

OPERATORS MANUAL AND PARTS CATALOG

FOR



ELECTRIC GENERATING PLANTS

DEC

SERIES

NOTE!!

The ONAN Manual and/or Parts Catalog only has been supplied. This model series is no longer in production. Due to reasons beyond our control we no longer stock or supply the engine manufacturers Manual or Parts Catalog. However we believe they are available direct from the engine manufacturer providing you furnish the SERIAL NUMBER and SPEC from the engine manufacturers nameplate on the engine. Refer to Parts Catalog and order from manufacturer as indicated under "Instructions for Ordering Repair Parts".

ONAN

ENGINE/GENERATOR DIVISION
Studebaker
CORPORATION

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Important Safety Precautions

Read and observe these safety precautions when using or working on electric generators, engines and related equipment. Also read and follow the literature provided with the equipment.

Proper operation and maintenance are critical to performance and safety. Electricity, fuel, exhaust, moving parts and batteries present hazards that can cause severe personal injury or death.

FUEL, ENGINE OIL, AND FUMES ARE FLAMMABLE AND TOXIC

Fire, explosion, and personal injury can result from improper practices.

- Used engine oil, and benzene and lead, found in some gasoline, have been identified by government agencies as causing cancer or reproductive toxicity. When checking, draining or adding fuel or oil, do not ingest, breathe the fumes, or contact gasoline or used oil.
- Do not fill tanks with engine running. Do not smoke around the area. Wipe up oil or fuel spills. Do not leave rags in engine compartment or on equipment. Keep this and surrounding area clean.
- Inspect fuel system before each operation and periodically while running.
- Equip fuel supply with a positive fuel shutoff.
- Do not store or transport equipment with fuel in tank.
- Keep an ABC-rated fire extinguisher available near equipment and adjacent areas for use on all types of fires except alcohol.
- Unless provided with equipment or noted otherwise in installation manual, fuel lines must be copper or steel, secured, free of leaks and separated or shielded from electrical wiring.
- Use approved, non-conductive flexible fuel hose for fuel connections. Do not use copper tubing as a flexible connection. It will work—harden and break.

EXHAUST GAS IS DEADLY

- Engine exhaust contains carbon monoxide (CO), an odorless, invisible, poisonous gas. Learn the symptoms of CO poisoning.
- Never sleep in a vessel, vehicle, or room with a genset or engine running unless the area is equipped with an operating CO detector with an audible alarm.
- Each time the engine or genset is started, or at least every day, thoroughly inspect the exhaust system. Shut down the unit and repair leaks immediately.

- Warning: Engine exhaust is known to the State of California to cause cancer, birth defects and other reproductive harm.

Make sure exhaust is properly ventilated.

- Vessel bilge must have an operating power exhaust.
- Vehicle exhaust system must extend beyond vehicle perimeter and not near windows, doors or vents.
- Do not use engine or genset cooling air to heat an area.
- Do not operate engine/genset in enclosed area without ample fresh air ventilation.
- Expel exhaust away from enclosed, sheltered, or occupied areas.
- Make sure exhaust system components are securely fastened and not warped.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not remove any guards or covers with the equipment running.
- Keep hands, clothing, hair, and jewelry away from moving parts.
- Before performing any maintenance, disconnect battery (negative [–] cable first) to prevent accidental starting.
- Make sure fasteners and joints are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- If adjustments must be made while equipment is running, use extreme caution around hot manifolds and moving parts, etc. Wear safety glasses and protective clothing.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses and do not smoke while servicing batteries.
- Always disconnect battery negative (–) lead first and reconnect it last. Make sure you connect battery correctly. A direct short across battery terminals can cause an explosion. Do not smoke while servicing batteries. Hydrogen gas given off during charging is explosive.
- Do not disconnect or connect battery cables if fuel vapors are present. Ventilate the area thoroughly.

DO NOT OPERATE IN FLAMMABLE AND EXPLOSIVE ENVIRONMENTS

Flammable vapor can be ignited by equipment operation or cause a diesel engine to overspeed and become difficult to stop, resulting in possible fire, explosion, severe personal injury and death. **Do not operate diesel equipment where a flammable vapor environment can be created by fuel spill, leak, etc., unless equipped with an automatic safety device to block the air intake and stop the engine.**

HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY

- Hot coolant is under pressure. Do not loosen the coolant pressure cap while the engine is hot. Let the engine cool before opening the pressure cap.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not service control panel or engine with unit running. High voltages are present. Work that must be done while unit is running should be done only by qualified service personnel.
- Do not connect the generator set to the public utility or to any other electrical power system. Electrocutation can occur at a remote site where line or equipment repairs are being made. An approved transfer switch must be used if more than one power source is connected.
- Disconnect starting battery (negative [-] cable first) before removing protective shields or touching electrical equipment. Use insulative mats placed on dry wood platforms. Do not wear jewelry, damp clothing or allow skin surface to be damp when handling electrical equipment.
- Use insulated tools. Do not tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- With transfer switches, keep cabinet closed and locked. Only authorized personnel should have cabinet or operational keys. Due to serious shock hazard from high voltages within cabinet, all service and adjustments must be performed by an electrician or authorized service representative.

If the cabinet must be opened for any reason:

1. Move genset operation switch or Stop/Auto/Handcrank switch (whichever applies) to Stop.
2. Disconnect genset batteries (negative [-] lead first).
3. Remove AC power to automatic transfer switch. If instructions require otherwise, use extreme caution due to shock hazard.

MEDIUM VOLTAGE GENERATOR SETS (601V TO 15kV)

- Medium voltage acts differently than low voltage. Special equipment and training are required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Induced voltage remains even after equipment is disconnected from the power source. Plan maintenance with authorized personnel so equipment can be de-energized and safely grounded.

GENERAL SAFETY PRECAUTIONS

- Do not work on equipment when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.
- Never step on equipment (as when entering or leaving the engine compartment). It can stress and break unit components, possibly resulting in dangerous operating conditions from leaking fuel, leaking exhaust fumes, etc.
- Keep equipment and area clean. Oil, grease, dirt, or stowed gear can cause fire or damage equipment by restricting airflow.
- Equipment owners and operators are solely responsible for operating equipment safely. Contact your authorized Onan/Cummins dealer or distributor for more information.

KEEP THIS DOCUMENT NEAR EQUIPMENT FOR EASY REFERENCE.

We mean it.....

.....and this certificate with the Onan electric plant you purchased proves we mean it! When this plant left our factory in Minneapolis it took with it our sincere assurance that it will produce exactly as stated on its nameplate.

The name of ONAN is synonymous with satisfactory performance, certified performance.



GENERAL INFORMATION

I

This instruction book contains information for the proper installation, operation, and maintenance of your equipment. We suggest that this book be kept handy so that it can be referred to when necessary.

This equipment is the result of proven engineering design, highest quality materials, and expert workmanship. Thorough inspection and testing assures you that this equipment will perform as expected.

If you wish to contact your dealer or the factory regarding this equipment, be sure to supply the complete MODEL and SPEC. NO., and the full serial number of the equipment as shown on the nameplate. This information is necessary to identify the equipment among the many basic and special optional types manufactured.

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

IMPORTANT

RETURN WARRANTY CARD ATTACHED TO UNIT

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Onan generating plants of the DEC series are complete units consisting of a diesel engine, self excited alternating current generator, and such controls and accessories as are specified by the purchaser.

Electrical characteristics of plants vary according to the particular model, and are noted on the Onan nameplate attached to the unit. The rated power is based on an .8 power factor load. For standby service, optional controls for automatic starting, load transfer, and stopping may be connected.

If it ever becomes necessary to contact a dealer or the factory regarding the plant, be sure to mention the complete Model and Spec. No., and the Serial No. as given on the Onan nameplate. This nameplate information is necessary to properly identify the plant among the many types manufactured. Refer to the engine nameplate when requesting information from its manufacturer.

Generating plants are given a complete running test under various load conditions and thoroughly checked before leaving the factory. Inspect the plant closely for damage that might have occurred in shipment. Any such damage must be repaired before putting the plant in operation.

ENGINE

The engine is a Ford Model ..PX-6005-.. and is fully described in the Ford manual. It basically is a four-cylinder, water cooled, diesel (compression ignition) engine. Cylinder bore is 3.937 inches, piston stroke is 4.524 inches, and displacement is 220-cubic inches. Engines are rated 53.0 horsepower (standby) at 1800-rpm. Compression ratio is 16 to 1. Standard oil capacity is 8.1 U.S. quarts. 12-volt battery current is used for starting and control circuits. Specific engines used may have variations due to optional features of the generating plant (type cooling etc.) specified by the plant purchaser.

GENERATOR

The generator consists of a 4-pole revolving field alternator and "static" exciter with magnetic amplifier regulation. Alternating current output is generated in the alternator stator winding attached directly to the rear end of the engine. The rotating field of the alternator is attached to the engine flywheel, and so turns at engine speed. Rotor speed determines the current frequency - thus the 60-cycle plant must operate at approximately 1800-rpm, and the 50-cycle plant at approximately 1500-rpm. The outer end of the rotor turns in a large sealed ball bearing fitted into the end bell.

The stationary exciter is mounted on a metal frame attached to the alternator end bell, and protected by a sheet metal enclosure. The exciter and regulator provides voltage regulation of plus or minus 2%, from no-load to continuous-load. Stable generator output is established within 5 seconds after a change in load. The exciter has no moving parts, and needs no external voltage regulator.

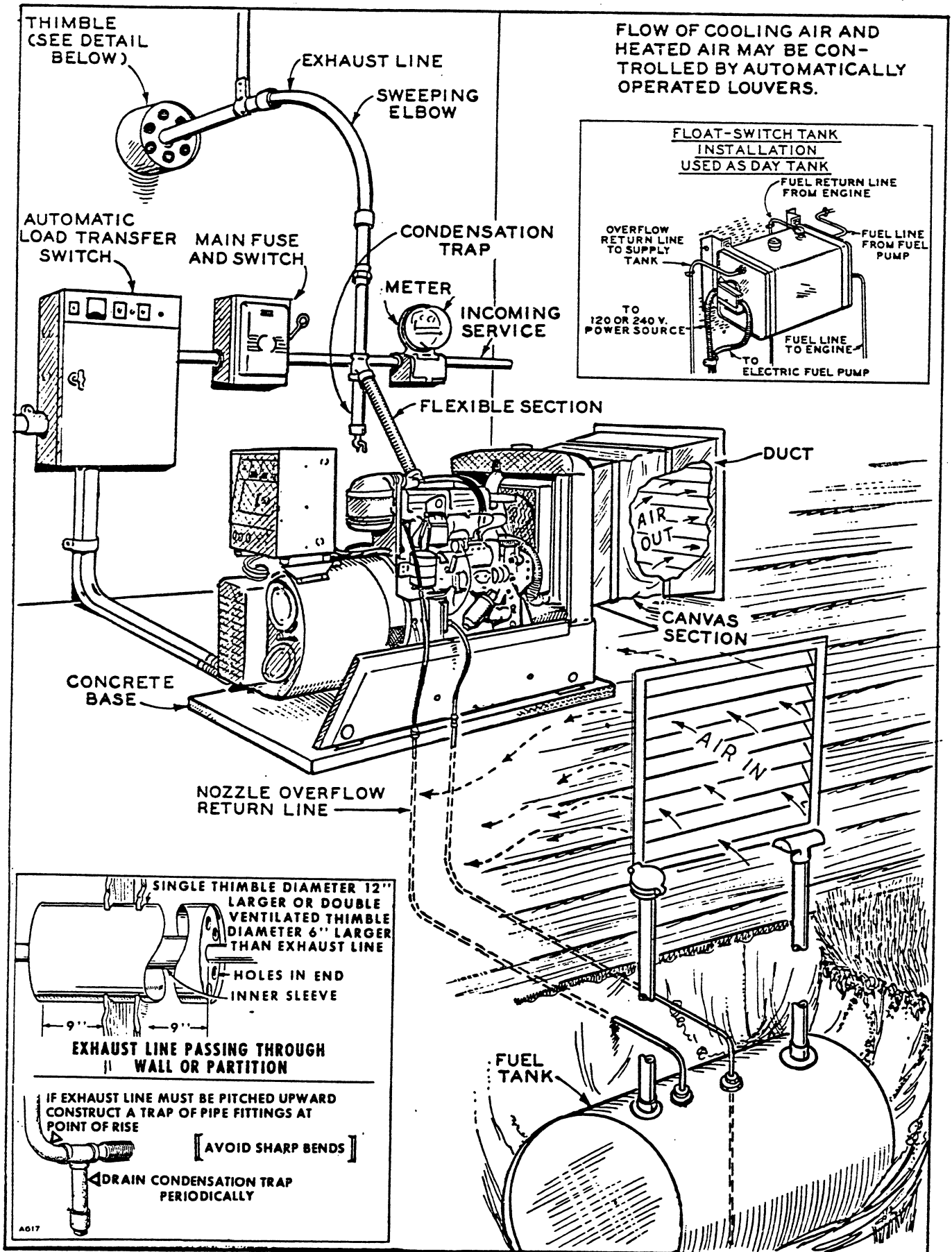
DESCRIPTION

CONTROLS

Engine controls for standard plants include 12-volt automotive starting and battery charging circuits with necessary relays, and a charge rate ammeter. Water temperature and oil pressure gauges provide for checking engine performance. A water temperature safety shut-off switch protects against engine damage if engine coolant temperature should rise dangerously high. Terminals may be provided for connection of optional warning devices, etc.

Generating plants are adaptable to the use of automatic load transfer control equipment (for emergency standby installations) if the ambient temperature will be above 50°F.

Electrical instrument panel equipment varies according to model and purchaser options. Instruments may include voltmeter, ammeter, circuit breaker, running time meter, etc. Output terminals are provided for load wire connections.



INSTALLATION

Generating plant installation involves location, connection to a fuel source, exhaust system, starting battery installation, etc. Each installation must be considered individually - use these instructions as a general guide. A typical installation is shown, and by following the principles outlined and referring to the installation outline drawing supplied a proper installation can be made. Local regulations (building code, fire ordinance, etc.) may affect some details, and any such regulations should be fully observed.

LOCATION. - Usually, the location has been pre-selected. For the average installation, a warm indoor site is recommended. Local regulations sometimes require that for emergency standby service the ambient temperature must not fall below a specified minimum. The selected site should be dry, well ventilated, and reasonably dust free. Provide for sufficient clearance (at least 24" recommended) on all sides for convenience in plant servicing.

MOUNTING. - Plants are mounted to a rigid base that provides proper support and adequate vibration damping. However, for convenience in draining crankcase oil, general servicing, etc., plants can be mounted on raised pedestals or rails at least 6" high. Extra vibration dampers are available and may be installed under the plant base. If mounting in a trailer, or for other mobile applications, bolt securely in place. Bolting down is optional for stationary installations.

VENTILATION. - The engine generates a considerable amount of heat that must be dissipated. For a radiator cooled unit, proper ventilation is of vital importance. Under average operating conditions, a cooling air volume of approximately 7500-cubic feet of air per minute will provide sufficient cooling. If the installation is made in a small room, this may require installation of an auxiliary fan of sufficient size to assure proper volume of air. The fan can be connected to operate only when the plant is running. If the plant is equipped for "city water" cooling, an air volume of approximately 4000-cubic feet of air per minute will provide proper generator cooling and will support combustion in the engine.

Pusher fans used on radiator cooled units force cooling air out through the front of the radiator. For room or compartment installations the usual method of exhausting the heated air is to construct a duct from the front of the radiator to an opening in an outside wall. The duct and wall opening area should be at least as large as the plant radiator outlet area. An air inlet opening of at least equal area must also be provided.

Air inlet and outlet openings should be provided with suitable shutters to prevent back flow of cold outside air during shut down periods. Proper consideration must be given to any other draft creating equipment installed in the same room. If unattended, automatic starting (as for emergency standby with automatic load transfer switch) is planned, the shutters should be automatically controlled.

CITY WATER COOLING. - An optional method of engine cooling, in place of the conventional radiator and fan, uses a constant pressurized water supply. For piping connections, etc., refer to the separate outline drawing furnished. Variations of "city" water cooling are optional: the water may circulate directly through the engine, or the raw water may run through a heat exchanger which keeps the actual engine cooling liquid separate. The cooling water may also be used to cool the exhaust manifolds. (Water cooled exhaust manifolds are recommended). An electric solenoid valve is installed in the water supply line, connected to open the water flow only when the plant is operating. A rate-of-flow valve (either automatic or hand adjusted) is recommended for installation in the supply line to control the water flow. Use flexible hose to connect water supply and outlet flow pipes to the engine connection points. Pipe the outlet flow to a convenient drain.

1. **STANDPIPE SYSTEM.** - The standpipe system uses a mixing, or tempering, tank. Cooling water that circulates through the engine mixes with a source of cool "raw" water. The "raw" water supply must be free of scale-forming lime or similar impurities.
2. **HEAT EXCHANGER SYSTEM.** - The heat exchanger installation provides for a "closed" engine cooling system. Engine coolant circulates through a tubed chamber, keeping the coolant separate from the cool "raw" water supply. The coolant chamber must be filled for operation, as for a radiator cooled plant. An electric solenoid valve is installed in the water supply line, connected to open the water flow only when the plant is operating. A rate of flow valve (either automatic or hand adjusted) is recommended for installation in the supply line to control the water flow. Use flexible hose to connect water supply and outlet flow pipes to the engine connection points.

If the plant is equipped for "city" water cooling, see that the water supply to the engine is turned on. If the system is the "closed" (heat exchanger) type, see that the chamber portion is properly filled, similar to a radiator equipped unit. Make a preliminary adjustment of the water flow as indicated in the table. Make final adjustment after the plant warms up.

MINIMUM WATER FLOW, HEAT EXCHANGER COOLING

ELECTRICAL LOAD	WATER TEMP.	MIN. FLOW-GAL./MIN.
30 KW	40°F.	9
	60°F.	11
	80°F.	13

INSTALLATION

MINIMUM WATER FLOW, TEMPERING TANK COOLING

ELECTRICAL LOAD	WATER TEMP.	MIN. FLOW-GAL./MIN.
30 KW	40°F.	1.49
	60°F.	1.7
	80°F.	2.1

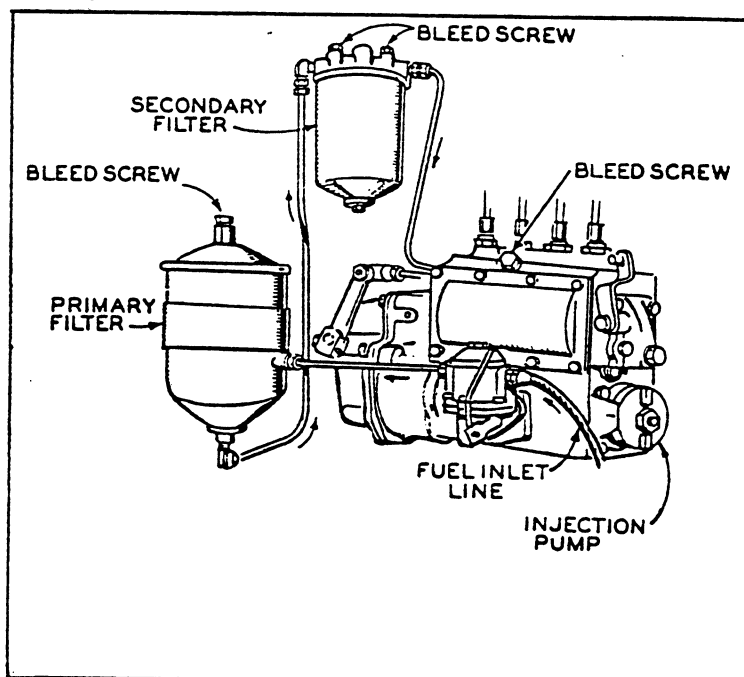
EXHAUST. - Pipe exhaust gases outside any enclosure. Use pipe at least as large as the 2" pipe size outlet of the engine. Increase the pipe diameter one pipe size for each additional 12-feet in length. Use a flexible connection at the engine exhaust manifold. Provide adequate support for the piping. Pipe fittings cause a resistance to the flow of exhaust gases and can result in a loss of engine power. Use sweeping elbows in preference to standard pipe elbows, and keep the number of necessary turns to the minimum. If the exhaust line runs upward at any point, install a vapor trap at the low point, with provision for periodic draining. Shield or insulate the line if there is danger of personnel contact. If the line passes close to a combustible wall or partition, allow at least 4" clearance. Install a suitable muffler.

FUEL CONNECTIONS. - Check local regulations governing the installation of a fuel supply tank.

NOTE

In any diesel engine installation, fuel system cleanliness is of utmost importance. Make every effort to prevent entrance of any moisture or contaminating matter of any kind. Do not use lines or fittings of galvanized material.

The maximum fuel lift without any horizontal run should not exceed 6-feet. The horizontal run, if the supply tank is level with the fuel pump, should not exceed 12-1/2 feet. Use 1/2-inch tubing for the supply line from the fuel tank and 3/8-inch tubing for the nozzle overflow return line. Use a flexible section to connect the lines to the plant.



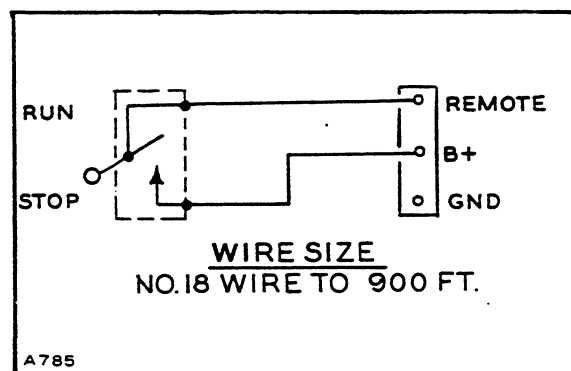
DAY TANK. - Engines may be equipped with an optional day tank. A float operated switch controls the electric fuel pump (not included with day tank) to maintain the correct fuel level to assure a constant source of fuel. Do not mount the tank on the plant. Mount the tank on a vibration free support below the engine fuel return line. The tank overflow line to supply tank is optional, consult local regulations. Refer to the installation instructions included with the tank.

Use proper adapter fittings for line connections to the engine: the fuel inlet on the auxiliary electric fuel pump, and the injector nozzle fuel return connection are threaded for a 1/8" pipe fitting. Be sure there is no possibility of an air leak in the supply line connections, which would prevent pumping of fuel.

BATTERY. - Two 6-volt batteries are recommended. Note that each battery cable terminal clamp is stamped "P" (positive) or "N" (negative) for connection to the proper battery terminal post. Connect positive to the large terminal of the start solenoid on the starter. Connect negative to a convenient ground point on the engine. Service the batteries as necessary.

Infrequent plant use (as in emergency standby service) may allow the batteries to self discharge to the point where they can not start the plant. A separate trickle charger should be connected if installing a load transfer switch that has no built-in charge circuit. Onan load transfer controls include such a battery charging circuit.

REMOTE CONTROL CONNECTIONS. - Starting and stopping is through a 2-wire electrical system. To extend this control to one or several remote locations, a 3-place terminal block is provided in the plant control box. The terminal block is marked REMOTE, B+, and GND. If a load transfer or an automatic control is used, follow the instructions supplied with the control. If a SPST manual switch is used, connect the wires and mount the switch so the engine will run when the switch handle is up, the same as an ordinary light switch. The size wire to use is determined by the plant-to-control distance. Use #18 wire up to 900-ft. The GND terminal is for a customer-supplied alarm at a remote location to warn of low oil pressure, high water temperature and overspeed.

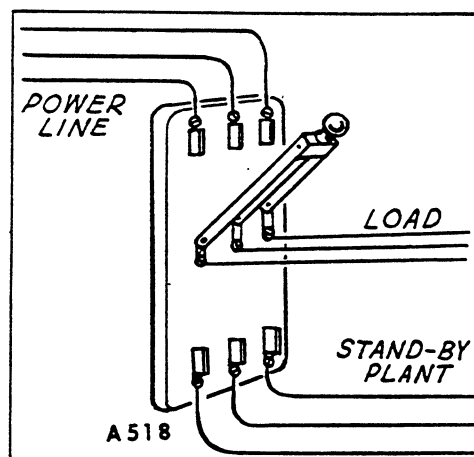


CONNECTING LOAD WIRES. - The plant AC output terminals are large studs located inside the control box, at the generator end of the plant. Knock out openings are provided for convenience in bringing the load wires into the control box.

Most local regulations require that wiring connections be made by a licensed electrician, and that the installation be inspected and approved before operation. All connections, wire size, etc., must conform to requirements of electrical codes in effect at the installation site.

INSTALLATION

If the installation is for standby service, a double throw transfer switch must always be used. This switch (either manual or automatic) must be connected so that it is impossible for the generator current to be fed into the normal power source lines, nor for the normal source and generator current to be connected at the same time. Instructions for connecting an automatic load transfer control are included with such equipment. It is assumed that personnel connecting the generator, and any such auxiliary equipment, are fully qualified and understand the problems of balancing the circuits, grounding the plant, etc. Refer to the output control wiring diagram furnished. Each generator lead is marked according to the wiring diagram.

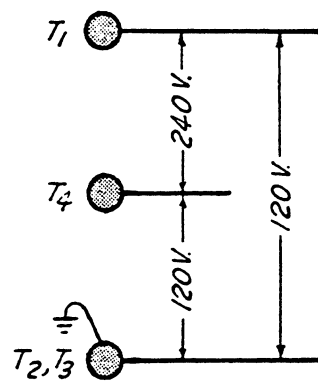


120/240-VOLT, 1-PHASE, 3-WIRE PLANT

Terminal post T2, T3 is the grounded (neutral) terminal. For 120-volt current, connect the "hot" load wire to either the T1 or T4 terminal. Connect the neutral load wire to the T2, T3 terminal. Two 120-volt circuits are thus available, with not more than 1/2 the rated capacity of the plant available on each circuit. Balance the load as closely as possible.

For 240-volt current, connect one load wire to terminal T1 and the second load wire to terminal T4. Terminal T2, T3 is not used for 240-volt service.

If both 120 and 240-volt current is to be used at the same time, use care not to overload either circuit.



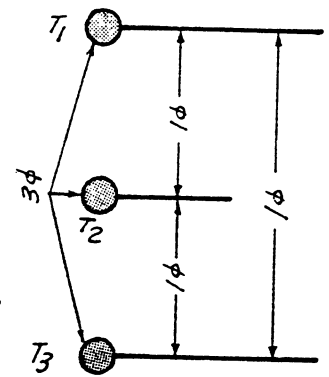
3-PHASE, 3-WIRE PLANT

No terminal is grounded. For three-phase current, connect separate load wires to each plant terminal T1, T2, and T3.

If phase sequence is important, as with 3-phase motors, final connections may be postponed until a trial run is made. When the plant is installed for standby service, phase sequence of the normal line service and the generator output must be the same, for proper load operation.

Single-phase current is obtained from any two plant terminals. Three single-phase circuits are thus available: T1-T2, T1-T3, and T2-T3. The load connected to any one single-phase circuit must not be greater than 1/3 the rated capacity of the plant.

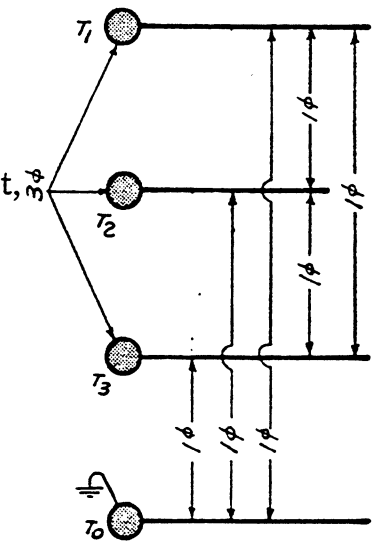
If both single-phase and three-phase current is to be used at the same time, use care not to over-load any one circuit. Subtract the amount of the 3-phase load from the rated capacity of the plant. Divide the remainder by 3, and this is the maximum load that can be connected to any one single-phase circuit. For example a 10,000-watt 3-phase load is connected to a 25,000-watt plant. This leaves 15,000 watts available for single phase use - 5,000 watts on each circuit. Do not attempt to take all 15,000 watts in this example off one circuit, as over loading of the generator will result.



3-PHASE, 4-WIRE, WYE CONNECTED PLANT

The 3-phase 4-wire plant produces single-phase current of one voltage and three-phase current of a different voltage. The single-phase voltage is the lower voltage as noted on the plant nameplate, and the three-phase voltage is the higher nameplate voltage.

The terminal marked T0 is grounded. For single-phase current, connect the neutral (white) load wire to the T0 terminal. Connect the "hot" (black) load wire to any one of the other three terminals - T1, T2, or T3. Three separate single-phase circuits are available, with not more than 1/3 the rated capacity of the plant from any one circuit.



For 3-phase current, connect separate load wires to each of the plant terminals T1, T2, and T3. If phase sequence is important, refer to the principles of connection as given for the 3-phase 3-wire plant. Single-phase current is obtained between any two 3-phase terminals.

If single-phase and 3-phase current is to be used at the same time, use care to properly balance the single-phase load.

120/240-VOLT, 3-PHASE, 4-WIRE DELTA CONNECTED PLANT

The 3-phase Delta connected plant is designed to supply 120-volt single-phase current and 240-volt 3-phase current. The T0 terminal is the generator center tap between T1 and T2, and is normally not grounded.

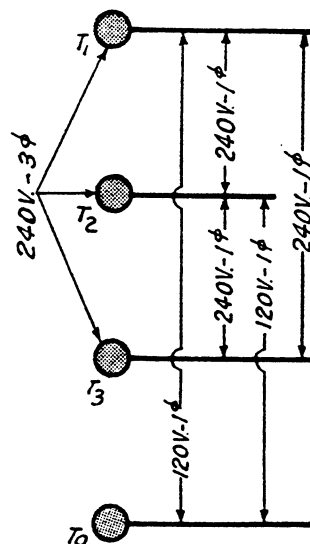
For 240-volt 3-phase operation connect the three load wires to the three plant terminals T1, T2, and T3 - one wire to each terminal. For 3-phase operation the T0 terminal is not used.

INSTALLATION

For 120/240-volt, 1-phase, 3-wire operation, terminals T1 and T2 are the "hot" terminals. The T0 terminal is the neutral, which can be grounded if required. For 120-volt service, connect the "hot" (black) load wire to either the T1 or T2 terminal. Connect the neutral (white) wire to the T0 terminal. Two 120-volt circuits are available. Any combination of single-phase and three-phase loading can be used at the same time as long as no terminal current exceeds the NAMEPLATE rating of the generator.

SIGNAL LIGHTS, ETC. - Optional equipment may include signal lights to warn of improper operation, or terminals for connecting such lights, horn, or other warning devices. Refer to the engine wiring diagram if such equipment is to be connected.

WATER JACKET HEATER. - The optional water jacket heater serves to keep the engine coolant warm during periods of plant shut-down in low ambient temperatures, thus promoting easier starting. Connect the heater to a normally energized electric power source, making sure that the line voltage is correct for the rated voltage of the heater.



WARNING
THIS ENGINE CONTAINS BREAK-IN OIL

Before Operating: FILL cooling system. CHECK lubricating oil level. CHANGE break-in oil after 15-hours operation. CHANGE oil filter after 15-hours.

Rust Inhibiting Oil is applied to cylinders for shipping. Run Diesel plant at 50% rated load for first 1/2-hour.

CRANKCASE OIL. - Refer to the LUBRICATION section of the Ford engine manual for recommendations as to the SAE number of oil to use. Fill the crankcase with 8 quarts (U.S. measure) of a good quality, heavy duty oil designated for "type DS" service.

Approximately 1-pint of oil drains from the oil filter into the crankcase during shut down, so a level reading is most accurate if taken immediately upon stopping.

GOVERNOR OIL. - Refer to the LUBRICATION AND MAINTENANCE section of the Ford engine manual. Fill the governor with engine oil until the oil starts to overflow from the oil level plug hole on the back of the governor. Do not over-fill.

INJECTOR PUMP OIL. - Remove the injector side plate and check that the injector pump lubricating oil level is correct. The oil level must reach the covered opening on the outside of the injector pump. Add fresh engine crankcase oil as required.

AIR CLEANER. - Service the air cleaner with oil, filling to the level marked on the cleaner. Use the same SAE number oil as used in the crankcase. However, it is not necessary to use expensive heavy duty oil in the air cleaner. A straight non-detergent mineral oil is satisfactory.

RADIATOR. - Fill the radiator with clean soft water. Use a good rust and scale inhibitor. If there is any danger of exposure to freezing temperatures, use a standard antifreeze in the recommended proportion. The approximate capacity of the cooling system is 17 U.S. quarts. On the initial run, check the level several times and add liquid as necessary to compensate for any air pockets which may have formed when filling.

FUEL. - Refer to the Ford manual for fuel oil specifications. Check with the fuel supplier for assurance that the fuel meets the specifications.

Before the initial start, the fuel system must be properly primed and all air bled from the fuel system.

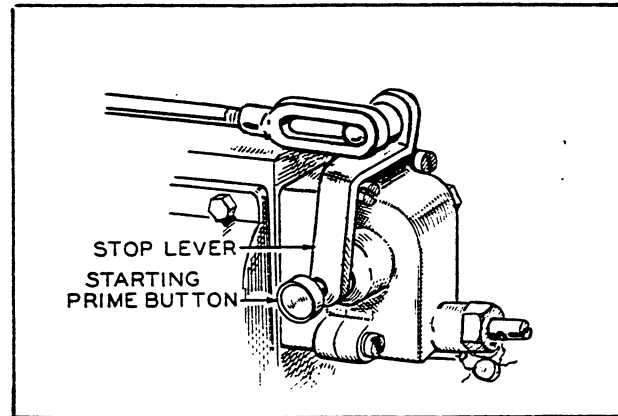
1. Loosen the bleeder screws at the top of both filters and the injection pump.
2. Operate the electric fuel pump until fuel flows from the primary filter bleeder. Tighten the primary filter bleed screw. When fuel flows from the inlet bleeder screw on the secondary filter, tighten the inlet bleeder screw. Tighten the secondary filter outlet bleeder screw when fuel flows from the outlet bleeder.
3. Tighten the bleed screw on the injection pump when air bubbles no longer appear at the bleeder port. Failure to bleed the entire fuel of air may result in an air lock condition and cause engine stoppage and erratic running.
4. Check the entire fuel system for leaks after starting the engine.

OPERATION

STARTING. - Always be sure the fuel system is air free, as directed under PRE-PARATION. If fuel lines have been disconnected, or if fuel has been exhausted bleed the entire fuel system. For normal starts, no further priming is necessary.

To start, press the START-STOP switch to its START position, holding in contact to crank the engine. The engine should start with a few seconds of cranking. Investigate any failure to start - do not crank for more than 30 seconds at one time. If engine fails to crank, check that the cranking limiter switch is closed. For a cold engine start, push in the Starting Prime Button on the injector pump and crank the engine. The Starting Prime Button will automatically release when the engine is running.

For starting in temperatures below $+10^{\circ}\text{F}$., be sure the fuel has a pour point well below the prevailing temperature. The fuel supplier is responsible for providing a fuel suitable for the temperature conditions - free of wax, etc. Drain, preheat, and refill the engine coolant and crankcase oil. If practical, keep the battery in a warm location during shut down and reconnect just before starting.



CHECKING OPERATION. - As soon as the engine starts, always check the oil pressure. Normal oil pressure is 30 to 45 lbs. at operating temperature, but will be considerable higher until the engine warms up.

The water temperature gauge indicates the coolant temperature during operation. Normal operating temperature is approximately 190°F .

The small DC ammeter indicates the battery charging current. An automatic regulator controls the charging rate, which will vary according to the charge condition of the battery. Normal charge rate is 5 to 10 amperes when the plant first starts. The rate should fall to almost zero as the battery becomes fully charged.

STOPPING. - If conditions permit, disconnect electrical load and allow the plant to run a few minutes at no load. This will allow the plant to cool off slightly and may prevent an excessive temperature rise when the plant stops and ventilation ceases. Press the START-STOP switch to its STOP position to stop the plant.

LOW OIL PRESSURE SWITCH. - In case of low engine oil pressure, the oil pressure switch acts through the emergency stop relay to stop the plant. After correcting the cause of the low oil pressure, press the reset button before attempting to restart the engine.

HIGH WATER TEMPERATURE. - If the engine coolant temperature rises to a dangerously high point, a thermostatic switch actuates the stop circuit and stops the plant. Correct the condition that caused the high temperature. The coolant temperature must drop approximately 10°F. before the plant can be started again. The high water temperature switch acts through the EMERGENCY STOP RELAY, and the PUSH TO RESET button must be pressed to restore normal operation.

VOLTAGE REGULATOR RHEOSTAT. - On plants equipped with the voltage regulator rheostat, the rheostat provides for approximately 5% plus or minus adjustment of the output voltage. Turn clockwise to increase the voltage, counterclockwise to decrease the voltage.

BATTERY, HOT LOCATION. - Batteries will self discharge very quickly when the ambient temperature is consistently above 90°F., such as in a boiler room. To lengthen battery life, dilute the electrolyte from its normal 1.275 specific gravity reading a full charge to a 1.225 reading. The cranking power of the battery will be reduced slightly when the electrolyte is so reduced, but if the temperature is above 90°F. this should not be noticed, and the lengthened battery life will be a distinct advantage.

CRANKING LIMITER. - The cranking limiter is a safety device which prevents excessive engine cranking. The electrically operated thermal relay will automatically open the engine cranking circuit after approximately one-minute cranking time. The limiter must be manually reset after opening. Allow at least one minute before attempting to reset the limiter. Investigate any failure in starting.

EXERCISE PERIOD. - If the plant is used infrequently, such as in standby service, start and operate for 15 to 30 minutes at least once a week. This exercise period keeps oil distributed on engine parts, fuel system full, etc., and promotes easier starting.

NO LOAD OPERATION. - Period of no load operation should be held to a minimum. After about 4 hours of continuous no load operation, the injection nozzles may become fouled enough to require servicing. If it is necessary to keep the engine running for long periods of time when no electrical output is required, best engine performance will be obtained by connecting a "dummy" electrical load. Such a load could consist of heater elements, etc.

OPERATION

SPECIAL EQUIPMENT

Some plant models are equipped with electrical indicating meters, running time meter, circuit breakers, etc. Such equipment varies according to purchaser options or plant model.

AC AMMETER. - The ac ammeter indicates the amount of load connected to the generator circuit. On three-phase models, the current shown will be for one phase only, according to the position of the selector switch.

AC VOLTMETER. - The ac voltmeter indicates the voltage of the ac output. On three-phase models, the voltage shown will be for the same phase as the amperage shown, according to the position of the selector switch. On a single-phase (no selector switch) or four-wire, three-phase model, the voltage shown will be the higher nameplate voltage.

METER SELECTOR SWITCH. - The meter selector switch is provided on three-phase models. The position of its handle indicates the phase of the generator output that is indicated on the ac ammeter and voltmeter.

RUNNING TIME METER. - The running time meter registers the total number of hours, to 1/10th, that the plant has run. Use it to keep a record of periodic servicing.

CIRCUIT BREAKER. - The circuit breaker is a safety device to protect the generator against damage from an over-load. If an over-load should occur, the circuit breaker will automatically trip, disconnecting the generator output from the load terminals. After correcting the over-load condition, it is necessary to manually reset the breaker to the ON position.

WATER JACKET HEATER. - Intended for use in cold weather applications. The electrically operated heater keeps the engine coolant at a moderate temperature to prevent condensation, oil thickening, hard starting.

FREQUENCY METER. - The frequency meter indicates the frequency of the output current in cycles per second. It can be used to check engine speed (each cycle per second equals 30-rpm engine speed).

TACHOMETER. - The tachometer indicates the engine operating speed in revolutions per minute. It can be used to check current frequency.

EMERGENCY STOP RELAY. - If a plant safety device operates to stop the plant, the emergency stop relay PUSH TO RESET button must be pressed in before the plant can be started again. Always be sure to correct the condition that caused the emergency stop.

GENERAL. - Follow a definite schedule of inspection and servicing, based on operating hours. Keep an accurate record of operating time. Use the running time meter (optional equipment) to keep a record of operation and servicing. Service periods outlined below are for normal service and operating conditions. For continuous duty, extreme temperature, etc., service more frequently. For infrequent use, light duty, etc., service periods can be lengthened accordingly. Refer to the Ford engine manual for details of engine service operations.

DAILY SERVICE, NORMAL 8-HOURS OF OPERATION.

1. FUEL OIL. - Check, replenish as necessary.
2. CRANKCASE OIL. - Check level, add as necessary.

NOTE

Check the oil level immediately after stopping, before oil in the filter drains back into the crankcase. Drain sediment off.

3. RADIATOR. - Check level, add as necessary.
4. CLEAN AND INSPECT. - Wipe clean of dust, spilled oil, etc. Inspect for loose parts, leaks, etc.

WEEKLY SERVICE, NORMAL 50-HOURS OF OPERATION.

1. GOVERNOR. - Check oil level, add oil as necessary.
2. AIR CLEANER. - Check, clean, replenish oil as frequently as necessary.

SEMI-MONTHLY SERVICE, NORMAL 100-HOURS OF OPERATION.

1. CRANKCASE BREATHER. - Clean and inspect.
2. FAN BELT. - Inspect and adjust to 1/2-inch depression between pulleys.
3. FUEL FILTER. - Drain sediment. Reprime.
4. COOLING SYSTEM. - Check for rust or scale formation.

MONTHLY SERVICE, NORMAL 200-250 HOURS OF OPERATION.

1. CHARGE ALTERNATOR. - Clean and inspect.
2. STARTER. - Oil front bearing sparingly, check brushes.
3. INJECTION NOZZLE. - Check for proper spray pattern, etc. Refer to the Ford manual.
4. AC GENERATOR. - Check brushes, replace if worn to 1/2-inch or if damaged. DO NOT LUBRICATE.
5. FUEL FILTER - Replace elements, clean, and reprime.
6. CRANKCASE OIL. - Drain and refill unless experience indicates otherwise. Refer to LUBRICATION in the Ford manual.
7. OIL FILTER. - Replace the element at time of oil change.

MAINTENANCE

ENGINE

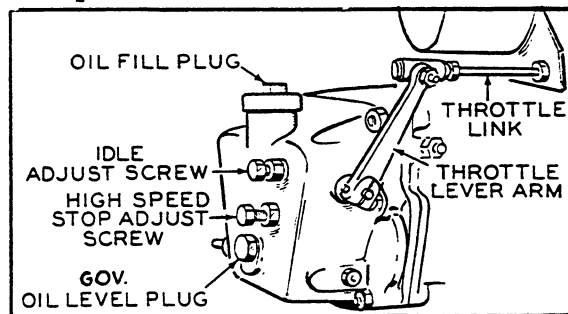
GENERAL. - Basic engine maintenance procedures are covered in the Ford engine manual. Proper attention to correct operating and periodic service procedures will lessen the necessity for future maintenance repairs.

ENGINE SPEED. - The frequency of the generator output current is in direct ratio to the engine speed. The engine speed is controlled by the built-in governor of the fuel injection pump. The original factory setting of the governor should not be disturbed. However, in case of pump repair, the governor is easily reset.

1. See that the injection pump is properly timed to the engine. Refer to the manual.
2. Check that the governor oil level is even with the bottom of the oil level plug. When adding oil to the governor, the oil should just start to flow out of the oil level plug hole. Do not over-fill.
3. Adjust the length of the throttle link to give an engine speed of approximately 1800-rpm for a 60-cycle plant (1500-rpm for a 50-cycle plant). Loosen the adjusting nuts which secure the throttle link to the injector pump and lengthen the link to decrease the rpm or shorten the link to increase the rpm. Use an accurate tachometer to determine engine speed, or a frequency meter connected to the AC generator output. Multiply frequency by 30 to obtain engine speed.

EXAMPLE: 30×61 (cycles) equals 1830-rpm.

Check the generator voltage. It may be necessary to make a slight re-adjustment of the speed setting to obtain the preferred voltage at average load. A range of 1830 to 1890-rpm (61 to 63 cycles) might give the desired voltage.

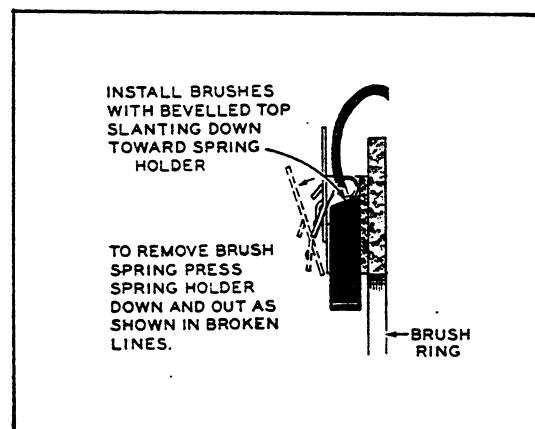


GENERATOR

AC generators normally require very little servicing. Periodic inspection, to coincide with engine oil changes, will assure continued good performance.

BRUSHES. - To examine the brushes, brush springs, and slip rings, remove the inspection and ventilating covers from the end bell openings. Keep the end bell, brush rig, etc. free of dust and dirt.

Brushes should be replaced when worn to approximately 1/2-inch long, or so that the lead end of the brush is below a point midway between the outer and inner end of its guide. Do not attempt to remove the brush without first removing its spring and bracket as shown. Never bend a spring back over its bracket - doing so will put a kink in it and require its replacement. Do not use a substitute brush that may look identical but may have entirely different electrical characteristics. Be sure the brush is installed so that the short side of its taper is toward the spring and its bracket.



GENERATOR BEARING. - The generator bearing is prelubricated for its life and sealed. It requires no servicing.

EXCITER. - The exciter contains no moving parts. Occasionally blow out any dust, etc. Check thoroughly to assure that all components are mechanically secure, and that all electrical connections are tight.

Generator tests. - If the generator does not function properly, a few simple tests with the plant off may isolate the cause.

1. Temporarily disconnect the leads from exciter terminals E1, E2, AF1 and AF2. Check the exciter wiring diagram for input voltage to the exciter, and temporarily connect an alternate source (such as commercial line) of AC power with the same voltage rating to exciter terminals E1 and E2.

Check the voltage across terminals AF1 (+) and AF2 (-). If there is no dc voltage, the exciter is not functioning.

2. If dc voltage at terminals AF1 and AF2 is 25 volts or higher, check the alternator for a grounded or open circuit, etc.
3. No terminal of the exciter should show a grounded circuit.

MAINTENANCE

4. CHECKING STATIC EXCITER. - Troubles are listed in advancing order, from no output voltage to a rated but fluctuating output voltage. The relationship between trouble and cause is not always consistent from model to model, so the following information must be used as a guide, not an absolute rule. The column entitled "step" indicates the step for testing a standard component. When the word "None" appears in that column, all the information needed to complete the check is given in the column headed "Corrective Action". Use a multimeter to check continuity, voltage, and resistance as indicated in the tests.

Note: It is imperative that the testing procedures are completely understood by the serviceman before attempting to perform corrective maintenance. Use caution when working on an operating plant.

NATURE OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION	STEP
Generator will not build up voltage.	Circuit breaker in "off" or "tripped" position	Reset and close breaker	None
	Open in circuit breaker	Stop plant and check breaker continuity	None
	No AC power to Magneciter	Check AC voltage at E1-E2 with the plant operating. Voltage should be five per cent of the rated voltage. If not, check continuity from E1-E2 back to the generator	None
	Partial loss of residual in Rotor	With plant operating jumper from E2 to heat sink of field rectifier Z until voltage begins to build-up. Then remove.	None
	Pair of Field Rectifiers (either W & Z or X & Y) open	Test rectifiers and replace if defective	5
	Both Field Rectifiers X and Y shorted	Test rectifiers and replace if defective	5

NATURE OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION	STEP
Output voltage slow to build up. Circuit breaker opens in about five seconds	Either Field Rectifier X or Y shorted	Test rectifiers and replace if defective	5
Output voltage slow to build up and five percent below rated voltage after build up. Voltage regulation poor.	Either Field Rectifier W or Z shorted	Test Rectifier and replace if defective	5
Output voltage slow to build up and higher than rated voltage after build up	Open circuit in one or more Control Rectifier	Test rectifier and replace if defective. Check soldered connections to rectifiers	5
Output voltage slow to build up and ten to twenty percent above rated voltage after build up	Open in one Field Rectifier	Test rectifiers and replace if defective	5
	Open circuit in Gate winding G1-G2 of Reactor A or B	If Field Rectifiers Y and Z check okay, check continuities of Gate windings G1-G2	6
Output voltage builds up normally but less than rated voltage after build up	Shorted winding in Control Reactor	Test Control Reactor and replace if defective	7
Output voltage builds up normally with slightly less than rated voltage at no load and low voltage at full load	Compound winding S1-S2 installed backward or has open circuit.	Check wiring diagram for polarity of Compound windings through Reactors A and B and test for continuity	None
Output voltage builds up normally but 20 percent above rated voltage after build up. Voltage regulation poor.	Compound winding S1-S2 installed backward through one Reactor (A or B)	Check wiring diagram for polarity of Compound winding through Reactor A or B	None
Output voltage builds up normally but is twenty five percent above rated voltage after build up	Open circuit in Control Rectifier bridge	Check continuity from the junction of Control Rectifiers 1 and 2 to the junction of Control Rectifiers 3 and 4	None

MAINTENANCE

NATURE OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION	STEP
Output voltage builds up normally but 125 to 150-percent above rated voltage after build up	Shorted turn in gate winding G1-G2 of Reactor A or B	Test Reactors A and B for shorted turns and replace if defective	6
Output voltage builds up normally but 150 to 200-percent above rated voltage after build up. No regulation possible	Control winding C1-C2 of Reactor A or B polarized incorrectly	Check circuit connections of both Reactors A and B	None
	Shorted turn in Control winding C1-C2 of Reactor A or B	Test Reactors A and B for shorted turn and replace if defective	6
	Open in Control Circuit	Check continuity from E1 to E2 through Control Circuit	None
Generator Voltage fluctuating while engine running at constant speed	Incorrect setting on the Stabilizing Resistor	Check resistance and reset.	8

5. Checking Rectifiers. Disconnect one lead from, or remove, each rectifier for its individual test.

CAUTION

Note carefully the DIRECTION OF MOUNTING of any rectifier removed. It must be remounted in its original direction.

- a. Connect the ohmmeter across the rectifier contacts and observe the meter reading.
- b. Reverse the connections and compare the new reading with the first reading.
- c. If one reading is considerably higher than the other reading, the rectifier can be considered satisfactory. However, if both readings are low, or if both indicate an "open" circuit, replace the rectifier with a new identical part.

6. Checking Reactors "A" and "B".

CAUTION: The extent to which the resistance values obtained when trouble shooting with an ohmmeter are reliable and useful is governed by the accuracy of that ohmmeter. Resistance readings of the range of values found between G and G2 cannot be read with accuracy on the multimeter.

- a. Set the resistance range selector on the meter to the resistance range.
- b. Isolate one Gate winding by disconnecting either end of Gate winding G1-G2 from its point of connection; for example, disconnect G1 at E2. Measure the resistance in the Gate winding across G1-G2. Should be 0.75.
- c. Isolate one Control winding by disconnecting either lead C1 or C2 from the terminal block. Measure the resistance in the Control winding across C1-C2. Should be 9.0.
- d. Connect one meter lead to the disconnected Gate winding lead and the other meter lead to the disconnected Control winding lead and check for continuity.

Results:

1. REACTOR IS SERVICEABLE if resistance is within 20 percent either way of the value listed and there is no continuity between the Control and Gate windings.
2. REACTOR IS DEFECTIVE if there is an open circuit in either the Gate or the Control windings. Continuity between the Gate and the Control windings is also an indication of a defective Reactor. In either case, the Reactor should be replaced.

7. Checking Control Reactor.

- a. Isolate the Control Reactor by disconnecting common lead "C" from its point of connection and carefully measure the resistance from this lead to the numbered lead on the Control Reactor. Should be 18.0.

Results:

1. CONTROL REACTOR IS SERVICEABLE if resistance is within 10 percent of the value specified.
2. CONTROL REACTOR IS DEFECTIVE if no continuity is indicated between the common lead "C" and the numbered lead, indicating the presence of an open circuit.

8. Checking Resistors:

The resistors must be checked with a multimeter adjusted to the appropriate range of resistances. See wiring diagram for correct values.

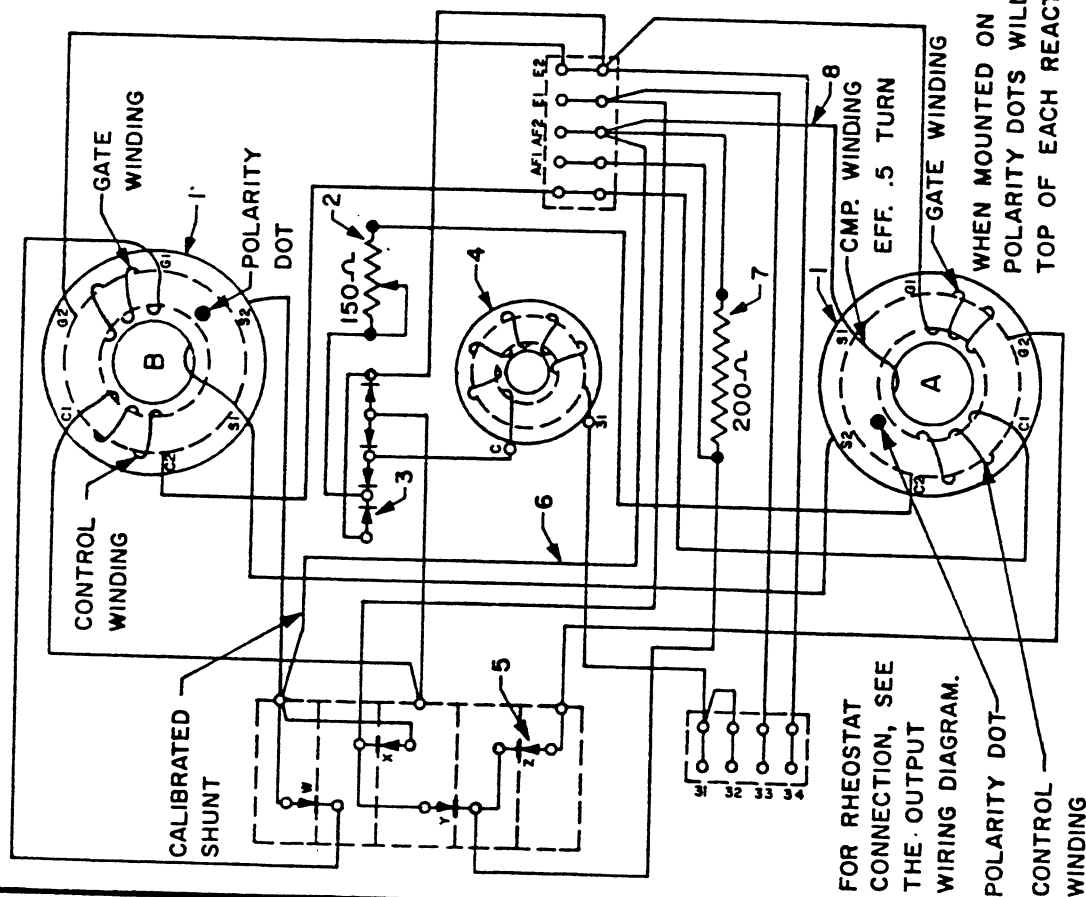
- a. Isolate the Resistor by disconnecting one end from its point of connection and carefully measure the resistance.

Results:

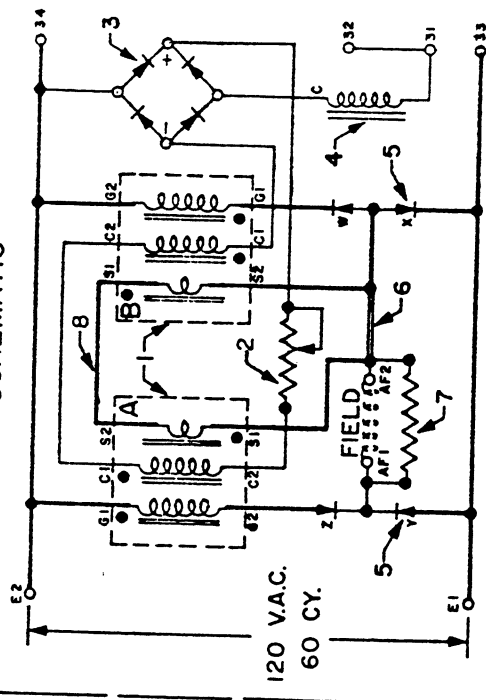
1. RESISTOR IS SERVICEABLE if the measured resistance falls within 20-percent of the value specified in the wiring diagram.
2. RESISTOR IS DEFECTIVE if there is no indication of continuity through the resistor. If the measured resistance exceeds the percent limits either way, the Stabilizing Resistor can be adjusted to bring the resistance within the required limits.

625A256

PICTORIAL



SCHEMATIC



8	1	NO. 14 WIRE, 26" LG.
7	1	RESISTOR-DAMPING
6	1	NO. 14 WIRE, 26" LG.
5	4	RECTIFIER-FIELD
4	1	REACTOR-CONTROL
3	4	RECTIFIER-CONTROL
2	1	RESISTOR-STABILIZING
1	2	REACTOR-GATE

ITEM	QTY	DESCRIPTION
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PARTS LIST

Onan

DATE 12-15-65 DR. CDR ENGR. 60 CKR. SC.
 NAME STATIC EXCITER WIRING DIAGRAM
 MODEL 120 V.A.C. 60 CY.

07SXINIC

625A256

FIELD RECONNECTING ONAN 12-LEAD GENERATORS

IMPORTANT

BEFORE ATTEMPTING TO RE-CONNECT A GENERATOR-CONTACT THE ONAN FACTORY FOR REQUIRED INSTRUMENT CHANGES, NEW WIRING DIAGRAMS, NEW PLANT NAMEPLATE WITH PROPER SPECIFICATION NUMBER AND VOLTAGE.

RECONNECTIBLE GENERATORS

When shipped - the generators are connected to deliver the voltage specified on the order. The plant nameplate will show *only* the single specified voltage for which the generator is connected. The output instruments on the plant (such as voltmeters, ammeters, transformers, frequency meters, and running time meters) are intended for use with the specific nameplate voltage.

Some plants may include an optional re-connection terminal block which allows safe and simple voltage changes. The generator leadwires terminate at the optional re-connection block or in the junction box on the generator side. The junction box also contains the ammeter current transformers (some plants have the current transformers in the control box) which may require replacement when changing to different output voltages. Instruments, which may require changes per new output voltages, are accessible by tipping out the control box front panel.

The generator is a basic coded type (either 2X, 5X, 6X) as identified by the generator data number on the plant nameplate. Example - 150UK2XN1A, 150UK5XN1A, 150UK6XN1A. Each type can be connected for output voltages shown in Table 1.

All generator wires have wire tags for identification. The output leads to load are T0, T1, T2, T3. The generator winding leads, which are joined to form the output leads, are marked 1 through 12. See Figure 1 wiring diagrams. All numbered leads are joined in various combinations to the output leads for the different voltages.

Instruments and their related parts may require changes because of different voltages and current. New instruments are selected by the new voltage and current ratings of the plant. Refer to Table 2 for voltage rated instruments and select according to the new voltage output. Always size the instrument so the plant output will not exceed instrument rating.

To determine if current rated instruments (ammeters and current transformers) must be changed, refer to Table 4 and find the correct ampere rating of the plant after re-connection. After determining current rating, refer to Table 3 for the proper size ammeter and current transformers.

Instrument wiring is essentially the same for all plants. Connect new instruments in the same manner as the old ones were connected. Wiring diagrams, supplied by ONAN after the re-connection registration, provide additional instructions and part numbers required to complete the plant wiring.

WARNING

SEVERE DAMAGE WILL RESULT IF LEADS ARE INCORRECTLY CONNECTED OR IMPROPERLY INSULATED. USE EXTREME CARE IN CHECKING LEADS TO ASSURE PROPER CONNECTIONS.

TABLE 1. (10-85 KW ONLY)

CODE	VOLTAGE	OUTPUT
"2X" GENERATOR		
4R	120/208	3ph Wye
7XR	240/416	3ph Wye
5DR	120/240	3ph Delta (Note 2)
	240/480	1ph "Zig-Zag" (Note 1)
7R	220/380	3ph Wye "Dog-Leg"
"5X" GENERATOR		
7XR	240/416	3ph Wye
5R	240	3ph Delta
6DR	240/480	3ph Delta (Note 2)
	240	1ph Delta (Note 1)
"6X" GENERATOR		
4XR	277/480	3ph Wye
	138/240	3ph Wye
7XR	240/416	3ph Wye "Dog-Leg"

NOTE 1: Usable output is 2/3 of normal 3ph. rating.
 NOTE 2: Delta-one phase center tapped. If no 3ph. output is being used, usable 1ph. output is up to 2/3 of normal 3ph. rating but, 1ph. output must be balanced between the two output legs.

TABLE 2. VOLTAGE RATED INSTRUMENTS

AC VOLTMETER VOLTAGE	RESISTOR	METER PART NO.
150	None	302P420
300	None	302P421
600	None	302P422
750	None	302P423
RUNNING-TIME METER		
120-240 (1ph)	None	302P465
120-208 (3ph)	None	302P465
220-380 (3ph)	None	302P466
277-480 (3ph)	None	302P467
FREQUENCY METER		
120	None	302P213
208	None	302P221
240	None	302P221
240 (5R connection)	304A125	302P213
220-380 (3ph)	304A125	302P213
277-480 (3ph)	304A305	302P213
480	304A305	302P213

TABLE 3. CURRENT RATED INSTRUMENTS

AC AMMETER CURRENT (AMPS)	CURRENT TRANS.	METER PART NO.
30	None	302P418
50	None	302P419
80	None	302P458
100	302P78	302P408
150	302B79	302P410
200	302B106	302P411
300	302B107	302P413
500	302B372	302P414
750	302B385	302P415

TABLE 4. NOMINAL AMPERE RATINGS.

ALWAYS USE KVA RATINGS WHEN SHOWN OR KNOWN			ONAN CODE	SINGLE-PHASE		THREE-PHASE				
				-1	-3	-4	-5 -5D	-7	-4X -6	-9
POWER FACTOR										
80 %		UNITY	120-V AMP	120/240-V AMP	120/208-V AMP	240-V 120/240-V AMP	220/380-V AMP	480-V 277/480-V AMP	600-V AMP	
KW	KVA	KW/KVA								
20.0	25.0	25.0	208	104	70	60	38	30	24	
25.0	31.25	31.25	260	130	87	75	48	38	30	
		30.0	250	125	83	72	46	36	29	
30.0	37.5	37.5	312	156	104	90	57	45	36	
35.0	43.75	43.75	364	182	122	105	67	53	42	
40.0	50.0	50.0	416	208	139	120	76	60	48	

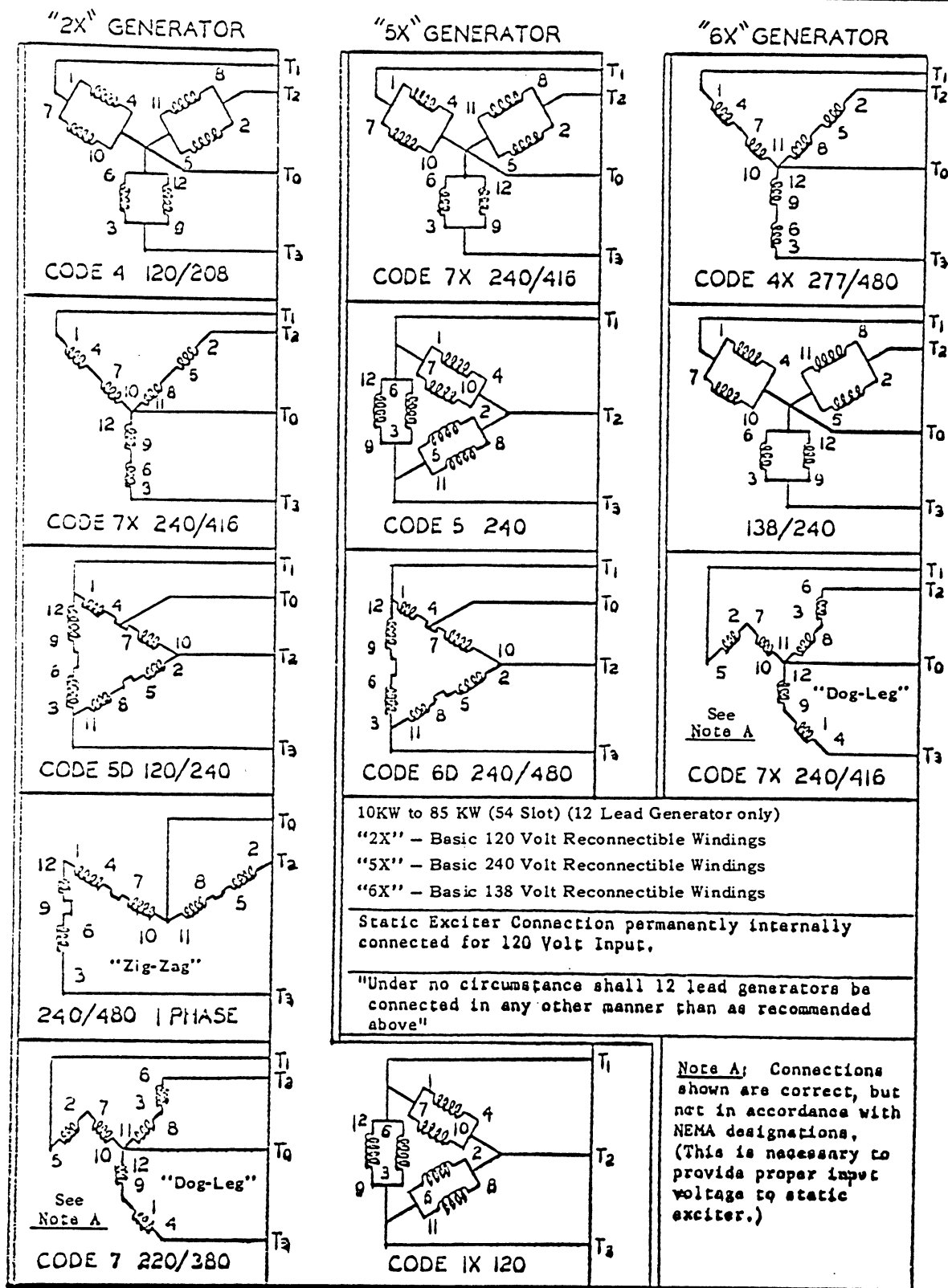


FIG. 1. 10 TO 85 KW RE-CONNECTION DIAGRAMS

INSTRUCTIONS FOR ORDERING REPAIR PARTS

ONAN PARTS

All parts in this list are *Onan* parts. For *Onan* parts or service, contact the dealer from whom you purchased this equipment or your nearest authorized service station. To avoid errors or delay in filling your order, please refer to the *Onan nameplate* located on the upper right side of the flywheel housing and give the complete:

MODEL AND SPEC. NO. SERIAL NO.

ELECTRIC Onan PLANT	
MODEL AND SPECIFICATION NO.	SERIAL NO.
IMPORTANT MENTION ABOVE NUMBERS AND GEN. DATA NO. WHEN ORDERING PARTS OR WRITING ABOUT THIS PLANT	
RATINGS AT SEA LEVEL BASED ON FUEL CHECKED BELOW:	
GASOLINE <input type="checkbox"/>	DIESEL FUEL <input type="checkbox"/>
STAND BY KW <input type="text"/>	KVA <input type="text"/> AMPS <input type="text"/>
CONTINUOUS KW <input type="text"/>	KVA <input type="text"/> AMPS <input type="text"/>
A.C. VOLTS <input type="text"/>	CYCLES <input type="text"/> PHASE <input type="text"/> P.F. <input type="text"/>
EXCITER <input type="text"/>	GEN. DATA <input type="text"/>
R.P.M. <input type="text"/>	USE <input type="text"/> VOLT BATTERY-NEGATIVE GROUND
MANUFACTURED BY ONAN DIVISION OF STUDEBAKER CORPORATION MINNEAPOLIS 14, MINNESOTA	

FORD PARTS

All Ford parts must be ordered from the Ford Motor Company of Dearborn, Michigan, or their nearest authorized distributor. Refer to the Engine nameplate located on side of the crankcase. When ordering parts, always supply Ford with the following nameplate information:

SERIAL NUMBER OPTIONS TYPE

INDUSTRIAL ENGINE	
SERIAL <input style="width: 100%;" type="text"/>	
TYPE <input style="width: 90%;" type="text"/>	OPTIONS <input style="width: 90%;" type="text"/>
MADE IN U. S. A. BY FORD	

PARTS CATALOG

This catalog applies to the standard DEC plants as listed below. Powered by a Ford C3PX6005A engine (see Ford Manual). Engine parts modified or added by *Onan* will be in this list and have *Onan* part numbers. These supersede similar parts listed in the Ford manual. *Onan* parts are arranged in groups of related items and are identified by a reference. All parts illustrations are typical. Unless otherwise mentioned, parts are interchangeable. Right and left plant sides are determined by facing the front end of the engine.

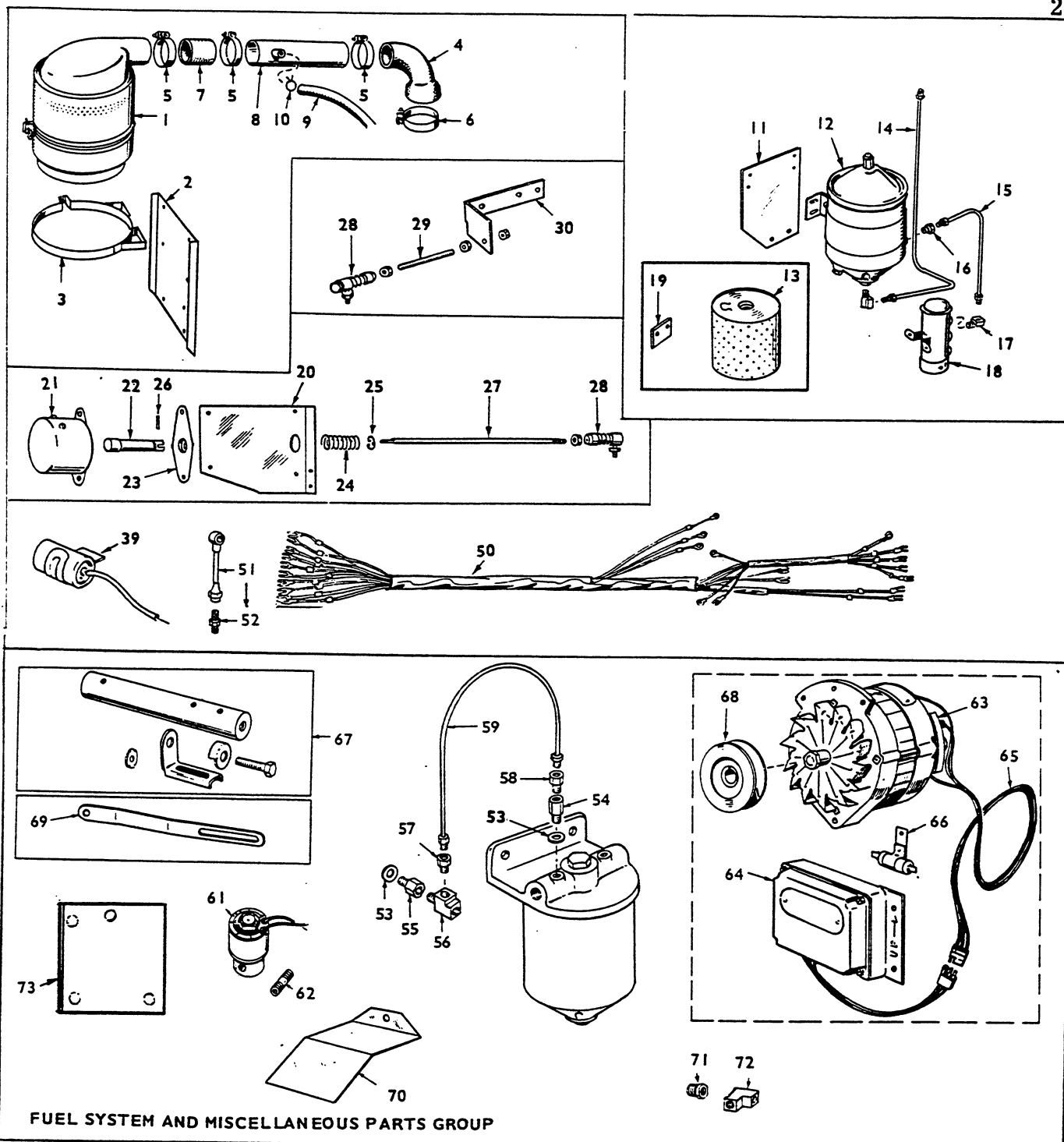
PLANT DATA TABLE

MODEL AND SPEC NO. *		ELECTRICAL DATA				
HOUSED	UNHOUSED	WATTS***	VOLTS	CYCLES	PHASE	WIRE
25DEC-54R/	25DEC-54R8/	25,000	120/208	50	3	4
25DEC-55DR/	25DEC-55DR8/	25,000	120/240	50	3	4
25DEC-57R/	25DEC-57R8/	25,000	220/380	50	3	4
30DEC-3R/	30DEC-3R8/	30,000	120/240	60	1	3
30DEC-4R/	30DEC-4R8/	30,000	120/208	60	3	4
30DEC-5DR/	30DEC-5DR8/	30,000	120/240	60	3	4
30DEC-4XR/	30DEC-4XR8/	30,000	277/480	60	3	4
30DEC-7R/	30DEC-7R8/	30,000	220/380	60	3	4
30DEC-9R/	30DEC-9R/	30,000	600	60	3	3

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

** - This is a delta-wound 240-volt model with one phase center-tapped. A limited amount of 1-phase, 120/240-volt power can be utilized together with 3-phase power as long as no terminal current exceeds the rated nameplate current.

*** - Maximum rating is shown. Continuous rating also appears on nameplate.



FUEL SYSTEM AND MISCELLANEOUS PARTS GROUP

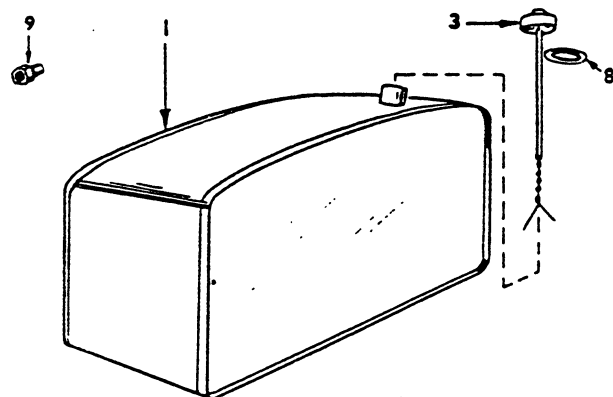
REF. NO.	PART NO.	QUANTITY USED	PARTS DESCRIPTION
1	140B62	1	Cleaner, Air
2	140B767	1	Bracket, Air Clnr. Mtg.
3	140A80	2	Band, Air Clnr. Mtg.
4	503B455	1	Hose, Air Clnr. Connector to Manifold
5	503-465	3	Clamp, Air Clnr. Hose
6	503-354	1	Clamp, Air Clnr. Hose
7	503-482	1	Hose, Air Clnr. To Connector
8	140A769	1	Connector, Air Clnr. to Manifold Hoses
9	503-483	1	Hose, Breather
10	503-197	2	Clamps, Breather Hose
11	149A985	1	Plate, Primary Fuel Filter Mtg.
12	149C823	1	Filter, Fuel - Primary

REF. NO.	PART NO.	QUANTITY USED	PARTS DESCRIPTION
13	149P846	1	Cartridge, Fuel Filter
14	149C988	1	Line, Fuel - Primary to Sec. Filter
15	LINE, FUEL - PUMP TO PRIMARY FILTER		
	149A987	1	Spec. A only
	149A1055	1	Begin Spec. B
16	502-35	1	Connector, Primary Fuel Filter
17	502-4	1	Elbow, Inv. Male - Fuel Pump - Spec. A only
18	149P554	1	Pump, Fuel - Elec. - Spec A only
19	149A986	1	Plate, Fuel Pump Hole Cover - Spec. A only
20	306B197	1	Bracket, Sol. Mtg.

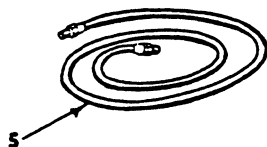
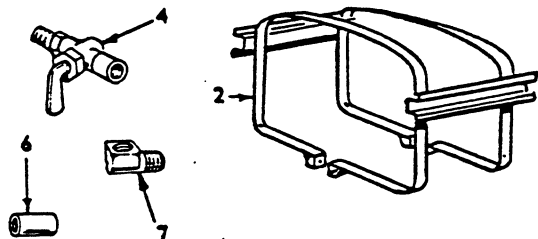
REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
21	307B628	1	Solenoid, Stopping (12 V)
22	306A199	1	Plunger, Stop Solenoid
23	306A162	1	Retainer, Stop Sol. Plunger
24	306A198	1	Spring, Stop Sol. Plunger
25	518-203	1	Ring, Snap - Sprg. Ret.
26	516P103	1	Pin, Roll - 1/8 x 1/2" - Sprg. Retg.
27	306A201	1	Rod, Stop Sol. to Joint
28	150A638	2	Joint (1) Rod to Inj. Pump, (1) Gov. to Adj. Stud
29	151A284	1	Stud, Gov. Adj.
30	151B286	1	Bracket, Gov. Adj. Stud
39	312A58	2	Condenser, (1) Volt. Reg. (1) Charge Gen.
50	HARNESS, ENGINE CONT.		
	338C317	1	Spec. A only
	338-378	1	Begin Spec. B
51		1	Connection Assy. Fuel Return-Incl. Male Connector (Used on some early Spec. A models) - Order 149A1050
52		1	Connector, Male - Fuel Return (Used on some early Spec A models) - Order 149A1050
53	526-65	2	Washer, Copper - Fuel Ret. Fittings - Spec A only
54	502A307	1	Adapter, Sec. Filter - Fuel Return - Spec. A only
55	502A306	1	Adapter, Fuel Ret. - Spec A only

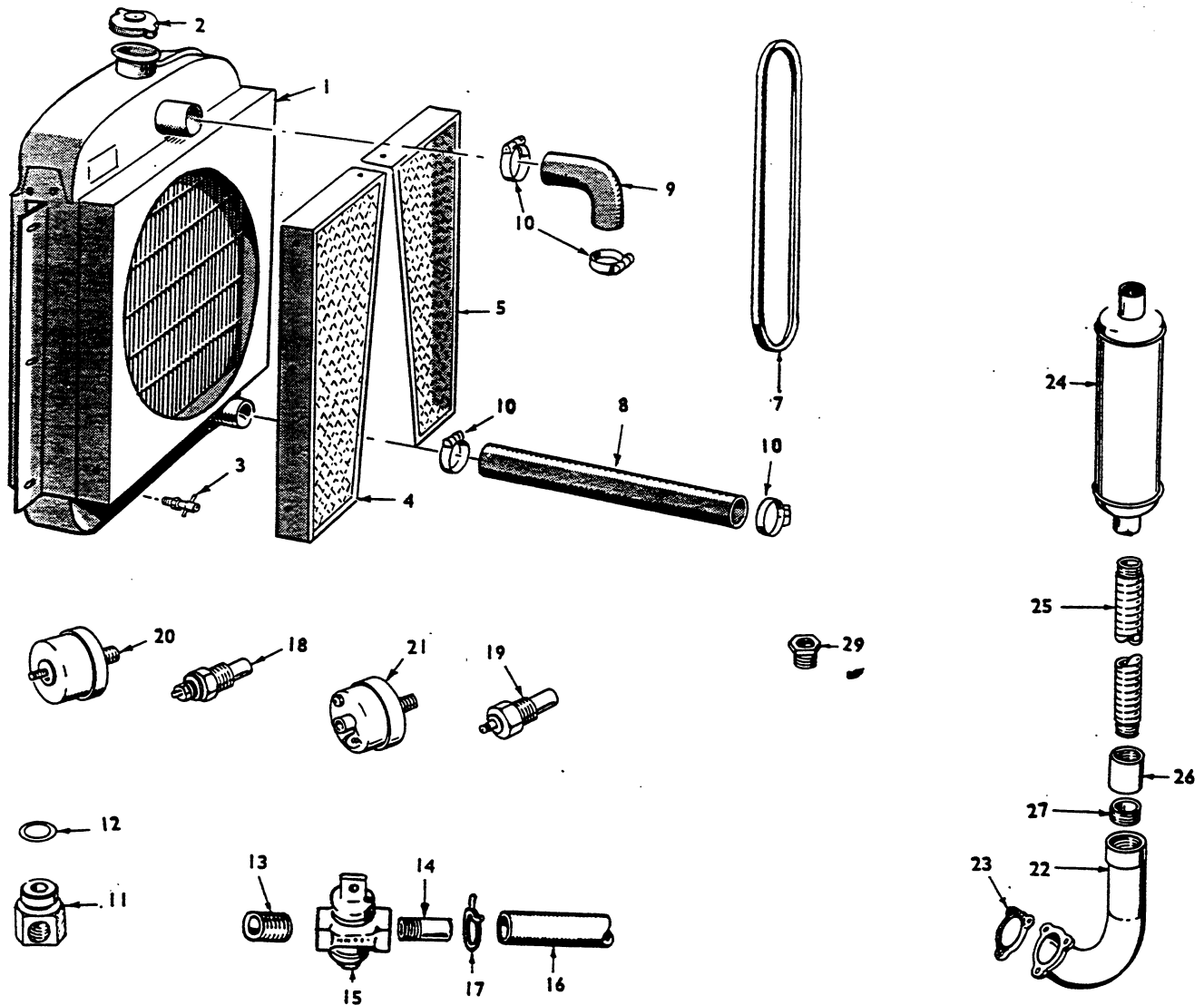
REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
56	502-58	1	Tee, Fuel Ret. - Spec. A only
57	502-30	1	Connector, Fuel Ret. - Spec A only
58	502-235	1	Connector, Rest. - Fuel Ret. - Spec. A only
59	149A1049	1	Line, Fuel Ret. - Spec. A only
61	307B565	1	Valve, Fuel Sol. Spec. A only
62	505-61	1	Nipple, (1/8 x 2") Fuel Valve - Spec. A only
63	191-543	1	Alternator, Charge - Begin Spec B
64	191-542	1	Reg. Charge Alt. - Begin Spec B
65	191-544	1	Cable, Alt. to Reg. - Begin Spec B
66	191-545	1	Resistor, Charge Alt. - Begin Spec B
67	191-546	1	Bracket, Alt. Mtg. - Begin Spec B
68	191-649	1	Pulley, Charge Alt. - Begin Spec B
69	191A101	1	Bracket Alt. - Adj. - Begin Spec B
70	191B619	1	Guard, Heat Shield - Begin Spec B
71	502-193	1	Connector, Fuel Pump Inlet - Begin Spec. B
72	502-5	1	Elbow, Fuel Pump Inlet - Begin Spec. B
73	305A317	1	Plate, Volt. Reg. Mtg. - Begin Spec. B

MOUNTED FUEL TANK GROUP (OPTIONAL EQUIPMENT)



REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
1	159D490	1	Tank, Fuel
2	159D489	1	Strap Assy., Fuel Tank Mtg.
3	159D512	1	Cap & Ind., Fuel Tank
4	VALVE, SHUT-OFF		
	504-13	1	Fuel Supply - With Screen
	504A75	1	Fuel Supply --With Screen - Three-Way
	504-7	1	Fuel Return
	504-4	1	Fuel Return - Three-Way
5	LINE, FUEL		
	501A89	1	Fuel Supply (39")
	501A88	1	Fuel Return (28")
6	505-26	1	Coupling, Pipe 1/8"
7	502-20	1	Elbow, Street
8	159P751	1	Gasket, Gas Tank Filler Neck
9	502-3	1	Connector, Inv. Male (Use with Three-Way Valve)

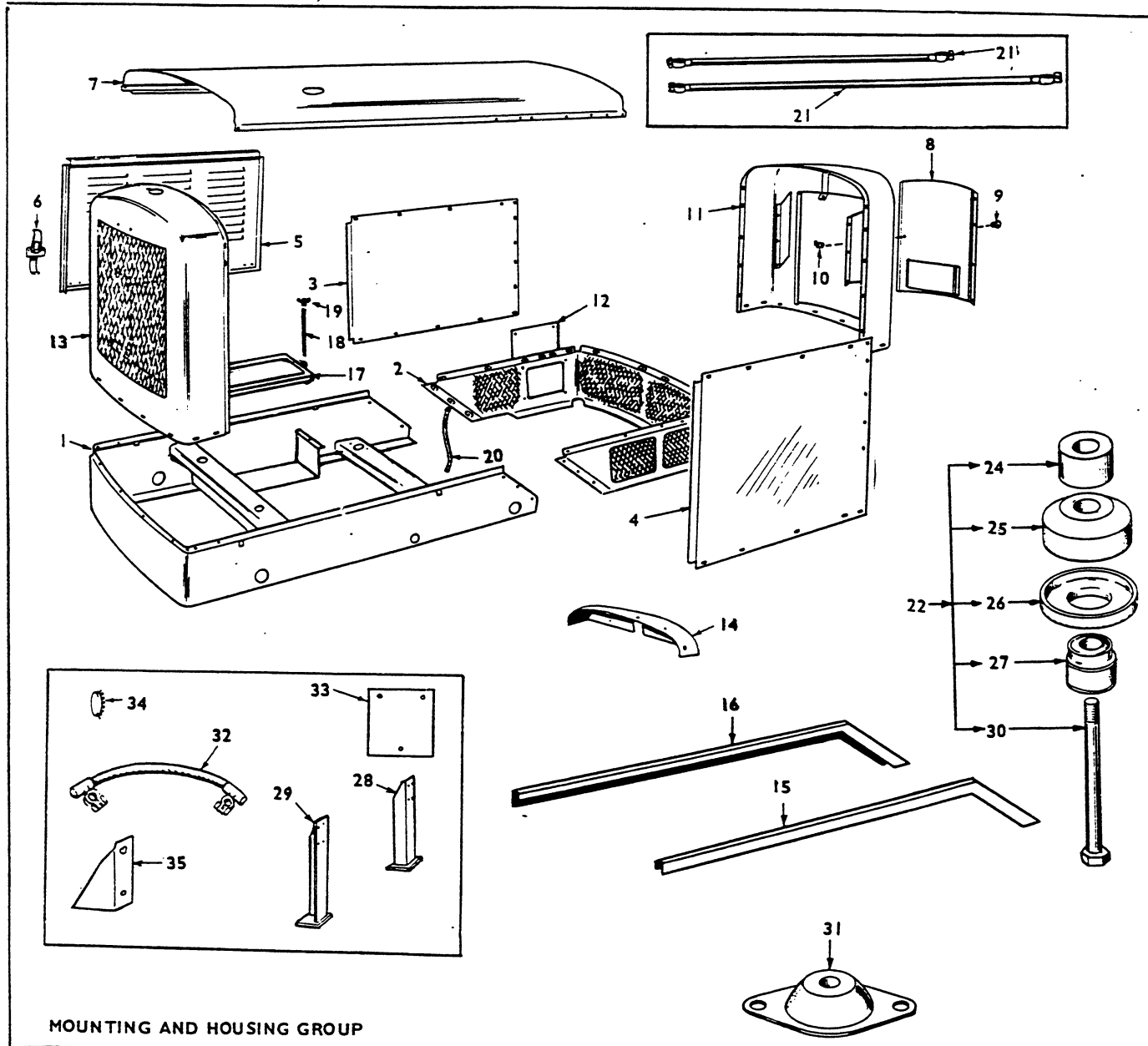




COOLING, OIL DRAIN AND EXHAUST GROUP

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
1	130D601	1	Radiator
2	130B449	1	Cap, Radiator
3	504-63	1	Valve, Rad. Drain
4	130C352	1	Guard, Fan (R.H.)
5	130C351	1	Guard, Fan (L.H.)
7	511P79	1	Belt, Chg. Alt. - Begin Spec B
8	503P439	1	Hose, Lower - Rad.
9	503A441	1	Hose, Upper - Rad.
10	503P311	4	Clamp, Hose
11	102A553	1	Adapter, Oil Drain
12	102P532	1	Gasket, Oil Drain
13	505-224	1	Nipple, Pipe - Oil Drain
14	505A135	1	Nipple, Half, Oil Drain
15	504-30	1	Valve, Oil Drain
16	503-484	1	Hose, Oil Drain

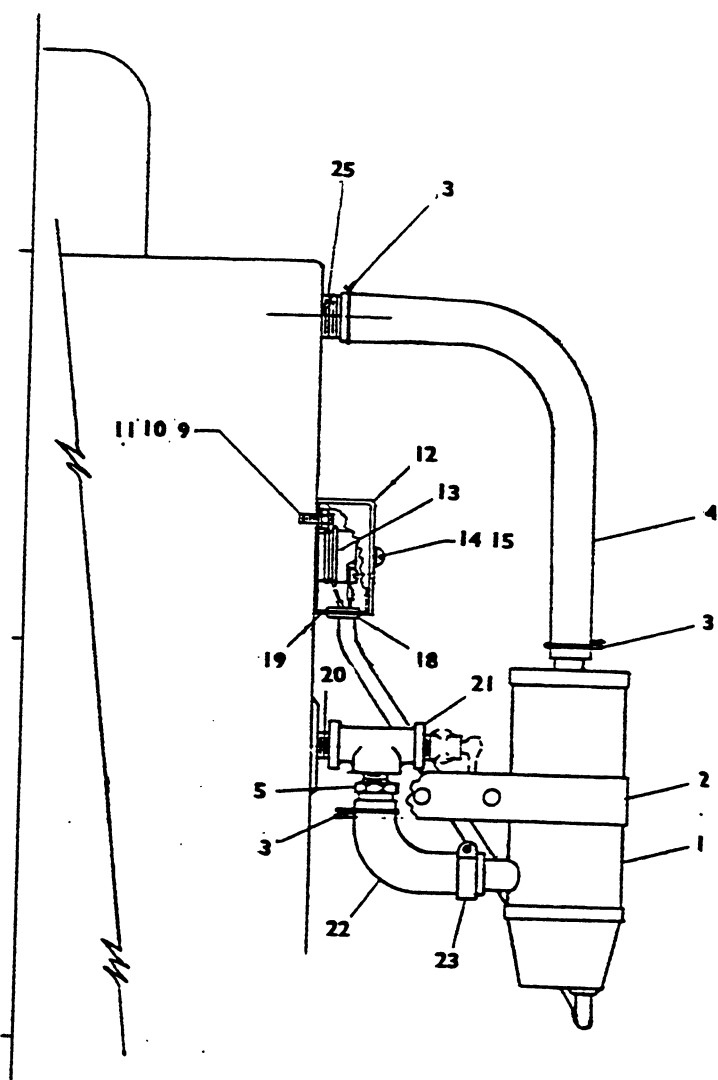
REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
17	503-131	1	Clamp, Hose - Oil Drain
18	193A104	1	Element, Water Temp.
19	309A179	1	Switch, Water Hi-Temp.
20	193A108	1	Element, Oil Pressure
21	309B10	1	Switch, Low Oil Pressure
22	155A863	1	Tube, Exhaust
23	185-112	1	Gasket, Exhaust Tube
24	155C917	1	Muffler
25	155A633	1	Tube, Exh. Flexible
26	505-203	1	Coupling, Exh. Tube
27	505-380	1	Nipple, Half Exh. Tube
29	505-7	2	Bushing, Red, (1) Oil Sender (1) Oil Switch



MOUNTING AND HOUSING GROUP

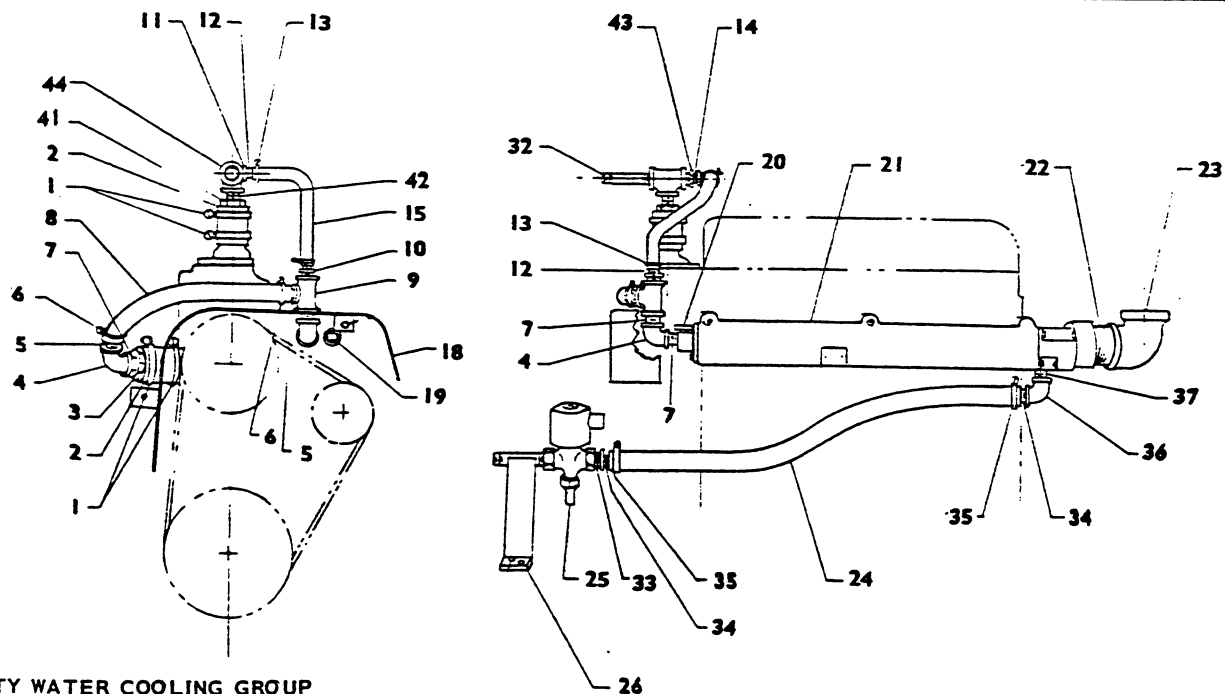
REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
1	403D696	1	Chassis, Front
2	403D697	1	Chassis, Rear (Housed)
3	405B931	1	Panel, Left Side (Housed)
4	405B930	1	Panel, Right Side (Housed)
5	405C934	2	Panel, Door Side (Housed)
6	406A105	4	Clamp, Door (Housed)
7	405D1377	1	Panel, Top (Housed)
8	405B932	1	Panel, Rear Door (Housed)
9	406-2	1	Knob, Door (Housed)
10	406A88	1	Catch, Door (Housed)
11	405D928	1	Panel, Rear (Housed)
12	403A373	1	Panel, Chassis (Housed)
13	405D1376	1	Panel, Front
14	405C1408	1	Extension Rad. Hood (Unhds.)
15	403C700	1	Trim, Chassis - R.H. (Unhds.)
16	403C701	1	Trim, Chassis - L.H. (Unhds.)
17	416C523	1	Frame, Battery Hold-down
18	520A656	1	Stud, Battery Hold-down
19	865-7	1	Wing Nut, Battery Hold-down
20	336A476	1	Cable, Ground

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
21	CABLE, BATTERY		
	416A530	1	16" Long
	416A531	1	24" Long
22	402A253	2	Mounting Assembly, Engine End Includes Parts Marked*
24	402A633	2	*Spacer, Engine Mount
25	402A10	2	*Mount, Rubber (Upper)
26	402A12	2	*Cup, Metal
27	402A11	2	*Mount, Rubber (Lower)
28	403B694	1	Bracket, Support - Eng. Rear L.H.
29	403B693	1	Bracket, Support - Eng. Rear R.H.
30	801-81	2	*Cap Screw, Hex
31	402A209	2	Mount, Vibration, Gen. End
32	416A446	1	Cable, Batt. (9'')
33	305A317	1	Plate, Volt. Reg. Mtg.
34	517-19	2	Plug, Dot Button - Rad. Panel (Unhds.)
35	403B695	2	Bracket, Support - Eng. Front



WATER HEATER GROUP (OPTIONAL EQUIPMENT)

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION	REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
1	333P52	1	Heater, Tank Type (1500 W.) Incl. Brkt. Hose Adapter & Cord	12	333A13	1	Cover, Therm. Mtg. Box
2		1	Clamp, Htr. Mtg. - NOT SOLD SEPARATELY (Incl. with tank assy.)	13	309P29	1	Thermostat, Heater Cont.
3	503-197	3	Clamp, Hose	14	850-25	2	Lockwasher (#8), Therm. Box Cover
4		As Req.	Hose (5/8" I.D. x 61/64" x 20") (Bulk #503P386)	15	812-76	2	Screw, RHS (#8-32) Therm. Box Cover
5		1	Adapter, Hose - NOT SOLD SEPARATELY (Incl. with tank assy.)	18	508-8	1	Grommet, Therm. Box
9	520A446	2	Stud, Therm. Box Mtg.	19	333A12	1	Box, Therm. Mtg.
10	850-30	2	Lockwasher (#10), Therm. Box Mtg.	20	505-71	1	Nipple, Pipe (1/4 x 2")
11	870-53	2	Nut, Hex (#10-32) - Therm. Box Mtg.	21	505-184	1	Tee, Pipe (1/4")
				22		As Req.	Hose (5/8" I.D. x 61/64" O.D. x 16") (Bulk #503P386)
				23	503-183	1	Clamp, Hose (Lower Tank Fitting)
				25	505-135	1	Nipple, Half - Pipe (3/8 x 1-1/2")



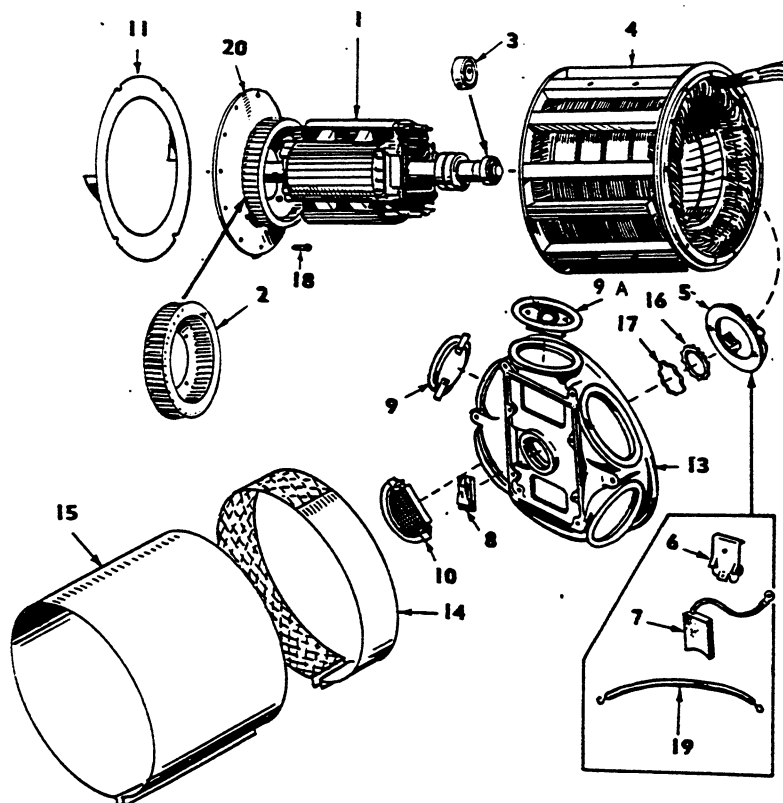
CITY WATER COOLING GROUP
(OPTIONAL EQUIPMENT)

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
1	503P4	4	Clamp, Hose (1-7/8")
2	503A3	2	Hose (1-1/2" I.D. x 1-7/8" O.D. x 2-1/2")
3	110A576	2	Adapter (1-1/2" I.D. Hose to 1/2" Pipe)
4	505-40	2	Elbow, Pipe (1/2" x 90°)
5	505-185	2	Nipple, Half - Pipe (1/2 x 1-1/2")
6	503-189	2	Clamp, Hose (1-1/2")
7	505-100	4	Nipple, Pipe (1/2 x 1-1/8")
8	As Req.		Hose (3/4" I.D. x 1-1/8" O.D. x 13") Bulk #503P191)
9	505-108	2	Tee, Pipe (1/2")
10	505-18	2	Bushing, Pipe - Red, (1/2 x 1/4")
11	505-38	1	Elbow, Pipe (1/4 x 90°)
12	505-10	2	Nipple, Half - Pipe (1/4" x 1")
13	503-32	2	Clamp, Hose (7/8")
14	505-99	1	Nipple (1/4 x 7/8")
15	As Req.		Hose (1/2" I.D. x 27/32" O.D. x 12") (Bulk #503-110)
18	191C523	1	Guard, Belt
19	505-56	1	Plug, Pipe (1/2")
20	RTF	1	Spacer, Belt Guard Mtg.
21	154P888	1	Manifold, Exhaust
22	505-172	1	Nipple, Pipe (2 x 2") - Exh.
23	505-175	1	Elbow, Pipe (2" x 90°) - Exh.

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
24	As Req.		Hose (5/8" I.D. x 61/64" O.D. x 28") (Bulk #503P386)
25	307P182	1	Valve, Sol. - 12-Volt.
26	110A526	1	Bracket & Nipple, Water In.
32	505-337	1	Nipple, Pipe (3/4" x 4") - Water Out
33	505-19	1	Bushing (1/2 x 3/8")
34	505-135	2	Nipple, Half - Pipe (3/8 x 1-1/2")
35	503-183	2	Clamp, Hose (1-1/16")
36	505-39	1	Elbow, Pipe (3/8 x 90°)
37	505-101	1	Nipple, Pipe (3/8 x 1")
41	110A1543	1	Adapter
42	505-102	1	Nipple (3/4 x 1-3/8")
43	505-20	1	Bushing (3/4 x 1/4")
44	505-166	1	Tee (3/4")
	504-20	1	*Key, Valve
	504-19	1	*Valve, Lockshield
	154-525	1	*Backplate, Nipple & Bracket Assy. (Open Units Only)
	403-384	1	*Cover, Frt. Chassis (Open Units Only)
	191-101	1	*Bracket, Gen. - Adj.
	RTF	1	*Flange, Man. Exh. End
	RTF	1	*Flange, Man. Eater Out. End
	RTF	1	*Gasket, Man. Exh. Flange
	RTF	1	*Gasket, Man. Water Outlet Flange

* - These parts not shown on drawing.

RTF - Refer to Factory, giving complete model, spec, serial number and description of part needed.



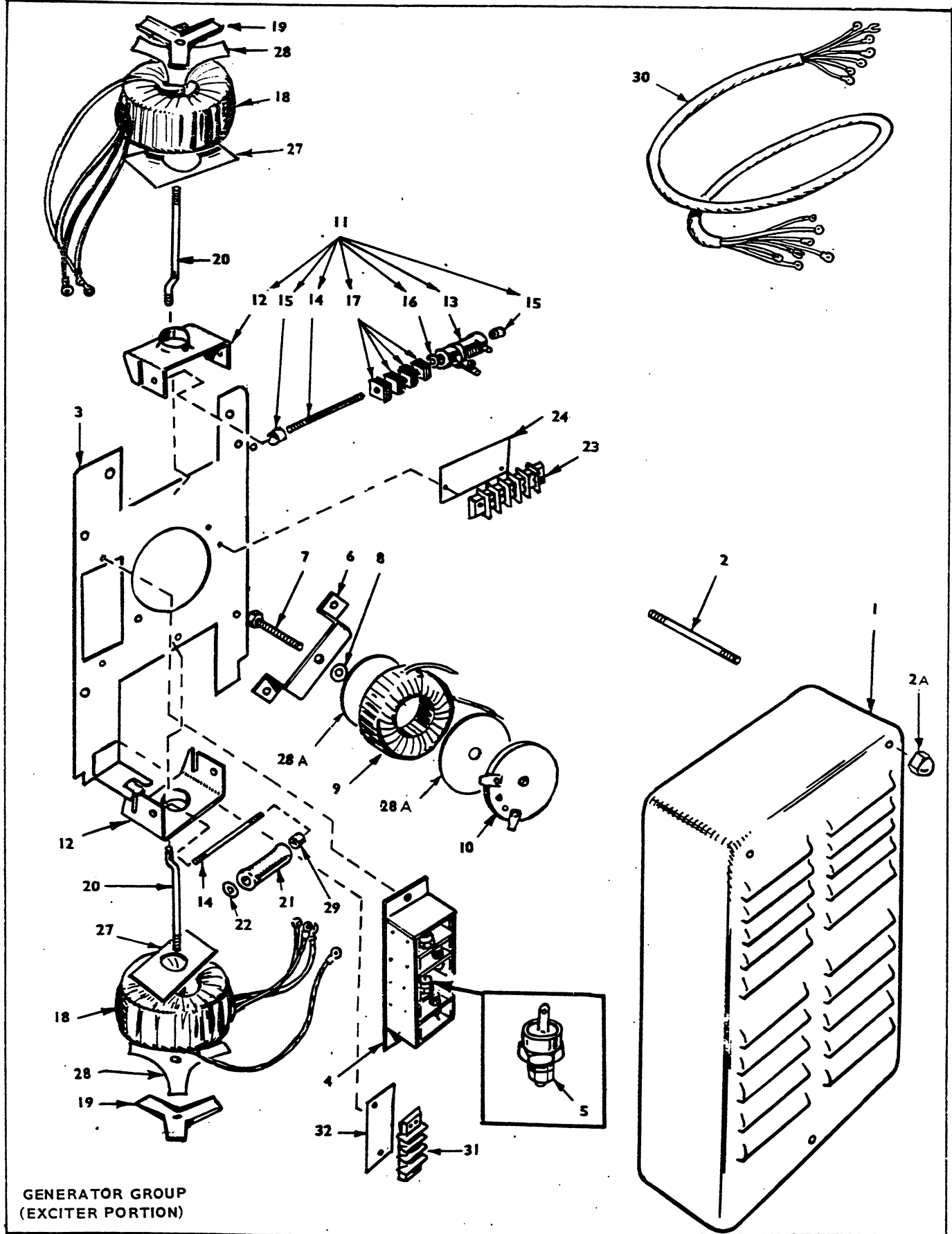
GENERATOR GROUP
(ALTERNATOR PORTION)

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
1	*	1	Rotor Assy. Wound - Includes Brg. Blower & Drive Assy.
2	205B68	1	Blower
3	510P63	1	Bearing
4	*	1	Stator Assy. Wound
5	212C248	1	Rig Assy., Brush
6	212B1105	4	Spring, Brush
7	214A56	4	Brush
8	150A717	1	Switch Assy., Overspeed
9	232B1254	2	Cover, End Bell, Open. (Plain)
9A	234C226	1	Cover, End Bell Openings (W- Lead Hole) - Incl. Grommet
10	232B1253	2	Cover, End Bell Openings (Screened)

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
11	234C175	1	Scroll, Air
13	211E131	1	Bell, End
14	234C174	1	Band, Gen. - Front (Narrow)
15	BAND, GENERATOR - REAR (Wide)		
	234C176	1	1-Phase Plants
	234C173	1	3-Phase Plants
16	232A1186	1	Holder, Brg. (Anti-Rotation)
17	232A1187	1	Spring, Brg. Holder
18	232A1653	6	Bolt, Shoulder (5/16-18")
19	336A943	2	Jumper, Brush Rig
20	232B1820	1	Disc, Drive

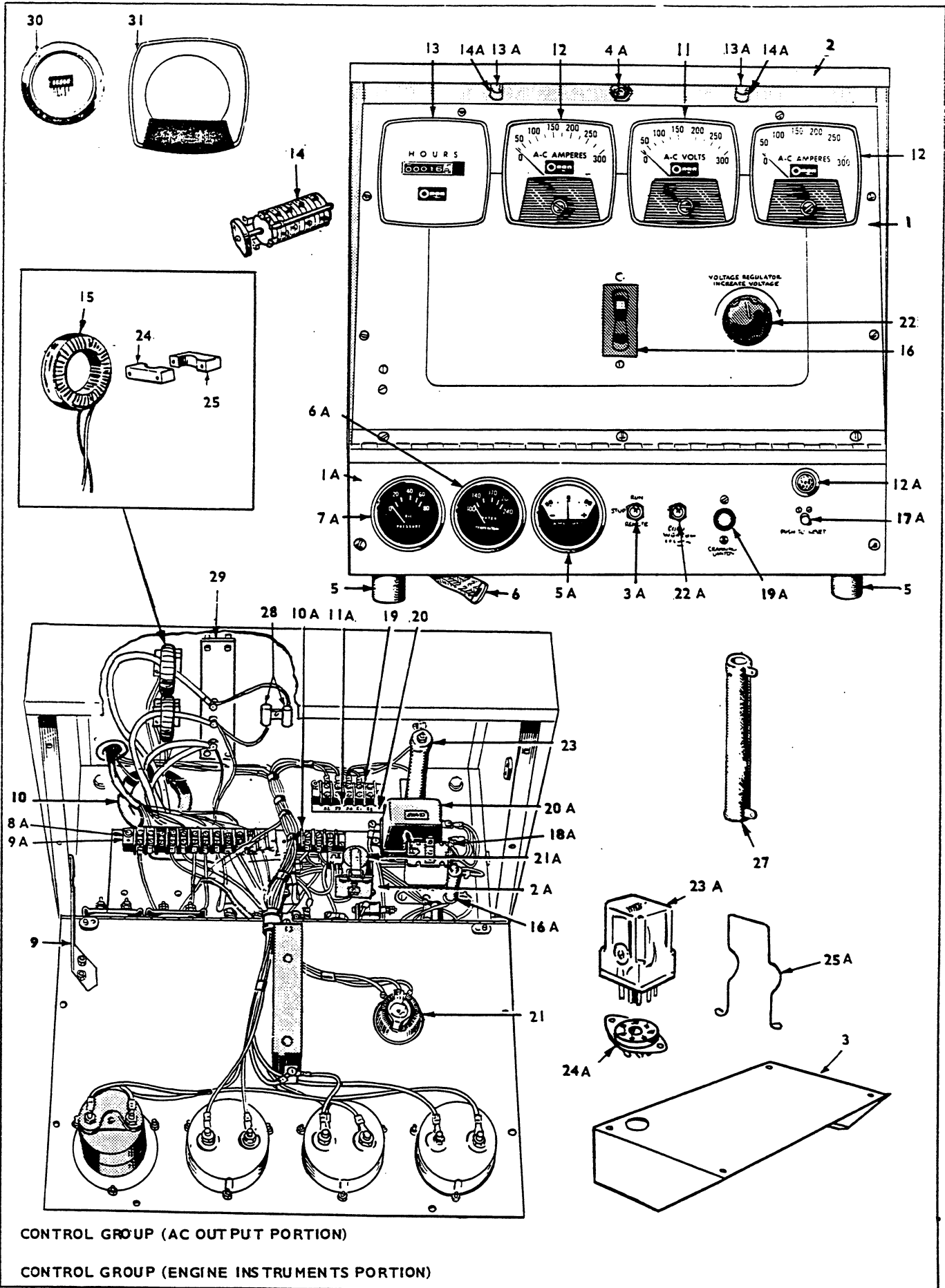
* - Order by description, giving complete Model and Serial
Number (ONAN Nameplate).

NOTE: Check Onan nameplate for correct Magneciter number.
Select the part number column that applies to your
plant.



NOTE: Check Onan nameplate for correct Magneciter number. Select the part number column that applies to your plant.

REF. NO.	QTY. USED	PART DESCRIPTIONS	PART NUMBER	
			07SXINIC	07SX5INIC
	1	Exciter Complete (Less Cover)	209B16	209D19
1	1	Cover, Exciter	234D106	234D106
2	3	Stud; Exciter Cover Mtg.	520A575	520A575
2A	3	Nut, Exciter Cover Mtg.	866-1	866-1
3	1	Panel Only, Exciter	234D105	234D105
4	1	Rectifier Assy., Power	305B200	305B200
5	4	Rectifier Only, Power (Field)	305P239	305P239
6	1	Bracket Only, Overspeed Switch	150B733	150B733
7	1	Stud & Contact Point Assy., Volt- age Control Reactor Mtg.	150A772	150A772
8	2	Fibre Washer (1/4 x 3/4 x 1/16")	508-18	508-18
8	1	Fibre Washer (1/4 x 3/8 x 1/32")	508-29	508-29
9	1	Reactor, Voltage Control	315A74	315B75
10	1	Block, Terminal -Volt. Cont. Reactor	332A687	332A687
11	1	Rectifier Assy., Includes Parts Marked*	305B202	305B202
12	2	*Bracket, Gate Reactor Mtg. (1 Only in 305B202)	234B60	234B60
13	1	*Resistor, Control, Adj. (150-Ohm, 25-Watt)	304A5	304A5
14	2	*Stud, Res. & Rect. Mtg. (1 Only in 305B202)	520A579	520A579
15	2	*Spacer, Res. & Rect. to Stud	232A1473	232A1473
16	2	*Washer, Adj. Resistor Centering	304A14	304A14
17	4	*Rectifier, Reg. Control	305P208	305P208
18	2	Reactor, Gate	315A47	315A59
19	2	Retainer, Gate Reactor	234B62	234B62
20	2	Stud, Gate Reactor Mtg.	232A1361	232A1361
21	1	Resistor, Fixed (200-Ohm, 50-Watt)	304A21	304A21
22	2	Washer, Fixed Res. Centering	304A15	304A15
23	1	Block, Term. (5-Place)	332A604	332A604
24	1	Strip, Blk. Marker (5-Place)	332A678	332A678
27	2	Insulation, Gate Reactor to Mtg. Bracket	232A1547	232A1547
28	2	Insulation, Gate Reactor to Retainer	232A1546	232A1546
28A	2	Insulation, Volt. Cont. Reactor Mtg.	232A1548	232A1548
29	2	Spacer, Fixed Resistor to Stud	232A1474	232A1474
30	1	Wiring Harness	338B237	338B237
31	1	Block, Term. (4-Place)	332A537	332A537
32	1	Strip, Marker	332A686	332A686



CONTROL GROUP (AC OUTPUT PORTION)

CONTROL GROUP (ENGINE INSTRUMENTS PORTION)

NOTE: Unhoused plants with optional Meter Panel, use parts marked (£) as listed for Housed Plants.
CONTROL GROUP (AC Output Portion)

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
1	£PANEL ONLY - UPPER CONTROL		
	301C1810	1	1-Phase - Housed Plants
	301C1814	1	3-Phase - Housed Plants
	301C1809	1	All Unhoused Plants
	301C1825	1	1-ph. Hsd. Plts. w/opt. Freq. Meter
	301C1815	1	3-ph. Hsd. plts. w/opt. Freq. Meter
2	301D2177	1	Box Only, Control
3	301B2539	1	Bracket, Cont. Box Mtg., Unhoused Plants
5	402-78	4	Mount, Rubber - Cont. Box Mtg. Unhoused Plants
6	337A44	1	Strap, Grd. - Unhoused Plants
9	301A1914	1	Bracket, Panel Stop
10	508-63	1	Grommet (For 2-3/4" Hole)
11	VOLTMETER, AC (Check Scale and Select According to Rating)		
	302P421	1	Voltmeter Scale 0-300
	302P422	1	Voltmeter Scale 0-600
	302P423	1	Voltmeter Scale 0-750
12	£AMMETER, AC - HOUSED PLANTS (Check Scale and Select According to Rating) NOTE: 1-Phase use 2.		
	302P405	1	Ammeter Scale 0-50
	302P406	1	Ammeter Scale 0-75
	302P408	1	Ammeter Scale 0-100
	302P410	1	Ammeter Scale 0-150
	302P411	1	Ammeter Scale 0-200
	302P412	1	Ammeter Scale 0-250
13	£METER, RUNNING TIME - HOUSED PLANTS 60-Cycle Plants		
	302P465	1	120/240-V, 1-Ph., 120-208-V, 3-Ph., 120/240-V, 3-Ph. & 600-V, 3-Ph.
	302P466	1	220/380-V, 3-ph
	302P467	1	277/480-V, 3-Ph 50-Cycle Plants
	302P468	1	120/240-V, 1-Ph., 120/208-V 3-Ph., 120/240-V 3-Ph. & 600-V 3-Ph.
	302P469	1	220/380-V 3-Ph.
	302P470	1	277/480-V 3-Ph.
14	308-22	1	Switch, Volt. & Current Sel., Housed Plants, 3-Ph.
15	£TRANSFORMER, CURRENT, HOUSED PLANTS, (Check Transformer Nameplate, Select According to Rating)		
	302B117	3	Nameplate Ratio 50/5 (Use with 0-50 AC Ammeter)
	302B76	3	Nameplate Ratio 75/5 (Use with 0-75 AC Ammeter)
	302B78	3	Nameplate Ratio 100/5 (Use with 0-100 AC Ammeter)
	302B79	3	Nameplate Ratio 150/5 (Use with 0-150 AC Ammeter)
	302B106	2	Nameplate Ratio 200/5 (Use with 0-200 AC Ammeter) 2 Only for 1-Ph.)
16	320B17	1	Breaker, Circuit

REF. NO.	PARTS NO.	QUANTITY USED	PARTS DESCRIPTION
19	332A604	1	Block, Term. (5-Place)
20	STRIP, TERMINAL BLOCK MARKER		
	332A689	1	Marked 32, 33, 34, E1, E2, For 120/240-V 1-Ph., 120/208-V 3-Ph. & 120/240-V 3-Ph.
	332A690	1	Marked 32, 33, 34, 35, 36. For 277/480-V 3-Ph., 220/380V 3-Ph. & 600-V 3-Ph.
21	303-97	1	Rheostat, Volt. Reg.
22	303-32	1	Knob, Rheostat
23	304A479	1	Resistor, Volt. Reg.
24	302A235	3	£Clamp, Current Trans. Mtg., Inside Half (Note: Use 2 for 1-Ph.) Housed Plants
25	302A236	3	£Clamp, Current Trans. Mtg., Outside Half (Note: Use 2 for 1-Ph.) Housed Plants
27	304A536	1	£Resistor, Fixed (9000-Ohm, 50-Watt) Off Running Time Meter, 600-V 3-Ph., Hsd. Plts.
28	CONDENSER, OUTPUT TERMINAL SUPPRESSION		
	312A58	2	120/240-V 1-Ph.
	312A58	3	120/208-V 3-Ph.
	312A58	4	120/240-V 3-Ph
	312A145	3	277/480-V 3-Ph. & 220/380-V 3-Ph.
29	332A513	1	Block, Term., Output
30	METER, FREQUENCY - OPTIONAL		
	302-213	1	60-Cycle
	302-234	1	50-Cycle
31	302B448	1	Plate, Meter Face - Opt.
1A	301C2124	1	Panel Only, Lower Cont.
2A	301A1685	1	Bracket, Time Delay Relay Mounting
3A	308P138	1	Switch (Run-Stop-Remote)
4A	308-2	1	Switch, Panel Light
5A	302A61	1	Ammeter, Charge (30-0-30)
6A	193B106	1	Gage, Water Temp.
7A	193B107	1	Gage, Oil Pressure
8A	332A607	1	Block, Term. (12-Place)
9A	332A608	1	Strip, Marker (4 through 15)
10A	332A611	1	Block, Term. (3-Place)
11A	332A762	1	Strip, Marker (Remote, B+, Ground)
12A	322P69	1	Receptacle Assy., Pilot Light
13A	322P72	2	Receptacle, Panel Light
14A	322-4	3	Bulb, (2) Panel (1) Pilot
16A	304A192	1	Resistor, Fixed (3-Ohm, 10-W)
17A	307A655	1	Relay, Emergency Latch
19A	307952	1	Relay, Start-Disconnect
19A	320A104	1	Limiter, Cranking
20A	307B597	1	Relay, Fuel Solenoid
21A	307A388	1	Relay, Time Delay, Low Oil Pressure Switch
22A	308-37	1	Switch, Manifold Heater (Opt.)
23A	307P819	1	Relay, Start, Disc. - Begin Spec B
24A	323P52	1	Socket, Relay
25A	307P278	1	Spring, Start-Disc. Relay Hold-down - Begin Spec B

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