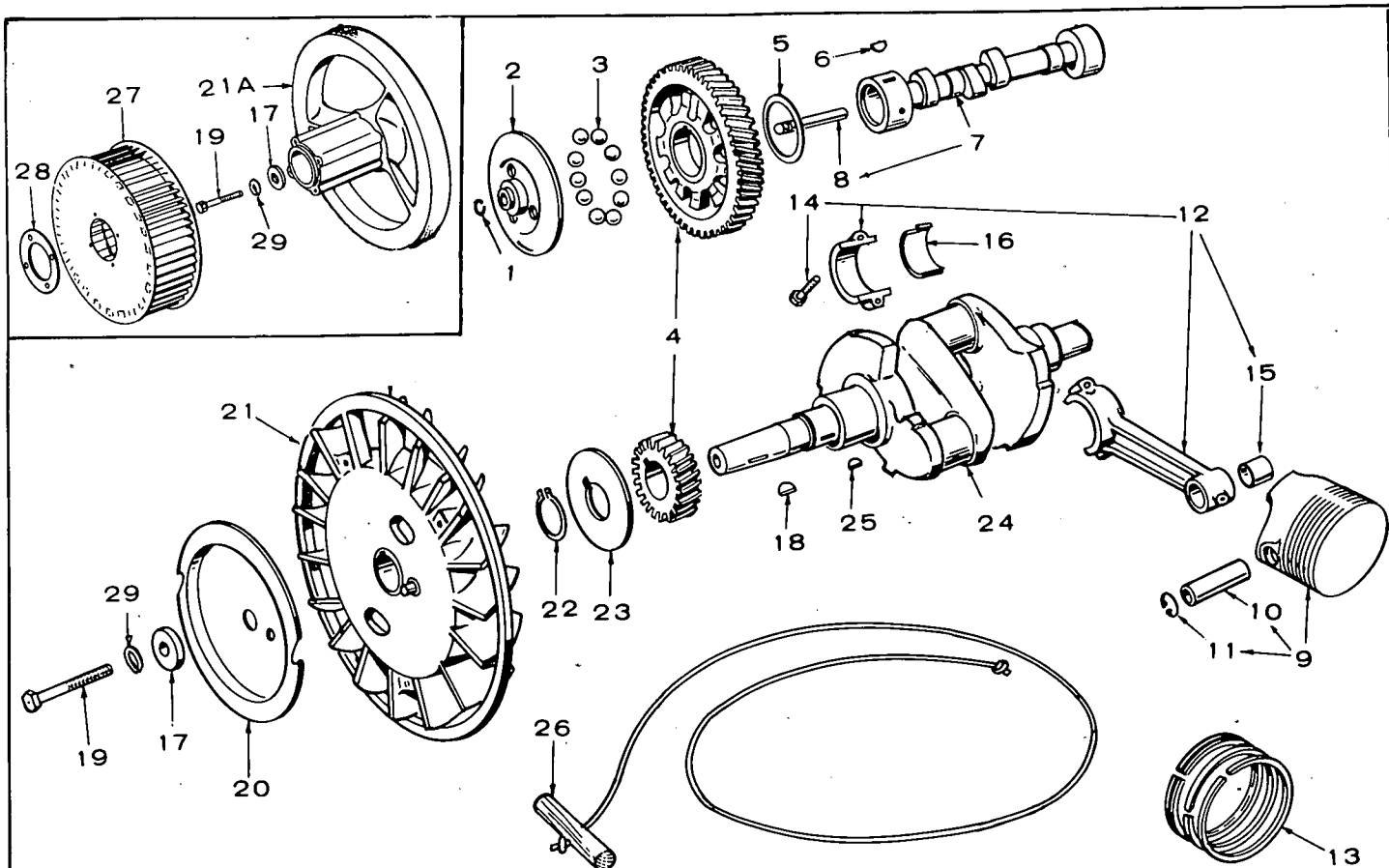
GENERATING SET DATA TABLE

MODEL & SPEC NO.	ELECTRICAL DATA				
	WATTS	VOLTS	HERTZ	WIRE	PHASE
6.5NH-3CR/*	6500	120/240	60	**	1
6.5NH-4R/*	6500	120/208	60	4	3
6.5NH-5DR/*	6500	120/240	60	4	3
6.5NH-4XR/*	6500	277/480	60	4	3
5.5NH-53CR/*	5500	120/240	50	**	1
5.5NH-55DR/*	5500	120/240	50	**	3
5.5NH-57R/*	5500	220/380	50	4	3
Contractor Models	See Special Parts List Following Standard Parts List.				

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

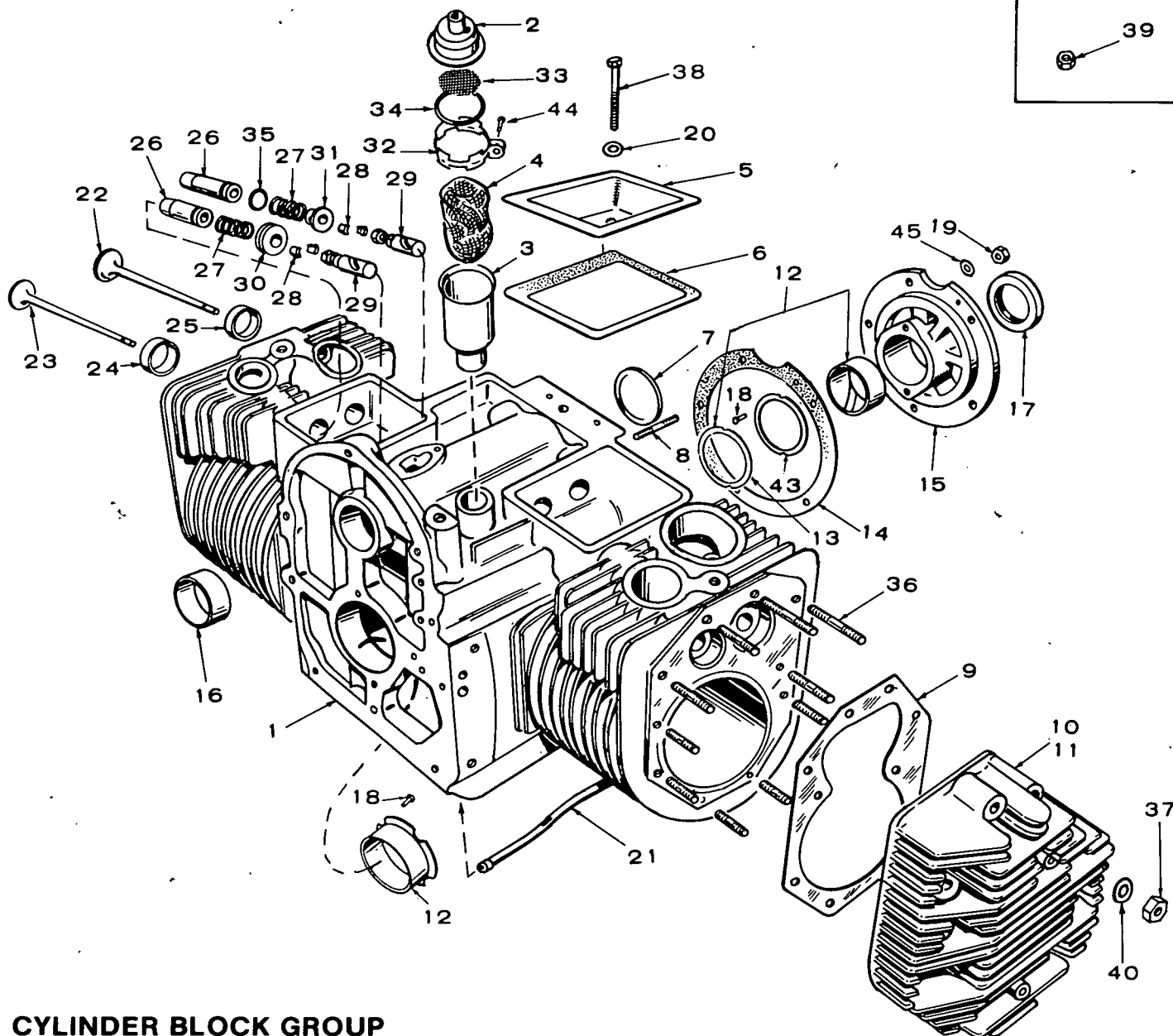
** - Set is reconnectable for 120 volt 2 wire, 240 volt 2 wire or 120/240 volt 3 wire service.

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



CRANKSHAFT, FLYWHEEL, CAMSHAFT AND PISTON GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	150-0078	1	Ring, Camshaft Center Pin		113-0166-20	2	.020" Oversize
2	150-1116	1	Cup, Governor		113-0166-30	2	.030" Oversize
3	510-0015	10	Ball, Fly - Governor		113-0166-40	2	.040" Oversize
4	105-0353	1	Gear Set, Timing - Includes (1) ea. Crankshaft and Camshaft Gears (Includes Flyball Spacer and Plate)	14	805-0010	4	Bolt, Place - Connecting Rod Cap
5	105-0004	1	Washer, Camshaft Gear Thrust	15	114-0036	2	Bushing, Piston Pin - Connecting Rod
6	515-0001	1	Key, Camshaft Gear Mounting	16	BEARING HALF, CONNECTING ROD		
7	105-0309	1	Camshaft (Includes Center Pin)		114-0188	4	Standard
8	150-0075	1	Pin, Center - Camshaft		114-0188-02	4	.002" Undersize
9	PISTON AND PIN (Includes Retaining Rings)				114-0188-10	4	.010" Undersize
	112-0111	2	Standard		114-0188-20	4	.020" Undersize
	112-0111-05	2	.005" Oversize		114-0188-30	4	.030" Undersize
	112-0111-10	2	.010" Oversize	17	WASHER, WHEEL MOUNTING		
	112-0111-20	2	.020" Oversize		526-0128	1	Pressure Cooled Units
	112-0111-30	2	.030" Oversize		526-0017	1	Vacu-Flo Cooled Units - Optional
	112-0111-40	2	.040" Oversize	18	515-0002	1	Key, Wheel Mounting
10	112-0112	2	Pin, Piston	19	104-0170	1	Screw, Wheel Mounting
11	518-0294	4	Ring, Piston Pin Retaining	20	192-0308	1	Sheave, Starter Rope
12	114-0203	2	Rod, Connecting (Includes Bushing and Bolts)		FLYWHEEL		
13	RING SET, PISTON - GASOLINE FUELED SETS			21	134-1903	1	Pressure Cooled Units
	113-0165	2	Standard	21A	104-0739	1	Vacu-Flo Cooled Units - Optional
	113-0165-05	2	.005" Oversize	22	518-0014	1	Lock, Crankshaft Gear Washer
	113-0165-10	2	.010" Oversize	23	104-0043	1	Washer, Crankshaft Gear Retaining
	113-0165-20	2	.020" Oversize	24	104-0731	1	Crankshaft
	113-0165-30	2	.030" Oversize	25	515-0001	1	Key, Crankshaft Gear Mtg.
	113-0165-40	2	.040" Oversize	26	192-0083	1	Rope, Manual Starting
	GASEOUS FUELED SETS			27	134-2130	1	Wheel, Blower - Vacu-Flo Cooled Units - Optional
	113-0166	2	Standard	28	134-0911	1	Plate, Blower Wheel - Vacu-Flo Cooled Units - Optional
	113-0166-05	2	.005" Oversize	29	850-0055	1	Washer (7/16"), Lock
	113-0166-10	2	.010" Oversize				



CYLINDER BLOCK GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	110-1835	1	Block Assembly, Cylinder (Includes Parts Marked *)
2	123-0954	1	Cap and Valve, Breather
3	123-0645	1	Tube, Breather
4	123-0865	1	Baffle, Breather Tube
5	110-1624	2	Cover, Valve Compartment
6	110-1720	2	Gasket, Valve Cover
7	517-0048	1	*Plug, Camshaft Expansion
8	520-0736	5	*Stud, Rear Bearing Plate Mounting
9	110-1731	2	Gasket, Cylinder Head
10	110-1905	1	Head, Cylinder (#2) - R.H.
11	110-1906	1	Head, Cylinder (#1) - L.H.
12	BEARING, CRANKSHAFT — MAIN		
	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
13	104-0575	2	£*Washer, Crankshaft, Bearing Thrust

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
14	101-0415	1	*Gasket, Bearing Plate
15	101-0407	1	*Plate, Rear Bearing (Excludes Bearing - Includes Pins)
16	101-0405	2	*Bearing, Camshaft Front and Rear (Precision)
17	509-0041	1	*Seal, Bearing Plate
18	516-0072	4	*Pin, Main Bearing Stop
19	104-0091	5	*Nut, Bearing Plate Stud
20	526-0063	2	Washer (Copper), Valve Compartment Cover
21	120-0680	1	*Tube, Crankcase Oil
22	110-1718	2	Valve, Intake
23	110-1719	2	Valve, Exhaust (Stellite)
24	INSERT, EXHAUST VALVE SEAT (Stellite)		
	110-1716	2	*Standard
	110-1716-02	2	.002" Oversize
	110-1716-05	2	.005" Oversize
	110-1716-10	2	.010" Oversize
	110-1716-25	2	.025" Oversize

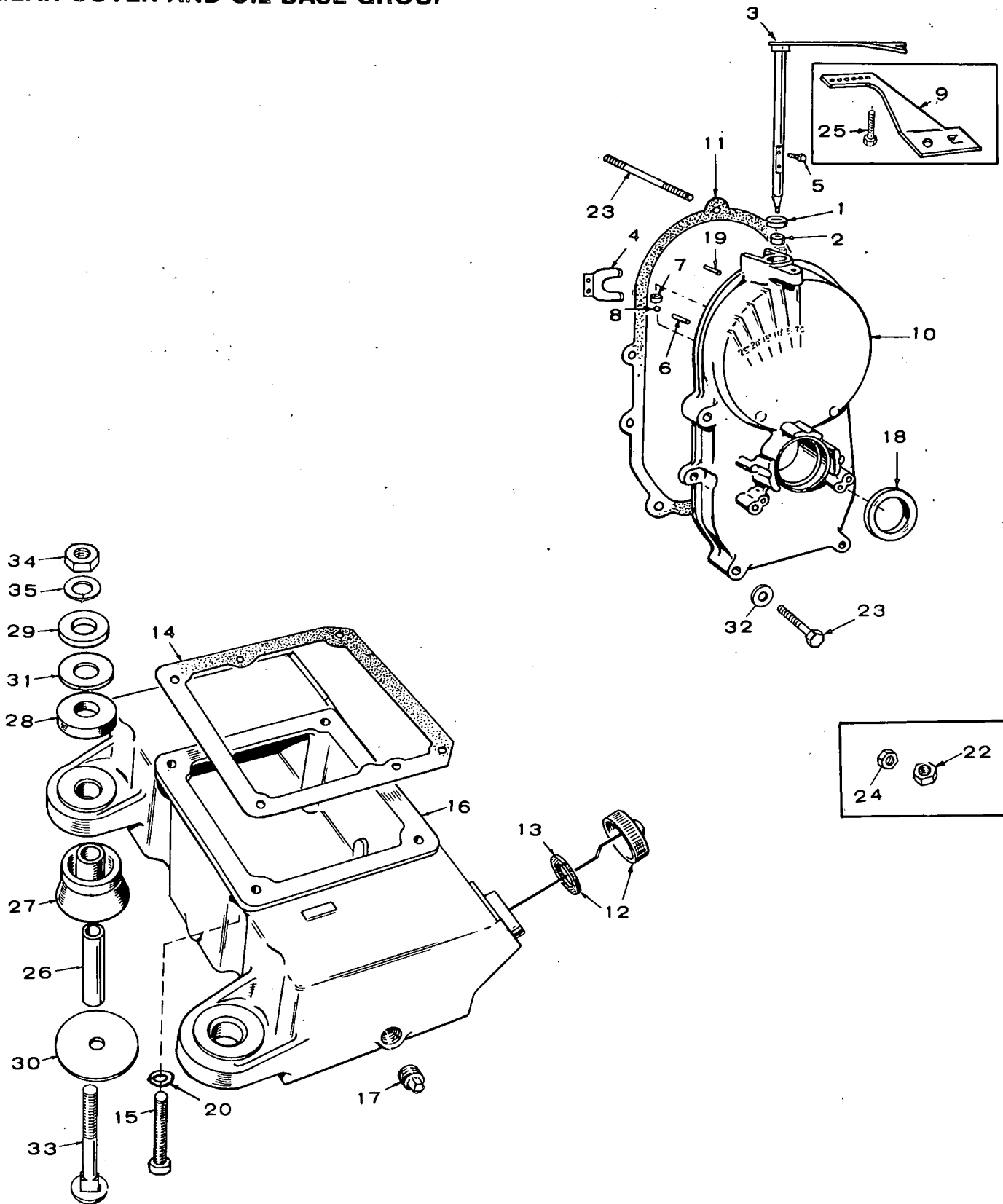
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
25	INSERT, INTAKE VALVE SEAT - SPEC A THROUGH B		
	110-1717	2	Standard
	110-1717-02	2	.002" Oversize
	110-1717-05	2	.005" Oversize
	110-1717-10	2	.010" Oversize
	110-1717-25	2	.025" Oversize
	BEGINNING SPEC C		
	110-1933	2	Standard
	110-1933-02	2	.002" Oversize
	110-1933-05	2	.005" Oversize
	110-1933-10	2	.010" Oversize
	110-1933-25	2	.025" Oversize
26	GUIDE, VALVE		
	110-1762	4	Spec A through B
	110-1939	4	Begin Spec C
27	110-0539	4	Spring, Valve
28	110-0639	8	Lock, Valve and Spring, Retaining
29	TAPPET, VALVE		
	115-0006	4	Standard
	115-0006-01	4	.001" Oversize
	115-0006-02	4	.002" Oversize
	115-0006-05	4	.005" Oversize
30	110-0904	2	Rotocap, Exhaust Valve
31	110-0893	2	Washer, Retainer - Intake Valve Spring
32	123-0951	1	Clamp, Breather Tube Cap
33	123-0958	1	Screen, Breather Tube

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
34	509-0117	1	Seal, "O" Ring, Breather Tube
35	110-0068	2	*Gasket, Valve Guide (Intake)
36	STUD, CYLINDER HEAD MOUNTING		
	520-0717	8	3/8" x 1-7/8"
	520-0715	8	3/8" x 2-3/4"
	520-0716	4	3/8" x 2-1/4"
37	NUT, FLANGE - CYLINDER HEAD STUD		
	870-0248	20	Spec A through B
	104-0091	20	Begin Spec C
38	800-0011	2	Screw (1/4-20 x 2") - Valve Box Cover (Replaces Stud used on early models)
39	115-0025	2	Nut, Hex - Valve Box Cover Stud (Used on Early Models with Stud)
40	526-0250	20	Washer, Flat - Cylinder Head Stud - Begin Spec C
41	154-1424	2	*Insert, Exhaust Port - Begin Spec C
43	104-0776	As Req.	*Shim (.005") - Crankshaft Thrust
44	809-0035	1	Screw, Breather Clamp
45	526-0251	5	*Washer, Bearing Plate Stud

* - Included in Cylinder Block Assembly.

£ - Use one only with rear bearing on units with flange type front bearing.

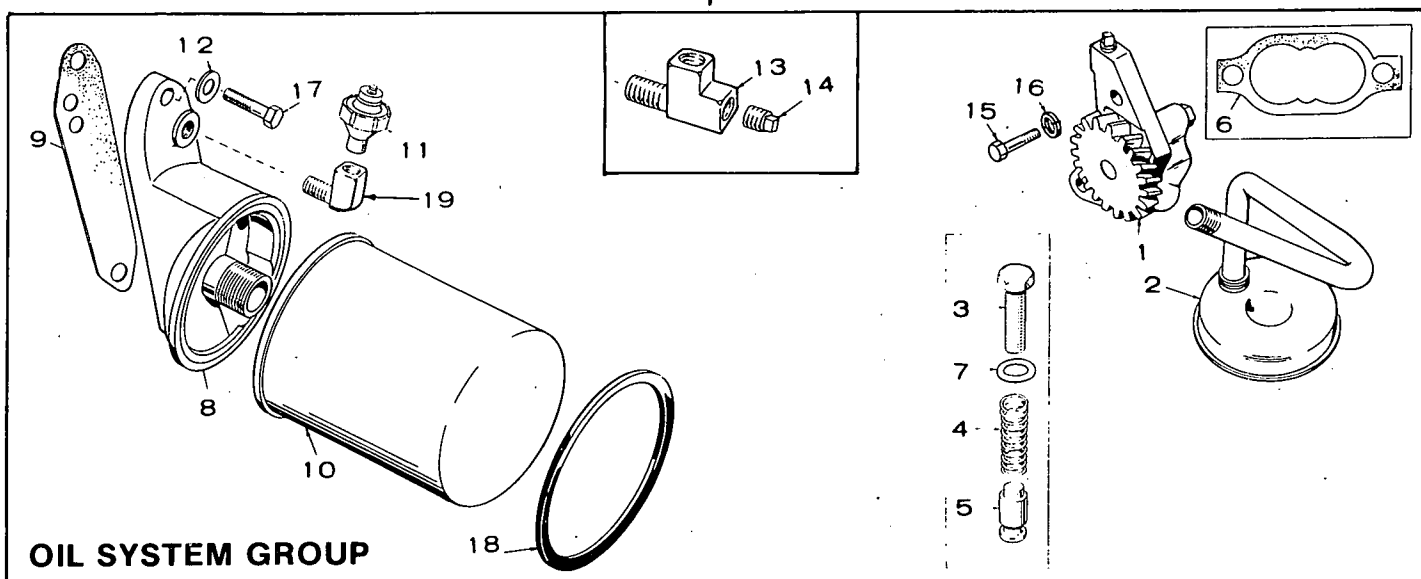
GEAR COVER AND OIL BASE GROUP



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	150-1260	1	**Shaft and Arm, Governor
4	150-1187	1	**Yoke, Governor Shaft
5	815-0046	2	**Screw, Yoke Mounting (8-32 x 3/8")
6	516-0130	1	**Pin, Governor Cup Stop (In Gear Cover)
7	510-0008	1	**Bearing, Governor Shaft (Lower)
8	510-0014	1	**Shaft, Bearing, Governor Shaft
9	150-1073	1	Extension, Governor Arm
10	103-0329	1	Cover Assembly, Gear (Includes Parts Marked **)
11	103-0011	1	Gasket, Gear Cover
12	123-0489	1	Cap and Indicator, Oil Fill
13	123-0191	1	Gasket, Oil Fill Cap
14	102-0646	1	Gasket, Oil Base Mounting
15	800-0051	4	Screw (3/8-16 x 1-1/4") - Oil Base to Block (Replaces Stud used on Early Models)
16	102-0672	1	Base, Oil
17	505-0056	1	Plug, Oil Drain
18	509-0040	1	**Seal, Gear Cover
19	516-0011	2	Pin, Gear Cover (5/16 x 1-1/8")
20	850-0050	4	Washer (3/8"), Lock
22	104-0091	4	Nut, Hex - Oil Base Stud (Used on Early Models)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
23	SCREW, GEAR COVER TO BLOCK		
	800-0032	4	5/16-18 x 1-3/4"
	800-0034	1	5/16-18 x 2-1/4"
24	110-0445	5	Nut, Gear Cover Mounting Stud
25	815-0181	1	Screw, Extension Arm Mounting (10-32 x 1/2")
26	402-0290	4	*Bushing, Spacer, Vibration Mount
27	402-0284	4	Cushion, Vibration (Front and Rear)
28	402-0282	4	*Snubber, Shock Mounting
29	526-0014	4	*Washer (29/64" I.D. x 1-1/2" O.D. x 1/8")
30	526-0195	4	*Washer (29/64" I.D. x 3-1/4" O.D. x 1/8")
31	526-0198	As Req.	*Washer (5/8" I.D. x 1-1/2" O.D. x 1/16")
32	526-0065	5	Washer, Copper - Gear Cover Mounting
33	816-0212	4	*Bolt, Carriage (7/16-14 x 5-1/2") - Cushion Mounting
34	862-0004	4	*Nut, Hex (7/16") - Cushion Mounting
35	850-0055	4	*Washer, Lock (7/16")
	402-0291	4	*Hardware Package, Mounting (Includes Parts Marked *)

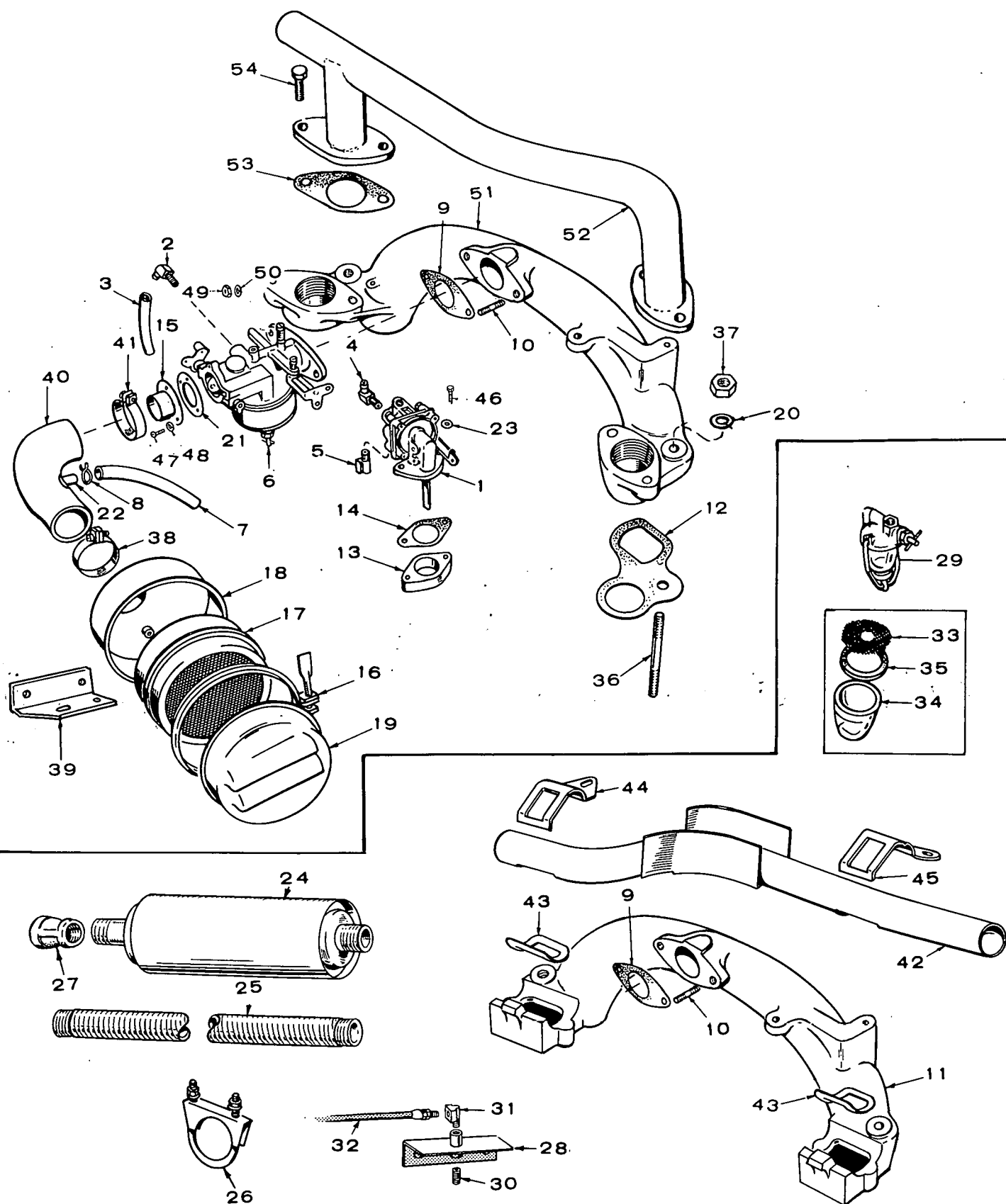
* - Included in Mounting Hardware Package.
 ** - Included in Gear Cover Assembly.



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	120-0491	1	Pump, Oil (Components Not Sold Separately)
2	120-0400	1	Intake, Oil Pump - Includes Cup, Screen and Pipe
3	801-0050	1	Screw, By-Pass
4	120-0140	1	Spring, By-Pass Valve
5	120-0398	1	Valve, By-Pass
6	120-0161	1	Gasket Kit, Oil Pump
7	526-0066	1	Washer, Oil Pressure Relief Valve Adjusting Screw
8	122-0320	1	Adapter, Oil Filter
9	122-0321	1	Gasket, Adapter
10	122-0323	1	Filter, Oil

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
11	SWITCH, LOW OIL PRESSURE		
	309-0010	1	Spec A through C
	309-0237	1	Begin Spec D
12	526-0065	2	Washer (Copper), Adapter Mounting
13	502-0058	1	Tee, Low Oil Pressure Switch
14	505-0057	1	Plug (1/8)
15	800-0007	2	Screw (1/4-20 x 1") - Oil Pump Mounting
16	850-0040	2	Washer, Lock (1/4)
17	800-0028	2	Screw (5/16-18 x 1") - Adapter Mounting
18	122-0347	1	Gasket, Oil Filter
19	502-0196	1	Elbow (90°), Street - Begin Spec D

FUEL SYSTEM AND EXHAUST GROUP



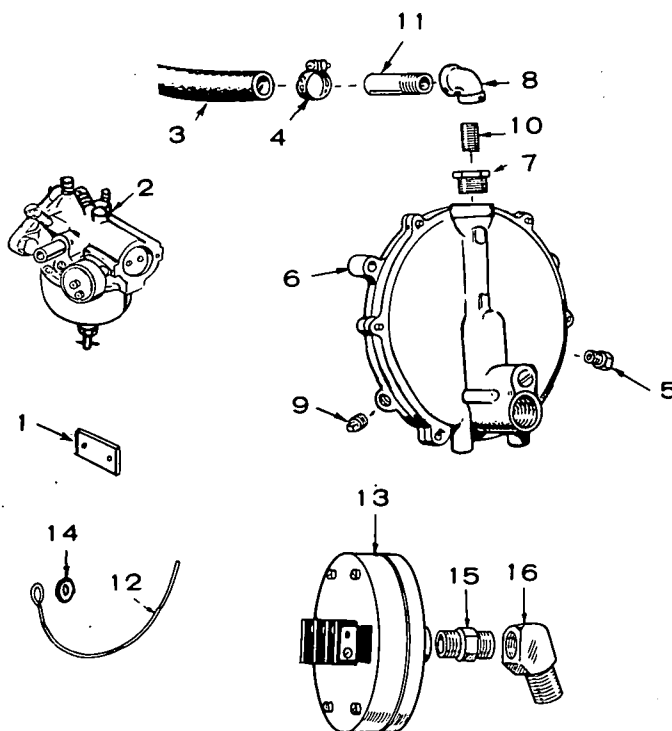
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	149-0526	1	Repair Kit, Fuel Pump
1	149-1223	1	Pump, Fuel
2	ELBOW, CARBURETOR INLET		
	502-0313	1	Gasoline Fueled Sets
	502-0065	1	Gaseous Fueled Sets
3	LINE, FUEL PUMP TO CARBURETOR		
	149-1228	1	Gasoline Fueled Sets
	149-1444	1	Gaseous Fueled Sets
4	ELBOW, FUEL PUMP OUTLET		
	502-0313	1	Gasoline Fueled Sets
	502-0002	1	Gaseous Fueled Sets
5	ELBOW, FUEL PUMP INLET		
	502-0002	1	Gasoline Fueled Sets
	502-0020	1	Gaseous Fueled Sets
6	CARBURETOR, GASOLINE (Separate Group For Components)		
	141-0808	1	Manual Choke
	141-0807	1	Electric Choke
7	503-0582	1	Hose, Breather
8	503-0170	2	Clamp, Breather Hose
9	141-0281	1	Gasket, Carburetor Mounting
10	520-0526	2	Stud, Carburetor Mounting
11	154-1237	1	Manifold, Intake
12	154-1250	2	Gasket, Intake Manifold to Cylinder Block
13	149-0045	1	Spacer, Fuel Pump Mounting
14	149-0003	2	Gasket, Fuel Pump Mounting
15	145-0398	1	Adapter, Carburetor Air Inlet
16	140-1073	1	Clamp, Air Cleaner
17	140-1071	1	Element, Air Cleaner
18	COVER, AIR CLEANER		
	140-1066	1	Spec A through C
	140-1135	1	Begin Spec D
19	140-1061	1	Cover, Air Cleaner
20	850-0050	2	Washer (3/8"), Lock
21	140-0921	1	Gasket, Adapter to Carburetor
22	123-0733	1	Tube, Adapter to Breather Hose
23	526-0063	2	Washer (Copper), Pump Mounting
24	155-0077	1	Muffler, Exhaust
25	TUBE, EXHAUST - FLEXIBLE		
	155-1094	1	Spec A through E
	155-1138	1	Begin Spec F
26	CLAMP, EXHAUST TUBE		
	155-1015	1	Spec A through E
	155-1135	1	Begin Spec F

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
27	505-0036	1	Coupling, Reducer (1-1/2 x 1-1/4)
28	149-0616	1	Bracket, Fuel Filter
29	149-0079	1	Filter, Fuel
30	502-0046	1	Nipple, Brass - Bracket to Filter Inlet
31	502-0020	1	Elbow, Street, Filter Bracket
32	LINE, FUEL		
	501-0003	1	9"
	501-0005	1	18-1/2"
33	149-0202	1	Screen, Fuel Filter
34	149-0150	1	Bowl, Fuel Filter
35	149-0149	1	Gasket, Fuel Filter Bowl
36	520-0713	2	Stud, Intake Manifold Mtg.
37	104-0091	2	Nut, Intake Manifold Stud
38	503-0004	1	Clamp, Hose - Air Cleaner
39	BRACKET, AIR CLEANER MOUNTING		
	140-1067	1	Spec A through C
	140-1133	1	Begin Spec D
40	140-1075	1	Elbow, Carburetor Air Inlet
41	503-0311	1	Clamp, Hose - Air Inlet Elbow to Adapter
42	155-1069	1	Tube, Exhaust
43	155-1070	2	Gasket, Exhaust Manifold
44	155-1052	1	Clamp, Exhaust Tube, L.H.
45	155-1053	1	Clamp, Exhaust Tube, R.H.
46	815-0222	2	Screw (1/4-20 x 1-1/4") - Pump Mounting
47	815-0199	3	Screw (10-32 x 5/16") - Adapter Mounting
48	850-0030	3	Washer, Lock (#10)
49	868-0002	2	Nut (5/16-24) - Carburetor Mounting
50	854-0017	2	Washer, Lock
51	MANIFOLD, INTAKE - BEGIN SPEC F		
	154-1385	1	Standard Units
	154-1505	1	Units With Vacuum Regulator Switch
52	154-1386	1	Manifold, Exhaust - Begin Spec F
53	154-1383	2	Gasket, Exhaust Manifold - Begin Spec F
54	821-0016	4	Screw (5/16-18 x 3/4"), Self Locking

OPTIONAL FUEL SYSTEM GROUP (GASEOUS FUELS)

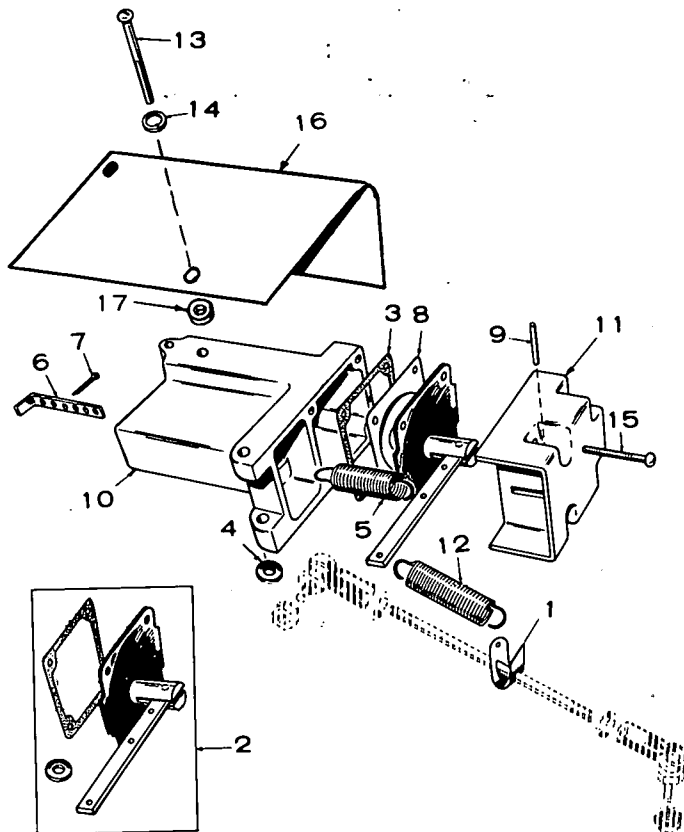
NOTE: Parts not in this group, refer to the Gasoline Fuel System Group.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	149-0136	1	Plate, Fuel Pump Hole - Gas Only Sets
2	CARBURETOR (See Separate Group for Components)		
	141-0726	1	Gas Only
	141-0722	1	Gas-Gasoline
3	503-0315	1	Hose, Regulator to Carburetor
4	503-0032	2	Clamp, Hose
5	148-0107	1	Vent
6	148-0311	1	Regulator Garretson
7	505-0017	1	Bushing, Reducer (3/8-1/4")
8	505-0038	1	Elbow, 1/4"
9	505-0057	1	Plug, Pipe (1/8")
10	505-0099	1	Nipple (1/4 x 7/8")
11	505-0302	1	Nipple, Half
12	143-0231	1	Wire, Choke Lock
13	148-0367	1	Switch, Vacuum Regulator
14	526-0008	1	Washer (#10) - Choke Lock Wire
15	502-0082	1	Nipple, Hex Pipe - Vacuum Regulator Switch
16	502-0053	1	Elbow (45°), Street - Vacuum Regulator Switch



VACUUM SPEED BOOSTER GROUP

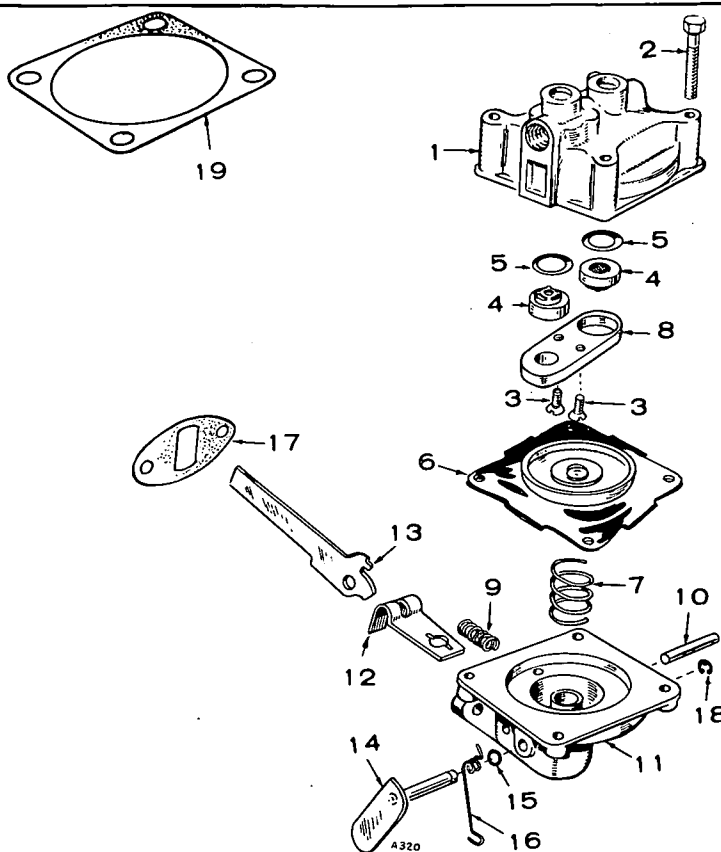
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	150-1030	1	Kit, Vacuum Speed Booster Replacement (Includes Parts Marked *)
1	150-0430	1	Bracket, Spring to Governor Link
2	150-1031	1	*Kit, Diaphragm Replacement, Includes Gaskets
3	150-0668	1	*Gasket, Diaphragm Plate
4	150-0425	1	*Gasket, Booster to Manifold
5	150-1354	1	*Spring, Internal
6	150-0376	1	*Bracket, Internal Spring Adjustment
7	516-0039	1	*Pin, Cotter (3/32 x 5/8") Adjusting Bracket
8	150-0666	1	*Plate, Diaphragm
9	516-0085	1	*Pin (3/32 x 3/4") - Diaphragm Lever Pivot
10		1	*Housing, Vacuum Booster (Not Sold Separately)
11		1	*Cover, Vacuum Booster Housing (Not Sold Separately)
12	150-0471	1	*Spring, External
13	813-0111	2	Screw (10-32 x 2-1/4") - Booster Mounting
14	853-0008	2	Washer, Lock
15	815-0148	4	*Screw (8-32 x 7/8")
16	150-1332	1	Shield, Heat
17	526-0196	2	Washer (#10), Flat



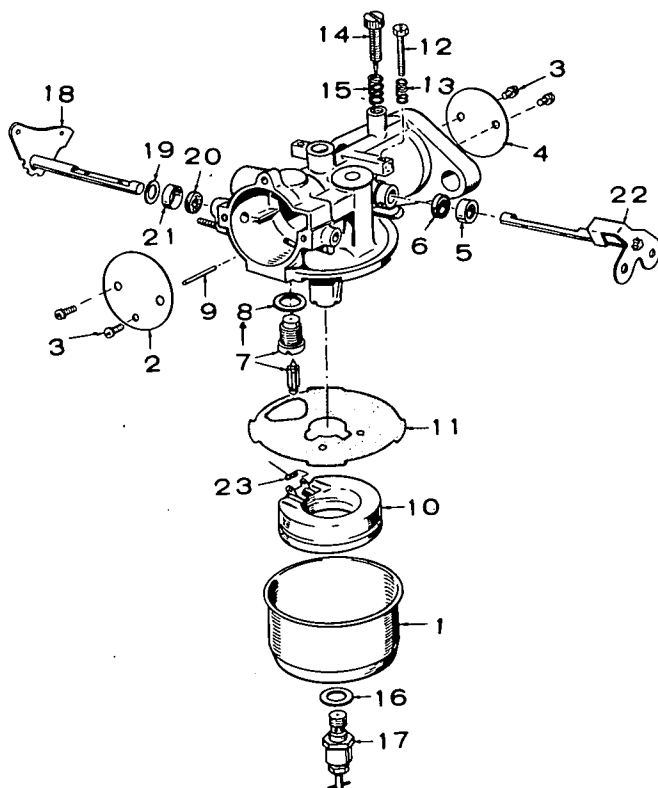
FUEL PUMP PARTS GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	149-1223	1	Pump, Fuel (Illustrated in Fuel System Group)
	149-0526	1	Repair Parts Kit - Includes Parts Marked *
1		1	Body, Not Sold Separately
2	815-0148	4	Screw, Machine (#8-32 x 7/8")
3	815-0147	2	Screw, Phillips Self Tapping (#6-32 x 5/8"), Valve Retainer
4	149-0096	2	*Valve and Cage
5	149-0095	2	*Gasket, Valve
6	149-0582	1	*Diaphragm Assembly
7	149-0672	1	*Spring
8	149-0539	1	Retainer, Valve Cage
9	149-0675	1	*Spring
10	516-0113	1	Pin, Rocker Arm
11		1	Body, Not Sold Separately
12	149-0670	1	Link, Rocker Arm
13	149-1148	1	Arm, Rocker
14	149-1042	1	Lever, Primer
15	509-0065	2	Seal, "O" Ring
16	149-1044	1	Spring, Primer Lever
17	149-0003	1	*Gasket, Pump Mounting
18	518-0129	1	Ring, Retainer, Primer Lever
19	149-0858	1	*Gasket, Diaphragm - Lower Side

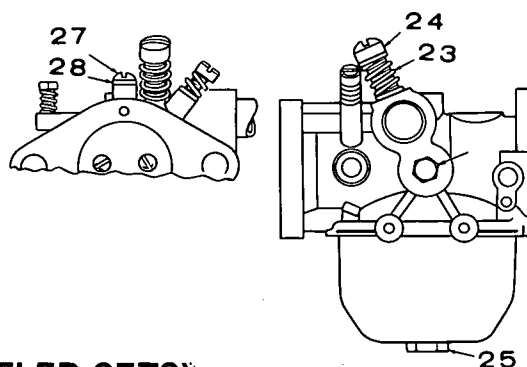
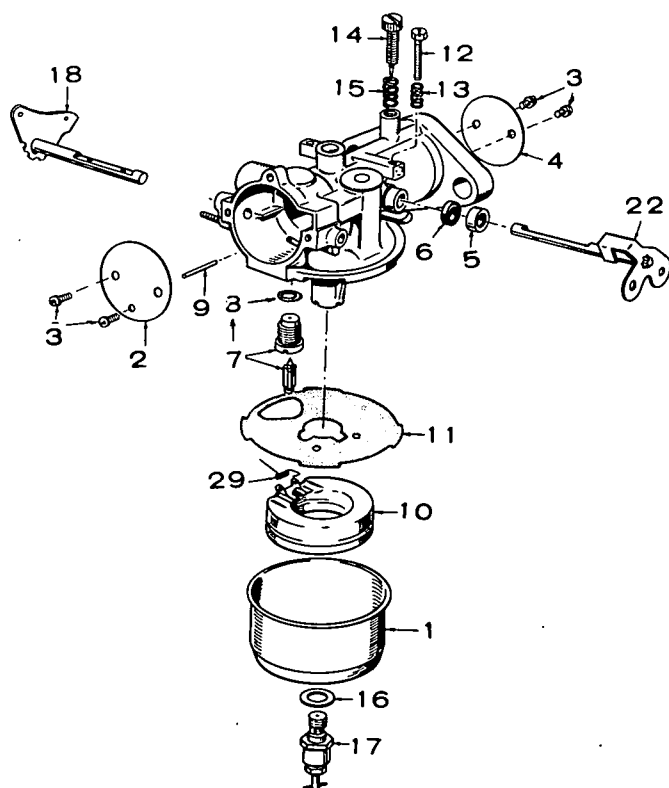
* - Parts in Repair Kit.



CARBURETOR PARTS GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
CARBURETOR, GASOLINE			
	141-0808	1	Manual Choke
	141-0807	1	Electric Choke
	141-0747	1	Repair Kit
	141-0748	1	Gasket Kit
	141-0281	1	Gasket, Carburetor Flange
1	141-0708	1	Bowl, Fuel
2	PLATE, CHOKE		
	141-0818	1	Electric Choke Units
	141-0771	1	Manual Choke Units
3	141-0698	4	Screw and Washer, Choke and Throttle Plate Mtg.
4	141-0817	1	Plate, Throttle
5	141-0705	1	Retainer, Seal
6	141-0661	1	Seal, Rubber
7	141-0798	1	Valve Seat Assembly, Fuel
8	141-0811	1	Washer, Fuel Valve Seat
9	141-0703	1	Shaft, Float
10	141-0702	1	Float Assembly
11	141-0701	1	Gasket, Bowl to Body
12	141-0700	1	Screw, Throttle Stop
13	141-0711	1	Spring, Throttle Stop
14	141-0713	1	Needle, Idle Adjusting
15	141-0710	1	Spring, Idle Needle
16	141-0077	1	Washer, Main Jet Assembly
17	141-0816	1	Jet Assembly, Main (Adjustable)
18	SHAFT, CHOKE		
	141-0742	1	Manual Choke Units
	141-0679	1	Electric Choke Units
19	141-0699	1	Washer, Manual Choke Units
20	141-0697	1	Seal, Felt - Manual Choke Units
21	141-0203	1	Retainer, Felt Seal - Manual Choke Units
22	141-0709	1	Shaft and Lever, Throttle
23	141-0799	1	Spring, Float



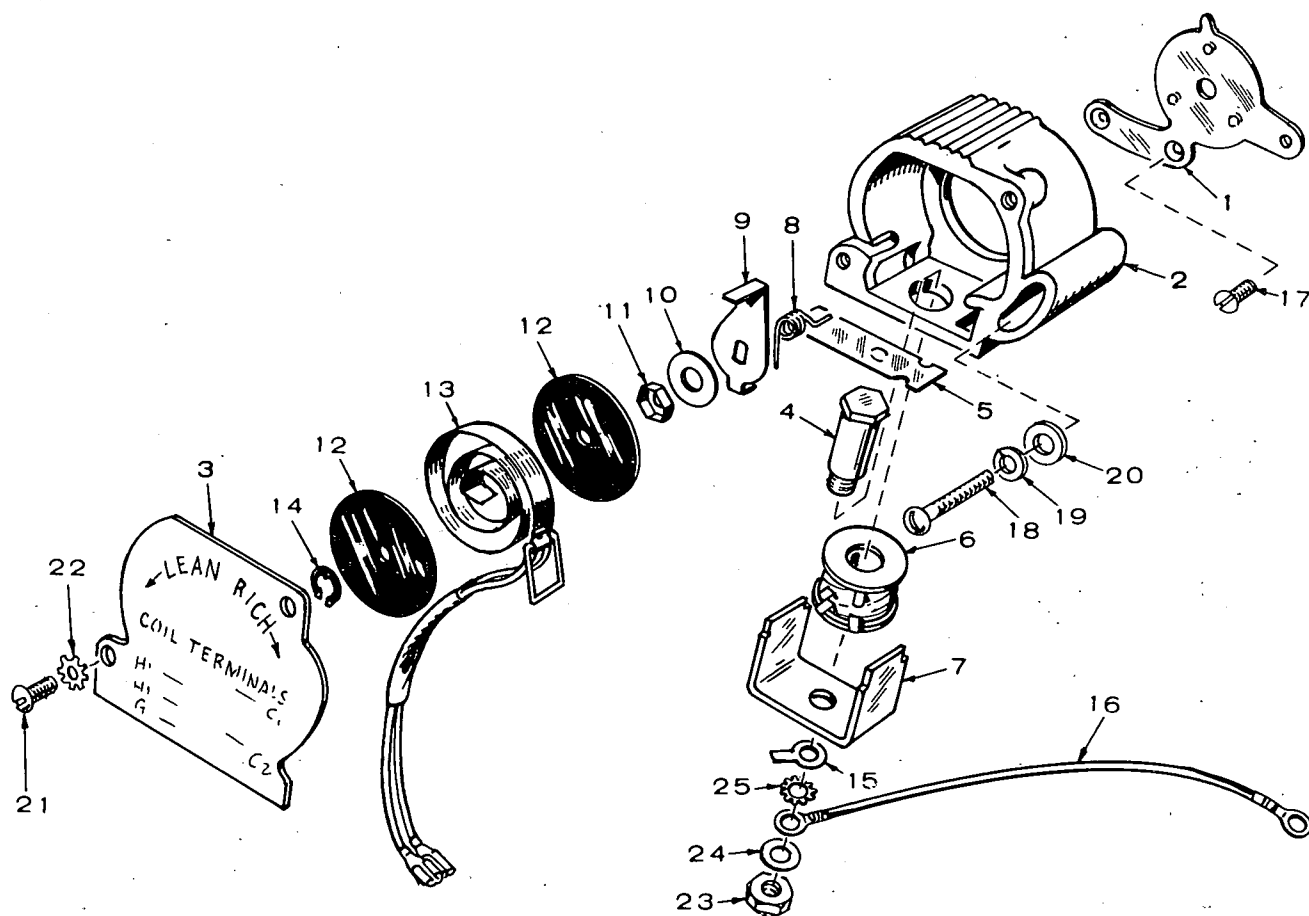
CARBURETOR PARTS GROUP — (GASEOUS FUELED SETS)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	141-0722	1	Carburetor, Gas-Gasoline - Optional
	141-0726	1	Carburetor, Gas Only - Optional
	141-0747	1	Repair Kit (Includes Parts Marked *)
	141-0748	1	Gasket Kit (Includes Parts Marked •)
	141-0281	1	*Gasket, Carburetor Flange
1	141-0708	1	Bowl, Fuel
2	141-0741	1	Plate, Choke (Not Used on Gas Only Units)
3	141-0698	4	Screw and Washer, Choke and Throttle Plate Mounting (2 Used on Gas Only Units)
4	141-0706	1	Plate, Throttle
5	141-0705	1	*Retainer, Seal
6	141-0661	1	*Seal, Rubber
7	141-0798	1	*Valve Seat Assembly, Fuel (Not Used on Gas Only Units)
8	141-0811	1	*Washer, Fuel Valve Seat (Not Used on Gas Only Units)
9	141-0703	1	*Shaft, Float (Not Used on Gas Only Units)
10	141-0702	1	Float Assembly (Not Used on Gas Only Units)
11	141-0701	1	*Gasket, Bowl to Body

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
12	141-0700	1	Screw, Throttle Stop
13	141-0711	1	Spring, Throttle Stop
14	NEEDLE, IDLE ADJUSTING		
	141-0713	1	Gasoline and Gas Only Units
	141-0713	2	Gas-Gasoline Units
15	SPRING, IDLE NEEDLE		
	141-0710	1	Gasoline and Gas Only Units
	141-0710	2	Gas-Gasoline Units
16	141-0077	1	*Washer, Main Jet Assembly
17	141-0712	1	Jet Assembly, Main (Adjustable) (Not Used on Gas Only Units)
18	141-0716	1	Shaft, Choke (Not Used on Gas Only Units)
22	141-0709	1	Shaft and Lever, Throttle
23	141-0733	1	Spring, Main Gas Needle
24	141-0734	1	Needle, Main Gas Adjusting
25	141-0736	1	Nut, Bowl - Gas Only Units
26	141-0737	1	Plug, Pipe (1/8") - Gas Only Units
27	141-0738	1	Screw, #10-32 - Gas Only Units
28	141-0739	1	Washer, Gas Only Units
29	141-0799	1	*Spring, Float (Not Used on Gas Only Carburetors)

* - Included in 148-0747 Repair Kit.

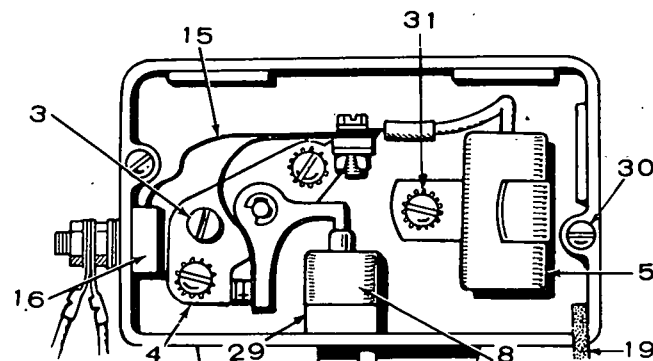
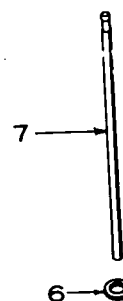
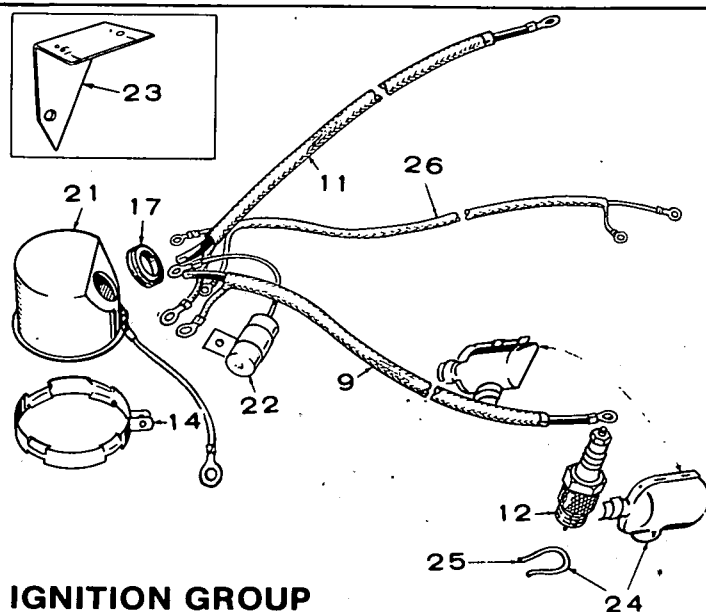
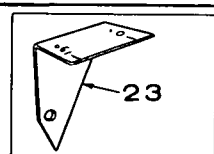
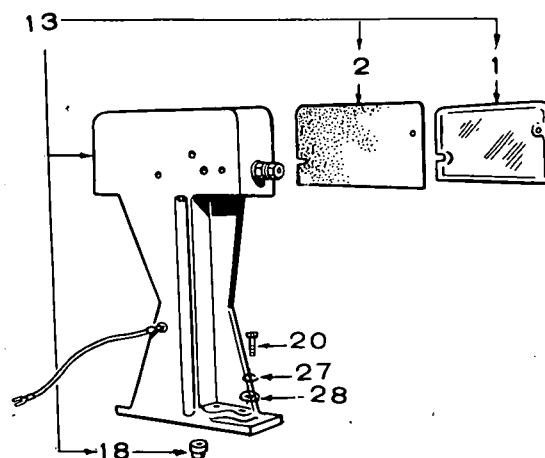
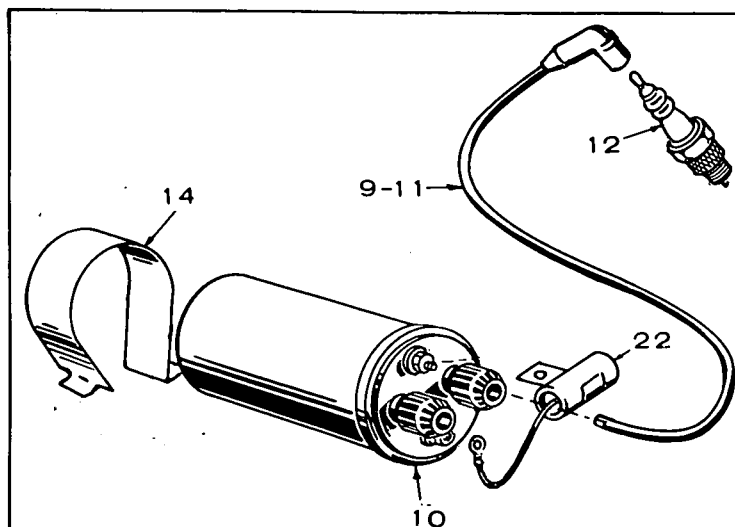
• - Included in 141-0748 Gasket Kit.



THERMO-MAGNETIC CHOKE GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	153-0429	1	Replacement Kit (Includes Complete Choke - Less Leads)
1	153-0385	1	Plate, Mounting
2	153-0386	1	Body
3	153-0389	1	Cover
4	153-0391	1	Core, Solenoid
5	153-0395	1	Armature
6	307-1203	1	Coil, Solenoid Assembly
7	153-0392	1	Frame, Solenoid
8	153-0387	1	Spring
9	153-0390	1	Lever, Thermostat
10	526-0018	1	Washer (17/64" I.D. x 5/8" O.D. x 1/16")
11	870-0134	1	Palnut (1/4-20)
12	153-0399	2	Insulator
13	153-0400	1	Heater Assembly
14	518-0129	1	Ring, Retaining
15	332-0876	1	Terminal Ground

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
16	LEAD, CHOKE		
	336-1550	1	Choke to Ground
	336-1549	1	Choke Solenoid Ground
17	815-0161	2	Screw (10-32 x 7/8") - Plate Mounting
18	813-0107	1	Screw (10-32 x 1-1/4"), Round Head - Choke Adjustment
19	850-0030	1	Washer (#10), Lock
20	526-0008	1	Washer (#10), Flat
21	812-0076	2	Screw (8-32 x 5/16"), Round Head - Cover Mtg.
22	854-0007	2	Screw (8-32 x 5/16"), Round Head - Cover Mtg.
23	864-0002	1	Nut (5/16-18), Jam - Choke Coil
24	526-0022	1	Washer (#8), Flat
25	854-0017	1	Washer (#8), Shakeproof IT

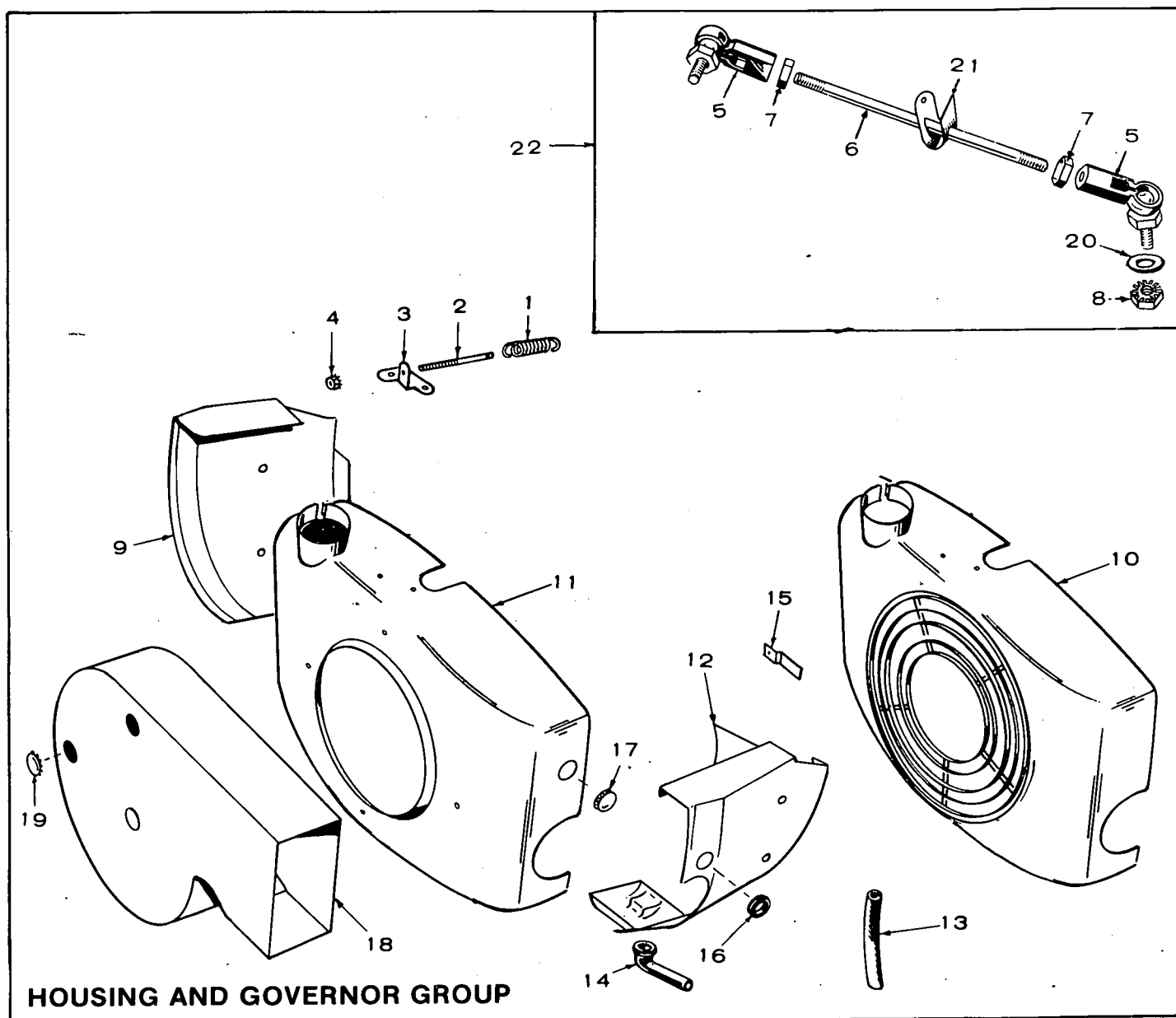


IGNITION GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	160-0930	1	*Cover, Breaker Box
2	160-0150	1	*Gasket, Breaker Box Cover
3	160-0075	1	*Cam, Point Gap Adjusting
4	160-0002	1	*Point Set, Breaker
5	312-0069	1	*Condenser, Breaker Points
6	160-1040	1	*Gasket, Breaker Box Mounting
7	160-0723	1	*Plunger
8	160-1143	1	*Diaphragm, Breaker Box
9	CABLE, SPARK PLUG - R.H.		
	167-1537	1	Spec A through C (22-1/4")
	167-1557	1	Begin Spec D (17")
10	166-0535	1	Coil, Ignition
11	CABLE, SPARK PLUG - L.H.		
	167-1536	1	Spec A through C (15-3/4")
	167-1558	1	Begin Spec D (12")
12	167-0241	2	Plug, Spark
13	160-1135	1	Box, Breaker (Includes Parts Marked *)
14	CLAMP		
	166-0541	1	Coil Cover - Spec A through C
	166-0588	1	Coil - Begin Spec D
15	160-0428	1	*Strap, Point Set to Terminal Block
16	160-0349	1	*Block and Terminal Assembly
17	508-0001	1	Grommet, Ignition Coil Cover

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	160-1041	1	*Bushings, Breaker Box (Bottom)
19	160-0261	1	*Wick, Breaker Box
20	802-0035	2	*Screw (1/4-20 x 7/8") - Breaker Box Mounting
21	166-0563	1	Cover, Ignition Coil - Spec A through C
22	312-0027	1	Condenser (.5 Mfd.) Ignition Coil Suppression
23	166-0519	1	Bracket, Timing - Vacu-Flo Cooled Units - Optional
24	167-0067	2	Shield, Spark Plug (Includes Clamp and Shield) - Spec A through C
25	167-0064	2	Clamp, Spark Plug Shield
26	336-1899	1	Lead Assembly, Shielded
27	850-0040	2	*Washer (1/4"), Lock
28	526-0214	2	*Washer (1/4"), Flat
29	160-0931	1	*Guide, Plunger
30	812-0077	2	*Screw (8-32 x 3/8"), Round Head
31	815-0285	3	*Screw (8-32 x 5/16"), Round Head W/Shakeproof Washer

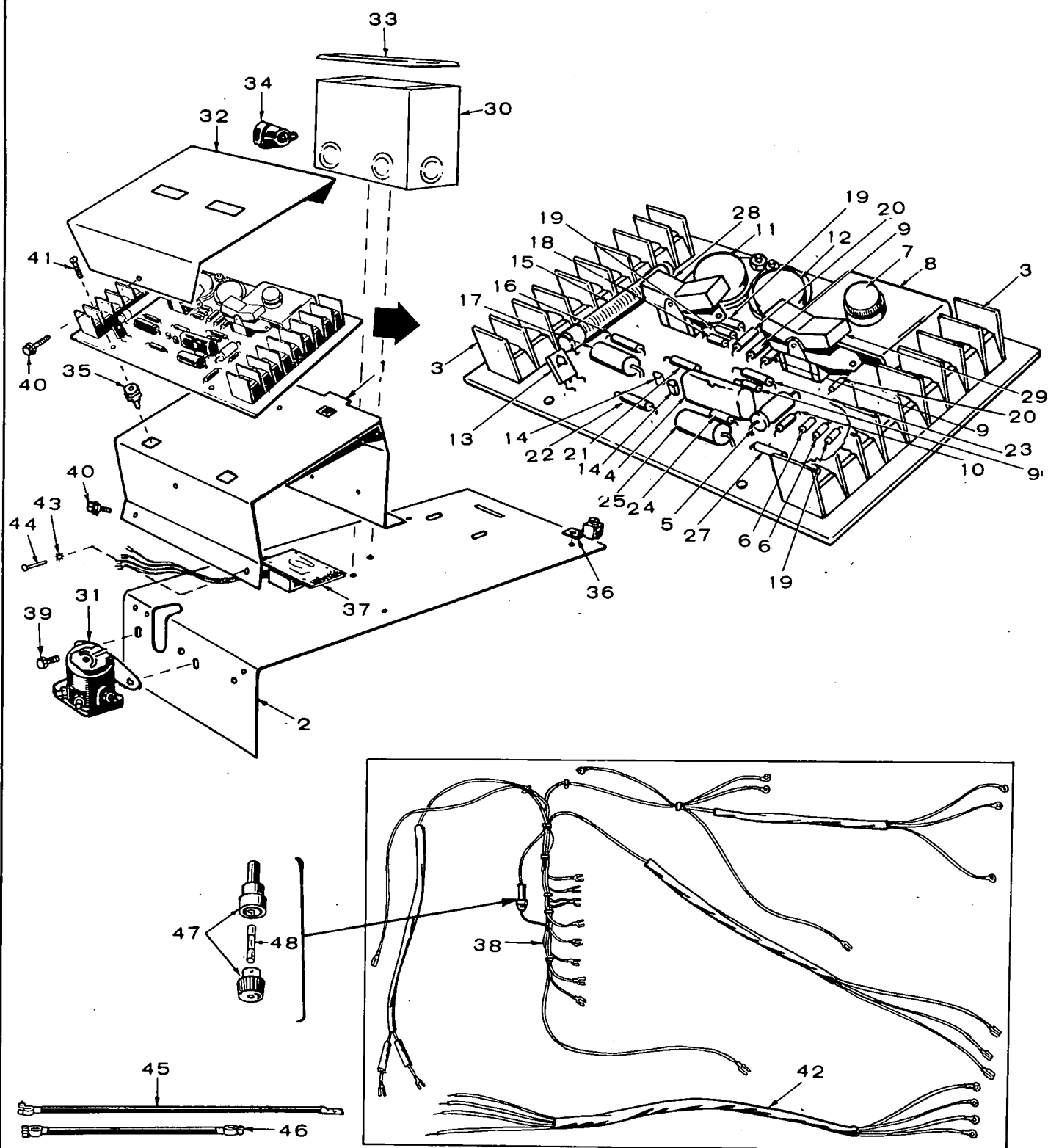
* - Included in the 160-1135 Breaker Box Assembly.



HOUSING AND GOVERNOR GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	150-0098	1	Spring, Governor	12	134-2142	1	Housing, Cylinder Air - Right
2	150-0096	1	Stud, Speed Adjustment		HOSE, OIL DRAIN		
3	150-1262	1	Bracket, Speed Stud	13	503-0391	1	Early Models
4	870-0131	1	Nut, Speed Adjustment	14	122-0345	1	Later Models
5	JOINT, BALL - GOVERNOR LINKAGE			15	134-0599	1	Clip, Cylinder Air Housing
	150-0639	2	Later Models - Metal	16	508-0162	1	Grommet, Rubber
	150-0939	2	Early Models - Plastic	17	517-0035	1	Plug, Dot Button (1-1/16")
6	ROD, GOVERNOR CONTROL						- Vacu-Flo Cooled Units
	520-0187	1	Later Models - Used With Metal Ball Joints Only				- Optional
	520-0623	1	Early Models - Used With Plastic Ball Joints Only	18	134-2367	1	Scroll, Air - Vacu-Flo Cooled Units - Optional
7	870-0053	2	Palnut, Locking	19	517-0021	2	Plug, Dot Button (7/8") - Air Scroll - Vacu-Flo Cooled Units - Optional
8	870-0131	2	Nut, Keys				
9	134-2141	1	Housing, Cylinder Air - Left	20	526-0196	2	Washer, Flat
10	HOUSING, BLOWER - PRESSURE COOLED UNITS			21	150-0430	1	Bracket, Governor Spring
	134-2076	1	Spec A through C	22	150-1080	1	Linkage Assembly, Governor - (When purchased as a unit this assembly will replace all specs.)
	134-2558	1	Begin Spec D				
11	HOUSING, BLOWER - VACU-FLO COOLED UNITS						
	134-2127	1	Spec A through C				
	134-2560	1	Begin Spec D				

CONTROL GROUP — BEGIN SPEC D

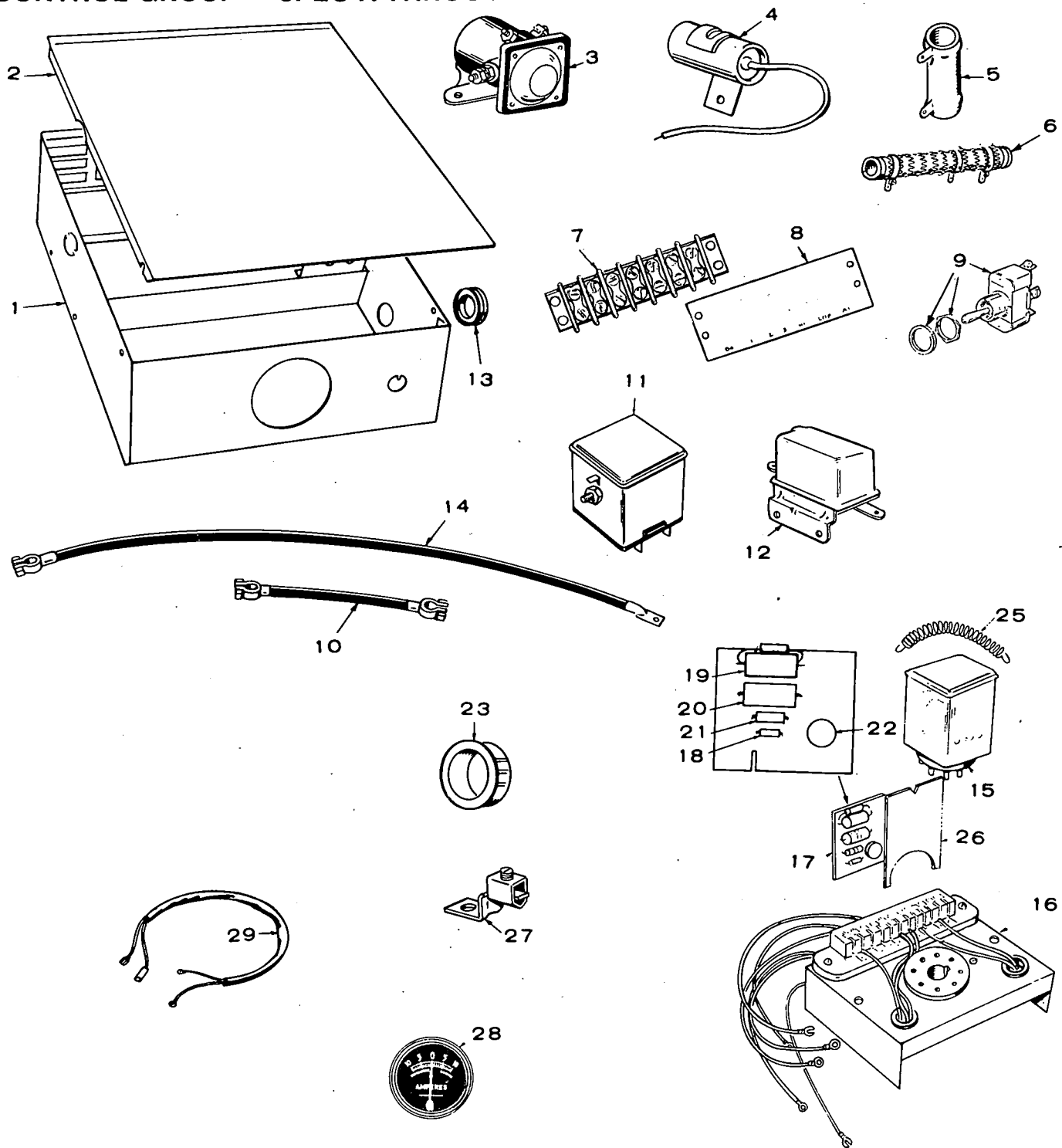


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0859	1	Control Assembly, Complete (Includes Parts Marked *)
1	301-3481	1	Bracket, Control Mounting
2	301-3560	1	Bracket, Control Mounting
3	332-1450	2	*Block, Terminal
4	355-0026	1	*Capacitor, .47 Mfd.
5	356-0046	1	*Capacitor, 5 Mfd.
6	357-0017	2	*Rectifier, Epoxy Case
7	358-0026	1	*Rectifier, Silicon
8	363-0063	1	*Sink, Heat
9	357-0004	3	*Rectifier, Silicon
10	359-0026	1	*Diode, Zener (18 Volt)
11	362-0018	1	*Transistor, Power (2N3055)
12	362-0033	1	*Transistor, Power (MJ2955)
13	362-0028	1	*Transistor (2N4918)
14	362-0011	2	*Transistor, Silicon (NPN)
15	353-0043	1	*Resistor, Fixed (35-Ohm, 10 Watt)
16	350-0437	1	*Resistor (120,000-Ohm, 1/2 Watt)
17	350-0977	1	*Resistor (390-Ohm, 2 Watt)
18	350-0427	1	*Resistor (47,000-Ohm, 1/2 Watt)
19	357-0013	3	*Rectifier, Epoxy Case
20	350-0404	2	*Resistor (4,300-Ohm, 1/2 Watt)
21	350-0315	1	*Resistor (1-Ohm, 1/2 Watt)
22	350-0355	1	*Resistor (47-Ohm, 1/2 Watt)
23	350-0379	1	*Resistor (470-Ohm, 1/2 Watt)
24	350-0530	1	*Resistor (330-Ohm, 1/2 Watt)
25	350-0983	1	*Resistor (680-Ohm, 2 Watt)
27	350-0673	1	*Resistor (270-Ohm, 1 Watt)
28	308-0323	1	*Switch, Rocker (DPDT) - Electric - Hand
29	308-0320	1	*Switch, Rocker (DPDT) - Start
30	330-0074	1	Box, AC Outlet (Not Part of Control Assembly)
31	307-1166	1	Solenoid, Start (Not Mounted in Control)
32	301-3484	1	Cover, Control

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
33	330-0004	1	Cover, AC Outlet Box (Not Part of Control Assembly)
34	508-0179	1	Grommet, AC Outlet Box (Not Part of Control Assembly)
35	870-0263	4	Nut, Insulator
36	332-0142	1	Terminal
37	300-0935	1	Adapter, Start Control
38	HARNES, WIRING - ENGINE CONTROL		
	338-0718	1	Standard Units
	338-0738	1	Units With Gas Carburetor
	338-0743	1	Units With HATKO
39	SCREW, SELF LOCKING - SOLENOID MOUNTING		
	821-0009	1	1/4-20 x 3/8"
	821-0010	1	1/4-20 x 1/4"
40	815-0350	9	Screw, Slotted Head - Self Tapping - Control Bracket Control Cover and Outlet Box Mounting (10-32 x 3/8")
41	815-0365	4	Screw, Sheet Metal - Circuit Board Mounting (#8 x 3/4")
42	HARNES, WIRING - START CONTROL ADAPTER		
	338-0642	1	1 Phase Sets
	338-0643	1	3 Phase Sets
43	853-0005	2	Washer, Shakeproof - Start Control Adapter Mounting (#8)
44	812-0077	2	Screw, Round Head - Start Control Adapter Mounting (#8-32 x 3/8")
45	416-0077	2	Cable, Battery (28")
46	416-0004	1	Cable, Battery Jumper - Optional
47	321-0193	1	Holder Assembly, Fuse (Includes Fuse)
48	321-0194	1	Fuse (9 Amp, 32 Volt)

* - Included in 300-0859 Control Assembly.

CONTROL GROUP — SPEC A THROUGH C

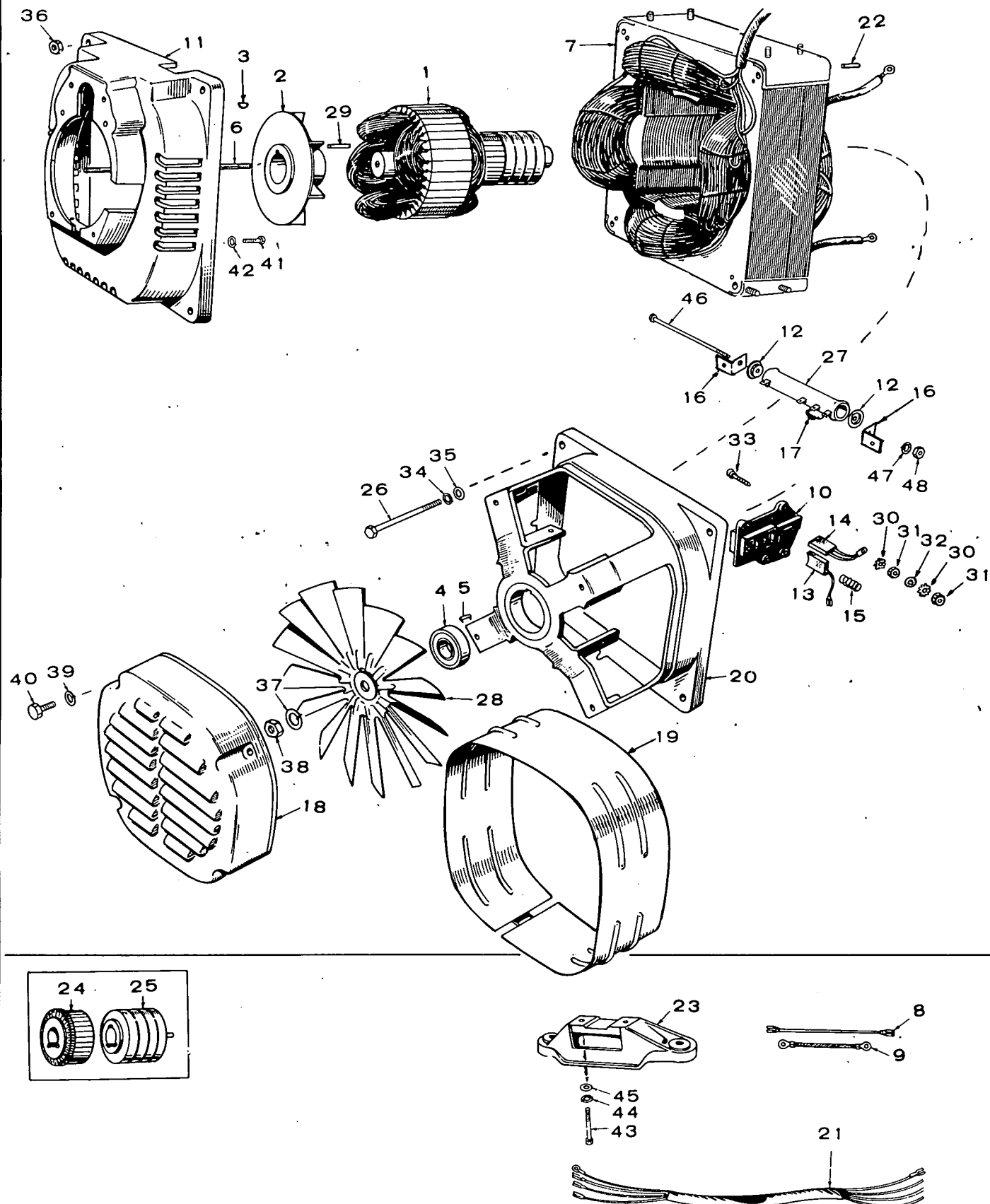


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301-3301	1	Box, Control
2	301-3302	1	Cover, Control Box
3	307-0845	1	Solenoid, Start
4	312-0057	1	Condenser (1.0 Mfd.) - Suppression
5	RESISTOR, FIXED		
	353-0006	1	6-Ohm, 50 Watt
	304-0251	1	30-Ohm, 5 Watt
6	304-0632	1	Resistor, Adjustable (6-Ohm, 100 Watt)
7	332-0745	1	Block, Terminal, Remote Control
8	332-1321	1	Strip, Marker
9	308-0154	1	Switch, Start-Stop
10	416-0004	1	Cable, Battery Jumper - Optional
11	307-1052	1	Relay, Stop
12	305-0383	1	Relay, Voltage Regulator
13	508-0001	1	Grommet, For 1-1/16" Hole
14	416-0077	2	Cable, Battery (28")
15	307-1070	1	Relay, Start-Disconnect

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
16	323-0803	1	Socket & Chassis Assembly, Start-Disconnect (Includes Leads)
17	300-0734	1	Amplifier Assembly, Start- Disconnect (Includes Parts Marked *)
18	359-0028	1	*Diode, Zener
19	350-0979	1	*Resistor, 470-Ohm, 2 Watt
20	350-0985	1	*Resistor, 820-Ohm, 2 Watt
21	350-0397	1	*Resistor, 2700-Ohm, 1/2 Watt
22	362-0010	1	*Transistor
23	BUSHING (Nylon)		
	331-0088	2	1-3/32" Mounting Hole
	508-0160	1	1/2" Mounting Hole
25	301-3306	1	Spring, Relay Hold-down
26	301-3307	1	Spacer, Relay to Amplifier
27	332-0142	As Req.	Terminal, Solderless
28	302-0058	1	Ammeter, Charge (10-0-10)
29	338-0561	1	Harness, Wiring

* - Included in 300-0734 Amplifier Assembly.

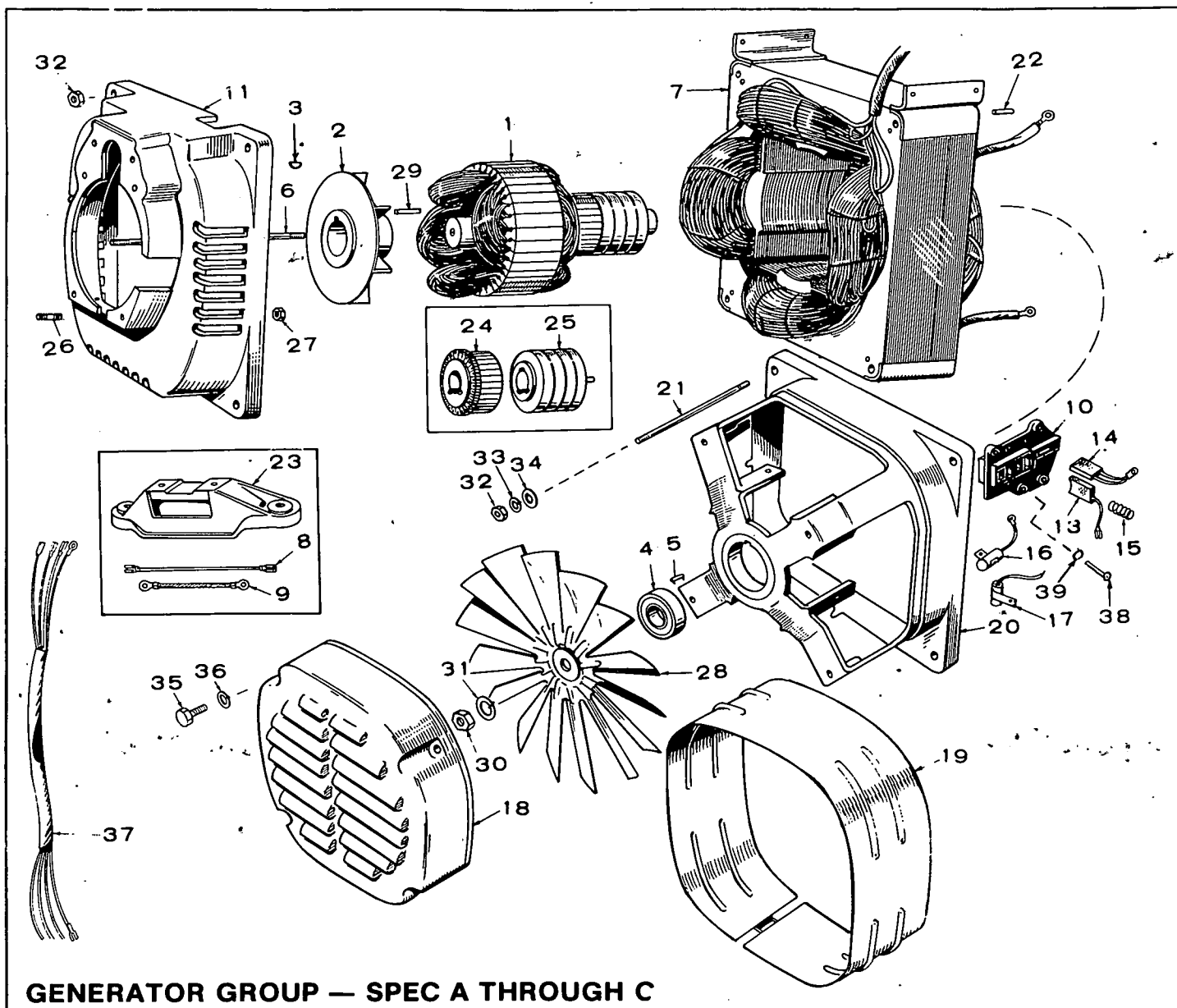
GENERATOR GROUP — BEGIN SPEC D



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1		1	Rotor Assembly, Wound
2	232-2316	1	Hub, Drive
3	515-0006	1	Key, Rotor to Crankshaft
4	510-0047	1	Bearing (Ball), Rotor
5	232-0596	1	Clip, Bearing Stop
6	520-0733	1	Stud, Rotor Through
7		1	Stator Assembly, Wound
8	LEAD ASSEMBLY, BRUSH		
	336-1891	4	Blade Type Terminals (9")
	336-1890	4	Blade Type and Round Type Terminal (4")
9	336-0186	3	Jumper, Ground (3-1/2")
10	BLOCK ASSEMBLY, BRUSH (Includes Parts Marked £)		
	212-0352	1	Lower
	212-0345	1	Right
	212-0346	1	Upper
	212-0353	1	Left
11	231-0164	1	Adapter, Generator to Engine
12	304-0015	2	Washer, Centering Resistor
13	214-0095	4	£Brush, Commutator
14	214-0096	8	£Brush, Collector
15	212-1232	12	£Spring, Brush
16	304-0706	2	Bracket, Resistor Mounting
17	357-0020	1	Diode
18	232-2107	1	Cover, Generator Fan
19	234-0362	1	Wrapper, End Bell
20	211-0187	1	Bell, End
21	HARNESS, WIRING		
	338-0642	1	1 Phase Sets
	338-0643	1	3 Phase Sets
22	516-0182	8	Pin, Roll - Generator Frame (1/4 x 3/4")
23	232-2321	1	Support, Generator
24	COMMUTATOR		
	203-0153	1	Key 1, 2, 4, 5
	203-0152	1	Key 3, 6, 7

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
25	204-0110	1	Collector Ring
26	800-0044	4	Screw (5/16-18 x 7-1/2"), Generator Through
27	353-0047	1	Resistor, Tapped
28	205-0090	1	Fan, Generator
29	515-0007	1	Key, Drive Hub
30	853-0008	8	Washer, Shakeproof - Brush Block Terminal
31	871-0010	8	Nut (10-32), Hex - Brush Block Terminal
32	526-0049	4	Washer (#10)
33	815-0341	4	Screw (10-32 x 1"), Brass - Brush Block Terminal
34	850-0045	4	Washer (5/16"), Lock
35	526-0115	4	Washer (5/16"), Flat
36	862-0015	4	Nut (5/16-18), Hex - Generator Through Screw
37	850-0055	1	Washer (7/16") - Fan Mounting
38	870-0203	1	Nut (7/16-20) - Fan Mounting
39	850-0040	4	Washer (1/4"), Lock - Fan Cover Mounting
40	812-0156	4	Screw (1/4-20 x 1-1/2"), Round Head - Fan Cover Mounting
41	800-0050	4	Screw (3/8-16 x 1-1/4") - Generator Adapter Mounting
42	850-0050	4	Washer (3/8"), Lock
43	800-0051	2	Screw (3/8-16 x 1-1/4") - Generator Support Mounting
44	850-0050	2	Washer (3/8"), Lock
45	526-0030	2	Washer (3/8"), Flat
46	812-0118	1	Screw, Round Head - Resistor Mounting
47	850-0030	1	Washer (#10), Lock
48	860-0011	1	Nut (10-24)

* - Order by description, giving complete Model, Spec and Serial Number from nameplate.
£ - Contained in the Brush Block Assembly.



GENERATOR GROUP — SPEC A THROUGH C

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1		1	Rotor Assembly, Wound
2	232-2108	1	Hub, Drive
3	515-0006	1	Key, Rotor to Crankshaft
4	510-0047	1	Bearing (Ball), Rotor
5	232-0596	1	Clip, Bearing Stop
6	520-0733	1	Stud, Rotor Through
7		1	Stator Assembly, Wound
8	LEAD ASSEMBLY, BRUSH		
	336-1891	4	Blade Type Terminals (9")
	336-1890	1	Blade Type and Round Type Terminal (4")
9	336-0186	2	Ground Jumper (3-1/2")
10	BLOCK ASSEMBLY, BRUSH (Includes Parts Marked £)		
	212-0345	1	Right
	212-0346	1	Upper
	212-0352	1	Lower
	212-0353	1	Left
11	231-0150	1	Adapter, Generator to Engine
13	214-0095	4	£Brush, Commutator
14	214-0096	8	£Brush, Collector Ring
15	212-1232	12	£Spring, Brush
16	312-0017	2	Condenser (.5 Mfd.) DC

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
17	312-0058	3	Condenser (.1 Mfd.) AC
18	232-2107	1	Cover, Generator Fan
19	234-0362	1	Wrapper, End Bell
20	211-0187	1	Bell, End
21	520-0730	4	Stud, Generator Through
22	516-0182	8	Pin (Roll), Generator Frame - 1/4 x 3/4"
23	232-2109	1	Support, Generator
24	203-0151	1	Commutator
25	204-0107	1	Collector Ring
26	520-0737	4	Stud, Generator Adapter Mounting (3/8 x 2")
27	104-0091	4	Nut, Generator Adapter Mounting (3/8)
28	205-0090	1	Fan, Generator
29	515-0007	1	Key, Drive Hub
30	867-0004	1	Nut, Hex (7/16-20)
31	850-0055	1	Washer, Lock (7/16)
32	862-0015	8	Nut, Hex (5/16-18) - Generator Through Stud
33	850-0045	4	Washer, Lock (5/16)
34	526-0115	4	Washer, Flat (5/16)

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
35	812-0156	4	Screw (1/4-20 x 1-1/2") - Cover Mounting
36	850-0040	4	Washer, Lock (1/4)
37	HARNESS ASSEMBLY, WIRING		
	338-0592	1	1 Phase Sets
	338-0591	1	3 Phase Sets
38	813-0104	12	Screw (10-32 x 7/8"), Round Head - Brush Block Mounting

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
39	850-0030	12	Washer (#10), Lock

- * - Order by description, giving complete Model and Serial Number (Onan Nameplate).
- £ - Included in Brush Block Assembly.

SERVICE KITS AND MISCELLANEOUS

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

<u>REF. NO.</u>	<u>PART NO.</u>	<u>QTY. USED</u>	<u>PART DESCRIPTION</u>
	98-1100	1	Decal Kit
	168-0115	1	Gasket Kit, Carbon Removal
	168-0113	1	Gasket Kit, Complete Engine
	160-0836	1	Ignition Tune-up Kit
	522-0256	1	Overhaul Kit, Engine
	TOUCH-UP PAINT (Pressurized Can)		
	525-0137	1	Metallic Green (16 oz.)
	525-0305	1	Non-Metallic Green (13 oz.)

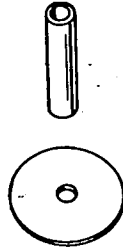
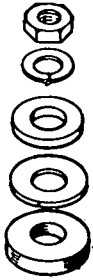
SPECIAL PARTS SECTION

FOR

CONTRACTOR MODELS

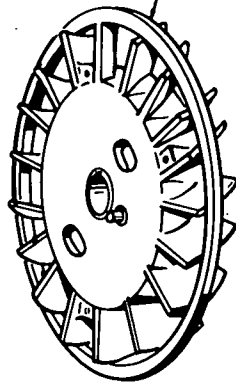
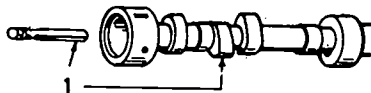
Parts not listed in this section, refer to the standard parts groups. **Exception:** Overhaul Kits do not apply.

GEAR COVER AND OIL BASE GROUP

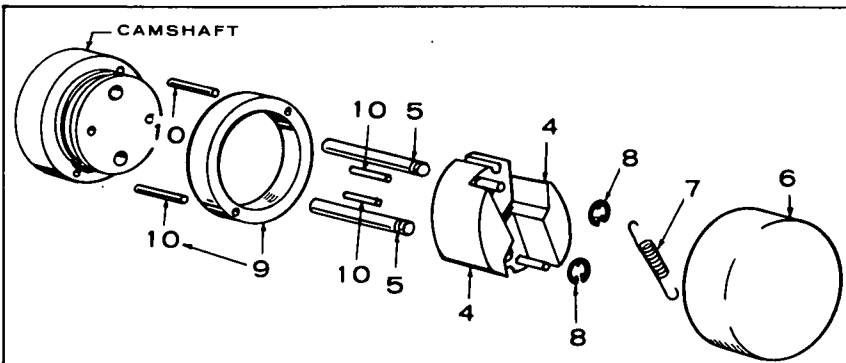


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	402-0379	4	Hardware Package, Mounting (Excludes Mounting Bolt)

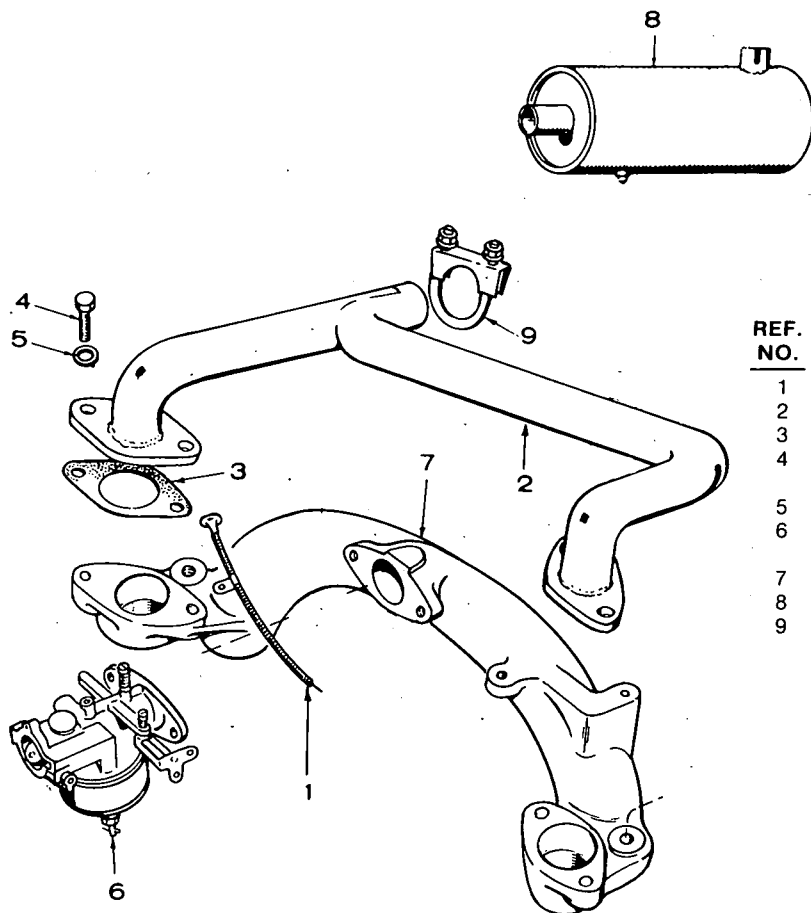
CRANKSHAFT, FLYWHEEL, CAMSHAFT AND PISTON GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	105-0317	1	Camshaft (Includes Center Pin and Spark Advance Mechanism Pins)
2	526-0017	1	Washer, Wheel Mounting
3	160-1080	1	Flywheel
4	160-1049	2	Weight Assembly, Timing Control - Includes Pins
5	516-0172	2	Pin, Groove (1-1/16") - Timing Control
6	110-1283	1	Cover, Timing Control
7	160-1051	1	Spring, Timing Control
8	518-0129	2	Ring, Timing Control Retainer
9	160-0791	1	Cam, Timing Control
10	516-0144	4	Pin, Roll (7/16") Cam- shaft and Timing Control Cam

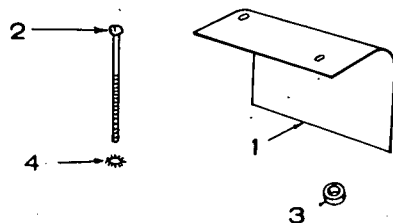


FUEL SYSTEM AND EXHAUST GROUP



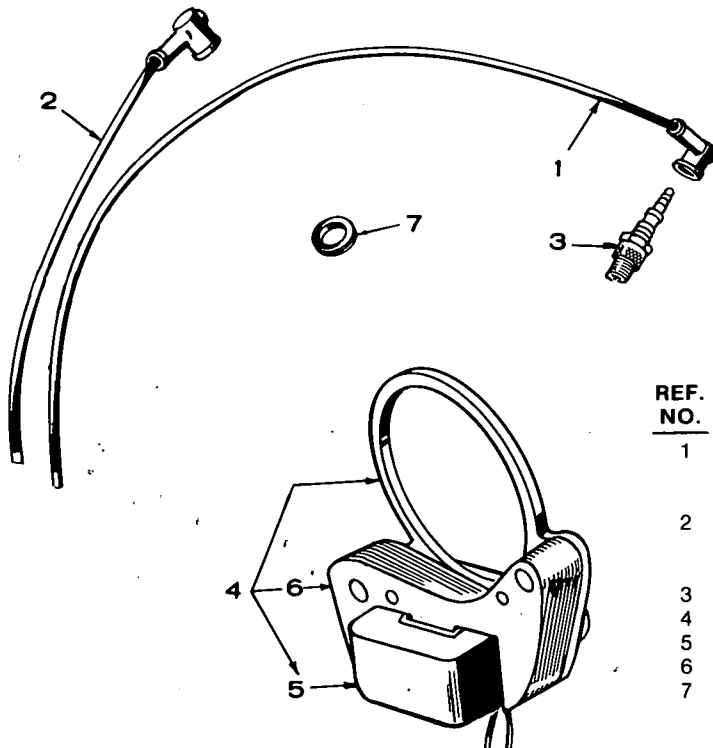
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	149-1024	1	Rod, Fuel Pump Primer
2	154-1401	1	Manifold, Exhaust
3	154-1383	2	Gasket, Exhaust Manifold
4	800-0028	4	Screw (5/16-18 x 1") - Exhaust Manifold Mtg.
5	850-0045	4	Washer, Lock (5/16")
6	141-0808	1	Carburetor (See Separate Group for Breakdown)
7	154-1385	1	Manifold, Intake
8	155-1173	1	Muffler, Exhaust
9	155-1135	1	Clamp, Exhaust Tube

VACUUM SPEED BOOSTER GROUP



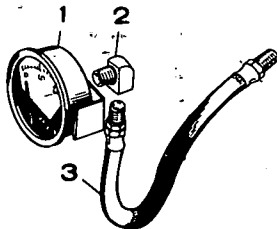
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	150-1071	1	Shield, Heat
2	813-0111	2	Screw (10-32 x 2-1/4") - Booster Mounting
3	526-0196	2	Washer, Spacer - Heat Shield Mounting
4	853-0008	2	Washer (#10), Shakeproof ET

IGNITION GROUP



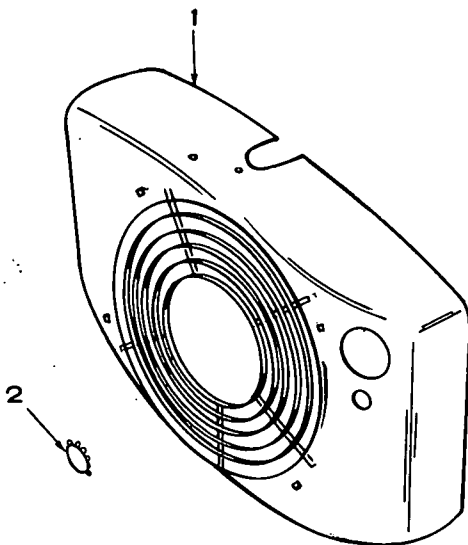
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	CABLE, SPARK PLUG - R.H. (21")		
	167-1548	1	Spec A through C
	167-1568	1	Begin Spec D
2	CABLE, SPARK PLUG - L.H. (19")		
	167-1463	1	Spec A through C
	167-1559	1	Begin Spec D
3	167-0241	2	Plug, Spark
4	160-1121	1	Stator Assembly, Magneto
5	160-1124	1	Coil, Magneto Stator
6	160-1118	1	Pole Shoe, Magneto Stator
7	508-0095	2	Grommet, Spark Plug Cables

OIL SYSTEM GROUP



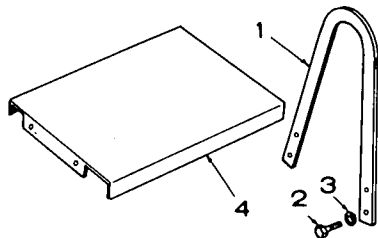
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	GAUGE, OIL PRESSURE		
	193-0005	1	Spec A through C
	193-0068	1	Begin Spec D
2	502-0005	1	Elbow, Oil Line to Gauge
3	501-0003	1	Line, Oil

HOUSING AND GOVERNOR GROUP



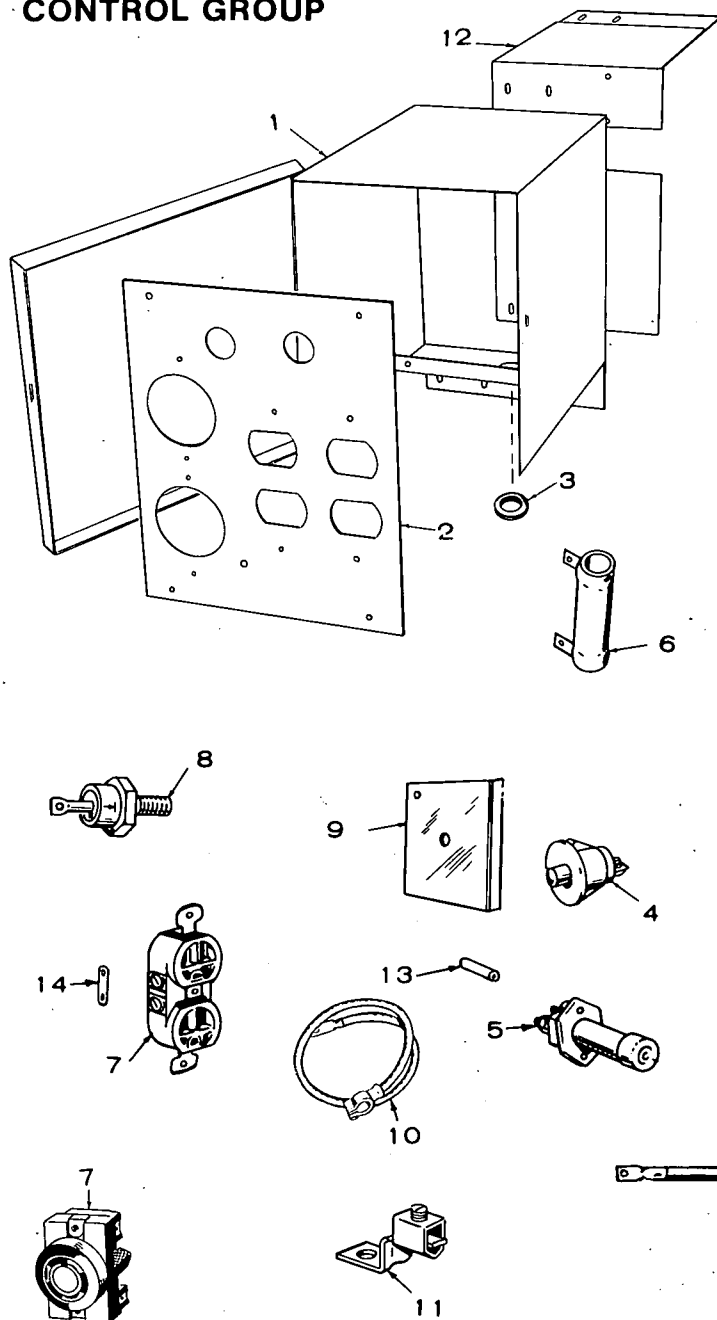
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	134-1988	1	Housing, Blower
2	517-0021	1	Button, Dot

GENERATOR GROUP



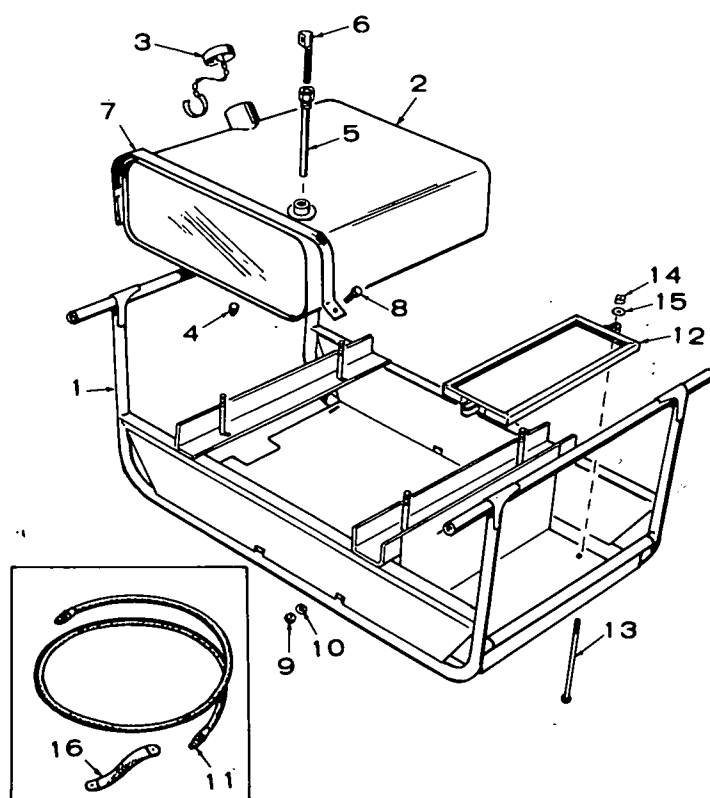
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	403-0934	1	Bracket, Lifting
2	800-0029	4	Screw (5/16-18 x 1-1/8") - Lifting Bracket Mounting
3	850-0045	4	Washer, Lock (5/16")
4	232-2207	1	Cover, Generator Stator

CONTROL GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	BOX, CONTROL		
	301-3336	1	Spec A through C
	301-3576	1	Begin Spec D
2	PANEL, CONTROL BOX		
	301-3337	1	Spec A through C
	301-3577	1	Begin Spec D
3	GROMMET, CONTROL BOX		
	508-0001	1	For 1-1/16" Hole - Spec A through C
	508-0002	1	For 1/2" Hole
	508-0008	1	For 13/16" Hole
4	313-0018	1	Switch, Stop
5	308-0028	1	Switch, Start
6	304-0046	1	Resistor (10-Ohm, 50 Watt)
7	RECEPTACLE, DUPLEX		
	323-0184	1	120 Volt
	323-0011	1	240 Volt
8	305-0235	1	Rectifier
9	BRACKET, RECTIFIER		
	305-0256	1	Spec A through C
	305-0254	1	Begin Spec D
10	416-0014	2	Cable, Battery (15")
11	TERMINAL, GROUND		
	332-0517	1	Spec A through C
	332-0142	1	Begin Spec D
12	301-3585	1	Bracket, Control Box Mtg. - Begin Spec D
13	301-3585	1	Spacer, Switch Mounting - Begin Spec D
14	306-0003	2	Jumper
15	416-0021	1	Cable (21"), Battery
16	416-0657	1	Cable (7-1/2"), Battery - B+ Start Solenoid

CARRYING FRAME AND FUEL TANK GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	403-0930	1	Frame, Carrying
2	159-0690	1	Tank, Fuel (7.35 Gal.)
3	159-0020	1	Cap, Tank
4	505-0008	1	Plug, Pipe (1/8)
5	159-0695	1	Tube and Bushing
6	149-0773	1	Strainer & Elbow Assembly
7	159-0692	2	Band, Tank Mounting
8	800-0009	2	Screw (1/4-20 x 1-1/2") - Tank Mounting
9	862-0001	2	Nut, Hex (1/4-20) - Tank Mounting
10	850-0040	2	Washer, Lock (1/4)
11	501-0122	1	Line, Fuel - Tank to Pump
12	416-0612	1	Frame, Battery Hold-down
13	816-0123	2	Bolt (5/16-18 x 9") - Battery Hold-down (Includes Nut)
14	865-0007	2	Nut (5/16-18), Wing
15	526-0041	2	Washer (5/16) - Battery Hold-down
16	337-0056	1	Strap, Bond - Grounding

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.

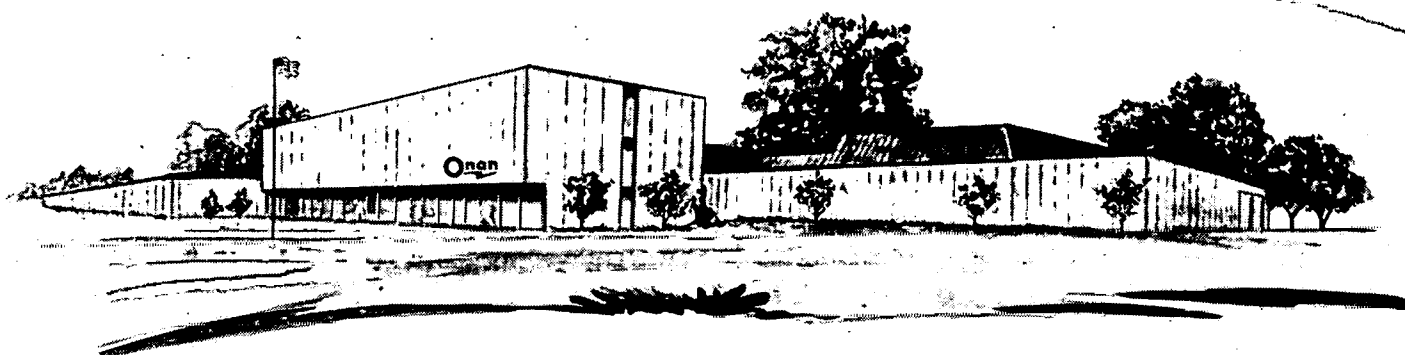
INSTALLATION

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
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