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OPERATORS MANUAL AND PARTS CATALOG



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ONAN

2515 UNIVERSITY AVE. S.E. • MINNEAPOLIS, MINN. 55414

A DIVISION OF STUDEBAKER CORPORATION

IN CANADA: ONAN GENERATORS CANADA LTD., P.O. BOX 652, GUELPH, ONTARIO

TABLE OF CONTENTS

TITLE	PAGE
Installation	7
Operation	13
Adjustments	17
Maintenance	20
Trouble Shooting	22
Parts Catalog	25

ONAN ELECTRIC GENERATING PLANTS MCCK SERIES

927-350

5AC68

PERFORMANCE CERTIFIED

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

ONAN 2515 UNIVERSITY AVE. S.E. • MINNEAPOLIS, MINN. 55414
A DIVISION OF STUDEBAKER CORPORATION

IMPORTANT...RETURN WARRANTY CARD ATTACHED TO UNIT

GENERAL INFORMATION

THIS OPERATOR'S MANUAL PROVIDES INFORMATION FOR PROPER INSTALLATION, OPERATION, AND MAINTENANCE PROCEDURES OF YOUR ONAN UNIT. AN APPLICABLE WIRING DIAGRAM WAS ALSO INCLUDED AT TIME OF SHIPMENT. RETAIN FOR FUTURE REFERENCE!

WE SUGGEST THIS MATERIAL BE KEPT HANDY SO THAT IT CAN BE READILY REFERRED TO WHEN NECESSARY, EITHER FOR ORDERING PARTS OR MAKING EQUIPMENT ADJUSTMENTS.

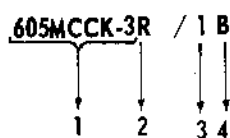
FOR MAJOR REPAIR INFORMATION A SERVICE MANUAL IS AVAILABLE. IF A MAJOR SERVICE MANUAL, ADDITIONAL OPERATORS MANUAL, AND/OR WIRING DIAGRAM IS REQUIRED, CONTACT YOUR NEAREST ONAN DISTRIBUTOR. THERE WILL BE A CHARGE FOR THIS MATERIAL.

BE SURE TO INCLUDE COMPLETE ONAN MODEL, SPEC., AND SERIAL NUMBER AS SHOWN ON ONAN NAMEPLATE ATTACHED TO UNIT. THIS IS ESSENTIAL IN FURNISHING YOU WITH THE PROPER INFORMATION.

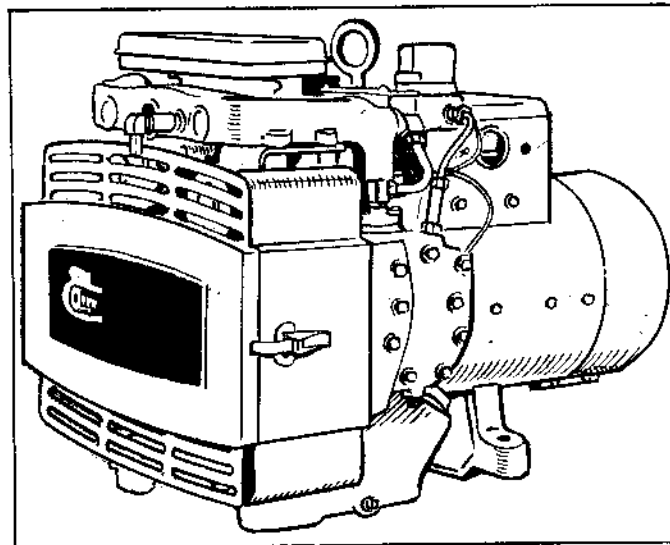
INTRODUCTION

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

How to interpret MODEL and SPEC. NO.



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



TYPICAL MODEL MCCK

MANUFACTURER'S WARRANTY

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

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

This warranty shall not apply to any of the Manufacturer's products which must be replaced because of normal wear, which have been subject to misuse, negligence or accident or which shall have been repaired or altered outside of the Manufacturer's factory unless authorized by the Manufacturer. Manufacturer shall not be liable for loss, damage or expense directly or indirectly from the use of its product or from any cause.

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

DATED AUGUST 1, 1963

SPECIFICATIONS

	Model Series	
	4MCCK	605MCCK
Nominal dimension of plant (inches)		
Height	24	24
Width	22	22
Length	30	33
Number cylinders	2	2
Displacement (cubic inch)	49.8	49.8
Cylinder bore (inches)	3-1/4	3-1/4
Piston stroke (inches)	3	3
Oil capacity	4 qts	4 qts
RPM (for 60-cycle)	1800	1800
RPM (for 50-cycle)	1500	1500
Compression ratio	7: 1	7: 1
B.H.P (1800 rpm)	13.0	13.0
Battery voltage	12 V	12 V
Battery size		
SAE group 1H	two, in series	two, in series
Amp/hr. SAE rating, 20-hr. (nominal)	105	105
Battery charge rate, amperes	2-3 low	2-3 low
	5-8 high	5-8 high
Ventilation required (cfm 1800 rpm)		
Generator	75	75
Combustion	32	32
Output rated at unity power factor load	1-phase	1-phase
Rating (output in watts)		
50-cycle AC, intermittent service	3500	5500
50-cycle AC, continuous service	3500	5000
60-cycle AC, intermittent service	4000	6500
60-cycle AC, continuous service	4000	6500
AC voltage regulation in \pm %	3	3
AC frequency regulation in %	5	5
Revolving armature-type generator	Yes	Yes
120/240- volt single phase model, reconnectible	Yes	Yes
Rotating - type exciter	Yes	Yes

OPTIONAL EQUIPMENT

1. REMOTE START-STOP SWITCH

SPDT, momentary contact, center-off type.

2. SWITCHBOARD

Instruments to read ac amperes, and ac volts, and to break overloaded ac circuit. Desirable information for operator. For wall mounting.

3. INSTRUMENT PANEL

Part of plant control box assembly. Instruments to read ac amperes and ac volts, and to break overloaded ac circuit. Desirable information for operator. Plants with instrument panel have no room for optional ac receptacles.

4. AC RECEPTACLES

Convenience for plugging in ac loads. Plants with ac receptacles have no room for optional instrument panel.

5. AUTOMATIC DEMAND CONTROL

Starts and stops plant automatically.

6. CONTROL-O-MATIC

A ③-function automatic control which automatically starts and stops plant; supplies current on demand and automatically runs bilge blower.

7. LOAD TRANSFER CONTROL

Controls running of plant and transfers load.

8. HEAT EXCHANGER COOLING

Closed system using fresh water in plant.

9. LOAD TRANSFER SWITCH

Three-pole, three-position to select generator or shore power.

10. AQUA LIFT MUFFLER

High-efficiency silencer for plants which discharge cooling water into exhaust. Suitable for above or below water-line installation.

11. SEPARATE FUEL TANK

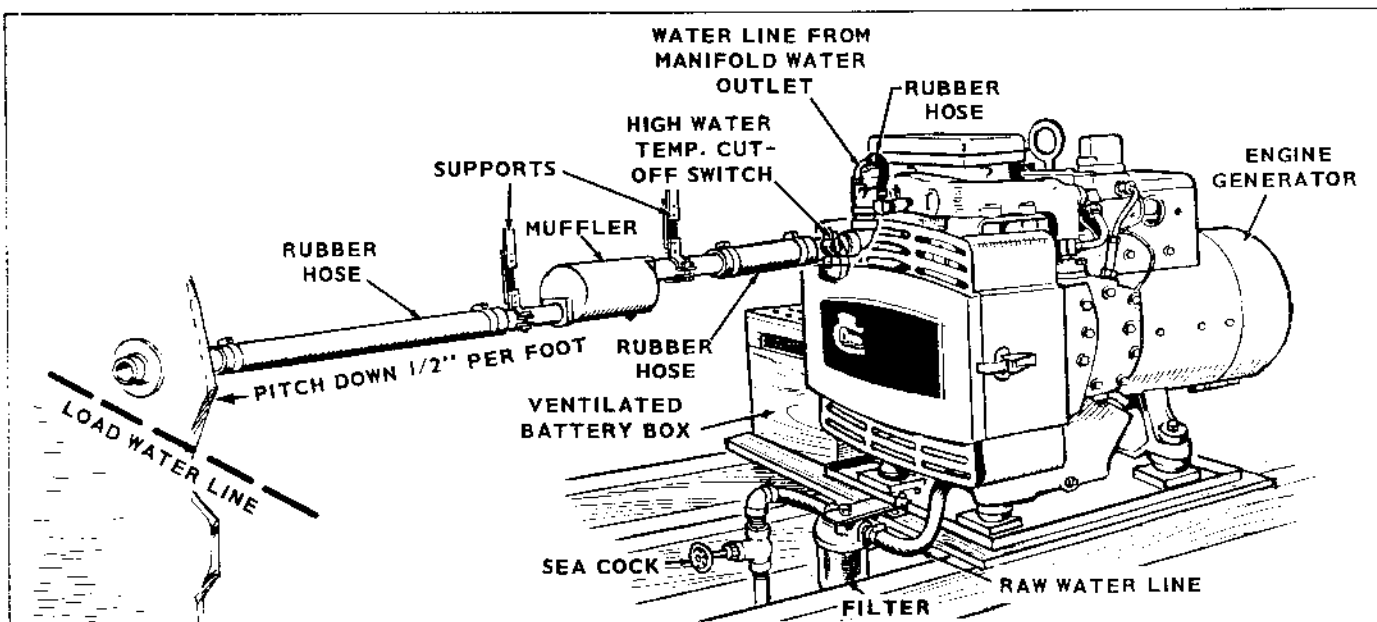
Various sizes.

12. EXHAUST LINE TEMPERATURE SWITCH

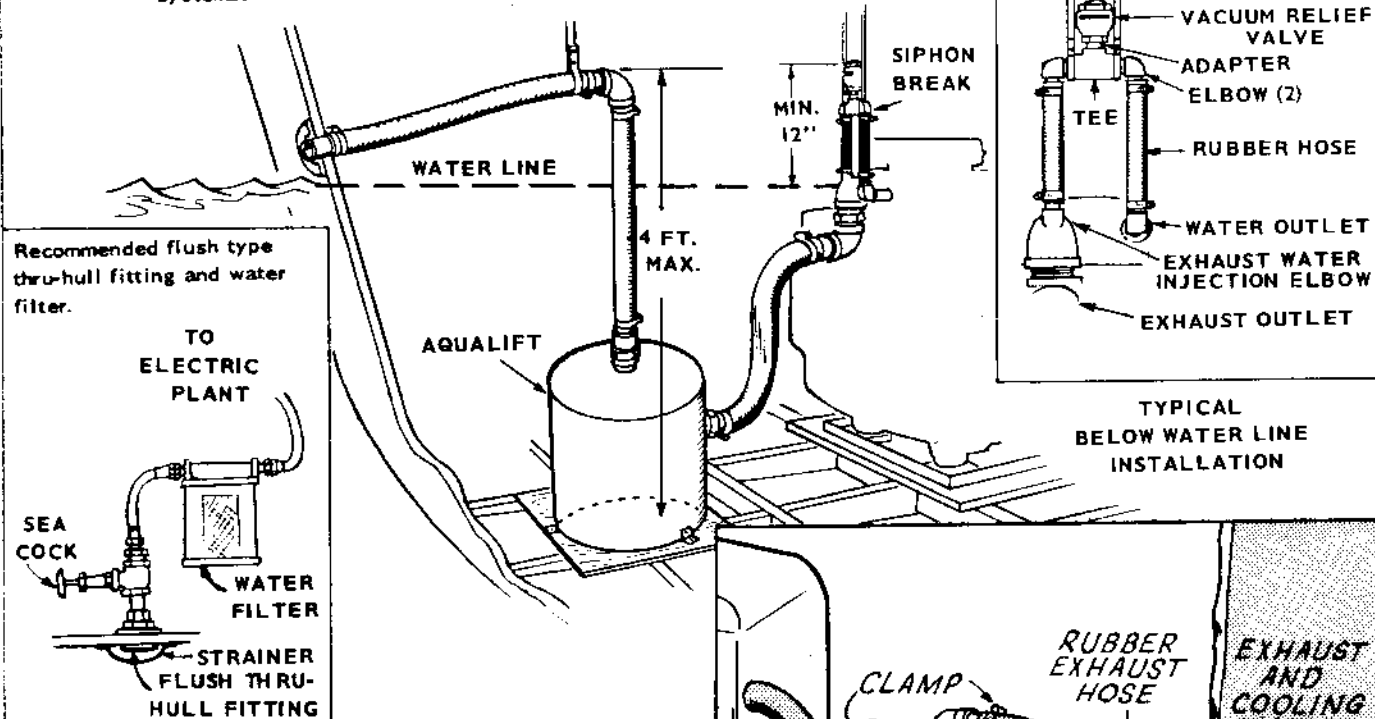
Shuts down plant if water flow fails.

13. OTHER

See your dealer.



WARNING: Do not use scoop type water inlet fittings on electric plants using Aqualift muffler systems.



CAUTION!

WARNING: Install Siphon Break Kit #155K950 if exhaust injection elbow is below load water line. Locate the Siphon Break at least 12" above load water line and in a vertical position. Remote mounting the siphon break is permissible within a 5' radius of water injection exhaust elbow. Vertical position and height of valve must be maintained.

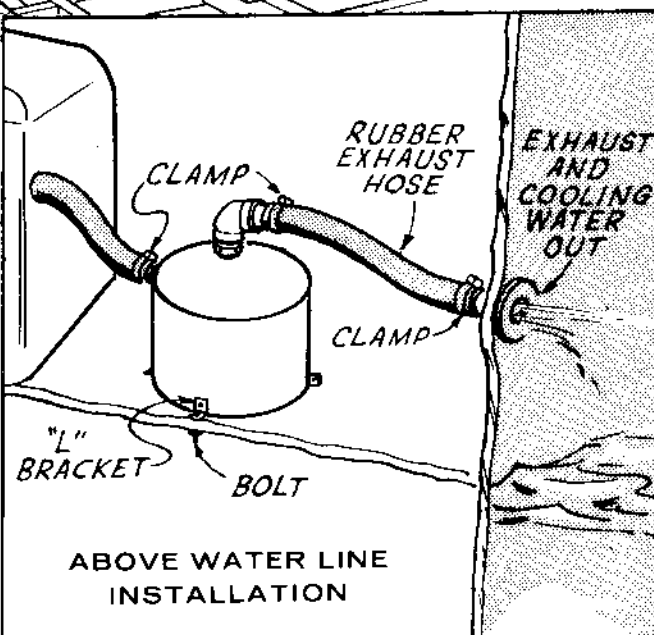


Figure 1. Typical Installation

INSTALLATION

GENERAL

Proper installation is very important. Give attention to the following points: Adequate generator cooling air, discharge of circulated air, adequate fresh air, adequate engine cooling water, discharge of circulated water, discharge of exhaust gases, electrical connections, fuel connection, sturdy and flat floor and accessibility for operation and service. Use this manual as a guide to help with the installation. Refer to Typical Installation, Figures 1 and 2. For more complete instructions, request Onan Technical Bulletin T-021.

Installations must be considered individually, and executed in compliance with all regulations which may affect the installation. The advice and guidance contained in the booklet, *Fire Protection Standard for Motor Craft*: (NFPA No.302) offered by the National Fire Protection Association International, Boston 10, Massachusetts, will be helpful to the installer of equipment in vessels.

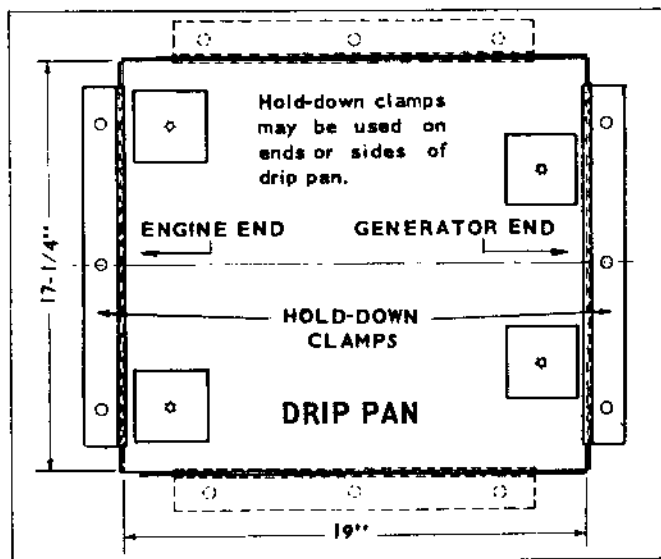


Figure 2. Mounting Dimensions

LOCATION

Select a dry, properly-ventilated location for the plant, preferably near the main keel, above low-lying vapors and free from splash from the bilge. Provide accessibility for minor servicing operations, draining of the crankcase lubricating oil and the cooling system.

MOUNTING

The floor should be flat, and give support directly under the plant mounting points.

A 2-1/2" clearance around the unit is required to permit it to rock on its mounts without restraint. Use flexible exhaust line, fuel line, battery cables, and electrical wires.

To install cone-type mounting cushions (Fig.3), position the plant on the drip pan and place the cushions under the oil base and generator support. Always use cushions with highest part number (part number is shown on the cushion) on the generator end. Secure the plant to the drip pan with the associated hardware (Fig.3). Add thin flat washers to maintain approximately 1/16" clearance between snubber washer and flat washer. Cushion deflection under load should be approximately 3/16".

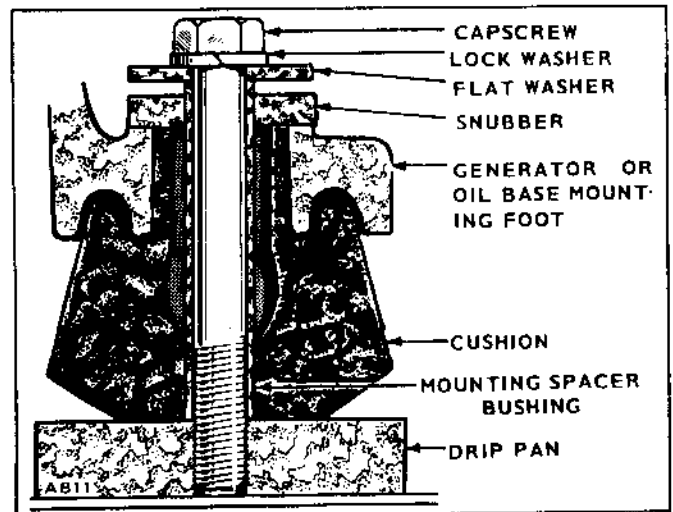


Figure 3. Cone-Type Mounting Cushion

Install two hold-down clamps to the drip pan (front and rear or both sides). Secure the clamps to the mounting base.

FUEL TANK AND LINES

If a separate fuel tank is used, install it so the bottom of the tank will be less than 4 feet below the fuel pump. To prevent siphoning if a system leak occurs, position the tank below the level of the engine pump, or use a siphon break system.

If a fuel tank is shared, do not connect to an existing line at a point above the fuel supply level. This avoids starving the plant (See Fig.4 and 5).

If vertical fuel lift exceeds 4 feet, or vapor lock occurs, install an auxiliary electric fuel pump near the fuel supply.

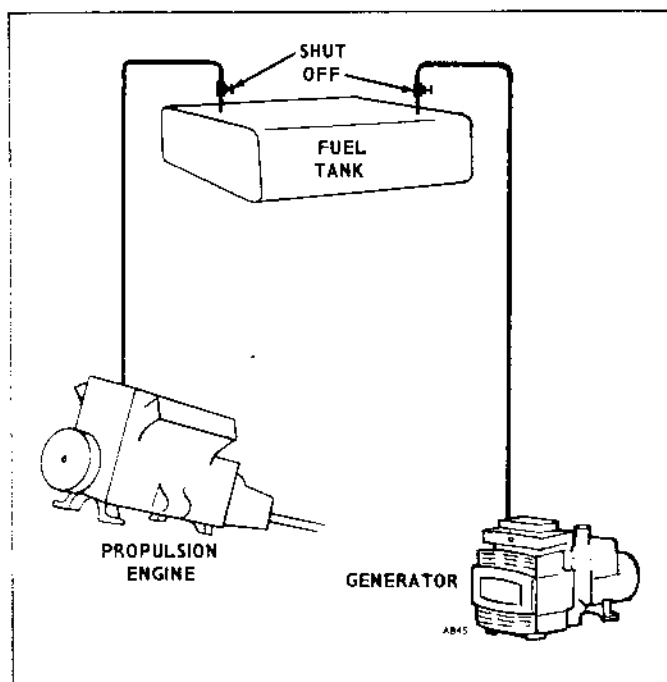


Figure 4. Fuel System

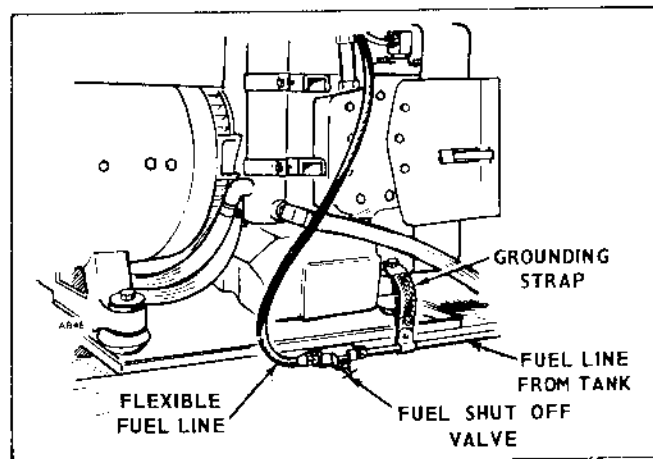


Figure 6. Fuel Shut-Off Valve

VENTILATION

Generating plants require fresh air for combustion and generator cooling. Onan recommends that the ventilation system be able to deliver 1-1/2 to 2 times the air required by the plant. When the ventilation system depends on wind or boat motion, use powered exhausters to provide ventilation when the boat is not in motion. For more information, refer to Onan Technical Bulletin T-021.

EXHAUST

See Installation, Fig.1 and 2. The engine exhaust connection is 1", pipe-tapped. Pipe exhaust gases outside of the hull - *exhaust gases are deadly poisonous!*

Install a separate exhaust line as follows:

1. Above vessel load water line.
2. Pitched downward to prevent water backflow.
3. Shield line near combustible material.
4. Use flexible hose or tubing (see Fig.1 and 2).
5. For turns, use sweeping (long radius) elbows.
6. Increase one pipe size for every 10' increase in pipe length.

Provide a tee for water line connection for wet exhaust (Fig.7). Refer to Water Discharge Line. Raise the dry portion of the exhaust line high enough to prevent water back-flowing into the engine. Onan recommends using the Aqua Lift muffler for maximum silencing efficiency and ease of installation.

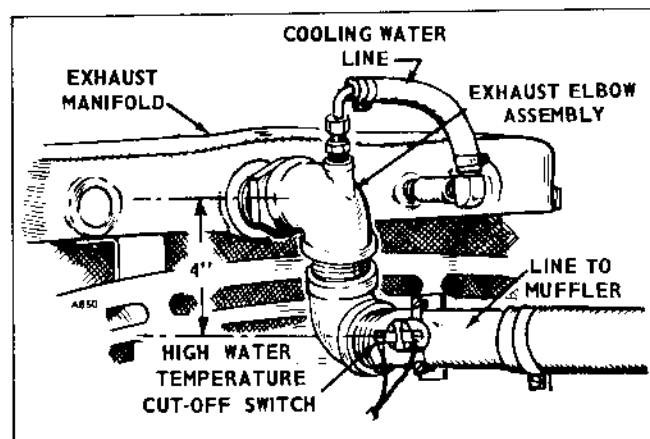


Figure 7. Water Outlet Connections

Use an approved flexible rubber fuel line next to the engine. Install the fuel supply line from near the bottom of the supply tank to the 1/8" pipe-tapped inlet of the fuel pump (see Fig.6).

A shut-off valve at the tank and near the plant is recommended for service convenience (Fig.6).

OIL DRAIN

The oil drain may be extended to suit the installation. The oil base has a 1/2" pipe-tapped hole.

The recommended Neoprene muffler (silencer) is an *Elasto-Muffler* brand, size *mark 0*, and two bushings, size AB (fits 1-5/8" O.D.). A cast iron or stainless-steel muffler is also available. Provide a recommended (or equal) silencer and install it near the end of the wet exhaust line.

Caution: Dry exhaust will damage the neoprene silencer.

WATER SUPPLY LINE

A continuous supply of cooling water is required. The water pump inlet is a hose fitting for 1/2" I.D. hose (see Fig. 8). Use a section of non-collapsible hose near the plant (or for the entire run) to absorb vibrations. The inside diameter of the plumbing must be at least 1/2". Use Permatex or other pipe sealer on all pipe fittings in supply line to pump. Normally, the pump should deliver 3.5 gallons of cooling water per minute. Measure the discharged water flow after thermostat opens, to be sure the supply line is large enough. Reduce resistance on pipe runs longer than 5' by using larger inside diameter plumbing. To prove suction line is airtight, see that no bubbles appear in discharged water. An air leak reduces lubrication and shortens pump impeller life. Install a strainer in the water suction line inlet where it is accessible for cleaning.

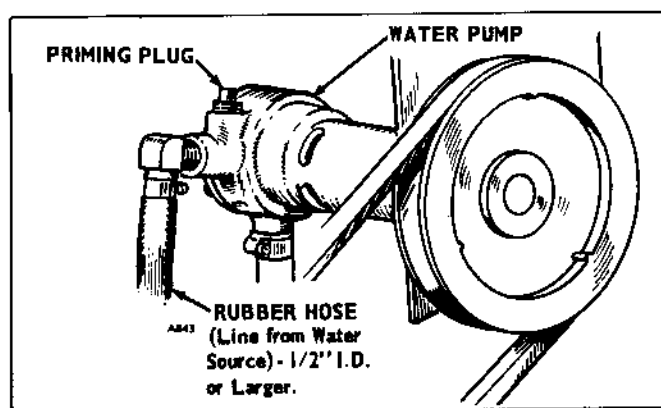


Figure 8. Water Pump Inlet Hose

WATER DISCHARGE LINE

The 1/2" I.D. water outlet hose fitting is on the exhaust manifold next to the exhaust outlet (see Fig. 7).

Use plumbing at least as large as the supply line. Use a section of hose near the plant or the entire run. Connect the line to discharge the heated water into the exhaust line several feet ahead of the Aqualift or neoprene silencer. Make sure water cannot back flow into the exhaust line. See Optional Heat Exchanger Cooling.

HEAT EXCHANGER COOLING (Optional)

Closed-type cooling systems are commonly referred to as fresh water cooling or heat exchanger cooling. Water circulated through the engine is called *fresh water*, *hot water*, etc. Water circulated through the heat exchanger only is called *raw water*, *sea water*, *cold water*, *discharged water*, etc. This system with an antifreeze coolant is recommended where freezing conditions exist, or

where the owner wants to prevent the possibility of salt water problems.

Caution: Do not use the existing neoprene impeller water pump in the hot water side of the cooling system. Heat or soluble oil (in many rust inhibitors and anti-freeze s) will damage the impeller. Instead, connect the neoprene impeller pump on the cold water side. Use a metal impeller, centrifugal-type water pump (Oberdorfer 1-GP, or equal) in the fresh water side. Drive it with a belt from the plant power take-off (see Fig. 9).

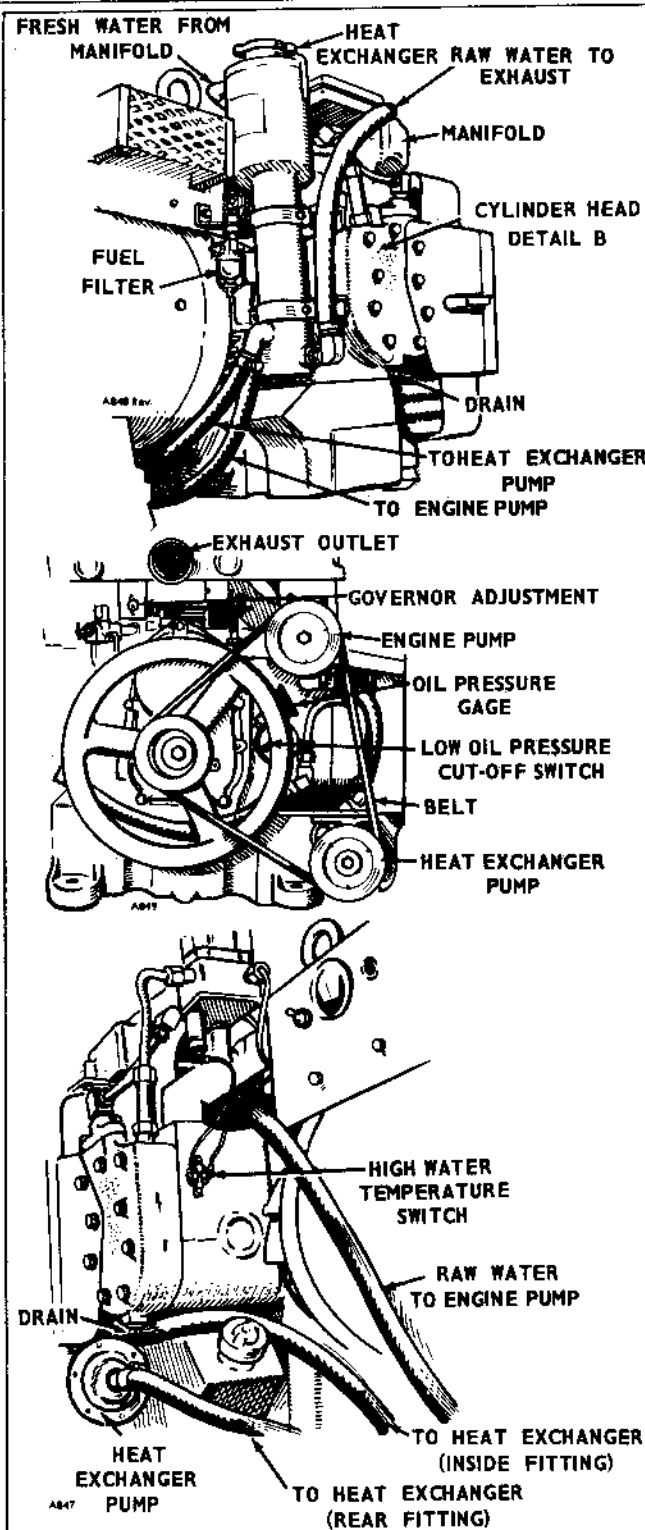


Figure 9. Cooling System Details

The discharged water leaves at the heat exchanger (Fig. 10). Supply line connections in both systems are the same. For general comments that apply in all cases, refer to the instructions for standard cooling systems in this section.

Fill the closed cooling system with clean, alkali-free water to the proper level in the expansion tank. Add an approved rust inhibitor to the coolant. If the plant will be operated in freezing temperatures, use the necessary proportion of anti-freeze, and test it periodically. Cooling system capacity (including heat exchanger) is 7 pints.

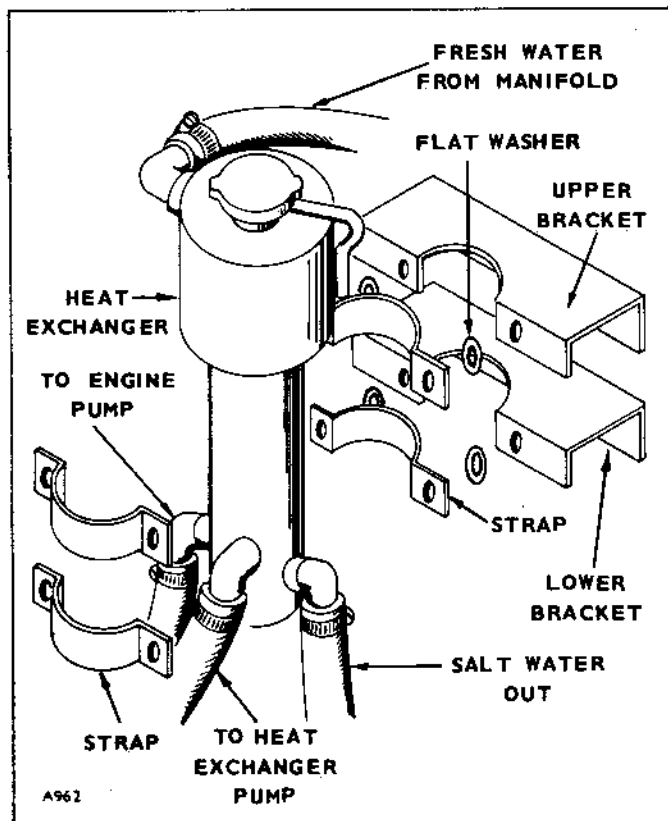


Figure 10. Heat Exchanger

BATTERY CONNECTION

Exciter Cranked Plant: Refer to the wiring diagram and Fig. 11. Plants are designed for negative (-) ground only.

Follow Onan battery recommendations. Use two 6-volt batteries connected in series for a 12-volt power source. See Fig. 11. Connect battery positive (+) terminal to the start solenoid located in the control box. Connect the negative (-) terminal to a good ground on the generator frame. Enter rear of control box to install battery cable.

Caution: Do not disconnect starting batteries while plant is running. The resulting over-voltage condition will damage electric choke and control components.

REMOTE START-STOP SWITCH (Optional)

For remote control of starting and stopping, use three wires to connect a remote switch (SPDT, momentary contact, center-off type) to the terminal block marked B+, 1, 2, 3 in the plant control box (Fig. 12). Use correct wire size according to switch distance from plant.

LOAD WIRE CONNECTIONS

The plant nameplate shows the electrical output rating of the plant in watts, volts, and cycles. The plant wiring diagram shows the electrical circuits and connections necessary for the available output voltage. Also see Figures 13 and 14.

Meet all applicable electrical code requirements. Work should be done by a qualified serviceman or electrician because the installation may be inspected for official approval. Plant control boxes have knockout sections to accommodate load wires. Use flexible conduit and stranded load wires near the plant to absorb vibration. Use sufficiently large insulated wires. Strip insulation from wire ends as necessary for clean connections. Connect each load wire to the proper generator output lead inside the plant box. Insulate bare ends of ungrounded wires. Use a bot (through the control box) to connect the grounded (\perp) generator lead and load wire. Install a fused main switch (or circuit breaker) between the generating plant and load.

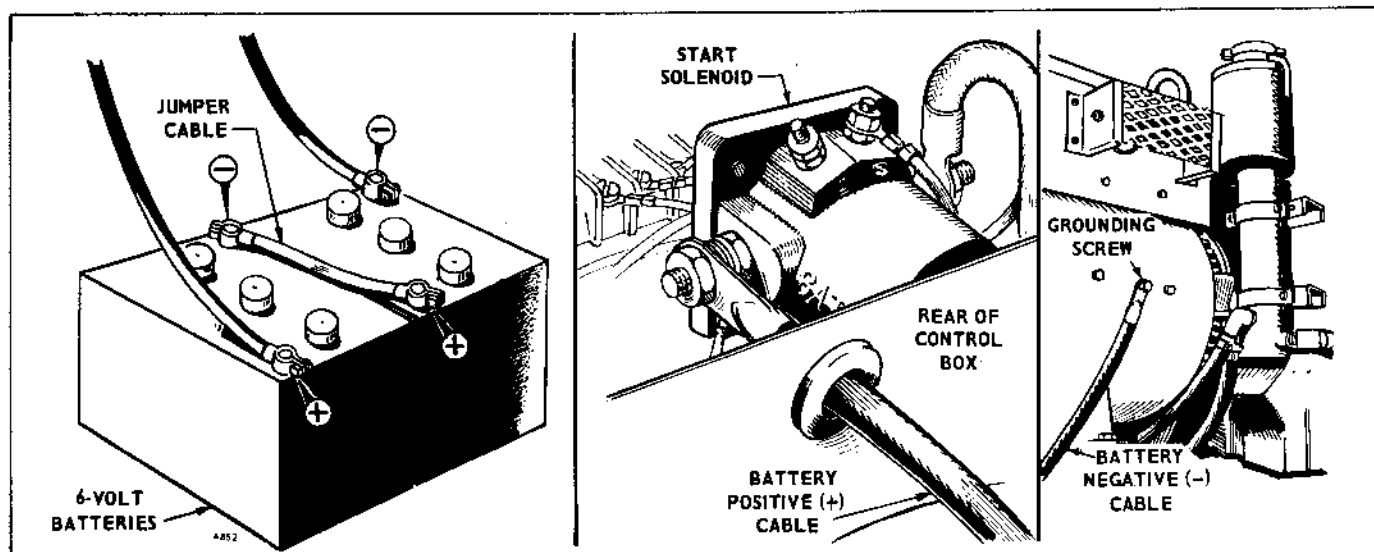


Figure 11. Battery Connections

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

Shore Power: If the installation connects to shore power, install a double-throw transfer switch (either manual or automatic type), such as *Onan* #308B204, to prevent feeding generator output into the shore power source lines and to 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. See Fig. 14.

Automatic Control: Use with negative ground electrical system only. If the electrical system is positive ground and cannot be converted, use a separate battery connected to negative ground for plant and control operation. Use a suitable grounding system for the entire vessel to prevent electrolytic action which may be caused by improper connections of mixed-polarity grounding systems.

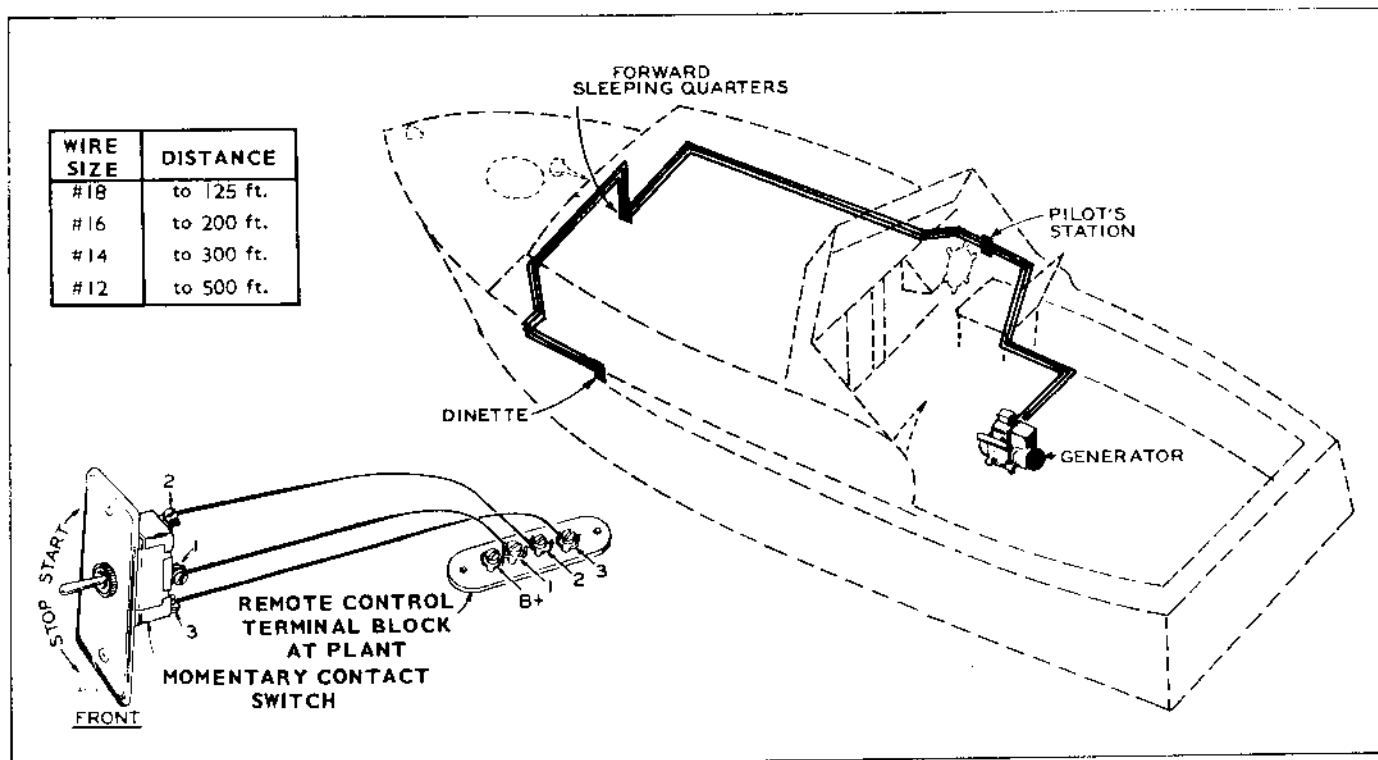


Figure 12. Remote Control Wiring

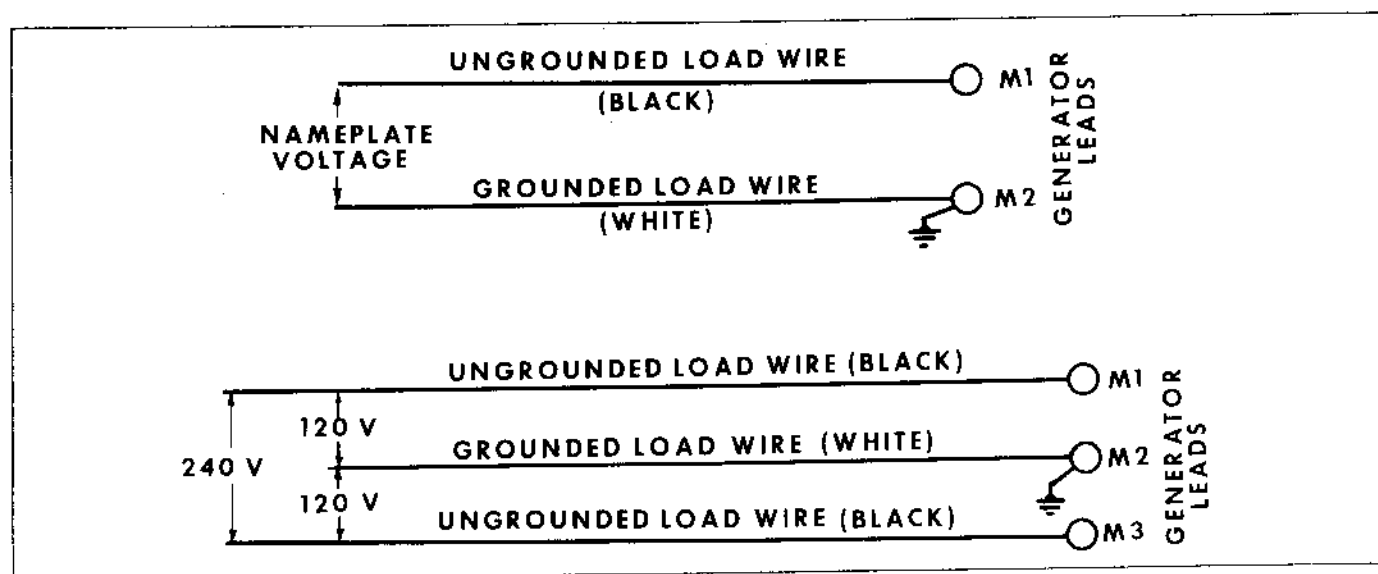


Figure 13. Load Wire Connections

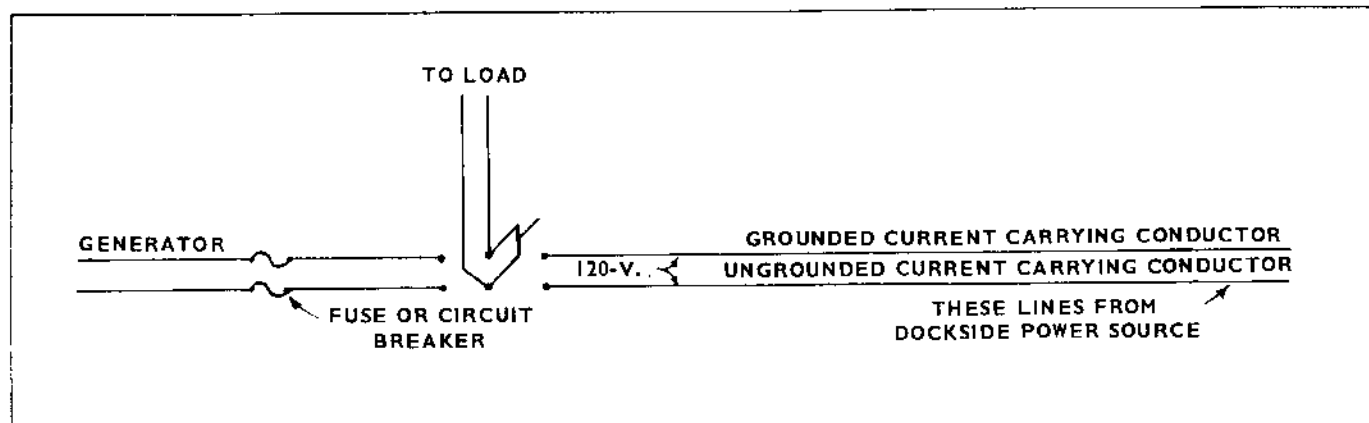


Figure 14. Shore Power Wiring Connections

OPERATION

INITIAL START

Check the engine to make sure it has been filled with oil and fuel. Fill cooling system and prime water pump (Fig.8). If engine fails to start at first attempt, inhibitor oil used at the factory may have fouled the spark plugs - remove, clean in gasoline, dry thoroughly and install. Heavy exhaust smoke when the engine is first started is normal, and is caused by the inhibitor oil.

NOTE: The Control-O-Matic will run the bilge blower for about 5 minutes before cranking the engine. The blower cycle may be eliminated; see Control-O-Matic section.

Crankcase Oil: Use a good-quality detergent oil that meets the API (American Petroleum Institute) service designations MS, MS/DG, or MS/DG. Recommended SAE oil numbers for expected ambient temperatures are as follows:

OIL CAPACITY - 4 QTS.

Above 90°F	SAE 50
30°F to 90°F	SAE 30
0°F to 30°F	SAE 10W

Do not use service DS oil. Do not mix brands or grades. Refer to Maintenance Section for recommended oil changes and complete lubricating oil recommendations.

Recommended Fuel: Use clean, fresh, regular grade automotive gasoline. *Do not* use highly leaded *premium* types. Never fill the tank when the engine is running. Leave some fuel expansion space. Open fuel line valve (when used).

The following shows the sequence of operation. This shows operation with manual control at the plant and automatic control, either at the plant or remotely located.

STARTING SEQUENCE

1. Operator pushes START button or plant is started by remote control.
2. Start solenoid energizes.
3. Battery current flows to
 - a) series field
 - b) STOP relay
 - c) electric choke
4. Ignition coil fires spark plugs when breaker points open.

5. Engine starts
6. Operator releases START button
7. Start disconnect relay energizes
8. Engine continues running.

STOPPING SEQUENCE

1. Operator pushes STOP button
2. Stop relay opens ignition circuit
3. Engine stops
4. Operator releases STOP button.

EMERGENCY SHUTDOWN

An emergency stop is caused by low oil pressure or high water temperature.

1. Low oil pressure switch closes, emergency relay energizes, opening ignition circuit.
2. High water temperature switch opens ignition circuit.
3. Engine stops.

NOTE: If shutdown is caused by high water temperature, plant will crank for about 90 seconds. If it does not start, it will stop cranking.

APPLYING LOAD

Allow plant to warm up before connecting a heavy load and keep the load within nameplate rating. Continuous generator overloading may cause high operating temperatures that can damage the windings.

BATTERY CHARGING

The battery charge rate is controlled by a charge regulator. This regulator is pre-set to allow the proper charge rate at operating speed. Do not attempt to change this setting.

This regulator is pre-set to allow the proper charge rate at operating speed. Do not attempt to change this setting.

SAFETY DEVICES

A high-water-temperature switch in the cooling system stops the plant if the engine overheats.

The engine has a *low-oil-pressure switch* which will stop the plant through an emergency relay in the control if oil pressure drops below a safe operating pressure. After an emergency stop, investigate and correct the cause.

The RESET button must be pressed before re-starting. A one minute time limit is necessary before the RESET button can be pressed after an emergency stop. If the plant is under automatic control, a re-start will be attempted automatically.

PLANT EXERCISE

Infrequent use results in hard starting. Operate plant one 30-minute period each week. Run longer if battery needs charging, or keep battery charged with a separate charger.

EMERGENCY OPERATION IF BATTERY FAILS

The remote-type revolving-armature plant needs a battery for electric choke, ignition and limiting exciter voltage. If the battery fails completely and the plant must be operated during an emergency, a battery can be shared with other equipment having an alternator. Do not disconnect the plant charging circuit, as damage will occur to the ignition relay from the increased voltage. Instead, consider disconnecting other equipment and using that battery.

BREAK-IN PROCEDURE

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

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

BREAK-IN PROCEDURE

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

Break-in, or ideal fitting of all internal moving metal parts can best be achieved by maintaining proper cooling and correct lubrication during the running-in period. *Break-in* can take as little as ten operating hours or it may take many hundreds of hours. Extended periods of very heavy engine loading (above rated horsepower or electrical output) during this initial service period can cause severe cylinder scoring or bearing galling. On the other hand, extended periods of very light loading during initial break-in may cause cylinder wall glazing and/or poor piston ring seating. Engine parts damage can also be caused by using the wrong type or viscosity of oil, and allowing the engine to run at too high a temperature during break-in.

All engines use more oil than normal during the first hours of operation. As internal moving parts are run-in by controlled operation, oil consumption should gradually decrease until the rate of consumption is stabilized. It is extremely rare that oil consumption drops to zero. All engines use some oil, even when in perfect condition and properly broken-in. Oil consumption varies according to engine design, engine (piston) speed, size of engine, type of oil, oil viscosity, length of operating periods,

operating temperatures, engine loading, etc. As engine operation is continued, clearances between moving parts increase slightly due to normal wear of piston rings, cylinder walls, valve guides, oil seals, etc. These clearances increase until oil consumption is excessive, and engine parts have to be replaced and/or refitted. This usually takes thousands of hours.

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

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

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

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

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

OUT-OF-SERVICE PROTECTION

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

1. Run plant until thoroughly warm.
2. Turn off fuel supply and run until plant stops.
3. Drain oil from oil base while still warm. Refill and attach a warning tag, stating oil viscosity used.
4. Remove each spark plug. Pour 1 oz. (two tablespoons) of rust inhibitor (or SAE #50 oil) into each cylinder. Crank engine slowly (by hand) several times. Install spark plugs.
5. Service flame arrester.
6. Clean governor linkage and protect by wrapping with a clean cloth.
7. Plug exhaust outlet to prevent entrance of moisture, dirt, bugs, etc.
8. Wipe generator brushes, slip rings, etc. DO NOT APPLY LUBRICANT OR PRESERVATIVE TO BRUSHES AND RINGS.
9. Wipe entire unit. Coat parts that can rust with a bright film of grease or oil.
10. Provide a suitable cover for the entire unit.
11. Drain cooling system if danger of freezing exists during storage.
12. If battery is used, disconnect and follow standard battery storage procedure. Do not allow batteries to become fully discharged.

HIGH TEMPERATURES

1. See that nothing obstructs air flow to and from the plant.
2. Keep cooling system clean. Maintain water level in closed system cooling.
3. Keep ignition timing properly adjusted.

LOW TEMPERATURES

1. Use correct SAE oil for temperature conditions. Change oil only when engine is warm. If an unexpected temperature drop causes an emergency, move the plant to a warm location until oil flows freely.
2. Use fresh regular grade (not premium) gasoline. Protect against moisture condensation. Below 0°F, adjust main jet for slightly richer fuel mixture.
3. Keep ignition system clean, properly adjusted, and the batteries in a well-charged condition.
4. Partially restrict cool air flow, but use care to avoid overheating.
5. Add good quality anti-freeze if danger of freezing exists.

DUST AND DIRT

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

HIGH ALTITUDE

For operation at altitudes of 2500 feet above sea level, close carburetor main jet adjustment slightly to maintain proper air-to-fuel ratio (refer to the *Adjustments Section*).

CONTROL -O-MATIC

Description

The Control-O-Matic is an automatic control which performs three functions. It is an engine-control, an automatic-demand control, and a bilge-blower control, all contained in one top-mounted control box. The front panel of this box holds a charge ammeter, an emergency relay and a 3-position toggle switch.

With the switch in the AUTO position, the Control-O-Matic will monitor the AC load circuit and:

1. sense a load on the AC line.
2. close the bilge blower circuit (when used), for approximately 5 minutes, depending on ambient temperature.
3. open the bilge blower circuit.
4. start the electric plant.
5. sense when all the load is removed.

6. stop the electric plant.

Operation

When the switch is in the RUN position, the bilge blower control goes through its control cycle before the electric plant cranks and starts. With the switch in AUTO position, the engine will crank and supply current on load demand after the bilge blower control cycles. When the load on the AC line is removed, the plant will stop. The plant stops when the switch is moved to the STOP position.

CONTROL-O-MATIC Operation (Optional)

A 3-position toggle switch controls plant operation. The operator may choose either of two running procedures.

1. Move switch to RUN position. The bilge blower control will go through its cycle, the engine will then crank and start.
2. Move switch to AUTO position. The engine will start when the load demand circuit senses a need for current. This occurs after the bilge blower starts and finishes its cycle. The plant will stop when there is no load on the AC line.
3. Move switch to STOP position. The plant stops. If stop circuit fails, close fuel valve.

The built-in emergency relay shuts down the plant for these conditions:

1. Engine fails to start. The engine will crank for approximately 90 seconds before the emergency relay shuts it down.
2. Low oil pressure
3. High water temperature. The engine will stop, start cranking again for about 90 seconds, then stop, and not attempt to restart.

To reset the emergency relay, remove the cause of the emergency, then push the red RESET button on the Control-O-Matic front panel.

The bilge blower may be connected to the Control-O-Matic in two ways, Fig. 15 shows the bilge blower connected to the Control-O-Matic. The blower operates from the electric plant cranking batteries. The B+ and BB terminals are labeled in the Control-O-Matic Box. With this circuit, the running current of the blower must not exceed 5 amperes. The user may add switches as shown to operate bilge blower without operating the electric plant

In the circuit shown in Fig. 16, an auxiliary relay is used so that the bilge blower can operate from a separate battery or power source. A larger blower may be

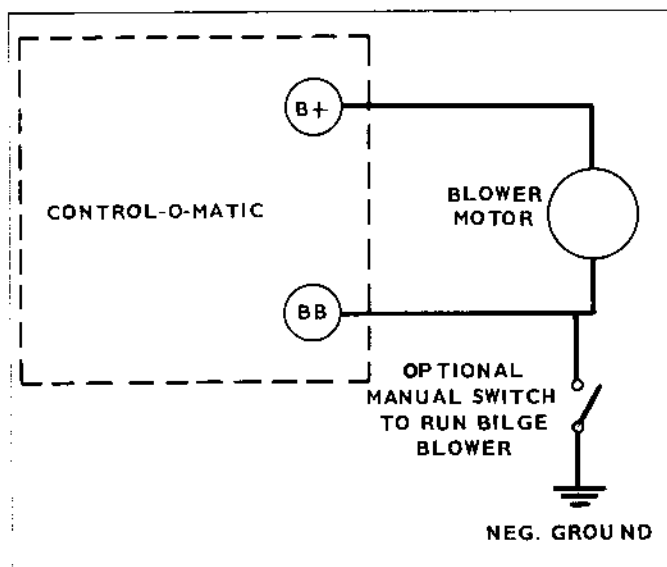


Figure 15. Bilge Blower Wiring Circuit

used, as long as the relay has a 12 volt DC coil and the relay contacts can safely carry the current needed by the blower.

The bilge blower circuit may be disabled so the plant can be started without delay. This requires changing one wire connection on the thermal delay relay, mounted on the inside bottom of the Control-O-Matic box. Fig. 17 shows this relay actual size. Take care with the following step, as the terminal posts can easily be broken. Lift the clip from the rear terminal post of terminal 1 and place it on the rear post of terminal 3. With the front-mounted toggle switch in the "AUTO" position, the plant will respond immediately when the automatic demand control senses a load. The bilge blower will run.

The Control-O-Matic should not need attention, but if it does not function properly, see the Trouble-Shooting section for repair procedures.

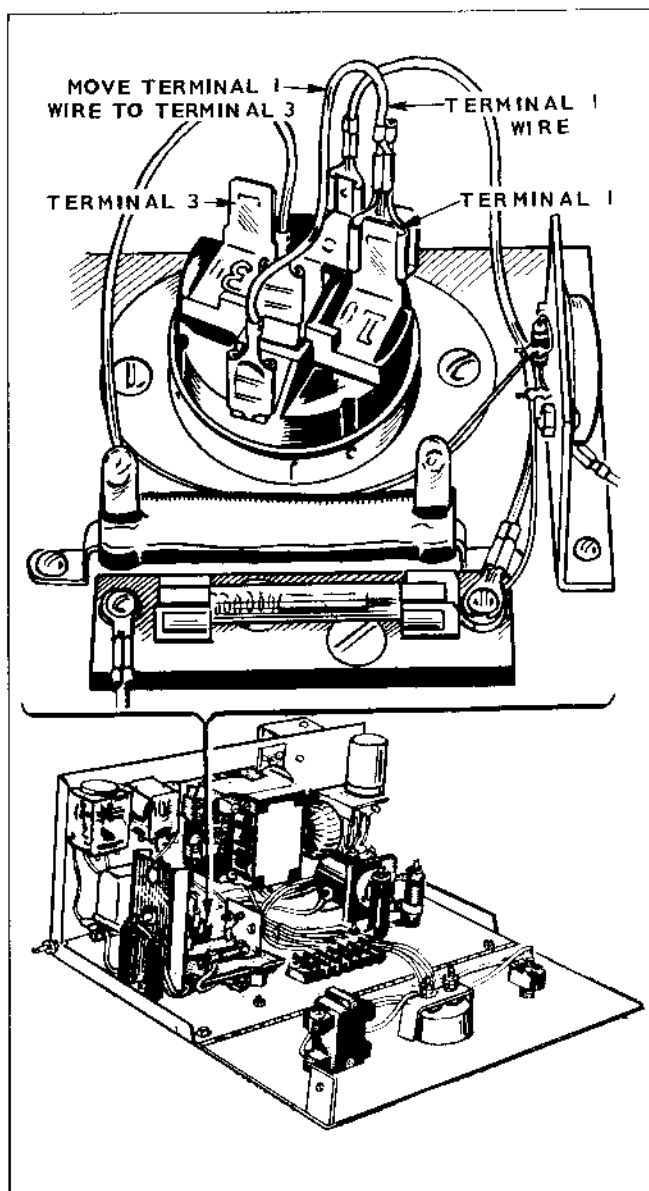


Figure 17. Disabling Bilge Blower Circuit

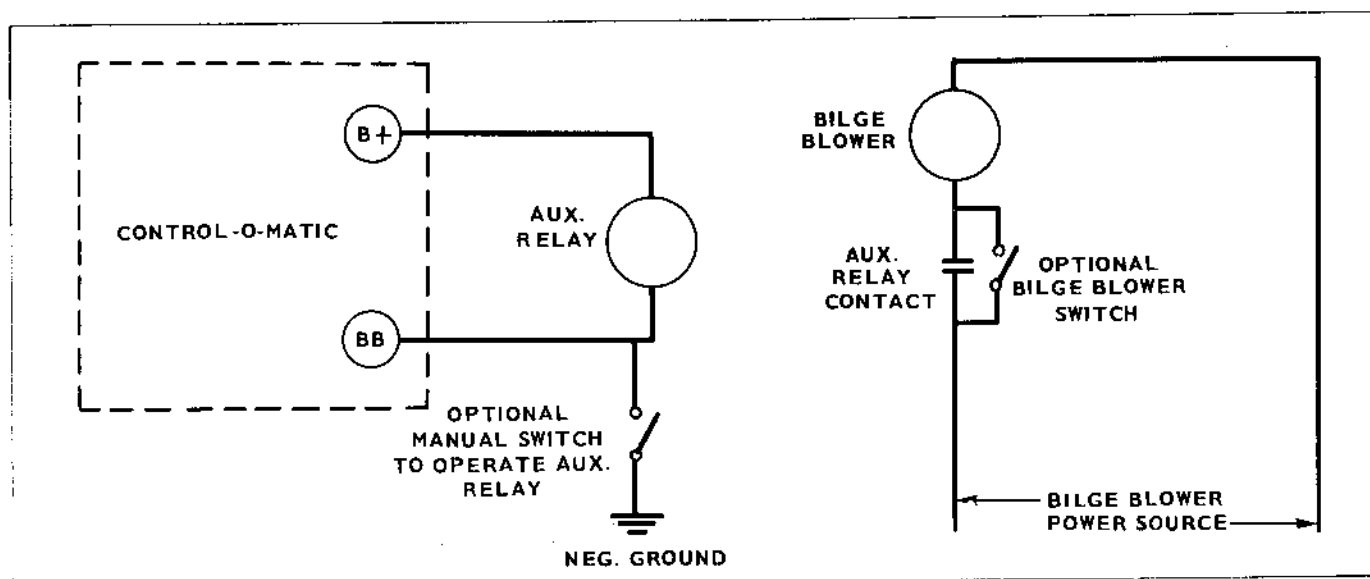


Figure 16. Auxiliary Relay Bilge Blower Circuit

ADJUSTMENTS

CHECK BREAKER POINTS

Refer to Figure 18 for correct gap distances. Replace burned or faulty points. If only slightly burned, dress smooth with file or fine stone. Do not use emory paper or emory cloth. Measure gap with thickness gauge; gap points at .020".

Ignition breaker points, Fig. 18, must be correctly gapped. Crank engine to fully open breaker points (1/4 turn after top center). Loosen locking screws and turn cam to adjust. Tighten breaker points and re-check gap.

Ignition points should break contact just as the 25° timing mark aligns with the flywheel timing mark. Final timing is corrected by properly shifting the breaker point box on its mounting and using a timing light. If specified timing cannot be obtained by positioning the breaker box, make sure timing marks on gears are aligned. Timing procedures are described in the MCK Service Manual, No. 927-355.

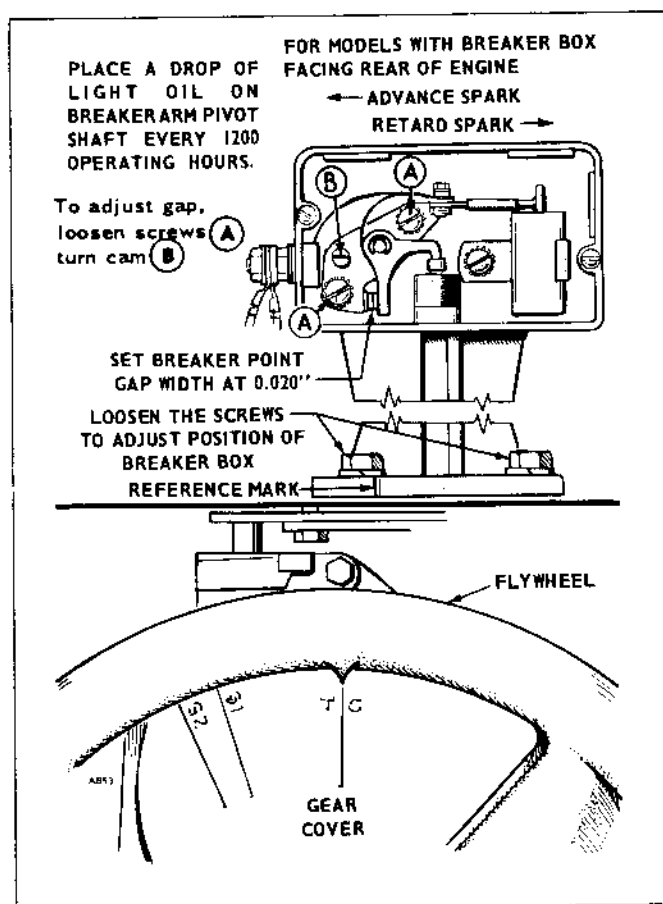


Figure 18. Ignition Points

CARBURETOR

The carburetor (Fig. 19) has a high-speed main fuel adjustment (needle A) and an idle fuel adjustment (needle B). The main adjustment (needle A) affects operation under heavy load conditions. Idle adjustment affects operation under light, or no load. Under normal circumstances, factory carburetor adjustments should not be disturbed. If the adjustments have been disturbed, turn needles off their seats 1 to 1-1/2 turns to permit starting, then re-adjust them for smooth operation.

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

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

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

Set throttle stop screw (located on carburetor throttle lever) with no load connected while running at rated speed. Turn the screw to give 1/32" clearance between the screw and pin (Fig. 19).

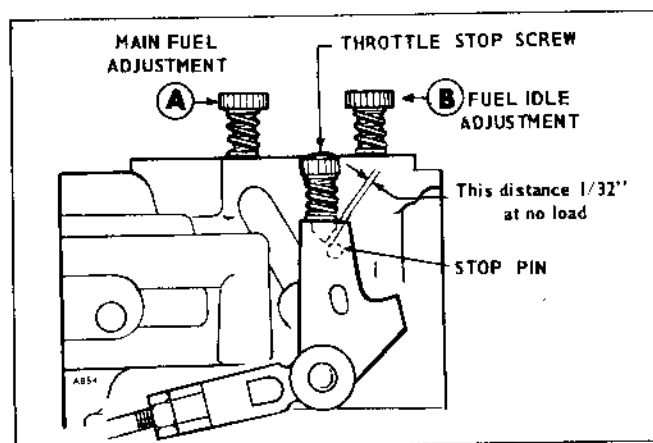


Figure 19. Throttle Stop Screw Adjustment (Spec A)

Beginning with Spec B, a Zenith carburetor is used. The carburetor adjustments are the same as the original carburetor. The only difference is the location of the adjustment needles (Fig. 20). The high-speed adjustment needle A is on the bottom of carburetor.

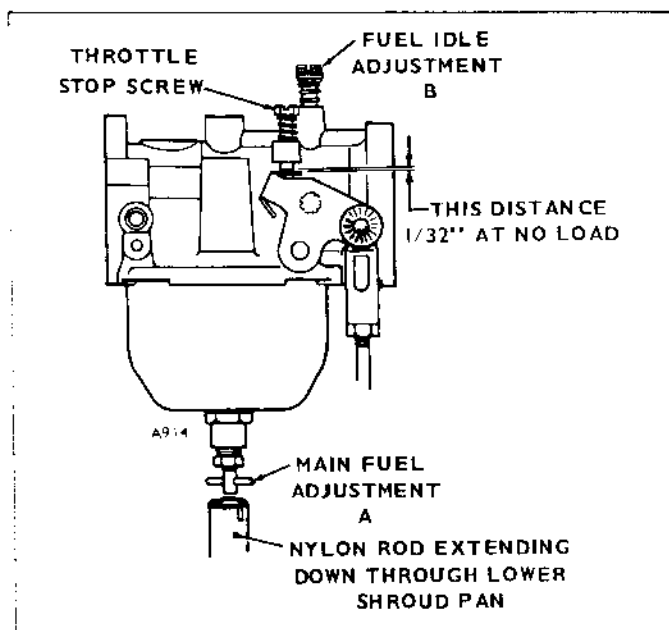


Figure 20. Throttle Stop Screw Adjustment (Spec B and later)

To check float level, remove the entire main fuel adjustment assembly from the float bowl (unscrew large nut from float bowl (Fig. 21). The proper level from the float to the carburetor body is 1/4". The float tab should just touch fuel inlet valve and not compress the inlet valve spring. Adjust by bending the tab on the float.

NOTE: Do not apply excessive pressure to float valve.

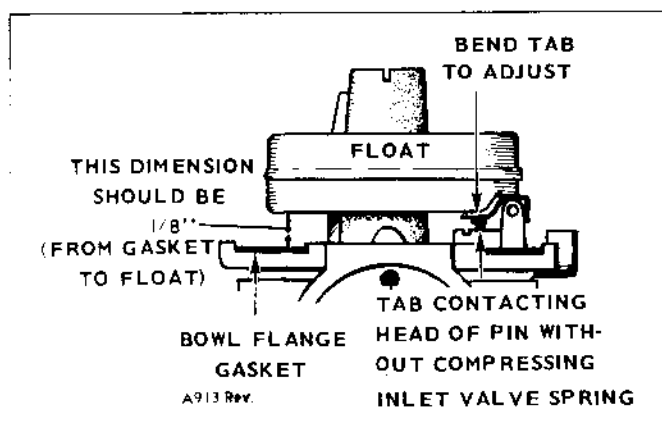


Figure 21. Setting Float Level

ONAN THERMO-MAGNETIC CHOKE

This choke uses a heating element and a heat-sensitive bi-metal spring to open the choke plate. The choke solenoid, actuated during engine cranking only, closes the choke plate according to ambient temperature.

If adjustment is required, use the following instructions. Bi-metal choke spring must be at ambient temperature. Allow engine to cool at least one hour before setting. Adjust choke by turning the choke body, which engages a link connected to a bi-metal choke spring. Remove flame arrestor and adapter to expose the carburetor throat. Loosen the screw which secures the choke body. Rotate choke body clockwise to increase choke, and counter-clockwise to decrease choke action (leaner mixture). Refer to Fig. 22 for correct choke settings at various ambient temperatures. Use drill rod or the shank of a drill bit to measure the choke opening (Fig. 22).

GOVERNOR

The governor and vacuum booster control engine speed (Fig. 23). Rated speed and voltage appear on the nameplate (also see Specifications). On a 4-pole generator, engine speed equals frequency multiplied by 30. Thus 1800 r.p.m. gives a 60-cycle frequency and 1500 r.p.m. equals 50-cycle frequency.

Preferred speed varies approximately 2-1/2 cycles from no-load to full-load operation. Be sure throttle, linkage, and governor mechanism operate smoothly.

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

Speed Adjustment: With the plant operating at temperature and no load, and with the booster external spring disconnected, adjust the tension of the governor spring. Turn the speed-adjusting nut to obtain a voltage and speed reading within the limits shown.

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

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

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

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

Vacuum-Booster Adjustment: After satisfactory performance under various loads is attained by governor adjustments without the booster, connect the booster. Connect the booster external spring to the bracket on the governor linkage. With the plant operating at no load, slide the bracket on the governor linkage to a position where the external spring is just free from tension.

Apply a full rated electrical load to the generator. The output voltage should stabilize at nearby the same reading at full load as for no-load operation. The speed may remain about the same, or increase when the load is applied, resulting in 1- or 2-cycle frequencies higher

than the no-load frequency. (1 cycle is equal to 30 rpm for a 4-pole generator.) If the rise in frequency is more than 2 cycles, lessen the internal spring tension. If there is a drop in frequency, increase the booster internal spring tension. To increase tension, pull out on the internal spring bracket and move the pin to a different hole.

With the booster disconnected, a maximum drop of 5 cycles from no-load to full-load is normal. With the booster in operation, a maximum increase of 2 cycles from no-load to 2/3 load is normal. A drop of 1 cycle at 1/4 load is permissible, giving an over-all maximum spread of 3 cycles.

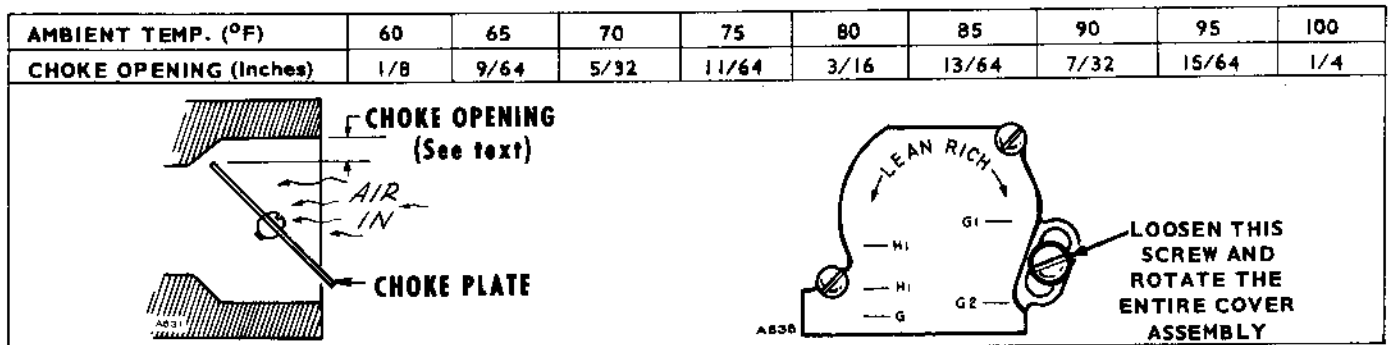


Figure 22. Thermo-Magnetic Choke Adjustments

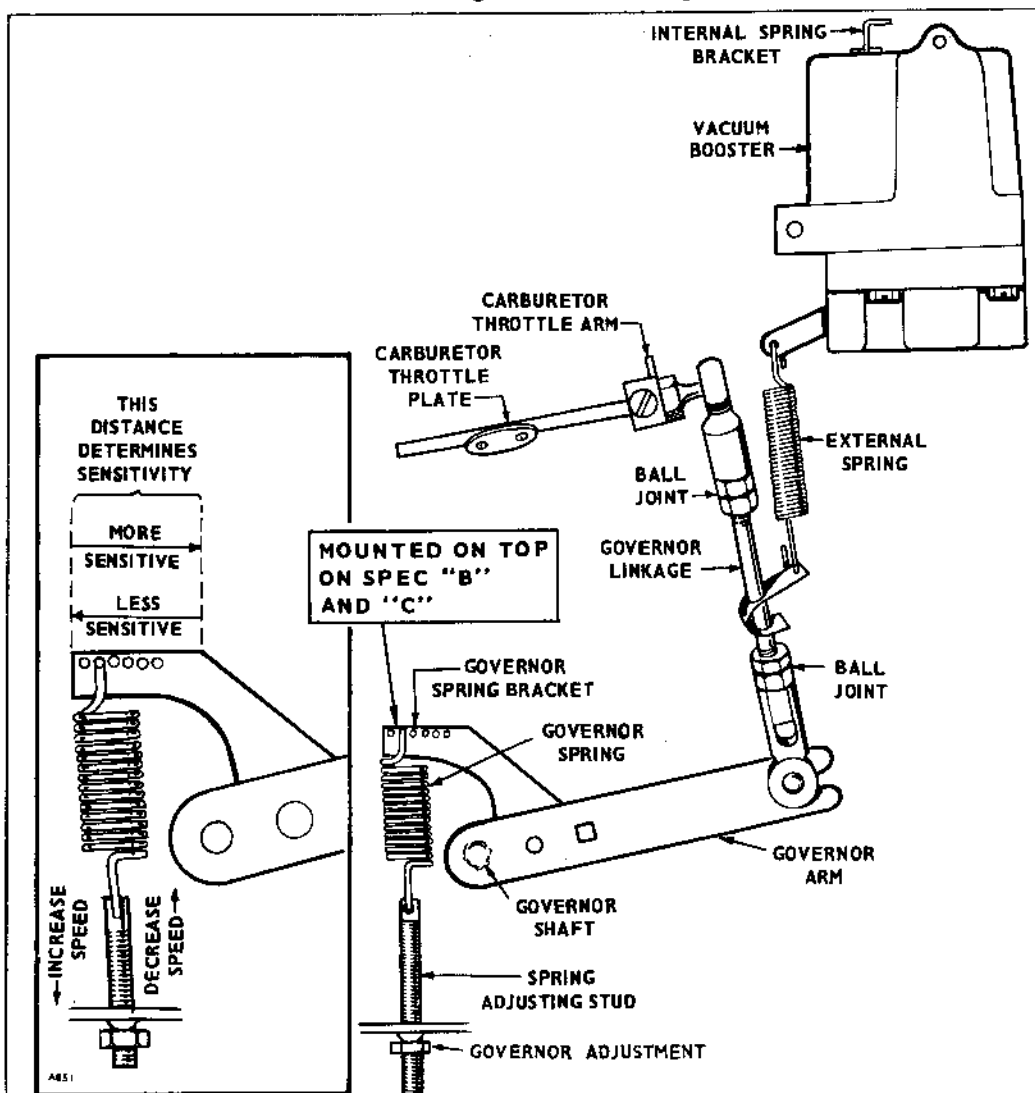
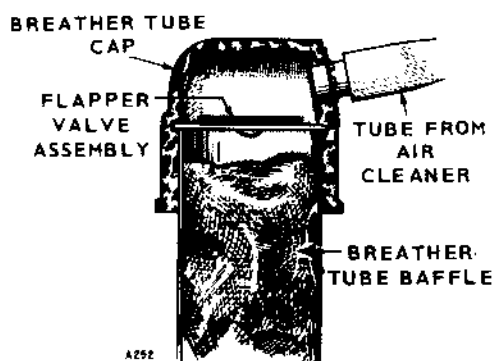


Figure 23. Governor Details.

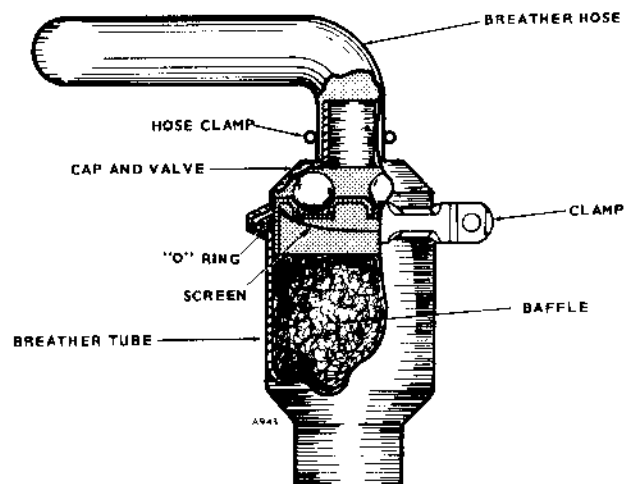
MAINTENANCE

PERFORM ALL MAINTENANCE DETAILS AS SPECIFIED IN THE MAINTENANCE SCHEDULE



CRANKCASE BREATHER - SPEC A ONLY

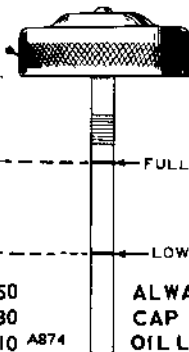
Lift off rubber breather cap. Carefully pry valve from cap. Otherwise, press hard with both of your thumbs on top of cap and keep fingers below to release valve from rubber cap. Wash this fabric flapper-type check valve in fuel. Dry and install. Position perforated disc toward engine.



CRANKCASE BREATHER - BEGIN SPEC B

Clean the crankcase breather cap and valve assembly, and the breather tube baffle in fuel every 300 operational hours. To remove breather cap and valve assembly, remove breather hose clamp and breather tube clamp.

CAP AND OIL LEVEL INDICATOR

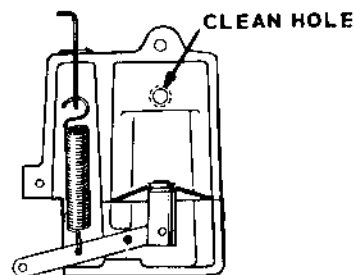


ABOVE 50°F SAE 50
30°F TO 90°F SAE 30
0°F TO 30°F SAE 10 A874
BELOW 0°F SAE 5

ALWAYS REPLACE CAP TIGHTLY, OR OIL LEAKAGE MAY OCCUR.

CRANKCASE OIL

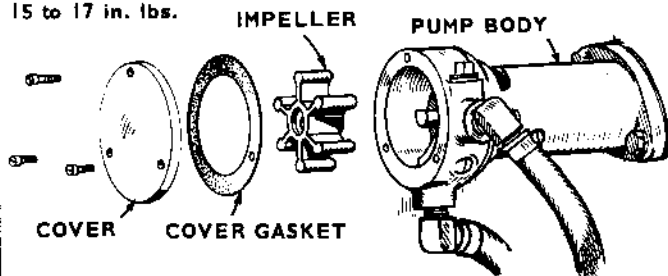
Oil capacity is four U.S. quarts. Fill to the full mark on oil indicator. Use a good quality detergent oil classified for service MS or MS/DG. Do not use service DS oil at any time. Use a single viscosity oil; oil consumption is usually higher with multi-viscosity all-weather oil. Use the proper SAE number of oil for the expected temperature conditions. Do not mix brands or grades. Extremely dusty or low temperature conditions require oil change at 50 hrs.



SPEED BOOSTER

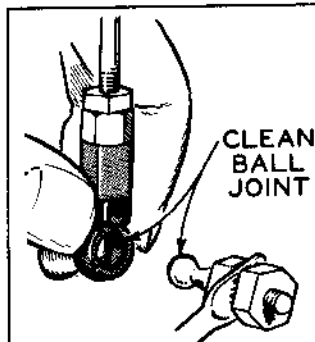
Use a fine wire to clean the small hole in the short vacuum tube which fits into the hole in the top of the engine intake manifold. Do not enlarge this hole. If there is tension on the external spring when the plant is operating at no load or light load, it may be due to improper adjustment, a restricted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

Tighten Screws
15 to 17 in. lbs.



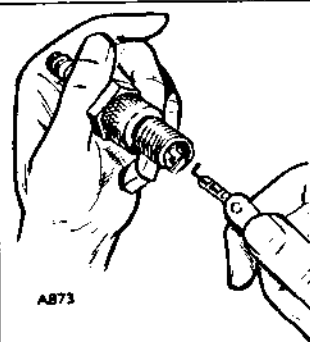
WATER PUMP IMPELLER

Remove water pump cover and inspect neoprene impeller. If worn or damaged, install new impeller. Pump should discharge a nominal 3.5 U.S. gallons per minute when thermostat is open. Install pump cover air tight to avoid early failure of impeller.



GOVERNOR LINKAGE

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



SPARK PLUG GAP
0.025" GASOLINE
0.018" GAS FUEL

FUEL SEDIMENT

Periodically clean fuel filter and carburetor filter (strainer) bowls of any accumulated sediment. Clean filter screen thoroughly. Assemble and check leaks.

GASOLINE

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

DRIVE BELT TENSION

Check pump drive belt for 1/2" deflection by depressing belt between pulleys with thumb. Adjust tension by loosening engine water pump mounting screws and changing pump position as required.

MAINTENANCE SCHEDULE

Use this factory-recommended maintenance schedule (based on favorable operating conditions) to serve as a guide to get long and efficient plant life. Neglecting routine maintenance can result in failure or permanent damage to the plant. Maintenance is divided into two categories: (1) *Operator Maintenance* - performed by the operator, (2) *Critical Maintenance* performed by qualified service personnel (Onan dealer). A Major Service Manual is available (See General Information page).

OPERATOR MAINTENANCE SCHEDULE (Performed by owner)

MAINTENANCE ITEMS	OPERATIONAL HOURS				
	8	50	100	200	300
Inspect Plant	x				
Check Fuel	x				
Check Oil Level	x				
Check Flame Arrester		x			
Clean Governor Linkage			x1		
Check Spark Plug			x		
Change Crankcase Oil			x1		
Clean Crankcase Breather					x
Clean Fuel System				x	
Check Battery				x	

x1 - Perform more often in extremely dusty conditions.

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

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

CRITICAL MAINTENANCE SCHEDULE (Performed by Onan Dealer)

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	200	500	1000	5000
Check Breaker Points	x			
Clean Commutator and Collector Rings	x1			
Check Brushes	x2			
Remove Carbon & Lead		x		
Check Valve Clearance		x		
Clean Carburetor		x		
Clean Generator			x	
Remove & Clean Oil Base			x	
Grind Valves (If Required)			x	
General Overhaul (If Required)				x

x1 - Perform more often in extremely dusty conditions.
x2 - Replace revolving field collector ring brushes when worn to 5/16" or less - Replace all other brushes when worn to 5/8" or less

Tappets (Intake & Exhaust)	0.012" to 0.015"
Ignition Breaker Points Gap	0.020"
Ignition Timing	25° B T C

MAJOR SERVICE MANUAL IS AVAILABLE - SEE GENERAL INFORMATION

TROUBLE SHOOTING

<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
ENGINE WILL NOT CRANK		ENGINE WILL NOT START WHEN CRANKED	
Battery discharged.	Recharge.	Lack of fuel or faulty carburetion.	Refill tank. Check fuel system. Clean, adjust as necessary.
Loose connections.	Tighten connections.	Clogged fuel screen.	Clean.
Defective starting circuit.	Repair or replace as necessary.	Cylinders flooded.	Crank few times with spark plugs removed.
Defective switch.	Replace.	Poor fuel.	Drain; fill with fresh fuel.
ENGINE CRANKS TOO STIFFLY		Poor compression.	Tighten spark plugs.
Too heavy oil in crankcase.	Drain; refill with lighter oil.	Wrong breaker point gap.	Reset breaker points.
EXCESSIVE OIL CONSUMPTION, LIGHT BLUE SMOKY EXHAUST		ENGINE MISFIRES AT LIGHT LOAD	
Oil leaks from oil base or connections. This does not cause smoky exhaust.	Replace gaskets. Tighten screws and connection. Check breather valve.	Spark plug gap too narrow.	Adjust to correct gap.
Oil too light or diluted.	Drain; refill with correct oil.	Intake air leak.	Tighten or replace manifold and carburetor gaskets.
Engine misfiring.	Clean; adjust or replace spark plugs.	Faulty ignition.	Clean; adjust or replace spark plugs.
Faulty ignition.	Clean, adjust, or replace spark plugs.	Low compression.	Tighten cylinder head and spark plugs.
Too much oil.	Drain excess oil.	ENGINE MISFIRES UNDER HEAVY LOAD	
BLACK, SMOKY EXHAUST, EXCESSIVE FUEL CONSUMPTION, FOULING OF SPARK PLUG WITH SOOT, POSSIBLE LACK OF POWER UNDER HEAVY LOAD		Spark plug gap too wide.	Adjust gap.
Fuel mixture too rich.	Adjust carburetor or choke. Install needed carburetor parts.	Faulty ignition.	Clean; adjust or replace spark plugs.
Choke not open.	Inspect linkage and setting.	Clogged carburetor.	Clean jet and adjust carb.
Dirty air cleaner.	Clean.	Clogged fuel screen.	Clean
Lack of crankcase vacuum.	Clean breather valve.	ENGINE BACKFIRES	
ENGINE STOPS UNEXPECTEDLY		Lean fuel mixture.	Clean or adjust carburetor.
Fuel tank empty.	Fill with fresh fuel.	Poor fuel.	Refill with good, fresh fuel.
Defective ignition.	Check ignition system.	ENGINE RACES	
SHARP METALLIC THUD, ESPECIALLY WHEN COLD ENGINE FIRST STARTED		Governor not controlling carburetor.	Check governor performance & linkage condition.
Low oil supply.	Add oil.	LOW OIL PRESSURE	
Oil badly diluted.	Change oil.	Defective gauge.	Replace.
		Oil too light or diluted from leaking fuel pump diaphragm.	Drain. Refill with proper oil. Repair or replace fuel pump.
		Oil too low.	Add oil.
		Sludge on oil cup screen.	Clean screen & oil sump.
		Badly worn oil pump.	Replace.

<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>	<u>POSSIBLE CAUSE</u>	<u>REMEDY</u>
PINGING SOUND WHEN ENGINE IS SUDDENLY OR HEAVILY LOADED		HIGH OIL PRESSURE	
Wrong spark plug.	Install correct spark plug.	Defective gauge.	Replace.
Spark plug burned or carboned.	Install new plug.	Oil too heavy grade.	Drain. Refill.
Fuel stale or low octane.	Use good, fresh fuel.	Clogged oil passages.	Clean all lines & passages.
Lean fuel mixture.	Clean & adjust carburetor.	Oil relief valve stuck.	Clean by-pass. Replace if needed.
LIGHT POUNDING KNOCK		ENGINE OVERHEATING	
Low oil supply.	Add oil.	Poor coolant circulation.	Maintain supply.
Oil badly diluted.	Change oil.	Improper lubrication.	See Low Oil Pressure.
Fuel mixture too lean.	Adjust carburetor.	GENERATOR OVERHEATING (Approximately 160°F higher than ambient)	
Generator overloaded.	Reduce load.	Overloaded.	Reduce load.
VOLTAGE LOW AT FAR END OF LINE BUT NORMAL NEAR POWER PLANT		VOLTAGE DROPS UNDER HEAVY LOAD	
Line wire too small for load and distance.	Install larger or extra wires or reduce load.	Engine lacks power.	See remedies for engine misfires under heavy load.
ELECTRIC MOTOR RUNS TOO SLOWLY AND OVERHEATS AT FAR END OF LINE BUT OK IF USED NEAR POWER UNIT		Poor compression.	Tighten cylinder head & spark plugs.
Line wire too small for load and distance.	Install larger or extra wires or reduce load.	Faulty carburetion.	Clean the fuel system. Clean, adjust or replace parts necessary.
VOLTAGE UNSTEADY BUT ENGINE NOT MISFIRING		Dirty flame arrester.	Clean.
Speed too low.	Adjust governor to correct speed.	Restricted exhaust line.	Clean or increase the size.
Loose connections.	Tighten connections.	Choke partially closed.	See that it opens fully.
Fluctuating load.	Correct any abnormal load condition causing trouble.	Shorted field rectifier in static exciter.	Check with ohmmeter.

CONTROL-O-MATIC TROUBLE SHOOTING

1. Control switch is in "RUN" position, but electric plant does not crank after the usual 5-minute delay period.
 - a. Check battery connections and battery voltage.
 - b. Remove the lead on thermal relay A2K1 (move lead wire from terminal 1, to terminal 3, Fig. 17) to disable the bilge-blower control. If plant cranks with the bilge blower control disabled, the problem is in the bilge blower control circuit. Refer to paragraph 5.
2. Electric plant will not start on load demand.
 - a. Move the toggle switch to "RUN" position. Plant should crank after approximately a 5-minute delay.
 - b. Apply some load (at least 100 watts) to load circuit. Move toggle switch to "AUTO" position. Plant should continue running.
3. Control-O-Matic starts plant automatically under load, but slows down or stops as soon as contactor picks up.
 - a. Recheck size of load and type of load to make certain it exceeds 40 W incandescent lamp load or 425 W heater load.
4. Plant won't stop with load removed.
 - a. Put toggle switch in "OFF" position to stop plant. If plant does not stop, remove battery lead and check for faulty start solenoid. Contacts may have stuck closed.
 - b. Remove the load from the load side of the contactor in Control-O-Matic.
 - c. Put toggle switch in "AUTO" position.

If plant does not crank, put toggle switch in "RUN" position to start plant. Put switch in "AUTO" position and plant should stop. If plant stops with the load lead removed from the load side of the contactor, it indicates that there was sufficient load on the AC line to keep the Control-O-Matic energized. Recheck load circuit.

5. Bilge-blower Control.

- a. Bilge-blower circuit does not function at all.

Check the 6-1/4 amp fuse A2F1.

- b. Blower circuit is energized continuously and electric plant doesn't crank.

Check heater element of thermal relay for open circuit or poor connection which may prevent relay from heating up enough to switch.

- c. Blower circuit is not energized, but plant starts after a 2- to 6-minute delay.

Check operation of blower by placing a jumper from terminal BB to ground. Blower should run. If it doesn't, check for proper voltage from ground to terminal B+. Check wiring to blower.

Your Onan dealer is equipped to service the Control-O-Matic. The Service Manual for this generating plant contains complete Trouble-shooting information.

INSTRUCTIONS FOR ORDERING REPAIR PARTS

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

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

Always refer to the nameplate on your plant:

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

ELECTRIC **Onan** PLANT

MODEL & SPEC. NO. _____ SERIAL NO. _____

IMPORTANT

RATINGS AT SEA LEVEL BASED ON FULL CHARGED BATTERY

GASOLINE	DIESEL FUEL		
STAND BY KW	KVA	AMPS	
CONTINUOUS KW	KVA	AMPS	
A.C. VOLTS	CYCLES	PHASE	P.F.
EXCITER _____ GEN DATA _____			
R.P.M.	USE _____ VOLT BATTERY NEGATIVE GROUND		

ONAN
MINNEAPOLIS, MINN.

For handy reference, insert YOUR plant 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".

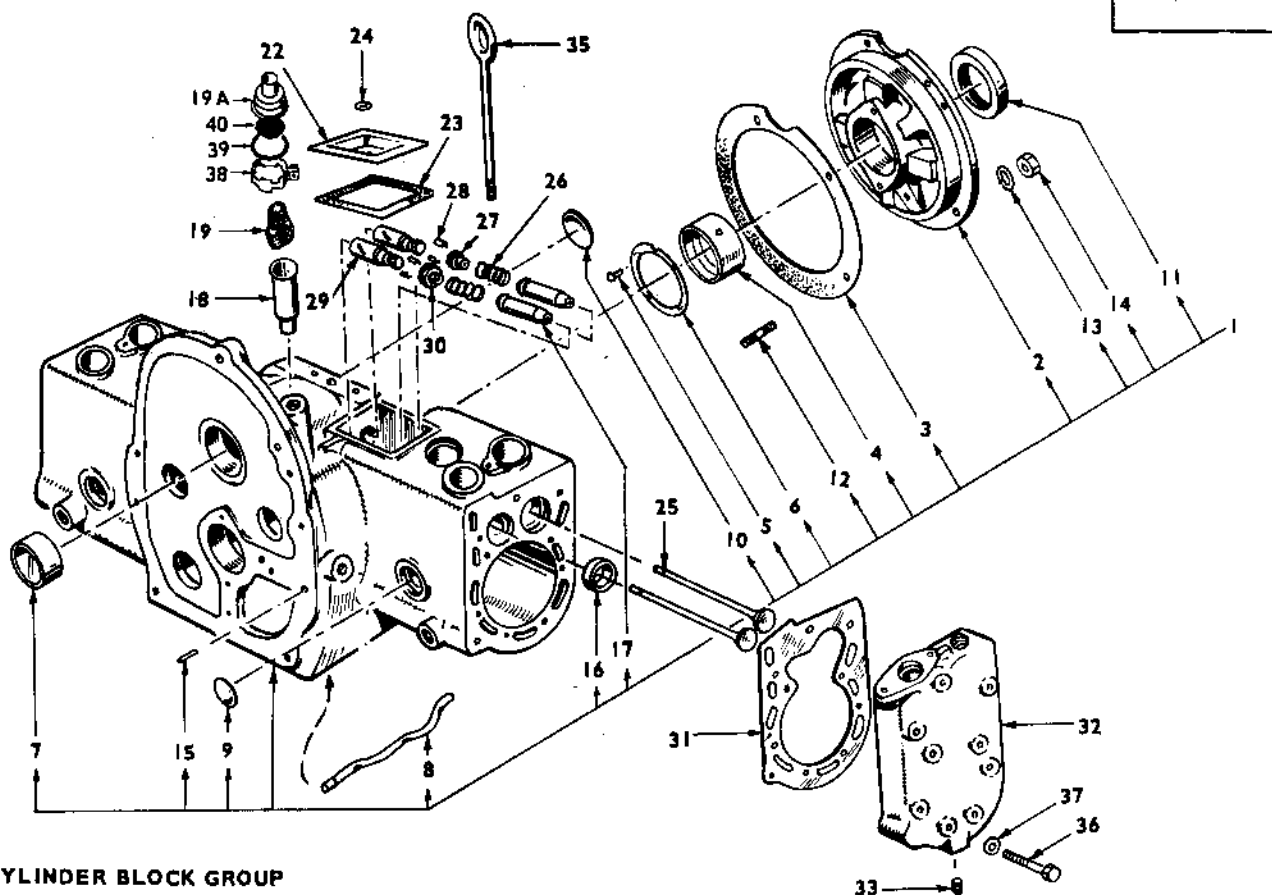
PARTS CATALOG

This catalog applies to the standard MCKK Plants as listed below. Parts are arranged in groups of related items. Each illustrated part is identified by a reference number corresponding to the same reference number below the illustration. Parts illustrations are typical. Using the MODEL and SPEC NO. from the plant nameplate, select the Parts Key No. (1, 2, etc. in the last column) that applies to your Plant Model and Spec No. This Parts Key No. represents parts that differ between models. Unless otherwise mentioned in the description, parts are interchangeable between models. Right and left plant sides are determined by FACING the engine end (front) of the plant.

PLANT DATA TABLE

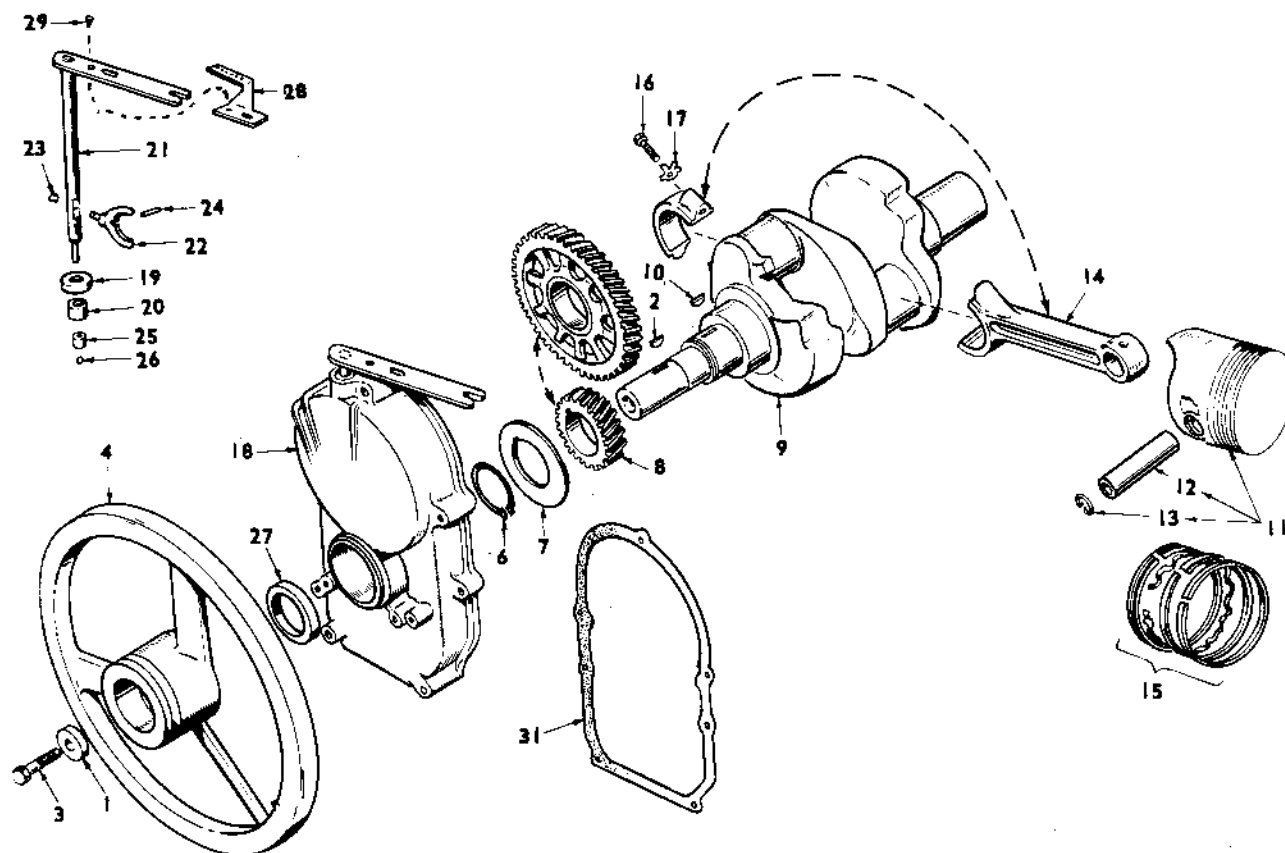
MODEL NO. AND SPECIFICATION	ELECTRICAL DATA					PARTS KEY NO.
	WATTS	VOLTS	CYCLE	WIRE	PHASE	
4MCKK-1R/ 4MCKK-2R/ 4MCKK-3R/	4000 4000 4000	120 240 120/240	60 60 60	2 2 3	 	1
305MCKK-51R/ 305MCKK-52R/ 305MCKK-53R/	3500 3500 3500	120 240 120/240	50 50 50	2 2 3	 	1
605MCKK-1R/ 605MCKK-2R/ 605MCKK-3R/	6500 6500 6500	120 240 120/240	60 60 60	2 2 3	 	2
505MCKK-51R/ 505MCKK-52R/ 505MCKK-53R/	5500 5500 5500	120 240 120/240	50 50 50	2 2 3	 	2

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



CYLINDER BLOCK GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	110A1498	1	Block Assy., Incl. Brg. Plt., Brgs., Guides, and Seats	23	110A667	2	Gasket, Valve Compartment
2	101C316	1	Plate, Brg. (Less Brg.)	24	526-63	2	Washer, Valve Compartment Cover
3	101K115	1	Gasket Kit, Brg. Plate	25	VALVE		
4	101K389	2	Bearing, Crankshaft (Frt. and Rr.) Specify: Std. or .002" .010", .020", .030" U/S		110B881	2	Intake, Steel
5	516A72	4	Pin, Bearing Stop		110B880	2	Exhaust, Stellite
6	104A575	2	Washer, Crankshaft Brg. Thrust	26	110A539	4	Spring, Valve
7	101A367	2	Bearing, Camshaft (Frt. and Rr.)	27	110A893	2	Washer, Valve Sprg.Ret.(Intake)
8	120A386	1	Tube, Crankcase Oil	28	110A639	8	Lock, Rotocap or Sprg. Ret. Washer
9	517-11	8	Plug, Expansion (1-1/4")	29	115A6	4	Tappet, Valve, Specify: Std. or .005" O/S
10	517-48	1	Plug, Camshaft Exp. (1-5/8")	30	110A904	2	Rotocap, Exh. Valve
11	509-41	1	Seal, Oil, Brg. Plate	31	110C1481	2	Gasket, Cyl. Head
12	520A114	5	Stud, Rear Brg. Plate	32	HEAD, CYLINDER		
13	851-5	5	Lockwasher (5/16") Rear Brg. Plate		110D1478	1	Left Side, #1 Cyl.
14	110A445	5	Nut, Rear Brg. Plate		110D1479	1	Right Side, #2 Cyl.
15	516A11	2	Pin, Gear Cover		110A1505	1	Left Side (Plts. W/Heat Exch.)
16	110A872	2	Insert, Exh. V. Seat (Stellite) Specify: Std., or .002", .005", .010", .025" O/S		110A1506	1	Right Side (Plts. W/Heat Exch.)
17	110A902	4	Guide, Valve	33	505-110	2	Plug, Cylinder Head
18	TUBE, BREATHER			35	403A580	1	Eye-Bolt, Lifting
	123A868	1	Spec A only	36	SCREW, HEX HEAD CAP		
	123A953	1	Begin Spec. B		800-509	18	Cylinder Head (5/16-18 x 2-1/2")
19	123A865	1	Baffle, Breather Tube		800-32	4	Gear Cover (5/16-18 x 1-3/4")
19A	123A954	1	Cap and Valve, Breather Tube - Begin Spec B		800-34	1	Gear Cover (5/16-18 X 2-1/4")
					800-57	2	Intake Manifold (3/8-16 x 2-3/4")
20	123A787	1	Cap, Breather Tube - Spec A		102A455	4	Oil Base (3/8-16 x 1-1/4")
21	123A315	1	Valve, Breather Tube - Spec A	37	526A122	18	Washer, Flat - Cyl. Hd.
22	110A666	2	Cover, Valve Compartment	38	123A951	1	Clamp, Breather Cap. - Begin Spec. B
				39	509-117	1	Gasket, "O" Ring, Breather Cap - Begin Spec. B
				40	123A958	1	Screen, Breather Tube-Begin Spec. B

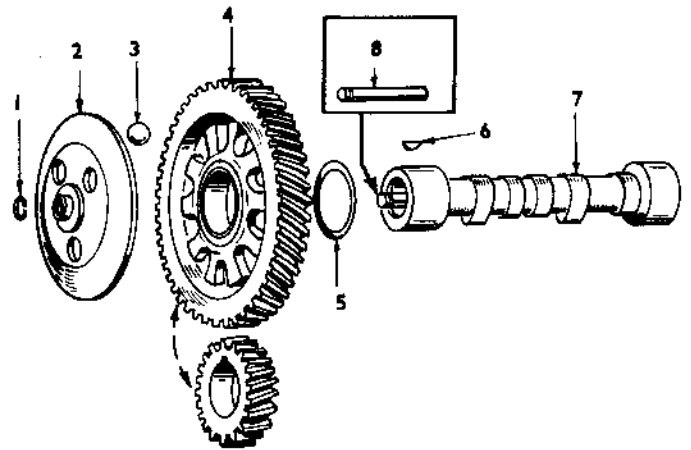


CRANKSHAFT, FLYWHEEL, GEAR COVER, CONNECTING ROD, AND PISTON GROUP

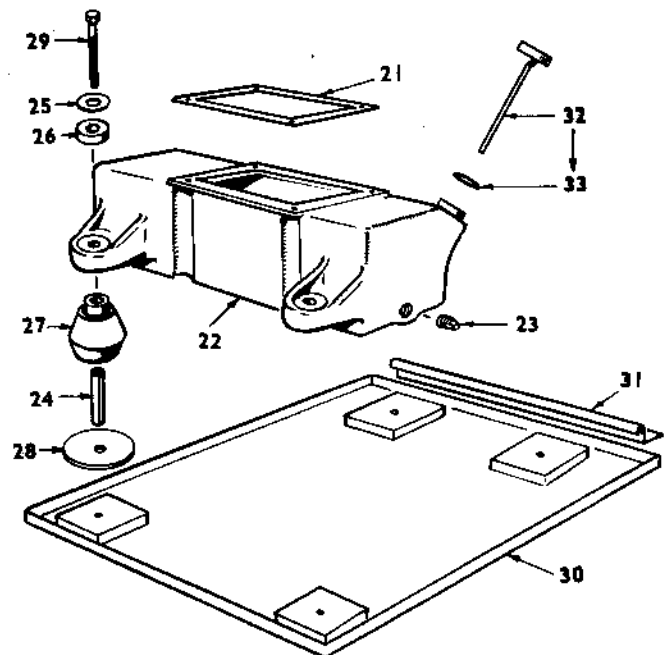
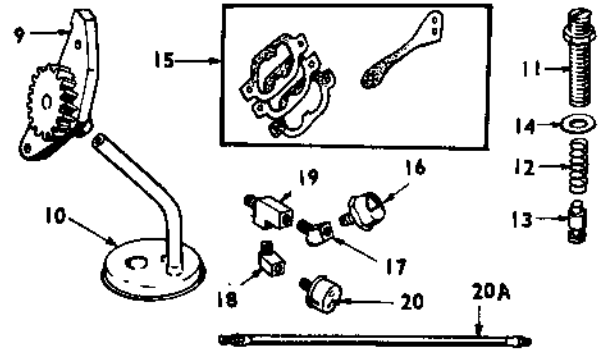
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	526A17	1	Washer, Flywheel Mtg.
2	515-2	1	Key, Flywheel Mtg.
3	104A170	1	Screw, Flywheel Mtg.
4	104D599	1	Flywheel
6	518-14	1	Lock, Crankshaft Gr. Washer
7	104A43	1	Washer, Crankshaft Gr. Ret.
8	105-192	1	Gear Set, Timing (Incls. Crank and Cam Gears)
9	104D256	1	Crankshaft
10	515-1	1	Key, Crankshaft Gear Mtg.
11	112A71	2	Piston & Pin (Incl. Ret. Rings) Specify: Std. or .010", .020", .030", .040" O/S
12	112A69	2	Pin, Piston
13	112A3	4	Ring, Piston Pin Retaining
14	114C98	2	Rod, Connecting - Specify: Std. or .010", .020", .030" U/S
15	113A88	2	Ring Set, Piston - Specify: Std. or .010", .020", .030", .040" O/S

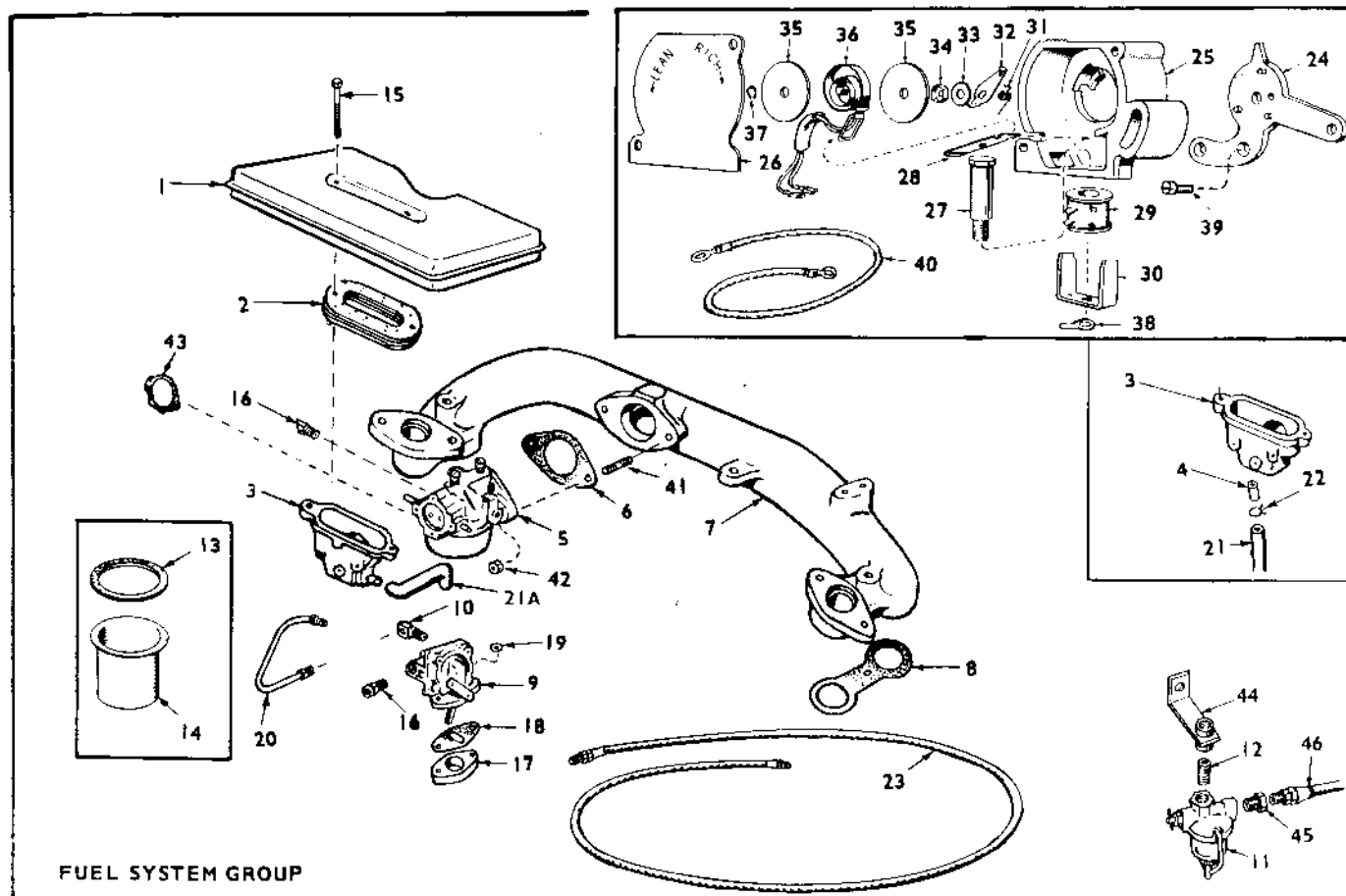
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
16	110A284	4	Screw, Rod Cap
17	114A59	4	Washer, Rod Cap Screw Lock
18	103C286	1	Cover Assy., Gear - Includes Parts Marked*
19	509P8	1	*Seal, Oil, Gov. Shaft
20	510-13	1	*Bearing, Gov. Shaft (Upper)
21	150B1008	1	*Shaft and Arm Assy.
22	150A620	1	*Yoke, Gov. Shaft
23	518-129	1	*Ring, Yoke Retainer
24	516-130	1	*Pin, Gov. Cup Stop
25	510A8	1	*Bearing, Gov. Shaft (Lower)
26	510P14	1	*Ball, Gov. Shaft Bearing
27	509A40	1	*Seal, Oil, Gear Cover
28	*EXTENSION, GOVERNOR ARM		Arm
	150A1005	1	Spec A only
	150B1073	1	Begin Spec. B
29	815-181	1	*Screw, Gov. Arm
31	103B11	1	Gasket, Gear Cover

CAMSHAFT, OIL PUMP, OIL BASE, AND DRIP PAN GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	150A78	1	Ring, Cam Center Pin Ret.
2	150A612	1	Cup, Governor
3	510P15	10	Ball, Gov. Fly
4	105-192	1	Gear Set, Timing (Incl. Cam & Crank Gears)
5	105A4	1	Washer, Cam Gear Thrust
6	515-1	1	Key, Cam, Gear Mounting
7	105-140	1	Camshaft, Incl. Center Pin
8	150A75	1	Pin, Camshaft Center
9	120A491	1	Pump, Oil (Note: Internal parts not sold separately)
10	120B400	1	Cup, Oil Pump Intake
11	120A187	1	Stud Assy., By-Pass Adj.
12	120A140	1	Spring, By-Pass Valve
13	120A398	1	Valve, By-Pass
14	526-66	1	Washer, Relief Valve Adj. Screw
15	120K161	1	Gasket Kit, Oil Pump
16	193P6	1	Gage, Oil Pressure
17	502-53	1	Elbow, Oil Gage
18	502-20	1	Elbow, Low Oil Press. Switch
19	502-58	1	Tee, Oil Line
20	SWITCH, LOW OIL PRESS. CUT-OFF		
	309A169	1	To Spec C
	309P183	1	Begin Spec C
20A	501A4	1	Line, Oil
21	102B158	1	Gasket, Oil Base
22	102A574	1	Base, Oil
23	505-56	1	Plug, Oil Drain
24	402A290	4	Bushing, Mounting Spacer
25	526-14	4	Washer, Flat (1-1/2")
26	402A282	4	Snubber, Shock Mounting
27	CUSHION, VIBRATION		
	402B283	2	Engine End
	402B284	2	Generator End, Key 1
	402B285	2	Generator End, Key 2
28	526A198	8	Washer, Flat (3-1/4")
29	800-81	4	Screw, Hex, Vibration Mtg. (7/16-14 x 3-1/2")
30	405C1554	1	Pan, Drip
31	405B1265	2	Clamp, Hold
32	123A489	1	Cap and Indicator, Oil Fill
33	123A191	1	Gasket, Fill Cap





FUEL SYSTEM GROUP

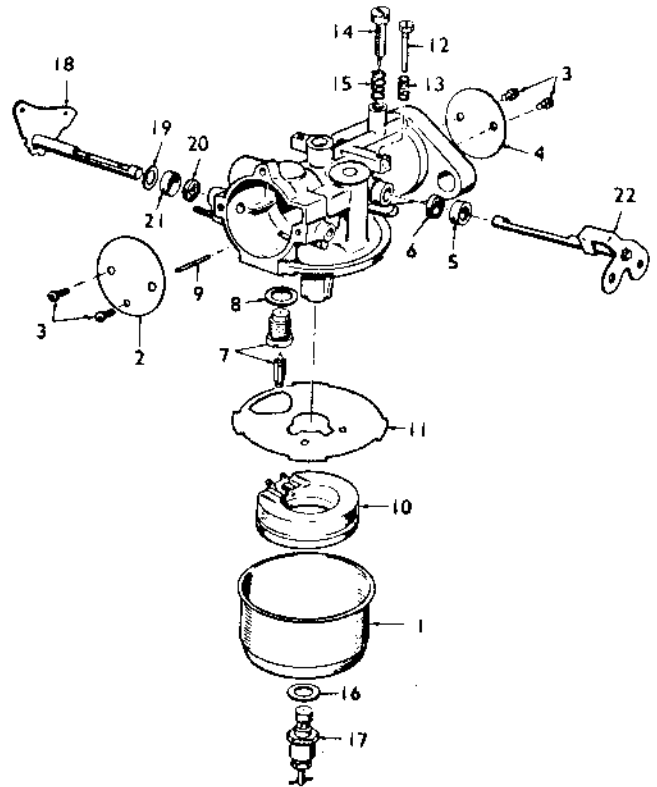
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	RESONATOR		
	140B830	1	Spec A only
	140B974	1	Begin Spec B
2	140B802	1	Flame Arrestor
3	ADAPTER, RESONATOR		
4	140C815	1	Spec A only
	140A972	1	Begin Spec B
4	123A893	1	Tube, Adapter to Breather Tube
5	CARBURETOR ASSEMBLY		
	143C323	1	Spec A Only
	141D690	1	Begin Spec B
6	141A281	1	Gasket, Carb. Mtg.
7	154C1164	1	Manifold, Intake
8	154A13	2	Gasket, Int. Manifold
9	149D1043	1	Pump, Fuel
3	502-2	2	90° Elbow, (1) Pump, (1) Filter
	149B282	1	Filter, Fuel
2	NIPPLE, FUEL FILTER		
	505-104	1	To Spec C
	502-46	1	Begin Spec C
3	149-149	1	Gasket, Filter Bowl
4	149-313	1	Bowl, Fuel Filter
5	800-720	2	Screw, Hex - Resonator Mtg.
6	502-65	2	45° Elbow, (1) Pump (1) Carb.
7	149A45	1	Spacer, Fuel Pump
8	149A3	2	Gasket, Fuel Pump Mtg.
9	526-63	2	Washer (Copper), Pump Mtg.
10	LINE, PUMP TO CARB.		
	149A1025	1	Spec A only
	149A1097	1	Begin Spec B
11	503A486	1	Hose, Breather - Spec A only
11 A	503A546	1	Hose, Breather-Begin Spec B
12	503-171	2	Clamp, Breather Hose (1) only Spec. A

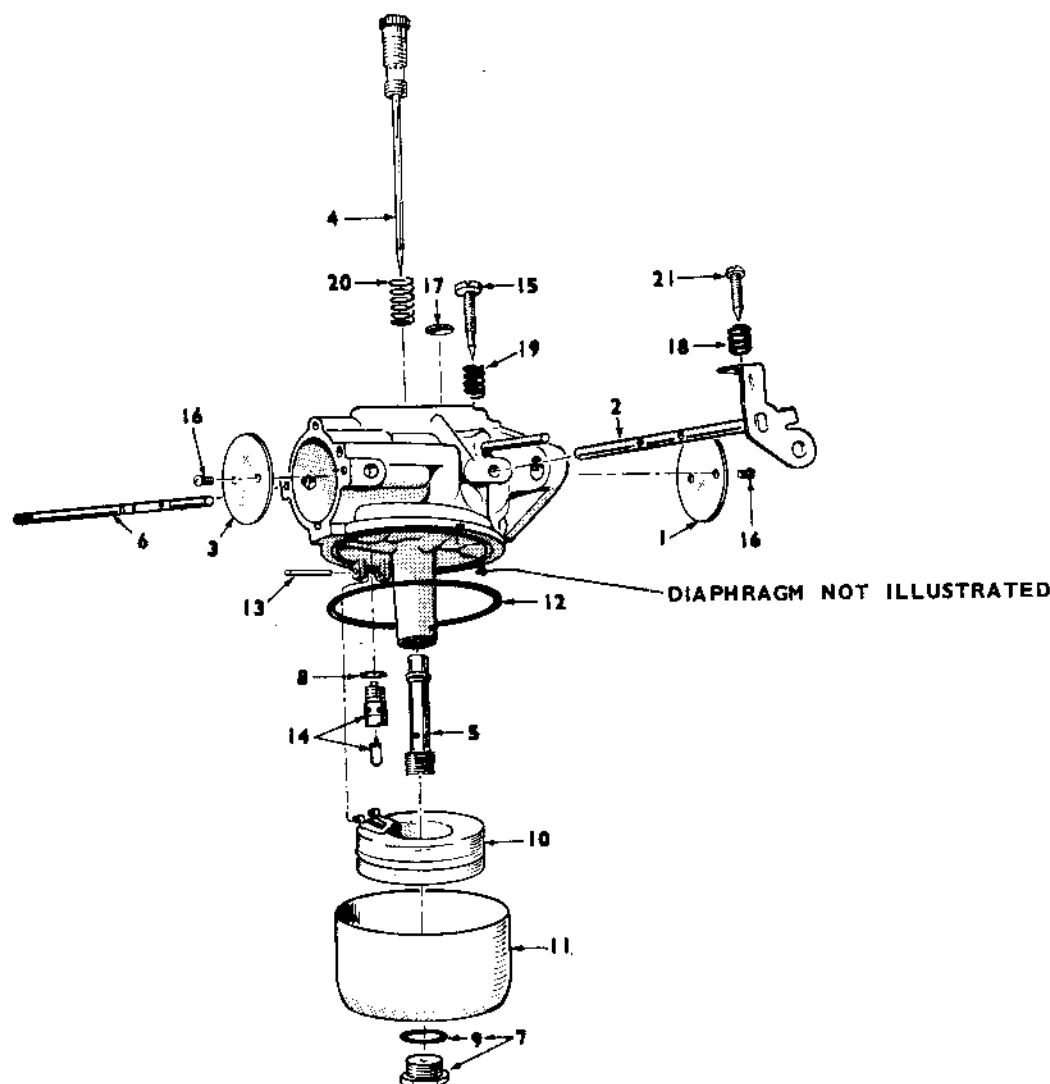
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
23	501A7	1	Line, Fuel - Flex
24	153C385	1	Plate, Choke Mtg.
25	153D386	1	Body, Choke
26	153C389	1	Cover, Choke
27	153B391	1	Core, Choke Solenoid
28	153A395	1	Armature, Choke Solenoid
29	307B801	1	Coil, Choke Solenoid
30	153B392	1	Frame, Choke Solenoid
31	153B387	1	Spring, Choke
32	153B390	1	Lever, Choke Limit
33	526-18	1	Washer (17/64" I.D. x 5/8" O.D. x 1/16")
34	870-134	1	Palnut (1/4-20")
35	153A399	2	Insulator, Choke Heater
36	153B400	1	Bimetal & Heater Assy., Choke
37	518P129	1	Ring, Retaining, Choke
38	332A876	1	Terminal, Choke Ground
39	815-266	2	Screw, Choke Mtg. Plate
40	336A1550	1	Lead, Choke Ground
41	520A526	2	Stud, Carb. Mtg.
42	868-2	2	Nut, Carb. Mtg.
43	GASKET, ADAPTER TO CARB.		
	140A585	1	Spec A only
	140A921	1	Begin Spec B
44	149A1187	1	Bracket, Fuel Filter Mtg. - Begin Spec C
45	502-3	1	Connector, Fuel Filter - Begin Spec C
46	501-3	1	Line, Fuel - Filter to pump - Begin Spec C
	149K526	1	Repair Kit, Fuel Pump (Includes: Diaphragm Assy., Valves, Springs, and Gaskets)
	143K332	1	Repair Kit, Carb. - Spec A only
	141P747	1	Repair Kit, Carb. - Begin Spec B
	143K201	1	Gasket Kit, Carb. - Spec A only
	141K748	1	Gasket Kit, Carb. - Begin Spec B

CARBURETOR PARTS GROUP - Begin Spec B

Note: See separate group for carburetor parts, Spec A only

REF. NO.	PARTS NO.	QTY. USED	PARTS DESCRIPTION
	141D690	1	Carburetor
	141P747	1	Repair Kit
	141K748	1	Gasket Kit
	141A281	1	Gasket, Carburetor Flange
1	141P708	1	Bowl, Fuel
2	141P741	1	Plate, Choke
3	141P698	4	Screw & Washer, Choke & Throttle Plate Mtg.
4	141P706	1	Plate, Throttle
5	141P705	1	Retainer, Seal
6	141-661	1	Seal, Rubber
7	141P704	1	Valve Seat Assy., Fuel
8	141P696	1	Washer, Fuel Valve Seat
9	141P703	1	Shaft, Float
10	141P702	1	Float Assy.
11	141P701	1	Gasket, Bowl to Body
12	141P700	1	Screw Throttle Stop
13	141P711	1	Spring, Throttle Stop
14	141P713	1	Needle Idle Adjusting
15	141P710	1	Spring, Idle Needle
16	141A77	1	Washer, Main Jet Assy.
17	141-712	1	Jet Assy., Main (Adjustable)
18	141B679	1	Shaft, Choke
22	141P709	1	Shaft & Lever, Throttle





CARBURETOR PARTS GROUP - SPEC A ONLY

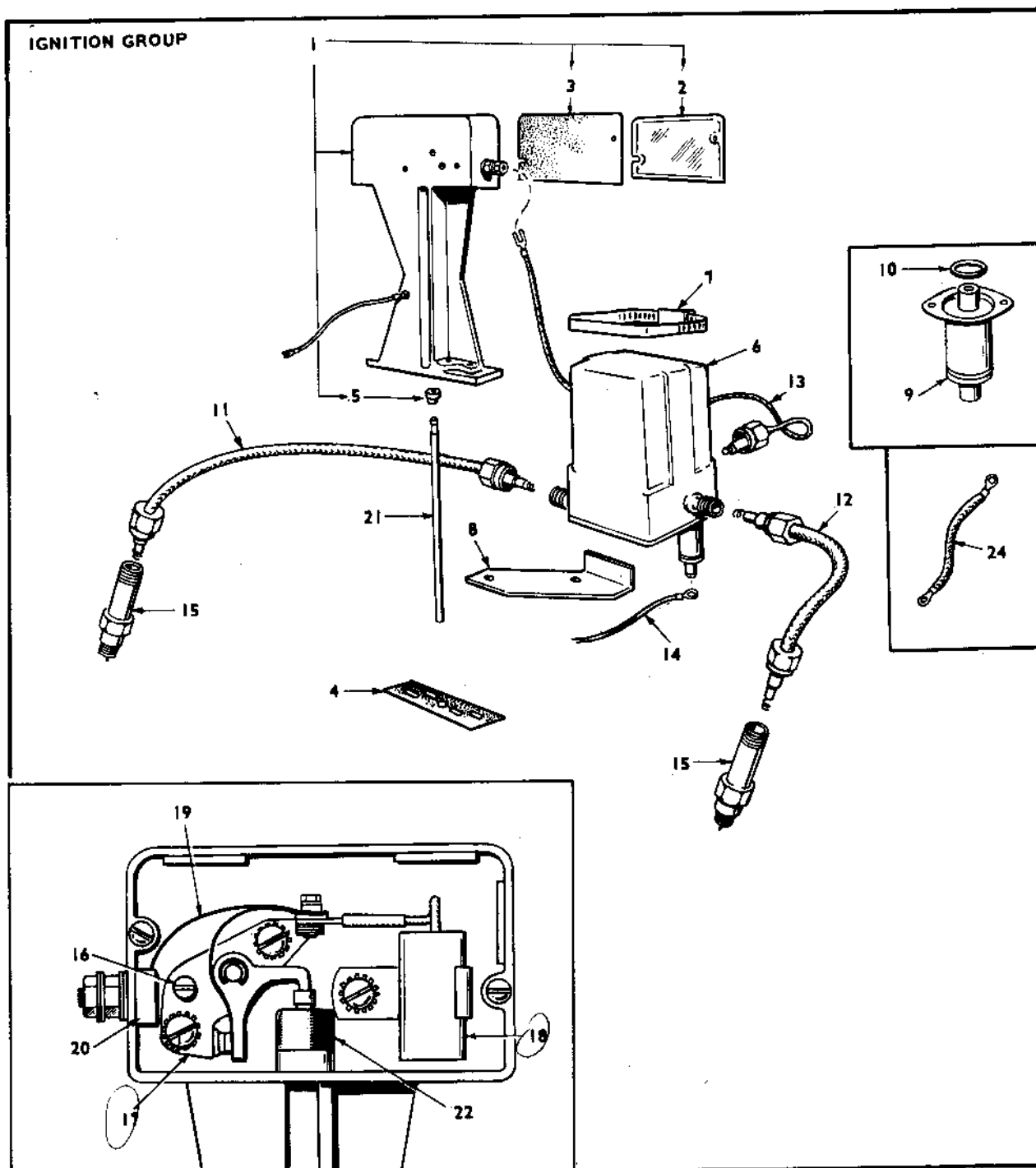
NOTE: See separate group begin Spec B

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	143D323	1	Carburetor, Gasoline
	143K332	1	Repair Kit
	143K201	1	**Gasket Kit
	141A281	1	*Gasket, Carb. Flange
1	143-202	1	Valve, Throttle
2	143P331	1	Shaft & Lever, Throttle
3	143-204	1	Valve, Choke
4	143P330	1	**Needle, Idle Jet & High Speed Adj.
5	143P329	1	**Nozzle
6	143A315	1	Shaft Choke
7	143-208	1	Screw & Gasket, Bowl
8	143A15	1	*Gasket, Fuel Inlet Valve

REF. NO.	PART NO.	QTY. USED	PARTS DESCRIPTION
9	143-209	1	*Gasket, Bowl Screw
10	143-297	1	Float & Lever
11	143-210	1	Bowl
12	143-77	1	*Gasket, Bowl Ring
13	143-212	1	**Pin, Float Lever
14	143-341	1	**Valve, Fuel Inlet
15	143-213	1	Screw, Idle Adj.
16	812-14	4	**Screw, #3-48 x 3/16, Choke & Throttle Valve
17	143-110	1	Plug, Expansion
18	143-214	1	Spring, Throttle Adj. Screw
19	143-112	1	Spring, Idle Adj. Screw
20	143-114	1	Spring, High Spd. Adj. Needle
21	143-215	1	Screw, Throttle Lever Adj.
	143-342	1	Diaphragm

* - Contained in Gasket Kit.
 ** - Contained in Repair Kit.

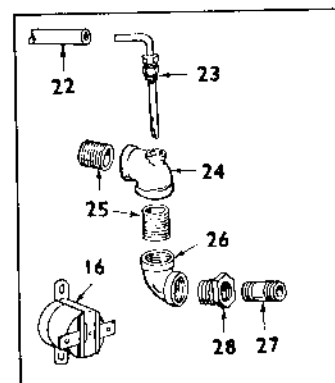
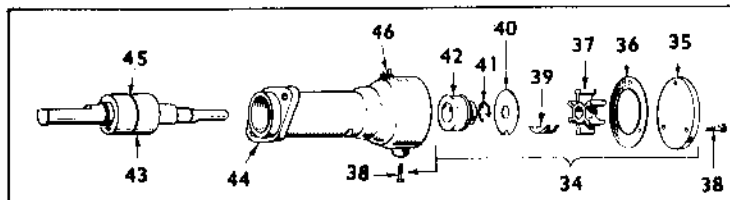
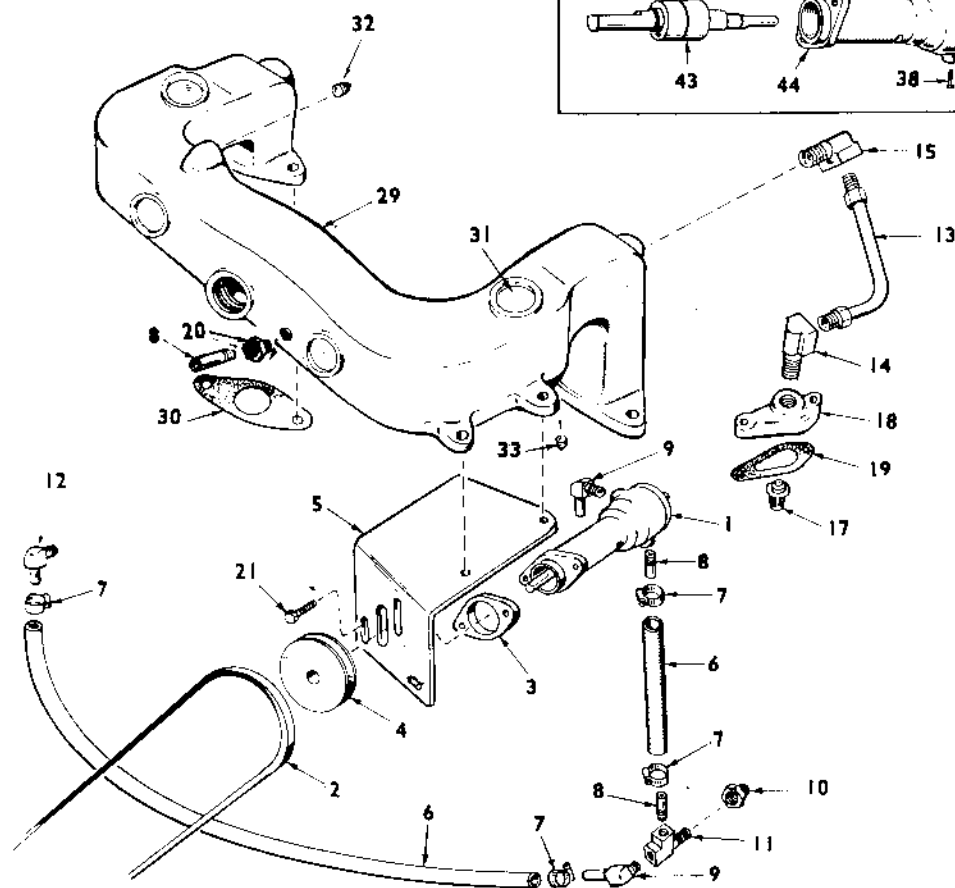
IGNITION GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	160A963	1	Box Assy., Ign. Brkr. (Complete)
2	160A930	1	Cover, Breaker Box
3	160A150	1	Gasket, Brkr. Box Cover
4	160A43	1	Gasket, Brkr. Box Mtg.
5	160A929	1	Bushing, Breaker Box
6	166B382	1	Coil, Ignition
7	503-465	1	Clamp, Ign. Coil Mtg.
8	166B407	1	Bracket, Coil Mounting
9	312P83	1	Condenser, Ignition
10	509-102	1	Seal, O-Ring, Condenser Mtg.
11	167A1480	1	Cable, Spark Plug (Shielded) - Left Side (17')
12	167A1485	1	Cable, Spark Plug (Shielded) - Right Side (8')
13	336A1569	1	Lead, Coil to Brkr. Box (Shielded)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
14	336A1562	1	Lead, Capacitor to Thermostat Switch
15	167-199	2	Plug, Spark (Shielded)
16	160A75	1	Pivot, Breaker Arm
17	160A2	1	Point Set, Breaker
18	312A69	1	Condenser, Breaker Box
19	160A428	1	Strap, Point Set to Brkr. Box Term. Blk.
20	160A349	1	Terminal Assy., Brkr. Box
21	160A723	1	Plunger, Breaker
22	160A263	1	Diaphragm, Plunger
24	337A70	1	Strap, Ground
	815-269	2	Screw, Brkr. Box Mounting
	526-201	2	Washer, Flat -- Brkr. Box Mtg.
	850-38	1	Lockwasher, Brkr. Box Mtg.

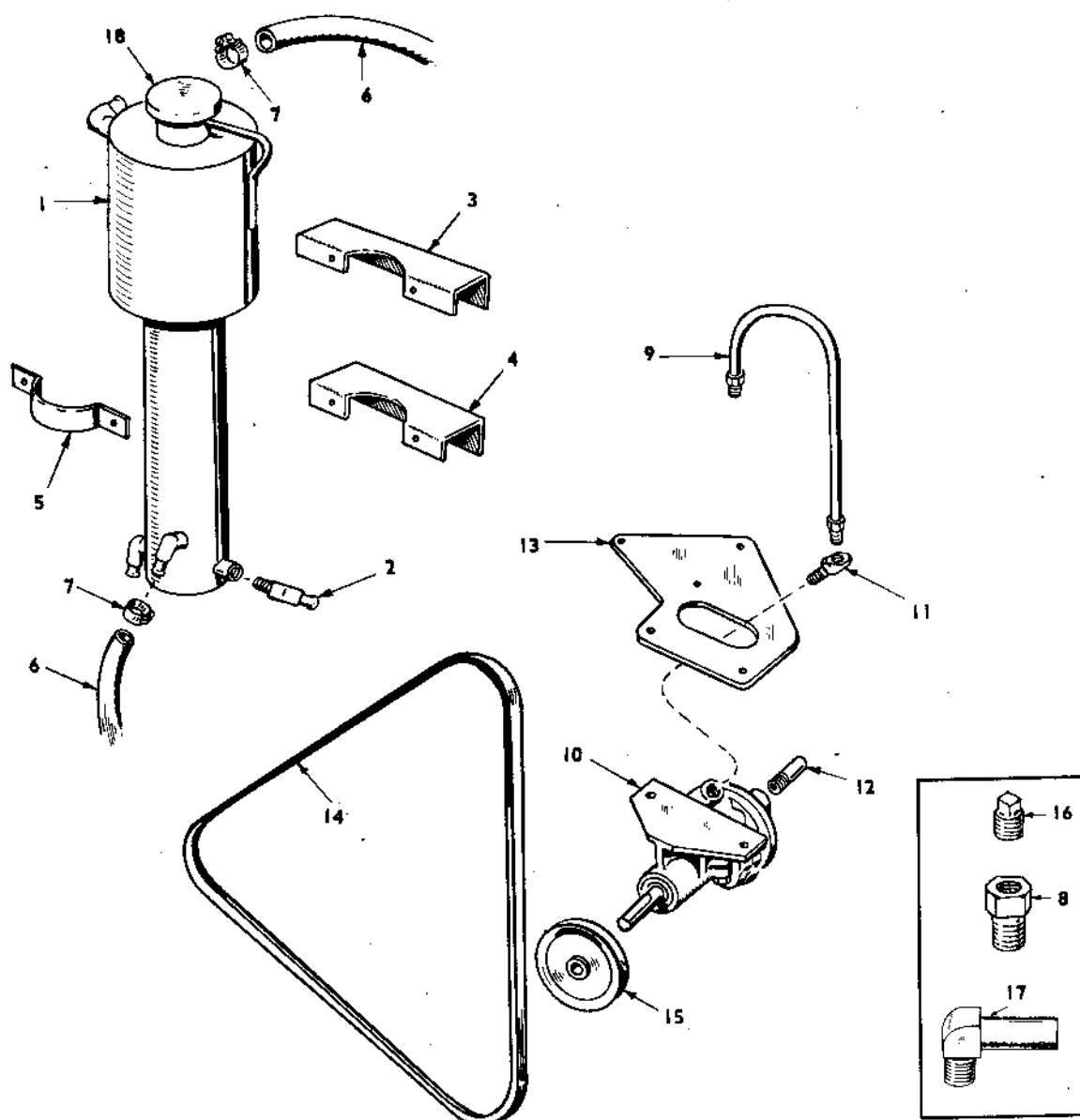
EXHAUST MANIFOLD AND WATER PUMP GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	131B165	1	Pump, Water
2	511P73	1	Belt, Pump Drive
3	131A173	1	Flange, Pump Mtg.
4	512P42	1	Pulley, Water Pump
5	131B171	1	Bracket, Pump Mtg.
6	HOSE, WATER		
	503-487	1	Pump to Cyl. Blk. (4-3/8")
	503-433	1	Cyl. Blk. to Blk. (17")
7	503-183	6	Clamp, Hose
8	502A256	3	Nipple, (1) Wtr. Pump, (1) Tee (1) Manifold
9	502P304	2	Elbow, Hose - (1) Water Pump, (1) Tee
10	502-50	1	Bushing, Cyl. Blk. (RH)
11	502-164	1	Tee, Cyl. Block (RH)
12	502A302	1	Elbow, Hose - Cyl. Blk. (LH)
13	130A643	2	Line, Water - Cyl. Hd. to Exh. Man.
14	502-73	2	Elbow, Male - Cyl. Hd.
15	502-74	2	Elbow, Male - Exh. Man.
16	309A151	1	Switch, Hi-Temp. Cut-off
17	309B130	2	Thermostat
18	309B185	2	Housing, Thermostat
19	309A186	2	Gasket, Thermostat Hsg.
20	502-50	1	Bushing Exh. Man.
21	114A23	2	Screw, Hex - Wtr. Pump Mtg.
22	503-159	1	Hose, Man. to Exh. Elbow
23	154B894	1	Tube, Water to Exh. Elbow
24	505-485	1	Tee, Red., Exh. (1-1/4 x 1/2 x 1-1/4")
25	505-625	2	Nipple, Exh. (1-1/4")
26	505-493	1	Elbow, Exh. (1-1/4" x 90°)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
27	505-624	1	Nipple, Exh. (1 x 2")
28	505-617	1	Bushing, Red., Exh. (1-1/4 x 1")
29	154B983	1	Manifold, Exh.
30	154A973	2	Gasket, Exh. Man.
31	517-41	4	Plug, Expansion - Exh. Man.
32	505-54	1	Plug, Pipe 1/4" - Exh. Man.
33	502-80	3	Plug, Pipe 1/8" (1) Man. (1) Wtr. Pump
34	131K179	1	Kit, Water Pump Repair - Incl. Parts Marked *
35	131A162	1	*Cover, Water Pump
36	131A161	1	*Gasket, Wtr. Pump Cover
37	131P160	1	*Impeller, Wtr. Pump
38	815-283	1	Screw (#8-32 x 1/2" Hex Brass), (1)*Cam (3) Cover
39	131C159	1	*Cam, Water Pump
40	131A158	1	*Wearplate, Wtr. Pump
41	518P221	1	*Ring, Retaining
42	131P157	1	*Seal, Water Pump
43	131A166	1	Bearing & Shaft Assy., Wtr. Pump
44		1	Body, Water Pump (Not Sold)
45	509-113	1	"O" Ring
46	502-80	2	Plug, Water Pump
47	403A832	1	Bracket, Support - Lifting Eye-Bolt
	SCREW, HEX		
	800-5	3	Wtr. Pump Brkt. Mtg. (1/4-20x3/4")
	800-7	4	Therm. Hsg. Mtg. (1/4-20 x 1")
	800-29	4	Exh. Manifold Mtg. (5/16-18 x 1-1/8")

34 * Parts contained in 131K179 Water pump Repair Kit.



HEAT EXCHANGER GROUP

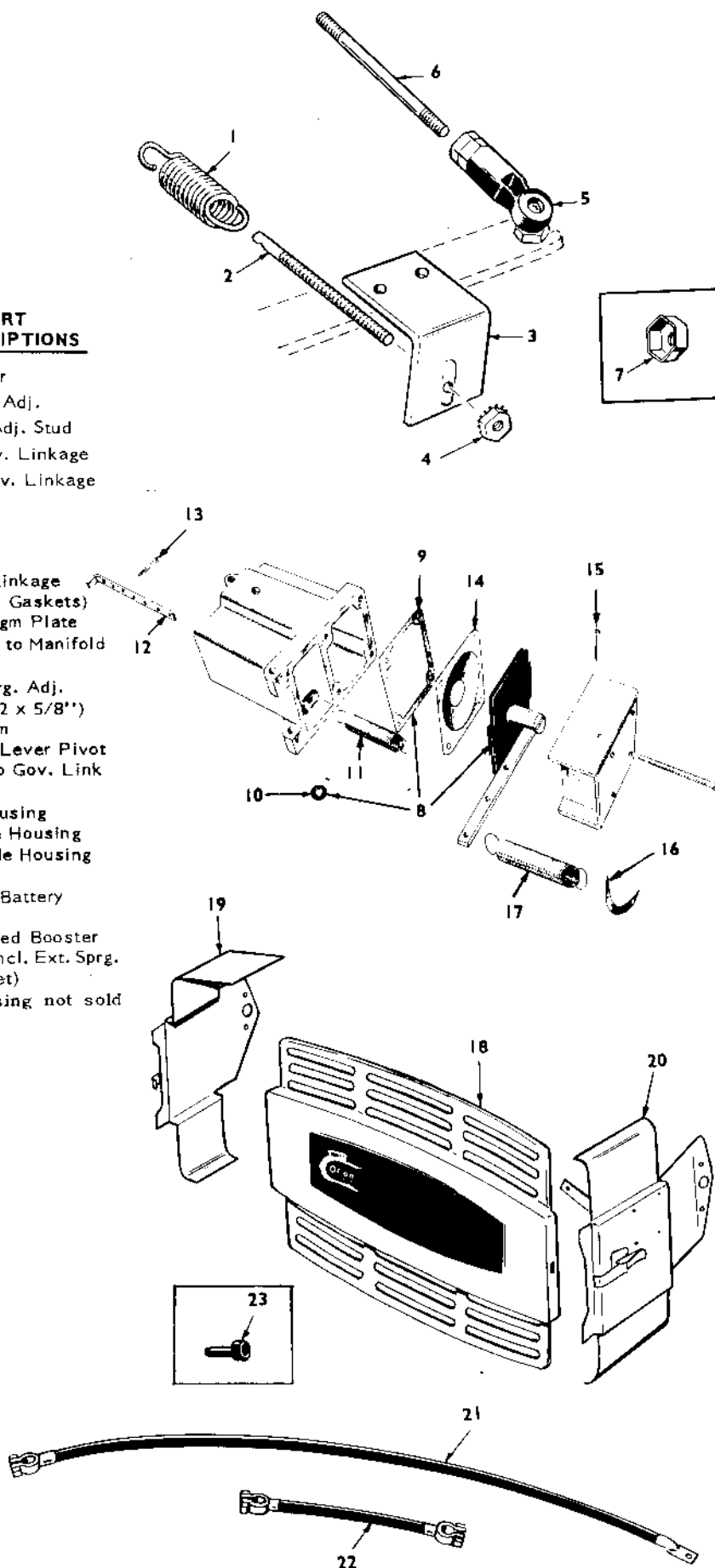
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	130C629	1	Exchanger, Heat
2	502-237	1	Elbow, Heat Exchanger
3	130B630	1	Bracket, Heat Exch. Mtg. (Upper)
4	130B631	1	Bracket, Heat Exch. Mtg. (Lower)
5	130A632	2	Strap, Heat Exch. Mtg.
6	HOSE		
	503-434	1	Heat Exch. to Exh. Manifold
	503-315	1	Heat Exch. to Fresh Wtr. Pump
7	503-183	5	Clamp, Hose
8	502-126	1	Connector, Tee to Tube
9	130A644	1	Line, Fresh Wtr. Pump to Block)

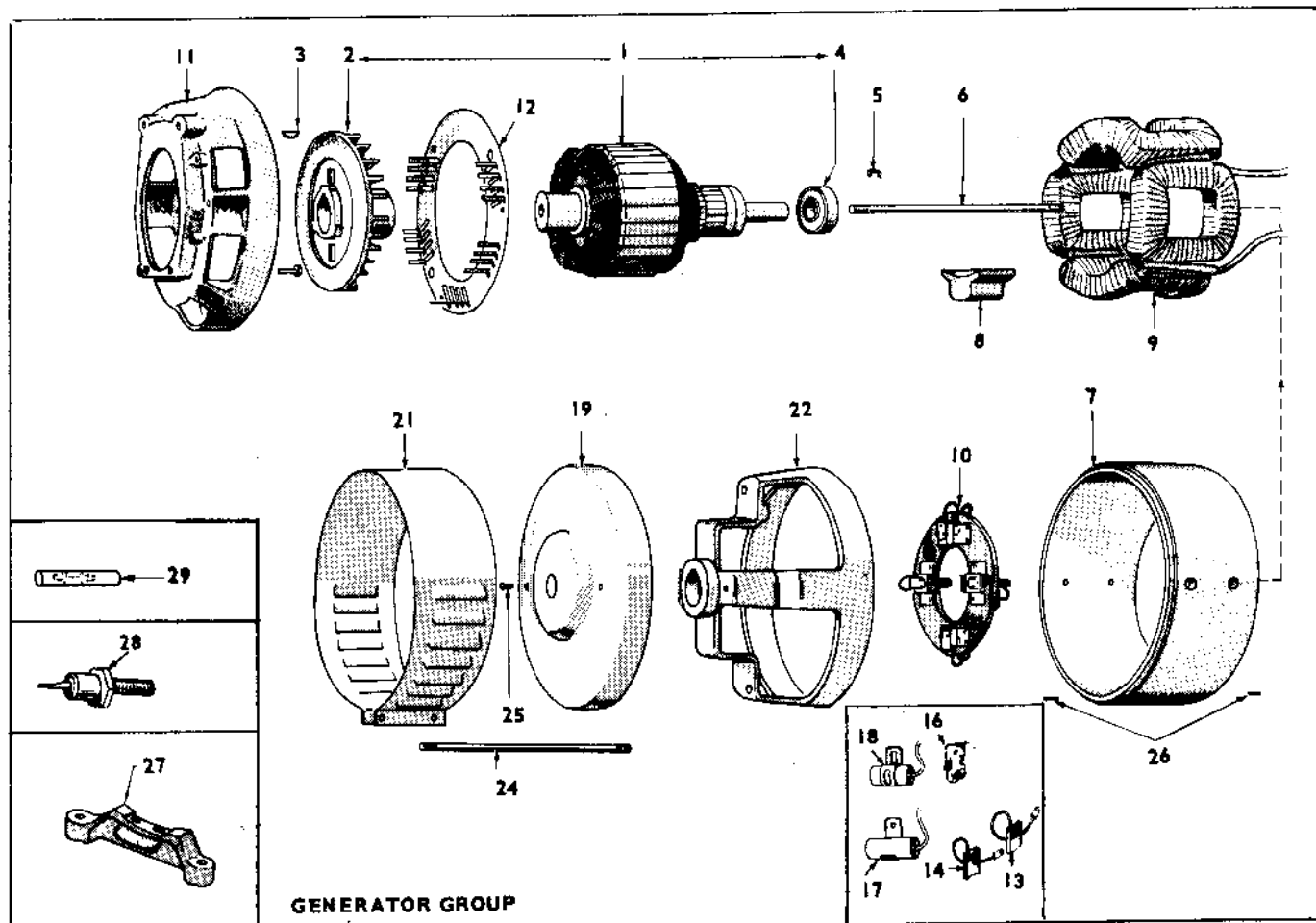
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
10	PUMP, FRESH WATER - LESS PULLEY		
	132B95	1	To Spec B
	132B110	1	Begin Spec B
11	502-275	1	Elbow, Male (45°), Fresh Wtr.
12	502-238	1	Nipple, Fresh Wtr. Pump Inlet
13	131B172	1	Bracket, Fresh Water Pump
14	511P41	1	Belt, Water Pump
15	512P42	1	Pulley, Fresh Wtr. Pump
16	505-110	1	Plug, Manifold
17	502P304	1	Elbow, Salt Water Pump Outlet
18	130-661	1	Cap, Pressure
	REPAIR KIT, WATER PUMP (INCL. SHAFT AND BEARINGS, SEAL GASKET, AND COVER SCREWS)		
	132K80		For Oberdorfer Mdl. IGP#50-P11 (Onan 132B95)
	132K111		For Oberdorfer Mdl. IGP#50-P15 (Onan 132B110)

GOVERNOR, VACUUM SPEED BOOSTER,
HOUSING AND BATTERY CABLES GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	150A731	1	Spring, Governor
2	150A147	1	Stud, Gov. Spd. Adj.
3	150B1010	1	Bracket, Gov. Adj. Stud
4	870-131	2	Nut, Keps - Gov. Linkage
5	150A939	1	Joint, Ball - Gov. Linkage
6	ROD, GOVERNOR CONTROL		
	520A187	1	Spec A only
	520A623	1	Begin Spec B
7	870P188	1	Pinnut, Choke Linkage
8	150K1031	1	Diaphragm (Incl. Gaskets)
9	150A668	1	Gasket, Diaphragm Plate
10	150A425	1	Gasket, Booster to Manifold
11	150A475	1	Spring, Internal
12	150A376	1	Bracket, Int. Sprg. Adj.
13	516-39	1	Pin, Cotter (3/32 x 5/8")
14	150A666	1	Plate, Diaphragm
15	516A85	1	Pin, Diaphragm Lever Pivot
16	150A430	1	Bracket, Sprg. to Gov. Link
17	150A471	1	Spring, External
18	405C1556	1	Panel, Front Housing
19	405C1558	1	Panel, Left Side Housing
20	405C1557	1	Panel, Right Side Housing
21	416A77	2	Cable, Battery
22	416A4	1	Cable, Jumper - Battery
23	508-136	4	Bumper, Rubber
	150K1030	1	Kit, Vacuum Speed Booster Replacement (Incl. Ext. Sprg. Mounting Gasket)

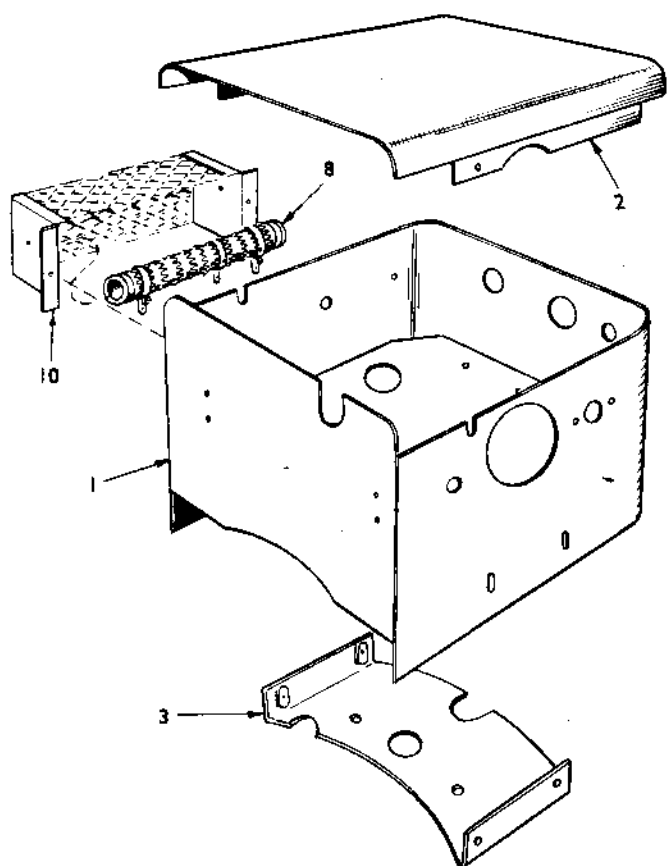
NOTE: Vacuum Booster Cover and Housing not sold separately.





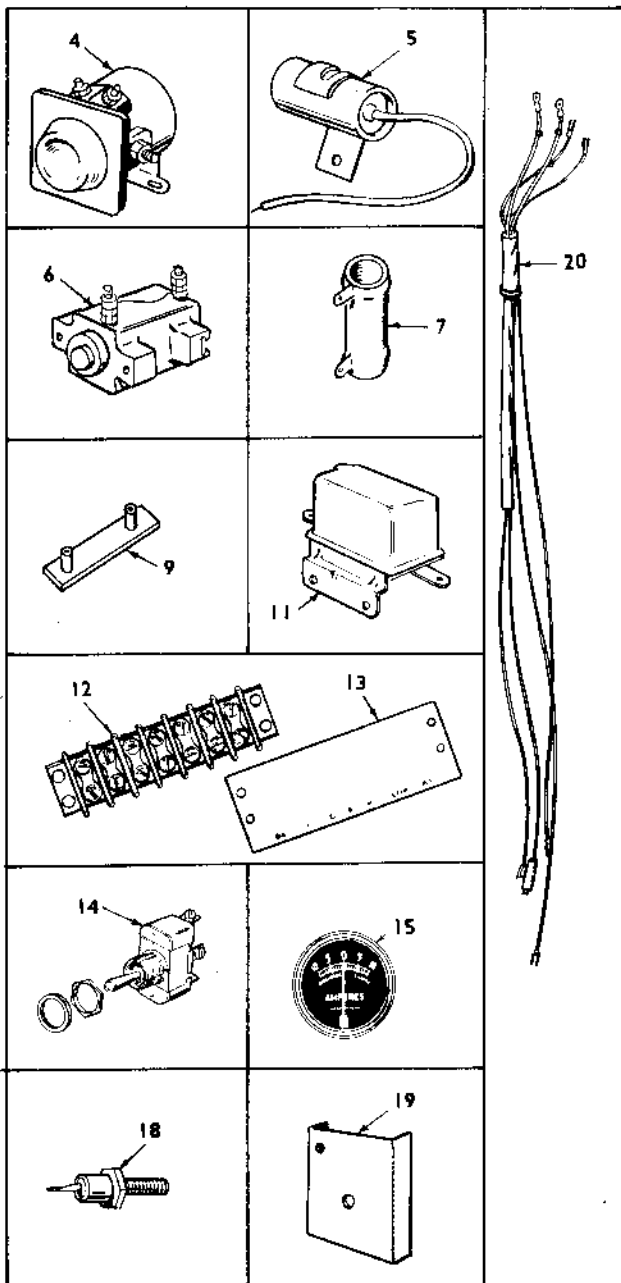
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	*	1	Armature Assy. (Incl. Brg. & Blower)
2	205C53	1	Blower, Generator
3	515-6	1	Key, Blower to Crankshaft
4	510A47	1	Bearing, Ball - Armature
5	232A596	1	Clip, Bearing Stop
6	STUD, ARMATURE THROUGH		
			Key 1
	520A491	1	120-V or 240-V, 1-Ph.
	520A525	1	120/240-V., 1-Ph.
			Key 2
	520A407	1	120-V or 240-V., 1-Ph.
	520A595	1	120/240-V., 1-Ph.
7	FRAME ONLY, GENERATOR (Machined & Drilled)		
	210D244	1	Key 1
	210B238	1	Key 2
8	SHOE, POLE-FIELD		
	221A91	4	Key 1
	221A90	4	Key 2
9	*	1	Coil Assy., Field (Set of 4 Coils)
10	RIG ASSEMBLY, BRUSH		
			Key 1
	212C294	1	120-V or 240-V, 1-Ph.
	212C295	1	120/240-V, 1-Ph.
			Key 2
	212C293	1	120-V, 1-Ph.
	212C294	1	240-V, 1-Ph.
	212C295	1	120/240-V, 1-Ph.
11	231E124	1	Adapter, Generator to Engine
12	232B1256	1	Scroll, Air Baffle
13	214A61	4	Brush, Commutator
14	BRUSH, COLLECTOR RING		
			Key 1

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
	214A50	4	120-V or 240-V, 1-Ph.
	214A56	3	120/240-V, 1-Ph.
			Key 2
	214A56	4	120-V, 1-Ph.
	214A50	4	240-V, 1-Ph.
	214A56	3	120/240-V, 1-Ph.
16	212B1105	4	Spring, Commutator Brush
16	SPRING, COLLECTOR RING BRUSH		
	212B1105	4	120-V or 240-V, 1-Ph.
	212B1105	3	120/240-V, 1-Ph.
17	CONDENSER, .5 Mfd. (DC)		
	312A17	1	120-V or 240-V, 1-Ph.
	312A27	1	120/240-V, 1-Ph.
18	CONDENSER - 1 Mfd. (AC)		
	312A58	1	120-V or 240-V, 1-Ph.
	312A58	2	120/240-V, 1-Ph.
19	211C114	1	Cover, End Bell
21	BAND, END BELL		
	234C255	1	120-V or 240-V, 1-Ph.
	234C256	1	120/240-V, 1-Ph.
22	BELL, END		
	211D154	1	120-V or 240-V, 1-Ph.
	211D155	1	120/240-V, 1-Ph.
24	STUD, GENERATOR THROUGH		
	520A502	2	Key 1 (5/16 x 12-3/16")
	520A498	2	Key 2 (5/16 x 15-11/16")
25	815-48	2	Screw, End Bell Cover Mtg. (#10-32 x 3/8")
26	516-103	2	Pin, Roll - Gen. Frame
27	232D1798	1	Support, Generator
28	358B37	1	Rectifier
29	332-556	1	Connector, Rectifier Lead



CONTROL GROUP — PRIOR TO SPEC C

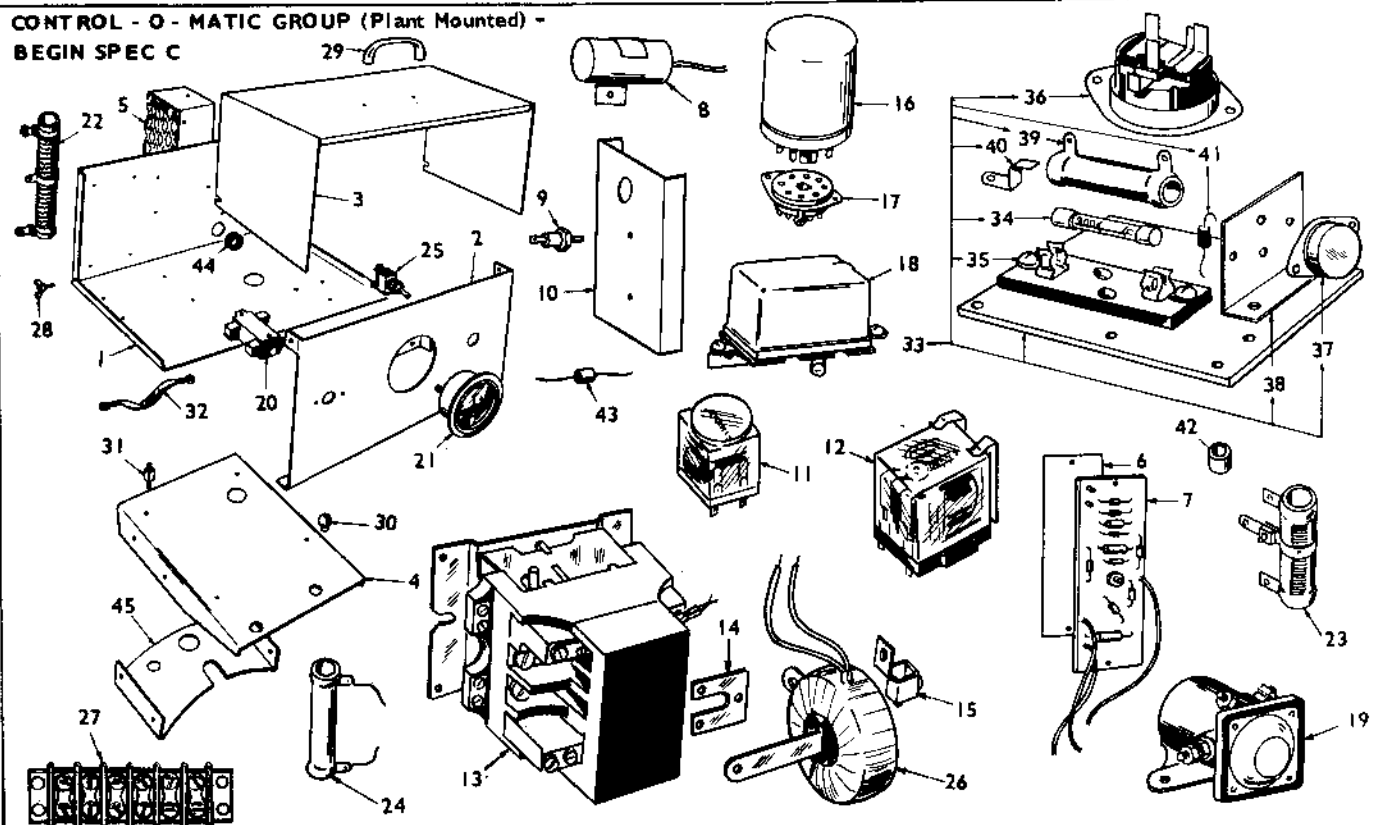
NOTE: See separate group for plants beginning Spec C.



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	301C2525	1	Box, Control
2	301C1244	1	Cover, Control Box
3	301B2532	1	Bracket, Control Box Mtg.
4	307B845	1	Solenoid, Start
5	312A57	1	Condenser (I. Mfd.) Start Sol. Supp.
6	320B104	1	Relay, Emergency
7	RESISTOR, FIXED		
	304A60	1	1.72 Ohm, 25 Watt
	304A217	1	1. Ohm, 10 Watt
	304A251	1	30 Ohm, 5 Watt
8	304A483	1	Resistor, Adj. (Mts. Outside Control Box)
9	304A610	1	Support, Adj. Resistor

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
10	301B2528	1	Box, Resistor Mounting
11	305B383	1	Regulator, Two-step Voltage - Charge Circuit
12	332A745	1	Block, Term. Remote Control
13	332A922	1	Strip, Marker (B+, I, 2, 3, H, I, L, O, P, A, I)
14	308P154	1	Switch, Start-Stop
15	302-58	1	Ammeter, Charge
16	307B253	1	Relay, Stop
17	307B642	1	Relay, Start-Disconnect
18	305B235	1	Rectifier
19	305A254	1	Sink, Heat (Rect. Mtg. Bracket)
20	338B334	1	Harness

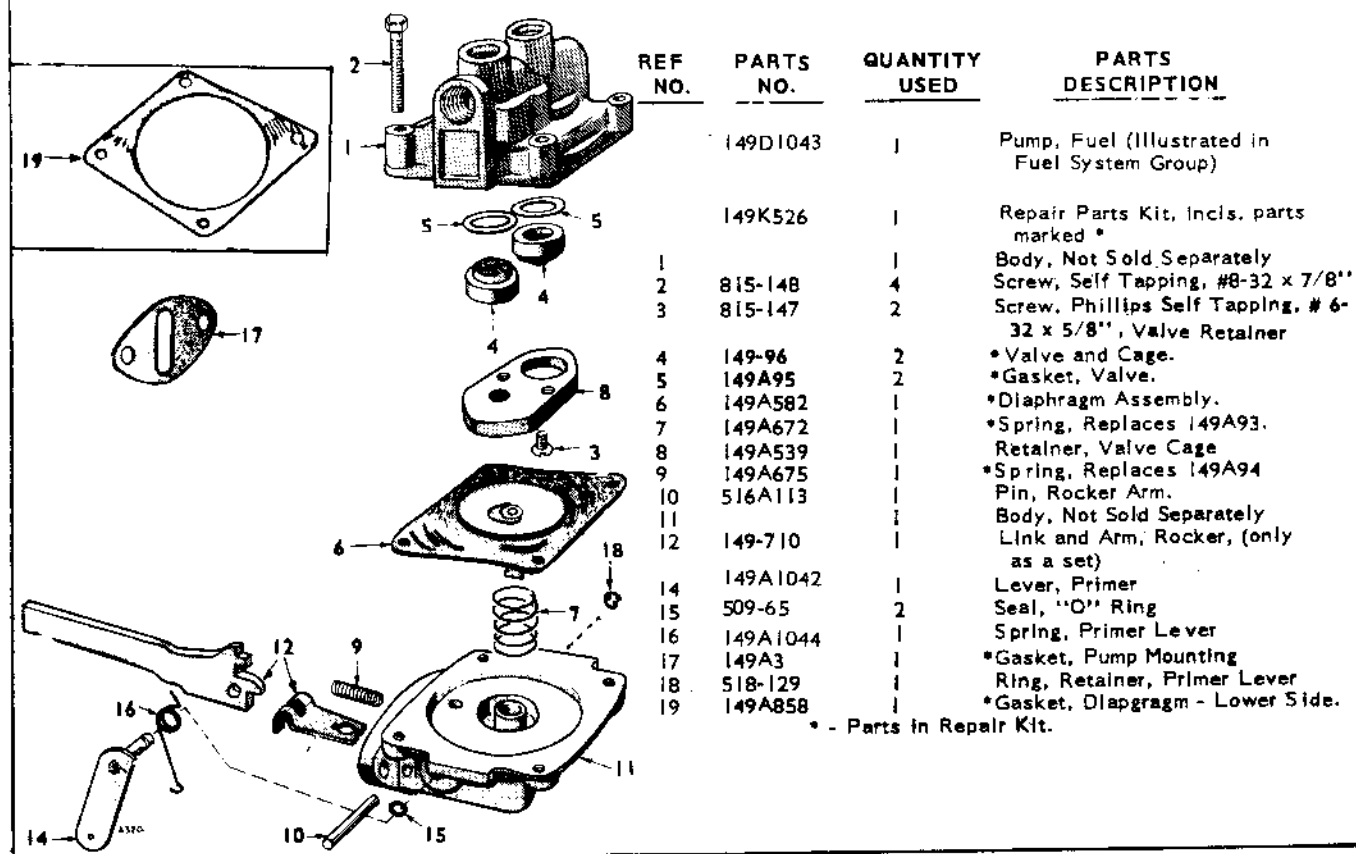
**CONTROL - O - Matic GROUP (Plant Mounted) -
BEGIN SPEC C**



NOTE: See separate group for control parts prior to
Spec C.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	301D2889	1	Chassis, Control	23	RESISTOR, ADJUSTABLE		
2	301B2886	1	Panel, Control Box	304A282	1		120-Volt Plants (300-ohm, 25-W)
3	301C2888	1	Cover, Control Box	304A131	1		240-V & 120/240-V Plants (750-Ohm, 25-W)
4	301C2887	1	Plate, Control Box Mtg.	24	RESISTOR, FIXED		
5	301B2871	1	Guard, Resistor	304A192	1		3-Ohm, 10-Watt
6	332A932	1	Board, Insulating	304A217	1		1-Ohm, 10-Watt
7	AMPLIFIER ASSY., LOAD SENSOR			304A60	1		72- Ohm, 25-Watt
	300B573	1	120-Volt Plants	25	308P138	1	Switch, Selector
	300B574	1	240-Volt Plants	26	TRANSFORMER, CURRENT		
	300B575	1	120/240-Volt Plants	315A241	1		120-V & 240-V plants
8	312A57	1	Capacitor (1 Mfd.)	315A291	1		120/240-V Plants
9	305A235	2	Diode, Reverse Current	27	332A699	1	Block, Terminal
10	363A29	1	Sink, Heat (2 Diode)	28	518-56	2	Screw, Wing (10-32 x 1/2")
11	307A981	1	Relay, Start-Stop	29	406A318	1	Handle
12	307B642	1	Relay, Start Disconnect	30	402P331	2	Foot, Control Box Mtg. Plate
13	CONTACTOR			31	402A354	4	Mount, Shock
	307C665	1	120-Volt Plants	32	337A56	1	Strap, Ground
	307C664	1	240-Volt Plants	33	300B567	1	Control Assy., Bilge Blower - Includes Parts marked *
	307C666	1	120/240-Volt Plants	34	321-139	1	*Fuse (6-1/4 Amp)
14	JUMPER			35	321-140	1	*Holder, Fuse
	307A685	2	120-Volt Plants	36	307A993	1	*Relay, Thermal
	160-144	2	120/240-Volt Plants	37	362-18	1	*Transistor, Power
15	TERMINAL			38	363A36	1	*Sink, Heat - Transistor Mtg.
	332-142	4	120-Volt Plants	39	304A121	1	*Resistor (10-Ohm, 10-Watt)
	332-517	4	240-Volt Plants	40	304-670	2	*Feet, Resistor Mtg.
	332-517	6	120/240-Volt Plants	41	350-524	1	*Resistor (100-Ohm, 1/2-Watt)
16	RELAY, START-RUN			42	332A1179	3	Spacer
	307A62	1	120-Volt & 240-Volt Plants	43	357A4	1	Diode
	307A858	1	120/240-Volt Plants	44	508P21	1	Grommet
17	323P380	1	Socket, Relay	45	301B2532	1	Bracket, Mtg. to Gen.
18	305B383	1	Relay, Charge Reg. (2-Step)				
19	307B845	1	Relay, Start Solenoid				
20	320B104	1	Switch, Emergency				
21	302A58	1	Ammeter, Charge (10-0-10)				
22	304A483	1	Resistor, tapped (6-Ohms, 225-Watts)				

FUEL PUMP PARTS GROUP



REF NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
	149D1043	1	Pump, Fuel (Illustrated in Fuel System Group)
	149K526	1	Repair Parts Kit, Incis. parts marked *
1		1	Body, Not Sold Separately
2	815-148	4	Screw, Self Tapping, #8-32 x 7/8"
3	815-147	2	Screw, Phillips Self Tapping, # 6-32 x 5/8", Valve Retainer
4	149-96	2	* Valve and Cage.
5	149A95	2	* Gasket, Valve.
6	149A582	1	* Diaphragm Assembly.
7	149A672	1	* Spring, Replaces 149A93.
8	149A539	1	Retainer, Valve Cage
9	149A675	1	* Spring, Replaces 149A94
10	516A113	1	Pin, Rocker Arm.
11		1	Body, Not Sold Separately
12	149-710	1	Link and Arm, Rocker, (only as a set)
14	149A1042	1	Lever, Primer
15	509-65	2	Seal, "O" Ring
16	149A1044	1	Spring, Primer Lever
17	149A3	1	* Gasket, Pump Mounting
18	518-129	1	Ring, Retainer, Primer Lever
19	149A858	1	* Gasket, Diaphragm - Lower Side.

* - Parts in Repair Kit.

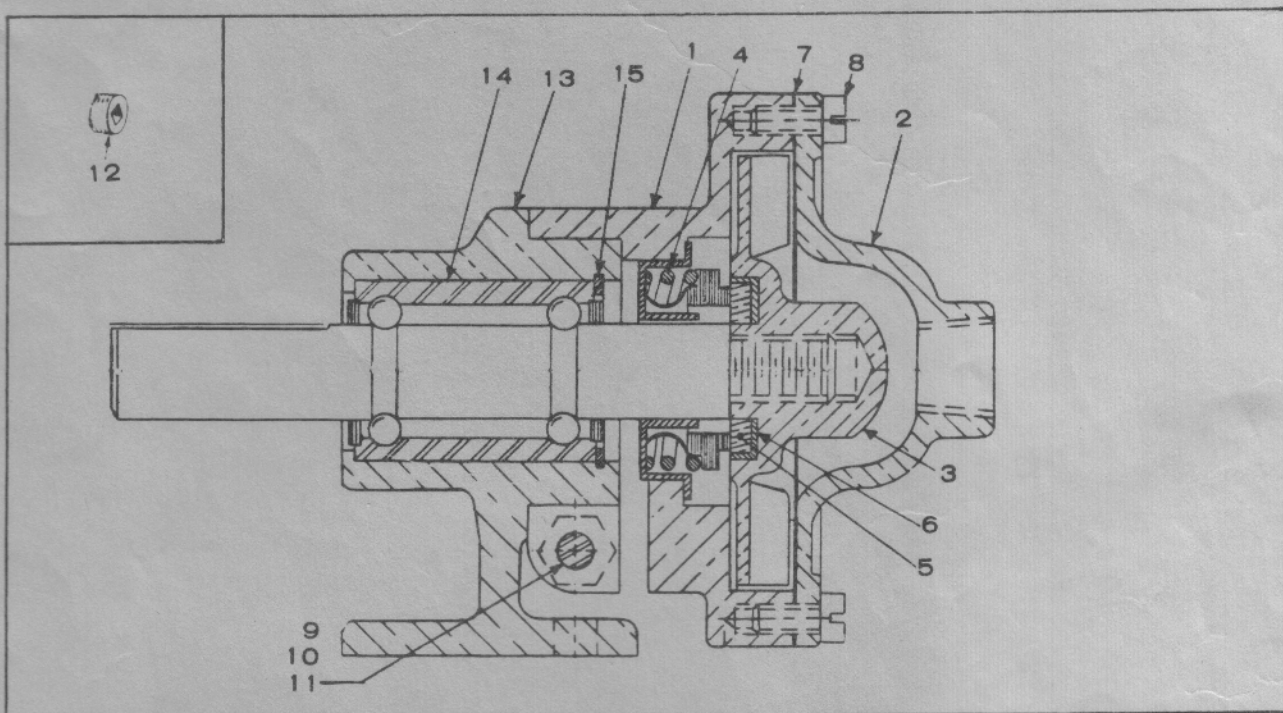
SERVICE KITS AND MISCELLANEOUS

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
	168K102	1	Gasket Kit, Engine
	160K836	1	Ignition Tune-up Kit
	ENGINE OVERHAUL KIT		
	522K221	1	Spec A only
	522K229	1	Begin Spec B
	525P216	1	Touch-up Paint(Pressurized Can)
			16-Ounce - Marine White Enamel

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

ONAN 968-1005 (5/15/70)
SUPPLEMENTARY PARTS LIST

Parts listed below are components of the 132B110 water pump (Oberdorfer Model 50P15) used on the MCKK,MJB,MDJB,MDJE,MJC,MDJC, and MDJF plants with heat exchanger cooling system. Use this list in addition to parts listed in the main parts catalogs 927-350,968-320,968-321,968-325,968-340,968-341, and 968-345.

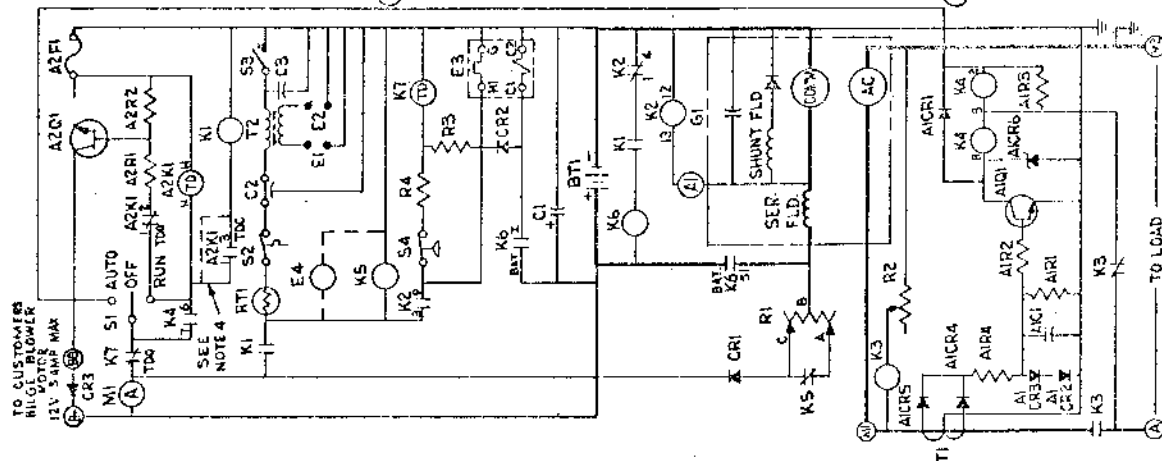


WATER PUMP PARTS GROUP (132B110)

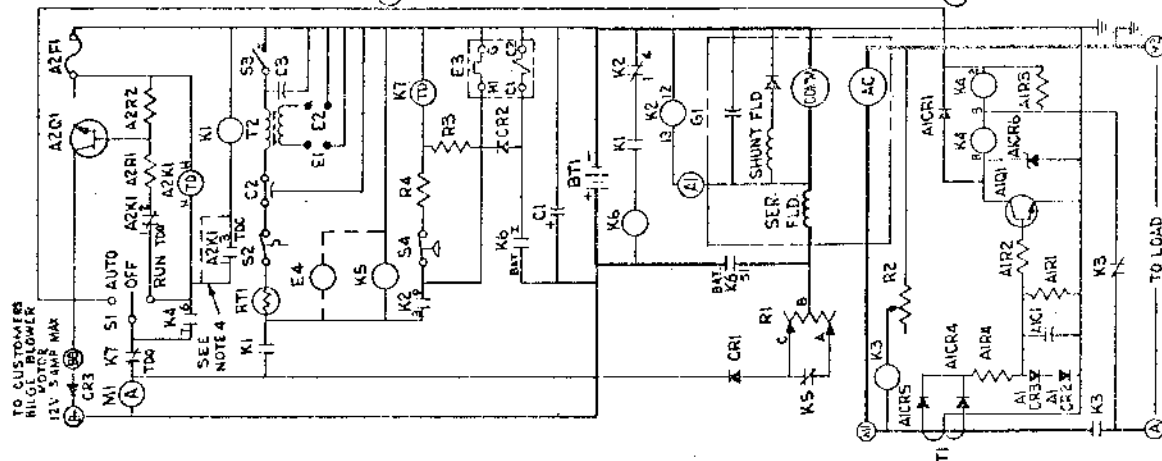
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1		1	Body, Pump - Oberdorfer #C-6475
2		1	Cover, Pump - Oberdorfer #B-6483
3	132-114	1	*Impeller
4	132P101	1	*Seal
5	132P91	1	*Face, Wear
6	132P92	1	*Seat, Seal
7	132-112	1	*Gasket, Cover
8	132-113	6	*Screw, Cover
9		1	Cap Screw, Oberdorfer #A-5014
10		1	Lockwasher, Oberdorfer #A-5016
11		1	Nut, Hex - Oberdorfer #A-5015
12		1	Plug, Drain - Oberdorfer #A-6062
13		1	Pedestal, Oberdorfer #C-6484
14	132-89	1	*Shaft and Bearing Assembly
15	132-132	1	Ring, Snap
	132K111	1	Repair Kit, Includes Parts Marked *

* - Parts included in the 132K111 Repair Kit.

NOTE: Order parts with Onan part numbers from your Onan dealer. Order parts that do not have an Onan number from Oberdorfer Foundries, Pump Division, Syracuse, New York.



SCHEMATIC



- NOTES
1. MOVE 377560 GROUND STRAP UNDER HEAD OF GROUND-ROCK ON UNDER SIDE OF CHASSIS FOR FUTURE CONNECTION TO GENERATOR FRAME
 2. MOUNT #1 & #2 W/2 CONTACT TERMINALS COME.
 3. TO AVOID CONTACT BETWEEN COVER AND LEAD TERMINATIONS ON CONTACTOR, ROUTE ALL LEADS DOWN OR OUT TO THE SIDE OF CONTACTOR.
 4. TO DISCIPLE BULKY BLOWER CONTROL, CLIP INTER-TRIP RELAY ON START. MOVE THIS LEAD FROM APU TERMINAL 1 TO START TERMINAL 3.

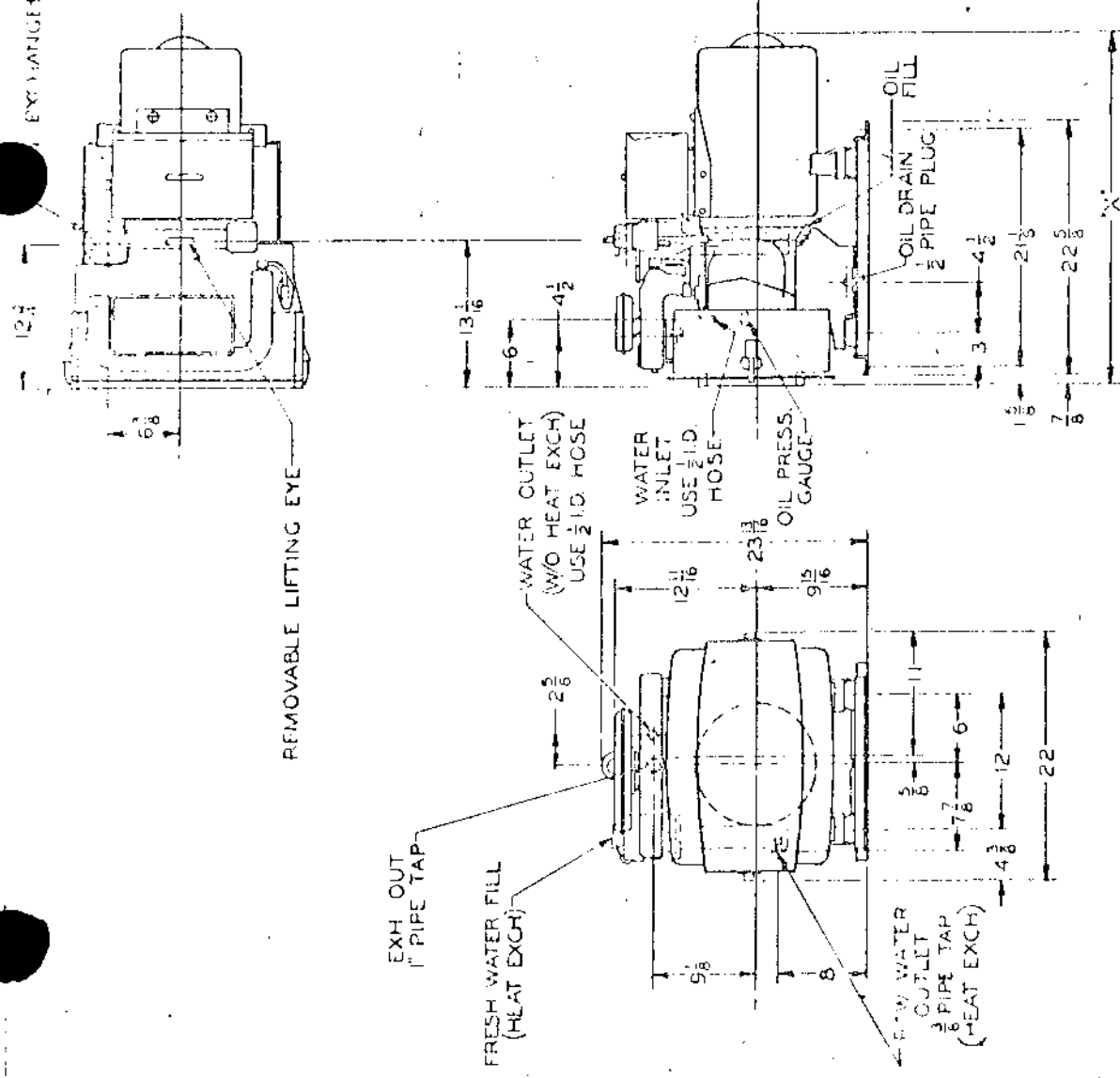
NOTE:
UNLESS OTHERWISE NOTED,
ALL COMPONENTS ARE SHOWN IN
THE DE-ENERGIZED POSITION.

REL. DRS.	PART NO.	QTY.	DESCRIPTION
A1	3005373	1	APPL. - STOP
A2	3005372	1	BOARD - REGULATING
A3	3005367	1	ASSY - BILGE BLOWER CONTROL
A4	3024119	2	SPACER
C1	3172437	1	CAPACITOR - 10 MFD
C2	3052435	2	DIODE - REVERSE CURRENT
C3	363449	1	HEAT SINK - 2 DIODE
C4	307444	1	DIODE
K1	3074881	1	RELAY - START STOP
K2	3078842	1	RELAY - START DISCONNECT
K3	3870065	1	CONTACTOR
K4	3074885	2	JUMPER
K5	317-142	2	TERMINAL
K6	3842045	1	LABEL - CRUTION
K7	307462	1	LABEL - START RUN
K8	323P324	1	SOLENOID
K9	3006383	1	RELAY - 2 STEP CHARGE REG
K10	3078845	1	RELAY - START SPEED/ID
K11	3206704	1	RELAY - EMERGENCY
K12	3842483	1	ARMER - CHARGE 10-2-10
K13	3074469	1	RESISTOR - 10K, 10W
K14	3042717	1	RESISTOR - 10K, 10W
K15	304460	1	RESISTOR - 30-0HM 25 W
K16	3042717	1	RESISTOR - 10K, 10W
K17	304460	1	RESISTOR - 30-0HM 25 W
K18	3042717	1	RESISTOR - 10K, 10W
K19	304460	1	RESISTOR - 30-0HM 25 W
K20	3042717	1	RESISTOR - 10K, 10W
K21	304460	1	RESISTOR - 30-0HM 25 W
K22	3042717	1	RESISTOR - 10K, 10W
K23	304460	1	RESISTOR - 30-0HM 25 W
K24	3042717	1	RESISTOR - 10K, 10W
K25	304460	1	RESISTOR - 30-0HM 25 W
K26	3042717	1	RESISTOR - 10K, 10W
K27	304460	1	RESISTOR - 30-0HM 25 W
K28	3042717	1	RESISTOR - 10K, 10W
K29	304460	1	RESISTOR - 30-0HM 25 W
K30	3042717	1	RESISTOR - 10K, 10W
K31	304460	1	RESISTOR - 30-0HM 25 W
K32	3042717	1	RESISTOR - 10K, 10W
K33	304460	1	RESISTOR - 30-0HM 25 W
K34	3042717	1	RESISTOR - 10K, 10W
K35	304460	1	RESISTOR - 30-0HM 25 W
K36	3042717	1	RESISTOR - 10K, 10W
K37	304460	1	RESISTOR - 30-0HM 25 W
K38	3042717	1	RESISTOR - 10K, 10W
K39	304460	1	RESISTOR - 30-0HM 25 W
K40	3042717	1	RESISTOR - 10K, 10W
K41	304460	1	RESISTOR - 30-0HM 25 W
K42	3042717	1	RESISTOR - 10K, 10W
K43	304460	1	RESISTOR - 30-0HM 25 W
K44	3042717	1	RESISTOR - 10K, 10W
K45	304460	1	RESISTOR - 30-0HM 25 W
K46	3042717	1	RESISTOR - 10K, 10W
K47	304460	1	RESISTOR - 30-0HM 25 W
K48	3042717	1	RESISTOR - 10K, 10W
K49	304460	1	RESISTOR - 30-0HM 25 W
K50	3042717	1	RESISTOR - 10K, 10W
K51	304460	1	RESISTOR - 30-0HM 25 W
K52	3042717	1	RESISTOR - 10K, 10W
K53	304460	1	RESISTOR - 30-0HM 25 W
K54	3042717	1	RESISTOR - 10K, 10W
K55	304460	1	RESISTOR - 30-0HM 25 W
K56	3042717	1	RESISTOR - 10K, 10W
K57	304460	1	RESISTOR - 30-0HM 25 W
K58	3042717	1	RESISTOR - 10K, 10W
K59	304460	1	RESISTOR - 30-0HM 25 W
K60	3042717	1	RESISTOR - 10K, 10W
K61	304460	1	RESISTOR - 30-0HM 25 W
K62	3042717	1	RESISTOR - 10K, 10W
K63	304460	1	RESISTOR - 30-0HM 25 W
K64	3042717	1	RESISTOR - 10K, 10W
K65	304460	1	RESISTOR - 30-0HM 25 W
K66	3042717	1	RESISTOR - 10K, 10W
K67	304460	1	RESISTOR - 30-0HM 25 W
K68	3042717	1	RESISTOR - 10K, 10W
K69	304460	1	RESISTOR - 30-0HM 25 W
K70	3042717	1	RESISTOR - 10K, 10W

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CONNECTIONS TO MATH

EXH. WATER (WHEN USED)



EMERGENCY RELAY RESET
CHARGE AMMETER
RUN OFF AUTO SWITCH
FUEL INLET (2 IN WT FLARE) (B)
FUEL FILTER (A)

MODEL	KW	GEN. OUTPUT	STARTING	WEIGHT DRY		LENGTH "X"
				W/O HEAT EXCH	WITH HEAT EXCH	
4MCCCK-1	4	10 LO PF 2W	AUTO DEMAND	361	375	27 5/8
4MCCCK-3	4	10 LO PF 3W	AUTO DEMAND	361	375	29 5/8
605MCCCK-1	6.5	10 LO PF 2W	AUTO DEMAND	414	428	31 7/8
605MCCCK-3	6.5	10 LO PF 3W	AUTO DEMAND	414	428	33 1/8

500C1173
OUTLINE - INSTALLATION

Circuits activating when Gen set starts

Push toggle switch to run
Power runs through bilge blower control to K1 relay (start-stop relay)
The relay is energised this sends power to starter relay and to RT1 and K5
Power for RT1 (ignition circuit) provided from ammeter

starter relay is energised
left side of K1 is cranker circuit
right side of K1 is K5 (charge regulator) and RT1 (points)
when A1 from generator energises
K2 energises
choke heats - H1 on (right side of K2)
K1 cranker circuit - off (left side of K2)

LOP (low oil pressure detection circuit) - oil when no pressure
Time delay on K7 (emergency relay) heats up breaking power (S4 normally shut!) LOP gets power from H1

Overheat then S2 breaks ignition circuit, no restart until it cools.

C1 gets power from big starter relay. If it does not start, C1 power heats Time thermal Delay on K7 breaking connection.

When cranking, C1 magnetizes choke coil closing choke.

*Control-o-matic
transistor
replacement*



NTE199

T-NPN, Si, Low Noise Preamplifier

V _{CEO}	70V	P _D	360mW
V _{CE(sat)}	50V	f _T	400 Min
V _{BE(sat)}	5V	f _T	90MHz Min
I _C	100mA		



FO9?
Replaces: LCG199, GL 62 SK3245



Signal Transistor

