Onan®

OPERATORS MANUAL AND PARTS CATALOG

ONAN
ELECTRIC GENERATING PLANTS
MCCK
SERIES

927-350 4A65

ADDITIONAL COPY
PRICE $1.00

Printed in U.S.A.

ONAN GENERATORS CANADA LIMITED
P. O. BOX 652 GUELPH, ONTARIO

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

TABLE OF CONTENTS

ONAN
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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 DIVISION of STUDEBAKER CORPORATION
Minneapolis 14, Minnesota

IMPORTANT...RETURN WARRANTY CARD ATTACHED TO UNIT

GENERAL INFORMATION

THIS OPERATOR'S MANUAL PROVIDES INFORMATION FOR PROPER INSTALLATION, OPERATION, AND MAINTENANCE PROCEDURES.

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

FOR MAJOR REPAIR INFORMATION, USE THE FORM PROVIDED BELOW. A SERVICE MANUAL WILL BE SENT UPON RECEIPT OF $1.00. INDIVIDUAL WIRING DIAGRAMS ARE AVAILABLE AND WILL BE INCLUDED, WHEN REQUESTED.

PLEASE!

WHEN FILLING OUT THE FORM, BE SURE YOU HAVE INDICATED THE MODEL AND SPEC NUMBER., AND THE SERIAL NUMBER EXACTLY AS SHOWN ON THE UNIT NAMEPLATE. THIS INFORMATION IS NECESSARY TO PROPERLY IDENTIFY THE UNIT AMONG THE MANY BASIC AND SPECIAL MODELS MANUFACTURED.

TRIM ALONG THIS LINE

ONAN

DIVISION of STUDEBAKER CORPORATION

2515 UNIVERSITY AVENUE S. E. MINNEAPOLIS 14, MINNESOTA

I ENCLOSE $1.00. PLEASE SEND ME A

MAJOR SERVICE MANUAL (Contains details for making all recommended repairs and general overhaul of unit)

IMPORTANT!

BE SURE TO INCLUDE COMPLETE MODEL, SPEC., AND SERIAL NUMBER OF UNIT (SEE ONAN NAMEPLATE)

MODEL AND SPEC. of my unit is _____

SERIAL NUMBER of my unit is _____

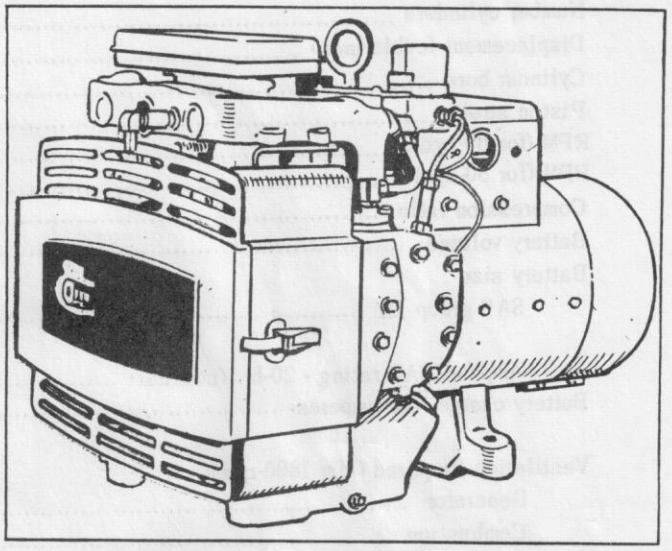
Name _____

St. or R.F.D. _____

City _____ Zone ___ State _____

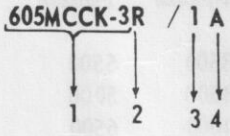
INTRODUCTION

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



TYPICAL MODEL MCCK

How to read MODEL and SPEC. NO.



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

MANUFACTURER'S WARRANTY

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

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

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

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

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

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)	50	50
Cylinder bore	3-1/4	3-1/4
Piston stroke	3	3
RPM (for 60-cycle)	1800	1800
RPM (for 50-cycle)	1500	1500
Compression ratio	7:1	7:1
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 5-8 High	2-3 Low 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 ± %	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. **LOAD TRANSFER CONTROL**
   Controls running of plant and transfers load.

7. **HEAT EXCHANGER COOLING**
   Closed system using fresh water in plant.

8. **LOAD TRANSFER SWITCH**
   Three pole, three position to select generator or shore power.

9. **ELASTO-MUFFLE**
   Neoprene silencer for wet exhaust.

10. **SEPARATE FUEL TANK**
    Various sizes.

11. **EXHAUST LINE TEMPERATURE SWITCH**
    Shuts down plant if water flow fails.

12. **OTHER**
    See your dealer.

MEMORANDUM

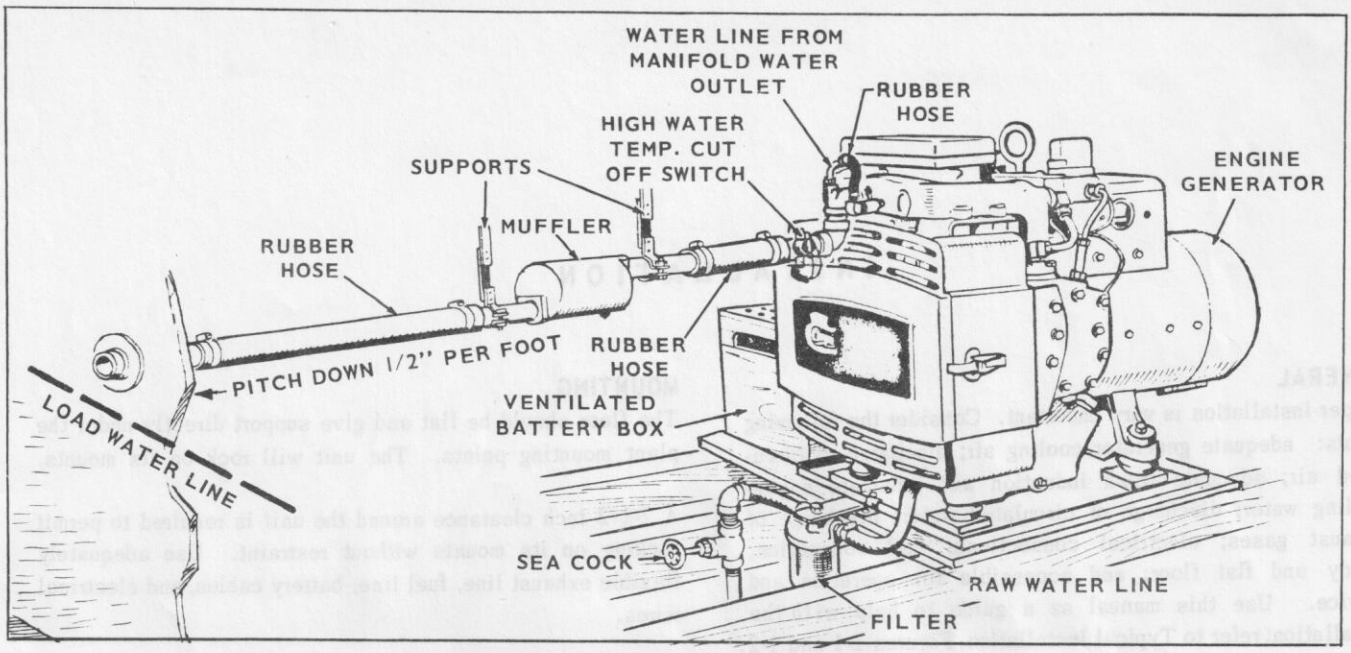

WATER LINE FROM MANIFOLD WATER OUTLET
RUBBER HOSE
HIGH WATER TEMP. CUT OFF SWITCH
SUPPORTS
ENGINE GENERATOR
MUFFLER
RUBBER HOSE
PITCH DOWN 1/2" PER FOOT
RUBBER HOSE
LOAD WATER LINE
VENTILATED BATTERY BOX
SEA COCK
RAW WATER LINE
FILTER

FIG. 1-1

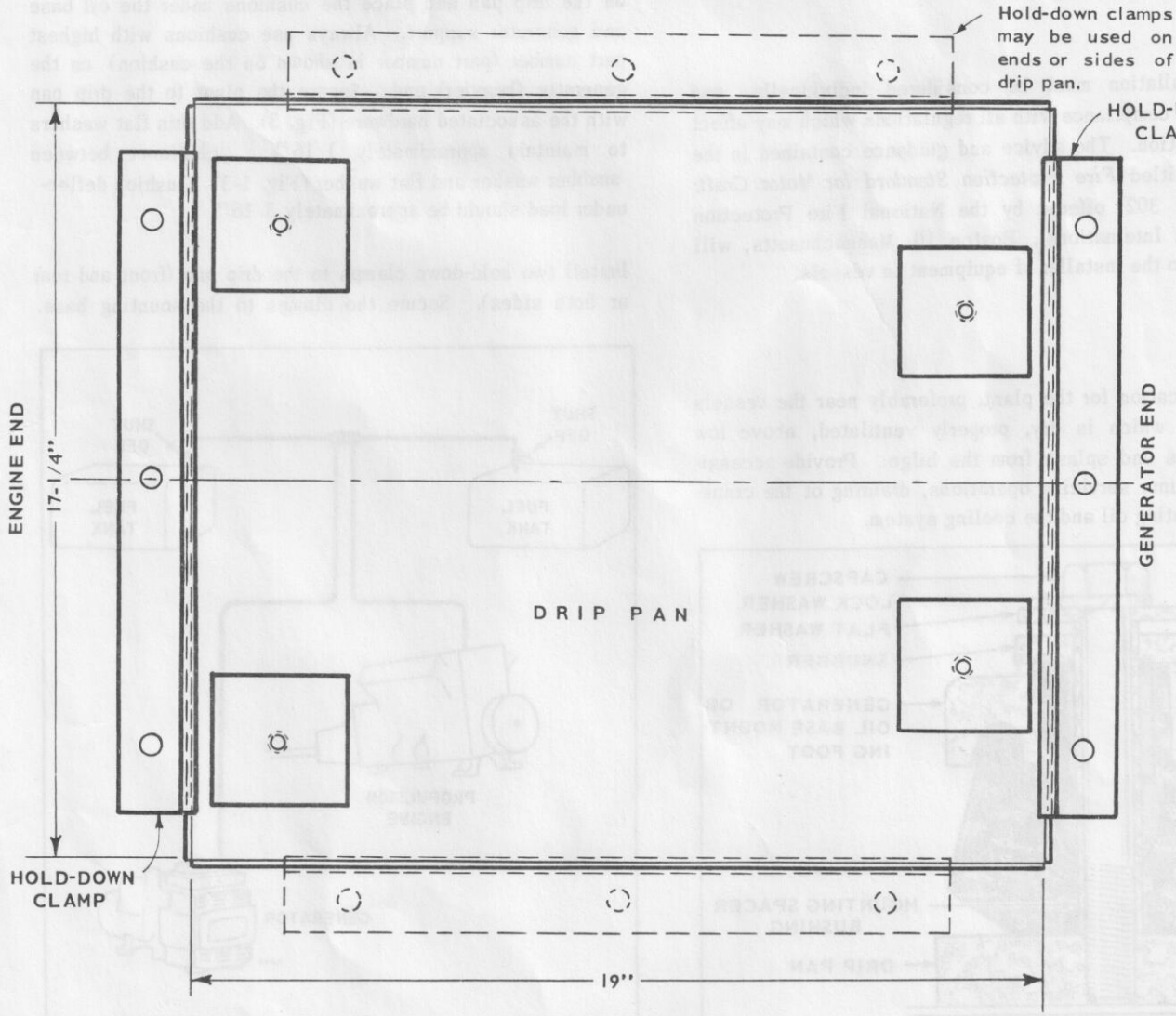

Hold-down clamps may be used on ends or sides of drip pan.
HOLD-DOWN CLAMP
ENGINE END
17-1/4"
DRIP PAN
GENERATOR END
HOLD-DOWN CLAMP
19"

FIG. 1-2

INSTALLATION

GENERAL

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

Each installation must be considered individually and executed in compliance with all regulations which may affect the installation. The advice and guidance contained in the booklet entitled *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.

LOCATION

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

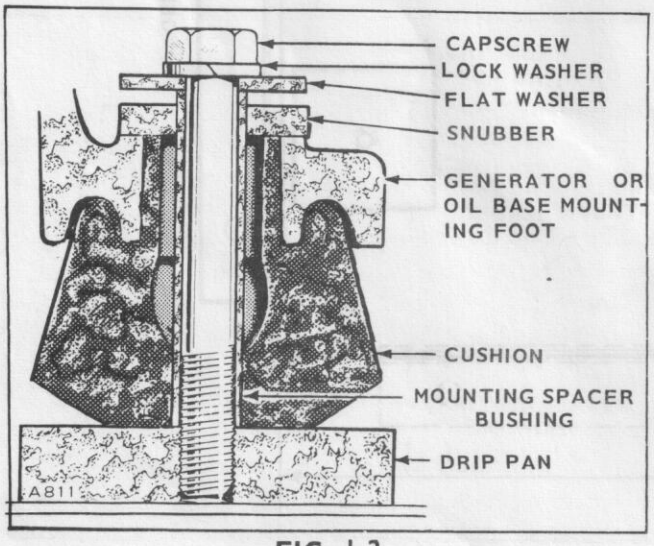


FIG. 1-3

MOUNTING

The floor should be flat and give support directly under the plant mounting points. The unit will rock on its mounts.

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

To install cone-type mounting cushions, 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 (heavier) 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 (Fig. 1-3). Cushion deflec- under load should be approximately 3/16".

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

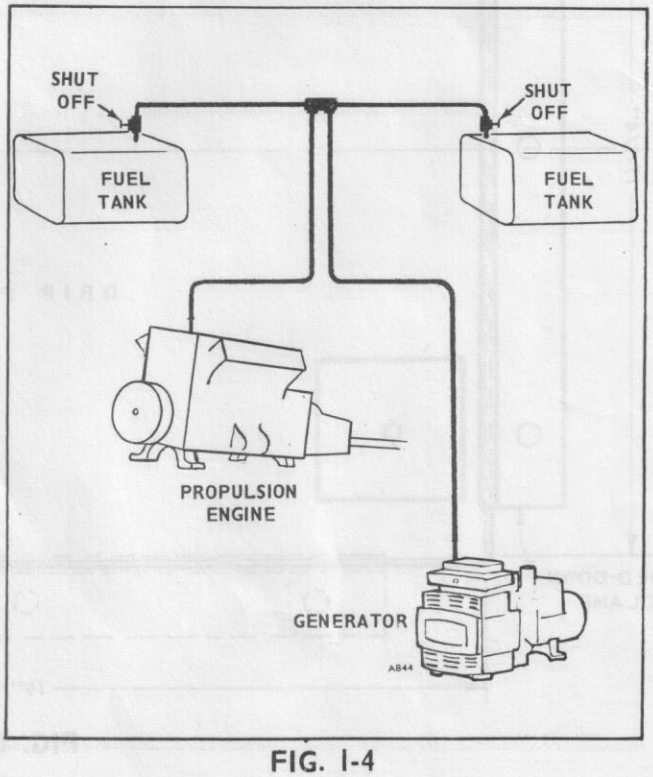


FIG. 1-4

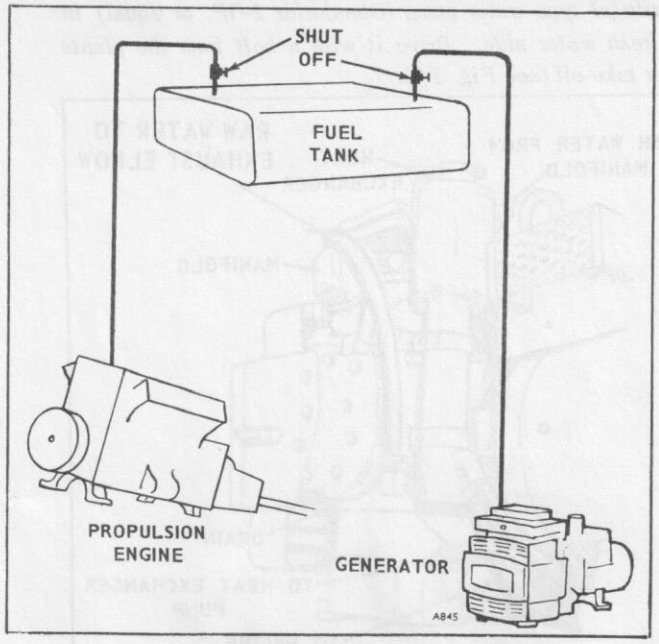


FIG. 1-5

FUEL TANK AND LINES

If a separate fuel tank is used, install it so the bottom of the tank will be less than 6-feet below the fuel pump. To prevent siphoning if a system leak occurs, locate the tank below the level of the engines 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. 1-4 and 1-5).

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

Use 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. 1-6).

A shut-off valve at the tank and near plant is recommended for service convenience (Fig. 1-6).

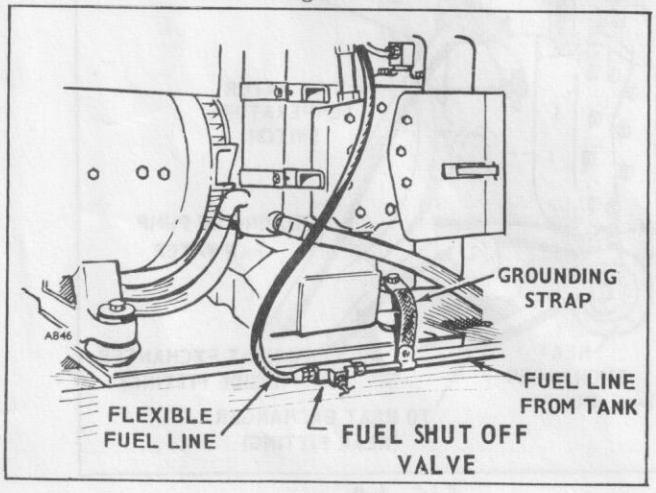


FIG. 1-6

OIL DRAIN

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

VENTILATION

The generating plant requires fresh air for combustion and 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. 1-1 and 1-2. 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. 1-1 and 1-2).
5. For turns use sweeping (long radius) elbows
6. Increase one pipe size for every 10 ft. in length

Provide a tee for water line connection for wet exhaust (Fig. 1-7) - refer to Water Discharge Line Instructions. Raise the dry portion of the exhaust line high enough to prevent water back-flowing into the engine under all conditions.

The recommended Neoprene muffler (silencer) is an *Elasto-Muffle* 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 burn 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" O.D. hose (see Fig. 1-8). Use a section of hose (that will not collapse) near the plant (or entire run) to absorb vibrations. The inside diameter of the plumbing must be 1/2" or larger. 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 assure the supply line is large enough. Reduce resistance on pipe runs longer than 5-ft. by using larger inside diameter plumbing. To prove suction line is air tight, see that no bubbles appear in discharged water. An *air leak* reduces lubrication and *shortens life of pumps impeller.* Install a strainer in the water suction line inlet and where accessible for cleaning.

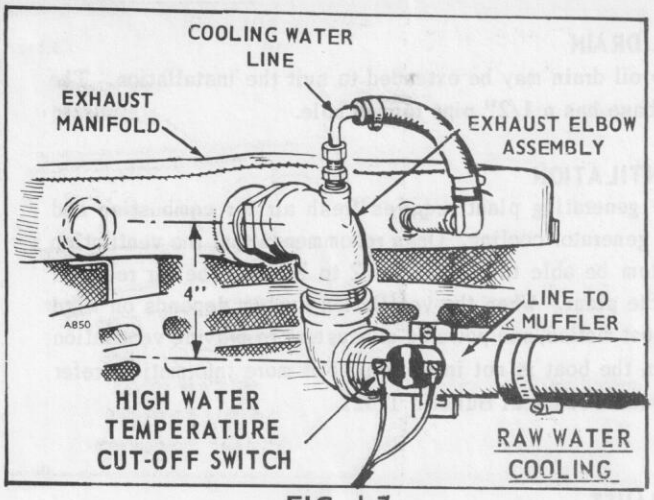


FIG. 1-7

WATER DISCHARGE LINE

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

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 cooling water into the exhaust line several feet ahead of the neoprene silencer. Be sure water will not back flow in 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 hazard exists, or where owner wants to prevent 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 many anti-freezes) will damage the impeller. Instead, connect the neoprene impeller pump in 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 plants power take-off (see Fig. 1-9).*

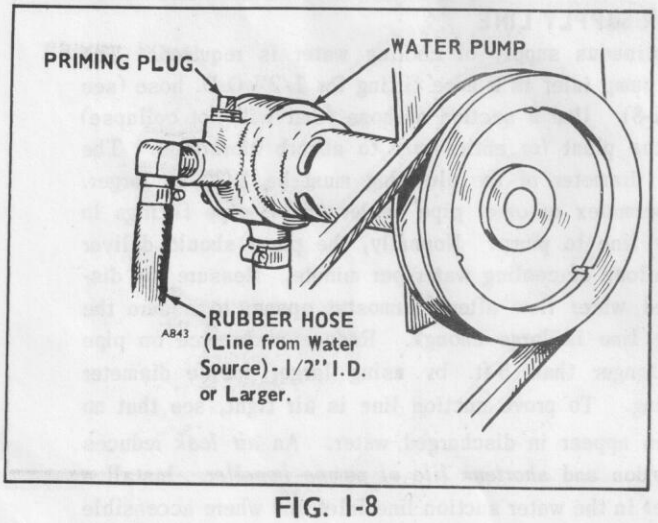


FIG. 1-8

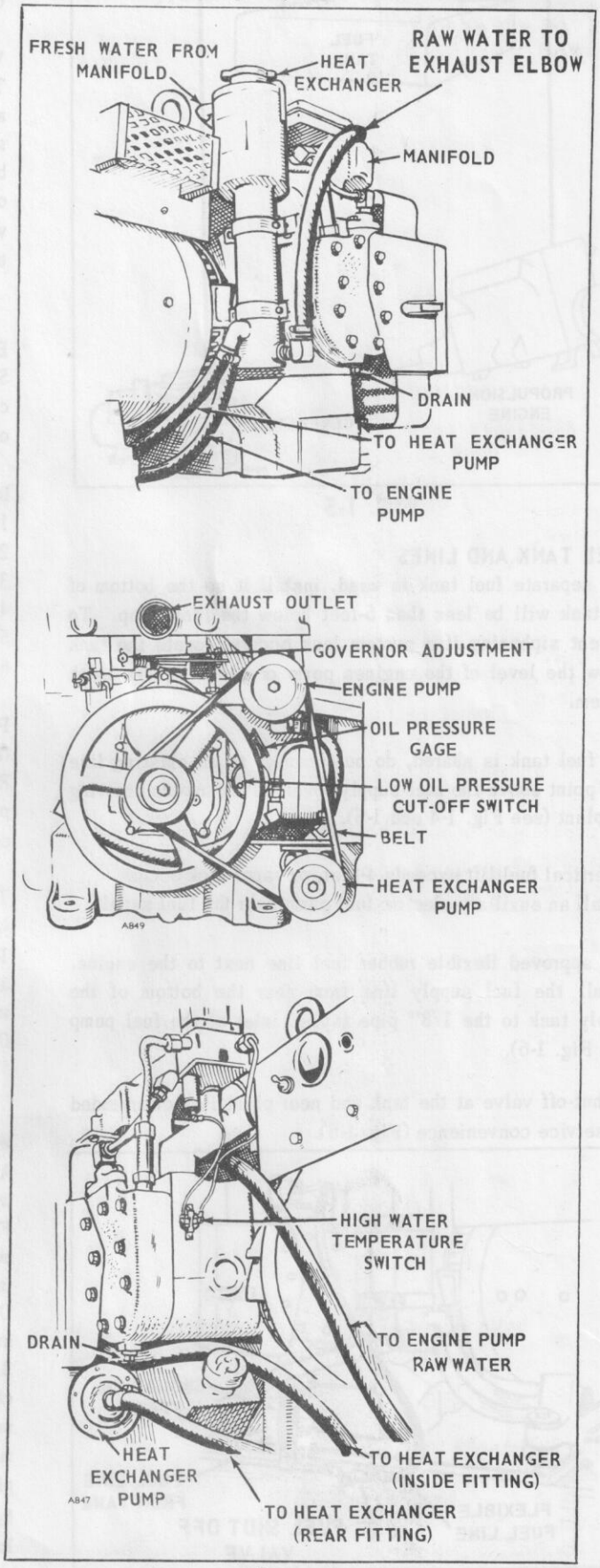


FIG. 1-9

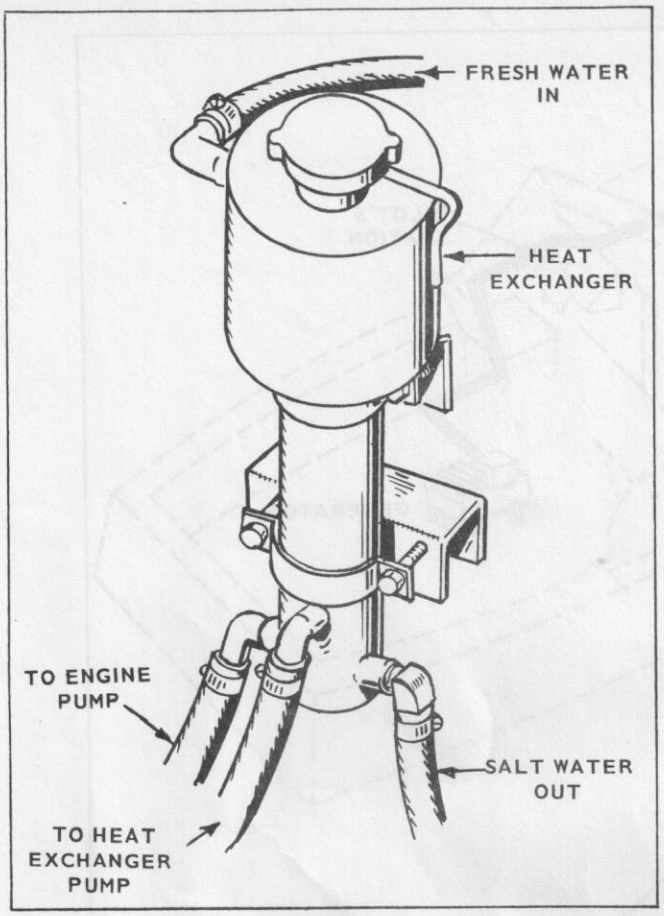


FIG. 1-10

The discharged water leaves at the heat exchanger. 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 coolant is for freezing temperatures, use the necessary proportion of anti-freeze, and test it periodically cooling system capacity (including heat exchanger) is 7 pints.

BATTERY CONNECTION

Exciter Cranked Plant: Refer to the wiring diagram and Fig. 1-11.

Provide *two* 6-volt batteries connected in series (on batteries negative to other batteries positive) for a 12-volt source. See Specifications for minimum battery amperes. **Caution:** *Connect battery positive (+) to the start solenoid (located in the control box). Connect the battery negative (–) to a good ground on the generator frame.* Enter control box rear to install battery cable.

Caution: *Do not disconnect starting batteries while plant is running. The resulting overvoltage condition will damage electric choke and may damage 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. 1 12). Use correct wire size according to switch distance from plant.

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

LOAD WIRE CONNECTIONS

Plant nameplate shows the electrical output rating of the plant in watts, volts, and cycles. The plant wiring diagram shows the electrical circuits and connections necessary for the available output voltage. Also see Fig. 1-13 and 1-14.

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

The plant control box has knockout sections to accommodate load wires. Use flexible conduit and stranded load wires near the plant to absorb vibration. Use sufficiently large

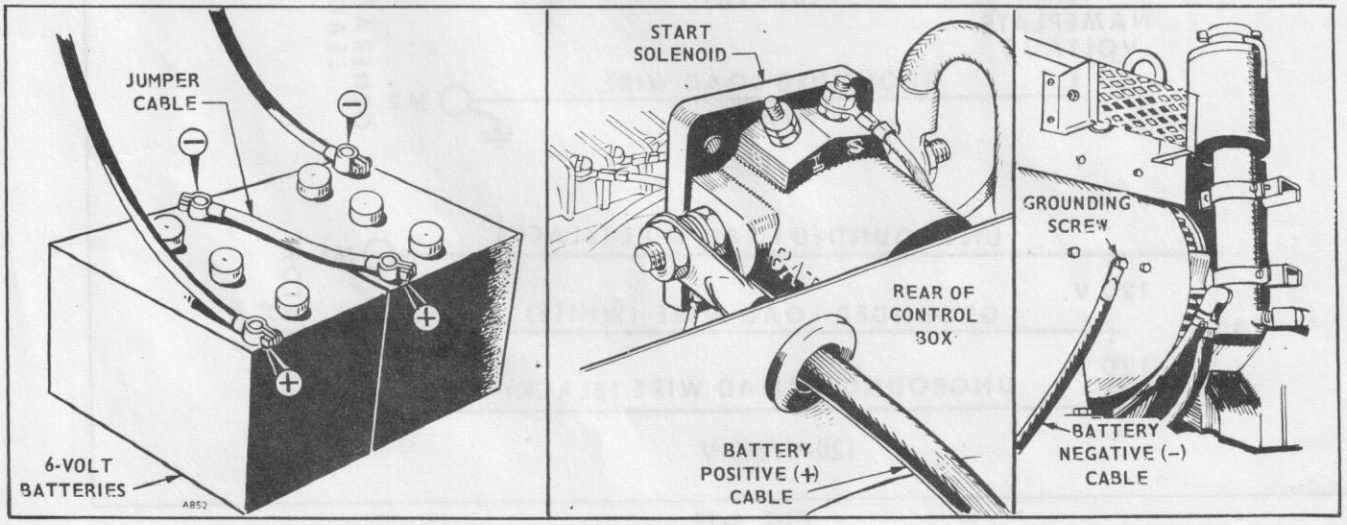


FIG. 1-11

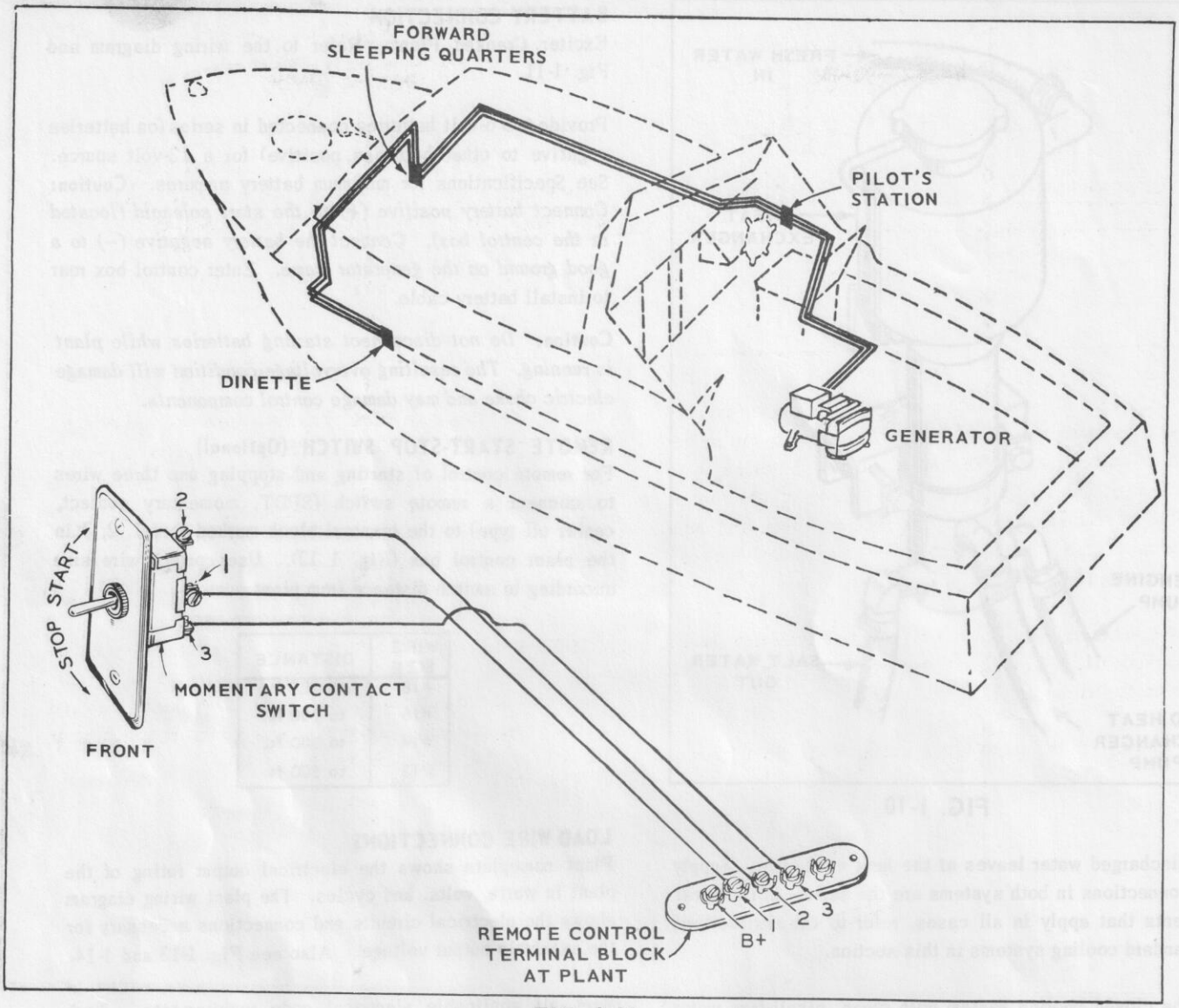


FIG. 1-12

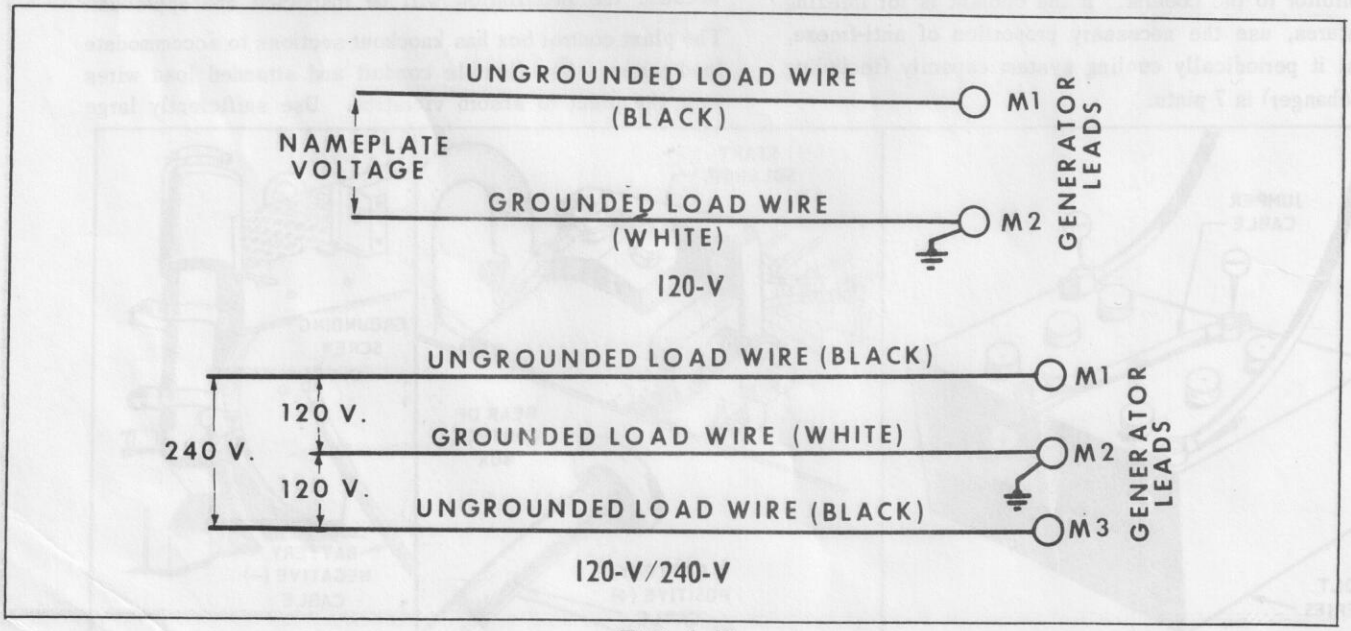


FIG. 1-13

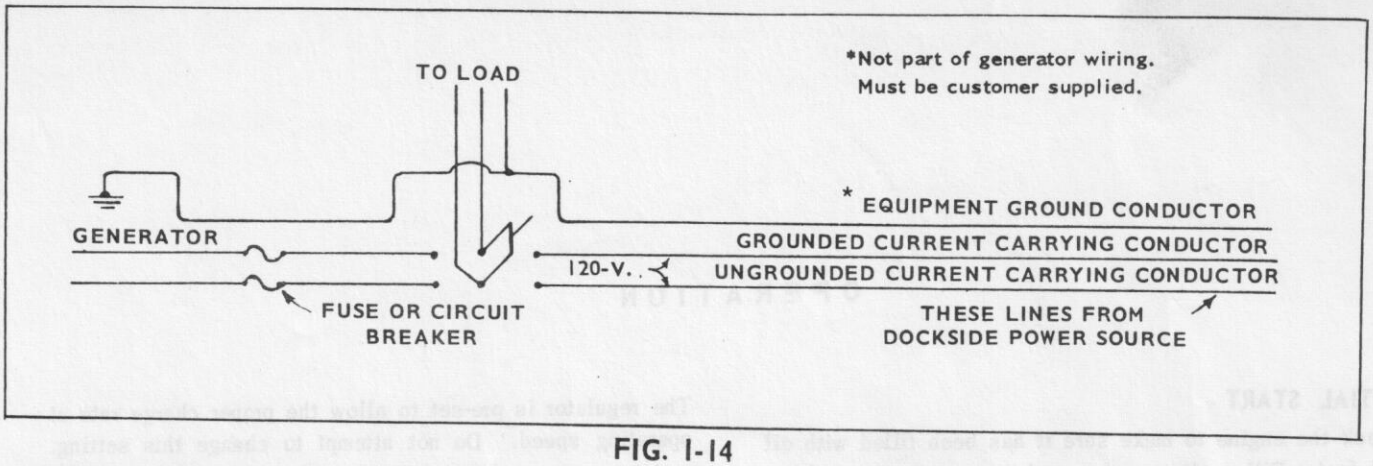


FIG. 1-14

insulated wires. Strip insulation from wire ends as necessary for clean connections. Connect each load wire to the proper generator output lead inside the plant box. Insulate bare ends of ungrounded wires. Use a bolt (through the control box) to connect the grounded (⏚) generator lead and load wire. Install a fused main switch (or circuit breaker) between the generating plant and load.

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 also prevent commercial power and generator output from being connected *at the same time to the load.* Instructions for connecting an automatic load transfer switch is included with such equipment. See Fig. 1-14.

Equipment Ground: The installation may include an equipment ground which provides a common ground for all electrical equipment aboard the vessel. Connect this ground to the generator frame. Do not tie this ground into generator current carrying conductor (see Fig. 1-14).

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. 1-8). 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.

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

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 and leave some fuel expansion space. Open fuel line valve (when used).

Starting: (Fig. 2-1)

1. Push *start-stop* switch to *start* position.
2. Release the switch after engine starts and reaches speed.
3. Oil pressure gage should read at least 20 psi.

Stopping:

(1) Push *start-stop* switch to *stop* position.
(2) Release switch when plant stops. If stop circuit fails, close fuel valve.

APPLYING LOAD

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

BATTERY CHARGING

The battery charge rate is controlled by a charge regulator. The 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 *low oil pressure switch*, the switch will stop the plant through an emergency relay in the control, whenever the oil pressure drops below a safe operating pressure. After an emergency stop, investigate and correct the cause. The reset button must be pressed before restarting. A one minute time limit is necessary before the reset button can be pressed after an emergency stop.

PLANT EXERCISE

Infrequent use results in hard starting. Operate plant one 30-minute period each week. Run longer if battery needs charging.

EMERGENCY OPERATION IF BATTERY FAILS

The remote-type revolving-armature plant needs a battery for electric choke and ignition. If the battery fails completely and the plant must be operated during an emergency, a battery can be shared with other equipment provided the plant charging circuit is disconnected as follows: Remove the wire which connects to the battery terminal on the voltage regulator from the ammeter and tape the bare end. With this lead disconnected, the plant will not recharge 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-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

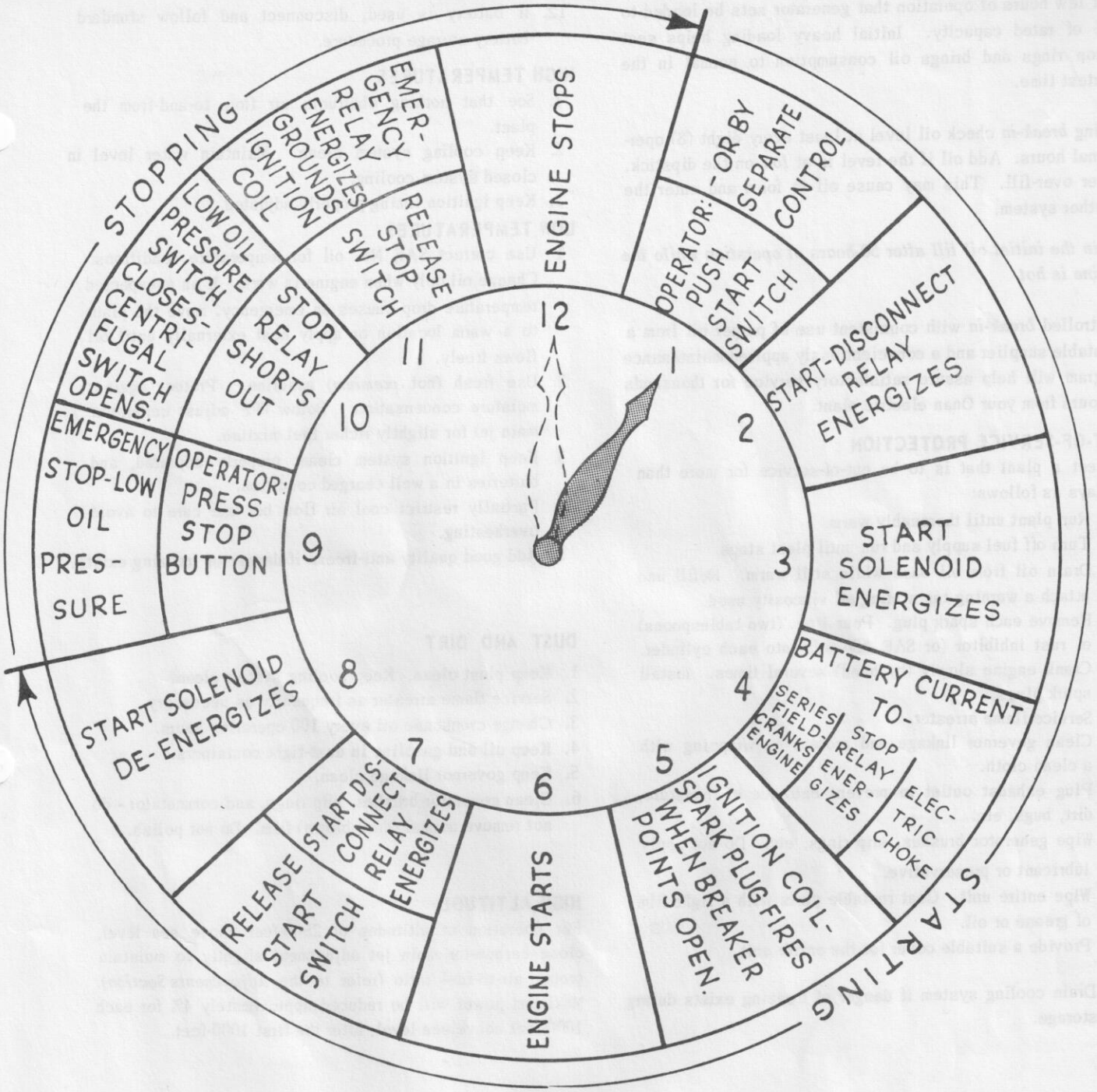


FIG. 2-1

wall glazing and/or poor piston ring seating. Engine parts damage can also be caused by using the wrong type and viscosity oil and high engine operating temperatures during break-in.

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

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

Generator sets manufactured by Onan can be loaded to full nameplate rated output (not until they *bog down*) as soon as they are put into operation. It is recommended during these

first few hours of operation that generator sets be loaded to 80% of rated capacity. Initial heavy loading helps seat piston rings and brings oil consumption to normal in the shortest time.

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

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

Controlled *break-in* with 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.
9. Wipe entire unit. Coat rustable parts with a light film of grease or oil.
10. Provide a suitable cover for the entire unit.
11. Drain cooling system if danger of freezing exists during storage.
12. If battery is used, disconnect and follow standard battery storage procedure.

HIGH TEMPERATURES

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

LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change oil only when engine is warm. If an unexpected temperature drop causes an emergency, move the plant to a warm location or apply heat externally until oil flows freely.
2. Use fresh (not *premium*) gasoline. Protect against moisture condensation. Below 0°F adjust carburetor main jet for slightly richer fuel mixture.
3. Keep ignition system clean, properly adjusted, and batteries in a well charged condition.
4. Partially restrict cool air flow but use care to avoid overheating.
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 100 operating hours.
4. Keep oil and gasoline in dust-tight containers.
5. Keep governor linkage clean.
6. Clean generator brushes, slip rings, and commutator - do not remove normal (dark brown) film. Do not polish.

HIGH ALTITUDE

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

ADJUSTMENTS

CHECK BREAKER POINTS

Refer to Maintenance Schedule for correct gap distances. Replace burned or faulty points. If only slightly burned, dress smooth with file or fine stone. Measure gap with thickness gage, gap points at .020".

Ignition breaker points, Fig. 3-1 must be correctly gapped. Crank engine to fully open breaker points (1/4 turn after top center). Loosen and move breaker point box to correct the gap at full separation. Retighten breaker point box and re-check gap.

Ignition points should break contact just when 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 rotation of the breaker plate check to be sure timing marks on gears are aligned. Timing procedures appear in separate service manual.

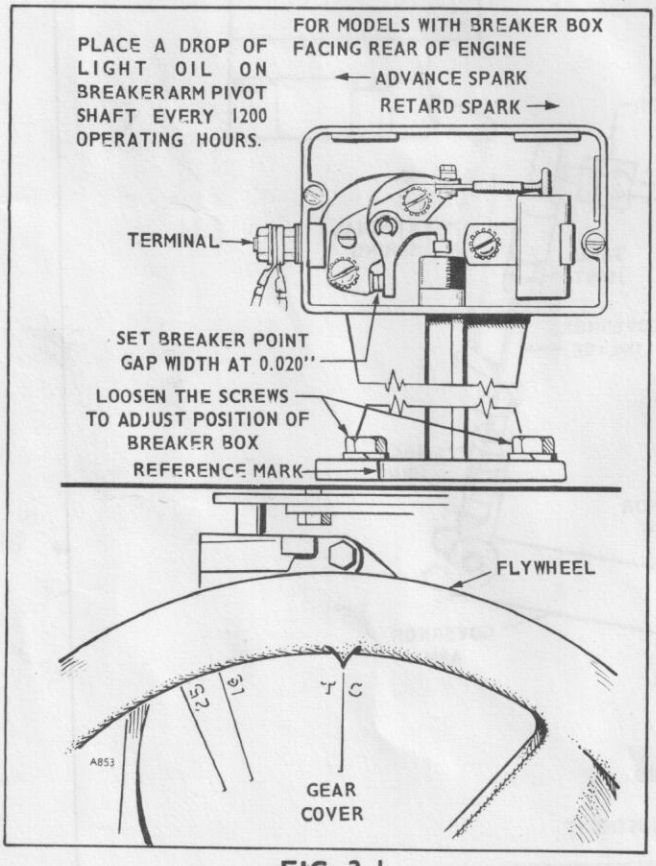


FIG. 3-1

CARBURETOR

The carburetor (Fig. 3-2) has a fuel main (high speed) adjustment (needle A) and a fuel idle adjustment (needle B). The main adjustment (needle A) affects operation under heavy load conditions. Idle adjustment affects operation at light or no load. Under normal circumstances, factory carburetor adjustments should not be disturbed. If the adjustments have been disturbed, turn needles off their seats, 1 to 1-1/2 turns to permit starting, then, re-adjust then for smooth operation. **Caution:** *Forcing the needle against its seat will damage it. The needle does not completely shut off when turned fully in.*

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

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

Set throttle stop screw (located on carburetor throttle lever) with no load connected and while running at rated speed. Turn the screw to give 1/32" clearance between the screw and pin (Fig. 3-2).

ONAN THERMO-MAGNETIC CHOKE

This choke uses a heating element and a heat sensitive

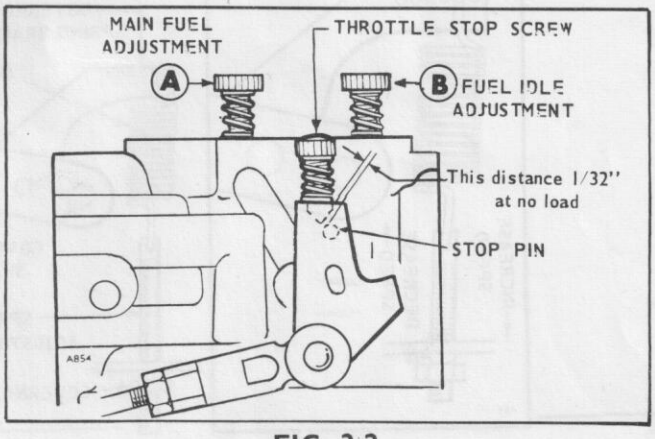


FIG. 3-2

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

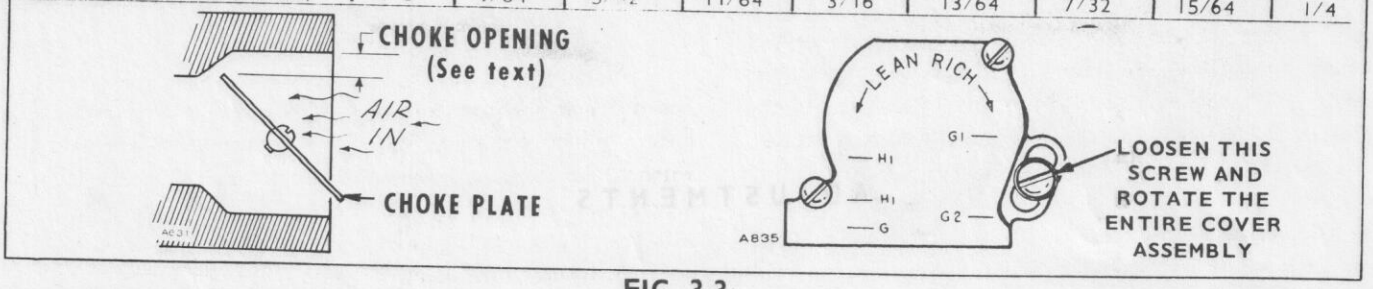


FIG. 3-3

bimetal spring to open the choke plate. The choke solenoid, actuated during engine cranking only, closes the choke plate according to ambient temperature.

If adjustment is required, use the following instructions. Choke bimetal spring must be at ambient temperature. Allow engine to cool at least one hour before setting. Adjust choke by turning the choke body, which engages a link connected to a bimetal choke spring. Remove flame arrestor and adapter to expose the carburetor throat. Loosen the screw which secures the choke body. Rotate choke body clockwise to increase choke and counterclockwise to decrease choke action (leaner mixture). Refer to Fig. 3-3 for correct choke setting according to ambient temperature. Use drill rod or shank of drill bit to measure choke opening (Fig. 3-3).

GOVERNOR

The governor and speed booster control engine speed (Fig. 3-4). Rated speed and voltage appear on the nameplate (see also Specifications). Engine speed equals frequency multiplied by 30, on a 4-pole generator, thus 1800 rpm gives 60-cycle frequency. Preferred speed does not vary more than 2-1/2 cycles from no-load to full-load operation. Be sure throttle, linkage, and governor mechanism operate smoothly.

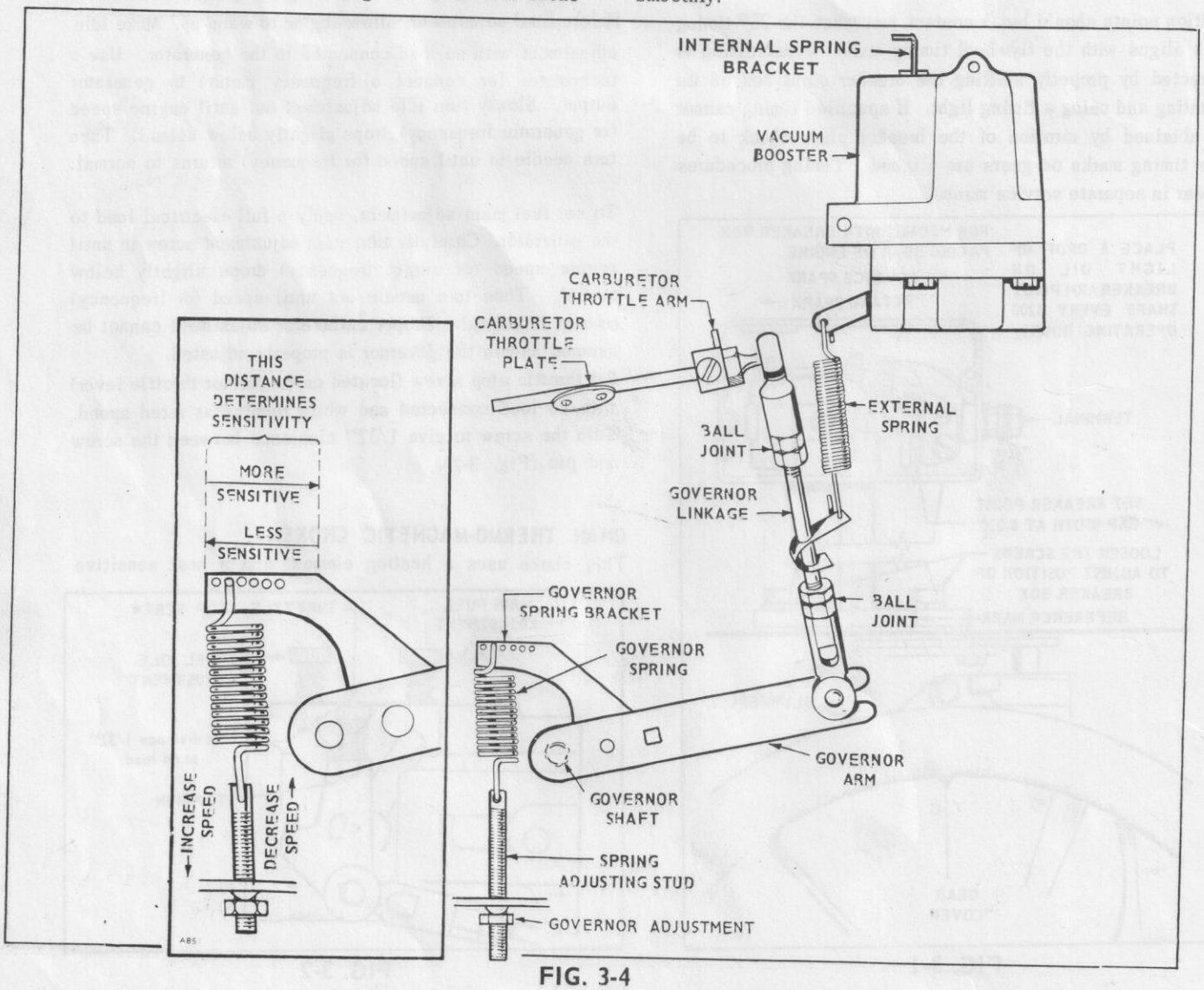


FIG. 3-4

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 tension on the governor spring, the stop screw on the carburetor throttle lever is 1/32" from stop pin. This setting allows immediate control by the governor after starting and synchronizes travel of the governor arm and the throttle shaft.

Speed Adjustment: With the warmed-up plant operating at no load, 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 so as to give the closest regulation (least speed and voltage difference between no load and full load) without causing a hunting condition.

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

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

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

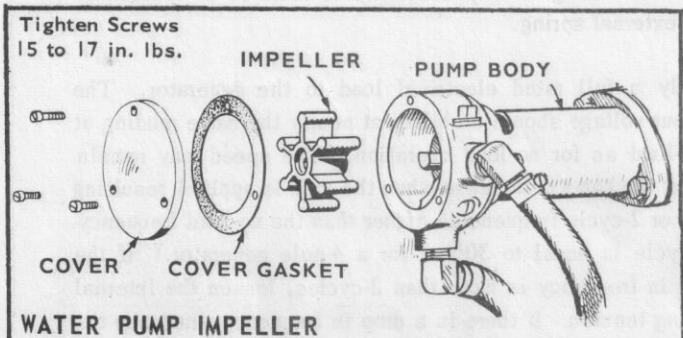
Speed-Booster Adjustment: After satisfactory performance under various loads is attained by governor adjustments without the booster, connect the booster. Connect the booster external spring to the bracket on the governor link with the plant operating at no load, slide the bracket on the governor linkage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

Apply a full rated electrical load to the generator. The output voltage should stabilize at nearly 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 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.

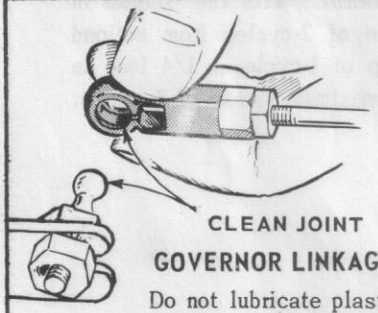
MAINTENANCE

PERFORM ALL MAINTENANCE DETAILS AS SPECIFIED IN THE MAINTENANCE SCHEDULE



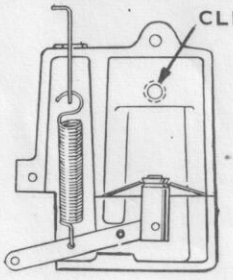
WATER PUMP IMPELLER

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 only require cleaning.

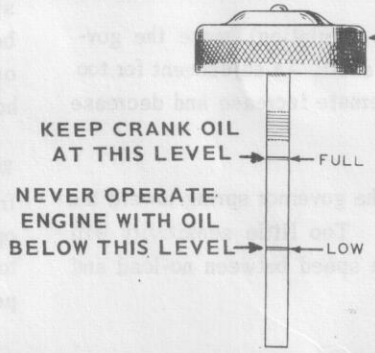


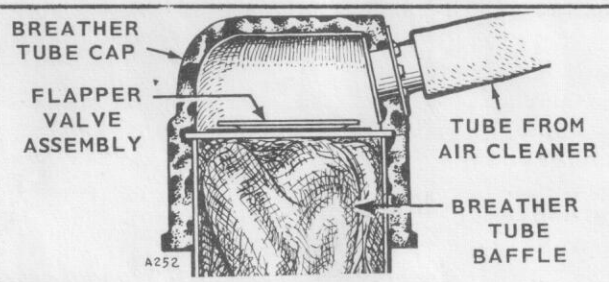
SPEED BOOSTER

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, restricted hole in the small vacuum tube, or a leak in the booster diaphragm or gasket.

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.





CRANKCASE BREATHER

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

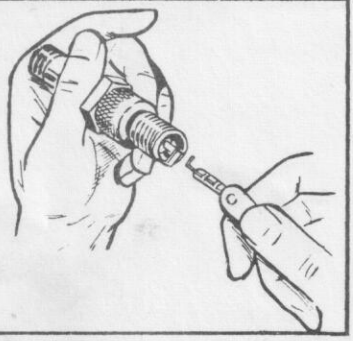


FIG. 4-1

FUEL SEDIMENT

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

GASOLINE FUEL

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

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 and (2) *critical maintenance* performed by qualified service personnel (*Onan* dealer). A Major Service Manual is available (see general information page) if needed.

OPERATOR MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	8	50	100	200
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.

CRITICAL MAINTENANCE SCHEDULE

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			x	
General Overhaul				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

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

Tappets (Intake & Exhaust)	0.012" to 0.015"
Ignition Breaker Points Gap	0.020"
Ignition Timing (Running) Gasoline	25° BTC
Ignition Timing (Stopped) Gasoline	25° BTC

MAJOR SERVICE MANUAL IS AVAILABLE - SEE GENERAL INFORMATION

MAINTENANCE DIAGNOSIS

POSSIBLE CAUSE	REMEDY
ENGINE WILL NOT CRANK	
Battery discharged.	Recharge.
Loose connections.	Tighten connections.
Defective starting circuit.	Repair or replace as necessary.
Defective switch.	Replace.
ENGINE CRANKS TOO STIFFLY	
Too heavy oil in crankcase.	Drain, refill with lighter oil.

POSSIBLE CAUSE	REMEDY
ENGINE WILL NOT START WHEN CRANKED	
Lack of fuel or faulty carburetion.	Refill tank. Check fuel system. Clean, adjust, as necessary.
Clogged fuel screen.	Clean.
Cylinders flooded.	Crank few times with spark plugs removed.
Poor fuel.	Drain, fill with fresh fuel.
Poor compression.	Tighten spark plugs.
Wrong breaker point gap.	Reset breaker points.

POSSIBLE CAUSE	REMEDY
EXCESSIVE OIL CONSUMPTION, LIGHT BLUE SMOKY EXHAUST	
Oil leaks from oil base or connections. This does not cause smoky exhaust.	Replace gaskets. Tighten screws and connection. Check breather valve.
Oil too light or diluted.	Drain, refill with correct oil.
Engine misfiring.	Clean, adjust, or replace spark plugs.
Faulty ignition.	Clean, adjust, or replace spark plugs.
Too much oil.	Drain excess oil.
BLACK, SMOKY EXHAUST, EXCESSIVE FUEL CONSUMPTION, FOULING OF SPARK PLUG WITH SOOT, POSSIBLE LACK OF POWER UNDER HEAVY LOAD	
Fuel mixture too rich.	Adjust carburetor or choke. Install needed carburetor parts.
Choke not open.	Inspect linkage and setting.
Dirty air cleaner.	Clean.
Excessive crankcase pressure, causing excessive fuel pump pressure.	Clean breather valve.
ENGINE STOPS UNEXPECTEDLY	
Fuel tank empty.	Fill with fresh fuel.
Defective ignition.	Check ignition system.
SHARP METALLIC THUD, ESPECIALLY WHEN COLD ENGINE FIRST STARTED	
Low oil supply.	Add oil.
Oil badly diluted.	Change oil.
PINGING SOUND WHEN ENGINE IS SUDDENLY OR HEAVILY LOADED	
Wrong spark plug.	Install correct spark plug.
Spark plug burned or carboned.	Install new plug.
Fuel stale or low octane.	Use good, fresh fuel.
Lean fuel mixture.	Clean & adjust carburetor.
LIGHT POUNDING KNOCK	
Low oil supply.	Add oil.
Oil badly diluted.	Change oil.

POSSIBLE CAUSE	REMEDY
ENGINE MISFIRES AT LIGHT LOAD	
Spark plug gap too narrow.	Adjust to correct gap.
Intake air leak.	Tighten or replace manifold and carburetor gaskets.
Faulty ignition.	Clean, adjust or replace spark plugs.
Low compression.	Tighten cylinder head and spark plugs.
ENGINE MISFIRES AT HEAVY LOAD	
Spark plug gap too wide.	Adjust gap.
Faulty ignition.	Clean, adjust or replace spark plugs.
Clogged carburetor.	Clean jet and adjust carb.
Clogged fuel screen.	Clean
ENGINE BACKFIRES	
Lean fuel mixture.	Clean or adjust carburetor.
Poor fuel.	Refill with good, fresh fuel.
ENGINE RACES	
Governor not controlling carburetor.	Check governor performance & linkage condition.
LOW OIL PRESSURE	
Defective gage.	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.
HIGH OIL PRESSURE	
Defective gage.	Replace.
Oil too heavy grade.	Drain. Refill.
Clogged oil passages.	Clean all lines & passages.
Oil relief valve stuck.	Clean by-pass. Replace if needed.
ENGINE OVERHEATING	
Poor coolant circulation.	Maintain supply.
Improper lubrication.	See Low Oil Pressure.

POSSIBLE CAUSE	REMEDY
Fuel mixture too lean.	Adjust carburetor.
Generator overloaded.	Reduce load.
VOLTAGE LOW AT FAR END OF LINE BUT NORMAL NEAR POWER PLANT	
Too small line wire for load and distance.	Install larger or extra wires or reduce load.
ELECTRIC MOTOR RUNS TOO SLOWLY AND OVERHEATS AT FAR END OF LINE BUT OK IF USED NEAR POWER UNIT	
Too small line wire for load and distance.	Install larger or extra wires or reduce load.
VOLTAGE UNSTEADY BUT ENGINE NOT MISFIRING	
Speed too low.	Adjust governor to correct speed.
Loose connections.	Tighten connections.
Fluctuating load.	Correct any abnormal load condition causing trouble.

POSSIBLE CAUSE	REMEDY
GENERATOR OVERHEATING (Approximately 160°F higher than amibent)	
Overloaded.	Reduce load.
VOLTAGE DROPS UNDER HEAVY LOAD	
Engine lacks power.	See remedies for engine misfires under heavy load.
Poor compression.	Tighten cylinder head & spark plugs.
Faulty carburetion.	Clean the fuel system. Clean, adjust or replace parts necessary.
Dirty flame arrester.	Clean.
Restricted exhaust line.	Clean or increase the size.
Choke partially closed.	See that it opens fully.
Shorted field rectifier in Static Exciter	Check with ohm meter

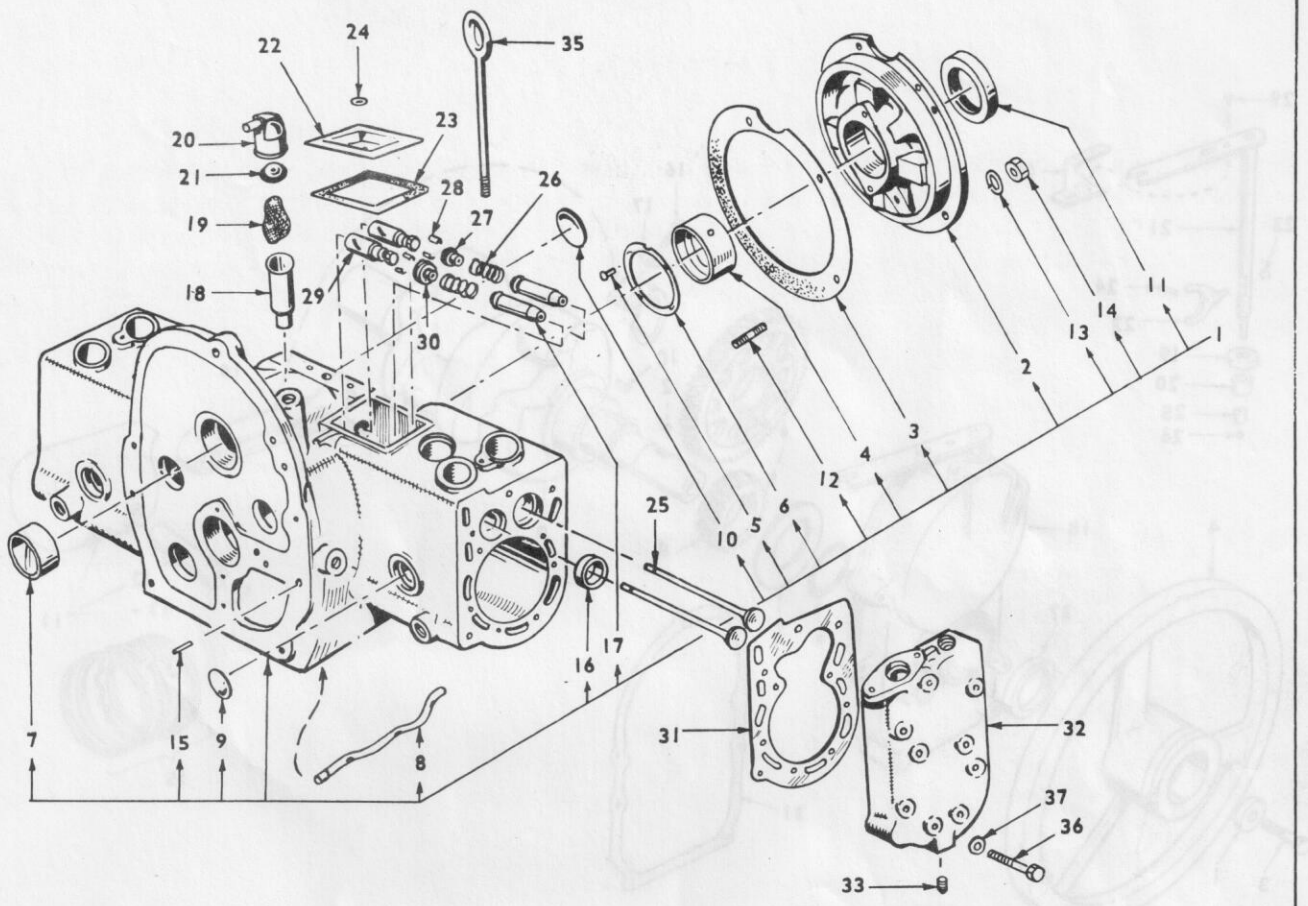
PARTS CATALOG

This catalog applies to the standard MCCK 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	
4MCCK-1R/	4000	120	60	2	1	
4MCCK-2R/	4000	240	60	2	1	1
4MCCK-3R/	4000	120/240	60	3	1	
305MCCK-51R/	3500	120	50	2	1	
305MCCK-52R/	3500	240	50	2	1	1
305MCCK-53R/	3500	120/240	50	3	1	
605MCCK-1R/	6500	120	60	2	1	
605MCCK-2R/	6500	240	60	2	1	2
605MCCK-3R/	6500	120/240	60	3	1	
505MCCK-51R/	5500	120	50	2	1	
505MCCK-52R/	5500	240	50	2	1	2
505MCCK-53R/	5500	120/240	50	3	1	

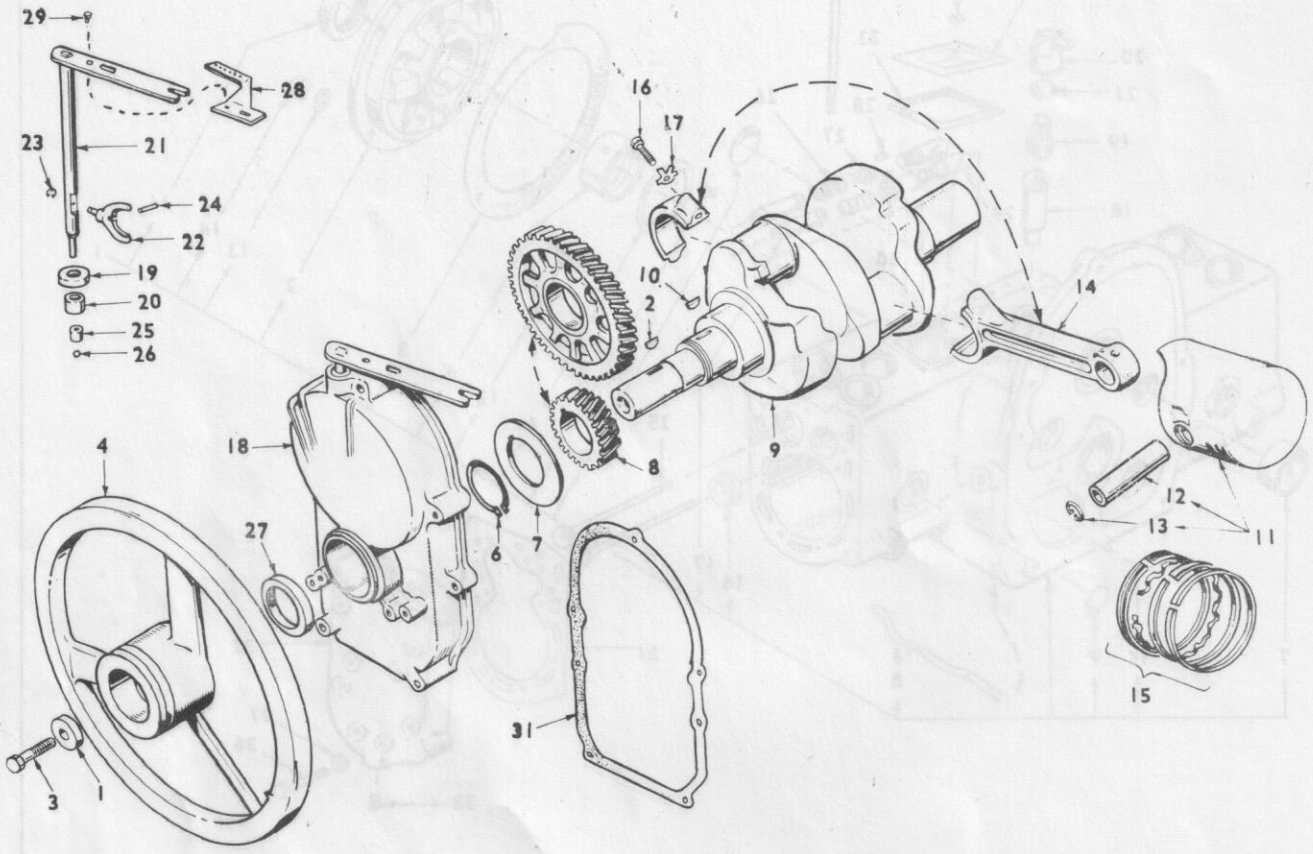
* - The Specification Letter Advances (A to B, B to C, etc.) with manufacturing changes.



CYLINDER BLOCK GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	110A1498	1	Block Assy., Incl. Brg. Plt., Brgs., Guides, and Seats
2	101C316	1	Plate, Brg. (Less Brg.)
3	101K115	1	Gasket Kit, Brg. Plate
4	101K389	2	Bearing, Crankshaft (Frt. and Rr.) Specify: Std. or .002" .010", .020", .030" U/S
5	516A72	4	Pin, Bearing Stop
6	104A575	2	Washer, Crankshaft Brg. Thrust
7	101A367	2	Bearing, Camshaft (Frt. and Rr.)
8	120A386	1	Tube, Crankcase Oil
9	517-11	8	Plug, Expansion (1-1/4")
10	517-48	1	Plug, Camshaft Exp. (1-5/8")
11	509-41	1	Seal, Oil, Brg. Plate
12	520A114	5	Stud, Rear Brg. Plate
13	851-5	5	Lockwasher (5/16") Rear Brg. Plate
14	110A445	5	Nut, Rear Brg. Plate
15	516A11	2	Pin, Gear Cover
16	110A872	2	Insert, Exh. V. Seat (Stellite) Specify: Std., or .002",.005", .010", .025" O/S
17	110A902	4	Guide, Valve
18	123A868	1	Tube, Breather
19	123A865	1	Baffle, Breather Tube
20	123A787	1	Cap, Breather Tube
21	123A315	1	Valve, Breather Tube
22	110A666	2	Cover, Valve Compartment

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
23	110A667	2	Gasket, Valve Compartment
24	526-63	2	Washer, Valve Compartment Cover
25	VALVE		
	110B881	2	Intake, Steel
	110B880	2	Exhaust, Stellite
26	110A539	4	Spring, Valve
27	110A893	2	Washer, Valve Sprg.Ret.(Intake)
28	110A639	8	Lock, Rotocap or Sprg. Ret. Washer
29	115A6	4	Tappet, Valve, Specify: Std. or .005" O/S
30	110A904	2	Rotocap, Exh. Valve
31	110C1481	2	Gasket, Cyl. Head
32	HEAD, CYLINDER		
	110D1478	1	Left Side, #1 Cyl.
	110D1479	1	Right Side, #2 Cyl.
	110A1505	1	Left Side (Plts. W/Heat Exch.)
	110A1506	1	Right Side (Plts. W/Heat Exch.)
33	505-110	2	Plug, Cylinder Head
35	403A580	1	Eye-Bolt, Lifting
36	SCREW, HEX HEAD CAP		
	800-509	18	Cylinder Head (5/16-18 x 2-1/2")
	800-32	4	Gear Cover (5/16-18 x 1-3/4")
	800-34	1	Gear Cover (5/16-18 X 2-1/4")
	800-57	2	Intake Manifold (3/8-16 x 2-3/4")
	102A455	4	Oil Base (3/8-16 x 1-1/4")
37	526A122	18	Washer, Flat - Cyl. Hd.

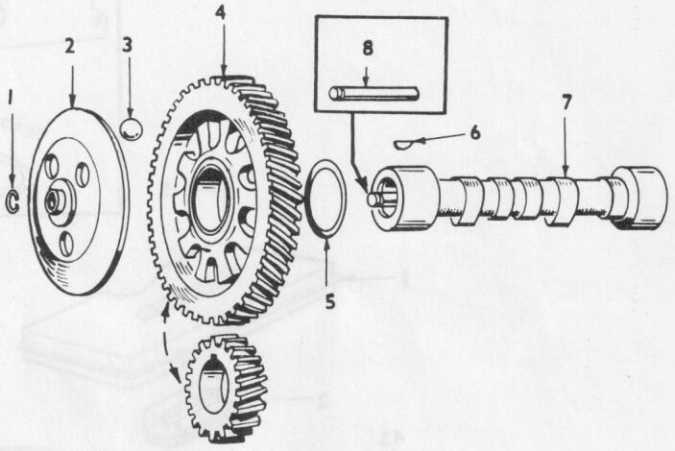


CRANKSHAFT, FLYWHEEL, GEAR COVER, CONNECTING ROD, AND PISTON GROUP

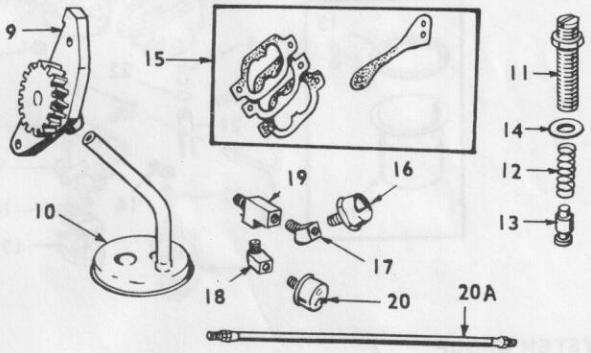
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	526A17	1	Washer, Flywheel Mtg.
2	515-2	1	Key, Flywheel Mtg.
3	104A170	1	Screw, Flywheel Mtg.
4	104D599	1	Flywheel
6	518-14	1	Lock, Crankshaft Gr. Washer
7	104A43	1	Washer, Crankshaft Gr. Ret.
8	105-192	1	Gear Set, Timing (Incls. Crank and Cam Gears)
9	104D256	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

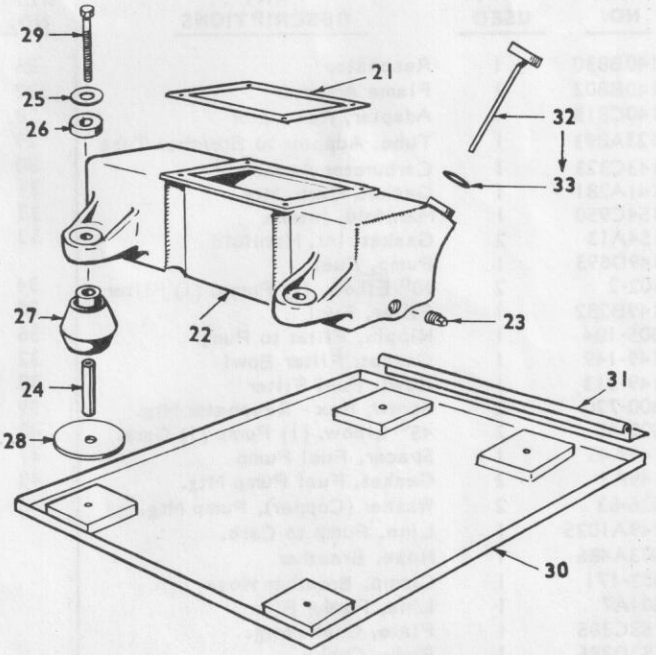
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
16	110A284	4	Screw, Rod Cap
17	114A59	4	Washer, Rod Cap Screw Lock
18	103C286	1	Cover Assy., Gear - Includes Parts Marked*
19	509P8	1	*Seal, Oil, Gov. Shaft
20	510-13	1	*Bearing, Gov. Shaft (Upper)
21	150B1008	1	*Shaft and Arm Assy.
22	150A620	1	*Yoke, Gov. 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	150A1005	1	*Extension, Governor Arm
29	815-181	1	*Screw, Gov. Arm
31	103B11	1	Gasket, Gear Cover

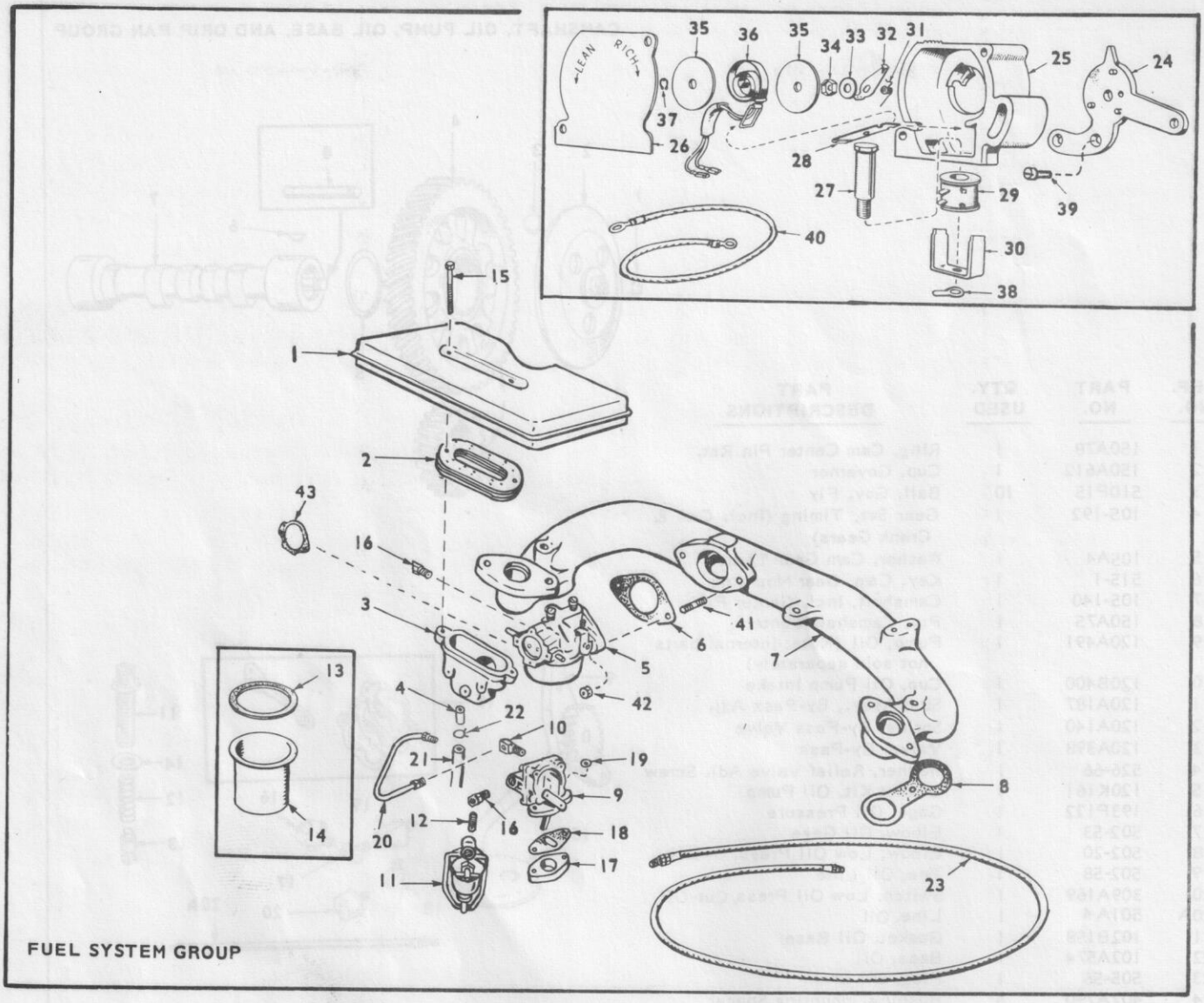
* - Included in Gear Cover Assembly.



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	193P122	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	309A169	1	Switch, Low Oil Press. Cut-Off
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



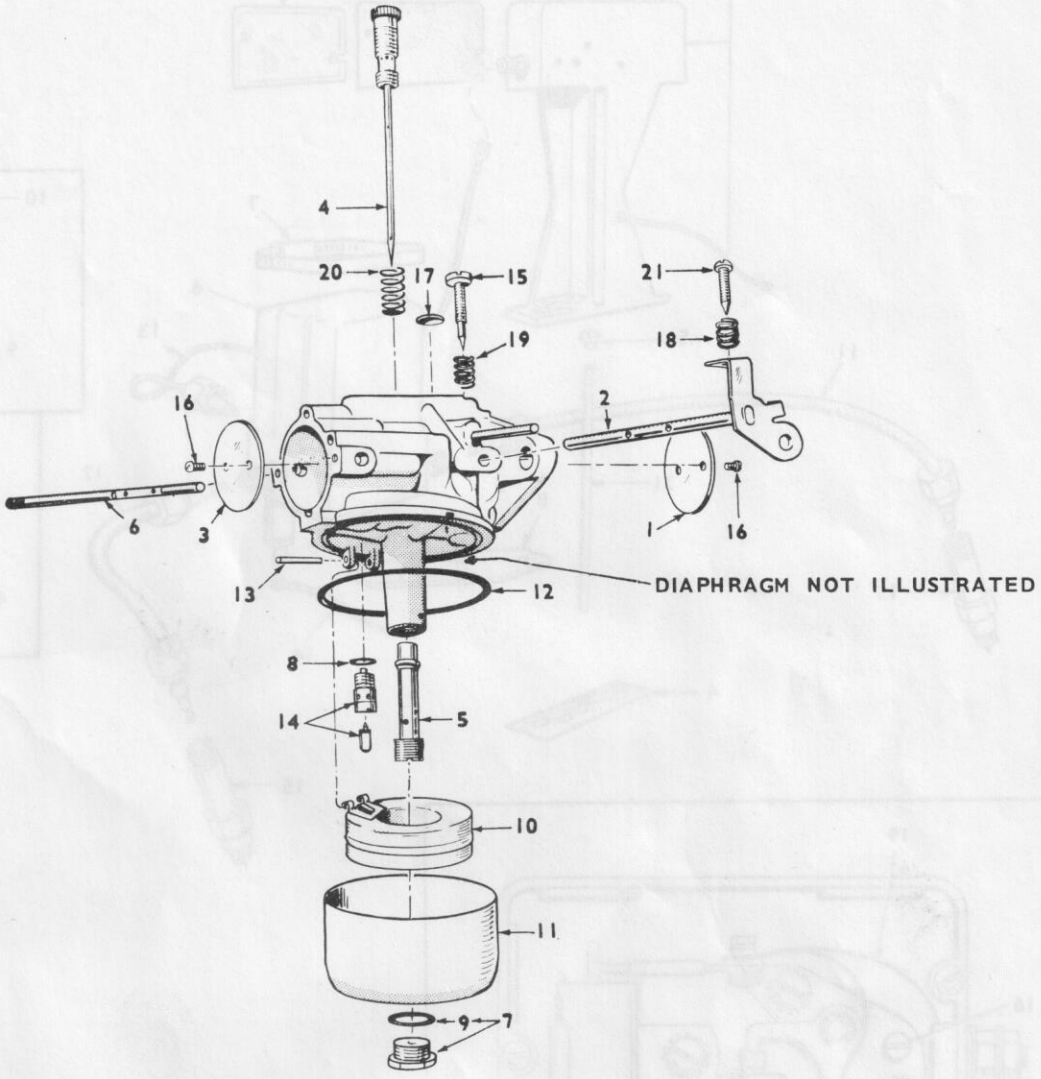




FUEL SYSTEM GROUP

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	140B830	1	Resonator
2	140B802	1	Flame Arrestor
3	140C815	1	Adapter, Resonator
4	123A893	1	Tube, Adapter to Breather Tube
5	143C323	1	Carburetor Assembly
6	141A281	1	Gasket, Carb. Mtg.
7	154C950	1	Manifold, Intake
8	154A13	2	Gasket, Int. Manifold
9	149D693	1	Pump, Fuel
10	502-2	2	90° Elbow, (1) Pump, (1) Filter
11	149B282	1	Filter, Fuel
12	505-104	1	Nipple, Filter to Pump
13	149-149	1	Gasket, Filter Bowl
14	149-313	1	Bowl, Fuel Filter
15	800-720	2	Screw, Hex - Resonator Mtg.
16	502-65	2	45° Elbow, (1) Pump (1) Carb.
17	149A45	1	Spacer, Fuel Pump
18	149A3	2	Gasket, Fuel Pump Mtg.
19	526-63	2	Washer (Copper), Pump Mtg.
20	149A1025	1	Line, Pump to Carb.
21	503A486	1	Hose, Breather
22	503-171	1	Clamp, Breather Hose
23	501A7	1	Line, Fuel - Flex
24	153C385	1	Plate, Choke Mtg.
25	153D386	1	Body, Choke

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
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	518-219	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	140A585	1	Gasket, Adapter to Carb.
	149K526	1	Repair Kit, Fuel Pump (Includes: Diaphragm Assy., Valves, Springs, and Gaskets)
	143K332	1	Repair Kit, Carburetor
	143K201	1	Gasket Kit, Carburetor



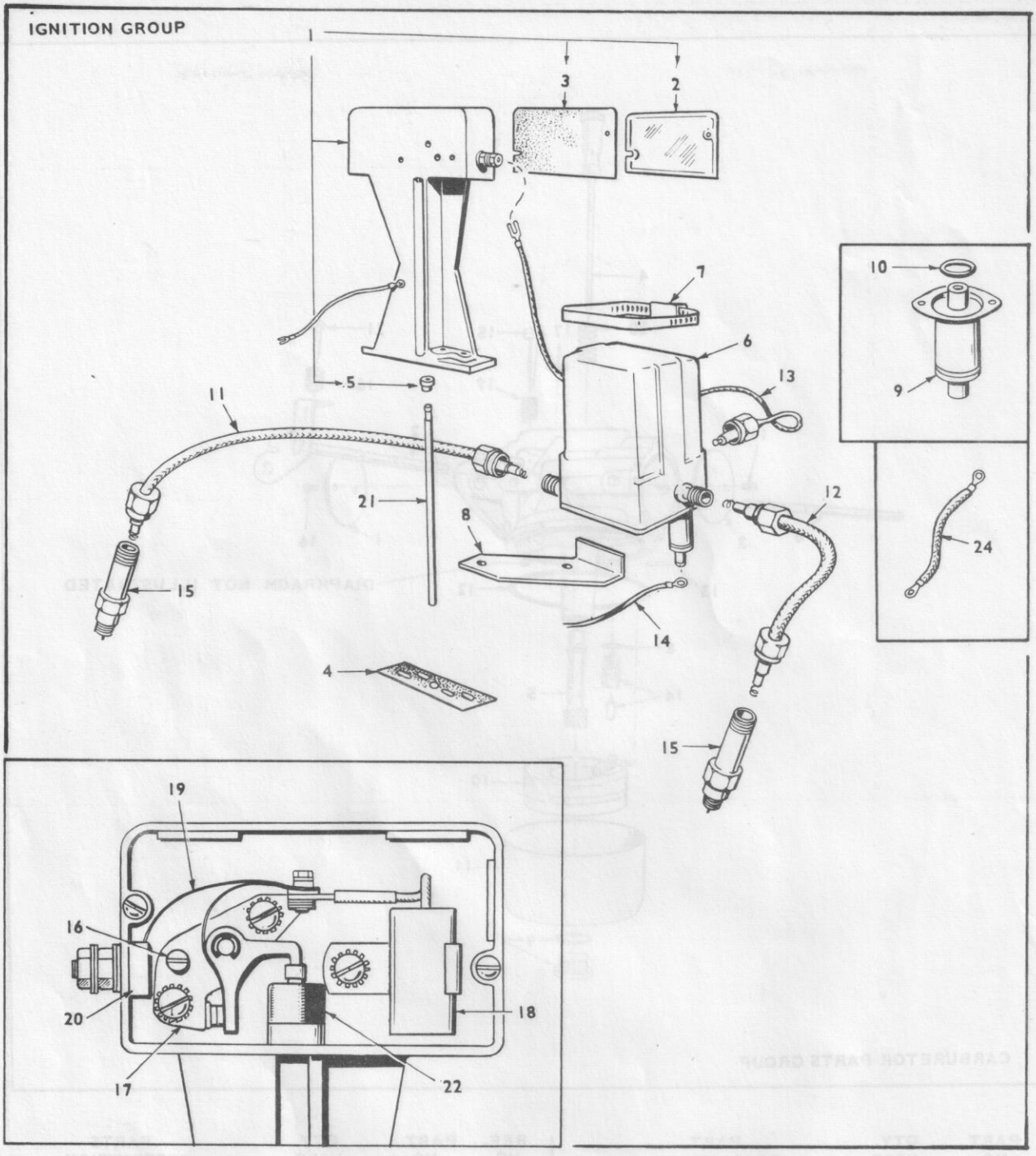
CARBURETOR PARTS GROUP

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	143-220	1	Valve, Choke
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

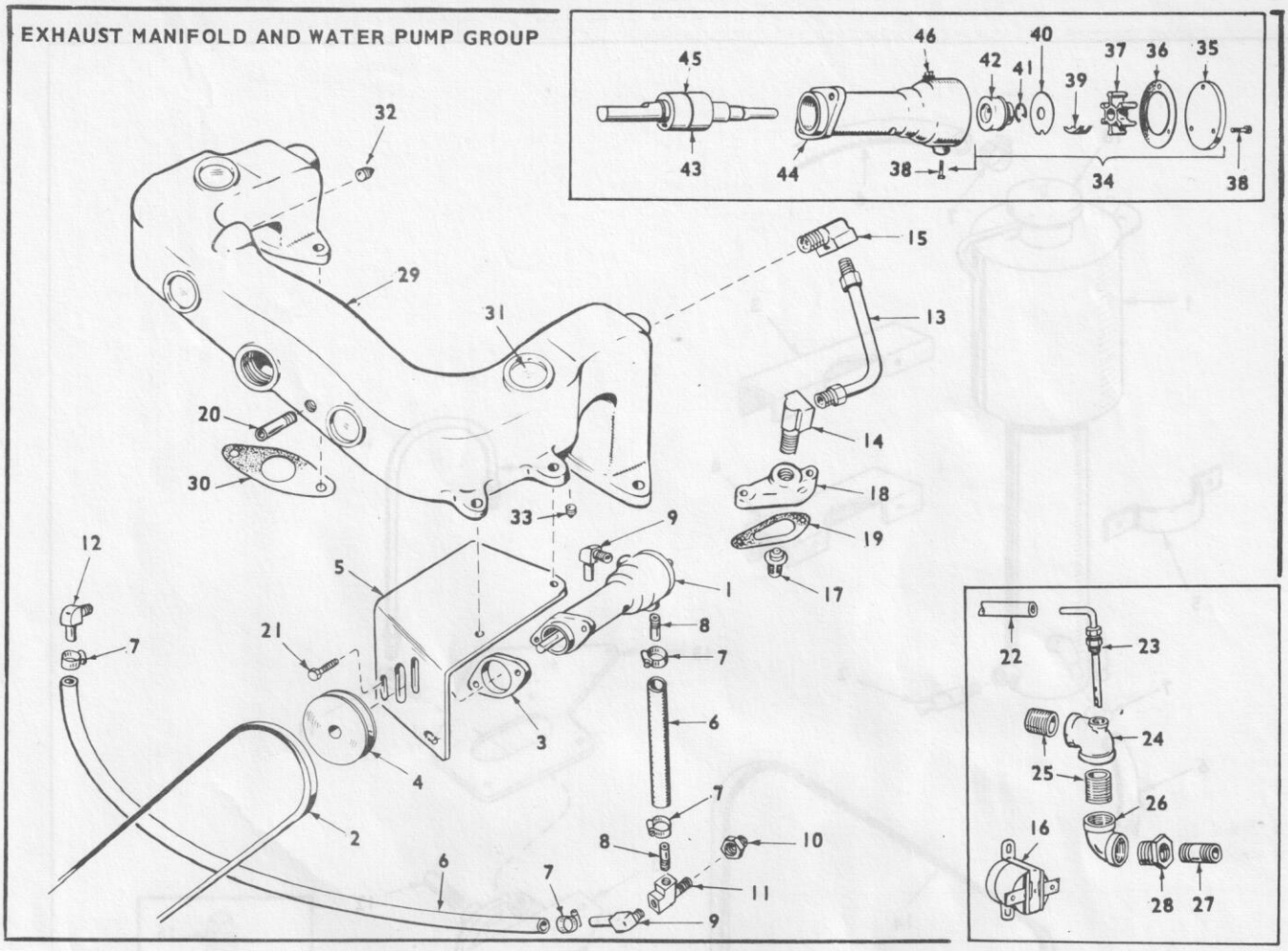
* - Contained in Gasket Kit.
** - Contained in Repair Kit.

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)
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.

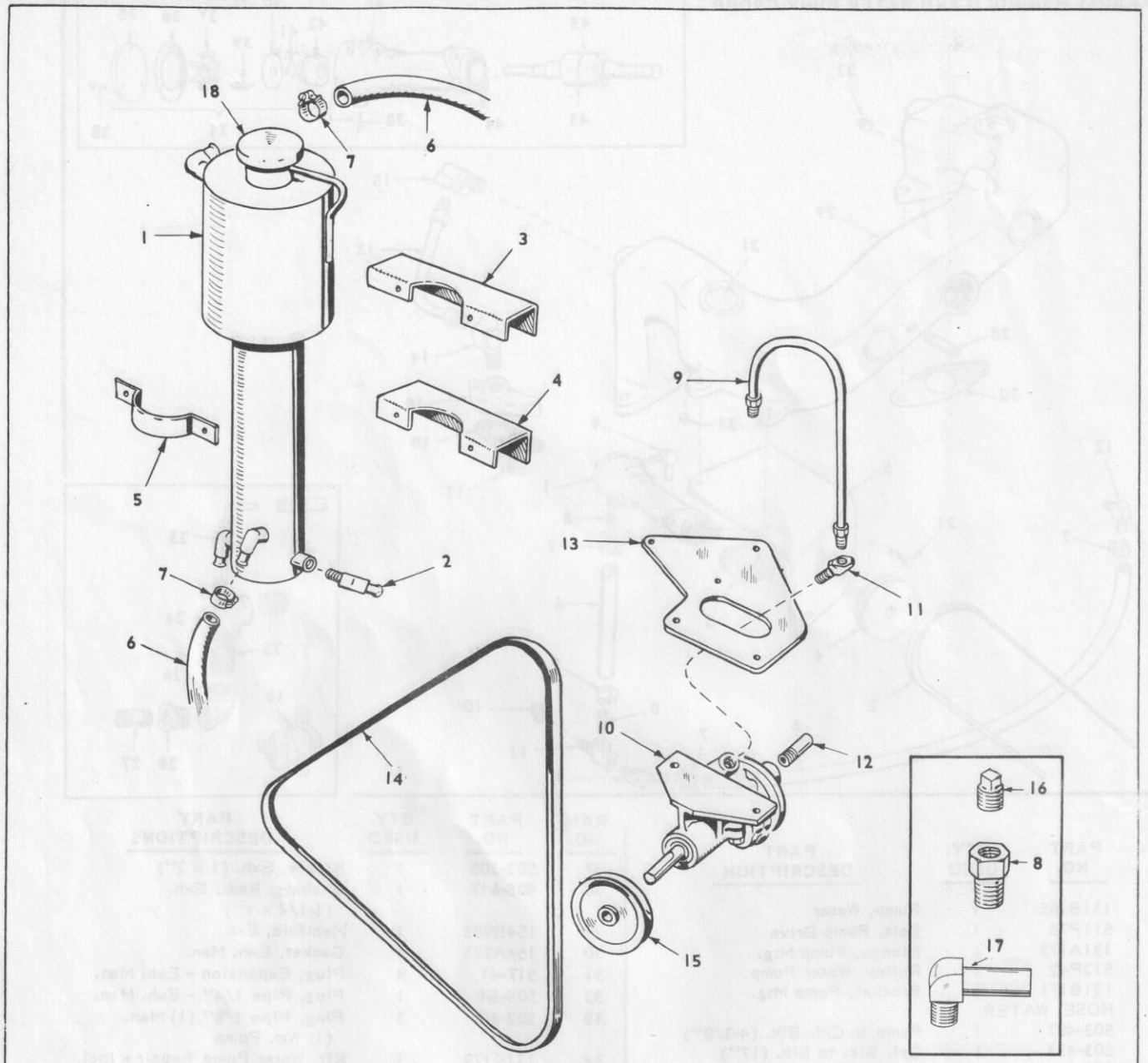
EXHAUST MANIFOLD AND WATER PUMP GROUP



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	2	Nipple, (1) Wtr. Pump, (1) Tee
9	502P304	2	Elbow, Hose - (1) Water Pump, (1) Tee
10	502-47	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	502-258	1	Nipple (3/8 x 2") 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	502-292	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	502-305	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	1	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	PLUG, WATER PUMP		
	502-80	1	Priming (Upper)
	502-308	1	Drain (Lower)
	SCREW, HEX		
	800-5	3	Wtr. Pump Brkt. Mtg. (1/4-20 x 3/4")
	800-7	4	Therm. Hsg. Mtg. (1/4-20 x 1")
	800-29	4	Exh. Manifold Mtg. (5/16-18 x 1-1/8")

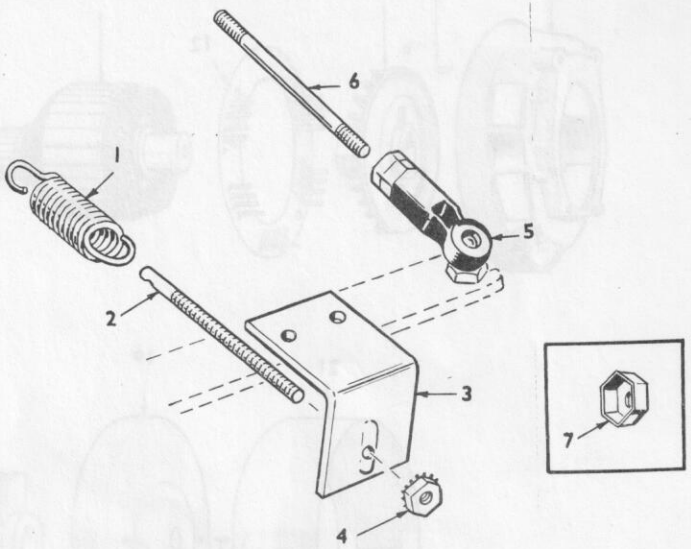
*Parts contained in 132K179 Water Pump Repair Kit.



HEAT EXCHANGER GROUP

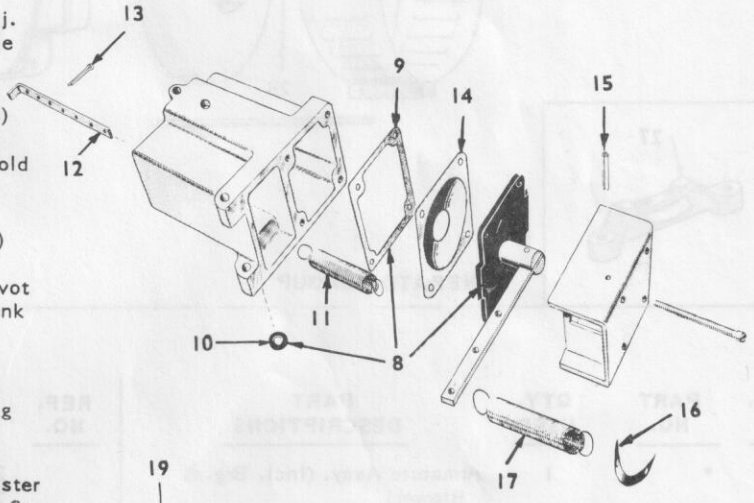
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	130C629	1	Exchanger, Heat
2	502-237	1	Elbow, Heat Exchanger
3	130B630	1	Bracket, Heat Exch. Mtg. (Upper)
4	130B631	1	Bracket, Heat Exch. Mtg. (Lower)
5	130A632	2	Strap, Heat Exch. Mtg.
6	HOSE		
	503-434	1	Heat Exch. to Exh. Manifold
	503-315	1	Heat Exch. 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)
10	132B95	1	Pump, Fresh Water
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
	132K80	1	Repair Kit, Water Pump (132B95) (Incl. shaft and bearings, seal, gasket, and cover screws)

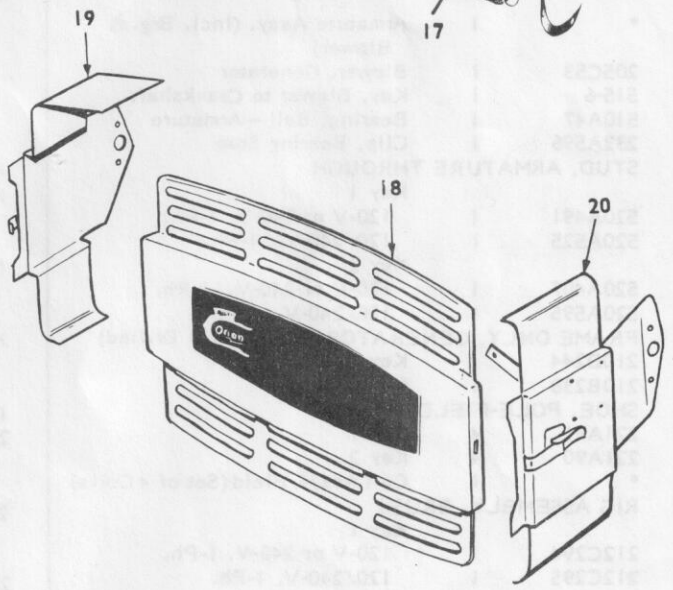
GOVERNOR, VACUUM SPEED BOOSTER, HOUSING AND BATTERY CABLES GROUP

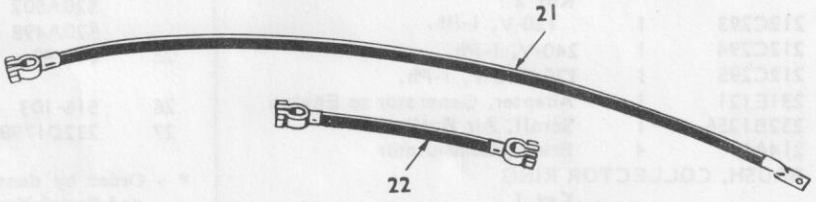


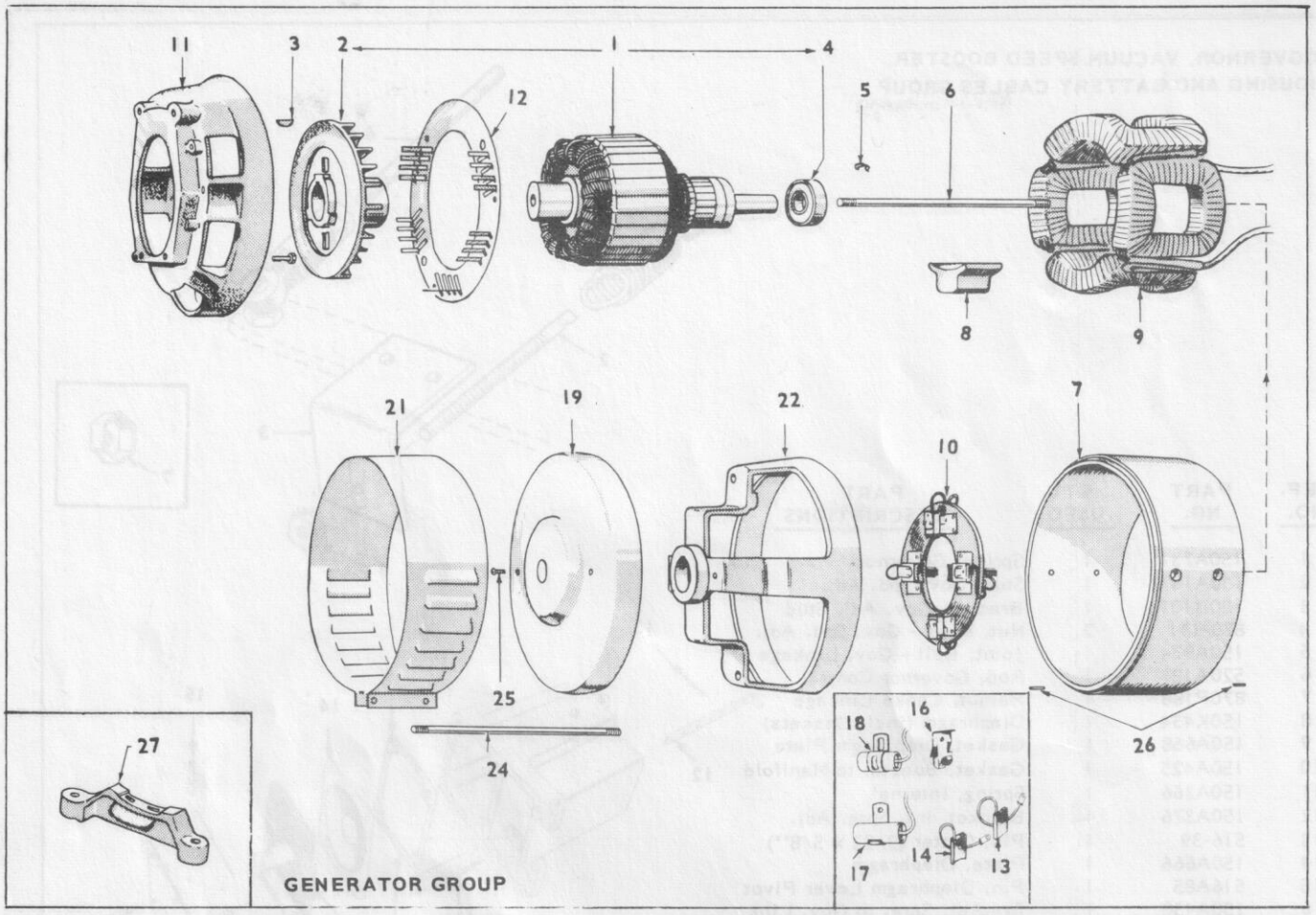
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
1	150A731	1	Spring, Governor
2	150A147	1	Stud, Gov. Spd. Adj.
3	150B1010	1	Bracket, Gov. Adj. Stud
4	870-131	2	Nut, Keps - Gov. Spd. Adj.
5	150A974	1	Joint, Ball - Gov. Linkage
6	520A187	1	Rod, Governor Control
7	870P188	1	Palnut, Choke Linkage
8	150K434	1	Diaphragm (Incl. Gaskets)
9	150A668	1	Gasket, Diaphragm Plate
10	150A425	1	Gasket, Booster to Manifold
11	150A366	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
	150K433	1	Kit, Vacuum Spd. Booster Replacement (Incl. Ext. Sprg. Mounting Gasket)

NOTE: Vacuum Booster Cover and Housing not sold separately.





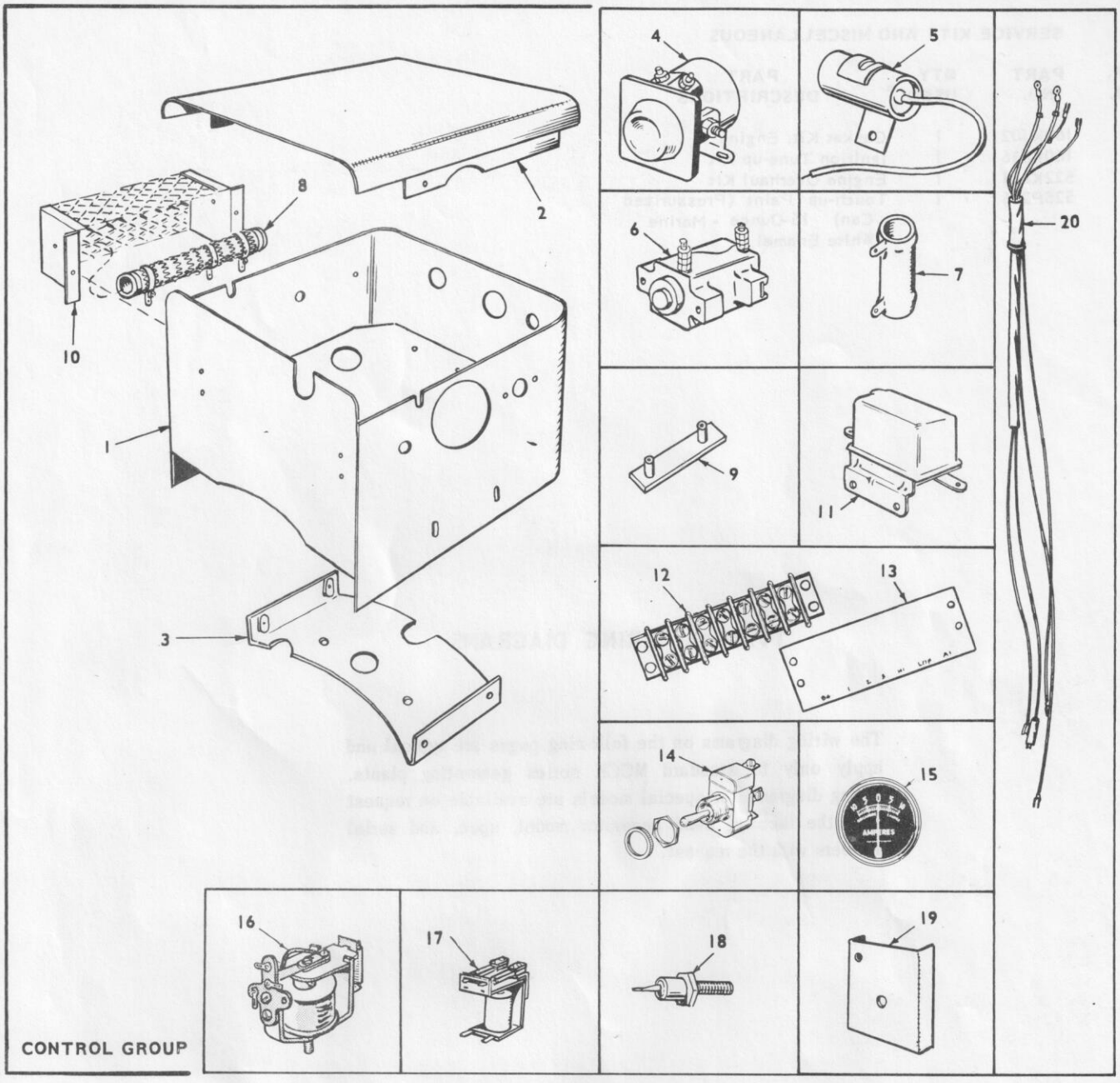




GENERATOR GROUP

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	231E121	1	Adapter, Generator to Engine
12	232B1256	1	Scroll, Air Baffle
13	214A61	4	Brush, Commutator
14	BRUSH, COLLECTOR RING		
			Key 1
	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

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

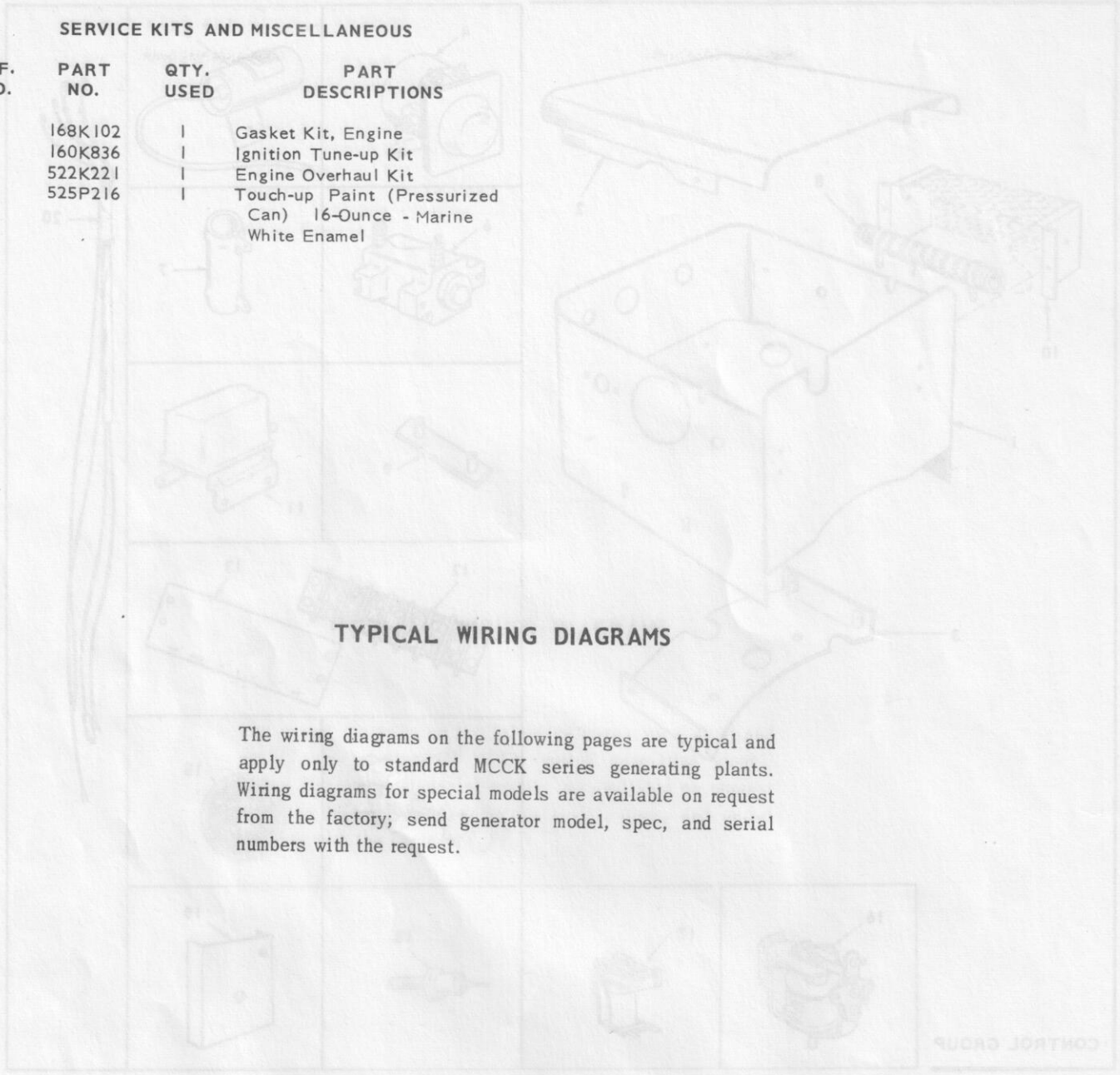


CONTROL GROUP

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 (1. 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
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+, 1, 2, 3, H1, LOP, A1)
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
20	338B334	1	Harness

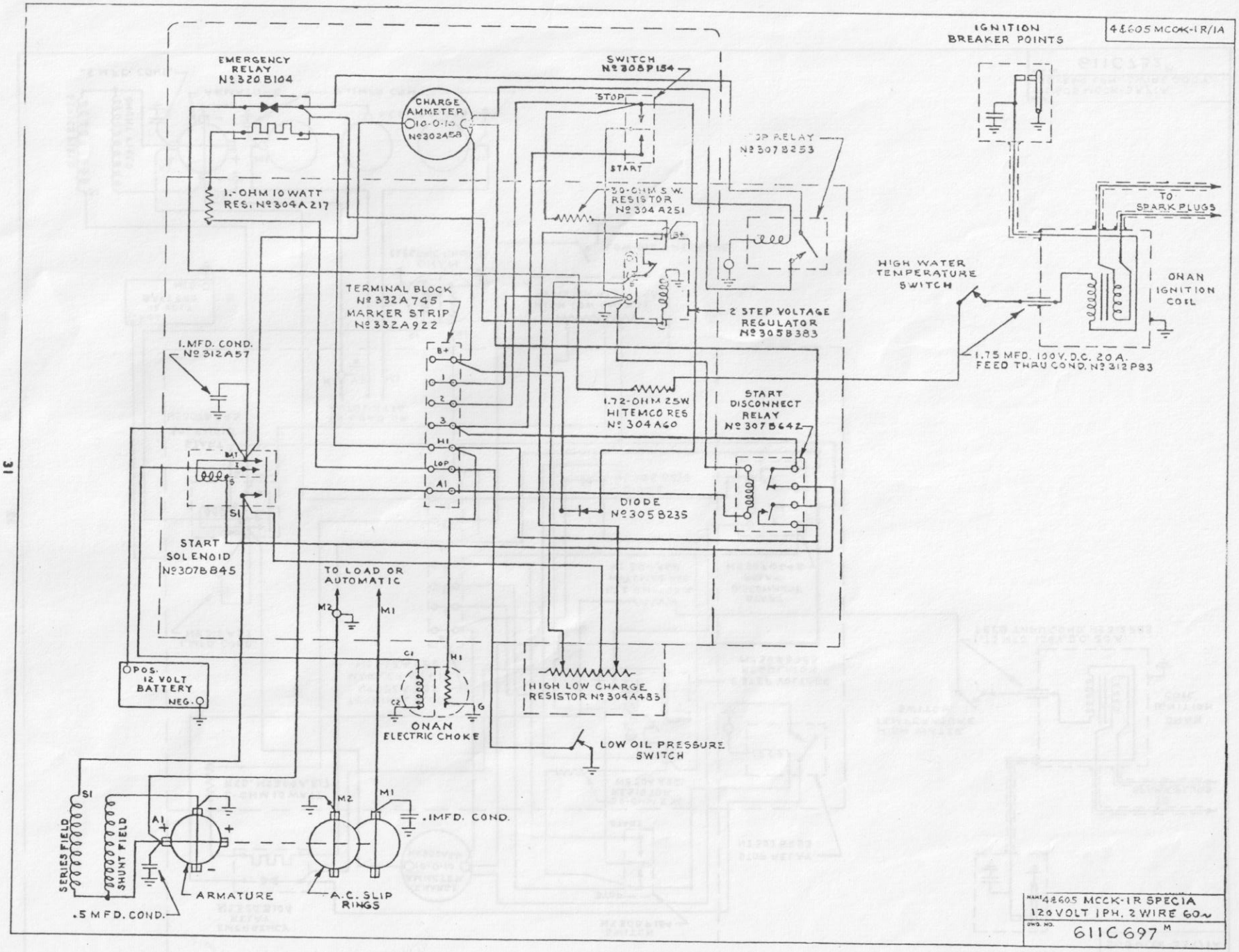
SERVICE KITS AND MISCELLANEOUS

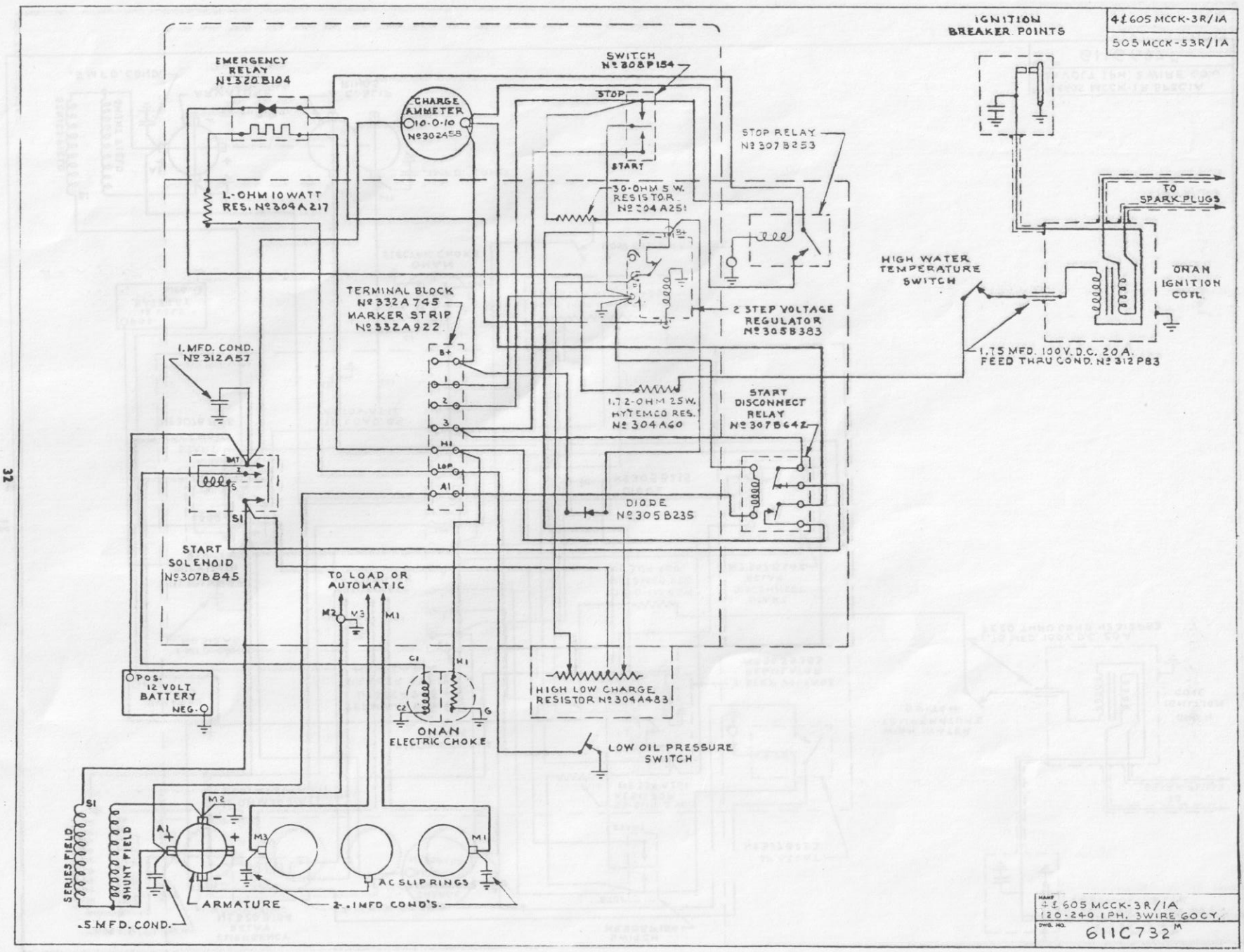
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTIONS
	168K102	1	Gasket Kit, Engine
	160K836	1	Ignition Tune-up Kit
	522K221	1	Engine Overhaul Kit
	525P216	1	Touch-up Paint (Pressurized Can) 16-Ounce - Marine White Enamel



TYPICAL WIRING DIAGRAMS

The wiring diagrams on the following pages are typical and apply only to standard MCCK series generating plants. Wiring diagrams for special models are available on request from the factory; send generator model, spec, and serial numbers with the request.


4&605 MCCK-1R/1A
IGNITION BREAKER POINTS
EMERGENCY RELAY Nº320B104
SWITCH Nº308P154
STOP
START
CHARGE AMMETER 10-0-10 Nº302A58
STOP RELAY Nº307B253
1.-OHM 10 WATT RES. Nº304A217
30-OHM S.W. RESISTOR Nº304A251
TO SPARK PLUGS
HIGH WATER TEMPERATURE SWITCH
ONAN IGNITION COIL
TERMINAL BLOCK Nº332A745 MARKER STRIP Nº332A922
2 STEP VOLTAGE REGULATOR Nº305B383
1.75 MFD. 100 V. D.C. 20 A. FEED THRU COND. Nº312P83
1 MFD. COND. Nº312A57
1.72-OHM 25W HITEMCO RES Nº304A60
START DISCONNECT RELAY Nº307B642
DIODE Nº305B235
START SOLENOID Nº307B845
TO LOAD OR AUTOMATIC
POS. 12 VOLT BATTERY NEG.
ONAN ELECTRIC CHOKE
HIGH LOW CHARGE RESISTOR Nº304A483
LOW OIL PRESSURE SWITCH
SERIES FIELD
SHUNT FIELD
ARMATURE
.5 MFD. COND.
A.C. SLIP RINGS
.1 MFD. COND.
NAME 4&605 MCCK-1R SPECIA
120 VOLT 1PH. 2 WIRE 60~
DWG. NO. 611C697 M


4 £605 MCCK-3R/1A
505 MCCK-53R/1A
IGNITION BREAKER POINTS
EMERGENCY RELAY Nº320B104
CHARGE AMMETER 10-0-10 Nº302458
SWITCH Nº308P154
STOP
START
STOP RELAY Nº307B253
1-OHM 10 WATT RES. Nº304A217
30-OHM 5 W. RESISTOR Nº304A251
TO SPARK PLUGS
HIGH WATER TEMPERATURE SWITCH
ONAN IGNITION COIL
TERMINAL BLOCK Nº332A745
MARKER STRIP Nº332A922
2 STEP VOLTAGE REGULATOR Nº305B383
1.75 MFD. 100 V. D.C. 20 A. FEED THRU COND. Nº312P83
1. MFD. COND. Nº312A57
1.72-OHM 25 W. HYTEMCO RES. Nº304A60
START DISCONNECT RELAY Nº307B642
DIODE Nº305B235
START SOLENOID Nº307B845
TO LOAD OR AUTOMATIC
POS. 12 VOLT BATTERY NEG.
HIGH LOW CHARGE RESISTOR Nº304A483
ONAN ELECTRIC CHOKE
LOW OIL PRESSURE SWITCH
SERIES FIELD
SHUNT FIELD
ARMATURE
AC SLIP RINGS
2-.1 MFD COND'S.
.5 MFD. COND.
4 £605 MCCK-3R/1A
120-240 1 PH. 3 WIRE 60 CY.
DWG. NO. 611C732M